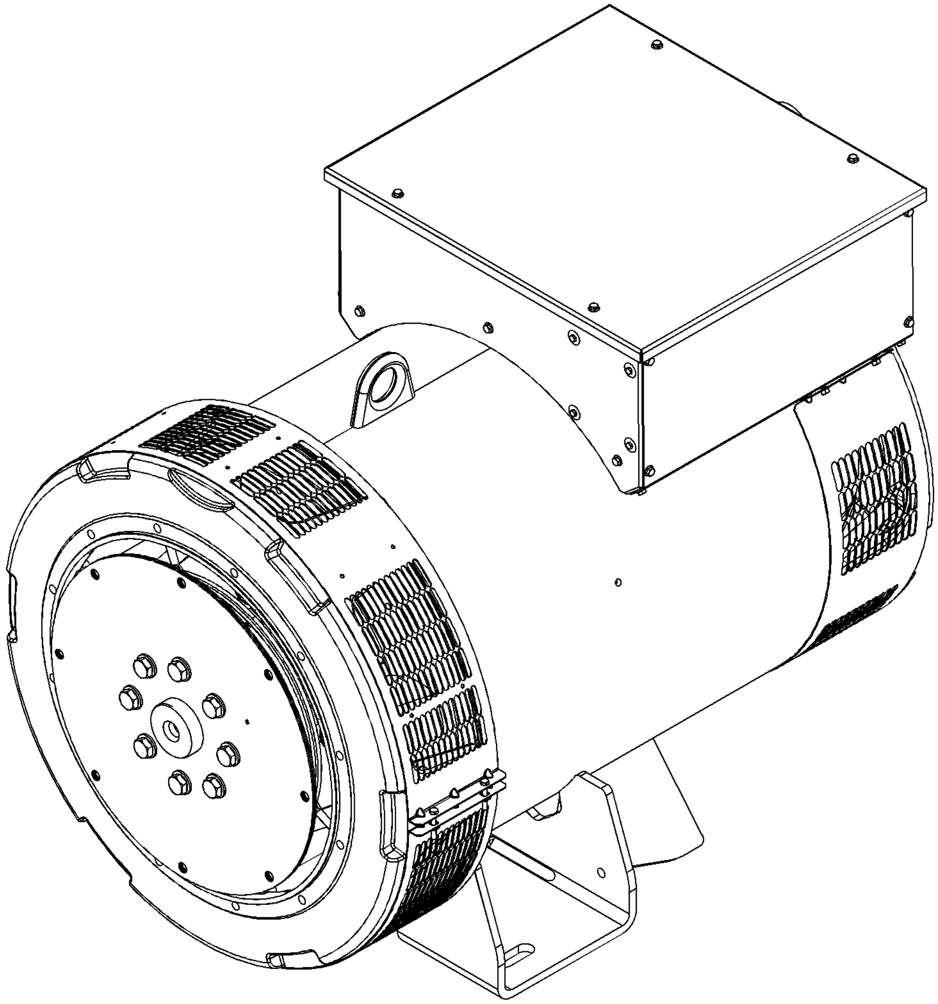
565-2330 **GENERATOR GP (contd.)** **i07916254**



GRAPHIC #1 <END> g06451898

565-2332 GENERATOR GP

S/N: MFE1-UP; MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

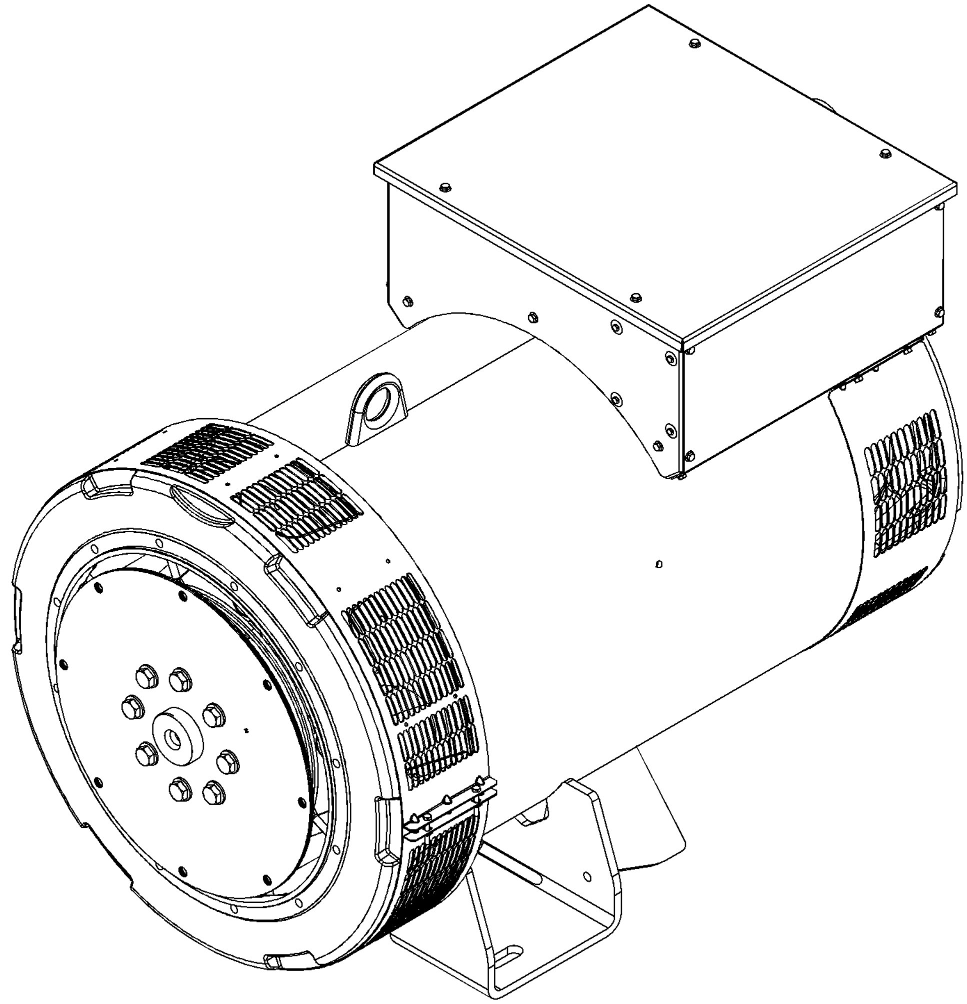
PART OF 565-2331 GENERATOR AR

SMCS-4450 **i07916256**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**493-2435**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**493-2436**	1	COVER (TERMINAL BOX)	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE (TERMINAL)	
F			**493-2444**	1	TERMINAL (NEUTRAL)	
F			**493-2446**	1	DISC-COUPLING	
F			**493-2831**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**497-9900**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	

F - NOT SHOWN

565-2332 **GENERATOR GP (**contd.**)** **i07916256**



GRAPHIC #1 <END> g06451723

565-2335 GENERATOR GP

S/N: MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

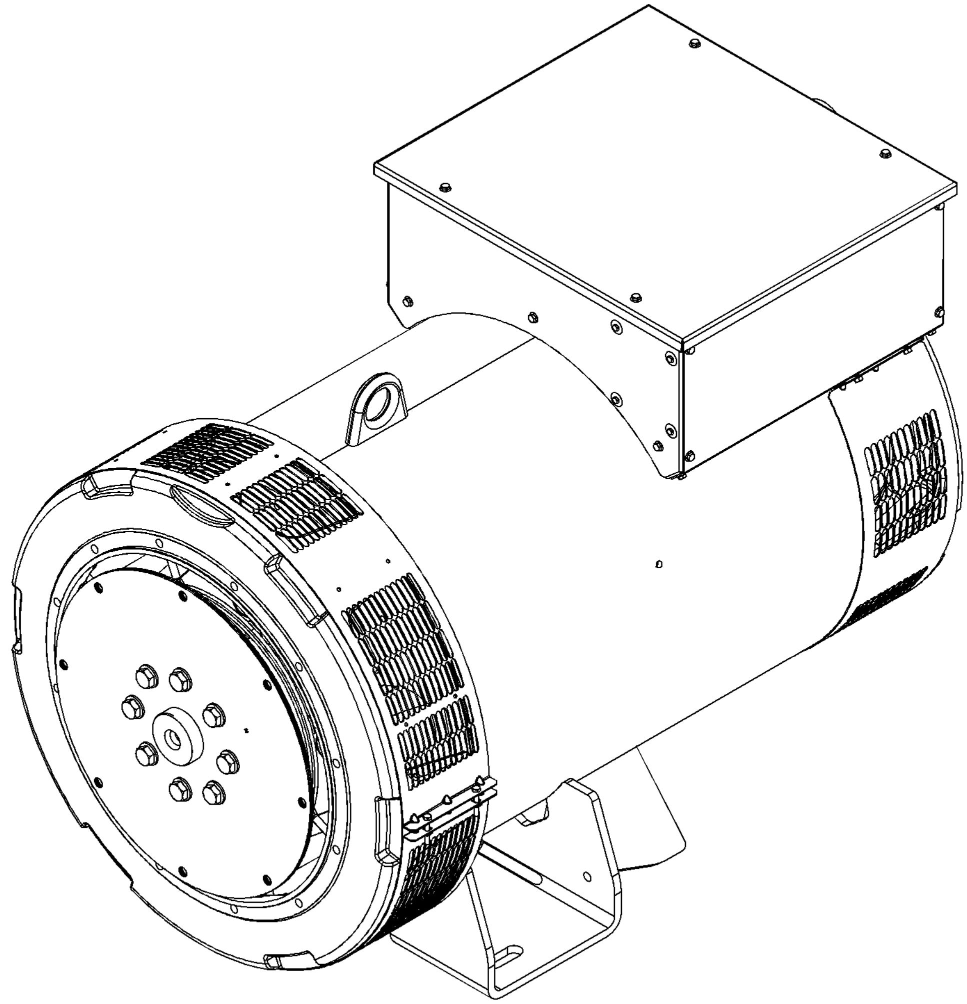
PART OF 565-2334 GENERATOR AR

SMCS-4450 **i07916260**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX	
F			**493-2435**	1	PANEL-TERMINAL BOX	
F			**493-2436**	1	COVER	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE	
F			**493-2444**	1	TERMINAL	
F			**241-4616**	1	DISC	
F			**493-2831**	1	PANEL-TERMINAL BOX	
F			**497-9900**	1	PANEL-TERMINAL BOX	

F - NOT SHOWN

565-2335 **GENERATOR GP (**contd.**)** **i07916260**



GRAPHIC #1 <END> g06451723

565-2337 GENERATOR GP

S/N: MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

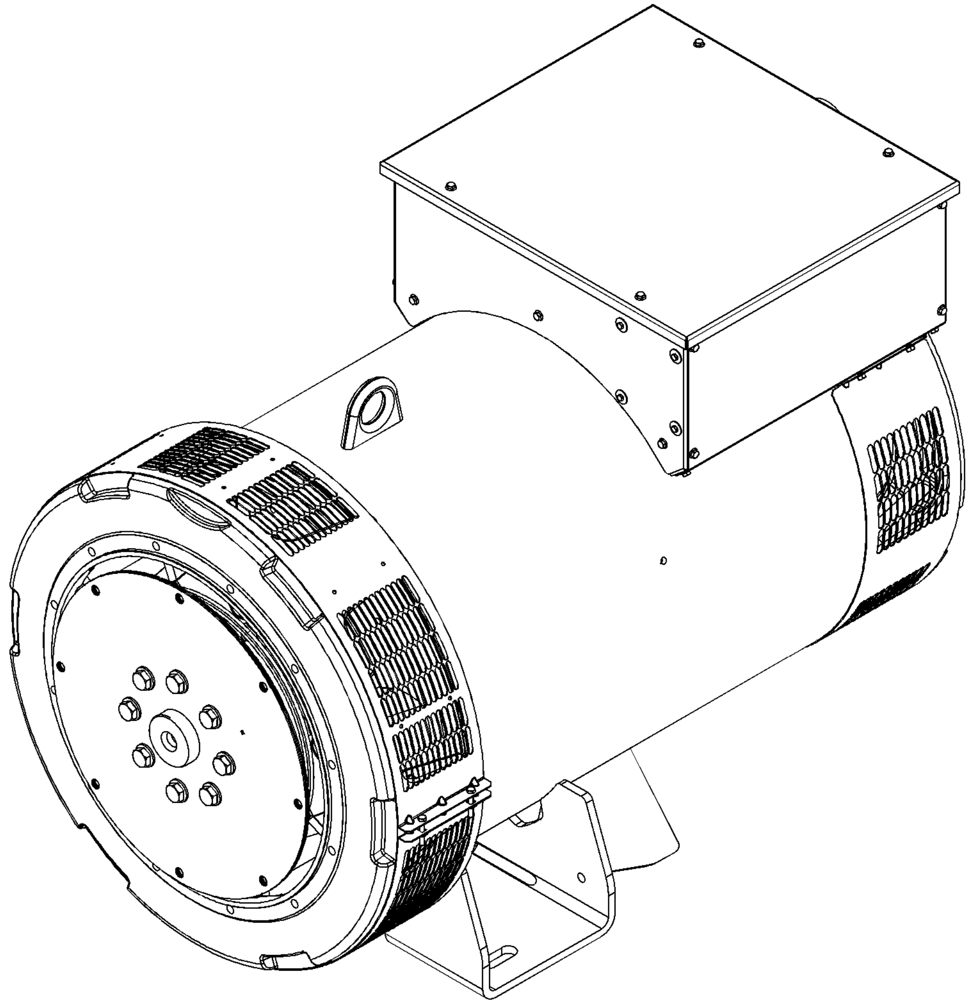
PART OF 565-2336 GENERATOR AR

SMCS-4450 **i07916262**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX	
F			**493-2435**	1	PANEL-TERMINAL BOX	
F			**493-2436**	1	COVER	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE (TERMINAL)	
F			**493-2444**	1	TERMINAL (NEUTRAL)	
F			**241-4616**	1	DISC	
F			**493-2831**	1	PANEL-TERMINAL BOX	
F			**497-9900**	1	PANEL-TERMINAL BOX	

F - NOT SHOWN

565-2337 **GENERATOR GP (**contd.**)** **i07916262**



GRAPHIC #1 <END> g06451687

565-5481 GENERATOR GP

S/N: MFE1-UP

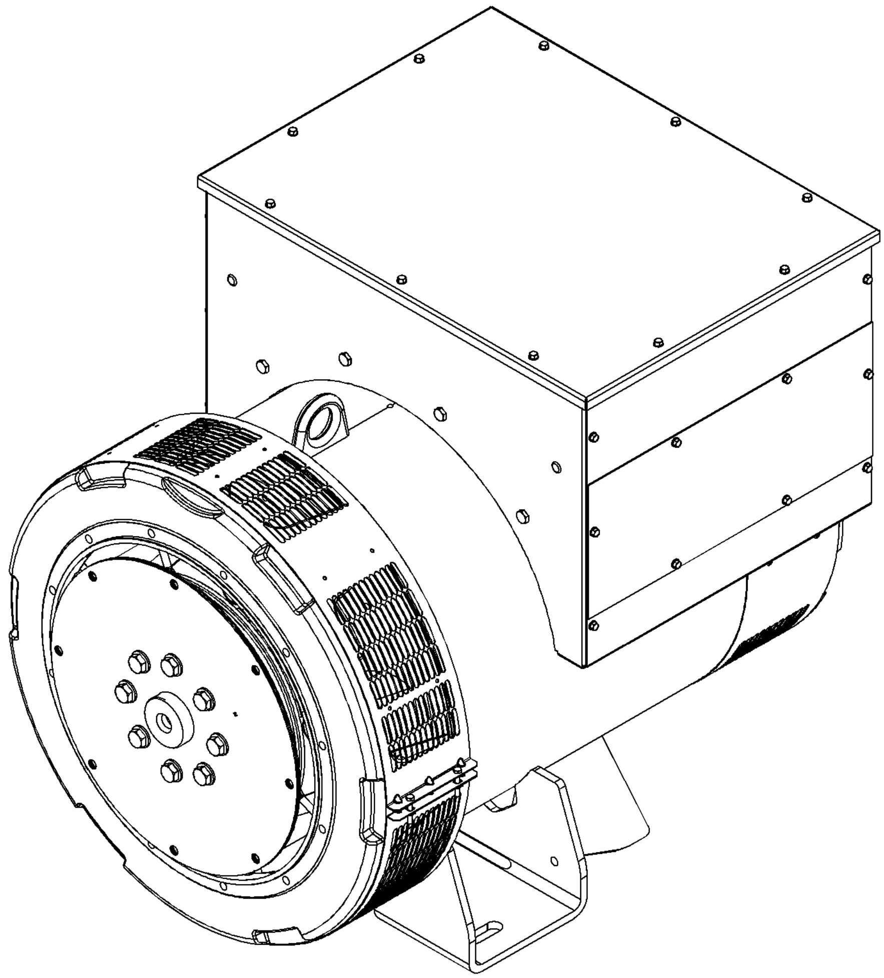
PART OF 565-5480 GENERATOR AR

SMCS-4450 **i07917813**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX	
F			**493-2435**	1	PANEL-TERMINAL BOX	
F			**493-2436**	1	COVER	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE	
F			**493-2444**	1	TERMINAL	
F			**241-4616**	1	DISC (COUPLING)	
F			**493-2831**	1	PANEL-TERMINAL BOX	
F			**497-9900**	1	PANEL-TERMINAL BOX	

F - NOT SHOWN

565-5481 **GENERATOR GP (**contd.**)** **i07917813**



GRAPHIC #1 <END> g06459839

569-3843 GENERATOR GP

S/N: MFE1-UP; MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

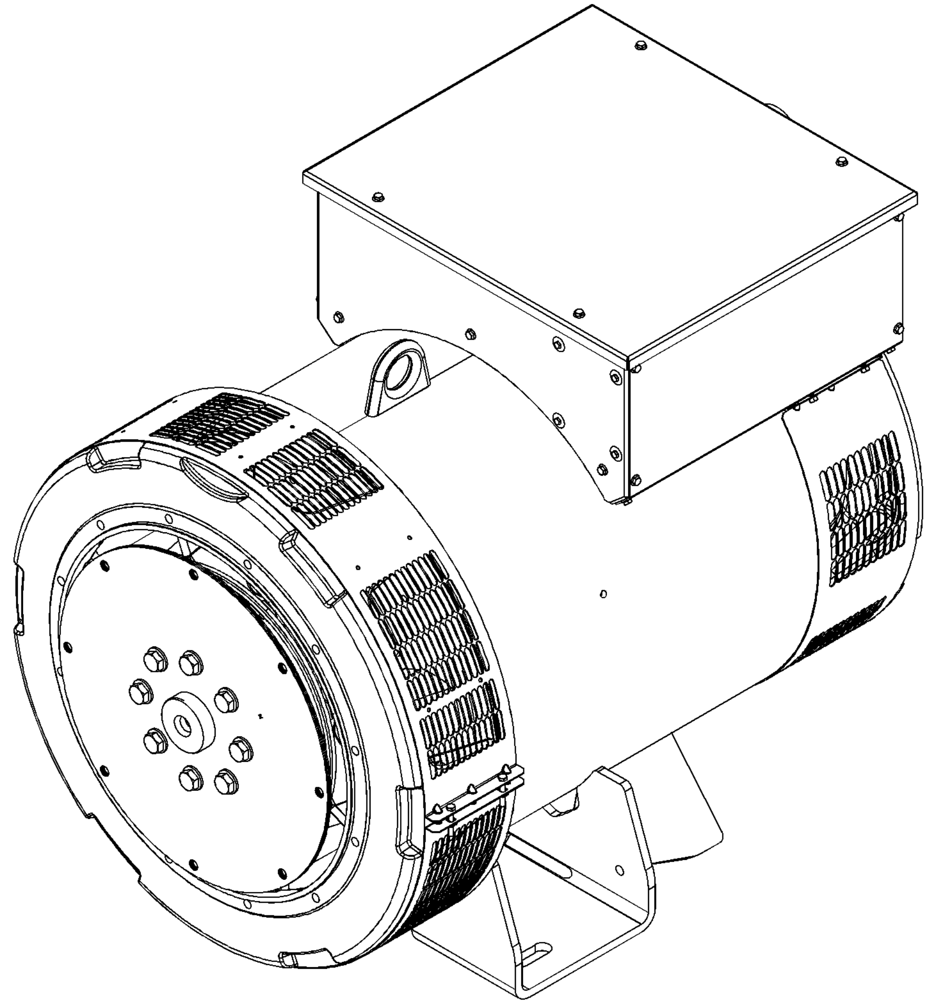
PART OF 570-8333 GENERATOR AR

SMCS-4450 **i07916495**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX	
F			**493-2435**	1	PANEL-TERMINAL BOX	
F			**493-2436**	1	COVER	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE	
F			**493-2444**	1	TERMINAL (NEUTRAL)	
F			**493-2446**	1	DISC-COUPLING	
F			**493-2831**	1	PANEL-TERMINAL BOX	
F			**497-9900**	1	PANEL-TERMINAL BOX	

F - NOT SHOWN

569-3843 **GENERATOR GP (**contd.**)** **i07916495**



GRAPHIC #1 <END> g06451764

569-3845 GENERATOR GP

S/N: MFE1-UP; MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

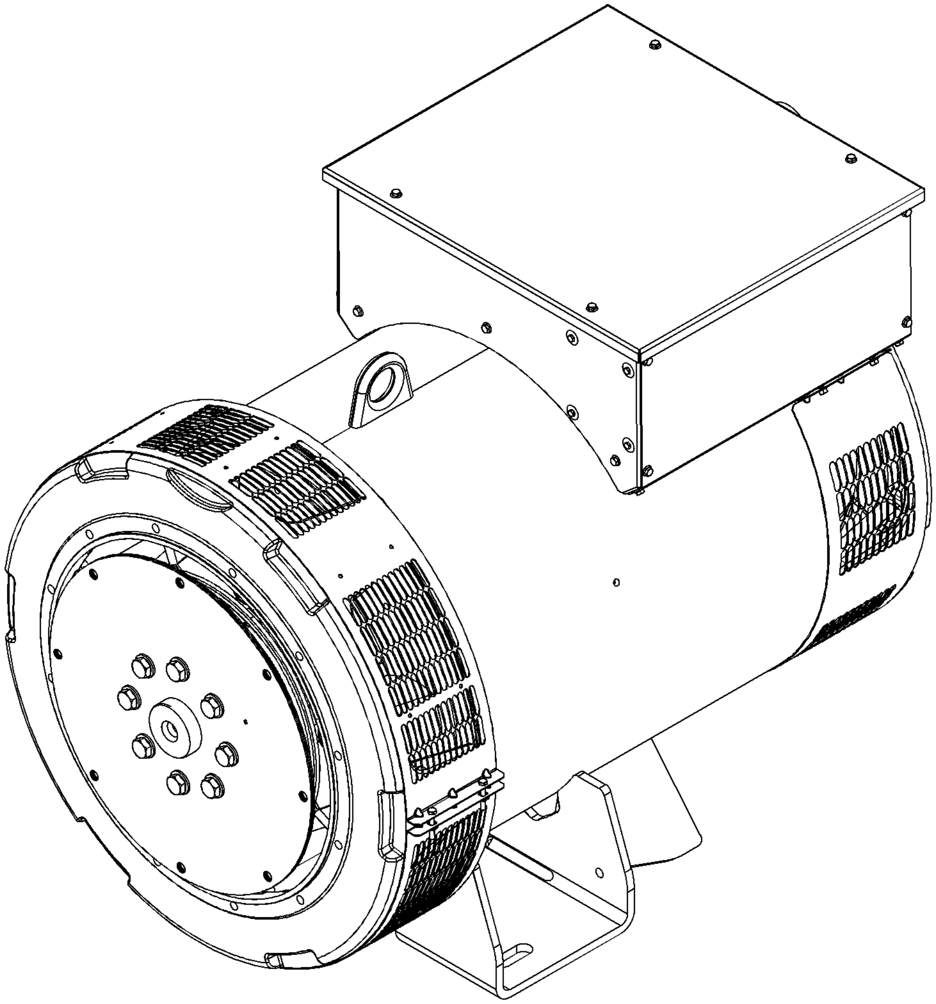
PART OF 570-8336 GENERATOR AR

SMCS-4450 **i07916498**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX	
F			**493-2435**	1	PANEL-TERMINAL BOX	
F			**493-2436**	1	COVER	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE (TERMINAL)	
F			**493-2444**	1	TERMINAL (NEUTRAL)	
F			**241-4616**	1	DISC	
F			**493-2831**	1	PANEL-TERMINAL BOX	
F			**497-9900**	1	PANEL-TERMINAL BOX	

F - NOT SHOWN

569-3845 **GENERATOR GP (**contd.**)** **i07916498**



GRAPHIC #1 <END> g06451898

569-3847 GENERATOR GP

S/N: MHE1-UP

50/60-HERTZ, 1500/1800-RPM. RANDOM WOUND, 1-BEARING

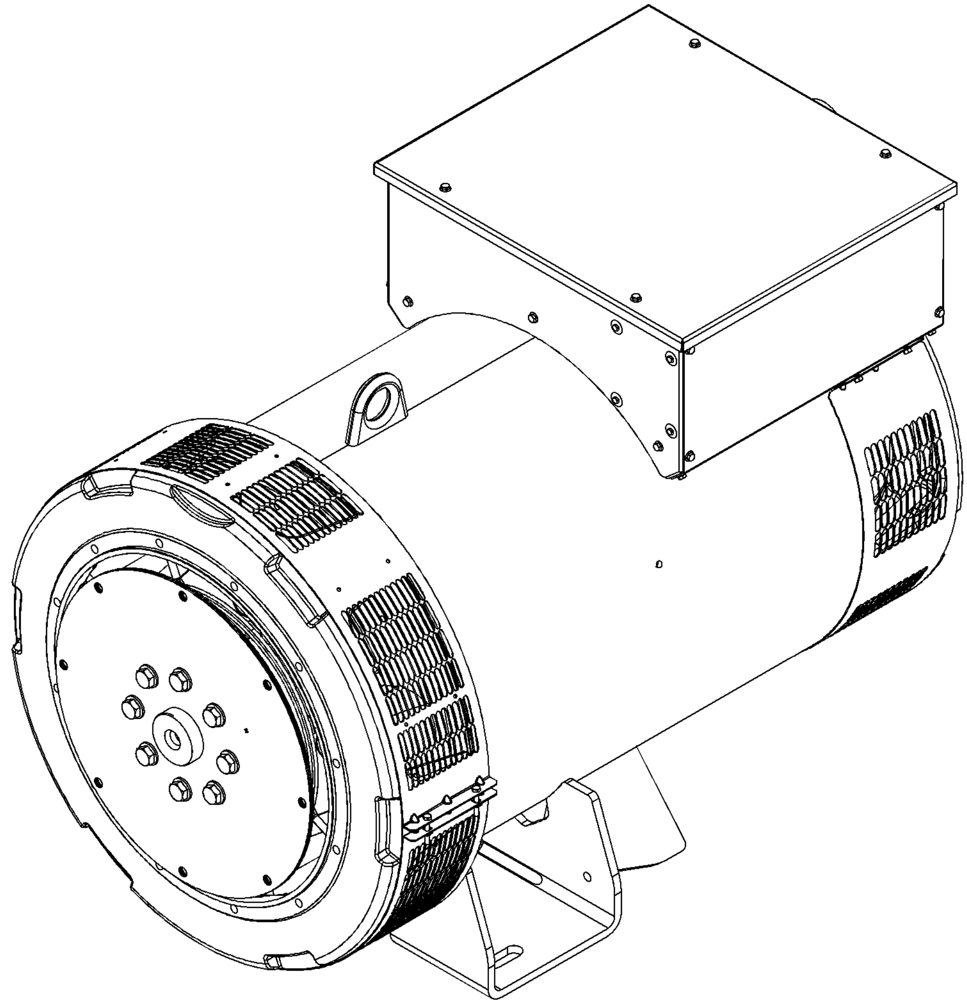
PART OF 570-8338 GENERATOR AR

SMCS-4450 **i07916502**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
F			**241-4597**	5	RING	
F			**241-4606**	1	SUPPORT-DIODE	
F			**241-4614**	1	HUB	
F			**241-4619**	1	DIODE AS	
F			**241-4620**	1	VARISTOR	
F			**241-4622**	5	SEAL-O-RING	
F			**243-5220**	1	BEARING	
F			**493-2401**	1	FAN (15-BLADE)	
F			**493-2406**	1	BRACKET	
F			**493-2407**	1	ADAPTER	
F			**493-2432**	1	SCREEN (AIR EXIT)	
F			**493-2433**	1	BRACKET	
F			**493-2434**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**493-2435**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**493-2436**	1	COVER (TERMINAL BOX)	
F			**493-2437**	1	SCREEN (AIR INLET)	
F			**493-2439**	1	CAP-BEARING	
F			**493-2440**	1	STATOR-EXCITER	
F			**493-2441**	1	ROTOR-EXCITER	
F			**493-2442**	1	PLATE (TERMINAL)	
F			**493-2444**	1	TERMINAL (NEUTRAL)	
F			**493-2446**	1	DISC-COUPLING	
F			**493-2831**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	
F			**497-9900**	1	PANEL-TERMINAL BOX (TERMINAL BOX)	

F - NOT SHOWN

569-3847 **GENERATOR GP (**contd.**)** **i07916502**



GRAPHIC #1 <END> g06451723

384-4307 HEATER AS-SPACE

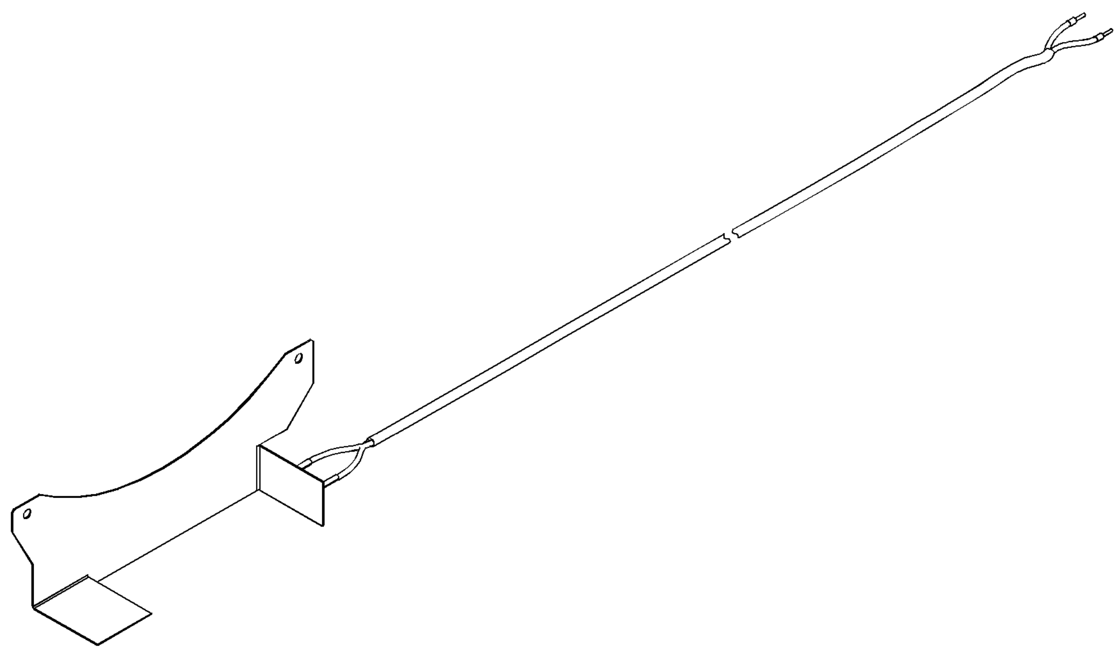
S/N: S341-UP

230-VOLT

AN ATTACHMENT

SMCS-4450, 7274 **i07876718**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



GRAPHIC #1 <END> g06467015

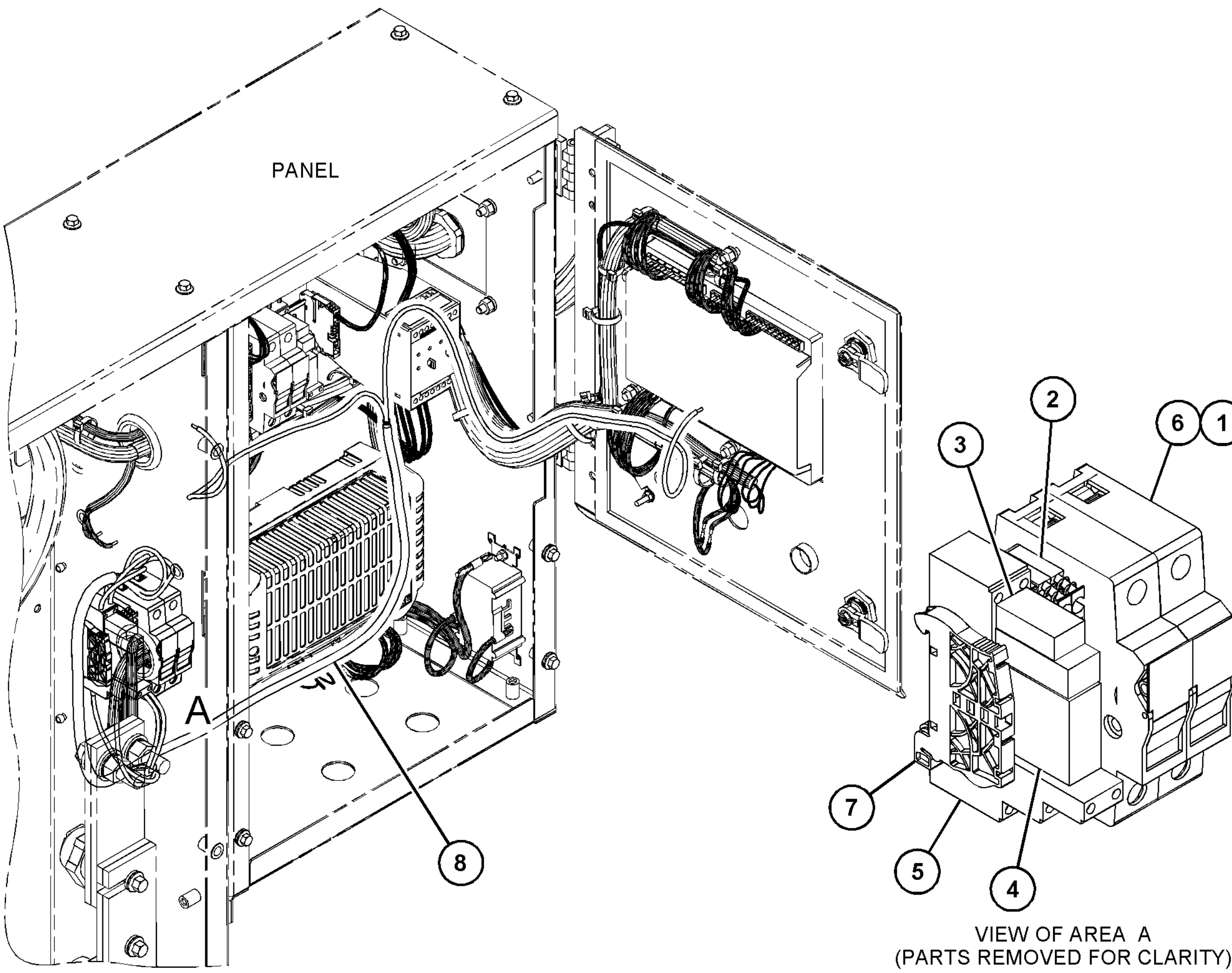
579-1020 HEATER GP-SPACE

S/N: S341-UP

AN ATTACHMENT

SMCS-7274 **i07839674**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**190-2558**	2	FUSE (6-AMPERE)	
	2	1	**301-8313**	2	BLOCK-TERMINAL (4-TERMINAL)	
	3	1	**336-8570**	1	DIODE	
	4	1	**352-2951**	1	RELAY (24-VOLT)	
	5	1	**352-2952**	1	BASE-RELAY	
	6	1	**443-1279**	2	HOLDER-FUSE (30-AMPERE)	
	7	1	**374-5721**	1	CLIP-TERMINAL	
	8	1	**580-8446**	1	HARNESS AS-HEATER	
		1	**110-8714**	6	END-WIRE (18-GA)	



GRAPHIC #1 <END> g06457528

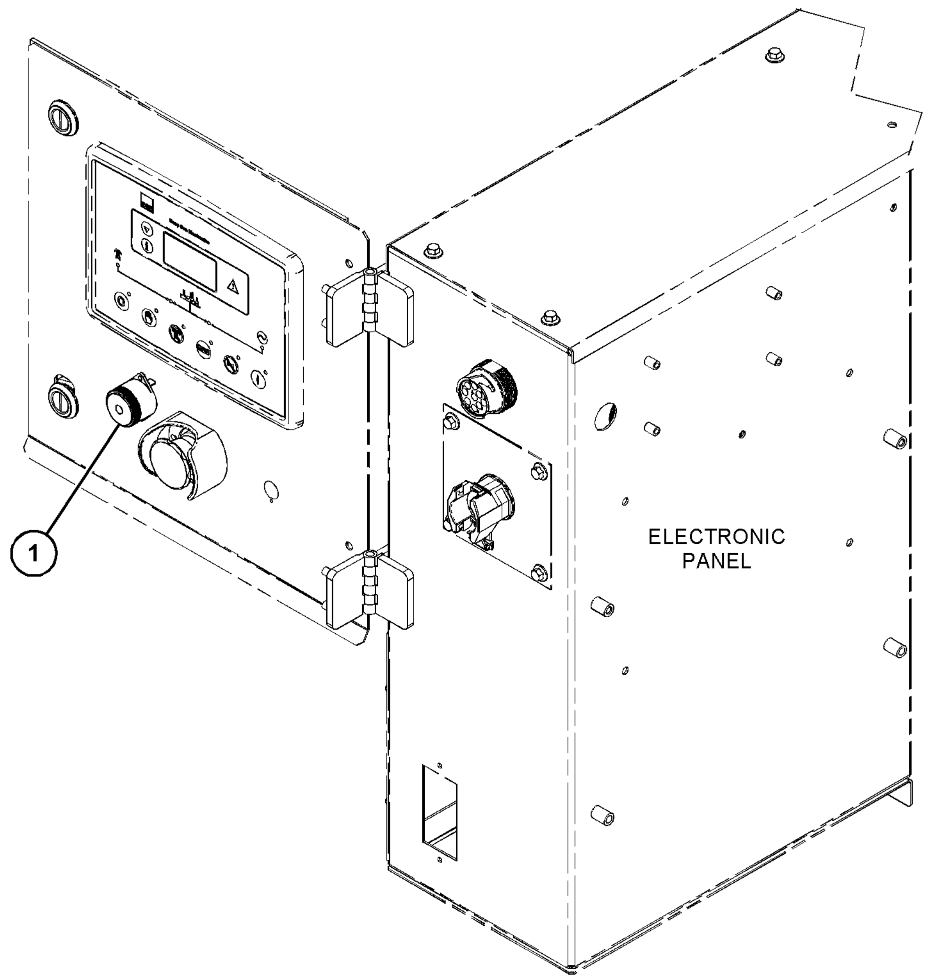
577-8710 ALARM GP

S/N: S341-UP

AN ATTACHMENT

SMCS-7400, 7407 **i07836573**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**241-3114**	1	HORN (24-VOLT)	



GRAPHIC #1 <END> g06453690

578-4983 ALARM GP–ANNUNCIATOR

S/N: S341-UP

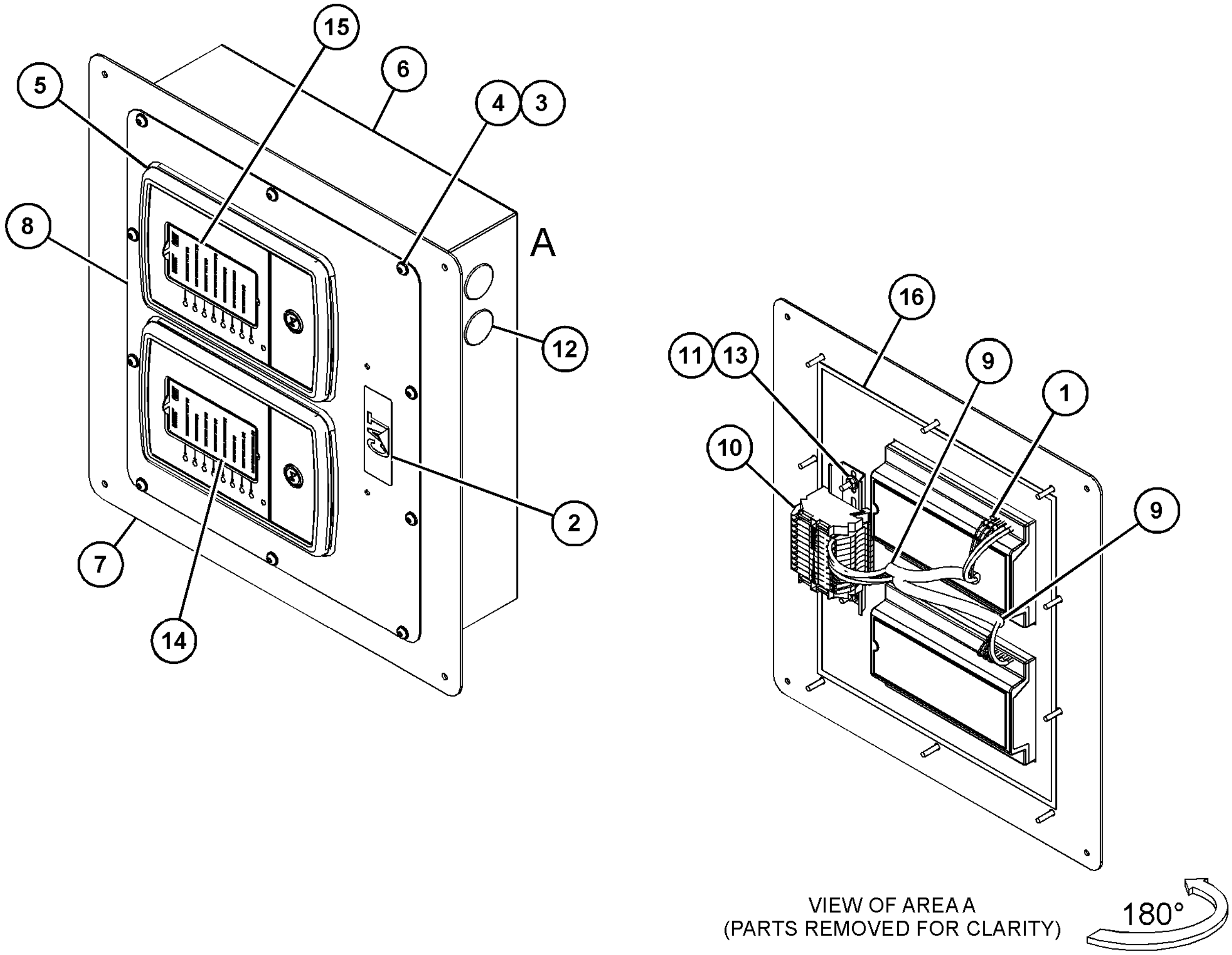
AN ATTACHMENT

SMCS-7400, 7407 **i07901593**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**9W-2275**	1	RESISTOR (120-OHM)	
	2	1	**245-2987**	1	FILM-IDENTIFICATION (CAT)	
M	3	1	**123-0707**	10	SCREW-HEX SOCKET (M4X0.7X20-MM)	
	4	1	**151-4977**	10	WASHER (4.445X9.525X1.092-MM THK)	
	5	1	**572-0773**	2	MODULE-CONTROL	
	6	1	**578-4901**	1	BOX AS	
M		1	**205-7047**	10	INSERT-THREADED (M4X0.7-THD)	
	7	1	**578-4902**	1	PLATE	
	8	1	**578-4949**	1	LID AS	
	9	1	**578-6063**	2	HARNESS AS-ALARM	
					(EACH INCLUDES)	
		1	**1S-9593**	2	STRAP-CABLE	
D		1	**5P-6001**		TUBE-HEAT SHRINK (4.75-MM DIA) (0.2-M)	
		1	**110-8714**	10	END-WIRE (18-GA)	
E		1	**125-7875**		TUBE-HEAT SHRINK (7.44-MM DIA) (10-CM)	
Y	10	1	**579-0011**	1	STRIP GP-TERMINAL	199
M	11	1	**5C-8312**	2	NUT (M4X0.7-THD)	
	12	1	**5H-4871**	2	PLUG	
	13	1	**4B-4863**	2	WASHER (4.7X11X1.2-MM THK)	
	14	1	**580-9731**	1	FILM-INFORMATION (EMERGENCY STOP)	
	15	1	**582-0555**	1	FILM-INFORMATION (BATTERY)	
E	16	1	**8C-7524**		SEAL (109-CM)	

D - ORDER BY THE METER
E - ORDER BY THE CENTIMETER
M - METRIC PART
Y - SEPARATE ILLUSTRATION

578-4983 **ALARM GP (**contd.**)** **i07901593**



GRAPHIC #1 <END> g06475639

576-1475 COVER GP-ACCESS

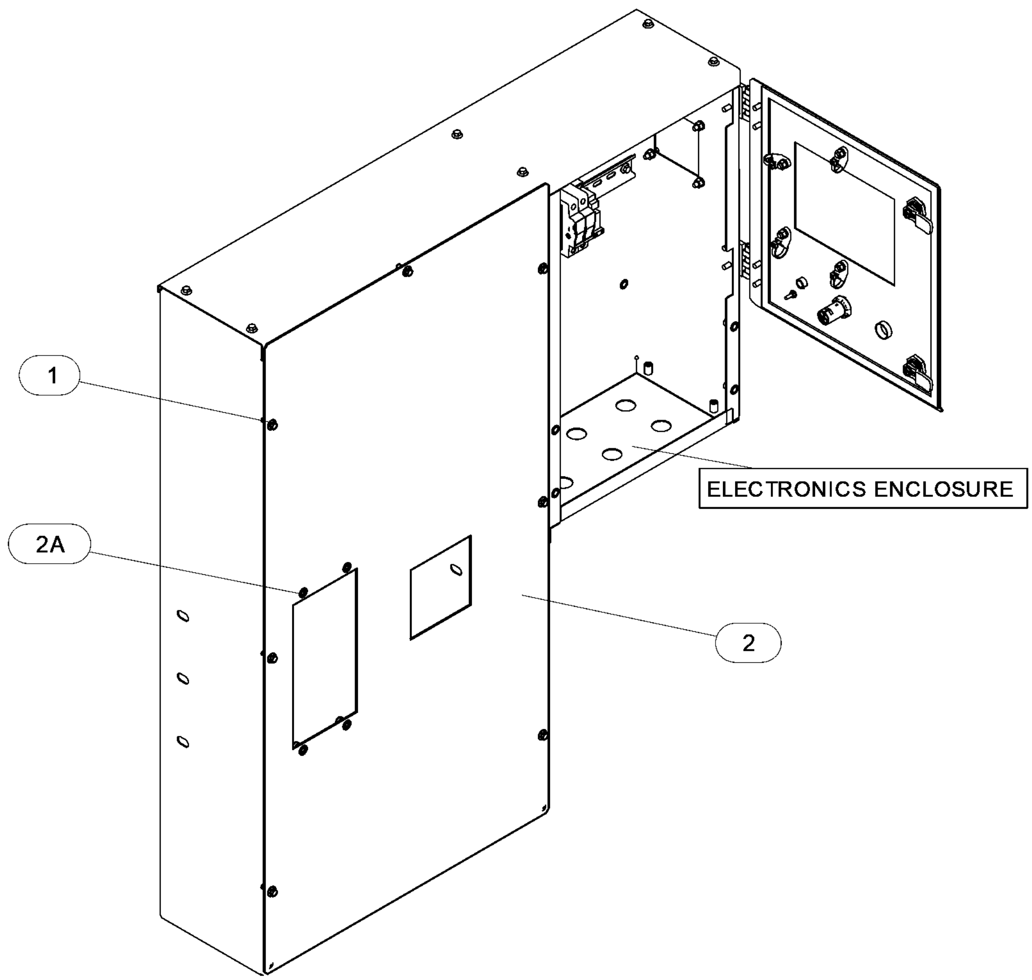
S/N: S341-UP

AN ATTACHMENT

SMCS-726A **i07869241**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
M	1	1	**235-4451**	7	BOLT-FLANGE HEAD (M6X1X16-MM)	
	2	1	**569-3046**	1	PANEL AS-COVER	
M	2A	1	**3E-4304**	4	INSERT-THREADED (M6X1-THD)	

M - METRIC PART



GRAPHIC #1 <END> g06466115

567-2014 COVER GP-INSTRUMENT PANEL

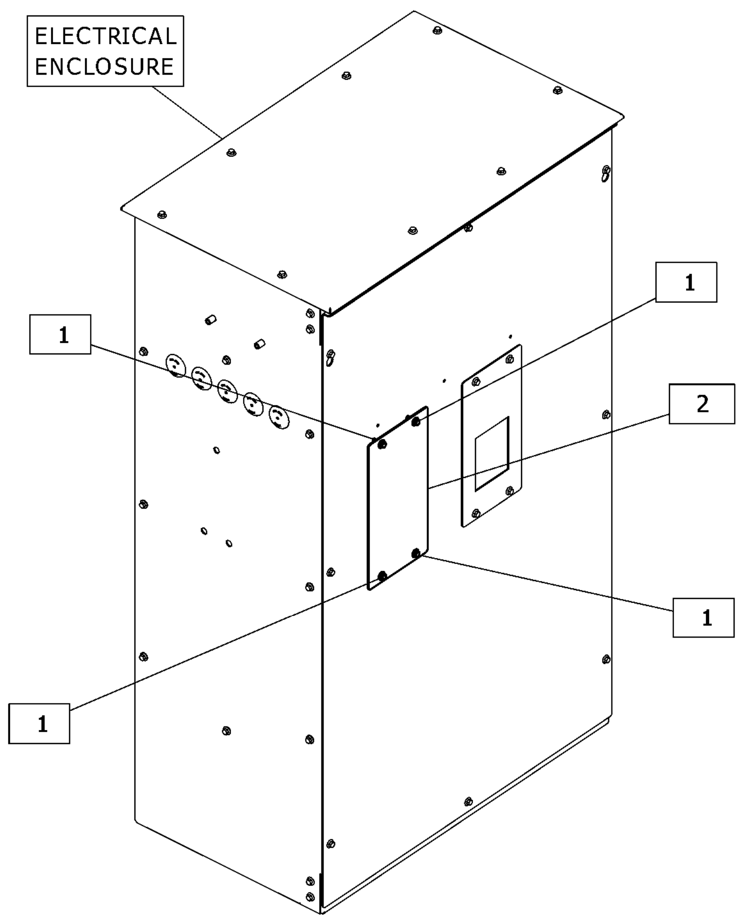
S/N: S341-UP

AN ATTACHMENT

SMCS-7451 **i07573900**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
M	1	1	**235-4451**	4	BOLT-FLANGE HEAD (M6X1X16-MM)	
	2	1	**567-2013**	1	PLATE	

M - METRIC PART



GRAPHIC #1 <END> g06369337

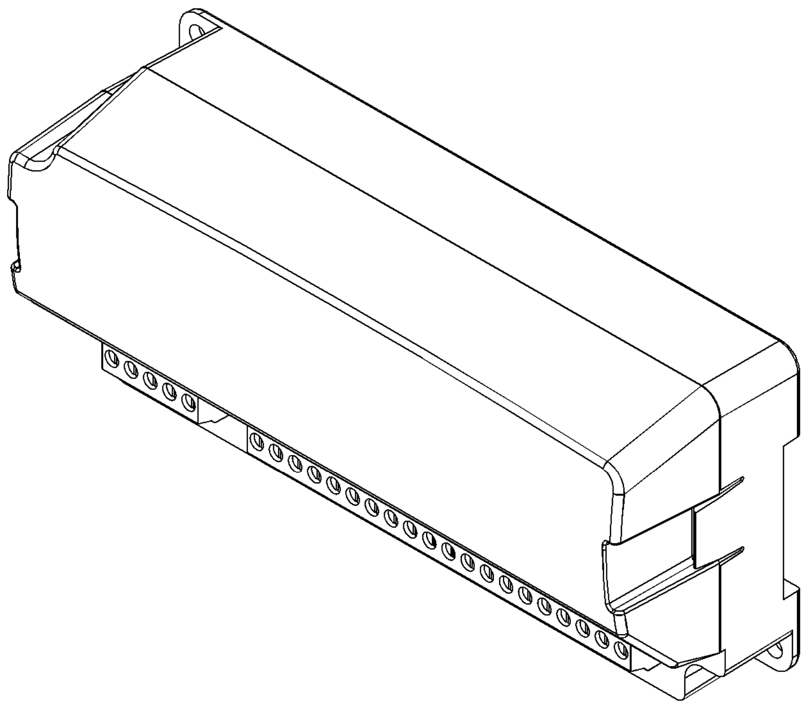
519-8756 MODULE

S/N: S341-UP

AN ATTACHMENT

SMCS-7498 **i07876889**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



GRAPHIC #1 <END> g06466950

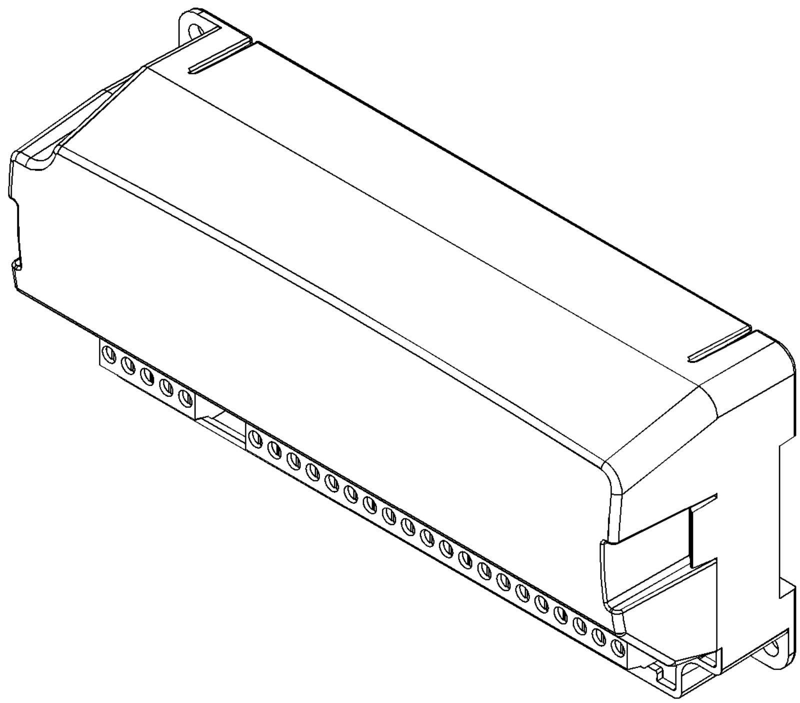
572-0774 MODULE-CONTROL

S/N: S341-UP

AN ATTACHMENT

SMCS-4490 **i07838909**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



GRAPHIC #1 <END> g06456507

569-6148 PANEL GP-CONTROL

S/N: S341-UP

PART OF 579-1018 WIRING GP-GENERATOR

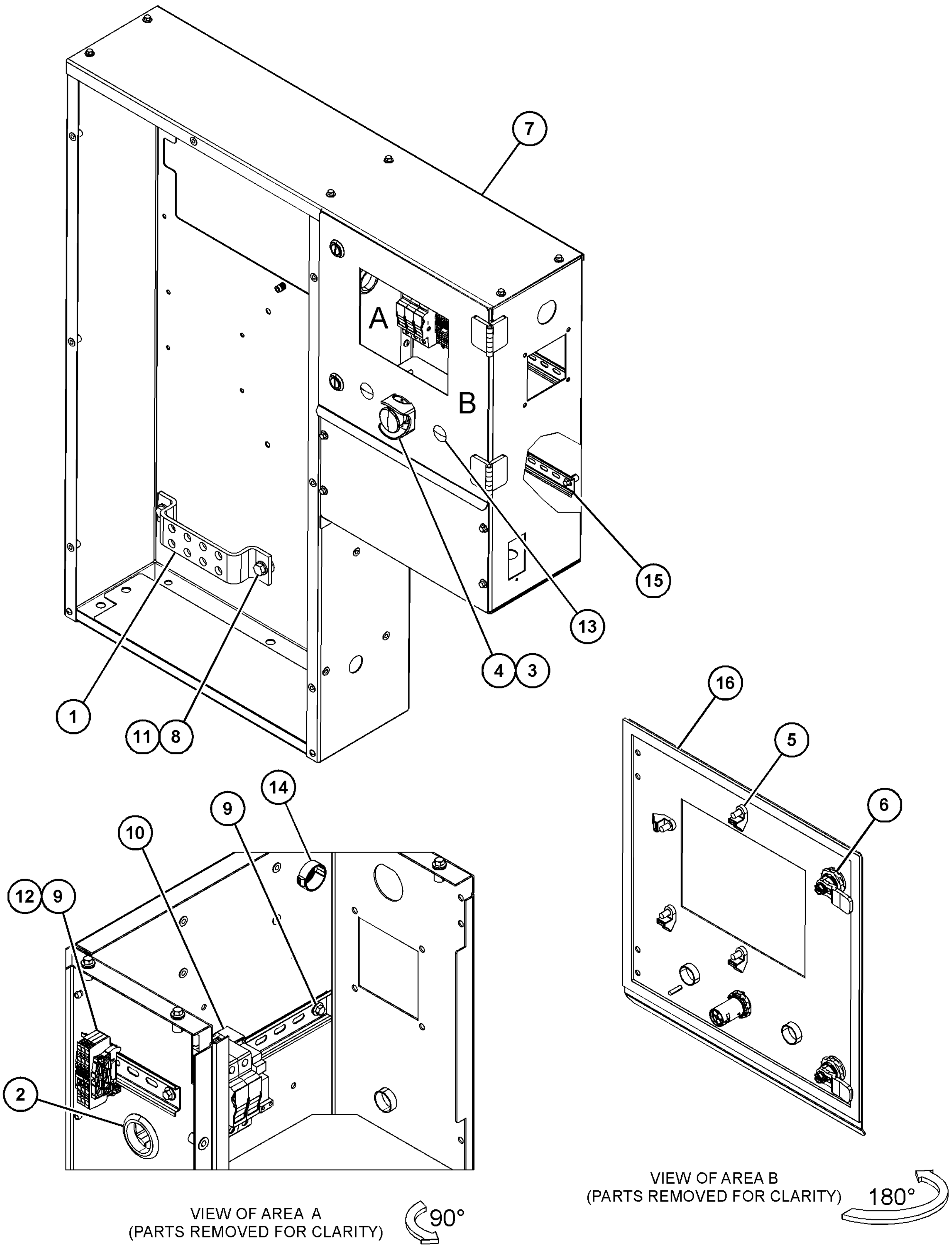
AN ATTACHMENT

SMCS-4490, 7451 **i07865517**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**571-0321**	1	BAR (ELECTRICAL)	
	2	1	**160-7307**	2	GROMMET	
	3	1	**390-1208**	1	SHROUD	
	4	1	**390-1209**	1	SWITCH AS (EMERGENCY STOP)	
	5	1	**298-5189**	4	BRACKET-TIE	
	6	1	**391-0853**	2	LOCK AS	
					(EACH INCLUDES)	
		1	**391-0856**	1	LOCK	
	7	1	**574-3577**	1	PANEL AS	
M		1	**3E-4304**	32	INSERT-THREADED (M6X1-THD)	
		1	**142-8194**	10	RIVET	
M		1	**235-4451**	15	BOLT-FLANGE HEAD (M6X1X16-MM)	
		1	**251-8101**	4	CAP-NUT	
		1	**267-5648**	2	HINGE	
	8	1	**8T-4121**	2	WASHER-HARD (11X21X2.5-MM THK)	
M	9	1	**235-4451**	6	BOLT-FLANGE HEAD (M6X1X16-MM)	
Y	10	1	*569-6150*	1	STRIP GP-TERMINAL	197
M	11	1	**8T-4136**	2	BOLT (M10X1.5X25-MM)	
Y	12	1	*571-0322*	1	STRIP GP-TERMINAL	198
	13	1	**267-7280**	3	GROMMET	
	14	1	**449-0760**	1	PLUG-CAP	
E	15	1	**147-1960**		RAIL (33-CM)	
J	16	1	**5P-5637**		SEAL (14-DM)	

E - ORDER BY THE CENTIMETER
J - ORDER BY THE DECIMETER
M - METRIC PART
Y - SEPARATE ILLUSTRATION

569-6148 **PANEL GP-CONTROL (**contd.**)** **i07865517**



GRAPHIC #1 <END> g06465480

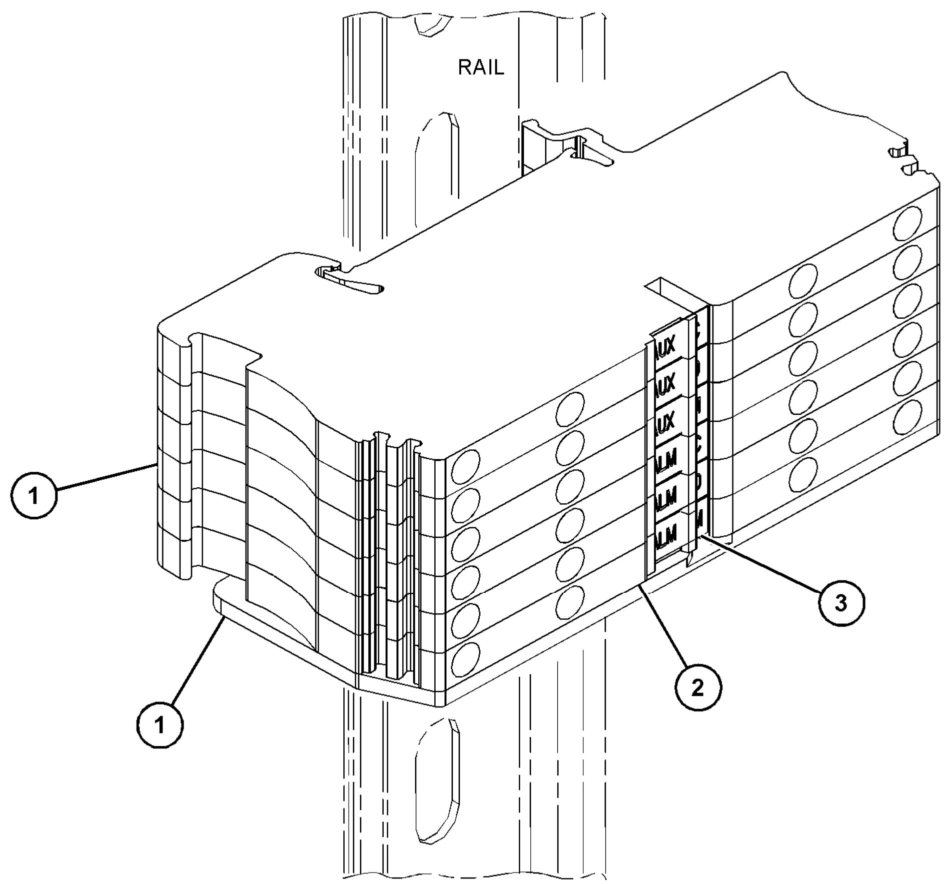
390-1204 PANEL GP-ELECTRONIC

S/N: S341-UP

AN ATTACHMENT

SMCS-4490, 7490 **i07916266**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**435-6753**	1	PLATE	
	2	1	**440-1350**	6	BLOCK-TERMINAL	
	3	1	**561-2892**	1	MARKER AS-TERMINAL	



GRAPHIC #1 <END> g06362637

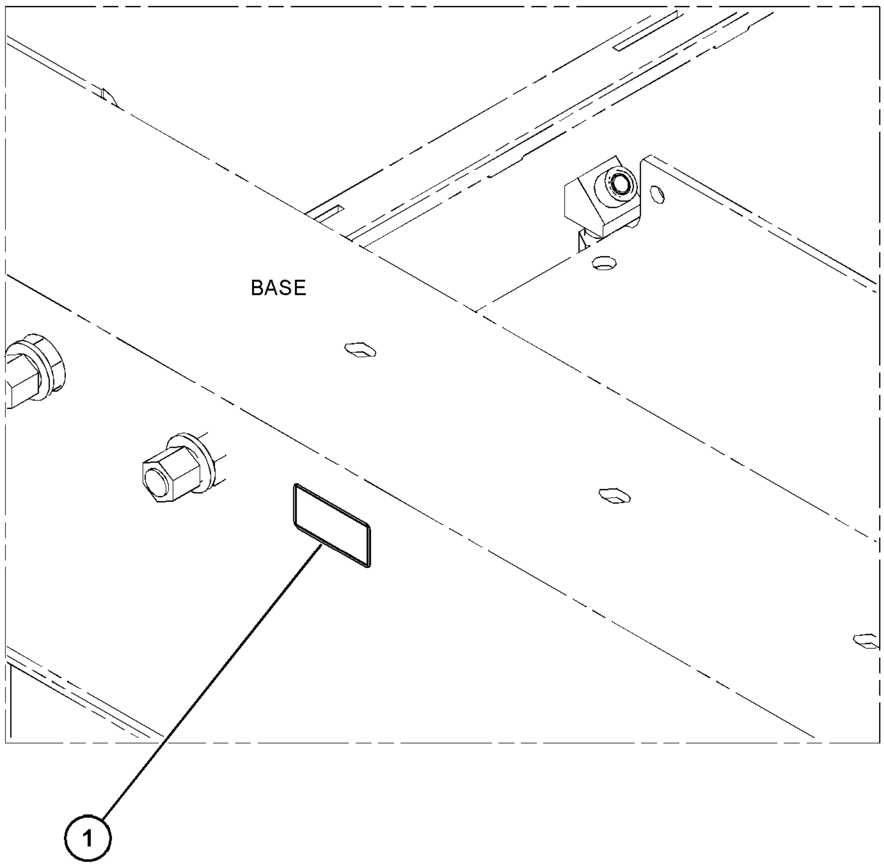
463-2985 FILM GP

S/N: S341-UP

AN ATTACHMENT

SMCS-7405, 7557 **i07142198**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**463-2984**	1	FILM-IDENTIFICATION (FUEL FLOW)	



GRAPHIC #1 <END> g06096924

520-4219 FILM GP

S/N: S341-UP

AN ATTACHMENT

SMCS-7405, 7557 **i06849097**

NOTE	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	517-1065	2	FILM-IDENTIFICATION (L1)	
	517-1066	2	FILM-IDENTIFICATION (N)	
	517-1067	2	FILM-IDENTIFICATION (L2)	
	517-1068	2	FILM-IDENTIFICATION (L3)	

<END>

587-1466 FILM GP

S/N: S341-UP

AN ATTACHMENT

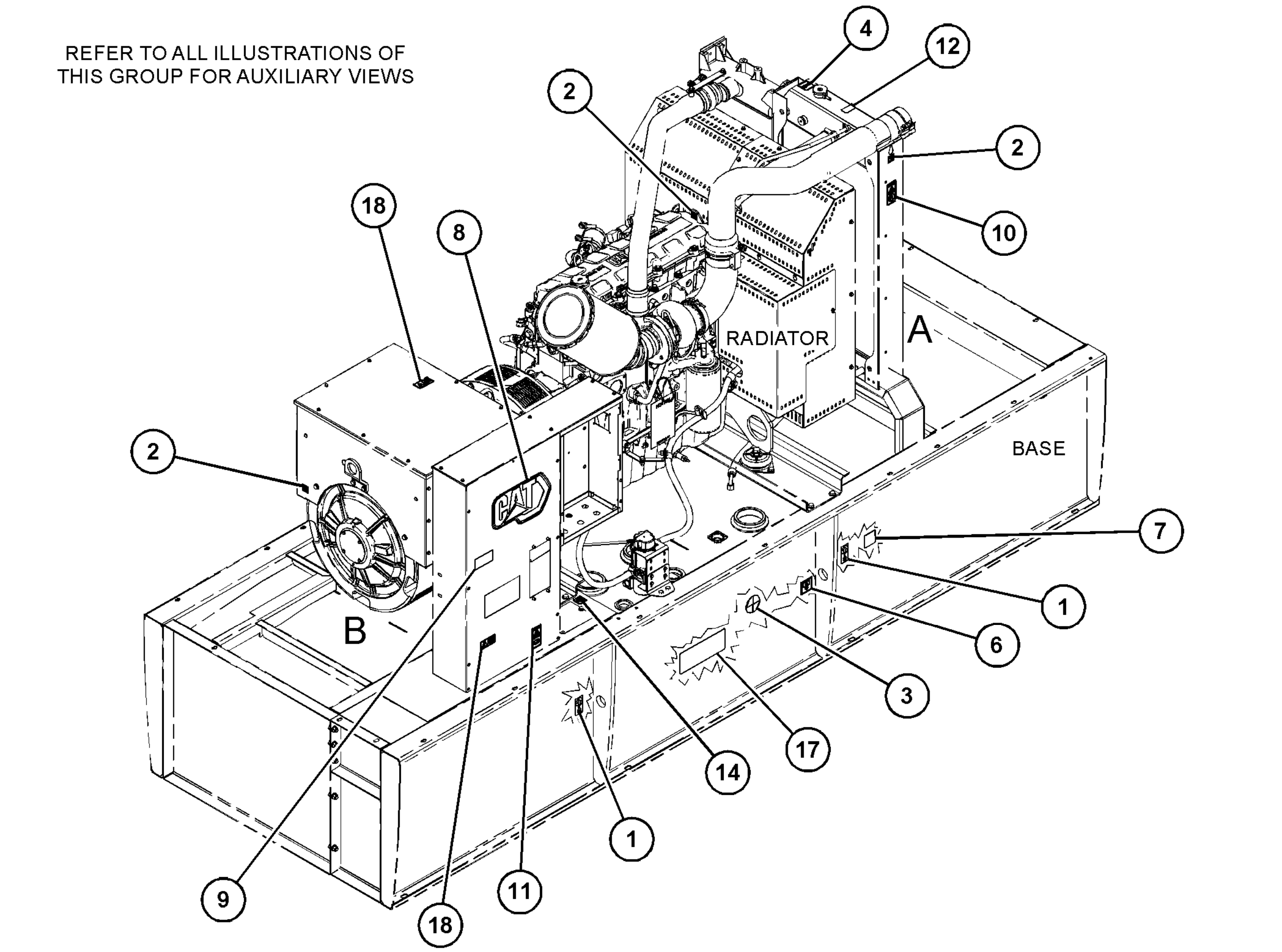
SMCS-7405, 7557

i07852108

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1,2	**1P-2807**	4	FILM-IDENTIFICATION (LIFT EYE LOCATION)	
	2	1,2	**3N-8591**	6	FILM-INFORMATION (DO NOT LIFT)	
	3	1,2	**3N-9344**	2	FILM-INFORMATION (CENTER OF GRAVITY)	
	4	1	**134-7258**	1	FILM-INFORMATION (EXTENDED LIFE COOLANT)	
	5	2	**142-7543**	1	FILM-INFORMATION (DIESEL FUEL FILL)	
	6	1	**144-0875**	1	FILM-INFORMATION (OIL DRAIN)	
	7	1	**144-0876**	1	FILM-INFORMATION (COOLANT DRAIN)	
	8	1	**573-8462**	1	FILM-IDENTIFICATION (CAT)	
	9	1,2	**225-3224**	2	FILM-WARNING (AUTOMATIC ENGINE START)	
	10	1,2	**225-3227**	4	FILM-WARNING (HOT SURFACE)	
	11	1	**225-3232**	2	FILM-WARNING (FALLING OBJECT)	
	12	1	**225-4256**	1	FILM-WARNING (HOT FLUID UNDER PRESSURE, U.S.)	
	13	2	**228-3369**	1	FILM-WARNING (DO NOT OPERATE, READ OMM)	
	14	1	**228-4798**	1	FILM-IDENTIFICATION (GROUND)	
	15	2	**228-7315**	1	FILM-WARNING (HOT SURFACE, HANDS CLEAR)	
	16	2	**267-1458**	1	FILM-INFORMATION (GENSET RATING)	
	17	1,2	**272-1732**	2	FILM-LIFTING (FALLING OBJECT)	
	18	1,2	**424-6100**	4	FILM-WARNING (ELECTROCUTION HAZARD, READ OMM)	
	19	2	**263-5804**	1	FILM-IDENTIFICATION (FUEL)	
	20	2	**573-0882**	1	FILM-IDENTIFICATION (CAT)	

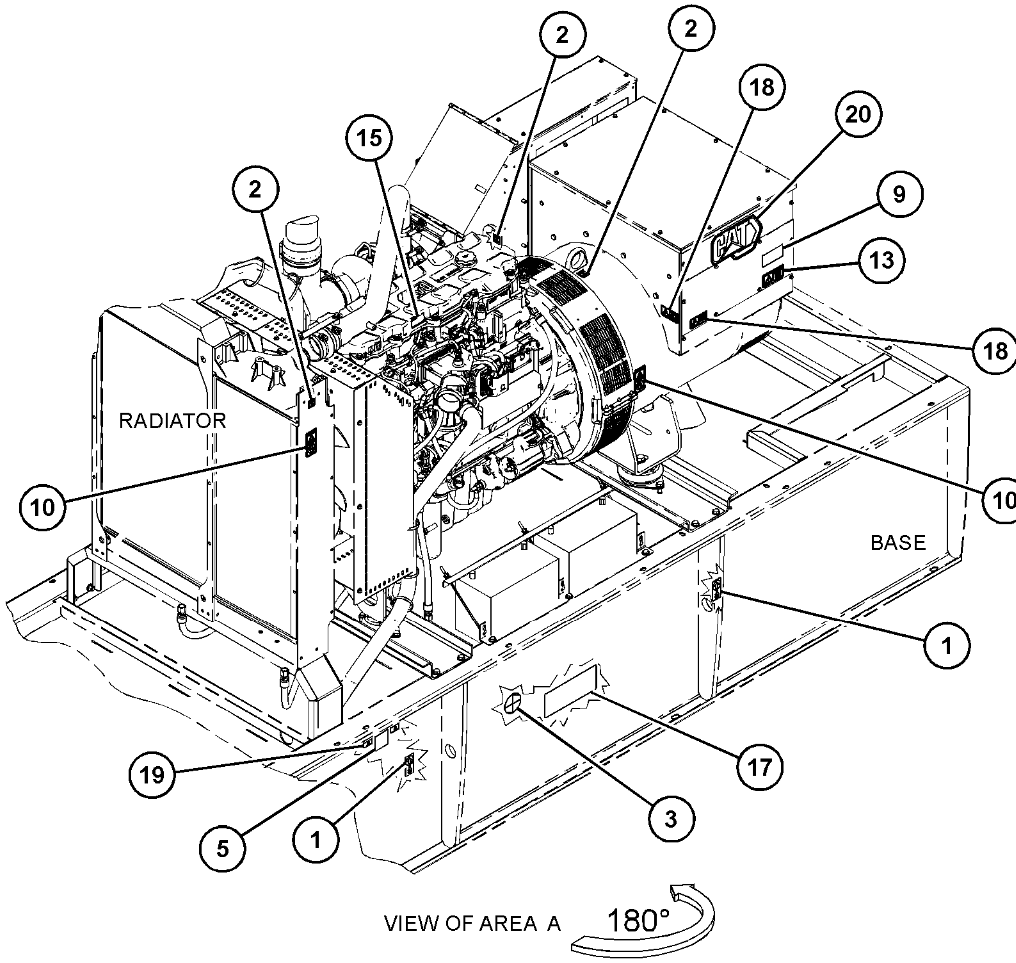
SERVICE EQUIPMENT AND SUPPLIES

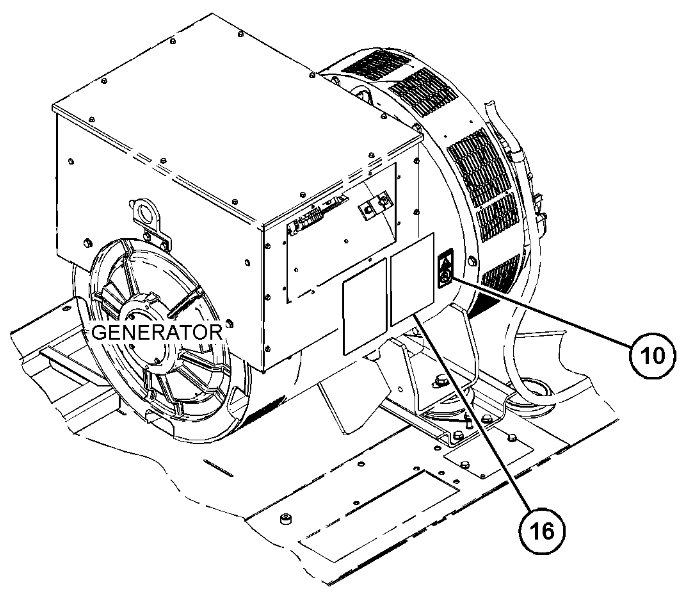
587-1466 **FILM GP** (contd.) **i07852108**



GRAPHIC #1 g06460794

587-1466 **FILM GP (**contd.**)** **i07852108**





GRAPHIC #2 <END> g06460795

587-1468 FILM GP

S/N: S341-UP

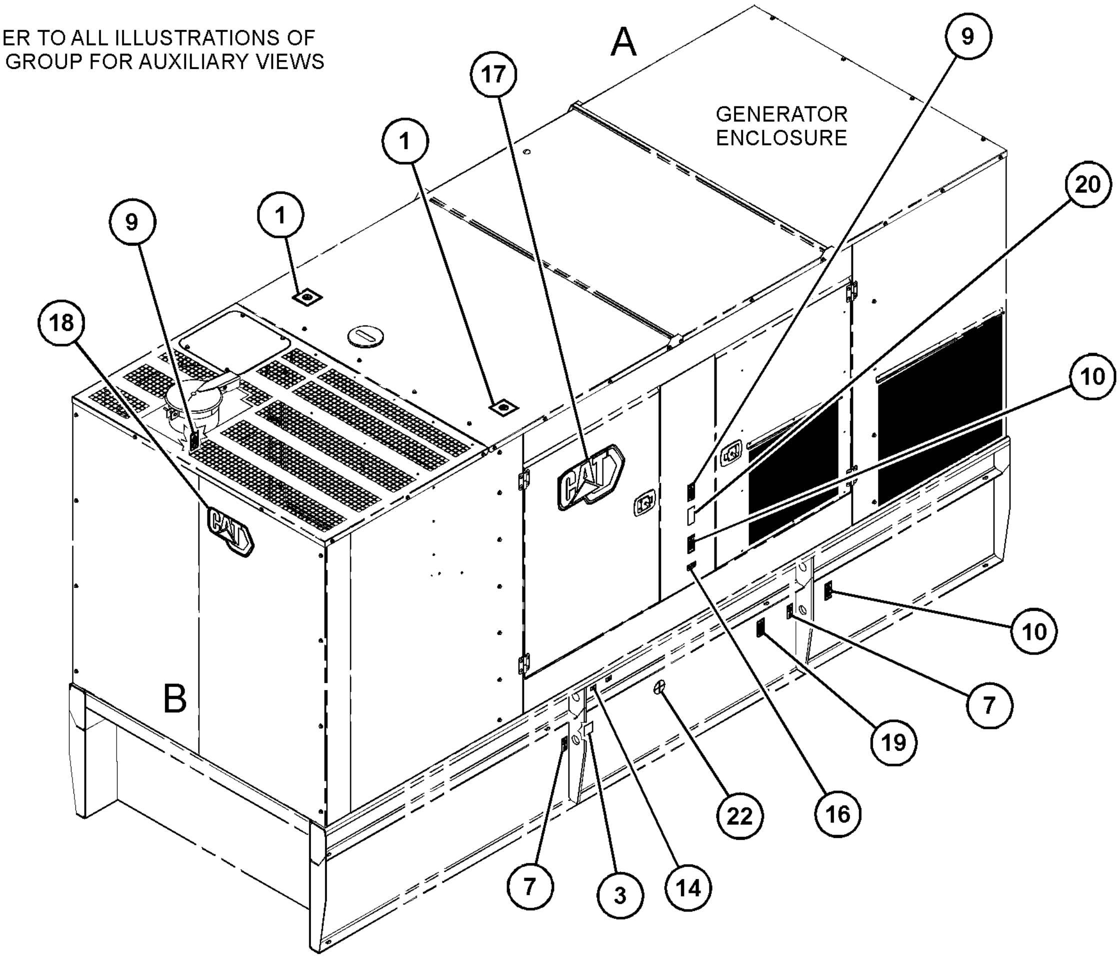
AN ATTACHMENT

SMCS-7405, 7557 **i07917983**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**124-2456**	2	FILM-INSTRUCTION (NO STEP)	
	2	2,3	**134-7258**	3	FILM-INFORMATION (EXTENDED LIFE COOLANT)	
	3	1	**142-7543**	1	FILM-INFORMATION (DIESEL FUEL FILL)	
	4	2	**144-0875**	1	FILM-INFORMATION (OIL DRAIN)	
	5	2	**144-0876**	1	FILM-INFORMATION (COOLANT DRAIN)	
	7	1,2	**1P-2807**	4	FILM-IDENTIFICATION (LIFT EYE LOCATION)	
	8	2	**224-9828**	1	FILM-WARNING (SHOCK HAZARD)	
	9	1,2,3	**225-3227**	6	FILM-WARNING (HOT SURFACE)	
	10	1,2,3	**225-3232**	4	FILM-WARNING (FALLING OBJECT)	
	11	2	**228-3369**	1	FILM-WARNING (DO NOT OPERATE, READ OMM)	
	12	3	**228-4798**	1	FILM-IDENTIFICATION (GROUND)	
	13	2	**228-7315**	1	FILM-WARNING (HOT SURFACE, HANDS CLEAR)	
	14	1	**263-5804**	1	FILM-IDENTIFICATION (FUEL)	
	15	3	**267-1458**	1	FILM-INFORMATION (GENSET RATING)	
	16	1,2	**299-7882**	2	FILM-WARNING (DO NOT OPERATE, READ OMM)	
	17	1,2	**571-4652**	2	FILM-IDENTIFICATION (CAT)	
	18	1,2,3	**573-8462**	3	FILM-IDENTIFICATION (CAT)	
	19	1,2	**308-2085**	2	FILM-INSTRUCTION (LIFT CAPACITY, READ OMM)	
	20	1,2,3	**381-1810**	4	FILM-WARNING (AUTOMATIC ENGINE START)	
	21	2,3	**3N-8591**	6	FILM-INFORMATION (DO NOT LIFT)	
	22	1,2	**3N-9344**	2	FILM-INFORMATION (CENTER OF GRAVITY)	
	23	2,3	**424-6100**	4	FILM-WARNING (ELECTROCUTION HAZARD, READ OMM)	

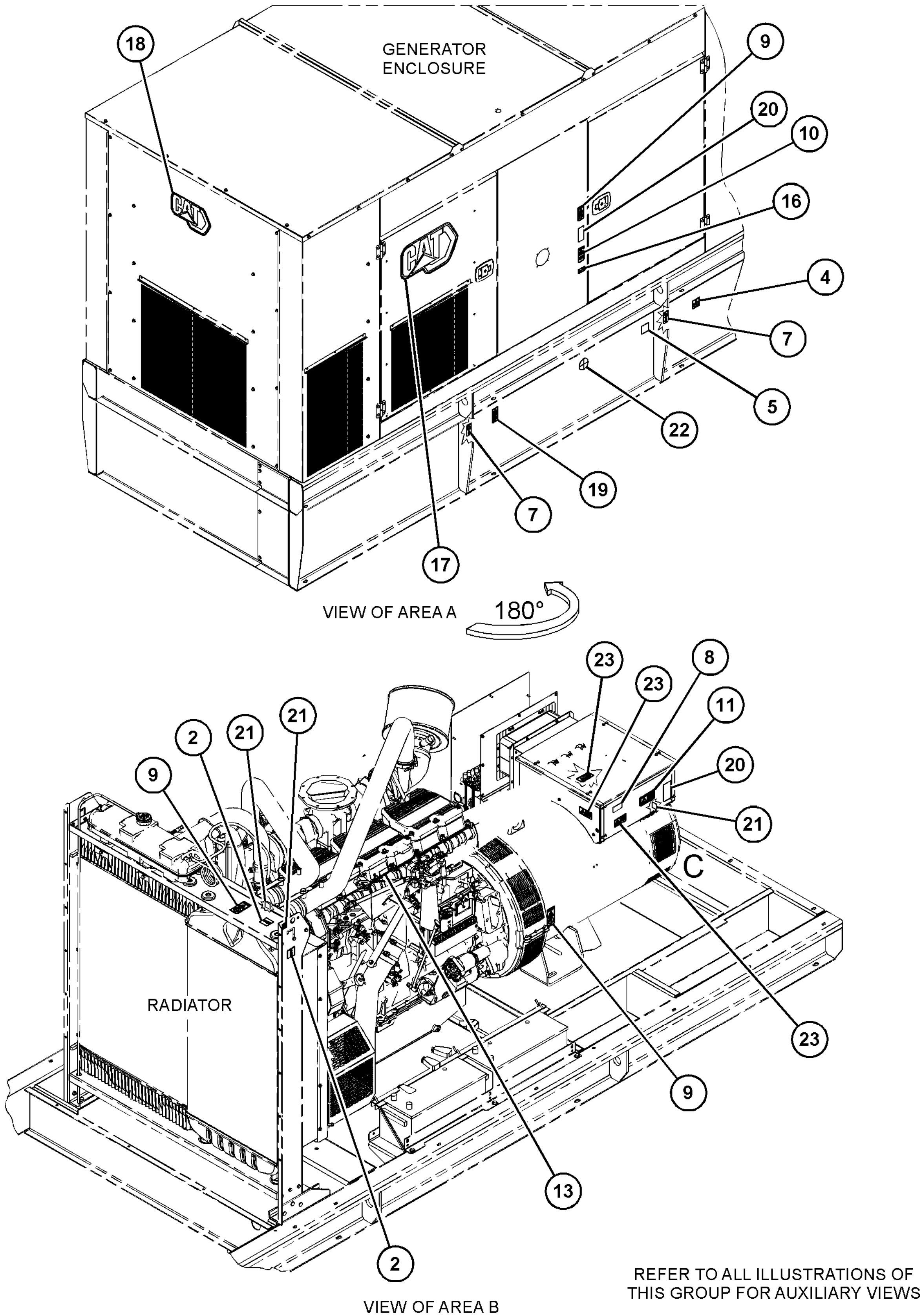
587-1468 **FILM GP (**contd.**)** **i07917983**

REFER TO ALL ILLUSTRATIONS OF
THIS GROUP FOR AUXILIARY VIEWS



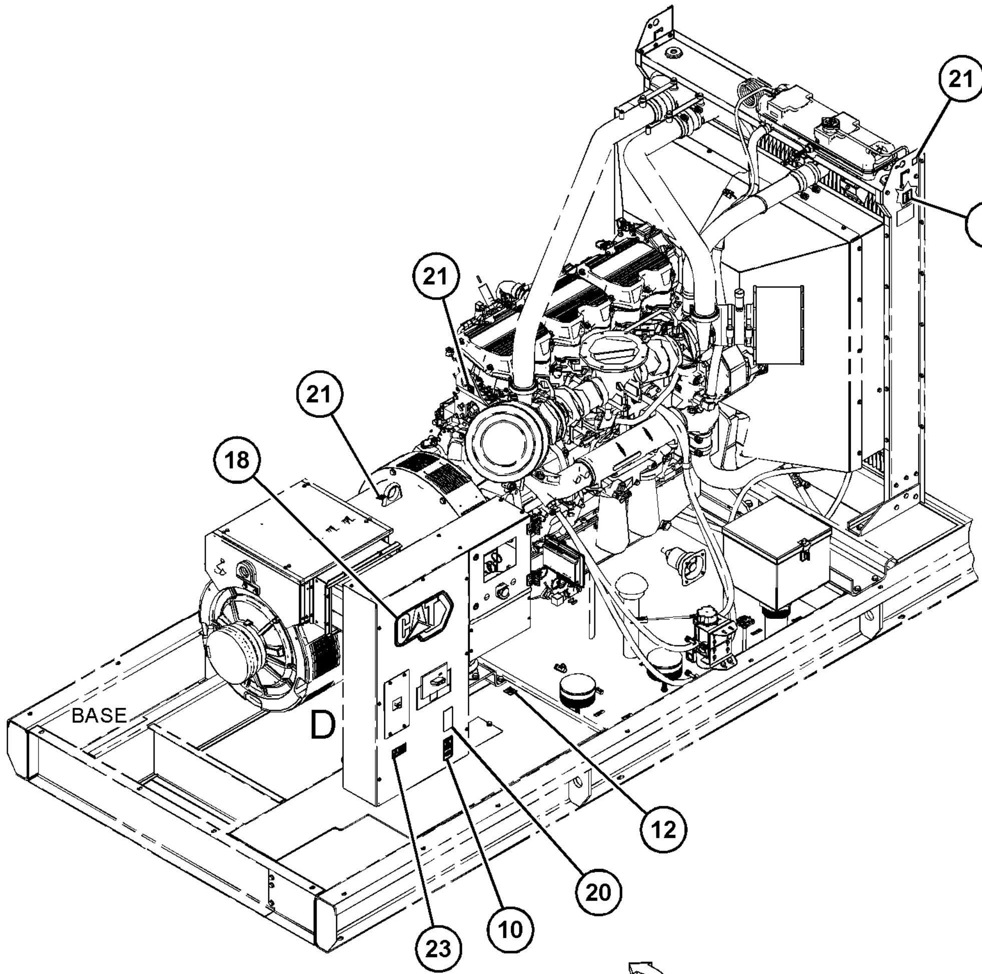
GRAPHIC #1 g06464149

587-1468 **FILM GP** (contd.) **i07917983**

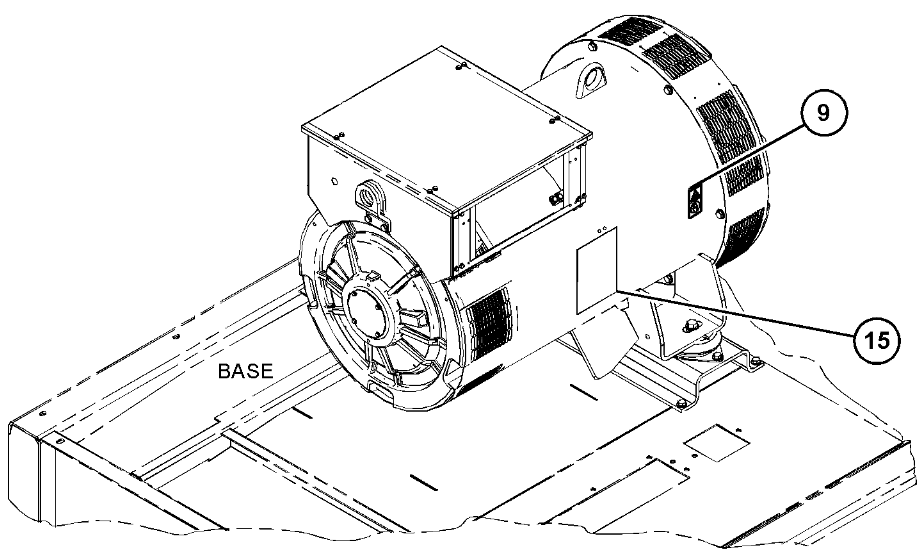


GRAPHIC #2 g06464150

587-1468 **FILM GP (**contd.**)** **i07917983**



VIEW OF AREA C 180°



VIEW OF AREA D

GRAPHIC #3 <END> g06480564

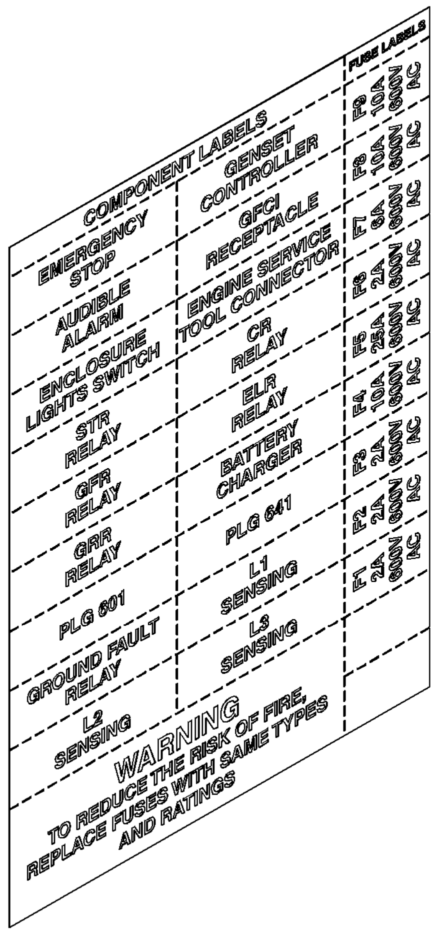
583-8799 FILM-FUSE IDENTIFICATION

S/N: S341-UP

AN ATTACHMENT

SMCS-7405 **i07870451**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



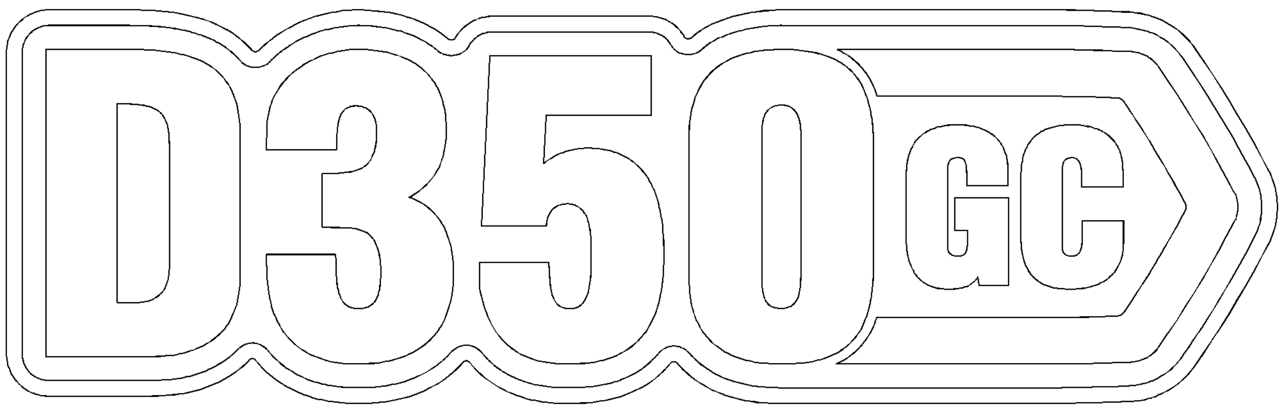
GRAPHIC #1 <END> g06466366

586-3077 FILM-IDENTIFICATION

S/N: S341-UP
70-MM X 225.5-MM
AN ATTACHMENT

SMCS-7557 **i07870839**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



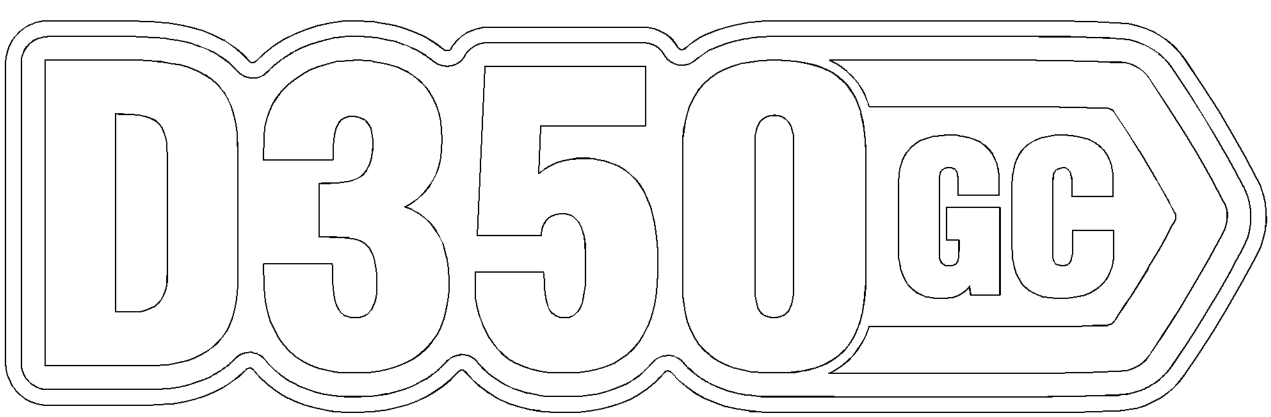
GRAPHIC #1 <END> g06466375

586-3078 FILM-IDENTIFICATION

S/N: S341-UP
120-MM X 386.5-MM
AN ATTACHMENT

SMCS-7557 **i07870853**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
					(NO SERVICED PARTS)	



GRAPHIC #1 <END> g06466515

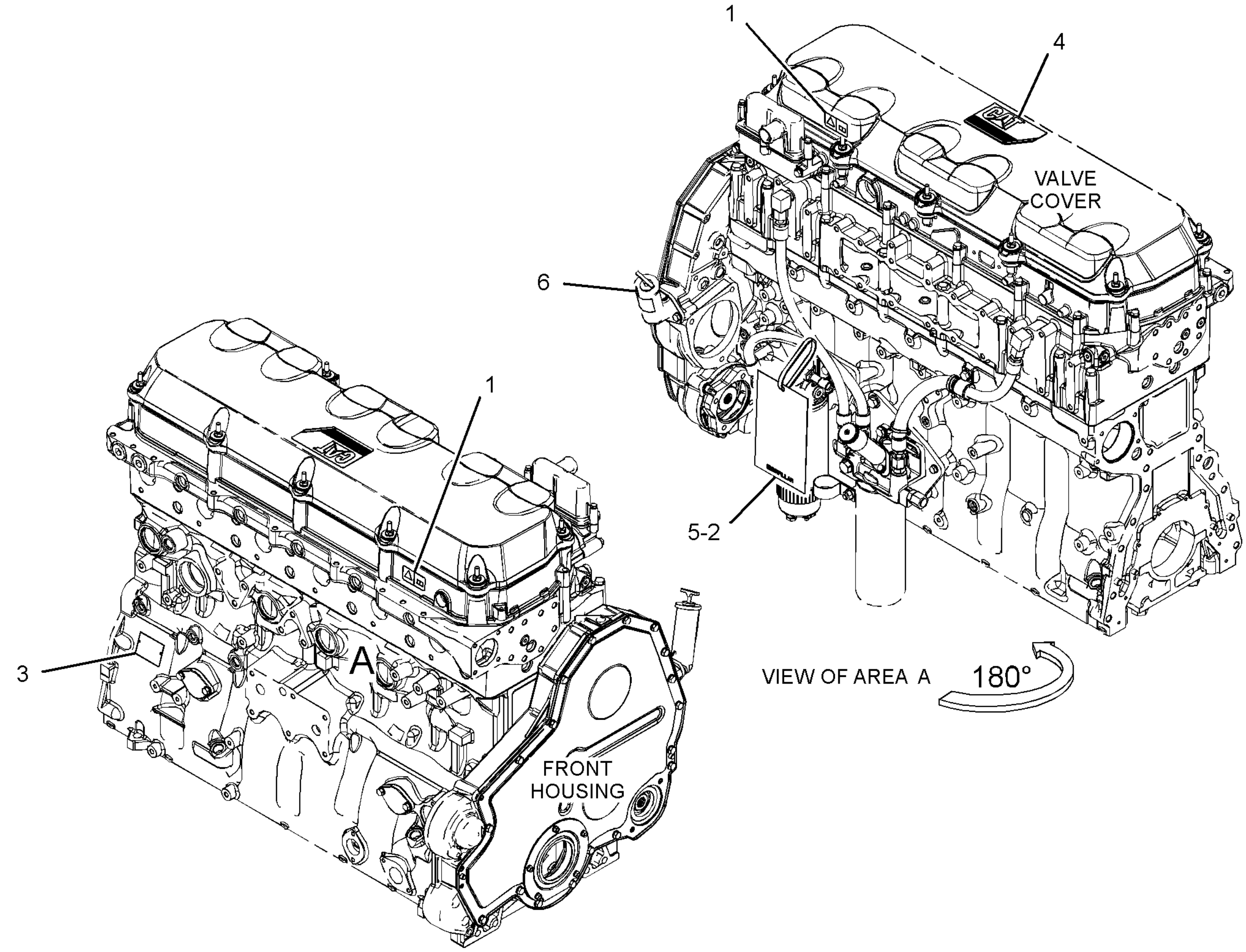
423-2862 PLATE & FILM GP

S/N: PW31-UP

PART OF 498-2851 ENGINE AR

SMCS-7405, 7557 **i05432632**

NOTE	REF NO	GRAPHIC REF	PART NUMBER	QTY	PART NAME 1 2 3 4 5 6 (PRODUCT LEVEL)	SEE PAGE
	1	1	**293-9659**	2	FILM-WARNING (UNIVERSAL, READ OMM)	
	2	1	**3N-3469**	1	TAG-INSTRUCTION (ENGINE PRESTART)	
	3	1	**3N-3790**	1	PLATE-SERIAL NUMBER (ENGINE)	
	4	1	**290-3785**	1	PLATE-IDENTIFICATION (CAT C13 ACERT)	
	5	1	**8L-8413**	1	STRAP-CABLE (WHITE)	
	6	1	**136-9066**	1	FILM-INFORMATION (ENGINE OIL)	



GRAPHIC #1 <END> g03403312

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Special Instruction

i08584380

Procedure to Install and Operate Cat ® GCCP 1.2/1.3 Control Panel on Certain Generator Sets

SMCS Code: 1609; 4490; 7451; 7490; 7566

Electric Power Generation
C1.1 DE9.5E3 (S/N: GB81-UP)
C1.5 DE13.5E3 (S/N: GB91-UP)
C3.3 DE33E0 (S/N: EC31-UP)
C3.3 DE33E3 (S/N: EC41-UP)
C3.3 DE50E0/DE5 (S/N: EC51-UP)
C3.3 DE50E2 (S/N: EC61-UP)
C3.3 GEN SET (S/N: H371-UP; RFF1-UP; RFG1-UP)
C4.4 DE110E2 (S/N: ECL1-UP)
C4.4 DE55E2 (S/N: EC71-UP)
C4.4 DE65E3 (S/N: EC81-UP)
C4.4 DE88E0 (S/N: EC91-UP)
C4.4 DE88E3/DE1 (S/N: ECK1-UP)
C4.4 GEN SET (S/N: T921-UP; T931-UP; T941-UP; T951-UP; T961-UP; H381-UP; RFJ1-UP; RFK1-UP; H3Z1-UP)
C7.1 DE200E0/DE (S/N: ECW1-UP)
C7.1 GEN SET (S/N: RD21-UP; RD31-UP; T971-UP; T991-UP; RMT1-UP; T9T1-UP; T9W1-UP)
DE150E0 (S/N: GTY1-UP)
DE18E3/DE22E3 (S/N: GBY1-UP)
Generator Set
D1000 (S/N: GN71-UP)
D1250 (S/N: GN91-UP)
D20 (S/N: 2F21-UP)
D25 (S/N: 2F31-UP)
D250GC (S/N: RG31-UP)
D30 (S/N: 2F41-UP)
D300GC (S/N: RE31-UP)
D350GC (S/N: RG41-UP; S341-UP)
D400GC (S/N: RE41-UP; S441-UP)
D450GC (S/N: RG51-UP; S351-UP)
D500GC (S/N: RK51-UP; S651-UP)
D550GC (S/N: S371-UP)
D600 GC (S/N: S361-UP)
D800 (S/N: GNF1-UP)
DE1000S (S/N: GJS1-UP)
DE1100 (S/N: GGF1-UP; GGM1-UP; GGR1-UP; GGS1-UP)
DE1250 (S/N: GJT1-UP)
DE1250S (S/N: GJZ1-UP)
DE1400 (S/N: GJX1-UP)
DE1500 (S/N: GJY1-UP)
DE800S (S/N: GG61-UP; GGY1-UP)

Revision History:

Table 1

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05	Added effectivity.
04	Added effectivity.
03	Added effectivity.
02	Added effectivity. Added content to Section “Cat GCCP 1.2 and Cat GCCP 1.3 Modules” and Section “Cat GCCP 1.3 Three Phase Four Wire” . Added content to Table 8 .
01	Updated Illustration 24.

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Introduction

This Special Instruction contains the procedure to install and operate Cat ® GCCP 1.2/1.3 Control Panel on certain generator sets.

Cat GCCP 1.2/1.3 Control Panel provides different functionality across a common platform. The functionality provides greater flexibility in choosing the controls for the generator set.

Cat GCCP 1.2/1.3 Control Panel allows the operator to start and stop the generator set, and transfer load to the generator set either manually or automatically.

The user can view system operating parameters via the text Liquid Crystal Display (LCD). Cat GCCP 1.2/1.3 Control Panel monitors the engine and indicates the operational status and fault conditions. The control panel helps to shut down automatically the engine and displays the fault condition through LCD display.

The Advanced RISC Machines microprocessor (ARM microprocessor) in the module incorporates the following complex features:

- Text-based LCD display
- True Root Mean Square Voltage (RMS Voltage)
- Current and Power monitoring
- Universal Serial Bus (USB) and RS485 Communications
- Engine parameter monitoring
- Fully configurable inputs for use as alarms or a range of different functions
- Engine Electronic Control Module interface (ECU interface) to electronic engines including Tier 5 engines
- Integral Programmable Logic Controller (PLC) to help provide customization where required
- Fuel tank level monitoring to track fuel filling operations and detect fuel leak/theft
- Data Logging

Cat GCCP 1.2/1.3 Configuration Suite Software allows alteration of selected operational sequences, timers, and alarms. The integral front panel configuration editor of the module is used to adjust the values.

A security code can protect access to critical operational sequences and timers for use by qualified engineers.

The module is housed on a robust plastic case suitable for panel mounting. Connections to the module are via locking plug and sockets.

Do not perform any procedure in this Special Instruction until you have read the information and you understand the information.

Safety Section

Do not perform any procedure in this Special Instruction until you have read this Special Instruction and you understand this information. Use only proper tools and observe all precautions that pertain to the use of those tools. Failure to follow these procedures can result in personal injury. **The following procedures should be observed.**

Work safely. Most accidents that involve product operation, maintenance, and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs.

A person must be alert to potential hazards. This person must also have the necessary training, skills, and tools to perform these functions properly.

Safety precautions and warnings are provided in this instruction and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons. Caterpillar cannot anticipate every possible circumstance of a potential hazard.

Therefore, the warnings in this publication and the warnings that are on the product are not all inclusive. Avoid using a tool, a procedure, a work method, or operating technique that is not recommended by Caterpillar.

Ensure that the product will not be damaged or the product will be made unsafe by the operation, lubrication, maintenance, or the repair procedures.

⚠ WARNING

Do not operate or work on this product unless you have read and understood the instructions and warnings in the relevant Operation and Maintenance Manuals and relevant service literature. Failure to follow the instructions or heed the warnings could result in injury or death. Proper care is your responsibility.

⚠ WARNING

When removing a major component or attachment, ensure that it is properly blocked or secured before removing mounting hardware. An assembly that is disconnected without proper blocking could shift or fall, resulting in serious injury or death of personnel or machine damage.

⚠ WARNING

Accidental engine starting can cause injury or death to personnel working on the equipment.

To avoid accidental engine starting and to bring the equipment to a zero energy state, disconnect all positive (+) and negative (−) battery cables. Install an appropriate battery cable lockout device and protect the battery posts to prevent accidental contact and shorting.

Place a Do Not Operate tag at the Start/Stop switch location to inform personnel that the equipment is being serviced.

Illustration 1 g06276183

WARNING

Never disconnect any charging unit circuit or battery circuit cable from the battery when the charging unit is operated. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released from the electrolyte through the battery outlets. Injury to personnel can be the result.

Hazardous Voltage Information

DANGER

ELECTROCUTION HAZARD - The electrical system contains hazardous voltage levels.

DO NOT remove any covers that will expose energized hazardous-voltage electrical components without shutting down and discharging the electrical system.

DO NOT perform any maintenance on the electrical system until after the electrical system has been shut down and the voltage has been discharged by qualified personnel.

Read and understand the instructions and warnings found in the Operation and Maintenance Manual to properly shut down the electrical system and discharge hazardous-voltage electrical components.

Failure to follow these instructions will result in personal injury or death.

DANGER

ELECTROCUTION HAZARD - Ensure proper grounding.

Avoid a buildup of hazardous live voltages on exposed surfaces by ensuring that all grounding wires/straps are always properly connected.

Disconnected grounding wires, including grounding wires/straps for hazardous-voltage components and electrical enclosures, must be properly reconnected before connecting equipment to the power supply.

Failure to follow these instructions will result in personal injury or death.

WARNING

When service or maintenance must be performed in a hazardous-voltage component enclosure, always assume that a hazardous voltage level could be present.

Qualified personnel should manually check for hazardous voltage using electrical measuring tools that have the capacity to measure the hazardous-voltage components being checked.

The voltage level present must be confirmed to be below 50 Volts before any exposure to the hazardous-voltage components can take place.

Failure to follow these instructions could result in personal injury or death.

There may be government regulations, local regulations, or site-specific rules that govern the operation, service, and maintenance of high-voltage components and machines. Comply with applicable rules and regulations for the work place.

Appropriate high-voltage protective equipment should be worn as defined by local rules and regulations.

Only qualified service personnel should perform service on high-voltage systems.

DO NOT remove covers, or open enclosures, that will expose energized high-voltage electrical components.

DO NOT perform service or maintenance on energized high-voltage electrical components.

High voltage can cause electrocution resulting in personal injury or death.

High-voltage components and connections must be properly maintained.

Refer to the Maintenance Section in the Operation and Maintenance Manual for additional information.

Residual energy can remain in high-voltage components even after operation has stopped. Always assume that a hazardous level of voltage could be present.

Before performing any type of service, repair, or maintenance on high-voltage electrical components, perform the following:

- Disconnect the electrical power source
- Isolate electrical components
- Discharge residual energy
- Check components for voltage using electrical measuring tools.

Note: Use electrical measuring tools that have the capacity to measure the high-voltage components being checked. The level of voltage present must be confirmed to be below 50 Volts before any exposure to the high-voltage components can take place.

Read and understand the instructions and warnings found in Operation and Maintenance Manual, "Electrical Shutdown and Voltage Discharge" , to shut down the electrical system and discharge high-voltage electrical components.

Specification

Storage Temperature

The storage temperature of the module is given in Table 2 :

Table 2

Module	Specification
Cat GCCP 1.2/1.3	-40° to 85°C (-40 ° to 185 °F)

Operating Temperature

The operating temperature of the module is given in Table 3 :

Table 3

Module	Specification
Cat GCCP 1.2/1.3	-30° to 70°C (-22° to 158°F)

Requirements for UL

Note: UL is a trademark owned by UL LLC.

Note: If more than one live circuit exists, refer to Section "Cat GCCP 1.2 Three Phase Four Wire, and Cat".

Suggested installation specifications to meet UL compliance is given Table 4 :

Table 4

Description	Specification
Screw Terminal Tightening Torque	0.5 N·m (4.42 lb in)
Conductors	Terminals suitable for connection of conductor size AWG 20 (0.5 mm^2) to AWG 13 (2.5 mm^2). Conductor protection must be provided in accordance with NFPA 70, Article 240. Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit. Separate and secure the communication, sensor, and battery derived circuit conductors. Maintain a minimum of 6 mm (0.2 inch) distance from the generator and mains connected circuit conductors, unless all conductors are rated 600 V or greater.
Current Inputs	Inputs must be connected through UL listed or recognized isolating Current Transformers (CTs) with a maximum secondary rating of 5 A.
Communication Circuits	Circuits must be connected to communication circuits of UL listed equipment.
Output Pilot Duty	0.5 A
Mounting	Suitable for use in type-one enclosure type rating with a surrounding air temperature between −30° to 70°C (-22° to 158°F). Suitable for pollution degree three environments when voltage sensing inputs do not exceed 300 V. To maintain a pollution degree two environment, install the device in an unventilated or filtered ventilation enclosure when used to monitor voltages over 300 V.
Operating Temperature	−30° to 70°C (−22° to 158°F)
Storage Temperature	−40° to 80°C (−40° to 176°F)

Terminal Specification

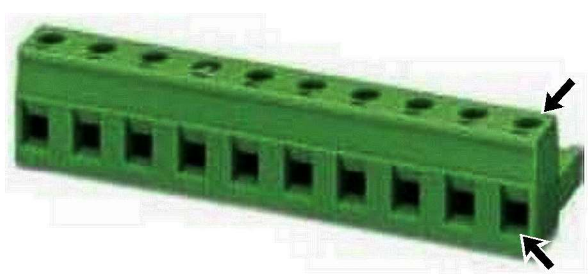


Illustration 2 g06528527

Cable Entry and Screw Terminals of a 10 Way Connector

Terminal specification of 10 Way Connector is given in Table 5 :

Table 5

Description	Specification
Connection Type	Two part connector Male part fitted to module. Female part supplied in module packing case - Screw terminal, rising clamp, no internal spring.(1)
Minimum Cable Size	AWG 20 (0.5 mm^2)
Maximum Cable Size	AWG 13 (2.5 mm^2)

(continued)

(Table 5, contd)

Description	Specification
Tightening Torque	0.5 N·m (4.42 lb in)
Wire Strip Length	7 mm (0.3 inch)

(1) Refer to Illustration 2 for cable entry and screw terminals of a 10 way connector.

Power Supply Requirements

The power supply requirement details are given in Table 6 :

Table 6

Description	Specification
Minimum Supply Voltage	8 V continuous, 5 V for up to 1 minute.
Cranking Dropouts	Survives 0 V for 100 ms when the supply is greater than 10 V before the dropout. Recovers to 5 V after sometime.
Maximum Supply Voltage	35 V continuous (60 V for 1 minute)
Reverse Polarity Protection	-35 V continuous
Maximum Operating Current	280 mA at 12 V 150 mA at 24 V
Maximum Standby Current	145 mA at 12 V 85 mA at 24 V

(continued)

(Table 6, contd)

Description	Specification
Maximum Current When In Sleep Mode	70 mA at 12 V 40 mA at 24 V
Typical Power (Controller ON, Heater OFF)	3.5 W
Typical Power (Controller ON, Heater ON)	6.5 W

Module Supply Instrumentation Display

The module supply instrumentation display specification is given in Table 7 :

Table 7

Description	Specification
Range	0 V to 70 V DC (maximum continuous operating voltage of 35 V DC)
Resolution	0.1 V
Accuracy	1% full scale (35 V)

Voltage and Frequency Sensing

The voltage and frequency sensing specification is given in Table 8 :

Table 8

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	40 kHz
Harmonics	Up to 11th grade or more.
Input Impedance	450 kΩ phase to neutral.
Phase to Neutral	15 V (minimum requirement for sensing frequency) to 415 V AC (absolute maximum) Suitable for 345 V AC nominal (±20% for under/overvoltage detection)
Phase to Phase	25 V (minimum required for sensing frequency) to 720 V AC (absolute maximum) Suitable for 600 V AC nominal (±20 % for under/overvoltage detection)
Common Mode Offset from Earth	100 V AC (max)
Resolution	1 V AC phase to neutral 2 V AC phase to phase
Accuracy	±1% full scale phase to neutral ±1% full scale phase to phase

(continued)

(Table 8, contd)

Description	Specification
Minimum Frequency	3.5 Hz
Maximum Frequency	75.0 Hz
Frequency Resolution	0.1 Hz
Frequency Accuracy	± 0.2 Hz

Current Sensing

The current sensing specification is given in Table 9 :

Table 9

Description	Specification
Measurement Type	True RMS conversion
Sample Rate	40 Hz
Harmonics	Up to 11th harmonics or more
Nominal Current Transformer (CT) Secondary Rating	5 A
Maximum Continuous Current	
Overload Measurement	15 A
Absolute Maximum Overload	50 A for 1 second
Burden	0.5 VA (0.02 R burden resistors)
Common Mode Offset	±1 V peak plant ground to Current Transformer (CT) common terminal
Resolution	25 mA
Accuracy	±1% of nominal (excluding CT error)

VA (Volt-Ampere) Rating of the CTs

Note: Details for 4 mm^2 cables are given for reference only. Connectors on Cat GCCP 1.2/1.3 control panel are only suitable for cables up to 2.5 mm^2 .

The VA burden of the module on the CTs is 0.5 VA. Depending upon the type and length of cable between the CT and the module, CTs with a greater VA rating than the module might be required.

Distance between CTs and the measuring module should be estimated and cross-referenced against the cable size chart to find the VA burden of the cable.

If the CTs are fitted within the alternator top box, connect the star point (common) of the CTs to system ground (Earth) closer to the CTs. Closer connections minimize the length of cable used to connect the CTs to Cat GCCP 1.2/1.3 control panel.

Example

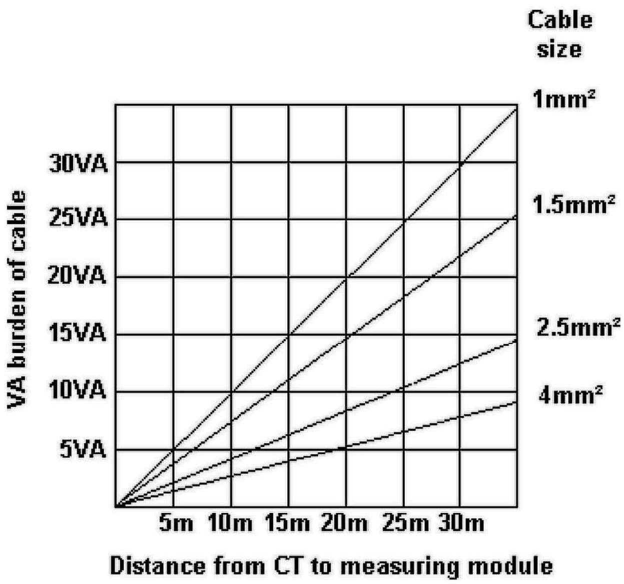


Illustration 3 g06528528

Cable Size

If a 1.5 mm^2 cable is used and the distance between CT and measuring module is 20.0 m (65.62 ft), VA burden of the cable would approximately be 15 VA. As VA burden of Cat GCCP 1.2/1.3 controller is 0.5 VA, use a CT with rating of at least 15.5 VA (15 VA + 0.5 VA).

If 2.5 mm^2 cables are used over the same distance as the 1.5 mm^2 , the VA burden of the cable on the CT would be approximately 7 VA. CTs required for this instance are at least 7.5 VA (7 VA + 0.5 VA).

Graphical representation of the distance between CT and the measuring module against VA burden of the cable, along with the cable size is given in Illustration 3.

CT Polarity

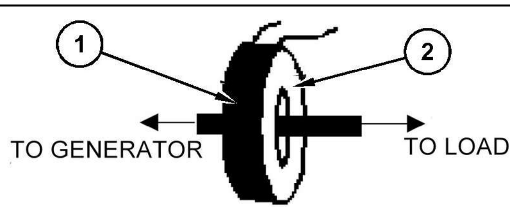


Illustration 4 g06528538

Polarity of CT Primary

(1) Side facing Generator (Labeled as p1, k, or K)
(2) Side facing Load (Labeled as p2, l, or L)

Note: Ensure correct polarity of the CT primary.

Incorrect CT orientation would lead to negative kW readings when the set is supplying power. Use labeling in the casing as an indicator of orientation, if available.

To test the orientation, run the generator in parallel mode and load the generator to around 10% of the set rating. Do not run the generator in parallel with any other supply while testing the orientation. Ensure that Cat GCCP 1.2/1.3 control panel shows positive kW for all three individual phase readings. Illustration 4 shows the polarity of CT primary.

CT Phasing

Ensure that the CTs are connected to the correct phases. For example, CT on phase 1 should be connected to the terminal on Cat GCCP 1.2/1.3 control panel intended for the CT Phase 1 connection.

Ensure that voltage sensing for phase 1 is connected to generator phase 1. Incorrect connection of phases results in incorrect power factor measurements, which in turn results in incorrect kW measurements.

Use a single-phase load to check for incorrect connection. Place the load on each phase, run the generator, and ensure that the kW value appears in the correct phase. For example, if the load is connected to phase 3, ensure that the kW figure appears on phase 3 display. The kW figure must not appear on phase 1 or phase 2 display.

CT Class

Ensure that the correct CT type is chosen. For instance, if Cat GCCP 1.2/1.3 control panel provides overcurrent protection, ensure that the CT could measure the overload level required to protect against, and accurately.

Fit a protection class CT (P15 type) to maintain high accuracy while the CT is measuring overload currents.

If Cat GCCP 1.2/1.3 control panel uses CT for instrumentation only (current protection disabled or not fitted to the controller), measurement class CTs can be used. Consider the level of accuracy that is required for your application. Cat GCCP 1.2/1.3 control panel is accurate to more than 1% of the full-scale current reading. To maintain the level of accuracy, a class 0.5 or class 1 CT must be used.

Inputs

Digital Inputs

The digital input specification is given in Table 10 :

Table 10

Description	Specification
Number	Eight configurable digital inputs (12 inputs in case if the “Analogue Inputs” are configured as digital inputs).
Arrangement	Contact between terminal and ground
Low-Level Threshold	2.1 V minimum
High-Level Threshold	6.6 V maximum
Maximum Input Voltage	+60 V DC for plant supply negative
Minimum Input Voltage	-24 V DC for plant supply negative
Contact Wetting Current	5 mA typical
Open Circuit Voltage	12 V typical

Emergency Stop

The emergency stop specification is given in Table 11 :

Table 11

Description	Specification
Arrangement	Contact between terminal and module supply positive
Closed Threshold	5 V minimum
Open Threshold	5 V maximum
Maximum Input Voltage	+35 V DC for plant supply negative (60 V protection for 1 minute)
Minimum Input Voltage	-24 V DC for plant supply negative
Open Circuit Voltage	0 V

Analogue Inputs

All analogue inputs are flexible within Cat GCCP 1.2/1.3 modules.

Analogue Input A

Table 12

Description	Specification
Input Type	Flexible: Configured for Oil Sensor in Cat GCCP 1.2/1.3 default configuration Flexible Options: Not Used, Digital Input, Flexible Analogue Oil Sensor, and Temperature Sensor
Flexible Input Selection	Pressure Sensor, Percentage Sensor, or Temperature Sensor
Flexible Measured Quantity	Current, Resistive, or Voltage

The resistive configuration specification is given in Table 13 :

Table 13

Resistive Configuration	
Description	Specification
Measurement Type	Resistance measurement by measuring voltage across sensor with a fixed current applied.
Arrangement	Differential resistance measurement input
Measurement Current	15 ± 2 mA
Full Scale	240 Ω
Over Range / Fail	350 Ω
Resolution	±1% of full scale
Accuracy	±2% of full scale resistance (±9.6 Ω) excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by Personal Computer software (PC software)

Table 14

0 V to 10 V Configuration	
Description	Specification
Full Scale	0 V to 10 V
Over Range / Fail	11 V
Resolution	±1% of full scale
Accuracy	±2% of full scale voltage ±0.2 V excluding sensor error

(continued)

(Table 14, contd)

0 V to 10 V Configuration	
Descrip-tion	**Specification**
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Table 15

4 mA to 20 mA Configuration	
Descrip-tion	**Specification**
Full Scale	0 mA to 20 mA
Over Range / Fail	22 mA
Resolution	±1% of full scale
Accuracy	±2% of full scale current ±0.4 mA excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Analogue Input B and C

Table 16

Descrip-tion	Specification
Analogue Input B Type	Flexible: Configured for Temperature Sensor in Cat GCCP 1.2/1.3 default configuration Not used, Digital Input, Flexible Analogue, Fuel Sensor, and Temperature Sensor
Analogue Input C Type	Flexible: Configured for Fuel Sensor in Cat GCCP 1.2/1.3 default configuration Flexible Options: Not used, Digital Input, Flexible Analogue, Fuel Sensor, and Temperature Sensor
Flexible Input Selection	Flexible Input Selection, Pressure Sensor, Percentage Sensor, or Temperature Sensor
Flexible Measured Quantity	Resistive only

Table 17

Resistive Configuration	
Descrip-tion	**Specification**
Measurement Type	Resistance is measured by measuring voltage across the sensor with a fixed current applied.
Arrangement	Differential resistance measurement input
Measurement Current	13 ± 10 mA
Full Scale	3 kΩ
Over Range / Fail	5 kΩ
Resolution	±1% of full scale
Accuracy	±2% of full scale resistance excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Analogue Input D

Table 18

Descrip-tion	Specification
Analogue Input D Type	Flexible: Configured for Temperature Sensor in Cat GCCP 1.2/1.3 default configuration Flexible Options: Not Used, Digital Input, Flexible Analogue, Fuel Sensor, and Temperature Sensor
Flexible Input Selection	Pressure Sensor, Percentage Sensor, or Temperature Sensor
Flexible Measured Quantity	Current, Resistive, or Voltage

Table 19

Resistive Configuration	
Descrip-tion	**Specification**
Measurement Type	Resistance is measured by measuring voltage across sensor with a fixed current applied.
Arrangement	Differential resistance measurement input
Measurement Current	13 ± 2 mA
Full Scale	3 kΩ
Over Range / Fail	5 kΩ
Resolution	±1% of full scale

(continued)

(Table 19, contd)

Resistive Configuration	
Description	Specification
Accuracy	±2% of full scale resistance (±9.6 Ω) excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Table 20

0 V to 10 V Configuration	
Description	Specification
Full Scale	0 V to 10 V
Over Range / Fail	11 V
Resolution	±1% of full scale
Accuracy	±2% of full scale voltage (±0.2 V) excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Table 21

4 mA to 20 mA Configuration	
Description	Specification
Full Scale	0 mA to 20 mA
Over Range / Fail	22 mA
Resolution	1% of full scale
Accuracy	±2% of full scale current (±0.4 mA) excluding sensor error
Maximum Common Mode Voltage	±2 V
Display Range	Configurable by PC software

Charge Fail Input

Charge Fail Input is a combined input and output. The terminal provides excitation current to charge the alternator field winding when the generator is required to run. Voltage of the terminal is close to the plant battery supply voltage when the charge alternator is correctly charging the battery.

In a failed charge situation, the voltage of the terminal drops down to low voltage. The drop in voltage triggers the "Charge Failure" alarm. The level at which the alarm operates and triggers a warning or shutdown alarm is configurable using Cat GCCP 1.2/ 1.3 Configuration Suite Software.

Table 22

Description	Specification
Minimum Voltage	0 V
Maximum Voltage	35 V
Resolution	0.2 V
Accuracy	±1% of full scale
Excitation	Active circuit constant power output
Output Power	2.5 W nominal at 12 V and 24 V
Current at 12V	210 mA
Current at 24V	105 mA

Magnetic Pick-Up

Requirements for Magnetic Pickup devices (MPU devices) when used with Cat GCCP 1.2/1.3 control panel is given in Table 23 .

Table 23

Description	Specification
Type	Differential input
Minimum Voltage	0.5 V RMS
Maximum Voltage	60 V RMS
Max Common Mode Voltage	±2 V peak
Minimum Frequency	5 Hz
Maximum Frequency	10,000 Hz
Resolution	6.25 rpm
Accuracy	± 25 rpm
Flywheel Teeth	10 to 500

Outputs

DC Outputs A and B (Fuel and Start)

Table 24

Description	Specification
Type	Normally used as Fuel and Start outputs. Fully configurable for other purposes if the module is configured to control an electronic engine, supplied from DC supply terminal 2.
Rating	10 A resistive for 10 seconds, 5 A resistance continuous at module supply

Configurable DC Inputs C, D, E, F, G, and H

Table 25

Description	Specification
Type	Fully configurable, supplied from DC supply terminal 2
Rating	2 A resistive at module supply

Communication Ports

Note: All communication ports can be used at the same time.

Table 26

Description	Specification
Universal Serial Bus port (USB port)	Type B USB 2.0 For connection to PC running Cat GCCP 1.2/1.3 Configuration Suite Software. Maximum distance is 5 m (16.4 ft)
RS485 Serial Ports	Isolated port Data connection 2 wire + common Half Duplex Data direction control for Transmit (by software protocol) Baud Rate 115.2 baud subject to configuration External termination required (120 Ω) Maximum common mode offset voltage is 56 V (on board protection transorb) Maximum distance 1.2 km (0.75 miles)
ECU Port	Engine Controller Area Network port (CAN port) standard implementation of slow mode up to 250 kbit/s Non-Isolated Internal termination enabled by software configuration provided (120 Ω) maximum distance 40 m (131.2 ft).

(continued)

(Table 26, contd)

Description	Specification
Cat ® (Expansion Comms) Port	Non-isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by software protocol). Maximum Baud Rate of 115 Kbaud internal termination fitted (120 Ω) Max common mode offset ±5 V maximum distance 1.2 km (0.75 miles)

Communication Port Usage

USB Slave Port (PC Configuration)

Note: DC supply must be connected to the module for PC configuration.

A USB port is provided to give a simple means of connection between a PC and the controller. The operator can perform the following actions using Cat GCCP 1.2/1.3 Configuration Suite Software:

- Control the module
- Start or stop the engine
- Select operating modes
- Activate various other functions

Various operating parameters such as coolant temperature and oil pressure, of the engine are available to be viewed or changed.

Illustration 5 g06528633

Cat GCCP 1.2/1.3 Control Panel

Illustration 6 g06528637

Cat Configuration Suite PC Software

Illustration 7 g06528634

USB Cable Type A to Type B

Items shown in Illustrations 5, 6, and 7 are required to connect the module to the PC using a USB. The cable shown in Illustration 7 is the same cable often used to connect a PC to a printer.

RS485 Port

Note: For a single module for PC connection and distances up to 6 m (19.7 ft), USB connection method is more suitable and lower-cost alternative to RS485. RS485 cable is more suited for longer distance connections.

RS485 port on the controller supports MODBUS Remote Terminal Unit protocol (RTU protocol) and connects to a single MODBUS master device only.

Cat GCCP 1.2/1.3 MODBUS register table for the controller is available upon request from the authorized Cat Dealer.

RS485 is used for point-to-point cable connection of more than one device (maximum 32 devices), and for connections to PCs, PLCs, and Building Management Systems.

The long-distance specification (1.2 km (0.75 miles)) of RS485 interface is an advantage when using BELDEN 9841 (or equivalent) cable. The long-distance specification allows large distance between the module and a PC running Cat GCCP 1.2/1.3 Configuration Suite software.

Note: BELDEN is a trademark owned by BELDEN INC.

The operator can control the module, starting, or stopping the engine, selecting operating modes, and so on. The various operating parameters such as coolant temperature and oil pressure of the remote engine can be viewed or changed.

Many PCs may not have an internal RS485 serial port. Caterpillar DOES NOT recommend the use of USB for RS485 convertors but does recommend PC add-ons add an RS485 port to the computer.

Cable Specification

Note: Cat GCCP 1.2/1.3 utilizes BELDEN 9841 (or equivalent) cable for RS485 communication. The cable is rated to a maximum length of 1.2 km (0.75 miles).

Table 27

Description	Specification
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω impedance Low capacitance
Recommended Cable	BELDEN 9841 BELDEN 9271
Maximum Cable Length	1.2 km (0.75 miles) when using BELDEN 9841 or direct equivalent 600 m (656.4 yd) when using BELDEN 9271 or direct equivalent
RS485 Topology	“Daisy Chain” bus with no stubs (spurs).
RS485 Termination	120 Ω Not fitted internally to module Must be fitted externally to the “first” and “last” device on RS485 link.

RS485 Used for MODBUS Engine Connection

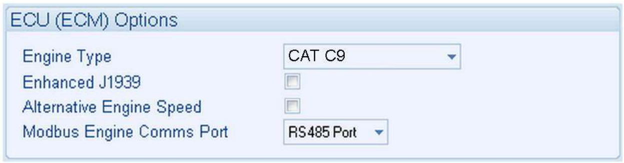


Illustration 8 g06528694

RS485

RS485 port can be configured for connection to units equipped with MODBUS capable controllers. The connection leaves DSENet interface free for connection to expansion devices.

Note: DSENet is a trademark of Deep Sea Electronics Inc.

Note: RS485 interface is no longer an available connection for remote monitoring equipment (Building Management System, PLC, or PC RS232 port), or dual mutual system.

An example of configuring DSENet for connection to Genset using Cat GCCP 1.2/1.3 Configuration Suite Software is shown in Illustration 8.

Electronic Control Unit Port (ECU Port) (SAE J1939)

Note: A screened 120 Ω impedance cable specified for use with CAN must be used for CAN link. Cat GCCP 1.2/1.3 utilizes BELDEN 9841 (or equivalent) cable for RS485 communication. The cable is rated to a maximum length of 1.2 km (0.75 miles).

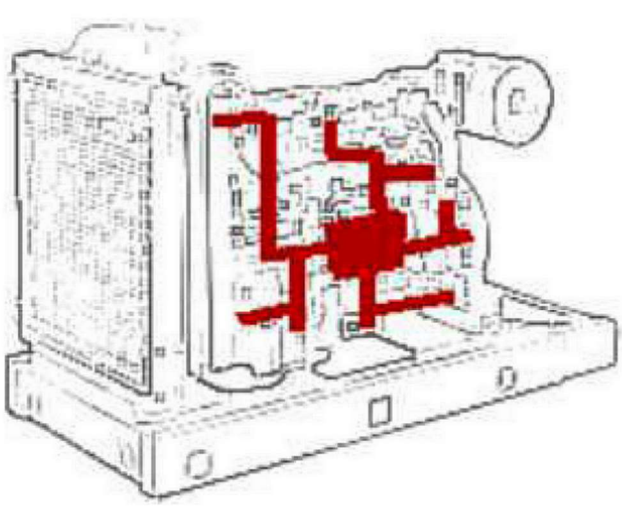


Illustration 9 g06528709

Engine

Modules are fitted with CAN interface as standard and receives engine data from engine ECU or Electronic Control Modules (ECMs) compliant with CAN SAE J1939 standard.

ECU or ECMs monitor operating parameters of engine such as speed, oil pressure, coolant temperature, to monitor closely and control the engine.

Industry standard communications interface (CAN) transports data gathered by ECU or ECM of the engine using SAE J1939 protocol. The data transport allows Cat GCCP 1.2/1.3 control panel to access the engine parameters without any physical connection to the sensor device.

The ECU port is used for point-to-point cable connection of more than one device and connections to CAN scanner, PLC, and CAN controllers and so on. The operator can now view the various operating parameters of the engine.

SAE J1939-75

Note: Refer to Section "CAN Interface Specification (SAE J1939-75)" for further details of CAN communication.

When SAE J1939-75 is enabled in the module configuration, the module AC measurements and alarms configuration are sent to the CAN bus using the ECU port. The AC measurements and alarms configuration are received through an external monitoring device.

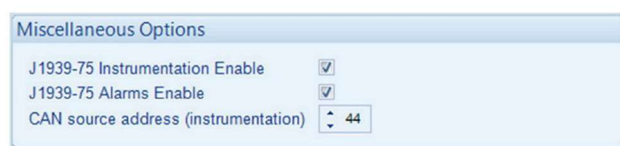


Illustration 10 g06528716

SAE J1939-75

There are two check boxes to enable each of the two parts of the interface, AC measurement and AC-related alarms. Refer to Illustration 10 for the two options. The module AC alarms are translated into SAE J1939 Diagnostic Messages 1 (DM1). No additional display screens are visible on the module when the options are selected.

The default CAN source address for additional SAE J1939-75 messages is 44. The address can be changed by the generator supplier.

Cat ® Expansion Modules

Note: Controller must be the first unit on the DSENet link as a termination resistor is internally fitted to the controller. The resistor must be fitted to the last unit on the DSENet link. Refer to Section “Typical Arrangement of DSENet, and DSENet” for connection details.

Note: Caterpillar recommends utilizing BELDEN 9841 (or equivalent) cable for DSENet communication. The cable is rated to a maximum length of 1.2 km (0.75 miles).

DSENet is the interconnection cable between the host controller and the expansion modules.

Do not connect interconnection cable to any device other than Cat equipment designed for connection to DSENet.

Table 28

Description	Specification
Cable Type	Two core screened and shielded twisted pair
Cable Characteristics	120 Ω impedance Low capacitance
Recommended Cable	BELDEN 9841 BELDEN 9271
Maximum Cable Length	1.2 km (0.75 miles) when using BELDEN 9841 or direct equivalent. 600 m (656.4 yd) when using BELDEN 9271 or direct equivalent.
DSENet Topology	“Daisy Chain” bus with no stubs (spurs).
DSENet Termination	120 Ω Fitted internally to the host controller. Must be fitted externally to the last expansion module.
Maximum Expansion Modules	Total 20 devices can make up the DSENet. Maximum 32 additional 0-10 V or 4-20 mA outputs Maximum 80 additional relay outputs Maximum 80 additional Light Emitting Diode indicators (LED indicators) Maximum 24 additional Resistance Temperature Device (RTD) or thermocouple inputs Maximum 4 Cat GCCP Battery Chargers

Note: Only supported Cat GCCP Intelligent Battery Chargers can be connected to DSENet. Contact the authorized Caterpillar Dealer for further information.

The following are the possibilities given by maximum expansion modules:

- 32 additional 0-10 V or 4-20 mA outputs
- 80 additional relay outputs
- 80 additional LED indicators
- 24 additional RTD or thermocouple inputs
- 4 Cat GCCP Battery Chargers

DSENet Used for MODBUS Engine Connection

The DSENet uses an RS485 hardware interface. This port can be configured for connection to units equipped with MODBUS capable controllers. The configuration leaves the RS485 interface free for connection to remote monitoring equipment (Building Management System, PLC, or PC RS485).

Note: The DSENet interface will not be available for connection to expansion devices, when the port is configured for connection for use with MODBUS capable controllers.

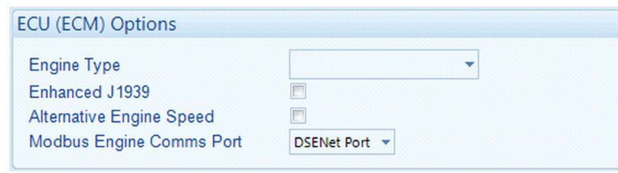


Illustration 11 g06529025

An example of configuring the DSENet for connection to a Genset using Cat GCCP 1.2/1.3 Configuration Suit Software is shown in Illustration 11.

Adding an External Sounder

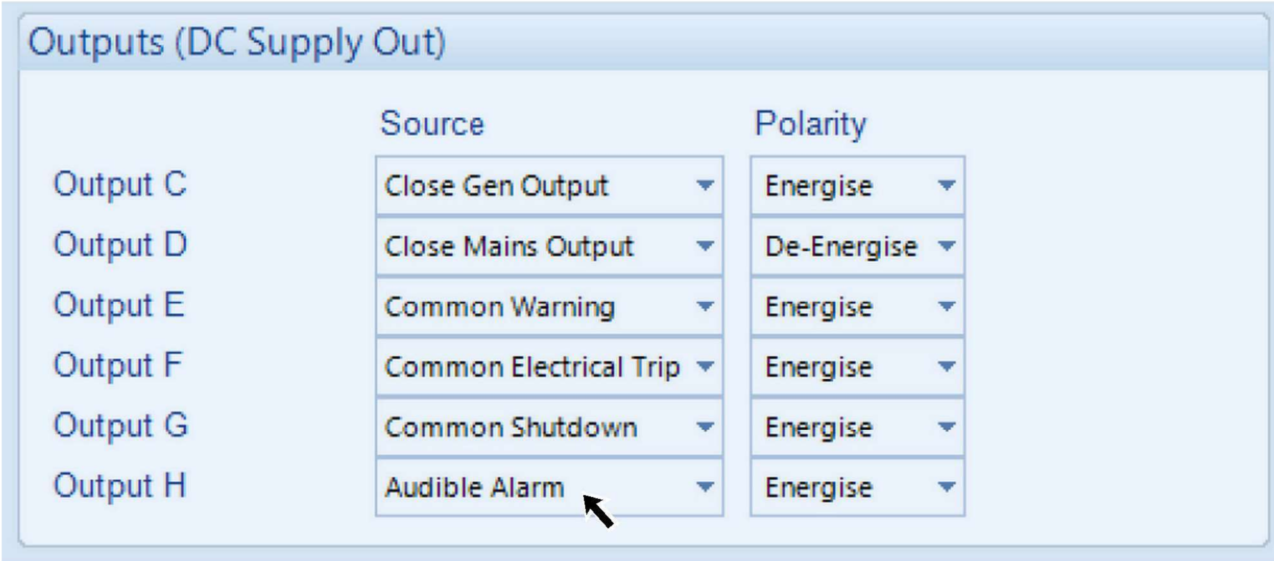


Illustration 12 g06529033

Audible Alarm

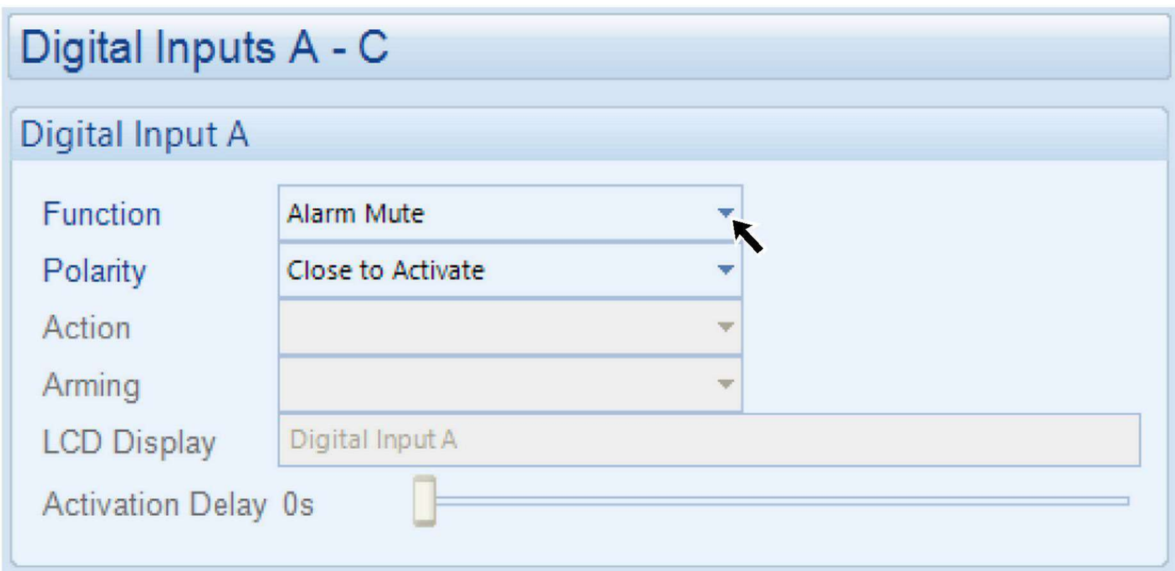


Illustration 13 g06529034

Alarm Mute

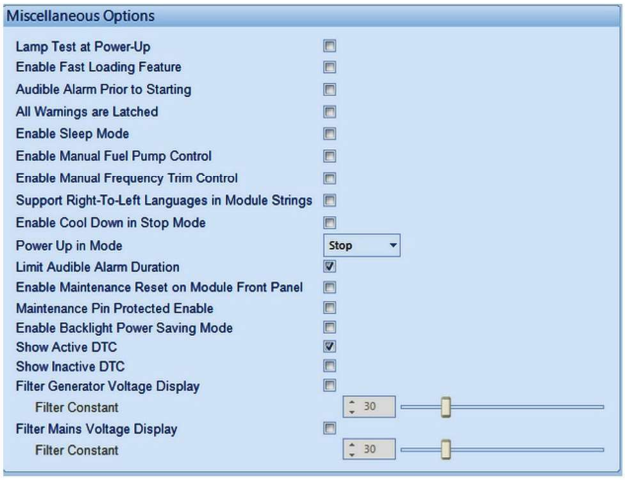


Illustration 14 g06538583

Miscellaneous Options

Cat GCCP 1.2/1.3 does not have an internal sounder. Hence an external alarm or indicator is required.

An external alarm or indicator can be utilized by the following means:

- Using Cat GCCP 1.2/1.3 Configuration Suite PC software to configure an auxiliary output for “Audible Alarm”
- Configuring an auxiliary input for “Alarm Mute”

The “Audible Alarm” output deactivates when the Alarm Mute input activates or after “Audible Alarm Duration” time ceases.

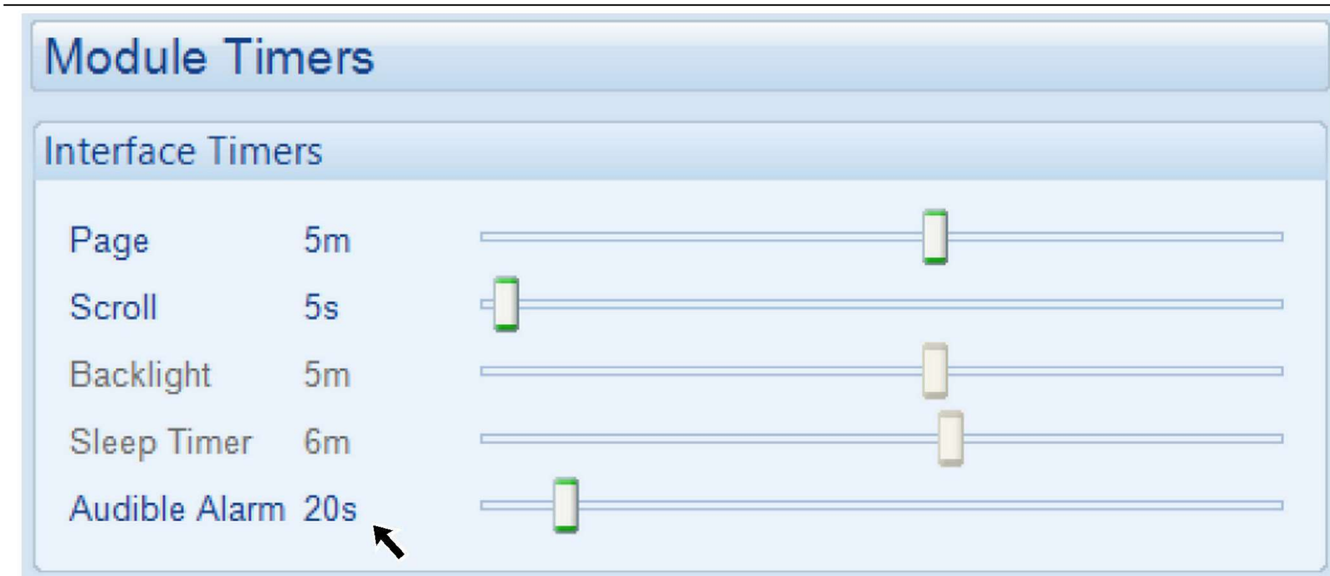


Illustration 15 g06529041

Module Timers

An example of configuration to achieve external sounder with external alarm mute/lamp test button or an automatic mute after 20 seconds is shown in Illustration 15.

Accumulated Instrumentation

Note: When an accumulated instrumentation value exceeds the maximum number, the value is reset and begins counting from zero again.

The amount of logged "Engine Hours" and "Number of Starts" can be set or reset using Cat GCCP 1.2/1.3 Configuration Suite PC Software.

The options may be locked with a Personal Identification Number (PIN) by Caterpillar depending upon the module configuration.

Table 29

Description	Specification
Engine Hours Run	Maximum 99999 hours 59 minutes (approximately 11 years 4 months).
Number of Starts	1,000,000 (1 Million)
Accumulated Power	999999 kWh/kvarh/kVAh

Dimensions and Mounting

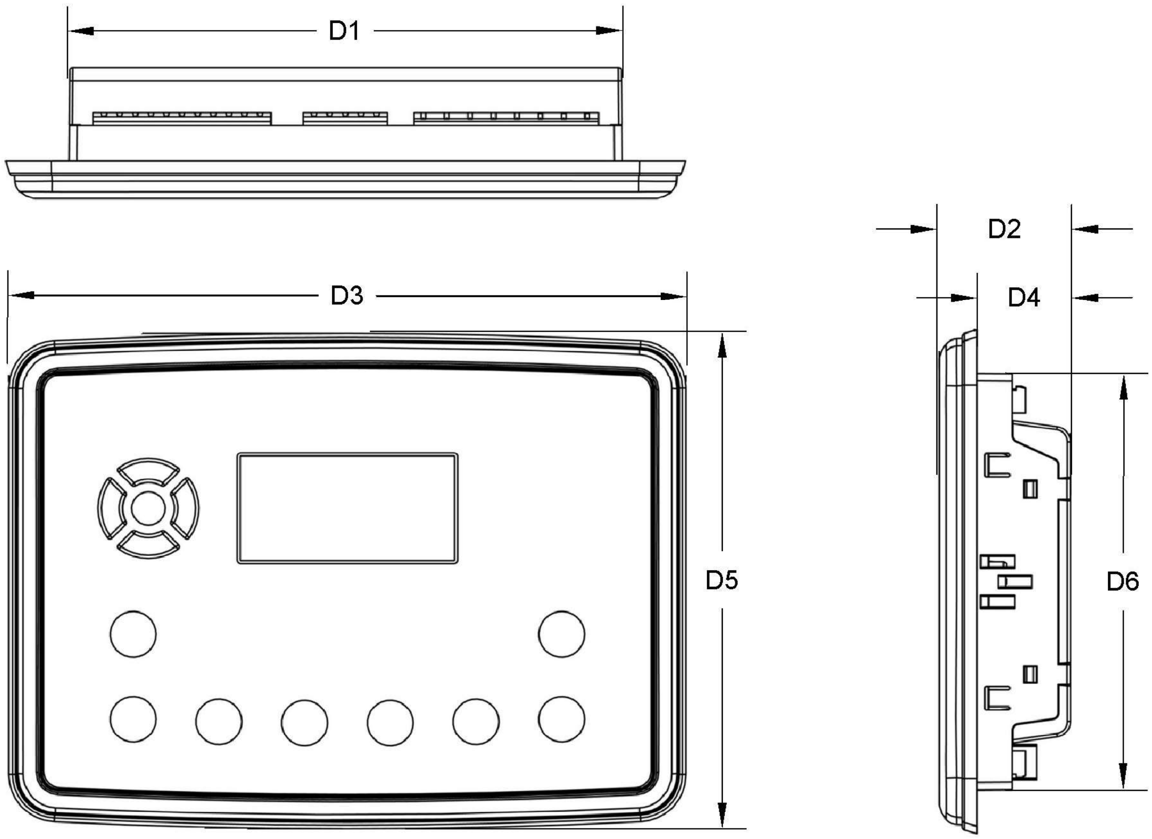


Illustration 16 g06529054

Dimensions of Module

(D1) 184 mm (7.2 inch)
(D2) 42.5 mm (1.67 inch)
(D3) 221 mm (8.7 inch)
(D4) 31 mm (1.2 inch)
(D5) 163 mm (6.4 inch)
(D6) 137 mm (5.4 inch)

Dimensions

The dimensions of the module are 245 mm (9.6 inch) x 184 mm (7.2 inch) x 51 mm (2.0 inch).

Panel Cutout

The dimensions of panel cutout of the module are 220 mm (8.7 inch) x 160 mm (6.3 inch).

Module Weight

The weight of the module is 0.98 kg (2.161 lb).

Fixing Clips

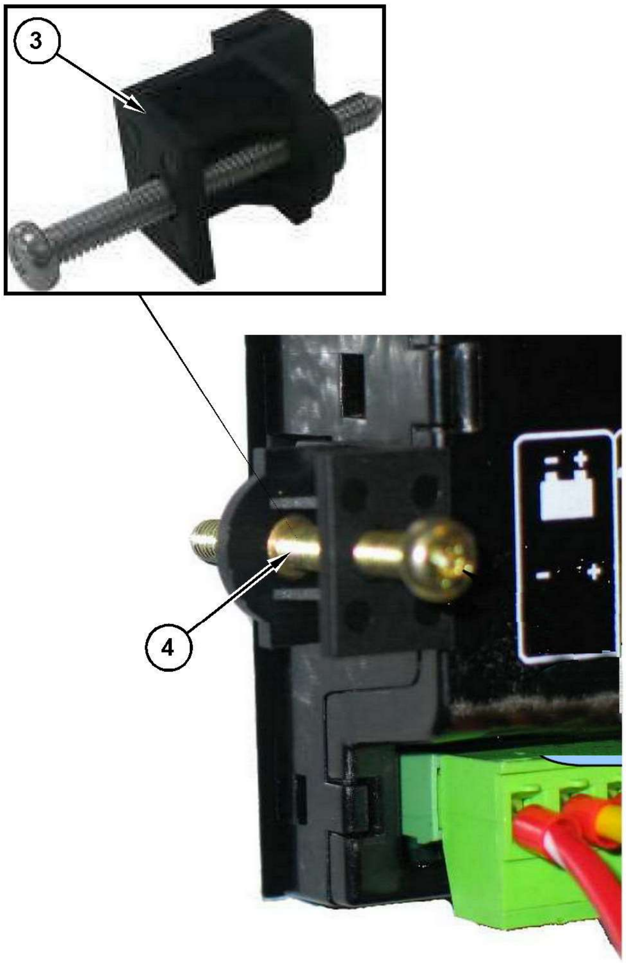


Illustration 17 g06529072

Location of Fixing Clips on the Module

(3) Fixing Clip
(4) Fixing Clip Screw

The module is held into the panel fascia using the supplied fixing clip (3). Follow the below procedure to fix the module:

1. Withdraw fixing clip screw (4) (turn counterclockwise) until only the pointed end protrudes from fixing clip (3).

2. Insert the three prongs of fixing clip (3) into the slots at the side of the module case.

3. Pull fixing clip (3) backwards (towards the back of the module) ensuring all the three prongs of the clip are inside the allotted slots.

4. Turn fixing clip screws (4) in clockwise direction until the screws reach the panel fascia.

5. Turn the screw a quarter of a turn to secure the module into the panel fascia.

Note: Do not overtighten fixing clip screws (4).

Cable Tie Fixing Points

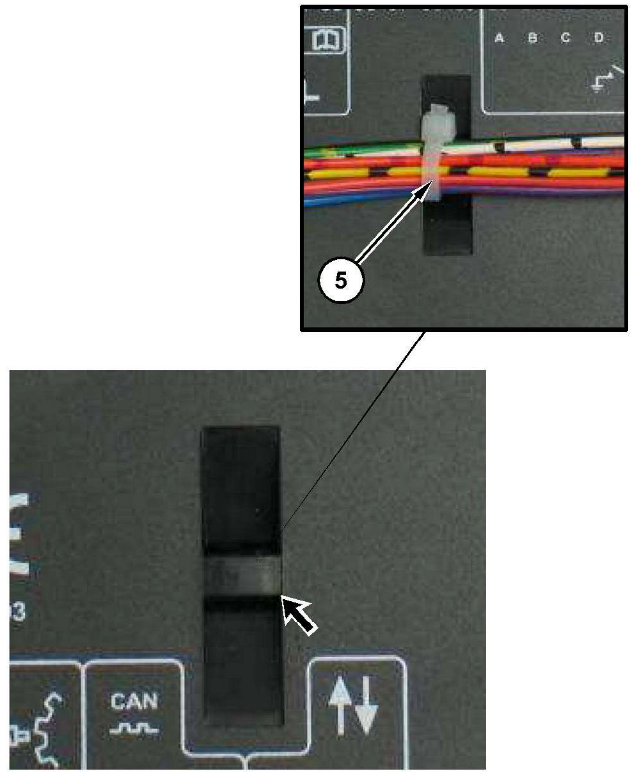


Illustration 18 g06529089

Location of Fixing Clips on the Module

(5) Cable Tie

Cable tie (5) fixing points are included at the rear side of the case of the module to aid wiring.

Including the fixing points at the rear side relieves strain to the cable loom by removing the weight of the loom from the screw connectors. This action reduces the chance of future connection failures.

Do not overtighten cable tie (5) (for instance with cable tie tools). Overtightening might damage the module case.

Silicon Sealing Gasket

Illustration 19 g06529093

Location of Fixing Clips on the Module

(6) Silicon Gasket

Silicon gasket (6) improves sealing between the module and the panel fascia. The gasket is fitted to the module before installing into the panel fascia.

Note: Ensure that silicon gasket (6) is correctly fitted to the module to maintain the integrity of the seal.

Applicable Standards

Table 30

Standard	Description
BS EN 60068-2-1 (Minimum temperature)	−30° C (−22° F)
BS EN 60068-2-2 (Maximum temperature)	70° C (158° F)

(continued)

(Table 30, contd)

Standard	Description
BS EN 60068-2-6 (Vibration)	Ten sweeps in each of three major axes 5 Hz to 8 Hz at ± 7.5 mm (0.30 inch) 8 Hz to 500 Hz at g_n
BS EN 60068-2-27 (Shock)	Three shocks in each of three major axes 15 g_n in ms.
BS EN 60068-2-30 (Damp heat cyclic)	20° C (68° F) to 55° C (131° F) at 95% for 48 hours
BS EN 60068-2-78 (Damp heat static)	40° C (104° F) at 95% for 48 hours
BS EN 60950 (Electrical safety)	Safety of information technology equipment, including electrical business equipment.
BS EN 61000-6-2 (Electro-magnetic Compatibility)	Electromagnetic Compatibility (EMC) Generic Immunity Standard (Industrial).
BS EN 61000-6-4 (Electro-magnetic Compatibility)	EMC Generic Emission Standard (Industrial).
BS EN 60529 (Degrees of protection provided by enclosures)	IP65 (front of the module when installed into the control panel with the optional sealing gasket). IP42 (front of the module when installed into the control panel WITHOUT being sealed to the panel).

(continued)

(Table 30, contd)

Standard	Description
UL 508, National Electrical Manufacturers Association (NEMA) rating (approximate)	12 (front of the module when installed into the control panel with the optional sealing gasket). 2 (front of the module when installed into the control panel WITHOUT being sealed to the panel).
IEEE C37.2 (Standard Electrical Power System Device Function Numbers and Contact Designations)	Under the scope of IEEE 37.2, function numbers can also be used to represent functions in microprocessor devices and software programs. Device number of the controller is 11L-8000 (multifunction device protecting Line (generator) - module). As the module is configurable for "IEEE C37.2" by the generator Original Equipment Manufacturer (OEM), functions covered by the module may vary. Depending on the module configuration, the device numbers included within the module could be as given below: 2- Time delay starting or closing relay 3- Checking or interlocking relay 5- Stopping device 8- Control power disconnecting device 10- Unit sequence switch 11- Multifunction device 12- Overspeed device 14- Underspeed device 49- Machine or transformer thermal relay 50- Instantaneous overcurrent relay 51- AC time overcurrent relay 52- AC circuit breaker 53- AC circuit breaker 54- Turning gear engaging relay 55- Power factor relay (using internal PLC editor) 59AC- AC overvoltage relay 59DC- DC overvoltage relay 62- Time delay stopping or opening relay 63- Pressure switch 71- Level switch 74- Alarm relay 78- Phase angle measuring relay 79- Reclosing relay (using internal PLC editor) 81- Frequency relay 83- Automatic selective control or transfer relay 86- Lockout relay

(continued)

(Table 30, contd)

Enclosure Classifications

IP Classifications

Module specification under BS EN 60529 degrees of protection provided by enclosures.

Note: IP65 (front of the module when module is installed into the control panel with the optional sealing gasket).

Note: IP42 (front of the module when module is installed into the control panel WITHOUT being sealed to the panel).

Table 31

First Digit	Second Digit
Protection Against Contact and Ingress of Solid Objects	**Protection Against Ingress of Water**
0 - No protection	0 - No protection
1 - Protection against ingress solid objects with a diameter of more than 50 mm (2.0 inch). No protection against deliberate access. For example, with a hand, but large surfaces of the body are prevented from approach.	1 - Protection against dripping water falling vertically. No harmful effect must be produced (vertically falling drops).
2 - Protection against penetration of solid objects with a diameter of more than 12 mm (0.5 inch). Fingers or similar objects prevented from approach.	2 - Protection against dripping water falling vertically. There must be no harmful effect when the equipment (enclosure) is tilted up to 15 degrees from the normal position (drops falling at an angle).
3 - Protection against ingress of solid objects with a diameter of more than 2.5 mm (0.10 inch). Tool wires and so on, with a thickness of more than 2.5 mm (0.10 inch) are prevented from approach.	3 - Protection against water falling at any angle up to 60 degrees from the vertical. There must be no harmful effect (spray water).
4 - Protection against ingress of solid objects with a diameter of more than 1.0 mm (0.04 inch). Tools, wires, and so on, with a thickness of more than 1.0 mm (0.04 inch) are prevented from approach.	4 - Protection against water splash against the equipment (enclosure) from any direction. There must be no harmful effect (splashing water).
5 - Protection against harmful dust deposits. Ingress of dust is not prevented completely, but the dust must not enter in sufficient quantity to interface with satisfactory operation of the equipment. Complete protection against contact.	5 - Protection against water projected from a nozzle against the equipment (enclosure) from any direction. There must be no harmful effect (water jet).
6 - Protection against ingress of dust (dust-tight). Complete protection against contact.	6 - Protection against heavy seas or powerful water jets. Water must not enter the equipment (enclosure) in harmful quantities (splashing over).

NEMA Classification

Note: There is no direct equivalence between Internet Protocol (IP)/NEMA ratings (National Electrical Manufacturers Association ratings). IP figures shown are only approximate.

12 – Front of the module when module is installed into the control panel with the optional sealing gasket.

2 – Front of the module when module is installed into the control panel WITHOUT being sealed to the panel.

NEMA ratings are given the Table 32 :

Table 32

Rating	Description
1 IP30	Provides protection contact with the enclosure equipment and against dirt falling.
2 IP31	Provides protection against limited amounts of falling water and dirt.
3 IP64	Provides protection against windblown dust, rain, and sleet. Undamaged by the formation of ice on the enclosure.
3R IP32	Provides protection against rain and sleet. Undamaged by the formation of ice on the enclosure.

(continued)

(Table 32, contd)

Rating	Description
4 (X) IP66	Provides protection against splashing water, wind-blown dust, and rain, hose directed water. Undamaged by the formation of ice on the enclosure. (resist corrosion).
12/12K IP65	Provides protection against dust, falling dirt, and dripping non-corrosive liquids.
13 IP65	Provides protection against dust and spraying of water, oil, and non-corrosive coolants.

Installation Procedure

The module is mounted on the panel fascia. For dimensions and mounting details, refer to Section “Dimensions and Mounting”.

User Connections

Note: Availability of some terminals depends upon the module version.

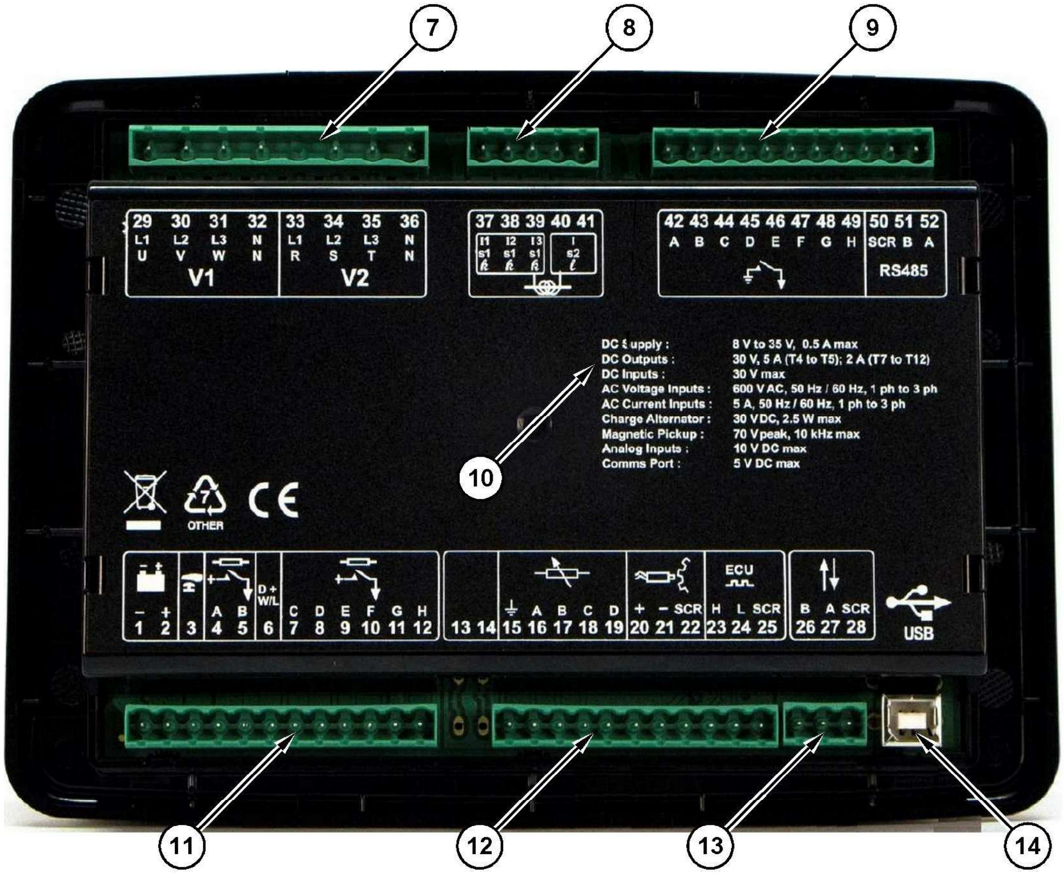


Illustration 20 g06529211

Icons on Rear Side of the Module

(7) Terminals 29 to 36
(8) Terminals 37 to 41
(9) Terminals 50 to 52
(10) UL Ratings
(11) Terminals 1 to 12
(12) Terminals 15 to 25
(13) Terminals 26 to 28
(14) USB Port

To aid user connection, icons are used on the rear of the module to help identify terminal functions. An example is shown in Illustration 20.

Connection Description

DC Supply, E-Stop Input, DC Outputs, and Charge Fail Input

Note: "Fuel" and "Start" output requirements may be different when the module is configured for operation with an electronic engine. Refer to the appropriate electrical schematic of the Engine.

Table 33

Pin	Description	Cable Size	Notes
1	DC Plant Supply Input (Negative)	AWG 13 (2.5 mm²)	Connect to ground where applicable.
2	DC Plant Supply Input (Positive)	AWG 13 (2.5 mm²)	Supplies the module and DC Outputs C, D, E, F, G & H
3	Emergency Stop Input	AWG 13 (2.5 mm²)	Plant Supply Positive. Supplies DC Outputs A & B.

(continued)

(Table 33, contd)

Pin	Description	Cable Size	Notes
4	DC Output A (FUEL)	AWG 13 (2.5 mm^2)	Plant Supply Positive from terminal 3. 5 A DC rated Fixed as fuel relay if electronic engine is not configured.
5	DC Output B (START)	AWG 13 (2.5 mm^2)	Plant Supply Positive from terminal 3. 5 A DC rated Fixed as start relay if electronic engine is not configured.
6	Charge Fail / Excite	AWG 13 (2.5 mm^2)	Do not connect to ground (battery negative). If charge alternator is not fitted, leave this terminal disconnected.
7	DC Output C	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.
8	DC Output D	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.
9	DC Output E	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.
10	DC Output F	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.
11	DC Output G	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.
12	DC Output H	AWG 18 (1.0 mm^2)	Plant Supply Positive from terminal 2. 2 A DC rated.

Analogue Sensor Inputs, MPU, and ECU

Note: Terminal 15 (sensor common) MUST be connected to the Earth point on the “Engine Block” and not within the control panel. The terminal must provide an electrical connection to the sensor bodies. The connection MUST NOT be used to provide an Earth connection for other terminals or devices. Run a separate Earth connection from the system Earth star point to terminal 15 directly, to avoid using the Earthing point for other connections.

Note: Ensure not to insulate the entire thread while using PTFE insulating tape on the sensor thread when using Earth return sensors. Insulating the entire thread prevents the sensor body from being Earthed via the engine block.

Note: A screened 120 Ω impedance cable specified for use with CAN must be used for the CAN ECU links. Caterpillar recommends utilizing BELDEN 9841 (or equivalent) cable for RS485 communication. The cable must be rated to a maximum length of 1.2 km (0.75 miles).

Note: For further details on connection to electric engines, refer to the appropriate electrical schematic of the Engine.

Table 34

Pin	Description	Cable Size	Notes
15	Sensor Common Return	AWG 20 (0.5 mm^2)	Ground Return Feed For Sensors
16	Analogue Sensor Input A	AWG 20 (0.5 mm^2)	Connect To Oil Pressure Sensor
17	Analogue Sensor Input B	AWG 20 (0.5 mm^2)	Connect To Coolant Temperature Sensor
18	Analogue Sensor Input C	AWG 20 (0.5 mm^2)	Connect To Fuel Level Sensor
19	Analogue Sensor Input D	AWG 20 (0.5 mm^2)	Connect To Extra Sensor (User Configurable)
20	Magnetic Pickup Positive	AWG 20 (0.5 mm^2)	Connect To Magnetic Pickup Device
21	Magnetic Pickup Negative	AWG 20 (0.5 mm^2)	Connect To Magnetic Pickup Device
22	Magnetic Pickup Screen	Shield	Connect To Ground At One End Only
23	CAN Port H	AWG 20 (0.5 mm^2)	Use only 120 Ω CAN or RS485 approved cable
24	CAN Port L	AWG 20 (0.5 mm^2)	Use only 120 Ω CAN or RS485 approved cable
25	CAN Port Screen	Shield	Use only 120 Ω CAN or RS485 approved cable

DSE Net

Note: The controller must be the first unit on the DSENet link, as a termination resistor is internally fitted to the controller. The termination MUST be fitted to the last unit on the DSENet link.

Table 35

Pin No	Description	Cable Size	Notes
26	DSENet Expansion B	AWG 20 (0.5 mm²)	Use only 120 Ω CAN or RS485 approved cable
37	DSENet Expansion A	AWG 20 (0.5 mm²)	Use only 120 Ω CAN or RS485 approved cable
28	DSENet Expansion Screen	Shield	Use only 120 Ω CAN or RS485 approved cable

V1 (Generator), V2 (Mains) Voltage, and Frequency Sensing

Table 36

Pin No	Description	Cable Size	Notes
29	Generator L1 (U) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to generator L1 (U) output (AC) (recommend 2 A fuse)
30	Generator L2 (V) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to generator L2 (V) output (AC) (recommend 2 A fuse)
31	Generator L3 (W) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to generator L3 (W) output (AC) (recommend 2 A fuse)
32	Generator Neutral (N) Input	AWG 18 (1.0 mm²)	Connect to generator Neutral terminal (AC)
33	Bus L1 (R) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to Bus L1 (R) output (AC) (recommend 2 A fuse)
34	Bus L2 (S) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to Bus L2 (S) output (AC) (recommend 2 A fuse)
35	Bus L3 (T) Voltage Sensing	AWG 18 (1.0 mm²)	Connect to Bus L3 (T) output (AC) (recommend 2 A fuse)
36	Bus Neutral (N) Input	AWG 18 (1.0 mm²)	Connect to Bus Neutral terminal (AC)

Note: Connection to a three phase, four wire alternator is described in Table 36 .

Note: Terminals 33 to 36 (V2) are not fitted to Cat GCCP 1.2/1.3.

Current Transformers

Note: The module has a VA burden of 0.25 VA on the CT. Ensure that the CT is rated for the burden of the controller, the cable length being used, and any other equipment sharing the CT. Consult with the CT supplier for any queries.

Table 37

Pin No	Description	Cable Size	Notes
37	CT Secondary for L1	AWG 13 (2.5 mm²)	Connect to s1 secondary of L1 monitoring CT
38	CT Secondary for L2	AWG 13 (2.5 mm²)	Connect to s1 secondary of L2 monitoring CT
39	CT Secondary for L3	AWG 13 (2.5 mm²)	Connect to s1 secondary of L3 monitoring CT
40	CT Common	AWG 13 (2.5 mm²)	Connect to s2 secondary of L1, L2 & L3 monitoring CTs and ground

Note: Ensure correct polarity of the CT primary as shown in Table 37 . Consult with the CT supplier if there are doubts.

CT Connections

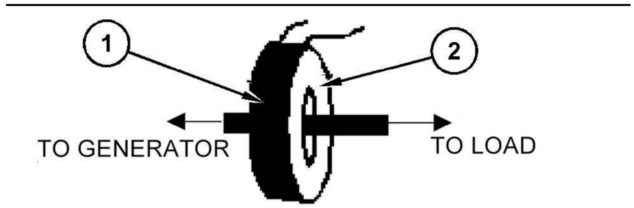


Illustration 21 g06528538

CT Connections

(1) Side facing Generator (Labeled as p1, k, or K)
(2) Side facing Load (Labeled as p2, l, or L)

Side facing Generator (labeled as p1, k, or K) (1) is the primary of the CT that points towards the Generator.

Side facing Load (labeled as p2, l, or L) (2) is the primary of the CT that points towards the Load.

s1 is the secondary of the CT that connects to the input for CT measuring of Cat GCCP 1.2/1.3 control panel.

s2 is the secondary of the CT that should be connected with s2 connections of all the other CTs. s2 is connected to the CT common terminal of the module.

Digital Inputs and RS485 Port

Table 38

Pin No	Description	Cable Size	Notes
42	Configurable Digital Input A	AWG 20 (0.5 mm^2)	Switch To Negative
43	Configurable Digital Input B	AWG 20 (0.5 mm^2)	Switch To Negative
44	Configurable Digital Input C	AWG 20 (0.5 mm^2)	Switch To Negative
45	Configurable Digital Input D	AWG 20 (0.5 mm^2)	Switch To Negative
46	Configurable Digital Input E	AWG 20 (0.5 mm^2)	Switch To Negative
47	Configurable Digital Input F	AWG 20 (0.5 mm^2)	Switch To Negative
48	Configurable Digital Input G	AWG 20 (0.5 mm^2)	Switch To Negative
49	Configurable Digital Input H	AWG 20 (0.5 mm^2)	Switch To Negative
50	RS485 Port Screen	Shield	Use only 120 Ω CAN or RS485 approved cable
51	RS485 Port B (+)	AWG 20 (0.5 mm^2)	Connect to RXD + and TXD+Use only 120 Ω CAN or RS485 approved cable
52	RS485 Port A (-)	AWG 20 (0.5 mm^2)	Connect to RXD- and TXD- Use only 120 Ω CAN or RS485 approved cable

Note: Fit a 120 Ω termination resistor across terminals A and B if Cat GCCP 1.2/1.3 control panel is the first or last device on R485 link.

Note: Screened 120 Ω impedance cable specified for use with CAN must be used for CAN ECU link. Caterpillar recommends utilizing BELDEN 9841 (or equivalent) cable for RS485 communication. The cable is rated to a maximum length of 1.2 km (0.75 miles). Refer to Table 38 for cable sizes.

USB Slave (PC Configuration) Connector

Illustration 22 g06529177

Socket for Connection to PC with Cat GCCP 1.2/1.3 Configuration Software

Illustration 23 g06528634

USB Type A to Type B Connector

Note: USB connection cable between the PC and the module must not be extended beyond 5 m (16.4 ft). For distances over 5 m (16.4 ft), there is a possibility of using a third-party USB extender. The USB can be extended up to 50 m (164.0 ft).

Note: Do not overload the USB system of the PCs by connecting more than the recommended number of USB devices to the PC. Consult the PC supplier for further information.

Cat GCCP 1.2 Three Phase Four Wire

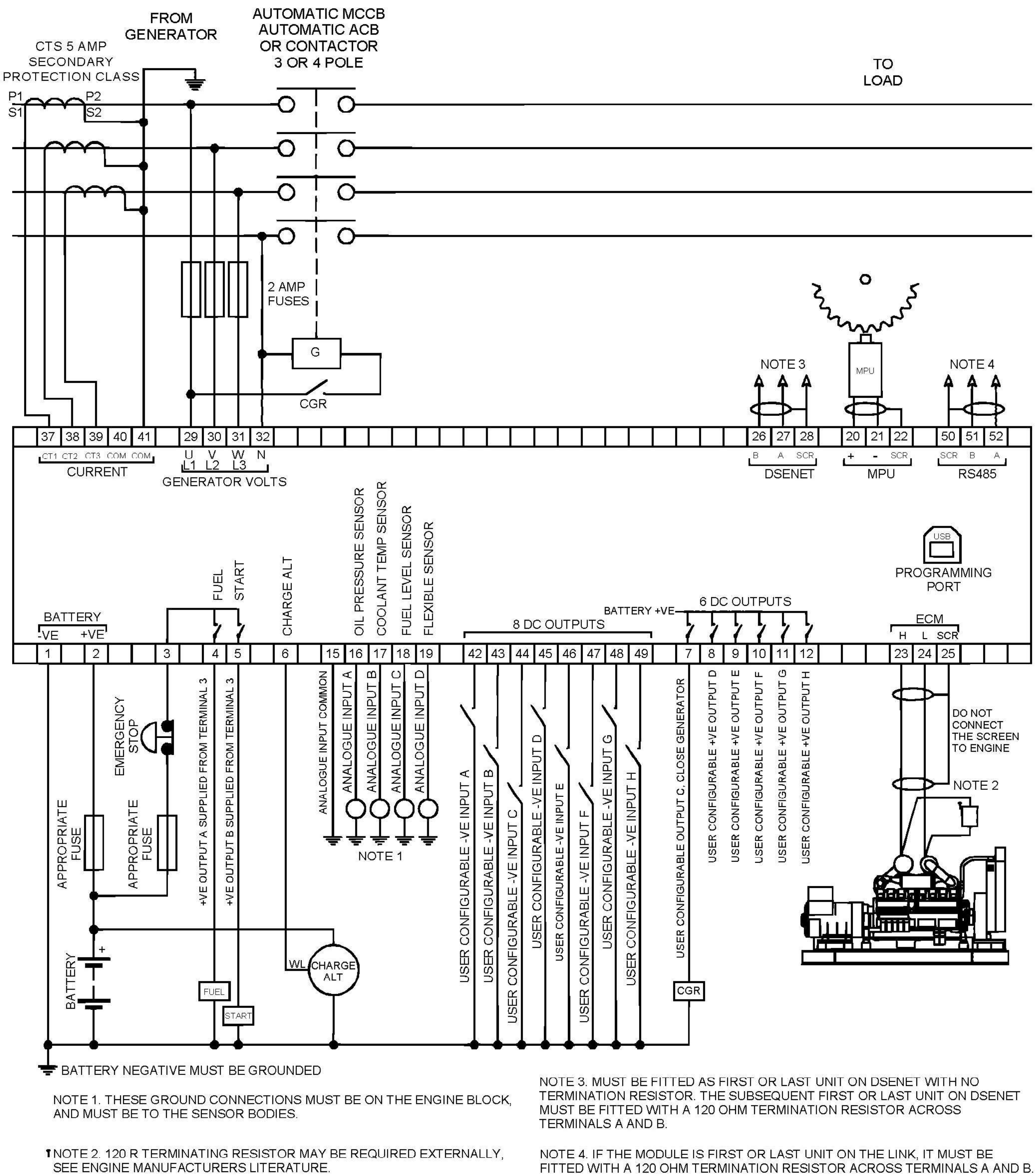


Illustration 24 g06548182

Typical Wiring Diagram of Cat GCCP 1.2 Three Phase, Four Wire

Note 1 – Ground connections must be on the engine block and must be to the sensor bodies.

Note 2 – 120 Ω terminating resistor may be required externally.

Note 3 – Must be fitted as the first or the last unit on DSENet with no termination resistor. The subsequent first or last unit on DSENet must be fitted with a 120 Ω termination resistor across terminals A and B.

Note 4 – The module is first or last unit on the link. The module must be fitted with a 120 Ω termination resistor across terminals A and B.

A typical three phase four wire system is shown in Illustration 24. As every system has different requirements, the Illustration 24 does not intend to show a complete system . Contact the authorized Cat Dealer for further information.

Illustration 24 is applicable for the following AC topologies:

- Three Phase four Wire Star
- Three Phase four Wire Delta L1-N-L2
- Three Phase four Wire Delta L1-N-L3
- Three Phase four Wire Delta L2-N-L3

Cat GCCP 1.3 Three Phase Four Wire

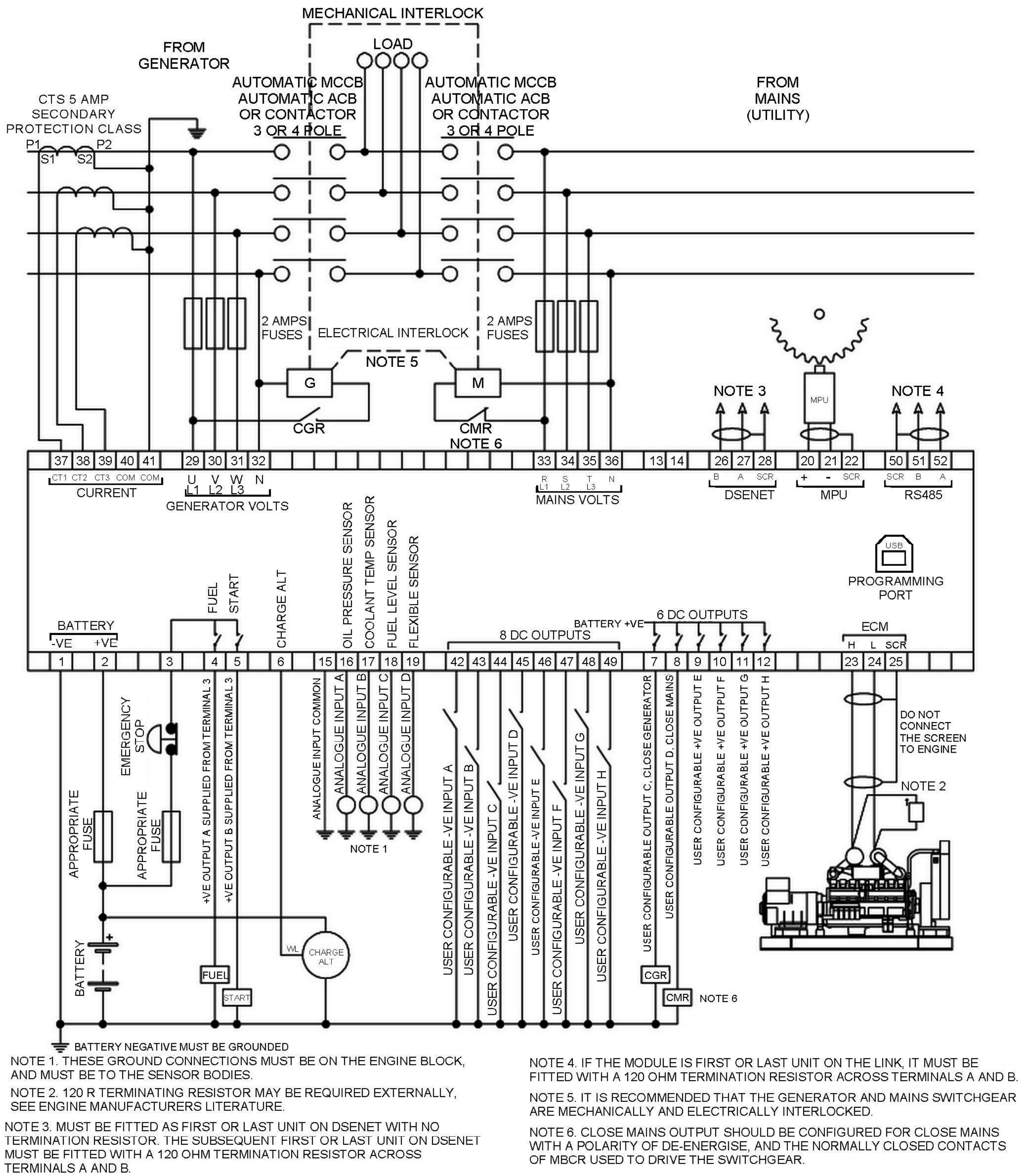


Illustration 25 g06610176

Cat GCCP 1.3 Three Phase Four Wire

Note 1 – Ground connections must be on the engine block and must be to the sensor bodies.

Note 2 – 120 Ω terminating resistor may be required externally.

Note 3 – Must be fitted as the first or the last unit on DSENet with no termination resistor. The subsequent first or last unit on DSENet must be fitted with a 120 Ω termination resistor across terminals A and B.

Note 4 – The module is first or last unit on the link. The module must be fitted with a 120 Ω termination resistor across terminals A and B.

Note 5 – Recommended to mechanically and electrically interlock generator and switchgear.

Note 6 – Close mains output should be configured for close mains of MBCR used to drive the switchgear.

Negative Earth

Typical wiring diagram shown in Illustration 24 shows connections for a negative Earth system (battery negative connects to Earth).

Positive Earth

The following points must be followed when using a Cat GCCP 1.2/1.3 control panel with a Positive Earth System (battery positive connects to Earth):

- Follow the typical wiring diagram shown in Illustration 24 as common for all sections except for the Earth points.
- All points shown as Earth in the typical diagram shown in Illustration 24 should connect to the battery negative (not Earth).

Floating Earth

The following points must be followed when the battery positive and/or battery negative terminals are not connected to Earth:

- Follow the typical wiring diagram as normal for all sections except the Earth points.
- All points shown as Earth in Illustration 24 should connect to the negative of the battery (not Earth).

Typical Arrangement of DSENet

Note: This feature is not available if Cat GCCP 1.2/ 1.3 control panel has been configured to use the DSENet port as an interface to ECU.

Note: Screened 120 Ω impedance cable specified for use with CAN must be used for the DSENet (RS485) connection.

20 devices can be connected to DSENet, made up of the devices listed in Table 39 :

Table 39

Device	Maximum Number Supported
Cat GCCP 1.2/1.3 Input Expansion	4
Cat GCCP 1.2/1.3 Output Expansion	10
Cat GCCP 1.2/1.3 Remote Annunciator	10
Cat GCCP 1.2/1.3 Battery Chargers	4

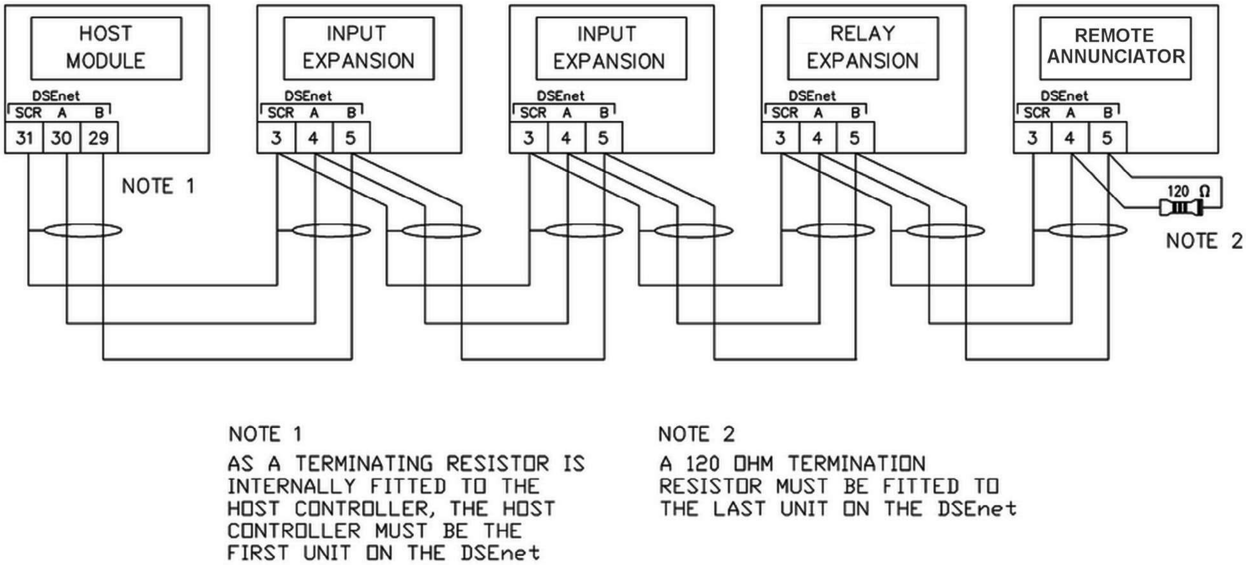


Illustration 26 g06529220

Typical Arrangement of DSENet

Note 1 – The host controller must be the first unit on the DSENet, as the terminating resistor is internally fitted to the host controller.

Note 2 – A 120 Ω termination resistor must be fitted to the last unit on DSENet.

Description of Controls

Note: The module may instruct an engine start event due to external influences.

Note: Prior to performing any maintenance on the system, remove the battery and isolate the supplies, as the engine might start at any time without warning.

Note: The following description details the sequences followed by a module containing the standard factory configuration. Refer to the configuration source for the exact sequences and timers observed by any particular module in the field.

Module control is via push buttons mounted on the front of the module “Stop/Reset Mode” , “Manual Mode” , “Auto Mode” , “Alarm Mute and Lamp Test” , and “Start” functions.

Only operate the above controls for a normal operation.

Cat GCCP 1.2 and Cat GCCP 1.3 Modules

Illustration 27 g06531405

Cat GCCP 1.2 Module

(15) Menu Navigation Button
(16) Module Display/Generator Display
(17) Open Generator Button
(18) Mains LED Button
(19) Close Generator Button
(20) Stop/Reset Mode Button
(21) Selected Mode Indication LED
(22) Manual Mode Button
(23) Auto Mode Button
(24) Alarm Mute and Lamp Test Button
(25) Start Button

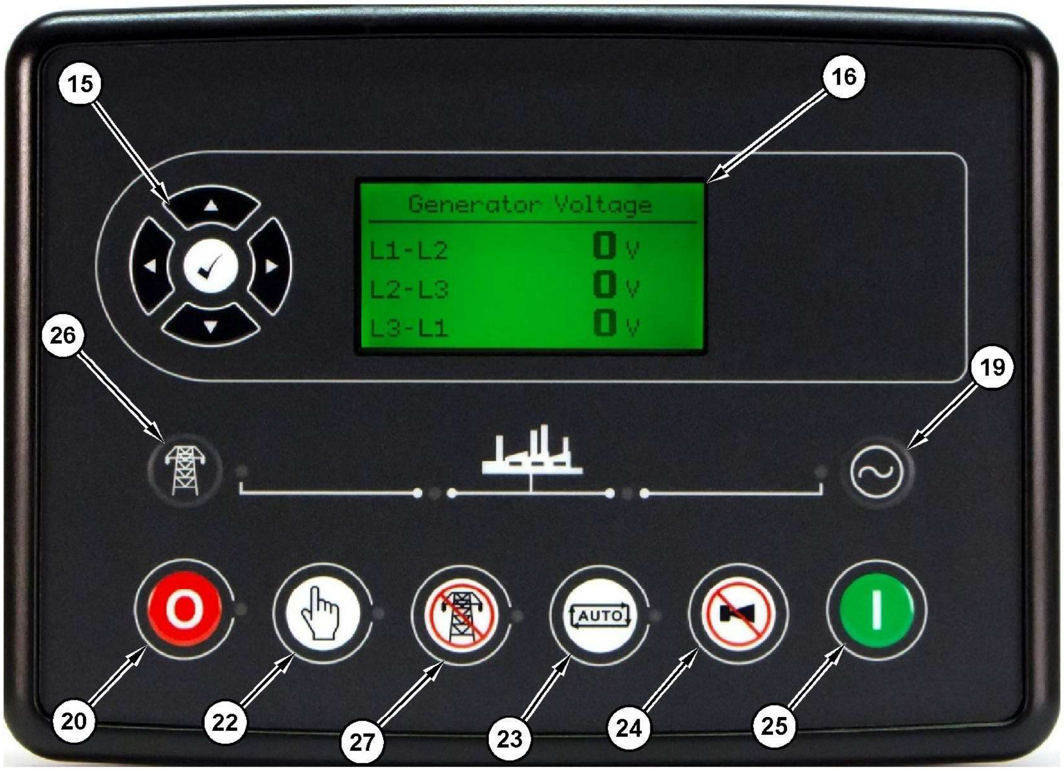


Illustration 28 g06610245

Cat GCCP 1.3 Module

(15) Menu Navigation Button
(16) Module Display/Generator Display
(19) Close Generator Button
(20) Stop/Reset Mode Button
(22) Manual Mode Button
(23) Auto Mode Button
(24) Alarm Mute and Lamp Test Button
(25) Start Button
(26) Transfer to Mains
(27) Test Mode

Illustration 29 g06610246

Cat GCCP 1.3 Module

(18) Mains LED Button
(21) Selected Mode Indication LED
(28) Mains available LED
(29) Generator Breaker LED
(30) Generator Available LED

Control Push Buttons

Note: For further details, refer to Section "Operation" in the document.

Stop/Reset Mode Button (20) – Pressing stop/reset mode button (20) puts the module in stop/reset mode. Pressing the button clears any alarm condition for which the triggering criteria has been activated.
If the engine is running and the module is put into stop/reset mode, the module automatically instructs the generator off load ("Close Generator Output" becomes inactive if used).

The fuel supply de-energizes and the engine comes to a standstill. When in stop/reset mode, the generator remains at rest if any form of start signal is present.

Manual Mode Button (22) – Pressing manual mode button (22) puts the module in manual mode. When in manual mode, the module responds to start button (25) to start the generator and run off load.

To place the generator on load, use the transfer to generator button (19). The module automatically instructs the changeover device to take the mains off load ("Close Mains Output" becomes inactive) and place the generator on load.

Use open generator button (17) to place the generator off load . The module automatically instructs the changeover device to take the generator off load and place the mains on load.

Additional digital inputs can be assigned to perform the functions.

If the engine is running off-load in manual mode and load signal becomes active, the module automatically instructs the changeover device to take mains off load. The generator is then placed on load.

Upon removal of the on load signal, the generator remains on load until either "Stop/Reset Mode" or "Auto Mode" is selected.

Auto Mode (23) – Pressing auto mode button (23) puts the module in auto mode. In auto mode, the module can control the function of the generator automatically.

The module monitors numerous start requests and when a start request is received, the set is automatically started. Once the generator is available, mains is taken off load and the generator is placed on load.

Upon removal of the starting signal, the module starts the return delay timer. Once the timer expires, the module takes the generator off load and place the mains on load.

The generator then continues to run during the cooling timer, until stopped. The module then waits for the next start event.

Alarm Mute/Lamp Test Button (24) – Alarm mute/lamp test button (24) puts the audible alarm in the controller in silent mode. The button de-activates the audible alarm output (if configured) and illuminates all the LEDs on the fascia module as a lamp test function.

Start Button (25) – Start button (25) is only active in the “Stop/Reset Mode” , “Manual Mode” , and “Test Mode” .

Pressing start button (25) in stop/reset mode, powers up the engine ECU but does not start the engine.

Pressing start button (25) in manual mode or test mode starts and runs the generator off load in manual mode or on load in test mode.

Menu Navigation Button (15) – Menu navigation button (15) is used for navigating the instrumentation, event log, and configuration screens.

Open Generator Button (17) – Open generator button (17) is active only in manual mode. Pressing the button when the generator is on load opens the generator load switch. Pressing the button further has no effect.

Viewing Instrument Pages

Scroll to view the different pages of information by repeatedly pressing the next and previous page buttons in the menu navigation button (15).

Note: A complete order and content of each information page are given in the following sections.

Once selected, the page remains on the Liquid Crystal Display (LCD) until the user selects a different page. The module reverts to the status display after certain period of inactivity (LCD page timer).

If no button is pressed upon entering an instrumentation page, the instruments displayed are automatically subjected to the setting of the LCD scroll timer. The LCD page and LCD scroll timers are configurable using Cat GCCP 1.2/1.3 Configuration Suite Software or by using the Front Panel Editor.

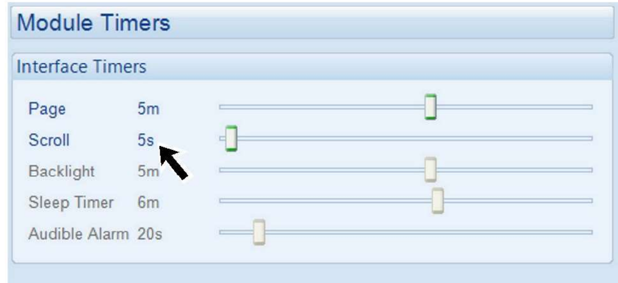


Illustration 30 g06529234

Factory Settings for Timers

Factory settings for module timers are shown in Illustration 30. Press the instrumentation scroll button or menu navigation button (15) to scroll manually through all instruments on the currently selected page.

Note: Auto scroll is disabled. Scroll to the title of instrumentation page (i.e “Engine”) to re-enable “Auto scroll”

After a short time (the duration of LCD scroll timer), the instrumentation display begins to auto scroll. When scrolling manually, the display automatically returns to the “Status” page if no buttons are pressed during the configuration LCD page timer.

The display shows the alarms page to draw the attention of the operator to the alarm condition, if an alarm activates while viewing the status page.

Status

Note: Press menu navigation button (15) on the status page to view other configurable status screens, if configured.

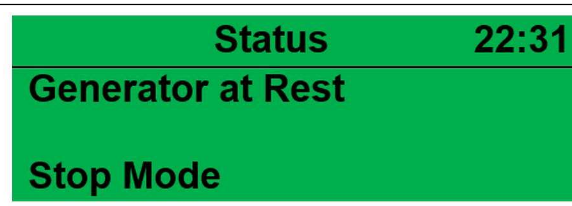


Illustration 31 g06533355

Factory Setting of Status Screen Showing Engine Stopped

“Home” page of the status page is shown in Illustration 31. The page is displayed when no other page has been selected. Status page is also automatically displayed after a certain period of inactivity (duration of LCD page timer) of the module control buttons.

Illustration 32 g06529505

Engine Running

"Status" screen changes with the action of the controller. For example, when the Generator is running and available, the display shows that the Generator is available. Refer to Illustration 32.

Generator Locked Out

Illustration 33 g06529506

Generator Locked Out

"Generator Locked Out" message shown in Illustration 33 indicates that the generator cannot be started due to an active "Shutdown or Electric Trip Alarm" on the module. Press the next button or the previous page button to clear the alarm, if the alarm does not clear the fault.

Waiting for Generator

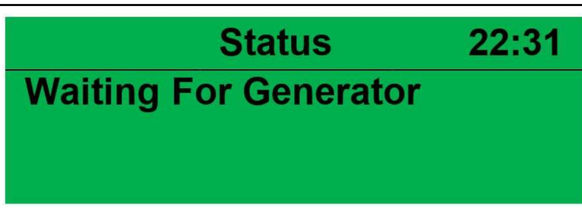


Illustration 34 g06529508

Generator Waiting

"Waiting for Generator" message shown in Illustration 34 indicates that the generator has started but not reached the required loading voltage and/or loading frequency as set in the module configuration. Press the next page or previous page button. Scroll to the "Generator" page to check if the generator voltage and frequency is higher than the configured voltage and loading frequency.

Configurable Status Screens

Illustration 35 g06529557

Configurable Status Screen

Note: Contents of "Home Page" are configurable and can be changed to display various information broadcast on the CAN network. An example of "Home Page" being changed to show engine CAN related information is shown in Illustration 35 .

Engine

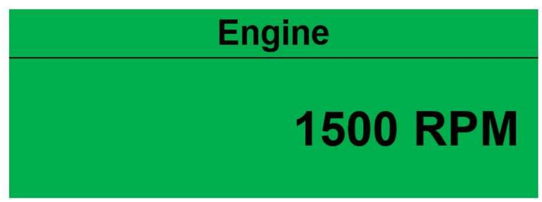


Illustration 36 g06529559

Engine Page

The "Engine" page contains information about the engine, measured or derived from the inputs of the module or obtained from the engine ECU.

* – Denotes CAN ECU-specific information

- Engine Speed
- Engine Oil Pressure
- Engine Coolant Temperature
- Engine Battery Voltage
- Engine Run Time
- Engine Fuel Level
- Engine Oil Temperature*
- Engine Inlet Temperature*
- Engine Turbo Pressure*
- Engine Percent Torque*

- Engine Demand Torque*
- Engine Percent Load*
- Non Friction Torque*
- Engine Oil Level*
- Engine Coolant Level*
- Cooling Fan Speed Level*
- Electrical Potential
- DEF Tank Level*
- DEF Level Status*
- SCR-DEF Lamps*
- SCR Action Timer*
- Engine Link*
- ECU Regeneration*
- ECU Regeneration Icons*
- Engine Soot Levels*
- DEF Tank Temperature*
- DEF Reagent Cons*
- SCR After Treatment Status*
- CAN Bus Information*
- Instant Fuel Rate
- Coolant Pressure*
- Exhaust Temperature*
- Fuel Temperature*
- Fuel Pressure*
- Fuel Consumption*
- Fuel Used*
- Flexible Sensors
- Engine Maintenance Alarm 1
- Engine Maintenance Alarm 2
- Engine Maintenance Alarm 3
- After Treatment Fuel Used*
- After Treatment Exhaust Gad Temperature*
- Engine Crank Case Pressure*
- Engine Injector Rail Pressure*
- Engine Exhaust Temperature*
- Intercooler Temperature*
- Turbo Oil Pressure*
- Fan Speed*
- Water In Fuel*
- Air Inlet Pressure*
- ECU ECR DEF Icons*
- DEF Counter Minimum*
- DPTC Filter Status*
- Engine ECU Link*
- Tire 4 Engine Information*

Manual Fuel Pump Control

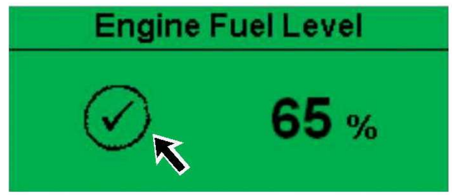


Illustration 37 g06529565

Engine Fuel Level Page

"Engine Fuel Level" page shown in Illustration 37 may have a tick icon depending upon the module configuration. The tick icon denotes that manual fuel pump control is available. Pressing and holding the Tick button allows manual fuel pump control.

DPF Regeneration Lamps

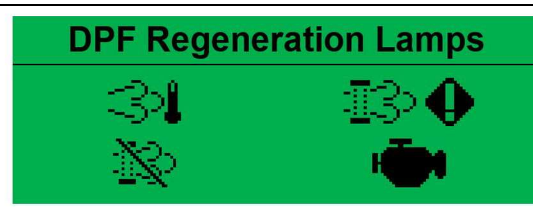


Illustration 38 g06529649

DPF Regeneration Lamps

Depending upon the engine type selected in the configuration of the module, "Engine" section may include "DPF Regeneration Lamps" page shown in Illustration 38. Icons on the page show the status of various ECU functions.

Some of the icons are applicable to Tier 4 engine requirements. The icons flash at different rates to show the status of the ECU function. The following are the faults displayed on the screen:

ECU Amber Alarm – Activates when the module receives an Amber fault condition from the engine ECU.

ECU Red Alarm – Activates when the module receives a Red fault condition from the engine ECU.

DPF Active – Activates when the module receives a fault indication from the engine ECU indicating that the Diesel Particulate Filter is active.

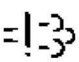
DPF Inhibited – Activates when the module receives a fault indication from the engine ECU indicating that the Diesel Particulate Filter has been inhibited.

DPF Stop – Activates when the module receives a fault indication from the engine ECU indicating that the Diesel Particulate Filter has been stopped.

DPF Warning – Activates when the module receives a fault condition from the engine ECU indicating that the Diesel Particulate Filter has a fault condition.

HEST Active – Activates when the module receives a fault indication from the engine ECU indicating that the High Exhaust System Temperature is active.

DEF Low Level – Activates when the module receives a fault condition from the engine ECU indicating that the Diesel Exhaust Fluid Low Level is active.



SCR Inducement – Activates when the module receives a fault indication from the engine ECU indicating that the Selective Catalytic Reduction Inducement is active.

Generator

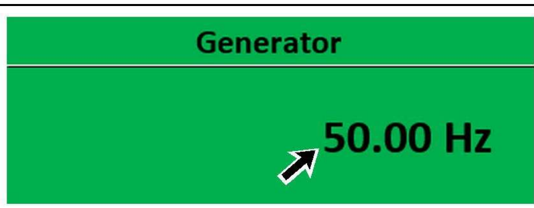


Illustration 39 g06533375

Generator Page

"Generator" page contains electrical values of the Generator, measured or derived from the voltage and current inputs of the module.

Press the menu navigation button to scroll through the "Generator" parameters listed below:

- Generator Voltage (Line to Neutral)
- Generator Voltage (Line to Line)
- Generator Frequency
- Generator Current (A)
- Generator Load Line to Neutral (kW)
- Generator Total Load (kW)
- Generator Load Line to Neutral (kVA)
- Generator Total Load (kVA)
- Generator Single Phase Power Factors
- Generator Power Factor Average
- Generator Load Line to Neutral (kvar)
- Generator Total Load (kvar)
- Generator Accumulated Load (kWh, kVAh, kvarh)
- Generator Phase Rotation
- Generator Active Configuration

Expansion

Note: Some display screens may be disabled depending upon the module configuration.

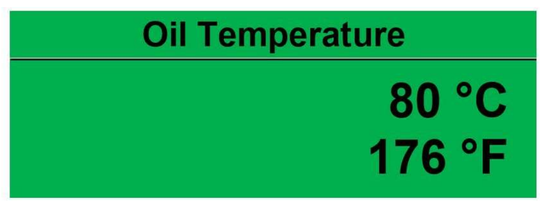


Illustration 40 g06529674

Oil Temperature

"Expansion" page contains measured values from various input expansion modules that are connected to Cat GCCP 1.2/1.3 module. Pressing the menu navigation button scrolls through the expansion parameters, if configured.

Note: Analogue inputs only appear if configured.

Charger ID

Note: Some display screens may be disabled depending upon the configuration of the module.

Press the menu navigation button and scroll through the charger ID parameters, if configured.

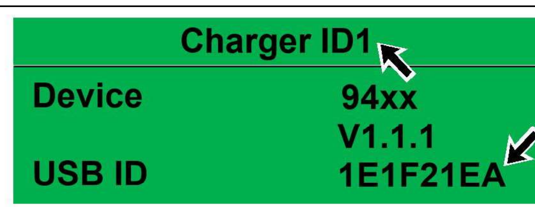


Illustration 41 g06529680

Charger ID1

ID number configured in the expansion module of Cat GCCP 1.2/1.3 control panel is shown in Illustration 41. The page contains information and instrumentation of Cat GCCP battery charger that are connected to Cat GCCP 1.2/1.3 controller.

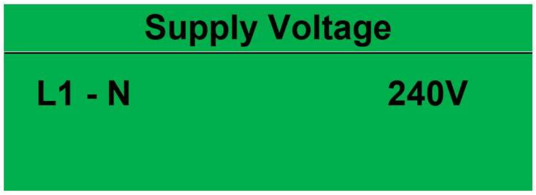


Illustration 42 g06529687

Supply Instrumentation Screen

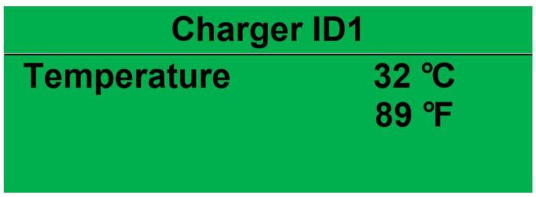


Illustration 43 g06529683

Battery Charger Temperature Instrumentation Screen

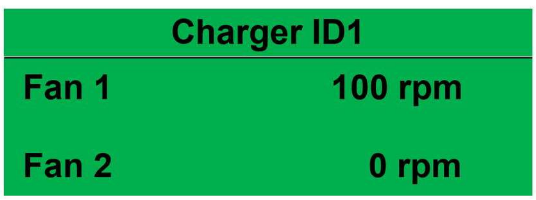


Illustration 44 g06529690

Battery Charger Fan Speed (When Supported by the Charger)

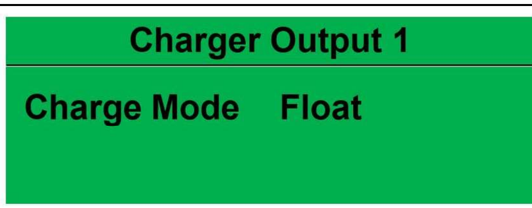


Illustration 45 g06529707

Output Instrumentation Screens Showing Output 1 of the Battery Charger

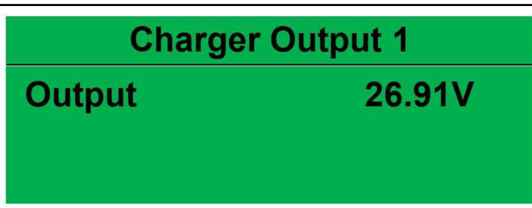


Illustration 46 g06529692

Output Voltage

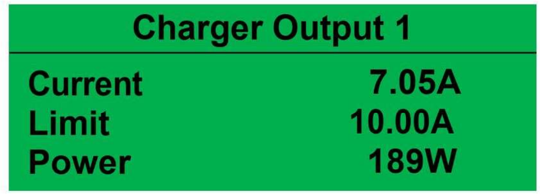


Illustration 47 g06529708

Output Current, Limit, and Power

Alarms

The "Common Alarm LED" illuminates (if configured) and an external "Audible Alarm" sounds when an alarm is active. Pressing alarm text/lamp test button (24) silences the audible alarm. Refer to Illustration 50 for alarm text/lamp test button (24).

The LCD changes from the "Information" page to display the "Alarm" Page. The LCD displays multiple alarms such as "Coolant Temperature High alarm" , "Emergency Stop alarm" , and "Low Coolant Warning alarm" .

The alarms automatically scroll in the order that the alarms occur or press the menu navigation button to scroll through the alarm manually. The LCD displays the appropriate text in the event of an alarm. If an additional alarm then occurs, the module displays the appropriate text.

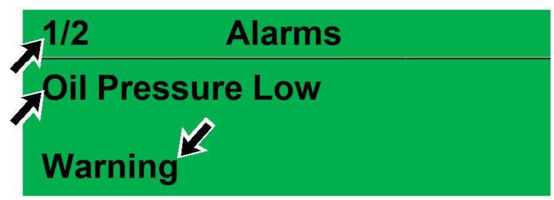


Illustration 48 g06529711

Alarm Mute/Lamp Test

The module indicates the following in the alarms page:

- One out of two alarms are active
- The cause of the alarm (Oil Pressure Low)
- The type of alarm (Warning)

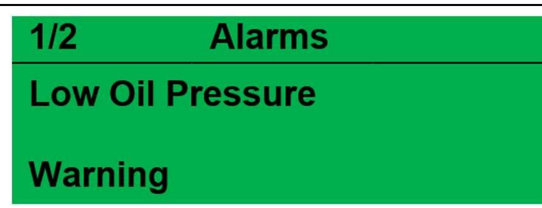


Illustration 49 g06533391

Example of Additional Alarms

Illustration 50 g06533394

Example of Additional Alarms

The module displays a message similar to Illustration 50 if there is an additional alarm.

ECU Alarms (CAN Fault Codes / Direct-to-Consumer (DTC))

Note: Refer to Cat engine ECU manual for appropriate Direct-to-Consumer code (DTC code) definitions and for details on the code/graphic meanings.

Illustration 51 g06529722

Type of Alarm

The controller displays alarm status messages from the ECU, in the alarms section of the display, when connected to a suitable CAN engine.

Press right menu navigation button (15) to access the list of current engine Diagnostic Trouble Codes (DTCs) from the ECU. DTCs are DM1 messages.

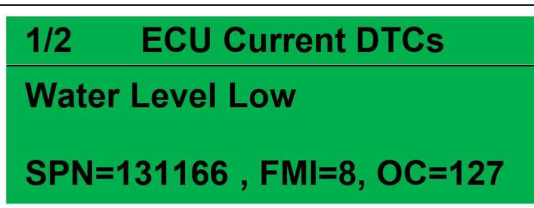


Illustration 52 g06529725

DM1 DTC

The DM1 DTC is interpreted by the module and is shown on module display (16) as a text message. Refer to Illustration 52 for manufacturer DM1 DTC. Refer to Illustration 50 for module display (16).

Event Log

The module maintains a log of past alarms and selected status changes. The log size has been increased in the module over the past module updates and is always subjected to change.

The modules log stores the last 250 log entries, with the latest version/update.

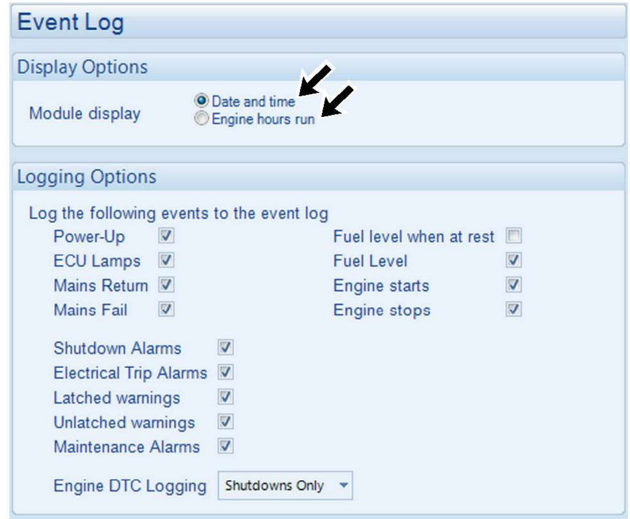


Illustration 53 g06529730

Event Log

Event log is configured to include all possible options under the default factory settings. Event log can only be configured by the technician using Cat GCCP 1.2/ 1.3 Configuration Suite software.

Any subsequent event overwrites the older entry when the event log is full. Hence, the event log always contains the most recent events. The module logs the event type, along with the date and time (or engine running hours, if configured).

Illustration 54 g06529731

Event Log 1

To view the event log, repeatedly press menu navigation button (15) until the LCD screen displays the "Event Log" page. Press scroll down button to view the next most recent event. Continuing to press the scroll down button cycles through the past events. The display shows the most recent alarm and the cycle begins again.

Press right or left menu navigation button (15) to exit the event log and return to viewing the instruments.

Protections Disabled

Note: Refer to Section "Protections" for further details on protections disabled.

Disabling the protections prevents the shutdown and electrical alarms from stopping the generator. The operator is informed that the events were blocked under such conditions.

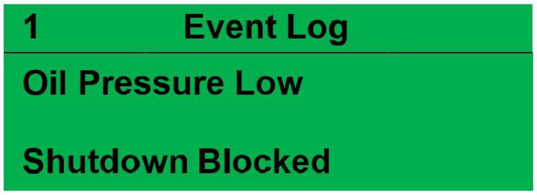


Illustration 55 g06529737

Shutdown Blocked

Serial Port

RS485 Serial Port

The items displayed on the serial port page change depending upon the configuration of the module.

Note: Factory default setting for the RS485 port is to operate at 115200 baud, MODBUS slave address 10.

Connected to R485 MODBUS Master

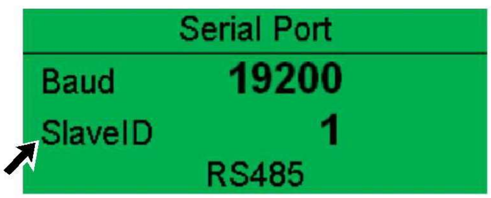


Illustration 56 g06529749

Slave Device

The module operates as a MODBUS RTU slave device. There is only one Master (typically a PLC) Human Machine Interface system (HMI system), or PC SCADA system in a MODBUS system.

The master requests for information from the MODBUS slave (module) and may also send request to change the operating modes (in control systems), and so on. Unless the Master makes a request, the slave is quiet on the data link.

Note: Factory default settings are for the module to communicate at 115200 baud, MODBUS slave address 10.

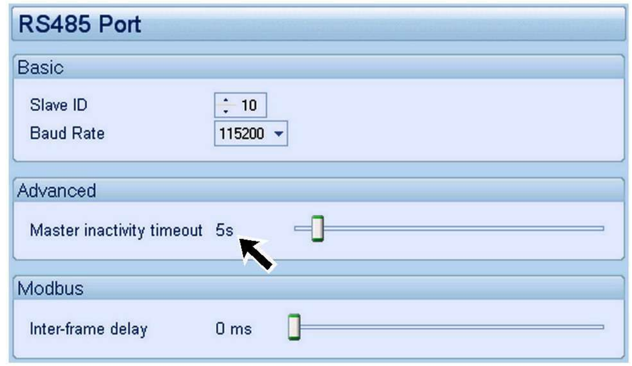


Illustration 57 g06529751

Master Inactivity Timeout

"Master Inactivity Timeout" must be set to at least two times the value of the system scan time. For example, if a MODBUS master PLC requests data from the module once per second, timeout should be set to at least 2 seconds.

Note: Cat GCCP 1.2/1.3 MODBUS document containing register mappings inside Cat GCCP 1.2/ 1.3 control panel is available from PowerNet. Refer to the link below:

https://engines.cat.com/en.html

Configurable CAN

Note: Some display screens may be disabled depending upon the module configuration.

Configurable CAN instruments are intended to display CAN information from CAN devices such as fuel flow meters. The contents of the screens may vary depending upon the configuration done by the engine manufacturer.

Configurable CAN instruments are not viewable under default factory settings. The instruments are configurable by the technician using Cat GCCP 1.2/ 1.3 Configuration Suite software.

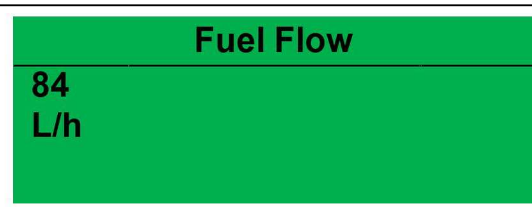


Illustration 58 g06529755

Fuel Flow

Configurable CAN Instrument 1 to 30

About

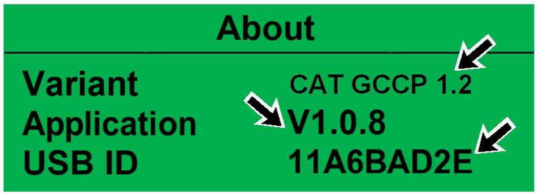


Illustration 59 g06529757

About

"About" page contains important information about the module and the firmware versions such as Variant, Application Version, and USB ID (unique identifier for PC USB connection).

Version of the module main firmware is updatable using Firmware Update Wizard in Cat GCCP 1.2/1.3 Configuration Suite Software. Press scroll down button to access more information about the module.

Illustration 60 g06529759

Bootloader and Analogue

Press the scroll down button to access more information about the module.

Bootloader is the bootstrap software version. Analogue is the version of the micro firmware file of the module.

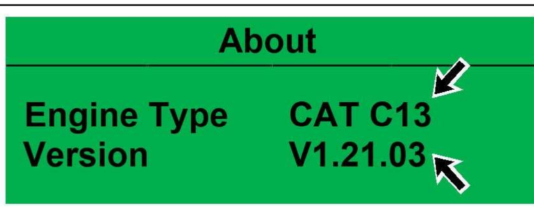


Illustration 61 g06529778

Engine Type and Version

Engine type and version of the engine file selected in the configuration is shown in Illustration 61.

Operation

Note: The following descriptions detail the sequences of a module with the standard factory configuration. Always refer to the configuration source for the exact sequences and timers observed by any particular module in the field.

Quickstart Guide for Module Operation

Engine Starting

Illustration 62 g06529785

Starting Engine

Press manual mode button (22) followed by start button (25). Refer to Illustration 50 for manual mode button (22) and start button (25).

Note: Refer to Section "Operation" for further details on starting engine.

Engine Stopping

Illustration 63 g06529790

Engine Stopping

The generator will stop when the stop/reset mode is selected.

Stop/Reset Mode

Note: Changing the module modes is not possible if a digital input configured to “Panel Lock” is active. Viewing the instruments and event logs is not affected by “Panel Lock” .

Pressing stop/reset mode button (20) activates stop/reset mode. The LED above stop/reset mode button (20) illuminates to indicate stop/reset mode operation. Refer to Illustration 50 for stop/reset mode button (20).

In stop/reset mode, the module removes the generator from load before stopping the generator, if necessary. “Fail to Stop” alarm activates if the generator does not stop when requested (subjected to the setting of the “Fail to Stop” timer). The following conditions must be satisfied to detect the engine at rest:

- Engine speed is zero as detected by the CAN ECU.
- Generator AC Voltage and Frequency must be zero.
- Engine Charge Alternator Voltage must be zero.
- Oil pressure sensor must indicate low oil pressure.

When the engine stops and the module is in stop/reset mode, the module configuration files from Cat GCCP Configuration Suite PC software can be installed. Also, front panel editor can be accessed to change the parameters.

Any latched alarms that have been cleared is at rest in the stop/reset mode. Engine does not start when in stop/reset mode. If start signals are received, input is ignored until auto mode is activated.

Illustration 64 g06529795

Power Save Mode

When the module is configured for “Power Save Mode” , leaving the module in stop/reset mode without any activity, will make the module enter power save mode. To wake the module, press any fascia control button.

ECU Override

Pressing start button (25) in stop/reset mode powers up the engine ECU, but does not start the engine. ECU override can be used to check the status of CAN communication and to prime the fuel system. Refer to Illustration 50 for start button (25).

Manual Mode

Note: If a digit input configured to panel lock is active, changing module modes is not possible. Viewing the instruments and event logs is not affected by panel lock.

Pressing manual mode button (22) activates manual mode. LED above manual mode button (22) illuminates to indicate manual mode operation. Generator does not start automatically in manual mode. Press start button (25) to begin the starting sequence. Refer to Illustration 50 for manual mode button (22) and start button (25).

Starting Sequence

Note: There is no “Start Delay” in manual mode of operation.

Note: Compatible ECUs receive start command via CAN if the unit has been configured for CAN.

The fuel relay is energized and the engine is cranked. If the engine fails to fire during a cranking attempt, the starter motor is disengaged for the crank rest timer duration. The next start attempt is made after the crank rest timer. If the sequence continues beyond the set number of attempts, the start sequence is terminated and the display shows “Fail to Start” . The starter motor disengages when the engine fires.

Speed detection is factory configured to be derived from the AC alternator output frequency. Speed can also be measured from “Magnetic Pick-Up” mounted on the flywheel or from CAN bus link to the engine ECU, depending on the module configuration. Rising oil pressure can be used to disconnect the starter motor but cannot detect underspeed or overspeed.

Once starter motor is disengaged, the “Safety on Delay” timer activates allowing the following to stabilize without triggering the fault:

- Oil Pressure
- High Engine Temperature
- Under-speed
- Charge Fail
- Any delayed Auxiliary fault inputs

Engine Running

Note: Load transfer signal remains inactive until the generator is available. Inactivity prevents excessive wear on the engine and alternator.

When in manual mode, the load is transferred to the generator whenever a “Loading Request” is made. The possible sources for loading requests are limited depending on the state of the Manual Breaker Control function.

Manual Breaker Control Disabled

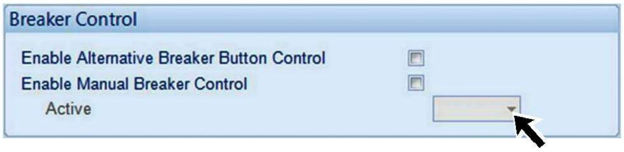


Illustration 65 g06530036

Manual Breaker Control Disabled

A loading request may come from any of the following sources:

- Pressing transfer to generator button (19). Refer to Illustration 50 for transfer to generator button (19).
- Activating an auxiliary input that has been configured to “Remote Start On Load” .
- Activating a built-in exercise scheduler if configured for “On Load” runs.
- Activating Dual Mutual Standby Balance Mode.

Once the generator is placed under load, the load will not be automatically removed. One of the following methods can be used to open the load switch manually depending on loading request state.

Follow the below procedure if the loading request has been removed:

1. Press open generator button (17). Refer to Illustration 50 for open generator button (17).

2. Activate auxiliary input that has been configured to Open Generator.

3. Press auto mode button (23) to return to auto mode. The set observes all auto mode start requests and stopping timers before beginning the auto mode stopping sequence. Refer to Illustration 50 for auto mode button (23).

Follow the below procedure if the loading request remains active:

1. Press stop/reset button (20) to remove the load and stop the generator. Refer to Illustration 50 for stop/reset button (20).

2. Activate an auxiliary input that has been configured to “Generator Load Inhibit” .

Manual Breaker Control Enabled

Illustration 66 g06530043

Manual Breaker Control Enabled

Loading request sources are limited to the following:

- Pressing transfer to generator button (19). Refer to Illustration 50 for transfer to generator button (19).
- Activating an auxiliary input that has been configured to Open Mains.

Once the generator is placed under load, the load will not be automatically removed. Use any of the following methods to open the load switch manually:

- Pressing open generator button (17).
- Activating an auxiliary input that has been configured to “Transfer To Generator” / “Open Generator” .
- Pressing auto mode button (23) to return to auto mode. The generator set observes all auto mode start requests and stopping timers before beginning the auto mode stopping sequence.
- Pressing stop/reset mode button (20) to remove load and stop the generator.
- Activating an auxiliary input that has been configured to “Generator Load Inhibit” .

Refer to Illustration 50 for open generator button (17), auto mode button (23), and stop/reset mode button (20).

Stopping Sequence

In test mode, the generator set continues to run until either of the following conditions occur:

Stop/Reset Mode Button (20) is pressed – Delayed load outputs are de-activated immediately and the generator set immediately stops.

Auto Mode Button (23) is pressed – Generator set observed all auto mode start requests and stopping timers before beginning “auto mode Stopping Sequence” .

Auto Mode

Note: Changing module modes is not possible if a digital input configured to external panel lock is active. Panel lock does not affect viewing instruments and event logs.

Pressing auto mode button (23) activates auto mode. Illumination of the LED above auto mode button (23) indicates auto mode operations. In auto mode, the generator can operate automatically, starting and stopping as required with no user intervention. Refer to Illustration 50 for auto mode button (23).

Waiting in Auto Mode

The starting sequence begins when a starting request is made. Starting requests can be from the following sources:

- Activation of an auxiliary input that has been configured to “Remote Start” .
- Activation of a built-in exercise scheduler.
- Instruction from external remote telemetry devices using the RS232 or RS485 interface.
- Activation of “Dual Mutual Standby Balance Mode” . Refer to Section “Operation” for more details.

Starting Sequence

Note: Compatible ECU receives start command via CAN and transmit the engine speed to Cat GCCP 1.2/ 1.3 controller if the unit has been configured for CAN.

The start delay timer begins to allow false start requests. The unit returns to a stand-by state if all start requests are removed during the “Start Delay” timer. Fuel relay energizes and engine cranks if a start request is still present at the end of the start delay timer.

If the engine fails to fire during cranking attempt, the starter motor is disengaged during crank rest timer. The next start attempt is made after the crank rest timer. If the sequence continues beyond the set number of attempts, the start sequence is terminated and the display shows “Fail to Start” . The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency.

Speed can also be measured from a magnetic pick-up mounted on the flywheel or from the CAN link to the engine ECU depending on module.

Rising oil pressure can be used to disconnect the starter motor, but cannot detect underspeed or overspeed.

Once the starter motor has disengaged, the “Safety On Delay” timer activates, allowing the following parameters to stabilize without triggering a fault:

- Oil Pressure
- High Engine Temperature
- Under-speed
- Charge Fail
- Any delayed auxiliary fault inputs

Engine Running

Note: Load transfer signal remains inactive until the generator is available. Inactivity prevents excessive wear on the engine and alternator.

Generator is placed on load, if configured. Stopping sequence begins if all start requests are removed.

Scheduler

Controller contains a built-in exercise run scheduler, capable of automatically starting and stopping the set or inhibiting the set from starting. Up to 16 scheduled (in two banks of eight) start/stop/inhibiting start sequences can be configured to repeat on a seven day or 28-day cycle. Scheduled runs may be on load or off load depending upon the module configuration.

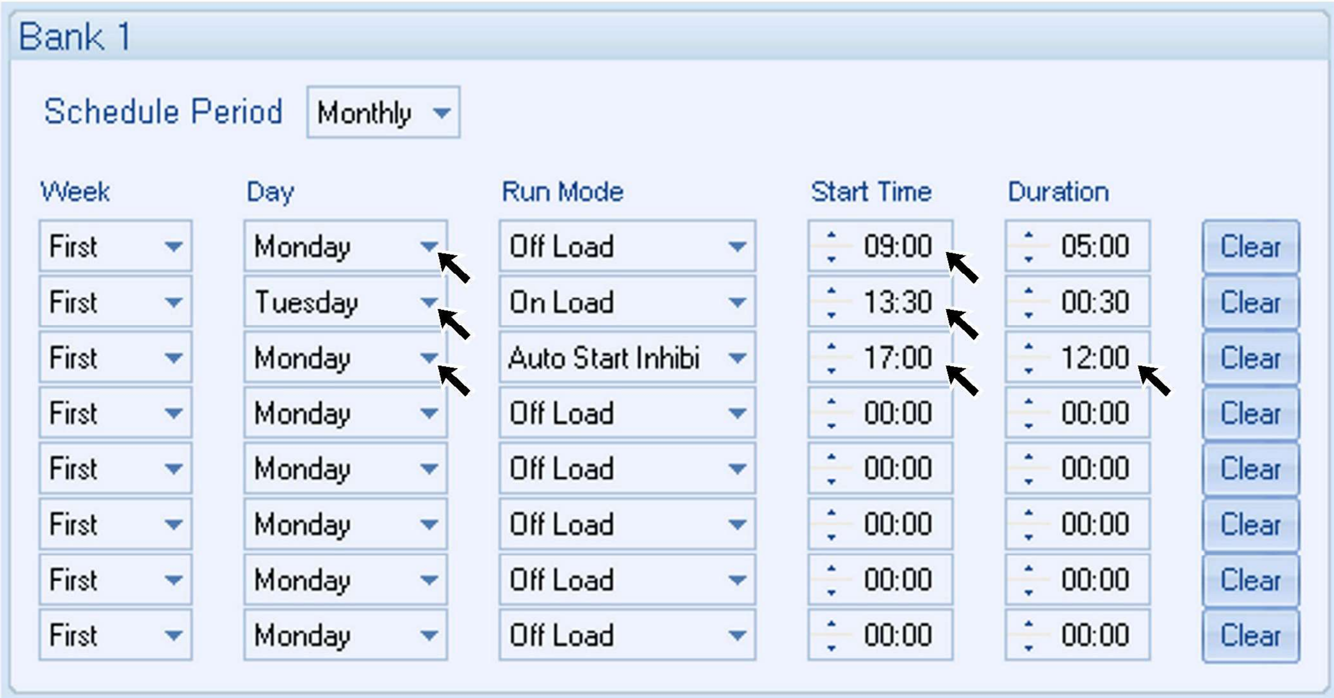


Illustration 67 g06530433

Screen Capture of Cat GCCP 1.2/1.3 Configuration Suite Software

A screen capture of Cat GCCP 1.2/1.3 Configuration Suite Software showing the configuration of "Exercise Scheduler" is shown in Illustration 67. In the example, the set starts at 09:00 on Monday and runs for 5 hours off load. The next set starts at 13:30 on Tuesday and runs for 30 minutes on load. The set is inhibited from automatically starting on Monday from 17:00 for 12 hours.

Stop Mode

Scheduled runs do not occur when the module is in stop/reset mode.

Manual Mode

Scheduled runs do not occur when the module is in manual mode waiting for a start request. Activating a scheduled run "On Load" when the module is operating off load in manual mode forces the set to run on load.

Auto Mode

Scheduled runs operate only if the module is in auto mode with no "Shutdown or Electrical Trip" alarms active. If the module is in "Stop/Reset Mode" or "Manual Mode" when a scheduled run begins, engine will not be started. However, if the module is put into auto mode during a scheduled run, the engine will be started.

Depending upon the configuration by technician, an external input can be used to inhibit a scheduled run. If the engine runs off load in auto mode and a scheduled run configured to "On Load" begins, the set is placed "On Load" during the Schedule.

Alternative Configuration

The system may have selectable configurations (for example, to select between 50 Hz and 60 Hz) depending upon the system configuration by the generator supplier.

If alternative configuration has been enabled, the generator supplier will advise about activating the selection. Selection can be activated by operating an external selector switch or by selecting the required configuration file in the front panel configuration editor of the module.

Protections

Alarms

When an alarm is active, an internal audible alarm sounds and the common alarm output activates, if configured. Pressing alarm mute/lamp test button (24) silences the audible alarm. The LCD display moves from the information page to display alarm page. Refer to Illustration 50 for alarm mute/lamp test button (24).

Illustration 68 g06529711

Protection Alarm

In Illustration 68 from the module, the following can be observed:

- One out of two alarm is active
- The cause of the alarm (Oil Pressure Low)
- The type of alarm (Warning)

The LCD displays multiple alarms such as “Coolant Temperature High” , “Emergency Stop” , and “Low Coolant Warning” . The alarms automatically scroll in the order that occurred or press menu navigation button (15) to scroll through manually. In the event of an alarm, the LCD displays the appropriate text. If an additional alarm occurs, the module displays the appropriate text.

Protections Disabled

Configuration is possible to prevent “Shutdown and Electrical Trip” alarms from stopping the generator. Under such conditions, “Protections Disabled” appears on module display/generator display (16) to inform the operator. Refer to Illustration 50 for module display/generator display (16).

Illustration 69 g06530493

Protections Disabled

“Shutdown and Electrical Trip” alarms still appear. The operator is informed that the alarms are blocked. The feature is provided to assist the technician in meeting specifications for “Warning Only” , “Protections Disabled” , “Run to Destruction” , “War Mode” , or other similar wording.

When configuring the feature in the PC software, the technician would make the feature permanently active or only active upon operation of an external switch. The technician provides a key operated switch. The location of the switch varies depending upon the manufacturer. The switch prevents inadvertent activation.

Depending upon the configuration, a warning alarm may be generated when the switch is operated. The feature is configurable in the PC configuration software for the module. Configuring a controller that has “Protections Disabled” configured alerts the user with a warning message displayed on the PC screen. The alert helps the user to acknowledge the problem before the configuration of the controller is changed, preventing inadvertent activation of the feature.

Reset Electrical Trip

Configuring “Reset Electrical Trip” enables the operator to reset electrical trip alarm for a configurable number of times before the generator has stopped. Resetting the electrical trip alarm before the generator stops allows the generator to go back on load without having to perform a cooling run initially.

“Electrical Trip” alarm can be prevented from stopping the generator. Under such conditions, the “Electrical Trip Stop Inhibited Warning” alarm appears on module display (16) to inform the operator. “Electrical Trip” alarms still appear however, the operator is informed the generator is inhibited from stopping.

Illustration 70 g06530506

Electrical Trip

Illustration 71 g06530507

Electrical Trip

The feature is provided to assist the technician in meeting specification requirements to ensure that the generator takes load again after the alarm has been reset. Depending upon the configuration, the generator may go into a cooling run or be inhibited from stopping after the “Electrical Trip” alarm activates.

When configuring the feature in the PC software, the technician chooses to make “Electrical Trip” alarms resettable using a switch connected to an input configured for “Reset Electrical Trip” . The “Electrical Trip” alarms can also be made resettable by pressing close generator button (19). Refer to Illustration 50 for close generator button (19).

The technician provides a key operated switch. The location of the switch varies depending upon manufacturer. The switch prevents inadvertent activation.

Press close generator (19) to place the generator on load on the following conditions:

- Cat GCCP 1.2/1.3 control panel is in manual mode
- No other on load request is active

Configuring the controller that has “Reset Electrical Trip” enabled, displays a warning message on the PC screen for the user to acknowledge before the controller configuration is changed. This action prevents inadvertent activation of the feature.

ECU Alarms (CAN Fault Codes / DTC)

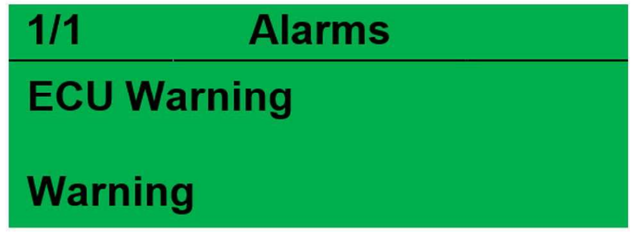


Illustration 72 g06530510

Type of Alarm

An example of Cat GCCP 1.2/1.3 showing the warning message is shown in Illustration 72. When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU in the Alarms section of the display.

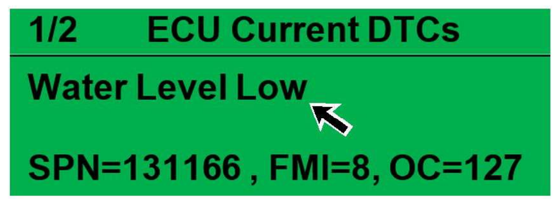


Illustration 73 g06530518

ECU Current DTC

Press right menu navigation button (15) to access the list of ECU Current DTCs from the ECU which are DM1 messages. The DM1 DTC is interpreted by the module and is shown on the display of the module as a text message. Manufacturer DTC is shown in Illustration 73.

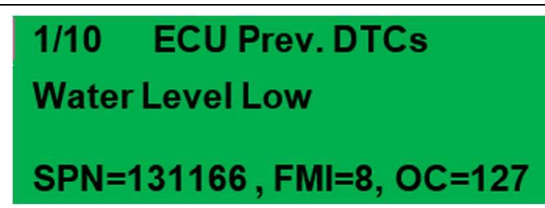


Illustration 74 g06530519

ECU Previous DTC

Press right menu navigation button (15) to access the list of ECU current DTCs from the ECU which are Diagnostic Message 2 messages (DM2 messages). The DM2 DTC is interpreted by the module and is shown on module display/generator display (16) as a text message. Manufacturer DTC is shown in Illustration 74. Refer to Illustration 50 for module display/generator display (16).

Warning Alarms

Warnings are non-critical alarm conditions and do not affect the operation of the engine system. Warning alarms serve to draw the attention of the operators to an undesirable condition.

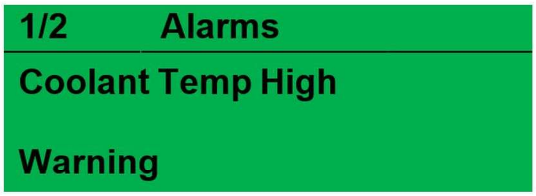


Illustration 75 g06530531

Warning Alarm

In the event of an alarm, the LCD moves to the alarms page and scrolls through all active alarms. Warning alarms are self-resetting by default, when the fault condition is removed.

Note: Enabling “All Warnings are Latched” causes warning alarms to latch until reset manually.

Warning alarms are enabled using Cat GCCP 1.2/1.3 Configuration Suite along with a compatible PC. “ECU Warning” is shown on the module display as a warning alarm if the module is configured for CAN and receives an error message from the ECU.

Table 40

Fault	Description
Cat GCCP 1.2/1.3 ID 0 to 3 Analogue Input (A to J High)	Module detected that an analogue input value of a Cat GCCP 1.2/1.3 Input Module had risen above the “Flexible Sensor High Pre-Alarm Trip” level.
Cat GCCP 1.2/1.3 ID 0 to 3 Analogue Input (A to J Low)	Module detected that an analogue input value of a Cat GCCP 1.2/1.3 had fallen below the “Flexible Sensor Low Pre-Alarm Trip” level.
Cat GCCP 1.2/1.3 ID 0 to 3 Digital Input (A to J)	Module detected that a digital input configured to create fault condition on Cat GCCP 1.2/1.3 expansion module became active. An appropriate message is displayed on the LCD.
Cat GCCP 1.2/1.3 ID 0 to 3 Common Warning	Module detected that a battery charger connected by DSENet had issued a “Common Warning Alarm” .
Analogue Input A to D (Digital)	Module detected that an analogue input configured as a digital input created a fault condition became active and an appropriate message is displayed on the LCD.
Battery Detect Failure	Module detected that a battery charger connected by DSENet had issued a “Battery Detect Failure” alarm.
Battery Failure Detection Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery Failure Detection” alarm on Output 1.
Battery Failure Detection Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery Failure Detection” alarm on Output 2.
Battery High Current Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery High Current” alarm on Output 1.
Battery High Current Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery High Current” alarm on Output 2.
Battery High Temperature Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery High Temperature” alarm on Output 1.

(continued)

(Table 40, contd)

Fault	Description
Battery High Temperature Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery High Temperature” alarm on Output 2.
Battery High Voltage Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery High Voltage” alarm on Output 1.
Battery High Voltage Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery High Voltage” alarm on Output 2.
Battery Low Voltage Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery Low Voltage” alarm on Output 1.
Battery Low Voltage Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery Low Voltage” alarm on Output 2.
Battery Temperature Sensor Fail Output 1	Module detected that a battery charger connected by DSENet had issued a “Battery Temperature Fail” alarm on Output 1.
Battery Temperature Sensor Fail Output 2	Module detected that a battery charger connected by DSENet had issued a “Battery Temperature Fail” alarm on Output 2.
Calibration Fault	Module detected that the internal calibration has failed. Contact the authorized Cat Dealer for Product Support.
Charge Alternator Failure (IEEE 37.2 – 27 DC Undervoltage Relay)	Module detected that the output voltage of the charge alternator had fallen below the “Charge Alternator Warning Trip” level for the configured delay timer.
Charger Fan Locked	Module detected that a battery charger connected by DSENet had a “Failure” alarm.
Charger High Temperature	Module detected that a battery charger connected by DSENet had a “High Temperature” alarm.
Charger Mains High Current	Module detected that a battery charger connected by DSENet had a “Mains High Current” alarm.
Charger Mains High Voltage	Module detected that a battery charger connected by DSENet had a “Mains High Voltage” alarm.
Charger Mains Low Voltage	Module detected that a battery charger connected by DSENet had a “Mains Low Voltage” alarm.
Charger Voltage Drop Charging Cable Output 1	Module detected that a battery charger connected by DSENet had issued a “Voltage Drop Charging Cable” alarm on Output 1.
Charger Voltage Drop Charging Cable Output 2	Module detected that a battery charger connected by DSENet had issued a “Voltage Drop Charging Cable” alarm on Output 2.
Coolant Temp High (IEEE C37.2 – 26 Apparatus Thermal Device)	Module detected that the engine coolant temperature had risen above the “High Coolant Temperature Pre-Alarm Trip” level after the Safety On Delay timer had expired.
DC Battery High Voltage (IEEE 37.2 – 59 DC Overvoltage Relay)	Module detected that the DC supply voltage had risen above the “Plant Battery Overvolts Warning Trip” level for the configured delay timer.
DC Battery Low Voltage (IEEE 37.2 – 27 DC Undervoltage Relay)	Module detected that the DC supply voltage had fallen below the “Plant Battery Undervolts Warning Trip” level for the configured delay timer.
DC Battery High Voltage (IEEE 37.2 – 59 DC Overvoltage Relay)	Module detected that the DC supply voltage had risen above the “Plant Battery Overvolts Warning Trip” level for the configured delay timer.
DC Battery Low Voltage (IEEE 37.2 – 27 DC Undervoltage Relay)	Module detected that the DC supply voltage had fallen below the Plant Battery Undervolts Warning Trip level for the configured delay timer.
DEF Level Low	Module received a fault condition from the engine ECU alerting about the DEF level. Module detected that the “DEF Level” had fallen below the “DEF Level Low Pre-Alarm Trip” level for the configured delay timer.
Digital Input A to H	Module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.

(continued)

(Table 40, contd)

Fault	Description
DPTC Filter	Module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated.
ECU Amber	Module received an amber fault condition from the engine ECU.
ECU Data Fail	Module is configured for CAN operation but has not detected data being sent from the ECU engine.
ECU Malfunction	Module received a malfunction fault condition from the engine ECU.
ECU Protect	Module received a protect fault condition from the engine ECU.
ECU Red	Module received a red fault condition from the engine ECU.
Engine Over Speed (IEEE C37.2 - 12 Overspeed Device)	Module detected that the engine speed had risen above the “Over Speed Pre-Alarm Trip” level for the configured delay timer.
Engine Over Speed Delayed (IEEE C37.2 - 12 Overspeed Device)	Module detected that the engine speed had risen above the “Over Speed Trip” level but was below the “Over Speed Overshoot Trip” for the configured “Overshoot Delay” timer during starting.
Engine Under Speed (IEEE C37.2 - 14 Underspeed Device)	Module detected that the engine speed had fallen below the Under Speed Pre-Alarm Trip level for the configured delay timer after the “Safety On Delay” timer had expired.
Exp. Unit Failure	Module detected that communications to one of the DSENet expansion modules had been lost.
Flexible Sensor A to D High	Module detected that an analog input value had risen above the “Flexible Sensor High Pre-Alarm Trip” level.
Flexible Sensor A to D Low	Module detected that an analog input value had fallen below the “Flexible Sensor Low Pre-Alarm Trip” level.
Fuel Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level rose above the “High Fuel Level Trip” level.
Fuel Level Low (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level had fallen below the “Low Fuel Level Trip” level.
Fuel Level Low Switch (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine low fuel level switch had activated.
Fuel Tank Bund Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the fuel tank bund level switch had activated.
Fuel Usage (IEEE C37.2 – 80 Flow Switch)	Module detected that the fuel consumption was more than the configured “Running Rate” or “Stopped Rate” .
Generator Loading Frequency	Module detected that the generator output frequency had not risen above the “Generator Loading Frequency” setting after the warming up timer had expired.
Generator Loading Voltage	Module detected that the generator output voltage had not risen above the “Generator Loading Voltage” setting after the warming up timer had expired.
Generator Over Current (IEEE C37.2 – 50 Instantaneous Overcurrent Relay) (IEEE C37.2 – 51 IDMT Overcurrent Relay)	Module detected that the generator output current had risen above the “Generator Over Current Trip” .
Generator Over Frequency (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had risen above the “Over Frequency Pre-Alarm Trip” level for the configured delay timer.

(continued)

(Table 40, contd)

Fault	Description
Generator Over Frequency Delayed (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had risen above the “Over Frequency Trip” level but was below the “Over Frequency Overshoot Trip” for the configured “Overshoot Delay” timer during starting.
Generator Over Voltage (IEEE C37.2 – 59 AC Overvoltage Relay)	Module detected that the generator output voltage had risen above the “Over Voltage Pre-Alarm Trip” level for the configured delay timer.
Generator Reverse Power (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had fallen below the “Reverse Power Trip” for the configured delay timer.
Generator Short Circuit (IEEE C37.2 – 51 IDMT Short Circuit Relay)	Module detected that the generator output current had risen above the “Short Circuit Trip” during the Inverse Definite Minimum Time function (IDMT function).
Generator Under Frequency (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had fallen below the “Under Frequency Pre-Alarm Trip” level for the configured delay timer after the “Safety On Delay” timer had expired.
Generator Under Voltage (IEEE C37.2 – 27 AC Undervoltage Relay)	Module detected that the generator output voltage had fallen below the “Under Voltage Pre-Alarm Trip” level for the configured delay timer after the “Safety On Delay” timer had expired.
HEST Active	Module received a fault condition from the engine ECU alerting that the “HEST” had activated.
Inlet Temperature	Module detected that the engine ECU measurement of inlet temperature had risen above the “Inlet Temperature Alarm Pre-Alarm Trip” level.
kW Overload (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had risen above the Overload Protection Trip for the configured delay timer.
Loss of Magnetic Pick Up	Module detected that the Magnetic Pick-Up was not producing a pulse output after the required “Crank Disconnect” criteria had been met.
Low Coolant Warning	Module detected that the engine coolant temperature had fallen below the “Low Coolant Temperature Pre-Alarm Trip” level.
Low Load (IEEE C37.2 – 37 Undercurrent to Underpower Relay)	Module detected that the load had fallen below the “Low Load Alarm Trip” level.
Maintenance Due	Module detected that one of the configured maintenance alarms is due as the configured maintenance interval has expired.
Negative kvar (IEEE C37.2 – 40 Field Under Excitation Relay)	Module detected that the generator output kvar had fallen below the “Negative var Pre-Alarm Trip” for the configured delay timer.
Negative Phase Sequence (IEEE C37.2 - 46 Phase-Balance Current Relay)	Module detected that there was an imbalance of current across the generator phases greater than the “Negative Phase Sequence Trip” Level percentage setting.
Oil Pressure Low (IEEE C37.2 - 63 Pressure Switch)	Module detected that the engine oil pressure had fallen below the “Low Oil Pressure Pre-Alarm Trip” level after the “Safety On Delay” timer had expired.
Positive kvar (IEEE C37.2 – 40 Field Over Excitation Relay)	Module detected that the generator output kvar had risen above the “Positive var Pre-Alarm Trip” for the configured delay timer.
Protections Disabled	Module detected that an input configured for “Protections Disable” became active.
SCR Inducement	Module received a fault condition from the engine ECU alerting about the SCR Inducement.
Water in Fuel	Module received a fault condition from the engine ECU alerting that water in the fuel had been detected.

Electrical Trip Alarm

Note: Fault condition must be resolved before the alarm is reset. Alarm cannot be reset if the fault condition is not resolved.The exception to this condition is the “Coolant Temp High” alarm and similar “Active From Safety On” alarms, as the coolant temperature could be high with the engine at rest.

Electrical trip alarms are latching and stop the generator but in a controlled manner. If there is an electrical trip, the module deactivates the “Close Generator Output” to remove the load from the generator.

After removing the load from the generator, the module starts the cooling timer and allows the engine to cool off-load before shutting down the engine. Fault must be cleared and the alarm must be reset to restart the generator.

Illustration 76 g06530533

Electrical Trip Alarm

LCD moves to the alarms page and scrolls through all active alarms in the event of an alarm. Electrical Trip alarms are latching alarms. Press stop/reset mode button (20) on the module to remove the fault. Refer to Illustration 50 for stop/reset mode button (20).

Table 41

Fault	Description
Cat GCCP 1.2/1.3 Input Expansion Module ID 0 to 3 Analogue Input A to J High	Module detected that an analog input value of a Cat GCCP Input Expansion Module had risen above the “Flexible Sensor High Alarm Trip” level.
Cat GCCP 1.2/1.3 Input Expansion Module ID 0 to 3 Analogue Input A to J Low	Module detected that an analog input value of a Cat GCCP input expansion module had fallen below the “Flexible Sensor Low Alarm Trip” level.
Cat GCCP 1.2/1.3 Input Expansion Module Charger ID 0 to 3 Common Electrical Trip	Module detected that a battery charger connected by DSENet had issued a “Common Electrical Trip Alarm” .
Analogue Input A to D (Digital)	Module detected that an analog input configured as a digital input to create fault condition became active and an appropriate message is displayed on the LCD.
Auto Sense Fail	Module detected that the output voltage of the generator had risen above the “Over Voltage During Auto Sensing Trip” level during starting while attempting to detect an alternative configuration to use.
Calibration Fault	Module detected that the internal calibration has failed. The unit must be returned back for investigation and repair.
Coolant Temperature High (IEEE C37.2 – 26 Apparatus Thermal Device)	Module detected that the engine coolant temperature had risen above the “High Coolant Temperature Electrical Trip” level after the “Safety On Delay” timer had expired.

(continued)

(Table 41, contd)

Fault	Description
DEF Level Low	Module received a fault condition from the engine ECU alerting about the DEF level. Module detected that the “DEF Level” had fallen below the “DEF Level Low Alarm Trip” level for the configured delay timer.
Digital Input A to H	Module detected that a digital input configured to create a fault condition became active and an appropriate message is displayed on the LCD.
DPTC Filter	Module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated.
ECU Amber	Module received an amber fault condition from the engine ECU.
ECU Data Fail	Module is configured for CAN operation but has not detected data being sent from the engine ECU.
ECU Malfunction	Module received a malfunction fault condition from the engine ECU.
ECU Protect	Module received a protect fault condition from the engine ECU.
ECU Red	Module received a red fault condition from the engine ECU.
Exp. Unit Failure	Module detected that communications to one of the DSENet expansion modules had been lost.
Flexible Sensor A to D Low	Module detected that an analog input value had fallen below the “Flexible Sensor Low Alarm Trip” level.
Fuel Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level rose above the “High Fuel Level Trip” level.
Fuel Level Low (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level had fallen below the “Low Fuel Level Trip” level.
Fuel Level Low Switch (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine low fuel level switch had activated.
Fuel Tank Bund Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the fuel tank bund level switch had activated.
Fuel Usage (IEEE C37.2 – 80 Flow Switch)	Module detected that the fuel consumption was more than the configured “Running Rate” or “Stopped Rate” .
Generator Loading Frequency	Module detected that the generator output frequency had not risen above the “Generator Loading Frequency setting” after the warming up timer had expired.
Generator Loading Voltage	Module detected that the generator output voltage had not risen above the “Generator Loading Voltage” setting after the warming up timer had expired.
Generator Over Current (IEEE C37.2 – 51 IDMT Overcurrent Relay)	Module detected that the generator output current had risen above the “Generator Over Current Trip” during the IDMT function.
Generator Phase Sequence Wrong (IEEE C37.2 – 47 Phase Sequence Relay)	Module detected that the phase rotation of the generator was different to the configured “Generator Phase Rotation Alarm” setting.
Generator Reverse Power (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had fallen below the “Reverse Power Trip” for the configured delay timer.
Generator Short Circuit (IEEE C37.2 – 51 IDMT Short Circuit Relay)	Module detected that the generator output current had risen above the “Short Circuit Trip” during the IDMT function.
Inlet Temperature	Module detected that the engine ECU measurement of inlet temperature had risen above the “Inlet Temperature Alarm Trip” level.
kW Overload (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had risen above the “Overload Protection Trip” for the configured delay timer.

(continued)

(Table 41, contd)

Fault	Description
Loss of Magnetic Pick Up	Module detected that the Magnetic Pick-Up was not producing a pulse output after the required “Crank Disconnect” criteria had been met.
Low Load (IEEE C37.2 – 37 Undercurrent to Underpower Relay)	Module detected that the load had fallen below the “Low Load Alarm Trip” level.
Maintenance Due	Module detected that one of the configured maintenance alarms is due as the configured maintenance interval has expired.
Negative kvar (IEEE C37.2 – 40 Field Under Excitation Relay)	Module detected that the generator output kvar had fallen below the “Negative var Alarm Trip” for the configured delay timer.
Negative Phase Sequence (IEEE C37.2 - 46 Phase-Balance Current Relay)	Module detected that there was an imbalance of current across the generator phases greater than the “Negative Phase Sequence Trip Level” percentage setting.
Positive kvar (IEEE C37.2 – 40 Field Over Excitation Relay)	Module detected that the generator output kvar had risen above the “Positive var Alarm Trip” for the configured delay timer.
SCR Inducement	Module received a fault condition from the engine ECU alerting about the SCR inducement.
Water in Fuel	Module received a fault condition from the engine ECU alerting that water in the fuel had been detected.

Shutdown Alarms

Note: Fault condition must be resolved before the alarm is reset. Alarm cannot be reset if the fault condition is not resolved. “Oil Pressure Low” alarm and similar “Active From Safety On” alarms are exceptions to this condition, as the coolant temperature could be high with the engine at rest.

Shutdown alarms are latching and immediately stop the generator. The module deactivates the “Close Gen Output” outputs on initiation of the electrical trip condition to remove the load from the generator.

The module starts the cooling timer and allows the engine to cool off-load before shutting down the engine once the outputs are deactivated. Fault must be cleared, and the alarm reset to restart the generator.

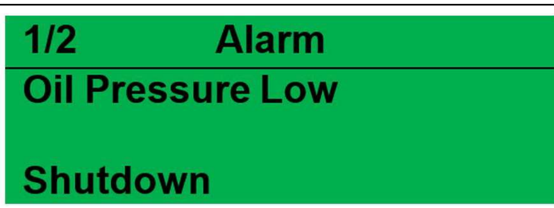


Illustration 77 g06530539

Shutdown Alarm

LCD moves to the alarms page and scrolls through all active alarms in the event of an alarm.

“Shutdown Alarms” are latching alarms. Press stop/reset mode button (20) on the module to remove the fault. Refer to Illustration 50 for stop/reset mode button (20).

Table 42

Fault	Description
Cat GCCP 1.2/1.3 Input Expansion Module ID 0 to 3 Analogue Input A to J High	Module detected that an analog input value of a Cat GCCP Input Expansion Module had risen above the "Flexible Sensor High Alarm Trip" level.
Cat GCCP 1.2/1.3 Input Expansion Module ID 0 to 3 Analogue Input A to J Low	Module detected that an analog input value of a Cat GCCP Input Expansion Module had fallen below the "Flexible Sensor Low Alarm Trip" level.
Cat GCCP 1.2/1.3 Input Expansion Module ID 0 to 3 Analogue Input A to J	The module detected that a digital input configured to create fault condition on Cat GCCP Input Expansion Module became active. An appropriate message is displayed on the LCD.
Cat GCCP 1.2/1.3 ID 0 to 3 Common Shutdown	Module detected that a battery charger connected by DSENet had issued a "Common Shutdown Alarm" .
Analogue Input A to D (Digital)	Module detected that an analog input configured as a digital input to create a fault condition became active and an appropriate message displayed on the LCD.
Auto Sense Fail	Module detected that the output voltage of the generator had risen above the "Over Voltage During Auto Sensing Trip" level during starting whilst attempting to detect which alternative configuration to use.
Battery Temperature	Module detected that a battery charger connected by DSENet had issued a "Battery Temperature" alarm.
Calibration Fault	Module detected that the internal calibration has failed. The unit must be returned back for investigation and repair.
Charge Alternator Failure (IEEE C37.2 – 27DC Undervoltage Relay)	Module detected that the output voltage of the charge alternator had risen above the "Charge Alternator Shutdown Trip" level for the configured delay timer.
Charger Failure	Module detected that a battery charger connected by DSENet had a "Failure" alarm.
Charger Fan Locked	Module detected that a battery charger connected by DSENet had a "Failure" alarm.
Charger High Temperature	Module detected that a battery charger connected by DSENet had a "High Temperature" alarm.
Charger Input Fuse Fail	Module detected that a battery charger connected by DSENet had an "Input Fuse Fail" alarm.
Charger Mains High Current	Module detected that a battery charger connected by DSENet had a "Mains High Current" alarm.
Charger Mains High Voltage	Module detected that a battery charger connected by DSENet had a "Mains High Voltage" alarm.
Charger Mains Low Voltage	Module detected that a battery charger connected by DSENet had a "Mains Low Voltage" alarm.
Charger Reverse Polarity	Module detected that a battery charger connected by DSENet had a "Reverse Polarity" alarm.
Charger Short Circuit	Module detected that a battery charger connected by DSENet had a "Short Circuit" alarm.
Charger Short Circuit / Reverse Polarity	Module detected that a battery charger connected by DSENet had a combined "Short Circuit" and "Reverse Polarity" alarm.
Coolant Sender O/C	Module detected that circuit to the engine coolant temperature sensor had become open circuit.
Coolant Temp High (IEEE C37.2 – 26 Apparatus Thermal Device)	Module detected that the engine coolant temperature had risen above the "High Coolant Temperature Shutdown Trip" level after the "Safety On Delay" timer had expired.
Coolant Temp High Switch (IEEE C37.2 – 26 Apparatus Thermal Device)	Module detected that the high engine coolant temperature switch had activated after the "Safety On Delay" timer had expired.
DEF Level	Module received a fault condition from the engine ECU alerting about the DEF level. Module detected that the "DEF Level" had fallen below the "DEF Level Low Alarm Trip" level for the configured delay timer.
Digital Input A to D	Module detected that a digital input configured to create a fault condition became active and the appropriate LCD message is displayed.
DPTC Filter	Module received a fault condition from the engine ECU alerting that the DPF/DPTC had activated.
ECU Amber	Module received an amber fault condition from the engine ECU.

(continued)

(Table 42, contd)

Fault	Description
ECU Data Fail	Module is configured for CAN operation but has not detected data being sent from the engine ECU.
ECU Malfunction	Module received a malfunction fault condition from the engine ECU.
ECU Protect	Module received a protect fault condition from the engine ECU.
ECU Red	Module received a red fault condition from the engine ECU.
Emergency Stop (IEEE C37.2 - 5 Stopping Device)	Module detected that emergency stop button had been pressed removing a positive voltage supply from the emergency stop input terminal. This input is failsafe (normally closed to emergency stop), and immediately stops the generator when the signal is removed.
Engine Over Speed (IEEE C37.2 - 12 Overspeed Device)	Module detected that the engine speed had risen above the “Over Speed Alarm Trip” level for the configured delay timer.
Engine Over Speed Overshoot (IEEE C37.2 - 12 Overspeed Device)	Module detected that the engine speed had risen above the “Over Speed Overshoot Trip” during the configured “Overshoot Delay” timer whilst starting.
Engine Under Speed (IEEE C37.2 - 14 Underspeed Device)	Module detected that the engine speed had fallen below the “Under Speed Alarm Trip” level for the configured delay timer after the “Safety On Delay” timer had expired.
Exp. Unit Failure	Module detected that communications to one of the DSENet expansion modules had been lost.
Failed to Start (IEEE C37.2 - 48 Incomplete Sequence Relay)	Module detected that the generator failed to start as the generator did not meet the required Crank Disconnect criteria, during the configured number of Crank Attempts.
Failed to Stop (IEEE C37.2 - 48 Incomplete Sequence Relay)	Module detects a condition that indicates the generator is running when the module has instructed the generator to stop.
Flexible Sensor A to D Fault	Module detected that circuit to the flexible sensor had become open circuit.
Flexible Sensor A to D High	Module detected that an analog input value had risen above the “Flexible Sensor High Alarm Trip” level.
Flexible Sensor A to D Low	Module detected that an analog input value had fallen below the “Flexible Sensor Low Alarm Trip” level.
Flexible Sensor A to F Open Circuit	Module detected that circuit to the flexible sensor had become open circuit.
Fuel Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level rose above the “High Fuel Level Trip” level.
Fuel Level Low (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine fuel level had fallen below the “Low Fuel Level Trip” level.
Fuel Level Low Switch (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the engine low fuel level switch had activated.
Fuel Sensor Fault	Module detected that circuit to the engine fuel level sensor had become open circuit.
Fuel Tank Bund Level High (IEEE C37.2 - 71 Liquid Level Switch)	Module detected that the fuel tank bund level switch had activated.
Fuel Usage (IEEE C37.2 – 80 Flow Switch)	Module detected that the fuel consumption was more than the configured Running Rate or Stopped Rate.
Generator Loading Frequency	Module detected that the generator output frequency had not risen above the “Generator Loading Frequency” setting after the warming up timer had expired.
Generator Loading Voltage	Module detected that the generator output voltage had not risen above the “Generator Loading Voltage” setting after the warming up timer had expired.

(continued)

(Table 42, contd)

Fault	Description
Generator Over Current (IEEE C37.2 – 51 IDMT Over-current Relay)	Module detected that the generator output current had risen above the "Generator Over Current Trip" during the IDMT function.
Generator Over Frequency (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had risen above the "Over Frequency Alarm Trip" level for the configured delay timer.
Generator Over Frequency Overshoot (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had risen above the "Over Frequency Overshoot Trip" during the configured "Overshoot Delay" timer whilst starting.
Generator Over Voltage (IEEE C37.2 – 59 AC Overvoltage Relay)	Module detected that the generator output voltage had risen above the "Over Voltage Alarm Trip" level for the configured delay timer.
Generator Phase Sequence Wrong (IEEE C37.2 – 47 Phase Sequence Relay)	Module detected that the phase rotation of the generator was different to the configured "Generator Phase Rotation Alarm" setting.
Generator Reverse Power (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had fallen below the "Reverse Power Trip" for the configured delay timer.
Generator Short Circuit (IEEE C37.2 – 51 IDMT Short Circuit Relay)	Module detected that the generator output current had risen above the "Short Circuit Trip" during the IDMT function.
Generator Under Frequency (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had fallen below the "Under Frequency Alarm Trip" level for the configured delay timer after the "Safety On Delay" timer had expired.
Generator Under Voltage (IEEE C37.2 – 27 AC Undervoltage Relay)	Module detected that the generator output voltage had fallen below the "Under Voltage Alarm Trip" level for the configured delay timer after the "Safety On Delay" timer had expired.
Inlet Temperature	Module detected that the engine ECU measurement of inlet temperature had risen above the "Inlet Temperature Alarm Trip" level.
kW Overload (IEEE C37.2 – 32 Directional Power Relay)	Module detected that the generator output kW had risen above the Overload Protection Trip for the configured delay timer.
Loss of Magnetic Pick Up	Module detected that the magnetic pickup was not producing a pulse output after the required Crank Disconnect criteria had been met.
Low Load (IEEE C37.2 – 37 Undercurrent to Underpower Relay)	Module detected that the load had fallen below the "Low Load Alarm Trip" level.
Magnetic Pick Up Fault	Module detected that the circuit to the magnetic pickup sensor had become open circuit.
Maintenance Due	Module detected that one of the configured maintenance alarms is due as the configured maintenance interval has expired.
Negative kvar (IEEE C37.2 – 40 Field Under Excitation Relay)	Module detected that the generator output kvar had fallen below the "Negative var Alarm Trip" for the configured delay timer.
Negative Phase Sequence (IEEE C37.2 - 46 Phase-Balance Current Relay)	Module detected that there was an imbalance of current across the generator phases greater than the "Negative Phase Sequence Trip Level" percentage setting.
Oil Pressure Sender Fault	Module detected that circuit to the engine oil pressure sensor had become open circuit.

(continued)

(Table 42, contd)

Fault	Description
Oil Pressure Low (IEEE C37.2 - 63 Pressure Switch)	Module detected that the engine oil pressure had fallen below the “Low Oil Pressure Shutdown Trip” level after the “Safety On Delay” timer had expired.
Oil Pressure Low Switch (IEEE C37.2 - 63 Pressure Switch)	Module detected that the low oil pressure switch had activated after the “Safety On Delay” timer had expired.
Over Frequency Runaway (IEEE C37.2 – 81 Frequency Relay)	Module detected that the generator output frequency had risen above the “Run Away Trip” level.
Over Speed Runaway (IEEE C37.2 - 12 Overspeed Device)	Module detected that the engine speed had risen above the “Run Away Trip” level.
Positive kvar (IEEE C37.2 – 40 Field Over Excitation Relay)	Module detected that the generator output kvar had risen above the “Positive var Alarm Trip” for the configured delay timer.
SCR Inducement	Module received a fault condition from the engine ECU alerting about the SCR Inducement.
Water in Fuel	Module received a fault condition from the engine ECU alerting that water in the fuel had been detected.

Maintenance Alarms

Depending upon the module configuration, one or more levels of engine maintenance alarm may occur based on the configured schedule.

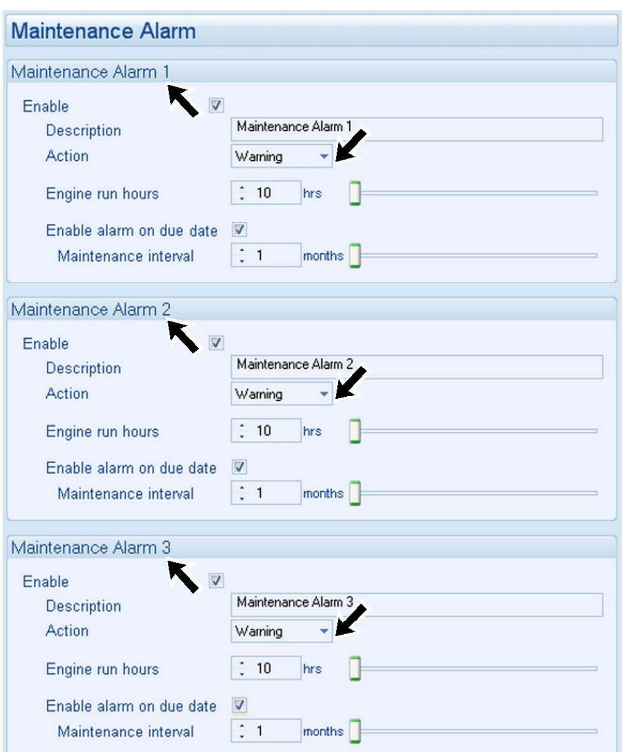


Illustration 78 g06530541

Maintenance Alarm

A screen capture from Cat GCCP 1.2/1.3 Configuration Suite Software showing the configuration of “Maintenance Alarm” for 1, 2, and 3 is shown in Illustration 78. Maintenance alarm can be either a “warning” (set continues to run) or “shutdown” (running the set is not possible) when activated.

Site service engineer resets the maintenance alarm after performing the required maintenance. Follow any one of the following methods to reset the alarm:

- Activate an input that has been configured to “Maintenance Reset Alarm” for 1, 2, or 3.
- Press the maintenance reset button in Cat GCCP 1.2/1.3 Configuration Suite under “Maintenance” section.
- Press and hold stop/reset mode button (20) for 10 seconds on the desired “Maintenance Alarm” status page. The page may be protected with a PIN number. Refer to Illustration 50 for stop/reset mode button (20).

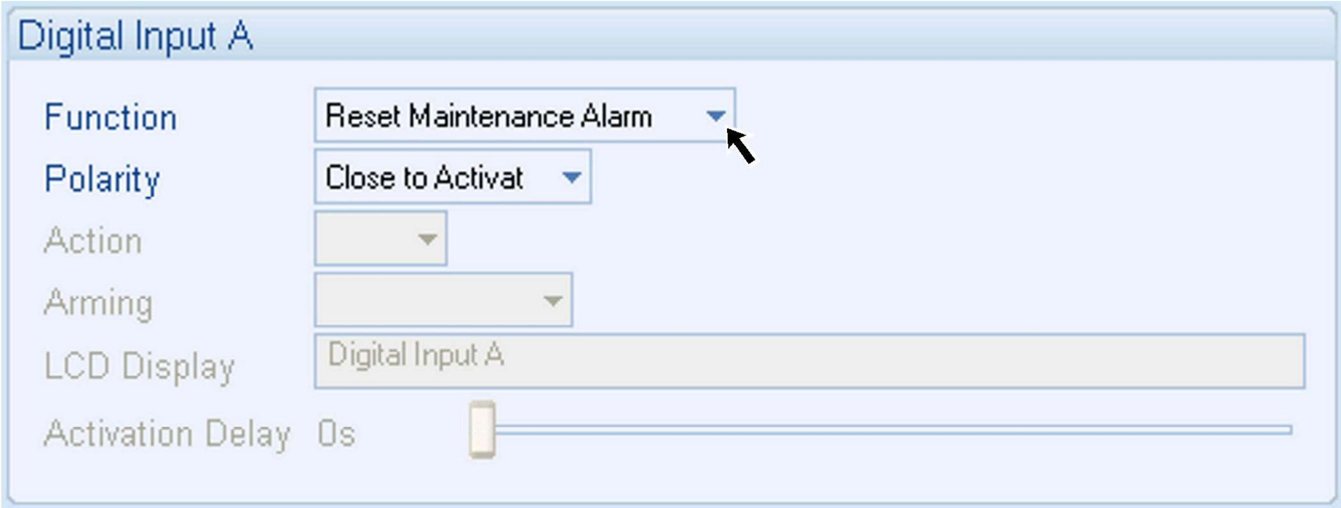


Illustration 79 g06530569

Resetting Maintenance Alarm

A screen capture from Cat GCCP 1.2/1.3 Configuration Suite Software showing the configuration of a digital input for reset maintenance alarm is shown in Illustration 79.

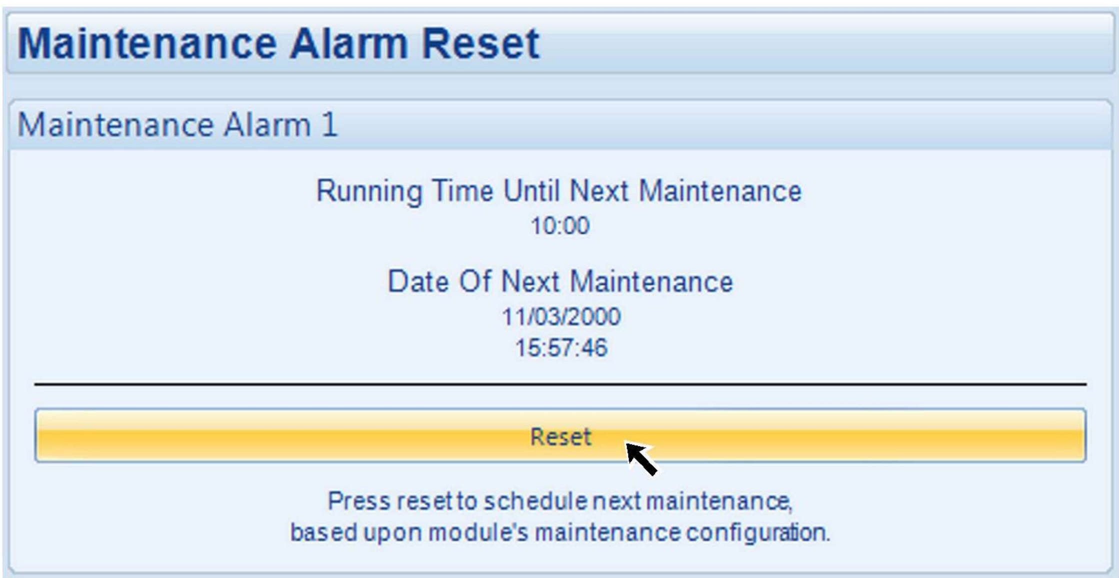


Illustration 80 g06530579

Maintenance Alarm Reset

A screen capture from Cat GCCP 1.2/1.3 Configuration Suite Software showing the maintenance alarm reset button in Cat GCCP 1.2/1.3 Configuration Suite SCADA/maintenance section.

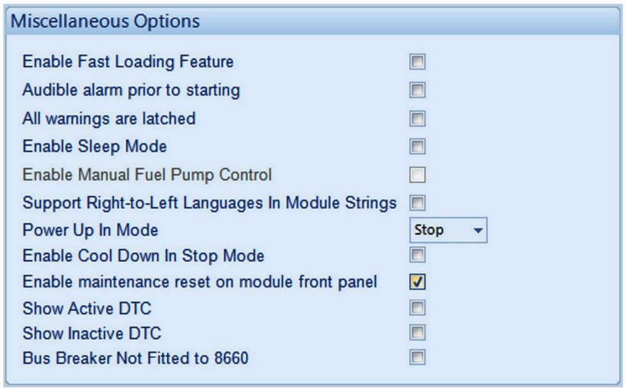


Illustration 81 g06530591

Resetting Maintenance Alarm

A screen capture from Cat GCCP 1.2/1.3 Configuration Suite Software showing the configuration holding stop/reset button (20) to reset the maintenance alarm is shown in Illustration 81.

Overcurrent Alarm

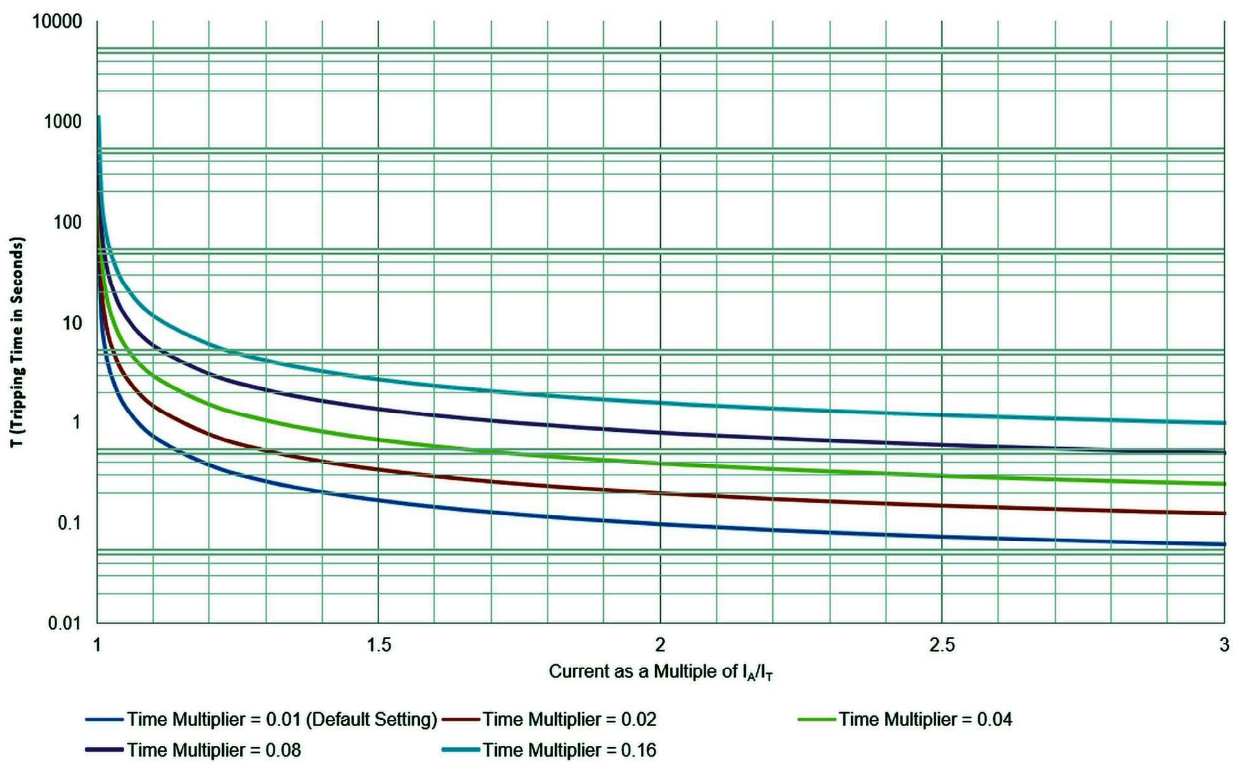


Illustration 82 g06531402

Short Circuit IDMT Alarm Curves

Overcurrent alarm combines a simple warning trip level with a fully functioning Inverse Definite Minimum Time curve (IDMT curve) for thermal protection.

Immediate Warning

If "Immediate Warning" is enabled, the controller generates a warning alarm when the trip level is reached. The alarm automatically resets once the generator loading current falls below the trip level, unless "All Warnings are Latched" is enabled.

Inverse Definite Minimum Time Alarm (IDMT Alarm)

The controller begins to follow IDMT curve when the current on any phase passes the "Trip" setting if the overcurrent IDMT alarm is enabled. IDMT alarm triggers shutdown or electrical trip as selected in action, if the trip is surpassed for an excess amount of time.

$$T = \frac{t}{\frac{I_A}{I_T} - 1}$$

Illustration 83 g06533872

Formula for Tripping Time

The larger the over circuit fault, the faster the trip. The speed of the trip depends upon the fixed formula shown in Illustration 83. The following are the parameters of the formula:

T – Tripping time (seconds)

I_A – Actual measured current of the most highly loaded line (L1, L2, or L3)

I_T – Delayed trip point setting in current

t – Time multiplier setting, and also represents the tripping time in seconds at twice full load (when $I_A/I_T = 2$).

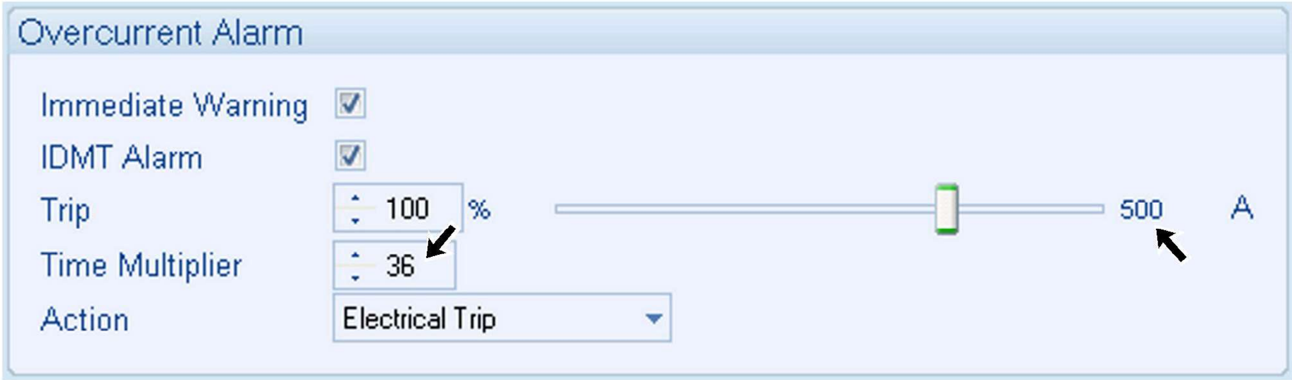


Illustration 84 g06530600

DSE Factory Settings

The settings shown in Illustration 84 are factory settings taken from Cat GCCP 1.2/1.3 Configuration Suite PC Software for a brushless alternator. The settings are for normal running of the generator up to 100% full load. If the load is surpassed, the “Immediate Warning” alarm is triggered, and the set continues to run.

Alternator windings begin to overheat when the generator is overloaded. The aim of the IDMT alarm is to prevent the windings from being overloaded (heated). The amount of time that the alternator can be safely overloaded is governed by high overload condition. The default settings as shown in Illustration 84 allows alternator to overload to the limit of a typical brushless alternator. A 110% overload is permitted for 1 hour or a 200% overload is permitted for 36 seconds.

The controller follows a cooling curve if the alternator load reduces. A second overload condition may trip soon after the first as the controller knows if the windings have not cooled sufficiently.

Creating Spreadsheet for Over Current IDMT Curve

The formula used to create a spreadsheet for overcurrent IDMT curve is shown in Illustration 83. The formula can be simplified for adding into a spreadsheet. The formula is useful for trying out different values of time multiplier setting “t” and viewing the results without testing on the generator.

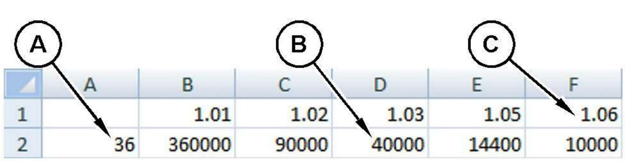


Illustration 85 g06541841

Spreadsheet for Over Current IDMT Curve (typical example)

(A) t (time multiplier setting)
(B) T (tripping time in seconds)
(C) I_A / I_T (multiple of the Trip setting from 1.01 to 3.0 in steps of 0.1)

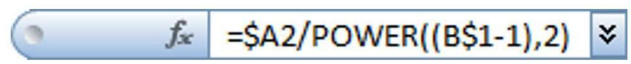


Illustration 86 g06530863

Formula for Trip Time

The formula for tripping time cells is shown in Illustration 86.

Short Circuit IDMT Alarm

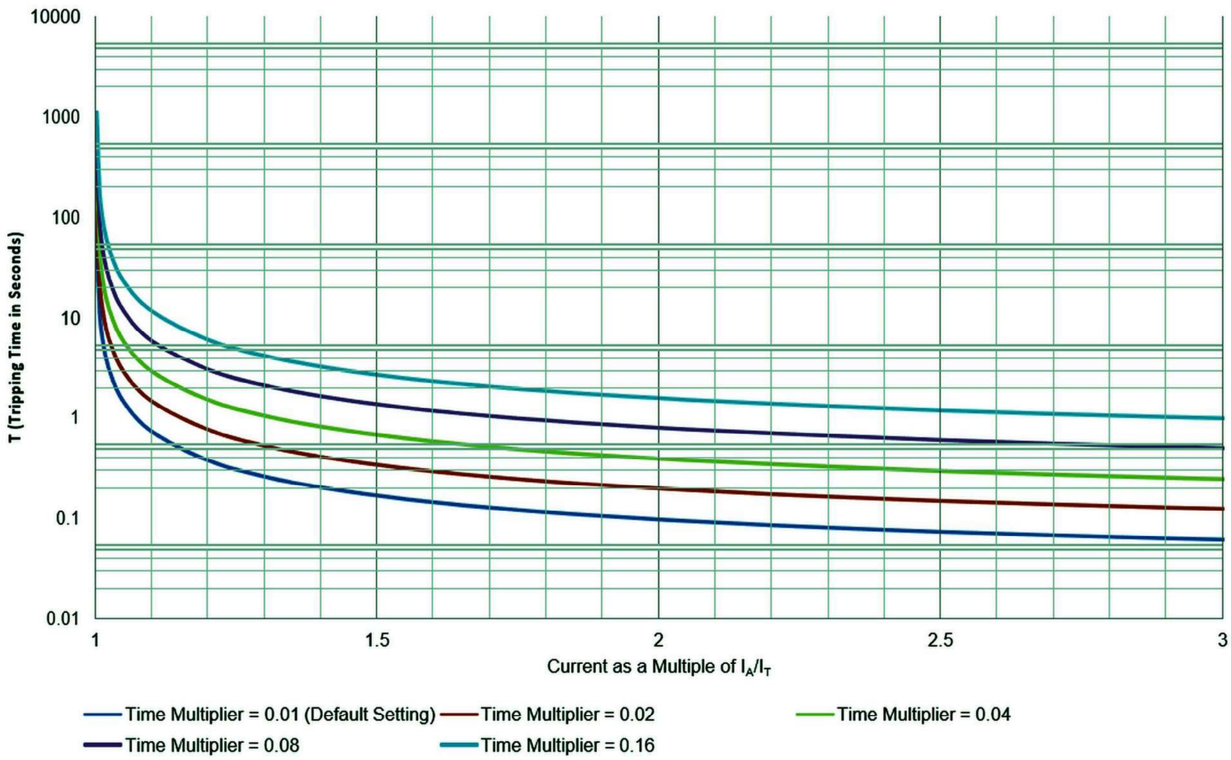


Illustration 87 g06531402

Short Circuit IDMT Alarm Curves

If Short Circuit alarm is enabled, the controller begins to follow the IDMT curve when the current on any phase passes the trip setting. The IDMT alarm triggers if the trip is surpassed for an excess amount of time.

$$T = \frac{t \times 0.14}{\left(\left(\frac{I_A}{I_T}\right)^{0.02} - 1\right)}$$

Illustration 88 g06533873

Formula for Tripping Time in Short Circuit Condition

The larger the short circuit fault, the faster the trip. The speed of the trip depends on the fixed formula, shown in Illustration 88.

The following are the parameter of the formula:

T – Tripping time in seconds (accurate to 5% , or +/- 50 ms (whichever is greater)).

I_A – Actual measured current

I_T – Trip point setting in current

t – Time multiplier setting

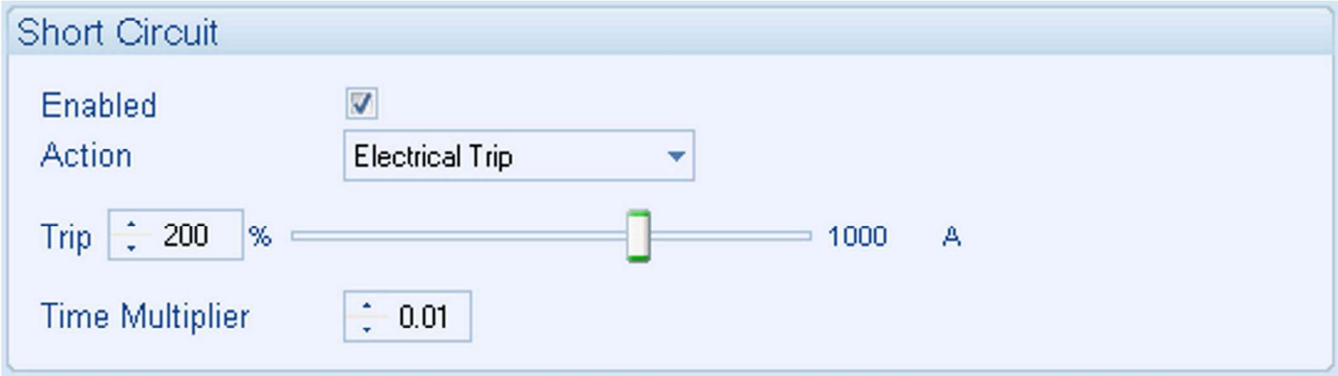


Illustration 89 g06531092

Factory Settings of DSE Configuration Suite Software

The settings shown in Illustration 89 are factory settings taken from Cat GCCP 1.2/1.3 Configuration Suite software.

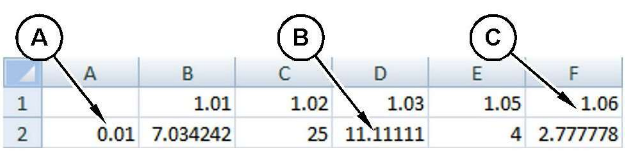
Note: Due to large inrush currents from certain loads, such as motors or transformers, the default settings for short circuit alarm may need adjusting to compensate.

Alternator stator and rotor begin to overheat when the generator is overloaded. The aim of the IDMT alarm is to prevent the stator and rotor from being overloaded (heated). The amount of time for which the alternator can be safely overloaded is governed by high short circuit condition.

Creating Spreadsheet for Short Circuit IDMT Curve

The formula used to create spreadsheet for short circuit curve is the same as given in Illustration 88.

The formula can be simplified for addition into a spreadsheet. The formula is useful for trying out different values of timer multiplier setting “t” , and viewing the results without testing on the generator.



	A	B	C	D	E	F
1		1.01	1.02	1.03	1.05	1.06
2	0.01	7.034242	25	11.11111	4	2.777778

Illustration 90 g06541843

Spreadsheet for Short Circuit IDMT Curve (typical example)

(A) t (time multiplier setting)
(B) T (tripping time in seconds)
(C) I_A / I_T (multiple of the Trip setting from 1.01 to 3.0 in steps of 0.1)

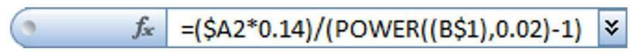


Illustration 91 g06531401

Tripping Time Cells Formula

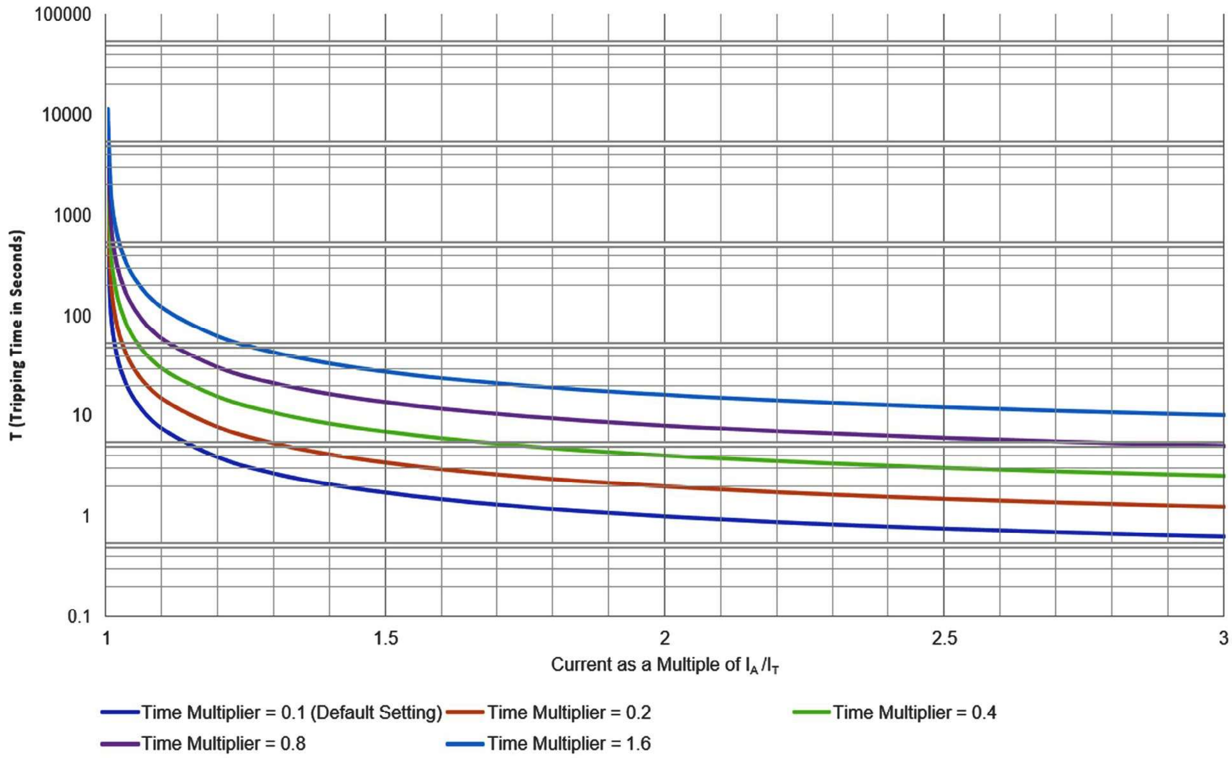


Illustration 92 g06531403

Earth Fault IDMT Alarm Curves

Default Current Protection Tripping Characteristics

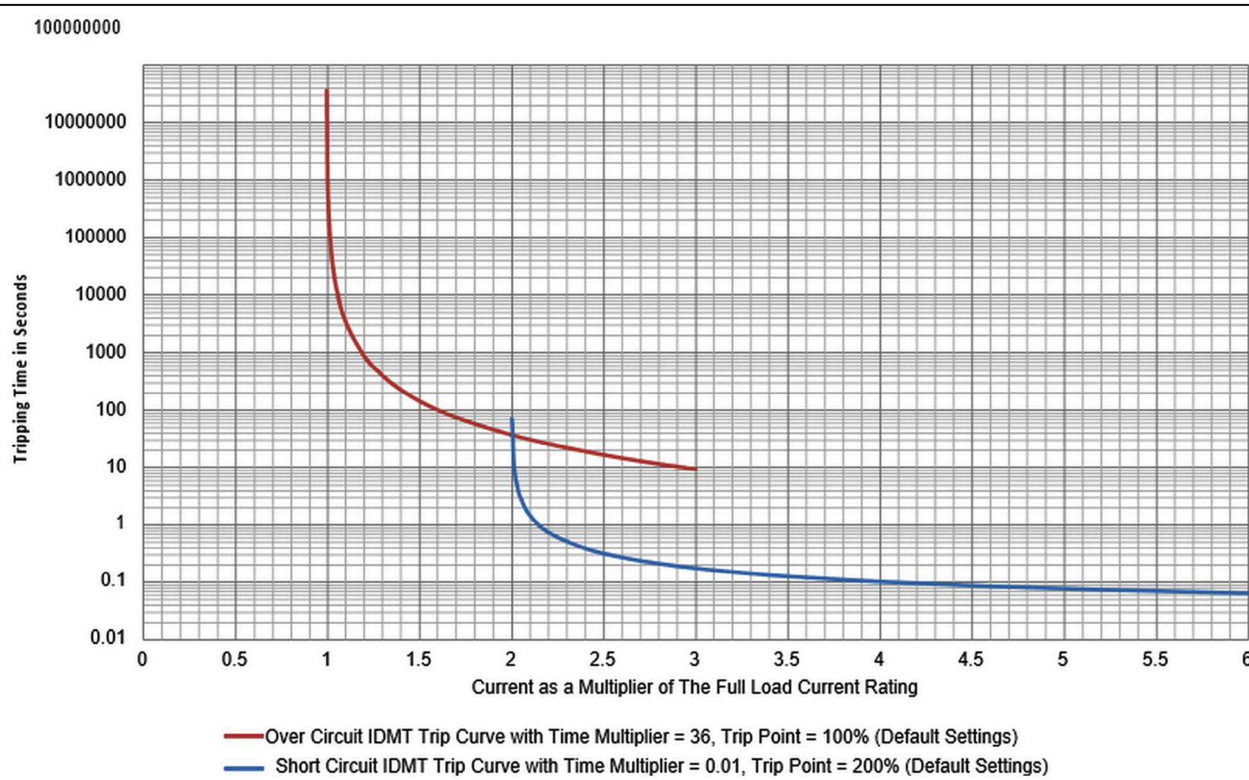


Illustration 93 g06531404

Cat GCCP 1.2/1.3 Default Configuration of Over Current, Short Circuit and, Earth Fault IDMT Alarm Curves

Cat GCCP 1.2/1.3 default settings for IDMT tripping curves for overcurrent, short circuit, and Earth fault protections are shown in Illustration 93. The default settings for overcurrent alarm allow the alternator to overload to the limit of a typical brushless alternator. The permitted overload is 110% for 1 hour or 200% for 36 seconds. The alternator begins to overheat in an overcurrent situation.

The aim of the overcurrent IDMT alarm is to prevent the windings from being overloaded (heated). The amount of time that the alternator can be safely overloaded is governed by high overload condition. The default settings for short circuit alarm allow an alternator to supply high current caused by a genuine short circuit or an inrush current of motor/transformer. The permitted overload is 300% for 0.17 seconds or 600% for 0.06 seconds.

The alternator begins to overheat to a point where the insulation breaks down, potentially causing a fire in a short circuit situation. The aim of the short circuit IDMT alarm is to prevent the insulation from melting due to excessive heat. The amount of time that the alternator can be safe in a short circuit condition is governed by the overload condition.

Front Panel Configuration

In front panel configuration mode, the operator can fully configure the module through the display without the use of Cat GCCP 1.2/1.3 Configuration Suite PC Software.

Illustration 94 g06531411

Fascia Buttons of Module

(15) Menu Navigation Button

Use the fascia buttons on the module shown in Illustration 94 to traverse the menu and make value changes to the parameters.

Main Configuration Editor

Accessing Main Configuration Editor

Note: More comprehension module configuration is possible via PC configuration software.

Press stop/reset mode button (20) to ensure that the engine is at rest and at the module. Press stop/reset mode button (20) and tick button together to enter the main configuration editor.

Entering Pin

Note: Entering PIN is not set by Caterpillar when the module leaves the factory. The module must be replaced if the code has been lost or forgotten.

If a module security PIN has been set, the PIN request is then shown.

Note: To ensure security, the PIN is automatically reset when the editor exits (manually or automatically) the security screen.

Follow the below steps to set or change the PIN number:

1. The first “#” changes to “0” . Press left or right menu navigation button (15) to adjust to the correct value.

2. Press right menu navigation button (15) when the first digit is correctly entered. The digit previously entered, now shows as “#” for security.

3. Repeat Step 1 and Step 2 for the other digits of the PIN number. Press left menu navigation button (15) to move back to adjust one of the previous digits.

4. The PIN is checked for validity when the center button in menu navigation button (15) is pressed after editing the final digit. If the number is incorrect, the PIN must be reentered.

5. The editor will display if the PIN has been successfully entered or if the module PIN was not enabled.

Editing Parameter

Note: Pressing and holding menu navigation button (15) provide the auto-repeat functionality. Values can be changed quickly by holding menu navigation buttons (15) for a prolonged period.

Follow the below procedure to edit a parameter:

1. Press left or right menu navigation button (15) to cycle the section to view/change.

2. Press up or down menu navigation button (15) to select the parameter to view/change within the current selected section.

3. Press center menu navigation button (15), to enter edit mode to edit the parameter. The parameter begins to flash to indicate editing.

4. Press left, right, up, or down menu navigation button (15) to change the parameter to the required value.

5. Press center menu navigation button (15) to save the value. The parameter ceases flashing to indicate that the parameter has been saved.

Exiting Main Configuration Editor

Note: To ensure security, the editor automatically exits after 5 minutes of inactivity.

- Press and hold stop/reset mode button (20) to exit the editor without saving the changes.
- Press and hold center menu navigation button (15) to exit the editor and save the changes.

Adjustable Parameters

Table 43

Section	Parameter as Shown on Display	Value
Module	Contrast	0%
	Language	English
	Current Date and Time	Month, Year, hh: mm
	Fast Loading	Active/Inactive
	Warnings Latched	
	Lamp Test At Start Up	
	Power Save Mode	
	Backlight Power Saving	
	Event Log Display Format	Date and Time
	Maintenance Pin Protect	Active/Inactive
	Cool Down In Stop Mode	
	Hold Start Button To Crank	
	Power Up In Mode	Stop/Auto/Manual
	Audible Alarm Timer	Active/Inactive
	Suppress Instrument Generator Voltage	

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Suppress Instrument Generator	
	Frequency	
	Suppress Instrument Mains Voltage	
	Suppress Instrument Mains Frequency	
	Suppress Instrument Current	
	Suppress Instrument kW	
	Suppress Instrument kvar	
	Suppress Instrument kVA	
	Suppress Instrument Power Factor	
	Suppress Instrument kWh	
	Suppress Instrument kvarh	
	Suppress Instrument kVAh	
	Suppress Instrument Charge Alternator	
Engine Generator	Start Attempts	3
	Gas Engine Choke (Gas Engine Only)	0 h 0 m 0 s
	Gas Engine Delay (Gas Engine Only)	
	Ignition off Delay (Gas Engine Only)	
	Crank Disconnect Oil Pressure	Active/Inactive
	Oil Pressure Check Prior to Starting	
	Crank Disconnect Frequency	Hz
	Crank Disconnect Engine Speed	rpm
	Crank Disconnect Oil Pressure	Bar/psi/kPa
	Oil Pressure Low Shutdown	

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Oil Pressure Low Pre-Alarm	
	Coolant Temp Low Warning	0° C
	Coolant Temp High Pre-Alarm	
	Coolant Temp High Electrical Trip	
	Coolant Temp High Shutdown	
	Fuel Usage Running Rate	%
	Fuel Usage Stopped Rate	
	Specific Gravity	0.89
	Pre-Heat Temp	0° C
	Pre-Heat Timer	0 h 0 m 0 s
	Post-Heat Temp	0° C
	Post-Heat Timer	0 h 0 m 0 s
	Battery Under Voltage Warning [Enable]	Active/Inactive
	Battery Under Voltage Warning	V
	Battery Under Voltage Warning Return	
	Battery Under Voltage Warning Delay	0 h 0 m 0 s
	Battery Over Voltage Warning [Enable]	Active/Inactive
	Battery Over Voltage Warning Return	V
	Battery Over Voltage Warning	
	Battery Over Voltage Warning Delay	0 h 0 m 0 s
	Over Speed Shutdown [Trip]	0%
	Over Speed Delay	0.89
	Overspeed Overshoot	0° C
	Overspeed Overshoot [Delay]	0 h 0 m 0 s

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Charge Alternator Failure Warning [Enable]	Active/Inactive
	Charge Alternator Failure Warning	V
	Charge Alternator Failure Warning Delay	0 h 0 m 0 s
	Charge Alternator Failure Shutdown [Enable]	Active/Inactive
	Charge Alternator Failure Shutdown	V
	Charge Alternator Failure Shutdown Delay	0 h 0 m 0 s
	Low Battery Start [Enable]	Active/Inactive
	Low Battery Run On Load [Enable]	
	Low Battery Start Threshold	0 V
	Low Battery Start Delay	0 h 0 m 0 s
	Low Battery Run Time	
	Magnetic Pickup [Enable]	Active/Inactive
	AC System	Three Phase Four Wire
	Alternator Fitted	Active/Inactive
	Alternator Poles	4
	Under Voltage Alarm [Enable]	Active/Inactive
	Under Voltage Alarm [Trip]	V
	Under Voltage Pre-Alarm [Enable]	Active/Inactive
	Under Voltage Pre-Alarm [Trip]	V
	Under Voltage Delay	0 s
	Loading Voltage	V
	Nominal Voltage	

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Over Voltage Pre-Alarm [Enable]	Active / Inactive
	Over Voltage Pre-Alarm Return	V
	Over Voltage Pre-Alarm [Trip]	
	Over Voltage Shutdown [Trip]	
	Over Voltage Delay	0 s
	Under Frequency Alarm [Enable]	Active/Inactive
	Under Frequency Alarm [Trip]	Hz
	Under Frequency Pre-Alarm [Enable]	Active/Inactive
	Under Frequency Pre-Alarm [Trip]	Hz
	Under Frequency Delay	0 s
	Loading Frequency	Hz
	Nominal Frequency	
	Over Frequency Pre-Alarm [Enable]	Active/Inactive
	Over Frequency Pre-Alarm Return	Hz
	Over Frequency Pre-Alarm [Trip]	
	Over Frequency Shutdown [Trip]	
	Over Frequency Delay	0 s
	Frequency Overshoot Shutdown	%
	Frequency Overshoot Delay	0 h 0 m 0 s
	CT Location	Gen / Load
	CT Primary	A
	CT Location	Gen / Load
	CT Primary	A
	Full Load Rating	
	Immediate Over Current [Enable]	Active/Inactive

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Delayed Over Current [Enable]	
	Delayed Over Current	%
	Full Load kW Rating	kW
	kW Overload Alarm [Enable]	Active/Inactive
	kW Overload Alarm Action	Indication/Warning/ Electrical Trip/ Shutdown
	kW Overload Alarm Trip	%
	kW Overload Alarm Delay	0 h 0 m 0 s
Timers	Start Delay Off Load	0 h 0 m 0 s
	Start Delay On Load	
	Start Delay Mains Fail	
	Start Delay Telemetry	
	Mains Transient Delay	0 m 0 s
	Crank Duration Timer	
	Crank Rest Timer	
	Smoke Limiting	
	Smoke Limiting Off	
	DPF Ramp	0 s
	Safety On Delay	0 m 0 s
	Warming	0 h 0 m 0 s
	ECU Override	0 m 0 s
	Mains Transfer Time	
	Breaker Close Pulse	0 s
	Breaker Trip Pulse	
	Return Delay	0 h 0 m 0 s
	Cooling	
	Cooling at Idle	
	ETS Solenoid Hold	0 m 0 s

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Fail To Stop Delay	
	LCD Page Timer	0 h 0 m 0 s
	LCD Scroll Delay	
CAN ECU	Alternate Engine Speed	-
	ECU Data Fail	
	ECU Data Fail Action	
	ECU Data Fail Delay	
	Use Module Oil Pressure	
	Use Module Coolant Temp	
	Use Module Engine Hours	
	Use Module RPM	
	Use Module Charge Alt	
Maintenance Alarms	Maintenance Alarm 1 [Enable]	Active/Inactive
	Maintenance Alarm 1 Action	Warning/Electrical Trip/Shutdown
	Maintenance Alarm 1 Engine Hours	Hours
	Maintenance Alarm 1 On Due Date	Active/Inactive
	Maintenance Alarm 1 Interval	MTH
	Maintenance Alarm 2 [Enable]	Active/Inactive
	Maintenance Alarm 2 Action	Warning/Electrical Trip/Shutdown
	Maintenance Alarm 2 Engine Hours	Hours
	Maintenance Alarm 2 On Due Date [Enable]	Active/Inactive
	Maintenance Alarm 2 Interval	MTH
	Maintenance Alarm 3 [Enable]	Active/Inactive
	Maintenance Alarm 3 Action	Warning/Electrical Trip/Shutdown

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	Maintenance Alarm 3 Engine Hours	Hours
	Maintenance Alarm 3 On Due Date [Enable]	Active/Inactive
	Maintenance Alarm 3 Interval	MTH
Outputs	Digital Output A Source	Refer to Section “Output Sources”.
	Digital Output A Polarity	Energize/De-energize
	Digital Output B Source	Refer to Section “Output Sources”.
	Digital Output B Polarity	Energize/De-energize
	Digital Output C Source	Refer to Section “Output Sources”.
	Digital Output C Polarity	Energize/De-energize
	Digital Output D Source	Refer to Section “Output Sources”.
	Digital Output D Polarity	Energize/De-energize
	Digital Output E Source	Refer to Section “Output Sources”.
	Digital Output E Polarity	Energize/De-energize
	Digital Output F Source	Refer to Section “Output Sources”.
	Digital Output F Polarity	Energize/De-energize
	Digital Output G Source	Refer to Section “Output Sources”.
	Digital Output G Polarity	Energize/De-energize
	Digital Output H Source	Refer to Section “Output Sources”.
	Digital Output H Polarity	Energize/De-energize
	LCD Indicator 1 Source	Refer to Section “Output Sources”.
	LCD Indicator 1 Polarity	Liter/Unit
	LCD Indicator 2 Source	Refer to Section “Output Sources”.

(continued)

(Table 43, contd)

Section	Parameter as Shown on Display	Value
	LCD Indicator 2 Polarity	Liter/Unit
	LCD Indicator 3 Source	Refer to Section “Output Sources”.
	LCD Indicator 3 Polarity	Liter/Unit
Schedule	Schedule Enable	Active/Inactive
	Schedule Period Bank 1	Weekly/Monthly
	Bank 1 Schedule 1 to 8	Press the Tick button to begin editing then up or down when selecting the different parameters.
	Schedule Period Bank 2	Weekly/Monthly
	Bank 2 Schedule 1 to 8	Press the Tick button to begin editing then up or down when selecting the different parameters.

Output Sources

Table 44

Output Sources	
0	Not Used
1	Air Flap Relay
2	Alarm Mute
3	Alarm Reset
4	Alternator Config 1 Selected
5	Alternator Config 2 Selected
6	Alternator Config 3 Selected
7	Alternator Config 4 Selected
8	Alternator Config 5 Selected
9	Analogue Input A
10	Analogue Input B
11	Analogue Input C
12	Analogue Input D
13	Arm Safety On Alarms
14	Audible Alarm
15	Auto Restore Inhibit

(continued)

(Table 44, contd)

Output Sources	
16	Auto Start Inhibit
17	Auxiliary Mains Failure
18	Battery High Volts
19	Battery Low Volts
20	Call For Scheduled Run
21	Charge Alt Fail Shutdown
22	Charge Alt Fail wiring
23	Close Gen Output
24	Close Gen Pulse
25	Close Mains Output
26	Close Mains Pulse
27	Combined Mains Failure
28	Maintenance Alm 1, 2, 3
29	Common Low / High Frequency Alarm
30	Combined Low / High Frequency Warning
31	Combined Low / High Volt Alm
32	Combined Low / High Volt Wng
33	Common Alarm
34	Common E Trip
35	Common Shutdown
36	Common Warning
37	Config CAN 1 Active
38	Config CAN 10 Active
39	Config CAN 2 Active
40	Config CAN 3 Active
41	Config CAN 4 Active
42	Config CAN 5 Active
43	Config CAN 6 Active
44	Config CAN 7 Active
45	Config CAN 8 Active
46	Config CAN 9 Active
47	Coolant Cooler Control
48	Coolant Heater Control
49	Coolant Temp Switch
50	Cooling Down
51	Data Logging Active
52	DEF Level Low
53	DEF Level Low Alarm

(continued)

(Table 44, contd)

Output Sources	
54	Digital Input A
55	Digital Input B
56	Digital Input C
57	Digital Input D
58	Digital Input E
59	Digital Input F
60	Digital Input G
61	Digital Input H
62	HTR Fitted and ON
63	DPF Forced Regen Requested
64	DPF Non Mission
65	DPF Regen Active
66	DPF Regen Interlock
67	DPTC Filter
68	Droop Enable
69	ECU (ECM) Data Fail
70	ECU (ECM) Power
71	ECU (ECM) Shutdown
72	ECU (ECM) Stop
73	ECU (ECM) Warning
74	ECU Pre-Heat
75	EJP 1
76	EJP 2
77	Emergency Stop
78	Energise to stop
79	External Panel Lock
80	Fail to Start
81	Fail to Stop
82	Fan Control
83	Flex Sensor A High Alarm
84	Flex Sensor A High Pre-Alm
85	Flex Sensor A Low Alarm
86	Flex Sensor A Low Pre-Alm
87	Flex Sensor A OC
88	Flex Sensor B High Alarm
89	Flex Sensor B High Pre-Alm
90	Flex Sensor B Low Alarm
91	Flex Sensor B Low Pre-Alm

(continued)

(Table 44, contd)

Output Sources	
92	Flex Sensor B OC
93	Flex Sensor C High Alarm
94	Flex Sensor C High Pre-Alm
95	Flex Sensor C Low Alarm
96	Flex Sensor C Low Pre-Alm
97	Flex Sensor C OC
98	Flex Sensor D High Alarm
99	Flex Sensor D High Pre-Alm
100	Flex Sensor D Low Alarm
101	Flex Sensor D Low Pre-Alm
102	Flex Sensor D OC
103	Fuel Level High Alarm
104	Fuel Level High Pre-Alm
105	Fuel Level Low Alarm
106	Fuel Level Low Pre-Alm
107	Fuel Pump Control
108	Fuel Relay
109	Fuel Sensor OC
110	Fuel Tank Bund Level High
111	Fuel Usage Alarm
112	Gas Choke ON
113	Gas Ignition
114	Gen Loading Freq Not Reached
115	Gen Loading Volts Not Reached
116	Gen Hi Freq Overshoot Alm
117	Gen Hi Freq Overshoot Wng
118	Gen Available
119	Gen Closed Aux
120	Gen Excite
121	Gen High Volts Alarm
122	Gen High Volts Warning
123	Gen High Volts Shutdown
124	Gen Load Inhibit
125	Gen Low Volts Alarm
126	Gen Low Volts Warning
127	Gen High Frequency Alarm
128	Gen High Frequency Delayed Alarm

(continued)

(Table 44, contd)

Output Sources	
129	Gen High Frequency Delayed Warning
130	Gen Ph Rotation Alarm
131	Gen Reverse Power
132	HEST Active
133	High Coolant Temp E Trip
134	High Coolant Temperature Shutdown
135	High Coolant Temperature Warning
136	High Inlet Temperature Shutdown
137	High Inlet Temperature Warning
138	Inhibit Schedule Run
139	kW Overload Alarm
140	Lamp Test
141	Load Freq Not Reached
142	Load Volts Not Reached
143	Loss of MPU Signal
144	Louvre Control
145	Low Coolant Temp
146	Low Load
147	Low Oil Pressure Sdn
148	Low Oil Pressure Wng
149	Main Configuration Selected
150	Mains Closed Aux
151	Mains Failure
152	Mains High Freq
153	Mains High Volts
154	Mains Load Inhibit
155	Mains Low Freq
156	Mains Low Volts
157	Mains Ph Rotation Alarm
158	Maintenance Alarm 1 Due
159	Maintenance Alarm 2 Due
160	Maintenance Alarm 3 Due
161	Manual Restore Contact
162	MPU Open Circuit
163	Negative Ph Sequence Alm
164	Oil Pressure Sensor OC
165	Oil Pressure Switch
166	Open Gen Output
167	Open Gen Pulse

(continued)

(Table 44, contd)

Output Sources	
168	Open Mains Output
169	Open Mains Pulse
170	Over Current IDMT Alarm
171	Over Current Imm Warning
172	Over Frequency Runaway
173	Over Frequency Warning
174	Over Speed Runaway
175	Over Speed Shutdown
176	Over Speed Warning
177	Overspeed Delayed Alarm
178	Overspeed Delayed Wng
179	Overspeed Overshoot Alarm
180	Overspeed Overshoot Wng
181	Preheat During Preheat Timer
182	Preheat Until Crank End
183	Preheat Until End Of Safety
184	Preheat Until End Of Warming
185	Protections Disabled
186	Remote Control 1
187	Remote Control 10
188	Remote Control 2
189	Remote Control 3
190	Remote Control 4
191	Remote Control 5
192	Remote Control 6
193	Remote Control 7
194	Remote Control 8
195	Remote Control 9
196	Remote Start Off Load
197	Remote Start On Load
198	Reset Maintenance 1
199	Reset Maintenance 2
200	Reset Maintenance 3
201	Scheduled Auto Start Inhibit
202	SCR Inducement
203	Screensaver Active
204	Shutdown Blocked
205	Simulate Auto Button

(continued)

(Table 44, contd)

Output Sources	
206	Simulate Close Gen
207	Simulate Lamp Test
208	Simulate Mains Available
209	Simulate Manual
210	Simulate Open Gen
211	Simulate Start
212	Simulate Stop
213	Simulate Test On Load
214	Smoke Limiting
215	Start Relay
216	Stop And Panel Lock
217	System In Auto Mode
218	System In Man Mode
219	System In Stop Mode
220	System In Test Mode
221	Telemetry Active
222	Telemetry Data Active
223	Temp Sensor OC
224	Low Frequency Alarm
225	Low Frequency Warning
226	Low Speed Alarm
227	Low Speed Warning
228	Wait For Man Restore
229	Water in Fuel

Running Configuration Editor

Accessing Running Configuration Editor

Running editor may be accessed during generator set operation. Press and hold center navigation button (15) to access the "Running Editor" .

Entering PIN

Note: Entering PIN is not set by Caterpillar when the module leaves the factory. If the code has been "lost" or "forgotten" , the module must be replaced.

Note: PIN is automatically reset when the editor is exited (manually or automatically) to ensure security.

The PIN is not requested while accessing the running editor even if a module security PIN has been set.

Editing Parameter

Note: Pressing and holding menu navigation button (15) provide auto-repeat functionality. Long press the buttons to change the values quickly.

Follow the below procedure to edit a parameter:

1. Select the configuration to be edited by pressing up or down menu navigation button (15).
2. Press left or right menu navigation button (15) to cycle to the section to view or change.
3. Press up or down menu navigation button (15) to select the parameter within the current selected section to view or change.
4. Press center menu navigation button(15) to enter edit mode. The parameter begins to flash to indicate editing.
5. Press up or down menu navigation button (15) to change the parameter to the required value.
6. Press center menu navigation button (15) to save the value. The parameter ceases flashing to indicate that the parameter has been saved.

Exiting Running Configuration Editor

Note: To ensure security, the editor automatically exits after 5 minutes of inactivity.

Press and hold center menu navigation button (15) to exit the editor, and save the changes.

Running Editor Parameters

Table 45

Section	Parameter	Values
Module	Contrast	%
	Language	English / Other
Engine	Manual Frequency Trim	0.0 Hz
	Speed Bias	0.0 Unit
	Governor Gain	0.0
	Frequency Adjust	0.0 Hz
	DPF Auto Regen Inhibit	Active / Inactive
	DPF Manual Regen Request	
	ECU Service Mode	

Commissioning

Basic Checks

Note: Link the input to DC positive if emergency stop feature is not required.

Perform the following checks before starting the system:

- The unit is adequately cooled and all the wiring to the module is of standard and rating compatibility with the system.
- All mechanical parts are correctly fitted and that all electrical connections (including Earths) are in good condition.
- The unit DC supply is fused and connected to battery and that the unit is of correct polarity.
- The emergency stop input is wired to an external “Normally closed” switch connected to the DC positive.

Note: To check the start cycle operation, prevent the engine from starting by disabling the operation of the fuel solenoid. Connect the battery supply after visual inspection. Press manual mode button (22) followed by the start button (25) until the start sequence commences.

The starter engages and operates for a pre-set crank period. After the starter motor has attempted to start the engine for a pre-set number of attempts, the LCD displays “Failed to Start” . Press stop/reset button (20) to reset the unit.

Restore the engine to operational status (reconnect the fuel solenoid). Press manual mode button (22) followed by start button (25). The engine should start and the starter motor should disengage automatically. The engine is fully operational and the fuel solenoid is operating if the engine does not start and the starter motor does not disengage automatically.

The engine should run at rated speed. If the engine does not run at the rated speed and an alarm is present, check if the alarm is valid and the check input wiring. The engine should continue to run for an indefinite period. The engine and alternator parameters can be viewed when the engine is running. Refer to Section “Description of Controls”. Press auto mode button (23). The engine runs for a pre-set cooling down period, then stops.

The generator should stay in the standby mode. If generator does not stay in the standby mode, check if the remote start input is not active. Initiate an automatic start by supplying a remote start signal, if configured. The start sequence should commence and the engine should run up to the rated speed.

Once the generator is available, the delayed load outputs activate and the generator should accept the load. If the generator does not accept the load, check the wiring to the delayed load output contactors. Verify that the warning timer has timed out.

Remove the remote start signal. The return sequence begins. Generator unloads after a pre-set time. The generator should run for a pre-set period and then shutdown into standby mode. Set the internal clock/calendar of the modules to ensure correct operation of the scheduler and event logging functions. Refer to Section “Front Panel Configuration” for details of the procedure.

Note: Check the connections between the controller and the customer system. Contact Caterpillar Dealer Solution Network (DSN), if the unit does not function as stated previously, after checking.

CAN Interface Specification (SAE J1939-75)

Use ECU port for live operational communications between Cat GCCP 1.2/1.3 and other CAN enabled devices. The below specification details all broadcast messages which are transmitted when SAE J1939-75 is enabled and the relevant engine file is selected.

Table 46

Parameter	Description
Protocol	SAE J1939 with PGNs as listed in the following subsections.
Bill Rate	250 kb/s
Isolation	±2.5 kV_{rms}
Termination	120 Ω termination resistor, with the option for direct PCB installation.

Instrumentation and Control

Broadcast Messages SAE J1939-75

Note: All configurable broadcast CAN messages are priority 3 by default. Priority of the messages cannot be changed.

The parameter groups under Section “Instrumentation and Control” are broadcasted by Cat GCCP 1.2/1.3.

Note: SPNs that are not implemented in Cat GCCP 1.2/1.3 have all bits set to “1” .

Note: “PDU Format” and “PDU Specific” are shown in Hexadecimal.

Note: Values larger than 8 bits utilize “Little-Endian” format. A 16-bit value occupying 2 bytes have “Byte1” as the most significant byte and “Byte2” as the least significant byte.

ACS-AC Switching Device Status

PGN 64913

Table 47

Priority	Extension Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	91	8 bytes	250 ms

Table 48

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
ODD9	3545	Generator Breaker Status - Indicates measured state of the generator circuit breaker.	Byte 1 Bits 1 to 3	000: Open 001: Closed 010: Locked Out 011-101: Available for SAE assignment 110: Error 111: Not available	0	N/A
ODDA	3546	Utility Circuit Breaker - Indicates the measured state of the utility circuit breaker.	Byte 1 Bits 4 to 6	000: Open 001: Closed 010: Locked Out 011-101: Available for SAE assignment 110: Error 111: Not available	0	N/A

GC1 - Generator Control 1

PGN 64915

Table 49

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	93	8 bytes	100 ms

Table 50

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0DEF	3567	Generator Control Not in Automatic Start State - Indicates whether the generator set is in a condition to start up automatically and provide power. The parameter remains in the active state if the generator does not automatically start up and power up.	Byte 1 Bits 4 to 5	00: Inactive (ready to start automatically) 01: Active (not ready to start automatically) 10: Error 11: Not available	0	N/A

GAAC - Generator Average Basic AC Quantities

PGN 65030

Table 51

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	6	8 bytes	100 ms

Table 52

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0988	2440	Generator Average L-L AC Voltage	Byte 1 to 2	1	0	V
098C	2444	Generator Average L-N AC Voltage	Byte 3 to 4	1	0	V
0984	2436	Generator Average AC Frequency	Byte 5 to 6	1/128 Hz/bit	0	Hz
0990	2448	Generator Average AC RMS Current	Byte 7 to 8	1	0	A

GPAAC - Generator Phase A Basic AC Quantities

PGN 65027

Table 53

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	3	8 bytes	100 ms

Table 54

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0985	2437	Generator Phase A AC Frequency	Byte 5 to 6	128	0	V
0989	2441	Generator Phase A Line AC RMS Voltage	Byte 1 to 2	1	0	V
098D	2445	Generator Phase A Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	A
0991	2449	Generator Phase A AC RMS Current	Byte 7 to 8	1	0	Hz

GPAACP - Generator Phase A AC Power

PGN 65026

Table 55

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	2	8 bytes	100 ms

Table 56

<table>
<tr><th colspan="2">SPN</th><th rowspan="2">Instrument</th><th rowspan="2">Byte / Bit</th><th rowspan="2">Scaling</th><th rowspan="2">Offset</th><th rowspan="2">Unit</th></tr>
<tr><th>Hex</th><th>Decimal</th></tr>
<tr><td>0993</td><td>2453</td><td>Generator Phase A Real Power</td><td>Byte 1 to 4</td><td rowspan="2">1</td><td rowspan="2">$-2*10^{9}$</td><td rowspan="2">W</td></tr>
<tr><td>099D</td><td>2461</td><td>Generator Phase A Apparent Power</td><td>Byte 5 to 8</td></tr>
</table>

GPAACR - Generator Phase A AC Reactive Power

PGN 65025

Table 57

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	0	8 bytes	100 ms

Table 58

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0986	2438	Generator Phase B AC Frequency	Byte 5 to 6	0.078125	0	Hz
098A	2442	Generator Phase B Line AC RMS Voltage	Byte 1 to 2	1	0	V
098E	2446	Generator Phase B Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	V
0992	2450	Generator Phase B AC RMS Current	Byte 7 to 8	1	0	A

GPBACP - Generator Phase B AC Power

PGN 65023

Table 59

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FF	8 bytes	100 ms

Table 60

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0996	2454	Generator Phase B Real Power	Byte 1 to 4	1	$-2*10^9$	W
099E	2462	Generator Phase A Apparent Power	Byte 5 to 8			

GPBACR - Generator Phase B AC Reactive Power

PGN 65022

Table 61

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FE	8 bytes	100 ms

Table 62

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0996	2454	Generator Phase B Reactive Power	Byte 1 to 4	1	$-2*10^9$	VAR

GPCAC - Generator Phase C Basic AC Quantities

PGN 65021

Table 63

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FD	8 bytes	100 ms

Table 64

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0987	2439	Generator Phase C AC Frequency	Byte 5 to 6	0.078125	0	Hz
098B	2443	Generator Phase B Line AC RMS Voltage	Byte 1 to 2	1	0	V
098F	2447	Generator Phase B Line Neutral AC RMS Voltage	Byte 3 to 4	1	0	V
0993	2451	Generator Phase B AC RMS Current	Byte 7 to 8	1	0	A

GPCACP - Generator Phase C AC Power

PGN 65020

Table 65

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FF	8 bytes	100 ms

Table 66

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0997	2455	Generator Phase C Real Power	Byte 1 to 4	1	$-2*10^9$	W
099F	2463	Generator Phase C Apparent Power	Byte 5 to 8			

GPCACR- Generator Phase C AC Reactive Power

PGN 65019

Table 67

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FB	8 bytes	100 ms

Table 68

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
099B	2459	Generator Phase C Reactive Power	Byte 1 to 4	1	$-2*10^9$	VAR

GTACPP- Generator Total AC Percent Power

PGN 64911

Table 69

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	8F	8 bytes	250 ms

Table 70

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E06	3590	Generator Total Percent kW as a percent-age of rated power	Byte 1 to 2	0.0078125	-251	%

GTACE- Generator Total kW Hours Export

PGN 65018

Table 71

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	FA	8 bytes	100 ms

Table 72

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E06	3590	Generator Total kW Hours Export	Byte 1 to 4	1	0	kWh

GTACER- Generator Total AC Reactive Energy

PGN 64910

Table 73

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	8E	8 bytes	250 ms

Table 74

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E09	3593	Generator Total kVAr Hours Export	Byte 1 to 4	1	0	kVARh

GTACP- Generator Total AC Power

PGN 65029

Table 75

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	5	8 bytes	100 ms

Table 76

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0994	2452	Generator Total Real Power	Byte 1 to 4	1	$-2*10^9$	W
099C	2460	Generator Total Apparent Power	Byte 5 to 8			VA

GTACR- Generator Total AC Power

PGN 65028

Table 77

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	4	8	100 ms

Table 78

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0988	2456	Generator Total Reactive Power	Byte 1 to 4	1	$-2*10^9$	VAR
09A0	2464	Generator Overall Power Factor	Byte 5 to 6	-1	6.103515625E05	pF
09D6	2518	Generator Overall Power Factor Lagging	Byte 7 to 8	1	0	+/-

Broadcast Messages Engine Instrumentation

Note: Availability of the engine instrumentation PGNs depends upon the engine file selected within the configuration of Cat GCCP 1.2/1.3 control panel.

Dash Display (DD)

PGN 65276

Table 79

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	FC	8 bytes	1000 ms

Table 80

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
060	96	Ratio of volume of fuel to the total volume of fuel storage container	Byte 2	0.4	0	%

EC2- Engine Configuration 2

PGN 64895

Table 81

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	7F	8 bytes	Request

Table 82

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E56	3670	Maximum Crank Attempts per Start Attempt	Byte 1	1	0	N/A

EEC1- Engine Speed

PGN 61444

Table 83

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	F0	4	8 bytes	100 ms

Table 84

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0BE	190	Engine Speed	Byte 4 to 5	0.125	0	RPM

EEC4- Crank Attempt Count on Present Start Attempt

PGN 65214

Table 85

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	FB	8 bytes	Request

Table 86

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E57	3671	Crank Attempt Count on Present Start Attempt	Byte 6	1	0	N/A

EFL_P1 - Oil Pressure

PGN 65263

Table 87

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	EF	8 bytes	500 ms

Table 88

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
064	100	Oil Pressure	Byte 4	4	0	kPa

EOI - Emergency Stop

PGN 64914

Table 89

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FD	92	8 bytes	250 ms

Table 90

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0E17	3607	Emergency Stop 00: Off (No Shutdown Requested) 01: On (Shutdown Requested) 10: Reserved 11: Do not care / take no action	Byte 6 Byte 6 to 8	1	0	N/A

ET1 - Coolant Temperature

PGN 65262

Table 91

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	EE	8 bytes	1000 ms

Table 92

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
06E	110	Engine Coolant Temperature	Byte 1	1	-40	°C

Hours - Engine Hour Revolutions

PGN 65253

Table 93

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	E5	8 bytes	Request

Table 94

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0F7	247	Engine Total Hours of Operation	Byte 1 to 4	0.05	0	hr

VEP1 - Vehicle Electrical Power

PGN 65271

Table 95

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
3	0	0	FE	F7	8 bytes	1000 ms

Table 96

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
0A7	167	Charge Alternator Voltage	Byte 1 to 4	0.05	0	V
0A8	168	Plant Battery Voltage	Byte 5 to 6			

DM01 - Conditions Active Diagnostic Trouble Codes

Note: Availability of “Engine Alarm” SPN and FMI depends upon the engine file selected within the configuration of Cat GCCP 1.2/1.3 control panel.

Note: DM1 priority will remain as six if only one DM1 alarm is active. Priority will be seven if two or more DM1 alarms are active.

PGN65226

Table 97

Priority	Ext Data Page	Data Page	PDU Format	PDU Specific	Size	Rate
6/7	0	0	FE	CA	8 bytes	1000 ms

Table 98

SPN		Instrument	Byte / Bit	Scaling	Offset	Unit
Hex	Decimal					
04BE	1214	Suspect Parameter Number	Byte 3 Bits 1 to 19	1	0	N/A
04BF	1215	Failure Mode Identifier	Byte 5 Bits 1 to 5			
06AA	1706	SPN Conversion Method	Byte 6 Bit 7			

DM1 Conditions

Table 99

Key	Value
Low Fault- Least Severe	17
High Fault- Least Severe	15
Low Fault- Most Severe	1
High Fault- Most Severe	0
Erratic- Incorrect Data	2

Table 100

Generator Alarm Condition	SPN	Warning FMI	Shutdown FMI
Generator Average AC Frequency Under	2436	17	1
SPN Generator Average Line-Line AC RMS Voltage Over	2436	15	0
Generator Average Line-Line AC RMS Voltage Under	2440	17	1
Generator Average Line-Line AC RMS Voltage Over	2440	15	0
Generator Average Line-Neutral AC RMS Voltage Under	2444	17	1
Generator Average Line-Neutral AC RMS Voltage Over	2444	15	0
Generator Average AC RMS Current Over	2448	15	0

Table 101

Engine Alarm Condition	SPN	Warning FMI	Shutdown FMI
Fuel Level Low	96	17	1
Oil Pressure Low (Analogue Sensor)	100	17	1
Oil Pressure Low (Digital Input)	100	17	1
Oil Pressure Sensor Fault	100	2	2
Coolant Temperature High (Analogue Sensor)	110	15	0
Coolant Temperature High (Digital Input)	110	15	0

(continued)

(Table 101, contd)

Engine Alarm Condition	SPN	Warning FMI	Shutdown FMI
Coolant Temperature Sensor Fault	110	2	2
Charge Alternator Failed	167	17	1
Plant Battery Voltage High	168	15	0
Plant Battery Voltage Low	168	17	1
Overspeed	190	15	0
Underspeed	190	17	1

Fault Finding

Note: Fault finding is provided as a guide check-list only. As the module can be configured to provide a wide range of different features, always refer to the source of the module configuration.

Starting

Table 102

Symptom	Possible Remedy
Unit is inoperative Read/Write configuration does not operate	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Ensure that the DC supply voltage is not above 35 V or below 9 V. Ensure that the operating temperature is not above 70° C (158° F). Check the DC fuse.
Fail to start is activated after preset number of attempts to start	Check the wiring of the fuel solenoid. Check fuel. Check the battery supply. Check if battery supply is present at the fuel output of the module. Check if speed-sensing signal is present at the inputs of the module.
Continuous starting of generator when in the Auto Mode	Ensure that there is no signal present at the remote start input. Ensure that the configured polarity is correct.
Generator fails to start on receipt of “Remote Start” signal	Check if start delay timer has timed out. Check signal at the remote start input. Confirm that correct configuration of input is configured as remote start. Check if the oil pressure switch or sensor is indicating low oil pressure to the controller. Depending upon the configuration, the set does not start if oil pressure is not low.
Preheat inoperative	Check the wiring to the engine heater plugs. Check the battery supply. Check if the battery supply is present at the pre-heat output of the module. Check if pre-heat configuration is correct.
Starter motor inoperative	Check the wiring to the starter solenoid. Check the battery supply. Check if battery supply is present at the starter output of the module. Ensure that the oil pressure switch or sensor is indicating “Low Oil Pressure” state to the controller.

Loading

Table 103

Symptom	Possible Remedy
Engine runs but generator does not take load	Check if warm up timer has timed out. Ensure that the generator load inhibit signal is not present at the module inputs. Check connections to the switching device.
Incorrect reading in engine gauges(1)	Check is the engine is operating correctly.
Fail to stop alarm when engine is at rest	Check if sensor is compatible with the module and that the module configuration is suited to the sensor.

(1) Set does not take load in manual mode unless there is an active load signal.

Alarms

Table 104

Symptom	Possible Remedy
"Oil Pressure Low" fault operates after engine has fired	Check engine oil pressure. Check oil pressure switch/sensor and wiring. Check configured polarity (if applicable) is correct (Normally Open or Normally Closed) or that sensor is compatible with the module and is correctly configured.
"Coolant Temperature High" fault operates after engine has fired	Check engine temperature. Check switch/sensor and wiring. Check configured polarity (if applicable) is correct (Normally Open or Normally Closed) or that sensor is compatible with the module.
"Shutdown" fault operates	Check the relevant switch and wiring of the fault indicated on the LCD display. Check configuration of the input.
"Electrical Trip" fault operates	
Warning fault operates	
ECU Amber ECU Red	Indicates the fault condition detected by the engine ECU and transmitted to Cat GCCP 1.2/1.3 controller.
ECU Data Fail	Indicates failure of CAN data link to the engine ECU. Check all wiring and termination resistors, if required.
Incorrect reading on engine gauges	Check if the engine is correctly operating. Check if the sensor and wiring are paying particular attention to the wiring to terminal 14.
"Fail to Stop" alarm when engine is at rest	Check if the sensor is compatible with the module and that the module configuration is suited to the sensor.

Communications

Table 105

Symptom	Possible Remedy
ECU Data Fail	Indicates failure of CAN data link to the engine ECU. Check all wiring and termination resistors, if required.

Instruments

Table 106

Symptom	Possible Remedy
Inaccurate generator measurements on controller display	Check if CT primary, CT secondary, and VT ratio settings are correct for the application. Check if the CTs are wired correctly with regards to the direction of current flow (p1 and p2, and s1 and s2). Also ensure that the CTs are connected to the correct phase. Error occurs if CT1 is connected to phase 2. Consider the power factor (kW = kVA x power factor). The controller is true RMS measuring and gives more accurate value when compared with "averaging" meter such as an analog panel meter or lower specified digital multimeters. Accuracy of the controller is better than 1% of full scale. Generator voltage full scale is 415 V ph-N and accuracy is ±4.15 V (1% of 415 V).

Glossary of Terms

Table 107

Term	Abbreviation	Description
Cat GCCP 1.2/1.3 Control Panel	-	-
CAN	Controller Area Network	Vehicle standard to allow digital devices communicate to one another.
CDMA	Code Division Multiple Access	Cell phone access used in some areas including part of USA and Australia.
CT	Current Transformer	An electrical device that takes a large Alternating Current (AC), and scales down AC to a smaller current by a fixed ratio.
BMS	Building Management System	A digital/computer based control system for the infrastructure of a building.
DEF	Diesel Exhaust Fluid	A consumable liquid used in Selective Catalytic Reduction process (SCR process) to lower nitric oxide, and nitrogen dioxide concentration in engine exhaust emissions.
DM1	Diagnostic Message 1	A DTC is active on the engine ECU.
DM2	Diagnostic Message 2	A DTC was previously active on the engine ECU and has been stored in the internal memory of the ECU.
DPF	Diesel Particulate Filter	A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas.
DPTC	Diesel Particulate Temperature Controlled Filter	A filter fitted to the exhaust of an engine to remove diesel particulate matter or soot from the exhaust gas which is temperature controlled.
DTC	Diagnostic Trouble Codes	Fault code sent by an engine ECU.
ECU/ECM	Engine Control Unit/Engine Control Management	An electronic device that monitors engine parameters and regulates fueling.
FMI	Failure Mode Indicator	A part of DTC that indicates the type of failure. For example high, low, open circuit.
SAE J1939	Society of Automotive Engineers SAE J1939	Vehicle bus recommended practice for communication and diagnostics among vehicle components.

(continued)

(Table 107, contd)

Term	Abbreviation	Description
SAE J1939-75	-	Sub section of SAE J1939 standard. The parameters and parameter groups contained in this sub section are predominantly associated with generators and driven equipment in electric power generation and industrial applications.
GSM	Global System for Mobile communications	Cell phone technology used in most part of the World.
HEST	High Exhaust System Temperature	Initiates when DPF filter is full with an extra fuel injector in the exhaust system to burn off accumulated diesel particulate matter or soot.
HMI	Human Machine Interface	A device that provides a control and visualization interface between a human and a process or machine.
IDMT	Inverse Definite Minimum Time	-
MSC	Multi-Set Communication	-
OC	Occurrence Count	A part of DTC that indicates the number of times a failure has occurred.
PGN	Parameter Group Number	A CAN address for a set of parameters that relate to the same topic and share transmission rate.
PLC	Programmable Logic Controller	A programmable digital device used to create logic for a specific purpose.
SCADA	Supervisory Control And Data Acquisition	A system that operates with coded signals over communication channels to provide control and monitoring of remote equipment.
SCR	Selective Catalytic Reduction	A process that uses DEF with aid of a catalyst to convert nitric oxide and nitrogen dioxide into nitrogen and water to reduce engine exhaust emission.
SIM	Subscriber Identity Module	A small card supplied by the GSM/CDMA provider. This card is inserted into the cell phone, GSM modem, or DSE gateway device to give GSM/GPRS (General Packet Radio Service) connection.
SMS	Short Message Service	The text messaging service of mobile/cell phones.
SPN	Suspect Parameter Number	A part of DTC that indicates failure. Examples of failure are oil pressure, coolant temperature, turbo pressure, and so on.

■

UENR8669
19FEB2020

Special Instruction

GCCP 1.2 Battery Charger Operator Manual

RG31-Up
S341-Up
RG41-Up
S351-Up
RG51-up
S361-up
RE31-Up
S441-Up
RE41-Up
S651-Up
RK51-Up
S371-Up

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1 SPECIFICATIONS

1.1 COMMON ELECTRICAL SPECIFICATIONS

Parameter		Min	Nominal	Max
AC Input Voltage (V) CAT CGCCP 1.2 24 V / 12 V 10 A		95 V	110 V-277 V	305 V
Operating Temperature	CAT GCCP 1.2 BATTERY CHARGERCAT GCCP 1.2 BATTERY CHARGER	-30 °C		75 °C with de-ratings
Input Frequency (Hz)		48 Hz		64 Hz
Output Ripple and Noise	CAT GCCP 1.2 BATTERY CHARGER		1% Vo	
Load Regulation	CAT GCCP 1.2 BATTERY CHARGER		1% Vo	
Line Regulation			<0.01% Vo	
Output Voltage Overshoot %			<5%Vo	
Transient Response Peak Deviation (mV) (at 50% to 100% load step)			<4% Vo	
Warm Up Voltage (V)			<1% Vo	
Output Voltage Rise Time (ms)	CAT GCCP 1.2 BATTERY CHARGER		<200 ms	
Short Circuit Protection			Hiccup	
Switching Frequency (kHz) 9470-xxx-xx			67 kHz	

Continued overleaf

Parameter		Min	Nominal	Max
Efficiency % (See section entitled '*output specifications*' elsewhere in this manual)				
	CAT GCCP 1.2 BATTERY CHARGER		**>**85%	
Temperature Sensor Input	CAT GCCP 1.2 BATTERY CHARGER		PT1000	

NOTE: CAT GCCP 1.2 BATTERY CHARGERCAT GCCP 1.2 Battery Charger

1.2 COMMUNICATION PORT USAGE

Communication	Specification
USB Port (CAT GCCP 1.2 BATTERY CHARGER only)	USB2.0 Device for connection to PC running DSE Configuration Suite Max distance 6 m (20 feet)
RS485 Serial Port (CAT GCCP 1.2 BATTERY CHARGER only)	Isolated Data connection 2 wire + common Half Duplex Data direction control for Transmit (by s/w protocol) Max Baud Rate 19200 External termination required (120 Ω) Max common mode offset 70 V (on board protection transorb) Max distance 1.2 km (¾ mile)

1.2.1 USB CONNECTION

The USB port is provided to give a simple means of connection between a PC and the CAT GCCP 1.2 BATTERY CHARGER series battery charger. Using the DSE Configuration Suite Software, the operator is then configure and monitor the state of the battery charger.

To connect a CAT GCCP 1.2 BATTERY CHARGER series battery charger to a PC by USB, the following items are required:

• CAT GCCP 1.2 BATTERY CHARGER series battery charger	
• DSE Configuration Suite Software (Supplied on configuration suite software CD or available from www.deepseaelectronics.com).	
• USB cable Type A to Type B. (This is the same cable as often used between a PC and a USB printer)	

NOTE: - Refer to CAT GCCP 1.2 BATTERY CHARGER Series Battery Charger PC Software Configuration Manual for further details on configuring and monitoring.

1.2.2 RS485

The RS485 port on the CAT GCCP 1.2 BATTERY CHARGER series battery chargers has three uses.

1) Support the Modbus RTU protocol for connection to a Modbus RTU Master device.
2) Supporting the DSENet® connection with the supported modules.

1.2.2.1 MODBUS RTU

RS485 is used for point-to-point cable connection of more than one device (maximum 32 devices) and allows for connection to PCs, PLCs and Building Management Systems (to name just a few devices).

Using the DSE Configuration Suite PC Software, Configurable Gencomm is used to map instrumentation to modbus registers.

One advantage of the RS485 interface is the large distance specification (1.2 km) when using Belden 9841 (or equivalent) cable. This allows for a large distance between the CAT GCCP 1.2 BATTERY CHARGER series battery charger and a PC running the DSE Configuration Suite software. The operator is then able to view the various operating parameters.

NOTE: For distances up to 6 m (8 yds) the USB connection method is more suitable and provides for a lower cost alternative to RS485 (which is more suited to longer distance connections).

1.2.2.2 DSENET

The DSE Intelligent Battery Chargers RS485 port can be configured as DSENet® using the CAT GCCP 1.2 Configuration Suite PC Software to allow the CAT GCCP 1.2 Intelligent Battery Chargers' information (Instruments and Status) to be viewed on the Genset controller's display.

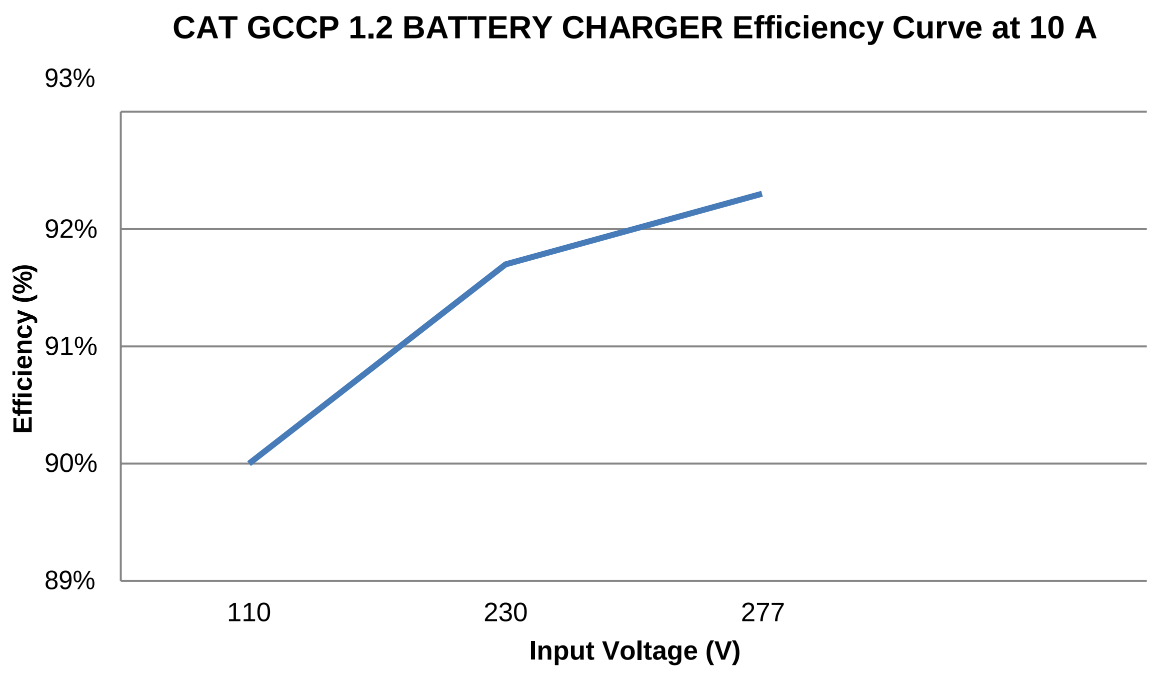
At the time of writing this manual, the following CAT GCCP 1.2 Intelligent Battery Chargers support the DSENet® communication on their RS485 port:
CAT GCCP 1.2 BATTERY CHARGER

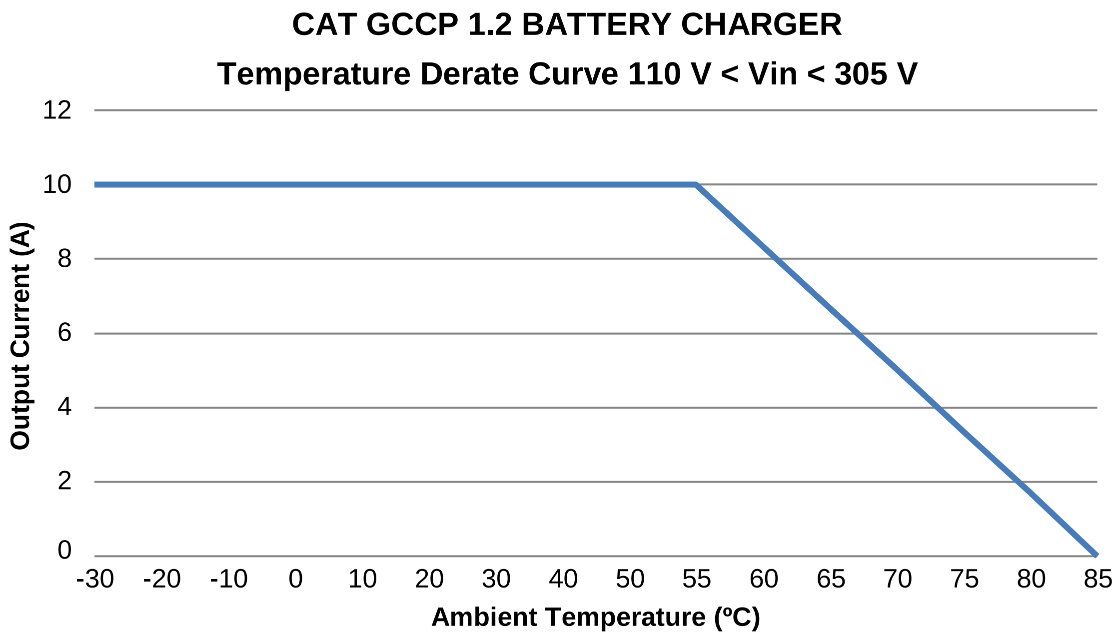
1.3 OUTPUT SPECIFICATIONS

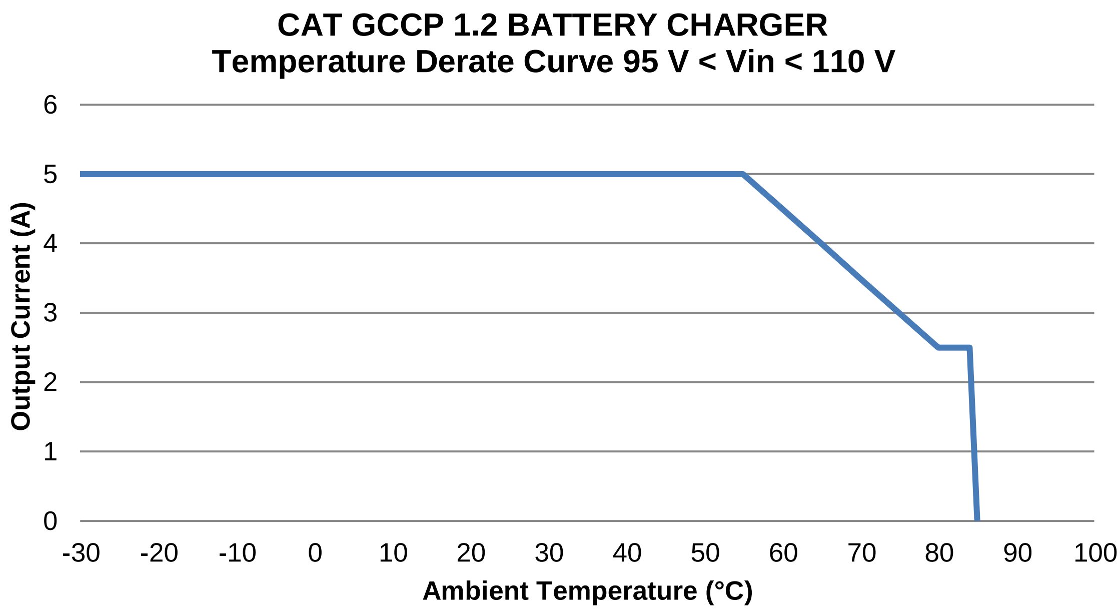
1.3.1 CAT GCCP 1.2 BATTERY CHARGER 24 V / 12 V, 10 A

NOTE: CAT GCCP 1.2 is factory configured to 24 V 10 A. If required, voltage and current levels can be user configured via CAT GCCP 1.2 Configuration Suite PC Software.

Parameter	Min	Nominal	Max	Comments
Output Voltage (24 V DC Battery)	26.7 V	27 V	29 V	
Output Charging Current (A)	2 A	10 A	11 A	
Current limit threshold (A)		10 A	11 A	
Recovery from current limit (A)	10 A		11 A	
Full load AC input current (A)			2.3 A	At Vin=230 V, Vo=28.8 V, Io=10 A
Full load AC input current (A)			4 A	At Vin=110 V, Vo=28.8 V, Io=10 A
AC Input Inrush current (A)		60 A		For 10 ms




CAT GCCP 1.2 BATTERY CHARGER
Temperature Derate Curve 110 V < Vin < 305 V
Output Current (A)
12
10
8
6
4
2
0
-30
-20
-10
0
10
20
30
40
50
55
60
65
70
75
80
85
Ambient Temperature (ºC)

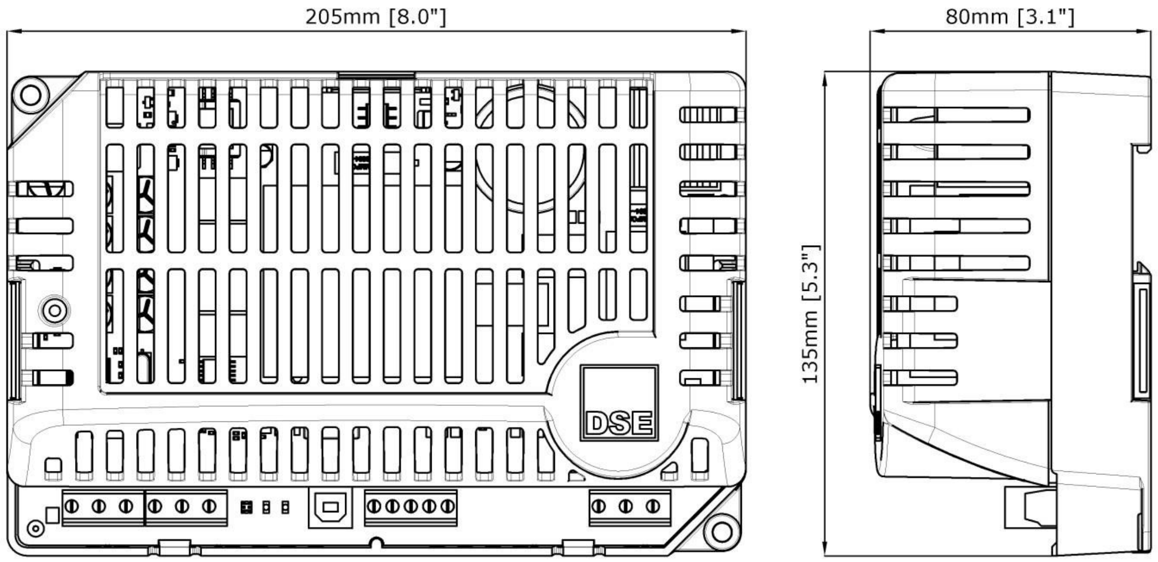

CAT GCCP 1.2 BATTERY CHARGER
Temperature Derate Curve 95 V < Vin < 110 V
Output Current (A)
6
5
4
3
2
1
0
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
Ambient Temperature (°C)

1.4 DIMENSIONS AND MOUNTING

1.4.1 CAT GCCP 1.2 BATTERY

NOTE: This battery charger is designed to be mounted with the base to a vertical surface with the terminal strips at the bottom.

Parameter	Comment
Overall size(mm)	205 mm x 135 mm x 80 mm (8.0” x 5.3” x 3.1”)
Weight	0.78 kg
Mounting type	DIN rail or chassis mounting
Din rail type	EN 50022 35 mm type only
Mounting holes	Suitable for M4
Mounting hole centers	190 mm x 120 mm (7.5” x 4.7”)
Input voltage (nominal)	110 V to 277 V
Input voltage (absolute range)	95 V to 305 V
Charge failure relay rating	3 A DC resistive 30 V maximum
Operating Temperature	-30 °C to 85 °C with de rating (-22 °F to 185 °F with de rating)



1.5 APPLICABLE STANDARDS

BS EN 60529 (Degrees of protection provided by enclosures)	IP20 Protected against penetration by solid objects with a diameter of more than 12 mm. Fingers or similar objects prevented from approach. No protection against water
UL508 **NEMA rating**	Enclosure type 1 Provides a degree of protection against contact with the enclosure equipment and against a limited amount of falling dirt

In line with our policy of continual development, Deep Sea Electronics, reserve the right to change specification without notice.

2 INSTALLATION

NOTE: CAT CGGP 1.2 Battery Chargers should only be used to charge one battery bank at a time. It is not recommended to parallel batteries as the tolerance of the batteries leads to imbalance in their charging.

The CAT GCCP 1.2 battery charger is designed to be mounted within a control panel, on the panel DIN rail utilizing the integral mounts or on a chassis utilizing the mounting holes. For dimension and mounting details, see the section entitled *Specification, Dimensions* elsewhere in this document.

The CAT GCCP 1.2 battery charger is *fit-and-forget.* It can be permanently connected to the supply and the load, with no requirement to disable the charger during times of heavy load (such as engine cranking) or when the generator is running (even when a DC charging alternator is fitted).

2.1 BATTERY SUITABILITY

The *standard* charger is factory set by DSE to suit Lead Acid batteries but can be adjusted at the time of ordering to suit other battery types. Care should be taken to ensure the batteries connected to the charger are of the correct 'technology' to suit the setting of the charger.
For details of other supported battery types and *float voltages* see the section entitled *Specifications, Part Numbering* elsewhere in this document.

2.2 USER CONNECTIONS

Parameter	Comment	
Connection type	Screw terminal, rising clamp, no internal spring	
Min cable size	0.5 mm² (AWG 20)	
Max cable size	2.5 mm² (AWG 10)	
Recommended AC fuse CAT GCCP 1.2 24 V / 12 V 10 A charger	**230 V AC Input** 3.5 A anti-surge	**110 V AC Input** 6.3 A anti-surge

NOTE: Where the current rating has been user configured below the rated maximum current, an appropriate fuse size must be selected to match the lower maximum output current.

2.2.1 CAT GCCP 1.2 BATTERY CHARGER

Connector A

Terminal	Function	Recommended size	Comments
-OP	Load negative	2.5 mm^2 (AWG 10)	Battery negative terminal
+OP	Load Positive	2.5 mm^2 (AWG 10)	Battery positive terminal

Connector B

Terminal	Function	Recommended size	Comments
LK1	Configurable Input	1 mm^2 (AWG 16)	Connect the terminals together to activate the input. *The Factory Setting for the digital input provides a selection of 12 V / 24 V operation. Customer configurable using CAT GCCP 1.2 Configuration Suite PC Software.
LK1	*Configurable Input (0V)*	*1 mm^2 (AWG 16)*	**NOTE: Digital Input Not Fitted to CAT GCCP 1.2**
NC	Normally Closed Contact of the Charge failure relay	0.5 mm^2 (AWG 22)	De-energizes Under Charge Fail Conditions
COM	Charge failure relay Contact Common	0.5 mm^2 (AWG 22)	
NO	Normally Open Contact of the Charge failure relay	0.5 mm^2 (AWG 22)	

Connector C

Terminal	Function	Recommended size	Comments
SCR	RS485 screen	0.5 mm^2 (AWG20)	Use only 120 Ω RS485 approved cable
A	RS485 -ve	0.5 mm^2 (AWG20)	Use only 120 Ω RS485 approved cable
B	RS485 +ve	0.5 mm^2 (AWG20)	Use only 120 Ω RS485 approved cable
NTC	PT1000 connection terminals	0.5 mm^2 (AWG20)	Use only PT1000
NTC		0.5 mm^2 (AWG20)	

Connector D

Terminal	Function	Recommended Size
⏚	Earth	1 mm^2 (AWG 16)
N	AC Neutral	1 mm^2 (AWG 16)
L	AC Live	1 mm^2 (AWG 16)

CAUTION: Ensure Earth Terminal is connected to Battery negative (for negative earth systems) or Battery positive (for positive earth systems)
Where no system earth exists, Earth Terminal must be connected to battery negative

3 INDICATIONS

3.1 CAT GCCP 1.2 BATTERY CHARGER

3.1.1 STATUS

LCondition	LED Designation		
	OPE	FAULT1	FAULT2
Charger Off	Off	Off	Off
Battery not Detected (Battery Detection Mode)	Green Flashing	Red Flashing	Red Flashing
Battery Connected (Battery Detection Mode)	Green Constant	Red Constant	Red Constant
Not Charging (Charger is operating correctly but the output has been disconnected from the battery)	Off	Red Constant	Red Constant

3.1.2 CHARGE MODE

Mode	LED Designation OPE
Bulk Charge in Progress	Yellow Constant
Absorption Charge in Progress	Yellow Flashing
Float Charge in Progress	Green Constant
Storage Charge in Progress	Green Flashing

3.1.3 FAULT CONDITIONS

Condition	LED Designation	
	FAULT1	FAULT2
High Output Voltage (DC)	Red Constant	Off
High / Low Input Voltage (AC) or High Output Current (DC)	Red Flashing	Off
High Ambient / Charger Temperature, High Battery Temperature (if enabled)	Off	Red Constant
Short Circuit/ Reverse Polarity (DC Output Connection)	Off	Red Flashing

4 OPERATION

4.2 OPERATION OF CAT GCCP 1.2 BATTERY CHARGER

The CAT GCCP 1.2 BATTERY CHARGER MKII Series battery charger can be used as a battery charger, DC power supply, or both at the same time. For instance, the unit can be used to power the generator control panels and charge the panel batteries or starter batteries at the same time.

With no AC input to the charger, the *Fault* relay is in its inactive state. This volts-free change over relay can be used to provide indication of alarms as detailed in the Protection section below.
When a suitable AC supply is connected, operation of the unit will depend upon the load connected to the unit’s output terminals:

4.2.1 PROTECTION

> **NOTE: The *Fault Relay* is configured by default to change state upon any fault occurring. If required, using *DSE Configuration Suite PC Software,* the user can configure the *Fault Relay* to ignore all *Mains Under/Over Voltage Warning* or *Mains Failure* situations, while continuing to operate upon activation of any other alarm. Configuration Suite Manual.**

Alarms fall into two categories:

- Shutdown Alarms, non-adjustable alarms.
- User Configurable Alarms, adjustable byDSE Configuration Suite PC Software.

4.2.1.1 SHUTDOWN ALARMS

> **NOTE: The Shutdown alarm are factory set and cannot be changed.**

> **NOTE: When the AC supply source falls outside the hardware voltage limits, the DSE charger is instantly switched off for safety reasons, and the alarm is activated (Fault Relay De-energizes).**

> **NOTE: The *Fault Relay* is configured by default to change state upon any fault occurring. If required, using *DSE Configuration Suite PC Software,* the user can configure the *Fault Relay* to ignore all *Mains Under/Over Voltage Warning* or *Mains Failure* situations, while continuing to operate upon activation of any other alarm.**

Under the following conditions, the Fault Relay de-energizes to the normally closed state and charging is stopped (DC output is disabled) :

- AC Power removed
- AC Power outside the hardware limits (Minimum & Maximum AC input voltage and frequency as detailed in the *Common Electrical Specifications* table for each specific charger)
- Battery temperature > 60 ºC (if temperature compensation isenabled)
- Battery Charger ambient temperature> 85 ºC
- DC output voltage > 110% of Boost Voltage
- Short circuit / reverse polarity of the DC output.

4.2.1.2 USER CONFIGURABLE ALARMS

The following alarms are user configurable using DSE Configuration Suite PC Software. In each case, the Fault relay de-energizes.

> **NOTE: When a *Shutdown Alarm* is active at the same time as a *User Configurable Alarm,* the *Shutdown Alarm* takes priority and switches the charger off.**

- DC Overcurrent alarm
- DC Overvoltage alarm
- Battery Temperature alarm. Activation of this alarm places the charger into Float mode.
- Mains Over Voltage alarm. Activation of this alarm places the charger into Float mode.
- Mains Under Voltage alarm. Activation of this alarm places the charger into Float mode.

4.2.2 DIGITAL INPUT

The CAT GCCP 1.2 BATTERY CHARGER series is fitted with a configurable digital input. Configuration is made using the DSE Configuration Suite PC Software.

The Factory Setting for the digital input provides a *12 V / 24 V selection* function.

4.2.3 VOLTAGE ADJUSTMENT POTENTIOMETER

A manually operated potentiometer is provided to make small adjustments to the *Boost Voltage* without the requirement for the DSE Configuration Suite PC Software.
This is primarily intended to increase charger output to cater for voltage drop in long connection cables.

The potentiometer adjusts the *boost voltage* by up to ±1.7 V. This is subject to an absolute maximum of 29.5 V.

The table below shows the effect of the potentiometer on the *boost voltage* in the various charging modes.

Charge Mode	Effect on *boost voltage*
Bulk	100% of potentiometer setting
Absorption	50% of potentiometer setting
Float	Potentiometer has no effect on *Float Voltage*
Storage	Potentiometer has no effect on *Storage Voltage*

4.2.4 PSU MODE

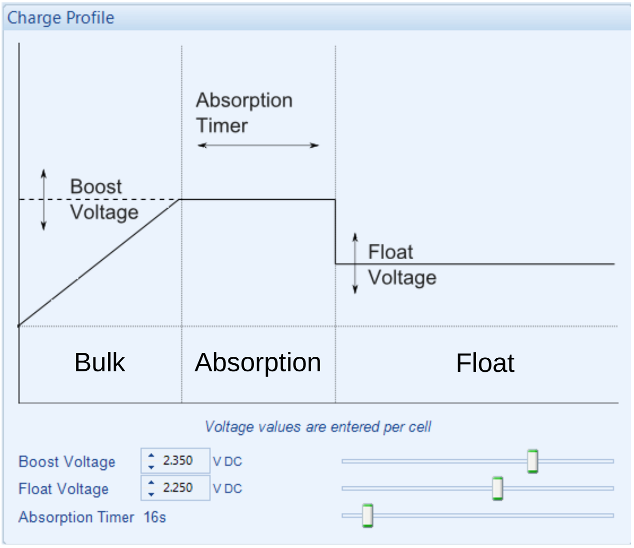
If no battery is connected to the output terminals, the battery charger will operate as a DC power supply only, current limit is factory set to 5 A, 10 A or 15 A and is adjustable (2 A – 10 A CAT GCCP 1.2 Battery Charger) using the DSE Configuration Suite PC Software. See the section entitled *Specification* elsewhere in this manual for further output specifications.

4.2.5 CHARGE MODE

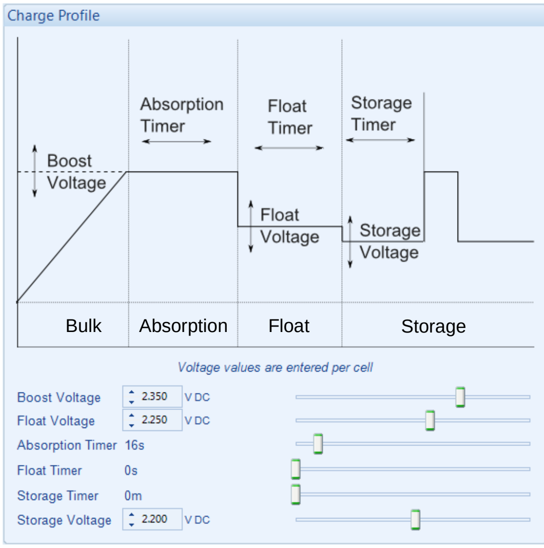
NOTE: For details of Battery Charger Configuration, you are referred to DSE Publication: 057-159 CAT GCCP 1.2 BATTERY CHARGER Series Battery Charger Configuration Suite

NOTE: Should a 2-Stage charging profile be required, select a 3-Stage profile and configure *Boost Voltage* and *Float Voltage* to the same value.

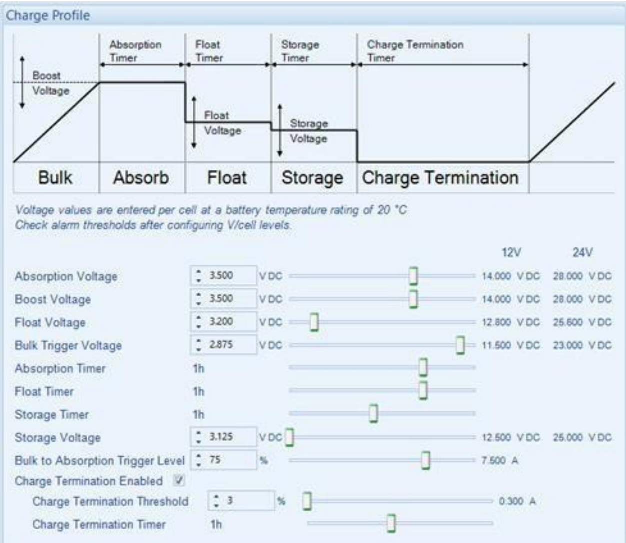
Using DSE Configuration Suite PC Software, the battery charger is configured to use a 3-Stage Charge, or 4-Stage Charge, or 5-Stage Charge profile as shown below. The description of each charge mode is given in the following sections.



3-Stage Charge Profile Configuration



4-Stage Charge Profile Configuration



5-Stage Charge Profile Configuration

4.2.5.1 BULK CHARGE

The battery charger operates in *Constant voltage current limited* mode.
The charger output voltage is maintained at a constant level (*boost voltage)* to allow the battery to charge while the load does not exceed the maximum rating of the charger.
If the load on the battery charger (*battery charge demand+standing load*) exceeds the maximum current rating of the charger, the charging current is limited to the maximum rating of the charger and the voltage is reduced.
The voltage will rise to the rated voltage again once the load drops below the maximum rating of the charger. This may occur naturally as the battery charges.
As the battery charges and the charge current drops below the *Bulk to Absorption Trigger Level* percentage, *Absorption* mode is entered. The default *Bulk to Absorption Trigger Level* is 75%, configurable using the DSE Configuration Suite PC Software.

4.2.5.2 ABSORPTION

This mode is active for the duration of the *Absorption Timer*. This is adjustable using the DSE Configuration Suite PC Software.
Absorption mode is used to complete the charging process, bringing the battery to 100% charged status.
After the *Absorption timer*, *float charge* mode is entered.

4.2.5.3 FLOAT CHARGE

The battery charger DC voltage is lowered to the configured f*loat voltage*.
Float Charge is used to provide a small amount of current to the battery, to overcome internal losses and keep the battery at its 100% charged state. The battery can be left in this mode indefinitely.

4.2.5.4 STORAGE

When configured to use a four-stage charging profile, a time limited storage charge is periodically entered (*storage timer*) to maintain the battery charge at optimum levels. This occurs at the level of the *storage voltage*. This is adjustable using the DSE Configuration Suite PC Software.
When the *storage timer* expires, the charger re-enters the *Absorption* mode.

Additionally, this is used as an 'Automatic Boost' facility, to periodically attempt to remove sulfation from the battery plates.

4.2.5.5 CHARGE TERMINATION

When *Charge Termination* is enabled, the charger terminates the charging when the output current level decreases below the *Charge Termination Threshold* % level, and the charger remains off for the *Charge Termination Timer* time before exiting this stage. The *Charge Termination Threshold* and the *Charge Termination Timer* are configured using the DSE Configuration Suite PC Software.
The charger transfers back to the Bulk Stage when the *Charge Termination Timer* expires, or the output voltage drops below the *Bulk Trigger Voltage* level.

4.2.5.6 CHARGING TIME

Charge time is often of little consequence when the battery is used in a *standby* operation. An example of this is when the battery is used to supply the starting system of a diesel generator.
During normal operation, the battery is at full capacity and the battery charger is used to maintain the float voltage of the battery. The battery is only drained when the generator is called to start.
As the generator has a DC charging alternator fitted, the battery is quickly recharged when the generator is running. Should the generator stop before the battery is fully recharged, the CAT GCCP 1.2 BATTERY CHARGER MKII Series battery charger will continue to recharge the battery until it is fully charged.

Typically, a battery will charge from flat to 80% capacity in 16 hrs. when charged at C/10.
For example, charging a 50 Ah battery for 16 hrs. at 5 A will charge the battery to 80% of its full capacity.
Remember to take into account any other standing load such as control panel requirements when calculating how much power is 'left' to charge the battery.

4.2.5.7 MANUAL BOOST

NOTE: The Digital Input must be configured to *Manual* Boost to provide this function.

Manual boost will place the charger into *Bulk* Charge mode, charging at the level of the *boost voltage*. A typical use of manual boost is with Lead Acid type batteries. When the battery is fully charged, placing the charger into boost mode will raise the output voltage. This has the effect of *gassing* the battery, helping to remove sulfation from the battery plates and helping the cells to *equalize* in voltage.

4.2.6 TEMPERATURE COMPENSATION

If temperature compensation is enabled through configuration, and remote temperature sensor is connected, the output voltage automatically varies by a configurable voltage per cell for each 1 °C deviation from 20 °C, within the range of -20 °C to 60 °C. Increasing temperature gives decreasing output voltage and decreasing temperatures gives increasing output voltage.
The battery temperature is measured by a 2 wire PT1000 sensor placed on the battery itself.

5 FAULT DIAGNOSIS

Nature of problem	Suggestion
The charger is not operating	Check that the incoming AC supply is correctly connected and within limits and check the integrity of any external fuse that may be fitted. Ensure the charger is not being operated above the maximum temperature specification. Check the LED indications against the LED descriptions listed elsewhere in this document.
Charge fail relay continuously operated	Check the connected load of the charger is not reverse connected or short circuit.
Batteries fail to charge	Check the batteries using the battery manufacturers recommendations.
Charge time is too long	Typically, a battery will charge from flat to 80% capacity in 16 hrs. when charged at C/10. For example, charging a 50 Ah battery for 16 hrs. at 5 A will charge the battery to 80% of its full capacity. Remember to consider any other standing load such as control panel requirements when calculating how much power is ‘left’ to charge the battery.

6 MAINTENANCE, SPARES, REPAIR AND SERVICING

The CAT GCCP 1.2 battery charger is designed to be *Fit and Forget*. As such, there are no user serviceable parts.

7 DISPOSAL

7.1 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

If you use electrical and electronic equipment you must store, collect, treat, recycle and dispose of WEEE separately from your other waste.

8 CAT GCCP 1.2 Battery Charger Installation Instructions

DANGER OF DEATH: **LIVE PARTS exist within the CAT GCCP 1.2 enclosures. The enclosure cover must not be removed.**

Installation

The CAT GCCP 1.2 battery charger is designed to be mounted within a control panel, on the panel DIN rail utilizing the integral mounts or on a chassis utilizing the mounting holes. For dimension and mounting details, see overleaf.

The CAT GCCP 1.2 battery charger is *fit-and-forget.* It can be permanently connected to the supply and the load, with no requirement to disable the charger during times of heavy load (such as engine cranking) or when in parallel with a charging alternator.

Battery suitability

The charger is factory set by Caterpillar Inc. to suit Lead Acid batteries. The CAT GCCP 1.2 battery charger is configured using the CAT GCCP 1.2 Configuration Suite to suit other battery types.

Care should be taken to ensure the batteries connected to the charger are of the correct 'technology' to suit the setting of the charger.

Indications

The CAT GCCP 1.2 battery charger features LED indicator(s) to show the battery charger *Status.*

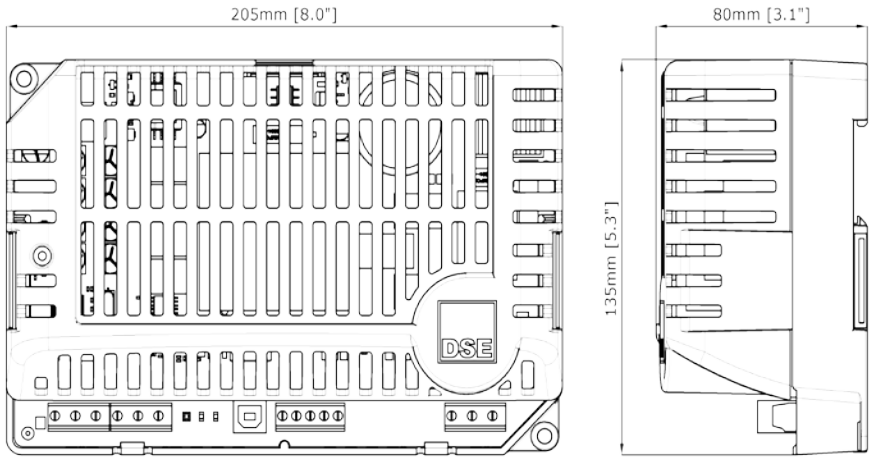
Boost Mode

The Boost Mode feature is controlled automatically, no external connection needed. Boost mode is operated by connecting the *BOOST* terminals together (for instance with an external switch or timer circuit. This will raise the battery charger floating voltage by 0.8V DC. **Caution: -** Boost mode is intended for equalization of cells in lead acid batteries.

Electrical Connections CAT GCCP Battery Charger		
Connection type	Screw terminal, rising clamp, no internal spring	
Min cable size	0.5mm² (AWG 20)	
Max cable size	2.5mm² (AWG 14)	
Recommended AC fuse	**230V AC Input**	**110V AC Input**
CAT GCCP 1.2 24V 10A charger	3.5A anti-surge	6.3A anti-surge

Dimensions and Mounting

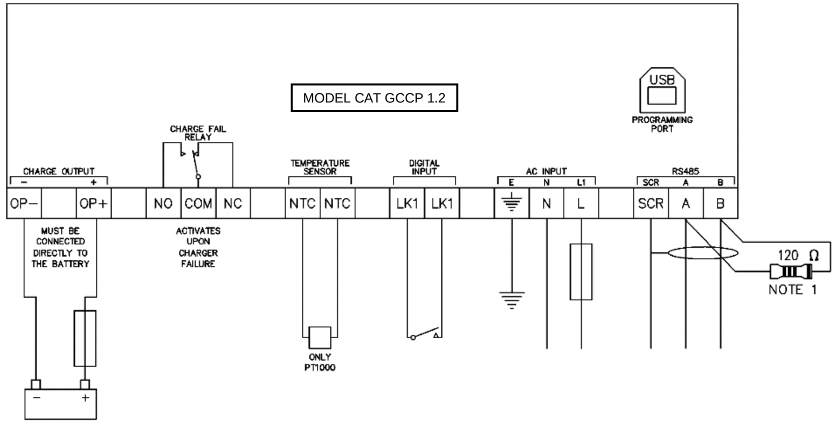
CAT GCCP 1.2 Intelligent Battery Charger



Dimensions in mm unless otherwise stated

Typical Wiring Diagrams

CAT GCCP 1.2 Battery Charger



NOTE 1
A 120 OHM TERMINATION RESISTOR MUST BE FITTED IF IT IS THE FIRST OR LAST DEVICE ON AN RS485 LINK

Dimensions and Mounting

CAT GCCP 1.2 Battery Charger

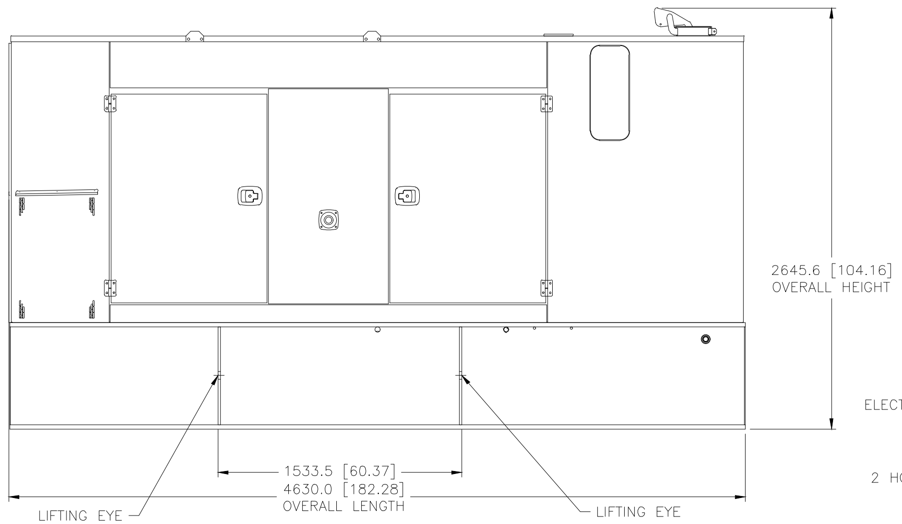
• Overall size	• 205mm x 135mm x 80mm (8.1" x 5.3" x 3.1")
• Weight CAT CGGP1.2 Battery Charger	• 0.78kg 0.7kg
• Mounting type	• DIN rail or chassis mounting
• Din rail type	• EN 50022 35mm type only
• Mounting holes	• Suitable for M4
• Mounting hole centers	• 190mm x 120mm (7.5" x 4.7")
• Input voltage (nominal)	• 110V-277V
• Input voltage (absolute range)	• 95V-305V
• Charge failure relay rating	• 3A DC resistive 30V maximum
• Operating Temperature	• -30°C to 85°C with de-rating (-22°F to 185°F)
• Optional Temperature Sensor	• NTC connections for PT1000 sensor only
• Communications	• RS485
• PC connection (USB)	• To enable PC Configuration

NOTE: CAT GCCP 1.2 Battery Charges are designed to be mounted with the base to a vertical surface with the terminal strips at the bottom.

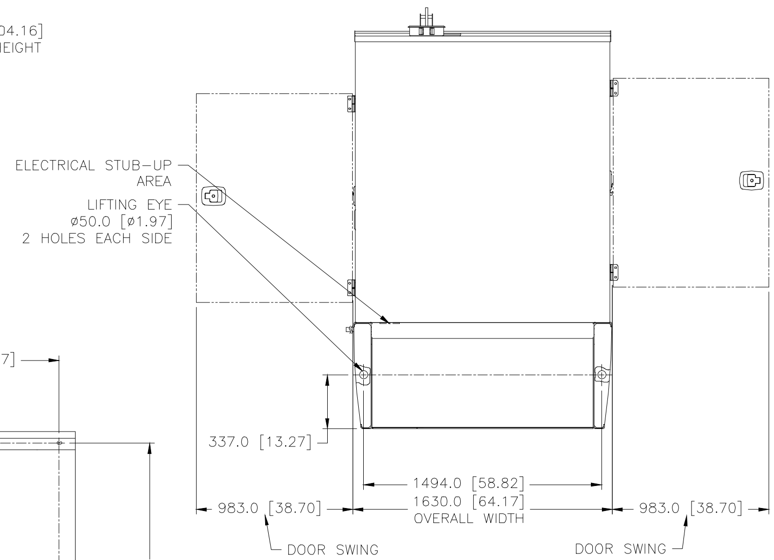
METRIC 588-8337

QTY	ENGINE CONNECTIONS	SIZE	SHEET
1	COOLANT DRAIN	ø19.05 [ø0.75] I.D.	2,3
1	OIL DRAIN	1-1/8-12 THD	2,3
1	EXHAUST	ø203.2 [ø8.00] O.D.	2
1	FUMES DISPOSAL HOSE	ø35.00 [ø1.38] I.D.	3

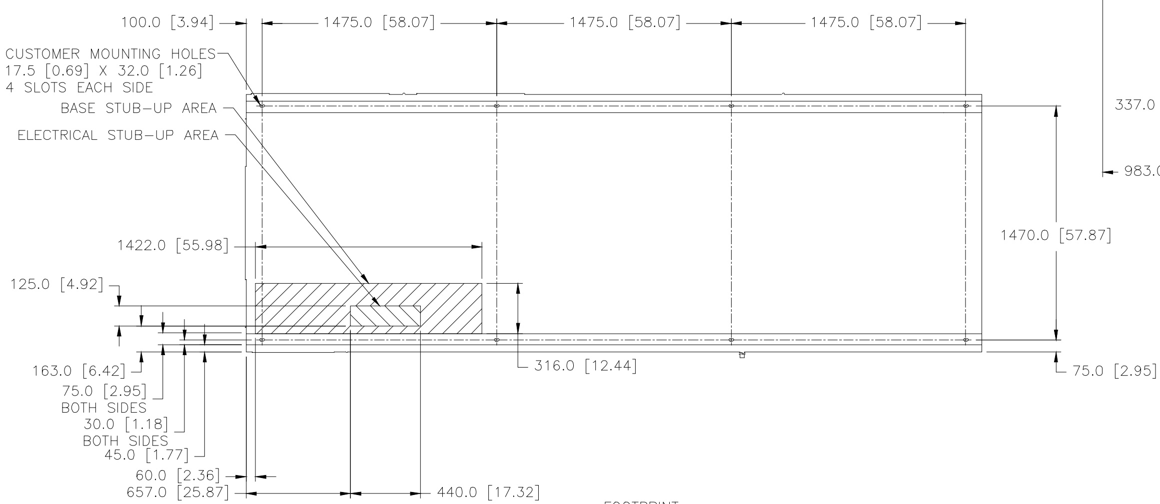
QTY	POSSIBLE TANK CONNECTIONS	SIZE	SHEET
1	FUEL SUPPLY	13/16-16 THD	3
1	FUEL RETURN	13/16-16 THD	3
2	SPARE PORTS	2" NPTF THD	3
1	FUEL FILL	4" NPT THD	3
1	MAIN TANK EMERGENCY VENT	4-8 NPTF THD	3
1	MAIN TANK NORMAL VENT	2' NPTF THD	2,3
1	BASIN TANK EMERGENCY VENT	4-8 NPT THD	3



RIGHT SIDE VIEW



FRONT VIEW



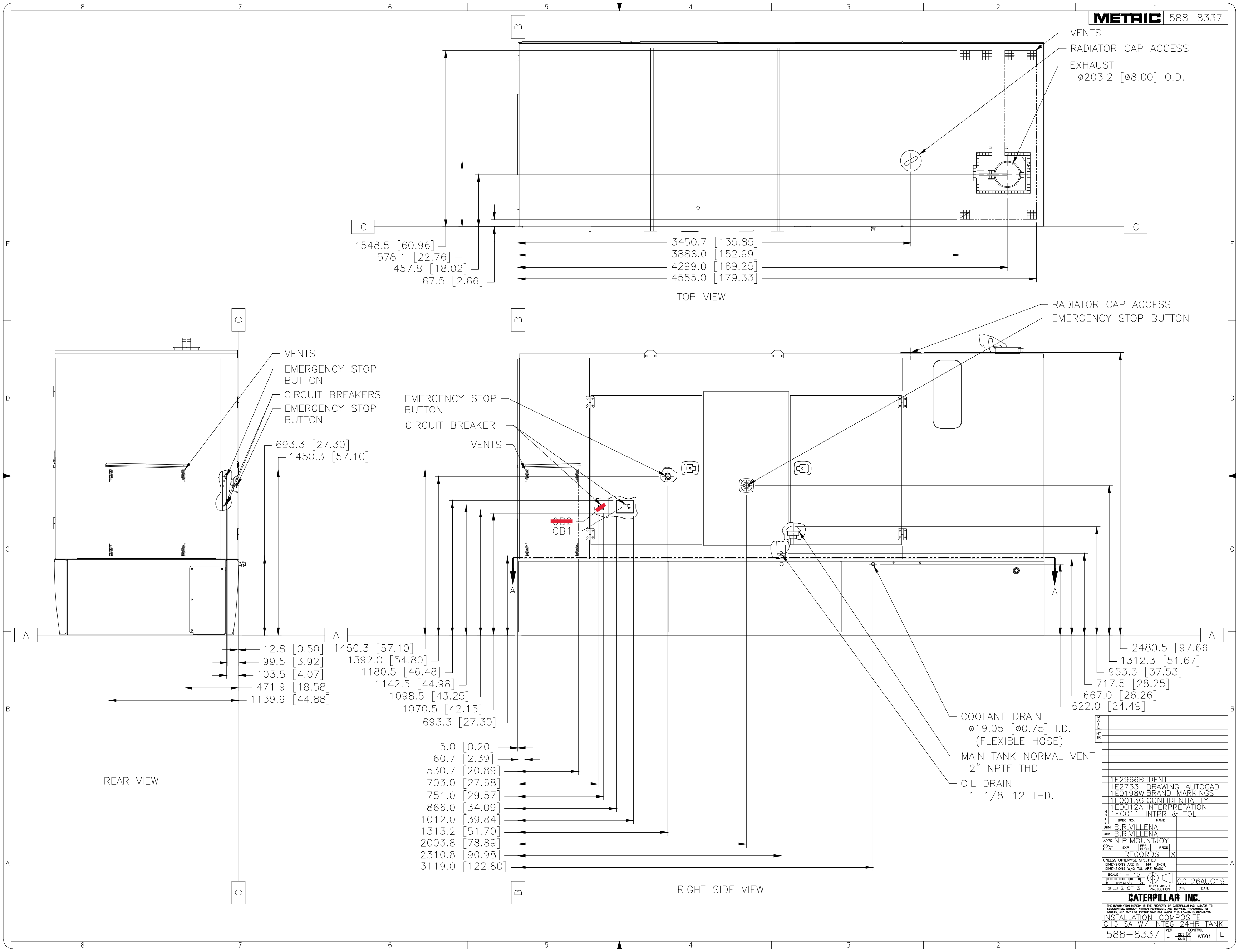
FOOTPRINT
(DIMENSIONED OUTLINE VIEW FROM ABOVE)
(RIGHT SIDE ORIENTATION)

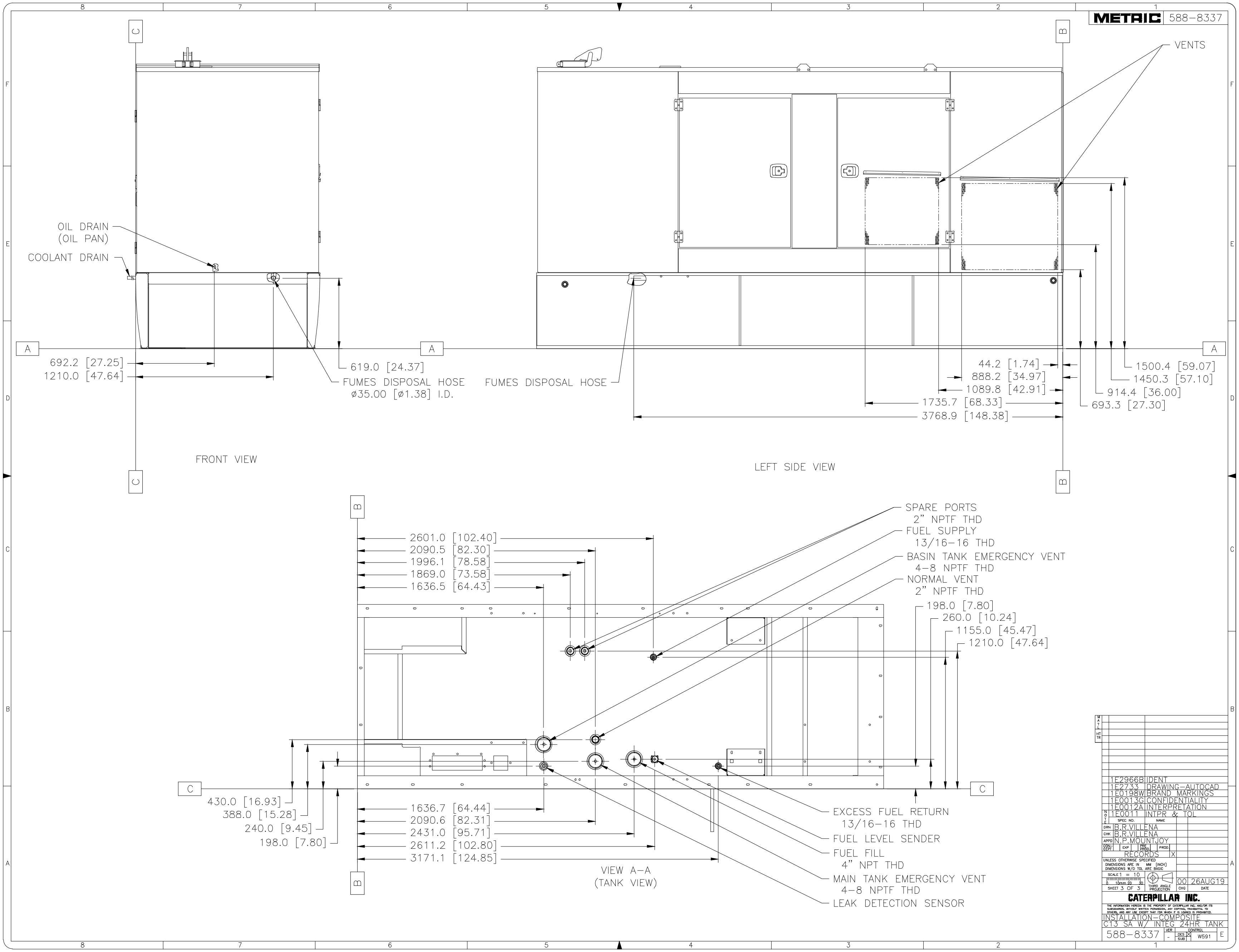
MODEL	TYPE	ENGINE AR	ENCLOSURE AR	TANK AR
C13	Y	LS-3973 CHG 00 LS-3974 CHG 00 LS-3975 CHG 00 LS-3976 CHG 00	LS-3858 CHG 00	LS-3870 CHG 00

PACKAGE LIFTED IN 4 PLACES

PACKAGE SHOWN WITH MORE DETAIL ON SHEETS 2 & 3

1E2966 BIDENT
1E2733 DRAWING-AUTOCAD
1E0198 WBRAND MARKINGS
1E0013 GCONFIDENTIALITY
1E0012 AINTERPRETATION
1E0011 INTPR & TOL
DRN B.R.VILLENA
CHK B.R.VILLENA
APPD N.P.MOUNTJOY
RECORDS
SHEET 1 OF 3
00 26AUG19
CATERPILLAR INC.
INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337 E


METRIC 588-8337
VENTS
RADIATOR CAP ACCESS
EXHAUST
ø203.2 [ø8.00] O.D.
1548.5 [60.96]
578.1 [22.76]
457.8 [18.02]
67.5 [2.66]
3450.7 [135.85]
3886.0 [152.99]
4299.0 [169.25]
4555.0 [179.33]
TOP VIEW
RADIATOR CAP ACCESS
EMERGENCY STOP BUTTON
VENTS
EMERGENCY STOP BUTTON
CIRCUIT BREAKERS
EMERGENCY STOP BUTTON
693.3 [27.30]
1450.3 [57.10]
EMERGENCY STOP BUTTON
CIRCUIT BREAKER
VENTS
~~CB2~~
CB1
12.8 [0.50]
99.5 [3.92]
103.5 [4.07]
471.9 [18.58]
1139.9 [44.88]
REAR VIEW
1450.3 [57.10]
1392.0 [54.80]
1180.5 [46.48]
1142.5 [44.98]
1098.5 [43.25]
1070.5 [42.15]
693.3 [27.30]
5.0 [0.20]
60.7 [2.39]
530.7 [20.89]
703.0 [27.68]
751.0 [29.57]
866.0 [34.09]
1012.0 [39.84]
1313.2 [51.70]
2003.8 [78.89]
2310.8 [90.98]
3119.0 [122.80]
RIGHT SIDE VIEW
2480.5 [97.66]
1312.3 [51.67]
953.3 [37.53]
717.5 [28.25]
667.0 [26.26]
622.0 [24.49]
COOLANT DRAIN
ø19.05 [ø0.75] I.D.
(FLEXIBLE HOSE)
MAIN TANK NORMAL VENT
2" NPTF THD
OIL DRAIN
1-1/8-12 THD.
1E2966BIDENT
1E2733 DRAWING-AUTOCAD
1E0198WBRAND MARKINGS
1E0013GCONFIDENTIALITY
1E0012AINTERPRETATION
1E0011 INTPR & TOL
B.R.VILLENA
B.R.VILLENA
N.P.MOUNTJOY
RECORDS
SCALE 1 = 10
SHEET 2 OF 3
00 26AUG19
CATERPILLAR INC.
INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337
W591
E



METRIC 588-8337
VENTS
OIL DRAIN (OIL PAN)
COOLANT DRAIN
692.2 [27.25]
1210.0 [47.64]
619.0 [24.37]
FUMES DISPOSAL HOSE ø35.00 [ø1.38] I.D.
FUMES DISPOSAL HOSE
44.2 [1.74]
888.2 [34.97]
1089.8 [42.91]
1735.7 [68.33]
3768.9 [148.38]
1500.4 [59.07]
1450.3 [57.10]
914.4 [36.00]
693.3 [27.30]
FRONT VIEW
LEFT SIDE VIEW
SPARE PORTS 2" NPTF THD
FUEL SUPPLY 13/16-16 THD
BASIN TANK EMERGENCY VENT 4-8 NPTF THD
NORMAL VENT 2" NPTF THD
2601.0 [102.40]
2090.5 [82.30]
1996.1 [78.58]
1869.0 [73.58]
1636.5 [64.43]
198.0 [7.80]
260.0 [10.24]
1155.0 [45.47]
1210.0 [47.64]
430.0 [16.93]
388.0 [15.28]
240.0 [9.45]
198.0 [7.80]
1636.7 [64.44]
2090.6 [82.31]
2431.0 [95.71]
2611.2 [102.80]
3171.1 [124.85]
EXCESS FUEL RETURN 13/16-16 THD
FUEL LEVEL SENDER
FUEL FILL 4" NPT THD
MAIN TANK EMERGENCY VENT 4-8 NPTF THD
LEAK DETECTION SENSOR
VIEW A-A (TANK VIEW)
1E2966B IDENT
1E2733 DRAWING-AUTOCAD
1E0198W BRAND MARKINGS
1E0013G CONFIDENTIALITY
1E0012A INTERPRETATION
1E0011 INTPR & TOL
B.R.VILLENA
B.R.VILLENA
N.P.MOUNTJOY
RECORDS
00 26AUG19
CATERPILLAR INC.
INSTALLATION-COMPOSITE
C13 SA W/ INTEG 24HR TANK
588-8337
W591

THIS DIAGRAM IS FOR GC GENSET MODELS (250kW to 600kW)

FOR USE WITH : C9, C13, C15 & C18 ENGINES

6310 CONTROLLER

SIGNAL NAMES

CIRCUIT_ID	COLOR	DESCRIPTION
10	WH	AVR_SUPPLY_X2_(SHUNT)
101	RD	UNFUSED_BTRY_(+)
105	WH	(+24V_DC)_ECM_SUPPLY
108	WH	(+24V_DC_)_PANEL_SUPPLY
123	WH	FUSED BTRY +
14	WH	AVR_SUPPLY_X1_(PMG)
148	WH	(+24_VDC)_LIGHTING_SUPPLY
15	WH	AVR_SUPPLY_X2_(PMG)
16	WH	AVR_SUPPLY_Z1_(PMG)
200	GN-YL	GROUND
208	WH	BATTERY_(-)
229	WH	CLEAN_GROUND
344	WH	EMERGENCY_STOP
345	WH	EMERGENCY_STOP
346	WH	EMERGENCY_STOP
347	WH	EMERGENCY_STOP
348	WH	EMERGENCY_STOP
5+	WH	GENERATOR_EXCITATION_(+)
6-	WH	GENERATOR_EXCITATION_(-)
879	WH	REMOTE_START_INPUT
892	BK	CAT_DATA_LINK_(-)
893	WH	CAT_DATA_LINK_(+)
9	WH	AVR_SUPPLY_X1_(SHUNT)
951	WH	MODBUS A
952	BK	MODBUS B
953	CU	MODBUS COM
954	WH	DSENET A
955	BK	DSENET B
956	CU	DSENET SCREEN
SCR	CU	SCREEN
A309	WH	DIGITAL_INPUT_(GENSET RUNNING)
A666	WH	ENCLOSURE_LIGHTING
A774	WH	EMERGENCY_STOP
A775	WH	EMERGENCY_STOP
AC101	WH	FUSED BTRY CHARGER (L)
AC102	WH	BTRY CHARGER (L)
AC103	WH	ALT HEATER BREAKER
AC104	WH	ALT HEATER BREAKER
AC199	WH	BTRY CHARGER (N)
AC703	WH	ALT HEATER RELAY (11)
AC719	WH	ALT HEATER RELAY (12)
AC720	WH	ALT HEATER TERM
E486	WH	SENSING_VOLTAGE-PHASE_A
E487	WH	SENSING_VOLTAGE-PHASE_B
E488	WH	SENSING_VOLTAGE-PHASE_C
E494	WH	CT_SENSING-PHASE_A
E495	WH	CT_SENSING-PHASE_B
E496	WH	CT_SENSING-PHASE_C
E498	WH	CT_SENSING-COMMON
E600	WH	GROUND FAULT RELAY
E601	WH	GROUND FAULT RELAY
F409	WH	SENSING_VOLTAGE-NEUTRAL
F430	WH	DIGITAL_INPUT_(D)
F434	WH	GEN_PHASE_A
F435	WH	GEN_PHASE_B
F436	WH	GEN_PHASE_C
N756	WH	HORN_OUTPUT
P733	WH	ANALOG_I/P_SIGNAL_(FUEL_LEVEL)
P854	WH	BREAKER_SHUNT_TRIP
R958	WH	DIGITAL_OUTPUT_(SHUNT_TRIP)
R959	WH	DIGITAL_OUTPUT_(ENCLOSURE_LIGHTS)
X861	WH	STARTER_MAG_SWITCH
Y797	YL	J1939_DATALINK_(CAN_+)
Y798	BK	J1939_DATALINK_(CAN_-)
Y799	CU	J1939_DATALINK_(CAN_SHLD)
Y983	WH	DIGITAL_INPUT_(LOW_COOLANT_LEVEL)
Y984	WH	DIGITAL_INPUT_(FUEL_LEAK)
Y985	WH	DIGITAL_INPUT__(ENCLOSURE_LIGHTS)

WIRE NAME DEFINITION

XXXX-XX# XX-XX

WIRE GAUGE

WIRE COLOUR

WIRE NUMBER

HARNESS IDENT

CIRCUIT IDENT

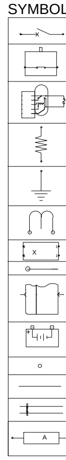
COLOUR ABBREVIATIONS

ABBREVIATION	DESCRIPTION
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GREY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE
CU	COPPER
GN-YL	GREEN-YELLOW

ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
AC	ALTERNATING CURRENT
AVR	AUTOMATIC VOLTAGE REGULATOR
BATT	BATTERY
CR	CONTROL RELAY
DC	DIRECT CURRENT
ECM	ENGINE CONTROL MODULE
ECR	ENGINE CRANK RELAY
ELR	EMNVLOSURE LIGHTS RELAY
E-STOP	EMERGENCY STOP
FLS	FUEL LEVEL SENDER
GFR	GERNERAL FAULT RELAY
GND	GROUND
GRR	GENERATOR RUNNING RELAY
LCL	LOW COOLANT LEVEL
MCB	MINIATURE CIRCUIT BREAKER
PMG	PERMANENT MAGNET GENERATOR
STR	SHUNT TRIP RELAY
TERM	PANEL TERMINAL
VFC	VOLT FREE CONTACT

SYMBOL LEGEND TABLE



MINIATURE CIRCUIT BREAKER

EMERGENCY STOP PUSHBUTTON

FUSED AUTOMOTIVE RELAY

RESISTOR

EARTH/GROUND

CURRENT TRANSFORMER

PANEL TERMINAL

TERMINAL

CONNECTOR

BATTERY

SPLICE

WIRE

SCREEN CABLE

FUSE

INDEX TABLE

SHEET INDEX	DESCRIPTION
1	CROSS REFERENCE SHEET INDEX, NOTES
2	CONTROL SCHEMATIC
3	POWER SCHEMATIC
4	OPTION SCHEMATIC
5	OPTION SCHEMATIC (CONTINUED)
6	CUSTOMER CONNECTIONS AND COMPONENT DETAILS .

HARNESS LAYER TABLE

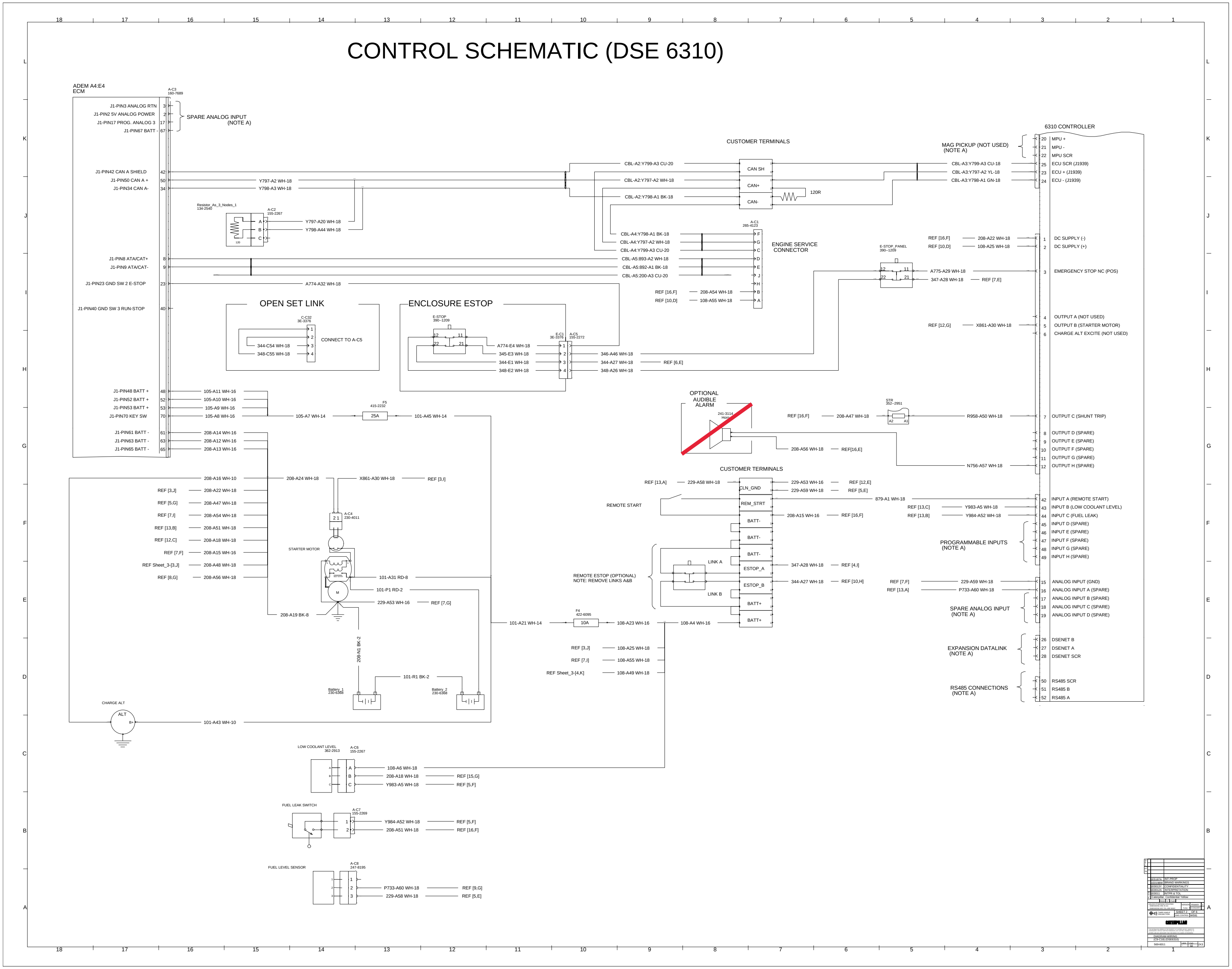
IDENT	PART NO	CHG	LOC	DESCRIPTION	NOTE
HARNESS AS.	-	-	-	-	-
A	572-5793	02	SH 2	MAIN HARNESS (C9-C13)	
A	572-5795	02	SH 2	MAIN HARNESS (C15-C18)	
AN	578-6063	01	SH 4	ANNUNCIATOR HARNESS	
B	577-8429	01	SH 4	PLG 641 & 601 HARNESS (RS485)	
C	580-2678	00	SH 2	E-STOP LINK (OPEN SET)	
CE	581-0536	00	SH 5	LC BATTERY CHARGER	
CD	577-8711	00	SH 5	GFCI	
CF	581-0537	00	SH 5	LC ALT HEATER	
E	572-5798	02	SH 2	E-STOP HARNESS (ENCLOSED SET)	
EL	580-3699	01	SH 4	CANOPY LIGHTS HARNESS	
ER	578-7682	01	SH 5	BATTERY CHARGER HARNESS	
GF	581-1932	01	SH 5	GROUND FAULT RELAY INDICATION HARNESS	
GR	579-3092	00	SH 4	GENSET RUNNING & COMMON ALARM	
PG	443-0637	00	SH 4	PMG ADAPTOR	
T	577-3930	00	SH 4	PLG 641 & 601 HARNESS (POWER)	
RC	580-8446	01	SH 5	ALTERNATOR HEATER HARNESS	
AX	TBA	-	SH3	1200A CB AUX CONTACT HARNESS	
FF	TBA	-	SH3	1200A CB SHUNT TRIP HARNESS	
Y	586-4861	00	SH 5	PLG CANBUS HARNESS	
WIRE AS. / CABLE AS.	-	-	-	-	-
N	-	-	SH 2	BATTERY NEGATIVE	
P	-	-	SH 2	BATTERY POSSITVE	
R	-	-	SH 2	BATTERY LINK	
SEE SHEET 3	-	-	SH 2	400A POWER CABLES	
SEE SHEET 3	-	-	SH 3	600A POWER CABLES	
SEE SHEET 3	-	-	SH 3	800A POWER CABLES	
SEE SHEET 3	-	-	SH 3	1200A POWER CABLES	

NOTE A: FACTORY WIRING NOT PROVIDED AS STANDARD. REFER TO MANUFACTURER INSTALLATION INSTRUCTIONS.

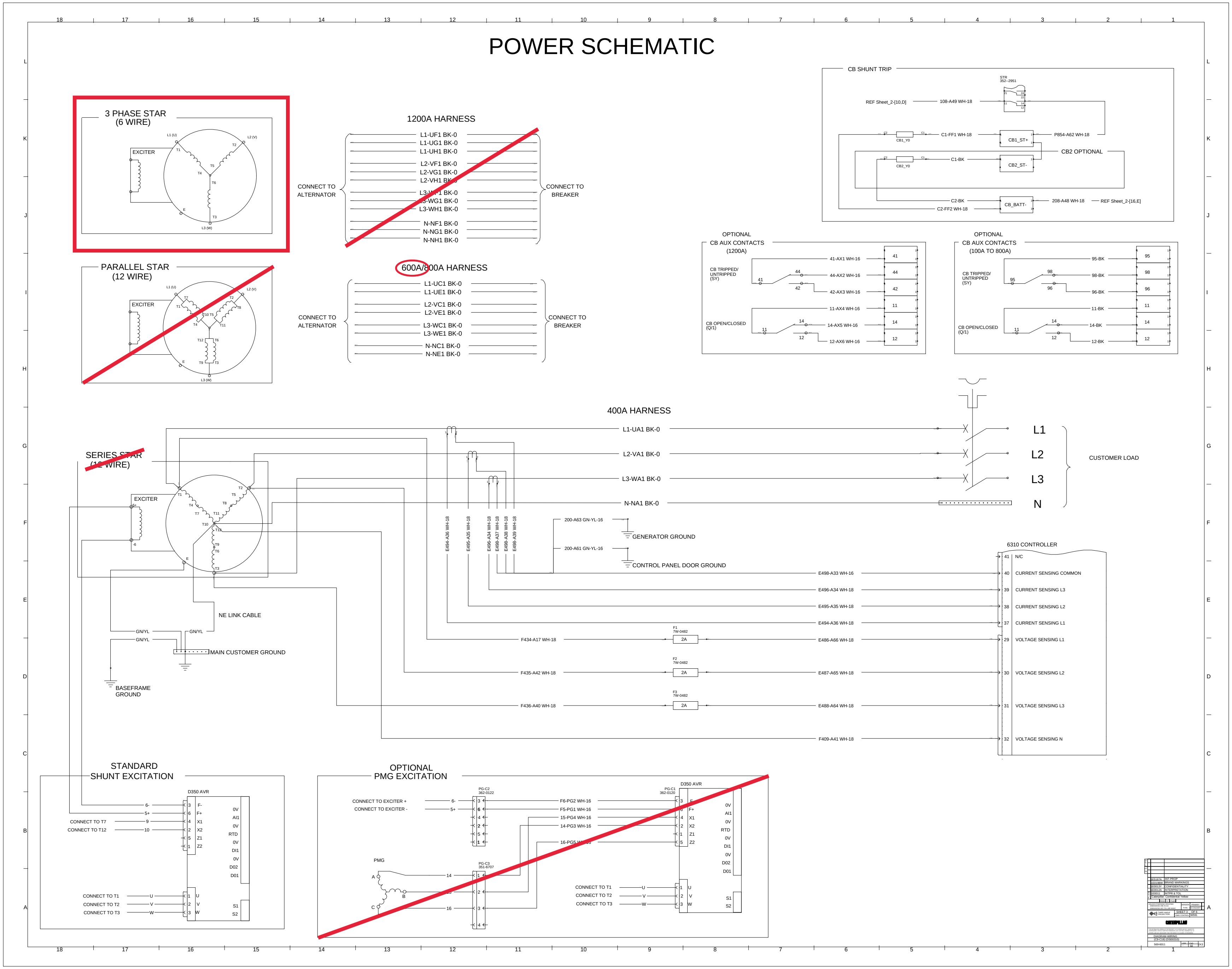
NOTE B: CONTACT OPEN IN DE-ENERGIZED STATE OR FAULT CONDITION.

NOTE C: RESISTOR TO BE REMOVED IF ADDITIONAL EXPANSION MODULES ARE CONNECTED.

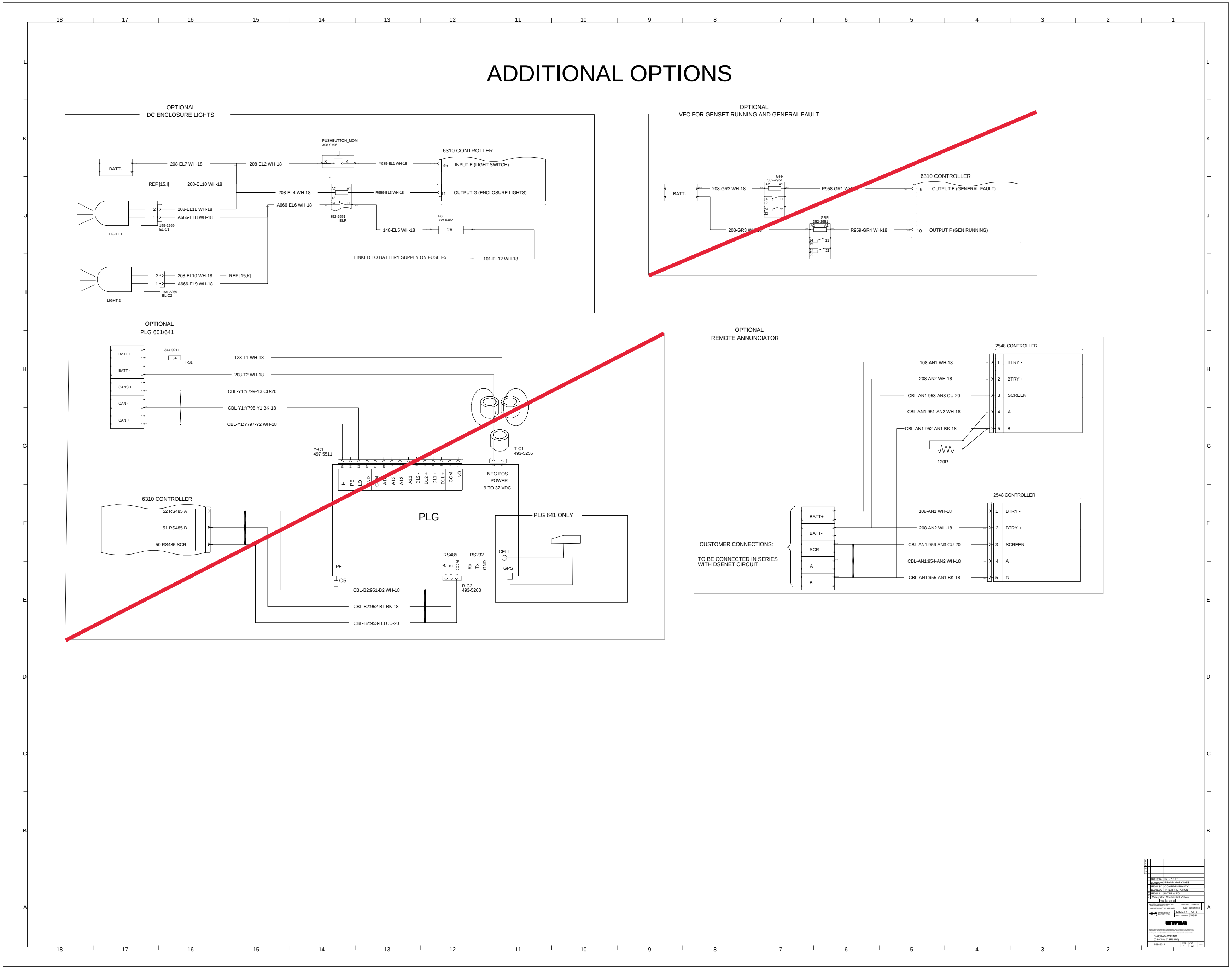
CONTROL SCHEMATIC (DSE 6310)



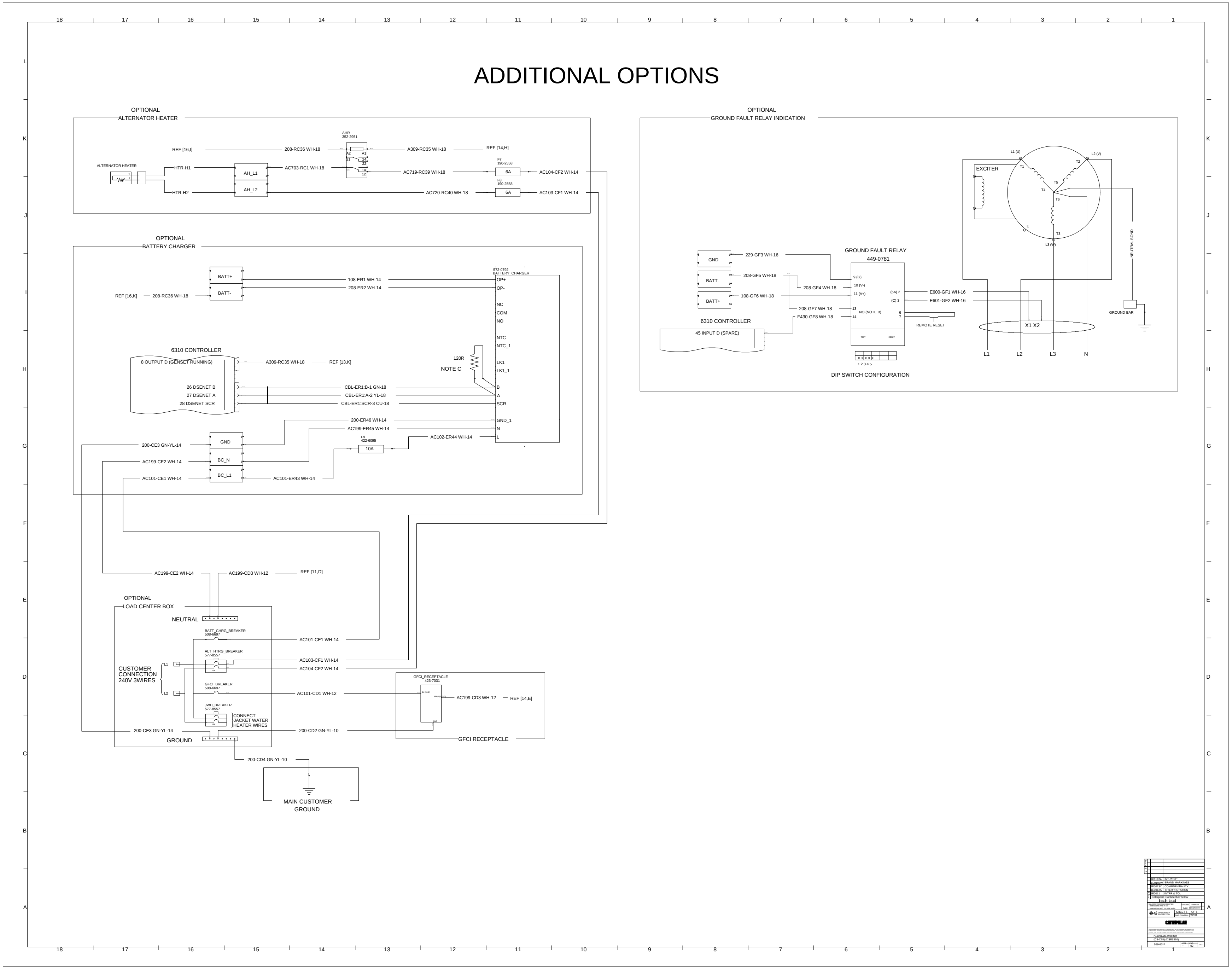
POWER SCHEMATIC



ADDITIONAL OPTIONS



ADDITIONAL OPTIONS

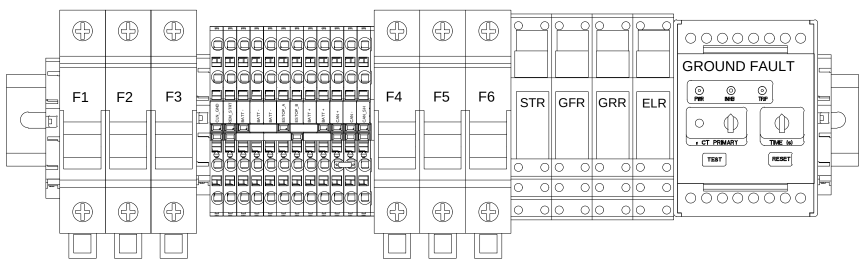


ADDITIONAL INFORMATION - COMPONENT DETAILS & CUSTOMER CONNECTIONS

MAIN CUSTOMER RAIL (OPTIONS INCLUDED)

FUSE ID	CURRENT RATING	WIRE ID	DESCRIPTION
F4	10A	101, 108	PANEL SUPPLY
F5	25A	101, 105	ECM POWER
F6	2A	148, 101	ENCLOSURE LIGHTS

DC FUSES



AC FUSES

CUSTOMER TERMINALS

RELAY VFC CONNECTIONS

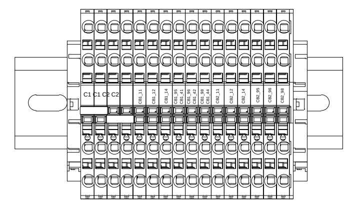
GROUND FAULT RELAY

FUSE ID	CURRENT RATING	WIRE ID	DESCRIPTION
F1	2A	F434, E486	L1 SENSING AC
F2	2A	F435, E487	L2 SENSING AC
F3	2A	F436, E488	L3 SENSING AC

TERMINAL ID	WIRE ID	DESCRIPTION
CLN_GND	229	CLEAN GROUND FOR ANALOG INPUTS
REM_STRT	879	REMOTE START INPUT
BATT -	208	BATTERY NEGATIVE
BATT -	208	BATTERY NEGATIVE
BATT -	208	BATTERY NEGATIVE
ESTOP_A	347	ECM ESTOP INPUT
ESTOP_B	344	GENSET CONTROLLER ESTOP INPUT
BATT +	108	BATTERY POSITIVE (10A FUSED)
BATT +	108	BATTERY POSITIVE (10A FUSED)
CAN +	Y797	CAN + COMMS
CAN -	Y798	CAN - COMMS
CAN SH	Y799	CAN SH COMMS

RAIL	CURRENT RATING	DESCRIPTION
STR	8A	SHUNT TRIP RELAY
GFR	8A	GENERAL FAULT RELAY
GRR	8A	GENSET RUNNING RELAY
ELR	8A	ENCLOSURE LIGHTS RELAY

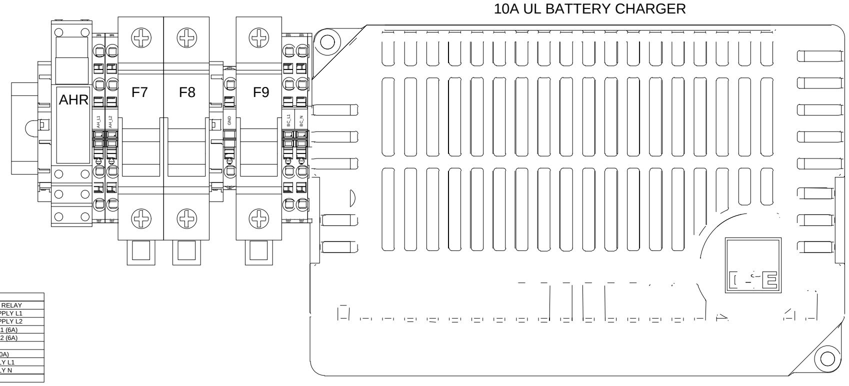
CIRCUIT BREAKER RAIL (OPTIONS INCLUDED)



TERMINAL ID	WIRE ID	DESCRIPTION
CB1_ST+	C1	CB1 SHUNT TRIP
CB2_ST+	C1	CB2 SHUNT TRIP
BATT-	C2	BATTERY NEGATIVE
11	11	CB1 AUX COM
12	12	CB1 AUX NO
14	14	CB1 AUX NC
95/41	95/41	CB1 AUX COM
96/42	96/42	CB1 AUX NO
98/44	98/44	CB1 AUX NC
11	11	CB2 AUX COM
12	12	CB2 AUX NO
14	14	CB2 AUX NC
95	95	CB2 AUX COM
96	96	CB2 AUX NO
98	98	CB2 AUX NC

SHORE POWER RAIL (OPTIONS INCLUDED)

10A UL BATTERY CHARGER



COMPONENT	DESCRIPTION
AHR	ALTERNATOR SPACE HEATER RELAY
AH_L1	ALTERNATOR HEATER AC SUPPLY L1
AH_L2	ALTERNATOR HEATER AC SUPPLY L2
F7	ALTERNATOR HEATER FUSE L1 (6A)
F8	ALTERNATOR HEATER FUSE L2 (6A)
GND	SHORE POWER GROUND
F9	BATTERY CHARGR FUSE L1 (10A)
BC_L1	BATTERY CHARGER AC SUPPLY L1
BC_N	BATTERY CHARGER AC SUPPLY N

Operation & Maintenance Manual

for

Provo Southwest Lift Station

Specification Section 26 36 23

AUTOMATIC TRANSFER SWITCHES 800A

Caterpillar

July 6, 2022

Presented To:

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OPERATION, MAINTENANCE, AND INSTALLATION GUIDE

Cat® CG Series
Automatic Transfer Switches
30-1200A, 200-480 Vac

Factory Authorized Service

For Cat® parts and service, contact your local Cat dealer.

For factory support, in the U.S. call (866) 883-3879. Outside of the U.S. call (+1) (678) 746-5000 or contact by email to CatSwgrHelpdesk@cat.com.

Receiving, handling and storage

Warning
Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

HAZARD OF EQUIPMENT OVERTURNING

When moving with a forklift, do not re-move the shipping packaging until the de-vice is in its final location.

Receiving and handling

Upon receipt, carefully inspect the transfer switch for damage that may have occurred during transit. If damage is evident, or there is visible indication of rough handling, immediately file a damage claim with the transportation company, and notify your local Cat dealer.

Do not remove the shipping packaging until ready to install the switch.

Storage

If the unit will not be placed into service immediately, store the transfer switch in its original package in a clean, dry location. To prevent condensation, maintain a uniform temperature. Store the unit in a heated building, allowing adequate air circulation and protection from dirt and moisture. Storing the unit outdoors could cause harmful condensation inside the transfer switch enclosure.

Failure to follow this instruction may result in personal injury or equipment damage.

Read these safety instructions carefully before using this product!

Danger
Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical per-sonnel.

- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live unless they are completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.

- Disconnect all sources of electric power before removing or making source side or load side connections to the transfer switch.
- Always use a properly rated voltage sensing device at all line and load connections to confirm transfer switch is disconnected from all live electrical sources.
- Turn off power supplying transfer switch before doing any other work on or inside switch.

Failure to follow these instructions could result in death or serious injury.

Operation, maintenance, and installation instruction

Cat CG Series Automatic transfer switches

Operation and Maintenance Instructions:	Chapters 1-8
Installation Instructions:	Chapters 9-11

Operation and maintenance instruction

Automatic transfer switches,
Cat CG series ATS

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1. Introduction

This manual describes the installation, basic operation, and maintenance of the Cat CG series (30-1200A, 200-480Vac) automatic transfer switches, manufactured by ABB. Installation instructions for the transfer switch and available accessories can be found in chapters 9 and 10.

1.1 Hazard Categories

The following important highlighted in-formation appears throughout this document to warn of potential hazards or to call attention to information that clarifies a procedure.

Carefully read all instructions and become familiar with the devices before trying to install, operate, service or maintain this equipment.

Danger
Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

Warning
Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

Caution
Indicates a hazardous situation that, if not avoided, could result in minor or moderate in-jury. Failure to comply with these instructions may result in product damage.

Notice
It is used to notify of practices not related to personal injury. Failure to comply with these instructions may result in product damage.

1.2 Definitions

ATS
Automatic transfer switches

Ekip
Electronic accessories / Ekip-modules; communication, signaling and connectivity modules

HMI
Control interface (Human Machine Interface), operating and configuration

Programming port
Only for Ekip Programming and Ekip Bluetooth -modules (USB port)

Slide switch
Switch for operating mode selection (Hand - Locking - AUTO)

S1
SOURCE 1, power supply

S2
SOURCE 2, power supply

Cat CG series ATS
General purpose commercial & industrial enclosed automatic transfer switches, product name

Load Shed
Digital output function for signaling a downstream load to disconnect. This functionality is different than the legacy Cat CTG R15 Load Shed which is an input for the ATS to disconnect generator when signaled.

1.3 Warranty

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all hardware and software systems.

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Contact your local Cat dealer if further information is required concerning any aspect of the automatic transfer switch operation or maintenance.

Warranty Period
The Warranty Period for CG series transfer switch products is twenty-four (24)months from the date of shipment.

Notes: This warranty is valid only in the United States and for products sold and installed within seller-specified countries.

Replacement parts are warranted for a period of 90 days when installed by a factory or an authorized service station.

Contact your local Cat dealer for service.

1.4 Product Specification

Quality Assurance

All Cat automatic transfer switches have been designed and manufactured to the highest technical standards. Strict procedures ensure first-class product quality.

Product Serial Number

Please have the serial number available when communicating about the automatic transfer switch. The serial number can be found on the product nameplate affixed to each power panel assembly. See example below.

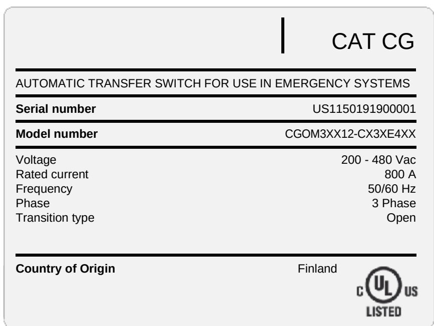


Figure 1.1: Sample nameplate

Product Rating / Applicable Standards For UL 1008 ‘withstand’ and ‘close on short circuit’ ratings, refer to Caterpillar specification sheet, publication number LEHE2083.

2. Product overview

Cat CG series automatic transfer switches, from 30 A up to 1200 A, are designed for use in general purpose commercial and industrial low voltage automatic transfer switch applications. Cat CG series automatic transfer switches can be operated electrically by LCD control interface (HMI) or manually by using the handle. You can select the operating mode by the slide switch (Hand - Locking - AUTO) on switch front. Configuration is done by LCD HMI.

The available operation types for automatic transfer switches:

- Open (standard) transition Cat CG series ATS, type codes beginning CGO_from 30-1200 A, 200-480 Vac
- Delayed transition Cat CGD series ATS, type codes beginning CGD_from 30-1200 A, 200-480 Vac

2.1 General overview

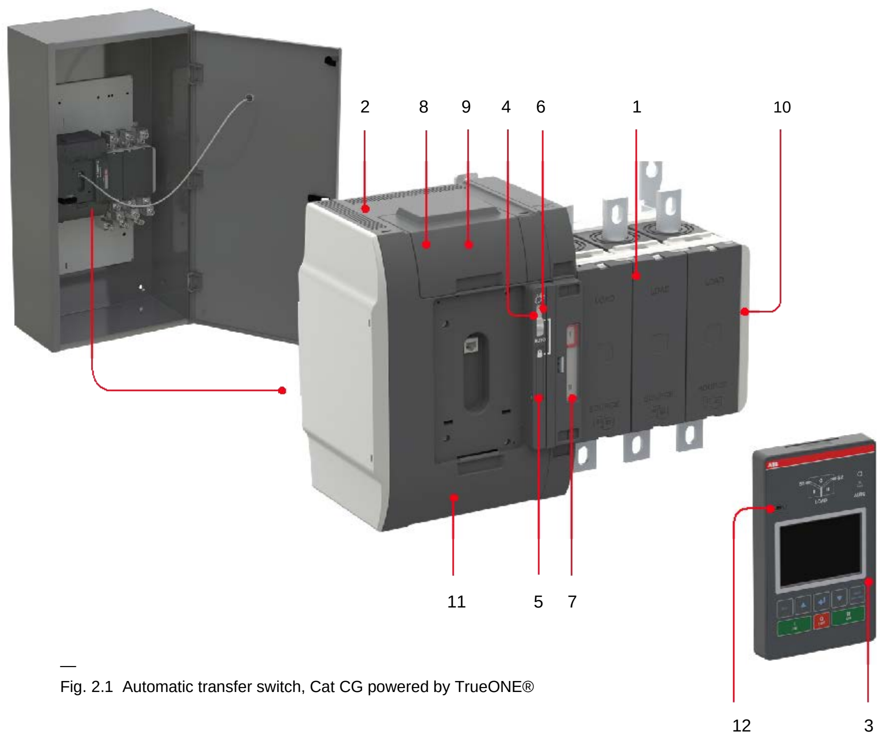


Fig. 2.1 Automatic transfer switch, Cat CG powered by TrueONE®

1 Automatic transfer switch
2 Embedded ATS control unit and mechanism
3 HMI unit, CG LCD
4 Slide switch (Hand - Locking - AUTO) for selection of the operation mode
5 Padlocking the automatic transfer switch to prevent automatic and manual operation
6 Handle for manual operation
7 Position indication
8 Terminals for control circuit connections (behind the cover)
9 Place for connectivity modules (aux power supply, com and signaling)
10 Place for auxiliary contact block
11 Location of product identification label
12 Programming port, only for Ekip Programming module and Ekip Connect software

2.1.1 Operation types

In this table you can find the differences of the automatic transfer switch open and delayed transition operation types. Due to the different transition types, there are variances with HMI and on wiring of I/O contacts. For more information on HMIs, see chapter 2.2.

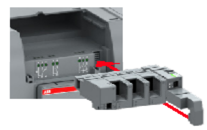
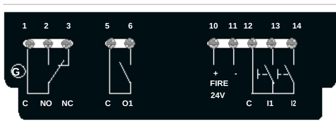
Operation types, CG series ATS		Ekip-modules suitable
Delayed transition, CGD	Open transition, CG	
S1 I O II S2  Load	S1 I II S2  Load	
CG series HMI (with LCD-screen) and connections of control circuit		
		Suitable 
		

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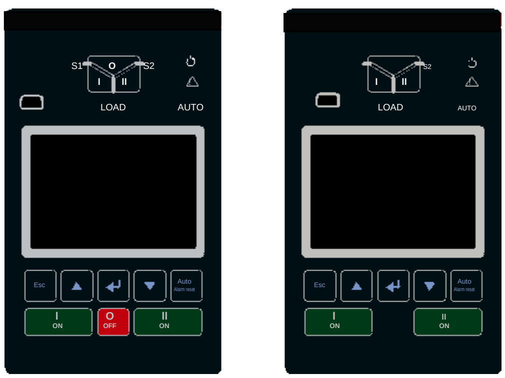
Table 2.1 The differences of level types / operation types and the suitability of Ekip-modules

2.2 HMI

The HMI is the control interface (Human Machine Interface) of the ATS.

Cat CG series has an LCD HMI with push buttons. The HMI is used for configuring parameters for automatic operation.

CG:
HMI with
LCD-screen



I - O - II (or II - O - I)

I - II (or II - I)

—
Fig. 2.2 The HMI form will correspond to the type of CG series - open or delayed transition

2.3 Cat CG series features

Feature comparison	CG(D) controls (LCD)
Rated voltage	200-480 Vac
Rated frequency	50 / 60 Hz
Phase system	Single and Three
Number of poles	2, 3 and 4
Neutral configuration	
Switched	Yes
Product type	
Open transition (I-II)	Yes
Delayed transition (I - O - II or II - O - I)	Yes
Voltage and frequency settings	
Pick up SOURCE 1 Voltage	71-99 %, 101-119 %
Drop out SOURCE 1 Voltage	70-98 %, 102-120 %
Pick up SOURCE 2 Voltage	71-99 %, 101-119 %
Drop out SOURCE 2 Voltage	70-98 %, 102-120 %
Pick up SOURCE 1 Frequency	80.5-99.5 %, 100.5-119.5 %
Drop out SOURCE 1 Frequency	70-99 %, 101-120 %
Pick up SOURCE 2 Frequency	80.5-99.5 %, 100.5-119.5 %
Drop out SOURCE 2 Frequency	70-99 %, 101-120 %
Time delay settings	
Override momentary SOURCE 1 Outage, sec	0-60
Transfer from SOURCE 1 to SOURCE 2, sec	0-3600
Override momentary SOURCE 2 Outage, sec	0-60
Transfer from SOURCE 2 to SOURCE 1, min	0-120
Generator stop delay, min	0-60
Center-OFF delay, sec	0-300

Feature comparison	CG(D) controls (LCD)
Pre-transfer delay S1 to S2, sec	0-300
Post-transfer delay S1 to S2 , sec	0-300
Pre-transfer delay S2 to S1, sec	0-300
Post-transfer delay S2 to S1, sec	0-300
Elevator Pre-signal delay S1 to S2, sec	0-300
Elevator Post-signal delay S1 to S2, sec	0-300
Elevator Pre-signal delay S2 to S1, sec	0-300
Elevator Post-signal delay S2 to S1, sec	0-300
Load shed delay, sec	0-300
Source failure detections	
No voltage	Yes
Undervoltage	Yes
Overvoltage	Yes
Phase missing	Yes
Voltage unbalance	Yes
Invalid frequency	Yes
Incorrect phase sequence	Yes
Features	
Controls	LCD + keys
LED indications for ATS, S1 and S2 status	Yes
Open transition - Standard digital inputs/outputs	1 / 1
Delayed transition - Standard digital inputs/ outputs	2 / 1
Programmable digital inputs/outputs	Yes
Auto config (voltage, frequency, phase system)	Yes
Source priority	SOURCE 1/2, No priority
Manual re-transfer	Yes
In-phase monitor	Yes
Genset exercising: on-load, off-load	Yes

Feature comparison	CG(D) controls (LCD)
Built-in power meter module	No
Load shedding	Yes
Real time clock	Yes
Event log	Yes
Field-mount accessories	
Auxiliary contacts for position indication	Yes
Digital input/output modules	Yes
12-24 Vdc aux supply module for controller	Yes
Communication modules	Yes
Connectivity	
Modbus RS485	Yes
Modbus/TCP	Yes
Profibus DP	Yes
ProfiNet	Yes
DeviceNet	Yes
Ethernet IP	Yes
Monitoring via Ability: EDCS	Yes
Enclosures	
Type 1, 3R, 4, 12, and 4X	
For applications	
Mains - Mains	
Mains - Generator	

—

Table 2.2 ATS features not limited to what is in the table above

2.4 Typical applications

Cat CG series automatic transfer switches from 30 A up to 1200 A, are designed for use in emergency or standby systems to choose and to switch between two power sources. See possible supply phase scenarios on next page. You have to define your own supply phase system - reference Chapter 4 / Navigating menu / Parameters: Power distribution systems. Factory setting: 3 phases with neutral.

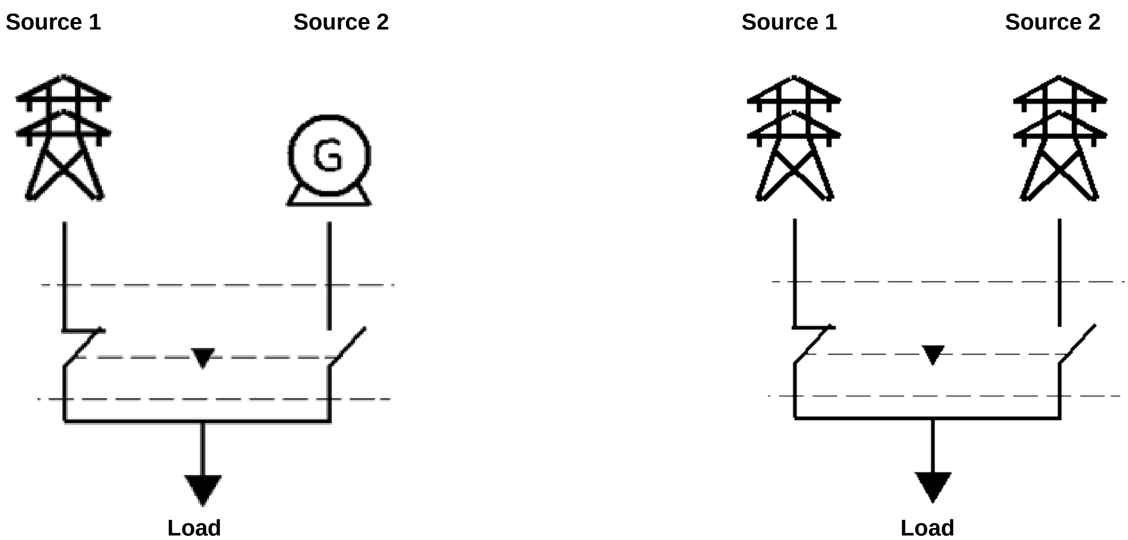
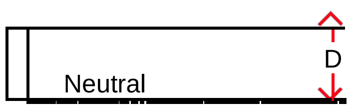
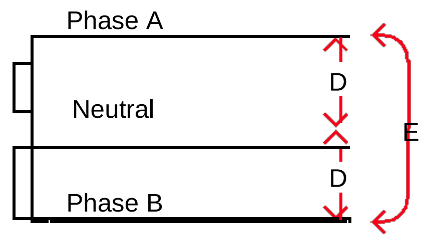


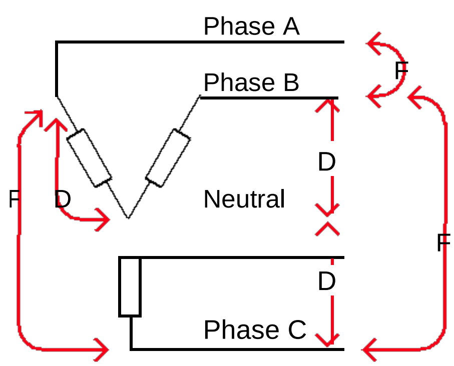
Fig. 2.3 Typical applications of automatic transfer switches



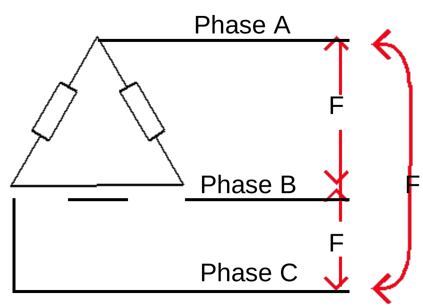
Single-phase, two-wire



Single-phase, three-wire

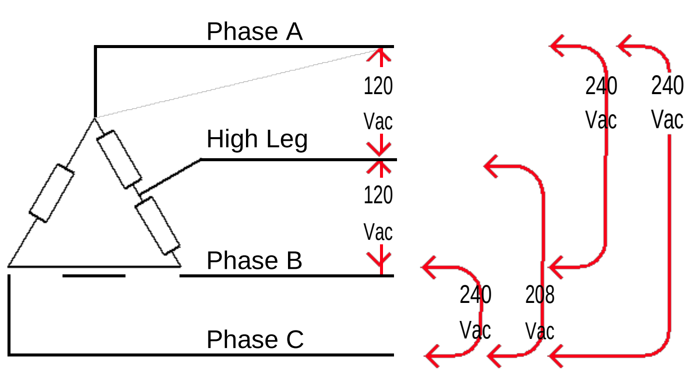


Three-phase, four-wire



Three-phase, three-wire

D	E	F
200-480 Vac L-N	200-480 Vac L-L	200-480 Vac L-L



Three-phase, with high leg delta

Fig. 2.4 Possible supply phase scenarios

2.5 Sequence of Operations

2.5.1 Switching sequence / Automatic

2.5.1.1 SOURCE 1 Priority (SOURCE 2 = Generator)

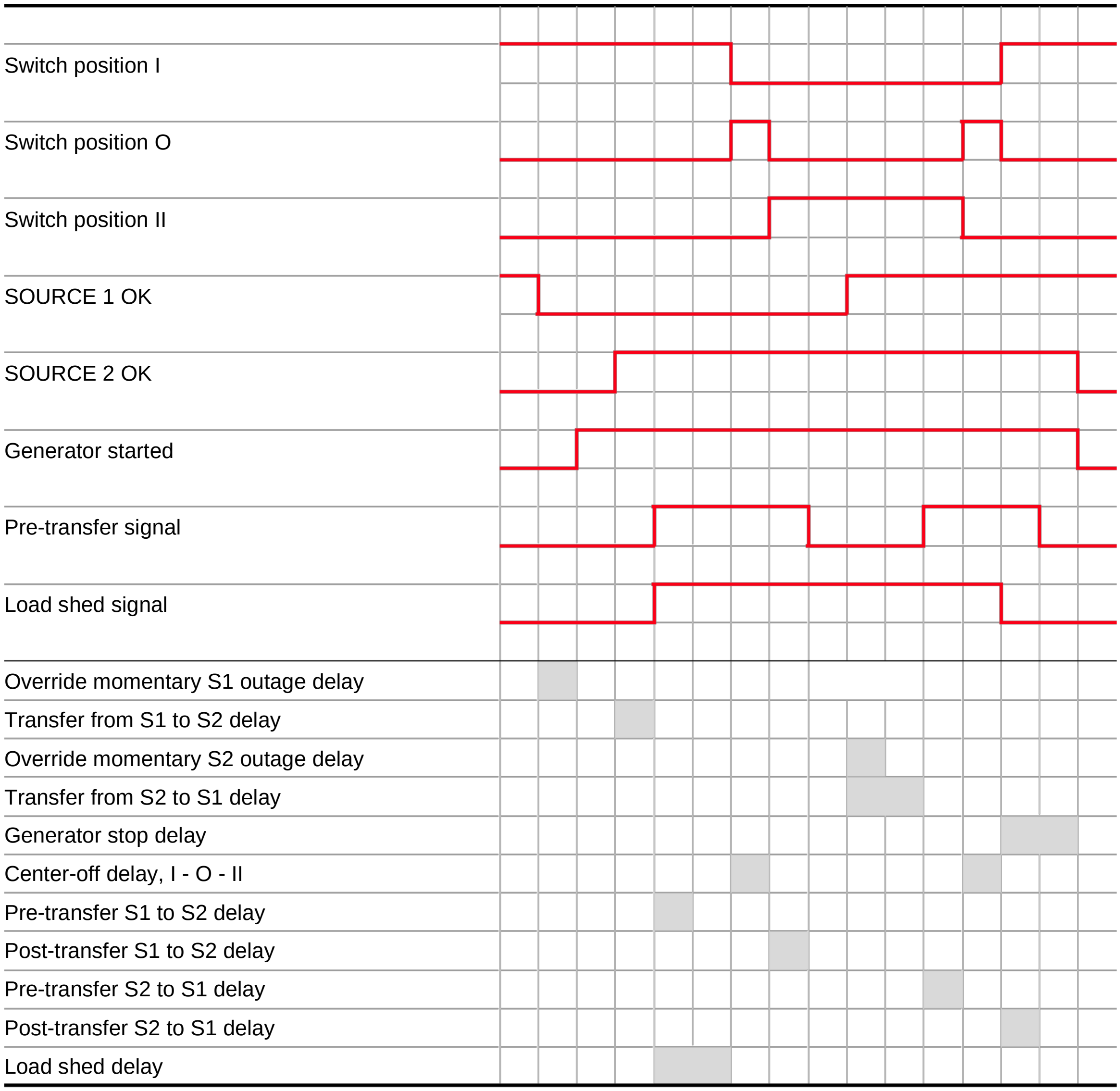
The switching sequence can be summarized in the following steps:

- An anomaly occurs on SOURCE 1
- Override momentary S1 outage delay
- Generator start
- SOURCE 2 OK
- Transfer from S1 to S2 delay
- Pre-transfer signal on
- Load shed signal on
- Pre-transfer S1 to S2 delay
- Load shed delay
- Transfer switch (SOURCE 1) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 2) to position II
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

The re-transfer sequence can be summarized in the following steps:

- SOURCE 1 is restored
- Transfer from S2 to S1 delay
- Pre-transfer signal on
- Pre-transfer S2 to S1 delay
- Transfer switch (SOURCE 2) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 1) to position I
- Load shed signal off
- Generator stop delay
- Post-transfer S2 to S1 delay
- Pre-transfer signal off
- Generator stop
- SOURCE 2 off

SOURCE 1 priority (SOURCE 2 = generator)



—

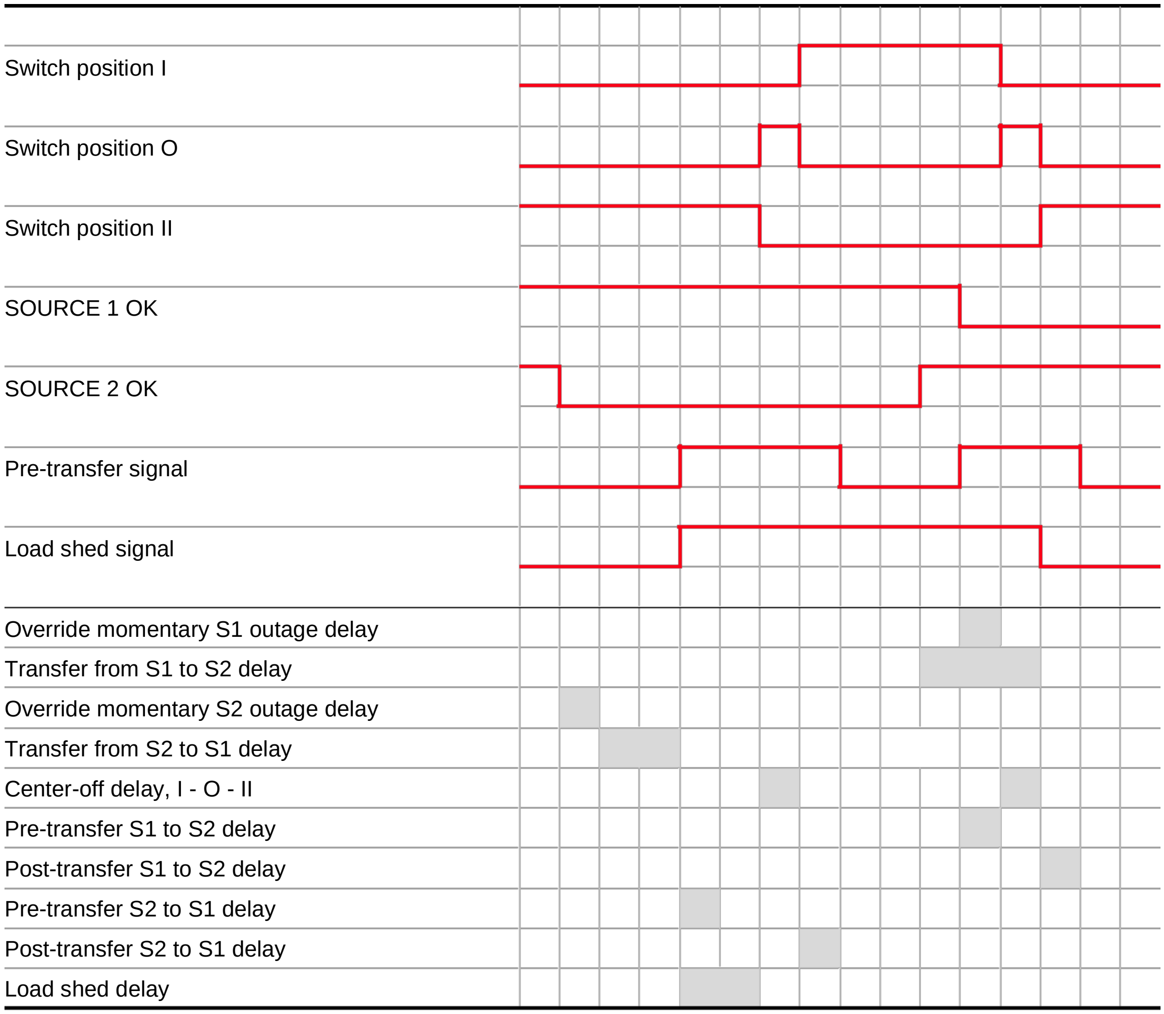
Table 2.3 Automatic Switching Sequences, SOURCE 1 Priority (SOURCE 2 = Generator)

2.5.1.2 SOURCE 2 Priority (No generator)

The switching sequence can be summarized in the following steps:
- An anomaly occurs on SOURCE 2
- Override momentary S2 outage delay
- Transfer from S2 to S1 delay
- Pre-transfer signal on
- Load shed signal on
- Pre-transfer S2 to S1 delay
- Load shed delay
- Transfer switch (SOURCE 2) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 1) to position I
- Post-transfer S2 to S1 delay
- Pre-transfer signal off

The re-transfer sequence can be summarized in the following steps:
- SOURCE 2 is restored
- Transfer from S1 to S2 delay
- Pre-transfer signal on
- Pre-transfer S1 to S2 delay
- Transfer switch (SOURCE 1) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 2) to position I
- Load shed signal off
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

SOURCE 2 priority (no generator)



—

Table 2.4 Automatic Switching Sequences, SOURCE 2 Priority (No generator)

2.5.1.3 No Source Priority (Generator and load shed usage disabled)

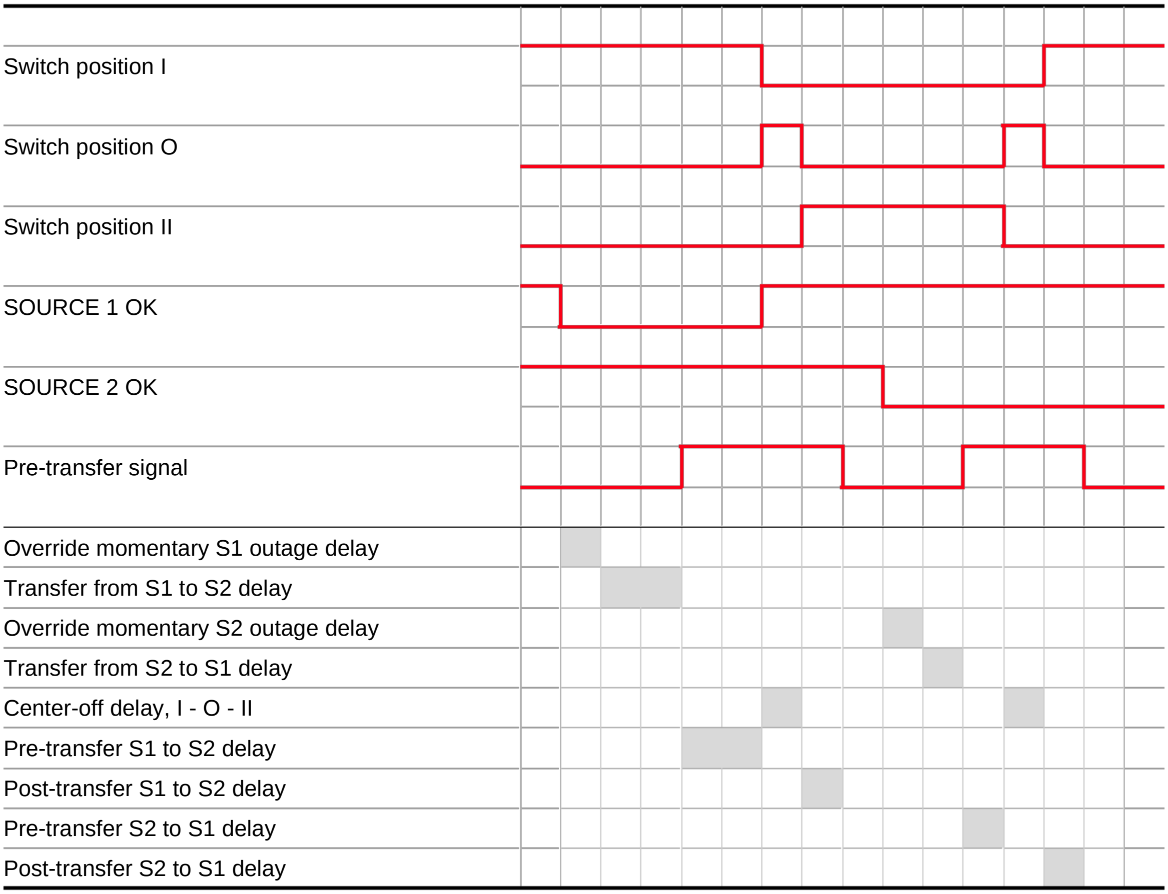
The switching to available source can be summarized in the following steps:

- An anomaly occurs on SOURCE 1
- Override momentary S1 outage delay
- Transfer from S1 to S2 delay
- Pre-transfer signal on
- Pre-transfer S1 to S2 delay
- Transfer switch (SOURCE 1) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 2) to position II
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

When an anomaly occurs in the source in-use, the re-transfer to available source can be summarized in the following steps:

- SOURCE 1 is restored
- An anomaly occurs on the SOURCE 2
- Transfer from S2 to S1 delay
- Pre-transfer signal on
- Pre-transfer S2 to S1 delay
- Transfer switch (SOURCE 2) to position O
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch (SOURCE 1) to position I
- Post-transfer S2 to S1 delay
- Pre-transfer signal off

No source priority (generator and load shed usage disabled)



—

Table 2.5 Automatic Switching Sequences, No Source Priority (Generator and load shed usage disabled)

2.6 Special features description

2.6.1 Automatic configuration

Basic system parameters can be automatically configured from the HMI: rated volt-age, rated frequency, each supply power distribution system type, and neutral location will be recognized and set by the controller. Other parameters are
set to factory values; see Chapter 4, Navigating menu.

2.6.2 In-phase monitor

In-phase monitor is a feature that calculates the phase difference of supply lines, preventing transfer when sources are not in sync. The user can set On/Off from the HMI. When the in-phase monitor is set to On, the device measures and detects when both sources are in sync with each other. The ATS will allow transfer from SOURCE 1 (S1) to SOURCE 2 (S2) only when they are in sync with each other. Any of these conditions will prevent source transfer when In-phase monitor is set to On:

- Phase difference between sources remains greater than 5 degrees
- Phase order between sources is not the same
- Voltage amplitude is out of range
- Phase is missing
- Voltage is asymmetric
- Frequency is out of range

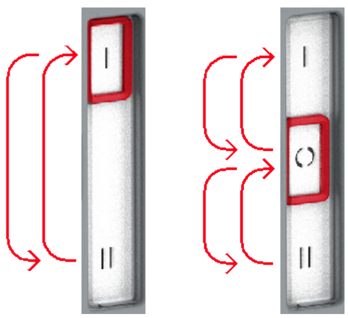
2.6.3 Powering supply scenarios Device can be powered by the following methods:

- Direct from SOURCE 1 or SOURCE 2: Controller and HMI are powered and ATS can be operated electrically.
- Auxiliary power supply module, OXEA1:
  Controller and HMI are powered, but load transfer cannot be performed.
- Programming port on HMI (USB port): Only the main board is powered. Allows software update to main device and connection of Ekip Connect commissioning tool.

3. General operation

3.1 Position indication

Contact movement and position indication is indicated in the figure below, on left side: Open transition I - II (or II - I) and on right side: Delayed transition I - O - II (or II - O-I)



CGI-II CGD:I-O-II

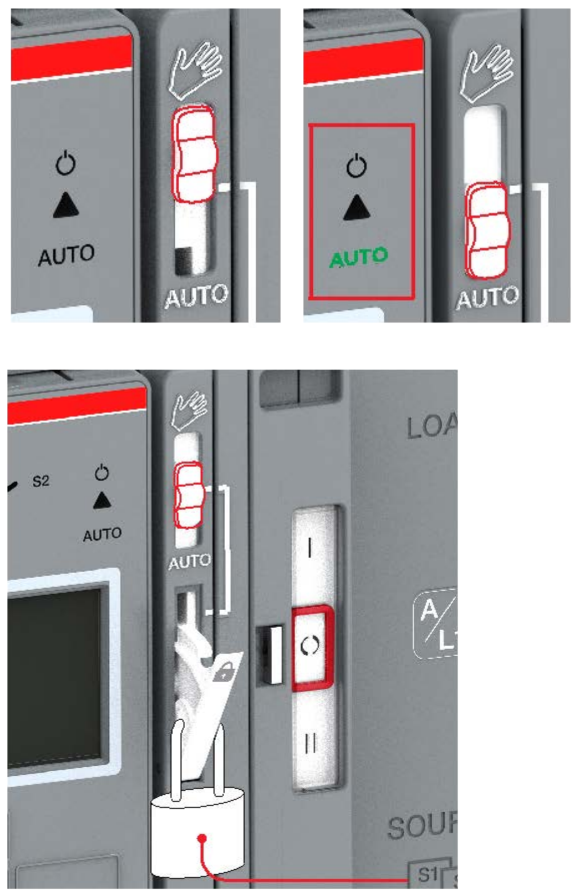
—

Fig. 3.1 Contact movement / position indication:
Type CG, Open transition; Type CGD, Delayed transition

3.2 Operating and locking

The operation mode is selected by using the slide switch (Hand - Locking - AUTO) located on the front of the automatic transfer switch (ATS).

- **Hand**-position = **Manual mode**, enabling emergency manual operation using the handle. ATS functionality is disabled when in Hand position.
- **Lock-**position = **Locking mode**, padlocking the automatic transfer switch in a specific position to prevent automatic and manual operation.
- **AUTO**-position = **Automatic control mode enabled**, ATS is operable in Automatic mode or from the HMI manual control keys. When the slide switch is moved to the AUTO position, the ATS is functioning immediately in the automatic control mode.



Notice

The handle must be in its stored position (not in use), after which the slide switch will move to the Locking mode automatically and the switch can be padlocked. To set
the operating handle back to its place, refer to the left most picture in Fig. 3.6.

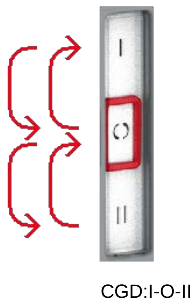
Fig. 3.2 Above the selection of the operation modes (Manual or Automatic) by the slide switch. Below padlocking the automatic transfer switch; The handle has to be in standby slot (not in use), after that the slide switch will move to the Locking mode automatically and the switch is allowed to be padlocked.

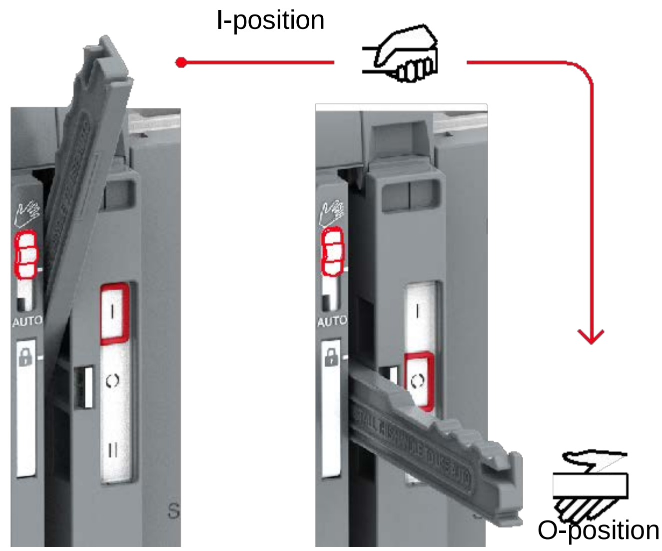
3.3 Manual handle operation

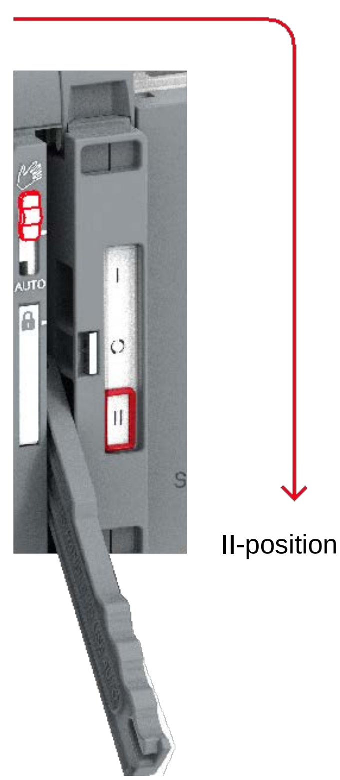
Warning
Verify the condition of power source prior to manually transferring. Manual operation may result in out- of-phase transfer when both sources are energized.

To mount the handle in the operating position, turn the slide switch to the Manual mode (Hand), lift the handle from its place inside and place it to the operating position.

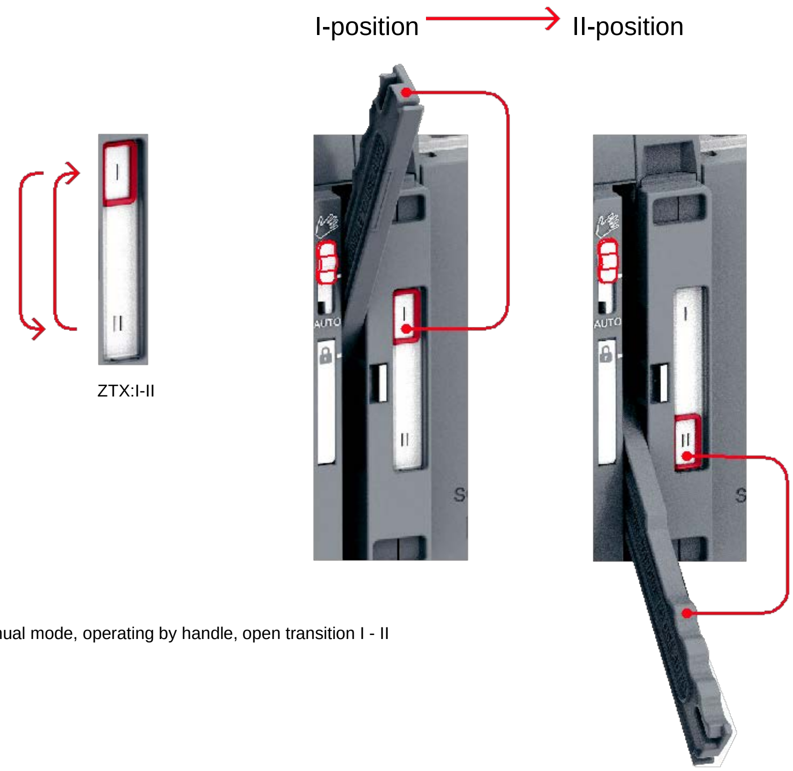
Fig. 3.3 Mounting of the handle in the operating position







—
Fig. 3.4 Manual mode, operating by handle, delayed transition I - O - II. You have to stop and release (= take the hand off) the handle in O-position when moving from position I to II (or from position II to I)



—
Fig. 3.5 Manual mode, operating by handle, open transition I - II

3.4 Return to Automatic mode, operating by HMI

When operating the automatic transfer switch by HMI, turn the slide switch to Automatic mode (AUTO). The handle MUST be standby slot (not in use) be-fore turning to automatic mode.

Notice
When the slide switch is moved to the AUTO position, the ATS will enter auto mode after a 3 second delay.

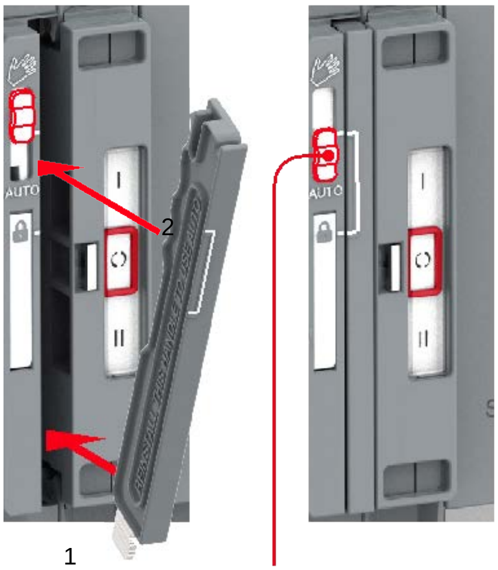
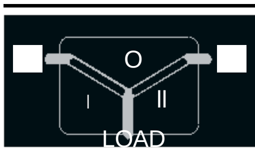


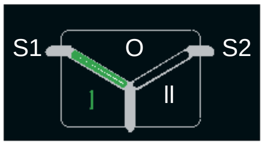
Fig. 3.6 The operating handle must returned to standby slot before moving to the automatic mode

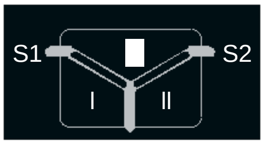
3.5 LED functionality in HMI

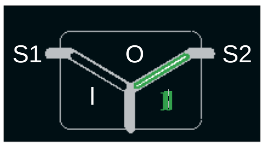
At the top of ZTG 30-1200 A, 200-480 Vac ATS, there is a set of LEDs intended to model the state of the transfer switch sources, position, alarms, and mode. A considerable amount of information can be deciphered from the LED states. See the tables below for more information.

LED	Indication	Description
Power led		
	ON, fixed light	Power supply and communication present
	2 quick flashes/1s	Power supply present, communication absent between switch and the HMI
	OFF	No power available for HMI.
S1 and S2 leds		
	ON, fixed light	S1 or / and S2 is present and within user defined limits
	2 quick flashes/1s	Undervoltage
	Flash/1 s, 90 %/10 %	Invalid frequency
	Flash/1 s, 10 %/90 %	Unbalance
	5 flashes/1 s, 50 %/50 %	Overvoltage
	Flash/2 s, 50 %/50 %	Incorrect phase sequence
	Flash/4 s, 50 %/50 %	Phase missing
	Flash/1 s, 50 %/50 %	Generator stop delay ongoing
	OFF	No voltage

I, II and 0 leds





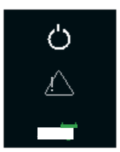


ON, fixed light	Switch position is indicated with fixed light in I, O or II led. Only one can be on simultaneously
Flash/1 s, 50 %/50 %	Delay ongoing. Going to move away from the blinking status

Load led

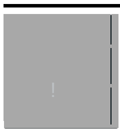
ON	Supply ok and connected to load
OFF	Not connected to load

Auto led



ON, fixed light	Switch is in automatic mode
Flash/1 s, 50 %/50 %	Test on load
Flash/1 s, 90 %/10 %	Test off load
5 flashes/1 s, 50 %/50 %	Autoconfig completed

Alarm led



OFF	No alarms
ON, fixed light	Handle attached, locked, other alarm
2 quick flashes/1s	Control Alarm
5 flashes/1 s, 50 %/50 %	Auto configuration ongoing
Flash/1 s, 50 %/50 %	Control Retry
Flash/1 s, 10 %/90 %	Auto mode off

Table 3.1 LED functionality

3.6 Using HMI

3.6.1 Keypad

1. **Esc:** Go back in menu. When pressed in root page, the alarm list is shown.
2. **Up, Down:** Move in menu or choose parameter values.
3. **Enter:** Opens menu from root page. Enter a new menu page and accept function. Also, selects parameters.
4. **Auto (Alarm reset):** If there are any alarms, by pressing this button you can reset all alarms. If there are not alarms, ATS will be set to Auto-mode.
5. **I ON:** Operate switch to I position.
6. **II ON:** Operate switch to II position.
7. **O OFF:** Operate switch to O position, only in delayed transition switches (CGD), I - O - II.

3.6.2 Navigating in menu

See the menu tree in Chapter 4.

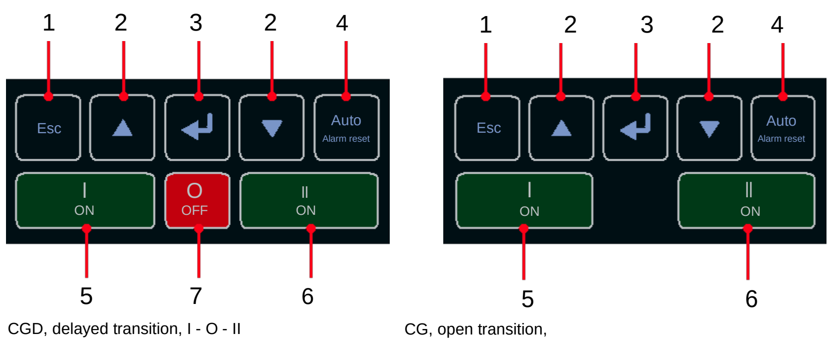


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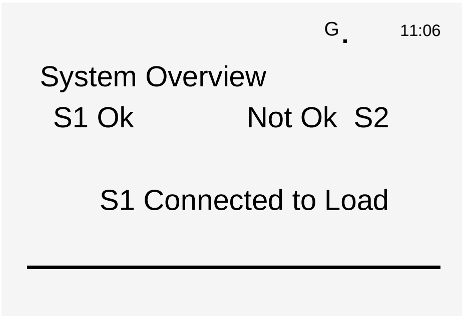
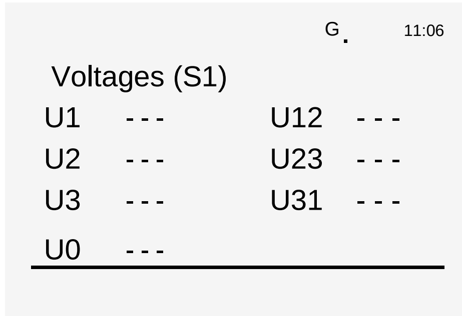
Fig. 3.8 Keypad in HMI with LCD screen

4. Navigating HMI menu

4.1 Start Screens





—
Fig. 4.1 From System Overview screen you will find Switch status and Supply info views, and by pressing Up and Down -keys (2), you can go forward to see Voltages and Synchronization view, see the table below.

Start screens
System Overview (Switch status)
Shows voltages and frequencies of both supplies and the switch position.
Supply info view
Shows Phase to Phase voltages of both supplies and the frequencies.
Voltages (S1)
S1 phase voltages
S1 line voltage
Voltages (S2)
S2 phase voltages
S2 line voltage
Synchronization view
Enabled only when In-phase monitor is on.
Show the time to next sync, sync period
Current view
Enabled only when current measurement module is connected.
Phase currents
Neutral current
Residual current

Active Power view
Enabled only when current measurement module is connected.
Active power by phase
Total active power
Reactive Power view
Enabled only when current measurement module is connected.
Reactive power by phase
Total reactive power
Apparent Power view
Enabled only when current measurement module is connected.
Apparent power by phase
Total apparent power
Energy Counters view
Enabled only when current measurement module is connected.
Active energy by source
Reactive energy by source
Apparent energy by phase
Total active energy
Total reactive energy
Total apparent energy

4.2 Using main menu and setting parameters

Description of the icons

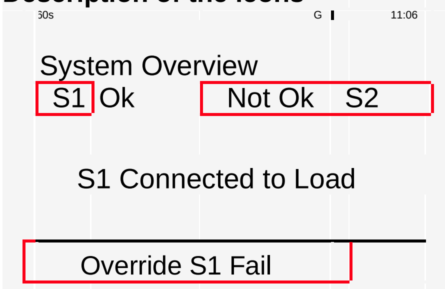


Fig. 4.2 Location of the small icons and the alarms

Alarm List

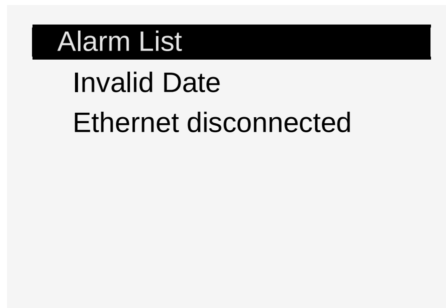


Fig. 4.3 When pressed Esc-key (1) in System Overview -pages, the alarm list is shown.

The small icons in System Overview -pages are:

●○○○

On upper right corner

Indicates the amount of pages and the page where you are at the moment

Auxiliary voltage connected

11:06 Time

G | Generator selected, not started

G | Generator selected, started

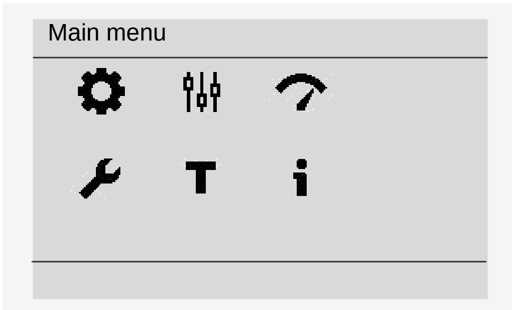
On upper left corner

60s Time delay, in Alarm list you can see the name of delay at the same time, e.g. Override S1 Fail

On the lower edge of the screen you can see the Alarms. When pressed Esc-key (1) in System Overview -pages, the alarm list is shown.

Notice
The default values are marked in the menu tree by *-marking.

For more information, see chapter 6, Troubleshooting



—
Fig. 4.4
By pressing Enter-key (3) you will move to the main menu page of Operation, Parameters, Measurements, Settings, Test and About, see the table below for the selections. You can move in menu or choose parameter values by Up and Down -keys (2) and by Enter-key (3) you can accept function and enter a new menu page. By Esc-key (1) you can go back in menu.

The default password is 00001, enter the password when prompted (see Fig. 4.5).

The keypad is described In Chapter 3.6, see Fig. 3.8.
By pressing the Enter-key (3) you can:

- open the menu in root page
- enter a new menu page
- accept the function

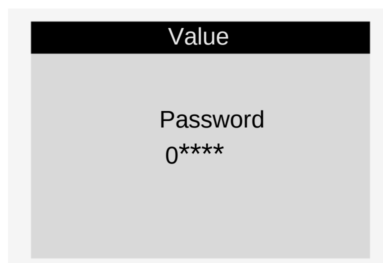
By pressing Up and Down -keys (2)
you can:

36 move in the menu
37 choose the parameter value

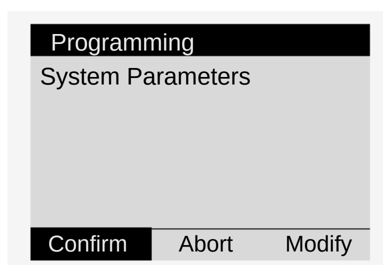
By pressing Esc-key (1) you can:

• go back in the menu

Notice
When you have changed the parameter, al-ways go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key.



—
Fig. 4.5 Enter the password when asked, choose the right number by Up and Down -keys (2) and confirm by Enter-key (3), go forward setting number after number



—
Fig. 4.6 After you have changed the parameter, always go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key

4.3 Menus and Parameters

Operation		*Default
Bypass Time Delay		
	Bypass any currently running time delay	
HMI Control Keys (I, II)		
	Enabled*	
	Disabled	
Energy Counters	Reset	

Parameters				*Default
System parameters				
	Start Automatic Configuration			
	Power distribution systems (see Fig. 2.2)			
		Source 1	1 Phase, 2 Wire	
			2 Phases, 3 Wire (Split Neutral)	
			3 Phases, no Neutral (3ph3w)	
			3 Phase with Neutral (3ph4w)*	
			3 Phase, High-Leg Delta	
		Source 2	1 Phase, 2 Wire	
			2 Phases, 3 Wire (Split Neutral)	
			3 Phases, no Neutral (3ph3w)	
			3 Phase with Neutral (3ph4w)*	
			3 Phase, High-Leg Delta 3 Phase, High-Leg Delta	
	Rated Voltage			
		200 V (3ph), 208 V (3ph), 220 V (3ph), 230 V (3ph), 240 V (3ph), 277 V (3ph), 347 V (3ph), 380 V (3ph), 400 V (3ph)*, 415 V (3ph), 440 V (3ph), 460 V (3ph), 480 V (3ph), 200 V (1ph), 220 V (1ph), 230 V (1ph), 240 V (1ph), 254 V (1ph), 265 V (1ph), 277 V (1ph), 318 V (1ph), 333 V (1ph), 347 V (1ph), 380 V (1ph), 400 V (1ph), 415 V (1ph), 440 V (1ph), 460 V (1ph), 480 V (1ph)		
	Rated Frequency			
		8 Hz*		
		60 Hz		
	Neutral Position			
		Pole 4*		
		Pole 1		
	Phase Sequence			
		ABC*		
		ACB		
		Not Enabled		

Continued the next page

Parameters (continued)				*Default
Device Parameters				
	In-phase Monitor			
		Enable	Off*	
			On	
		Synchronization Delay	0*-60 s	
	Time Delays			
		Override S1 Failure	0-60 s (2* s)	S1 priority: How long the device is waiting S1 recovery before starting transfer sequence to S2. S2 priority: How long the device is keeping the load on failed S1 although S2 is already available.
		Transfer from S1 to S2	0-60 min (2* s)	S1 priority: How long the device is keeping the load on failed S1 after S2 becomes available. S2 priority: How long the device waits before transfer sequence back to available S2 begins. This delay is bypassed by 'Override S1 Failure' in case of S1 failure.
		Pre-transfer S1 to S2	0*-300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S1 to S2.
		Center-off	0*-300 s	Only delayed transition I-O-II type. How long the switch is stopped at position O while transferring from S1 to S2 or from S2 to S1 and the original source is not completely down. Center-OFF delay is bypassed in case all phases are missing from the original source which we are leaving.
		Post-transfer S1 to S2	0*-300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring from S1 to S2.
		Override S2 Failure	0-60 s (2* s)	S1 priority: How long the device is keeping the load on failed S2 although S1 is already available. S2 priority: How long the device is waiting S2 recovery before starting transfer sequence to S1.

Continued the next page

Parameters (continued) ***Default**

Device Parameters (continued)

Time Delays (continued)

Transfer from S2 to S1	0-120 min (2* s)	S1 priority: How long the device waits before transfer sequence back to available S1 begins. This delay is overridden by 'Override S2 Failure' in case of S2 failure. S2 priority: How long the device is keeping the load on failed S2 although S1 is already available.
Pre-transfer S2 to S1	0*-300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S2 to S1.
Post-transfer S2 to S1	0*-300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring from S2 to S1.
Generator Stop	0-60 min (5* min)	Enabled only when generator is in use. Generator cooling time, how long the device is keeping the generator running without load after returning to priority source.
Load Shed	0*-60 s	Enabled only when any digital output is configured as 'Load Shed'. How long before the transfer from priority to non-priority source the device activates load shed signal.
Elevator Pre-signal S1 to S2	0*-60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S1 to S2.
Elevator Post-signal S1 to S2	0*-60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S1 to S2.
Elevator Pre-signal S2 to S1	0*-60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S2 to S1.
Elevator Post-signal S2 to S1	0*-60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S2 to S1.

Continued the next page

Parameters (continued)				***Default**
Device Parameters (continued)				
Voltage & Frequency Setpoints			Defines the voltage and frequency limits for source being acceptable. Source has an anomaly when measured voltage/frequency goes out of range drop-out lower/drop-out Upper. Source becomes acceptable when measured voltage/frequency goes back in range pick-up lower/pick-up higher.	
	S1 Setpoints			
		S1 Drop-out Voltage	Upper Threshold	102-120 % Un (115* % Un)
			Lower Threshold	70-98 % Un (85* % Un)
		S1 Pick-up Voltage	Upper Threshold	101-119 % Un (114* % Un)
			Lower Threshold	71-99 % Un (86* % Un)
		S1 Drop-out Frequency	Upper Threshold	101-120 % fn (115* % fn)
			Lower Threshold	80-99 % fn (85* % fn)
		S1 Pick-up Frequency	Upper Threshold	100.5-119.5 % fn (114* % fn)
			Lower Threshold	80.5...99.5 % fn (86* % fn)
	S2 Setpoints			
		S2 Drop-out Voltage	Upper Threshold	102-120 % Un (115* % Un)
			Lower Threshold	70-98 % Un (85* % Un)
		S2 Pick-up Voltage	Upper Threshold	101-119 % Un (114* % Un)
			Lower Threshold	71-99 % Un (86* % Un)
		S2 Drop-out Frequency	Upper Threshold	101-120 % fn (115* % fn)
			Lower Threshold	80-99 % fn (85* % fn)
		S2 Pick-up Frequency	Upper Threshold	100.5-119.5 % fn (114* % fn)
			Lower Threshold	80.5-99.5 % fn (86* % fn)
Generator Exercisers			Switch and generator functioning can be tested automatically and also periodically by using four independent exerciser events. Test on load function starts the generator and transfers the load to it. Test off load function only starts the generator for the duration of the event. Overlapping events are prioritized, event 1 has the highest priority.	
	Exerciser 1 / 2 / 3 / 4			
		Status	Disabled*	
			Non-periodic	
			Daily	
			Weekly	
			Bi-weekly	
			Monthly	
			Yearly	

Continued the next page

Parameters (continued) ***Default**

Parameter	Setting	Value / Description
Device Parameters (continued)		
Generator Exercisers (continued)		
Exerciser 1 / 2 / 3 / 4 (continued)		
	Function	No Function*
		Test on Load
		Test off load
	Duration (hh:mm:ss)	00:00:00-24:00:59 (00:01:00*)
	Time (hh:mm)	Starting time of the event: 00:00*-23:59
	Date (month day, year)	Starting date of the event Jan 01, 2000 (---*)
Application		
S1-Transformer/S2-Generator*		
S2-Transformer/S1-Generator		
2 Transformers/S1 Priority		
2 Transformers/S2 Priority		
2 Transformers/No Priority		
Manual Retransfer		
Off*		Automatic retransfer sequence enabled. Load is automatically retransferred to priority source upon the restoration of priority source.
On		Automatic retransfer sequence disabled. Load will be kept on non-priority source until operator manually (by HMI or manual handle) or remotely operates the load back to priority source. Load is also retransferred when the feature is set OFF.
Commit Transfer		
Off*		If priority source fails, device cancels the transfer sequence to non-priority source (generator) if priority source returns before non-priority source becomes acceptable.
On		If priority source fails, device continues transfer sequence to non-priority source (generator) even if priority returns before non-priority source becomes acceptable. Retransfer sequence according to time delays.
Transfer to Dead Source		
On*		User can transfer to an unavailable source by using HMI keys I/II or by a remote command.
Off		Transfer to an unavailable source is disabled.

Measurements			
Switch Diagnostics			
	Total operations	I-O-II switches: Total number of transfers I-O, O-II, II-O and O-I. I-II switches: Total number of transfers I-II and II-I.	
	Manual operations	Total transfers operated by the handle.	
	Number of load transfers	Total number of transfers I-II and II-I.	
	Transfer time	Time it took to transfer the load between sources (ms).	
	Source fail transfers	Total number of automatic transfers due to source failures.	
	Days energized		
	Total time on S1	Hours	
	Total time on S2	Hours	
	Time S1 available	Minutes	
	Time S2 available	Minutes	
	Last generator start	MMM DD, YYYY hh:mm:ss	
	Generator starting time	How long it took for the generator to become acceptable after latest start (s).	
	In-phase time	How long it took for the in-phase monitor to achieve synchronized transfer (s).	
Event Log		250 time stamped events, latest first.	
Harmonics		Harmonic components up to 15th are calculated for the selected phase.	
	Measured Phase	Disabled*	
		Phase 1	
		Phase 2	
		Phase 3	
	Voltage	Total distortion	THD for each phase of both voltage sources.
		S1 Components	Each harmonic component of the selected S1 phase.
		S2 Components	Each harmonic component of the selected S2 phase.
Power Factor		Enabled only when current measurement module is connected.	

Settings			*Default
Standard I/O Settings			
I01/I02/I03			
	Function	No function	Input disabled.
		Emergency Stop* (default in I 01)	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
		Remote Test On Load* (default in I 02)	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
		Remote Test Off Load* (default in I 03)	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
		Inhibit AUTO Mode	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
		Manual Retransfer	Disables automatic transfer back to priority source.
		Source Priority S1	Sets priority for source 1 in transformer-transformer application.
		Source Priority S2	Sets priority for source 2 in transformer-transformer application.
		Inhibit Transfer	Disables automatic transfer from priority source to non-priority source.
		Bypass Running Time Delays	Bypass any currently running time delay
		Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
		Remote Control to OFF	Transfer to O position when active.
		Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
		Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure)
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
	Contact type	NC	Active open.
		NO*	Active closed.
O 01			
	Function	No Function	Output disabled.
		Alarm / Product availability*	Signals any active alarms or ATS being disabled for automatic transfer operations.
		Load Connected to S1	Switch in position I.
		Load Disconnected	Switch in position O.
		Load Connected to S2	Switch in position II.

Continued the next page

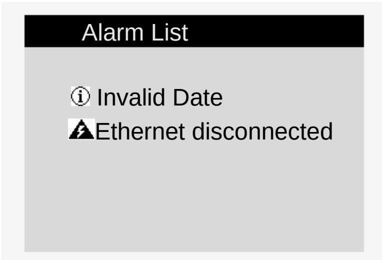
Settings		*Default
Standard I/O Settings (continued)		
O 01 (continued)		
Function (continued)		
	Pre-transfer Signal	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
	Source 1 Available	No anomalies in S1 voltage supply.
	Source 2 Available	No anomalies in S2 voltage supply.
	Load Shed 1	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
	Elevator pre-signal	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
Contact type	NC	Active open.
	NO*	Active closed.
Modules (See Chapter 5, Electronic accessories)		
System		
RESET to Factory Setting		Restore default parameter values.
Date[1)]		Month day, year
Time[1)]		Hours:Minutes
Language		
	English*	
	Italian	
	French	
	German	
	Spanish	
	Russian	
	Chinese	
New Password		Five digits
Temperature Unit		
	Celsius*	
	Fahrenheit	
Clock Format	24 h*	
	12 h	
Display Contrast	10 - 100% (30 %*)	

[1] RTC capacitor must be charged before inserting Date/Time. RTC capacitor is charged from source voltage (not AUX) and takes about 10 minutes. RTC capacitor keeps the date/time saved for 48 h in case of no source voltage available.

Test			*Default
On-Load Test Settings			
	Bypass Local Test		
		Bypass if Gen. fails*.	
		Stay on Gen.	
	Bypass Remote Test		
		Bypass if Gen. fails*.	
		Stay on Gen.	
Test On Load		Test generator with transferring the load. Test with switch transfer.	
Test off Load		Test generator without transferring the load. Test without switch transfer.	
HMI Test		Initiate display test screen and turn all LEDs on.	
Optional modules (See Chapter 5, Electronic accessories)			

About	
HMI	HMI serial number
	Software version
	Software subversion
	HMI Type code
Controller Unit	Time
	Date
	Serial number
	Normative
	Controller software version
	Controller software subversion
Automatic Transfer Switch	TAG name
	ATS Type Code
	ATS serial number
	Rated current
	Number of poles
	ATS Type
Modules (See Chapter 5, Electronic accessories)	

4.3.1 Esc key



—
Fig. 4.7
By pressing Esc-key (1) in System Overview
-pages, the alarm list is shown.

Alarm list
More information, see chapter 6, Troubleshooting

5. Electronic accessories

Warning
Hazardous voltage may be present within the panel when connecting electronic accessories. Remove all sources of power to the ATS panel before connecting Ekip modules.

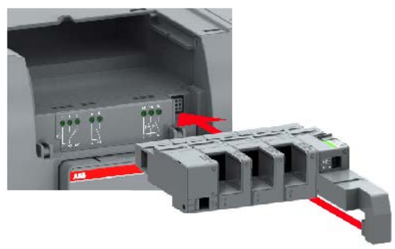
Ekip Connect Software and Bluetooth and Programming -modules are suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches, refer to chapters 5.1-5.3. for more details on:

- Ekip Connect -software
- Ekip Bluetooth -module
- Ekip Programming -module

Ekip Signaling and Com modules are suit-able for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches. These modules are mounted with auxiliary power supply module, OXEA1 (refer to Chapter 10.3 for further details).

Ekip-modules mounted with auxiliary power supply module are (see chapters 5.4-5.8):

- Ekip Signaling 2K-_
- Ekip Com modules
- Ekip Com Modbus RTU
- Ekip Com Profibus DP
- Ekip Com DeviceNet
- Ekip Com Modbus TCP
- Ekip Com Profinet
- Ekip Com EtherNet/IP
- Ekip Link



5.1 Using Ekip Connect - software

Ekip Connect is a free software for communication and testing of Cat automatic transfer switches. The software is compatible with CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

It can be installed on PCs equipped with the Micro-soft Windows® operating system. To download it, see the address below: http://www.abb.com/abblibrary/DownloadCenter/

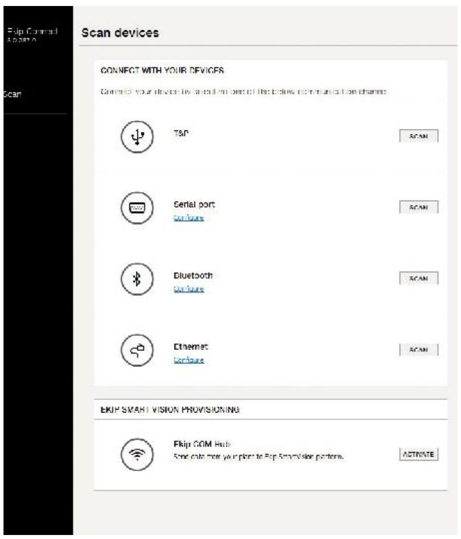


Fig. 5.3 Ekip Connect -software

With its communication function, it allows you to:

- Monitor the state of the automatic transfer switches connected and record information.
- Configure the automatic transfer switches with customized parameters.
- Configure the electronic accessories, connected to the automatic transfer switch via Local Bus.
- Create communication reports.
- Reset configurations.

Further information on the Ekip Connect application is available from the web site, see the address below, particularly the manual 1SDH000891R0002.

5.2 Using Ekip Bluetooth module

The Ekip Bluetooth module allows connection via Bluetooth between the automatic transfer switch and a support device (PC, tablet, or smart phone) with the Ekip Connect software installed. Ekip Bluetooth module is suitable to use with all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

The Ekip Bluetooth module draws its power from a rechargeable lithium-polymer battery supplied with the unit. It is connected directly to the programming port (see Fig. 5.6) powers the controller without the need for auxiliary voltage supply. The programming port is only compatible for use with Ekip Bluetooth and Ekip Programming modules.

Notice
Ekip Bluetooth only powers the main controller board (HMI and external modules excluded). Therefore, in order to identify all connected parts with Ekip Connect, the auxiliary power supply module, type OXEA1, must be used (see chapter 5.4).

Fig. 5.4 Ekip Bluetooth-module

5.2.1 LED indications

Ekip Bluetooth -module is switched on by pressing the power button on the side, and is equipped with two LEDs:

- The first LED illuminates in green with the device on and the battery charge, red with the device turned on and low battery.
- The second LED flashes blue with active Bluetooth communication.

5.3 Using Ekip Programming module

The Ekip Programming module is suit-able to use with all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches. You can connect the module via the programming port, see Fig. 5.6. The programming port is only compatible for use with Ekip Programming and Ekip Bluetooth -modules.

Ekip Programming module allows you to:

- With Ekip Connect software update the software and load, set and read the parameters

The Ekip Programming-module
draws its power from the PC and connects one side directly to the programming port (see Fig. 5.6) and on the other to the USB port of the PC with the cable supplied.

Notice
Ekip Programming only powers the controller board (HMI and external modules excluded) . Therefore, in order to identify all connected parts with Ekip Connect, the auxiliary power supply module, type OXEA1, must be used (see chapter 5.4).

5.3.1 LED indications

Ekip Programming -module turns on after connecting to the PC, and is equipped with two LEDs. The first, illuminates green indicating that the module is on, and the second, illuminates yellow indicating active communication.

Fig. 5.5 Ekip Programming -module

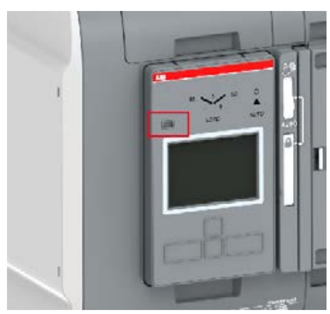


Fig. 5.6 Programming port (USB port) is situated in the front of the HMI, on left side

5.4 Auxiliary power supply module

When connected to a 12-24 Vdc source, the auxiliary power supply module, type OXEA1, supplies power to the external Ekip-modules, HMI and main control unit. It is supplied by external supply, for example from generator battery or from isolated transformer connected to the main power circuit. Powering product only with Auxiliary power supply module limits some operation functions of the main control unit, for example: Operation of the main switch contacts is not possible Connections are push-in spring terminals, no tool is required.

For external wiring, cable cross section; AWG 22-16 / 0.5-1.5 mm_2.

5.4.1 Electrical characteristics

The following table lists the electrical characteristics of OXEA1:

Module	OXEA1
Power supply input voltage	12-24VDC±10%SELV
Nominal power consumption	5-12W
Inrush current	Maximum 2 A

—
Table 5.1 Electrical characteristics of auxiliary power supply module OXEA1

—
Fig. 5.7 Auxiliary power supply module, type OXEA1, is needed when Ekip Signaling, Com and Link -modules are mounted to automatic transfer switch OX_

5.4.2 LED indications

LED	Indication	Description
Power LED, green	On, fixed	Power is connected to the input of the module.
	Off	Power is not connected.

—
Table 5.2 Indication / auxiliary power supply module OXEA1

—
Fig. 5.8 Signals of auxiliary power supply module OXEA1

5.5 Using Ekip Signaling 2K-_ -module

The Ekip Signaling 2K-_ is a signaling accessory module. It is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches. The module has:

- Two digital inputs, and two contacts for output signals.
- A power status LED, and four signaling LEDs (one LED for every input/output).

Notice
On each ATS, a maximum of three Ekip Signal-ling 2K modules can be installed: one 2K-1, one 2K-2, and one 2K-3. These modules differ by their name and label, and have distinct wiring, but they are identical in terms of their characteristics and manner of installation.

Fig. 5.9   Ekip Signaling 2K -module

5.5.1 Electrical characteristics of Ekip Signaling 2K-_ -module

The following table lists the electrical characteristics of the module:

Component	Characteristics
Output contacts	Maximum switching voltage*: 150VDC/250VAC
	Breaking power*: 2 A @ 30 V DC, 0.8A@50VDC,0.2A@150V DC,4A@250VAC
	Dielectric strength between each contact and coil: 1000 V AC (1 minute @ 50 Hz)
	Dielectric strength between open contacts: 1000 V AC (1 minute @ 50 Hz)
Input contacts	5 V@2.5 mA Do not connect to any power supply

*Data relating to a resistive load

Table 5.3   Electrical characteristics of Ekip Signaling 2K-_ -module

5.5.2 Access from the display / Ekip Signaling 2K-_ -module

With modules energized, and Local Bus enabled, the presence of the modules on the module slot activates additional menus on the display:

- In order to configure the inputs and out-put contacts.
- To display information on the modules and the state of inputs and outputs.

The following table illustrates the path for accessing the configuration parameters of the module from the display:

Settings (*Default)			Description
Modules (Optional modules)			
Ekip Signaling 2K-1 / -2 / -3			
I 11/12, I 21/22, I 31/32			
Function		No Function*	Input disabled
		Emergency Stop	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
		Remote Test on Load	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
		Remote Test off Load	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
		Inhibit AUTO Mode	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
		Manual Retransfer	Disables automatic transfer back to priority source.
		Source Priority S1	Sets priority for source 1 in transformer-transformer application.
		Source Priority S2	Sets priority for source 2 in transformer-transformer application.
		Inhibit Transfer	Disables automatic transfer from priority source to non-priority source.
		Bypass Running Time Delays	Bypass any currently running time delay.
		Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
		Remote Control to OFF	Transfer to position O when active.
		Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
		Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
Contact Type		NC	Active open
		NO*	Active closed
O 11/12, O 21/22, O 31/32			
Function		No Function*	Output disabled
		Alarm/Product Availability	Signals any active alarms or ATS being disabled for automatic transfer operations.
		Load Connected to S1	Switch in position I.
		Load Disconnected	Switch in position O.
		Load Connected to S2	Switch in position II.
		Pre-transfer Signal	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.

Continued on the next page

Settings (*Default) (continued)		Description
Modules (Optional modules) (continued)		
Ekip Signaling 2K-1 / -2 / -3 (continued)		
O 11/12, O 21/22, O 31/32 (continued)		
Function (continued)		
	Source 1 Available	No anomalies in S1 voltage supply.
	Source 2 Available	No anomalies in S2 voltage supply.
	Load Shed 1	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
	Elevator pre-signal	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
Contact Type	NC	Active open
	NO*	Active closed

Test	
:	
Modules (Optional modules)	
Ekip Signaling 2K-1 / -2 / -3	Auto Test
:	

—
Table 5.4 Configuration and test parameters of Ekip Signaling 2K-_ -module in HMI

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Signaling 2K-1 / -2 / -3		
	SN	Serial number
	Version	Software version
	Input 1	The logical state of the inputs: “Off” if not active, “On” if active
	Input 2	
	Output 1	The state of the output contacts: “Open” if open, “Closed” if closed
	Output 2	
:		

—
Table 5.5 Information of Ekip Signaling 2K-_ -module in HMI

5.5.3 LED indications and inputs/ outputs of Ekip Signaling 2K-_ -module

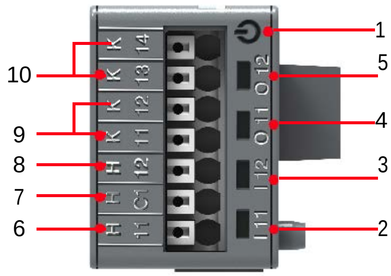


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Fig. 5.10 Signals and inputs/outputs of Ekip Signaling 2K-_ -module

1 Power LED, green. The possible states are:
– Off: power supply absent.
– On fixed: power supply and communication with the device present.
– On, with two quick flashes per second (not synchronized with those of the green LED on the device): power supply present, and communication with device absent (for example: for Local Bus disabled) [1]

2 Green[3] LED for Signaling the physical state of the input H x I[2]. The possible states are:
– Off: floating input
– On fixed: input short-circuited on H Cx[2]

3 Green[3] LED for Signaling the physical state of the input H x2[2]. The possible states are:
-- Off: floating input
-- On fixed: input short-circuited on H Cx

4 Green[3] LED for Signaling contact K x1 - K x2[2]. The possible states are:
– Off: contact open
– On fixed: contact closed

5 Green[3] LED for Signaling the state of the contact K x3 - K x4[2]. The possible states are:
– Off: contact open
– On fixed: contact closed

6 Input I x1

7 Conductive part of the inputs H x1 and H x2[2]

8 Input I x2[2]

9 Output contact pin O x1[2]

10 Output contact pin O x2[2]

1) The absence of communication is signaled immediately by the power LED, unlike the outputs which (apart from those programmed to be activated in the case of disconnection) are deactivated if the condition persists for at least 8 s
2) With x = 1, 2, or 3
3) The LED turns on and off according to the physical state of the input, without taking any account of how the Delay parameter is set.

For external wiring, cable cross section; AWG 22-16 / 0.5-1.5 mm^2.

5.6 Using Ekip Com _ -modules

Suitable Ekip Com_ -modules are:

- Ekip Com Modbus RTU
- Ekip Com Profibus DP
- Ekip Com DeviceNet
- Ekip Com Modbus TCP
- Ekip Com Profinet
- Ekip Com EtherNet/IP

Fig. 5.11 Ekip Com Modbus RTU -module

5.6.1 Ekip Com Modbus RTU -module

The Ekip Com Modbus RTU is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

It can be connected to a RS-485 network with a Modbus RTU communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (e.g. open, closed).

For the communication lines W1 (A) and W2 (B), Belden type 3105 A or equivalent cables must be used.

5.6.1.1 LED indications

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
RX and TX LEDs, green	Off	Modbus RTU communication not active.
	On, flashing rapidly	Modbus RTU communication active.

—
Table 5.6 Indication / Ekip Com Modbus RTU -module

Fig. 5.12 Signals of Ekip Com Modbus RTU -module

5.6.1.2 Termination resistor

On the Ekip Com Modbus RTU module it is possible to activate the terminating resistance Rterm = 120 Ω. To enable the Rterm, the corresponding dip-switches 1 and 2 (on the side of the module) must be positioned to ON. This option must be selected before the installation of the module.

With the Ekip Com Modbus RTU modules, the dip switches 3 and 4 of the Rpol (polarization resistance), are not used.

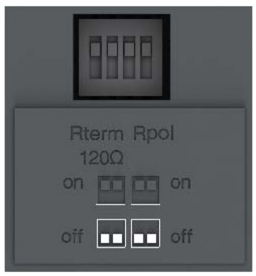


Fig. 5.13 Termination resistor; To enable the Rterm, the dip-switches 1 and 2 must be positioned to ON. This option must be selected before the installation of the module

5.6.1.3 Access from the display

/**Ekip Com Modbus RTU –module**

With modules connected and energized the presence of the modules on the module slot activates additional menus on the display. The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)			**Description**
:			
Modules (Optional modules)			
Ekip Com Modbus RTU			
	Serial address	1-247, default 247*	Address to be assigned to the modules. NOTE: devices connected to the same network must have different addresses
	Baudrate	9600 bit/s, 19200 bit/s*, 38400 bit/s	Data transmission speed
	Physical protocol	8.E,1*, 8.O,1, 8.N,2, 8.N,1	8.E,1 = 8 data bits, 1 EVEN parity bit, 1 STOP bit
			8.O,1 = 8 data bits, 1 ODD parity bit, 1 STOP bit
			8.N,2 = 8 data bits, no parity bit, 2 STOP bits
			8.N,1 = 8 data bits, no parity bit, 1 STOP bit
:			

—
Table 5.7 The path for accessing the configuration parameters of the Ekip Com Modbus RTU -module from the display

The following table illustrates the path from the display for accessing information on the module:

About		**Description**
:		
Modules (Optional modules)		
Ekip Com Modbus RTU		
	SN	Serial number
	Version	Software version
:		

—
Table 5.8 Information of Ekip Com Modbus RTU -module in HMI

5.6.2 Ekip Com Profibus DP -module

The Ekip Com Profibus DB is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches

It can be connected to a network RS-485 of Profibus communication protocol, and allows:

- Connecting the automatic transfer switch as a slave to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (e.g. open, closed).

For the communication lines W5 (B) and W6 (A), Belden type 3079A or equivalent cables must be used.

Fig. 5.14 Ekip Com Profibus DP -module

5.6.2.1 LED indications

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with one flash per second	Power supply and communication with device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
RX LED, green	Off	Communication not active.
	On, fixed	Communication active.
TX LED, green	Off	Communication not active.
	On, flashing	Communication active.

—
Table 5.9 Indication / Ekip Com Profibus DP -module

5.6.2.2 Termination resistor

The Ekip Com Profibus DP modules pro-vide the possibility to insert a 220 Ω termination resistor on the RS-485 bus, by setting the DIP-switches Rterm (1 and 2) on the side of the modules, in position ON. In the event of termination of the bus, a 390 Ω pull-up or pull-down resistor must also be inserted on the lines, by setting the DIP-switches Rpol (3 and 4), in position ON.

These options must be selected before installation of the modules.

—
Fig. 5.15   Signals of Ekip Com Profibus DB -module

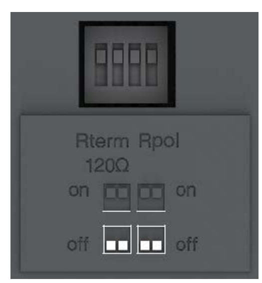


Fig. 5.16   Termination resistor; To enable the Rterm, the dip-switches 1 and 2 must be positioned to ON. When Rterm is activated, the Rpol must also be activated by turning dip-switches 3 and 4 to ON-position.

5.6.2.3 Access from the display / Ekip Com Profibus DB -module

With modules connected and energized, the presence of the modules on the module slot activates additional menus on the display.

The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)		Description
:		
Modules (Optional modules)		
Ekip Com Profibus DB		
Serial address	1-125, default 125*	Address to be assigned to the modules.
IMPORTANT: devices connected to the same network must have different addresses		

—
Table 5.10 Configuration of Ekip Com Profibus DB -module in HMI

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Com Profibus DB -module		
	SN	Serial number
	Version	Software version
:		

—
Table 5.11 Information of Ekip Com Profibus DB -module in HMI

5.6.3 Ekip Com DeviceNet -module

The Ekip Com DeviceNet –module is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

It can be connected to a CAN network with a DeviceNet™ communication proto-col, and allows you to:

- Connect the automatic transfer switch as a slave to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (e.g. open, closed).

For the communication lines, Belden type 3084A or equivalent cables must be used.

Fig. 5.17 Ekip Com DeviceNet -module

5.6.3.1 LED indications

The following table illustrates the possible signals, and their meaning:

1) The device has not yet sent Duplicate ID sequence on line.

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Network LED, red	Off	Device off line (with red LED off) 1), or in error conditions (with red LED on).
	On, fixed	Device on line, and allocated on a master (operating condition).
	On, flashing	Device on line, but not allocated on a master (device ready for communication).
Status LED, green	Off	No error.
	On, fixed	Device in bus off, or Network Power absent condition.
	On, flashing	I/O connection (cyclic data) in timeout.

2) The device has not yet sent Duplicate ID sequence on line.

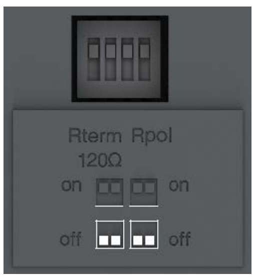
—
Table 5.12 Indication / Ekip Com DeviceNet -module in HMI

—
Fig. 5.18 Signals of Ekip Com DeviceNet -module

5.6.3.2 Termination resistor

The modules provide the possibility to insert a 120 Ω termination resistor on the CAN bus, by setting the DIP-switches Rterm (1 and 2) on the side of the modules, in position ON. This option must be selected before the installation of the modules. With the Ekip Com DeviceNet - modules, the dip switches 3 and 4 of the Rpol (polarization resistance), are not used.

Notice
The termination resistors must never be included in the nodes. The inclusion of this capability could easily lead to a network with improper termination (impedance too high or too low), potentially causing a failure. For ex-ample the removal of a node, which includes a termination resistor, could result in a network failure. The termination resistors must not be installed at the end of a branch (drop line), only at the two ends of the main backbone (trunk line).



—
Fig. 5.19 Termination resistor; To enable the Rterm,
the dipswitches 1 and 2 must be positioned to ON.
This option must be selected before the installation of the module.

5.6.3.3 Access from the display / Ekip Com DeviceNet –module

With modules connected and energized, the presence of the modules on the module slot activates additional menus on the display.

The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)			Description
:			
Modules (Optional modules)			
	Ekip Com DeviceNet		
	MAC address	1-63, default 63*	Address to be assigned to the modules. IMPORTANT: devices connected to the same network must have different addresses
	Baudrate	125 kbit/s, 250 kbit/s*, 500 kbit/s	Data transmission speed
:			

—
Table 5.13 The path for accessing the configuration parameters of the Ekip Com DeviceNet -module from the display

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Com DeviceNet		
	SN	Serial number
	Version	Software version
:		

—
Table 5.14 Information of Ekip Com DeviceNet -module in HMI

5.6.4 Ekip Com Modbus TCP -module

Ekip Com Modbus TCP is an accessory module that can function as a communication module integrating the automatic transfer switch in an industrial remote supervision and control network or as an HTTP Server. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

As a communication module, it can be connected to an Ethernet network with the Modbus TCP communication, and allows:

- Connecting the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (e.g. open, closed).

As an HTTP Server, connected to an Ether-net network it allows read-only access to the information of the automatic transfer switch. This access is possible through a browser, inserting the IP address of the module as the URL. Once the switch has been found, a login page is opened that asks for the user password to be inserted, which is the same password to be inserted in the display in order to edit parameters.

Notice

Since the module allows access to the data contained in the automatic transfer switch, it can only be connected to networks that meet all the necessary requirements for safety and prevention of unauthorized access (for example, the network of the control system of an installation). It is the installer's responsibility to ensure that all the necessary safety measures are adopted (for example, firewalls, etc) . The module cannot be connected directly to the Internet. It is recommended to connect it only to dedicated Ethernet net-works, with the Modbus TCP communication protocol.

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).

—
Fig. 5.20 Ekip Com Modbus TCP -module

The following table illustrates the ports used by the module:

Port	Service	Notes
502/tcp	Modbus TCP	When the module is used as a Modbus TCP/IP communication module.
80/tcp	Server HTTP	When the module is used as a Server HTTP.
319/udp	IEEE 1588	When IEEE protocol 1588 is enabled
320/udp		

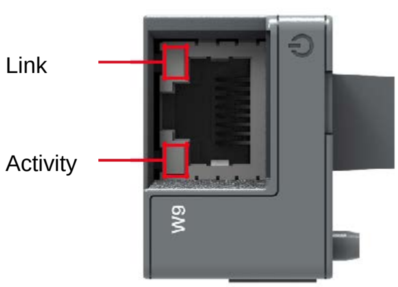
—
Table 5.15 Ports of Ekip Com Modbus TCP -module

5.6.4.1 LED indications

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission).

—
Table 5.16 Indication / Ekip Com Modbus TCP -module



—
Fig. 5.21 Signals of Ekip Com Modbus TCP -module

5.6.4.2 Access from the display / Ekip Com Modbus TCP –module

With modules connected and energized, the presence of the modules on the module slot activates additional menus on the display:

- For setting the function and addressing of the modules.
- In order to display information on the modules.

The following table illustrates the path from the display, for setting the function and addressing of the modules:

Settings (* Default value)			Description
:			
Modules (Optional modules)			
Ekip Com Modbus TCP			
	Function	HTTP Server	HTTP Server operating mode.
		TCPModbus*	Communication module operating mode.
	Force Static IP address	Off*	Dynamic IP address.
		On	Static IP address.
	Static IP Address		Displayed with static IP Address enabled, it must be selected in order to insert the IP Address of the modules.
	Static Network Mask		Displayed with static IP Address enabled, it must be selected in order to insert the subnet mask of the modules.
	Static Gateway addr		Displayed with static IP Address enabled, it must be selected in the presence of multiple subnets, in order to insert the IP Address of the node to which the modules are connected.
:			

—
Table 5.17 The path for setting the function and addressing of the modules of the Ekip Com Modbus TCP - module from the display

The following table illustrates the path
from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Com Modbus TCP		
	SN	Serial number
	Version	Software version
	IP Address	This is the address assigned to the modules at the moment of connection to the network. It consists of four bytes (for a total of 32 bits), each of which can have value from 0 to 255. By default, allocation is dynamic. With dynamic allocation, the modules wait to receive the IP address from a DHCP server. Without a DHCP server, the modules adopt an Autoconfiguration IP Address in the range 169.254.xxx.xxx, calculated in a pseudo random manner so as to be the same at every switch-on. Alternatively, you can enable the static IP address option, which allows the IP address to be forced. In this case, you must make sure that the IP Address inserted is different to that of the other devices connected to the same network.
	Network Mask	This is the subnet mask, and identifies the method to recognize the subnet to which the modules belong, with the possibility of searching for the modules within a defined set of recipients. If you enabled the option Static IP Address, you must also enter the correct Network Mask.
	Gateway Address	The IP address of the node to which the module it is connected, in the presence of multiple subnets. If you enabled the Static IP Address option, you must also enter the correct Gateway Address.
	TCP Client	There are three IP Addresses of the client devices connected to the modules.
	MAC Address	It is the address assigned by ABB, having a OUI equal to ac:d3:64[1].
:		

1) Organizationally Unique Identifier, formed from the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device.

—
Table 5.18 Information of Ekip Com Modbus TCP -module in HMI

5.6.5 Ekip Com Profinet -module

The Ekip Com Profinet is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

Notice
The module can only be connected to net-works that meet all the necessary requirements for safety and prevention of unauthorized access (for example, the network of the control system of an installation). It is the in-staller's responsibility to ensure that all the necessary safety measures are adopted (for example, firewalls, and so on). It is recommended to connect it only to dedicated Ether-net networks, with the Profinet communication protocol. The module cannot be connected to the Internet.

It can be connected to an Ethernet network with a Profinet communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (e.g. open, closed).

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat. 6 with S/FTP double shielding).

Fig. 5.22 Ekip Com Profinet -module

The following table illustrates the ports used by the module:

Ethertype	Port	Service	Notes
0x88CC	-	LLDP	Link Layer Discovery Protocol
0x8892 (Profinet)	-	Profinet IO	Specific for real time communications (RT)
0x0800	34964/udp	Profinet-cm (Context Manager)	DCE/RP

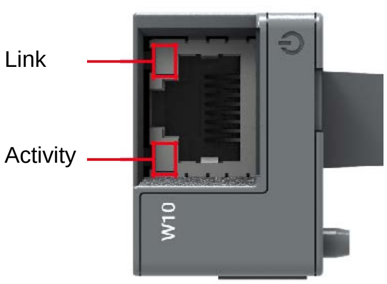
—
Table 5.19 Ports of Ekip Com Profinet –module

5.6.5.1 LED indications

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission.

—
Table 5.20 Indication / Ekip Com Profinet -module



—
Fig. 5.23 Signals of Ekip Com Profinet -module

5.6.5.2 Access from the display / Ekip Com Profinet -module

The following table illustrates the path from the display for accessing information on the module:

About		
:		
Modules (Optional modules)		
Ekip Com Profinet -module		
	SN	Serial number
	Version	Software version
	MAC Address	It is the address assigned by ABB and with an OUI (Organizationally Unique Identifier, formed of the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device) equal to ac:d3:64.
:		

—
Table 5.21 Information of Ekip Com Profinet -module

5.6.6 Ekip Com EtherNet/IP -module

The Ekip Com EtherNet/IP is an accessory module that can act as a communication module integrating the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for all CG(D) 30-1200 A, 200-480 Vac automatic transfer switches.

It can be connected to an Ethernet net-work with a EtherNet/IP™ -communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.

- Provide the status information of the automatic transfer switch (e.g. open, closed)

Notice
Since this module allows the access to the data contained in the automatic transfer switch, it can only be connected to networks possessing all the necessary requirements for security and prevention of unauthorized access (for example, the network of the control system of an installation). It is responsibility of the installer to make sure that all the necessary security measures are adopted (for ex-ample firewalls and so on). The module cannot be connected directly to the Internet. It is recommended to connect it only to dedicated Ethernet networks using the EtherNet/IP™ -c

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).

The following table illustrates the ports used by the module:

Port	Protocol	Notes
44818	TCP	Encapsulation Protocol (example: List Identity, UCMM, CIP Transport Class 3)
44818	UDP	Encapsulation Protocol (example: List Identity)
2222	UDP	CIP Transport Class 0 or 1

—

Table 5.22 Ports of Ekip Com EtherNet/IP -module

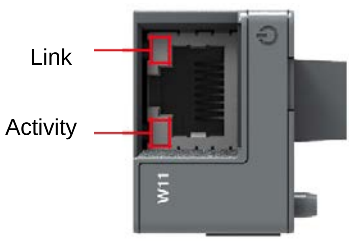
—
Fig. 5.24 Ekip Com EtherNet/IP -module

5.6.6.1 LED indications

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission).

—
Table 5.23 Indication / Ekip Com EtherNet/IP -module



—
Fig. 5.25 Signals of Ekip Com EtherNet/IP -module

5.6.6.2 Access from the display / Ekip Com EtherNet/IP

With modules connected and energized,
the presence of the modules on the module slot activates additional menus on the display:

- To set the addressing of the modules.
- In order to display information on the modules.

The following table illustrates the path from the display, for setting the function and addressing of the modules:

Settings (*Default value)			Description
:			
Modules (Optional modules)			
Ekip Com EtherNet/IP			
	Force Static IP address	Off*	Dynamic IP address.
		On	Static IP address.
	Static IP Address		Displayed with static IP Address enabled, it must be selected in order to insert the IP Address of the modules.
	Static Network Mask		Displayed with static IP Address enabled, it must be selected in order to insert the subnet mask of the modules.
	Static Gateway addr		Displayed with static IP Address enabled, it must be selected in the presence of multiple subnets, in order to insert the IP Address of the node to which the modules are connected.
:			

—
Table 5.24 The path for setting the function and addressing of the modules of the Ekip Com Ethernet/IP - module from the display

The following table illustrates the path
from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Com EtherNet/IP		
	SN	Serial number
	Version	Software version
	IP Address	This is the address assigned to the modules at the moment of connection to the network. It consists of four bytes (for a total of 32 bits), each of which can have value from 0 to 255. By default, allocation is dynamic. With dynamic allocation, the modules wait to receive the IP address from a DHCP server. Without a DHCP server, the modules adopt an Autoconfiguration IP Address in the range 169.254.xxx.xxx, calculated in a pseudo random manner so as to be the same at every switch-on. Alternatively, you can enable the static IP address option, which allows the IP address to be forced. In this case, you must make sure that the IP Address inserted is different to that of the other devices connected to the same network.
	Network Mask	This is the subnet mask, and identifies the method to recognize the subnet to which the modules belong, with the possibility of searching for the modules within a defined set of recipients. If you enabled the option Static IP Address, you must also enter the correct Network Mask.
	Gateway Address	The IP address of the node to which the module it is connected, in the presence of multiple subnets. If you enabled the Static IP Address option, you must also enter the correct Gateway Address.
	TCP Client	There are three IP Addresses of the client devices connected to the modules.
	MAC Address	It is the address assigned by ABB, having a OUI equal to ac:d3:64[1].
:		

1) Organizationally Unique Identifier, formed from the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device.

—
Table 5.25 Information of Ekip Com EtherNet/IP -module in HMI

6. Troubleshooting

Warning
Any troubleshooting should be conducted by trained and authorized personnel only. Appropriate personal protective equipment (PPE) shall be used when troubleshooting the ATS panel. Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS panel. Failure to do so may result in serious injury or death.

6.1 Alarms

LCD Touch

Message	Fault	Action
Locked, Alarm LED on	Lock input activated	Unlock
Switch not in AUTO mode, Alarm LED on	Slide switch is in handle or lock position	Turn slide switch into the AUTO position
Phases crossed	Phase rotation of sources 1 and 2 are different	Connect the phases of both sources in the same order
S1 undervoltage	Voltage of source 1 is under the threshold level set in parameter “Dropout voltage, lower threshold“	Check the correlation between power source and device configuration
S1 overvoltage	Voltage of source 1 is over the threshold level set in parameter “Dropout voltage, upper threshold“	Check the correlation between power source and device configuration
S1 phase missing	One or two phases of source 1 are missing	Check the power source and connections
S1 unbalance	Phases of source 1 are not symmetric	Check the power source
S1 phase rotation	Phase rotation of source 1 is different from the value of parameter “Phase sequence“	Connect the phases according to the configuration
S1 invalid frequency	Frequency of source 1 is out of range set in parameters “Drop-out frequency, upper threshold“ and “Drop-out frequency, lower threshold“	Check the correlation between power source and device configuration
S2 undervoltage	Voltage of source 2 is under the threshold level set in parameter “Dropout voltage, lower threshold“	Check the correlation between power source and device configuration

Table 6.1 Alarms-list in level 3 and 4, LCD and touch control interfaces

Message	Fault	Action
S2 overvoltage	Voltage of source 2 is over the threshold level set in parameter “Dropout voltage, upper threshold“	Check the correlation between power source and device configuration
S2 phase missing	One or two phases of source 2 are missing	Check the power source and connections
S2 unbalance	Phases of source 2 are not symmetric	Check the power source
S2 phase rotation	Phase rotation of source 2 is different from the value of parameter “Phase sequence“	Connect the phases according to the configuration
Frequency Difference	Frequency difference of voltage sources is greater than 3 Hz while In-phase monitor is on	Alarm is active and transfer operations disabled as long as the frequency difference is above the accepted level
S2 invalid frequency	Frequency of source 2 is out of range set in parameters “Drop-out frequency, upper threshold“ and “Drop-out frequency, lower threshold“	Check the correlation between power source and device configuration
Open I failure, Alarm LED blinking	Switch transfer from position I to O or II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Close I failure, Alarm LED blinking	Switch transfer to position I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Open II failure, Alarm LED blinking	Switch transfer from position II to O or I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Close II failure, Alarm LED blinking	Switch transfer to position II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Switch position alarm, Alarm LED on	More than one switch position indication inputs are activated	Switch service needed
Pole temperature alarm	Measured pole temperature is too high	Switch service needed
Local bus	Communication between HMI and switch controller is off	Check connection
Ethernet disconnected	Ethernet module not connected	Check connection
Fire Fighting	Fire fighting input activated	Alarm is active and disables transfer operations as long as the input is active
Control Voltage Failure	Control voltage dropped during switch control	Check power source
Control Voltage Low	Switch control voltage is below the minimum	Check power source
Configuration Error	Invalid configuration	Check parameter values
IEC 61850 Error	IEC 61850 failure	Check configuration file
Ekip Com Hub Alarm	Ekip Com Hub failure	Check configuration

Table 6.1 Alarms-list in level 3 and 4, LCD and touch control interfaces

6.2 Warnings

LCD Touch

Message	Reason
S1 and S2 not in sync	Voltage sources are not synchronized
Voltage Not Calibrated	Calibration data in power module is invalid or unavailable
Current Not Calibrated	Calibration data in current measurement module is invalid or unavailable
Control Retry	Failed transfer sequence retry activated
Auto Control Disabled	Device is in manual operating mode
Local Bus	Module heartbeat error
Configuration	Configuration session ports are open
RTC capacitor charging	Real time clock is not yet operational, date & time setting is disabled as long as this warning is active. RTC capacitor is charged from source voltage (not AUX) and takes about 10 minutes.

Table 6.2 Warnings-list in level 3 and 4, LCD and touch control interfaces

6.3 Information

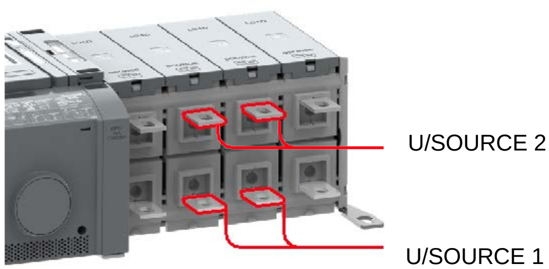
LCD Touch

Message	Description
Invalid Date	Date not set
Test on Load	Test on load sequence active
Test off Load	Test off load sequence active
Alarm/Product Availability	Digital output function activated
In Position I	Digital output function activated
In Position O	Digital output function activated
In Position II	Digital output function activated
Pre-transfer Signal	Digital output function activated
Source 1 Available	Digital output function activated
Source 2 Available	Digital output function activated
Load Shed	Digital output function activated
Emergency Stop	Digital input function activated
Remote Test on Load	Digital input function activated
Remote Test off Load	Digital input function activated
Inhibit Auto Mode	Digital input function activated
Manual Retransfer	Digital input function activated
Priority S1	Digital input function activated
Priority S2	Digital input function activated
Inhibit Transfer	Digital input function activated
Bypass Running Delays	Digital input function activated
Remote Control to S1	Digital input function activated
Remote Control to Off	Digital input function activated
Remote Control to S2	Digital input function activated
Alarm Reset	Digital input function activated
Manual-Auto Mode	Digital input function activated

Table 6.3 Info statements in level 3 and 4, LCD and touch control interfaces

7. Technical data

7.1 General technical data



Operating voltage for control circuit 200-480 Vac.
Generator supply; min. power rating 20 kVA

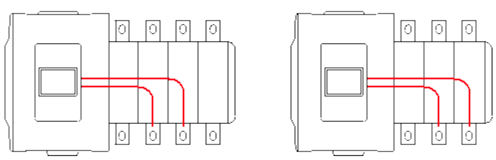
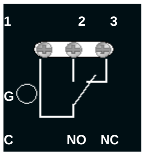
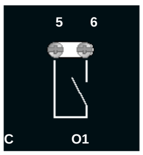
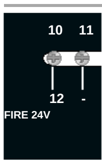
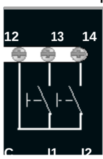


Fig. 7.1 Power supply for control and power switching circuits

Automatic transfer switch, power circuit	Value	
Rated operational voltage	200-480 Vac	
Rated frequency	50 / 60 Hz	
Rated impulse withstand voltage	12 / 8 kV	
Operating times	See Table 7.3	
Automatic transfer switch, control circuit	**Value**	**Remark**
Voltage supply	200-480 Vac	Integrated, see Fig. 7.1
Operating voltage range	±20 %	
Voltage measurement accuracy		
Rated frequency	50 / 60 Hz	
Operating frequency range	±20 %	
Frequency measurement accuracy		
Rated impulse withstand voltage	6 kV	

Automatic transfer switch, I/O contacts		**Cabling / Terminal**	**Rating / Remark**
Generator start/stop		24-14 AWG	Stripping length; 0.255"
	Common, voltage supply	1	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Generator start/stop NO	2	
	Generator start/stop NC	3	
Output relay features		24-14 AWG	
	Common, voltage supply	5	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Programmable output (default; Product available)	6	
Fire Fighting applications		24-14 AWG	Only in CGD-types, delayed transition, I – O – II
	Fire fighting input 24 Vdc (+)	10	SELV
	Fire fighting input 24 Vdc (-)	11	
Input contact features		24-14 AWG	Do not connect to any power supply
Common input		12	24 Vdc 5 mA
	Programmable input (default; Remote test on load)	13	
	Programmable input (default; Remote test off load)	14	Only in OXB_-types, delayed transition, I – O – II or II – O – I

AC15		**AC12**			**AC13**	
Ue/[V]	**Ie/[A]**	**Ue/[V]**	**Ie/[A]**	**P/[W]**	**Ie/[A]**	**P/[W]**
230	6	24	10	240	2	50
400	4	72	4	290	0.8	60
415	4	125	2	250	0.55	70
690	2	250	0.55	140	0.27	
		440	0.1	44		

—
Table 7.1 Technical data for auxiliary contacts according to IEC 60947-5-1, for OA1G_, OA3G_

Recommended Operating / Storage Temperature

Do not store the automatic transfer switch in corrosive environments above LC1 (sea salt mist) and G1 as per ANSI/ ISA-S71.04-1985. Failure to comply with these instructions may result in product damage. Store the automatic transfer switch and related accessories in a clean, dry location in their original packaging.

Environmental	Value
Environments category	E
EMC environment	Environment A
Operating temperature (without derating)	-20 - +40 °C
Operating temperature (with derating)	-25 - +70 °C
Transportation and storage temperature	-40 - +70 °C
Altitude (without derating)	Up to 2000 m

—

Table 7.2 General technical data of automatic transfer switch

Type	Voltage [Vac]	Nominal current* [A]	Operating time* = current duration I-0, 0-I, 0-II, II-0 [ms]	Operating transfer time[1, 2] AUTO mode I-II or II-I [ms]	Contact transfer time[1] I-II or II-I [ms]
CG 30 - 260A	200 - 480	37	-	< 500	< 50
CGD 30 - 260A	200 - 480	37	< 110	< 500	< 50
CG 400 - 600A	200 - 480	40	-	< 500	< 50
CGD 400 - 600A	200 - 480	40	< 130	< 500	< 50
CG 800 - 1200A	200 - 480	40	-	< 500	< 50
CGD 800 - 1200A	200 - 480	40	< 130	< 500	< 50

[1] Under nominal conditions
[2] Time from source fail detection to contact closing on already-available secondary source
[3] All times consider that all timers are set to "0"

—

Table 7.3 Specified technical data of operating times

7.2 Circuit diagrams

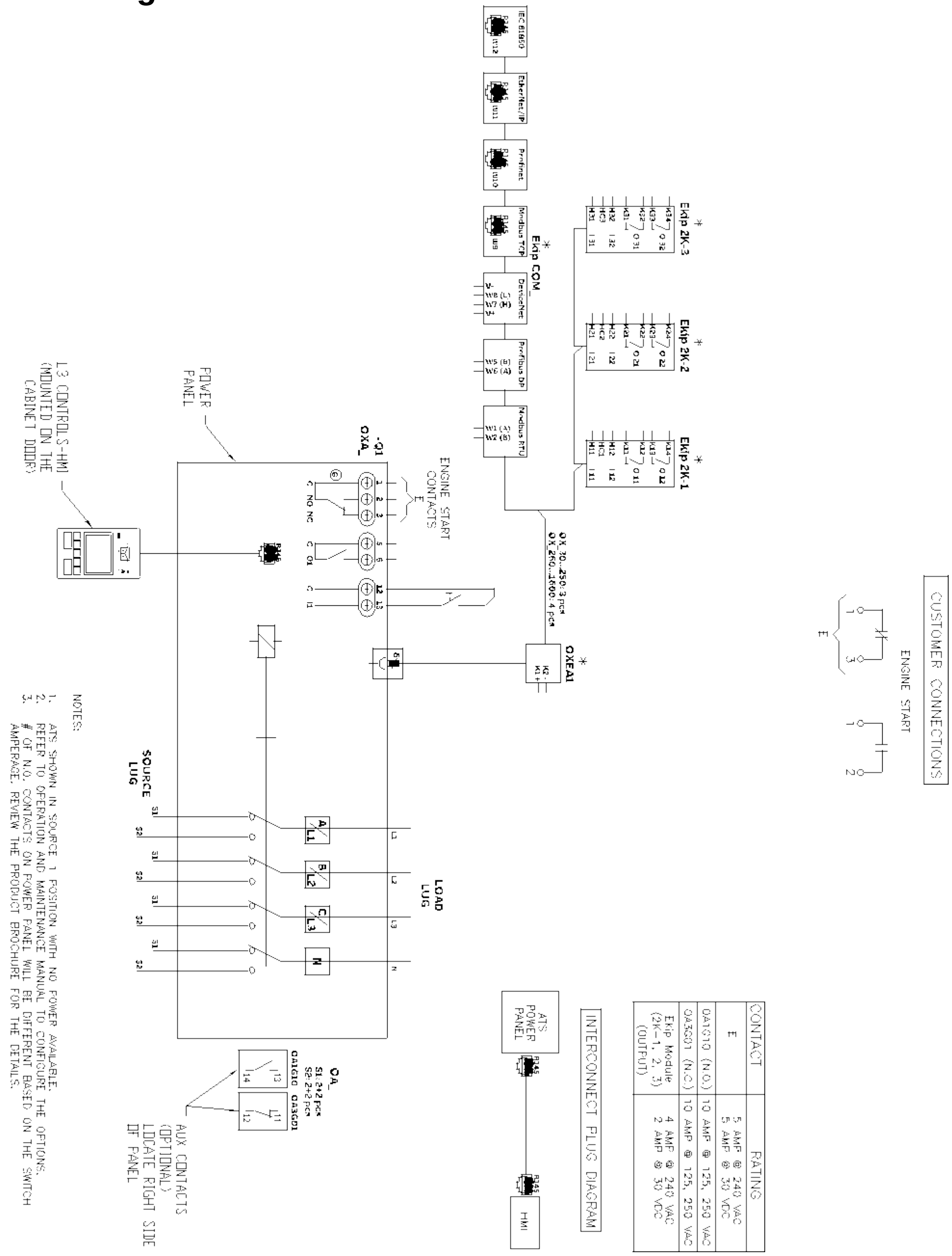
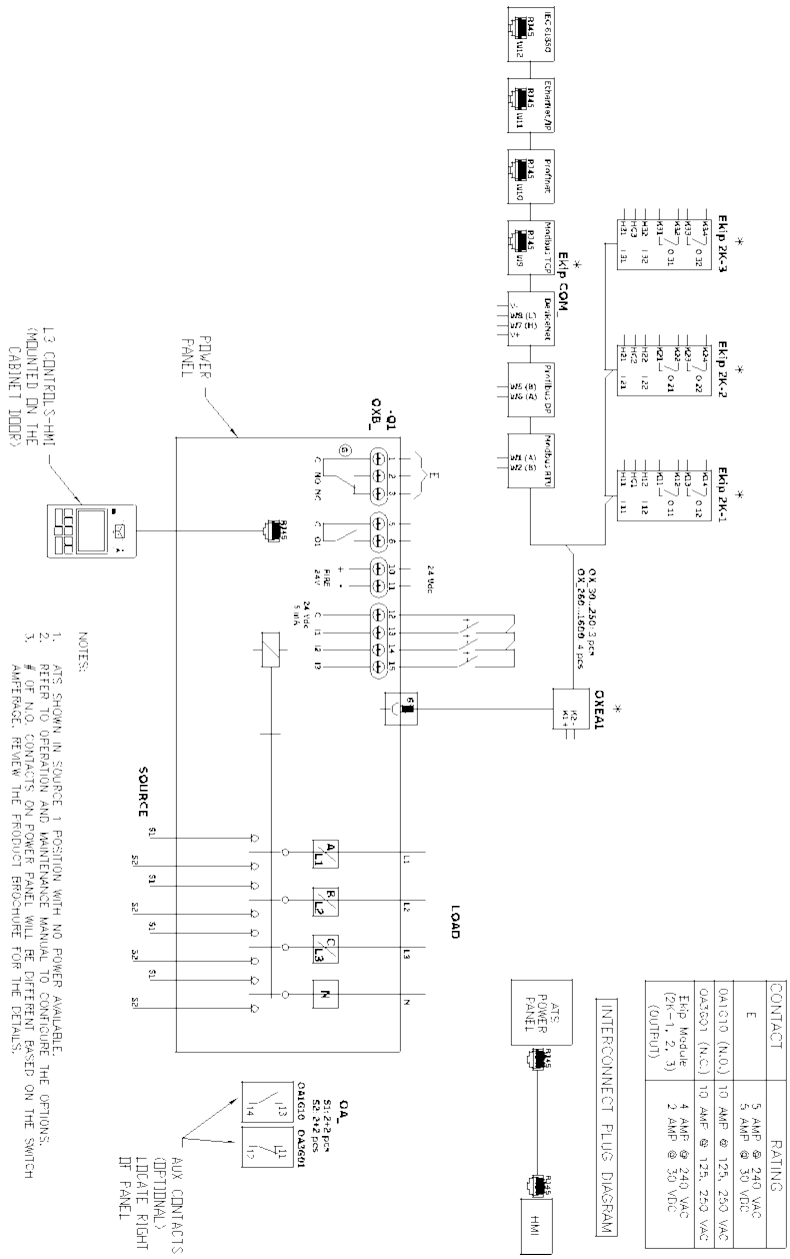


Fig. 7.2 CG, open transition circuit diagram



—
Fig. 7.3 CGD, delayed transition circuit diagram

7.3 Overall Dimensions

CG series dimensions and weights, UL Type 1 Enclosure

Model	ATS Rating (A)	Poles	Ref. Figure	Weight[1] lb (kg)	Dimensions[2] in (mm) Height	Width	Depth
CG CGD	30 - 200	2	A	89 (40)	32 (813)	24 (610)	12 (305)
		3	A	93 (42)	32 (813)	24 (610)	12 (305)
		4	A	98 (44)	32 (813)	24 (610)	12 (305)
	260	2	A	145 (66)	46 (1168)	24 (610)	14 (356)
		3	A	150 (68)	46 (1168)	24 (610)	14 (356)
		4	A	155 (70)	46 (1168)	24 (610)	14 (356)
	400	2	A	153 (69)	46 (1168)	24 (610)	14 (356)
		3	A	159 (72)	46 (1168)	24 (610)	14 (356)
		4	A	290 (131)	54 (1372)	28 (711)	19.5 (495)
	600	2	B	278 (126)	54 (1372)	28 (711)	19.5 (495)
		3	B	284 (129)	54 (1372)	28 (711)	19.5 (495)
		4	B	290 (131)	54 (1372)	28 (711)	19.5 (495)
	800 - 1200	3	C	482 (219)	74 (1880)	40 (1016)	19.5 (495)
		4	C	515 (234)	74 (1880)	40 (1016)	19.5 (495)

[1]Enclosures Type 3R, 12, 4, and 4X weights are up to 22% greater than Type 1 Enclosures.
[2]Enclosures Type 3R, 12, 4, and 4X dimensions differ. Consult Tech Support for details.
[3]All dimensions and weights are approximate and subject to change without notice.
[4]Packing materials must be added to weights shown. Allow 15% additional weight for cartons, skids, crates, etc.

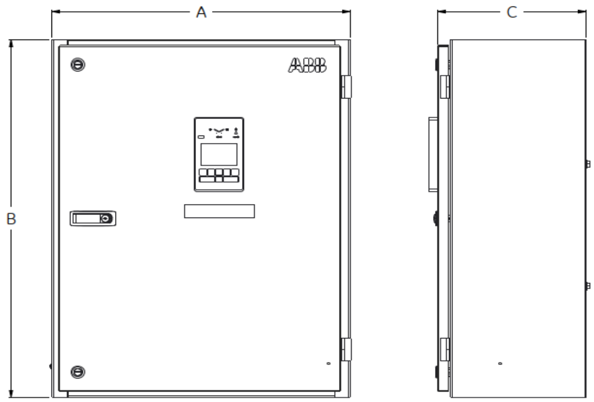


Figure A

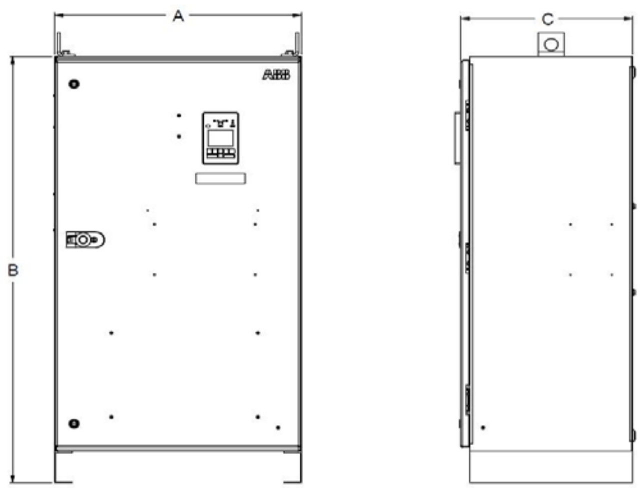


Figure B

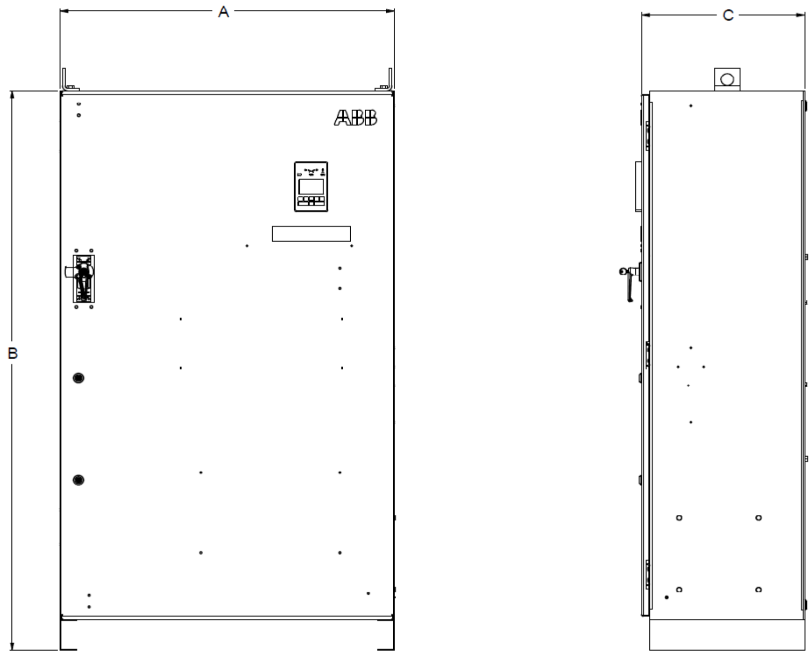


Figure C

8. Maintenance

Warning
Any maintenance should be conducted by trained and authorized personnel only. Appropriate personal protective equipment (PPE) shall be used when performing maintenance on the ATS panel.
Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS panel.
Failure to do so may result in serious injury or death.

Maintenance Principle

The Cat CG(D) series 30-1200 A, 200-480 Vac automatic transfer switches are designed so that the contacts last their designed lifetime without any routine maintenance needs. If there are abnormal conditions such as a fault or overload without adequate protection, or extreme environment conditions, a failure of ATS components may occur. Fortunately, all critical modules, including complete mechanism with electronics (controller, power module, and solenoid mechanism), HMI, and accessories are easily replaceable. Refer to Chapter 11 for replacement parts.

On the other hand, when the contacts have seen an event, or have met the end of their lifetime, the whole switch should be replaced – which can be done easily by replacing the complete TruONE power panel within the enclosure.

In the case you suspect a failure may be due to manufacturer defect and covered under warranty, see Chapter 1.3.

Installation instruction Automatic transfer switches

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9. Panel installation

Before mounting the product, please, check the product identification from the product identification label, which is located on the front panel under the control interface unit (HMI). This label indicates the product model (type number), some important technical data information, minimum enclosure size, suitable wire information, etc.

Notice

Final inspection of the equipment should be performed prior to energizing the automatic transfer.

Remove any dirt or debris that may have collected during shipment or installation. NEVER use compressed air. Doing so could drive dirt or other foreign objects into electrical or mechanical components, which could cause damage. Use an industrial-quality vacuum cleaner to remove any dirt or foreign objects.

Be certain all cable connections are correct and that the phase rotation of both sources match.

Inspect the engine start connections and verify the correct connection of all control wires.

Check all programmable set points and adjust as necessary. In addition, adjust any optional accessories as required.

Be certain that the actual lug torque values are in keeping with the requirements outlined in the instruction book to ensure the integrity of power connections.

Check to be sure that all covers and barriers are properly installed and fastened.

If any damage is found or suspected, file a claim as soon as possible with the carrier, and notify your Cat Dealer.

9.1 Basic Tools for Installation and Maintenance

Tool	Task
1/4" to 1/2" Allen head socket driver	Power cable connection
Torque wrench	Torqueing of the lugs and other hardware as required. Range of device to be 50 - 500 in-lbs (5-57 N-m)
Torque screwdriver	Torqueing of control wire terminations, auxiliary contact input terminals. 5 - 25 in-lbs (0.5 - 2.8 N-m)
Wire cutters/wire crimpers	Auxiliary contacts wire installation, Options installation
Voltmeter	Trouble shooting tool for measuring incoming voltage, frequency, continuity and control signal transmission.
Controller default password 00001	Changing parameters within the controller

—
Table 9.1 Required tools for common installation and maintenance tasks

9.2 Equipment Inspection and Storage

Warning
When performing a hi-pot or dielectric test on the power section of the ATS panel, DISCONNECT the complete electronics, controller, and mechanism section of the ATS from the power section to avoid potential damage to the electronics.

Once you have received the transfer switch, inspect it for any damage. This includes damage to the enclosure, power panel, control panel and wiring harness. If any damage is found or suspected, file a claim as soon as possible with the carrier and notify your Cat dealer representative.

Before installation, if it is necessary, store the transfer switch in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation.

See table 7.2 for recommended storage and ambient operating temperatures.

9.3 Lifting and Mounting the Panel

Lifting guidelines

Adequate lifting means must be used to mount the transfer switch into place. The recommended method for moving the ATS, up to 1200 A, is with lifting strap and lifting equipment rated for the equipment weight.

Danger

Hazardous Voltage can Cause Severe Injury or Death

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Lifting, Mounting and Installation

The safe operation of your switch is paramount to Caterpillar. Please recognize that hazardous voltages and currents can exist during normal operation, and any maintenance on the transfer switch must be performed utilizing appropriate safety measures. Installation, adjustment, maintenance or removal of the switch must only be carried out by qualified personnel and with all power to the switch turned off. It is recommended that only qualified electricians be allowed to install or provide maintenance on the switch.

Prior to installation, store the transfer switch in a clean dry location, protected from dirt and water. Provide ample air circulation and heat if necessary, to prevent condensation. See table 7.2 for recommended storage and ambient operating temperatures.

Cat automatic transfer switches are packaged as per the standard packaging regulatory standards requirement suitable for domestic and international shipment through all modes of transportation (air, sea and road). Once you unpack the units, please make sure all the components are received as per the BOM. For any missing items, contact your local Cat Dealer representative.

Warning

Due to hazardous voltages and currents, Caterpillar recommends that a certified technician or a qualified electrician perform the installation & maintenance of the switch.

Danger

Hazardous Voltage can Cause Severe Injury or Death

Automatic Transfer Switch Equipment must be electrically grounded. Failure to do so may result in malfunction of the switch and possible damage to surrounding equipment.

Warning

Before drilling conduit entry holes or any accessory mounting holes, cover and protect the switch and control panel to prevent dirt and metal fragments from entering the mechanical and electrical

9.4 Mounting the automatic transfer switch

9.4.1 Mounting hole dimensions

Fig. 9.1 Automatic transfer switches, Mounting hole dimensions, refer to Table 9.2 for A1 and A2 values

CG series enclosure mounting dimensions

		Type 1, in (mm)			Type 3R/4/4X/12, in (mm)	
Model	**ATS Rating (A)**	**Poles**	**Height (A1)**	**Width (A2)**	**Height (A1)**	**Width (A2)**
CG CGD	30 - 200	2	28.0 (711)	20.0 (508)	33.3 (845)	18.0 (457)
		3	28.0 (711)	20.0 (508)	33.3 (845)	18.0 (457)
		4	28.0 (711)	20.0 (508)	33.3 (845)	18.0 (457)
	260	2	42.0 (1067)	20.0 (508)	47.25 (1200)	18.0 (457)
		3	42.0 (1067)	20.0 (508)	47.25 (1200)	18.0 (457)
		4	42.0 (1067)	20.0 (508)	47.25 (1200)	18.0 (457)
	400	2	42.0 (1067)	20.0 (508)	47.25 (1200)	18.0 (457)
		3	42.0 (1067)	20.0 (508)	47.25 (1200)	18.0 (457)
		4	46.0 (1168)	24.0 (610)	51.25 (1302)[1]	22.0 (559)
	600	2	46.0 (1168)	24.0 (610)	51.25 (1302)[1]	22.0 (559)
		3	46.0 (1168)	24.0 (610)	51.25 (1302)[1]	22.0 (559)
		4	46.0 (1168)	24.0 (610)	51.25 (1302)[1]	22.0 (559)
	800 - 1200	3	66.0 (1676)	35.0 (889)	71.25 (1810)	34.0 (864)
		4	66.0 (1676)	35.0 (889)	71.25 (1810)	34.0 (864)

1 4X enclosures add 0.05 inches to dimensions

Table 9.2 Cat CG(D) panel mounting dimensions

9.5 Mounting of the handle

For more information of operating, position indication and the selection of the operating mode, see the Chapter 3.2 Operating and locking.

Warning

Verify the condition of power source prior to manually transferring. Manual operation may result in out-of-phase transfer when both sources are energized.

9.5.1 Mounting of the handle to operation position, manual mode

Fig. 9.2 Mounting the handle to the operating position;turn the slide switch to the Manual mode (Hand), lift the handle and place it to the operating position

9.5.2 Mounting of the HMI, automatic mode

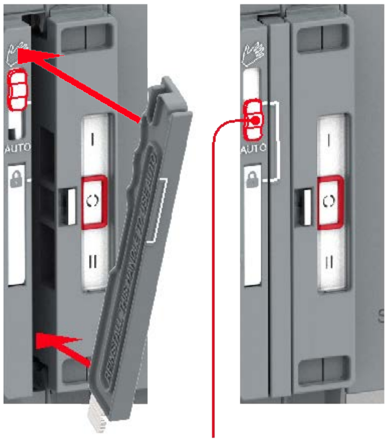

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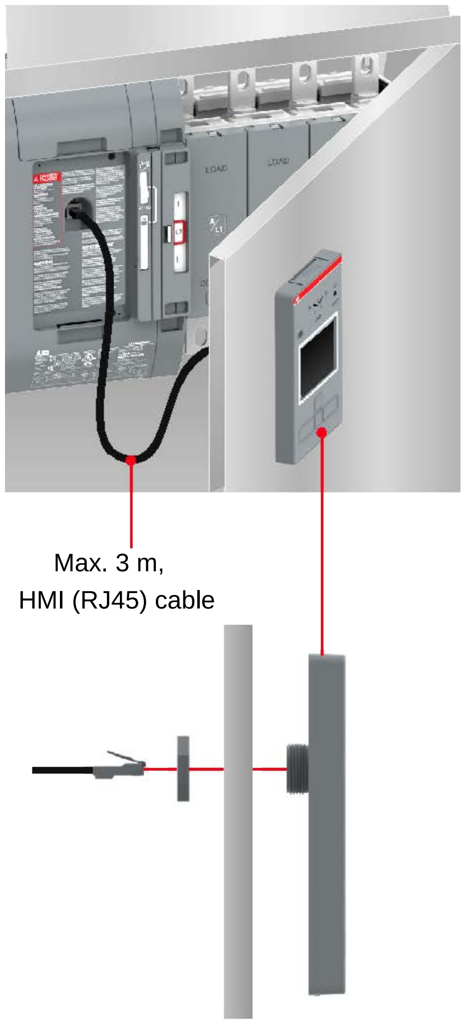
Fig. 9.3 Before moving to the Automatic mode, the operating handle must set to its place. When the handle is in its place properly, the slide switch will move to the Locking mode automatically and the switch is allowed to be padlocked, if needed. From the Locking mode the slide switch can be moved to the Automatic mode

9.5.3 HMI Installation



9.6 Wire Connection

Notice
Lugs come pre-installed and torqued

CG series AL/CU UL Listed Solderless Screw-Type Terminals for External Power Connections

Model	ATS Rating (A)	Source/Load	Wire Range	Cables per pole	Cables - Tightening Torque[1], lb-in (N-m)
CG CGD	30 - 200	Source 1	6 AWG - 300 KCMIL	1	275/31.1
		Source 2 / Load	4 AWG - 300 KCMIL	1	200/22.6
	260 - 400	Source 1	2 AWG - 600 KCMIL	1	375/42.4
		Source 2 / Load	2 AWG - 600 KCMIL	1	375/42.4
	600	Source 1	2 AWG - 600 KCMIL	2	500/56.5
		Source 2 / Load	2 AWG - 600 KCMIL	2	500/56.5
	800 - 1200	Source 1	2 AWG - 600 KCMIL	4	500/56.5
		Source 2	2 AWG - 600 KCMIL	4	500/56.5
		Load	2 AWG - 600 KCMIL	4	500/56.5

[1]Do not exceed this value - may cause damage to switch, voiding warranty—

Table 9.3 Power Cable Torque Requirements

9.7 Final Equipment Inspection

Prior to energizing the transfer switch:

1 Remove any debris incurred, with a vacuum, due to shipment or installation.
2 Verify that all cabled connections are correct and that phase rotation of both sources match.
3 Check engine start connections.
4 Verify the correct connection of all control wires.
5 Check settings of all timers and adjust as necessary.
6 Adjust any optional accessories as required.
7 Check the lug torque values of the power connections.
8 Make sure that all covers and barriers are installed and properly fastened

Each Cat transfer switch is factory wired and tested. A complete information package is furnished with each switch which includes:

1 Sequence of operation.
2 Description and operation of all accessories supplied.
3 Power panel connection diagram and schematic.
4 Description and identification of all customer field connections.

Installation of Cat transfer switches includes:

1 Mounting the transfer switch cabinet.
2 Connection of Source 1, Source 2, and Load cables or bus bars.
3 Connection of external control circuits as required.

9.8 Initial Energizing

Before proceeding, refer to the information package supplied with the ATS and read and understand the information on all accessories provided, including this complete document.

Before energizing the panel

Confirm that installation has been per-formed by a qualified person and in accordance with NFPA 70 (NEC).

Notice

This installation should be properly operated and maintained in accordance with the safety practices of NFPA 70E

- Confirm rating label matches the in-stalled application. Rating label is located inside the panel enclosure.
- Confirm that cables are connected properly and torqued according to the ATS labeling.
- Verify that the enclosure ground connection is properly terminated.
- Confirm that control wiring for engine start is properly terminated to the engine start contact (located in Figure 2.1, number 8). Additionally, connect all applicable digital I/O, communications, and auxiliary contact wiring.
- Flip slide switch (Figure 2.1, number 4) to AUTO

Ensure that all objects and debris are removed from enclosure, and enclosure is closed and latched

Energizing the panel

1. Close Source 1 circuit breaker.

NOTE: The HMI should illuminate if line voltage is present and S1 LED should light up.

- Verify the phase to phase voltages at the Source 1 terminals.
- Initiate auto configure from HMI default screen: Enter>Parameters>System Parameters>Start Automatic Configuration and allow a few seconds for system parameters to set.
- Close the Source 2 circuit breaker.
- Start the generator engine.

NOTE: If generator voltage is present at Source 2 terminals, S2 LED should light up.

2. Verify phase rotation of S1 matches that of S2.

NOTE: The ATS will not allow transfer if phase rotation does not match.

- Shut down the generator engine.
- Place the ATS in AUTO mode from the HMI by pressing AUTO key.

10. Accessories

Warning
Any troubleshooting should be conducted by trained and authorized personnel only. Appropriate personal protective equipment (PPE) shall be used when troubleshooting the ATS panel.
Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS panel.
Failure to do so may result in serious injury or death.

10.1 Phase barriers

Phase barriers must be used to maintain a clearance of 1 inch on the automatic transfer switch types. They are included with the shipment of CG series ATS Panel.

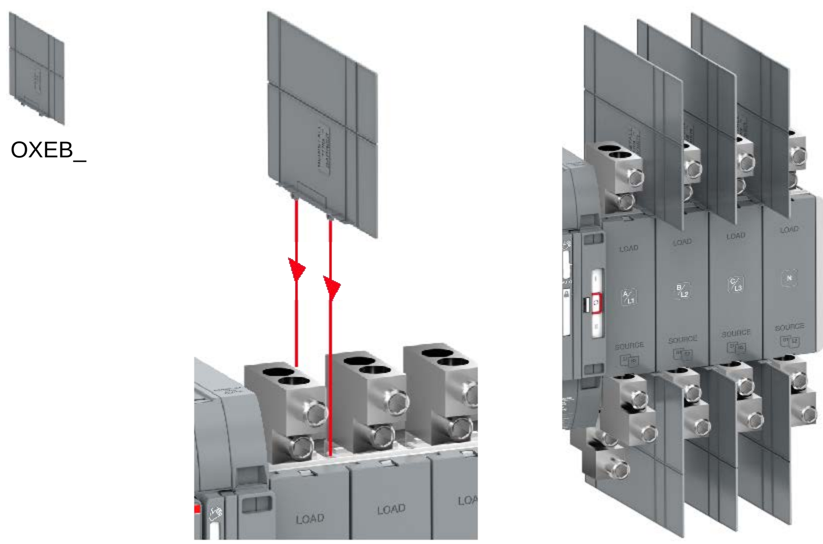


Fig. 10.1 Mounting of phase barriers, type OXEB_

10.2 Auxiliary contact blocks

Refer to Figure 7.1 for auxiliary contact ratings.

Position	OA1G10	OA3G01
SOURCE 1 (S1), max 2+2		
I		
O		
II		
SOURCE 2 (S2), max 2+2		
I		
O		
II		

—

Table 10.1 Contact positions

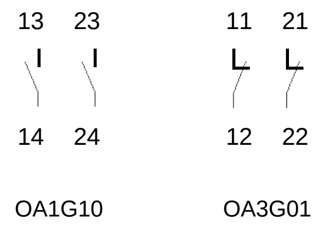


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Fig. 10.3 Labels for contact numbering

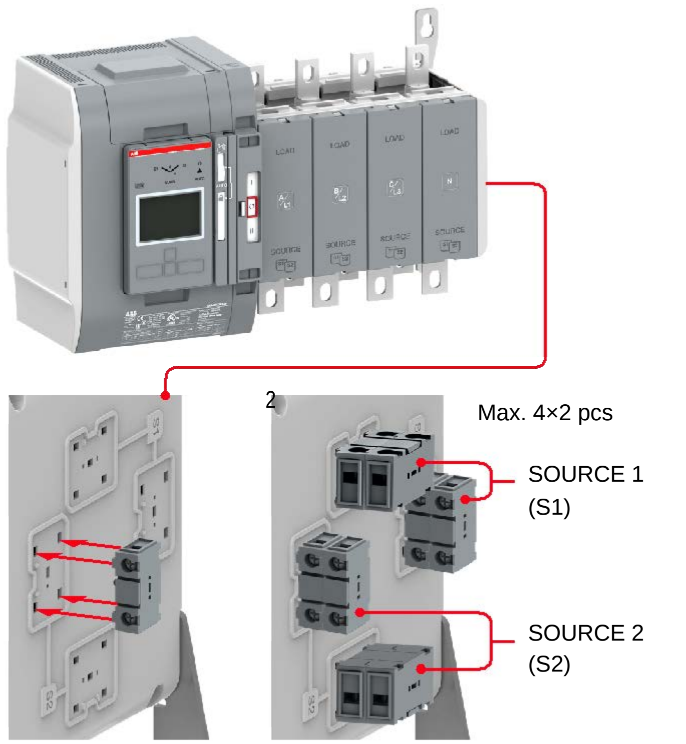

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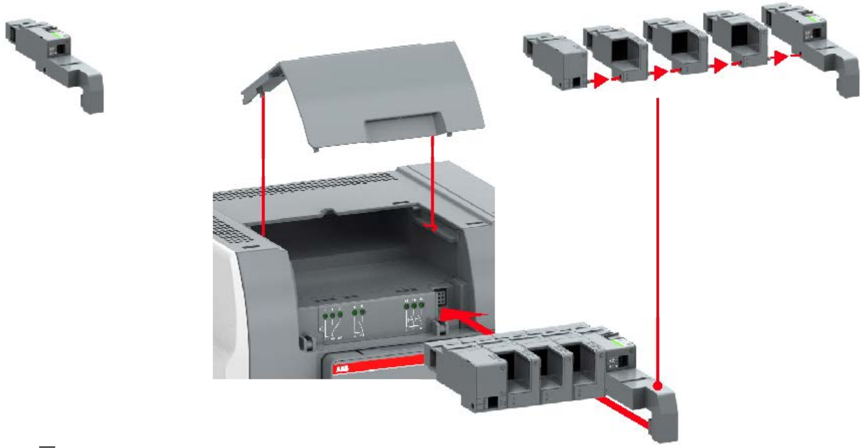
Fig. 10.2 Mounting of the auxiliary contact blocks, type OA_

10.3 Auxiliary power supply and Ekip -modules

CG(D) 30-1200 A, 200-480 Vac Automatic transfer switches can be equipped with Ekip-modules. Ekip-modules are mounted with a auxiliary power supply module, OXEA1. Suitable Ekip-modules are: Ekip link, Signaling and connectivity modules. For more information, see Chapter 5, Electronic accessories.

The maximum number of Ekip-modules varies by panel ampacity :
430-200 A: 3 Ekip modules
260-400 A: 4 Ekip modules



—
Fig. 10.4 Mounting of the auxiliary power supply module OXEA1 and Ekip –modules

—
Fig. 10.5 Removing the auxiliary power supply module OXEA1 and Ekip –modules from the automatic transfer switch

10.4 HMI protective cover

UL Type 3R HMI protective cover, type OXEC21, provides protection against water ingress. It comes standard with NEMA 3R enclosures, and is available as a replacement part.

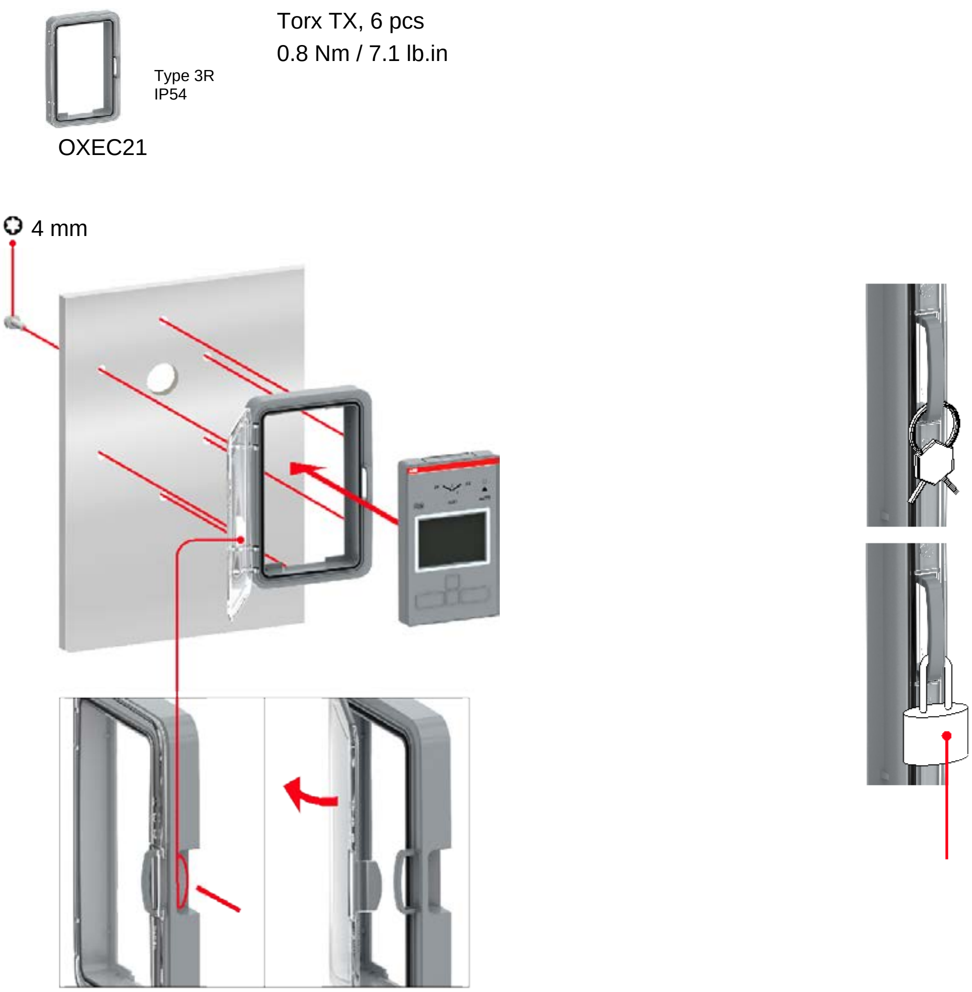


Fig. 10.6 Mounting of HMI protective cover, type OXEC21

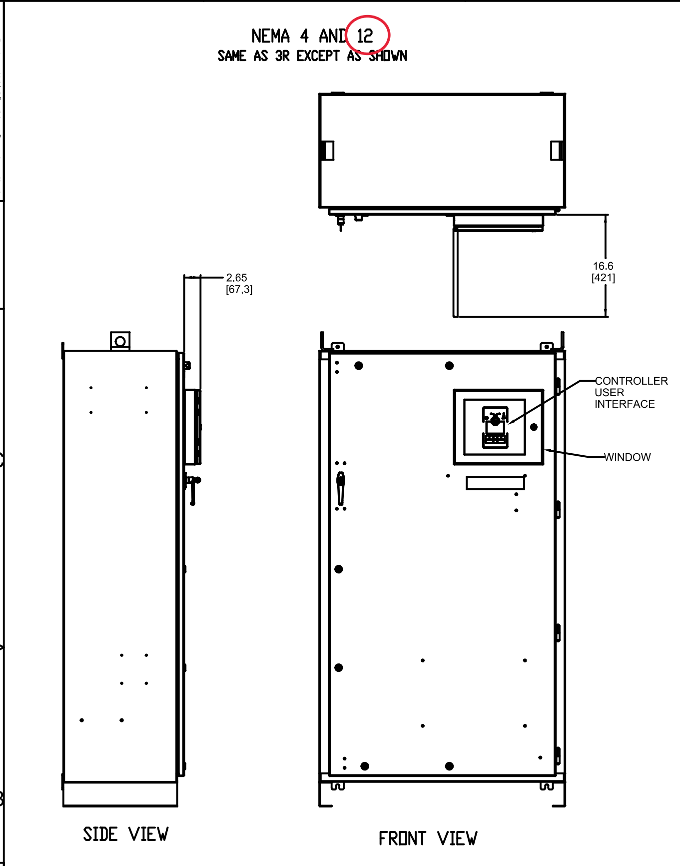
11. Replacement Parts

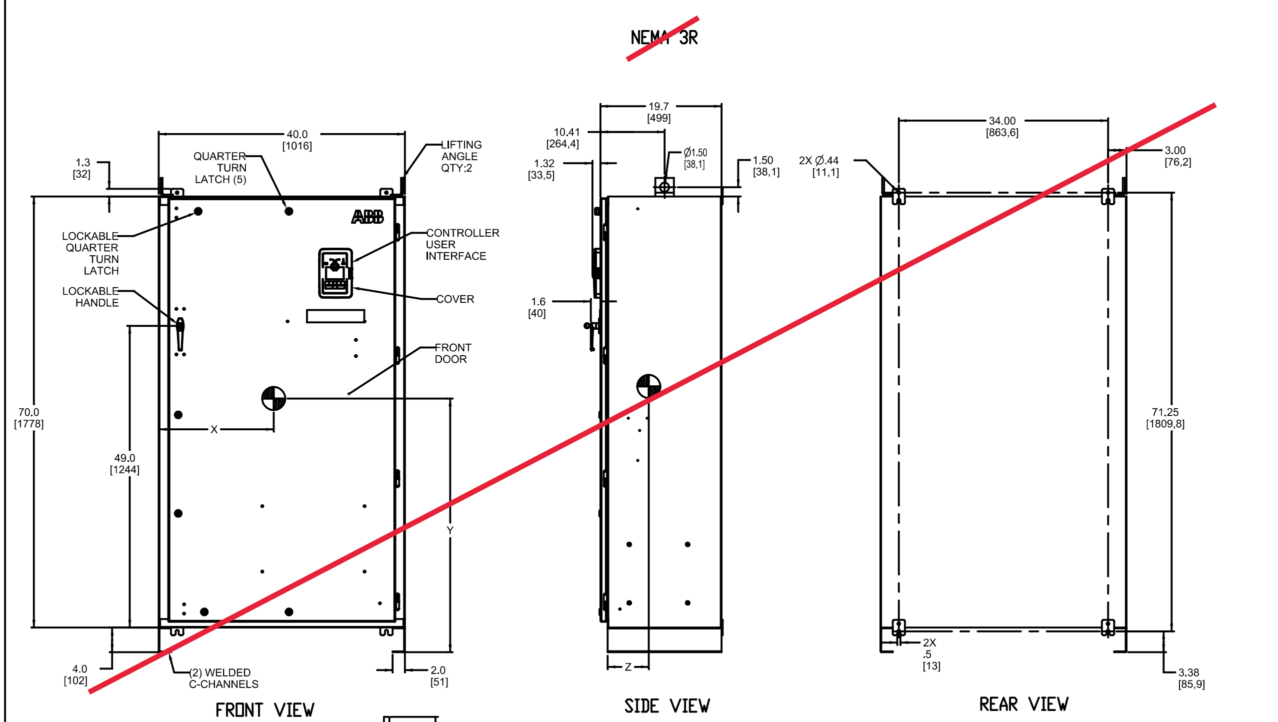
CG series replacement parts

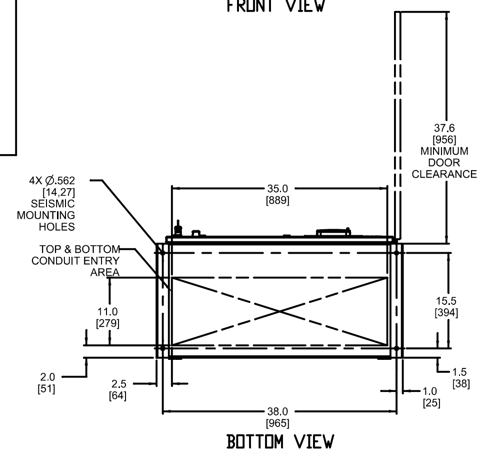
Type	Suitable for Switches	Order code	Weight (lb)
HMI module	Open transition (CG 30-1200 A, 200-480 Vac)	OXAHMI-L3	0.42
	Delayed transition (CGD 30-1200 A, 200-480 Vac)	OXBHMI-L3	0.42
Manual handle	Open transition and delayed transition (CG(D) 30-1200 A, 200-480 Vac)	OXHANDLE-1600	0.18
Complete[1] mechanism with electronics	**Open transition (CG, 200-480 Vac)**		
	30-260 Amps	OXAMECH-2-L3	16.28
	400-600 Amps	OXAMECH-3-L3	21.12
	800-1200 Amps	OXAMECH-4-L3	23.32
	Delayed transition (CGD, 200-480 Vac)		
	30-260 Amps	OXBMECH-2-L3	16.50
	400-600 Amps	OXBMECH-3-L3	21.34
	800-1200 Amps	OXBMECH-4-L3	23.54
Phase barrier	30-1200 Amps, 3 pole	OXEB1600/4	1.10
	30-1200 Amps, 4 pole	OXEB1600/6	1.54

[1]Includes the tested, field replaceable module complete with operating mechanism, power module, and controller

—
Fig. 11.1 Replacement parts, available from your Cat dealer.







AMP	POLE	CONTROLLER TYPE	CABINET #	LUG RANGE	WEIGHT	CENTER OF GRAVITY IN(MM)		
					LB(KG)	X	Y	Z
800A-1200A	3	SEE TABLE A	F-2017MP	QTY 4 2 AWG-600 KCMIL	516(234)	20.4 (518)	38.6 (980)	9.6 (244)
	4				550(249)			

TABLE A - HMI			
TYPE	TRANSITION	LEVEL	PART NO.
CTX	OPEN	2	DXAMI1-L2
CTG	OPEN	3	DXAMI1-L3
CTGD	DELAYED	3	DXBMI1-L3

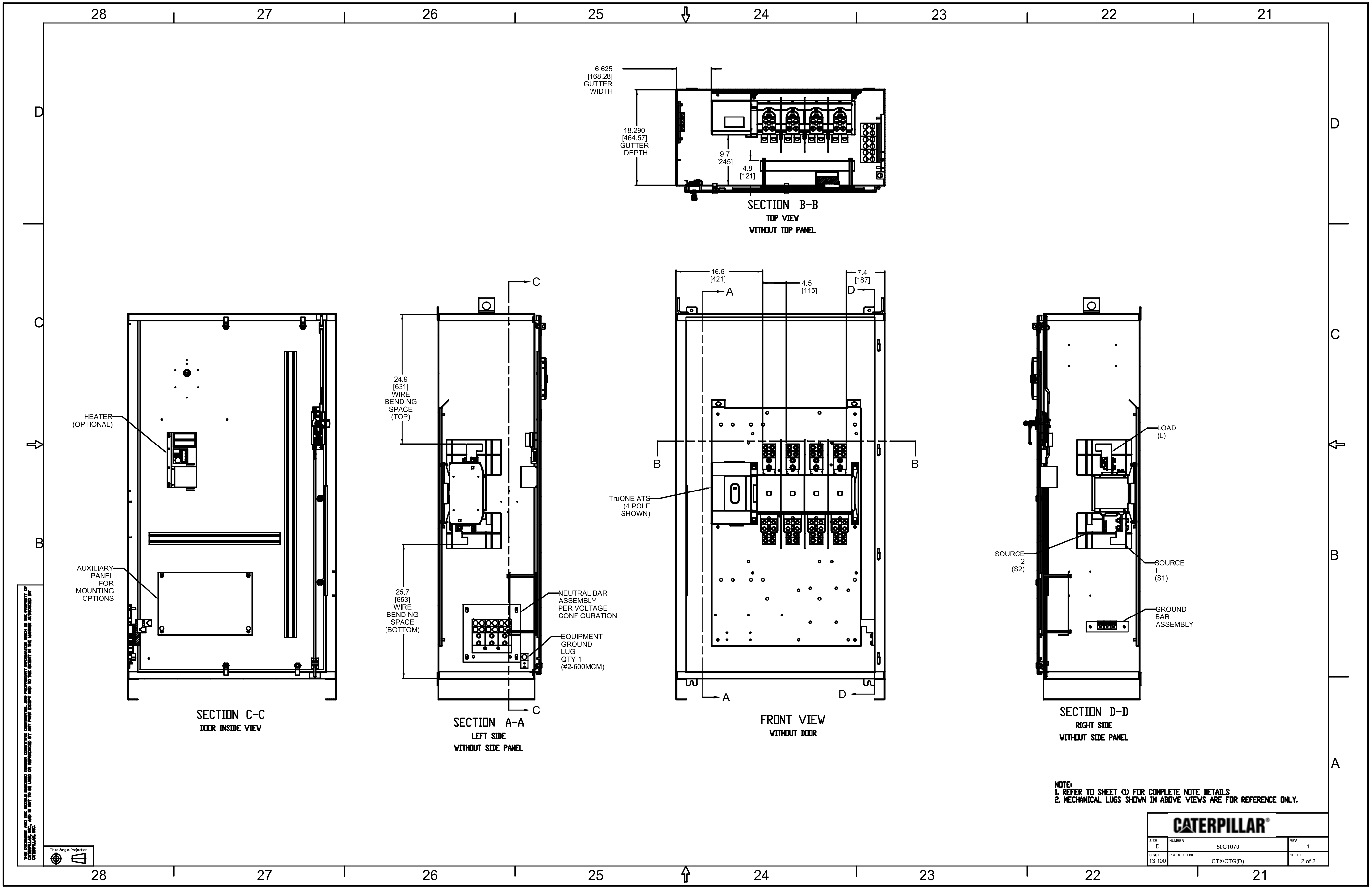
NOTES
1. ENCLOSURE : NEMA-3R,4,12 TYPE, FREE STANDING, FLOOR MOUNT.
2. MATERIAL:12 GA (.105) 1018 HRS REF.
3. FINISH : ANSI 61 GREY
4. CONSTRUCTION PER UL 1008 STANDARD.
5. FRONT ACCESSIBLE UNIT. NO SIDE OR REAR ACCESS REQUIRED.
6. SUITABLE WIRE BENDING SPACE PROVIDED PER THE SAFETY AGENCY STANDARDS.
7. UL AND CSA RECOGNIZED/CERTIFIED MECHANICAL LUGS ARE STANDARD.
8. EQUIPMENT GROUND LUG IS PROVIDED IN ALL UNITS. REFER TO SHEET 2 FOR DETAILS.
9. ALL DIMENSIONS ARE FOR REFERENCE ONLY AND SHOWN IN INCHES(MILLIMETERS).
10. 100% RATED SOLID/SWITCHED NEUTRAL PROVIDED PER THE SWITCH CONFIGURATION.
11. SUITABLE FOR TOP AND/OR BOTTOM CABLE ENTRY.

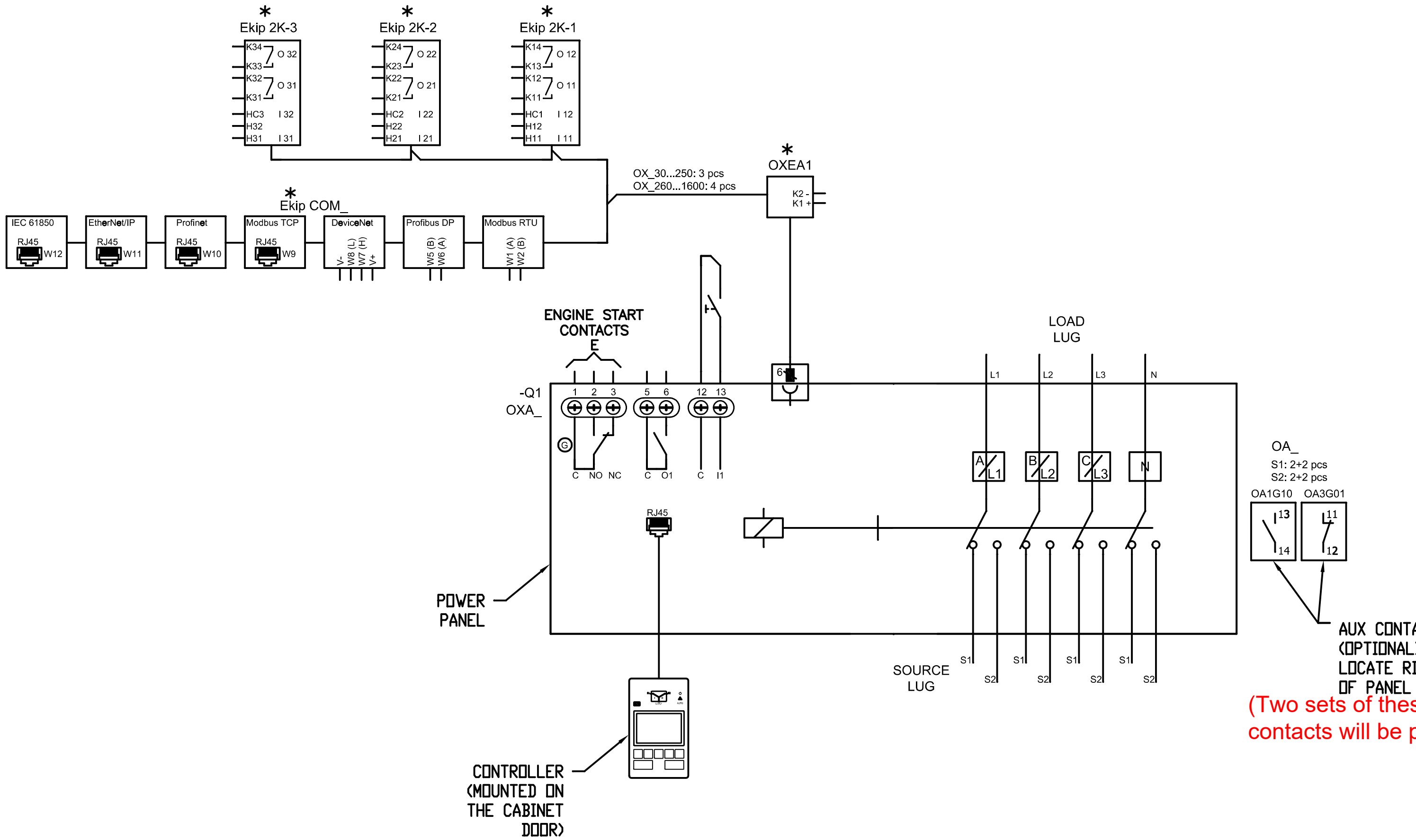
SEISMIC NOTES:

1. BOLT ENCLOSURE FROM C-CHANNEL BASE USING THE FOLLOWING SEISMIC CERTIFIED MOUNTING HARDWARE PER MOUNTING HOLE: (HARDWARE PROVIDED BY INSTALLER).
   *1/2-13 GRADE 5 BOLT TORQUE TO 70 FT-LBS. (95 NEWTON METERS).
   *1/2-13 STANDARD FLAT WASHER.
   *1/2 (13) HELICAL SPRING LOCK WASHER.
2. CENTER OF GRAVITY DIMENSIONS ARE FOR REFERENCE ONLY.
3. FOR WORKING CLEARANCE REFER TO NATIONAL AND LOCAL CODES AND STANDARDS.

DRAWING FILE 50C1070	MODEL FILE 50C1070	CATERPILLAR®	
DATE MODIFIED 22-May-19 03:47:33 PM	DESIGNED BY DV		
Calculated for: VOLUME 0.000 in^3	CN# C066448	APPROVED BY SR	TITLE TruONE LAYOUT, 800A/1200A NEMA 3R, 4, 12
	◇ Critical to Quality Characteristic		
MASS 0.000 lbm	MATERIAL SPECIFICATION ---	FINISH SPECIFICATION ---	UNITS in; LOCAL TITLE —
UNLESS OTHERWISE SPECIFIED TOLERANCE ON: 1 PL DECIMALS ± 0.1; 2 PL DECIMALS ± 0.02; 3 PL DECIMALS ± 0.005; ANGLES ± 1.0	MATERIAL DESCRIPTION —		SIZE D; ROOT NUMBER 50C1070; REV 1; RELEASE STATE Under Review
	FINISH DESCRIPTION —		SCALE 13:100; PRODUCT LINE CTX/CTG(D); SHEET 1 of 2

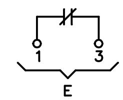
Third Angle Projection


6.625
[168,28]
GUTTER
WIDTH
18.290
[464,57]
GUTTER
DEPTH
9.7
[245]
4.8
[121]
SECTION B-B
TOP VIEW
WITHOUT TOP PANEL
HEATER
(OPTIONAL)
AUXILIARY
PANEL
FOR
MOUNTING
OPTIONS
SECTION C-C
DOOR INSIDE VIEW
24.9
[631]
WIRE
BENDING
SPACE
(TOP)
25.7
[653]
WIRE
BENDING
SPACE
(BOTTOM)
NEUTRAL BAR
ASSEMBLY
PER VOLTAGE
CONFIGURATION
EQUIPMENT
GROUND
LUG
QTY-1
(#2-600MCM)
SECTION A-A
LEFT SIDE
WITHOUT SIDE PANEL
16.6
[421]
4.5
[115]
7.4
[187]
TruONE ATS
(4 POLE
SHOWN)
FRONT VIEW
WITHOUT DOOR
LOAD
(L)
SOURCE
2
(S2)
SOURCE
1
(S1)
GROUND
BAR
ASSEMBLY
SECTION D-D
RIGHT SIDE
WITHOUT SIDE PANEL
NOTE:
1. REFER TO SHEET (1) FOR COMPLETE NOTE DETAILS
2. MECHANICAL LUGS SHOWN IN ABOVE VIEWS ARE FOR REFERENCE ONLY.
CATERPILLAR®
SIZE D
NUMBER 50C1070
REV 1
SCALE 13:100
PRODUCT LINE CTX/CTG(D)
SHEET 2 of 2
Third Angle Projection



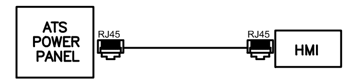
CUSTOMER CONNECTIONS

ENGINE START



CONTACT	RATING
E	5 AMP @ 240 VAC 5 AMP @ 30 VDC
OA1G10 (N.O.)	10 AMP @ 125, 250 VAC
OA3G01 (N.C.)	10 AMP @ 125, 250 VAC
Ekip Module (2K–1, 2, 3)	4 AMP @ 240 VAC 2 AMP @ 30 VDC

INTERCONNECT PLUG DIAGRAM



NOTES:

1. ATS SHOWN IN SOURCE 1 POSITION WITH NO POWER AVAILABLE.
2. REFER TO OPERATION AND MAINTENANCE MANUAL TO CONFIGURE THE OPTIONS.
3. # OF N.O. CONTACTS ON POWER PANEL WILL BE DIFFERENT BASED ON THE SWITCH AMPERAGE. REVIEW THE PRODUCT BROCHURE FOR THE DETAILS.

CUST

LEGEND	NOTES
* OPTIONAL	

CATERPILLAR®

DRAWING FILE	77A2000
MODEL FILE	77A2000
DATE MODIFIED	27-Feb-19 07:54:08 AM
DESIGNED BY	---
APPROVED BY	---
CN#	CN-C067078
Calculated for: VOLUME	0.000 in^3
MASS	0.000 lbm
MATERIAL SPECIFICATION	UNASSIGNED
FINISH SPECIFICATION	---
MATERIAL DESCRIPTION	---
FINISH DESCRIPTION	---
TITLE	OPEN TRANSITION ATS SCHEMATIC FOR 30-1200A CTG PRODUCT
UNITS	in
LOCAL TITLE	---
SIZE	B
ROOT NUMBER	77A2000
REV	1
RELEASE STATE	RELEASED
SCALE	1:1
PRODUCT LINE	CTG
SHEET	1 of 1

◇ Critical to Quality Characteristic

UNLESS OTHERWISE SPECIFIED
TOLERANCE ON:
1 PL DECIMALS ± 0.1
2 PL DECIMALS ± 0.02
3 PL DECIMALS ± 0.005
ANGLES ± 1.0

Third Angle Projection

us_3rd_b.frm

PROVO CITY SOUTHWEST LIFT STATION
PROJECT #: 001958
SECTION: 26 24 22

50HP. VARIABLE FREQ. DRIVE SYSTEMS
O & M MANUAL

JULY 5, 2022

PREPARED FOR:

MORRIS ELECTRIC, INC.
275 W 900 N
SPRINGVILLE, UT 84663
(801) 489-8501

PREPARED BY:

QUALITY ELECTRICAL SYSTEMS
646 WEST 9TH AVENUE
MIDVALE, UTAH 84047
(801) 566-7200

646 WEST 9TH AVENUE
MIDVALE, UTAH 84047
OFFICE: (801) 566-7200
FAX: (801) 255-0835

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MAIN - BILL OF MATERIAL			
QTY.	DESCRIPTION	PART NUMBER	MANUFACTURER
1	50 HP VFD SYSTEM, NEMA 12 ENCLOSURE	PMP-42310	QES
1	LOCAL CONTROL PANEL	N/A	QES
1	50 HP VFD SYSTEM, NEMA 12 ENCLOSURE	PMP-42320	QES
1	LOCAL CONTROL PANEL	N/A	QES
1	50 HP VFD SYSTEM, NEMA 12 ENCLOSURE	PMP-42330	QES
1	LOCAL CONTROL PANEL	N/A	QES

Spare Parts
Bill of Materials

VFD Panel				
ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	2	ON DELAY TIMER 120V (8 PINS)	RTE-P1AF20	IDEC
2	2	TIMER BASE 8 PINS FINGER SAFE	SR2P-05C	IDEC
3	2	2 POLE RELAY WITH INDICATOR 120V	RH2B-UL-AC120V	IDEC
4	2	2 POLE RELAY BASE FINGER SAFE	SH2B-05C	IDEC
5	2	4 POLE RELAY WITH INDICATOR 120V	RH4B-UL-AC120V	IDEC
6	2	4 POLE RELAY BASE FINGER SAFE	SH4B-05C	IDEC
7	2	BREAKER - TMAX, XT2, 480V 3P 100A FIXED	XT2HU3100BFF000XXX	ABB/GE
8	10	FUSE 600VAC, 3A	KLDR 3	LITTELFUSE
9	10	FUSE 250 VAC, 6.25A	FLM 6-1/4	LITTELFUSE
10	10	FUSE 250 VAC, 1A	217001	LITTELFUSE
11	1	POWER SUPPLY - 24VDC, 15W, 0.65A	PS5R-VB24	IDEC
12	2	PILOT LIGHT: 120VAC, PUSH-TO-TEST, AMBER	ALD2QH211DNUA	IDEC
13	2	PILOT LIGHT: 120VAC, PUSH-TO-TEST, RED	ALD2QH211DNUR	IDEC
14	2	PILOT LIGHT: 120VAC, PUSH-TO-TEST, GREEN	ALD2QH211DNUG	IDEC
15	2	PUSH BUTTON: MOMENTARY, BLACK, 1NC-1NO	ABD111NUB	IDEC
16	1	TOUCH UP PAINT - SPRAY ENAMEL, ANSI61 GRAY	ATPPY61	IDEC

LCS Panel				
ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	2	SELECTOR SWITCH: 3 POS. MAINTAINED	ASD340NU	IDEC
2	2	PUSH BUTTON: GREEN, FLUSH	ABD111NUG	IDEC
3	2	PUSH BUTTON: RED, FLUSH	ABD111NUR	IDEC
4	2	PUSH BUTTON: RED MUSHROOM	AVD301NUR	IDEC

646 West 9th Avenue
Midvale, Utah 84047
Office: (801) 566-7200
Fax: (801) 255-0835

Certificate of Warranty

Quality Electrical Systems Inc. is pleased to certify that the equipment purchased for the job listed below is covered by Quality Electrical Systems Inc. and the respective original equipment manufacturers for a period of 18 months from the date of shipment or 12 months from the date of start-up or (beneficial use by the owner) whichever comes first.

This warranty covers failures due to defects in materials and workmanship only. Failures due to improper use, abuse, physical damage, utility surge or acts of nature are not covered.

In the event of a failure Quality Electrical Systems working with the equipment manufacture will replace or repair the equipment (at its' sole discretion). Replaced or repaired equipment will be covered by this same warranty until the expiration thereof. Replacement or repair of equipment does not reset the warranty period.

Repairs or modifications to the equipment by anyone other than Quality Electrical Systems Inc. will void the warranty entirely.

Warranty coverage is limited to the value of the replacement or repair of the equipment supplied by Quality Electrical System Inc. and in no way implies coverage of any other costs associated with the failure or loss of use of the equipment.

Project Name:	Provo City Southwest Lift Station
Project No.:	001958
Customer:	Morris Electric, Inc.
Owner:	Provo City Public Works
Date:	17 December 2021
Shipment Date:	TBD
Startup Date:	TBD

Ken Worton
Quality Electrical Systems, Inc.

646 WEST 9TH AVENUE
MIDVALE, UTAH 84047
OFFICE: (801) 566-7200
FAX: (801) 255-0835

FACTORY FORMS

QUALITY ELECTRICAL SYSTEMS

W/O#_______________

FINAL INSPECTION AND TEST CHECK

1. Power Wiring	Builder	Lead	Engineer
Check wire condition inspect wire jackets			
Verify terminal torque is correct			
Torque marks are present			
Pull test on each wire was performed			
verify wire size per UL 508 Table 28.1 is correct			
Verfy customer connection lugs are the correct size			

2. Control Wiring	Builder	Lead	Engineer
Check wire Strip length			
Wires are properly labeled			
Pull test on each wire was completed			

3. Input breaker and through the door operator	Builder	Lead	Engineer
Main circuit breaker is correct size for load			
Mechanical operation of breaker was verified			
Breaker has been tripped and reset with op. mech			
Breaker door interlock verified operational			

4. Enclosure Inspection	Builder	Lead	Engineer
Exterior paint is free from scratches			
Paint color is correct			
Door closes properly			
Verify uniform gasket compression			
Gaskets and covers are installed			
Correct air filter is installed			
Panel is free from all foreign matter			

5. Name Plates and Labels	Builder	Lead	Engineer
Name plates match the drawing			
Warning labels have been installed			
QES rating label is installed			
QES brand label is installed			
QES inspection sticker is installed and initialed			
Ground stickers			
Torque stickers			

6. Serial # Section	Builder	Lead	Engineer
VFD Serial #______________			
Transformer S/N___________			
Breakers S/N______________			
PLC S/N__________________			
_________________________			
_________________________			
_________________________			
_________________________			
_________________________			
Soft start S/N____________			
_________________________			
_________________________			
_________________________			
_________________________			
_________________________			

Note: Electronics that have a S/N must be recorded in section 7.

QUALITY ELECTRICAL SYSTEMS

W/O#________________

7. VFD/ Soft Start Section	Engineer
Verify parameter setup	
Motor no load run test	

8. Operational test	Engineer
Setup meters/displays	
Hand operation	
Auto operation	
Stop by permissive	
Digital inputs	
Digital outputs	
Analog inputs	
Analog outputs	
Door fan operation/rotation	
DC bus fan operation	
Pilot lights	
Link keypad set-up	
Phase relay verified.	

9. Functionality Check	Engineer
System voltage was verified	
System voltage was applied	
Control voltage was verified	
Parts function & operation was verified	

	Engineer
10. UL Label was applied (if required)	

	Engineer
11. Engineer verifies all production blocks are complete	

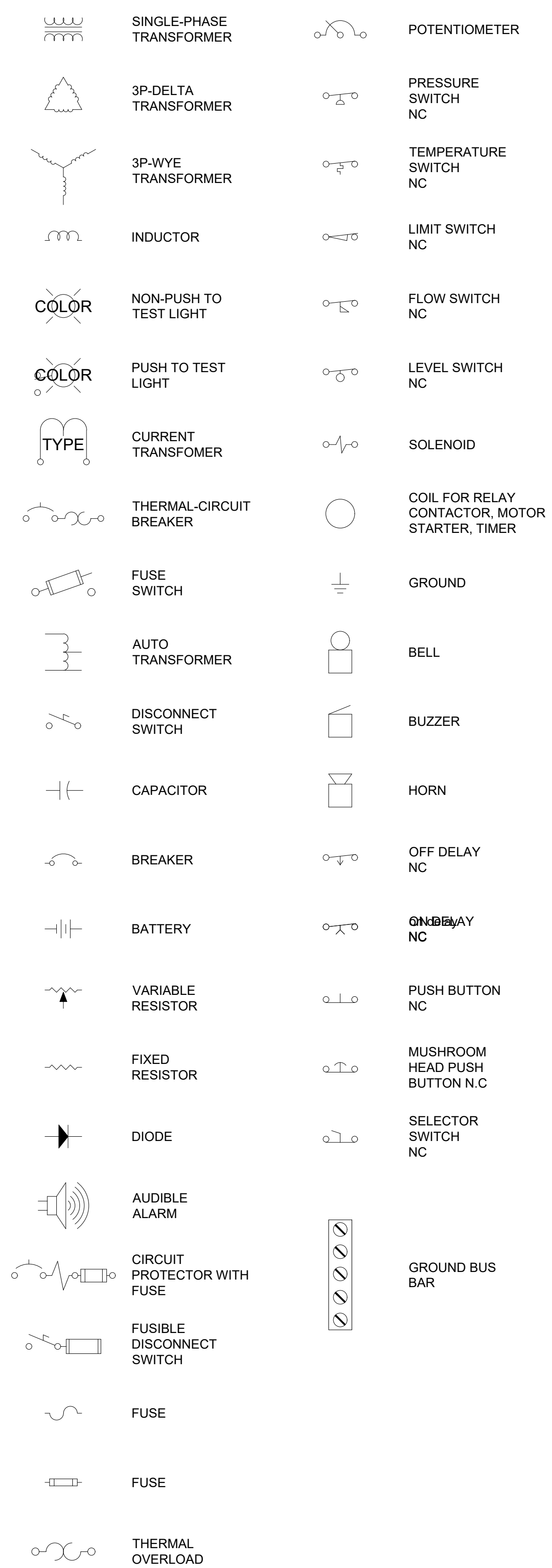
12. Shipment	Shipper
Control panel has been photographed	
Photos have been uploaded to server	
Control panel has been properly packaged for shipment	
Frieght Signage if required was applied	
Control panel was banded and secured to pallet	
Vacuum and clean if needed.	

13. Document follow up	Project Mngmnt
Photos have been uploaded to server	
Tracking # was recorded and sent to customer	
Updated on Production	

646 WEST 9TH AVENUE
MIDVALE, UTAH 84047
OFFICE: (801) 566-7200
FAX: (801) 255-0835

DRAWINGS & LAYOUTS

LEGEND:



ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	1	ENCLOSURE ,TYPE 12, GRAY, 90"H X 34"W X 24"D	CUSTOM	QES
1A	1	BACK PANEL	CUSTOM	QES
2	1	VFD - 50HP (NORMAL DUTY), 74A, 480VAC, 3P	ATV630D37N4	SCHNEIDER
2A	1	KEYPAD MOUNTING KIT	VW3A1112	SCHNEIDER
2B	1	KEYPAD CORDSET	VW3A1104R30	SCHNEIDER
3	1	BREAKER - TMAX, XT2, 480V 3P 100A FIXED	XT2HU3100BFF000XXX	ABB/GE
4	1	LOAD TERMINAL: CuAl, XT2, #10 - 2/0 AWG, W/ CTRL TAP	KXT2CUAL2C-3PC	ABB/GE
5	1	LINE TERMINAL: Cu, XT2, #14 - 1/0 AWG	KXT2CU-3PC	ABB/GE
6	1	OPERATION HANDLE BASE	KXTCRHEBFP	ABB/GE
6A	1	HANDLE - PISTOL w/ LOCKOUT TAB	OHB65J10B	ABB/GE
6B	1	TELESCOPIC SHAFT	OXP10X500	ABB/GE
7	1	LINE REACTOR - 5% IMPEADANCE, 65A, 3 POLE	KDRF1H	TCI
8	1	POWER DISTRIBUTION BLOCK - 3P, LINE:(1)3/0-#14, LOAD:(1)3/0-#14	1343572	MARATHON
9	1	CONTROL CIRCUIT TRANSFORMER, 480V:120V .5kVA	9T58K0050G38	ABB/GE
10	2	FUSE 600VAC, 3A	KLDR 3	LITTELFUSE
11	1	FUSE 250 VAC, 6.25A	FLM 6-1/4	LITTELFUSE
12	4	FUSE 250 VAC, 1A	217001	LITTELFUSE
13	6	2 POLE RELAY WITH INDICATOR 120V	RH2B-UL-AC120V	IDEC
13A	6	2 POLE RELAY BASE FINGER SAFE	SH2B-05C	IDEC
14	2	4 POLE RELAY WITH INDICATOR 120V	RH4B-UL-AC120V	IDEC
14A	2	4 POLE RELAY BASE FINGER SAFE	SH4B-05C	IDEC
15	1	ON DELAY TIMER 120V (8 PINS)	RTE-P1AF20	IDEC
15A	1	TIMER BASE 8 PINS FINGER SAFE	SR2P-05C	IDEC
16	3	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, AMBER, 30MM	ALD2QH211DNUA	IDEC
17	1	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, RED, 30MM	ALD2QH211DNUR	IDEC
18	1	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, GREEN, 30MM	ALD2QH211DNUG	IDEC
19	1	PUSH BUTTON: OCTAGONAL FLUSH, MOMENTARY, BLACK, 1NC-1NC	ABD111NUB	IDEC
20	1	POWER SUPPLY - 24VDC, 15W, 0.65A	PS5R-VB24	IDEC
21	2	FAN - 120VAC, 600CFM	W2E200-HH86-01	EBM
22	1	FAN GUARD	78128-2-4039	EBM
23	1	AIR FILTER - 10 x 10 x 1, MERV 8, PRE PLEAT 40	80055.01101	FLANDERS
24	4FT	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1ft order)	0801733	PHOENIX CONTACT
25	45	UNIVERSAL TERMINAL BLOCK - UT 4	3044102	PHOENIX CONTACT
26	8	END PLATE	3047028	PHOENIX CONTACT
27	9	END STOP	0800886	PHOENIX CONTACT
28	1	JUMPER BAR, UT6	3030271	PHOENIX CONTACT
29	1	TERMINAL GROUND BLOCK 8.2mm UT4-PE (24~12 AWG)	3044128	PHOENIX CONTACT
30	4	FUSE HOLDER - MINI FAST ACTING	3046100	PHOENIX CONTACT
31	1	ETHERNET SWITCH - 5 PORT, DIN RAIL MOUNTED	2891152	PHOENIX CONTACT
32	1	MEDIUM DANGER SIGN	DANGER3X3	MISC
33	2	GROUND LUG	KA2U	BURNDY
34	6FT	WIRE DUCT 2"WX2"H, WHITE (order by ft)	G2X2WH6	PANDUIT
35	6FT	DUCT COVER WHITE	C2WH6	PANDUIT
36	1	CAT 6 CABLE - RJ45/RJ45, 600V RATED, SHIELDED, 10FT	CAT6600V10	PROFESSIONAL CABLE
37	1	CAT 6 CABLE - RJ45/RJ45, 600V RATED, SHIELDED, 1FT	CAT6600V1	PROFESSIONAL CABLE
38	1	SERIAL DEVICE SERVER - Nport 5200, SERIAL-TO-ETHERNET CONVERTER	NPORT 5230A	MOXA
38A	1	DIN MOUNTING KIT - MOXA NPORT	DK35A	MOXA
39	*2*	SEAL FAIL RELAY - KBS PUMPSAFE	SUPPLIED BY OTHERS	KBS
40	2	12 PIN SOCKET - 600V, 10A, SEAL FAIL MOUNTING SOCKET	SD12-PC	CUSTOM CONNECTOR
41	1	WINDOW KIT - 12" x 12", NEMA 12, HINGED	APWK1212H	HOFFMAN

REV. No.	DATE	REVISION DESCRIPTION
A	12/2/2021	INITIAL SUBMITTAL
B	01/17/2022	REVISED PER REVIEW COMMENTS

QUALITY ELECTRICAL SYSTEMS

646 WEST 9TH AVE.
MIDVALE, UTAH 84047
(801) 566-7200
FAX (801) 255-0835
www.qualityelectricalsystems.net

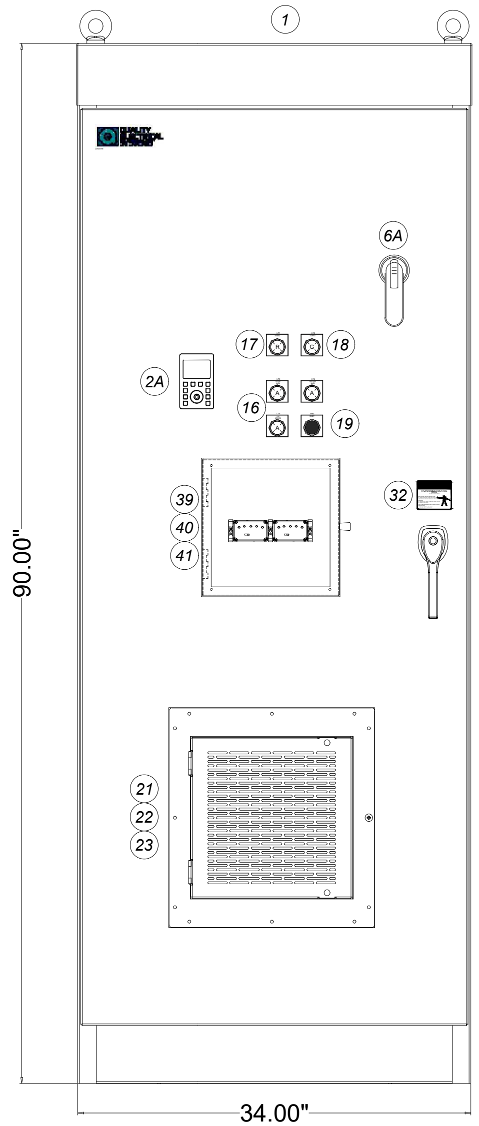
PROJECT NAME / ADDRESS

PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

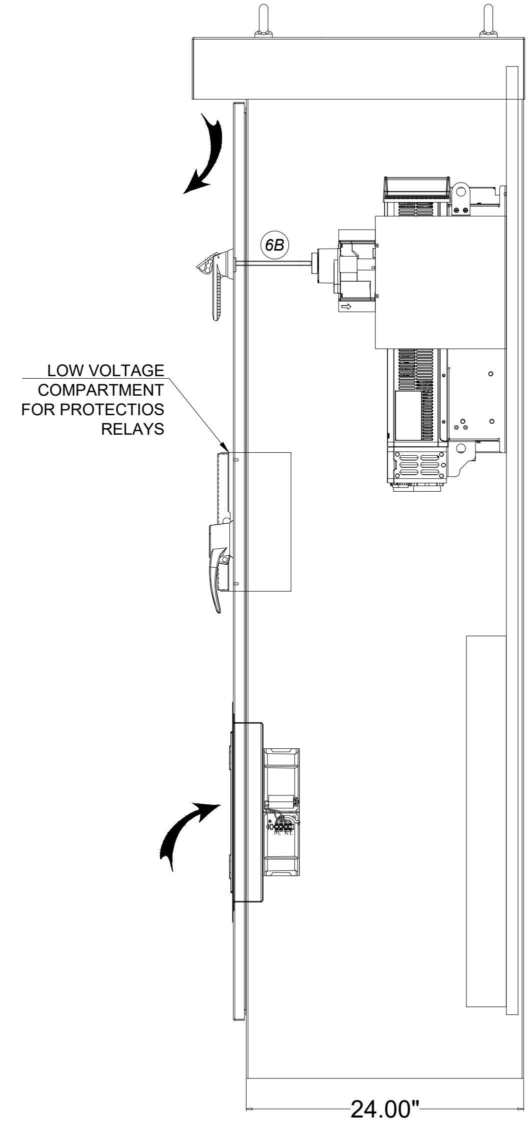
DRAWING No.: B101
PROJECT No.: 001958
PROJECT ENGINEER: TYLER C
DESIGNER/ENG.: TDC
CUSTOMER: MORRIS ELEC SPRINGVILLE, UT

TITLE:
50HP 480VAC VFD
NEMA TYPE 12
BILL OF MATERIALS

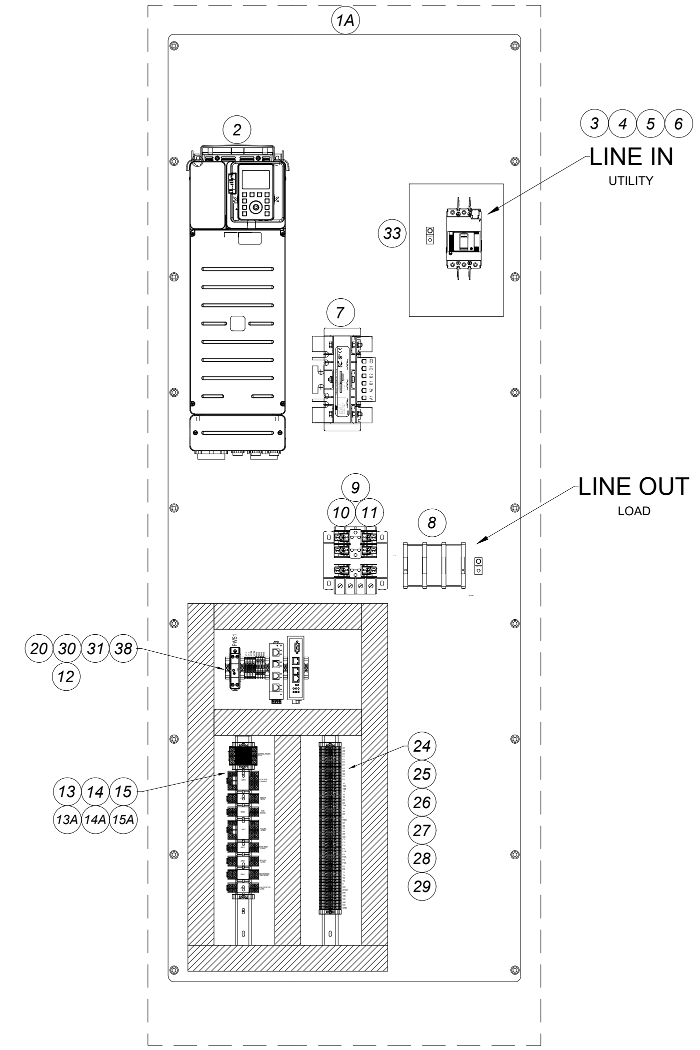
DATE: 12/2/2021
SHEET: 1 OF 5
REV.: B



Front View
EXTERIOR



Side View
SOME COMPONENTS NOT SHOWN
TRANSPARENT WALLS



Panel View
CONCEPT MAY DIFFER FROM AS BUILT
INTERIOR

Bottom View
EXTERIOR

TYPICAL FOR:
PMP-42310
PMP-42320
PMP-42330

UL LISTED 508A
NEMA TYPE 12 ENCLOSURE
ANSI 61 GRAY POWDERCOAT
12 GA COLD ROLLED STEEL
EST. WEIGHT - 600 LBS
PANEL FLA - 68 AMP
SCCR - 65 KAIC

SCALE
0 1 FT 2 FT 3 FT

REV. No.	DATE	REVISION DESCRIPTION
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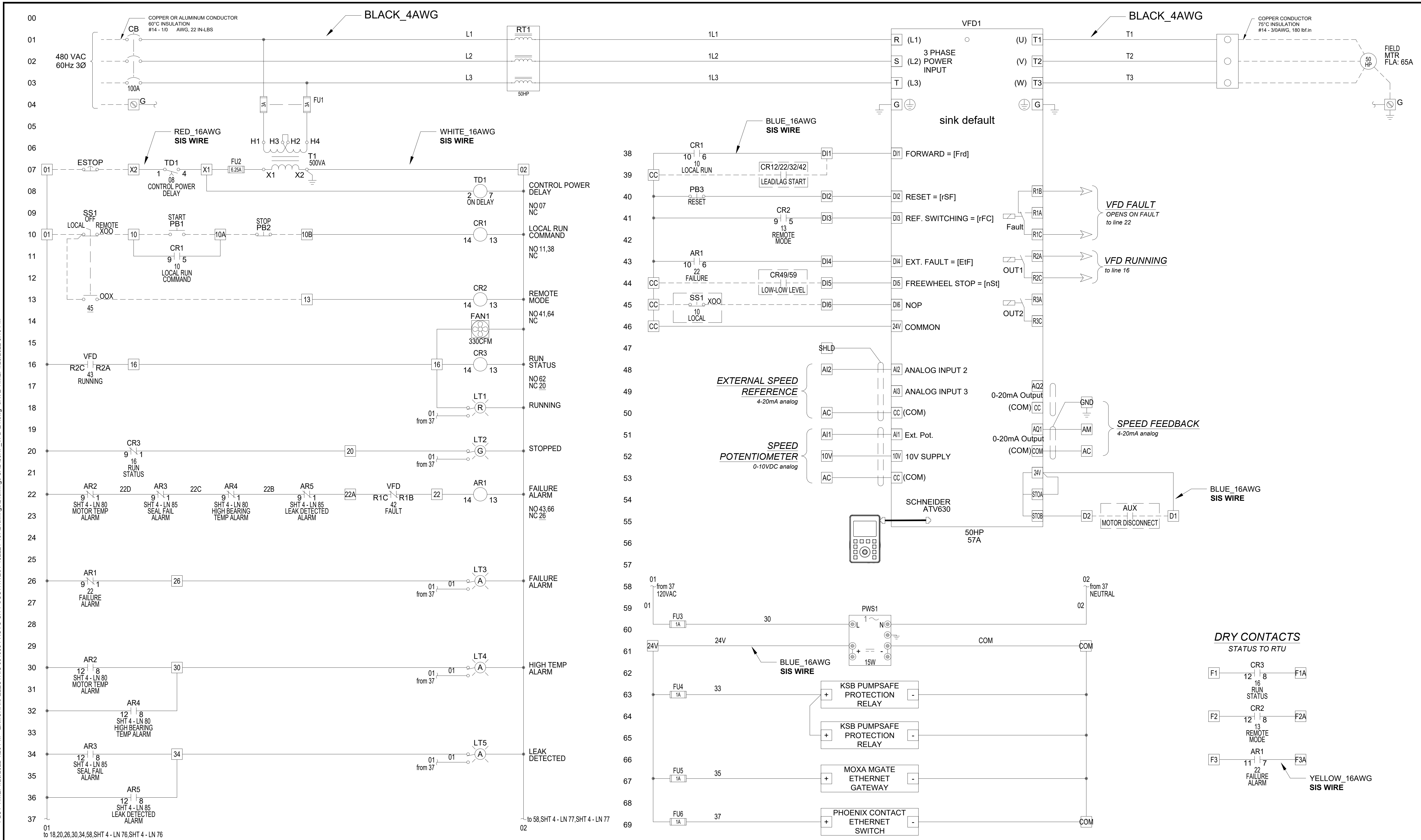
PROJECT NAME / ADDRESS
PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

DRAWING No.:	P101
PROJECT No.:	001958
PROJECT ENGINEER:	TYLER C
DESIGNER/ENG.:	TDC
CUSTOMER:	MORRIS ELEC SPRINGVILLE, UT

TITLE:
50HP 480VAC VFD
NEMA TYPE 12
LAYOUT

DATE: 12/2/2021 SHEET: 2 OF 5 REV.: B



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PROJECT NAME / ADDRESS

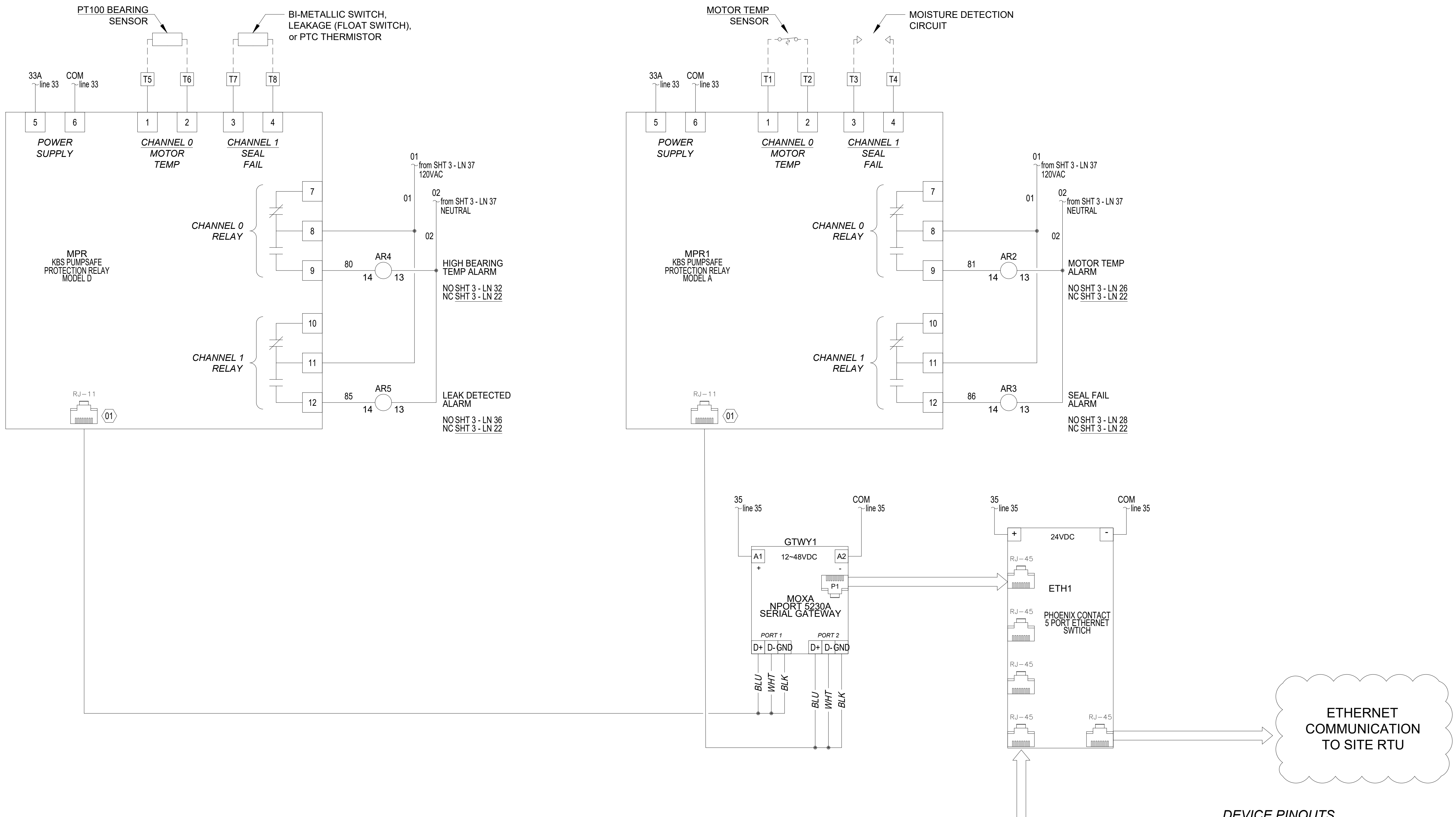
PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

DRAWING No.:	E101
PROJECT No.:	001958
PROJECT ENGINEER:	TYLER C
DESIGNER/ENG.:	TDC
CUSTOMER:	MORRIS ELEC SPRINGVILLE, UT

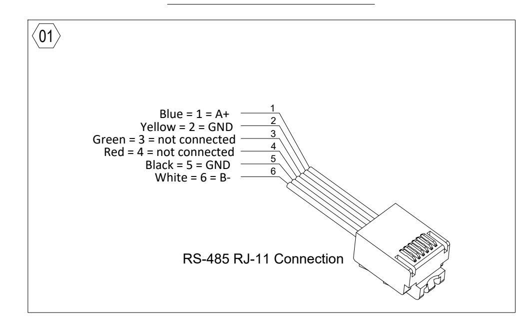
TITLE: 50HP 480VAC VFD NEMA TYPE 12 SCHEMATIC

DATE: 12/2/2021 SHEET: 3 OF 5 REV.: B

PLOT TIME: 1/20/2022 4:26 PM Z:\MORRIS ELECTRIC 001958 PROVO CITY SOUTHWEST 102221-107\Drawings\Drawings CAD\50HP_VFD-E1.dwg SAVE TIME: 1/20/2022 3:10 PM



DEVICE PINOUTS



NOTE:

1. POWER WIRING TO BE SIZE FOR LOAD.
2. WIRE SHALL BE COLOR CODED, UNLESS STATED OTHERWISE, AS FOLLOWS:
   - RED 120 VAC CONTROL CIRCUIT
   - WHITE 120 VAC REFERENCE NEUTRAL
   - BLUE 24 VDC CONTROL CIRCUIT
   - GREEN GROUND
   - YELLOW EXTERNAL SOURCE / DRY CONTACTS
   - BLACK LOAD AND LINE POWER CIRCUIT
3. USE STRANDED MACHINE TOOL WIRE FOR CONTROL WIRING, UNLESS STATED OTHERWISE (16 GAUGE MINIMUM).
4. WIRING SHOWN BROKEN -------- IS EXTERNAL TO PANEL
5. ALL WIRES MUST BE TAGGED AT BOTH ENDS, TERMINAL AND WIRE NUMBER TO BE THE SAME.
6. CONTROL VOLTAGE IS 120VAC UNLESS SPECIFIED.
7. ANALOG SIGNALS, IF NOT SPECIFIED ON DRAWING, MIN. 24AWG
   RED = POSITIVE (+), BLACK = NEGATIVE (-), WHITE = SIGNAL.

REV. No.	DATE	REVISION DESCRIPTION
A	12/2/2021	INITIAL SUBMITTAL
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PROJECT NAME / ADDRESS
PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

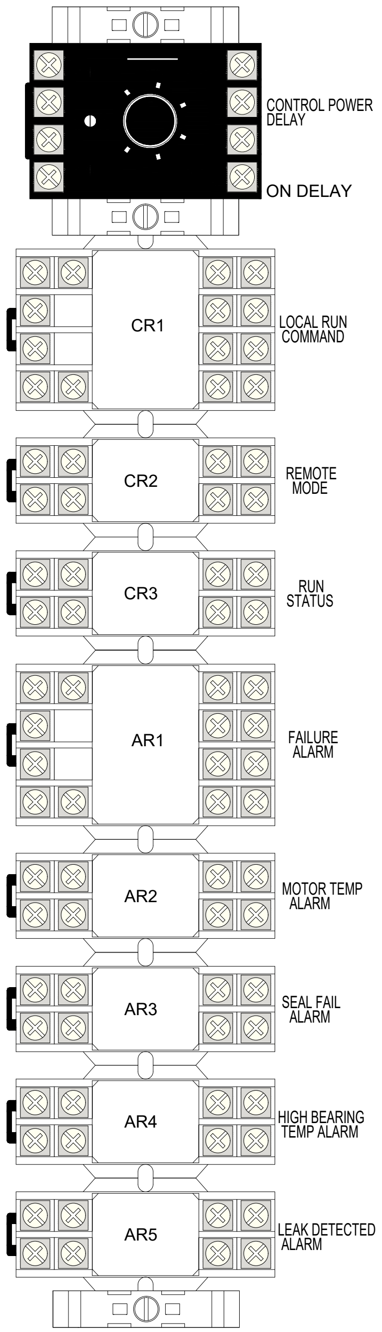
DRAWING No.:	E102
PROJECT No.:	001958
PROJECT ENGINEER:	TYLER C
DESIGNER/ENG.:	TDC
CUSTOMER:	MORRIS ELEC SPRINGVILLE, UT

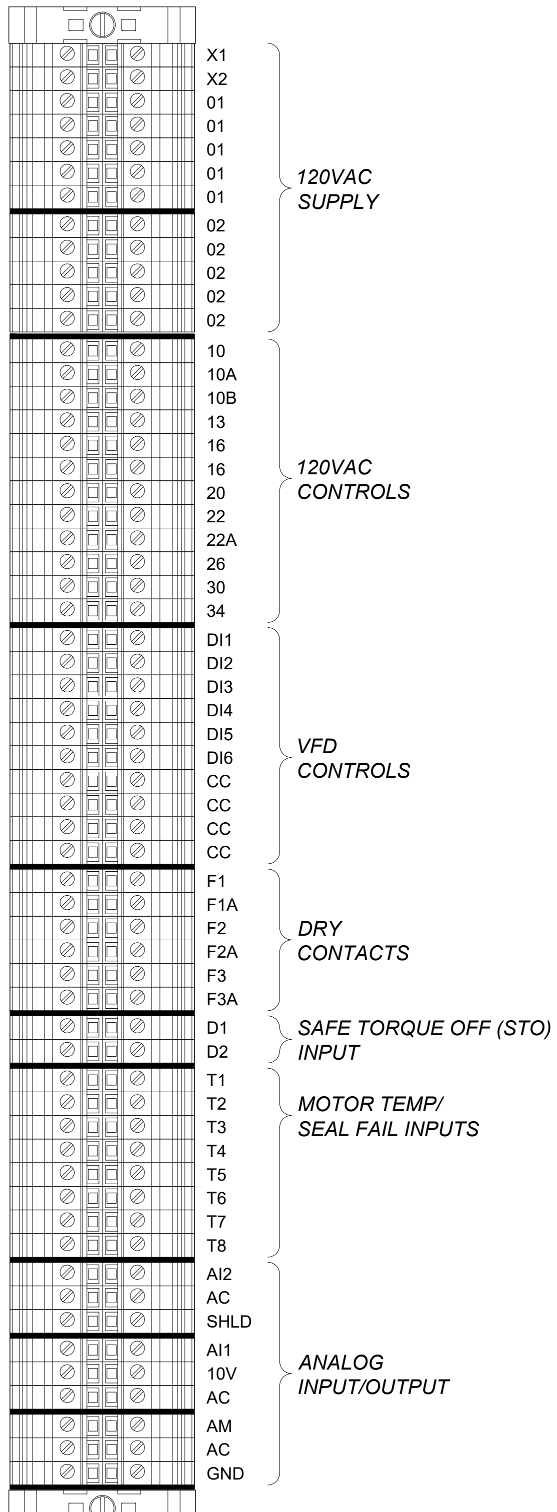
TITLE: 50HP 480VAC VFD NEMA TYPE 12 SCHEMATIC

DATE: 12/2/2021 | SHEET: 4 OF 5 | REV.: B

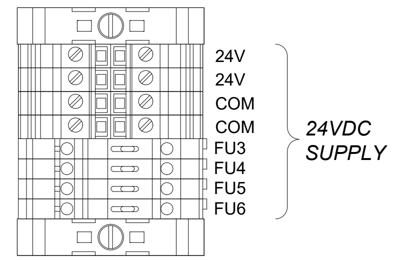
TERMINAL STRIP DETAILS

FOR ASSEMBLY REFERANCE
SOME LABELS OR LOCATIONS MAY CHANGE





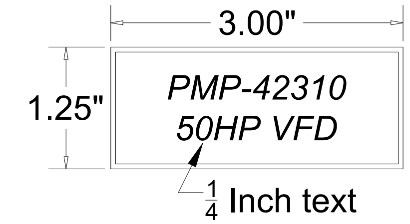
Suitable for AWG: 26-10
Tightening torque min: 5.31 in-lb
Tightening torque max: 7.08 in-lb



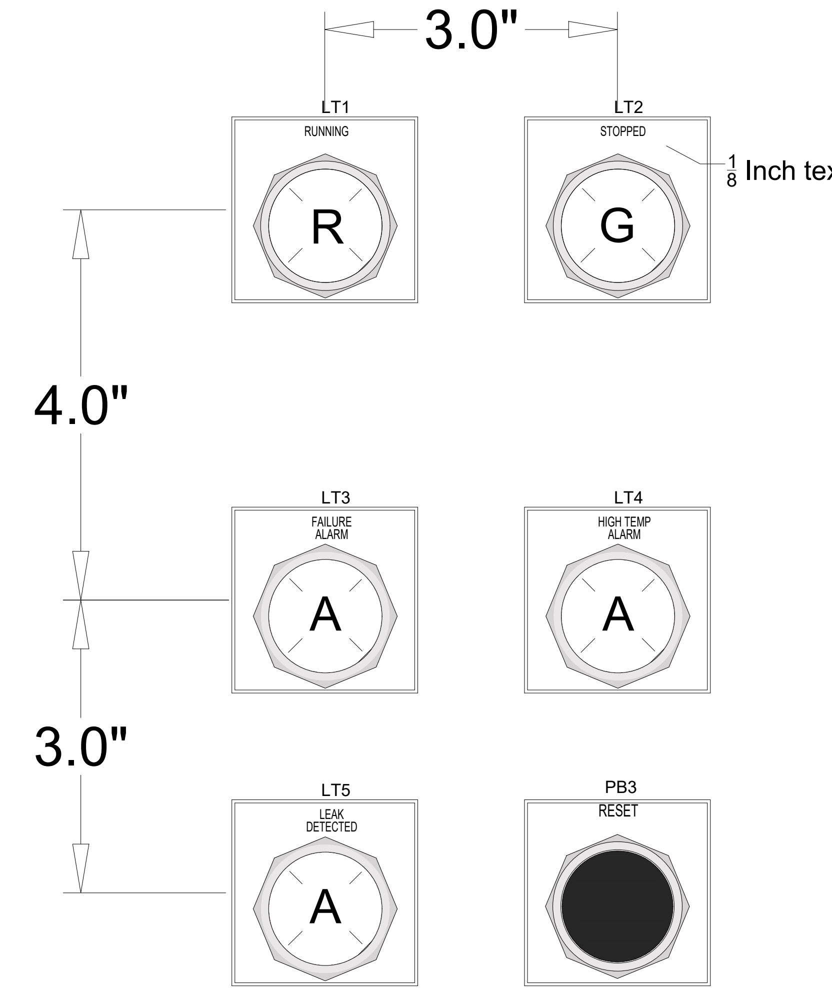
Suitable for AWG: 26-10
Tightening torque min: 5.31 in-lb
Tightening torque max: 7.08 in-lb

NAMEPLATE DETAILS

WHITE TEXT ON BLACK BACKGROUND



PANEL NAMEPLATE SCHEDULE		
WO#	LINE 1	LINE 2
210NG	*PMP-42310*	50HP VFD
210NH	*PMP-42320*	50HP VFD
210NI	*PMP-42330*	50HP VFD



REV. No.	DATE	REVISION DESCRIPTION
A	12/2/2021	INITIAL SUBMITTAL
B	01/17/2022	REVISED PER REVIEW COMMENTS

QUALITY ELECTRICAL SYSTEMS™
646 WEST 9TH AVE.
MIDVALE, UTAH 84047
(801) 566-7200
FAX (801) 255-0835
www.qualityelectricalsystems.net

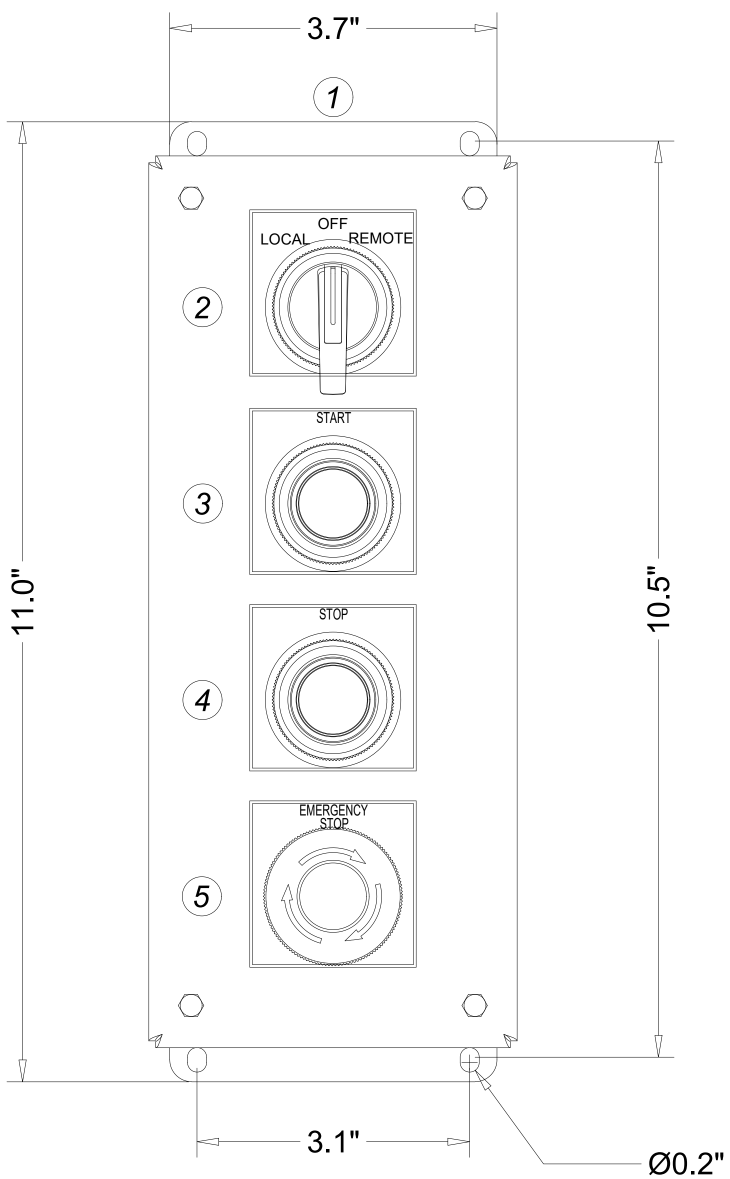
PROJECT NAME / ADDRESS
PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

DRAWING No.:	D101
PROJECT No.:	001958
PROJECT ENGINEER:	TYLER C
DESIGNER/ENG.:	TDC
CUSTOMER:	MORRIS ELEC SPRINGVILLE, UT

TITLE: 50HP 480VAC VFD NEMA TYPE 12 DETAILS

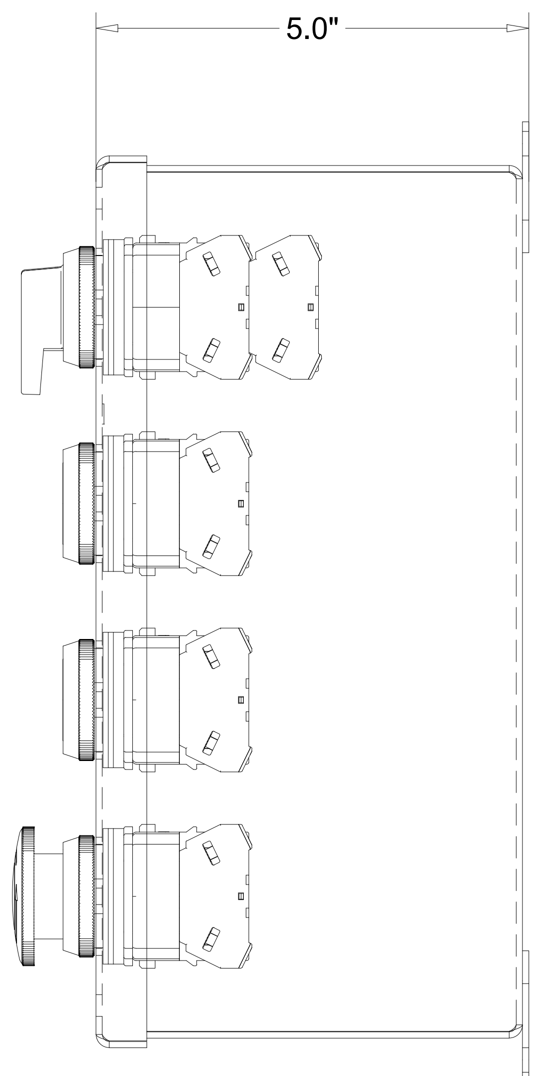
DATE: 12/2/2021 | SHEET: 5 OF 5 | REV.: B

ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	1	ENCLOSURE ,TYPE 12, GRAY, 4 PILOT DEVICE HOLES, 11" x 4.2"	E4PBX	HOFFMAN
2	1	SELECTOR SWITCH: 3 POS. MAINTAINED, 120VAC, 2NO - 2NC	ASD340NU	IDEC
3	1	PUSH BUTTON: GREEN, FLUSH, 120VAC, 1NO - 1NC	ABD111NUG	IDEC
4	1	PUSH BUTTON: RED, FLUSH, 120VAC, 1NO - 1NC	ABD111NUR	IDEC
5	1	PUSH BUTTON: RED MUSHROOM, PUSH LOCK - TURN RELEASE, 1 N	AVD301NUR	IDEC



Front View

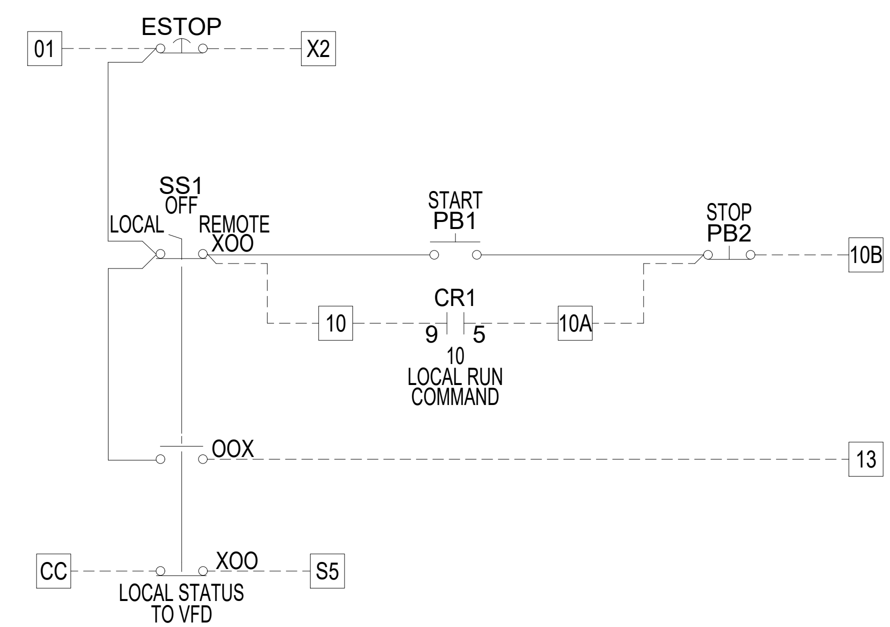
EXTERIOR



Side View

SOME COMPONENTS NOT SHOWN

TRANSPARENT WALLS



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REV. No.	DATE	REVISION DESCRIPTION
A	12/2/2021	INITIAL SUBMITTAL
B	01/17/2022	REVISED PER REVIEW COMMENTS

QUALITY ELECTRICAL SYSTEMS™

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PROJECT NAME / ADDRESS

PROVO CITY
PUBLIC WORKS DEPT.
SOUTHWEST LIFT STATION

DRAWING No.:	L201
PROJECT No.:	001958
PROJECT ENGINEER:	TYLER C
DESIGNER/ENG.:	TDC
CUSTOMER:	MORRIS ELEC SPRINGVILLE, UT

TITLE: LOCAL CONTROL PANEL NEMA TYPE 12 LAYOUT

DATE: 12/2/2021 SHEET: 1 OF 1 REV.: B

646 WEST 9TH AVENUE
MIDVALE, UTAH 84047
OFFICE: (801) 566-7200
FAX: (801) 255-0835

BILL OF MATERIALS

50HP VFD - BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	1	ENCLOSURE ,TYPE 12, GRAY, 90"H X 34"W X 24"D	CUSTOM	QES
1A	1	BACK PANEL	CUSTOM	QES
2	1	VFD - 50HP (NORMAL DUTY), 74A, 480VAC, 3P	ATV630D37N4	SCHNEIDER
2A	1	KEYPAD MOUNTING KIT	VW3A1112	SCHNEIDER
2B	1	KEYPAD CORDSET	VW3A1104R30	SCHNEIDER
3	1	BREAKER - TMAX, XT2, 480V 3P 100A FIXED	XT2HU3100BFF000XXX	ABB/GE
4	1	LOAD TERMINAL: CuAl, XT2, #10 - 2/0 AWG, W/ CTRL TAP	KXT2CUAL2C-3PC	ABB/GE
5	1	LINE TERMINAL: Cu, XT2, #14 - 1/0 AWG	KXT2CU-3PC	ABB/GE
6	1	OPERATION HANDLE BASE	KXTCRHEBFP	ABB/GE
6A	1	HANDLE - PISTOL w/ LOCKOUT TAB	OHB65J10B	ABB/GE
6B	1	TELESCOPIC SHAFT	OXP10X500	ABB/GE
7	1	LINE REACTOR - 5% IMPEADANCE, 65A, 3 POLE	KDRF1H	TCI
8	1	POWER DISTRIBUTION BLOCK - 3P, LINE:(1)3/0-#14, LOAD:(1)3/0-#14	1343572	MARATHON
9	1	CONTROL CIRCUIT TRANSFORMER, 480V:120V .5kVA	9T58K0050G38	ABB/GE
10	2	FUSE 600VAC, 3A	KLDR 3	LITTELFUSE
11	1	FUSE 250 VAC, 6.25A	FLM 6-1/4	LITTELFUSE
12	4	FUSE 250 VAC, 1A	217001	LITTELFUSE
13	6	2 POLE RELAY WITH INDICATOR 120V	RH2B-UL-AC120V	IDEC
13A	6	2 POLE RELAY BASE FINGER SAFE	SH2B-05C	IDEC
14	2	4 POLE RELAY WITH INDICATOR 120V	RH4B-UL-AC120V	IDEC
14A	2	4 POLE RELAY BASE FINGER SAFE	SH4B-05C	IDEC
15	1	ON DELAY TIMER 120V (8 PINS)	RTE-P1AF20	IDEC
15A	1	TIMER BASE 8 PINS FINGER SAFE	SR2P-05C	IDEC
16	3	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, AMBER, 30MM	ALD2QH211DNUA	IDEC
17	1	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, RED, 30MM	ALD2QH211DNUR	IDEC
18	1	PILOT LIGHT: 120VAC, PUSH-TO-TEST, LED, GREEN, 30MM	ALD2QH211DNUG	IDEC
19	1	PUSH BUTTON: OCTAGONAL FLUSH, MOMENTARY, BLACK, 1NC-1NO	ABD111NUB	IDEC
20	1	POWER SUPPLY - 24VDC, 15W, 0.65A	PS5R-VB24	IDEC
21	2	FAN - 120VAC, 600CFM	W2E200-HH86-01	EBM
22	1	FAN GUARD	78128-2-4039	EBM
23	1	AIR FILTER - 10 x 10 x 1, MERV 8, PRE PLEAT 40	80055.01101	FLANDERS
24	4FT	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1ft order)	0801733	PHOENIX CONTACT
25	45	UNIVERSAL TERMINAL BLOCK - UT 4	3044102	PHOENIX CONTACT
26	8	END PLATE	3047028	PHOENIX CONTACT
27	9	END STOP	0800886	PHOENIX CONTACT
28	1	JUMPER BAR, UT6	3030271	PHOENIX CONTACT
29	1	TERMINAL GROUND BLOCK 8.2mm UT4-PE (24~12 AWG)	3044128	PHOENIX CONTACT
30	4	FUSE HOLDER - MINI FAST ACTING	3046100	PHOENIX CONTACT
31	1	ETHERNET SWITCH - 5 PORT, DIN RAIL MOUNTED	2891152	PHOENIX CONTACT
32	1	MEDIUM DANGER SIGN	DANGER3X3	MISC
33	2	GROUND LUG	KA2U	BURNDY
34	6FT	WIRE DUCT 2"WX2"H, WHITE (order by ft)	G2X2WH6	PANDUIT
35	6FT	DUCT COVER WHITE	C2WH6	PANDUIT
36	1	CAT 6 CABLE - RJ45/RJ45, 600V RATED, SHIELDED, 10FT	CAT6600V10	PROFESSIONAL CABLE
37	1	CAT 6 CABLE - RJ45/RJ45, 600V RATED, SHIELDED, 1FT	CAT6600V1	PROFESSIONAL CABLE
38	1	SERIAL DEVICE SERVER - Nport 5200, SERIAL-TO-ETHERNET CONVERTER	NPORT 5230A	MOXA
38A	1	DIN MOUNTING KIT - MOXA NPORT	DK35A	MOXA
39	*2*	SEAL FAIL RELAY - KBS PUMPSAFE	SUPPLIED BY OTHERS	KBS
40	2	12 PIN SOCKET - 600V, 10A, SEAL FAIL MOUNTING SOCKET	SD12-PC	CUSTOM CONNECTOR
41	1	WINDOW KIT - 12" x 12", NEMA 12, HINGED	APWK1212H	HOFFMAN

L C P - BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	CATALOG	MANUFACTURE
1	1	ENCLOSURE ,TYPE 12, GRAY, 4 PILOT DEVICE HOLES, 11" x 4.2"	E4PBX	HOFFMAN
2	1	SELECTOR SWITCH: 3 POS. MAINTAINED, 120VAC, 2NO - 2NC	ASD340NU	IDEC
3	1	PUSH BUTTON: GREEN, FLUSH, 120VAC, 1NO - 1NC	ABD111NUG	IDEC
4	1	PUSH BUTTON: RED, FLUSH, 120VAC, 1NO - 1NC	ABD111NUR	IDEC
5	1	PUSH BUTTON: RED MUSHROOM, PUSH LOCK - TURN RELEASE, 1 NC	AVD301NUR	IDEC

646 West 9th Avenue
Midvale, Utah 84047
Office: (801) 566-7200
Fax: (801) 255-0835

Data Sheets

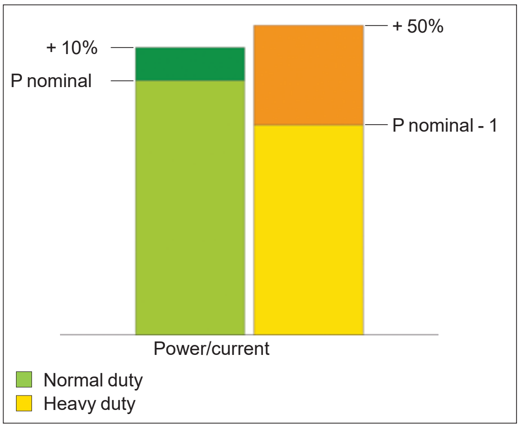
ATV630●●●N4F, ATV630●●●M3, ATV630●●●Y6, ATV650●●●N4, ATV650●●●N4E

Extensive offer

The Altivar Process wall-mounting and floor-standing products cover motor power ratings from 0.75...315 kW/*1...500 HP* for three-phase voltages between 200...240 V, 380...480 V and 500...690 V.

Three-phase power supply	Motor power	Degree of protection	Reference
200...240 V (-15...10%)	0.75 kW...75 kW *1...100 HP*	IP21 UL Type 1	**ATV630U07M3...D75M3**
380...480 V (-15...10%)	0.75 kW...315 kW *1...500 HP*	IP21 UL Type 1	**ATV630U07N4...C31N4**
		IP55	**ATV650U07N4...D90N4**
		IP55	**ATV650U07N4E...D90N4E** *(1)*
380...440 V (-15...10%)	110 kW...315 kW *150...500 HP*	IP21	**ATV630C11N4F...C31N4F**
		IP54	**ATV650C11N4F...C31N4F**
500...690 V (-15...10%)	2.2...90 kW *3...125 HP*	IP20 UL Type 1	**ATV630U22Y6...D90Y6**

(1) Integrated with disconnect switch.



Normal duty and Heavy duty modes

Altivar Process variable speed drives are designed for use in two operating modes that can optimize the drive nominal rating according to the system constraints.

These two modes are:
- Normal duty (ND): Dedicated mode for applications requiring a slight overload (up to 110%) with a motor power no higher than the drive nominal power
- Heavy duty (HD): Dedicated mode for applications requiring a significant overload (up to 150%) with a motor power no higher than the drive nominal power derated by one rating

Presentation: page 1/12
Configuration and runtime tools: page 2/14
Combinations: page 2/18
Dimensions: page 2/56

Variable speed drives
Altivar Process ATV600

Accessories and options

Altivar Process drives are designed to take numerous accessories and options to increase their functionality and also their capacity for integration and adaptation.

Accessories

- Drive:
  - Fan kit (see page 2/12)
- Graphic display terminal:
  - Remote mounting kit for mounting on enclosure door (see page 2/15)
  - Multidrop connection accessories for connecting several drives to the RJ45 terminal port (see page 2/15)

Options

- Modules (see page 2/24):
  - Extended I/O module:
    - 2 analog inputs
    - 6 digital inputs
    - 2 digital outputs
  - Extended relay module:
    - 3 NO contacts
  - Communication:
    - EtherNet/IP and Modbus TCP Dual port
    - CANopen bus: RJ45 daisy chain, SUB-D, 5-way screw terminals
    - PROFINET bus
    - Profibus DP V1 bus
    - DeviceNet bus
    - BACnet MS/TP
- Passive filters (see page 2/34)
- Additional EMC input filters for reducing conducted emissions on the line (see page 2/39)
- Output filters:
  - dv/dt filters (see page 2/43)
  - Sinus filters (see page 2/46)

Motor starters

Schneider Electric offers combinations of circuit breakers and contactors to be able to use Altivar Process drives in optimum conditions (see page 2/50).

Presentation: page 1/12 | Configuration and runtime tools: page 2/14 | Combinations: page 2/18 | Dimensions: page 2/56

Variable speed drives

Altivar Process ATV600

Three-phase supply voltage: 380...480 V 50/60 Hz

Wall-mounting drives

ATV630D15N4

ATV630D30N4

380...480 V (-15...10%) IP21/UL Type 1 drives

Motor			Line supply				Altivar Process			
Power indicated on rating plate *(1)*			Line current *(2)*		Apparent power	Maximum prospec-tive line Isc	Max. continuous current *(1)*	Max. transient current for 60 s	Reference *(5)*	Weight
ND: Normal duty *(3)* / *HD: Heavy duty (4)*			380 V	480 V	380 V					
	kW	*HP*	A	A	kVA	kA	A	A		kg/ *lb*
With category C2 integrated EMC filter										
ND	0.75	*1*	1.5	1.3	1.1	50	2.2	2.4	ATV630U07N4	4.500/ *9.921*
HD	*0.37*	*0.5*	*0.9*	*0.8*	*0.7*	*50*	*1.5*	*2.3*		
ND	1.5	*2*	3	2.6	2.2	50	4	4.4	ATV630U15N4	4.500/ *9.921*
HD	*0.75*	*1*	*1.7*	*1.5*	*1.2*	*50*	*2.2*	*3.3*		
ND	2.2	*3*	4.3	3.8	3.2	50	5.6	6.2	ATV630U22N4	4.500/ *9.921*
HD	*1.5*	*2*	*3.1*	*2.9*	*2.4*	*50*	*4*	*6*		
ND	3	*–*	5.8	5.1	4.2	50	7.2	7.9	ATV630U30N4	4.600/ *10.141*
HD	*2.2*	*3*	*4.5*	*4*	*3.3*	*50*	*5.6*	*8.4*		
ND	4	*5*	7.6	6.7	5.6	50	9.3	10.2	ATV630U40N4	4.600/ *10.141*
HD	*3*	*–*	*6*	*5.4*	*4.5*	*50*	*7.2*	*10.8*		
ND	5.5	*7.5*	10.4	9.1	7.6	50	12.7	14	ATV630U55N4	4.700/ *10.362*
HD	*4*	*5*	*8*	*7.2*	*6.0*	*50*	*9.3*	*14*		
ND	7.5	*10*	13.8	11.9	9.9	50	16.5	18.2	ATV630U75N4	7.700/ *16.976*
HD	*5.5*	*7.5*	*10.5*	*9.2*	*7.6*	*50*	*12.7*	*19.1*		
ND	11	*15*	19.8	17	14.1	50	23.5	25.9	ATV630D11N4	7.700/ *16.976*
HD	*7.5*	*10*	*14.1*	*12.5*	*10.4*	*50*	*16.5*	*24.8*		
ND	15	*20*	27	23.3	19.4	50	31.7	34.9	ATV630D15N4	13.600/ *29.983*
HD	*11*	*15*	*20.6*	*18.1*	*15.0*	*50*	*23.5*	*35.3*		
ND	18.5	*25*	33.4	28.9	24	50	39.2	43.1	ATV630D18N4	14.200/ *31.306*
HD	*15*	*20*	*27.7*	*24.4*	*20.3*	*50*	*31.7*	*47.6*		
ND	22	*30*	39.6	34.4	28.6	50	46.3	50.9	ATV630D22N4	14.300/ *31.526*
HD	*18.5*	*25*	*34.1*	*29.9*	*24.9*	*50*	*39.2*	*58.8*		
ND	30	*40*	53.3	45.9	38.2	50	61.5	67.7	ATV630D30N4	28.000/ *61.729*
HD	*22*	*30*	*40.5*	*35.8*	*29.8*	*50*	*46.3*	*69.5*		
ND	37	*50*	66.2	57.3	47.6	50	74.5	82	ATV630D37N4	28.200/ *62.170*
HD	*30*	*40*	*54.8*	*48.3*	*40.2*	*50*	*61.5*	*92.3*		
ND	45	*60*	79.8	69.1	57.4	50	88	96.8	ATV630D45N4	28.700/ *63.273*
HD	*37*	*50*	*67.1*	*59.0*	*49.1*	*50*	*74.5*	*111.8*		

(1) These values are given for use in continuous operation with a nominal switching frequency of 4 kHz (ATV630U07N4...D45N4). The switching frequency is adjustable from 2…12 kHz (ATV630U07N4...D45N4).
Above the nominal switching frequency, the drive will automatically reduce the switching frequency in the event of an excessive temperature rise.
For continuous operation above the nominal switching frequency, nominal drive current should be derated according to the derating curves in the Installation Manual.

(2) Typical value for the indicated motor power and for the maximum prospective line Isc.

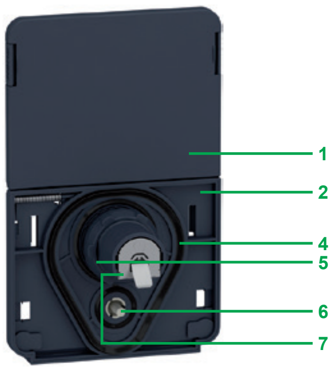
(3) Values given for applications requiring a slight overload (up to 110%).

(4) Values given for applications requiring a significant overload (up to 150%).

(5) For ATV630●●●N4Z cabinet integration products, see pages 3/6 and 3/7 in the cabinet integration section.

Note: Consult the summary tables of possible drive, option, and accessory combinations (see page 2/18).

Remote mounting kit for mounting graphic display terminal on enclosure door (front panel)



Remote mounting kit for graphic display terminal (rear panel)

Accessories for graphic display terminal

■ Remote mounting kit for mounting on enclosure door with IP65/UL Type 12 degree of protection as standard

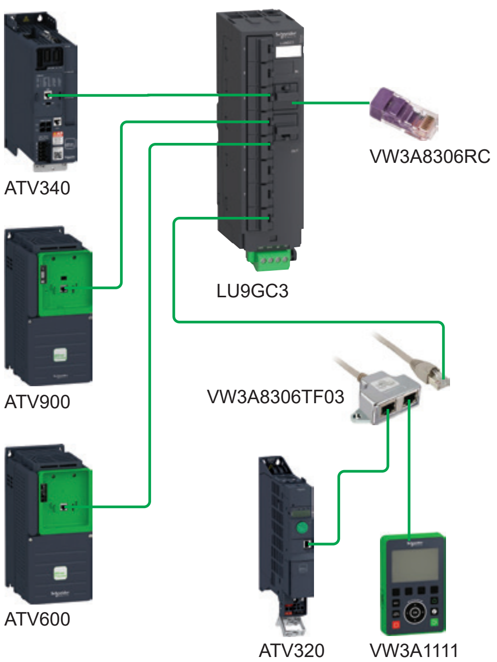
The kit comprises:
- Tightening tool (also sold separately under the reference ZB5AZ905)

1 Cover plate to maintain IP65 protection when there is no terminal connected
2 Mounting plate
3 RJ45 port for the graphic display terminal
4 Seal
5 Fixing nut
6 Anti-rotation pin
7 RJ45 port for connecting the remote-mounting cordset (10 m/*33 ft* maximum); Cordsets should be ordered separately depending on the length required.
8 Grounding connector

Drilling a hole with a standard Ø 22 tool, as used for a pushbutton, allows the unit to be mounted without needing a cut-out in the enclosure (Ø 22.5 mm/*Ø 0.89 in.* drill hole).

References

Description	Length m/ *ft*	IP rating	Reference	Weight kg/ *lb*
Remote mounting kit Order with remote-mounting cordset VW3A1104R●●●	–	65/UL Type 12	VW3A1112	–
Tightening tool for remote mounting kit	–	–	ZB5AZ905	0.016/ *0.035*
Remote-mounting cordset equipped with 2 RJ45 connectors	1/ *3.28*	–	VW3A1104R10	0.050/ *0.110*
	3/ *9.84*	–	VW3A1104R30	0.150/ *0.331*
	5/ *16.40*	–	VW3A1104R50	0.250/ *0.551*
	10/ *32.81*	–	VW3A1104R100	0.500/ *1.102*
USB/Mini B USB cable for connecting the display terminal to a PC	–	–	TCSXCNAMUM3P	–
IP65 remote mounting kit for Ethernet port *(1)* Ø 22 RJ45 female/female adapter with seal	–	65	VW3A1115	0.018/ *0.040*
Set of 10 x IP55 shutters: To maintain IP55 protection when the graphic display terminal is removed *(2)*	–	55	VW3A1116	0.640/ *1.411*



Example of multipoint screen architecture

Multidrop connection accessories

These accessories are used to connect a graphic display terminal to several drives via a multidrop link. This multidrop connection uses the RJ45 terminal port on the front of the drive.

Connection accessories

Description			Sold in lots of	Unit reference	Weight kg/ *lb*
Modbus splitter box 10 RJ45 connectors and 1 screw terminal block			–	LU9GC3	0.500/ *1.102*
Modbus T-junction boxes	With 0.3 m/*0.98 ft* *integrated cable*		–	VW3A8306TF03	0.190/ *0.419*
	With 1 m/3.28 ft integrated cable		–	VW3A8306TF10	0.210/ *0.463*
Modbus line terminator	For RJ45 connector	R = 120 Ω C = 1 nf	2	VW3A8306RC	0.010/ *0.022*

Cordsets (equipped with 2 RJ45 connectors)

Used for	Length m/ *ft*	Reference	Weight kg/ *lb*
Serial link	0.3/ *0.98*	VW3A8306R03	0.025/ *0.055*
	1/ *3.28*	VW3A8306R10	0.060/ *0.132*
	3/ *9.84*	VW3A8306R30	0.130/ *0.287*

(1) Used to connect a remote PC to the RJ45 port on an IP21 drive mounted in an enclosure or on a wall. Drill hole with a standard Ø 22 tool, as used for a pushbutton. (Requires a remote-mounting cordset VW3A1104R●0● equipped with 2 RJ45 connectors.)
(2) Only compatible with ATV650 drives.

Ordering codes for Tmax XT2
Circuit breakers

XT2HU3100BFF000XXX

Tmax XT2 – circuit breaker

Distribution circuit breakers

Tmax XT, XT2, 125A Frame, Thermal Magnetic-Fixed (TMF) and Adjustable (TMA) Protection with Front Terminals

Amps	N (25kA) U.S. Ordering Code	S (35kA) U.S. Ordering Code	H (65kA) U.S. Ordering Code
Thermal Magnetic-Fixed (TMF)			
15	XT2N■♦015AFF000XXX	XT2S■♦015AFF000XXX	XT2H■♦015AFF000XXX
20	XT2N■♦020AFF000XXX	XT2S■♦020AFF000XXX	XT2H■♦020AFF000XXX
25	XT2N■♦025AFF000XXX	XT2S■♦025AFF000XXX	XT2H■♦025AFF000XXX
30	XT2N■♦030AFF000XXX	XT2S■♦030AFF000XXX	XT2H■♦030AFF000XXX
35	XT2N■♦035AFF000XXX	XT2S■♦035AFF000XXX	XT2H■♦035AFF000XXX
40	XT2N■♦040AFF000XXX	XT2S■♦040AFF000XXX	XT2H■♦040AFF000XXX
50	XT2N■♦050AFF000XXX	XT2S■♦050AFF000XXX	XT2H■♦050AFF000XXX
60	XT2N■♦060AFF000XXX	XT2S■♦060AFF000XXX	XT2H■♦060AFF000XXX
70	XT2N■♦070AFF000XXX	XT2S■♦070AFF000XXX	XT2H■♦070AFF000XXX
Thermal Magnetic-Adjustable (TMA)			
80	XT2N■♦080BFF000XXX	XT2S■♦080BFF000XXX	XT2H■♦080BFF000XXX
90	XT2N■♦090BFF000XXX	XT2S■♦090BFF000XXX	XT2H■♦090BFF000XXX
100	XT2N■♦100BFF000XXX	XT2S■♦100BFF000XXX	XT2H■♦100BFF000XXX
110	XT2NU♦110BFF000XXX	XT2SU♦110BFF000XXX	XT2HU♦110BFF000XXX
125	XT2NU♦125BFF000XXX	XT2SU♦125BFF000XXX	XT2HU♦125BFF000XXX

■ U for UL 80% rated or Q for 100% rated
♦ 3 for 3-pole or 4 for 4-pole

Tmax XT, XT2, 125A Frame, Thermal Magnetic-Fixed (TMF) and Adjustable (TMA) Protection with Front Terminals

Amps	L (100kA) U.S. Ordering Code	V (150kA) U.S. Ordering Code	X (200kA) U.S. Ordering Code
Thermal Magnetic-Fixed (TMF)			
15	XT2L■♦015AFF000XXX	XT2V■♦015AFF000XXX	XT2X■♦015AFF000XXX
20	XT2L■♦020AFF000XXX	XT2V■♦020AFF000XXX	XT2X■♦020AFF000XXX
25	XT2L■♦025AFF000XXX	XT2V■♦025AFF000XXX	XT2X■♦025AFF000XXX
30	XT2L■♦030AFF000XXX	XT2V■♦030AFF000XXX	XT2X■♦030AFF000XXX
35	XT2L■♦035AFF000XXX	XT2V■♦035AFF000XXX	XT2X■♦035AFF000XXX
40	XT2L■♦040AFF000XXX	XT2V■♦040AFF000XXX	XT2X■♦040AFF000XXX
50	XT2L■♦050AFF000XXX	XT2V■♦050AFF000XXX	XT2X■♦050AFF000XXX
60	XT2L■♦060AFF000XXX	XT2V■♦060AFF000XXX	XT2X■♦060AFF000XXX
70	XT2L■♦070AFF000XXX	XT2V■♦070AFF000XXX	XT2X■♦070AFF000XXX
Thermal Magnetic-Adjustable (TMA)			
80	XT2L■♦080BFF000XXX	XT2V■♦080BFF000XXX	XT2X■♦080BFF000XXX
90	XT2L■♦090BFF000XXX	XT2V■♦090BFF000XXX	XT2X■♦090BFF000XXX
100	XT2L■♦100BFF000XXX	XT2V■♦100BFF000XXX	XT2X■♦100BFF000XXX
110	XT2LU♦110BFF000XXX	XT2VU♦110BFF000XXX	XT2XU♦110BFF000XXX
125	XT2LU♦125BFF000XXX	XT2VU♦125BFF000XXX	XT2XU♦125BFF000XXX

■ U for UL 80% rated or Q for 100% rated
♦ 3 for 3-pole or 4 for 4-pole

Compliance with standards

SACE® Tmax XT circuit-breakers and their accessories are constructed in compliance with[1]:

- Standards:
  - UL489 (MCCB File # E93565 & MCCB Accessories File # E116596) and CSA C22.2;
- Directives:
  - EC "Low Voltage Directive" (LVD) N° 2014/35/EC;
  - EC "Electromagnetic Compatibility Directive" (EMC) 2014/30/EC;
- Shipping Registers approvals upon request.

Terminal options

Fixed version:

The standard fixed version of the SACE® Tmax XT circuit breakers are supplied with front terminals (F) and can be fitted with the following types of terminals as accessories thanks to the special kits:

- Extended front (EF)
- Extended spread front (ES)
- Front for copper/aluminum cables (FCCuAl)
- Rear oriented (R)

Withdrawable versions:

Please see the Tmax XT Technical Catalog for more details.

Trip unit options

- Thermal Magnetic Adjustable (TMA)
- Ekip Dip (LS/I, LSI, LIG, LSIG)
- Ekip M Dip (I)
- Ekip G Dip (LS/I)
- Molded Case Switch (MCS)

Accessories

- Terminal Options
- Auxiliary Contacts
- Operating Mechanisms (Direct Handles, Extended Handles, Flange Handles, etc.)
- Remote Control (Shunt Trip, Undervoltage Release, Motor Operator, etc.)
- Safety and Protection (Terminal Covers, Phase Separators, Padlocks, Keylocks, IP Protection, etc.)
- Interlocks

Included with the breaker

The breaker comes with breaker mounting hardware, terminal hardware, phase barriers, an insulation backplate, and lateral conduit for accessory wires.

Temperature rating

Tmax XT circuit breakers can be used in ambient air temperatures varying between -25°C and +70°C, and can be stored at temperatures between -40°C and +70°C. Please consult the temperature performance derating tables for temperature values outside of +40°C. The reference temperature for the trip units is +40°C. Note that the lug and wire insulation ratings are +75°C, so care should be exercised when operating near this temperature in order not to exceed these ratings.

100% rated

A Fixed XT6 breaker is suitable for continuous operation at 100-percent of rating up to 800A with electronic trip units and 90°C wire. The wire size shall be based on the ampacity of 75°C rated wire..

Single phase application

XT6 three pole circuit breakers, equipped with thermal-magnetic trip units, can be used in single phase applications. For this purpose, they are marked as follows according to UL standard: Suitable for single phase application up to 600VAC.

Reverse feed capabilities

Power can be supplied from the bottom terminals of the XT6 breaker up to the maximum voltage rating.

Related links

Installation Instructions

Drawings

- XT6 Fixed 3-4p breaker (2D)
- XT6 Fixed 3p breaker (3D)
- XT6 Fixed 4p breaker (3D)

1. Product complies with listed standards and directives as of the date of this publication

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Cary, NC 27511

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888-437-3765
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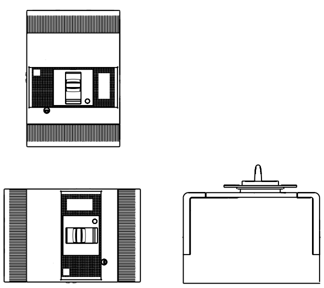
1SXU210260D0201

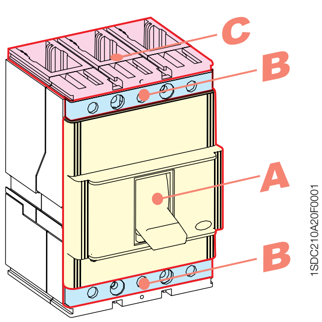
Main characteristics

1

Positive operation



Installation positions



Protection degrees

Test pushbutton

The references in round brackets (Gx.x) refer to the Glossary in the final chapter of the technical catalog.

All circuit breakers in the SACE Tmax XT family are made with the following construction characteristics:

- double insulation(G1.5);
- positive operation(G1.6);
- isolation behavior(G1.7);
- electromagnetic compatibility(G1.8);
- tropicalization(G1.9);
- impact and vibration resistance(G1.10);
- power supply from the top towards the bottom or vice versa, except for over 480V on XT2 and over 600V on XT4;
- installation versatility. Circuit breaker can be mounted in a horizontal or vertical position or laid flat without any derating of rated characteristics;
- no nominal performance derating for use up to an altitude of 2000m/6561ft. Above 2000m/6561ft, atmospheric properties (air composition, dielectric strength, cooling power and pressure) change, affecting the main parameters that define the circuit breaker. The table below shows changes to the main performance parameters:

Altitude		2000m/ 6561ft	3000m/ 9842ft	4000m/ 13123ft	5000m/ 16404ft
Rated employ voltage, Ue	[V AC]	600	528	468	408
Rated uninterrupted current	%	100	98	93	90

- SACE Tmax XT circuit breakers can be used in ambient temperatures between -25°C/-13°F and +70°C/158°F and stored in ambient temperatures between -40°C/-40°F and +70°C/158°F. For temperatures outside these ranges, see the “Temperature performance” paragraph of the “Typical curves and technical information” chapter;
- different degrees of IP (International Protection)(G 1.11)(2);

Circuit-breaker	With front	Without front(1)	With front for lever -FLD-	With rotary handles	With extended rotary handle and accessory IP54	With high terminal covers HTC	With low terminal covers LTC
A	IP40	IP20	IP40	IP40	IP54	IP40	IP40
B	IP20	IP20	IP20	IP20	IP20	IP40	IP40
C	NC	NC	NC	NC	NC	IP40	IP30

(1) During the installation of electrical accessories
NC Not classifiable
(2) IEC only

Accessories	Motor operator MOD, MOE or MOE-E	Residual current devices	Residual current from switchboard RCQ020	Automatic transfer switch ATS021 and ATS022
On Front	IP30	IP40	IP41	IP40

- all circuit breakers in the XT family have a pushbutton for performing the release test. The circuit breaker must be closed, with no current, while the test is being performed.

Regulations and reference standards

Hologram

Naval Registers

1

Conformity with Standards

SACE Tmax XT circuit breakers and their accessories are constructed in conformity with:

- Standard(G6.1):
  - UL 489;
  - CSA C22.2 No. 5;
  - IEC 60947-2;
- Directives(G6.2):
  - EC “Low Voltage Directive” (LVD) N° 2006/95/EC (replacing 73/23/EEC and subsequent amendments);
  - EC “Electromagnetic Compatibility Directive” (EMC) 2004/108/CE;
- Naval Registers(G6.3) (ask ABB SACE for the versions available):
  - ABS.

Certification of conformity with the product Standards is carried out in the ABB SACE test laboratory (accredited by SINAL) in respect of the EN 45011 European Standard, by the Italian certification body ACAE (Association for Certification of Electrical Apparatus), member of the European LOVAG organization (Low Voltage Agreement Group) and by the Swedish certification body SEMKO belonging to the International IECEE organization.
The SACE Tmax XT series has a hologram on the front, obtained using special anti-forgery techniques. This ensures the quality and authenticity of the circuit breaker as a genuine ABB SACE product.

Company Quality System

The ABB SACE Quality System conforms to the following Standards:

- ISO 9001 International Standard;
- EN ISO 9001 (equivalent) European Standards;
- UNI EN ISO 9001 (equivalent) Italian Standards;
- IRIS International Railway Industry Standard.

The ABB SACE Quality System attained its first certification with the RINA certification body in 1990.

Environmental management system, social responsibility and ethics

For ABB SACE, environmental protection is a top priority, as evidenced when ours was the first industry in Italy’s electromechanical sector to have obtained the RINA’s Environmental Management System certification in recognition of the company’s commitment in conformity with the International ISO 14001 Standard.
In 1999, the Environmental Management System and the Occupational Health and Safety Management System were integrated according to the OHSAS 18001 Standard. In 2005, the SA 8000 (Social Accountability 8000) Standard was integrated, committing itself to respect business ethics and working conditions.
Our commitment to environmental protection is solidified through:

- selection of materials, processes and packaging which mitigate the true environmental impact of the product;
- use of recyclable materials;
- voluntary adherence to the RoHS directive(G6.4).

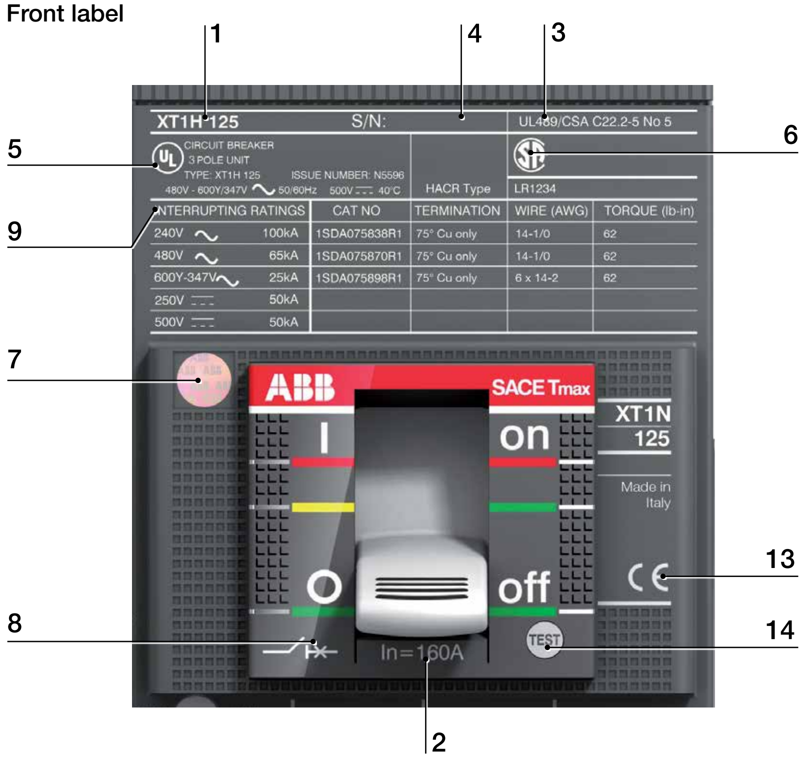
ISO 14001, 18001 and SA8000 recognitions together with ISO 9001 made it possible for ABB SACE to obtain RINA BEST FOUR CERTIFICATION.

Identification of the SACE Tmax XT circuit breakers

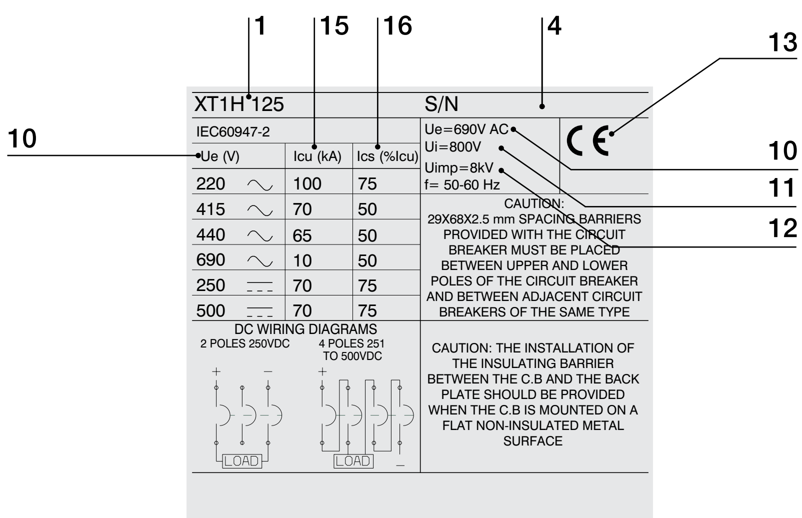
1

The specifications of each circuit breaker appear on the rating name plate on both the front and side of the unit.

Front label



Side label



1	Name and performance level	**9**	Interrupting ratings
2	In: rated current	**10**	Rated service voltage
3	Reference standard UL489/CSA22.2	**11**	Rated insulation voltage
4	Serial number	**12**	Rated impulse withstand voltage
5	UL marking	**13**	CE marking
6	CSA marking	**14**	Test pushbutton
7	Anti-forgery logo	**15**	Rated ultimate short-circuit breaking capacity
8	Symbol of isolation behavior	**16**	Rated short-circuit duty breaking capacity

Nomenclature of the trip units

The tables below outline the logic behind the naming of each thermal magnetic and electronic trip unit.

Magnetic trip units

Family name		Protection
M: magnetic	+	A: with adjustable threshold

Thermal magnetic trip units

Family name		Protection
TM: thermal magnetic	+	F: with fixed threshold A: with adjustable thermal and magnetic threshold

Example:
- MA: magnetic only trip unit, with adjustable protection threshold (MCP);
- TMF: thermal magnetic trip unit, with fixed thermal and fixed magnetic protection threshold;

Electronic trip units

Family name		Application		Protection
Ekip	+	….: Distribution M: Motor protection E: Energy measurements	+	I LS/I LSI LSIG LIU

Example:
- Ekip LS/I: electronic trip unit for distribution networks protection, with "L" against overload and either "S" protection function against delay short circuit or "I" protection function against instantaneous short circuit;
- Ekip M-LIU: electronic trip unit for motor protection, with LIU protection functions.

Residual current protection devices[1]

Family name		Typology
RC	+	Inst: instantaneous type 'A' Sel: selective type 'A' Sel 200: selective type 'A' reduced to 200mm B Type: selective type 'B'

[1] IEC only

Ordering codes for Tmax XT accessories
Power connection


—
Front extended terminal – EF


—
Front extended spread terminal – ES


—
FC Cu terminal


—
FC CuAl external terminal


—
FC CuAl internal terminal

Terminals for circuit breaker (cont.)

Size	Type	3 pcs (½ kit for 3p)	4 pcs (½ kit for 4p)
		U.S. Ordering Code	U.S. Ordering Code
XT2	FC CuAl terminals for CuAl cables 10-2/0 AWG	KXT2CUAL2-3PC	KXT2CUAL2-4PC
XT2	FC CuAl terminals AuxV for CuAl cables 10-2/0 AWG	KXT2CUAL2C-3PC	KXT2CUAL2C-4PC
XT2	FC Cu terminals for Cu cables 14-1/0 AWG	KXT2CU-3PC	KXT2CU-4PC
XT2	MC Cu multi-cable terminals for Cu cables 6x14-2 AWG	KXT2MC-3PC	KXT2MC-4PC
XT2	R rear adjustable terminals	KXT2ER-3PC	KXT2ER-4PC
XT2	FB flexible busbar terminals	KXT2EFB-3PC	KXT2EFB-4PC
XT3	F front terminals	KXT3F-3PC	KXT3F-4PC
XT3	EF extended front terminals	KXT3EF-3PC	KXT3EF-4PC
XT3	ES extended spread front terminals	KXT3ES-3PC	KXT3ES-4PC
XT3	FC CuAl terminals AuxV for CuAl cables 14-1/0 AWG	KXT3CUAL1C-3PC	KXT3CUAL1C-4PC
XT3	FC CuAl terminals for CuAl cables 14-1/0 AWG	KXT3CUAL1-3PC	KXT3CUAL1-4PC
XT3	FC CuAl terminals AuxV for CuAl cables 4 AWG-300 Kcmil	KXT3CUAL2C-3PC	KXT3CUAL2C-4PC
XT3	FC CuAl terminals for CuAl cables 4 AWG-300 Kcmil	KXT3CUAL2-3PC	KXT3CUAL2-4PC
XT3	FC Cu terminals for Cu cables 10-250 AWG	KXT3CU-3PC	KXT3CU-4PC
XT3	MC Cu multi-cable terminals for Cu cables 6x12-2 AWG	KXT3MC-3PC	KXT3MC-4PC
XT3	R rear adjustable terminals	KXT3ER-3PC	KXT3ER-4PC
XT3	FB flexible busbar terminals	KXT3EFB-3PC	KXT3EFB-4PC
XT3	R-RC rear terminal for RC Inst-Sel	–	KXT3ERRC-4PC
XT4	F front terminals	KXT4F-3PC	KXT4F-4PC
XT4	EF extended front terminals	KXT4EF-3PC	KXT4EF-4PC
XT4	ES extended spread front terminals	KXT4ES-3PC	KXT4ES-4PC
XT4	FC CuAl terminals for CuAl cables 14-1/0 AWG	KXT4CUAL1-3PC	KXT4CUAL1-4PC
XT4	FC CuAl terminals AuxV for CuAl cables 14-1/0 AWG	KXT4CUAL1C-3PC	KXT4CUAL1C-4PC
XT4	FC CuAl terminals for CuAl cables 4 AWG-300 Kcmil	KXT4CUAL2-3PC	KXT4CUAL2-4PC
XT4	FC CuAl terminals AuxV for CuAl cables 4 AWG-300 Kcmil	KXT4CUAL2C-3PC	KXT4CUAL2C-4PC
XT4	FC CuAl terminals for CuAl cables 3/0 AWG-350 Kcmil (1)	KXT4CUAL3-3PC	KXT4CUAL3-4PC

Ordering codes for Tmax XT accessories
Operating mechanism

Heavy duty rotary mechanisms, shafts and pistol handles XT1…XT4

Size	Description	U.S. Ordering Code
XT1-XT4	RHE-B XT1…XT4 f/p metallic base	KXTMRHESTFP
XT1-XT4	RHE-SS XT1..XT4 shaft support	KXTMRHESS
XT1-XT4	92mm pistol handle shaft	OXP10X92
XT1-XT4	148mm pistol handle shaft	OXP10X148
XT1-XT4	225mm pistol handle shaft	OXP10X225
XT1-XT4	500mm pistol handle shaft	OXP10X500
XT1-XT4	700mm pistol handle shaft	OXP10X700
XT1-XT4	900mm pistol handle shaft	OXP10X900
XT1-XT4	Standard Pistol Hdl w/reset, 65mm, NEMA 3R,12	OHB65J10B
XT1-XT4	Emerg. Pistol Hdl w/reset, 65mm, NEMA 3R,12	OHY65J10B
XT1-XT4	Standard Pistol Hdl w/reset, 65mm, NEMA 4,4X	OHB65L10B
XT1-XT4	Emerg. Pistol Hdl w/reset, 65mm, NEMA 4,4X	OHY65L10B
XT1-XT4	Standard Pistol Hdl w/reset,125mm, NEMA 3R,12	OHB125J10B
XT1-XT4	Emerg. Pistol Hdl w/reset, 125mm, NEMA 3R,12	OHY125J10B
XT1-XT4	Standard Pistol Hdl w/reset, 125mm, NEMA 4,4X	OHB125L10B
XT1-XT4	Emerg. Pistol Hdl w/reset,125mm, NEMA 4,4X	OHY125L10B

Spare parts for transmitted (rotary) handle

Size	Description	Fixed/plug-in	Withdrawable
		U. S. Ordering Code	U. S. Ordering Code
XT1-XT3	RHE-B base for transmitted handle	KXTBRHEBFP	–
XT1-XT3	RHE-B base for extended handle + 2PLL	KXTBRHEBFPPLK	–
XT2-XT4	RHE-B base for transmitted handle	KXTCRHEBFP	KXTCRHEBW
XT2-XT4	RHE-B base for extended handle + 2PLL	KXTCRHEBFPPLK	KXTCRHEBWPLK
XT2-XT4	Telescopic rod kit	KXTHRHETR	–
XT1-XT4	RHE-S rod of 500mm	KXTARHES500	–
XT1-XT4	RHE-H normal transmitted handle	KXTARHEHST	–
XT1-XT4	RHE-H emergency transmitted handle	KXTARHEHEM	–
XT1-XT4	LH normal large handle	KXTALHNDLST	–
XT1-XT4	LH large emergency handle	KXTALHNDLEM	–

—
NFPA handle

RHE NFPA handle

Size	Type	U.S. Ordering Code
XT1-XT4	RHE NFPA handle	KXTANFPAHDL

KDR Optimized Line Reactors
KLR Series Three Phase Line Reactors
DIN-Rail Line Reactors

KDR At The Input Of The Drive
KDR Optimized Line Reactors applied to the line side of a PWM drive will greatly improve the overall performance of the drive. The additional circuit inductance will reduce AC voltage waveform line notching, DC bus overvoltage trips, inverter overvoltage, poor total power factor, and cross-talk.

Use KDR Low "Z" Units For:
These units can be used in any applications where traditionally either a 1.5% or 3% reactor would be applied.
Reduction of nuisance tripping caused by:
- Transient voltages caused by capacitor switching
- Line notching
- DC bus overvoltage tripping
- Inverter overcurrent and overvoltage

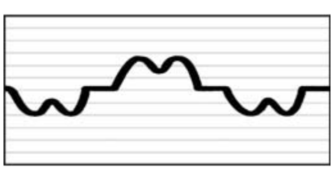
Additional benefits include:
- Lowering injected percentage of harmonic current
- Improving true power factor
- Reducing cross-talk between drives

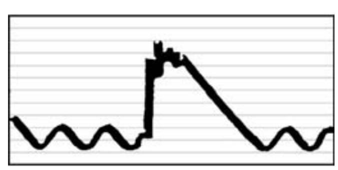
Use KDR High "Z" Units For:
These units can be used in any rugged application where traditionally a 5% reactor would be applied.
KDR High "Z" offers the same superior benefits as Low "Z" plus additional benefits which include:
- Helping prevent drive component damage
- Providing maximum harmonic mitigation without adding capacitance
- Further improving true power factor
- Adding impedance to drives with or without DC link chokes/reactors when more impedance is desired due to a relatively stiff source.

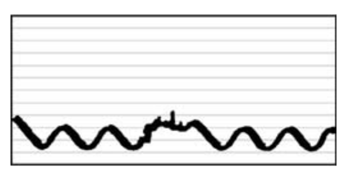
Watts Loss
The watts loss shown above are based on the effects of increased losses in both the core steel laminations and wire due to the presence of harmonic currents. Consideration of eddy currents in the watts loss calculation is important. The watt losses in the reactor core caused by eddy currents are proportional to the harmonic frequency squared. The harmonic current levels were derived from a typical 6 pulse converter as follows:

Harmonic	Current Distortion
5th	17%
7th	11%
11th	4.5%


Harmonic Current Distortion without KDR


Harmonic Current Distortion with KDR


Transient Voltage without KDR


Transient Voltage with KDR

KDR Optimized Line Reactors

KDR 480V

480 Volt High-Z

Part Number	NEC Motor HP	NEC Motor Current	Watts Loss	Standard Terms	Dimensions (in.)	Open		NEMA 1 Enclosed	
					Height x Width x Depth	Weight	List Price	Part Number	List Price
KDRA6H	0.5	1.1	9	TB	4.00 x 4.18 x 3.75	4	$ 112.00	KDRA6HC1	$ 236.00
KDRA7H	0.75	1.6	15	TB	4.00 x 4.18 x 3.75	4	$ 122.00	KDRA7HC1	$ 247.00
KDRA8H	1	2.1	12	TB	4.00 x 4.18 x 3.75	4	$ 123.00	KDRA8HC1	$ 248.00
KDRA9H	1.5	3	23	TB	4.00 x 4.18 x 3.75	4	$ 124.00	KDRA9HC1	$ 249.00
KDRA1H	2	3.4	33	TB	4.00 x 4.18 x 3.75	4	$ 129.00	KDRA1HC1	$ 252.00
KDRA2H	3	4.8	38	TB	4.00 x 4.18 x 3.75	4	$ 165.00	KDRA2HC1	$ 289.00
KDRA3H	5	7.6	80	TB	4.00 x 4.18 x 3.75	4	$ 190.00	KDRA3HC1	$ 315.00
KDRA4H	7.5	11	77	TB	4.00 x 4.18 x 3.75	5	$ 214.00	KDRA4HC1	$ 338.00
KDRA5H	10	14	111	TB	4.00 x 4.18 x 3.75	5	$ 266.00	KDRA5HC1	$ 390.00
KDRB2H	15	21	133	TB	5.00 x 6.00 x 4.00	7	$ 273.00	KDRB2HC1	$ 398.00
KDRC3H	20	27	108	TB	5.75 x 7.20 x 5.00	15	$ 307.00	KDRC3HC2	$ 455.00
KDRC1H	25	34	112	TB	5.75 x 7.20 x 5.00	15	$ 368.00	KDRC1HC2	$ 516.00
KDRE2H	30	40	141	TB	5.75 x 7.20 x 5.00	16	$ 418.00	KDRE2HC2	$ 566.00
KDRF4H	40	52	169	TB	7.00 x 9.00 x 6.00	25	$ 435.00	KDRF4HC3	$ 646.00
KDRF1H	50	65	191	TB	7.00 x 9.00 x 6.00	25	$ 600.00	KDRF1HC3	$ 810.00
KDRF2H	60	77	226	TB	7.00 x 9.00 x 6.00	25	$ 621.00	KDRF2HC3	$ 832.00
KDRH2H	75	96	212	CB	9.00 x 11.00 x 7.00	45	$ 706.00	KDRH2HC4	$ 1,060.00
KDRI2H	100	124	362	CB	9.00 x 11.00 x 7.00	52	$ 845.00	KDRI2HC4	$ 1,198.00
KDRG3H	125	156	274	CB	9.00 x 11.00 x 8.00	55	$ 950.00	KDRG3HC4	$ 1,303.00
KDRG1H	150	180	359	CB	9.00 x 11.00 x 8.00	55	$ 1,160.00	KDRG1HC4	$ 1,513.00
KDRJ1H	200	240	420	CB	9.00 x 11.00 x 9.00	70	$ 1,541.00	KDRJ1HC5	$ 2,014.00
KDRL1H	250	302	548	CB	11.38 x 14.50 x 9.50	110	$ 1,681.00	KDRL1HC5	$ 2,153.00
KDRL2H	300	361	786	CB	11.38 x 14.50 x 9.31	95	$ 1,693.00	KDRL2HC5	$ 2,164.00
KDRL3H	350	414	750	CB	11.38 x 14.50 x 9.31	100	$ 1,930.00	KDRL3HC5	$ 2,401.00
KDRL4H	400	477	730	CB	11.38 x 14.50 x 9.50	110	$ 2,554.00	KDRL4HC5	$ 3,027.00
KDRL5H	450	515	774	CB	11.38 x 14.50 x 11.00	120	$ 2,663.00	KDRL5HC5	$ 3,135.00
KDRL6H	500	590	697	CB	11.38 x 14.50 x 11.00	120	$ 3,367.00	KDRL6HC5	$ 3,838.00
KDRS1H	600	720	1246	CB	11.38 x 15.00 x 13.00	260	$ 4,052.00	KDRS1HC7	$ 5,237.00
KDRS2H	700	840	1454	CB	11.38 x 15.00 x 13.00	260	$ 4,729.00	KDRS2HC7	$ 5,672.00
KDRX2H	800	960	1661	CB	18.50 x 18.25 x 12.50	290	$ 5,404.00	KDRX2HC7	$ 6,646.00
KDRX3H	900	1080	1869	CB	18.50 x 18.25 x 12.50	290	$ 6,080.00	KDRX3HC7	$ 7,320.00
KDRX4H	1000	1200	1337	CB	18.50 x 18.25 x 12.50	274	$ 6,754.00	KDRX4HC7	$ 7,996.00
KDRY2H	1100	1320	2284	CB	20.00 x 21.00 x 16.00	525	$ 7,430.00	KDRY2HC7	$ 8,671.00
KDRY1H	1250	1500	2596	CB	20.00 x 21.00 x 16.00	575	$ 8,443.00	KDRY1HC7	$ 9,684.00

Part Numbering System

KDR B 43 H C1

- KDR Series
- Design Frame
- Sequence Code
- Impedance Rating
  - L = Low Impedance
  - H = High Impedance
  - P = Output Reactor
- Enclosure
  - NEMA 1 Sizes: 1-5, 7

* For enclosed unit dimensions and added weight, please refer to the Reactor Enclosure Price Page

Product Data Sheet

POWER DISTRIBUTION BLOCK

134x572

Replace “x” with 1, 2, or 3 for number of poles

Wire Range

- Line: (1) 3/0 - #14 AWG ($70mm^2$ - $2.5mm^2$)
- Load: (1) 3/0 - #14 AWG ($70mm^2$ - $2.5mm^2$)

Electrical Ratings

- 200 Amps
- 600V per UL 1953 & CSA 22.2 No.158, class B & C requirements
- Short Circuit Current Rating (SCCR): See SCCR section for specifications
- CU7AL - 75°C connector terminal rating with copper or aluminum wire
- Factory & Field Wiring

Agency Compliance

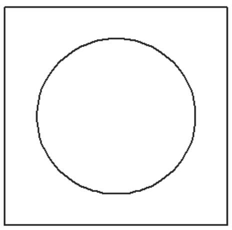
- UL Listed, Investigated to UL 1953, File QPQS7.E309401

Material Information

- Insulator base:
    - Thermoplastic
    - Flammability rating of insulator base UL94V0
    - Insulator base temperature rating: -40°C to 125°C (UL RTI)
- Connector: aluminum, tin plated
- Line terminal set screws: aluminum, tin plated
- Load terminal set screw: steel, zinc plated
- Connector mounting screws: steel, zinc plated
- RoHS compliant

marathon® Special Products

Termination Specifications

Line and Load Side	Wire Size (CU Stranded)	Torque	Wires / Terminal	Wire Class (UL) [1]
	3/0	20.3 N.m (180 lbf in)	1	B, C
	2/0 - 2	20.3 N.m (180 lbf in)	1	B, C, G, H, I (DLO)
	4	20.3 N.m (180 lbf in)	1	G, H, I (DLO)
			1 - 2	B, C
	6 - 8	20.3 N.m (180 lbf in)	1 - 2	B, C, G, H, I (DLO)
	10	5.6 N.m (50 lbf. in)	1 - 4	B, C
			1 - 2	G, H, I (DLO)
	12 - 14	5.6 N.m (50 lbf. in)	1 - 4	B. C
			1	G, H, I (DLO)

- Aluminum stranded wire range: 3/0 - #6 AWG
- Wire strip length: 7/8 in. (18mm)
- Copper solid wire range: #10 - #14
- Terminal screw drive: 1/4” Hex

[1] For information on copper stranded wire classes please visit:
http://www.marathonsp.com/flexible-stranded-wire.php

Short Circuit Current Ratings (SCCR)

- The suitable conductor ranges are limited to the table values only for achieving the SCCR in excess of the default rating of 10,000A.
- Other conductor combinations within the "Terminal Specifications" noted are suitable for achieving a SCCR of 10,000A (the default rating of terminal blocks).
- Enclosure size – For SCCR's greater than the default of 10KA, the minimum enclosure size is 16x12x6. When using the default rating, there are no enclosure limitations other than proper fit of the product.

Wire Class	Suitable Conductors		Max Overcurrent Protection Fuse Required Amp Rating / Class						SCCR RMS Sym. Amps 600V. Max
	Line	Load	J	T	RK1	RK5	G	CC	
B, C	3/0 - 8	3/0 - 8	300	300	200	100	60	30	100,000
G, H, I (DLO)	2/0 - 8	2/0 - 8	300	300	200	100	60	30	100,000
*	3/0 - 14	3/0 - 14	None (Default Rating)						10,000

* Any wire class evaluated (see terminal specification section)

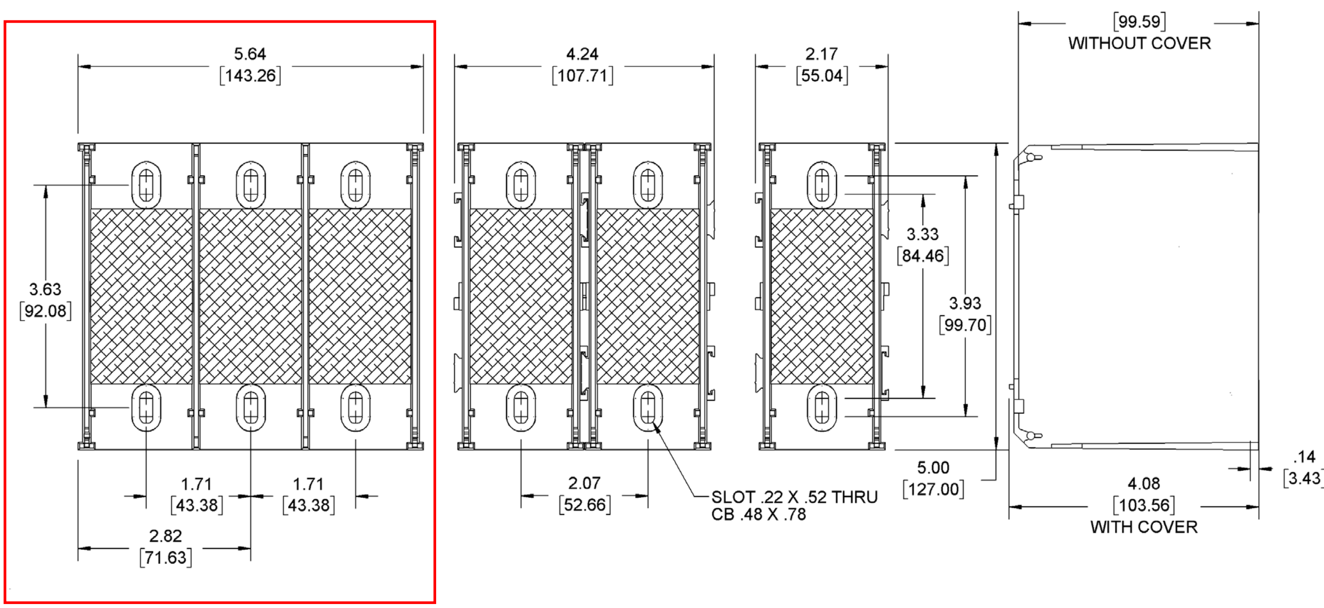
marathon® Special Products

Installation & Accessories

- Mounting (Panel):
  - For use with #10 fastener. (#8 washer recommended with SHCS)
  - Mounting torque to be determined in end use application not to exceed 30 in lbs (3.4 N.m)

- Cover:
  - Snap on hinge cover available upon request
  - Catalog number:
    - For 3-Pole (1343xxx), CH1343
    - For 2-Pole (1342xxx), CH1342
    - For 1-Pole (1341xxx), CH1341
  - Cover is back thermoplastic

Drawing



Transformers
Open Core and Coil Transformers
Machine Tool and Control Power

Description

Type IP transformers are core and coil units designed for machine tool, industrial control, panelboard, and general-purpose applications. These designs are now welded core and encapsulated to provide the highest quality electrical performance. The transformer coil is completely surrounded by epoxy, making the unit impervious to external elements. The lamination core is welded to provide superior quiet performance.

Several types of terminations are available to simplify installation. These include primary and secondary leads out, integral fuse, and spade-type terminals and our standard which is a touch proof terminal block. Consult your local GE Sales Office for complete technical applications data.

—**Standards:** Type IP units conform to NEMA ST20. They are UL listed under UL-506, File E—2739, and C-UL listed.
—**Insulation Classes:** Generally, 150 VA and below are 105°C insulation class, 55°C rise. 200 VA and above are 185°C (NEMA), 180°C (UL) insulation class, 115°C rise. Maximum surface temperature rise is 65°C above ambient.
—**Frequency:** 60 Hertz is standard; 50 Hertz is available as an option.
—**Voltage Regulation:** All designs 2.0 kVA and below are compensated for voltage drop. Generally, this compensation ranges from 10% in the smallest rating to 3% for the largest. All machine tool designs meet or exceed NMTBA regulation requirements.
—**Series-Multiple Secondary Connections:** Transformers with 120/240 V secondaries (series-multiple) may be connected for 120 V, 240 V or 240/120 V three-wire. Jumpers are provided.
—**Overcurrent Protection:** Type IP transformers are low impedance transformers that require overcurrent protection for most applications. They provide for optional integral primary and/or secondary fusing.
—**Mounting Dimensions:** Type IP transformers are lightweight, small, and designed for minimum mounting dimensions. Many units will fit competitors mounting footprints.

Machine Tool
Machine Tool Applications: Single-Phase (9T58K) Product Tables 14-2
Control: Single-Phase (9T58K) Product Tables 14-3
Options and Fusing Guide 14-5
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Outlines and Dimensions 14-7
CE-Rated
Product Tables (9T58E) 14-8
Dry-Type/Cased
Isolated, General Purpose, Single-Phase, (9T51B and 9T21B) Product Tables 14-9
Isolated, CE-Rated (9T51E) Product Tables 14-12
Dimensions and Weights 14-13
Wiring Diagrams 14-14

Transformers
Open Core and Coil Transformers
Machine Tool Applications
Single-Phase

60 Hz Terminal Board Connection

Input Voltage	Output Voltage	KVA	Frame Size	Inrush VA @ .20 PF, 95% Sec. Volt	Wiring Diagram No.[1]	Product Number	List Price GO-80
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.05	6100	193	1	9T58K0042	**$25.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.075	6125	303	1	9T58K0043	**$29.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.1	8100	396	1	9T58K0044	**$33.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.15	8150	724	1	9T58K0045	**$37.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.2	8175	821	1	9T58K0046	**$46.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.25	8200	1034	1	9T58K0047	**$54.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.3	8250	1037	1	9T58K0048	**$60.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.375	8250	1441	1	9T58K0049	**$69.50**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.5	10225	2027	1	9T58K0050	**$79.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	0.75	12225	3092	1	9T58K0051	**$110.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	1	12300	4494	1	9T58K0052	**$135.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	1.5	14225	5156	1	9T58K0053	**$185.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	2	14300	9193	1	9T58K0054	**$249.00**
220 x 440, 230 x 460, 240 x 480 Volts	110, 115, 120 Volts	3	14475	14513	1	9T58K0055	**$331.00**

50/60 Hz Terminal Board Connection

Input Voltage	Output Voltage	KVA	Frame Size	Inrush VA @ .20 PF, 95% Sec. Volt	Wiring Diagram No.[1]	Product Number	List Price GO-80
230/460/575 Volts	115/95 Volts	0.05	6100	196	2	9T58K0062	**$36.00**
230/460/575 Volts	115/95 Volts	0.075	8100	278	2	9T58K0063	**$42.00**
230/460/575 Volts	115/95 Volts	0.1	8150	445	2	9T58K0064	**$45.00**
230/460/575 Volts	115/95 Volts	0.15	8200	663	2	9T58K0065	**$57.50**
230/460/575 Volts	115/95 Volts	0.2	8200	864	2	9T58K0066	**$65.00**
230/460/575 Volts	115/95 Volts	0.25	8250	1137	2	9T58K0067	**$77.00**
230/460/575 Volts	115/95 Volts	0.3	10225	1412	2	9T58K0068	**$87.00**
230/460/575 Volts	115/95 Volts	0.375	10225	1670	2	9T58K0069	**$96.00**
230/460/575 Volts	115/95 Volts	0.5	10225	1822	2	9T58K0070	**$104.00**
230/460/575 Volts	115/95 Volts	0.75	12300	3524	2	9T58K0071	**$140.00**
230/460/575 Volts	115/95 Volts	1	14225	4392	2	9T58K0072	**$194.00**
230/460/575 Volts	115/95 Volts	1.5	14300	6753	2	9T58K0073	**$251.00**
230/460/575 Volts	115/95 Volts	2	14475	11563	2	9T58K0074	**$306.00**
208/277/380 Volts	115/95 Volts	0.05	6150	217	3	9T58K0082	**$36.00**
208/277/380 Volts	115/95 Volts	0.075	8100	322	3	9T58K0083	**$42.00**
208/277/380 Volts	115/95 Volts	0.1	8150	464	3	9T58K0084	**$45.00**
208/277/380 Volts	115/95 Volts	0.15	8200	761	3	9T58K0085	**$57.50**
208/277/380 Volts	115/95 Volts	0.2	8200	837	3	9T58K0086	**$65.00**
208/277/380 Volts	115/95 Volts	0.25	8250	1198	3	9T58K0087	**$77.00**
208/277/380 Volts	115/95 Volts	0.3	10225	1409	3	9T58K0088	**$87.00**
208/277/380 Volts	115/95 Volts	0.375	10225	1674	3	9T58K0089	**$96.00**
208/277/380 Volts	115/95 Volts	0.5	10225	1821	3	9T58K0090	**$104.00**
208/277/380 Volts	115/95 Volts	0.75	12300	3771	3	9T58K0091	**$140.00**
208/277/380 Volts	115/95 Volts	1	14225	4234	3	9T58K0092	**$194.00**
208/277/380 Volts	115/95 Volts	1.5	14300	7091	3	9T58K0093	**$251.00**
208/277/380 Volts	115/95 Volts	2	14475	11729	3	9T58K0094	**$306.00**

[1]See page 14-6 for wiring diagrams.

Factory- or Field-Installed Options

Secondary Fusing—Factory- or field-installed secondary fuse clips are available. They are restricted to units with terminal strips and a single secondary voltage or secondary with one tap.

Dual Primary and Secondary Fusing—Factory- or field-installed dual primary and secondary fusing is available on all units, including leads out and multiple secondary voltages.

Leads Out—Terminal strip is replaced by rugged primary and secondary leads emanating from the top of the encapsulated coil.

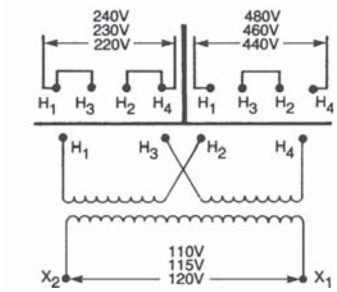


Diagram 1

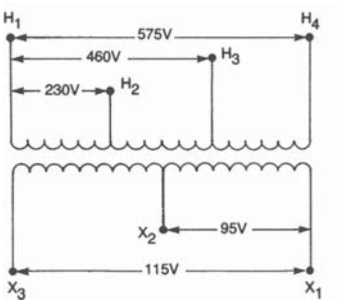


Diagram 2

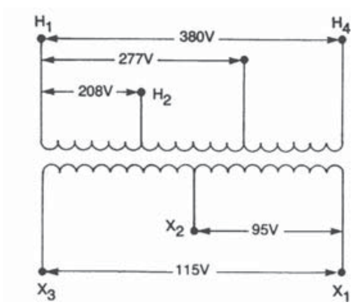


Diagram 3

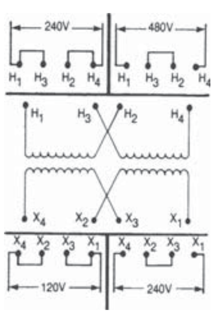


Diagram 4

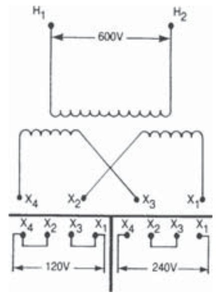


Diagram 5

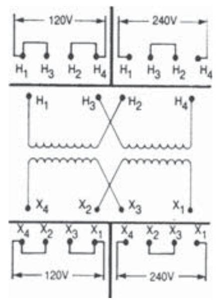


Diagram 6

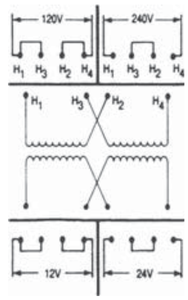


Diagram 7

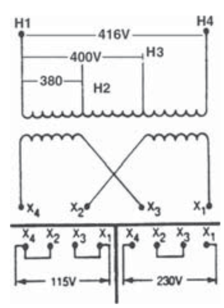


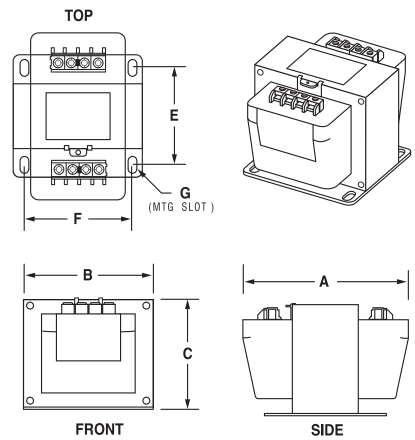
Diagram 8

Rev. 4/16
Prices and data subject
to change without notice

Transformers
Open Core and Coil Transformers
Outlines and Dimensions
6, 8 and 10 Frame

Terminal Board Connection Style

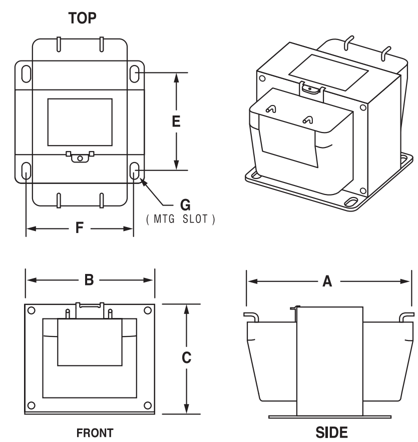
Frame size	KVA	Approx. Net Weight (Lbs.)	A Depth (in.)	B Width (in.)	C Height (in.)	Mounting Depth E (in.)	Mounting Width F (in.)	Mounting Slot (in.)
6100	0.05	2.6	4	3.06	2.68	2.16	2.5	.219 x .750
6125	0.075	3	4.25	3.06	2.68	2.41	2.5	.219 x .750
8100	0.1	3.9	4.12	3.81	3.28	2.16	3.12	.219 x .750
8150	0.15	5.5	4.62	3.81	3.28	2.66	3.12	.219 x .750
8175	0.2	6.3	4.88	3.81	3.28	2.91	3.12	.219 x .750
8200	0.25	7	5.12	3.81	3.28	3.16	3.12	.219 x .750
8250	0.375	8.3	5.62	3.81	3.28	3.66	3.12	.219 x .750
10225	0.5	11.6	5.75	4.56	3.9	3.38	3.75	.297 x .580
12225	0.75	13	5.81	5.31	4.56	3.38	4	.297 x .580
12300	1	17.5	6.56	5.31	4.56	4.13	4	.297 x .580
14225	1.5	29	6.31	6.81	5.81	3.38	5.5	.297 x .580
14300	2	35.5	7.06	6.81	5.81	4.13	5.5	.297 x .580
14475	3	51.5	8.81	6.81	5.81	5.88	5.5	.297 x .580



Terminal Board Connection Style

Leads Out Connection Style

Frame size	KVA	Approx. Net Weight (Lbs.)	A Depth (in.)	B Width (in.)	C Height (in.)	Mounting Depth E (in.)	Mounting Width F (in.)	Mounting Slot (in.)
6100	0.05	2.6	3.25	3.06	2.68	2.16	2.5	.219 x .750
6125	0.075	3	3.5	3.06	2.68	2.41	2.5	.219 x .750
8100	0.1	3.9	3.42	3.81	3.28	2.16	3.12	.219 x .750
8150	0.15	5.5	3.92	3.81	3.28	2.66	3.12	.219 x .750
8175	0.2	6.3	4.18	3.81	3.28	2.91	3.12	.219 x .750
8200	0.25	7	4.42	3.81	3.28	3.16	3.12	.219 x .750
8200	0.3	7	4.42	3.81	3.28	3.16	3.12	.219 x .750
8250	0.375	8.3	4.92	3.81	3.28	3.66	3.12	.219 x .750
10225	0.5	11.6	5.75	4.56	3.9	3.38	3.75	.297 x .580
12225	0.75	13	5.81	5.31	4.56	3.38	4	.297 x .580
12300	1	17.5	6.56	5.31	4.56	4.13	4	.297 x .580
14225	1.5	29	6.31	6.81	5.81	3.38	5.5	.297 x .580
14300	2	35.5	7.06	6.81	5.81	4.13	5.5	.297 x .580
14475	3	51.5	8.81	6.81	5.81	5.88	5.5	.297 x .580



Leads Out Connection Style

CLASS CC KLDR SERIES FUSES

600 Vac • 300 Vdc • Time-Delay • 1/10-30 A

Description

KLDR fuses are time-delay fuses designed to protect control transformers, solenoids and similar inductive components with high magnetizing currents during the first half-cycle. They provide excellent protection of motor branch circuits containing IEC or NEMA rated motor controllers or contactors.

Features/Benefits

- Meets UL and CSA standards
- Class CC fuses are the smallest 600 V, 200,000 A.I.R. fuses approved for branch circuit protection
- Rejection feature prevents use of fuses with lower interrupting ratings or voltage ratings when used with corresponding fuse holders
- Extremely current limiting reduces damage caused by heating and magnetic effects of short-circuit currents

Applications

- Transformer Protection

Web Resources

For additional informations, visit:
littelfuse.com/kldr

Recommended Fuse Holders

L60030C Series
LPSC Touch-Safe Series

Specifications

Voltage Rating	AC: 600 V DC: 300 V
Amperage Rating	1/10 – 30 A
Interrupting Rating	AC: 200 kA rms symmetrical DC: 20 kA
Material	Body: Melamine Caps: Nickel-plated Bronze
Fuse Weight	.019 lb (8.62g)
Approvals	AC: Standard 248-4, Class CC UL Listed 1/10-30 A (File: E81895) CSA Certified 1/10-30 A (File: LR29862) DC: Littelfuse self-certified
Environmental	RoHS Compliant
Country of Origin	Mexico

Ordering Information

AMPERAGE RATINGS				
1/10	6/10	1 8/10	4 1/2	10
1/8	3/4	2	5	12
15/100	8/10	2 1/4	5 6/10	15
3/16	1	2 1/2	6	17 1/2
2/10	1 1/8	2 8/10	6 1/4	20
1/4	1 1/4	3	7	25
3/10	1 4/10	3 2/10	7 1/2	30
4/10	1 1/2	3 1/2	8	—
1/2	1 6/10	4	9	—

Part Numbering System

KLDR xxx T XP

Series — KLDR

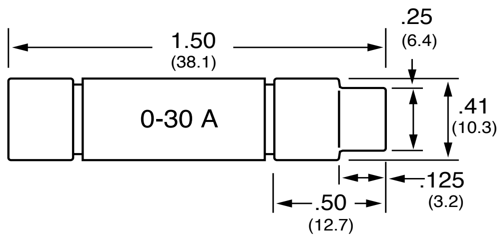
Amp Code — xxx
Refer to Amp Code Column in Electrical Specifications Table

Package Quantity — T
T = 10
H = 100

Options — XP
XP = RoHS Compliant

SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
KLDR	10	10	KLDR 10	KLDR010.TXP

Dimensions Inches (mm)



A i L C t i F

i t

2 t s T F FL S i

PL

ELECT ICAL CHA ACTE ISTICS

A ti	A ti	i Ti
135%	1/10-30	1 hour, imum
	32/10–30	12 seconds, i imum
200%	0–3	5 seconds, i imum

AGENC APP ALS Listed by Underwriters Laboratories and Certified by CSA.

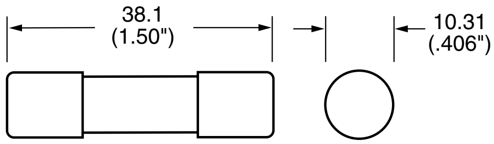
INTE PTING ATING 10,000 amperes at 250 VAC.

F SES T IL SPEC See F09B type in Military Section.

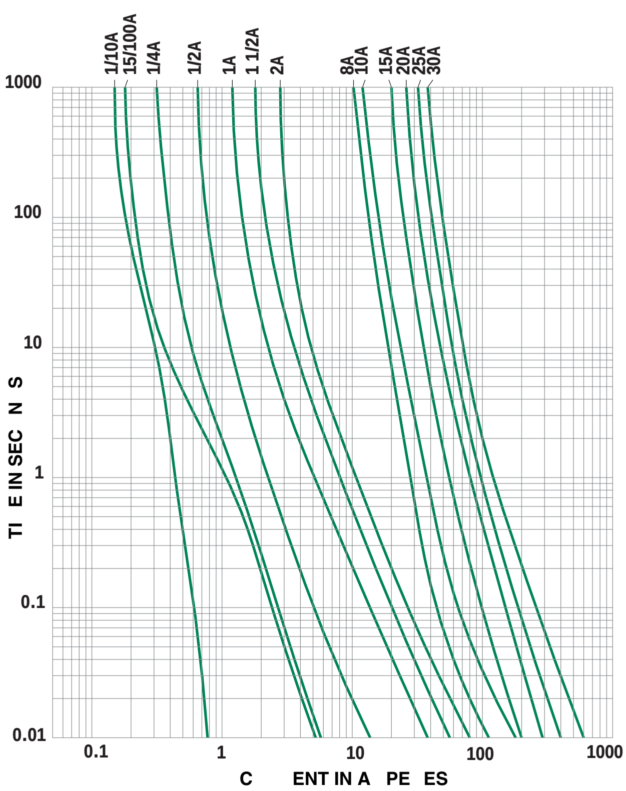
PATENTE

E ING INF ATI N

C t i C t N	A ti	AC t ti	N i i t C h
FL 1/10	.100	250	188.0
FL 15/100	.150	250	87.0
FL 2/10	.200	250	35.109
FL 1/4	.250	250	5.413
FL 3/10	.300	250	3.79
FL 4/10	.400	250	2.10
FL 1/2	.500	250	1.54
FL 6/10	.600	250	1.024
FL 8/10	.800	250	.623
FL 1	1	250	.395
FL 1 1/8	1.125	250	.356
FL 1 1/4	1.25	250	.286
FL 1 4/10	1.4	250	.253
FL 1 1/2	1.5	250	.219
FL 1 6/10	1.6	250	.184
FL 1 8/10	1.8	250	.162
FL 2	2	250	.125
FL 2 1/4	2.25	250	.102
FL 2 1/2	2.5	250	.0904
FL 2 8/10	2.8	250	.0735
FL 3	3	250	.0700
FL 3 2/10	3.2	250	.0576
FL 3 1/2	3.5	250	.0517
FL 4	4	250	.0426
FL 4 1/2	4.5	250	.0360
FL 5	5	250	.0413
FL 5 6/10	5.6	250	.0326
FL 6	6	250	.0280
FL 6 1/4	6.25	250	.0277
FL 7	7	250	.02133
FL 8	8	250	.01247
FL 9	9	250	.01066
FL 10	10	250	.00903
FL 12	12	250	.00698
FL 15	15	250	.00530
FL 20	20	250	.00385
FL 25	25	250	.00275
FL 30	30	250	.00226

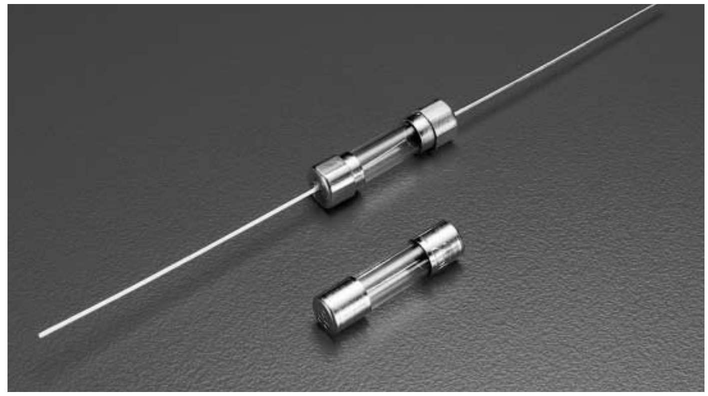


A Ti C t C

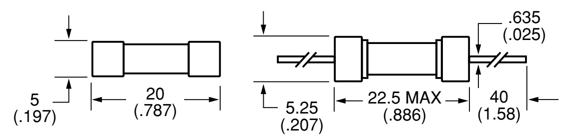


5 x 20 mm Fast-Acting Fuse 217/227 Series

- Designed to International (IEC) Standards for use globally.
- Meets the IEC 60127-2, Sheet 2 specification for Fast-Acting Fuses.
- Available in Cartridge and Axial Lead Form.
- Available in ratings of 0.032 to 10 amperes.



217 000 Series | 217 000 XE 227 000 Series[1]



ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Ampere Rating	Opening Time
150%	.032–.100	60 minutes, **Min**imum
	.125–6.3	60 minutes, **Min**imum
210%	.032–.100	30 minutes, **Max**imum
	.125–6.3	30 minutes, **Max**imum
275%	.032–.100	0.01 sec., **Min.**; .5 sec. **Max.**
	.125–6.3	0.05 sec., **Min.**; 2 sec. **Max.**
400%	.032–.100	.003 sec., **Min.**; 0.1 sec. **Max.**
	.125–6.3	.01 sec., **Min.**; 0.3 sec. **Max.**
1000%	.032–.100	.02 second, **Max**imum
	.125–6.3	.02 second, **Max**imum

AGENCY APPROVALS: Sheet I IEC 60127-2:* SEMKO, VDE approved thru 6.3 amps. BSI approved 0.4-6.3 amps. Recognized under the Components Program of Underwriters Laboratories and recognized by CSA. UL recognized to 6.3A only.

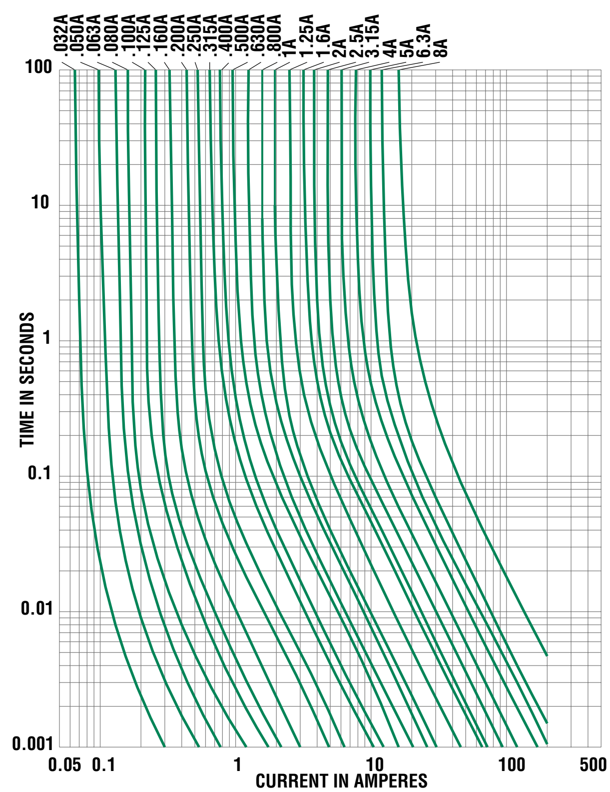
INTERRUPTING RATING: 35 amperes or 10 x rated current; whichever is greater.

ORDERING INFORMATION:

Cartridge Catalog Number	Axial Lead Catalog Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I²t A² Sec.
217.032	**227**.032	.032	250	262.2	0.000048
217.040	**227**.040	.040	250	183.2	0.000074
217.050	**227**.050	.050	250	15.20	0.00020
217.063	**227**.063	.063	250	10.43	0.00057
217.080	**227**.080	.080	250	7.88	0.00085
217.100	**227**.100	.100	250	5.10	0.0034
217.125	**227**.125	.125	250	3.68	0.0049
217.160	**227**.160	.160	250	2.53	0.011
217.200	**227**.200	.200	250	1.65	0.025
217.250	**227**.250	.250	250	1.18	0.043
217.315	**227**.315	.315	250	0.810	0.110
217.400	**227**.400	.400	250	0.277	0.130
217.500	**227**.500	.500	250	0.210	0.225
217.630	**227**.630	.630	250	0.168	0.420
217.800	**227**.800	.800	250	0.134	0.870
217 001	**227** 001	1	250	0.096	1.07
217 1.25	**227** 1.25	1.25	250	0.070	2.29
217 01.6	**227** 01.6	1.6	250	0.046	4.74
217 002	**227** 002	2	250	0.040	5.88
217 02.5	**227** 02.5	2.5	250	0.033	9.72
217 3.15	**227** 3.15	3.15	250	0.022	18.2
217 004	**227** 004	4	250	0.016	30.0
217 005	**227** 005	5	250	0.013	43.9
217 06.3	**227** 06.3	6.3	250	0.0098	64.2
217 008	**227** 008	8*	250	0.0068	203.5
217 010	**227** 010	10*	250	0.0060	223.5

*IEC Standards for 5 x 20mm fuses do not include ratings above 6.3 amperes, but are under consideration.

Average Time Current Curves

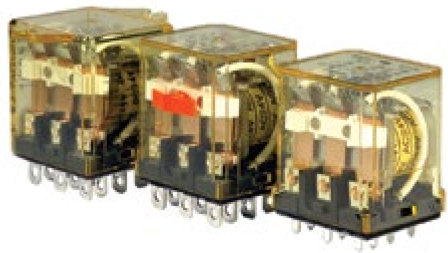


[1] 227 Series is used for North American ordering.

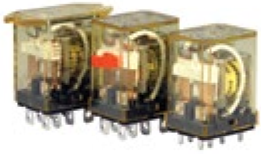
RH Series Compact Power Relays

Key features

- SPDT through 4PDT, 10A contacts
- Compact power type relays
- Miniature power relays with a large capacity
- 10A contact capacity
- Compact size saves space



Part Number Selection

Contact	Model	Part Number		Coil Voltage Code (Standard Stock in bold)
		Blade Terminal	PCB Terminal	
SPDT 	Standard	RH1B-U □	RH1V2-U □	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH1B-UL □	—	
	With Check Button	RH1B-UC □	—	
	With Indicator and Check Button	RH1B-ULC □	—	
	Top Bracket Mounting	RH1B-UT □	—	
	With Diode (DC coil only)	RH1B-UD □	RH1V2-UD □	DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH1B-ULD □	—	**DC12V**, **DC24V**, DC48V, DC110V
DPDT 	Standard	RH2B-U □	RH2V2-U □	AC6V, AC12V, **AC24V**, **AC110-120V**, **AC220-240V** DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V
	With Indicator	RH2B-UL □	RH2V2-UL □	
	With Check Button	RH2B-UC □	—	
	With Indicator and Check Button	RH2B-ULC □	—	
	Top Bracket Mounting	RH2B-UT □	—	
	With Diode (DC coil only)	RH2B-UD □	RH2V2-UD □	DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V
	With Indicator and Diode (DC coil only)	RH2B-ULD □	RH2V2-ULD □	
3PDT 	Standard	RH3B-U □	RH3V2-U □	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH3B-UL □	RH3V2-UL □	
	With Check Button	RH3B-UC □	—	
	With Indicator and Check Button	RH3B-ULC □	—	
	Top Bracket Mounting	RH3B-UT □	—	
	With Diode (DC coil only)	RH3B-UD □	—	DC6V, DC12V, DC24V, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH3B-ULD □	—	
4PDT 	Standard	RH4B-U □	RH4V2-U □	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH4B-UL □	RH4V2-UL □	
	With Check Button	RH4B-UC □	—	
	With Indicator and Check Button	RH4B-ULC □	—	
	Top Bracket Mounting	RH4B-UT □	—	
	With Diode (DC coil only)	RH4B-UD □	RH4V2-UD □	DC6V, DC12V, DC24V, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH4B-ULD □	—	

PCB terminal relays are designed to mount directly to a circuit board without any socket.

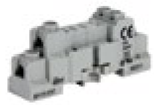
Ordering Information

When ordering, specify the Part No. and coil voltage code:

(example) **RH3B-U** $\boxed{\textbf{AC120V}}$

Part No. — Coil Voltage Code

Sockets (for Blade Terminal Models)

Relays	Standard DIN Rail Mount [1]	Finger-safe DIN Rail Mount [1]	Through Panel Mount	PCB Mount
RH1B	SH1B-05	SH1B-05C	SH1B-51	SH1B-62
RH2B	SH2B-05	SH2B-05C	SH2B-51	SH2B-62
RH3B	SH3B-05	SH3B-05C	SH3B-51	SH3B-62
RH4B	SH4B-05	SH4B-05C	SH4B-51	SH4B-62
				

1. DIN Rail mount socket comes with two horseshoe clips. Do not use unless you plan to insert pullover wire spring. Replacement horseshoe clip part number is Y778-011.

Hold Down Springs & Clips

Appearance	Item	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket
	Pullover Wire Spring	RH1B	SY2S-02F1 [2]	SY4S-51F1
		RH2B	SY4S-02F1 [2]	
		RH3B	SH3B-05F1 [2]	
		RH4B	SH4B-02F1 [2]	
	Leaf Spring (side latch)	RH1B, RH2B, RH3B, RH4B	SFA-202 [3]	SFA-302 [3]
	Leaf Spring (top latch)	RH1B, RH2B, RH3B, RH4B	SFA-101 [3]	SFA-301 [3]

2. Must use horseshoe clip when mounting in DIN mount socket. Replacement horseshoe clip part number is Y778-011.
3. Two required per relay.

AC Coil Ratings

Voltage (V)	Rated Current (mA) ±15% at 20°C								Coil Resistance (Ω) ±10% at 20°C				Operation Characteristics (against rated values at 20°C)		
	AC 50Hz				AC 60Hz										
	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	Max. Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
6	170	240	330	387	150	200	280	330	330	9.4	6.4	5.4	110%	80% maximum	30% minimum
12	86	121	165	196	75	100	140	165	165	39.3	25.3	21.2			
24	42	60.5	81	98	37	50	70	83	83	153	103	84.5			
110	9.6	—	18.1	21.6	8.4	—	15.5	18.2	18.2	—	2,200	1,800			
110-120	—	9.4-10.8	—	—	—	8.0-9.2	—	—	—	—	—	—			
120	8.6	—	16.4	19.5	7.5	—	14.2	16.5	16.5	—	10,800	7,360			
220	4.7	—	8.8	10.7	4.1	—	7.7	9.1	9.1	—	10,800	7,360			
220-240	—	4.7-5.4	—	—	—	4.0-4.6	—		—	18,820	—	—			
240	4.9	—	8.2	9.8	4.3	—	7.1	8.3	8.3	—	12,100	9,120			

DC Coil Ratings

Voltage (V)	Rated Current (mA) ±15% at 20°C				Coil Resistance (Ω) ±10% at 20°C				Operation Characteristics (against rated values at 20°C)		
	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	Max. Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
6	128	150	240	250	47	40	25	24	110%	80% maximum	10% minimum
12	64	75	120	125	188	160	100	96			
24	32	36.9	60	62	750	650	400	388			
48	18	18.5	30	31	2,660	2,600	1,600	1,550			
100-110	—	8.2-9.0	—	—	—	12,250	—	—			
110	8	—	12.8	15	13,800	—	8,600	7,340			

Standard coil voltages are in **BOLD**.

Contact Ratings

Model	Continuous Current	Maximum Contact Capacity: Allowable Contact Power: Resistive Load	Inductive Load	Rated Load: Voltage (V)	Res. Load	Ind. Load
SPDT	10A	1540VA 300W	990VA 210W	110 AC	10A	7A
				220 AC	7A	4.5A
				30 DC	10A	7A
DPDT 3PDT 4PDT	10A	1650VA 300W	1100VA 225W	110 AC	10A	7.5A
				220 AC	7.5A	5A
				30 DC	10A	7.5A

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

TÜV Ratings

Voltage	RH1	RH2	RH3	RH4
240V AC	10A	10A	7.5A	7.5A
30V DC	10A	10A	10A	10A

AC: cos ø = 1.0, DC: L/R = 0 ms

UL Ratings

Voltage	Resistive			General Use			Horsepower Rating		
	RH1 RH2	RH3	RH4	RH1 RH2	RH3	RH4	RH1 RH2	RH3	RH4
240V AC	10A	7.5A	7.5A	7A	6.5A	5A	1/3 HP	1/3 HP	—
120V AC	—	10A	10A	—	7.5A	7.5A	1/6 HP	1/6 HP	—
30V DC	10A	10A	—	7A	—	—	—	—	—
28V DC	—	—	10A	—	—	—	—	—	—

CSA Ratings

Voltage	Resistive				General Use				Horse-power Rating
	RH1	RH2	RH3	RH4	RH1	RH2	RH3	RH4	RH1, 2, 3
240V AC	10A	10A	—	7.5A	7A	7A	7A	5A	1/3 HP
120V AC	10A	10A	10A	10A	7.5A	7.5A	—	7.5A	1/6 HP
30V DC	10A	10A	10A	10A	7A	7.5A	—	—	—

Socket Specifications

	Sockets	Terminal	Electrical Rating	Wire Size	Torque
DIN Rail Mount Sockets	SH1B-05	(Coil) M3 screws (contact) M3.5 screws with captive wire clamp	250V, 10A	Maximum up to 2–#12AWG	5.5 - 9 in•lbs 9 - 11.5 in•lbs
	SH2B-05 SH3B-05 SH4B-05	M3.5 screws with captive wire clamp	300V, 10A	Maximum up to 2–#12AWG	9 - 11.5 in•lbs
Finger-safe DIN Rail Mount	SH1B-05C	(coil) M3 screws (contact) M3.5 screws with captive wire clamp, fingersafe	250V, 10A	Maximum up to 2–#12AWG	5.5 - 9 in•lbs 9 - 11.5 in•lbs
	SH2B-05C SH3B-05C SH4B-05C	M3.5 screws with captive wire clamp, fingersafe	300V, 10A	Maximum up to 2–#12AWG	9 - 11.5 in•lbs
Through Panel Mount Socket	SH1B-51 SH2B-51 SH3B-51 SH4B-51	Solder	300V, 10A	—	—
PCB Mount Socket	SH1B-62	PCB mount	250V, 10A	—	—
	SH2B-62 SH3B-62 SH4B-62	PCB mount	300V, 10A	—	—

Accessories

Item	Appearance	Use with	Part No.	Remarks
Aluminum DIN Rail (1 meter length)		All DIN rail sockets	BNDN1000	The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm).
DIN Rail End Stop		DIN rail	BNL5	9.1 mm wide.
Replacement Hold-Down Spring Anchor		DIN mount sockets and hold down springs.	Y778-011	For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket.

Specifications

<table>
<tr><td colspan="2">Contact Material</td><td colspan="2">Silver cadmium oxide</td></tr>
<tr><td colspan="2">Contact Resistance [1]</td><td colspan="2">50mΩ maximum</td></tr>
<tr><td colspan="2">Minimum Applicable Load</td><td colspan="2">24V DC, 30 mA; 5V DC, 100 mA (reference value)</td></tr>
<tr><td rowspan="2">Operating Time [2]</td><td>SPDT
DPDT</td><td colspan="2">20ms maximum</td></tr>
<tr><td>3PDT
4PDT</td><td colspan="2">25ms maximum</td></tr>
<tr><td rowspan="2">Release Time [2]</td><td>SPDT
DPDT</td><td colspan="2">20ms maximum</td></tr>
<tr><td>3PDT
4PDT</td><td colspan="2">25ms maximum</td></tr>
<tr><td rowspan="4">Power Consumption (approx.)</td><td>SPDT</td><td>AC: 1.1VA (50Hz), 1VA (60Hz)</td><td>DC: 0.8W</td></tr>
<tr><td>DPDT</td><td>AC: 1.4VA (50Hz), 1.2VA (60Hz)</td><td>DC: 0.9W</td></tr>
<tr><td>3PDT</td><td>AC: 2VA (50Hz), 1.7VA (60Hz)</td><td>DC: 1.5W</td></tr>
<tr><td>4PDT</td><td>AC: 2.5VA (50Hz), 2VA (60Hz)</td><td>DC: 1.5W</td></tr>
<tr><td colspan="2">Insulation Resistance</td><td colspan="2">100MΩ minimum (500V DC megger)</td></tr>
<tr><td rowspan="2">Dielectric Strength [3]</td><td>SPDT</td><td>Between live and dead parts:
Between contact and coil:
Between contacts of the same pole:</td><td>2,000V AC, 1 minute
2,000V AC, 1 minute
1,000V AC, 1 minute</td></tr>
<tr><td>DPDT
3PDT
4PDT</td><td>Between live and dead parts:
Between contact and coil:
Between contacts of different poles:
Between contacts of the same pole:</td><td>2,000V AC, 1 minute
2,000V AC, 1 minute
2,000V AC, 1 minute
1,000V AC, 1 minute</td></tr>
<tr><td colspan="2">Operating Frequency</td><td>Electrical:
Mechanical:</td><td>1,800 operations/hour maximum
18,000 operations/hour maximum</td></tr>
<tr><td colspan="2">Vibration Resistance</td><td>Damage limits:
Operating extremes:</td><td>10 to 55Hz, amplitude 0.5 mm
10 to 55Hz, amplitude 0.5 mm</td></tr>
<tr><td colspan="2">Shock Resistance</td><td>Damage limits:
Operating extremes:</td><td>1,000m/s² (100G)
200m/s² (20G - SPDT, DPDT)
100m/s² (10G - 3PDT, 4PDT)</td></tr>
<tr><td colspan="2">Mechanical Life</td><td colspan="2">50,000,000 operations minimum</td></tr>
<tr><td rowspan="2">Electrical Life</td><td>DPDT</td><td colspan="2">500,000 operations minimum (120V AC, 10A)</td></tr>
<tr><td>SPDT
3PDT
4PDT</td><td colspan="2">200,000 operations minimum (120V AC, 10A)</td></tr>
<tr><td>Operating Temperature [4]</td><td>SPDT
DPDT
3PDT
4PDT</td><td colspan="2">–25 to +70°C (no freezing)</td></tr>
<tr><td colspan="2">Operating Humidity</td><td colspan="2">45 to 85% RH (no condensation)</td></tr>
<tr><td colspan="2">Weight (approx.)</td><td colspan="2">SPDT: 24g, DPDT: 37g, 3PDT: 50g, 4PDT: 74g</td></tr>
</table>

Note: Above values are initial values.

1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
   Release time of relays with diode: 40 ms maximum
3. Relays with indicator or diode: 1000V AC, 1 minute
4. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve. The operating temperature range of relays with indicator or diode is –25 to +40°C.

RTE Series — Analog Timers

Key features of the RTE series include:

- 20 time ranges and 10 timing functions
- Time delays up to 600 hours
- Space-saving package
- High repeat accuracy of ± 0.2%
- ON and timing OUT LED indicators
- Standard 8- or 11-pin and 11-blade termination
- 2 form C delayed output contacts
- 10A Contact Rating

TÜV PRODUCT SERVICE
Cert. No. E9950913332316 (EMC, RTE)
Cert. No. BL960813332355 (LVD, RTE)

UL Listed
File No. E66043

General Specifications

Operation System		Solid state CMOS Circuit
Operation Type		Multi-Mode
Time Range		0.1sec to 600 hours
Pollution Degree		2 (IE60664-1)
Over voltage category		III (IE60664-1)
Rated Operational Voltage	AF20	100-240V AC(50/60Hz)
	AD24	24V AC(50/60Hz)/24V DC
	D12	12V DC
Voltage Tolerance	AF20	85-264V AC(50/60Hz)
	AD24	20.4-26.4V AC(50/60Hz)/21.6-26.4V DC
	D12	10.8-13.2V DC
Input off Voltage		Rated Voltage x10% minimum
Ambient Operating Temperature		-20 to +65°C (without freezing)
Ambient Storage and Transport Temperature		-30 to +75°C (without freezing)
Relative Humidity		35 to 85%RH (without condensation)
Atmospheric Pressure		80kPa to 110kPa (Operating), 70kPa to 110kPa (Transport)
Reset Time		100msec maximum
Repeat Error		±0.2%, ±20msec*
Voltage Error		±0.2%, ±20msec*
Temperature Error		±0.5%, ±20msec*
Setting Error		±10% maximum
Insulation Resistance		100MΩ minimum (500V DC)
Dielectric Strength		Between power and output terminals: 2000V AC, 1 minute
		Between contacts of different poles: 2000V AC, 1 minute
		Between contacts of the same pole:1000V AC, 1 minute
Vibration Resistance		10 to 55Hz amplitude 0.5mm² hours in each of 3 axes
Shock Resistance		Operating extremes: 98m/sec² (10G)
		Damage limits: 490m/sec² (50G)
		3 times in each of 3 axes
Degree of Protection		IP40 (enclosure) (IEC60529)

Power Consumption (Approx.)	TYPE		RTE-P1, -B1	RTE-P2, -B2
	AF20	120V AC/60Hz	6.5VA	6.6VA
		240V AC/60Hz	11.6VA	11.6VA
	24V AC 60Hz/DC		3.4VA/1.7W	3.5VA/1.7W
	D12		1.6W	1.6W

Mounting Position		Free
Dimensions	RTE-P1, P2	40Hx 36W x 77.9D mm
	RTE-B1, B2	40Hx 36W x 74.9D mm

Weight (Approx.)	RTE-P1	RTE-P2	RTE-B1, -B2
	87g	89g	85g

Contact Ratings

Contact Configuration		2 Form C, DPDT (Delay output)
Allowable Voltage / Allowable Current		240V AC, 30V DC / 10A
Maximum Permissible Operating Frequency		1800 cycles per hour
Rated Load	Resistive	10A 240V AC, 30V DC
	Inductive	7A 240V AC, 30V DC
	Horse Power Rating	1/6 HP 120V AC, 1/3 HP 240V AC
Life	Electrical	500,000 op. minimum (Resistive)
	Mechanical	50,000,000 op. minimum

*For the value of the error against a preset time, whichever the largest. applies.

Part Numbering Guide

RTE series part numbers are composed of 4 part number codes. When ordering a RTE series part, select one code from each category.
Example: **RTE-P1AF20**

RTE	–	P	1	AF20
① Series		② Terminal Style	③ Function Group	④ Input Voltage

Part Numbers: RTE Series

	Description	Part Number Code	Remarks
① Series	RTE series	RTE	For internal circuits, see next page.
② Terminal Style	Pin	P	Select one only.
	Blade	B	
③ Function Group	ON-delay, interval, cycle OFF, cycle ON	1	Each function group has different timing functions.
	ON-delay, cycle OFF, cycle ON, signal ON/OFF delay, OFF-delay, one-shot	2	See page 794.
④ Input Voltage	100 to 240V AC(50/60Hz)	AF20	
	24V AC(50/60Hz)/24V DC	AD24	
	12V DC	D12	

Part Numbers

Voltage	Power Triggered		Start Input Triggered	
	8-Pin	Blade	11-Pin	Blade
12V DC	RTE-P1D12	RTE-B1D12	RTE-P2D12	RTE-B2D12
24V AC/DC	RTE-P1AD24	RTE-B1AD24	RTE-P2AD24	RTE-B2AD24
100-240V AC	RTE-P1AF20	RTE-B1AF20	RTE-P2AF20	RTE-B2AF20

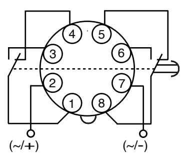
Time Range Determined by Time Range Selector and Dial Selector

	Dial	0 - 1	0 - 3	0 - 10	0 - 30	0 - 60
Range	Second	0.1 sec - 1 sec	0.1 sec - 3 sec	0.2 sec - 10 sec	0.6 sec - 30 sec	1.2 sec - 60 sec
	Minute	1.2 sec - 1 min	3.6 sec - 3 min	12 sec - 10 min	36 sec - 30 min	1.2 min - 60 min
	Hour	1.2 min - 1 hr	3.6 min - 3 hr	12 min - 10 hr	36 min - 30 hr	1.2 hr - 60 hr
	10 Hours	12 min - 10 hr	36 min - 30 hr	2 hr - 100 hr	6 hr - 300 hr	12 hr - 600 hr

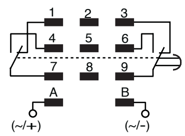
Timing Diagrams

RTE-P1, -B1

RTE-P1

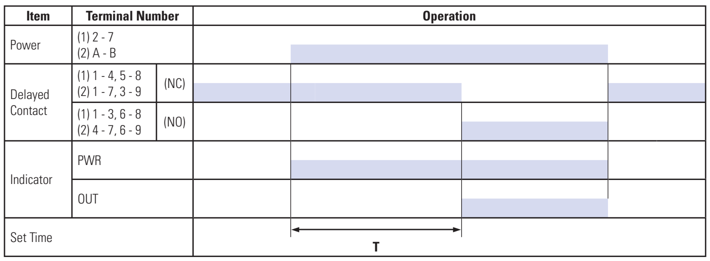


RTE-B1

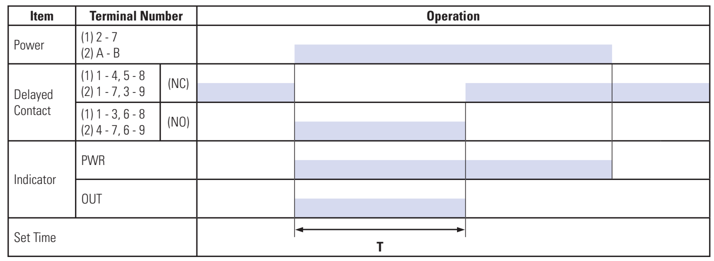


1. RTE-B1: Do not apply voltage to terminals #2, #5 & #8.
2. IDEC sockets are as follows: RTE-P1: SR2P-06* pin type socket, RTE-B1: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

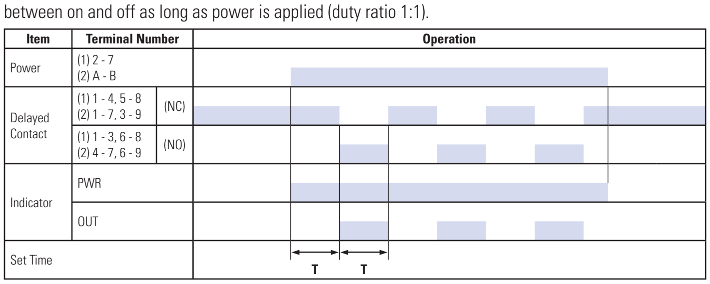
A: ON-Delay 1 (power start)
Set timer for desired delay, apply power to coil. Contacts transfer after preset time has elapsed, and remain in transferred position until timer is reset. Reset occurs with removal of power.



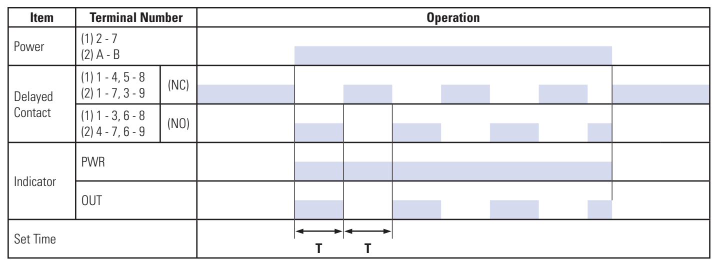
B: Interval (power start)
Set timer for desired delay, apply power to coil. Contacts transfer immediately, and return to original position after preset time has elapsed. Reset occurs with removal of power.



C: Cycle 1 (power start, OFF first)
Set timer for desired delay, apply power to coil. First transfer of contacts occurs after preset delay has elapsed, after the next elapse of preset delay contacts return to original position. The timer now cycles between on and off as long as power is applied (duty ratio 1:1).

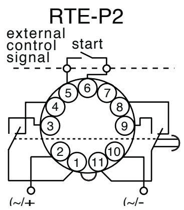


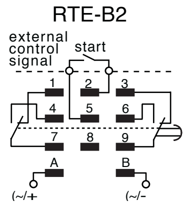
C: Cycle 3 (power start, ON first)
Functions in same manner as Mode C, with the exception that first transfer of contacts occurs as soon as power is applies. The ratio is 1:1. Time On = Time Off



Timing Diagrams con't

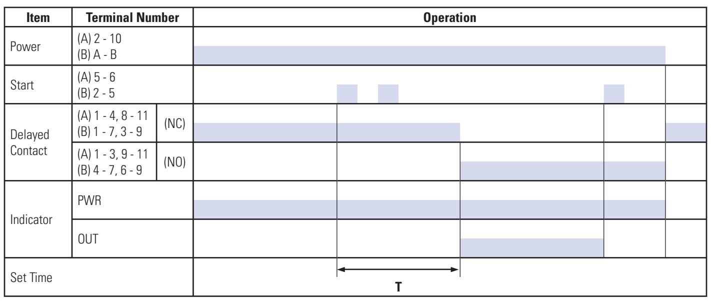
RTE-P2, -B2



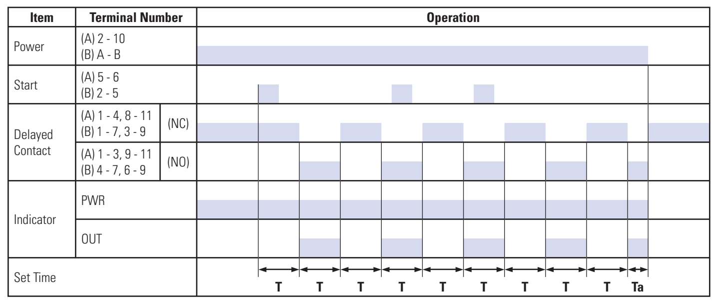


1. RTE-P2: Do not apply voltage to terminals #5, #6 & #7.
2. RTE-B2: Do not apply voltage to terminals #2, #5 & #8.
3. IDEC sockets are as follows: RTE-P2: SR3P-05* pin type socket, RTE-B2: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

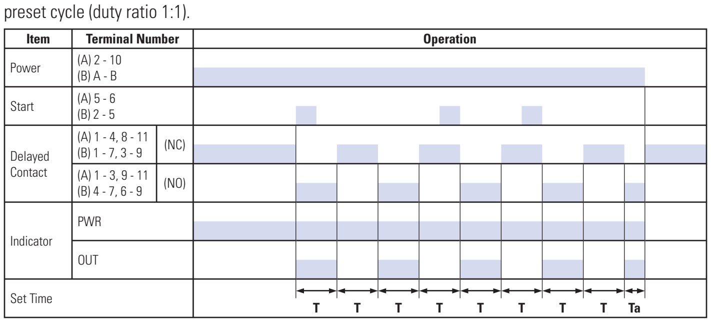
A: ON-Delay 2 (signal start)
When a preset time has elapsed after the start input turned on while power is on, the NO output contact goes on.



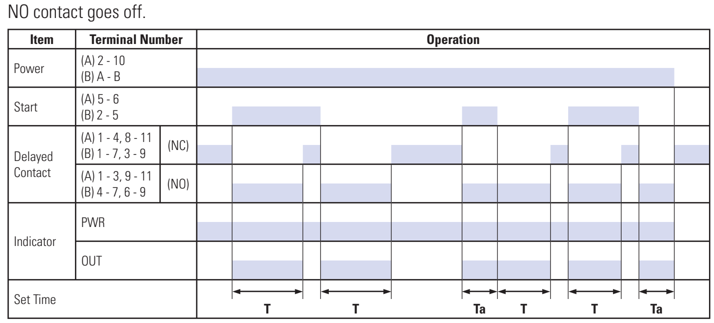
B: Cycle 2 (signal start, OFF first)
When the start input turns on while power is on, the output oscillates at a preset cycle (duty ratio 1:1), starting while the NO contact off.



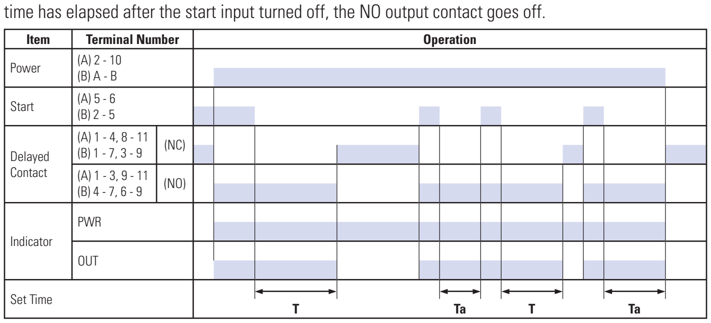
C: Cycle 4 (signal start, ON first)
When the start input turns on while power is on, the NO contact goes on. The output oscillates at a preset cycle (duty ratio 1:1).



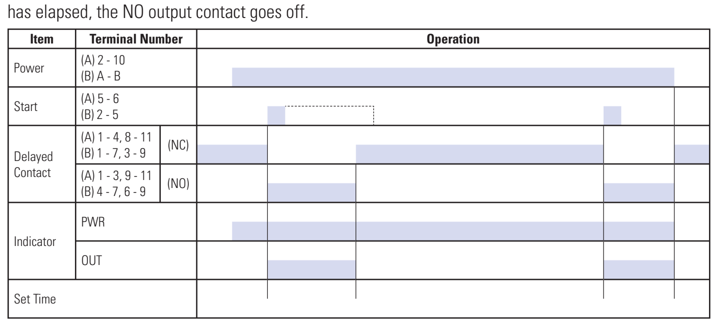
D: Signal ON/OFF-Delay
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed while the start input remains on, the output contact goes off. When the start input turns off, the NO contact goes on again. When a preset time has elapsed after the start input turned off, the NO contact goes off.



E: Signal OFF-Delay
When power is turned on while the start input is on, the NO output contact goes on. When a preset time has elapsed after the start input turned off, the NO output contact goes off.



F: One-Shot (signal start)
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed, the NO output contact goes off.



Accessories

DIN Rail Mounting Accessories

DIN Rail/Surface Mount Sockets and Hold-Down Springs

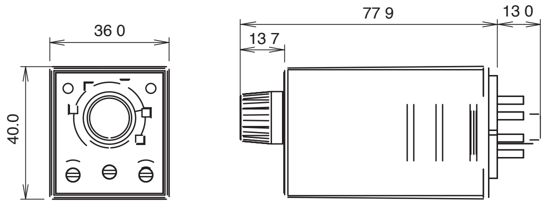
DIN Rail Mount Socket				Applicable Hold-Down Springs	
Style	**Appearance**	**Use with Timers**	**Part Number**	**Appearance**	**Part Number**
11-Pin Screw Terminal (dual tier)		RTE-P2	SR3P-05		SFA-203
11-Pin FingerSafe Socket		RTE-P2	SR3P-05C		
8-Pin Screw Terminal		RTE-P1	SR2P-06		SFA-202
8-Pin Fingersafe Socket			SR2P-05C		
11-Blade Screw Terminal		RTE-B1 RTE-B2	SR3B-05		
DIN Mounting Rail Length 1000mm		—	BNDN1000		

Panel Mounting Accessories

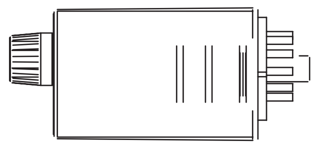
Flush Panel Mount Adapter and Sockets that use an Adapter

Accessory	Description	Appearance	Use with	Part No.
Panel Mount Adapter	Adaptor for flush panel mounting RTE timers		All RTE timers	RTB-G01
Sockets for use with Panel Mount Adapter	8-pin screw terminal	 (Shown: SR6P-M08G Wiring Socket Adapter)	RTE-P1	SR6P-M08G
	11-pin screw terminal		RTE-P2	SR6P-M11G
	8-pin solder terminal		RTE-P1	SR6P-S08
	11-pin solder terminal		RTE-P2	SR6P-S11

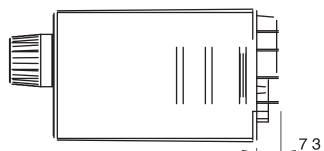
Dimensions



R E-P1 (8 pin) erminal Style



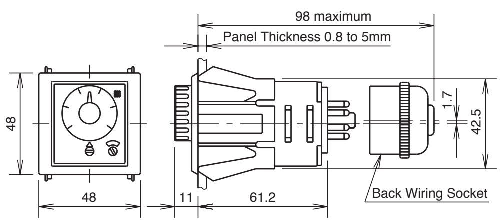
R E-P2 (11 pin) erminal Style



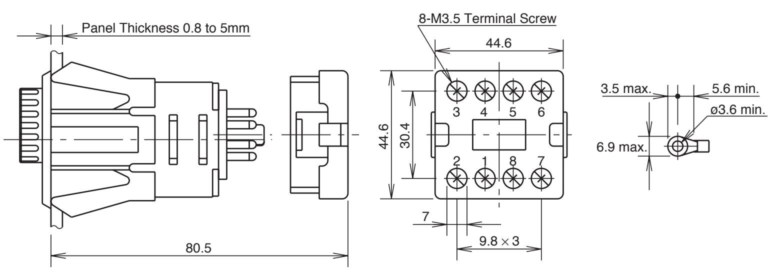
R E-B1/R E-B2 (11 blade) erminal Style

Panel Mount Adapter

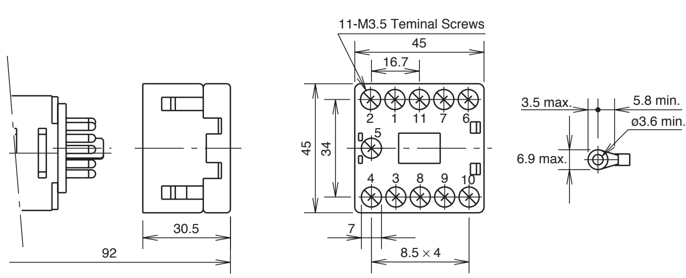
RTE Timer, 8-Pin and 11-Pin with SR6P-S08 or SR6P-S11



RTE Timer, 8-Pin with SR6P-M08G



RTE Timer, 11-Pin with SR6P-M11G



Illuminated Pushbuttons (Assembled)

Assembled Illuminated Pushbuttons

A L ( ) D 2 126 11 D NU R

Function
L: Momentary Action
OL: Maintained Action

Bezel Shape
Blank: Octagonal
F: Full Shroud

Series Designation
D: TWND Series

Lens Shape
2: Extended
3: Mushroom ø 40mm

Rated Operational Voltage (Primary)

Transformer Type	Full Voltage Type
126: 120V AC	66: 6VAC/DC
246: 240V AC	11: 12VAC/DC
486: 480V AC	22: 24VAC/DC
	QH2: 120VAC/DC
	QM4: 240VAC

Lens Color Code
A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

D: LED

Contact Arrangement
20: 2NO
02: 2NC
11: 1NO-1NC

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. All transformers step down to 6V.

Illuminated Pushbuttons (Assembled)

Illuminated Pushbuttons

Style		Contacts	Part Number	
			Momentary	Maintained
Extended Lens 	Full Voltage	1NO-1NC 2NO 2NC	ALD2③11DNU② ALD2③20DNU② ALD2③02DNU②	AOLD2③11DNU② AOLD2③20DNU② AOLD2③02DNU②
	Transformer	1NO-1NC 2NO 2NC	ALD2 ④ 11DNU② ALD2 ④ 20DNU② ALD2 ④ 02DNU②	AOLD2 ④ 11DNU② AOLD2 ④ 20DNU② AOLD2 ④ 02DNU②
Extended Lens with Full Shroud 	Full Voltage	1NO-1NC 2NO 2NC	ALFD2③11DNU② ALFD2③20DNU② ALFD2③02DNU②	AOLFD2③11DNU② AOLFD2③20DNU② AOLFD2③02DNU②
	Transformer	1NO-1NC 2NO 2NC	ALFD2 ④ 11DNU② ALFD2 ④ 20DNU② ALFD2 ④ 02DNU②	AOLFD2 ④ 11DNU② AOLFD2 ④ 20DNU② AOLFD2 ④ 02DNU②
ø 40mm Mushroom Lens 	Full Voltage	1NO-1NC 2NO 2NC	ALD3③11DNU② ALD3③20DNU② ALD3③02DNU②	AOLD3③11DNU② AOLD3③20DNU② AOLD3③02DNU②
	Transformer	1NO-1NC 2NO 2NC	ALD3 ④ 11DNU② ALD3 ④ 20DNU② ALD3 ④ 02DNU②	AOLD3 ④ 11DNU② AOLD3 ④ 20DNU② AOLD3 ④ 02DNU②

1. In place of ②, specify the Lens Color Code.
2. In place of ③, specify the Full Voltage Code (LED voltage).
3. In place of ④, specify the Transformer Voltage Code.
4. Light is independent of switch position.
5. Yellow pushbutton comes with white LED only.

② Lens Color Codes

Color	Code
Amber	A
Green	G
Red	R
Blue	S
White	W
Yellow	Y

③ Full Voltage Codes

Voltage	Code
6V AC/DC	66
12V AC/DC	11
24V AC/DC	22
120V AC/DC	QH2
240V AC	QM4

④ Transformer Voltage Codes

Voltage	Code
120VAC	126
240VAC	246
480VAC	486

6V secondary voltage (uses 6V LED).

Non-Illuminated Selector Switches (Assembled)

Assembled Selector Switches

A S D 2 ( ) ( ) 11 NU – ( )

Function

S: Selector Switch

Series Designation

D: TWND Series

Number of Positions

2: 2-Position
3: 3-Position

Spring Return Action

Blank: Maintained
1: Spring return from Right
2: Spring return from Left
3: 2-Way spring return from Left and Right

Circuit Number

(See Circuit # column of Selector Switch Contact Arrangement Chart on beginning on page 820.)

Contact Arrangement Code

10: 1NO	01: 1NC
20: 2NO	02: 2NC
40: 4NO	04: 4NC
11: 1NO-1NC	22: 2NO-2NC

Operator Style Code

Blank: Knob Operator
L: Lever Operator
K: Key Operator

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom key removal codes available. Please contact IDEC for details.

Non-Illuminated Selector Switches (Assembled)

Non-Illuminated 2-Position Selector Switches

Style: Contact	Style: Mounting	Operator Position L	Operator Position R		Part Number: Maintained	Part Number: Spring Return from Right	Part Number: Spring Return from Left
1NO	1 2	0 0	X 0	Knob Lever Key	ASD210NU ASD2L10NU ASD2K10NU	ASD2110NU ASD21L10NU ASD21K10NU	ASD2210NU ASD22L10NU ASD22K10NU
1NC	1 2	X 0	0 0	Knob Lever Key	ASD201NU-116 ASD2L01NU-116 ASD2K01NU-116	ASD2101NU-116 ASD21L01NU-116 ASD21K01NU-116	ASD2201NU-116 ASD22L01NU-116 ASD22K01NU-116
1NO 1NC	1 2	0 X	X 0	Knob Lever Key	ASD211NU ASD2L11NU ASD2K11NU	ASD2111NU ASD21L11NU ASD21K11NU	ASD2211NU ASD22L11NU ASD22K11NU
2NO	1 2	0 0	X X	Knob Lever Key	ASD220NU ASD2L20NU ASD2K20NU	ASD2120NU ASD21L20NU ASD21K20NU	ASD2220NU ASD22L20NU ASD22K20NU
2NC	1 2	X X	0 0	Knob Lever Key	ASD202NU-104 ASD2L02NU-104 ASD2K02NU-104	ASD2102NU-104 ASD21L02NU-104 ASD21K02NU-104	ASD2202NU-104 ASD22L02NU-104 ASD22K02NU-104
2NO 2NC	1 2 3 4	0 X 0 X	X 0 X 0	Knob Lever Key	ASD222NU ASD2L22NU ASD2K22NU	ASD2122NU ASD21L22NU ASD21K22NU	ASD2222NU ASD22L22NU ASD22K22NU
2NO 2NC	1 2 3 4	0 0 X X	X X 0 0	Knob Lever Key	ASD222NU-111 ASD2L22NU-111 ASD2K22NU-111	ASD2122NU-111 ASD21L22NU-111 ASD21K22NU-111	ASD2222NU-111 ASD22L22NU-111 ASD22K22NU-111

1. The truth table indicates the operating position of contact block when the operator is switched to that position.
   X = On (closed contacts) 0 = Off (open contacts)
   X—X = Overlapping Contacts: Remain on (closed contacts) when switch is moved between these two positions.
2. All knob and lever selector switches come in black. Other colors are available by ordering the knob or lever separately.
3. Custom contact arrangements available, see page 820.

Non-Illuminated 3-Position Selector Switches

Style: Contact	Style: Mounting	Operator Position L	Operator Position C	Operator Position R		Part Number: Maintained	Part Number: Spring Return from Right	Part Number: Spring Return from Left	Part Number: Spring Return Two-Way
2NO	1 2	X 0	0 0	0 X	Knob Lever Key	ASD320NU ASD3L20NU ASD3K20NU	ASD3120NU ASD31L20NU ASD31K20NU	ASD3220NU ASD32L20NU ASD32K20NU	ASD3320NU ASD33L20NU ASD33K20NU
2NC	1 2	0 X—	X— —X	—X 0	Knob Lever Key	ASD302NU ASD3L02NU ASD3K02NU	ASD3102NU ASD31L02NU ASD31K02NU	ASD3202NU ASD32L02NU ASD32K02NU	ASD3302NU ASD33L02NU ASD33K02NU
2NO 2NC	1 2 3 4	X 0 0 X—	0 0 X— —X	0 X —X 0	Knob Lever Key	ASD322NU ASD3L22NU ASD3K22NU	ASD3122NU ASD31L22NU ASD31K22NU	ASD3222NU ASD32L22NU ASD32K22NU	ASD3322NU ASD33L22NU ASD33K22NU
2NO 2NC	1 2 3 4	X X— 0 0	0 —X X 0	X 0 0 X	Knob Lever Key	ASD322NU-309 ASD3L22NU-309 ASD3K22NU-309	ASD3122NU-309 ASD31L22NU-309 ASD31K22NU-309	ASD3222NU-309 ASD32L22NU-309 ASD32K22NU-309	ASD3322NU-309 ASD33L22NU-309 ASD33K22NU-309
2NO 2NC	1 2 3 4	0 0 0 0	X 0 X 0	0 X 0 X	Knob Lever Key	ASD322NU-310 ASD3L22NU-310 ASD3K22NU-310	ASD3122NU-310 ASD31L22NU-310 ASD31K22NU-310	ASD3222NU-310 ASD32L22NU-310 ASD32K22NU-310	ASD3322NU-310 ASD33L22NU-310 ASD33K22NU-310
4NO	1 2 3 4	X 0 X 0	0 0 0 0	0 X 0 X	Knob Lever Key	ASD340NU ASD3L40NU ASD3K40NU	ASD3140NU ASD31L40NU ASD31K40NU	ASD3240NU ASD32L40NU ASD32K40NU	ASD3340NU ASD33L40NU ASD33K40NU
4NC	1 2 3 4	0 X— 0 X—	X— —X X— —X	—X 0 —X 0	Knob Lever Key	ASD304NU ASD3L04NU ASD3K04NU	ASD3104NU ASD31L04NU ASD31K04NU	ASD3204NU ASD32L04NU ASD32K04NU	ASD3304NU ASD33L04NU ASD33K04NU

Switching Power Supplies

PS5R-V Series

STANDARDS COMPLIANCE

Applicable Standards	Mark	File No. or Organization
UL508 UL1310[1] ANSI/ISA 12.12.01 CSA C22.2 No.107.1 CSA C22.2 No.213 CSA C22.2 No.223[1]	c UL us	UL/c-UL Listed File No. E467154, E177168
EN60950-1 EN50178 EN61204-3 EN50581	TÜV	TÜV SÜD[2]
	CE	EU Low Voltage Directive, EMC Directive RoHS Directive
SEMI F47	—	EPRI

Note 1: PS5R-VA/VB/VC/VD/VE only
Note 2: EN60950-1, EN50178 only

PART NUMBERS

Output Capacity	Part Number	Input Voltage	Output Voltage	Output Current
7.5W	PS5R-VA05	100 to 240V AC (Voltage range: 85 to 264V AC / 100 to 370V DC)	5V	1.5A
	PS5R-VA12		12V	0.6A
	PS5R-VA24		24V	0.3A
10W	PS5R-VB05		5V	2.0A
15W	PS5R-VB12		12V	1.3A
	PS5R-VB24		24V	0.65A
30W	PS5R-VC12		12V	2.5A
	PS5R-VC24		24V	1.3A
60W	PS5R-VD24		24V	2.5A
90W	PS5R-VE24		24V	3.75A
120W	PS5R-VF24		24V	5.0A
240W	PS5R-VG24		24V	10.0A

Part Number Structure

PS5R - V □ □

Output Capacity
A: 7.5W
B: 10W/15W
C: 30W
D: 60W
E: 90W
F: 120W
G: 240W

Output Voltage
05: 5V[3]
12: 12V[4]
24: 24V

Note 3: PS5R-VA/VB only
Note 4: PS5R-VA/VB/VC only
Use only for interpreting part numbers.
Do not use for developing part numbers.

PRODUCT DESCRIPTION

DIN-rail mount switching power supplies with global approvals for both industrial and hazardous locations

KEY FEATURES

- Compact size preserves panel space
- Slim size (width):
  22.5mm (10W/15W/30W)
  36mm (60W/90W)
  46mm (120W)
  60mm (240W)
- Universal Voltage Input:
  85-264V AC/100-370V DC
- Wide operating temperature range
- Spring-up terminals accept ring & fork terminals
- Approved for use in Class I Division 2 hazardous locations
- Can be installed in 6 directions
- 10W ~ 90W meet NEC Class 2 output ratings
- Overcurrent protection with auto-reset
- Meets SEMI F47 Sag Immunity (208V AC input)
- RoHS compliant
- Five-year factory warranty

SPECIFICATIONS

Item		Condition	PS5R-VA	PS5R-VB	PS5R-VC	PS5R-VD	PS5R-VE	PS5R-VF	PS5R-VG
Model		5V DC output	PS5R-VA05	PS5R-VB05	-	-	-	-	-
		12V DC output	PS5R-VA12	PS5R-VB12	PS5R-VC12	-	-	-	-
		24V DC output	PS5R-VA24	PS5R-VB24	PS5R-VC24	PS5R-VD24	PS5R-VE24	PS5R-VF24	PS5R-VG24
Output Capacity			7.5W	15W (5V Model is 10W)	30W	60W	90W	120W	240W
Input	Rated Input Voltage (Single-phase two-wire)[1]		100 to 240V AC (Voltage range: 85 to 264V AC/100 to 370V DC) (Load ≤ 80% at 100-105V DC)						
Input	Frequency		50/60 Hz						
Input	Input Current (Typ.)	100V AC	5V: 0.20A 12V, 24V: 0.18A	5V: 0.25A 12V, 24V: 0.35A	0.7A	1.3A	1.1A	1.4A	2.7A
Input	Input Current (Typ.)	230V AC	5V: 0.12A 12V, 24V: 0.10A	5V: 0.14A 12V, 24V: 0.19A	0.3A	0.8A	0.6A	0.7A	1.2A
Input	Inrush Current (Typ.) (Ta=25°C, cold start)	100V AC	15A	18A					14A
Input	Inrush Current (Typ.) (Ta=25°C, cold start)	230V AC	36A	45A				41A	30A
Input	Leakage Current	120V AC	0.5mA max.						
Input	Leakage Current	230V AC	1.0mA max.						
Input	Efficiency (Typ.) (at rated output)[2]	100V AC	5V: 74%, 12V: 79%, 24V: 80%	5V: 77%, 12V: 82%, 24V: 84%	12V: 83%, 24V: 85%	86%	88%		89%
Input	Efficiency (Typ.) (at rated output)[2]	230V AC	5V: 73%, 12V: 77%, 24V: 76%	5V: 73%, 12V: 80%, 24V: 81%	12V: 85%, 24V: 87%	86%	89%		90%
Input	Power Factor (Typ.)	100V AC	—	—	—	—	0.99		
Input	Power Factor (Typ.)	230V AC	—	—	—	—	0.86	0.92	0.96
Output	Rated Voltage/Current		5V/1.5A, 12V/0.6A, 24V/0.3A	5V/2.0A[3], 12V/1.3A, 24V/0.65A	12V/2.5A, 24V/1.3A	24V/2.5A	24V/3.75A	24V/5A	24V/10A
Output	Adjustable Voltage Range		±10%				±5%	±10%	
Output	Output Holding Time (Typ.) (at rated output)	100V AC	45ms	5V: 53ms, 12V: 34ms, 24V: 36ms	12V: 13ms, 24V: 15ms	13ms	20ms	30ms	
Output	Output Holding Time (Typ.) (at rated output)	230V AC	285ms	5V: 330ms 12V: 215ms 24V: 230ms	12V: 110ms 24V: 110ms	105ms	30ms	33ms	40ms
Output	Start Time (at rated input and output)		500ms max.	500ms max.	600ms max.	800ms max.		700ms max.	800ms max.
Output	Rise Time (at rated input and output)		5V, 12V: 200ms max 24V: 250ms max	5V, 12V: 200ms max. 24V: 250ms max.	200ms max.				
Output	Regulation	Input Fluctuation	0.4% max.						
Output	Regulation	Load Fluctuation	5V: 2.5% max. 12V, 24V: 1.0% max.		1.0% max.				
Output	Regulation	Temperature Change	0.04%/°C max. (-10 to +65°C)	0.05%/°C max. (-10 to +65°C)	12V: 0.05%/°C max. (-10 to +50°C) 24V: 0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +50°C)	0.05%/°C max. (-25 to +55°C)	0.05%/°C max. (-25 to +50°C)
Output	Regulation	Ripple (including noise)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	4% p-p max. (-25 to -10°C)			
Output	Regulation	Ripple (including noise)	5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	1.5% p-p max. (-10 to +0°C)			
Output	Regulation	Ripple (including noise)	5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	12V: 1.5% p-p max. (0 to +50°C) 24V: 1% p-p max. (0 to +55°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)
Overcurrent Protection			105% min. (auto reset)				101% min. (auto reset)	105% min. (auto reset)	
Operation Indicator			LED (green)						
Dielectric Strength	Between input and output terminals		3,000V AC, 1 minute						
Dielectric Strength	Between input and ground terminals		2,000V AC, 1 minute						
Dielectric Strength	Between output and ground terminals		500V AC, 1 minute						
Insulation Resistance			Between input and output terminals: 100MΩ min. (500V DC megger) Between input and ground terminals: 100MΩ min. (500V DC megger)						
Operating Temperature[4] (No freezing)			-25 to +75°C		-25 to +70°C		-25 to +65°C		
Operating Humidity (no condensation)			20 to 90% RH						
Storage Temperature (No freezing)			-25 to +75°C						
Storage Humidity (no condensation)			20 to 90% RH						
Vibration Resistance			10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL6 end clips)			10 to 55Hz, amplitude 0.33mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips)		10 to 55Hz, amplitude 0.21mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips)	10 to 55 Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with part no. BNL6 mounting clips)
Shock Resistance			300 m/s^2 (30G), 3 times each in 6 directions						
Expected Life[5]			8 years minimum (at the rated input, 50% load, operating temperature +40°C, standard mounting direction)						
EMC	EMI		EN61204-3 (Class B)						
EMC	EMS		EN61204-3 (industrial)						
Safety Standards			UL508 (Listing), UL1310 Class 2, ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213, 223 EN60950-1, EN50178					UL508 (Listing) ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213 EN60950-1, EN50178	
Other Standard			SEMI F47 (at 208V AC input only)						
Degree of Protection			IP20 (EN60529)						
Dimensions (mm)			75H × 45W × 70D	90H × 22.5W × 95D		95H × 36W × 108D		115H × 46W × 121D	125H × 60W × 125D
Weight (approx.)			130g	140g	150g	260g	310g	470g	960g
Terminal Screw			M3.5						

*At normal temperature and humidity unless otherwise specified.
Note 1: DC input voltage is not subject to safety standards. When using on DC input, connect a fuse to the input terminal for DC input protection.
Note 2: Under stable state.
Note 3: PS5R-VB05 (5V DC/2.0A) is 10W (Up to 3.0A at Ta = 0 to 40°C. Not subject to safety standards above 2.0A.)
Note 4: See the output derating curves.
Note 5: Calculation of the expected life is based on the actual life of the aluminum electrolytic capacitor. The expected life depends on operating conditions.

W2E200-HH86-01

AC axial compact fan

sickle-shaped blades (S series)

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Amtsgericht (court of registration) Stuttgart · HRA 590344

General partner Elektrobau Mulfingen GmbH · Headquarters Mulfingen
Amtsgericht (court of registration) Stuttgart · HRB 590142

Nominal data

Type	**W2E200-HH86-01**
Motor	**M2E068-BF**

Phase		1~	1~
Nominal voltage	VAC	115	115
Frequency	Hz	50	60
Method of obtaining data		fa	fa
Valid for approval/standard		CE	CE
Speed	min^{-1}	2550	2800
Power consumption	W	64	80
Current draw	A	0.58	0.70
Capacitor	µF	5	5
Capacitor voltage	VDB	220	220
Capacitor standard		P0 (CE)	P0 (CE)
Max. back pressure	Pa	100	120
Min. ambient temperature	°C	-25	-25
Max. ambient temperature	°C	60	65
Starting current	A	0.98	0.98

ml = Max. load · me = Max. efficiency · fa = Free air · cs = Customer specification · ce = Customer equipment
Subject to change

AC axial compact fan

sickle-shaped blades (S series)

Technical description

Weight	2.1 kg
Fan size	200 mm
Rotor surface	Painted black
Blade material	Sheet steel, painted black
Fan housing material	Die-cast aluminum
Number of blades	9
Airflow direction	"V"
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP44; installation- and position-dependent
Insulation class	"B"
Moisture (F) / Environmental (H) protection class	F0
Max. permitted ambient temp. for motor (transport/storage)	+ 80 °C
Min. permitted ambient temp. for motor (transport/storage)	- 40 °C
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor storage	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Via terminals, capacitor connected
Motor protection	Thermal overload protector (TOP) internally connected
With cable	Variable
Protection class	I (with customer connection of protective earth)
Motor capacitor according to EN 60252-1 in safety protection class	P0/S0
Conformity with standards	CE
Approval	CSA C22.2 No. 113; VDE; EAC; CCC; UL 507

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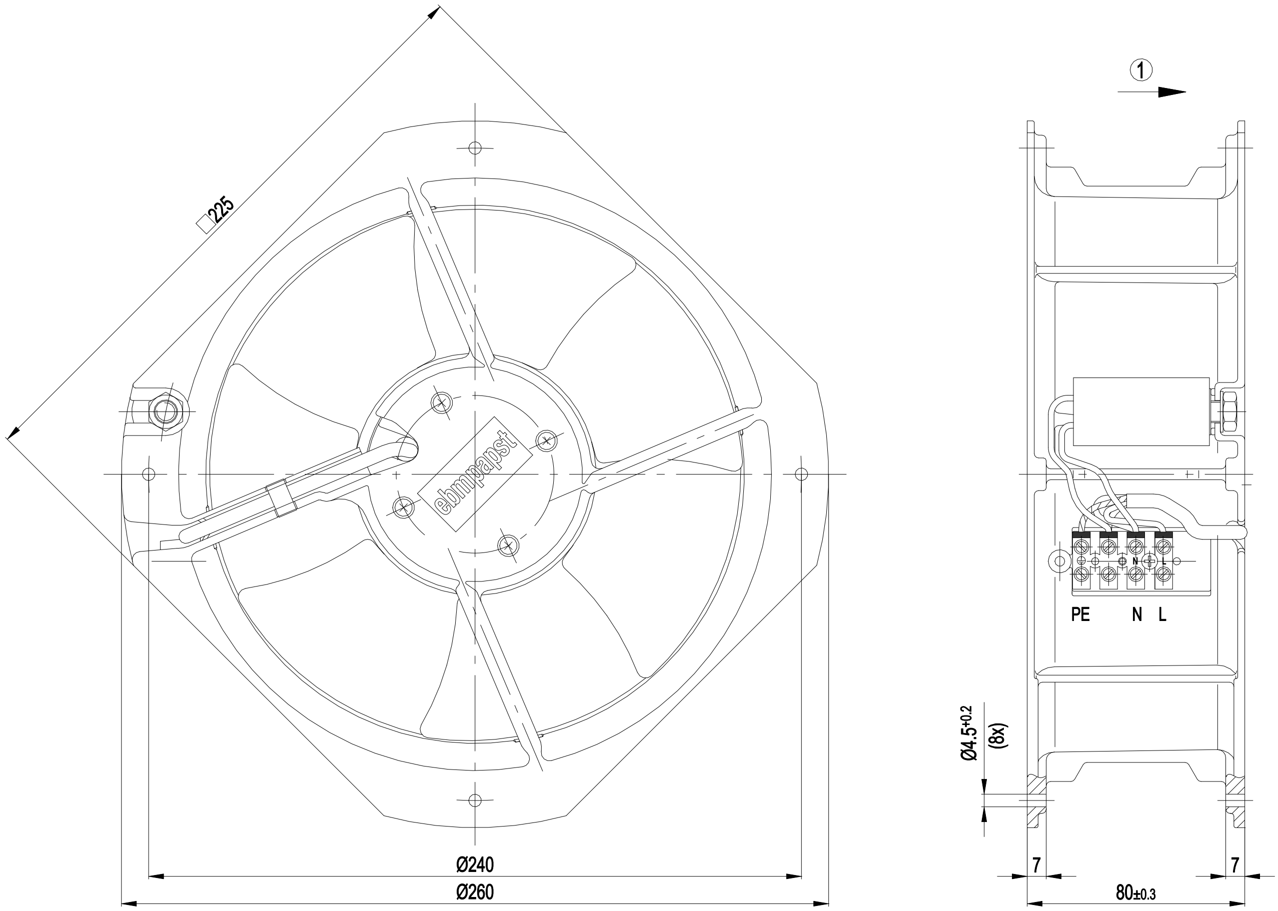
W2E200-HH86-01

AC axial compact fan

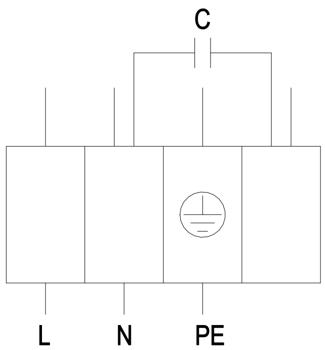
sickle-shaped blades (S series)

Product drawing



1	Direction of air flow "V"

Terminal/plug assignment



L	blue	N	black	PE	green/yellow

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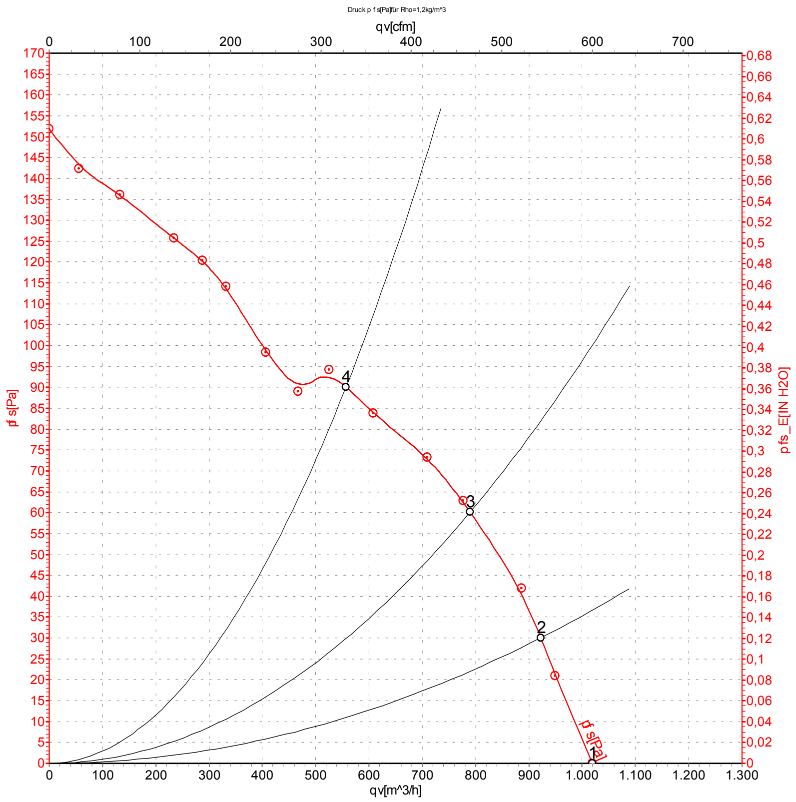
AC axial compact fan

sickle-shaped blades (S series)

Curves: Air performance 60 Hz



Measurement: LU-57315

Air performance measured according to ISO 5801 installation category A. For detailed information on the measurement setup, contact ebm-papst. Intake sound level: Sound power level according to ISO 13347 / sound pressure level measured at 1 m distance from fan axis. The values given are valid under the specified measuring conditions and may vary due to conditions of installation. For deviations from the standard configuration, the parameters have to be checked on the installed unit.

Measured values

	U	f	n	P_e	I	qv	p_{fs}
	V	Hz	min^{-1}	W	A	m^3/h	Pa
1	115	60	2800	80	0.70	1020	0
2	115	60	2715	81	0.70	920	30
3	115	60	2620	85	0.73	790	60
4	115	60	2500	87	0.76	555	90

U = Power supply · f = Frequency · n = Speed · P_e = Power consumption · I = Current draw · qv = Air flow · p_{fs} = Pressure increase

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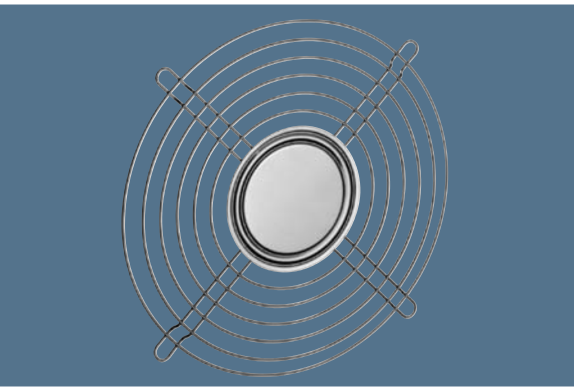
Guard grilles

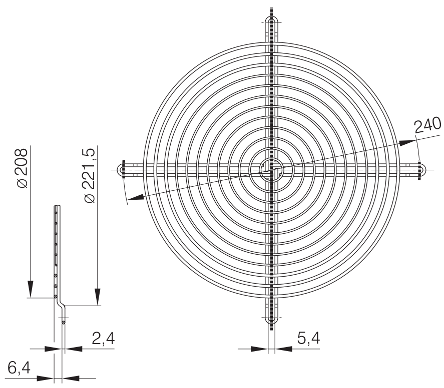


– Steel wire, plastic-coated, silver-metallic gloss.

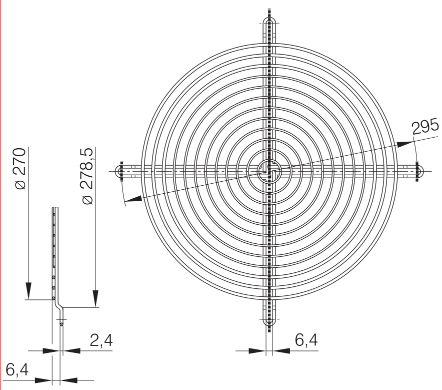
Fan series	Guard grilles
W1G 200	78128-2-4039
W1G 250	09418-2-4039
W2E 200	78128-2-4039

Fan series	Guard grilles
W4S 200	78128-2-4039
W2E 250	09418-2-4039

78128-2-4039 **Size 200**



09418-2-4039 **Size 250**



Pre Pleat® 40 LPD

MERV 8A Extended Surface Pleated Filters

Model #'s 80255 (High), 80055 (Standard)

Bulletin: PB700-0312

General

Flanders has led the world in filter media development and the application of high efficiency filtration for over 60-years. Originally introduced in 2004, the industry's first MERV 8 filter operating solely on mechanical means has now been improved! Since 2004, other manufacturers have altered media blends to meet the LEED® and market driven demand for non-electret MERV 8 filters. This has led to pressure drop increases in their filters of 25% or more!

Utilizing a unique new fiber technology, our Research & Development Team has now achieved multiple goals of maintaining MERV 8A performance at a resistance that is 40% lower than competition. At the same time, the LPD's Dust Holding Capacity remains the highest in the industry. All this while operating on 100% mechanical principles - Remarkable!

Air filters are designed for dust holding (filter life), pressure drop (energy use), and MERV (particle removal efficiency). Flanders Pre Pleat 40 LPD achieves the highest **dust holding capacity** and the **lowest pressure drop** in the industry, while maintaining a mechanical MERV 8A per ASHRAE Standard 52.2-2007, Appendix J. Classified UL Class 900.

Installation Considerations

Distinctions can be made in air filter technology. Flanders is committed to continuously developing new and improved products to assist in an environmentally responsible, healthy, and prosperous environment.

The Pre Pleat 40 LPD high and standard capacity pleated panel filters are suitable as pre filters but are best suited for heavy duty commercial, industrial, pharmaceutical, as well as other industrial applications where high dust holding is required. The Pre Pleat 40 LPD can be installed in PF-1 Holding Frames, K-Trac Framing Modules, Surepleat Side Access Housings and Bag-In / Bag-Out Containment housings.

Operating Temperature Limits

Maximum operating temperature is 180° F (82.22° C).

Physical Data

Media: 100% Non-woven synthetic media manufactured from recyclable material

Media Support: Diamond-shaped expanded metal

Pleat Design: V-Pleat

Pleat Count:

Economy Standard: 1”=13, 2”=10, 4”=9

High Capacity: 1”=15, 2”=15, 4”=13

Frame: Moisture-resistant clay coated frame made with recyclable material

Important Features

- Ecologically advanced filtration medium made from recyclable materials
- Media maximizing V-pleat design
- Expanded metal grid prevents media flutter while in operation
- Diagonal and horizontal support members provide frame strength
- Filter media pack is sealed to eliminate air bypass
- Average efficiency is 30-35% per ASHRAE 52.1-92
- Average arrestance is 93%
- MERV 8A per ASHRAE 52.2-2007, Appendix J

Pleated Air Filters

Capacities and Dimensions

Nominal Depth (in.)	Nominal Size WxHxD (in.)	Standard Capacity						High Capacity					
		300 FPM		500 FPM		Media Area (sq. ft.)	Wt. Each (lbs.)	300 fpm		500 FPM		Media Area (sq. ft.)	Wt. Each (lbs.)
		CFM	PD	CFM	PD			cfm	PD	CFM	PD		
1” Std. Capacity 13 ppf High Capacity 15 ppf	10x10x1	208	0.17	347	-	1.1	0.2	208	0.15	347	-	1.3	0.2
	10x20x1	417	0.17	694	-	2.3	0.3	417	0.15	694	-	2.7	0.3
	12x20x1	500	0.17	833	-	2.7	0.3	500	0.15	833	-	3.1	0.3
	12x24x1	600	0.17	1000	-	3.2	0.3	600	0.15	1000	-	3.7	0.4
	14x20x1	583	0.17	972	-	3.3	0.3	583	0.15	972	-	3.7	0.4
	14x25x1	729	0.17	1215	-	4.1	0.4	729	0.15	1215	-	4.6	0.5
	15x20x1	625	0.17	1042	-	3.5	0.4	625	0.15	1042	-	3.9	0.4
	16x20x1	667	0.17	1111	-	3.7	0.4	667	0.15	1111	-	4.1	0.4
	16x25x1	833	0.17	1389	-	4.6	0.5	833	0.15	1389	-	5.2	0.5
	18x24x1	900	0.17	1500	-	4.9	0.5	900	0.15	1500	-	5.7	0.6
	18x25x1	938	0.17	1563	-	5.2	0.5	938	0.15	1563	-	5.9	0.6
	20x20x1	833	0.17	1389	-	4.5	0.5	833	0.15	1389	-	5.1	0.5
	20x24x1	1000	0.17	1667	-	5.4	0.5	1000	0.15	1667	-	6.2	0.6
	20x25x1	1042	0.17	1736	-	5.7	0.6	1042	0.15	1736	-	6.4	0.6
	24x24x1	1200	0.17	2000	-	6.4	0.6	1200	0.15	2000	-	7.4	0.7
	25x25x1	1302	0.17	2170	-	7.2	0.7	1302	0.15	2170	-	8.3	0.8
2” Std. Capacity 10 ppf High Capacity 15 ppf	10x20x2	417	0.11	694	0.21	4.3	0.4	417	0.10	694	0.20	6.2	0.5
	12x20x2	500	0.11	833	0.21	4.8	0.5	500	0.10	833	0.20	7.2	0.5
	12x24x2	600	0.11	1000	0.21	5.8	0.6	600	0.10	1000	0.20	8.7	0.6
	14x20x2	583	0.11	972	0.21	5.8	0.5	583	0.10	972	0.20	8.6	0.6
	14x25x2	729	0.11	1215	0.21	7.2	0.7	729	0.10	1215	0.20	10.8	0.8
	15x20x2	625	0.11	1042	0.21	6.2	0.6	625	0.10	1042	0.20	9.1	0.7
	16x20x2	667	0.11	1111	0.21	6.7	0.6	667	0.10	1111	0.20	9.6	0.7
	16x25x2	833	0.11	1389	0.21	8.4	0.7	833	0.10	1389	0.20	12.0	0.9
	18x24x2	900	0.11	1500	0.21	8.7	0.8	900	0.10	1500	0.20	13.3	0.9
	18x25x2	938	0.11	1563	0.21	9.0	0.8	938	0.10	1563	0.20	13.8	1.0
	20x20x2	833	0.11	1389	0.21	8.2	0.7	833	0.10	1389	0.20	12.0	0.9
	20x24x2	1200	0.11	2000	0.21	9.8	0.9	1200	0.10	2000	0.20	14.4	1.0
	20x25x2	1042	0.11	1736	0.21	10.2	0.9	1042	0.10	1736	0.20	15.0	1.1
	24x24x2	1200	0.11	2000	0.21	11.5	1.0	1200	0.10	2000	0.20	17.3	1.2
	25x25x2	1302	0.11	2170	0.21	12.6	1.1	1302	0.10	2170	0.20	19.3	1.3
4” Std. Capacity 9 ppf High Capacity 13 ppf	12x24x4	600	0.10	1000	0.19	11.1	1.0	600	0.09	1000	0.17	16.5	1.0
	16x20x4	667	0.10	1111	0.19	12.3	1.0	667	0.09	1111	0.17	18.0	1.2
	16x25x4	833	0.10	1389	0.19	15.5	1.3	833	0.09	1389	0.17	22.6	1.4
	18x24x4	900	0.10	1500	0.19	17.3	1.4	900	0.09	1500	0.17	24.2	1.5
	20x20x4	833	0.10	1389	0.19	15.4	1.3	833	0.09	1389	0.17	22.3	1.4
	20x24x4	1000	0.10	1667	0.19	18.6	1.5	1000	0.09	1667	0.17	24.0	1.7
	20x25x4	1042	0.10	1736	0.19	19.3	1.6	1042	0.09	1736	0.17	27.7	1.8
	24x24x4	1200	0.10	2000	0.19	22.3	1.8	1200	0.09	2000	0.17	28.8	2.0
	25x29x4	1510	0.10	2517	0.19	28.4	2.4	1510	0.09	2517	0.17	28.4	2.7

Notes:

1. PD represents clean pressure drop in inches w.g. The recommended final pressure drop for all models is 1.0 in. w.g. System design may dictate a lower change-out point.
2. Actual filter face size for 12x24 and 24x24 filters is 5/8 in. under on height and width. Actual face size on all other sizes is 1/2 in. under on height and width.
3. Actual filter depth is 1/4 inch under for these nominal 1-inch, 2-inch and 4-inch deep filters. For capacities other than those shown, ratio the face velocities.
4. Efficiency is not affected by the conditioning steps outlined in ASHRAE 52.2-2007 per Appendix J.

DIN rail perforated - NS 35/ 7,5 PERF 2000MM - 0801733

DIN rail perforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver

Key Commercial Data

Packing unit	1 M
Minimum order quantity	5 M
GTIN	4 017918 006686
GTIN	4017918006686
Weight per Piece (excluding packing)	1.000 g
Custom tariff number	72166190
Country of origin	Germany

Technical data

Dimensions

Height	7.5 mm
Length	2000 mm
Width	35 mm
Hole width	15.00 mm
Hole height	6.20 mm
Drill hole spacing	25.00 mm

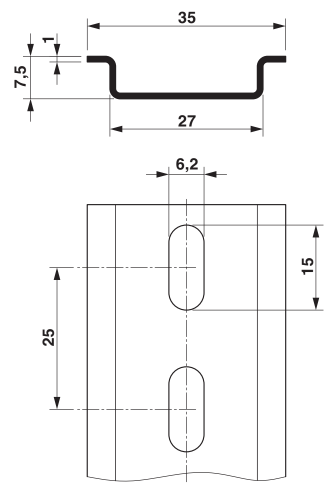
Standards and Regulations

Test standard	acc. to EN 60715
Connection in acc. with standard	IEC / EN

DIN rail perforated - NS 35/ 7,5 PERF 2000MM - 0801733

Drawings

Dimensional drawing



Classifications

eCl@ss

eCl@ss 10.0.1	27400602
eCl@ss 11.0	27400602
eCl@ss 4.0	27110800
eCl@ss 4.1	27110800
eCl@ss 5.0	27141100
eCl@ss 5.1	27141100
eCl@ss 6.0	27400600
eCl@ss 7.0	27400602
eCl@ss 8.0	27400602
eCl@ss 9.0	27400602

ETIM

ETIM 2.0	EC001285
ETIM 3.0	EC001285
ETIM 4.0	EC000212
ETIM 5.0	EC000212
ETIM 6.0	EC001285
ETIM 7.0	EC001285

UNSPSC

UNSPSC 6.01	30212109

PHOENIX CONTACT

Feed-through terminal block - UT 4 - 3044102

Feed-through terminal block, nom. voltage: 1000 V, nominal current: 32 A, connection method: Screw connection, number of connections: 2, cross section: 0.14 mm² - 6 mm², AWG: 26 - 10, width: 6.2 mm, height: 46.9 mm, color: gray, mounting type: NS 35/7,5, NS 35/15

Your advantages

- The large wiring space enables the connection of solid and stranded conductors without ferrules, even above the nominal cross section
- As well as saving space, the compact design enables user-friendly wiring in a small amount of space
- Optimum screwdriver guidance through closed screw shafts
- The cable entry funnel enables the use of conductors with ferrules and plastic collars within the nominal cross section
- Tested for railway applications

RoHS

Key Commercial Data

Packing unit	50 pc
GTIN	4 017918 960391
GTIN	4017918960391

Technical data

General

Number of levels	1
Number of connections	2
Potentials	1
Nominal cross section	4 mm²
Color	gray
Insulating material	PA
Flammability rating according to UL 94	V0
Area of application	Railway industry
	Machine building
	Plant engineering
	Process industry

Feed-through terminal block - UT 4 - 3044102

Technical data

General

Rated surge voltage	8 kV
Degree of pollution	3
Overvoltage category	III
Insulating material group	I
Maximum power dissipation for nominal condition	1.02 W
Maximum load current	41 A (with 6 mm² conductor cross section)
Nominal current I_N	32 A (with 4 mm² conductor cross section)
Nominal voltage U_N	1000 V
Open side panel	Yes
Ambient temperature (operation)	-60 °C ... 85 °C
Ambient temperature (storage/transport)	-25 °C ... 55 °C (For a short time, not exceeding 24 h, -60 to +70 °C)
Permissible humidity (storage/transport)	30 % ... 70 %
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Result of surge voltage test	Test passed
Result of power-frequency withstand voltage test	Test passed
Power frequency withstand voltage setpoint	2.2 kV
Result of the test for mechanical stability of terminal points (5 x conductor connection)	Test passed
Result of bending test	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.14 mm² / 0.2 kg
	4 mm² / 0.9 kg
	6 mm² / 1.4 kg
Tensile test result	Test passed
Result of tight fit on support	Test passed
Tight fit on carrier	NS 35
Setpoint	1 N
Result of voltage-drop test	Test passed
Result of temperature-rise test	Test passed
Requirement temperature-rise test	Increase in temperature ≤ 45 K
Short circuit stability result	Test passed
Conductor cross section short circuit testing	4 mm²
Short-time current	0.48 kA
Conductor cross section short circuit testing	6 mm²
Short-time current	0.72 kA
Result of thermal test	Test passed

Feed-through terminal block - UT 4 - 3044102

Technical data

General

Proof of thermal characteristics (needle flame) effective duration	30 s
Oscillation, broadband noise test result	Test passed
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03
Test spectrum	Service life test category 1, class B, body mounted
Test frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	1.857 $(m/s^2)^2/Hz$
Acceleration	0,8 g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Shock test result	Test passed
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03
Shock form	Half-sine
Acceleration	5g
Shock duration	30 ms
Number of shocks per direction	3
Test directions	X-, Y- and Z-axis (pos. and neg.)
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-60 °C
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Dimensions

Width	6.2 mm
End cover width	2.2 mm
Length	47.7 mm
Height	46.9 mm
Height NS 35/7,5	47.5 mm
Height NS 35/15	55 mm

Connection data

Connection method	Screw connection
Screw thread	M3
Stripping length	9 mm
Tightening torque, min	0.6 Nm

Feed-through terminal block - UT 4 - 3044102

Technical data

Connection data

Tightening torque max	0.8 Nm
Connection in acc. with standard	IEC 60947-7-1
Note	Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area.
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	6 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	10
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	6 mm²
Min. AWG conductor cross section, flexible	26
Max. AWG conductor cross section, flexible	10
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	4 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	4 mm²
2 conductors with same cross section, solid min.	0.14 mm²
2 conductors with same cross section, solid max.	1.5 mm²
2 conductors with same cross section, stranded min.	0.14 mm²
2 conductors with same cross section, stranded max.	1.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, minimum	0.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, maximum	2.5 mm²
Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, minimum	0.14 mm²
Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, maximum	1.5 mm²
Connection in acc. with standard	IEC/EN 60079-7
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	6 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	10
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	4 mm²
Internal cylindrical gage	A4

Standards and Regulations

Connection in acc. with standard	CSA
	IEC 60947-7-1
	IEC/EN 60079-7
Flammability rating according to UL 94	V0

Feed-through terminal block - UT 4 - 3044102

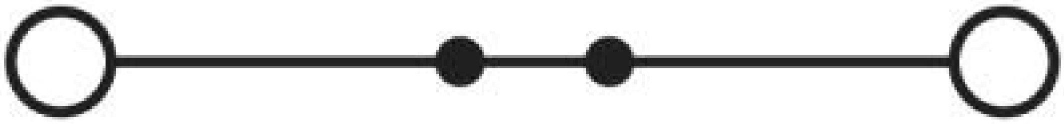
Technical data

Environmental Product Compliance

REACh SVHC	Lead 7439-92-1
China RoHS	Environmentally Friendly Use Period = 50 years
	For details about hazardous substances go to tab “Downloads”, Category “Manufacturer's declaration”

Drawings

Circuit diagram



Classifications

eCl@ss

eCl@ss 10.0.1	27141120
eCl@ss 4.0	27141100
eCl@ss 4.1	27141100
eCl@ss 5.0	27141100
eCl@ss 5.1	27141100
eCl@ss 6.0	27141100
eCl@ss 7.0	27141120
eCl@ss 8.0	27141120
eCl@ss 9.0	27141120

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC000897
ETIM 5.0	EC000897
ETIM 6.0	EC000897
ETIM 7.0	EC000897

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410
UNSPSC 18.0	39121410
UNSPSC 19.0	39121410

Feed-through terminal block - UT 4 - 3044102

Classifications

UNSPSC

UNSPSC 20.0	39121410
UNSPSC 21.0	39121410

Approvals

Approvals

Approvals

DNV GL / CSA / PRS / UL Recognized / cUL Recognized / IECEE CB Scheme / VDE Gutachten mit Fertigungsüberwachung / EAC / RS / LR / cULus Recognized

Ex Approvals

IECEx / ATEX / UL Recognized / cUL Recognized / EAC Ex / cULus Recognized

Approval details

DNV GL https://approvalfinder.dnvgl.com/ TAE00001S9

CSA http://www.csagroup.org/services-industries/product-listing/ 13631

	B	C
Nominal voltage UN	600 V	600 V
Nominal current IN	30 A	30 A
mm²/AWG/kcmil	26-10	26-10

PRS http://www.prs.pl/ TE/2156/880590/17

UL Recognized http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm FILE E 60425

	B	C
Nominal voltage UN	600 V	600 V
Nominal current IN	30 A	30 A
mm²/AWG/kcmil	26-10	26-10

Feed-through terminal block - UT 4 - 3044102

Approvals

cUL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C
Nominal voltage UN	600 V	600 V
Nominal current IN	30 A	30 A
mm²/AWG/kcmil	26-10	26-10

IECEE CB Scheme	http://www.iecee.org/	DE1-60117

Nominal voltage UN	800 V
mm²/AWG/kcmil	0.2-4

VDE Gutachten mit Fertigungsüberwachung	http://www2.vde.com/de/Institut/Online-Service/VDE-gepruefteProdukte/Seiten/Online-Suche.aspx	40013658

Nominal voltage UN	800 V
Nominal current IN	32 A
mm²/AWG/kcmil	0.2-4

EAC		RU C-DE.A*30.B.01742

RS	http://www.rs-head.spb.ru/en/index.php	17.00013.272

LR	http://www.lr.org/en	LR2003762TA

cULus Recognized		

Accessories

Accessories

End cover - D-UT 2,5/10 - 3047028

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)

End cover, length: 47 mm, width: 2.2 mm, height: 39.8 mm, color: gray

Key Commercial Data

Packing unit	50 pc
Minimum order quantity	50 pc
GTIN	4 017918 960346
GTIN	4017918960346

Technical data

General

Color	gray
Material	PA
Flammability rating according to UL 94	V0

Dimensions

Width	2.2 mm
Length	47 mm
Height	39.8 mm

General

Ambient temperature (operation)	-60 °C ... 85 °C
Ambient temperature (storage/transport)	-25 °C ... 55 °C (For a short time, not exceeding 24 h, -60 to +70 °C)
Permissible humidity (storage/transport)	30 % ... 70 %
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C

End cover - D-UT 2,5/10 - 3047028

Technical data

General

Static insulating material application in cold	-60 °C
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Standards and Regulations

Flammability rating according to UL 94	V0

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Classifications

eCl@ss

eCl@ss 10.0.1	27141133
eCl@ss 4.0	21011300
eCl@ss 4.1	21011300
eCl@ss 5.0	27141100
eCl@ss 5.1	27141100
eCl@ss 6.0	27141100
eCl@ss 7.0	27141133
eCl@ss 8.0	27141133
eCl@ss 9.0	27141133

ETIM

ETIM 2.0	EC000886
ETIM 3.0	EC000886
ETIM 4.0	EC000886
ETIM 5.0	EC000886
ETIM 6.0	EC000886
ETIM 7.0	EC000886

UNSPSC

UNSPSC 6.01	30211827
UNSPSC 7.0901	39121424
UNSPSC 11	39121424

End cover - D-UT 2,5/10 - 3047028

Classifications

UNSPSC

UNSPSC 12.01	39121424
UNSPSC 13.2	39121425
UNSPSC 18.0	39121425
UNSPSC 19.0	39121425
UNSPSC 20.0	39121425
UNSPSC 21.0	39121425

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32825 Blomberg
Germany
Tel. +49 5235 300
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http://www.phoenixcontact.com

End clamp - E/NS 35 N - 0800886

End clamp, width: 9.5 mm, color: gray

Product Features

- Large-surface labeling

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
GTIN	4 017918 129309
Weight per Piece (excluding packing)	14.8 g
Custom tariff number	85389099
Country of origin	Germany

Technical data

Dimensions

Height	32.8 mm
Length	48.6 mm
Width	9.5 mm

General

Material	PA
Color	gray
Tightening torque, min	0.4 Nm
Tightening torque max	0.5 Nm

Standards and Regulations

End clamp - E/NS 35 N - 0800886

Technical data

Standards and Regulations

Flammability rating according to UL 94	V2

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141135
eCl@ss 5.1	27141145
eCl@ss 6.0	27141135
eCl@ss 7.0	27141135
eCl@ss 8.0	27141135

ETIM

ETIM 2.0	EC000761
ETIM 3.0	EC001041
ETIM 4.0	EC001041
ETIM 5.0	EC001041

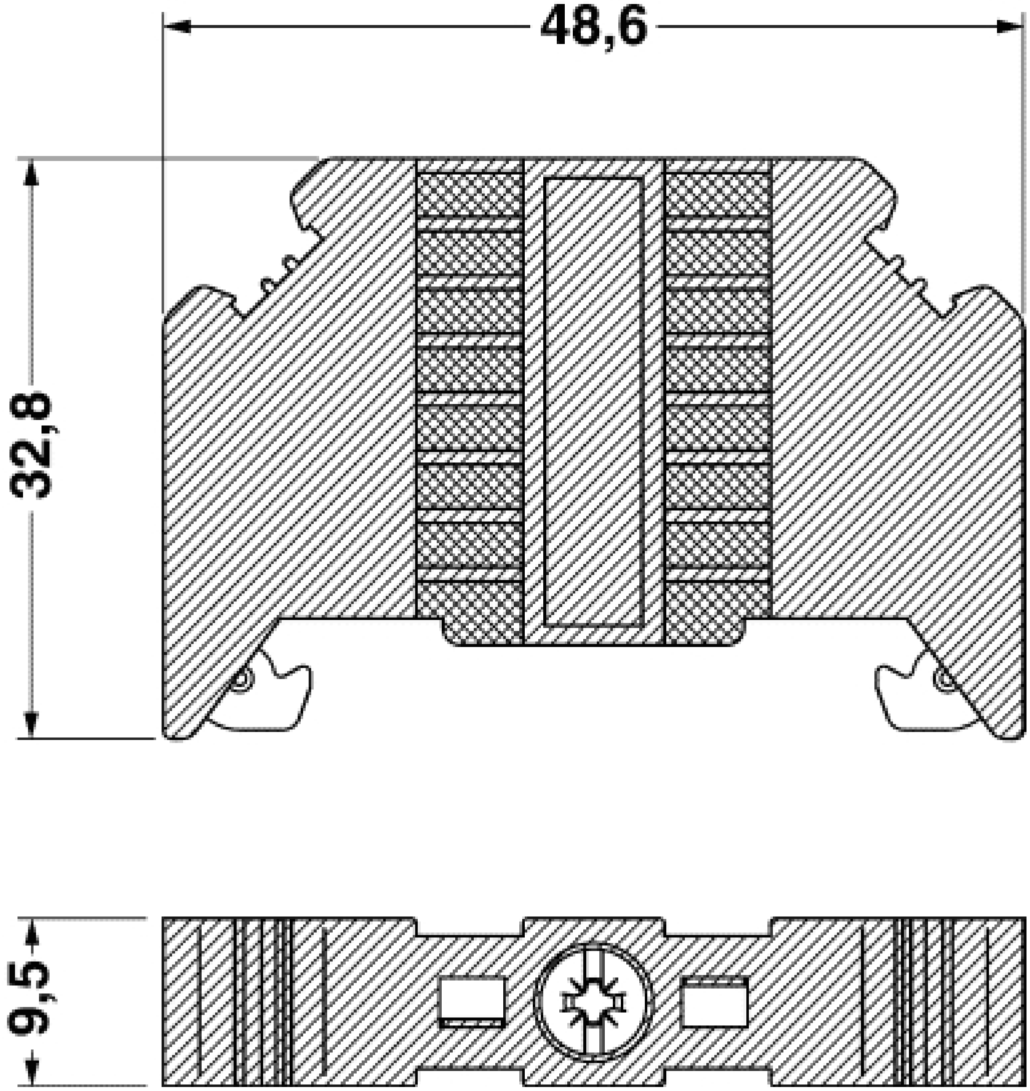
UNSPSC

UNSPSC 6.01	30212109
UNSPSC 7.0901	39121708
UNSPSC 11	39121708
UNSPSC 12.01	39121708
UNSPSC 13.2	39121708

Drawings

End clamp - E/NS 35 N - 0800886

Dimensional drawing

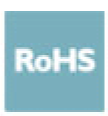


Plug-in bridge - FBS 10-8 - 3030323

Plug-in bridge, pitch: 8.2 mm, width: 80.3 mm, number of positions: 10, color: red

Your advantages

- The 2- to 50-pos. jumpers can bridge up to 50 terminal blocks in the two bridge shafts of the CLIPLINE complete system in one step



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	10 pc
GTIN	4 017918 188634
GTIN	4017918188634
Weight per Piece (excluding packing)	19.460 g
Custom tariff number	85366990
Country of origin	Germany

Technical data

Technical data

Color	red
Material	Copper
Number of positions	10
Pitch	8.2 mm
Height	29.6 mm
Width	80.3 mm
Flammability rating according to UL 94	V0

Plug-in bridge - FBS 10-8 - 3030323

Technical data

Technical data

Maximum load current	41 A (The current values for the jumpers can deviate when used in different modular terminal blocks. The precise values can be found in the accessories data for the respective modular terminal blocks.)

Standards and Regulations

Flammability rating according to UL 94	V0

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141140
eCl@ss 5.1	27141100
eCl@ss 6.0	27141100
eCl@ss 7.0	27141140
eCl@ss 8.0	27141140
eCl@ss 9.0	27141140

ETIM

ETIM 2.0	EC000489
ETIM 3.0	EC000489
ETIM 4.0	EC000489
ETIM 5.0	EC000489
ETIM 6.0	EC000489

UNSPSC

UNSPSC 6.01	30211829
UNSPSC 7.0901	39121426
UNSPSC 11	39121426
UNSPSC 12.01	39121426
UNSPSC 13.2	39121426

Approvals

Approvals

Ground modular terminal block - UT 4-PE - 3044128

Ground modular terminal block, connection method: Screw connection, number of connections: 2, cross section: 0.14 mm² - 6 mm², AWG: 26 - 10, width: 6.2 mm, height: 46.9 mm, color: green-yellow, mounting type: NS 35/7,5, NS 35/15

Your advantages

- Tested for railway applications

RoHS

Key Commercial Data

Packing unit	50 pc
GTIN	4 017918 960407
GTIN	4017918960407

Technical data

General

Number of levels	1
Number of connections	2
Nominal cross section	4 mm²
Color	green-yellow
Insulating material	PA
Flammability rating according to UL 94	V0
Area of application	Railway industry
	Machine building
	Plant engineering
	Process industry
Rated surge voltage	8 kV
Degree of pollution	3
Overvoltage category	III
Insulating material group	I
Open side panel	Yes

Ground modular terminal block - UT 4-PE - 3044128

Technical data

General

Ambient temperature (operation)	-60 °C ... 85 °C
Ambient temperature (storage/transport)	-25 °C ... 55 °C (For a short time, not exceeding 24 h, -60 to +70 °C)
Permissible humidity (storage/transport)	30 % ... 70 %
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C
Oscillation, broadband noise test result	Test passed
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03
Test spectrum	Service life test category 1, class B, body mounted
Test frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	1.857 $(m/s^2)^2/Hz$
Acceleration	0,8 g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Shock test result	Test passed
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03
Shock form	Half-sine
Acceleration	5g
Shock duration	30 ms
Number of shocks per direction	3
Test directions	X-, Y- and Z-axis (pos. and neg.)
Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C
Static insulating material application in cold	-60 °C
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Dimensions

Width	6.2 mm
End cover width	2.2 mm
Length	47.7 mm
Height	46.9 mm
Height NS 35/7,5	47.5 mm
Height NS 35/15	55 mm

Connection data

Ground modular terminal block - UT 4-PE - 3044128

Technical data

Connection data

Note	Please observe the current carrying capacity of the DIN rails.
Connection method	Screw connection
Screw thread	M3
Stripping length	9 mm
Tightening torque, min	0.6 Nm
Tightening torque max	0.8 Nm
Connection in acc. with standard	IEC 60947-7-2
Note	Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area.
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	6 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	10
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	6 mm²
Min. AWG conductor cross section, flexible	26
Max. AWG conductor cross section, flexible	10
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	4 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	4 mm²
2 conductors with same cross section, solid min.	0.14 mm²
2 conductors with same cross section, solid max.	1.5 mm²
2 conductors with same cross section, stranded min.	0.14 mm²
2 conductors with same cross section, stranded max.	1.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, minimum	0.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, maximum	2.5 mm²
Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, minimum	0.14 mm²
Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, maximum	1.5 mm²
Connection in acc. with standard	IEC/EN 60079-7
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	6 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	10
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	4 mm²
Internal cylindrical gage	A4

Standards and Regulations

Ground modular terminal block - UT 4-PE - 3044128

Technical data

Standards and Regulations

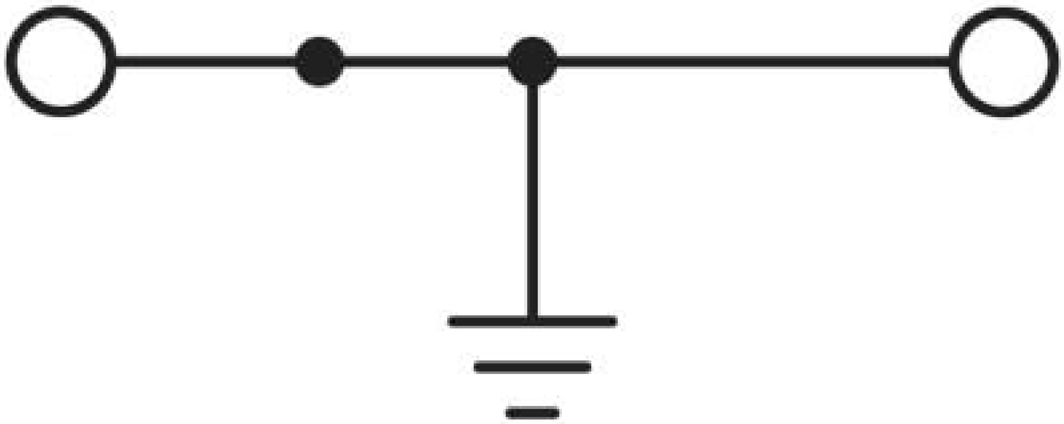
Connection in acc. with standard	CSA
	IEC 60947-7-2
	IEC/EN 60079-7
Flammability rating according to UL 94	V0

Environmental Product Compliance

REACh SVHC	Lead 7439-92-1
China RoHS	Environmentally Friendly Use Period = 50 years
	For details about hazardous substances go to tab “Downloads”, Category “Manufacturer's declaration”

Drawings

Circuit diagram



Classifications

eCl@ss

eCl@ss 10.0.1	27141141
eCl@ss 4.0	27141100
eCl@ss 4.1	27141100
eCl@ss 5.0	27141100
eCl@ss 5.1	27141100
eCl@ss 6.0	27141100
eCl@ss 7.0	27141141
eCl@ss 8.0	27141141
eCl@ss 9.0	27141141

ETIM

ETIM 2.0	EC000901
ETIM 3.0	EC000901

Ground modular terminal block - UT 4-PE - 3044128

Classifications

ETIM

ETIM 4.0	EC000901
ETIM 5.0	EC000901
ETIM 6.0	EC000901
ETIM 7.0	EC000901

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410
UNSPSC 18.0	39121410
UNSPSC 19.0	39121410
UNSPSC 20.0	39121410
UNSPSC 21.0	39121410

Approvals

Approvals

Approvals

DNV GL / CSA / PRS / UL Recognized / cUL Recognized / IECEE CB Scheme / VDE Gutachten mit Fertigungsüberwachung / EAC / RS / LR / cULus Recognized

Ex Approvals

IECEx / ATEX / EAC Ex

Approval details

DNV GL		https://approvalfinder.dnvgl.com/	TAE00001S9

CSA		http://www.csagroup.org/services-industries/product-listing/	13631

	B	C
mm²/AWG/kcmil	26-10	26-10

Ground modular terminal block - UT 4-PE - 3044128

Approvals

PRS	http://www.prs.pl/	TE/2156/880590/17

UL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C	D
mm²/AWG/kcmil	26-10	26-10	26-10

cUL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425

	B	C	D
mm²/AWG/kcmil	26-10	26-10	26-10

IECEE CB Scheme	http://www.iecee.org/	DE1-63045

VDE Gutachten mit Fertigungsüberwachung	http://www2.vde.com/de/Institut/Online-Service/VDE-gepruefteProdukte/Seiten/Online-Suche.aspx	40013715

mm²/AWG/kcmil	0.2-4

EAC		RU C-DE.A*30.B.01742

RS	http://www.rs-head.spb.ru/en/index.php	17.00013.272

LR	http://www.lr.org/en	LR2003762TA

cULus Recognized		

Industrial Ethernet Switch - FL SWITCH SFN 5TX - 2891152

One port is located on the bottom

Ethernet switch, 5 TP RJ45 ports, automatic detection of data transmission speed of 10 or 100 Mbps (RJ45), autocrossing function

Your advantages

- Local diagnostic indicators with LEDs
- The switch also offers cable locking and port blocking
- RJ45 ports support a transmission speed of 10/100 Mbps; fiber optic ports support 100 Mbps
- QoS-prioritized (Quality of Service) messages

RoHS

Key Commercial Data

Packing unit	1 pc
GTIN	4 046356 100793
GTIN	4046356100793
Weight per Piece (excluding packing)	420.000 g
Custom tariff number	85176200
Country of origin	Taiwan

Technical data

Dimensions

Width	30 mm
Height	120 mm
Depth	70 mm

Ambient conditions

Industrial Ethernet Switch - FL SWITCH SFN 5TX - 2891152

Technical data

Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	0 °C ... 60 °C
Ambient temperature (storage/transport)	-20 °C ... 70 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)
Air pressure (operation)	86 kPa ... 5 kPa (up to 1500 m above sea level)
Air pressure (storage/transport)	66 kPa ... 108 kPa (up to 3500 m above sea level)

Interfaces

Interface	Ethernet (RJ45)
No. of ports	5 (RJ45 ports)
Note on the connection method	Auto negotiation and autocrossing
Transmission physics	Ethernet in RJ45 twisted pair
Transmission speed	10/100 Mbps

Function

Basic functions	Unmanaged switch / auto negotiation, complies with IEEE 802.3, store and forward switching mode
Additional functions	Autonegotiation
Status and diagnostic indicators	LEDs: U_S, link and activity per port

Network expansion parameters

Cascading depth	Network, linear, and star structure: any
Maximum conductor length (twisted pair)	100 m

Supply voltage

Supply voltage	24 V DC
Residual ripple	3.6 V_{PP} (within the permitted voltage range)
Supply voltage range	9 V DC ... 32 V DC
Typical current consumption	90 mA (at U_S = 24 V DC)
Max. current consumption	205 mA (at 9 V DC)

General

Mounting type	DIN rail
Type AX	Block design
Net weight	415 g
Housing material	Aluminum
MTTF	192.9 Years (MIL-HDBK-217F standard, temperature 25°C, operating cycle 100%)

Standards and Regulations

Industrial Ethernet Switch - FL SWITCH SFN 5TX - 2891152

Technical data

Standards and Regulations

Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Noise emission	EN 61000-6-4
Noise immunity	EN 61000-6-2:2005
Vibration (storage/transport)	5g, 150 Hz, in acc. with IEC 60068-2-6
Free from substances that could impair the application of coating	In acc. with VW specification
Vibration (operation)	in acc. with IEC 60068-2-6: 5g, 150 Hz
Conformance	CE-compliant
UL, USA / Canada	Class I, Div. 2, Groups A, B, C, D, T4

Environmental Product Compliance

REACh SVHC	Lead 7439-92-1
China RoHS	Environmentally Friendly Use Period = 10;
	For details about hazardous substances go to tab “Downloads”, Category “Manufacturer's declaration”

TYPES KA-U, KKA-U

UNIVERSAL TERMINAL

(One Conductor)
For Aluminum and
Copper Conductors

These dual-rated one-conductor lugs are constructed from high strength aluminum alloy and electro tin-plated to provide low contact resistance.

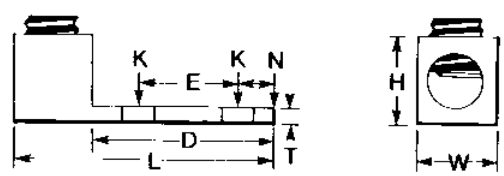
AL9CU

Fig. 1

Fig. 2

Fig. 3

Fig. 4



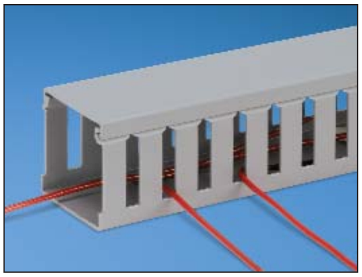
Catalog Number*	Fig. No.	Wire Range Aluminum or Copper	Stud Hole Size	Dimensions							Recommended Tightening ▲ Torque in-lb
				D	L	N	** W	E	T	** H	
KA6U	1	14 Str. - 6 Str.	1/4	.63	1.06	.25	.50	—	.09	.50	45
KA2U	1	14 Str. - 2 Str.		.63	1.16	.31	.50	—	.10	.55	50
KA25U	1	14 Str. - 1/0 Str.		.81	1.50	.44	.63	—	.19	.80	50
KA26U	2	6 Str. - 2/0 Str.		.81	1.47	.47	.63	—	.19	.80	120
KA29U	2	6 Str. - 250 kcmil	5/16	.94	2.00	.50	1.00	—	.25	1.13	275
KA30U	2	6 Str. - 300 kcmil		.94	2.00	.50	1.00	—	.25	1.12	275
KA31U	2	6 Str. - 350 kcmil	3/8	1.03	2.25	.88	1.13	—	.25	1.25	275
KA34U	2	4 Str. - 500 kcmil		1.50	2.81	.88	1.51	—	.31	1.58	500
KA36U	2	2 Str. - 600 kcmil		1.72	3.19	.78	1.50	—	.44	1.56	500
KA40U	2	300 - 800 kcmil	1/2	1.69	3.38	.88	1.75	—	.50	1.94	550
KA44U	2	500 - 1000 kcmil		1.69	3.38	.88	1.75	—	.50	1.94	550
KKA31U-2N	3	6 Str. - 350 kcmil	1/2	3.16	5.50	.63	1.25	1.75	.38	1.50	275
KA36U-2N	4	2 Str. - 600 kcmil		3.22	4.69	.63	1.50	1.75	.44	1.57	500
KA40U-2N	4	300 - 800 kcmil		3.03	4.75	.63	1.75	1.75	.50	1.94	500
KA44U-2N	4	500 - 1000 kcmil		3.03	4.75	.63	1.75	1.75	.50	1.94	550

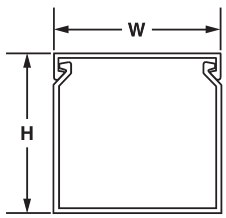
* "N" indicates NEMA standard stud holes.
▲ Listed torque values are for maximum conductor sizes accommodated. Consult UL486 Tables 7-4, 7-5, 7-6 for smaller conductor sizes.
** Maximum dimension.

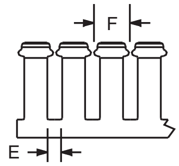
Blue highlighted items are industry standard and most frequently ordered.

Panduct® Type G Wide Slot Wiring Duct

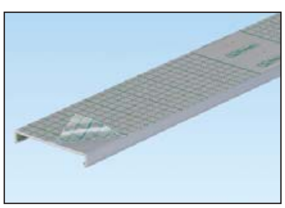
- Wide slot/finger design provides greater sidewall rigidity and can be used with a wide range of wire bundle sizes
- Material: Lead-free PVC
- UL recognized continuous use temperature: 122°F (50°C)
- UL 94 flammability rating of V-0
- Conforms with NFPA 79-2007 section 13.3.1 requirement for flame retardant material
- Provided with mounting holes
- Base and cover length is 6 feet







	E	F
For .5" duct height:	0.37" [9.4]	0.80" [20.3]
0.75" to 2" duct height:	0.31" [7.9]	0.80" [20.3]
3" to 4" duct height:	0.31" [7.9]	1.00" [25.4]
5" duct height:	0.38" [9.4]	1.33" [33.8]



To order cover with protective film add "-F" to part number. 6" cover not available with film.

Base Part Number	Duct Size (W x H)* In.	Duct Size (W x H)* mm	Slot Width In.	Slot Width mm	Cover Part Number	Std. Pkg. Qty.	Base Ctn. Qty.	Cover Ctn. Qty.
G.5X.5LG6	0.69 x 0.60	17.5 x 15.2	0.38	9.7	C.5LG6	6	120	120
G.5X1LG6	0.69 x 1.06	17.5 x 26.9	0.31	7.9	C.5LG6	6	120	120
G.5X2LG6	0.69 x 2.03	17.5 x 51.6	0.31	7.9	C.5LG6	6	120	120
G.75X.75LG6	0.93 x 0.82	23.6 x 20.8	0.31	7.9	C.75LG6	6	120	120
G.75X1LG6	0.93 x 1.06	23.6 x 26.9	0.31	7.9	C.75LG6	6	120	120
G.75X1.5LG6	0.93 x 1.57	23.6 x 39.9	0.31	7.9	C.75LG6	6	120	120
G.75X2LG6	0.93 x 2.03	23.6 x 51.7	0.31	7.9	C.75LG6	6	120	120
G1X1LG6	1.26 x 1.12	32.0 x 28.4	0.31	7.9	C1LG6	6	120	120
G1X1.5LG6	1.26 x 1.62	32.0 x 41.1	0.31	7.9	C1LG6	6	120	120
G1X2LG6	1.26 x 2.12	32.0 x 53.8	0.31	7.9	C1LG6	6	120	120
G1X3LG6	1.26 x 3.12	32.0 x 79.2	0.31	7.9	C1LG6	6	120	120
G1X4LG6	1.26 x 4.10	32.0 x 104.1	0.31	7.9	C1LG6	6	60	120
G1.5X1LG6	1.75 x 1.12	44.5 x 28.4	0.31	7.9	C1.5LG6	6	120	120
G1.5X1.5LG6	1.75 x 1.62	44.5 x 41.1	0.31	7.9	C1.5LG6	6	120	120
G1.5X2LG6	1.75 x 2.12	44.5 x 53.8	0.31	7.9	C1.5LG6	6	120	120
G1.5X3LG6	1.75 x 3.12	44.5 x 79.2	0.31	7.9	C1.5LG6	6	120	120
G1.5X4LG6	1.75 x 4.10	44.5 x 104.1	0.31	7.9	C1.5LG6	6	60	120
G2X1LG6	2.25 x 1.12	57.2 x 28.4	0.31	7.9	C2LG6	6	120	120
G2X1.5LG6	2.25 x 1.62	57.2 x 41.1	0.31	7.9	C2LG6	6	120	120
G2X2LG6	2.25 x 2.12	57.2 x 53.8	0.31	7.9	C2LG6	6	120	120
G2X3LG6	2.25 x 3.12	57.2 x 79.2	0.31	7.9	C2LG6	6	60	120
G2X4LG6	2.25 x 4.10	57.2 x 104.1	0.31	7.9	C2LG6	6	60	120
G2X5LG6	2.25 x 5.10	57.2 x 129.5	0.38	9.7	C2LG6	6	60	120
G2.5X3LG6	2.75 x 3.12	69.9 x 79.2	0.31	7.9	C2.5LG6	6	120	120
G3X1LG6	3.25 x 1.12	82.6 x 28.4	0.31	7.9	C3LG6	6	120	120
G3X2LG6	3.25 x 2.12	82.6 x 53.8	0.31	7.9	C3LG6	6	120	120
G3X3LG6	3.25 x 3.12	82.6 x 79.2	0.31	7.9	C3LG6	6	60	120
G3X4LG6	3.25 x 4.10	82.6 x 104.1	0.31	7.9	C3LG6	6	60	120
G3X5LG6	3.25 x 5.10	82.6 x 129.5	0.38	9.7	C3LG6	6	60	120
G4X1.5LG6	4.25 x 1.62	108.0 x 41.1	0.31	7.9	C4LG6	6	120	120
G4X2LG6	4.25 x 2.12	108.0 x 53.8	0.31	7.9	C4LG6	6	60	120
G4X3LG6	4.25 x 3.12	108.0 x 79.2	0.31	7.9	C4LG6	6	60	120
G4X4LG6	4.25 x 4.10	108.0 x 104.1	0.31	7.9	C4LG6	6	60	120
G4X5LG6	4.25 x 5.10	108.0 x 129.5	0.38	9.7	C4LG6	6	60	120
G6X4LG6	6.25 x 4.15	158.8 x 105.4	0.31	7.9	C6LG6	6	60	120

Part number shown for LG (Light Gray). For other color availability see color selection guide, page C1.48.
Base and cover sold separately.
*"H" dimension includes duct and cover.

nVent HOFFMAN

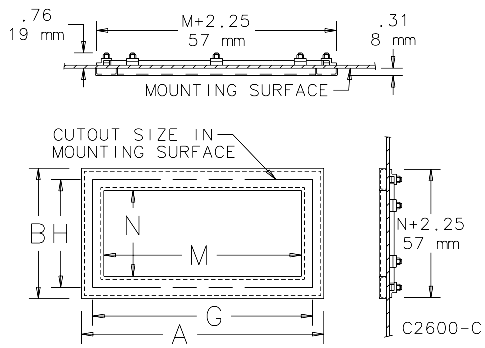
STEEL, STAINLESS STEEL AND NON-METALLIC WINDOW KITS

Steel Window Kits have a heavy gauge cold rolled steel formed frame (cleaned and treated for paint endurance and adhesion), painted ANSI 61 gray. The clear window is made of .25-in. (6mm) impact-resistant polycarbonate material. They are ideal for indoor and outdoor Type 3R, 4 and 12 applications.
Stainless Steel Window kits have a formed heavy gauge Type 304 stainless steel frame with a brushed finish. The clear window is made of .25-in. (6mm) impact-resistant polycarbonate material. They are ideal for indoor and outdoor Type 3R, 4X and 12 applications.
Non-Metallic Window kits are made of a single piece special polycarbonate blend, Makrolon, that has enhanced impact, UV, water exposure, absorption, and saturation resistance. They are ideal for indoor and outdoor Type 3R, 4, 4X and 12 applications. They are also ideal for non-metallic enclosures where exterior metallic materials are not allowed and can accommodate up to .25-in. enclosure material thickness.

All Window kits are easy to install and require a simple rectangular enclosure cutout. All required hardware is furnished, along with assembly and cut- out instructions. The gasket material on all windows is resistant to oils, cutting fluids and many other liquids. Window kits of the same size use the same interchangeable cutout.

Custom sizes for Steel and Stainless Steel Window Kits are available along with different finishes and gasket materials. Consult nVent HOFFMAN for details.

BULLETIN: A80SW, A80W



INDUSTRY STANDARDS

UL 508A Component Recognized; Type 4, 4X (stainless steel and non-metallic versions only), 3R, 12; File No. E61997.
UL 746C Component Recognized (non-metallic version only).

CSA Type 4, 4X (stainless steel and non-metallic versions only), 3R, 12; File No. 42186
NEMA/EEMAC 4, 4X (stainless steel and non-metallic versions only), 3R, 12
IEC 60529, IP66

Catalog Number	AxB in.	AxB mm	Material	Window Size M x N (in.)	Window Size M x N (mm)	Required Cutout Size G x H (in.)	Required Cutout Size G x H (mm)
APWK53NF	7.50 x 5.50	191 x 140	Steel	5.00 x 3.00	127 x 76	6.69 x 4.69	170 x 119
APWK53NFSS	7.50 x 5.50	191 x 140	Stainless Steel	5.00 x 3.00	127 x 76	6.69 x 4.69	170 x 119
APWK53NFNM	7.62 x 5.62	194 x 143	Polycarbonate	5.00 x 3.00	127 x 76	6.78 x 4.78	172 x 121
APWK711NFSS	9.50 x 13.50	241 x 343	Stainless Steel	11.00 x 7.00	279 x 178	8.69 x 12.69	221 x 322
APWK95NF	11.50 x 8.00	292 x 203	Steel	9.00 x 5.50	229 x 140	10.69 x 7.19	272 x 183
APWK95NFSS	11.50 x 8.00	292 x 203	Stainless Steel	9.00 x 5.50	229 x 140	10.69 x 7.19	272 x 183
APWK95NFNM	11.62 x 8.12	295 x 203	Polycarbonate	9.00 x 5.50	229 x 140	10.78 x 7.28	274 x 185
APWK116NFNM	13.62 x 8.62	346 x 219	Polycarbonate	11.00 x 6.00	279 x 152	12.78 x 7.78	325 x 198
APWK133NF	15.50 x 5.50	394 x 140	Steel	13.00 x 3.00	330 x 76	14.69 x 4.69	373 x 119
APWK138NF	15.50 x 10.50	394 x 267	Steel	13.00 x 8.00	330 x 203	14.69 x 9.69	373 x 246
APWK138NFSS	15.50 x 10.50	394 x 267	Stainless Steel	13.00 x 8.00	330 x 203	14.69 x 9.69	373 x 246
APWK138NFNM	15.62 x 10.62	397 x 270	Polycarbonate	13.00 x 8.00	330 x 203	14.69 x 9.69	375 x 248
APWK715NFSS	17.50 x 9.50	445 x 241	Stainless Steel	15.00 x 7.00	381 x 178	8.69 x 16.69	221 x 424
APWK175NF	19.50 x 8.00	495 x 203	Steel	17.00 x 5.50	432 x 140	18.69 x 7.19	475 x 183
APWK1711NF	19.50 x 13.50	495 x 343	Steel	17.00 x 11.00	432 x 279	18.69 x 12.69	475 x 322
APWK1711NFSS	19.50 x 13.50	495 x 343	Stainless Steel	17.00 x 11.00	432 x 279	18.69 x 12.69	475 x 322
APWK720NFSS	22.50 x 9.50	572 x 241	Stainless Steel	20.00 x 7.00	508 x 178	8.69 x 21.69	221 x 551
APWK2315NF	25.50 x 17.50	648 x 445	Steel	23.00 x 15.00	584 x 381	24.69 x 16.69	627 x 424
APWK2315NFSS	25.50 x 17.50	648 x 445	Stainless Steel	23.00 x 15.00	584 x 381	24.69 x 16.69	627 x 424
APWK724NFSS	26.50 x 9.50	673 x 241	Stainless Steel	24.00 x 7.00	610 x 178	8.69 x 25.69	221 x 653
APWK729NFSS	31.50 x 9.50	800 x 241	Stainless Steel	29.00 x 7.00	737 x 178	8.69 x 30.69	221 x 780
APWK2919NF	31.50 x 21.50	800 x 546	Steel	29.00 x 19.00	737 x 483	30.69 x 20.69	780 x 525
APWK2919NFSS	31.50 x 21.50	800 x 546	Stainless Steel	29.00 x 19.00	737 x 483	30.69 x 20.69	780 x 525
APWK3523NF	37.50 x 25.50	953 x 648	Steel	35.00 x 23.00	889 x 584	36.69 x 24.69	932 x 627

When determining if a window kit will fit in a door or cover, be sure to allow for gaskets, data pockets, door handles, latch rods and other parts attached to the door or cover.

nVent | HOFFMAN

CONCEPT DEEP HINGED WINDOW KIT

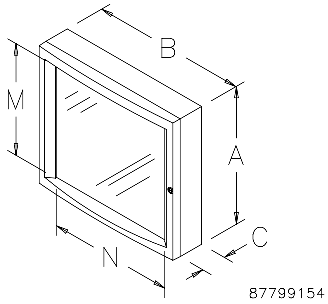
INDUSTRY STANDARDS

UL 508A, 508, File Number E61997: Type 12

NEMA Type 12
CSA File Number LR42186: Type 12
IEC 60529, IP66

APPLICATION

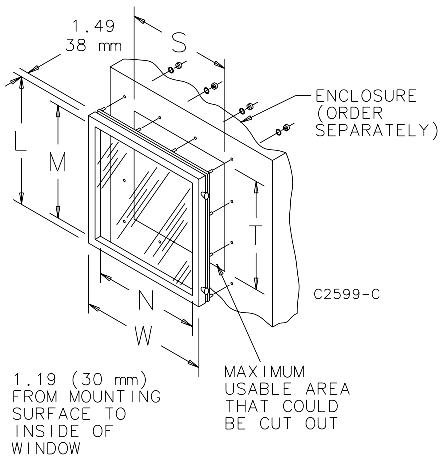
Kit is hinged on left side and has a single-point slotted latch (optional locking or non-locking wing knob latch is also available). Aesthetic die-cast aluminum frame has .188-in. (5-mm) thick, clear polycarbonate window. Two-inch space between enclosure front opening and window surface accommodates switches, lights, meters and other components. This kit can be used as an accessory window kit on larger standard Hoffman enclosure doors. Textured finish, ANSI 61 gray or RAL 7035 light gray.



BULLETIN: C2

Catalog Number	AxBxC in.	AxBxC mm	Finish	Window Size M x N (mm)	Window Size M x N (in.)
CWHD3136	12.20 x 14.17 x 3.31	310 x 360 x 84	ANSI 61	253 x 276	9.96 x 10.86
CWHD3136LG	12.20 x 14.17 x 3.31	310 x 360 x 84	RAL 7035	253 x 276	9.96 x 10.86
CWHD4045	15.75 x 17.72 x 3.39	400 x 450 x 86	ANSI 61	343 x 366	13.50 x 14.40
CWHD4045LG	15.75 x 17.72 x 3.39	400 x 450 x 86	RAL 7035	343 x 366	13.50 x 14.40
CWHD5557	21.65 x 22.44 x 3.50	550 x 570 x 89	ANSI 61	493 x 486	19.40 x 19.13

TYPE 12 HINGED WINDOW KIT



INDUSTRY STANDARDS

UL 508A Component Recognized; Type 12; File No. E61997

CSA Type 12; File No. 42186
NEMA/EEMAC Type 12
IEC 60529, IP55

For use as a viewing window where access to components mounted behind the window is required. Window is .25-in. (6-mm) clear polycarbonate. Easily mounted by drilling the appropriate mounting holes. All mounting hardware is provided. Continuous gaskets on all openings maintain UL Type 12 integrity. Finish is ANSI 61 gray polyester powder paint.

BULLETIN: A80W

Catalog Number	Window Size M x N in./mm	Overall L x W in./mm	S in./mm	T in./mm
APWK1212H	10.28 x 10.28 261 x 261	12.00 x 12.00 305 x 305	10.44 265	10.44 265
APWK1612H	14.28 x 10.28 363 x 261	16.00 x 12.00 406 x 305	10.44 265	14.44 367
APWK2016H	18.28 x 14.28 464 x 363	20.00 x 16.00 508 x 406	14.44 367	18.44 468
APWK2020H	18.28 x 18.28 464 x 464	20.00 x 20.00 508 x 508	18.44 468	18.44 468
APWK2420H	22.28 x 18.28 566 x 464	24.00 x 20.00 610 x 508	18.44 468	22.44 570
APWK3024H	28.28 x 22.28 718 x 566	30.00 x 24.00 762 x 610	22.44 570	28.44 722

EXTRA-DEEP PUSHBUTTON ENCLOSURES, TYPE 12

INDUSTRY STANDARDS

UL 508A Listed; Type 12, 13; File No. E61997
cUL Listed per CSA C22.2 No. 94; Type 12, 13; File No. E61997

NEMA/EEMAC Type 12, 13
CSA File Number 42186: Type 12
IEC 60529, IP65

APPLICATION

Extra-Deep Pushbutton Enclosures are designed to hold 30.5-mm and 22.5-mm pushbuttons and switches, with added depth to accommodate additional pushbutton contact blocks.

SPECIFICATIONS

- 16 or 14 gauge steel
- Seams continuously welded and ground smooth
- Captivated cover screws thread into sealed wells
- Bonding provision on cover
- Grounding stud on body
- Oil-resistant gasket
- Factory stamped 4-way pushbutton holes
- Enclosures 6.00 x 4.00 x 4.75 in. (152 x 102 x 121 mm) and larger have internal detachable hinge to hold cover open during wiring
- External welded-on mounting brackets for easy installation
- 30.5-mm or 22.5-mm size holes

FINISH

ANSI 61 gray polyester powder paint inside and out

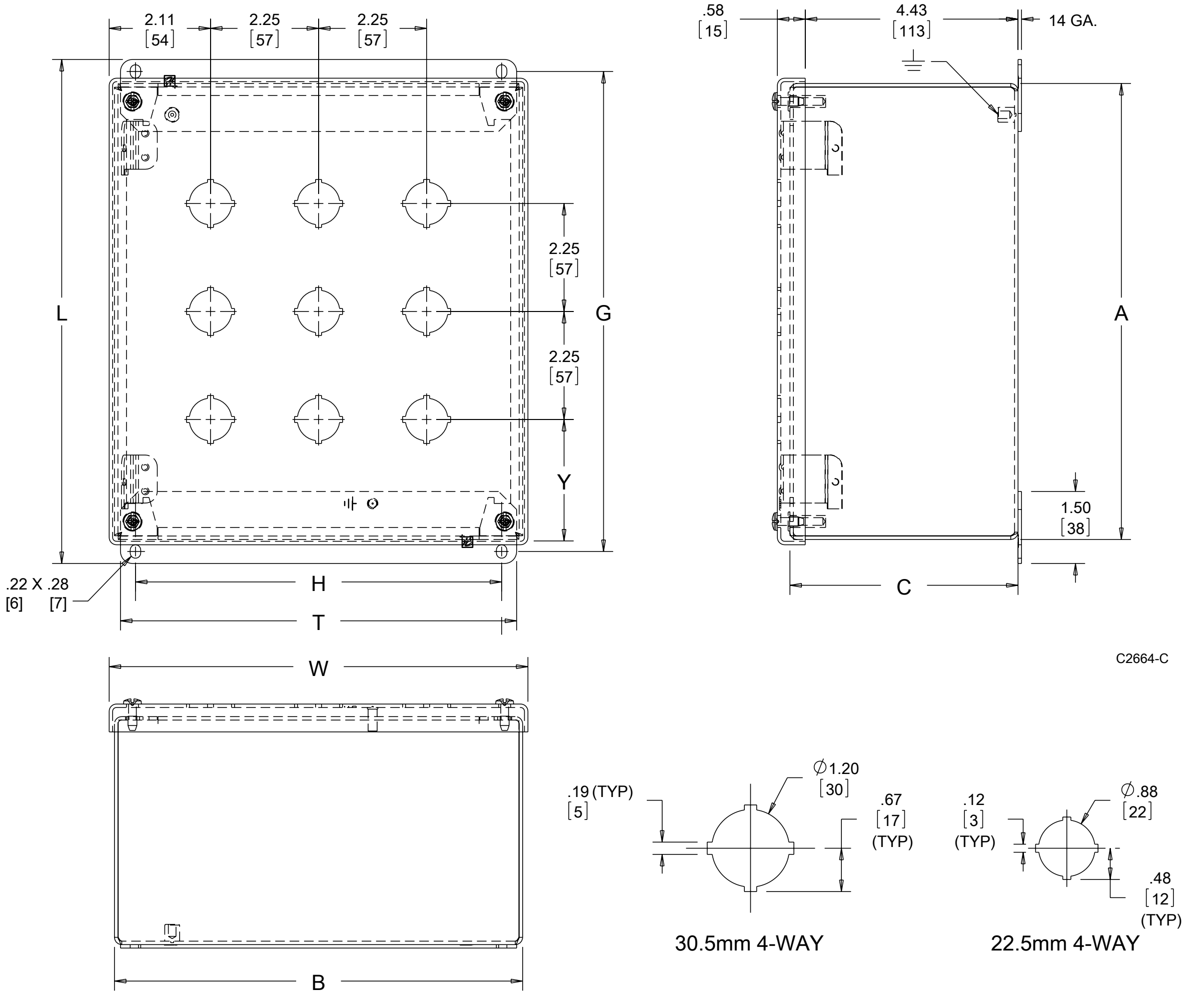
ACCESSORIES

See also Accessories.
Industrial Corrosion Inhibitors
HOL-SEALERS Hole Seals
Tamper-Resistant Screws

BULLETIN: PB1

Standard Product

Catalog Number	AxBxC in.	AxBxC mm	Hole Size	Number of Holes	Gauge	Mounting G x H (in.)	Mounting G x H (mm)	Overall L x W (in.)	Overall L x W (mm)	T (in.)	T (mm)	Y (in.)	Y (mm)
E1PBX	4.00 x 4.00 x 4.75	102 x 102 x 121	30.5 mm	1	16	4.50 x 3.12	114 x 79	5.00 x 4.22	127 x 107	3.75	95	2.11	54
E1PBXM	4.00 x 4.00 x 4.75	102 x 102 x 121	22.5 mm	1	16	4.50 x 3.12	114 x 79	5.00 x 4.22	127 x 107	3.75	95	2.11	54
E2PBX	6.00 x 4.00 x 4.75	152 x 102 x 121	30.5 mm	2	14	6.50 x 3.12	165 x 79	7.00 x 4.22	178 x 107	3.75	95	1.98	50
E2PBXM	6.00 x 4.00 x 4.75	152 x 102 x 121	22.5 mm	2	14	6.50 x 3.12	165 x 79	7.00 x 4.22	178 x 107	3.75	95	1.98	50
E3PBX	8.00 x 4.00 x 4.75	203 x 102 x 121	30.5 mm	3	14	8.50 x 3.12	216 x 79	9.00 x 4.22	229 x 107	3.75	95	1.86	47
E3PBXM	8.00 x 4.00 x 4.75	203 x 102 x 121	22.5 mm	3	14	8.50 x 3.12	216 x 79	9.00 x 4.22	229 x 107	3.75	95	1.86	47
E4PBX	10.00 x 4.00 x 4.75	254 x 102 x 121	30.5 mm	4	14	10.50 x 3.12	267 x 79	11.00 x 4.22	279 x 107	3.75	95	1.73	44
E4PBXM	10.00 x 4.00 x 4.75	254 x 102 x 121	22.5 mm	4	14	10.50 x 3.12	267 x 79	11.00 x 4.22	279 x 107	3.75	95	1.73	44
E4SPBX	7.25 x 6.25 x 4.75	184 x 159 x 121	30.5 mm	4	14	7.75 x 5.38	197 x 137	8.25 x 6.47	210 x 164	6.00	152	2.61	66
E4SPBXM	7.25 x 6.25 x 4.75	184 x 159 x 121	22.5 mm	4	14	7.75 x 5.38	197 x 137	8.25 x 6.47	210 x 164	6.00	152	2.61	66
E6PBX	9.50 x 6.25 x 4.75	241 x 159 x 121	30.5 mm	6	14	10.00 x 5.38	254 x 137	10.50 x 6.47	267 x 164	6.00	152	2.61	66
E6PBXM	9.50 x 6.25 x 4.75	241 x 159 x 121	22.5 mm	6	14	10.00 x 5.38	254 x 137	10.50 x 6.47	267 x 164	6.00	152	2.61	66
E9PBX	9.50 x 8.25 x 4.75	241 x 210 x 121	30.5 mm	9	14	10.00 x 7.62	254 x 194	10.50 x 8.72	267 x 221	8.25	210	2.61	66
E9PBXM	9.50 x 8.50 x 4.75	241 x 216 x 121	22.5 mm	9	14	10.00 x 7.62	254 x 194	10.50 x 8.72	267 x 221	8.25	210	2.61	66
E10PBX	14.00 x 6.25 x 4.75	356 x 159 x 121	30.5 mm	10	14	14.50 x 5.38	368 x 137	15.00 x 6.47	381 x 164	6.00	152	2.61	66
E10PBXM	14.00 x 6.25 x 4.75	356 x 159 x 121	22.5 mm	10	14	14.50 x 5.38	368 x 137	15.00 x 6.47	381 x 164	6.00	152	2.61	66
E12PBX	11.75 x 8.50 x 4.75	298 x 216 x 121	30.5 mm	12	14	12.25 x 7.62	311 x 194	12.75 x 8.72	324 x 221	8.25	210	2.61	66
E12PBXM	11.75 x 8.50 x 4.75	298 x 216 x 121	22.5 mm	12	14	12.25 x 7.62	311 x 194	12.75 x 8.72	324 x 221	8.25	210	2.61	66
E16SPBXV	20.75 x 6.25 x 4.75	527 x 159 x 121	30.5 mm	16	14	21.25 x 5.38	540 x 137	21.75 x 6.47	552 x 164	6.00	152	2.61	66
E16SPBXVM	20.75 x 6.25 x 4.75	527 x 159 x 121	22.5 mm	16	14	21.25 x 5.38	540 x 137	21.75 x 6.47	552 x 164	6.00	152	2.61	66
E16PBX	11.75 x 10.75 x 4.75	298 x 273 x 121	30.5 mm	16	14	12.25 x 9.88	311 x 251	12.75 x 10.97	324 x 279	10.50	267	2.61	66
E16PBXM	11.75 x 10.75 x 4.75	298 x 273 x 121	22.5 mm	16	14	12.25 x 9.88	311 x 251	12.75 x 10.97	324 x 279	10.50	267	2.61	66
E20PBX	14.00 x 10.75 x 4.75	356 x 273 x 121	30.5 mm	20	14	14.50 x 9.88	368 x 251	15.00 x 10.97	381 x 279	10.50	267	2.61	66
E20PBXM	14.00 x 10.75 x 4.75	356 x 273 x 121	22.5 mm	20	14	14.50 x 9.88	368 x 251	15.00 x 10.97	381 x 279	10.50	267	2.61	66
E25PBX	14.00 x 13.00 x 4.75	356 x 330 x 121	30.5 mm	25	14	14.50 x 12.12	368 x 308	15.00 x 13.22	381 x 336	12.75	324	2.61	66
E25PBXM	14.00 x 13.00 x 4.75	356 x 330 x 121	22.5 mm	25	14	14.50 x 12.12	368 x 308	15.00 x 13.22	381 x 336	12.75	324	2.61	66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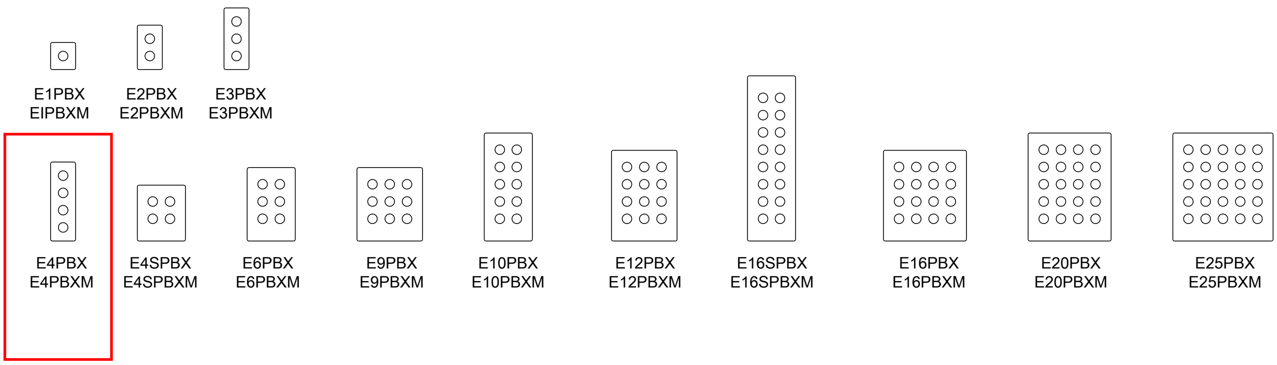
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E3PBX
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E4PBX
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E4SPBX
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E6PBX
E6PBXM
E9PBX
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E25PBX
E25PBXM

NPort 5200A Series

2-port RS-232/422/485 serial device servers

Features and Benefits

- Fast 3-step web-based configuration
- Surge protection for serial, Ethernet, and power
- COM port grouping and UDP multicast applications
- Screw-type power connectors for secure installation
- Dual DC power inputs with power jack and terminal block
- Versatile TCP and UDP operation modes

Certifications

Introduction

The NPort® 5200A device servers are designed to make serial devices network-ready in an instant and give your PC software direct access to serial devices from anywhere on the network. The NPort® 5200A device servers are ultra-lean, ruggedized, and user-friendly, making simple and reliable serial-to-Ethernet solutions possible.

A Greener Serial-to-Ethernet Solution

The MiiNe is a small but powerful Arm-based serial-to-Ethernet SoC with RAM and Flash embedded. With the MiiNe inside, the NPort® 5200A Series saves at least 50% on power consumption compared to existing solutions on the market, helping engineers meet the tough environmental compliance challenges found in today's industrial environments.

Surge Protection for Serial, Ethernet, and Power

Surge, which is typically caused by high voltages that result from switching and lightning transients, is a common threat to all electrical devices. Moxa's leading-edge surge immunity solution, which is applied to the NPort® 5200A's serial, power, and Ethernet lines, is tested and proven compliant with IEC 61000-4-5. This state-of-the-art surge protection provides a robust serial-to-Ethernet solution that can protect electrical devices from voltage spikes and withstand electrically noisy environmental conditions.

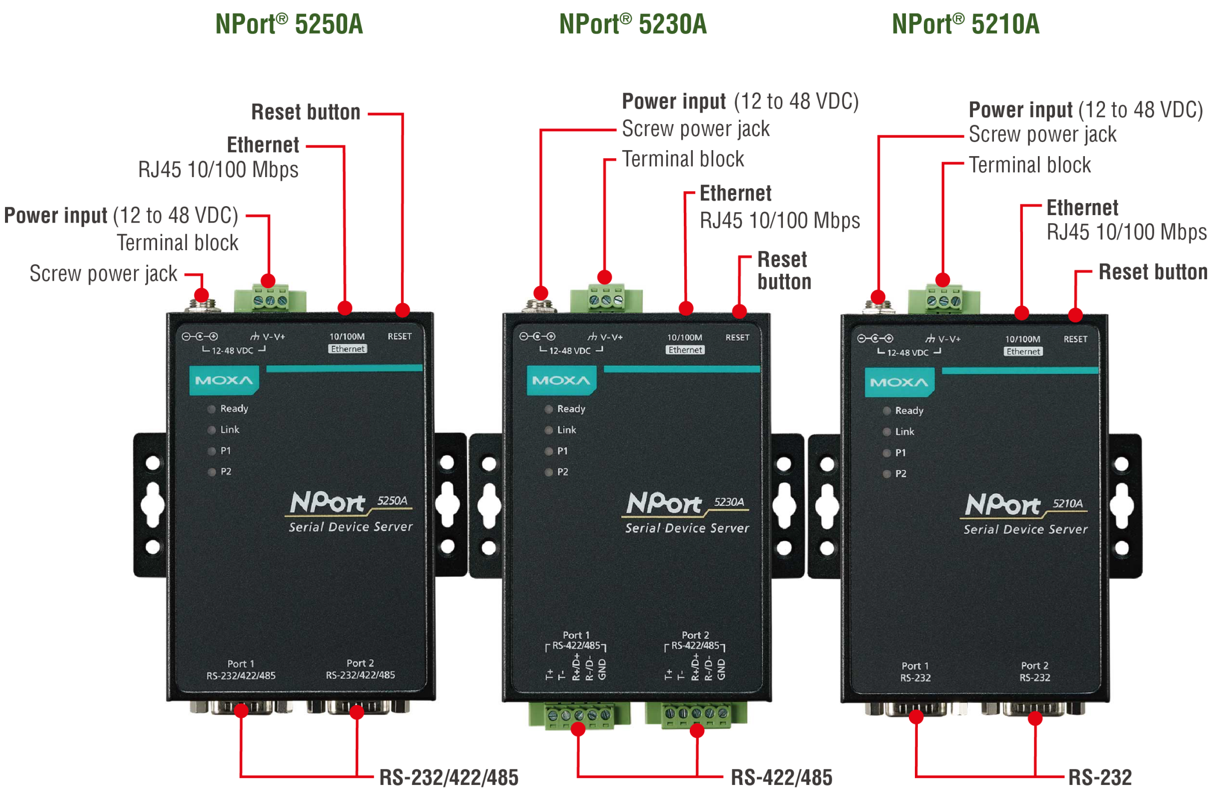
3-Step Web-based Configuration

The NPort® 5200A's 3-step web-based configuration tool is straightforward and user-friendly. The NPort® 5200A's web console guides users through three simple configuration steps that are necessary to activate the serial-to-Ethernet application. With this fast 3-step web-based configuration, a user only needs to spend an average of 30 seconds to complete the NPort® settings and enable the application, saving a great amount of time and effort.

COM Port Grouping

The NPort® 5200A's COM Grouping function allows you to create a COM Group and redirect data from it to several physical COM ports on NPort device servers. With COM Grouping, you will be able to control multiple physical serial ports simultaneously by operating only one COM port.

Appearance



Specifications

Ethernet Interface

10/100BaseT(X) Ports (RJ45 connector)	1
Magnetic Isolation Protection	1.5 kV (built-in)

Ethernet Software Features

Configuration Options	Windows Utility, Serial Console, Telnet Console, Web Console (HTTP/HTTPS)
Management	ARP, BOOTP, DHCP Client, DNS, HTTP, HTTPS, ICMP, IPv4, LLDP, SMTP, SNMPv1/ v2c, Telnet, TCP/IP, UDP
Filter	IGMP v1/v2
Windows Real COM Drivers	Windows 95/98/ME/NT/2000, Windows XP/2003/Vista/2008/7/8/8.1/10 (x86/x64), Windows 2008 R2/2012/2012 R2/2016/2019 (x64), Windows Embedded CE 5.0/6.0, Windows XP Embedded
Linux Real TTY Drivers	Kernel versions: 2.4.x, 2.6.x, 3.x, 4.x, and 5.x
Fixed TTY Drivers	SCO UNIX, SCO OpenServer, UnixWare 7, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i, Mac OS X
Android API	Android 3.1.x and later
MIB	RFC1213, RFC1317

Serial Interface

Connector	NPort 5210A/5250A Series: DB9 male NPort 5230A Series: 5-pin terminal block
No. of Ports	2
Serial Standards	NPort 5210A Series: RS-232 NPort 5230A Series: RS-422, RS-485 NPort 5250A Series: RS-232, RS-422, RS-485

Operation Modes	Disabled, Ethernet Modem, Pair Connection, Real COM, Reverse Telnet, RFC2217, TCP Client, TCP Server, UDP
Baudrate	Supports standard baudrates (unit=bps): 50, 75, 110, 134, 150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 230.4k, 460.8k, 921.6k
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS (RS-232 only), DTR/DSR (RS-232 only), XON/XOFF
Pull High/Low Resistor for RS-485	1 kilo-ohm, 150 kilo-ohms
RS-485 Data Direction Control	ADDC® (automatic data direction control)
Terminator for RS-485	120 ohms

Serial Signals

RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	Tx+, Tx-, Rx+, Rx-, GND
RS-485-4w	Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w	Data+, Data-, GND

Power Parameters

Input Current	119 mA @ 12 VDC
Input Voltage	12 to 48 VDC
No. of Power Inputs	2
Power Connector	1 removable 3-contact terminal block(s) Power input jack

Reliability

Automatic Reboot Trigger	Built-in WDT

Physical Characteristics

Housing	Metal
Dimensions (with ears)	100 x 111 x 26 mm (3.94 x 4.37 x 1.02 in)
Dimensions (without ears)	77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
Weight	340 g (0.75 lb)
Installation	Desktop, DIN-rail mounting (with optional kit), Wall mounting

Environmental Limits

Operating Temperature	Standard Models: 0 to 60°C (32 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature (package included)	-40 to 75°C (-40 to 167°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Standards and Certifications

EMC	EN 55032/24
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV IEC 61000-4-6 CS: 150 kHz to 80 MHz: 10 V/m; Signal: 10 V/m IEC 61000-4-8 PFMF IEC 61000-4-11
EMI	CISPR 32, FCC Part 15B Class A
Safety	UL 60950-1

Declaration

Green Product	RoHS, CRoHS, WEEE

MTBF

Time	847,750 hrs
Standards	Telcordia (Bellcore) Standard TR/SR

Warranty

Warranty Period	5 years
Details	See www.moxa.com/warranty

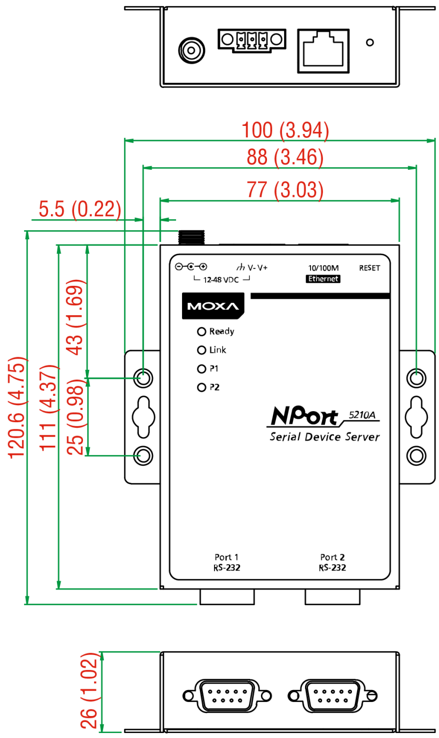
Package Contents

Device	1 x NPort 5200A Series device server
Power Supply	1 x power adapter, suitable for your region (standard temp. models only)
Documentation	1 x quick installation guide 1 x warranty card

Dimensions

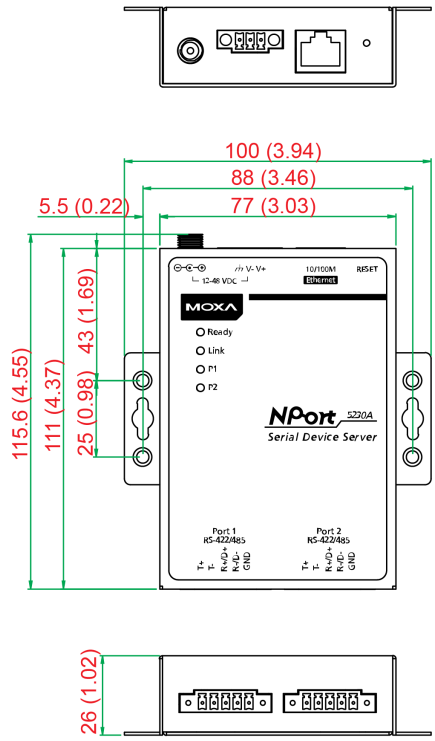
NPort 5210A

Unit: mm (inch)



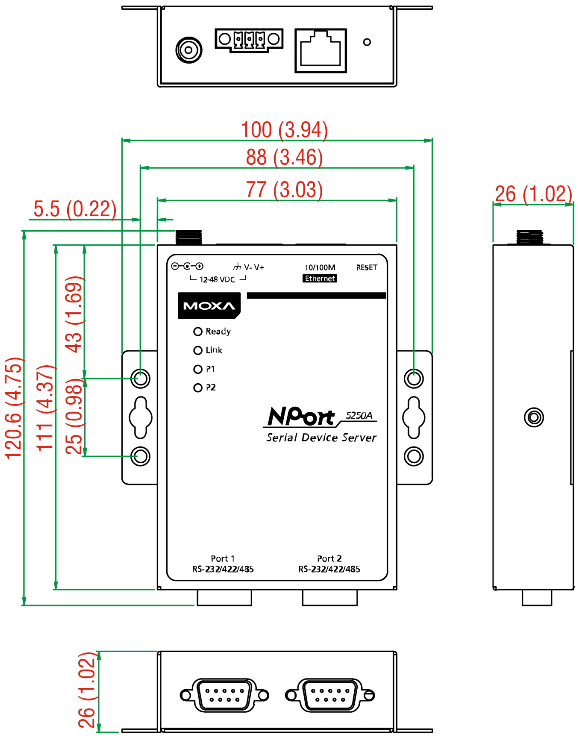
NPort 5230A

Unit: mm (inch)



NPort 5250A

Unit: mm (inch)



Ordering Information

Model Name	Operating Temp.	Baudrate	Serial Standards	No. of Serial Ports	Input Current	Input Voltage
NPort 5210A	0 to 55°C	50 bps to 921.6 kbps	RS-232	2	119 mA @ 12 VDC	12-48 VDC
NPort 5210A-T	-40 to 75°C	50 bps to 921.6 kbps	RS-232	2	119 mA @ 12 VDC	12-48 VDC
NPort 5230A	0 to 55°C	50 bps to 921.6 kbps	RS-422/485	2	119 mA @ 12 VDC	12-48 VDC
NPort 5230A-T	-40 to 75°C	50 bps to 921.6 kbps	RS-422/485	2	119 mA @ 12 VDC	12-48 VDC
NPort 5250A	0 to 55°C	50 bps to 921.6 kbps	RS-232/422/485	2	119 mA @ 12 VDC	12-48 VDC
NPort 5250A-T	-40 to 75°C	50 bps to 921.6 kbps	RS-232/422/485	2	119 mA @ 12 VDC	12-48 VDC

Accessories (sold separately)

Cables

CBL-F9M9-150	DB9 female to DB9 male serial cable, 1.5 m
CBL-F9M9-20	DB9 female to DB9 male serial cable, 20 cm

Connectors

ADP-RJ458P-DB9F	DB9 female to RJ45 connector
Mini DB9F-to-TB	DB9 female to terminal block connector

DIN-Rail Mounting Kits

DK35A	DIN-rail mounting kit, 35 mm

Power Adapters

PWR-12050-WPAU-S1	Locking barrel plug, 12 VDC, 0.5 A, 100 to 240 VAC, Australia (AU) plug, 0 to 40°C operating temperature
PWR-12050-WPCN-S1	Locking barrel plug, 12 VDC, 0.5 A, 100 to 240 VAC, China (CN) plug, 0 to 40°C operating temperature
PWR-12050-WPEU-S1	Locking barrel plug, 12 VDC, 0.5 A, 100 to 240 VAC, Continental Europe (EU) plug, 0 to 40°C operating temperature
PWR-12050-WPUK-S1	Locking barrel plug, 12 VDC, 0.5 A, 100 to 240 VAC, United Kingdom (UK) plug, 0 to 40°C operating temperature
PWR-12050-WPUSJP-S1	Locking barrel plug, 12 VDC, 0.5 A, 100 to 240 VAC, United States/Japan (US/JP) plug, 0 to 40°C operating temperature
PWR-12150-AU-SA-T	Locking barrel plug, 12 VDC, 1.5 A, 100 to 240 VAC, Australia (AU) plug, -40 to 75°C operating temperature Applicable Models: NPort 5210A-T NPort 5230A-T NPort 5250A-T
PWR-12150-CN-SA-T	Locking barrel plug, 12 VDC, 1.5 A, 100 to 240 VAC, China (CN) plug, -40 to 75°C operating temperature Applicable Models: NPort 5210A-T NPort 5230A-T NPort 5250A-T
PWR-12150-EU-SA-T	Locking barrel plug, 12 VDC, 1.5 A, 100 to 240 VAC, Continental Europe (EU) plug, -40 to 75°C operating temperature Applicable Models: NPort 5210A-T NPort 5230A-T NPort 5250A-T
PWR-12150-UK-SA-T	Locking barrel plug, 12 VDC, 1.5 A, 100 to 240 VAC, United Kingdom (UK) plug, -40 to 75°C operating temperature

	Applicable Models: NPort 5210A-T NPort 5230A-T NPort 5250A-T
PWR-12150-USJP-SA-T	Locking barrel plug, 12 VDC 1.5 A, 100 to 240 VAC, United States/Japan (US/JP) plug, -40 to 75°C operating temperature Applicable Models: NPort 5210A-T NPort 5230A-T NPort 5250A-T

Power Cords

CBL-PJ21NOPEN-BK-30	Locking barrel plug to bare-wire cable

NPort 5200 Series User's Manual

Ninth Edition, September 2014

www.moxa.com/product

NPort 5200 Series User's Manual

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1

Introduction

The NPort 5200 Series of advanced serial device servers make it easy to network enable your serial devices. The NPort 5200 Series includes 4 models: NPort 5210/5210-T (2 ports for RS-232), NPort 5230/5230-T (1 port for RS-232; 1 port for RS-422/485), NPort 5232/5232-T (2 ports for RS-422/485), and NPort 5232I/5232I-T (2 ports for RS-422/485, with isolation protection). In this manual, we refer to the four products collectively as “NPort 5200” or “NPort 5200 Series.”

The following topics are covered in this chapter:

❒ **Overview**

❒ **Package Checklist**

❒ **Product Features**

❒ **Product Specifications**

Overview

The NPort 5200 Series serial device servers are designed to make your industrial serial devices Internet ready in no time. The compact size of NPort 5200 device servers makes them the ideal choice for connecting your RS-232 (NPort 5210/5230/5210-T/5230-T) or RS-422/485 (NPort 5230/5232/ 5232I/5230-T/5232-T/5232I-T) serial devices—such as PLCs, meters, and sensors—to an IP-based Ethernet LAN, making it possible for your software to access serial devices from anywhere over a local LAN or the Internet.

The NPort 5200 serial device servers ensure the compatibility of network software that uses a standard network API (Winsock or BSD Sockets) by providing TCP Server Mode, TCP Client Mode, and UDP Mode. And thanks to the NPort 5200 Series' Real COM/TTY drivers, software that works with COM/TTY ports can be set up to work over a TCP/IP network, without modifying your serial COM software applications. This excellent feature preserves your software investment and lets you enjoy the benefits of networking your serial devices instantly.

The NPort 5200 serial device servers support automatic IP configuration protocols (DHCP, BOOTP) and manual configuration via the handy web browser console. Both methods ensure quick and effective installation. And with the NPort 5200's Windows Utility, installation is very straightforward, since all system parameters can be stored and then copied to other device servers simultaneously.

Package Checklist

The NPort 5200 Series products are shipped with the following items:

Standard Accessories

- 1 NPort 5200 2-port serial device server
- Document & Software CD
- NPort 5200 Series Quick Installation Guide

Optional Accessories

- DK-35A DIN-Rail Mounting Kit (35 mm)
- CBL-RJ45M9-150 RJ45 (8-pin) to DB9 (M) cable, 150 cm
- CBL-RJ45F9-150 RJ45 (8-pin) to DB9 (F) cable, 150 cm
- CBL-RJ45M25-150 RJ45 (8-pin) to DB25 (M) cable, 150 cm
- CBL-RJ45F25-150 RJ45 (8-pin) to DB25 (F) cable, 150 cm

NOTE: *Notify your sales representative if any of the above items is missing or damaged.*

Product Features

The NPort 5200 Series device servers have the following features:

- Make your serial devices Internet ready instantly
- Versatile socket operation modes, including TCP Server, TCP Client, and UDP
- Easy-to-use Windows Utility for installing multiple device servers
- Cigarette pack size
- Auto detectable 10/100 Mbps Ethernet port
- 2- or 4-wire RS-485 (NPort 5230/5232/5232I/5230-T/5232-T/5232I-T) with patented ADDC™ (Automatic Data Direction Control)
- SNMP MIB-II supported for network management
- Pair Connection mode for connecting two serial devices over a network without a PC
- Reverse Telnet

Product Specifications

Ethernet Interface

Number of Ports: 1

Speed: 10/100 Mbps, auto MDI/MDIX

Connector: 8-pin RJ45

Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface

Number of Ports: 2

Serial Standards:

NPort 5210: RS-232

NPort 5230: 1 RS-232 port, 1 RS-422/485 port

NPort 5232/5232I: RS-422/485

Connector:

NPort 5210: RJ45 (8 pins)

NPort 5230/5232/5232I: Terminal Block (5 contacts per port)

Serial Line Protection: 2 kV isolation protection (NPort 5232I/5232I-T)

RS-485 Data Direction Control: ADDC® (automatic data direction control)

Serial Communication Parameters

Data Bits: 5, 6, 7, 8

Stop Bits: 1, 1.5, 2

Parity: None, Even, Odd, Space, Mark

Flow Control: RTS/CTS (RS-232 only), DTR/DSR (NPort 5210 only), XON/XOFF

Baudrate: 110 bps to 230.4 kbps

Serial Signals

RS-232:

NPort 5210: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

NPort 5230: TxD, RxD, RTS, CTS, GND

RS-422: Tx+, Tx-, Rx+, Rx-, GND

RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND

RS-485-2w: Data+, Data-, GND

Software

Network Protocols: ICMP, IPv4, TCP, UDP, DHCP, BOOTP, Telnet, DNS, SNMP V1, HTTP, SMTP, SNTP

Configuration Options: Web Console, Serial Console (NPort 5210/5230 only), Telnet Console, Windows Utility

Windows Real COM Drivers: Windows 95/98/ME/NT/2000, Windows XP/2003/Vista/2008/7/8/8.1 (x86/x64), Windows 2008 R2/2012/2012 R2 (x64), Windows Embedded CE 5.0/6.0, Windows XP Embedded

Fixed TTY Drivers: SCO Unix, SCO OpenServer, UnixWare 7, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i, Mac OS X

Linux Real TTY Drivers: Linux 2.4.x, 2.6.x, 3.x

Physical Characteristics

Housing: Metal

Weight:

NPort 5210: 340 g

NPort 5230/5232: 360 g

NPort 5232I: 380 g

Dimensions:

NPort 5210/5230/5232:

Without ears: 67 x 100.4 x 22 mm (2.64 x 3.95 x 0.87 in)

With ears: 90 x 100.4 x 22 mm (3.54 x 3.95 x 0.87 in)

NPort 5232I:

Without ears: 67 x 100.4 x 35 mm (2.64 x 3.95 x 1.37 in)

With ears: 90 x 100.4 x 35 mm (3.54 x 3.95 x 1.37 in)

Environmental Limits

Operating Temperature:

Standard Models: 0 to 55°C (32 to 131°F)

Wide Temp. Models: -40 to 75°C (-40 to 167°F)

Storage Temperature: -40 to 75°C (-40 to 167°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Altitude: Up to 2000 m

Note: Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption:

NPort 5210: 325 mA @ 12 V, 190 mA @ 24 V

NPort 5230: 325 mA @ 12 V, 190 mA @ 24 V

NPort 5232: 280 mA @ 12 V, 150 mA @ 24 V

NPort 5232I: 365 mA @ 12 V, 200 mA @ 24 V

Standards and Certifications

EMI: EN55022 Class A, FCC part 15 Subpart B Class A

EMS:

EN 61000-4-2 ESD: contact 4 kV; air 8 kV

EN 61000-4-3 RS: 3 V/m (80 MHz to 1 GHz)

EN 61000-4-4 EFT: Power 1 kV; Signal 0.5 kV

EN 61000-4-5 Surge: AC 1 kV

EN 61000-4-6 CS: 3 V

EN 61000-4-8

EN 61000-4-11

Safety: UL 60950-1, EN 60950-1

EMC: 55022/24

Marine: DNV

Medical: (NPort 5210 only) EN 60601-1-2 Class B, EN55011

Reliability

Alert Tools: Built-in buzzer and RTC (real-time clock)

Automatic Reboot Trigger: Built-in WDT (watchdog timer)

MTBF (mean time between failures):

NPort 5210: 134,850 hrs

NPort 5230: 106,955 hrs

NPort 5232: 102,344 hrs

NPort 5232I: 87,083 hrs

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

2

Getting Started

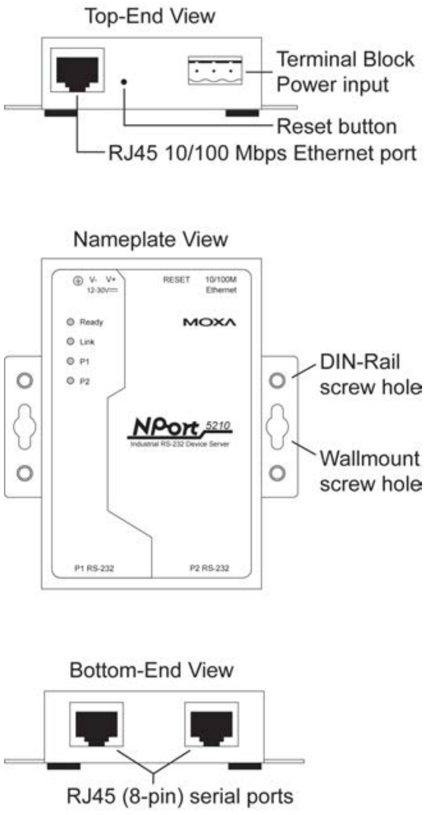
In this chapter, we give instructions on how to install the NPort 5200 device servers. Software installation is covered in subsequent chapters.

The following topics are covered in this chapter:

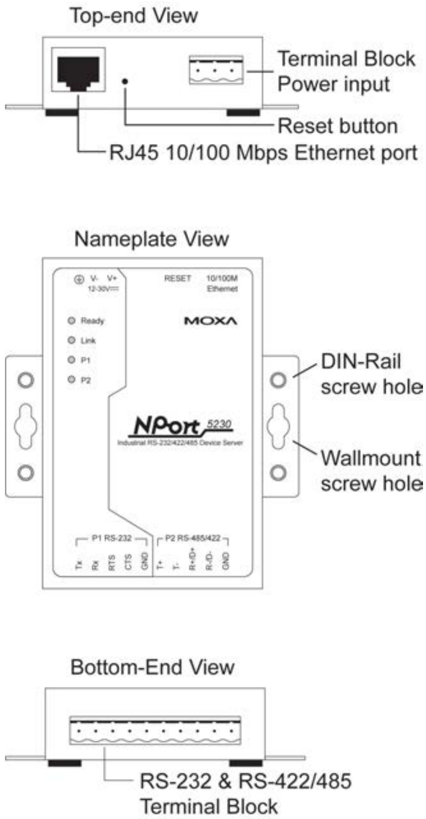
- **Panel Layout**
- **Connecting the Hardware**
  - Wiring Requirements
  - Connecting the Power
  - Grounding the NPort 5200
  - Connecting to the Network
  - Connecting to a Serial Device
  - LED Indicators

Panel Layout

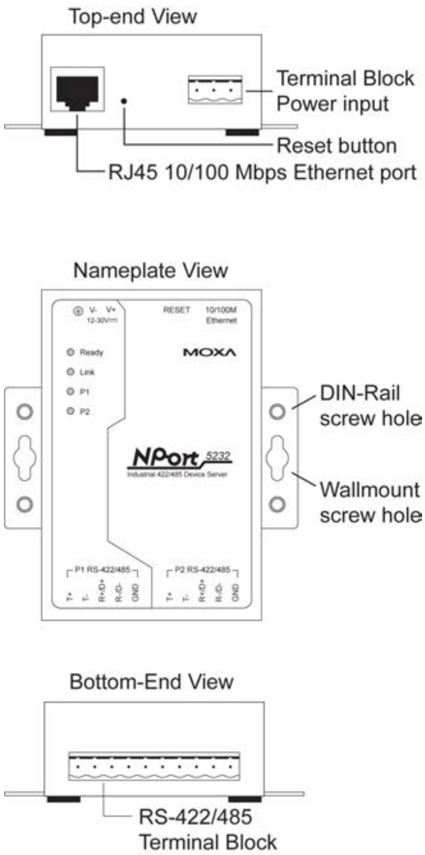
NPort 5210/5210-T



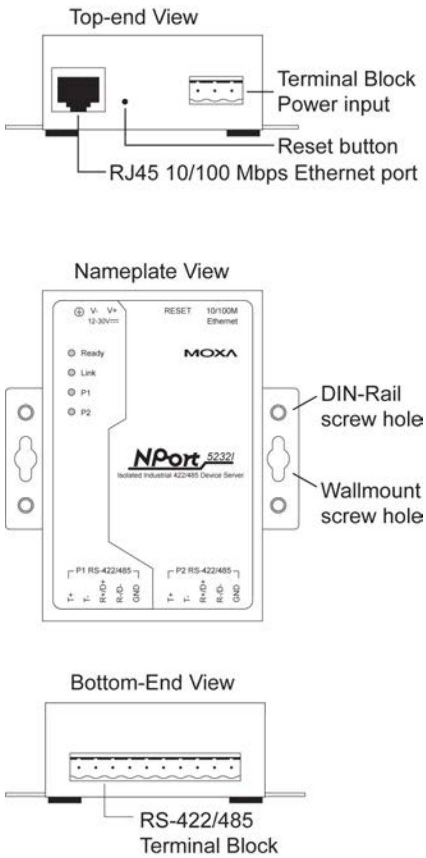
NPort 5230/5230-T



NPort 5232/5232-T



NPort 5232I/5232I-T



Connecting the Hardware

This section describes how to connect the NPort 5200 to serial devices for first time testing purposes. We cover **Wiring Requirements**, **Connecting the Power**, **Grounding the NPort 5200**, **Connecting to the Network**, **Connecting to a Serial Device**, and **LED Indicators**.

Wiring Requirements

ATTENTION

Safety First!
Be sure to disconnect the power cord before installing and/or wiring your NPort 5200.

Wiring Caution!
Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!
Please take care when handling the NPort 5200. When plugged in, the NPort 5200's internal components generate heat, and consequently the casing may feel hot to the touch.

You should also heed the following:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

  NOTE: Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- Where necessary, it is strongly advised that you label wiring to all devices in the system.

Connecting the Power

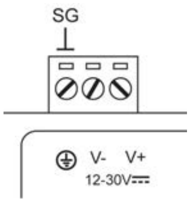
Connect the 12-48 VDC power line with the NPort 5200's terminal block. If the power is properly supplied, the "Ready" LED will show a solid red color until the system is ready, at which time the "Ready" LED will change to a green color.

Grounding the NPort 5200

Grounding and wire routing helps limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

ATTENTION

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.



SG: The *Shielded Ground* (sometimes called *Protected Ground*) contact is the left most contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

Connecting to the Network

Connect one end of the Ethernet cable to the NPort 5200's 10/100M Ethernet port and the other end of the cable to the Ethernet network. If the cable is properly connected, the NPort 5200 will indicate a valid connection to the Ethernet in the following ways:

- The Ethernet LED maintains a solid green color when connected to a 100 Mbps Ethernet network.
- The Ethernet LED maintains a solid orange color when connected to a 10 Mbps Ethernet network.
- The Ethernet LED will flash when Ethernet packets are being transmitted or received.

Connecting to a Serial Device

Connect the serial data cable between the NPort 5200 and the serial device. Serial data cables are optional accessories for NPort 5210. Refer to Chapter 1 under **Optional Accessories** for information about the RJ45-to-DB25 and RJ45-to-DB9 cables.

LED Indicators

The top panels of all the NPort 5200 device servers have four LED indicators, as described in the following table.

LED Name	LED Color	LED Function
Ready	red	Steady on: Power is on and NPort 5200 is booting up. Blinking: Indicates an IP conflict, or DHCP or BOOTP server did not respond properly.
	green	Steady on: Power is on and NPort 5200 is functioning normally. Blinking: The device server has been located by Administrator's Location function.
	off	Power is off, or power error condition exists.
Ethernet	orange	10 Mbps Ethernet connection.
	green	100 Mbps Ethernet connection.
	off	Ethernet cable is disconnected, or has a short.
P1, P2	orange	Serial port is receiving data.
	green	Serial port is transmitting data.
	off	No data is being transmitted or received through the serial port.

3

Initial IP Address Configuration

When setting up your NPort 5200 for the first time, the first thing you should do is configure the IP address. This chapter introduces the methods that can be used to configure the device server's IP address. *Select one of the initial IP Address configuration methods to configure the NPort 5200's IP Address.* For more details about network settings, see the Network Settings section from Chapter 5, *Web Console Configuration*.

The following topics are covered in this chapter:

- ❒ **Initializing the NPort 5200's IP Address**
- ❒ **Factory Default IP Address**
- ❒ **NPort Administration Suite**
- ❒ **ARP**
- ❒ **Telnet Console**
- ❒ **Serial Console (19200, n, 8, 1)**

Initializing the NPort 5200's IP Address

1. Determine whether your NPort 5200 needs to use a Static IP or Dynamic IP (either DHCP or BOOTP application).
2. ***If the NPort 5200 is used in a Static IP environment,*** you can use NPort 5200 Administration Suite, Web Console, Telnet Console or Serial Console to configure the new IP address.
3. ***If the NPort 5200 is used in a Dynamic IP environment,*** you can use NPort 5200 Administration suite, Web Console, Telnet Console, or Serial Console to configure the NPort 5200 to get an IP address dynamically with DHCP, DHCP/BOOTP, or BOOTP.

ATTENTION

Consult your network administrator to learn how to reserve a fixed IP address for your NPort 5200 in the MAC-IP mapping table when using a DHCP Server or BOOTP Server. For most applications, you should assign a fixed IP address to your NPort 5200.

Factory Default IP Address

NPort 5200 device servers are configured with the following default private IP address:

Default IP address: 192.168.127.254

(IP addresses of the form 192.168.xxx.xxx are referred to as private IP addresses, since it is not possible to access a device configured with a private IP address directly from a public network. For example, you would not be able to ping such a device from an outside Internet connection. NPort 5200 applications that require sending data over a public network, such as the Internet, require setting up the server with a valid public IP address, which can be leased from a local ISP.)

NPort Administration Suite

NPort Administration Suite consists of useful utility programs that are used to configure and manage your NPort 5200 device server.

See Chapter 5 for details on how to install NPort Administration Suite, and how to use this suite of useful utilities to set up IP addresses and configure your NPort 5200 Series serial device servers.

ARP

You can use the ARP (Address Resolution Protocol) command to set up an IP address for your NPort 5200. The ARP command tells your computer to associate the NPort 5200's MAC address with the intended IP address. You must then use Telnet to access the NPort 5200, at which point the device server's IP address will be reconfigured.

ATTENTION

In order to use this setup method, both your computer and the NPort 5200 must be connected to the same LAN. Or, you may use a cross-over Ethernet cable to connect the NPort 5200 directly to your computer's Ethernet card. Your NPort 5200 must be configured with the factory default IP address—192.168.127.254—before executing the ARP command, as described below.

Take the following steps to use ARP to configure the IP address:

1. Obtain a valid IP address for your NPort 5200 from your network administrator.
2. Obtain the NPort 5200's MAC address from the label on its bottom panel.
3. Execute the 'arp -s' command from your computer's MS-DOS prompt by typing:

   `arp –s 192.168.200.100 00-90-E8-xx-xx-xx`

This is where 192.168.200.100 is the new IP address and 00-90-E8-xx-xx-xx is the MAC address for your NPort 5200. (Be sure to use the actual IP address and MAC address for your NPort 5200.)

4. Next, execute a special Telnet command by typing:

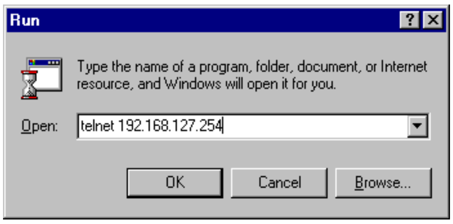
   `telnet 192.168.200.100 6000`

   After issuing this command, a **Connect failed** message will appear, as shown here. After the NPort 5200 reboots, its IP address will be updated to the new address, and you can reconnect using either Telnet, Web, or Administrator to check that the update was successful.

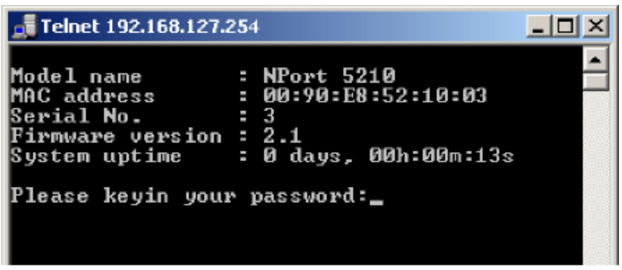
Telnet Console

Depending on how your computer and network are configured, you may find it convenient to use network access to set up your NPort 5200's IP address. This can be done using the Telnet.

1. From the Windows desktop, click on **Start** and then select **Run**.
2. Type `telnet 192.168.127.254` (use the correct IP address if different from the default) in the **Open** text input box, and then click on **OK**.



3. When the Telnet window opens, if you are prompted to input the **Console password**, input the password and then press **Enter**.
   Note that this page will only appear if the NPort 5200 is password protected.



4. Type **2** to select **Network settings**, and then press **Enter**.

```
------------------------------------------------
<< Main Menu >>
  (1) Basic settings
  (2) Network settings
  (3) Serial settings
  (4) Operating settings
  (5) Accessible IP settings
  (6) Auto warning settings
  (7) Monitor
  (8) Ping
  (9) Change password
  (a) Load factory default
  (v) View settings
  (s) Save/Restart
  (q) Quit

Key in your selection: 2
```

5. Type **1** to select **IP address** and then press **Enter**.

```
------------------------------------------------
<< Main Menu->Network settings >>
  (1) IP address
  (2) Netmask
  (3) Gateway
  (4) IP configuration
  (5) DNS server 1
  (6) DNS server 2
  (7) SNMP
  (8) SNMP community name
  (9) SNMP contact
  (a) SNMP location
  (b) Auto IP report to IP
  (c) Auto IP report to TCP port
  (d) Auto IP report period
  (v) View settings
  (m) Back to main menu
  (q) Quit

Key in your selection: 1_
```

6. Use the Backspace key to erase the current IP address, type in the new IP address, and then press Enter.

```
<< Main Menu->Network settings >>
  (1) IP address
  (2) Netmask
  (3) Gateway
  (4) IP configuration
  (5) DNS server 1
  (6) DNS server 2
  (7) SNMP
  (8) SNMP community name
  (9) SNMP contact
  (a) SNMP location
  (b) Auto IP report to IP
  (c) Auto IP report to TCP port
  (d) Auto IP report period
  (v) View settings
  (m) Back to main menu
  (q) Quit

Key in your selection: 1
IP address: 192.168.127.253_
```

7. Press any key to continue.

```
<< Main Menu->Network settings >>
  (1) IP address
  (2) Netmask
  (3) Gateway
  (4) IP configuration
  (5) DNS server 1
  (6) DNS server 2
  (7) SNMP
  (8) SNMP community name
  (9) SNMP contact
  (a) SNMP location
  (b) Auto IP report to IP
  (c) Auto IP report to TCP port
  (d) Auto IP report period
  (v) View settings
  (m) Back to main menu
  (q) Quit

Key in your selection: 1
IP address: 192.168.127.253
Set IP address success

Press any key to continue...
```

8. Type **m** and then press **Enter** to return to the main menu.

```
<< Main Menu->Network settings >>
  (1) IP address
  (2) Netmask
  (3) Gateway
  (4) IP configuration
  (5) DNS server 1
  (6) DNS server 2
  (7) SNMP
  (8) SNMP community name
  (9) SNMP contact
  (a) SNMP location
  (b) Auto IP report to IP
  (c) Auto IP report to TCP port
  (d) Auto IP report period
  (v) View settings
  (m) Back to main menu
  (q) Quit

Key in your selection: m
```

9. Type **s** and then press **Enter** to **Save/Restart** the system.

```
-----------------------------------------
<< Main Menu >>
  (1) Basic settings
  (2) Network settings
  (3) Serial settings
  (4) Operating settings
  (5) Accessible IP settings
  (6) Auto warning settings
  (7) Monitor
  (8) Ping
  (9) Change password
  (a) Load factory default
  (v) View settings
  (s) Save/Restart
  (q) Quit

Key in your selection: s
```

10. Type **y** and then press **Enter** to save the new IP address and restart the NPort 5200.

```
-----------------------------------------
Ready to restart
  (y) Yes
  (n) No

Key in your selection: y
```

Serial Console (19200, n, 8, 1)

You may use the RS-232 console port to set up the IP address for NPort 5200. We suggest using PComm Terminal Emulator, which is available free of charge as part of the PComm Lite program suite (found on the Software CD that comes with the product), to carry out the installation procedure, although other similar utilities may also be used.

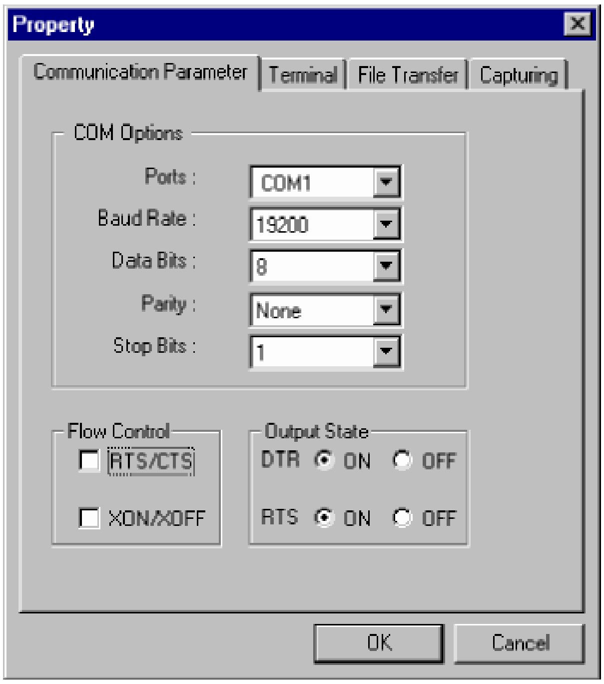
ATTENTION

The Serial Console can only be accessed by NPort 5200's RS-232 ports Port 1 for NPort 5210 and NPort 5230. Since NPort 5232 and NPort 5232I do not have an RS-232 interface, the Serial Console program cannot be used to configure NPort 5232/5232I's IP address.

Before you use the serial console to configure the NPort 5200, turn off the power and connect the serial cable from NPort 5200 to your computer's serial port.

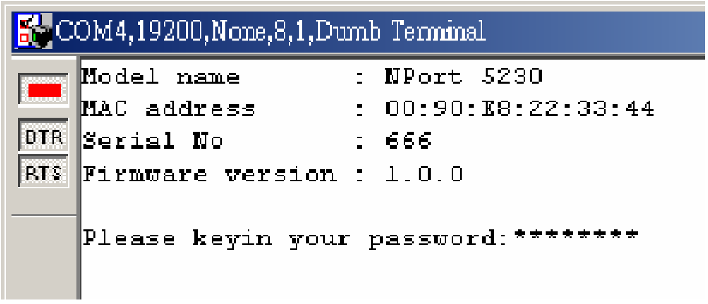
1. Connect NPort 5200's serial port 1 directly to your computer's male RS-232 serial port.
2. From the Windows desktop, click on **Start → Programs → PComm Lite → Terminal Emulator**.
3. When the **PComm Terminal Emulator** window opens, first click on the **Port Manager** menu item and select **Open**, or simply click on the **Open** icon.

4. The **Property** window opens automatically. From the **Communication Parameter** page, select the appropriate COM port for the connection, **COM1** in this example, and **19200** for **Baud Rate**, **8** for **Data Bits**, **None** for **Parity**, and **1** for **Stop Bits**.
5. From the Property window's **Terminal** page, select **ANSI** or **VT100** for **Terminal Type** and then click **OK**. If you select **Dumb Terminal** as the terminal type, some of the console functions—especially the "Monitor" function—may not work properly.

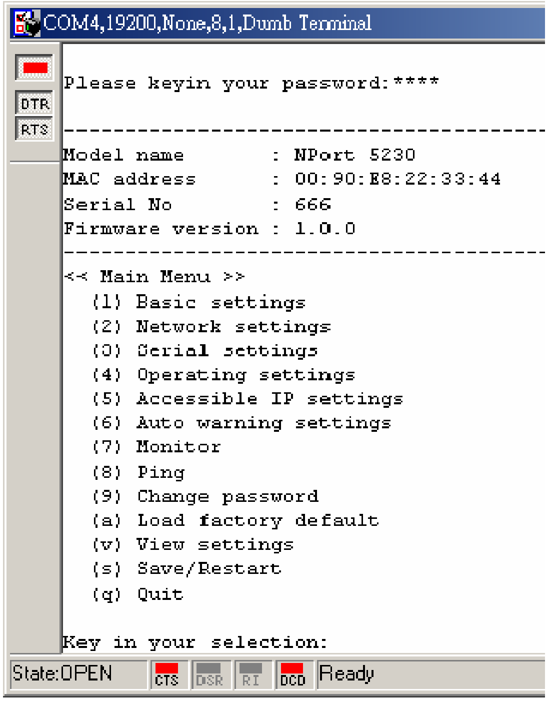


6. Press the " ` " key continuously and then power on the NPort 5200.

7. NPort 5200 will switch automatically from data mode to console mode as it receives a continuous " ` "string.
8. Input the password when prompted. Note that this page will only appear when the NPort 5200 has been set up for password protection.



9. Start configuring the IP address under **Network Settings**. Refer to step 4 in the **Telnet Console** section for the rest of the IP settings.



4

Choosing the Proper Operation Mode

In this chapter, we describe the various NPort 5200 operation modes. The options include "Driver Mode," which uses a driver installed on the host computer, and operation modes that rely on TCP/IP socket programming concepts. After reading this chapter, choose the operation mode most suitable for your application, and then refer to Chapter 5 for detailed instructions on how to configure the operation mode's parameters.

The following topics are covered in this chapter:

- **Overview**
- **Real COM Mode**
- **TCP Server Mode**
- **TCP Client Mode**
- **UDP Mode**
- **Pair Connection Mode**
- **Reverse Telnet Mode**
- **Disabled Mode**

Overview

NPort 5200 serial device servers network-enable traditional RS-232/422/485 devices. A serial device server is a tiny computer equipped with a CPU, real-time OS, and TCP/IP protocols that can bi-directionally transform data between the serial and Ethernet formats. By incorporating serial device servers in your application, you will be able to access, manage, and configure remote facilities and equipment over the Internet from anywhere in the world.

Traditional SCADA and data collection systems rely on serial ports (RS-232/422/485) to collect data from various kinds of instruments. Since NPort 5200 Serial Device Servers network-enable instruments equipped with an RS-232/422/485 communication port, your SCADA and data collection system will be able to access all instruments connected to a standard TCP/IP network, regardless of whether the devices are used locally or at a remote site.

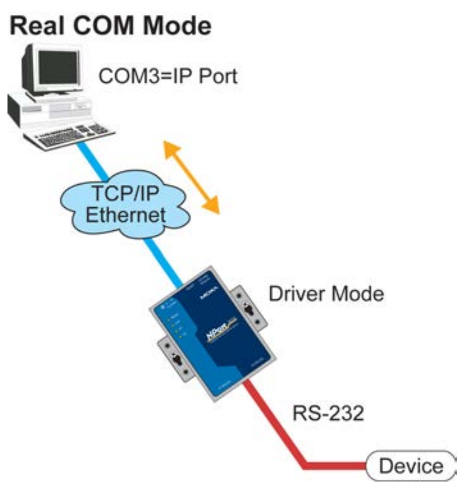
The NPort 5200 is an external IP-based network device that allows you to expand the number of serial ports for a host computer on demand. As long as your host computer supports the TCP/IP protocol, you won't be limited by the host computer's bus limitation (such as ISA or PCI), or lack of drivers for various operating systems.

In addition to providing socket access, the NPort 5200 also comes with a Real COM/TTY driver that transmits all serial signals intact. This means that you can continue using your existing COM/TTY-based software, without needing to invest in additional software.

Three different Socket Modes are available: TCP Server, TCP Client, and UDP Server/Client. The main difference between the TCP and UDP protocols is that TCP guarantees delivery of data by requiring the recipient to send an acknowledgement for every data packet received. UDP does not require this type of verification, making it possible to offer speedier delivery. UDP also allows unicast transmission to on IP, or multicast transmission to groups of IP addresses.

Real COM Mode

The NPort 5200 comes equipped with COM drivers that work with Windows 95/98/ME/NT/2000/XP systems, and also TTY drivers for Linux systems. The driver establishes a transparent connection between host and serial device by mapping the IP:Port of the NPort 5200's serial port to a local COM/TTY port on the host computer. Real COM Mode also supports up to 4 simultaneous connections, so that multiple hosts can collect data from the same serial device at the same time.



ATTENTION

The driver used for Real COM Mode is bundled with NPort Administrator. The driver is installed on your computer automatically when you install NPort 5200 Administration Suite.

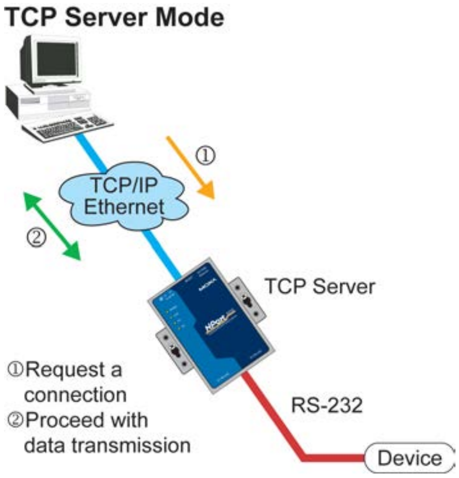
RS-232/422/485 serial communications software that was written for pure serial communications applications. The driver intercepts data sent to the host's COM port, packs it into a TCP/IP packet, and then redirects it through the host's Ethernet card. At the other end of the connection, the NPort 5200 accepts the Ethernet frame, unpacks the TCP/IP packet, and then sends it transparently to the appropriate serial device attached to one of the NPort 5200's serial ports.

ATTENTION

Real COM Mode allows several hosts to have access control to the same NPort 5200. The driver that comes with your NPort 5200 controls host access to attached serial devices by checking the host's IP address. Refer to the **Accessible IP Settings** section of Chapter 5 for more details.

TCP Server Mode

In **TCP Server Mode**, NPort 5200 is configured with a unique IP:Port combination on a TCP/IP network. In this case, NPort 5200 waits passively to be contacted by the host computer. After the host computer establishes a connection with the serial device, it can then proceed with data transmission. TCP Server mode also supports up to 4 simultaneous connections, so that multiple hosts can collect data from the same serial device—at the same time.



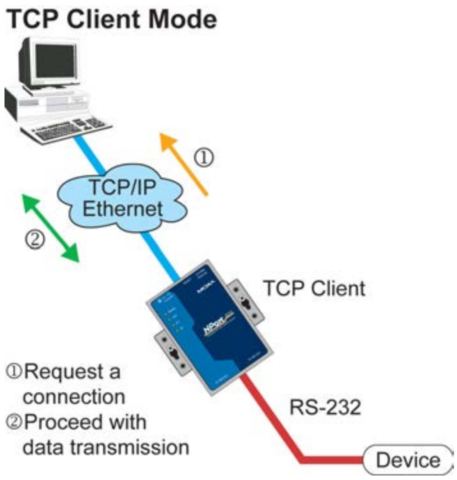
As illustrated in the figure, data transmission proceeds as follows:

1. The host requests a connection from the NPort 5200 configured for TCP Server Mode.
2. Once the connection is established, data can be transmitted in both directions—from the host to the NPort 5200, and from the NPort 5200 to the host.

TCP Client Mode

In TCP Client Mode, the NPort 5200 can actively establish a TCP connection with a pre-determined host computer when serial data arrives.

After the data has been transferred, the NPort 5200 can disconnect automatically from the host computer by using the **TCP alive check time** or **Inactivity time** settings. Refer to Chapter 5 for detailed configuration instructions.

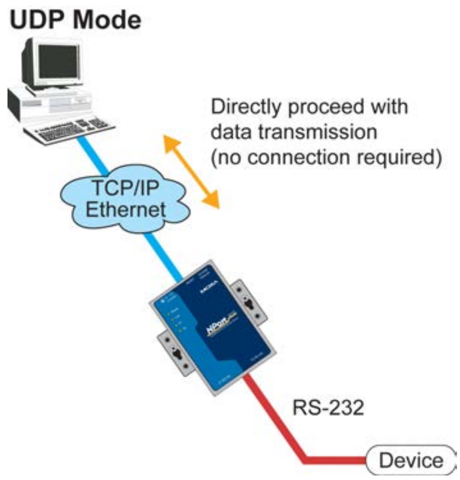


As illustrated in the figure, data transmission proceeds as follows:

1. The NPort 5200 configured for TCP Client Mode requests a connection from the host.
2. Once the connection is established, data can be transmitted in both directions—from the host to the NPort 5200, and from the NPort 5200 to the host.

UDP Mode

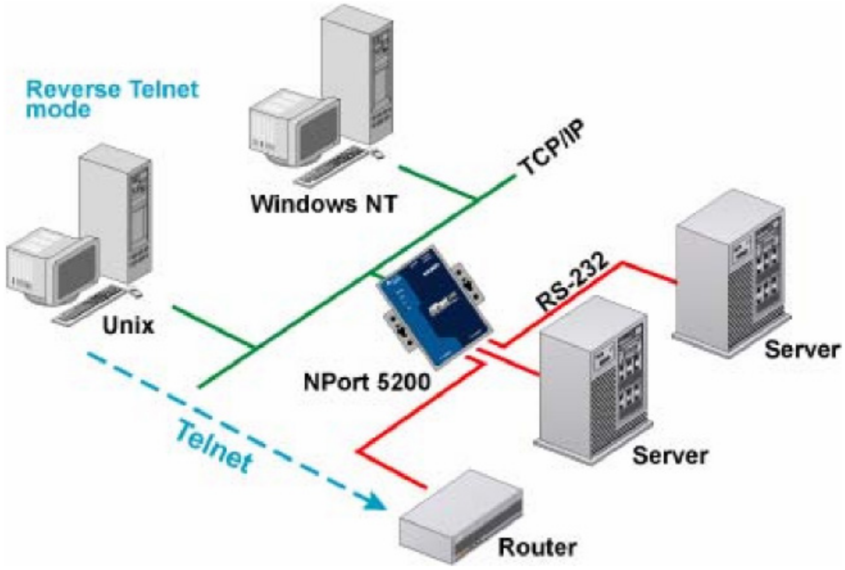
Compared to TCP communication, UDP is faster and more efficient. In UDP mode, you can unicast or multicast data from the serial device to one or multiple host computers, and the serial device can also receive data from one or multiple host computers, making this mode ideal for message display applications.



Pair Connection Mode

Pair Connection Mode employs two NPort 5200 in tandem, and can be used to remove the 15-meter distance limitation imposed by the RS-232 interface. One NPort 5200 is connected from its RS-232 port to the COM port of a PC or other type of computer, such as hand-held PDAs that have a serial port, and the serial device is connected to the RS-232 port of the other NPort 5200. The two NPort 5200 are then connected to each other with a cross-over Ethernet cable, both are connected to the same LAN, or in a more advanced setup, they communicate with each other over a WAN (i.e., through one or more routers). Pair Connection Mode transparently transfers both data and modem control signals (although it cannot transmit the DCD signal) between the two NPorts.

Reverse Telnet Mode



Console management is commonly used upon Console/AUX or COM port of routers, switches, and UPS. Reverse telnet works the same as RAW mode that they only listen to one specific TCP port after booting up, and wait for the host on the network to initiate the connection. The difference is that the RAW mode does not provide conversion function of telnet protocol. If the connected devices need to use CR/LF conversion function when controlling, then users have to choose Reverse telnet mode.

Disabled Mode

When Operation mode is set to Disabled, that particular port will be disabled. Check the “Apply the above settings to all serial ports” to apply this setting to the other port.

5

Web Console Configuration

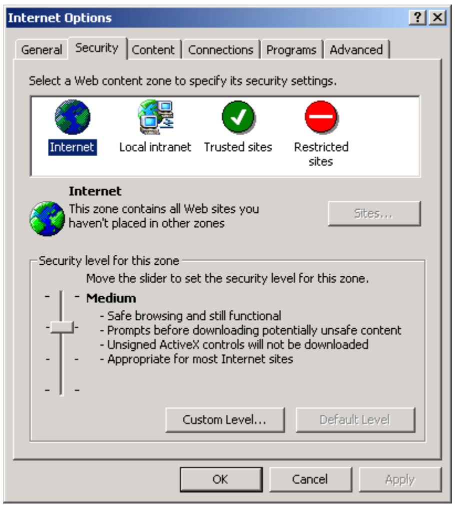
The Web Console is the most user-friendly method available to configure NPort 5200. In this chapter, we introduce the Web Console function groups and function definitions.

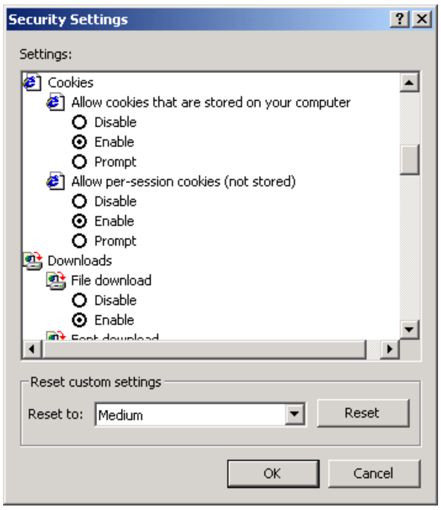
The following topics are covered in this chapter:

- **Opening Your Browser**
- **Basic Settings**
- **Network Settings**
- **Serial Settings**
- **Operating Settings**
  - Real COM Mode
  - TCP Server Mode
  - TCP Client Mode
  - UDP Mode
  - Pair Connection Mode
  - Reverse Telnet Mode
  - Disabled Mode
- **Accessible IP Settings**
- **Auto Warning Settings**
  - Auto warning: Email and SNMP trap
  - Event Type
- **Monitor**
  - Monitor Line
  - Monitor Async
  - Monitor Async-Settings
- **Change Password**
- **Load Factory Default**

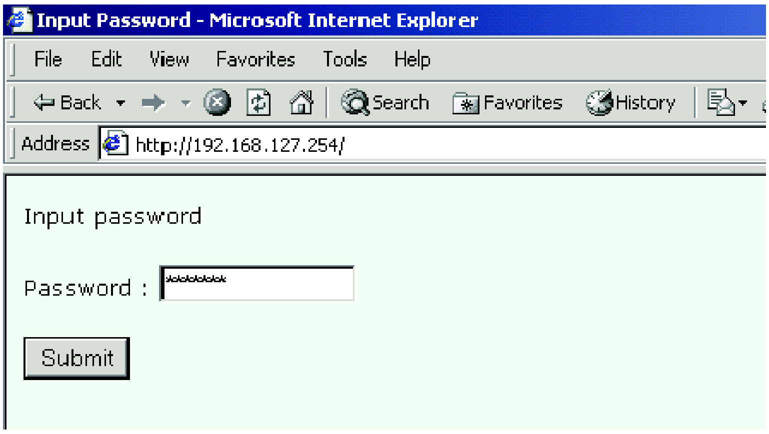
Opening Your Browser

1. Open your browser with the cookie function enabled. (To enable your browser for cookies, right click on your desktop Internet Explorer icon, select Properties, click on the Security tab, and then select the three Enable options as shown in the figure below.)





2. Type **192.168.127.254** in the **Address** input box (use the correct IP address if different from the default), and then press **Enter**.
3. Input the password if prompted. The password is transmitted with MD5 encryption over the Ethernet. Note that you will not be prompted to enter the password if the NPort 5200 is not password protected.



ATTENTION

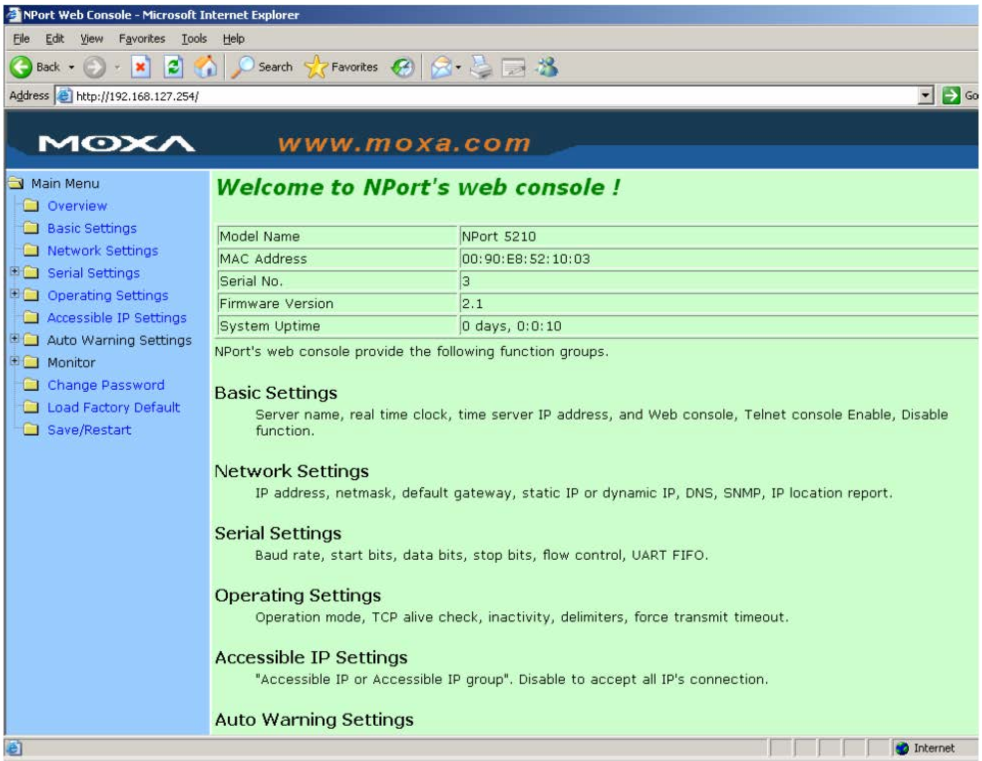
If you use web browsers other than Explorer, remember to Enable the functions to "allow cookies that are stored on your computer" or "allow per-session cookies."

Note that NPort 5200 only uses cookies for "password" transmission.

ATTENTION

Refer to Chapter 3, **Initial IP Address Configuration**, to see how to configure the IP address. Examples shown in this chapter use the Factory Default IP address (192.168.127.254).

4. The NPort 5200 homepage will open next. On this page, you can see a brief description of the Web Console's nine function groups.



ATTENTION

If you can't remember the password, the ONLY way to start configuring the NPort 5200 is to load factory defaults by using the Reset button located near the NPort 5200's RJ45 Ethernet port.

Remember to use NPort Administrator to export the configuration file when you have finished the configuration. After using the Reset button to load factory defaults, your configuration can be easily reloaded into the NPort 5200 by using the NPort Administrator Import function. Refer to Chapter 6 for more details about using the Export and Import functions.

ATTENTION

If your NPort 5200 application requires using password protection, you must enable the cookie function in your browser. If the cookie function is disabled, you will not be allowed to enter the Web Console Screen.

Basic Settings

Server name

Setting	Factory Default	Necessity
1 to 39 characters	[model name]_[Serial No.]	Optional

This option is useful for specifying the location or application of different NPort 5200s.

Time

NPort 5200 has a built-in Real-Time Clock for time calibration functions. Real-time information can be added to Auto warning "Email" or "SNMP Trap" messages.

ATTENTION

First time users should select the time zone first. The Console will display the "real time" according to the time zone compared to GMT.

If you would like to modify the real time clock, select "Local time." NPort 5200's firmware will modify the GMT time according to the Time Zone.

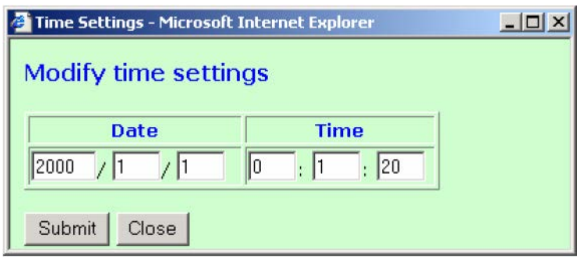
Time zone

Setting	Factory Default	Necessity
User selectable time zone	GMT (Greenwich Mean Time)	Required

Local time

Setting	Factory Default	Necessity
User adjustable time (1900/1/1 to 2037/12/31)	GMT (Greenwich Mean Time)	Required

Click on the **Modify** button to open the **Modify time settings** window to modify the time.



Time server

Setting	Factory Default	Necessity
IP Address or Domain Name (E.g., 192.168.1.1, time.stdtime.gov.tw, or time.nist.gov)	blank	Optional

The NPort 5200 uses SNTP (RFC-1769) for auto time calibration.

Input the correct "Time server" IP address or domain name. Once NPort 5200 is configured with the correct Time server address, NPort 5200 will request time information from the "Time server" every 10 minutes.

Web/Telnet Console

The "Disable" option for "Web Console" and "Telnet Console" is included for security reasons. In some cases, you may want to disable one or both of these console utilities as an extra precaution to prevent unauthorized users from accessing your NPort 5200. The factory default for both Web console and Telnet console is **Enable**.

Web console

Setting	Factory Default	Necessity
Enable or Disable	Enable	Required

Telnet console

Setting	Factory Default	Necessity
Enable or Disable	Enable	Required

ATTENTION

If you disable both the "Web console" and "Telnet console," you can still use NPort Administrator to configure NPort 5200 either locally or remotely over the network. Refer to Chapter 6 for more details.

Reset button protect

Setting	Factory Default	Necessity
No or Yes	No	Required

NOTE: Select the **Yes** option to allow limited use of the Reset Button. In this case, the Reset Button can be used for only 60 seconds. I.e., 60 sec. after booting up, the Reset Button will be disabled automatically.

Network Settings

You must assign a valid IP address to the NPort 5200 before it will work in your network environment. Your network system administrator should provide you with an IP address and related settings for your network. The IP address must be unique within the network (otherwise, the NPort 5200 will not have a valid connection to the network). First time users can refer to Chapter 3, **Initial IP Address Configuration**, for more information.

You can choose from four possible **IP Configuration** modes—**Static**, **DHCP**, **DHCP/BOOTP**, and **BOOTP**—located under the web console screen's IP configuration drop-down box.

Method	Function Definition
Static	**User defined** IP address, Netmask, Gateway.
DHCP	DHCP Server assigned IP address, Netmask, Gateway, DNS, and Time Server
DHCP/BOOTP	DHCP Server assigned IP address, Netmask, Gateway, DNS, and Time Server, or BOOTP Server assigned IP address (if the DHCP Server does not respond)
BOOTP	BOOTP Server assigns IP address

IP Address

Setting	Factory Default	Necessity
E.g., 192.168.1.1 (IP addresses of the form x.x.x.0 and x.x.x.255 are invalid.)	192.168.127.254	Required

An IP address is a number assigned to a network device (such as a computer) as a permanent address on the network. Computers use the IP address to identify and talk to each other over the network. Choose a proper IP address that is unique and valid in your network environment.

Netmask

Setting	Factory Default	Necessity
E.g., 255.255.255.0	255.255.255.0	Required

A netmask identifies a local area network. When a packet is sent out over the network, the NPort 5200 will use the subnet mask to check whether the destination TCP/IP host specified in the packet is on the local network segment. If the address is on the same network segment as the NPort 5200, a connection is established directly from the NPort 5200. Otherwise, an attempt is made to establish a connection through the given default gateway.

Gateway

Setting	Factory Default	Necessity
E.g., 192.168.1.1	blank	Optional

The gateway IP address identifies a network gateway that acts as an entrance to another network. Usually, the computers that control traffic within the network or at the local Internet service provider are gateway nodes. The NPort 5200 needs to know the IP address of the default gateway computer in order to communicate with the hosts outside the local network environment. For correct gateway IP address information, consult your network administrator.

IP Configuration

Setting	Factory Default	Necessity
Static, DHCP, DHCP/BOOTP, BOOTP	Static	Required

ATTENTION

In Dynamic IP environments, the firmware will retry 3 times every 30 seconds until network settings are assigned by the DHCP or BOOTP server. The Timeout for each try increases from 1 second, to 3 seconds, to 5 seconds.
If the DHCP/BOOTP Server is unavailable, the firmware will use the default IP address (192.168.127.254), Netmask, and Gateway for IP settings.

DNS server 1 / DNS server 2

Setting	Factory Default	Necessity
E.g., 192.168.1.1 (IP addresses of the form x.x.x.0 and x.x.x.255 are invalid DNS server settings.)	blank	Optional

When the user wants to visit a particular website, the computer requests the website's IP address from a Domain Name System (DNS) server, and then the computer uses that IP address to connect to the web server. DNS is used to identify Internet domain names, and to translate domain names into IP addresses. A domain name is an alphanumeric name, such as moxa.com. A DNS server is a host that translates this kind of text-based domain name into the numeric IP address used to establish a TCP/IP connection.

In order to use NPort 5200's DNS feature, you need to configure the DNS server. Doing so allows NPort 5200 to use a host's domain name to access the host. NPort 5200 provides **DNS server 1** and **DNS server 2** configuration items to configure the IP address of the DNS server. DNS Server 2 is used when DNS sever 1 is unavailable.

NPort 5200 plays the role of DNS client, in the sense that the NPort 5200 will actively query the DNS server for the IP address associated with a particular domain name. NPort 5200 functions that support domain name are **Time server, Destination IP Address in TCP Client mode, Mail Server, SNMP trap server,** and **Auto report to IP**.

SNMP Settings

Community Name

Setting	Factory Default	Necessity
1 to 39 characters (E.g., Support, 886-89191230 #300)	public	Optional

A community name is a plain-text password mechanism that is used to authenticate queries weakly to agents of managed network devices.

Contact

Setting	Factory Default	Necessity
1 to 39 characters (E.g., Support, 886-89191230 #300)	blank	Optional

The SNMP contact information usually includes an emergency contact name and telephone or pager number.

Location

Setting	Factory Default	Necessity
1 to 39 characters (E.g., Floor 1, office 2)	blank	Optional

Specify the location of SNMP agents, such as NPort 5200. This string is usually set to the street address where the NPort 5200 is physically located.

IP Address Report

When NPort 5200 Series products are used in a dynamic IP environment, users must spend more time with IP management tasks. For example, if NPort 5200 is set up as a server (TCP or UDP), then the host, which acts as a client, must know the IP address of the server. If the DHCP server assigns a new IP address to NPort 5200, the host must have some way of determining NPort 5200's new IP address.

NPort 5200 device servers help out by reporting their IP address periodically to the IP location server, in case the dynamic IP has changed. The parameters shown below are used to configure the Auto IP report function. There are two ways to develop an "Auto IP report Server" to receive NPort 5200's Auto IP report.

1. Use Device Server Administrator's IP Address Report function.
2. "Auto IP report protocol," which can receive the Auto IP report automatically on a regular basis, is also available to help you develop your own software. Refer to Appendix E for the "Auto IP report protocol."

Auto report to IP

Setting	Factory Default	Necessity
E.g., 192.168.1.1 or URL (IP addresses of the form x.x.x.0 and x.x.x.255 are invalid.)	blank	Optional

Reports generated by the Auto report function will be sent to this IP address automatically.

Auto report to UDP port

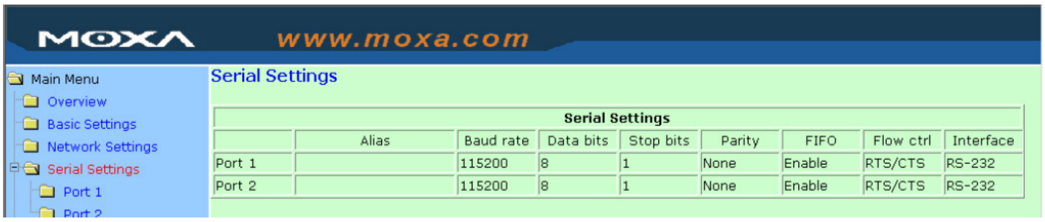
Setting	Factory Default	Necessity
E.g., 4002	4002	Optional

Auto report period

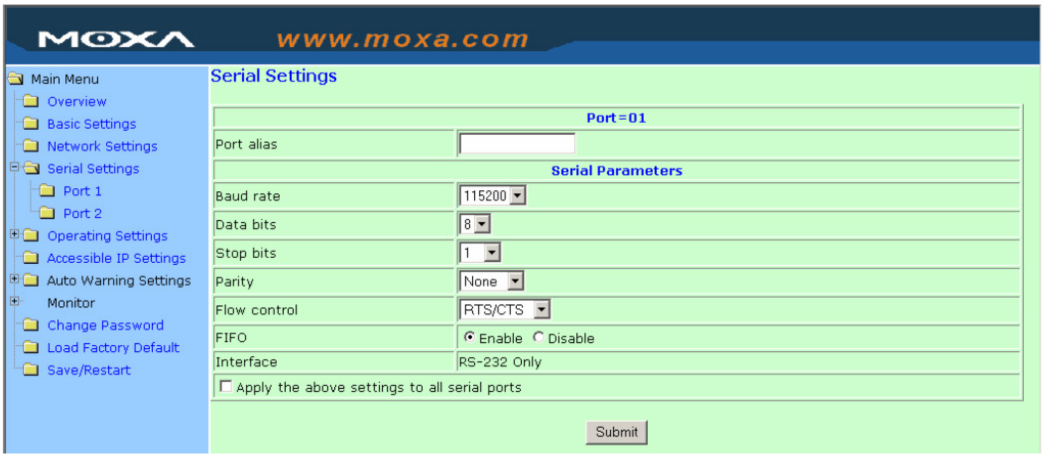
Setting	Factory Default	Necessity
Time interval (in seconds)	10	Optional

Serial Settings

Click on **Serial Settings**, located under **Main Menu**, to display serial port settings for ports 1 and 2.



To modify serial settings for a particular port, click on either **Port 1** or **Port 2** under **Serial Settings**, located under **Main Menu** on the left side of the browser window.



Port alias

Setting	Factory Default	Necessity
1 to 15 characters (E.g., PLC-No.1)	blank	Optional

"Port alias" is included to allow easy identification of the serial devices that are connected to NPort 5200's serial port.

Serial Parameters

ATTENTION

Check your serial device's user's manual to determine the proper settings for the device's serial communication parameters. Use these settings to configure NPort 5200's serial parameters.

Baud rate

Setting	Factory Default	Necessity
110 bps to 230.4 Kbps	115.2 Kbps	Required

Data bits

Setting	Factory Default	Necessity
5, 6, 7, 8	8	Required

When the user sets Data bits to 5 bits, the Stop bits setting will automatically change to 1.5 bits.

Stop bits

Setting	Factory Default	Necessity
1, 2	1	Required

Stop bits will be set to 1.5 when Data bits is set to 5 bits.

Parity

Setting	Factory Default	Necessity
None, Even, Odd, Space, Mark	None	Required

Flow control

Setting	Factory Default	Necessity
None, RTS/CTS, DTR/DSR, Xon/Xoff	RTS/CTS	Required

FIFO

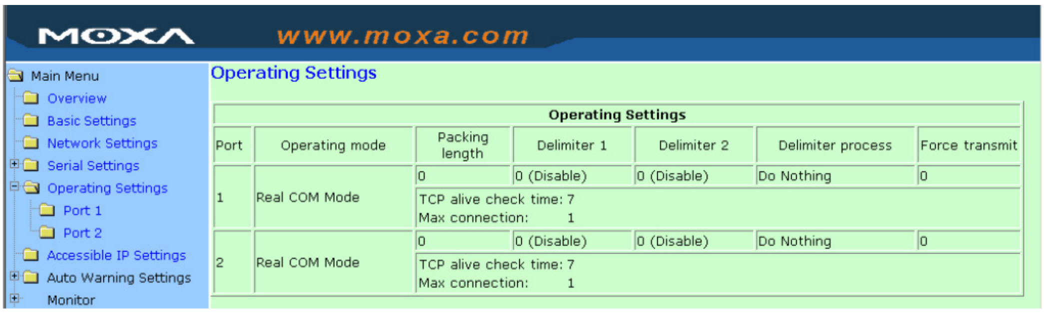
Setting	Factory Default	Necessity
Enable, Disable	Enable	Required

NPort 5200's serial ports provide a 16-byte FIFO both in the Tx and Rx directions. To prevent data loss during communication, disable the FIFO setting when your serial device does not have a FIFO.

Interface

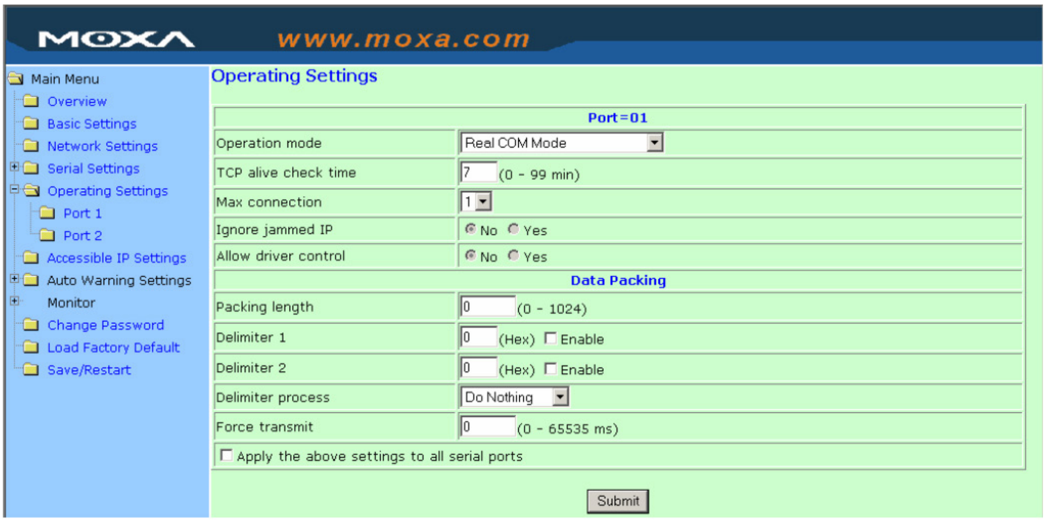
Model	Port	Settings	Factory Default	Necessity
NPort 5210	1 and 2	RS-232	RS-232	N/A
NPort 5230	1	RS-232	RS-232	Required
	2	RS-422, 2-wire RS-485, 4-wire RS-485	4-wire RS-485	
NPort 5232/5232I	1 and 2	RS-422, 2-wire RS-485, 4-wire RS-485	4-wire RS-485	Required

Operating Settings



Click on **Operating Settings,** located under **Main Menu**, to display the operating settings for both of NPort 5200's serial ports.

Real COM Mode



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7 min	Required

0 min: TCP connection is not closed due to an idle TCP connection.

1 to 99 min: NPort 5200 automatically closes the TCP connection if there is no TCP activity for the given time. After the connection is closed, the NPort 5200 starts listening for another Real COM driver connection from another host.

Max connection

Setting	Factory Default	Necessity
1, 2, 3, 4	1	Required

Max connection is usually used when the user needs to receive data from different hosts simultaneously. The factory default is 1. In this case, only one specific host can access this port of the NPort 5200, and the Real COM driver on that host will have full control over the port.

Max. Connection 1:
Allows only 1 host's Real COM driver to open the specific NPort 5200 serial port.

Max Connection 2 to 4:
Allows 2 to 4 host's Real COM drivers to open the specific NPort 5200 serial port, at the same time. When multiple hosts' Real COM drivers open the serial port at the same time, the COM driver only provides a pure data tunnel without control ability. That is, this serial port parameter will use the firmware settings, instead of depending on your application program (AP).

Application software that is based on the COM driver will receive a driver response of "success" when the software uses any of the Win32 API functions. The firmware will only send the data back to the driver on the host.

Data will be sent first-in-first-out when data comes into the NPort 5200 from the Ethernet interface.

ATTENTION

When Max connection is set to 2, 3, or 4, this means that the NPort 5200 will be using a "multi connection application" (i.e., 2, 3, or 4 hosts are allowed access to the port at the same time). When using a multi connection application, the NPort 5200 will use the serial communication parameters set in the console. All of the hosts connected to that port must use the same serial settings. If one of the hosts opens the COM port with parameters that are different from the NPort 5200's console setting, data communication may not work properly.

Ignore jammed IP

Setting	Factory Default	Necessity
No or Yes	No	Required

For previous versions of NPort 5200, when Max connections > 1, and the serial device is transmitting data, if any one of the connected hosts was not responding NPort 5200 would wait until the data had been transmitted successfully before transmitting the second group of data to all hosts. For the current version of NPort 5200, if you select Yes for "Ignore jammed IP," the host that is not responding will be ignored, but the data will still be transmitted to the other hosts.

Allow driver control

Setting	Factory Default	Necessity
No or Yes	No	Required

If "max connection" is greater than 1, NPort will ignore driver control commands from all connected hosts. However, if you set "Allow driver control" to YES, control commands will be accepted. Note that since NPort 5200 may get configuration changes from multiple hosts, the most recent command received will take precedence.

Packing length

Setting	Factory Default	Necessity
0 to 1024	0	Required

Default = 0, The Delimiter Process will be followed, regardless of the length of the data packet. If the data length (in bytes) matches the configured value, the data will be forced out. The data length can be configured for 0 to 1024 bytes. Set to 0 if you do not need to limit the length.

Delimiter 1

Setting	Factory Default	Necessity
00 to FF (hex)	0	Required

Delimiter 2

Setting	Factory Default	Necessity
00 to FF (hex)	0	Required

Once the NPort 5200 receives both delimiters through its serial port, it immediately packs all data currently in its buffer and sends it to the NPort 5200's Ethernet port.

ATTENTION

Delimiter 2 is optional. If left blank, then Delimiter 1 alone trips clearing of the buffer. If the size of the serial data received is greater than 1 KB, the NPort 5200 will automatically pack the data and send it to the Ethernet. However, to use the delimiter function, you must at least enable Delimiter 1. If Delimiter 1 is left blank and Delimiter 2 is enabled, the delimiter function will not work properly.

Delimiter process

Setting	Factory Default	Necessity
Do nothing, Delimiter + 1, Delimiter + 2, Strip Delimiter	Do Nothing	Required

When [Delimiter + 1] or [Delimiter + 2] is selected, the data will be transmitted when an additional byte (for Delimiter +1), or an additional 2 bytes (for Delimiter +2) of data is received after receiving the Delimiter.

When [Strip Delimiter] is selected, when the Delimiter is received, the Delimiter is deleted (i.e., stripped), and the remaining data is transmitted.

When [Do nothing] is selected, the data will be transmitted when the Delimiter is received.

Force transmit

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Required

0: Disable the force transmit timeout.

1 to 65535: Forces the NPort 5200's TCP/IP protocol software to try to pack serial data received during the specified time into the same data frame.

This parameter defines the time interval during which NPort 5200 fetches the serial data from its internal buffer. If data is incoming through the serial port, NPort 5200 stores the data in the internal buffer. NPort 5200 transmits data stored in the buffer via TCP/IP, but only if the internal buffer is full or if the Force transmit time interval reaches the time specified under Force transmit timeout.

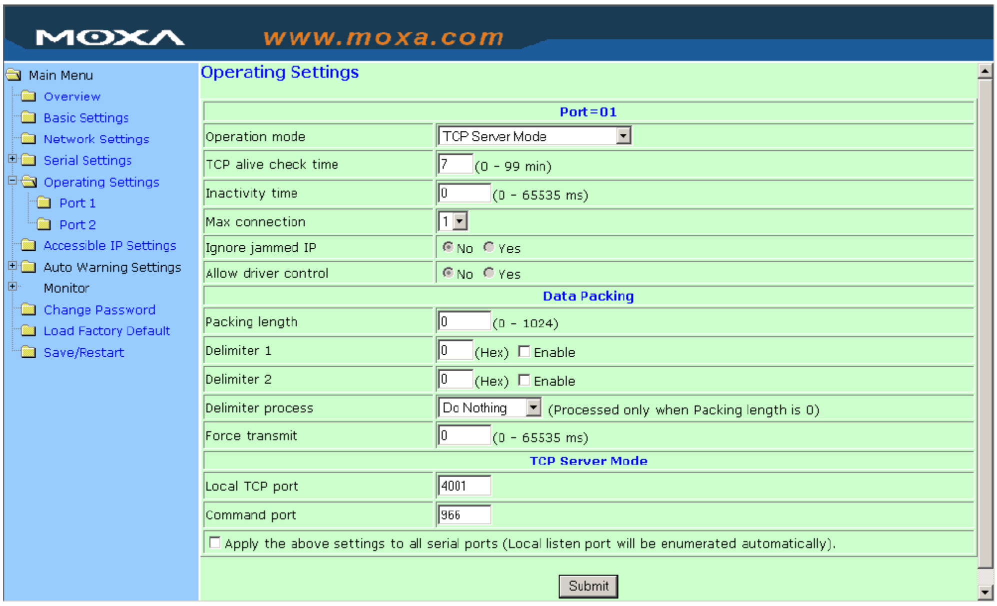
The optimal Force transmit timeout depends on your application, but it must be at least larger than one character interval within the specified baud rate. For example, assume that the serial port is set to 1200 bps, 8 data bits, 1 stop bit, and no parity. In this case, the total number of bits needed to send a character is 10 bits, and the time required to transfer one character is

(10 (bits) / 1200 (bits/s)) * 1000 (ms/s) = 8.3 ms.

Therefore, you should set Force transmit timeout to be larger than 8.3 ms, so in this case, it must be greater than or equal to 10 ms.

If the user wants to send a series of characters in the same packet, the serial device attached to NPort 5200 should send that series of characters during a time interval less than the Force transmit timeout for NPort 5200, and the total length of data must be less than or equal to NPort 5200's internal buffer size. The serial communication buffer size for NPort 5200 is 1 KB per port.

TCP Server Mode



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7 min	Optional

0 min: TCP connection is not closed due to an idle TCP connection.

1 to 99 min: The NPort 5200 automatically closes the TCP connection if there is no TCP activity for the given time. After the connection is closed, the NPort 5200 starts listening for another host's TCP connection.

Inactivity time

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Optional

0 ms: TCP connection is not closed due to an idle serial line.

1-65535 ms: The NPort 5200 automatically closes the TCP connection if there is no serial data activity for the given time. After the connection is closed, the NPort 5200 starts listening for another host's TCP connection.

This parameter defines the maintenance status as Closed or Listen for the TCP connection. The connection is closed if data is not incoming or outgoing through the serial port during the specific Inactivity time.

If the Inactivity time is set to 0, the current TCP connection is kept active until a connection close request is received. Although Inactivity time is disabled, the NPort 5200 will check the connection status between the NPort 5200 and remote host by sending "keep alive" packets periodically. If the remote host does not respond to the packet, NPort 5200 assumes that the connection was closed down unintentionally. NPort 5200 will then force the existing TCP connection to close.

ATTENTION

The Inactivity time should at least be larger than Force transmit timeout. To prevent the unintended loss of data due to the session being disconnected, it is highly recommended that this value is set large enough so that the intended data transfer can be completed.

Max Connection

Setting	Factory Default	Necessity
1, 2, 3, 4	1	Required

Max Connection is usually used when the user needs to receive data from different hosts simultaneously. The factory default only allows 1 connection at a time.

Max. Connection 1:
NPort 5200 only allows 1 host to open the TCP connection to the specific serial port.

Max Connection 2 to 4:
Allows 2 to 4 host's TCP connection request to open this NPort 5200 serial port, at the same time. When multiple hosts establish a TCP connection to the specific serial port at the same time, NPort 5200 will duplicate the serial data and transmit to all of the hosts. Ethernet data is sent on a first-in-first-out basis to the serial port when data comes into NPort 5200 from the Ethernet interface.

Ignore jammed IP

Setting	Factory Default	Necessity
No or Yes	No	Required

For previous versions of NPort 5200, when Max connections > 1, and the serial device is transmitting data, if any one of the connected hosts was not responding NPort 5200 would wait until the data had been transmitted successfully before transmitting the second group of data to all hosts. For the current version of NPort 5200, if you select Yes for "Ignore jammed IP," the host that is not responding will be ignored, but the data will still be transmitted to the other hosts.

Allow driver control

Setting	Factory Default	Necessity
No or Yes	No	Required

If "max connection" is greater than 1, the NPort will ignore driver control commands from all connected hosts. However, if you set "Allow driver control" to YES, control commands will be accepted. Note that since the NPort 5200 may get configuration changes from multiple hosts, the most recent command received will take precedence.

Packing length

Setting	Factory Default	Necessity
0 to 1024	0	Optional

Default = 0, The Delimiter Process will be followed, regardless of the length of the data packet. If the data length (in bytes) matches the configured value, the data will be forced out. The data length can be configured for 0 to 1024 bytes. Set to 0 if you do not need to limit the length.

Delimiter 1

Setting	Factory Default	Necessity
00 to FF	blank	Optional

Delimiter 2

Setting	Factory Default	Necessity
00 to FF	blank	Optional

Once the NPort 5200 receives both delimiters through its serial port, it immediately packs all data currently in its buffer and sends it out the NPort 5200's Ethernet port.

ATTENTION

Delimiter 2 is optional. If left blank, then Delimiter 1 alone trips clearing of the buffer. If the size of the serial data received is greater than 1 KB, the NPort 5200 will automatically pack the data and send it to the Ethernet. However, to use the delimiter function, you must at least enable Delimiter 1. If Delimiter 1 is left blank and Delimiter 2 is enabled, the delimiter function will not work properly.

Delimiter process

Setting	Factory Default	Necessity
Do nothing Delimiter + 1, Delimiter + 2 Strip Delimiter	Do Nothing	Optional

When [Delimiter + 1] or [Delimiter + 2] is selected, the data will be transmitted when an additional byte (for Delimiter +1), or an additional 2 bytes (for Delimiter +2) of data is received after receiving the Delimiter.

When [Strip Delimiter] is selected, when the Delimiter is received, the Delimiter is deleted (i.e., stripped), and the remaining data is transmitted.

When [Do nothing] is selected, the data will be transmitted when the Delimiter is received.

Force transmit

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Optional

0: Disable the force transmit timeout.

1 to 65535: Forces the NPort 5200's TCP/IP protocol software to try to pack serial data received during the specified time into the same data frame.

This parameter defines the time interval during which NPort 5200 fetches the serial data from its internal buffer. If data is incoming through the serial port, NPort 5200 stores the data in the internal buffer. NPort 5200 transmits data stored in the buffer via TCP/IP, but only if the internal buffer is full or if the Force transmit time interval reaches the time specified under Force transmit timeout.

The optimal Force transmit timeout depends on your application, but it must be at least larger than one character interval within the specified baud rate. For example, assume that the serial port is set to 1200 bps, 8 data bits, 1 stop bit, and no for parity. In this case, the total number of bits needed to send a character is 10 bits, and the time required to transfer one character is

(10 (bits) / 1200 (bits/s)) * 1000 (ms/s) = 8.3 ms.

Therefore, you should set Force transmit timeout to be larger than 8.3 ms, so in this case, it must be greater than or equal to 10 ms.

If the user wants to send a series of characters in the same packet, the serial device attached to NPort 5200 should send that series of characters during a time interval less than the Force transmit timeout for NPort 5200, and the total length of data must be less than or equal to NPort 5200's internal buffer size. The serial communication buffer size for NPort 5200 is 1 KB per port.

Local TCP port

Setting	Factory Default	Necessity
1 to 65535	4001	Required

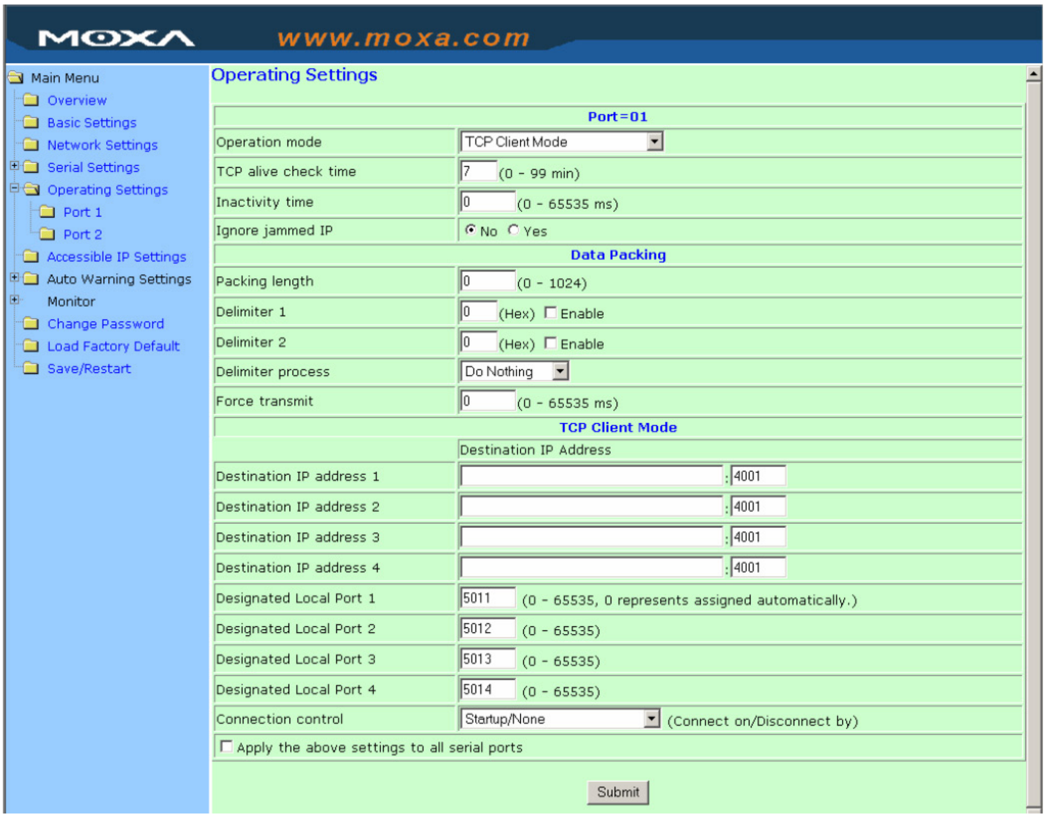
The "Local TCP port" is the TCP port that NPort 5200 uses to listen to connections, and that other devices must use to contact NPort 5200. To avoid conflicts with commonly used TCP port numbers, the default is set to 4001.

Command port

Setting	Factory Default	Necessity
1 to 65535	966	Optional

The "Command port" is a listen TCP port for IP-Serial Lib commands from the host. In order to prevent a TCP port conflict with other applications, the user can set the Command port to another port if needed. IP-Serial Lib will automatically check the Command Port on NPort 5200 so that the user does not need to configure the program.

TCP Client Mode



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7 min	Optional

0 min: TCP connection is not closed due to an idle TCP connection.

1 to 99 min: NPort 5200 closes the TCP connection automatically if there is no TCP activity for the given time.

Inactivity time

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Optional

0 ms: TCP connection is not closed due to an idle serial line.

0-65535 ms: NPort 5200 closes the TCP connection automatically if there is no serial data activity for the given time.

This parameter defines the maintenance status as Closed or Listen for the TCP connection. The connection is closed if data is not incoming or outgoing through the serial port during the specified Inactivity time.

If the Inactivity time is set to 0, the current TCP connection is kept active until a connection close request is received. Although Inactivity time is disabled, the NPort 5200 will check the connection status between the NPort 5200 and remote host by sending “keep alive” packets periodically. If the remote host does not respond to the packet, NPort 5200 assumes that the connection was closed down unintentionally. NPort 5200 will then force the existing TCP connection to close.

ATTENTION

The Inactivity time should at least be set larger than that of Force transmit timeout. To prevent the unintended loss of data due to the session being disconnected, it is highly recommended that this value is set large enough so that the intended data transfer is completed.

ATTENTION

Inactivity time is ONLY active when “TCP connect on” is set to “Any character.”

Ignore jammed IP

Setting	Factory Default	Necessity
No or Yes	No	Optional

For previous versions of NPort 5200, when Max connections > 1, and the serial device is transmitting data, if any one of the connected hosts was not responding NPort 5200 would wait until the data had been transmitted successfully before transmitting the second group of data to all hosts. For the current version of NPort 5200, if you select Yes for “Ignore jammed IP,” the host that is not responding will be ignored, but the data will still be transmitted to the other hosts.

Packing length

Setting	Factory Default	Necessity
0 to 1024	0	Optional

Default = 0, The Delimiter Process will be followed, regardless of the length of the data packet. If the data length (in bytes) matches the configured value, the data will be forced out. The data length can be configured for 0 to 1024 bytes. Set to 0 if you do not need to limit the length.

Delimiter 1

Setting	Factory Default	Necessity
00 to FF (hex)	blank	Optional

Delimiter 2

Setting	Factory Default	Necessity
00 to FF (hex)	blank	Optional

Once the NPort 5200 receives both delimiters through its serial port, it immediately packs all data currently in its buffer and sends it to the NPort 5200’s Ethernet port.

ATTENTION

Delimiter 2 is optional. If left blank, then Delimiter 1 alone trips clearing of the buffer. If the size of the serial data received is greater than 1 KB, the NPort 5200 will automatically pack the data and send it to the Ethernet. However, to use the delimiter function, you must at least enable Delimiter 1. If Delimiter 1 is left blank and Delimiter 2 is enabled, the delimiter function will not work properly.

Delimiter process

Setting	Factory Default	Necessity
Do nothing, Delimiter + 1, Delimiter + 2, Strip Delimiter	Do Nothing	Required

When [Delimiter + 1] or [Delimiter + 2] is selected, the data will be transmitted when an additional byte (for Delimiter +1), or an additional 2 bytes (for Delimiter +2) of data is received after receiving the Delimiter.

When [Strip Delimiter] is selected, when the Delimiter is received, the Delimiter is deleted (i.e., stripped), and the remaining data is transmitted.

When [Do nothing] is selected, the data will be transmitted when the Delimiter is received.

Force transmit

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Required

0: Disable the force transmit timeout.

1 to 65535: Forces the NPort 5200's TCP/IP protocol software to try to pack serial data received during the specified time into the same data frame.

This parameter defines the time interval during which NPort 5200 fetches the serial data from its internal buffer. If data is incoming through the serial port, NPort 5200 stores the data in the internal buffer. NPort 5200 transmits data stored in the buffer via TCP/IP, but only if the internal buffer is full or if the Force transmit time interval reaches the time specified under Force transmit timeout.

The optimal Force transmit timeout depends on your application, but it must be at least larger than one character interval within the specified baud rate. For example, assume that the serial port is set to 1200 bps, 8 data bits, 1 stop bit, and no parity. In this case, the total number of bits needed to send a character is 10 bits, and the time required to transfer one character is

(10 (bits) / 1200 (bits/s)) * 1000 (ms/s) = 8.3 ms.

Therefore, you should set Force transmit timeout to be larger than 8.3 ms, so in this case, it must be greater than or equal to 10 ms.

If the user wants to send a series of characters in the same packet, the serial device attached to NPort 5200 should send that series of characters during a time interval less than the Force transmit timeout for NPort 5200, and the total length of data must be less than or equal to NPort 5200's internal buffer size. The serial communication buffer size for NPort 5200 is 1 KB per port.

Destination IP address 1

Setting	Factory Default	Necessity
IP address or Domain Name (E.g., 192.168.1.1)	blank	Optional

Allows NPort 5200 to connect actively to the remote host whose IP address is set by this parameter.

Destination IP address 2/3/4

Setting	Factory Default	Necessity
IP address or Domain Name (E.g., 192.168.1.1)	blank	Optional

Allows the NPort 5200 to connect actively to the remote host whose IP address is set by this parameter.

ATTENTION

Up to 4 connections can be established between the NPort 5200 and hosts. The connection speed or throughput may be low if one of the four connections is slow, since the 1 slow connection will slow down the other 3 connections.

ATTENTION

The “Destination IP address” parameter can use both IP address and Domain Name. For some applications, the user may need to send the data actively to the remote destination domain name.

Designated Local Port 1/2/3/4

Setting	Factory Default	Necessity
TCP Port No.	5011 (Port 1) 5012 (Port 2) 5013 (Port 3) 5014 (Port 4)	Required

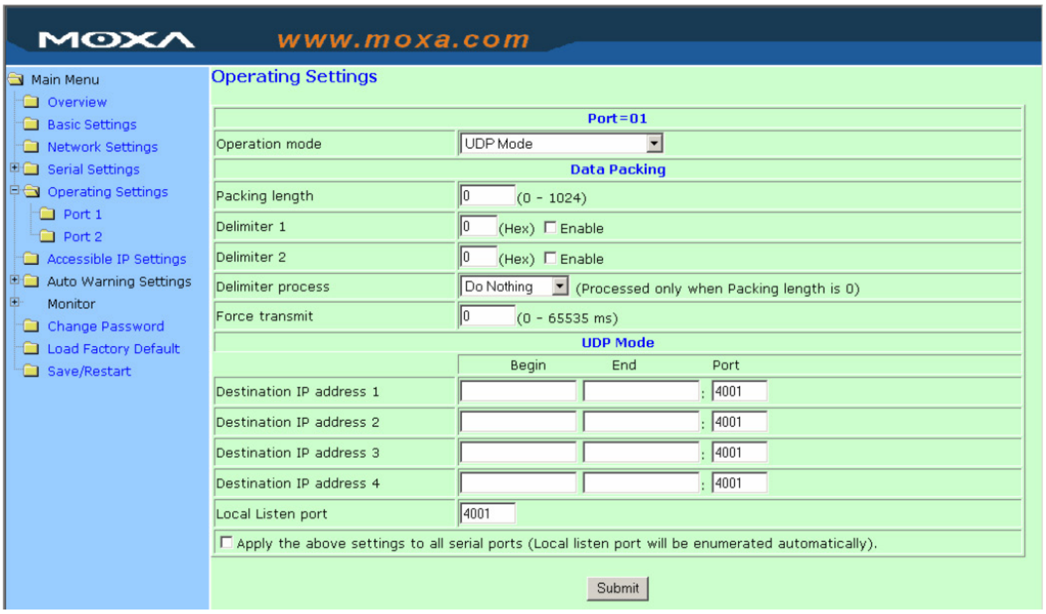
Connection control

Setting	Factory Default	Necessity
Startup/None, Any Character/None, Any Character/ Inactivity Time, DSR ON/DSR OFF, DSR ON/None, DCD ON/DCD OFF, DCD ON/None	Startup/None	Required

The meaning of each of the above settings is given in the table below. In general, both the Connect condition and Disconnect condition are given.

Connect/Disconnect	Description
Startup/None (default)	A TCP connection will be established on startup, and will remain active indefinitely.
Any Character/None	A TCP connection will be established when any character is received from the serial interface, and will remain active indefinitely.
Any Character/ Inactivity Time	A TCP connection will be established when any character is received from the serial interface, and will be disconnected when the Inactivity time out is reached.
DSR On/DSR Off	A TCP connection will be established when a DSR “On” signal is received, and will be disconnected when a DSR “Off” signal is received.
DSR On/None	A TCP connection will be established when a DSR “On” signal is received, and will remain active indefinitely.
DCD On/DCD Off	A TCP connection will be established when a DCD “On” signal is received, and will be disconnected when a DCD “Off” signal is received.
DCD On/None	A TCP connection will be established when a DCD “On” signal is received, and will remain active indefinitely.

UDP Mode



Packing length

Setting	Factory Default	Necessity
0 to 1024	0	Required

Default = 0, The Delimiter Process will be followed, regardless of the length of the data packet. If the data length (in bytes) matches the configured value, the data will be forced out. The data length can be configured for 0 to 1024 bytes. Set to 0 if you do not need to limit the length.

Delimiter 1

Setting	Factory Default	Necessity
00 to FF	blank	Required

Delimiter 2

Setting	Factory Default	Necessity
00 to FF	blank	Required

Once the NPort 5200 receives both delimiters through its serial port, it immediately packs all data currently in its buffer and sends it out the NPort 5200's Ethernet port.

ATTENTION

Delimiter 2 is optional. If left blank, then Delimiter 1 alone trips clearing of the buffer. If the size of the serial data received is greater than 1 KB, the NPort 5200 will automatically pack the data and send it to the Ethernet. However, to use the delimiter function, you must at least enable Delimiter 1. If Delimiter 1 is left blank and Delimiter 2 is enabled, the delimiter function will not work properly.

Delimiter process

Setting	Factory Default	Necessity
Do nothing Delimiter + 1 Delimiter + 2 Strip Delimiter	Do Nothing	Optional

[Delimiter + 1] or [Delimiter + 2]: The data will be transmitted when an additional byte (for Delimiter +1), or an additional 2 bytes (for Delimiter +2) of data is received after receiving the Delimiter.

[Strip Delimiter]: When the Delimiter is received, the Delimiter is deleted (i.e., stripped), and the remaining data is transmitted.

[Do nothing]: The data will be transmitted when the Delimiter is received.

Force transmit

Setting	Factory Default	Necessity
0 to 65535 ms	0 ms	Required

0: Disable the force transmit timeout.

1 to 65535: Forces the NPort 5200's TCP/IP protocol software to try to pack serial data received during the specified time into the same data frame.

This parameter defines the time interval during which NPort 5200 fetches the serial data from its internal buffer. If data is incoming through the serial port, NPort 5200 stores the data in the internal buffer. NPort 5200 transmits data stored in the buffer via TCP/IP, but only if the internal buffer is full or if the Force transmit time interval reaches the time specified under Force transmit timeout.

The optimal Force transmit timeout depends on your application, but it must be at least larger than one character interval within the specified baud rate. For example, assume that the serial port is set to 1200 bps, 8 data bits, 1 stop bit, and no parity. In this case, the total number of bits needed to send a character is 10 bits, and the time required to transfer one character is

(10 (bits) / 1200 (bits/s)) * 1000 (ms/s) = 8.3 ms.

Therefore, you should set Force transmit timeout to be larger than 8.3 ms, so in this case, it must be greater than or equal to 10 ms.

If the user wants to send a series of characters in the same packet, the serial device attached to NPort 5200 should send that series of characters during a time interval less than the Force transmit timeout for NPort 5200, and the total length of data must be less than or equal to NPort 5200's internal buffer size. The serial communication buffer size for NPort 5200 is 1 KB per port.

Destination IP address 1

Setting	Factory Default	Necessity
IP address range E.g., Begin: 192.168.1.1 End: 192.168.1.10	Begin: *blank* End: *blank*	Optional
	Port: 4001	Required

Destination IP address 2/3/4

Setting	Factory Default	Necessity
IP address range E.g., Begin: 192.168.1.11 End: 192.168.1.20	Begin: *blank* End: *blank*	Optional
	Port: 4001	Required

Local listen port

Setting	Factory Default	Necessity
1 to 65535	4001	Required

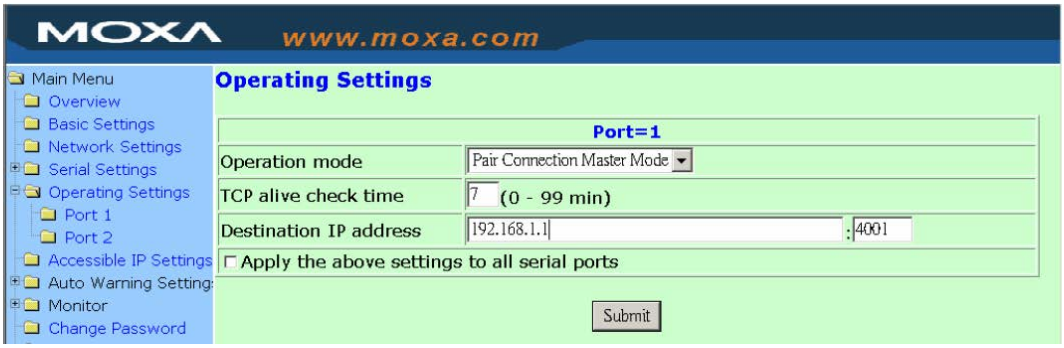
The UDP port that NPort 5200 listens to, and that other devices must use to contact NPort 5200. To avoid conflicts with common UDP ports, the default is set to 4001.

Pair Connection Mode

Pair Connection Mode employs two NPort 5200 device servers in tandem, and can be used to remove the 15-meter distance limitation imposed by the RS-232 interface. One NPort 5200 is connected from its RS-232 port to the COM port of a PC or other type of computer, such as hand-held PDAs that have a serial port, and the serial device is connected to the RS-232 port of the other NPort 5200. The two NPort 5200 device servers are then connected to each other with a cross-over Ethernet cable, both are connected to the same LAN, or in a more advanced setup, they communicate with each other over a WAN (i.e., through one or more routers). Pair Connection Mode transparently transfers both data and modem control signals (although it cannot transmit the DCD signal) between the two NPorts.

Pair Connection Master Mode

When using Pair Connection Mode, you must select **Pair Connection Master Mode** for the Operation mode of one of the NPort 5200 device servers. In effect, this NPort 5200 will be acting as a TCP client.



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7 min	Required

0 min: TCP connection is not closed due to an idle TCP connection.

1 to 99 min: The NPort 5200 closes the TCP connection automatically if there is no TCP activity for the given time.

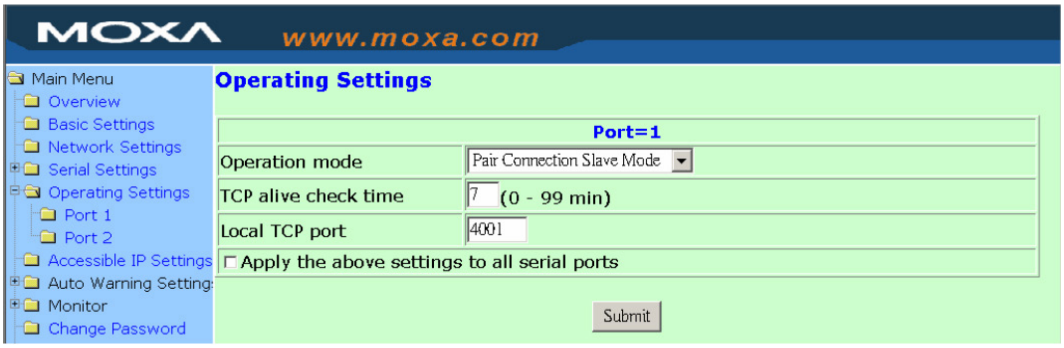
Destination IP address

Setting	Factory Default	Necessity
IP address or Domain Name (E.g., 192.168.1.1)	blank	Optional
TCP port No.	4001	Required

The Pair Connection “Master” will contact the network host that has this IP address. Data will be transmitted through the port No. (4001 by default). Note that you must configure the same TCP port No. for the device server acting as the Pair Connection “Slave.”

Pair Connection Slave Mode

When using Pair Connection Mode, you must select **Pair Connection Slave Mode** for the Operation mode of one of the NPort 5200 device servers. In effect, this NPort 5200 will be acting as a TCP server.



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7 min	Required

0 min: TCP connection is not closed due to an idle TCP connection.

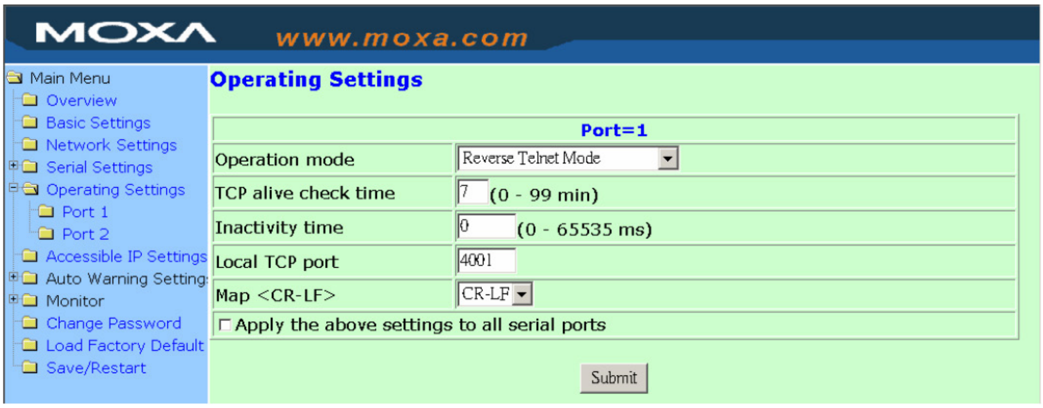
1 to 99 min: The NPort 5200 closes the TCP connection automatically if there is no TCP activity for the given time.

Local TCP port

Setting	Factory Default	Necessity
TCP port No. (e.g., 4001)	4001	Required

This Port No. must be the same port No. that you set up for the Pair Connection "Master" device server.

Reverse Telnet Mode



TCP alive check time

Setting	Factory Default	Necessity
0 to 99 min	7	Required

0 min: TCP connection is not closed due to an idle TCP connection.

1 to 99 min: NPort 5200 closes the TCP connection automatically if there is no TCP activity for the given time.

Inactivity time

Setting	Factory Default	Necessity
0 to 65535 ms	0	Required

Idle time setting for auto-disconnection. 0 min. means it will never disconnect.

Local TCP port

Setting	Factory Default	Necessity
1 to 65535	4001	Required

Each of NPort 5200's serial ports is mapped to a TCP port. To avoid conflicts with common TCP port numbers, set port numbers to 4001 for port 1, 4002 for port 2, etc.

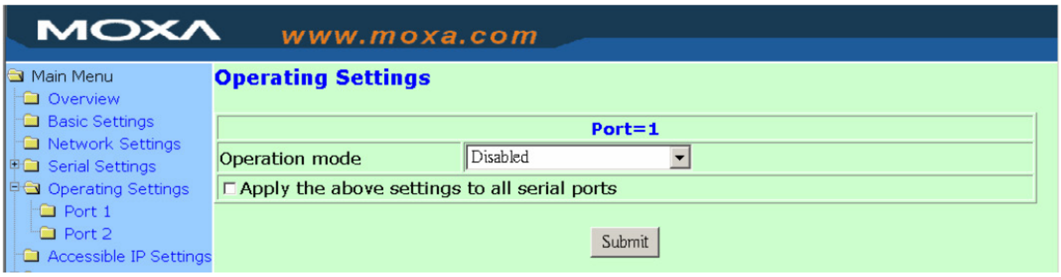
Map <CR-LF>

Setting	Factory Default	Necessity
CR, LF, CR-LF	CR-LF	Required

If data received through NPort 5200's Ethernet port is sent using the "enter" command, the data will be transmitted out the serial port with an added

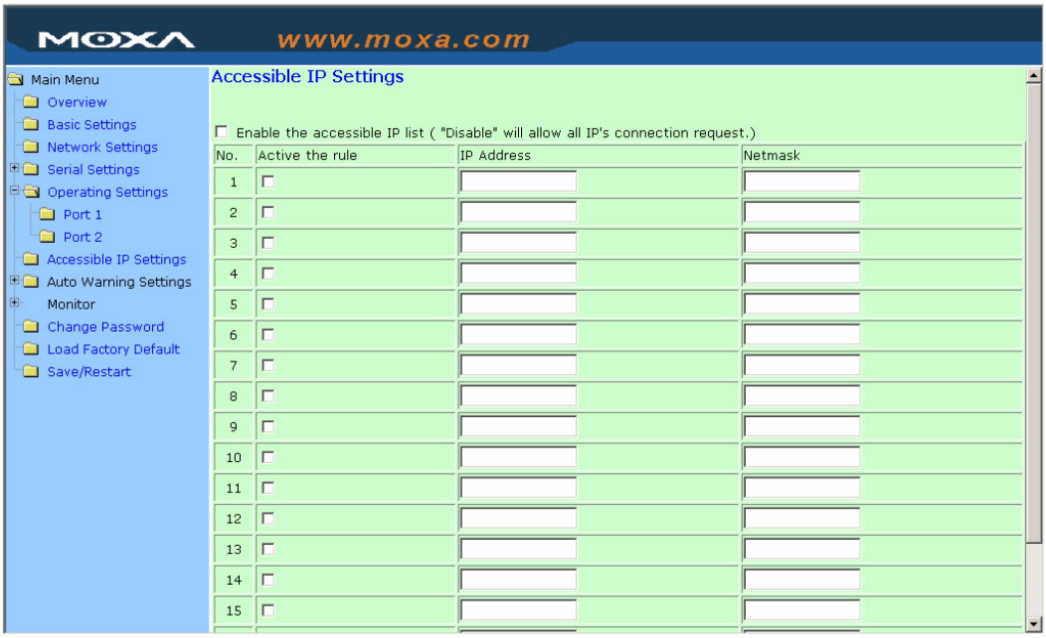
1. "carriage return + line feed" if you select the <CR-LF> option
   (i.e., the cursor will jump to the next line, and return to the first character of the line)
2. "carriage return" if you select the <CR> option
   (i.e., the cursor will return to the first character of the line)
3. "line feed" if you select the <LF> option.
   (i.e., the cursor will jump to the next line, but not move horizontally)

Disabled Mode



When Operation mode is set to Disabled, that particular port will be disabled. Check the "Apply the above settings to all serial ports" to apply this setting to the other port.

Accessible IP Settings



The NPort 5200 uses an IP address based filtering method to control access to itself.

Accessible IP Settings allows you to add or block remote host IP addresses to prevent unauthorized access. Access to NPort 5200 is controlled by IP address. That is, if a host's IP address is in the accessible IP table, then the host will be allowed to access the NPort 5200. You can use one of the following types of access.

- **Only one host with a specified IP address can access the NPort 5200**

  Use Netmask = 255.255.255.255 for one of the Accessible IP Settings rules.

- **Hosts on a specific subnet can access the NPort 5200**

  Use a non-trivial Netmask, such as 255.255.255.0, for one of the Accessible IP Settings rules.

- **Any host can access the NPort 5200**

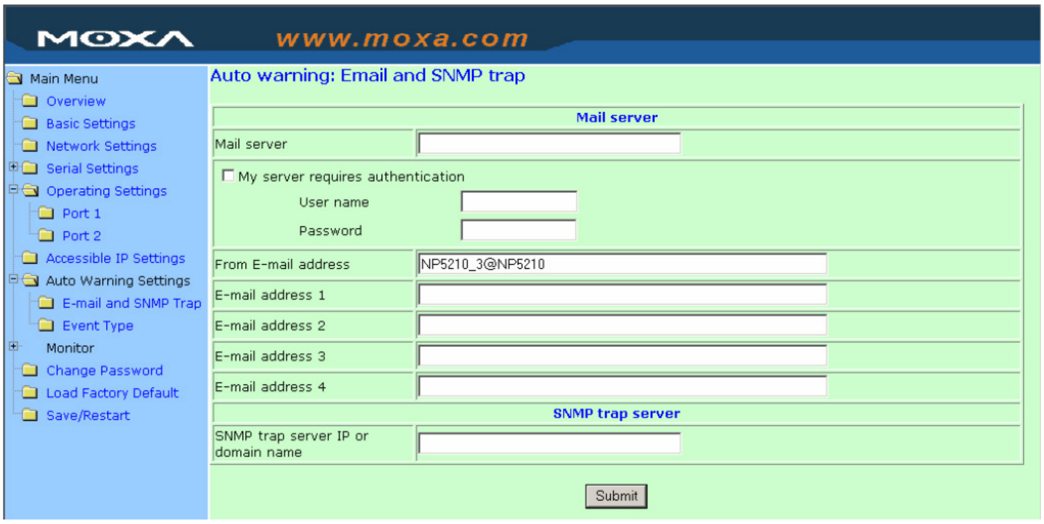
  Disable this function by un-checking the "Enable the accessible IP list" checkbox.

  The following table shows six specific Accessible IP Settings rules. In the "Input format" column, "192.168.1.123 / 255.255.255.255" means you should enter 192.168.1.123 for IP Address, and 255.255.255.255 for Netmask.

Allowable Hosts	Input Format
Any host	Disable
192.168.1.120	192.168.1.120 / 255.255.255.255
192.168.1.1 to 192.168.1.254	192.168.1.0 / 255.255.255.0
192.168.0.1 to 192.168.255.254	192.168.0.0 / 255.255.0.0
192.168.1.1 to 192.168.1.126	192.168.1.0 / 255.255.255.128
192.168.1.129 to 192.168.1.254	192.168.1.128 / 255.255.255.128

Auto Warning Settings

Auto warning: Email and SNMP trap



Mail Server

Mail server

Setting	Factory Default	Necessity
IP Address or Domain Name	blank	Optional

User name

Setting	Factory Default	Necessity
1 to 15 characters	blank	Optional

Password

Setting	Factory Default	Necessity
1 to 15 characters	blank	Optional

From E-mail address

Setting	Factory Default	Necessity
1 to 63 characters	blank	Optional

E-mail address 1/2/3/4

Setting	Factory Default	Necessity
1 to 63 characters	blank	Optional

ATTENTION

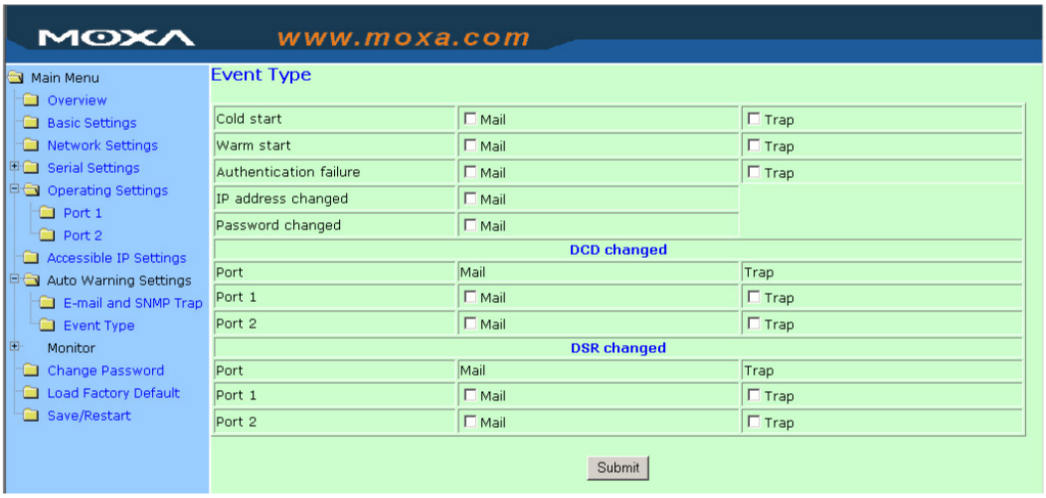
Consult your Network Administrator or ISP for the proper mail server settings. The Auto warning function may not work properly if it is not configured correctly. NPort 5200 SMTP AUTH supports LOGIN, PLAIN, CRAM-MD5 (RFC 2554).

SNMP Trap Server

SNMP trap server IP or domain name

Setting	Factory Default	Necessity
IP address or Domain Name	blank	Optional

Event Type



Cold start

This refers to starting the system from power off (contrast this with warm start). When performing a cold start, NPort 5200 will issue an Auto warning message automatically by e-mail, or send an SNMP trap after booting up.

Warm start

This refers to restarting the computer without turning the power off. When performing a warm start, NPort 5200 will send an e-mail automatically, or send an SNMP trap after rebooting.

Authentication failure

Authentication failure occurs when the user inputs a wrong password from the Console or Administrator. When authentication failure occurs, the NPort 5200 will immediately send an e-mail or SNMP trap.

IP address changed

The user has changed NPort 5200's IP address. When the IP address changes, NPort 5200 will send an e-mail with the new IP address before NPort 5200 reboots. If the NPort 5200 is unable to send an e-mail message to the mail server within 15 seconds, NPort 5200 will reboot anyway, and abort the e-mail auto warning.

Password changed

The user has changed NPort 5200's password. When the password changes, NPort 5200 will send an e-mail with the password changed notice before NPort 5200 reboots. If the NPort 5200 is unable to send an e-mail message to the mail server within 15 seconds, NPort 5200 will reboot anyway, and abort the e-mail auto warning.

DCD changed

The DCD (Data Carrier Detect) signal has changed, also indicating that the modem connection status has changed. For example, a DCD change to high also means "Connected" between local modem and remote modem. If the DCD signal changes to low, it also means that the connection line is down.

When the DCD changes, the NPort 5210/5230 will immediately send an e-mail or send an SNMP trap.

DSR changed

The DSR (Data Set Ready) signal has changed, also indicating that the data communication equipment's power is off. For example, a DSR change to high also means that the DCE is powered ON. If the DSR signal changes to low, it also means that the DCE is powered off.

When the DSR changes, the NPort 5210/5230 will immediately send an e-mail or send an SNMP trap.

Mail

Setting	Factory Default	Necessity
Enable, Disable	Disable	Optional

This feature helps the administrator manage how the NPort 5200 sends e-mail to pre-defined e-mail boxes when the enabled events—such as Cold start, Warm start, Authentication failure, etc.—occur. To configure this feature, click on the Event Type Mail checkbox.

Trap

Setting	Factory Default	Necessity
Enable, Disable	Disable	Optional

This feature helps the administrator manage how the NPort 5200 sends SNMP Trap to a pre-defined SNMP Trap server when the enabled events—such as Cold start, Warm start, Authentication failure, etc.—occur. To configure this feature, click on the Event Type Trap checkbox.

ATTENTION

DCD changed and **DSR changed** events are only supported by RS-232 ports (ports 1 and 2 for NPort 5210, and port 1 for NPort 5230). Since NPort 5232 and NPort 5232I do not have RS-232 ports, the **DCD changed** and **DSR changed** options will not appear in the **Event Type** screen.

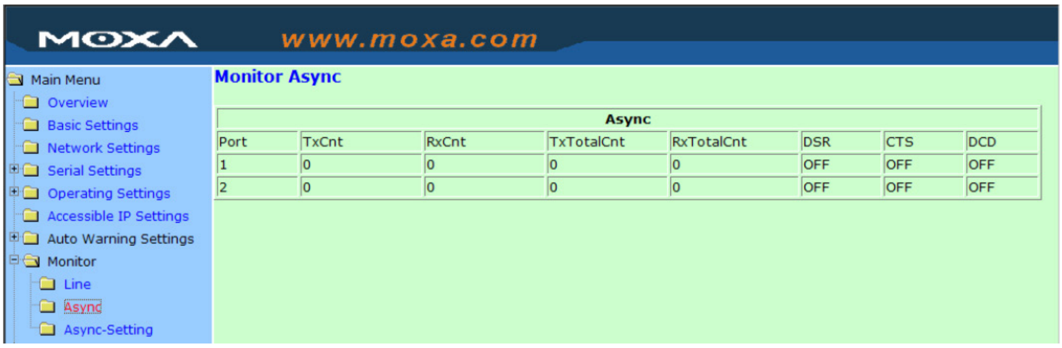
Monitor

Monitor Line

Click on **Line** under **Monitor** to show the operation mode and status of each connection (IPx), for each of the two serial ports.

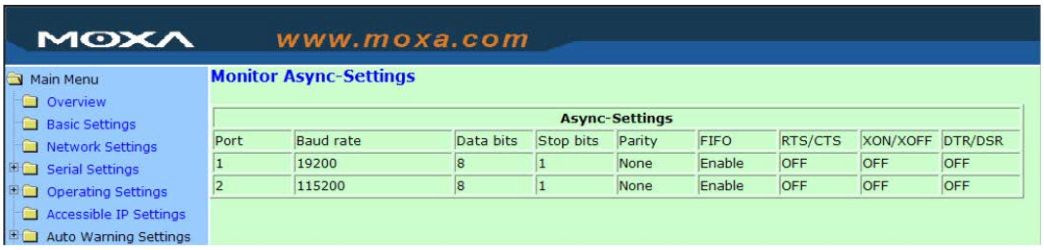
Monitor Async

Click on **Async** under **Monitor** to show the current status of each of the two serial ports.

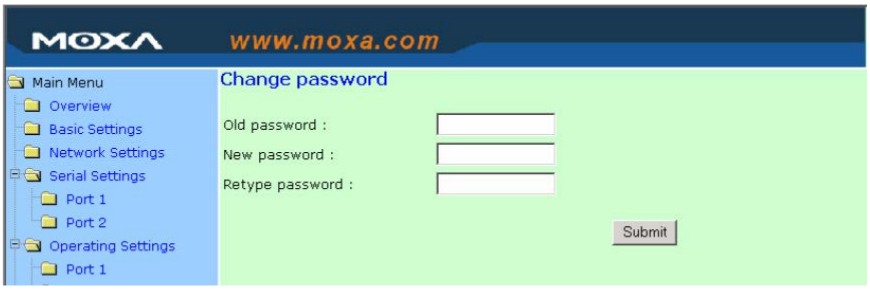


Monitor Async-Settings

Click on **Async Setting** under **Monitor** to show the run-time settings for each of the two serial ports.



Change Password



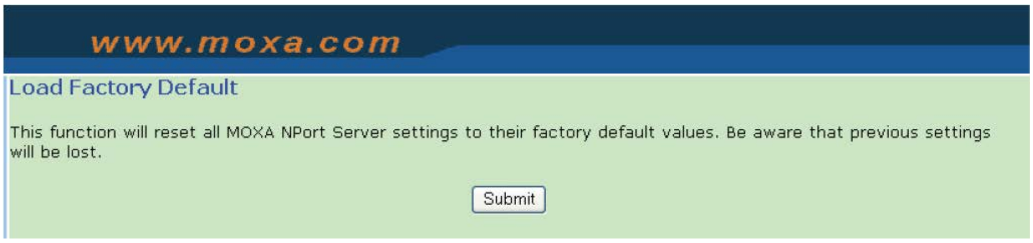
Input the "Old password" and "New password" to change the password. Leave the password boxes blank to erase the password. Keep in mind that if the password is erased, then NPort 5200 will not have password protection.

ATTENTION

If you forget the password, the ONLY way to configure NPort 5200 is by using the Reset button on NPort 5200's casing to "Load Factory Default."

Remember to export the configuration file using NPort Administrator when you finish the configuration. By using the Import function of NPort Administrator, your configuration can be re-loaded into NPort 5200 after using "Load Factory Default." Refer to Chapter 6 for more details about the Export and Import function.

Load Factory Default



Use this function to reset all of NPort 5200's settings to the factory default values. Be aware that previous settings will be lost.

6

Configuring NPort Administrator

The following topics are covered in this chapter:

- **Overview**
- **Installing NPort Administrator**
- **Configuration**
  - Broadcast Search
  - Unlock Password Protection
  - Configuring the NPort 5200
  - Upgrading the Firmware
  - Export Configuration
  - Import Configuration
- **Monitor**
- **Port Monitor**
- **COM Mapping**
  - On-line COM Mapping
  - Off-line COM Mapping
- **IP Address Report**

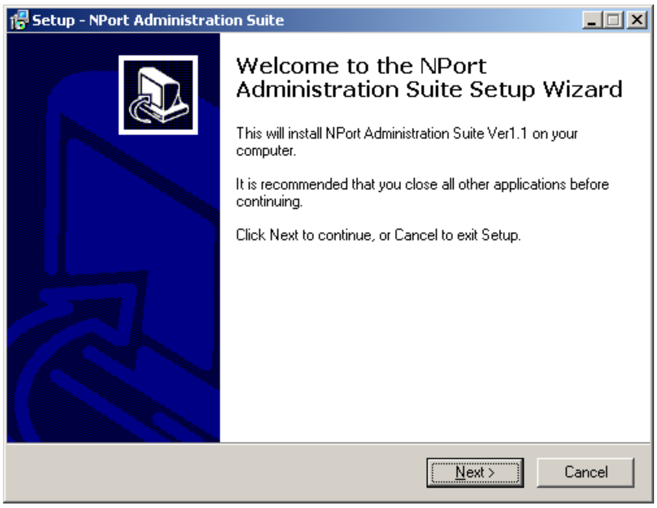
Overview

Device Server Administrator lets you install and configure your NPort 5200 Series products easily over the network. Five function groups are provided to ease the installation process, allow off-line COM mapping, and provide monitoring and IP location server functions.

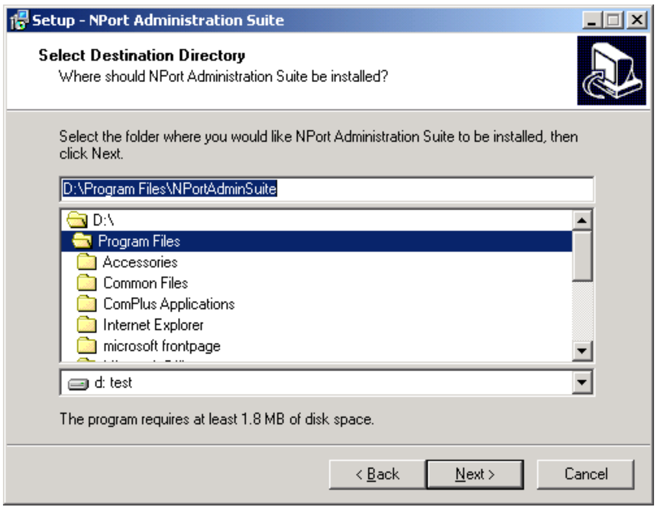
Device Server Administrator is an integrated software suite that bundles Device Server Administrator and the IP Serial Library, and provides everything you need to manage, monitor, and modify your NPort 5200 from a remote location.

Installing NPort Administrator

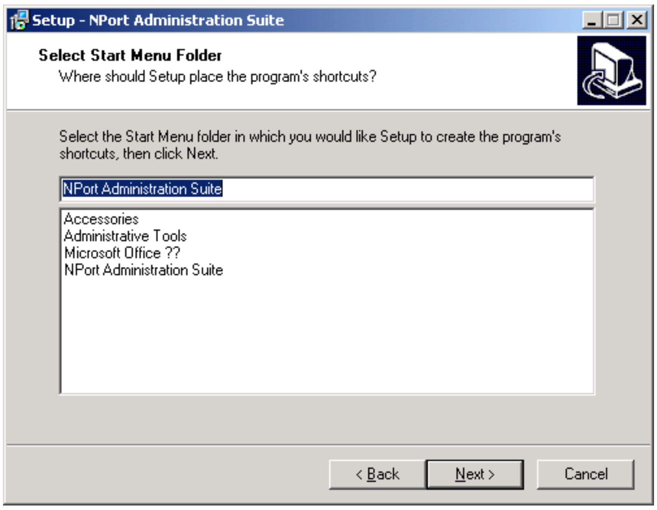
1. Once the Setup program starts running, click on **Next** when the **Welcome** window opens to proceed with the installation.



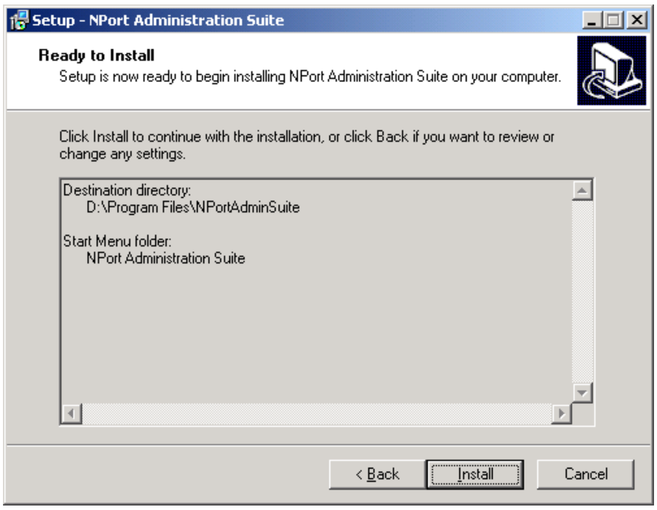
2. Click on **Next** to install program files in the default directory, or select an alternative location.



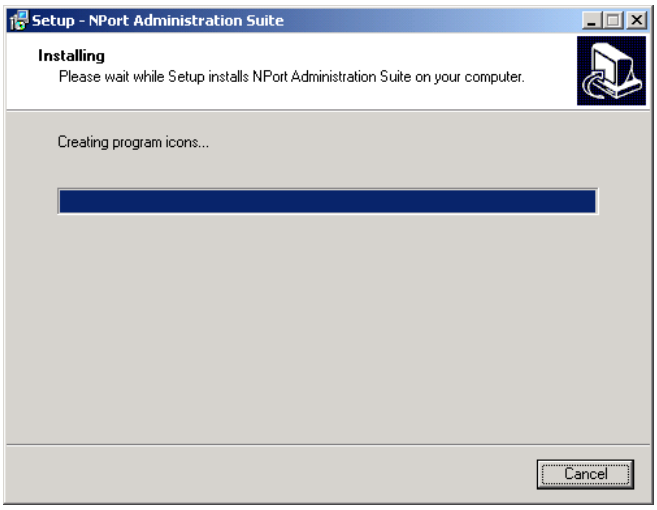
3. Click on **Next** to install the program using the default program name, or select a different name.



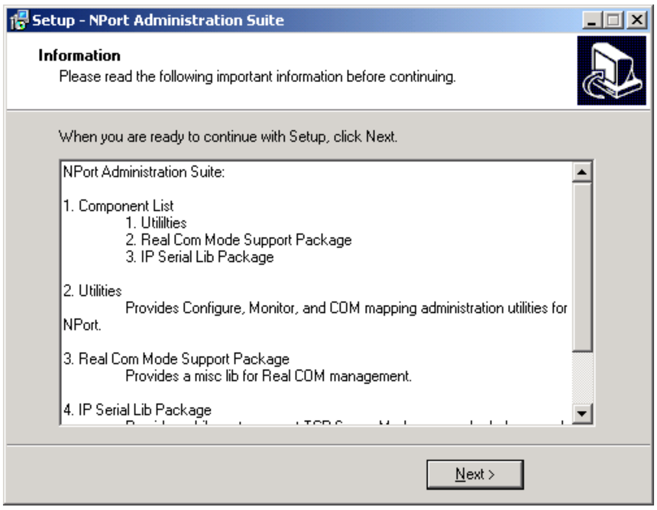
4. Click on **Install** to proceed with the installation.



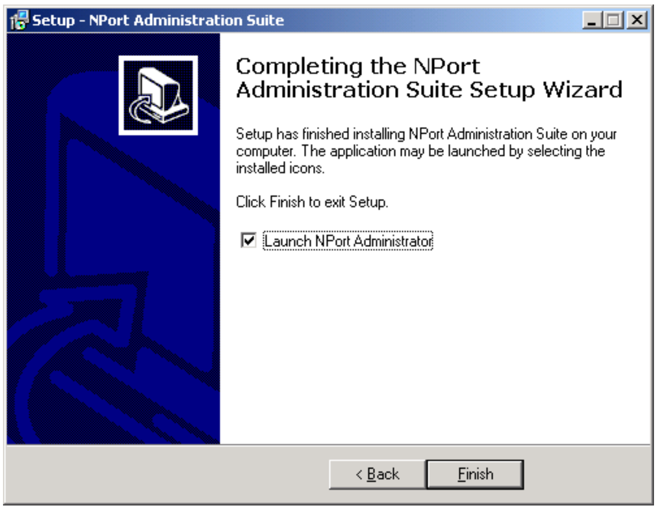
5. The **Installing** window reports the progress of the installation.



6. Click on **Next** to proceed with the installation.



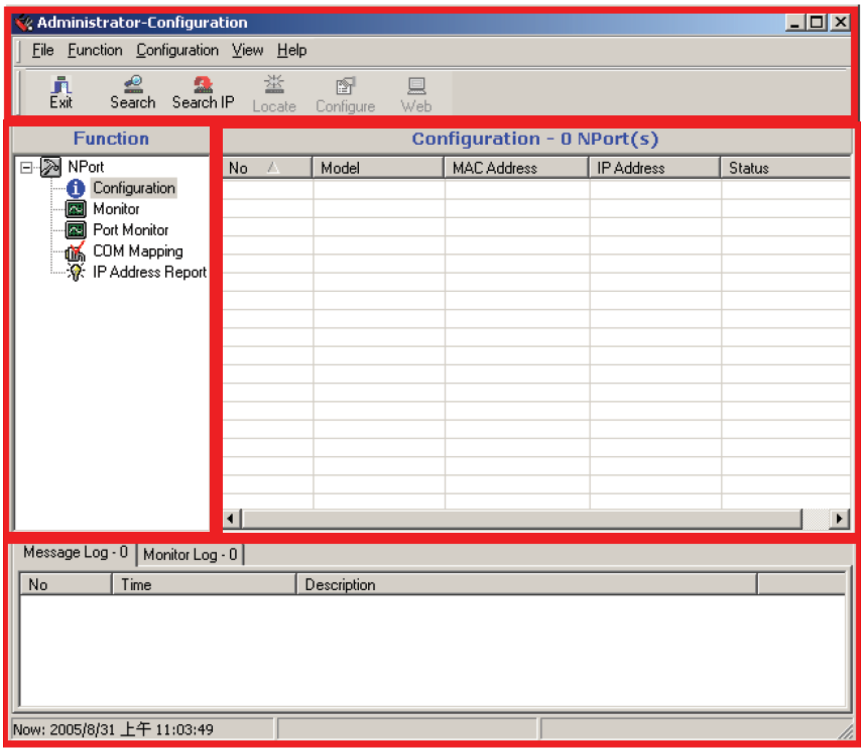
7. Click on **Finish** to complete the installation of NPort 5200 Administration Suite.



Configuration

The Administrator-Configuration window is divided into four parts.

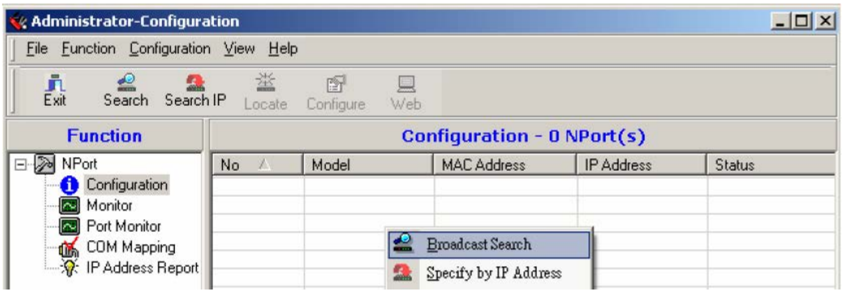
- The top section contains the function list and online help area. (Windows NT does not support this .chm file format.)
- The five Administrator function groups are listed in the left section.
- A list of NPort 5200 serial device servers, each of which can be selected to process user requirements, is displayed in the right section.
- The activity Log, which displays messages that record the user's processing history, is shown in the bottom section.



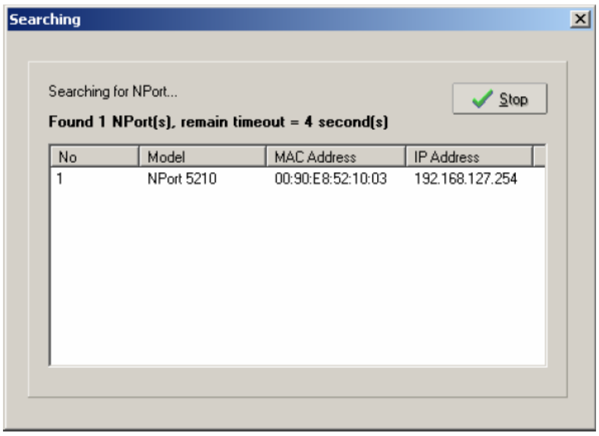
Broadcast Search

The **Broadcast Search** function is used to locate all NPort 5200s that are connected to the same LAN as your computer. Since the Broadcast Search function searches by MAC address and not IP address, all NPort 5200s connected to the LAN will be located, regardless of whether or not they are part of the same subnet as the host.

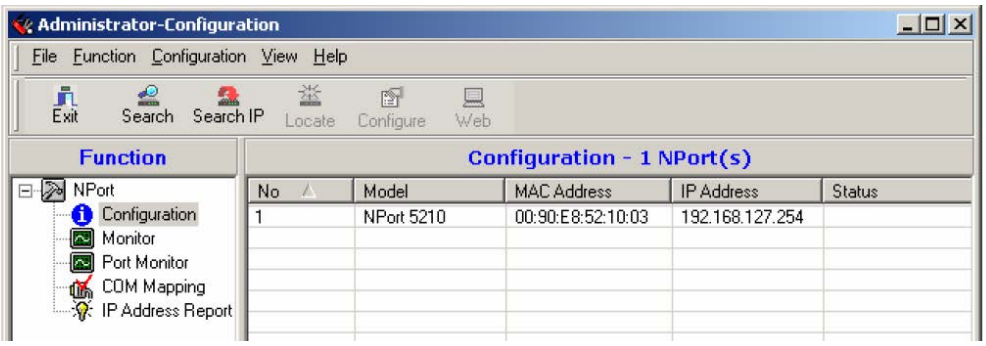
1. Position the cursor in the right middle section of the Administrator window and then click the right mouse button.



2. The **Broadcast Search** window will open and display the Model, IP Address, MAC Address, and Progress of the search for that particular device.



3. When the search is complete, the Broadcast Search window will close, and the NPort 5200s that were located will be displayed in the right pane of the Administrator window. If you found more than one server connected to this network, refer to the MAC address sticker on your server(s) to determine which server(s) are the ones you wish to configure. To configure an NPort 5200, place the cursor over the row displaying that NPort 5200's information, and then double click the left mouse button.



ATTENTION

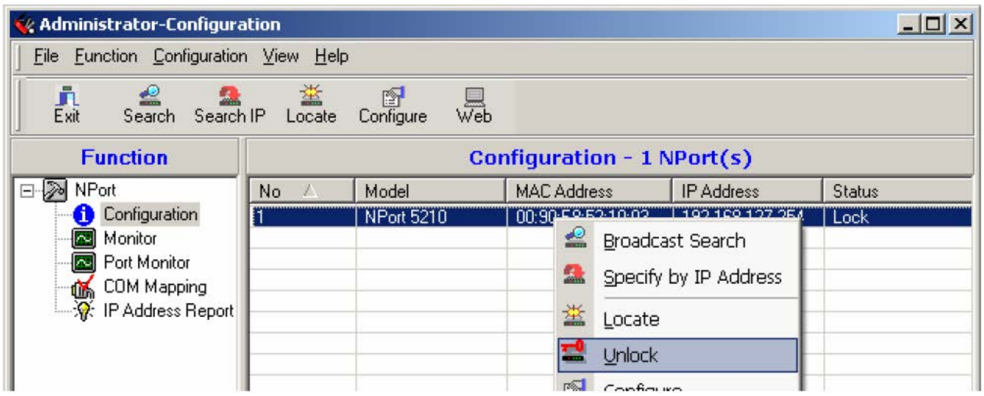
Before modifying the NPort 5200's configuration, use Broadcast Search to locate all NPort 5200s connected to the LAN, or use Specify by IP Address to locate a particular NPort 5200.

Unlock Password Protection

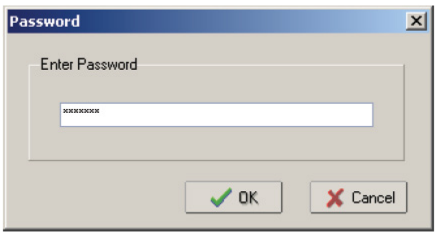
If the NPort 5200 is password protected (indicated by "Lock" for Status), you will receive the following error, and you will not be able to use the right click method to open the configuration page.

In this case, proceed as follows to "Unlock" the device server.

1. Select the NPort 5200 with "Lock" status, click the right mouse button, and then select **Unlock**.

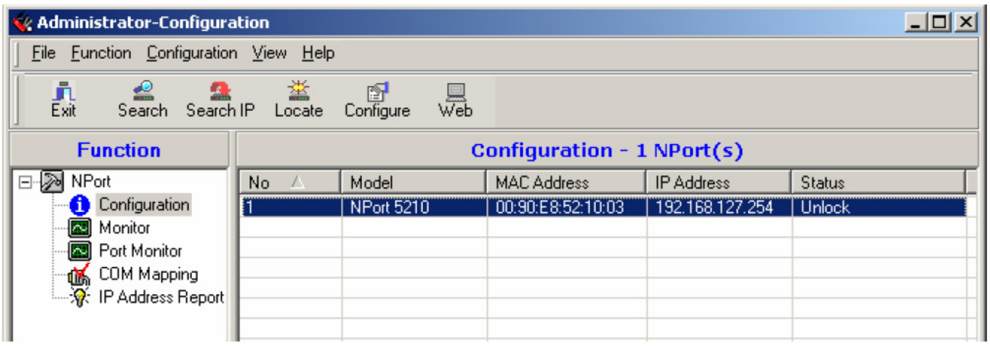


2. Input the password and then click on **OK**.



3. The NPort Administrator will display an “Unlock ok” message.

4. The “Lock” status will change to “Unlock,” and the Administrator utility will keep this NPort 5200 in the Unlock status throughout this Administrator session.



The meanings of the six “Status” states are given below (note that the term Fixed is borrowed from the standard fixed IP address networking terminology):

Lock

The NPort 5200 is password protected, “Broadcast Search” was used to locate it, and the password has not yet been entered from within the current Administrator session.

Unlock

The NPort 5200 is password protected, “Broadcast Search” was used to locate it, and the password has been entered from within the current Administrator session. Henceforth during this Administrator session, activating various utilities for this NPort 5200 will not require re-entering the server password.

Blank

The NPort 5200 is not password protected, and “Broadcast Search” was used to locate it.

Fixed

The NPort 5200 is not password protected, and “Search by IP address” was used to locate it.

Lock Fixed

The NPort 5200 is password protected, “Specify by IP address” was used to locate it, and the password has not yet been entered from within the current Administrator session.

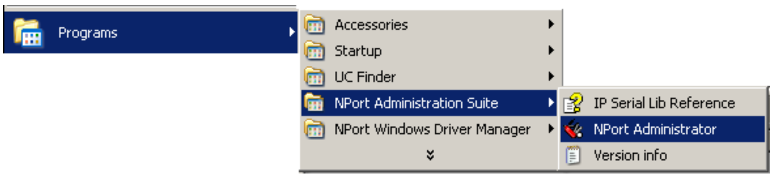
Unlock Fixed

The NPort 5200 is password protected, “Specify by IP address” was used to locate it, and the password has been entered from within the current Administrator session. Henceforth during this Administrator session, activating various utilities for this NPort 5200 will not require re-entering the server password.

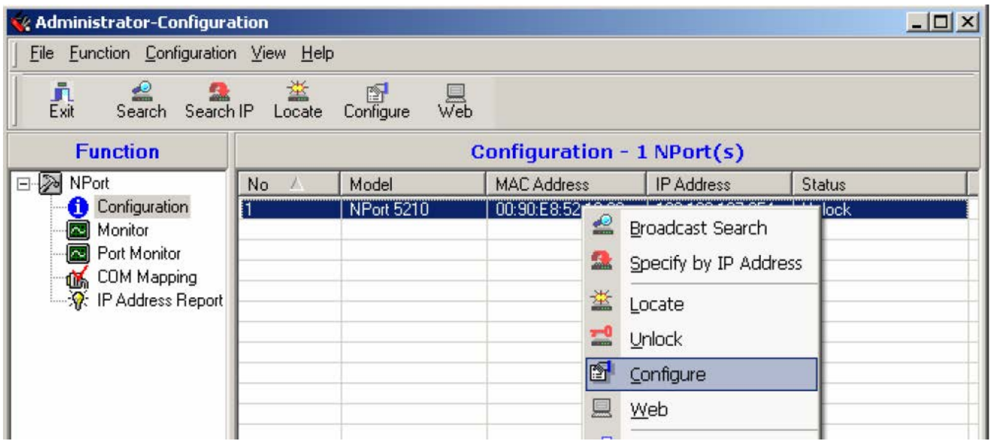
Configuring the NPort 5200

In this section, we illustrate how to access the NPort 5200’s configuration utility. You should first make sure that you can connect over the network from your computer to the NPort 5200.

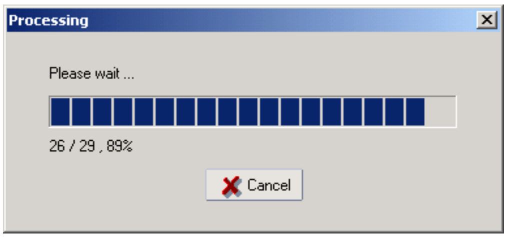
1. To start NPort Administrator, click on **Start → NPort Administration Suite → NPort Administrator**.



2. Unlock the NPort 5200 you wish to configure if it is password protected. Right click on the NPort 5200 and select **Configure** to start the configuration.



3. The progress bar shows that Administrator is retrieving configuration information from the specific NPort 5200.



4. Refer to Chapter 5 for each parameter's function definition. To modify the configuration, you must first click in the modify box to activate the parameter setting box. For example, click on the middle modify box.