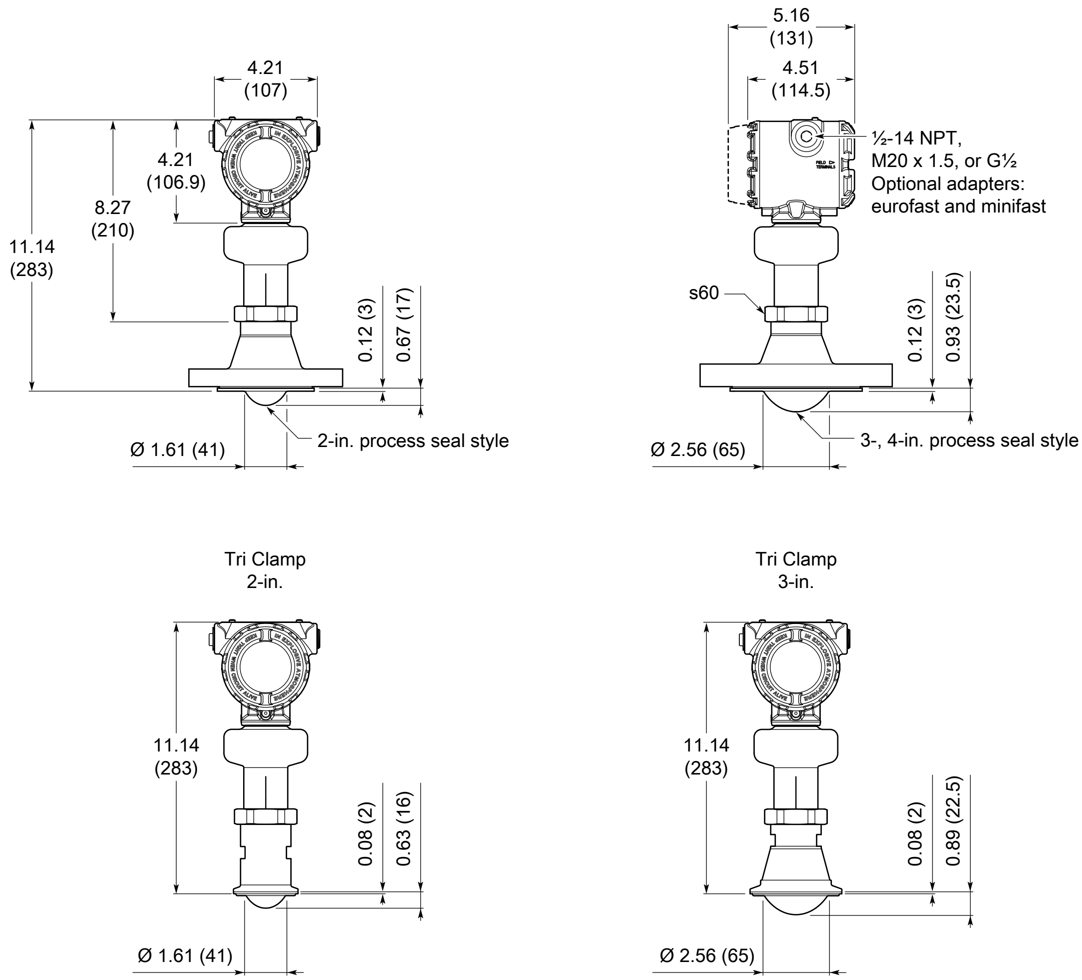
Table A-19: Cone Antenna Dimensions

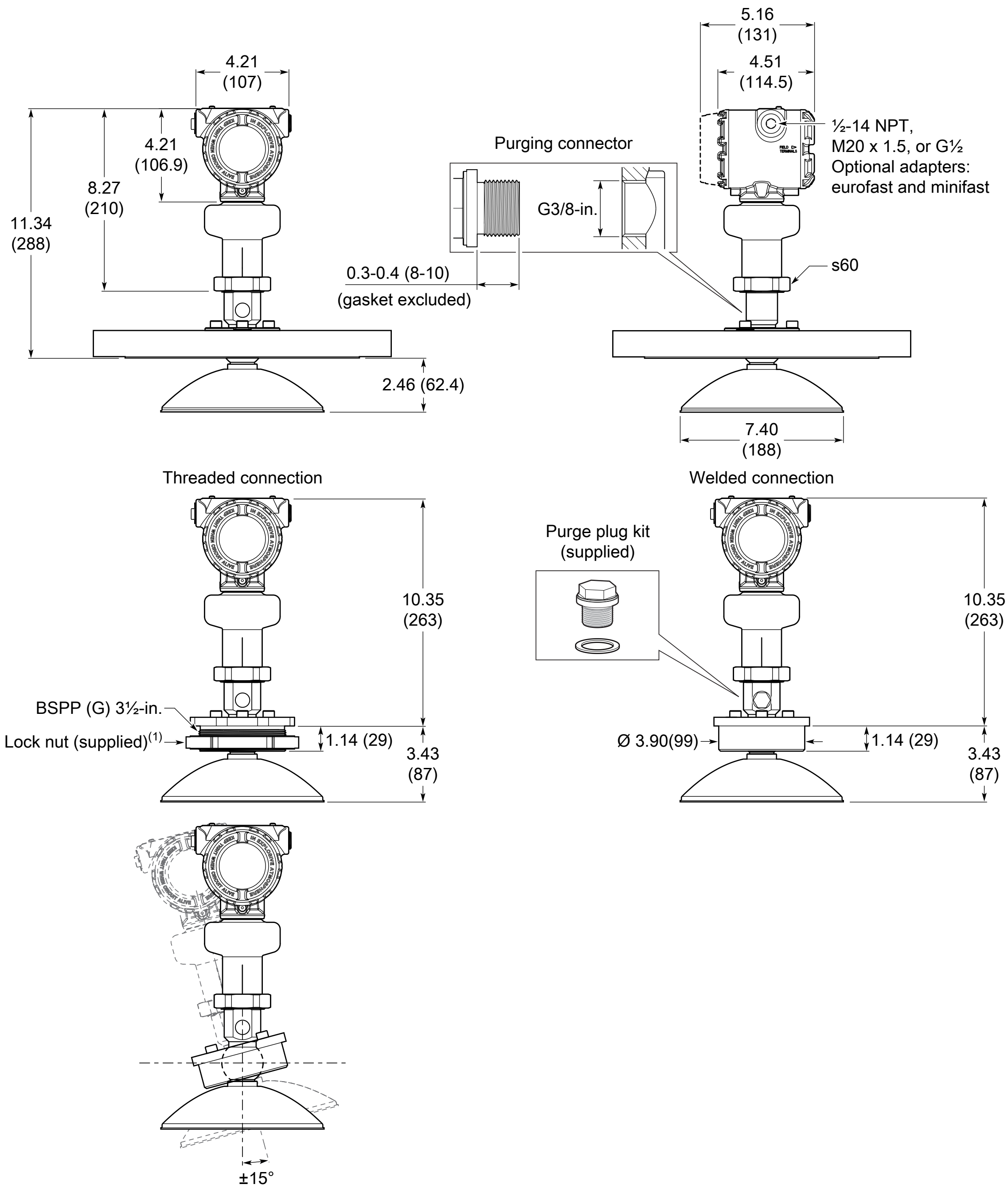
Cone size	A	B	L
2-in. (DN50)	6.10 in. (155 mm)	1.85 in. (47 mm)	5.39 in. (137 mm)
3-in. (DN80)	6.02 in. (153 mm)	2.64 in. (67 mm)	6.77 in. (172 mm)
4-in. (DN100)	6.93 in. (176 mm)	3.62 in. (92 mm)	7.80 in. (198 mm)

Figure A-12: Process Seal Antenna



Dimensions are in inches (millimeters).

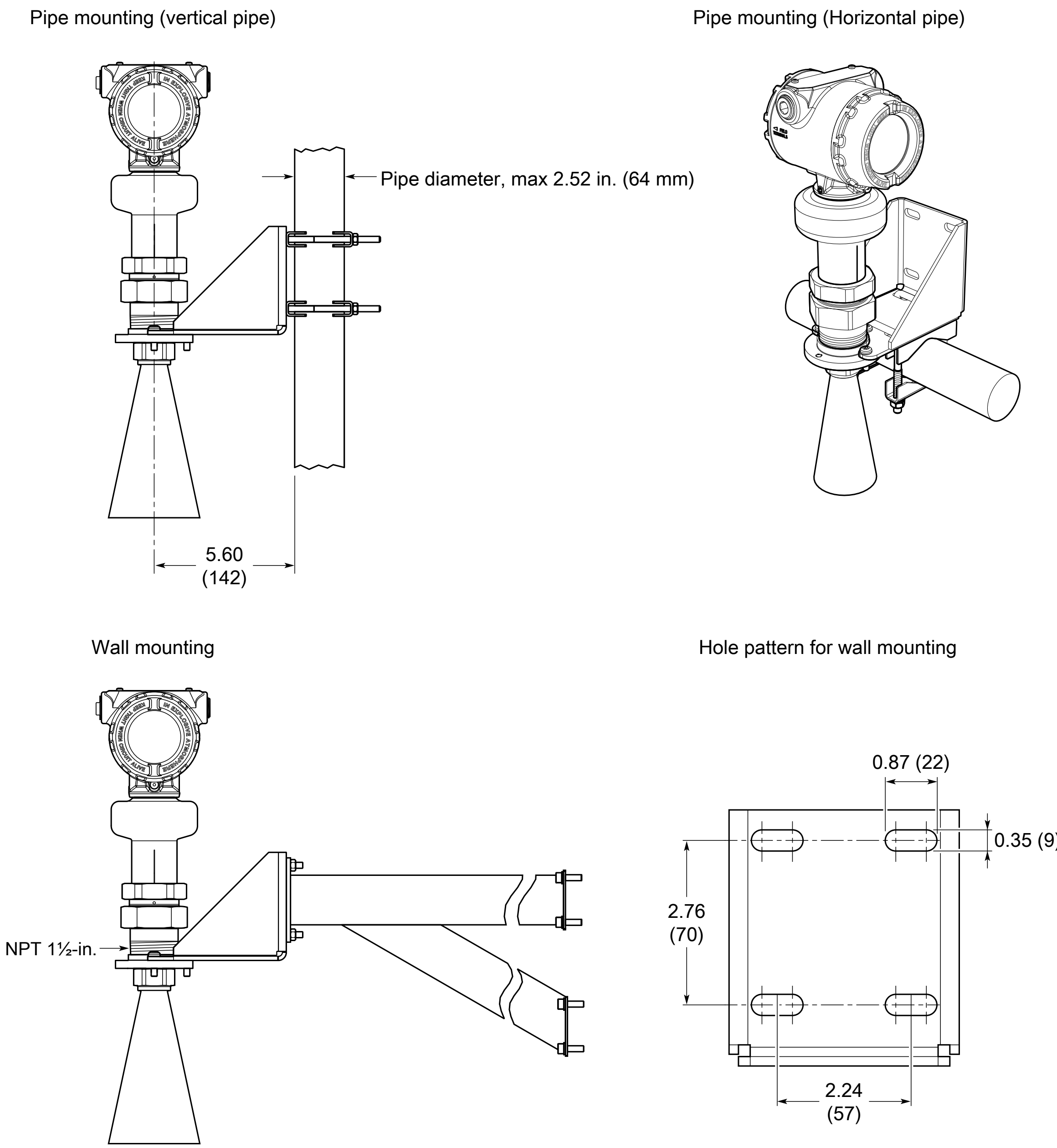
Figure A-13: Parabolic Antenna



1. Maximum flange thickness (with lock nut): 0.59 in. (15 mm)

Dimensions are in inches (millimeters).

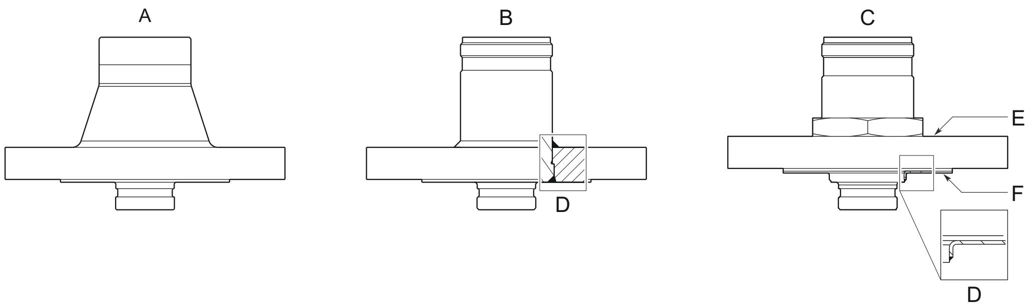
Figure A-14: Bracket Mounting (Process Connection Type Code B)



Dimensions are in inches (millimeters).

A.7.1 Standard flanges

Figure A-15: Cone Antenna Flange Connection



A. Forged one-piece
B. Welded construction
C. Protective plate design
D. Weld
E. Backing flange
F. Protective plate

Table A-20: Standard Flanges for Cone Antenna

Standard	Face type (1)	Face surface finish, R_a	Material
ASME B16.5	Raised face	125-250 µin	316/316L SST
EN 1092-1	Type B1 raised face	3.2-12.5 µm	EN 1.4404
	Type A flat face	3.2-12.5 µm	EN 1.4404
JIS B2220	Raised face	3.2-6.3 µm	EN 1.4404

(1) Face gasket surface is serrated per mating standard.

Table A-21: Cone Antennas with Protective Plate

Standard	Face type including protective plate	Plate surface finish, R_a	Material
ASME B16.5	Raised face	3.2-6.3 µm	316/316L SST
EN 1092-1	Raised face	3.2-6.3 µm	EN 1.4404
JIS B2220	Raised face	3.2-6.3 µm	EN 1.4404

Figure A-16: Parabolic Antenna Flange Connection

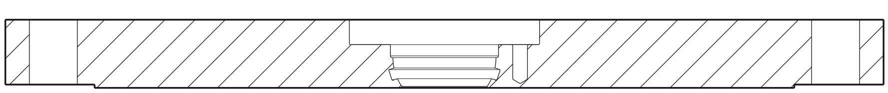


Table A-22: Standard Flanges for Parabolic Antenna

Standard	Face type (1)	Face surface finish	Material
ASME B16.5	Raised face	125-250 µin	316/316L SST
EN 1092-1	Type A flat face	3.2-12.5 µm	EN 1.4404
JIS B2220	Raised face	3.2-12.5 µm	EN 1.4404

(1) Face gasket surface is serrated per mating standard.

Appendix B
Product Certifications

Rev 2.3

B.1 European directive information

A copy of the EU Declaration of Conformity can be found at the end of the Rosemount™ 5408 and 5408:SIS *Product Certifications* document. The most recent revision of the EU Declaration of Conformity can be found at *Emerson.com/Rosemount*.

B.2 Safety Instrumented Systems (SIS)

SIL 3 Capable: IEC 61508 certified for use in safety instrumented systems up to SIL 3 (Minimum requirement of single use (1oo1) for SIL 2 and redundant use (1oo2) for SIL 3).

B.3 Telecommunication compliance

Measurement principle

Frequency Modulated Continuous Wave (FMCW), 26 GHz

Maximum output power

-5 dBm (0.32 mW)

Frequency range

24.05 to 27.0(1) GHz (TLPR)

24.05 to 26.5 GHz (LPR)

LPR (Level Probing Radar) equipment are devices for measurement of level in the open air or in a closed space. Model option "OA". Hardware Version Identification Number (HVIN) is 5408L.

TLPR (Tank Level Probing Radar) equipment are devices for measurement of level in a closed space only (i.e metallic, concrete or reinforced fiberglass tanks, or similar enclosure structures made of comparable attenuating material). Hardware Version Identification Number (HVIN) is 5408T.

(1) 26.5 GHz in Australia and New Zealand.

B.4 FCC

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC ID:	K8C5408L (for LPR) K8C5408T (for TLPR)

B.5 IC

This device complies with Industry Canada's licence-exempt RSS standard. Operation is subject to the following conditions:

1. This device may not cause interference.
2. This device must accept any interference received, including interference that may cause undesired operation.
3. The installation of the LPR/TLPR device shall be done by trained installers in strict compliance with the manufacturer's instructions.
4. The use of this device is on a "no-interference, no-protection" basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, devices found to interfere with primary licensing operations will be required to be removed at the user's expense.
5. Devices operating under TLPR conditions (i.e. not operating in "Open Air" Mode) shall be installed and operated in a completely enclosed container to prevent RF emissions, which can otherwise interfere with aeronautical navigation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.

2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
3. L'installation d'un dispositif LPR ou TLPR doit être effectuée par des installateurs qualifiés, en pleine conformité avec les instructions du fabricant.
4. Ce dispositif ne peut être exploité qu'en régime de non-brouillage et de non-protection, c'est-à-dire que l'utilisateur doit accepter que des radars de haute puissance de la même bande de fréquences puissent brouiller ce dispositif ou même l'endommager. D'autre part, les capteurs de niveau qui perturbent une exploitation autorisée par licence de fonctionnement principal doivent être enlevés aux frais de leur utilisateur.
5. Un dispositif visé comme TLPR ("Open Air") doit être installé et exploité dans un réservoir entièrement fermé afin de prévenir les rayonnements RF qui pourraient autrement perturber la navigation aéronautique.

Certificate:	2827A-5408L (for LPR)
	2827A-5408T (for TLPR)

B.6 Radio Equipment Directive (RED) 2014/53/EU

This device complies with ETSI EN 302 372 (TLPR), ETSI EN 302 729 (LPR) and EN 62479.

For the receiver test that covers the influence of an interferer signal to the device, the performance criterion has at least the following level of performance according to ETSI TS 103 361 [6].

- Performance criterion: measurement value variation Δd over time during a distance measurement
- Level of performance: Δd ≤ ±2 mm

LPR (Level Probing Radar), model code "OA"

Install at a separation distance of >4 km from Radio Astronomy sites, unless a special authorization has been provided by the responsible National regulatory authority (a list of Radio Astronomy sites may be found at *www.craf.eu*).

Between 4 km to 40 km around any Radio Astronomy site the LPR antenna height shall not exceed 15 m height above ground.

TLPR (Tank Level Probing Radar)

The device must be installed in closed tanks. Install according to requirements in ETSI EN 302 372 (Annex E).

B.7 Installing equipment in North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

B.8 U.S.A.

B.8.1 E5 Explosionproof (XP), Dust-Ignitionproof (DIP)

Certificate: FM-US FM16US0010X

Standards: FM Class 3600 – 2011; FM Class 3615 – 2006; FM Class 3810 – 2005; ANSI/ISA 60079-0 – 2013; ANSI/UL 60079-1 – 2015; ANSI/ISA 60079-26 – 2011; ANSI/ISA 60079-31 – 2015; ANSI/NEMA® 250 – 1991; ANSI/IEC 60529 – 2004, ANSI/ISA 12.27.01:2011

Markings: XP CL I, DIV 1, GRPS A, B, C, D T6…T2
DIP CLII/III, DIV 1, GRPS E, F, G; T6…T3
CL I Zone 0/1 AEx db IIC T6…T2 Ga/Gb
Zone 21 AEx tb IIIC T85 °C…T250 °C Db
(-40°C ≤ Ta ≤ +70°C) (2); Type 4X/IP6X
SINGLE SEAL

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP6X and/or Type 4X rating. To maintain the ingress protection ratings. Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
6. Install per Control drawing D7000002-885.

(2) Other temperature ranges may apply, see Specific Conditions of Use (X).

7. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
8. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
9. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Table B-1: For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	-40°C ≤ Ta ≤ 70°C	-40°C to 250°C
T3	-40°C ≤ Ta ≤ 70°C	-40°C to 195°C
T4	-40°C ≤ Ta ≤ 70°C	-40°C to 130°C
T5	-40°C ≤ Ta ≤ 70°C	-40°C to 95°C
T6	-40°C ≤ Ta ≤ 70°C	-40°C to 80°C
Division Dust groups:		
T3	-50°C ≤ Ta ≤ 70°C	-50°C to 160°C
T4	-50°C ≤ Ta ≤ 70°C	-50°C to 130°C
T5	-50°C ≤ Ta ≤ 70°C	-50°C to 95°C
T6	-50°C ≤ Ta ≤ 70°C	-50°C to 80°C

Table B-2: For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	-50°C ≤ Ta ≤ 70°C	-50°C to 250°C
T3	-50°C ≤ Ta ≤ 70°C	-50°C to 195°C
T4	-50°C ≤ Ta ≤ 70°C	-50°C to 130°C
T5	-50°C ≤ Ta ≤ 70°C	-50°C to 95°C
T6	-50°C ≤ Ta ≤ 70°C	-50°C to 80°C
Zone Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.8.2 I5 Intrinsic Safety (IS), Non-Incendive (NI)

Certificate: FM-US FM16US0010X

Standards: FM Class 3600 – 2011; FM Class 3610 – 2015; FM Class 3611 – 2016; FM Class 3810 – 2005; ANSI/ISA 60079-0 – 2013; ANSI/ISA 60079-11 – 2013; ANSI/ISA 60079-26 – 2011; ANSI/NEMA 250 – 1991; ANSI/IEC 60529 – 2004; ANSI/ISA 12.27.01:2011

Markings: IS CL I, II, III DIV 1, GRPS A-G T4...T2
NI CL I, DIV 2, GRPS A-D T4...T2
S CL II, III DIV 2, GRPS E-G T4...T3
CL I Zone 0 AEx ia IIC T4...T2 Ga
CL I Zone 0/1 AEx ib IIC T4...T2 Ga/Gb
Zone 20 AEx ia IIIC T85°C...T250°C Da
(-60°C ≤ Ta ≤ +70°C)
When installed per Control Drawing D7000002-885
SINGLE SEAL

Safety parameter	HART®
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.

6. The applicable temperature class, ambient temperature range and process temperature range if the equipment is as follows;

Table B-3: For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Division Dust groups:		
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 160°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T5	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T6	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

Table B-4: For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Zone Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.9 Canada

B.9.1 E6 Explosionproof, Dust-Ignitionproof

Certificate: FM-C FM16CA0011X

Standards: C22.2 NO. 0.4-04:2004 (R2013), C22.2 NO. 0.5-16:2016, C22.2 No. 25-1966:1966 (R:2014), C22.2 No.30-M1986:1986 (R:2012), C22.2 No.94-M91:1991 (R:2011), C22.2 No. 1010.1:2004, CAN/CSA C22.2 No. 60079-0:2015 Ed. 3, C22.2 No. 60079-1:2016 Ed. 3, C22.2 No. 60079-26:2016; CAN/CSA-C22.2 No. 60079-31:2015, C22.2. 60529:2005 (R:2015), ANSI/ISA 12.27.01:2011

Markings: XP CL I, DIV 1, GRPS A-D T6...T2
DIP CLII/III, DIV 1, GRPS E-G; T6...T3
Ex db IIC T6...T3 Gb
Ex tb IIIC T85 °C...T250°C Db
(-40°C ≤ Ta ≤ +70°C) (3); Type 4X/IP6X
SINGLE SEAL

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. Metric Field Wiring Entries are not allowed for Divisions.
5. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
6. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP6X and/or Type 4X rating. To maintain the ingress protection ratings. Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
7. Install per Control Drawing D7000002-885.
8. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
9. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
10. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

(3) Other temperature ranges may apply, see Specific Conditions of Use (X).

Table B-5: For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	-40°C ≤ Ta ≤ 70°C	-40°C to 250°C
T3	-40°C ≤ Ta ≤ 70°C	-40°C to 195°C
T4	-40°C ≤ Ta ≤ 70°C	-40°C to 130°C
T5	-40°C ≤ Ta ≤ 70°C	-40°C to 95°C
T6	-40°C ≤ Ta ≤ 70°C	-40°C to 80°C
Division Dust groups:		
T3	-50°C ≤ Ta ≤ 70°C	-50°C to 160°C
T4	-50°C ≤ Ta ≤ 70°C	-50°C to 130°C
T5	-50°C ≤ Ta ≤ 70°C	-50°C to 95°C
T6	-50°C ≤ Ta ≤ 70°C	-50°C to 80°C

Table B-6: For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	-50°C ≤ Ta ≤ 70°C	-50°C to 250°C
T3	-50°C ≤ Ta ≤ 70°C	-50°C to 195°C
T4	-50°C ≤ Ta ≤ 70°C	-50°C to 130°C
T5	-50°C ≤ Ta ≤ 70°C	-50°C to 95°C
T6	-50°C ≤ Ta ≤ 70°C	-50°C to 80°C
Zone Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.9.2 I6 Intrinsically Safe and Non-Incendive Systems

Certificate: FM-C FM16CA0011X

Standards: C22.2 NO. 0.4-04:2004 (R2013), C22.2 NO. 0.5-16:2016, C22.2 No. 25-1966:1966 (R:2014), C22.2 No.94-M91:1991 (R:2011), C22.2 No. 213-16:2016, C22.2 No. 1010.1:2004, CAN/CSA C22.2 No. 60079-0:2015

Ed. 3, CAN/CSAC22.2 No. 60079-11:2014 Ed. 2, CAN/CSAC22.2 No. 60079-15:2015 Ed.2, C22.2 No. 60079-26:2016, C22.2. 60529:2005 (R: 2015); ANSI/ISA 12.27.01:2011

Markings: IS CL I, II, III DIV 1, GRPS A-G T4...T2
NI CL I, DIV 2, GRPS A-D T4...T2
S CL II, III DIV 2, GRPS E-G T4...T3
Ex ia IIC T4...T2 Ga
Ex ib IIC T4...T2 Ga/Gb
Ex ia IIIC T85°C...T250°C Da
(-60°C ≤ Ta ≤ +70°C)
When installed per Control Drawing D7000002-885
SINGLE SEAL

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Table B-7: For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Division Dust groups:		
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 160°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T5	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T6	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

Table B-8: For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Zone Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.10 Europe

B.10.1 E1 ATEX Flameproof

Certificate: FM15ATEX0055X

Standards: EN 60079-0:2012, EN 60079-1:2014, EN 60079-26:2015, EN 60079-31:2014, EN 60529+A1+A2:2013

Markings: Ⓔx II 1/2G Ex db IIC T6…T2 Ga/Gb
II 2D Ex tb IIIC T85°C… T250°C Db, IP6X
(-60°C ≤ Ta ≤ +70 °C)

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Category 1 and Category 2 location. In this configuration, the process connection is installed in Category 1, while the transmitter housing is installed in Category 2. Refer to Control Drawing D7000002-885.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP6X. To maintain the ingress protection ratings. Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
6. Install per Control Drawing D7000002-885.
7. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
8. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
9. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas & Dust groups:		
T2 / T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3 / T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4 / T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T5 / T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T6 / T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.10.2 I1 ATEX Intrinsic Safety

Certificate: FM15ATEX0055X

Standards: EN 60079-0:2012, EN 60079-11:2012, EN 60079-26:2015

Markings: Ⓔx II 1G Ex ia IIC T4…T2 Ga
II 1/2G Ex ib IIC T4…T2 Ga/Gb
II 1D Ex ia IIIC T85°C…T250°C Da

(-60°C ≤ Ta ≤ +70°C)

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Category 1 and Category 2 location. In this configuration, the process connection is installed in Category 1, while the transmitter housing is installed in Category 2. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.10.3 N1 ATEX Type N: Non-Sparking

Certificate: FM15ATEX0056X

Standards: EN 60079-0:2012, EN 60079-15:2010

Markings: ⟨Ex⟩II 3G Ex nA IIC T4...T2 Gc, IP65
(-34°C ≤ Ta ≤ +70°C)
V ≤ 42.4V, I ≤ 23 mA

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic part of Process Seal Antenna may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
4. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class	Ambient temperature range	Process temperature range
T2	-34°C ≤ Ta ≤ 70°C	-34°C to 250°C
T3	-34°C ≤ Ta ≤ 70°C	-34°C to 195°C
T4	-34°C ≤ Ta ≤ 70°C	-34°C to 130°C

B.11 International

B.11.1 E7 IECEx Flameproof

Certificate: IECEx FMG15.0033X

Standards: IEC 60079-0:2011, IEC 60079-1:2014; IEC 60079-26:2014, IEC 60079-31:2013

Markings Ex db IIC T6...T2 Ga/Gb

Ex tb IIIC T85 °C...T250°C Db IP6X
(-60°C ≤ Ta ≤ +70 °C)

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between EPL Ga and EPL Gb. In this configuration, the process connection is EPL Ga, while the transmitter housing is EPL Gb. Refer to Control Drawing D7000002-885.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP6X. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
6. Install per Control Drawing D7000002-885.
7. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
8. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
9. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas & Dust groups:		
T2 / T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3 / T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4 / T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T5 / T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T6 / T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.11.2 I7 IECEx Intrinsic Safety

Certificate: IECEx FMG15.0033X

Standards: IEC 60079-0:2011, IEC 60079-11:2011, IEC 60079-26:2014

Markings: Ex ia IIC T4...T2 Ga

Ex ib IIC T4…T2 Ga/Gb
Ex ia IIIC T85°C…T250°C Da
(-60°C ≤ Ta ≤ +70°C)

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic wire-on tag, Plastic part of Process Seal Antenna and Non-standard paint options (paint options other than Rosemount Blue) may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between EPL Ga and EPL Gb. In this configuration, the process connection is EPL Ga, while the transmitter housing is EPL Gb. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

B.11.3 N7 IECEx Type N: Non-Sparking

Certificate: IECEx FMG15.0033X

Standards: IEC 60079-0:2011, IEC 60079-15:2010

Markings: Ex nA IIC T4...T2 Gc
(-34°C ≤ Ta ≤ +70°C), IP65
V≤42.4V, I≤23 mA

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Plastic part of Process Seal Antenna may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
4. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
T2	-34°C ≤ Ta ≤ 70°C	-34°C to 250°C
T3	-34°C ≤ Ta ≤ 70°C	-34°C to 195°C
T4	-34°C ≤ Ta ≤ 70°C	-34°C to 130°C

B.12 Brazil

B.12.1 E2 INMETRO Flameproof

Certificate: UL-BR 17.0344X

Standards: ABNT NBR IEC 60079-0:2013, ABNT NBR IEC 60079-1:2016, ABNT NBR IEC 60079-26:2016, ABNT NBR IEC 60079-31:2014

Markings: Ex db IIC T6...T2 Ga/Gb
Ex tb III C T85°C...T250°C Db
Tamb = -60° to +70°C; IP6X

Specific Conditions of Use (X):

1. See certificate.

B.12.2 I2 INMETRO Intrinsic Safety

Certificate: UL-BR 17.0344X

Standards: ABNT NBR IEC 60079-0:2013, ABNT NBR IEC 60079-11:2013, ABNT NBR IEC 60079-26:2016, ABNT NBR IEC 60079-31:2014

Markings: Ex ia IIC T4...T2 Ga
Ex ib IIC T4...T2 Ga/Gb
Ex ia IIIC T85°C...T250°C Da
Tamb = -60° to +70°C

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. See certificate.

B.12.3 N2 INMETRO Type N: Non-Sparking

Certificate: UL-BR 17.0344X

Standards: ABNT NBR IEC 60079-0:2013, ABNT NBR IEC 60079-15:2012

Markings: Ex nA IIC T4...T2 Gc
Tamb = -34° to +70°C; IP65
V≤42.4V, I≤23 mA

Specific Conditions of Use (X):

1. See certificate.

B.13 China

B.13.1 E3 Flameproof

Certificate: NEPSI GYJ17.1226X
Standards: GB3836.1/2/4/20-2010, GB12476.1/5-2013
Markings: Ex d IIC T6~T2 Ga/Gb
Ex tD A21 IP6X T85°C~250°C
Tamb = -60° to +70°C; IP6X

Specific Conditions of Use (X):

1. See certificate.

B.13.2 I3 Intrinsic Safety

Certificate: NEPSI GYJ17.1226X
Standards: GB3836.1/2/4/20-2010, GB12476.1/5-2013, GB12476.4-2010
Markings: Ex ia IIC T4~T2 Ga
Ex ib IIC T4~T2 Ga/Gb
Ex iaD 20 T85~250 Da
Tamb = -60° to +70°C

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. See certificate.

B.13.3 N3 Type N: Non-Sparking

Certificate: NEPSI GYJ17.1226X
Standards: GB3836.1-2010, GB3836.8-2014
Markings: Ex nA IIC T4~T2 Gc
Tamb = -34° to +70°C; IP65
V≤42.4V, I≤23 mA

Specific Conditions of Use (X):

1. See certificate.

B.14 India

B.14.1 Intrinsic Safety

Certificate:	PESO P403812
Markings:	Ex ia IIC T4...T2 Ga

B.14.2 Flameproof Safety

Certificate:	PESO P403810
Markings:	Ex db IIC T6...T2 Ga/Gb

B.14.3 Intrinsic Safety and Flameproof

Certificate:	PESO P402545
Markings:	Ex ia IIC T4...T2 Ga/Gb Ex db IIC T6...T2 Ga/Gb

B.15 Republic of Korea

B.15.1 IP Intrinsic Safety

Certificate:	KTL 17-KA4BO-0448X
Markings:	Ex ia IIC T4...T2 Ga Tamb = -60° to +70°C

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. See certificate.

B.16 Additional certifications

B.16.1 QT Safety-certified to IEC 61508:2010 with certificate of FMEDA data

Certificate: exida ROS 15-01-149 C001 R1.0

B.16.2 Suitable for intended use

Compliant with NAMUR NE 95:2013, “Basic Principles of Homologation”.

B.16.3 U1 Overfill prevention

Certificate: Z-65.16-575

Application: TÜV tested and approved by DIBt for overfill prevention according to the German WHG regulations.

B.16.4 QA 3-A

Certificate Authorization Number: 3626

The following options are conforming to the 3-A Sanitary Standards, Number 74-06 (Sensors and Sensor Fittings and Connections):

Process connection type:	C (Tri-Clamp)
Process connection size:	2, 3
Antenna type:	SAA (Process Seal antenna)
Antenna size:	2, 3

The certification of the transmitter relies upon the following materials used in its construction:

Table B-9: Product Contact Surfaces

Item	Material
Microwave launcher	PTFE fluoropolymer

Table B-10: Nonproduct Contact Surfaces

Item	Material
Metal housing	Stainless steel 300 series or aluminium 360, painted with epoxy-polyester or polyurethane
Fasteners and plugs	Stainless steel 300 series
Seals	Nitrile rubber NBR, Ethylene propylene peroxide and FKM fluoroelastomer
Labels	Stainless steel 300 series, metallized polyester, polyester/polycarbonate

It is the responsibility of the user to ensure:

1. The materials listed in *Table B-9* and *Table B-10* are suitable for the media and cleaning/sanitizing processes.
2. The installation of the transmitter is drainable and cleanable.
3. That the joint/clamping between the transmitter and the nozzle is compatible with the tank pressure and media.
4. That for the application suitable cable entry devices are used and with appropriate ingress protection.
5. That any unused cable entries are sealed with suitable plugs to maintain the ingress protection ratings.

B.17 Installation drawings

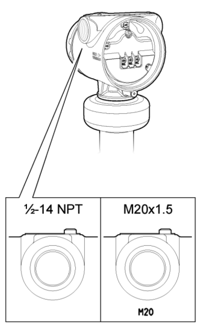
The installation guidelines presented by the System Control Drawing must be followed in order to maintain certified ratings for installed transmitters.

Figure B-1: D7000002-885 - System Control Drawing

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720

SYSTEM CONTROL DRAWING – ROSEMOUNT 5408 SERIES
GENERAL INFORMATION

1. No revision to drawing without prior FM Approval.
2. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
3. Installations in the U.S. should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the latest edition of the National Electrical Code (ANSI/NFPA 70).
4. Installation in Canada should be in accordance with the latest edition of the C22.1 Canadian Electrical Code, Part I.
5. Installations in Europe shall comply with the relevant requirements of EN 60079-14 and applicable National regulations.
6. Installations for IECEx certification shall be in accordance with latest editions of the wiring practices for the country of origin.
7. The EPL Ga partition wall is made of stainless steel and a welded fused glass/ stainless steel lens.
8. The EPL Ga/Gb separation is invalidated if the transmitter is removed from the antenna connection i.e. there is a risk of flammable gas release and flame entrance. Disconnect power before removing the transmitter.
9. Thread size either ½-14 NPT or M20x1.5. Identification of thread size and type (No marking = ½-14 NPT).



CONDUIT THREAD, BOTH SIDES
(see note 9)

10. Additional installation requirements are found in the Quick Start Guide (doc no 00825-0100-4408/ 00825-0300-4408/00825-0500-4408) and the Product Certification Document (doc no 00825-0200-4408).
11. See table below for applicable P/T rating for different antenna types.

Antenna Type	Operating Temperature and Pressure
Cone Antenna (PTFE seal, CAA)	-15 … 363 psig (-1 ... 25 bar) -76… 392 °F (-60 … 200 °C)
Cone Antenna (PTFE seal, CAB)	-15 … 725 psig (-1 ... 50 bar) -40… 302 °F (-40 … 150 °C)
Cone Antenna (PTFE seal, CAC)	-15 … 1450 psig (-1 ... 100 bar) -40… 212 °F (-40 … 100 °C)
Cone Antenna (PTFE seal, CAD)	-15 … 44 psig (-1 ... 3 bar) -76… 482 °F (-60 … 250 °C)
Cone Antenna (PEEK seal, FVMQ, CBF)	-15 … 754 psig (-1 ... 52 bar) -76… 338 °F (-60 … 170 °C)
Cone Antenna (PEEK seal, Kalrez, CBK)	-15 … 754 psig (-1 ... 52 bar) 5… 482 °F (-15 … 250 °C)
Cone Antenna (PEEK seal, Viton, CBV)	-15 … 754 psig (-1 ... 52 bar) -22… 392 °F (-30 … 200 °C)
Cone Antenna (PEEK seal, FKM, CBM)	-15 … 754 psig (-1 ... 52 bar) -13… 428 °F (-25 … 220 °C)
Parabolic Antenna (Swivel Mount, PAS)	-7…43 psig (-0.5 ... 3 bar) -67… 392 °F (-55 … 200 °C)
Process Seal Antenna (SAA)	-7 … 363 psig (-0.5 ... 25 bar) -76 … 392 °F (-60 … 200 °C) Note: Rating for Tri-clamp connection: -7 … 232 psig (-0.5 ... 16 bar) -13 … 392 °F (-25 … 200 °C)

12. The bottom of the transmitter is approved as a SINGLE SEAL device according to ANSI/ISA 12.27.01 up to a maximum process pressure of 100 bar and a process temperature range of -76 ... 482 °F (-60 ... 250 °C). Actual process limits depends on antenna type and seal, see table above. Materials of the sealing wall are according to Note 7.

WARNING – Substitution of components may impair Intrinsic Safety.
WARNING – Potential electrostatic charging hazard, wipe with a damp cloth.
WARNING – To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
AVERTISSEMENT – La substitution de composants peut compromettre la sécurité intrinsèque.
AVERTISSEMENT – Risque potentiel de charge éLectrostatique, essuyer avec un chiffon humide.
AVERTISSEMENT – Ne pas ouvrir en cas de presence d'atmosphere explosive.

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

D7000002-885

EMERSON. Process Management

ROSEMOUNT®
Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (General Information)

APPROVED BY	WEEK	DOC. TYPE	SIZE	DRAWING NO.	ISSUE
EAp	1525	6	A3	D7000002-885	3

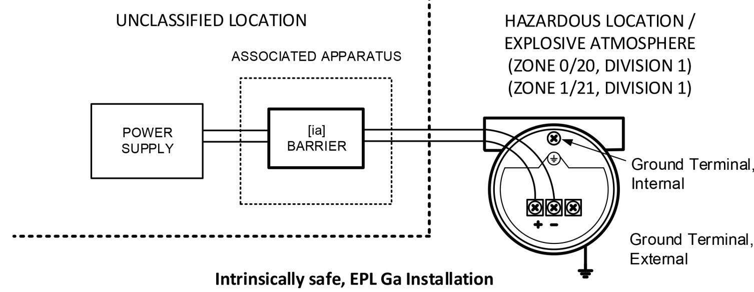
SHEET 1 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720

ENTITY CONCEPT APPROVALS

The Entity concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in combination as a system. The approved values of max. open circuit voltage (Uo, Voc or Vt) and max. short circuit current (Io, Isc or It) and max. power (Po or Voc x Isc / 4 or Vt x It / 4), for the associated apparatus must be less than or equal to the maximum safe input voltage (Ui), maximum safe input current (Ii), and maximum safe input power (Pi) of the intrinsically safe apparatus. In addition, the approved max. allowable connected capacitance (Ca or Co) of the associated apparatus must be greater than the sum of the interconnecting cable capacitance and the unprotected internal capacitance (Ci) of the intrinsically safe apparatus, and the approved max. Allowable connected inductance (La or Lo) of the associated apparatus must be greater than the sum of the interconnecting cable inductance and the unprotected internal inductance (Li) of the intrinsically safe apparatus.



Intrinsically safe, EPL Ga Installation

	Safe Apparatus for use in:	Ambient Temperature Limits
FM_{US}	IS Class I, II, III, DIV 1, GP A-G T4…T2 CL I, Zone 0 AEx ia IIC T4…T2 Ga/Gb Zone 20 AEx ia IIIC T85°C…T250°C Da	-60°C≤Ta≤+70°C
FMc	IS Class I, II, III, DIV 1, GP A-G T4…T2 Ex ia IIC T4…T2 Ga Ex ia IIIC T85°C…T250°C Da	-60°C≤Ta≤+70°C
ATEX	II 1G Ex ia IIC T4..T2 Ga II 1D Ex ia IIIC T85°C...T250°C Da	-60°C≤Ta≤+70°C
IECEx	Ex ia IIC T4..T2 Ga Ex ia IIIC T85°C...T250°C Da	-60°C≤Ta≤+70°C

Model	Intrinsic Entity Parameters
4-20mA / HART	Ui ≤ 30V, Ii ≤ 133 mA Pi ≤1W, Ci = 7.3 nF, Li = 0 uH

Notes

1. No revision to drawing without prior FM Approval.
2. The Associated Apparatus must be FM Approved for installations in the U.S.
3. The Associated Apparatus must be Canadian Approved for Installations in Canada.
4. The Associated Apparatus must be ATEX Certified for Installations in Europe.
5. The Associated Apparatus must be IECEx Certified for IECEx installations.
6. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
7. Installations in the U.S. should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the latest edition of the National Electrical Code (ANSI/NFPA 70).
8. Resistance between Intrinsically Safe Ground and earth ground must be less than 1.0 Ohm.
9. Installation in Canada should be in accordance with the latest edition of the C22.1 Canadian Electrical Code, Part I.
10. Installations in Europe shall comply with the relevant requirements of EN 60079-14 and applicable National regulations.
11. Installations for IECEx certification shall be in accordance with latest editions of the wiring practices for the country of origin.
12. The Entity Concept allows interconnection of associated apparatus and intrinsically safe apparatus with when the following is true:
    $U_o \le U_i$, $I_o \le I_i$, $P_o \le P_i$, $C_o \le C_i + C_{cable}$; $L_o \le L_i + L_{cable}$.

WARNING – Substitution of components may impair Intrinsic Safety.
WARNING – Potential electrostatic charging hazard, wipe with a damp cloth.
WARNING – To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
AVERTISSEMENT – La substitution de composants peut compromettre la sécurité intrinsèque.
AVERTISSEMENT – Risque potentiel de charge éLectrostatique, essuyer avec un chiffon humide.
AVERTISSEMENT – Ne pas ouvrir en cas de presence d'atmosphere explosive.

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

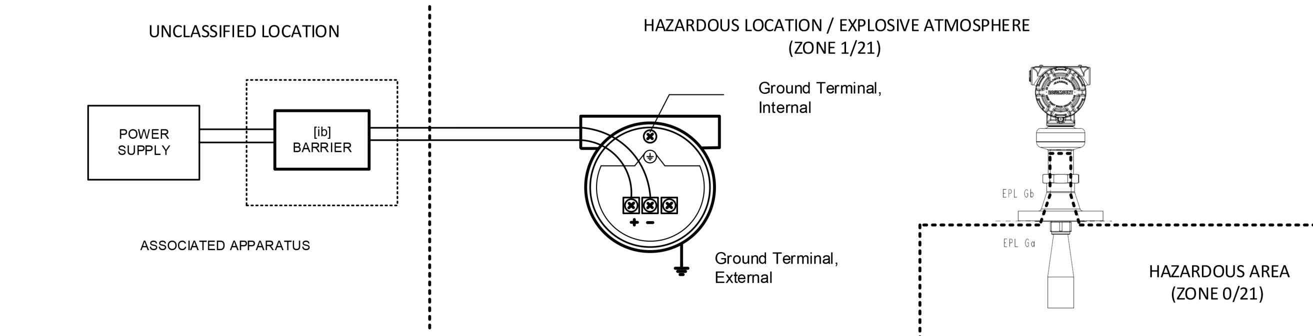
D7000002-885

EMERSON. Process Management — ROSEMOUNT
Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (Intrinsically safe, EPL Ga installation)
APPROVED BY	WEEK	DOC. TYPE	SIZE: A3 — DRAWING NO.: D7000002-885 — ISSUE: 3
EAp	1525	6	SHEET 2 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720



Notes

1. No revision to drawing without prior FM Approval.
2. The Associated Apparatus must be FM Approved for installations in the U.S.
3. The Associated Apparatus must be Canadian Approved for Installations in Canada.
4. The Associated Apparatus must be ATEX Certified for Installations in Europe.
5. The Associated Apparatus must be IECEx Certified for IECEx installations.
6. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
7. Installations in the U.S. should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the latest edition of the National Electrical Code (ANSI/NFPA 70).
8. Resistance between Intrinsically Safe Ground and earth ground must be less than 1.0 Ohm.
9. Installation in Canada should be in accordance with the latest edition of the C22.1 Canadian Electrical Code, Part I.
10. Installations in Europe shall comply with the relevant requirements of EN 60079-14 and applicable National regulations.
11. Installations for IECEx certification shall be in accordance with latest editions of the wiring practices for the country of origin.
12. The Entity Concept allows interconnection of associated apparatus and intrinsically safe apparatus with when the following is true: $U_o \le U_i$, $I_o \le I_i$, $P_o \le P_i$, $C_o \le C_i + C_{cable}$; $L_o \le L_i + L_{cable}$.
13. Listed intrinsic safety parameters apply only to associated apparatus with linear output.

Intrinsically safe, EPL Gb installation

	Safe Apparatus for use in:	Ambient Temperature Limits
FM$_{US}$	CL I, Zone 0/1 AEx ib IIC T4…T2 Ga/Gb	-60°C≤Ta≤+70°C
FMc	Ex ib IIC T4…T2 Ga/Gb	-60°C≤Ta≤+70°C
ATEX	II 1/2G Ex ib IIC T4…T2 Ga/Gb	-60°C≤Ta≤+70°C
IECEx	Ex ib IIC T4…T2 Ga/Gb	-60°C≤Ta≤+70°C

Model	Intrinsic Entity Parameters
4-20mA / HART	Ui ≤ 30V, Ii ≤ 133 mA Pi ≤ 1W, Ci = 7.3 nF, Li = 0 uH

WARNING – Substitution of components may impair Intrinsic Safety.
WARNING – Potential electrostatic charging hazard, wipe with a damp cloth.
WARNING – To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
AVERTISSEMENT – La substitution de composants peut compromettre la sécurité intrinsèque.
AVERTISSEMENT – Risque potentiel de charge éLectrostatique, essuyer avec un chiffon humide.
AVERTISSEMENT – Ne pas ouvrir en cas de presence d'atmosphere explosive.

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

D7000002-885

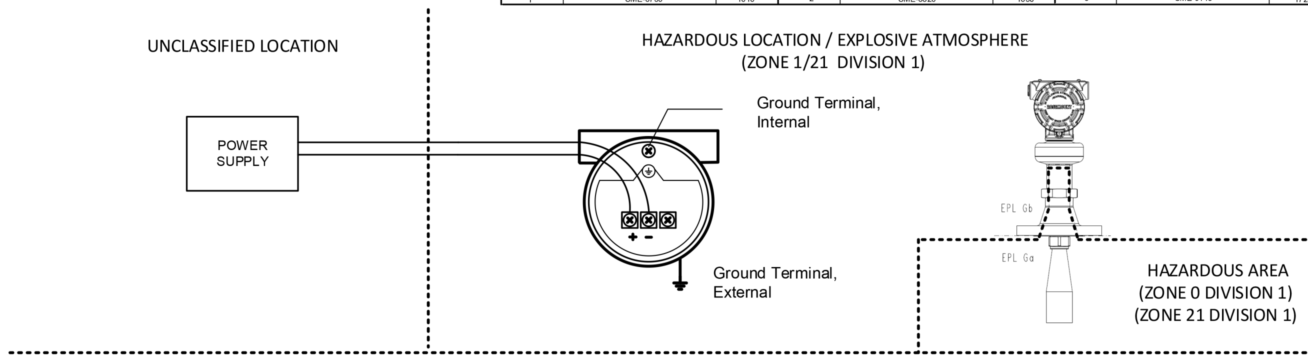
EMERSON. Process Management — ROSEMOUNT
Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (Intrinsically safe, EPL Gb installation)
APPROVED BY	WEEK	DOC. TYPE	SIZE / DRAWING NO. / ISSUE
EAp	1525	6	A3 / D7000002-885 / 3

SHEET 3 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720



Notes

1. No revision to drawing without prior FM Approval.
2. The control room equipment connected to Associated Apparatus must not generate more than 250 Vrms or Vdc.
3. Installations in the U.S. should be in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70).
4. Installation in Canada should be in accordance with the latest edition of the C22.1 Canadian Electrical Code, Part I.
5. Installations in Europe shall comply with the relevant requirements of EN 60079-14 and applicable National regulations.
6. Installations for IECEx certification shall be in accordance with latest editions of the wiring practices for the country of origin.
7. -50°C for Division Dust, -60°C for Zone Dust and -50°C for Zone Gas installations.

Flameproof/XP installation

	Safe Apparatus for use in:	Ambient Temperature Limits
FM_{US}	XP Class I, DIV 1, GP A-D T6…T2 DIP CL II, III DIV 1, GP E-G T6…T3 CL I Zone 0/1 AEx db IIC T6..T2 Ga/Gb Zone 21 AEx tb IIIC T85°C...T250°C Db	-40°C≤Ta≤+70°C (see note 7)
FMc	XP Class I, DIV 1, GP A-D T6…T2 DIP CL II, III DIV 1, GP E-G T6…T3 Ex db IIC T6..T2 Ga/Gb Ex tb IIIC T85°C...T250°C Db	-40°C≤Ta≤+70°C (see note 7)
ATEX	II 1/2G Ex db IIC T6..T2 Ga/Gb II 2D Ex tb IIIC T85°C...T250°C Db	-60°C≤Ta≤+70°C
IECEx	Ex db IIC T6..T2 Ga/Gb Ex tb IIIC T85°C...T250°C Db	-60°C≤Ta≤+70°C

Model	Normal Operating Parameters
4-20mA / HART	U ≤ 42.4V, I ≤ 23 mA

WARNING – Potential electrostatic charging hazard, wipe with a damp cloth.
WARNING – To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
WARNING – In explosive atmosphere keep tight when circuit is alive.
WARNING – Seal to be installed within 50 mm of the enclosure (applicable for Canada/Zone only).

AVERTISSEMENT – Risque potentiel de charge électrostatique, essuyer avec un chiffon humide.
AVERTISSEMENT – Ne pas ouvrir en cas de presence d'atmosphere explosive.
AVERTISSEMENT – Ouvrir le circuit avant d'enlever le couvercle.
AVERTISSEMENT – Un dispositif d'étanchéité doit être installé à 50 mm du boiter (applicable uniquement pour le Canada/Zone).

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

D7000002-885

EMERSON. Process Management — ROSEMOUNT
Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE	
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (Flameproof/XP installation)	
APPROVED BY	**WEEK**	**DOC. TYPE**	**SIZE / DRAWING NO.**	**ISSUE**
EAp	1525	6	A3 D7000002-885	3

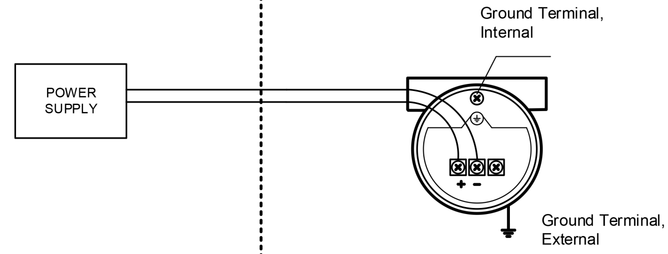
SHEET 4 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720

UNCLASSIFIED LOCATION

HAZARDOUS LOCATION / EXPLOSIVE ATMOSPHERE
(ZONE 2 DIVISION 2)



Notes

1. No revision to drawing without prior FM Approval.
2. Installations in the U.S. should be in accordance with the latest edition of the National Electrical Code (ANSI/NFPA 70).
3. Installation in Canada should be in accordance with the latest edition of the C22.1 Canadian Electrical Code, Part I.
4. Installations in Europe shall comply with the relevant requirements of EN 60079-14 and applicable National regulations.
5. Installations for IECEx certification shall be in accordance with latest editions of the wiring practices for the country of origin.

Non-incendive installation

	Safe Apparatus for use in:	**Ambient Temperature Limits**
FM_{US}	NI CL I,DIV 2, GP A-D T4…T2 S CL II, III DIV 2, GP E-G T4…T3	-60°C≤Ta≤+70°C
FMc	NI CL I,DIV 2, GP A-D T4…T2 S CL II, III DIV 2, GP E-G T4…T3	-60°C≤Ta≤+70°C
ATEX	II 3G Ex Na IIC T4…T2 Gc	-34°C≤Ta≤+70°C
IECEx	Ex Na IIC T4…T2 Gc	-34°C≤Ta≤+70°C

Model	**Normal operating parameters**
4-20mA / HART	U ≤ 42.4V, I ≤ 23 mA

WARNING – Do not separate when energized.
WARNING – Substitution of components may impair Intrinsic Safety.
WARNING – Potential electrostatic charging hazard, wipe with a damp cloth.
WARNING – To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

AVERTISSEMENT – Ne pas séparer lorsqu'il est activé.
AVERTISSEMENT – La substitution de composants peut compromettre la sécurité intrinsèque.
AVERTISSEMENT – Risque potentiel de charge éLectrostatique, essuyer avec un chiffon humide.

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

D7000002-885

EMERSON. Process Management — ROSEMOUNT
Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (Non-incendive installation)

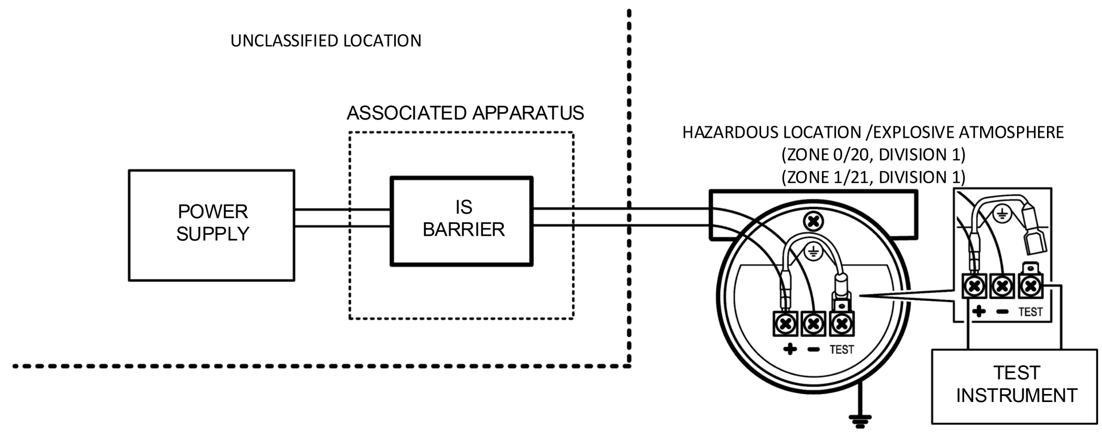
APPROVED BY	WEEK	DOC. TYPE	SIZE	DRAWING NO.	ISSUE
EAp	1525	6	A3	D7000002-885	3

SHEET 5 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK	ISSUE	CHANGE ORDER NO.	WEEK
1	SME-8739	1616	2	SME-8826	1650	3	SME-9113	1720

SYSTEM CONTROL DRAWING – ROSEMOUNT 5408 SERIES
TRANSMITTERS WITH TEST TERMINAL OPTION



In addition to instructions per Type of Protection, the following applies for the Test Terminal option:

1. In hazardeous locations/explosive atmospheres, this test can only be done for intrinsically safe installations.
2. The instrument used for loop current measurement must have correct intrinsically safe type of protection.
3. The combined entity parameters of the transmitter and the test instrument must be compatible with the output parameters of the associated apparatus.
4. The cable/plug must be re-attached to the TEST terminal after completed test.

FM APPROVED PRODUCT
No revisions to this drawing without prior Factory Mutual Approval.

D7000002-885

EMERSON. Process Management

ROSEMOUNT®

Rosemount Tank Radar AB, Layoutvägen 1, S-435 33 MÖLNLYCKE, SWEDEN

ISSUED BY	WEEK	PRODUCT CODE	TITLE
ESa-LN	1524	5408	System Control Drawing Rosemount 5408 Series (Transmitter with test terminal option)
APPROVED BY	WEEK	DOC. TYPE	
EAp	1525	6	

SIZE	DRAWING NO.	ISSUE
A3	D7000002-885	3

SHEET 6 OF 6

THE COPYRIGHT/OWNERSHIP OF THIS DOCUMENT IS AND WILL REMAIN OURS. THE DOCUMENT MUST NOT BE USED WITHOUT AUTHORIZATION OR BROUGHT TO THE KNOWLEDGE OF A THIRD PARTY. CONTRAVENTION WILL BE PROSECUTED. ROSEMOUNT TANK RADAR AB, SWEDEN

Appendix C Configuration Parameters

C.1 Menu tree

The menu tree structure in *Figure C-1* is applicable for Rosemount™ Radar Master Plus. For AMS Device Manager and the Field Communicator, see *Figure C-2*.

Figure C-1: Menu Tree for Rosemount Radar Master Plus

- Overview
  - Primary Variables
  - All Variables
  - Device Information
    - Identification
    - Revisions
    - Alarm and Security
    - Upgrade
- Configure
  - Guided Setup
  - Verify Level
  - Device Setup
    - HART
    - Units
    - Analog Output
    - Display
    - Security
    - Device Information
  - Level Setup
    - Geometry
    - Environment
    - Volume
    - Scaled Variable
    - Antenna
    - Advanced
  - Alert Setup
    - Measurement Recovery
    - Signal Quality Alert
    - High User Defined Alert
    - Low User Defined Alert
- Service Tools
  - Alerts
  - Echo Curve
  - Maintenance
    - Routine Maintenance
    - Backup
    - Reset/Restore
    - Upgrade
  - Simulate
    - Simulate Measurement Values
    - Loop Test

Figure C-2: Menu Tree for AMS Device Manager and Field Communicator

- Overview
  - Device Status
  - Communication Status
  - PV
  - PV Status
  - SV
  - SV Status
  - TV
  - TV Status
  - QV
  - QV Status
  - Device Information
    - Identification
    - Revisions
    - Alarm and Security
    - Upgrade
- Configure
  - Guided Setup
    - Basic Setup
    - Verify Level
  - Manual Setup > Device Setup
    - HART
    - Units
    - Analog Output
    - Display
    - Security
    - Device Information
  - Manual Setup > Level Setup
    - Geometry
    - Environment
    - Volume
    - Scaled Variable
    - Antenna
    - Advanced
  - Alert Setup
    - Measurement Recovery
    - Signal Quality Alert
    - High User Defined Alert
    - Low User Defined Alert
- Service Tools
  - Alerts
  - Variables
    - Mapped Variables
    - Process
    - Device
    - Signal Quality
  - Maintenance
    - Routine Maintenance
    - Reset/Restore
  - Echo Tuning
    - Thresholds
    - Echo Peaks
    - Suppress
  - Simulate
    - Simulate Measurement Values
    - Analog Out > Loop test

C.2 Device setup

C.2.1 HART protocol

HART/polling address

The address range is 0 to 63. The transmitter operates in either standard mode with a 4–20 mA output signal or in multidrop. When the transmitter is in multi-drop mode, the current output is fixed to 4 mA.

Burst mode

When set to burst mode, the transmitter regularly sends out messages instead of waiting for the host to request it.

Both the transmitter and host must be configured to operate in burst mode. Almost all HART host systems today are designed to communicate in poll/response mode, not burst mode. However, the Rosemount 333 HART Tri-Loop™ requires burst mode communication (see *Section 5.9*).

Variable mapping

Up to four transmitter variables can be assigned for the HART protocol. The transmitter outputs a 4-20 mA signal proportional to the primary variable. Additional variables are available through the HART digital signal. See *Table A-2* for a list of available transmitter variables.

Damping value

This parameter defines how fast the transmitter reacts to a change of the level value (step response). The default value is 2 seconds.

A high value makes the level reading steady, while a low value allows the transmitter to respond to rapid level changes (but the presented level value may be less steady).

Percent of range auxiliary

Set this parameter to output the percent of range for another transmitter variable (in addition to the primary variable).

Table C-1: Percent of range auxiliary

Parameter	Description
100% auxiliary	Value corresponding to 100% range of variable selected for percent of range auxiliary.
0% auxiliary	Value corresponding to 0% range of variable selected for percent of range auxiliary.

C.2.2 Units

The units for length, volume, temperature, and level rates are selectable. All configuration parameters and transmitter variables will be expressed in these units. For information on available units of measure, see *Output units*.

C.2.3 Analog output

The output source (primary variable), range values, and alarm mode are specified for the analog output.

Primary variable

Select the desired transmitter variable to use for the analog output.

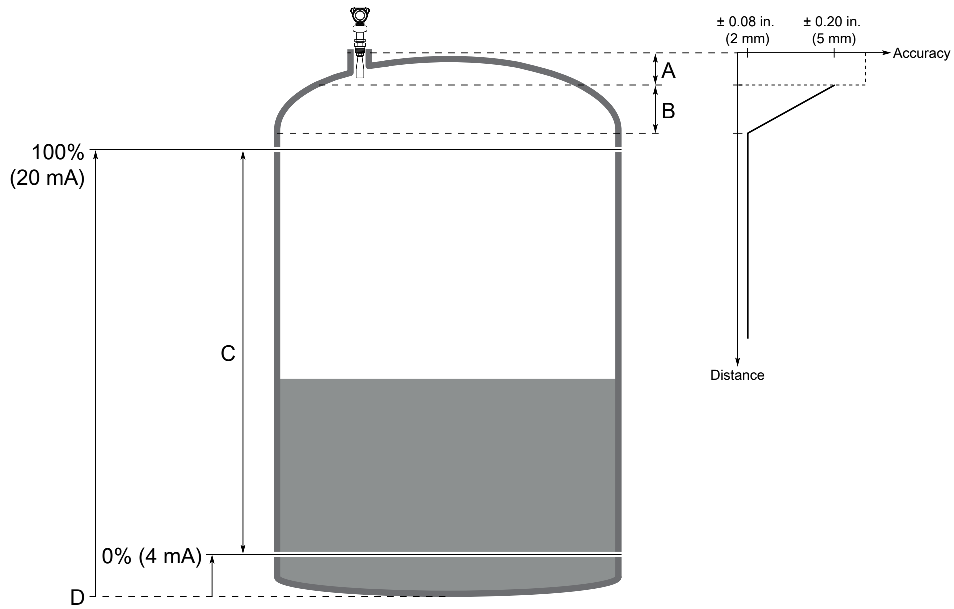
Upper/lower range value

Enter the range values that correspond to the analog output values 4 and 20 mA. The transmitter will drive the output to saturation mode if a measured value goes outside the 4-20 mA range values.

Note

Measurements may not be possible in the blind zone, and measurements close to the blind zone will have reduced accuracy (see *Figure A-1*). Therefore, the 20 mA point should be configured outside these zones.

Figure C-3: Example of Range Value Settings



A. Upper blind zone
B. Upper reduced accuracy zone
C. Level measurement range 0-100%
D. Zero Level

Alarm mode

The transmitter automatically and continuously performs self-diagnostic routines. If a failure or a measurement error is detected, the transmitter drives the output to selected alarm limit (high or low).

C.2.4 Display

Select variables to show on the optional LCD display (option code M5). If more than one variable is selected, then the LCD display toggles between the output variables.

C.2.5 Security

Write protection

The transmitter can be write protected (with or without a password) to prevent unauthorized changes.

Operational mode

There are two Operational Modes to choose from for the Rosemount 5408:SIS: Control/ Monitoring and Safety (SIS).

If the transmitter is used as safety device in a Safety Instrumented System, the Operational Mode must be set to Safety (SIS).

Safety mode

The Safety Mode applies only to the Rosemount 5408:SIS.

When the operational mode is set to Safety (SIS), then the Safety Mode must be enabled for the transmitter to become operational. When Safety Mode is enabled, the transmitter is write protected (with or without a password) to prevent unauthorized changes.

Change counter

A counter that increments each time the device enters active Safety Mode. Change counter applies only to the Rosemount 5408:SIS.

C.2.6 Device Information

Tag

Identifier of up to 8 characters for the transmitter used by host system. The tag is typically a reference number, location, or duty description.

Long tag

Identifier of up to 32 characters for the transmitter used by host system. It is recommended to enter both a short and a long tag (they may be the same).

Date

The date field can be used for any purpose, for example to save the date of the last configuration change.

Descriptor

The 16-character descriptor field can be used for any purpose.

Message

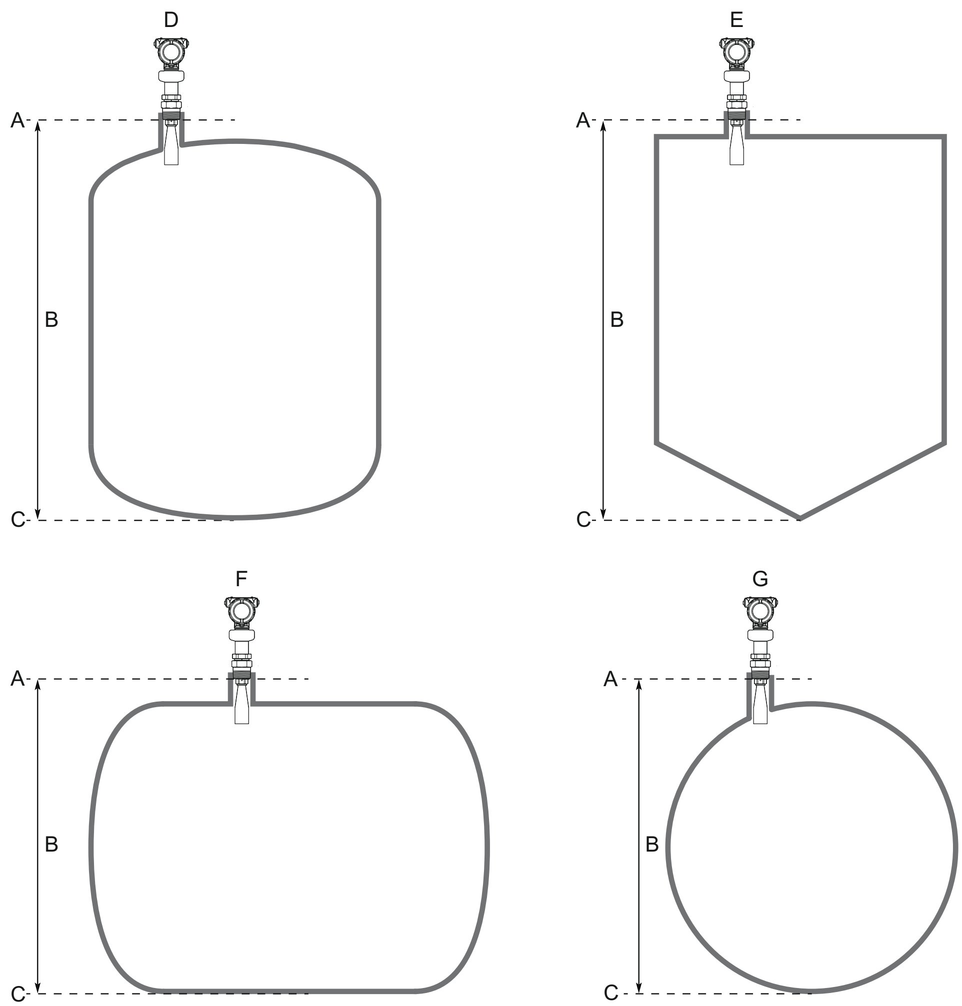
The 32-character message field can be used for any purpose, such as providing details of the last configuration change.

C.3 Level setup

C.3.1 Geometry

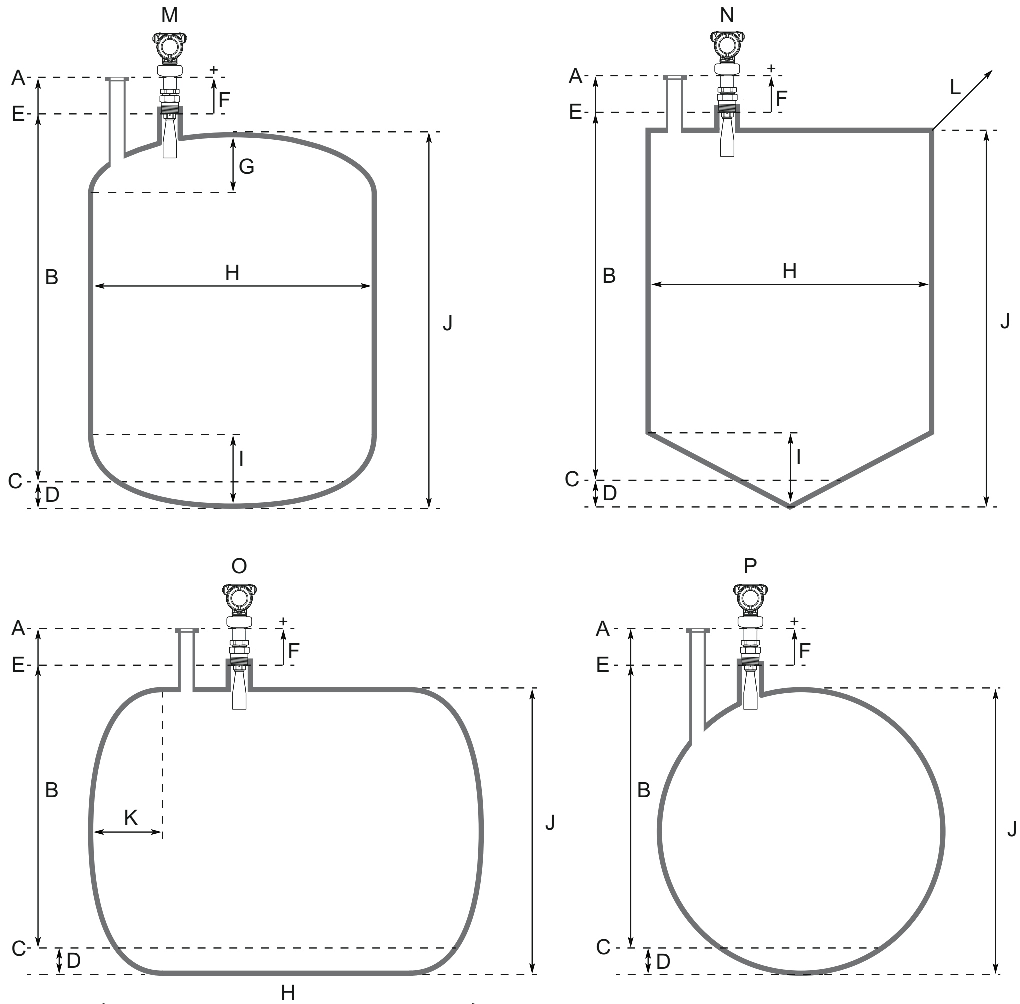
The transmitter configuration includes setting the tank geometry parameters, see *Figure C-4* and *Figure C-5*.

Figure C-4: Tank Geometry, Basic Dimensions



A. *Device Reference Point*
B. *Reference Height*
C. *Zero Level*
D. *Vertical cylinder*
E. *Cubical Tank*
F. *Horizontal cylinder*
G. *Spherical tank*

Figure C-5: Tank Geometry, All Dimensions



A. *Tank Reference Point*

B. *Reference Height*

C. *Zero Level*

D. *Bottom Offset*

E. *Device Reference Point*

F. *Reference Offset*

G. *Top Shape Height*/Top Height***

H. *Width of Tank*/Width***

I. *Bottom Shape Height*/Bottom Height***

J. *Height of Tank*/Height (of tank)***

K. *End Shape Length*/End Length***

L. *Length of Tank*/Length***

M. *Vertical cylinder*

N. *Cubical cylinder*

O. *Horizontal cylinder*

P. *Spherical cylinder*

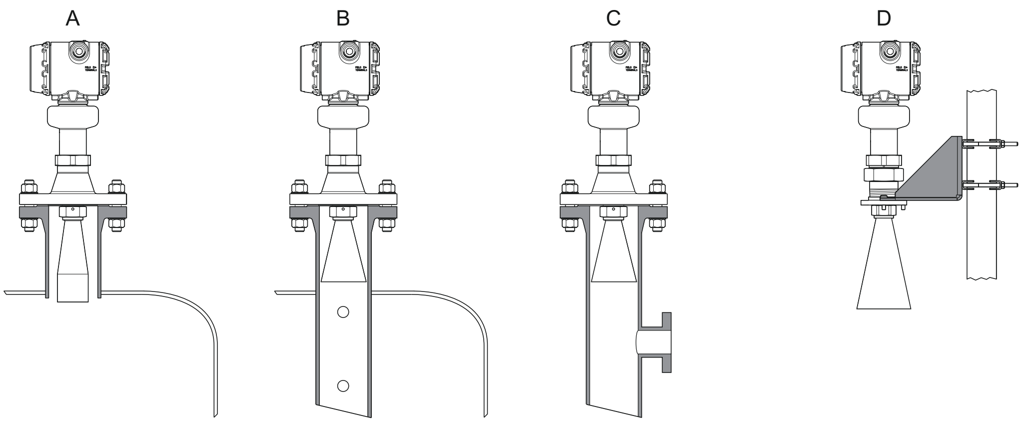
* *AMS Device Manager and Field Communicator*

** *Rosemount Radar Master Plus*

Mounting type

Select option best describing how transmitter is mounted on the tank. There are four options to choose from: Nozzle, Still pipe, Chamber, and Bracket.

Figure C-6: Mounting Type



A. Nozzle
B. Still pipe
C. Chamber
D. Bracket (open air)

Inner diameter, pipe/chamber

Enter the inner diameter for the pipe or chamber in which the antenna is mounted. The inner diameter value is used to compensate for the lower microwave propagation speed inside the pipe/chamber. An incorrect value will give a scale factor error.

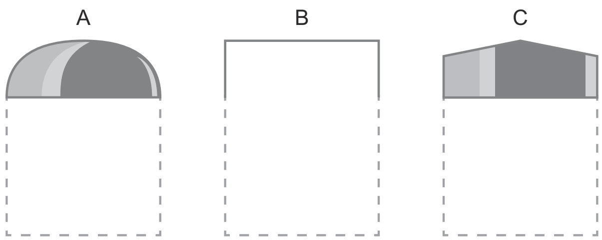
Tank shape

Select a tank shape that corresponds to the actual tank. If the actual tank does not match one of the pre-defined tank shapes, then select Other (e.g. level measurements of sumps, basins, or ponds).

Tank top shape

Form of the upper tank closure.

Figure C-7: Tank Top Shape

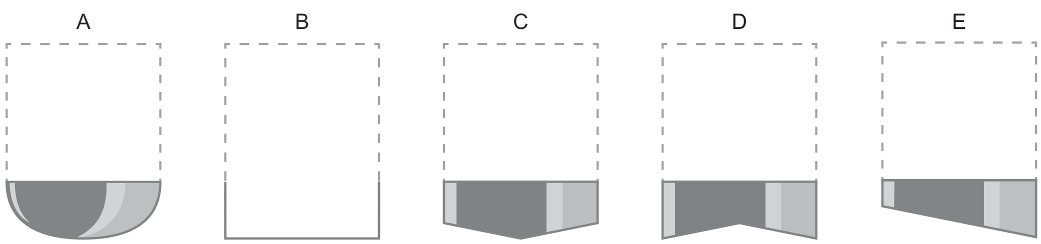


A. Dome
B. Flat
C. Conical

Tank bottom shape

Form of the lower tank closure.

Figure C-8: Tank Bottom Shape

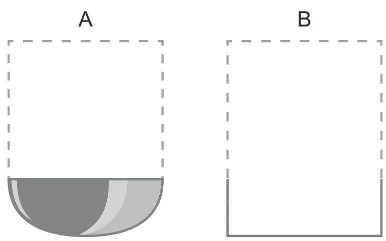


A. Dome
B. Flat
C. Conical/pyramid
D. Flat, inclined (for vertical cylinder)
E. Flat, inclined (for cubical tank)

Tank end shape

For a horizontal tank, form of the tank ends. Same shape is assumed at both ends.

Figure C-9: Tank End Shape



A. Dome
B. Flat

Reference height

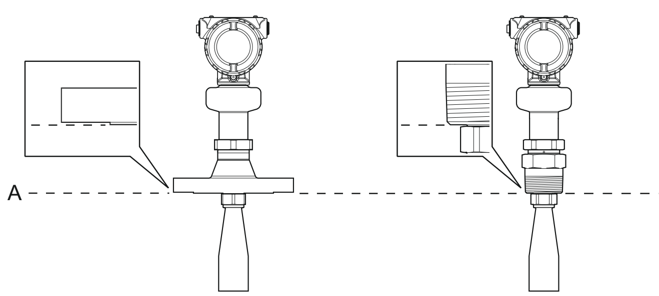
Distance between the Tank Reference Point (typically same as Device Reference Point) and zero level.

Ensure the Reference Height is set as accurate as possible. The transmitter measures the distance to the product surface and subtracts this value from the Reference Height to determine the level.

Device reference point

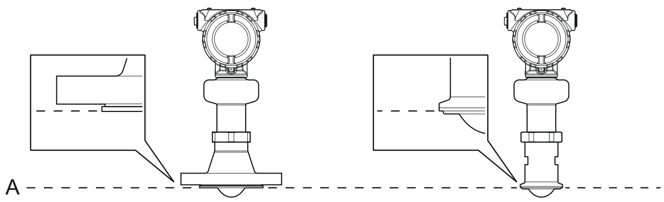
Figure C-10, *Figure C-11*, and *Figure C-12* show the Device Reference Point for various antennas and tank connections.

Figure C-10: Device Reference Point for Cone Antennas



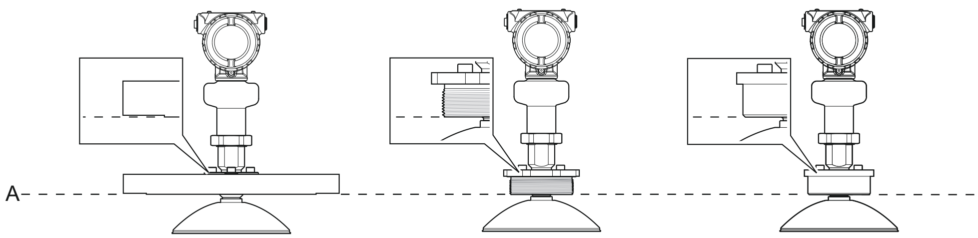
A. Device Reference Point

Figure C-11: Device Reference Point for Process Seal Antennas



A. Device Reference Point

Figure C-12: Device Reference Point for Parabolic Antennas



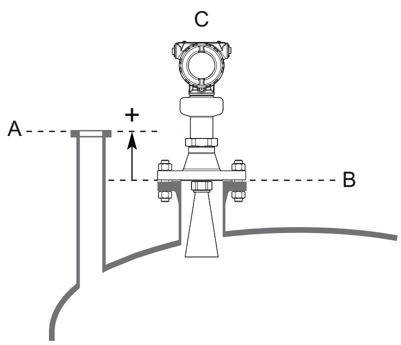
A. Device Reference Point

Reference offset

Distance between the Device Reference Point and the Tank Reference Point (typically the upper side of a customer plug where levels can be manually measured).

The Reference Offset parameter can be used to specify your own reference point, for example when the measured level by the transmitter should correspond with the level value obtained by hand-dipping.

Figure C-13: Reference Offset



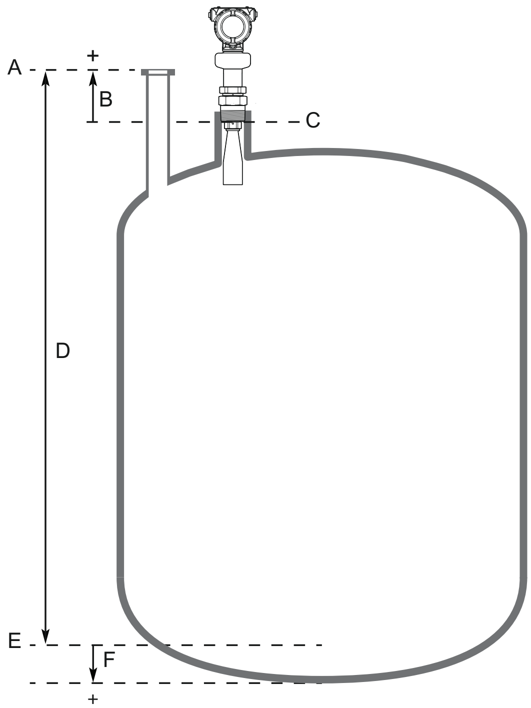
A. Tank Reference Point
B. Device Reference Point
C. Reference Offset > 0
D. Reference Offset < 0

Bottom offset

The Bottom Offset is defined as the distance between Zero Level and the tank bottom. The default value is zero.

If the Zero Level is not located at the tank bottom, then enter a Bottom Offset. It is needed for the transmitter to know the position of the tank bottom echo and for correct volume calculations.

Figure C-14: Bottom Offset



A. Tank Reference Point
B. Reference Offset
C. Device Reference Point
D. Reference Height
E. Zero Level
F. Bottom Offset

Height of tank

The vertical distance between tank bottom and tank roof. For a horizontal cylinder or spherical tank, this is the diameter of the tank.

Width of tank

The horizontal distance between tank ends. For a vertical cylinder, this is the diameter of the tank. The width of tank is also the shortest horizontal side of a box-shaped (cubical) tank.

Length of tank

The longest horizontal side of a cubical tank.

Top shape height

The height of the shape on tank top (typically from shape floor to cap top, measured at cylinder center line).

Bottom shape height

The height of the shape at tank bottom (typically from shape floor to shape bottom, measured at cylinder center line).

End shape length

The width of the spherical cap at tank end (measured at cylinder center line).

Show negative level as zero

When this setting is selected and the product surface is at or below Zero Level, the level measurement output will be zero.

C.3.2 Environment

Product type

The media (liquid/solid) used in the monitored process.

- Liquid (requires measurement type code 1 or 4)
- Solid (requires measurement type code 3 or 4)

The solids measurement mode should never be used for measuring liquid products due to the solids specific signal processing method, and vice versa.

Note
Solid is not supported for a Rosemount 5408:SIS operating in Safety (SIS) mode.

Process conditions

Turbulent surface

Set this parameter to improve the performance of the transmitter when there are small and local rapid level changes caused by surface turbulence. The reason for the turbulence might be splash loading, agitators, mixers, or boiling product.

Foam

This parameter should be used if there is, or may be, surface foam. When setting this parameter, the transmitter is optimized for conditions with weak and varying surface echo amplitudes, which is typical for presence of surface foam.

Maximum level rate

Fastest rate that may occur in the monitored process to (partially) fill or empty this tank. Note that product level rate may be higher during upset conditions.

Product dielectric range

Select the range of the dielectric constant for the product in the tank. If the range is not known, or if the product in the tank is changed on a regular basis, then select Default.

C.3.3 Volume

Select if the volume measurement should be calculated from the configured tank dimensions or a strapping table.

Strapping tables can be used for irregularly shaped tanks, to eliminate errors due to bulging when product is added to a tank, or if a pre-defined tank type does not provide sufficient accuracy.

Strapping table

Strapping table requires entering level-volume pairs in a table (maximum 50 points). Use most of the strapping points in regions where the tank shape is non-linear. Starting at the bottom of the tank, for each new point, enter the total volume up to the specified level value.

Volume offset

Use this parameter to add a volume to each calculated volume value, for example a sump volume below the Zero Level in the tank.

C.3.4 Scaled variable

The scaled variable can be used to convert a transmitter variable into an alternative measurement, such as open channel flow, mass, or calibrated level (e.g. 5 point verification). This variable is available only for transmitters ordered with Smart Diagnostics Suite (option code DA1).

The scaled variable is defined by creating a table of transmitter variables and corresponding output variables. A maximum of 50 points can be specified. Between the points linearly interpolated values are calculated.

Figure C-15: Scaled Variable Examples

As an example, consider a product with a density of 900 kg/m^3. In this case, the volume to mass conversion is given by the following table:

Table C-2: Example of Scaled Variable Table

Number	Input value (volume)	Output value (mass)
1	0 m^3	0 ton
2	100 m^3	90 ton

Scaled variable name

Name of the scaled variable. It is recommended to enter a short name to fit into the LCD display area.

Scaled variable unit

Units of measurement of the scaled variable.

Number of scaled values

Number of values in the scaled variable table.

Input variable

Select the input variable to use for scaled variable calculation.

C.3.5 Antenna

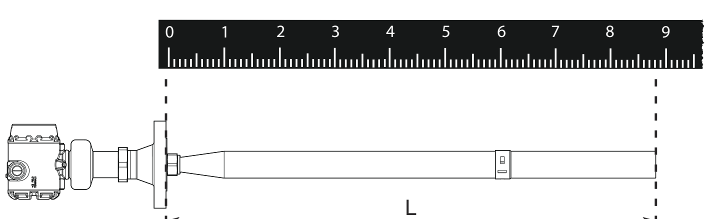
Antenna type

The transmitter is designed to optimize measurement performance for each available antenna type. This parameter is pre-configured at factory; it only needs to be set if the antenna is changed to another type, or if you have installed a spare transmitter.

Antenna extension length

This parameter is pre-configured at factory. The Antenna Extension Length (see *Figure C-16*) must be changed if the extension is shortened, or if you have ordered a spare transmitter head. Enter zero (0) for antennas without extensions.

Figure C-16: Antenna Extension Length (L)



User defined antenna options

Parameters for user defined antenna. These settings are typically provided by factory and should only be modified for customized antennas.

When a Rosemount 5408 transmitter head is mounted on a Rosemount 5402 antenna, refer to *Table C-3* and *Table C-4* for antenna parameters.

Table C-3: Rosemount 5402 Antenna Parameters, Free Propagation

Antenna type	Tank connection length		Antenna gain	Nearzone threshold (mV)	Nearzone range		Upper null zone (1)	
	ft	m			ft	m	ft	m
2-in. cone, 316L SST (EN 1.4404)	0.509	0.155	2.45	4500	5.09	1.55	0.541	0.165
2-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	2.45	5000	5.25	1.60	0.492	0.150
2-in. process seal	0.929	0.283	3.4	3400	4.13	1.26	0.492	0.150
3-in. cone, 316L SST (EN 1.4404)	0.509	0.155	1.4	1170	3.38	1.03	0.492	0.150
3-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	1.4	4400	5.41	1.65	0.591	0.180
3-in. process seal	1.191	0.363	1.7	3400	4.13	1.26	0.492	0.150
4-in. cone, 316L SST (EN 1.4404)	0.509	0.155	0.9	1170	3.38	1.03	0.738	0.225
4-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	0.9	2400	4.27	1.30	0.820	0.250
4-in. process seal	1.316	0.401	0.8	1000	3.48	1.06	0.492	0.150

(1) *Default setting. The Upper Null Zone may need to be increased if there are disturbance echoes in the region close to the antenna.*

Table C-4: Rosemount 5402 Antenna Parameters, Still Pipe/Chamber Installation

Antenna type	Tank connection length		Antenna gain	Nearzone threshold (mV)	Nearzone range		Upper null zone (1)	
	ft	m			ft	m	ft	m
2-in. cone, 316L SST (EN 1.4404)	0.509	0.155	0.035	800	2.03	0.62	0.541	0.165
2-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	0.035	900	3.28	1.00	0.492	0.150
2-in. process seal	0.929	0.283	0.035	930	2.56	0.78	0.492	0.150
3-in. cone, 316L SST (EN 1.4404)	0.509	0.155	0.035	800	2.03	0.62	0.492	0.150
3-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	0.035	1100	4.27	1.30	0.591	0.180

Table C-4: Rosemount 5402 Antenna Parameters, Still Pipe/Chamber Installation *(continued)*

Antenna type	Tank connection length		Antenna gain	Nearzone threshold (mV)	Nearzone range		Upper null zone [1]	
	ft	m			ft	m	ft	m
3-in. process seal	1.191	0.363	0.035	1000	2.53	0.77	0.492	0.150
4-in. cone, 316L SST (EN 1.4404)	0.509	0.155	0.035	800	2.03	0.62	0.738	0.225
4-in. cone, Alloy C-276 or Alloy 400	0.509	0.155	0.035	1000	3.61	1.10	0.820	0.250
4-in. process seal	1.316	0.401	0.035	900	4.59	1.40	0.492	0.150

(1) Default setting. The Upper Null Zone may need to be increased if there are disturbance echoes in the region close to the antenna.

Upper null zone

The Upper Null Zone defines how close to the transmitter's reference point a level value is accepted. You can extend this value to block out disturbing echoes close to the antenna, for example from the tank nozzle or bypass well inlet. See *Section 7.5.1* for more information.

Note

Make sure the 20 mA value is below the Upper Null Zone. Measurements are not performed within the Upper Null Zone (UNZ).

C.3.6 Advanced

Calibration offset

Difference between surface distance measured by transmitter and the same distance measured by e.g. hand-dipping with a measurement tape. A positive Calibration Offset value will increase the presented level value.

It is recommended to run the Verify Level tool to match the product level reported by the transmitter to a reference measurement, see *Section 5.7*.

User defined variable setup

This section applies only to transmitters ordered with Smart Diagnostics Suite (option code DA1).

Name

Name of the user defined variable. It is recommended to enter a short name to fit into the LCD display area.

Input register

Enter the number of the input register that contains value of the user defined variable. See *Table C-5* for a list of suitable input registers.

The default value is 20210 (Distance).

Table C-5: List of Input Registers to the User Defined Variable

Variable	Register	Description
Min Electronics Temperature	20146	Minimum electronics temperature measured by the device (°C)
Max Electronics Temperature	20148	Maximum electronics temperature measured by the device (°C)
Surface Update Relation	21028	Determines how robust the surface echo measurement is (0 to 1). A decreasing value may be used to identify turbulence or foam in the process.
Min Signal Quality	21034	Minimum signal quality measured by the device since last signal quality reset. Signal quality calculation must be enabled to use this variable.
Max Signal Quality	21036	Maximum signal quality measured by the device since last signal quality reset. Signal quality calculation must be enabled to use this variable.
Distance to Upper Surface	21042	Distance to the upper product surface (m) when measuring on multiple products in the tanks. Double Surface function must be enabled to use this variable.
Distance to Lower Surface	21044	Distance to the lower product surface (m) when measuring on multiple products in the tanks. Double Surface function must be enabled to use this variable.
Surface Signal/Noise Ratio	21054	Ratio between surface echo signal strength and signal noise (dB). A high value (>20 dB) indicates very good margin to noise.
Product Dielectric Constant	22800	Square root of the product dielectric constant estimated by the transmitter when the Bottom Projection function is enabled. The product dielectric constant is calculated when both the bottom and surface echoes are found by device, and when surface echo is within the Max Projection Distance. Product dielectric constant estimation is frozen if any of these conditions are not fulfilled.

Unit

Units of measurement of the user defined variable.

More advanced options

More advanced options are only available in Rosemount Radar Master Plus.

By default, these parameters are automatically set based on current configuration. It is recommended that these parameters should remain at the default settings, unless there is a good understanding of the function and capability of the parameters.

Empty tank handling

The Empty Tank Handling functions handle situations when the surface echo is close to the tank bottom.

Table C-6: Empty Tank Handling

Parameter	Description
Empty tank detection area	The Empty Tank Detection Area defines a range where it is accepted to lose the echo from the product. If the echo is lost in this range, the tank is considered empty and the level is presented as 0. When the tank is empty, the transmitter looks in this range for the product surface. When a new echo is found in this range, it is considered to be the product surface. Therefore, if there are disturbance echoes in this area, they may need to be filtered out. This function requires the Bottom echo visible when tank is empty parameter to be disabled.
Bottom echo visible when tank is empty	Only enable this parameter if the bottom echo is visible when tank is empty. By setting this parameter, the bottom echo will be treated as a disturbance echo to facilitate tracking of weak surface echoes close to the tank bottom (see *Enable bottom echo visible when tank is empty*).

Tank bottom projection

The Tank Bottom Projection is used to enhance measurement performance near the bottom of the tank. When the tank bottom echo is strong (typical for flat tank bottoms) and the dielectric constant of the product is low (e.g. oil), the transmitter may lock on the bottom echo and report a false level measurement (empty tank). This problem can be solved by using the Tank Bottom Projection function. See *Section 7.5.2* for further instructions.

Table C-7: Tank Bottom Projection

Parameter	Description
Bottom product dielectric constant	Enter the product dielectric constant for the product in the bottom of the tank.
Maximum projection distance	This defines the range where the function is active. Enter the maximum distance from the zero level (tank bottom).
Minimum tank bottom amplitude	Enter the minimum allowed amplitude for the echo from the tank bottom before this function is activated.

Echo tracking

Surface echo tracking

Use these settings to configure how the transmitter should keep track of the surface. These are advanced settings. Normally, they should not be changed.

Table C-8: Surface Echo Tracking

Parameter	Description
Search window size	This parameter defines a window centered at the current surface position where new surface echo candidates can be selected. The size of the window is ±Search Window Size. Echoes outside this window will not be considered as surface echoes. If there are rapid level changes in the tank, the value of the Search Window Size can be increased to prevent the transmitter from missing level changes. On the other hand, a large value may cause the transmitter to select an invalid echo as the surface echo.
Track first echo	Select the Track First Echo check box if the first echo above threshold always should be considered as the surface echo (see *Section 7.5.3*).

Double surface handling

If there are multiple products in the tank, the Double Surface Handling function can be manually set to allow user to select if the upper or lower product should be used as output.

The upper and lower surface echoes must be stronger than any disturbance echoes in the search region for Double Surface Handling to function properly.

Table C-9: Double Surface Handling

Parameter	Description
Track upper surface	Track upper surface when there are multiple products in the tank (for example thin oil layer on top of water).
Track lower surface	Track the lower product surface, such as the interface when there are multiple products in the tank, or the product surface instead of a foam layer.
Upper product dielectric constant	Enter the dielectric constant for the upper product. A more precise value results in better accuracy for the lower surface level.

Double bounce handling

Use this function to prevent transmitter from locking on strong double bounce echoes (may occur in spherical and horizontal cylinder tanks). See *Section 7.5.4* for more information.

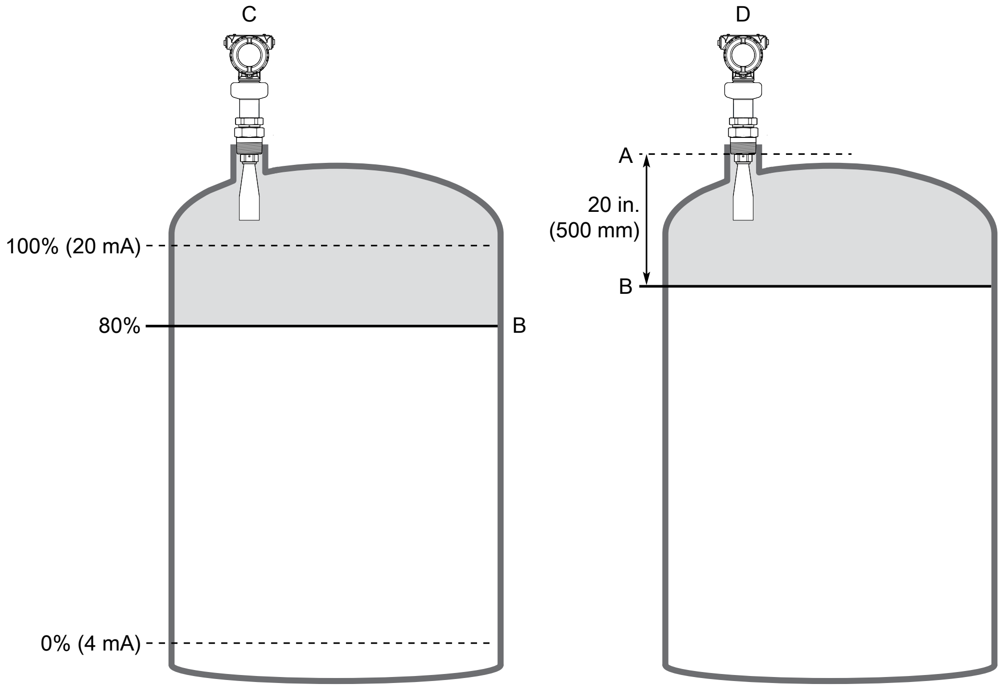
Overfill prevention

The Overfill Prevention function adds an extra layer of protection to prevent tank overfills. The function uses an independent echo logic algorithm to identify the surface echo close to the top of the tank.

In the unlikely event there is a conflict between the normal and the overfill prevention echo logic, the Overfill Prevention function will have a precedence in determining the position of the surface. The transmitter will then output this new value, or generate an alarm if the normal echo logic is not able to find the surface echo at the new position.

The Overfill Prevention Range defines the lower end of the range in which the function operates. The range is configurable. See *Figure C-17* for default factory settings.

Figure C-17: Overfill Prevention Range



A. Device Reference Point
B. Overfill Prevention Range
C. Rosemount 5408:SIS
D. Rosemount 5408

Expert options

Use the expert options to view input registers, and to view and edit holding registers.

Note
Instructions for how to use Expert options are typically provided by factory and should only be modified if required.

Expert options

Use the expert options to view input registers, and to view and edit holding registers.

Note
Instructions for how to use Expert options are typically provided by factory and should only be modified if required.

C.4 Alert setup

C.4.1 Measurement recovery

Measurement recovery time

The Measurement Recovery Time (Echo Timeout) parameter controls the maximum time from when measurement is lost (e.g. due to process conditions such as foam or turbulence) until it is annunciated. If measurement is recovered within the time specified by this parameter, then it will not be annunciated.

Measurement recovery handling

By default, the Measurement Recovery Time is set up automatically by the device based on the transmitter configuration.

It is recommended to leave the Measurement Recovery Handling at default unless required by your application. A higher value may be entered to increase robustness and avoid nuisance alarms. Only enter a lower value if lost measurement is required to be annunciated within a certain time for your application.

Used measurement recovery time

This is the value used by the transmitter.

C.4.2 Signal quality alert

This section applies only to transmitters ordered with Smart Diagnostics Suite (option code DA1).

Signal Quality is a measure of the product surface echo amplitude compared to the surface threshold and noise.

The Signal Quality spans from 0 to 10. A low value means that there is a risk for the noise peak to be mistaken for the product surface peak.

Note

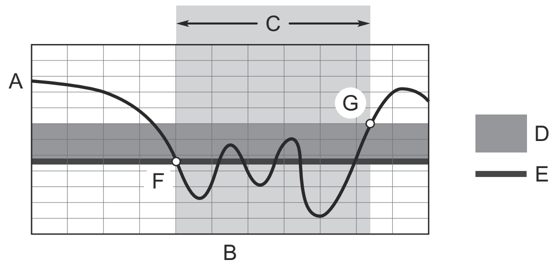
The Signal Quality may not be 10 even if the antenna is clean. The value depends on antenna type, application conditions, configured surface threshold, as well as the condition of the antenna.

Build up on the antenna and different surface conditions are factors that can result in a low Signal Quality value. By setting an alert[1], the Signal Quality value can be used to schedule maintenance to clean the antenna, fine-tune the surface threshold, or detect and monitor adverse surface conditions such as turbulence or foam.

Suitable alert limits vary from application to application. Appropriate value can be determined by logging Signal Quality over time and viewing maximum/minimum values. The Signal Quality Alert limit should be at least 1, but a better guideline is 2-3.

(1) Signal strength fluctuations are common when measuring solids, so Signal Quality alerts may not be appropriate in this case.

Figure C-18: Signal Quality Alert



A. *Signal quality*
B. *Time*
C. *Alert ON*
D. *Deadband*
E. *Limit*
F. *The Signal Quality drops below the alert limit and an alert message is triggered.*
G. *The alert message is reset once the Signal Quality value rises above the Deadband range.*

Limit

The Signal Quality value that will trigger the alert.

Deadband

The Deadband is a buffer zone so the alerts do not toggle on and off when the Signal Quality fluctuates around the alert limit. The alert is set when value falls below the alert limit. The alert is then cleared when value rises above the Deadband range.

C.4.3 High/low user defined alert

A high and low alert may be established to output an alert message when the measurement readings exceed the specified limits.

Variable

Select the transmitter variable to use for the alert.

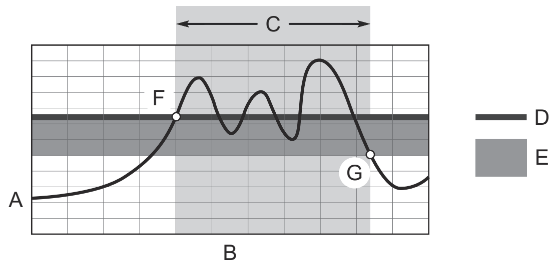
Limit

The value that will trigger the alert.

Deadband

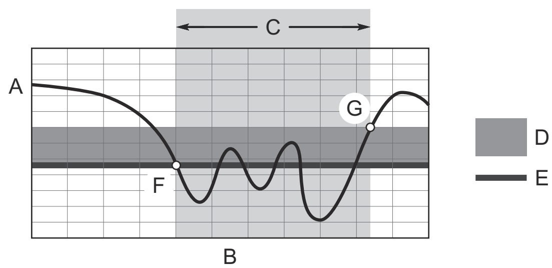
The Deadband is a buffer zone so the alerts do not toggle on and off when the measurement value fluctuates around the alert limit. The alert is set when the value exceeds the alert limit. The alert is then cleared when the value falls outside the Deadband range.

Figure C-19: High User Defined Alert



A. User Defined Alert
B. Time
C. High Alert ON
D. Limit
E. Deadband
F. The alert is active when the level value rises above the alert limit.
G. The alert turns off when the value falls below the deadband.

Figure C-20: Low User Defined Alert



A. User Defined Alert
B. Time
C. Low Alert ON
D. Deadband
E. Limit
F. The alert is active when the level value falls below the alert limit.
G. The alert turns off when the value rises above the deadband.

00809-0100-4408
Rev BB
2018

Global Headquarters
Emerson Automation Solutions
6021 Innovation Blvd
Shakopee, MN 55379 USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@Emerson.com

North America Regional Office
Emerson Automation Solutions
8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRF@Emerson.com

Latin America Regional Office
Emerson Automation Solutions
Sunrise, FL 33323, USA
T +1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@Emerson.com

Europe Regional Office
Emerson Automation Solutions Europe GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
T +41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office
Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
Republic of Singapore
+65 6777 8211
+65 6777 0947
Enquiries@AP.Emerson.com

Middle East and Africa Regional Office
Emerson Automation Solutions
Emerson FZE P.O. Box 17033
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
+971 4 8118100
+971 4 8865465
RFQ.RMTMEA@Emerson.com

Linkedin.com/company/Emerson-Automation-Solutions
Twitter.com/Rosemount_News
Facebook.com/Rosemount
Youtube.com/user/RosemountMeasurement
Google.com/+RosemountMeasurement

©2018 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. Rosemount is mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

ROSEMOUNT™

EMERSON™

Reference Manual
00809-0100-4378, Rev CF
May 2022

Rosemount™ 751 Field Signal Indicator

ROSEMOUNT™

EMERSON™

Safety messages

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, ensure you thoroughly understand the contents before installing, using, or maintaining this product.

For equipment and service needs, contact your local Emerson representative or go to Emerson.com.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings. For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

Contents

Chapter 1 Introduction........ 5

1.1 Product overview........ 5
1.2 LCD display........ 5
1.3 Service support........ 6
1.4 Product recycling/disposal........ 6

Chapter 2 Installation........ 7

2.1 Assembly........ 7
2.2 Wiring diagrams........ 8
2.3 LCD display configuration........ 12

Chapter 3 Ordering information, specifications, and drawings........ 17

1 Introduction

1.1 Product overview

The Rosemount 751 Field Signal Signal Indicators provide a means of displaying important process variables. These devices operate with any two-wire transmitter that measures input variables such as pressure, flow, liquid level, or temperature. Rosemount indicators are ideal for installations where an integral meter would be difficult to view.

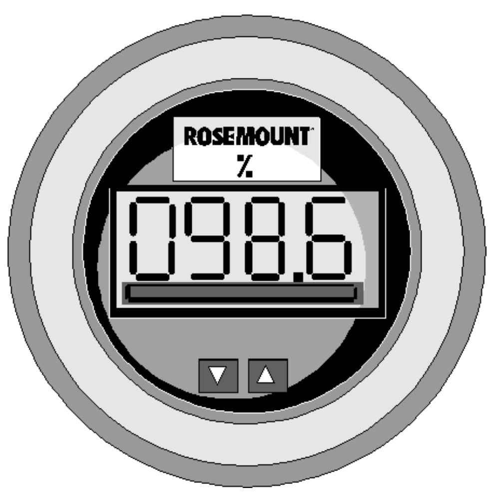
Rosemount 751 Indicators are designed for use in industrial environments where all-weather performance is necessary. These units are vibration- and corrosion-resistant, and explosion-proof or intrinsically safe. An LCD display or analog meter may be ordered to meet specific application requirements.

1.2 LCD display

The LCD display requires an analog 4–20 mA dc output from a two-wire transmitter. It may be configured from a 4 mA point of –999 to 1000 and a 20 mA point of -999 to 9999. The sum of the 4 mA point and the span must not exceed 9999. The decimal point can be placed in any of three positions (X.X.X.X) or not used. Calibration adjustments are made using noninteractive zero and span buttons. The scaled meter may be labelled with the appropriate engineering units. A twenty-segment bar graph, on the bottom of the meter faceplate, represents the 4–20 mA signal directly.

The large 2¼-in. meter face has ½-inch high characters for easy readability as shown in Figure 1-1. The 4 and 20 mA points may be changed by pressing the buttons on the meter faceplate. The meter can be rotated in 90-degree increments within the enclosure for convenient viewing.

Figure 1-1: LCD Display



1.3 Service support

To expedite the return process, refer to Emerson.com and contact the nearest Emerson representative.

⚠ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. Returned products must include a copy of the required Safety Data Sheet (SDS) for each substance.

Emerson representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

1.4 Product recycling/disposal

Consider recycling equipment and packaging. Dispose of the product and packaging in accordance with local and national legislation.

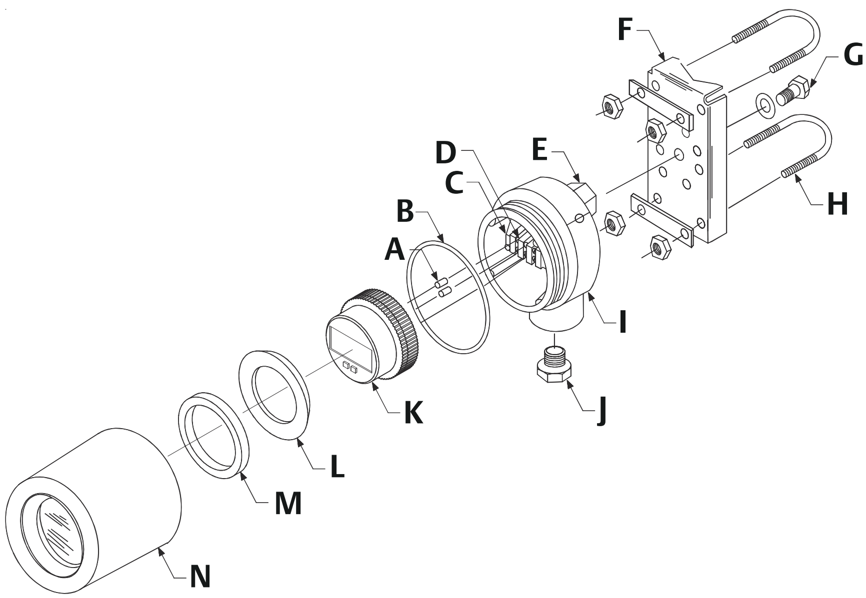
2 Installation

2.1 Assembly

The Rosemount 751 Field Signal Indicator is comprised of the components shown in Figure 2-1. The housing may contain an analog or liquid crystal display (LCD) display meter. Both meters are independent of component parts and are completely interchangeable. Both meters plug into the terminal screws on the housing, as shown in Figure 2-1.

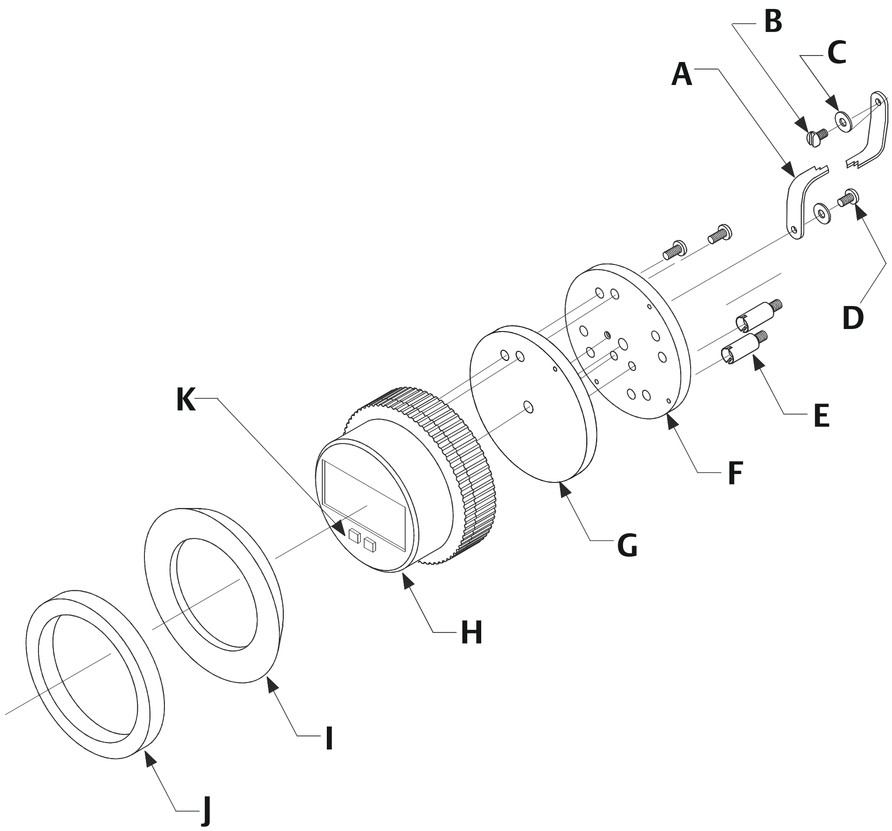
The meter sub-assembly contains the components shown in Figure 2-2.

Figure 2-1: Rosemount 751 Exploded View



A. Terminal screws
B. Housing O-ring
C. Field wiring terminals
D. Loop protection diode
E. Tapped mounting boss
F. Optional mounting bracket
G. Mounting bolt with washer
H. U-bolt for 2-in. pipe
I. Housing
J. Optional ¾- to ½-in. conduit reducing bushing (if required)
K. Meter
L. Bushing
M. Foam spacer
N. Housing cover

Figure 2-2: Meter Exploded View



A. *Retaining straps*
B. *Mounting screw into housing*
C. *Washer for retaining strap*
D. *Mounting screws into mounting plate*
E. *Terminal screws (2)*
F. *Mounting plate*
G. *Spacer plate*
H. *LCD display*
I. *Bushing*
J. *Foam spacer*
K. *Configuration buttons*

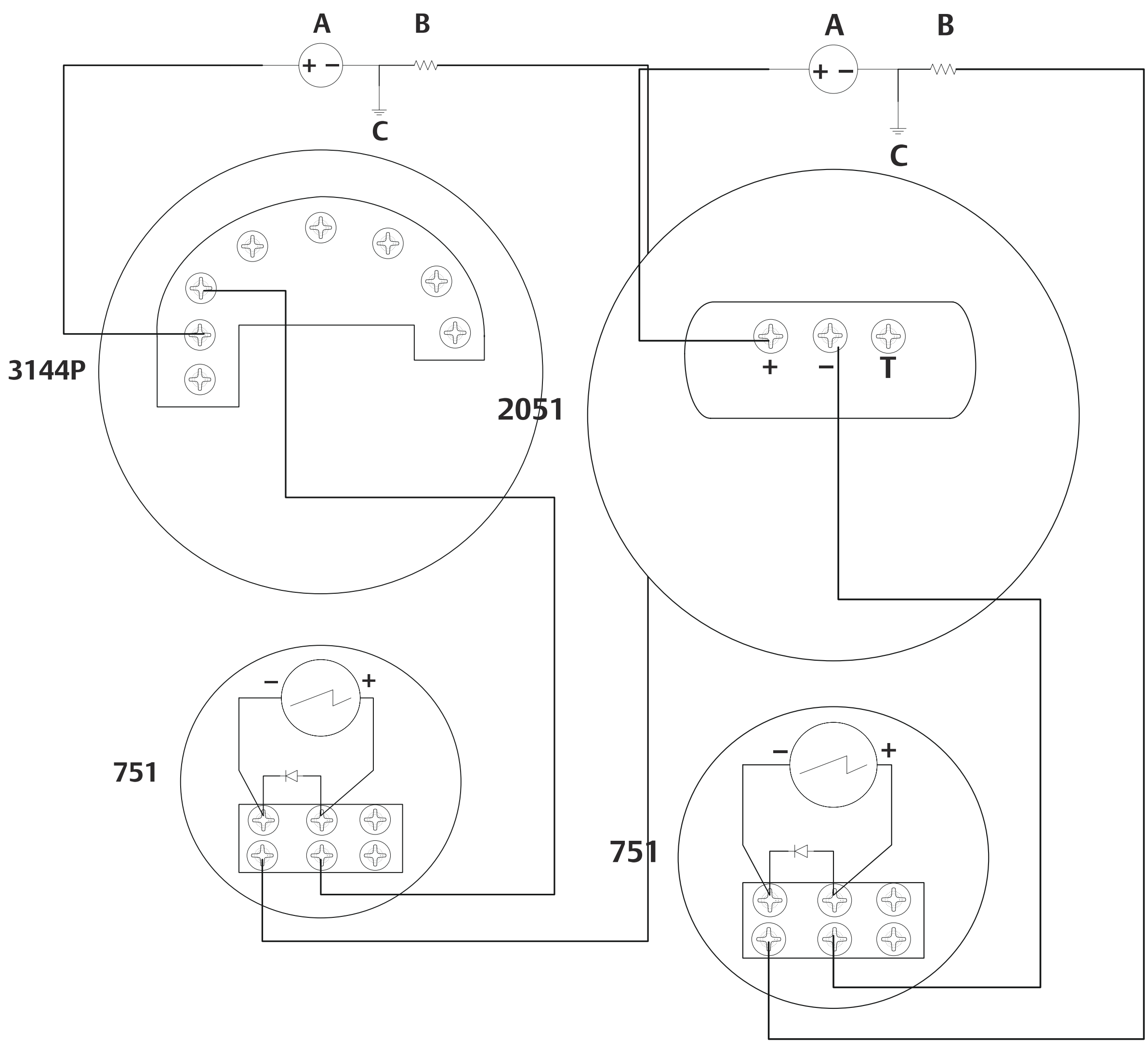
2.2 Wiring diagrams

Use the following wiring diagrams to wire the Rosemount 751 Field Signal Indicator, in series or in parallel, with Rosemount transmitters. Use shielded cable for best results in electrically noisy environments.

Series configuration

It is recommended that the Rosemount 751 Indicator be wired in a series configuration when the 4-20 mA transmitter does not contain a test terminal. The indicator is designed so the analog or LCD display meter can be removed from the housing without impacting the integrity of the 4-20 mA loop. Removal of the entire device from the series configuration will disrupt the loop.

Figure 2-3: Rosemount 751 Series Wiring Diagrams for Rosemount 3144P and 2051



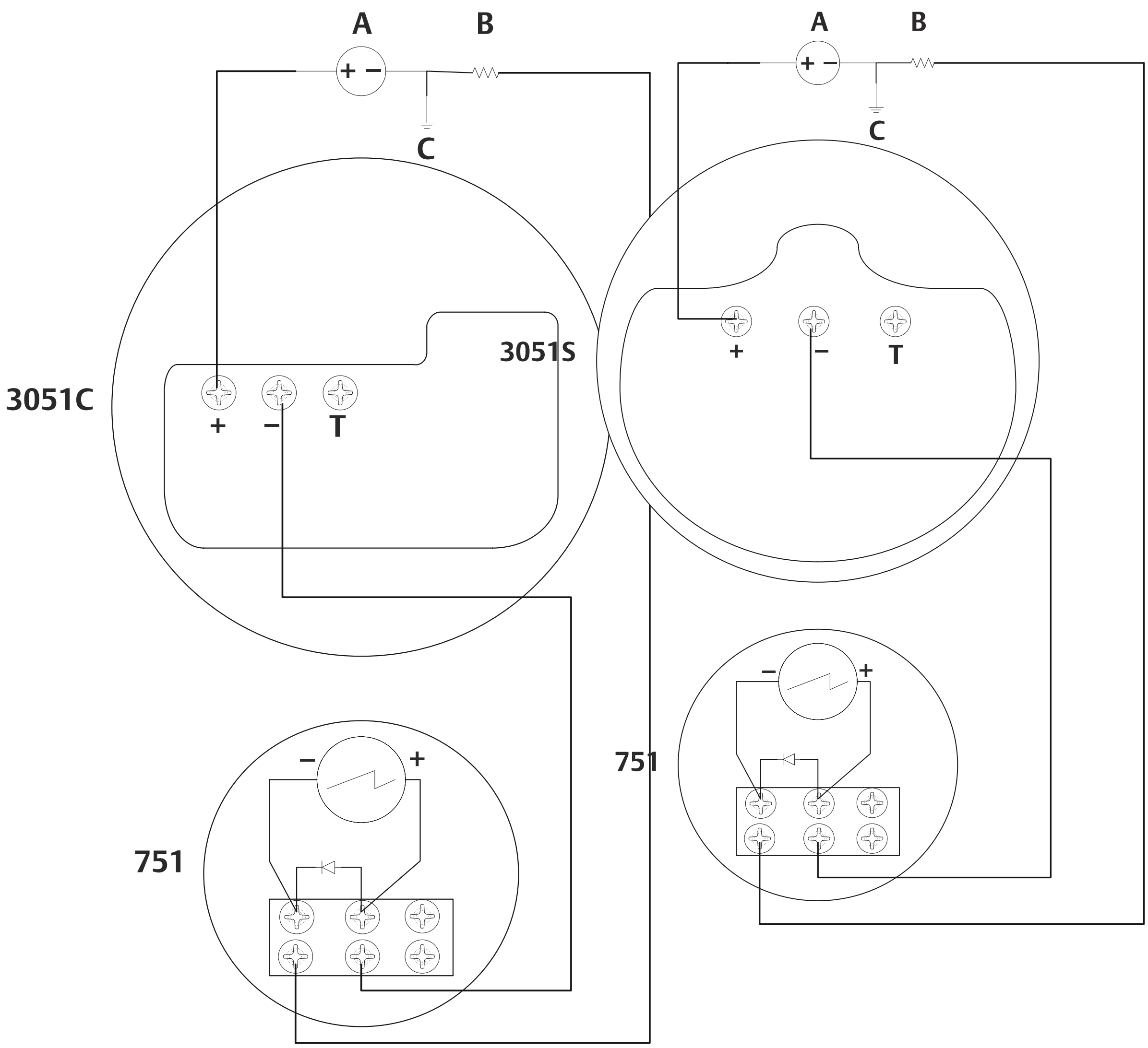
4–20 mA dc Input Signal for Rosemount 3144P

4–20 dc Input Signal for Rosemount 2051

A. Power supply
B. Load resistor
C. Optional ground

Figure 2-4: Rosemount 751 Series Wiring Diagrams for Rosemount 3051C and 3051S

4–20 mA dc Input Signal for Rosemount 3144P   4–20 dc Input Signal for Rosemount 2051



4–20 mA dc Input Signal for Rosemount 3051C   4–20 dc Input Signal for Rosemount 3051S

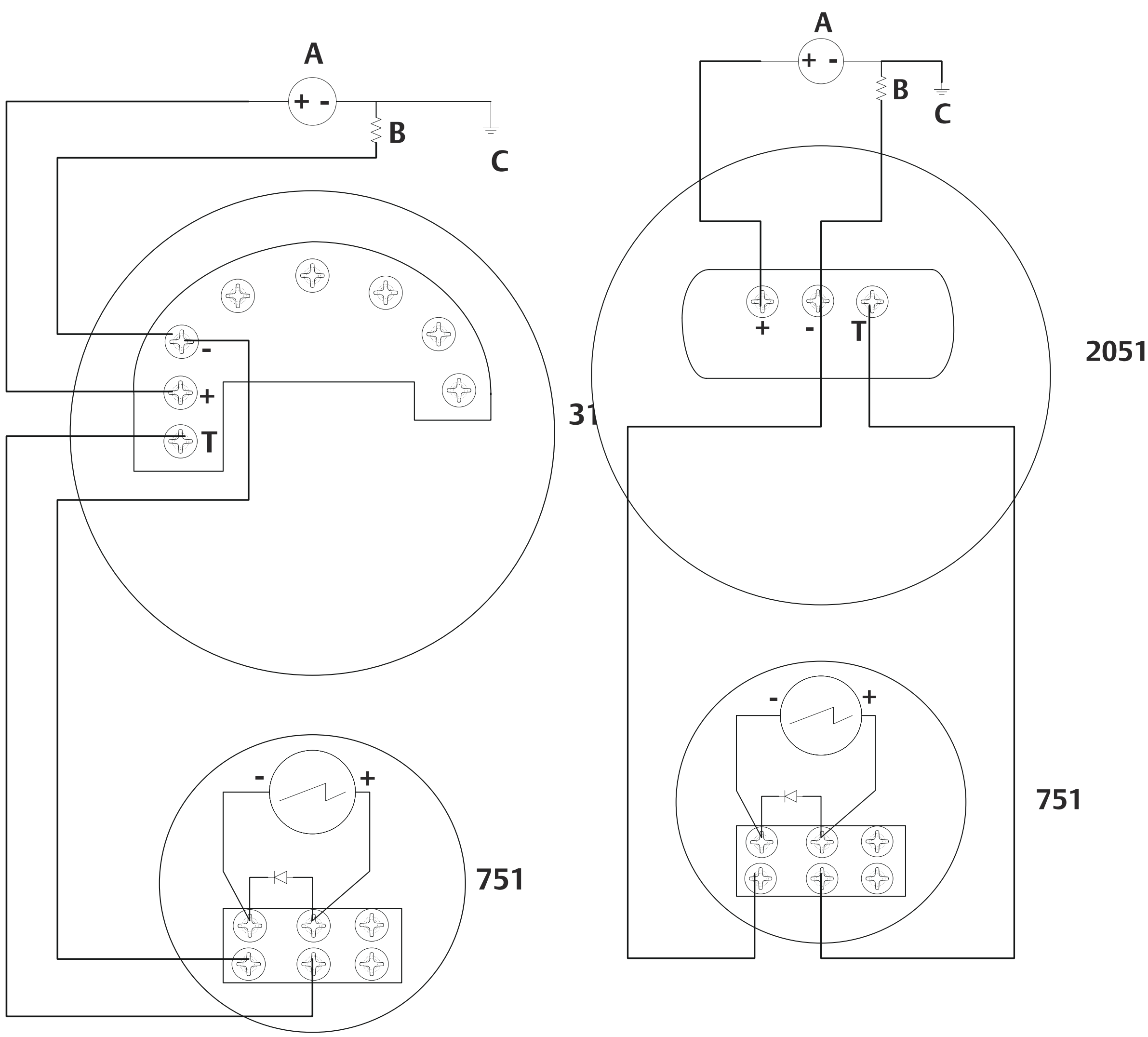
A. Power supply
B. Load resistor
C. Optional ground

Parallel configuration

It is recommended that the device be wired in a parallel configuration when the 4-20 mA transmitter includes a test terminal. Utilization of the test terminal is required in a parallel configuration. Connecting the indicator across the positive and negative terminals of the 4-20 mA transmitter could impact the loop.

A parallel configuration will allow the removal of the indicator without affecting the integrity of the 4-20 mA loop. Additionally, spare indicators can be added without disrupting the loop.

Figure 2-5: Rosemount 751 Parallel Wiring Diagrams for Rosemount 3144P and 2051

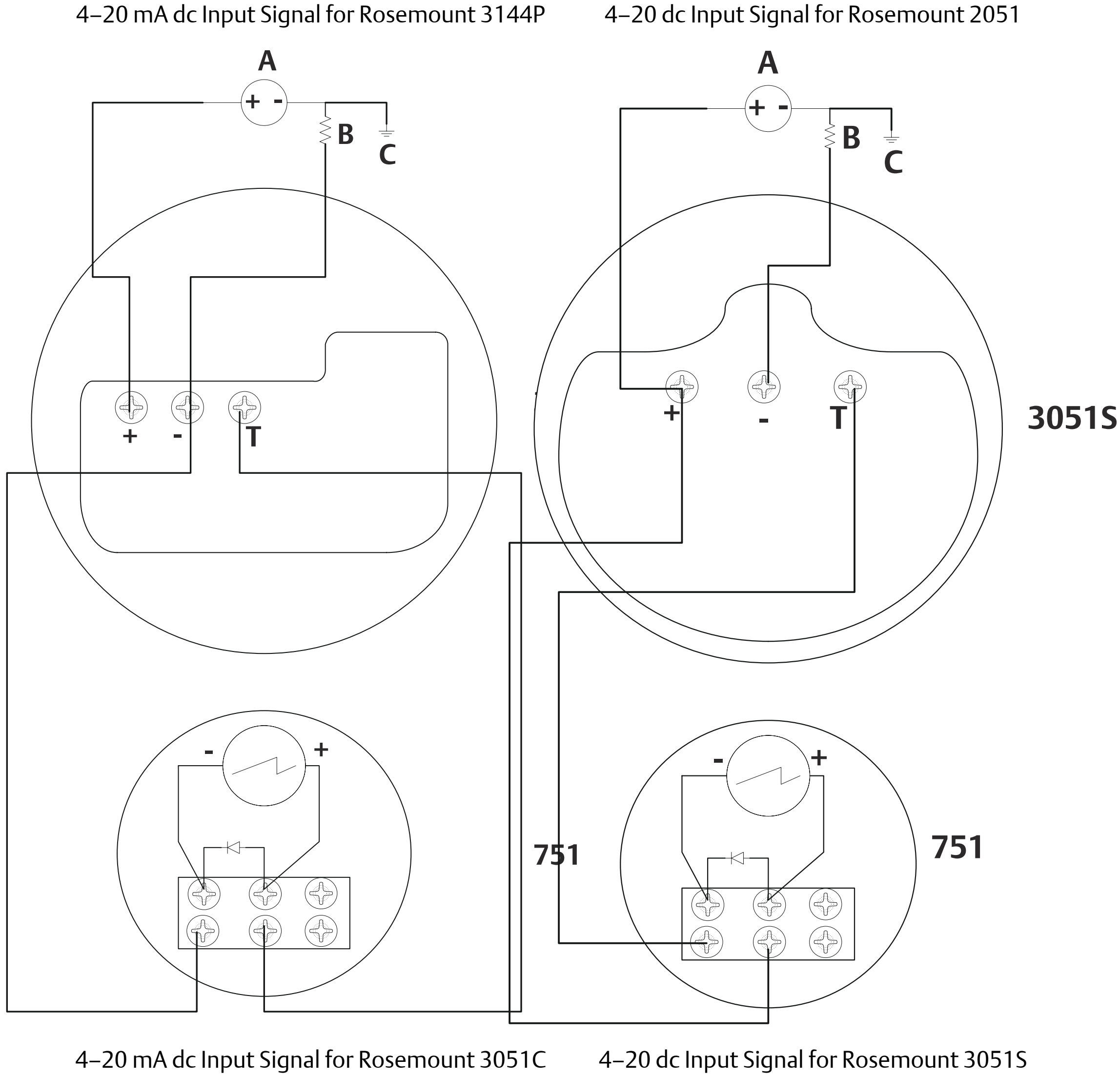


4–20 mA dc Input Signal for Rosemount 3051C

4–20 dc Input Signal for Rosemount 3051S

A. Power supply
B. Load resistor
C. Optional ground

Figure 2-6: Rosemount 751 Parallel Wiring Diagrams for Rosemount 3051C and 3051S



A. Power supply
B. Load resistor
C. Optional ground

2.3 LCD display configuration

The 20-segment bar graph is factory calibrated and represents 4–20 mA directly, but the end points of the LCD display are user-definable. The meter requires a current between 4 and 20 mA in order to be scaled, but the actual value of the current is not significant.

2.3.1 Remove the cover

⚠ WARNING

Explosions could result in death or serious injury. Do not remove the transmitter cover in explosive atmospheres when the circuit is live.

Procedure

Unscrew and remove the transparent housing cover from the LCD display body.

Note
The LCD display time-out is approximately 16 seconds. If you do not press the configuration buttons within 16 seconds, the indicator will revert to reading the current signal.

2.3.2 Position the decimal point and select the meter function

Procedure

1. Press the left and right configuration buttons simultaneously and release them immediately.
2. To move the decimal point to the desired location, press the left configuration button.

   Note
   The decimal point wraps around.

3. To scroll through the mode options, press the right configuration button repeatedly until the meter displays the desired mode (see Table 2-1).

   Note
   The LCD display time-out is approximately 16 seconds. If you do not press the configuration buttons within 16 seconds, the indicator will revert to reading the current signal.

Table 2-1: LCD Display Mode Options

Options	Relationship between Input Signal and Digital Display
Lin	Linear
LinF	Linear with 5-second filter
Srt	Square root
SrtF	Square root with 5-second filter
Square root function only relates to the digital display. The bar graph output remains linear with the current signal.	

Table 2-1: LCD Display Mode Options *(continued)*

Options	Relationship between Input Signal and Digital Display
Square root response The digital display will be proportional to the square root of the input current where 4 mA = 0 and 20 mA = 1.0, scaled per the calibration procedure. The transition point from linear to square root is at 25 percent of full scale flow.	
Filter response operates upon “present input” and “input received in the previous five second interval” in the following manner: Display = (0.75 previous input) + (0.25 present input) This relationship is maintained provided that the previous reading minus the present reading is less than 25 percent of full scale.	

2.3.3 Store the information

Procedure

Press both configuration buttons simultaneously for two seconds.

Note
The meter displays “- -” for approximately 7.5 seconds while the information is being stored.

2.3.4 Set the display equivalent to a 4 mA signal

Procedure

1. Press the **left** configuration button for two seconds.
2. To decrease the display numbers, press the left configuration button. To increase the numbers, press the right configuration button. Set the numbers between –999 and 1000.
3. To store the information, simultaneously press both configuration buttons for two seconds.

2.3.5 Set the display equivalent to a 20 mA signal

Procedure

1. Press the **right** configuration button for two seconds.
2. To decrease the display numbers, press the left configuration button. To increase the numbers, press the right configuration button. Set the numbers between –999 and 9999.

   Note
   The sum of the 4 mA point and the span must not exceed 9999.

3. To store the information, simultaneously press both configuration buttons for two seconds. The LCD display meter is now configured.

2.3.6 Replace the cover

Procedure

Make sure the rubber gasket is seated properly, and thread the transparent housing cover onto the LCD display meter body.

3 Ordering information, specifications, and drawings

To view current Rosemount 751 ordering information, specifications, and drawings, follow these steps:

Procedure

1. Go to Emerson.com/Rosemount/Rosemount 751 Field Signal Indicator.
2. Scroll as needed to the green menu bar and click Documents & Drawings.
3. For installation drawings, click Drawings & Schematics and select the appropriate document.
4. For ordering information, specifications, and dimensional drawings, click Data Sheets & Bulletins and select the appropriate Product Data Sheet.
5. For the Declaration of Conformity, click Certificates & Approvals and select the most current document.

00809-0100-4378
Rev. CF
2022

For more information: **www.emerson.com**

©2022 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. Rosemount is a mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

ROSEMOUNT™

EMERSON™

Product Data Sheet
February 2013
00813-0100-4001, Rev RA

Rosemount 3051 Pressure Transmitter

With the Rosemount 3051 Pressure Transmitter, you'll gain more control over your plant. You'll be able to reduce product variation and complexity as well as your total cost of ownership by leveraging one device across a number of pressure, level and flow applications. You'll have access to information you can use to diagnose, correct and even prevent issues. And with unparalleled reliability and experience, the Rosemount 3051 is the industry standard that will help you perform at higher levels of efficiency and safety so you can remain globally competitive.

ROSEMOUNT

EMERSON.
Process Management

The Proven Industry Leader in Pressure Measurement

- Best-in-Class performance with 0.04% reference accuracy
- Coplanar™ platform enables integrated pressure, flow and level solutions
- IEC 62591 (WirelessHART™) Protocol enables cost effective installations
- Power Advisory Diagnostics provide predictive visibility to the health of your entire electrical loop
- Local Operator Interface (LOI) offers easy to use configuration capabilities at the transmitter
- Selectable HART™ Revision prepares your plant for the latest HART capabilities while ensuring seamless integration with today's systems
- SIL2 safety certification to IEC 61508 is available with the full HART offering to simplify compliance
- Over 20 years of backwards compatibility allows you to invest in the latest features without adding complexity to your plant

Setting the standard for pressure measurement

Proven best-in-class performance, reliability and safety

- Over 7 million installed
- Meet your application needs with extensive offering
- Real world total performance of ±0.14%
- Reference accuracy of ±0.04%

Flow

Pressure

Level

Maximize Installation Flexibility with Coplanar Platform

- Improve reliability and performance with integrated DP Flowmeters, DP Level and manifolds
- Easy installation with all solutions fully assembled, leak-tested and calibrated
- Meet your application needs with an unsurpassed offering

Table of Contents

Ordering information

Rosemount 3051C Coplanar Pressure Transmitter 4
Rosemount 3051T In-Line Pressure Transmitter 11
~~Rosemount 3051CF Flowmeter Series . . . . 17~~
~~Rosemount 3051L Level Transmitter . . . . 36~~
Specifications 42
Product Certifications 53
Standard 3051 Dimensional Drawings 60
Enhanced 3051 Dimensional Drawings 71

Industry Leading Capabilities Extended to IEC 62591 (WirelessHART)

- Cost effectively implement wireless on the industry's most proven platform
- Optimize safety with the industry's only intrinsically safe Power Module
- Eliminate wiring design and construction complexities to lower costs by 40-60%
- Quickly deploy new pressure, level and flow measurements in 70% less time

Innovative, Integrated DP Flowmeters

- Fully assembled, configured, and leak tested for out-of-the-box installation
- Reduce straight pipe requirements, lower permanent pressure loss and achieve accurate measurement in small line sizes
- Up to 1.65% volumetric flow accuracy at 8:1 turndown

Proven, Reliable and Innovative DP Level Technologies

- Connect to virtually any process with a comprehensive offering of process connections, fill fluids, direct mount or capillary connections and materials
- Quantify and optimize total system performance with QZ option
- Operate at higher temperature and in vacuum applications
- Optimize level measurement with cost efficient Tuned-System™ Assemblies

Instrument Manifolds – Quality, Convenient, and Easy

- Designed and engineered for optimal performance with Rosemount transmitters
- Save installation time and money with factory assembly
- Offers a variety of styles, materials and configurations

Rosemount 3051C Coplanar Pressure Transmitter

3051C Coplanar
Pressure Transmitter

This ordering table contains the following Rosemount 3051C configurations:

Configuration	Transmitter Output Code
4-20 mA HART -3051 -Enhanced 3051(1)	A
FOUNDATION™ fieldbus	F
PROFIBUS® PA	W
Wireless	X

(1) The enhanced 4-20 mA HART device can be ordered with Transmitter Output option code A plus any of the following new option codes: DA0, M4, QT, DZ, CR, CS, CT, HR5, HR7.

See Specifications and Options for more details on each configuration.

Additional Information

Specifications: page 42
Certifications: page 53
Dimensional Drawings: page 60

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type			
3051C	Coplanar Pressure Transmitter			
Measurement Type				
Standard				Standard
D	Differential			★
G	Gage			★
Expanded				
A(1)	Absolute			
Pressure Range				
	3051CD	3051CG	3051CA	
Standard				Standard
1	−25 to 25 inH_2O (−62.2 to 62.2 mbar)	−25 to 25 inH_2O (−62,1 to 62.2 mbar)	0 to 30 psia (0 to 2.1 bar)	★
2	−250 to 250 inH2O (−623 to 623 mbar)	−250 to 250 inH_2O (−621 to 623 mbar)	0 to 150 psia (0 to 10.3 bar)	★
3	−1000 to 1000 inH_2O (−2.5 to 2.5 bar)	−393 to 1000 inH_2O (−0.98 to 2.5 bar)	0 to 800 psia (0 to 55.2 bar)	★
4	−300 to 300 psi (−20.7 to 20.7 bar)	−14.2 to 300 psi (−0.98 to 20.7 bar)	0 to 4000 psia (0 to 275.8 bar)	★
5	−2000 to 2000 psi (−137.9 to 137.9 bar)	−14.2 to 2000 psi (−0.98 to 137.9 bar)	Not Applicable	★
Expanded				
0(2)	−3 to 3 inH_2O (−7.5 to 7.5 mbar)	Not Applicable	Not Applicable	
Transmitter Output				
Standard				Standard
A(3)	4–20 mA with Digital Signal Based on HART Protocol			★
F	FOUNDATION fieldbus Protocol			★
W(4)	PROFIBUS PA Protocol			★
X(5)	Wireless			★

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Materials of Construction				
	Process Flange Type	Flange Material	Drain/Vent	
Standard				Standard
2	Coplanar	SST	SST	★
3(6)	Coplanar	Cast C-276	Alloy C-276	★
4	Coplanar	Cast Alloy 400	Alloy 400/K-500	★
5	Coplanar	Plated CS	SST	★
7(6)	Coplanar	SST	Alloy C-276	★
8(6)	Coplanar	Plated CS	Alloy C-276	★
0	Alternate Process Connection			★
Isolating Diaphragm				
Standard				Standard
2(6)	316L SST			★
3(6)	Alloy C-276			★
Expanded				
4(7)	Alloy 400			
5(7)	Tantalum (Available on 3051CD and CG, Ranges 2–5 only. Not available on 3051CA)			
6(7)	Gold-plated Alloy 400 (Use in combination with O-ring Option Code B.)			
7(7)	Gold-plated SST			
O-ring				
Standard				Standard
A	Glass-filled PTFE			★
B	Graphite-filled PTFE			★
Sensor Fill Fluid				
Standard				Standard
1	Silicone			★
2(7)	Inert (Differential and Gage only)			★
Housing Material			**Conduit Entry Size**	
Standard				Standard
A	Aluminum		½–14 NPT	★
B	Aluminum		M20 × 1.5	★
J	SST		½–14 NPT	★
K	SST		M20 × 1.5	★
P(8)	Engineered Polymer		No Conduit Entries	★
Expanded				
D	Aluminum		G½	
M	SST		G½	

Wireless options (Requires Wireless output code X and Engineered Polymer housing code P)

Wireless Transmit Rate, Operating Frequency and Protocol		
Standard		Standard
WA3	User Configurable Transmit Rate, 2.4GHz WirelessHART	★
Antenna and SmartPower		
Standard		Standard
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Options (Include with selected model number)

Plantweb Control Functionality		
Standard		Standard
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
Plantweb Diagnostic Functionality		
Standard		Standard
DA0(9)(10)	Power Advisory HART Diagnostic	★
D01	FOUNDATION fieldbus Diagnostics Suite	★
Alternate Flange(11)		
Standard		Standard
H2	Traditional Flange, 316 SST, SST Drain/Vent	★
H3(6)	Traditional Flange, Alloy C, Alloy C-276 Drain/Vent	★
H4	Traditional Flange, Cast Alloy 400, Alloy 400/K-500 Drain/Vent	★
H7(6)	Traditional Flange, 316 SST, Alloy C-276 Drain/Vent	★
HJ	DIN Compliant Traditional Flange, SST, $^1/_{16}$ in. Adapter/Manifold Bolting	★
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	★
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	★
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	★
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	★
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	★
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	★
Expanded		
HK(12)	DIN Compliant Traditional Flange, SST, 10 mm Adapter/Manifold Bolting	
HL	DIN Compliant Traditional Flange, SST, 12mm Adapter/Manifold Bolting (Not available on 3051CD0)	
Manifold Assembly(12)(13)		
Standard		Standard
S5	Assemble to Rosemount 305 Integral Manifold	★
S6	Assemble to Rosemount 304 Manifold or Connection System	★
Integral Mount Primary Element(12)(13)		
Standard		Standard
S3	Assemble to Rosemount 405 Compact Orifice Plate	★
S4(14)	Assemble to Rosemount Annubar® or Rosemount 1195 Integral Orifice	★
Seal Assemblies(13)		
Standard		Standard
S1(15)	Assemble to one Rosemount 1199 seal	★
S2(16)	Assemble to two Rosemount 1199 seals	★
S7	One Seal, All-Welded System (Capillary Connection Type)	
S8	Two Seals, All-Welded System (Capillary Connection Type)	
S9	Two Seals, All-Welded System (One Direct Mount and One Capillary Connection Type)	
S0	One Seal, All-Welded System (Direct Mount Connection Type)	

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Mounting Bracket[17]		
Standard		Standard
B1	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	★
B2	Traditional Flange Bracket for Panel Mounting, CS Bolts	★
B3	Traditional Flange Flat Bracket for 2-in. Pipe Mounting, CS Bolts	★
B4	Coplanar Flange Bracket for 2-in. Pipe or Panel Mounting, all SST	★
B7	B1 Bracket with Series 300 SST Bolts	★
B8	B2 Bracket with Series 300 SST Bolts	★
B9	B3 Bracket with Series 300 SST Bolts	★
BA	SST B1 Bracket with Series 300 SST Bolts	★
BC	SST B3 Bracket with Series 300 SST Bolts	★
Product Certifications		
Standard		Standard
E8	ATEX Flameproof and Dust Certification	★
I1[18]	ATEX Intrinsic Safety and Dust	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION fieldbus protocol only	★
N1	ATEX Type n Certification and Dust	★
K8	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E4[19]	TIIS Flame-proof	★
I4[20]	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-Proof	★
I5[21]	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6 [8]	CSA Intrinsic Safety	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n Certification	★
K7	IECEx Flame-proof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Instrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KB	FM and CSA Explosion-proof, Dust Ignition Proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Drinking Water Approval		
Standard		Standard
DW[22]	NSF drinking water approval	★
Shipboard Approvals		
Standard		Standard
SBS[7]	American Bureau of Shipping	★
Custody Transfer		
Standard		Standard
C5[9]	Measurement Canada Accuracy Approval *(Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative)*	★

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Bolting Material		
Standard		Standard
L4	Austenitic 316 SST Bolts	★
L5	ASTM A 193, Grade B7M Bolts	★
L6	Alloy K-500 Bolts	★
Display and Interface Options		
Standard		Standard
M4[23]	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Calibration Certificate		
Standard		Standard
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration certification and tamper evident seal	★
Material Traceability Certification		
Standard		Standard
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		Standard
QS[24]	Prior-use certificate of FMEDA data	★
QT[9][10]	Safety certified to IEC 61508 with certificate of FMEDA	★
Configuration Buttons		
Standard		Standard
D4[9]	Analog Zero and Span	★
DZ[25]	Digital Zero Trim	★
Transient Protection		
Standard		Standard
T1[7][26]	Transient Protection Terminal Block	★
Software Configuration		
Standard		Standard
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 for wired and 00806-0100-4100 for Wireless required with order)	★
Gage Pressure Calibration		
Standard		Standard
C3	Gage Calibration (Model 3051CA4 only)	★
Alarm Levels		
Standard		Standard
C4[9][26]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN[9][26]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm Low	★
CR[9][10]	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS[9][10]	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT[9][10]	Low alarm (standard Rosemount alarm and saturation levels)	★
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	

Table 1. 3051C Coplanar Pressure Transmitters Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Cleaning Process Area		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
Pressure Calibration		
Expanded		
P4	Calibrate at Line Pressure *(Specify Q48 on order for corresponding certificate)*	
High Accuracy		
Standard		Standard
P8(27)	0.04% Accuracy to 5:1 turndown (Range 2-4)	★
Flange Adapters		
Standard		Standard
DF(28)	1/2-14 NPT flange adapter(s)	★
Vent/Drain Valves		
Expanded		
D7	Coplanar Flange Without Drain/Vent Ports	
Conduit Plug		
Standard		Standard
DO(7)(29)	316 SST Conduit Plug	★
RC1/4 RC1/2 Process Connection		
Expanded		
D9(30)	RC ¼ Flange with RC ½ Flange Adapter - SST	
Max Static Line Pressure		
Standard		Standard
P9	4500 psig (310 bar) Static Pressure Limit (3051CD Ranges 2–5 only)	★
Ground Screw		
Standard		Standard
V5(7)(31)	External Ground Screw Assembly	★
Surface Finish		
Standard		Standard
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		Standard
QZ	Remote Seal System Performance Calculation Report	★
Conduit Electrical Connector		
Standard		Standard
GE(7)	M12, 4-pin, Male Connector (eurofast®)	★
GM(7)	A size Mini, 4-pin, Male Connector (minifast®)	★
HART Revision Configuration		
Standard		Standard
HR5(9)(10)(32)	Configured for HART Revision 5	★
HR7(9)(10) (33)	Configured for HART Revision 7	★
Typical Model Number: 3051CD 2 A 2 2 A 1 A B4		

(1) Wireless output (Code X) available in absolute measurement type (Code A) with only range 1-4, 316L SST isolating diaphragm material (Code 2), silicone fill fluid (Code 1), and housing code (Code P).

(2) *3051CD0 is available only with Output Code A and X. Output Code A only available with Process Flange Code 0 (Alternate Flange H2, H7, HJ, or HK), Isolating Diaphragm Code 2, O-ring Code A, and Bolting Option L4. Output Code X and draft range 0 only available with Silicone Fill Fluid Code 1 and Process Flange Code 0 (Alternate Flange H2), Isolating Diaphragm Code 2, O-ring Code A, and Bolting Option L4.*

(3) HART Revision 5 is the default HART output. The Enhanced 3051 can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.

(4) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(5) Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(6) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(7) Not Available with Wireless output (output code X).

(8) Only available with Wireless output (output code X).

(9) Only available with HART 4-20 mA output (output code A).

(10) Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.

(11) Requires 0 code in Materials of Construction for Alternate Process Connection.

(12) Not valid with optional code P9 for 4500 psi Static Pressure.

(13) "Assemble-to" items are specified separately and require a completed model number.

(14) Process Flange limited to Coplanar (codes 2, 3, 5, 7, 8) or Traditional (H2, H3, H7).

(15) Not valid with optional code D9 for RC$^1/_2$ Adaptors.

(16) Not valid for optional codes DF and D9 for Adaptors.

(17) Panel mounting bolts are not supplied.

(18) Dust approval not applicable to output code X. See "IEC 62591 (WirelessHART Protocol)" on page 59 for wireless approvals.

(19) Available only with output codes A - 4-20 mA HART and F - FOUNDATION fieldbus.

(20) Available only with 3051CD and 3051CG and output code A - 4-20 mA HART.

(21) Only Intrinsically Safe available with Wireless.

(22) Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).

(23) Not available with FOUNDATION fieldbus (output code F) or Wireless (output code X).

(24) Only Available with Standard Rosemount 3051 4-20mA HART (output code A).

(25) Only available with HART 4-20 mA output (output code A) and Wireless output (output code X)

(26) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field for the standard 3051.

(27) Only available with Standard 3051. See specification section for more information.

(28) Not valid with Alternate Process Connection options S3, S4, S5, and S6.

(29) Transmitter is shipped with a 316 SST Conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(30) Not available with Alternate Process Connection; DIN Flanges and Level Flanges.

(31) The V5 options is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(32) Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.

(33) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Rosemount 3051T In-Line Pressure Transmitter

3051T In-Line
Wireless Pressure Transmitter

3051TG1A2B21AM4Q4

This ordering table contains the following Rosemount 3051T configurations:

Configuration	Transmitter Output Code
4-20 mA HART® -3051 -Enhanced 3051(1)	A
FOUNDATION™ fieldbus	F
PROFIBUS PA	W
Wireless	X

(1) The enhanced 4-20 mA HART device can be ordered with Transmitter Output option code A plus any of the following new option codes: DA0, M4, QT, DZ, CR, CS, CT, HR5, HR7.

See Specifications and Options for more details on each configuration.

Additional Information

Specifications: page 42
Certifications: page 53
Dimensional Drawings: page 60

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter Type		
3051T	In-Line Pressure Transmitter		
Pressure Type			
Standard			Standard
G	Gage		★
A(1)	Absolute		★
Pressure Range			
	3051TG(2)	**3051TA**	
Standard			Standard
1	-14.7 to 30 psi (-1.0 to 2.1 bar)	0 to 30 psia (0 to 2.1 bar)	★
2	-14.7 to 150 psi (-1.0 to 10.3 bar)	0 to 150 psia (0 to 10.3 bar)	★
3	-14.7 to 800 psi (-1.0 to 55 bar)	0 to 800 psia (0 to 55 bar)	★
4	-14.7 to 4000 psi (-1.0 to 276 bar)	0 to 4000 psia (0 to 276 bar)	★
5	-14.7 to 10000 psi (-1.0 to 689 bar)	0 to 10000 psia (0 to 689 bar)	★
Transmitter Output			
Standard			Standard
A(3)	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★
W(4)	PROFIBUS PA Protocol		★
X(5)	Wireless		★
Process Connection Style			
Standard			Standard
2B	1/2–14 NPT Female		★
2C(6)	G½ A DIN 16288 Male (Available in SST for Range 1–4 only)		★
Expanded			
2F(7)	Coned and Threaded, Compatible with Autoclave Type F-250-C (Range 5 only)		
61(7)	Non-threaded Instrument flange (Range 1-4 only)		

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ **The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.**
The Expanded offering is subject to additional delivery lead time.

Isolating Diaphragm		**Process Connection Wetted Parts Material**	
Standard			Standard
2(8)	316L SST	316L SST	★
3(8)	Alloy C-276	Alloy C-276	★
Sensor Fill Fluid			
Standard			Standard
1	Silicone		★
2(7)	Inert		★
Housing Material		**Conduit Entry Size**	
Standard			Standard
A	Aluminum	½–14 NPT	★
B	Aluminum	M20 × 1.5	★
J	SST	½–14 NPT	★
K	SST	M20 × 1.5	★
P(9)	Engineered polymer	No conduit entries	★
Expanded			
D	Aluminum	G½	
M	SST	G½	

Wireless options (Requires Wireless output code X and Engineered Polymer housing code P)

Wireless Transmit Rate, Operating Frequency and Protocol		
Standard		Standard
WA3	User Configurable Transmit Rate, 2.4GHz WirelessHART	★
Antenna and SmartPower		
Standard		Standard
WP5	Internal Antenna, Compatible with Green Power Module (I.S. Power Module Sold Separately)	★

Options (Include with selected model number)

PlantWeb Control Functionality		
Standard		Standard
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
PlantWeb Diagnostic Functionality		
Standard		Standard
DA0(10)(17)	Power Advisory HART Diagnostic	★
D01	FOUNDATION fieldbus Diagnostics Suite	★
Integral Assembly		
Standard		Standard
S5(11)	Assemble to Rosemount 306 Integral Manifold	★
Diaphragm Seal Assemblies		
Standard		Standard
S1(11)	Assemble to one Rosemount 1199 seal	★
Mounting Bracket(12)		
Standard		Standard
B4	Bracket for 2-in. Pipe or Panel Mounting, All SST	★

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Product Certifications		
Standard		Standard
E8	ATEX Flameproof and Dust Certification	★
I1(13)	ATEX Intrinsic Safety and Dust	★
IA	ATEX Intrinsic Safety for FISCO; for FOUNDATION fieldbus protocol only	★
N1	ATEX Type n Certification and Dust	★
K8	ATEX Flame-proof, Intrinsic Safety, Type n, Dust (combination of E8, I1 and N1)	★
E4	TIIS Flameproof	★
I4	TIIS Intrinsic Safety	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5(14)	FM Intrinsically Safe, Division 2	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION fieldbus protocol only	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I6 (9)	CSA Intrinsic Safety	★
K6	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
E7	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Type n Certification	★
K7	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
Drinking Water Approval		
Standard		Standard
DW(15)	NSF drinking water approval	★
Shipboard Approvals		
Standard		Standard
SBS(7)	American Bureau of Shipping	★
Custody Transfer		
Standard		Standard
C5	Measurement Canada Accuracy Approval *(Limited availability depending on transmitter type and range. Contact an Emerson Process Management representative)*	★
Calibration Certification		
Standard		Standard
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration Certification and tamper evident seal	★
Material Traceability Certification		
Standard		Standard
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
Standard		Standard
QS(16)	Prior-use certificate of FMEDA Data	★
QT(10)(17)	Safety certified to IEC 61508 with certificate of FMEDA	★

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

★ **The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.**
The Expanded offering is subject to additional delivery lead time.

Configuration Buttons		
Standard		Standard
D4(17)	Analog Zero and Span	★
DZ(18)	Digital Zero Trim	★
Display and Interface Options		
Standard		Standard
M4(19)	LCD Display with Local Operator Interface	★
M5	LCD Display	★
Wireless SST Sensor Module		
Standard		Standard
WSM(9)	Wireless SST Sensor Module	★
Conduit Plug		
Standard		Standard
DO(7)(20)	316 SST Conduit Plug	★
Transient Terminal Block		
Standard		Standard
T1(7)(21)	Transient Protection Terminal Block	★
Software Configuration		
Standard		Standard
C1(18)	Custom Software Configuration (Completed CDS 00806-0100-4001 for wired and 00806-0100-4100 for wireless required with order)	★
Alarm Levels		
Standard		Standard
C4(17)(22)	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN(17)(22)	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Low Alarm	★
CR(10)(17)	Custom alarm and saturation signal levels, high alarm (requires C1 and Configuration Data Sheet)	★
CS(10)(17)	Custom alarm and saturation signal levels, low alarm (requires C1 and Configuration Data Sheet)	★
CT(10)(17)	Low alarm (standard Rosemount alarm and saturation levels)	★
Pressure Testing		
Expanded		
P1	Hydrostatic Testing with Certificate	
Cleaning Process Area(23)		
Expanded		
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
High Accuracy		
Standard		Standard
P8(24)	0.04% Accuracy to 5:1 turndown (Range 2-4)	★
Ground Screw		
Standard		Standard
V5(7)(25)	External Ground Screw Assembly	★
Surface Finish		
Standard		Standard
Q16	Surface finish certification for sanitary remote seals	★
Toolkit Total System Performance Reports		
Standard		Standard
QZ	Remote Seal System Performance Calculation Report	★

Table 2. 3051T In-Line Pressure Transmitter Ordering Information

**★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.**

Conduit Electrical Connector		
Standard		Standard
GE(7)	M12, 4-pin, Male Connector (eurofast®)	★
GM(7)	A size Mini, 4-pin, Male Connector (minifast®)	★
HART Revision Configuration		
Standard		
HR5(10)(17)(26)	Configured for HART Revision 5	★
HR7(10)(17)(27)	Configured for HART Revision 7	★
Typical Model Number:	**3051T G 5 F 2A 2 1 A B4**	

(1) Wireless output (code X) only available in absolute measurement type (code A) in range 1-5 with 1/2 14 NPT process connection (code 2B), and housing code (code P).

(2) 3051TG lower range limit varies with atmospheric pressure.

(3) HART Revision 5 is the default HART output. The Enhanced 3051 can be factory or field configured to HART Revision 7. To order HART Revision 7 factory configured, add option code HR7.

(4) Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.

(5) Available approvals are FM Intrinsically Safe, (option code I5), CSA Intrinsically Safe (option code I6), ATEX Intrinsic Safety (option code I1), and IECEx Intrinsic Safety (option code I7).

(6) Wireless output (code X) only available in G1/2 A DIN 16288 Male process connection (code 2C) with range 1-4, 316 SST isolating diaphragm (code 2), silicone fill fluid (code 1) and housing code (code P).

(7) Not available with Wireless output (output code X).

(8) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

(9) Only available with Wireless output (output code X).

(10) Select Configuration Buttons (option code D4 or DZ) or Local Operator Interface (option code M4) if local configuration buttons are required.

(11) “Assemble-to” items are specified separately and require a completed model number.

(12) Panel mounting bolts are not supplied.

(13) Dust approval not applicable to output code X. See “IEC 62591 (WirelessHART Protocol)” on page 59 for wireless approvals.

(14) Only Intrinsically Safe available with Wireless.

(15) Not available with Alloy C-276 isolator (3 code), tantalum isolator (5 code), all cast C-276 flanges, all plated CS flanges, all DIN flanges, all Level flanges, assemble-to manifolds (S5 and S6 codes), assemble-to seals (S1 and S2 codes), assemble-to primary elements (S3 and S4 codes), surface finish certification (Q16 code), and remote seal system report (QZ code).

(16) Only Available with Standard Rosemount 3051 4-20mA HART.

(17) Only available with HART 4-20 mA output (output code A).

(18) Only available with HART 4-20 mA output (output code A) and Wireless output (output code X).

(19) Not available with FOUNDATION Fieldbus (output code F) and Wireless output (output code X)

(20) Transmitter is shipped with 316 SST conduit plug (uninstalled) in place of standard carbon steel conduit plug.

(21) The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA and IE.

(22) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field for the standard 3051.

(23) Not valid with Alternate Process Connection S5.

(24) Only available with Standard 3051. See specification section for more information.

(25) The V5 option is not needed with T1 option; external ground screw assembly is included with the T1 option.

(26) Configures the HART output to HART Revision 5. The device can be field configured to HART Revision 7 if needed.

(27) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Functional Specifications

Range and Sensor Limits

Table 7. 3051CD, 3051CG, 3051CF, and 3051L Range and Sensor Limits

Range	Minimum Span	Range and Sensor Limits				
			Lower (LRL)			
	3051CD, 3051CG, 3051CF, 3051L	Upper (URL)	3051CD Differential 3051CF Flowmeters	3051CG Gage(1)	3051L Differential	3051LGage(1)
0 (2) (3)	0.10 inH_2O (0,25 mbar)	3.00 inH_2O (25,00 mbar)	-3.00 inH_2O (-7,47 mbar)	NA	NA	NA
1(3)	0.50 inH_2O (1,2 mbar)	25.00 inH_2O (62,16 mbar)	-25.00 inH_2O (-62,1 mbar)	-25.00 inH_2O (-62,1 mbar)	NA	NA
2(3)	1.67 inH_2O (4,14 mbar)	250.00 inH_2O (621,60 mbar)	-250.00 inH_2O (-0,62 bar)	-250.00 inH_2O (-0,62 bar)	-250.00 inH_2O (-621,60 bar)	-250.00 inH_2O (-621,60 bar)
3(3)	6.67 inH_2O (16,58 mbar)	1000.00 inH_2O (2,49 bar)	-1000.00 inH_2O (-2,49 bar)	0.50 psia (34,47 mbar abs)	-1000.00 inH_2O (-2,49 bar)	0.50 psia (34,47 mbar abs)
4(3)	2.00 psi (137,90 mbar)	300.00 psi (20,68 bar)	-300.00 psi (-20,68 bar)	0.50 psia (34,47 mbar abs)	-300.00 psi (-20,68 bar)	0.50 psia (34,47 mbar abs)
5(3)	13.33 psi (919,30 bar)	2000.00 psi (137,90 bar)	- 2000.00 psi (-137,90 bar)	0.50 psia (34,47 mbar abs)	NA	NA

(1) Assumes atmospheric pressure of -14.7 psig.

(2) Range 0 only available with 3051CD. Range 1 only available with 3051CD, 3051CG, or 3051CF. Range 5 not available with 3051L Differential and 3051 Gage.

(3) inH_2O referenced at 68 degrees Fahrenheit.

Service

Liquid, gas, and vapor applications

Table 8. 3051CA and 3051T Range and Sensor Limits

Range	3051CA			Range	3051T			
		Range and Sensor Limits				Range and Sensor Limits		
	Minimum Span	Upper (URL)	Lower (LRL)		Minimum Span	Upper (URL)	Lower (LRL)	Lower(1) (LRL) (Gage)
1	0.33 psia (20,68 mbar)	30.00 psia (2,07 bar)	0 psia (0 bar)	1	0.33 psi (20,68 mbar)	30.00 psi (2,07 bar)	0 psia (0 bar)	-14.70 psig (-1,01 bar)
2	1.00 psia (68,95 mbar)	150.00 psia (10,34 bar)	0 psia (0 bar)	2	1.00 psi (68,95 mbar)	150.00 psi (10,34 bar)	0 psia (0 bar)	-14.70 psig (-1,01 bar)
3	5.33 psia (367,27 bar)	800.00 psia (55,16 bar)	0 psia (0 bar)	3	5.33 psi (367,27 mbar)	800.00 psi (55,16 bar)	0 psia (0 bar)	-14.70 psig (-1,01 bar)
4	26.6 psia (1,84 bar)	4000.00 psia (275,79 bar)	0 psia (0 bar)	4	26.67 psi (1,83 bar)	4000.00 psi (275,79 bar)	0 psia (0 bar)	-14.70 psig (-1,01 bar)
				5	2000.00 psi (137,90 bar)	10000.00 psi (689,48 bar)	0 psia (0 bar)	-14.70 psig (-1,01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

4-20 mA HART (Output Code A)

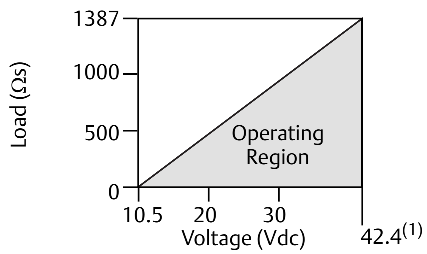
Power Supply

External power supply required. Standard transmitter (4-20mA) operates on 10.5-42.4 Vdc with no load

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Indication

Optional two line LCD/LOI Display

Zero and Span Adjustment Requirements

Zero and span values can be set anywhere within the range limits stated in Table 7 and Table 8.

Span must be greater than or equal to the minimum span stated in Table 7 and Table 8.

Output

Two-wire 4-20mA, user selectable for linear or square root output. Digital process variable superimposed on 4-20 mA signal, available to any host that conforms to HART protocol.

3051

Digital communications based on HART Revision 5 protocol.

Enhanced 3051

The enhanced 3051 comes with Selectable HART Revisions. Digital communications based on HART Revision 5 (default) or Revision 7 (option code HR7) protocol can be selected. The HART revision can be switched in the field using any HART based configuration tool or the optional local operator interface (LOI).

Enhanced 3051 Features

Power Advisory Diagnostics

Power Advisory Diagnostics proactively detect and notify you of degraded electrical loop integrity before it can affect your process operation. Example loop problems that can be detected include water in the terminal compartment, corrosion of terminals, improper grounding, and unstable power supplies.

The Device Dashboard presents the diagnostics in a graphical, task-based interface that provides single-click access to critical process/device information and descriptive graphical troubleshooting.

Local Operator Interface

The LOI utilizes a 2 button menu with internal and external configuration buttons. Internal buttons are always configured for Local Operator Interface. External Buttons can be configured for either LOI, (option code M4), Analog Zero and Span (option code D4) or Digital Zero Trim (option code DZ). See enhanced 3051 product manual (00809-0100-4007) for LOI configuration menu.

FOUNDATION fieldbus (Output code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Indication

Optional two line LCD display

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input Selector	30 milliseconds
Arithmetic	35 milliseconds
Signal Characterizer	40 milliseconds
Integrator	35 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

Contains hardware, electronics, and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

Configures the local display.

2 Analog Input Blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

Advanced Control Function Block Suite (Option Code A01)

Input Selector Block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first "good."

Arithmetic Block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal Characterizer Block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator Block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

FOUNDATION fieldbus Diagnostics Suite (Option Code D01)

The 3051C FOUNDATION fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indication. The integral statistical process monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The 3051C ASP algorithm uses these values and highly flexible configuration options for customization to many user-defined or application specific abnormal situations. The detection of plugged impulse lines is the first available predefined application.

PROFIBUS PA (Output Code W)

Profile Version

3.02

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Output Update Rate

Four times per second

Standard Function Blocks

Analog Input (AI Block)

The AI function block processes the measurements and makes them available to the host device. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement.

Physical Block

The physical block defines the physical resources of the device including type of memory, hardware, electronics and diagnostic information.

Transducer Block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

Indication

Optional two line LCD display

Local Operator Interface

The LOI utilizes a 2 button menu with external configuration buttons.

Wireless (Output Code X)

Output

IEC 62591 (WirelessHART), 2.4 GHz DSSS

Wireless Radio (Internal Antenna, WP5 Option)

- Frequency: 2.400 - 2.485 GHz
- Channels: 15
- Modulation: IEEE 802.15.4 compliant DSSS
- Transmission: Maximum of 10 dBm EIRP

Local Display

The optional 3-line, 7-digit LCD can display user-selectable information such as primary variable in engineering units, scaled variable, percent of range, sensor module temperature, and electronics temperature. The display updates based on the wireless update rate.

Digital Zero Trim

Digital Zero trim (option DZ) is an offset adjustment to compensate for mounting position effects, up to 5% of URL.

Update Rate

User selectable 1 sec. to 60 min.

Wireless Sensor Module for In-line Transmitters

The 3051 Wireless transmitter requires the engineered polymer housing to be selected. The standard sensor module will come with aluminum material. If stainless steel is required, the option WSM must be selected.

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT/PC enclosure. Ten-year life at one minute update rate.(1)

(1) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.

NOTE: Continuous exposure to ambient temperature limits of -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified life by less than 20 percent.

Overpressure Limits

Rosemount 3051CD/CG/CF

- Range 0: 750 psi (51,7 bar)
- Range 1: 2000 psig (137,9 bar)
- Ranges 2-5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,7 bar)
- Range 2: 1500 psia (103,4 bar)
- Range 3: 1600 psia (110,3 bar)
- Range 4: 6000 psia (413,7 bar)

Rosemount 3051TG/TA

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

For 3051L or Level Flange Option Codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table 9. 3051L and Level Flange Rating Limits

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature, per ANSI/ASME B16.5.			
DIN	PN 10-40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 248 °F (120 °C), the rating decreases with increasing temperature, per DIN 2401.			

Static Pressure Limit

Rosemount 3051CD Only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 3 bar) for Option Code P9).
Range 0: 0.5 psia and 750 psig (3, 4 bar and 51, 7 bar)
Range 1: 0.5 psia and 2000 psig (3, 4 bar and 137, 9 bar)

Burst Pressure Limits

3051C, 3051CF Coplanar or Traditional process flange

10000 psig (69 MPa)

3051T Inline

Ranges 1-4: 11000 psi (75,8 MPa)
Range 5: 26000 psig (179 MPa)

Failure Mode Alarm

HART 4-20 mA (Output option Code A)

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper/switch on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is configured to *standard, NAMUR-compliant,* or custom levels (see Alarm Configuration below). The values for each are as follows:

	High Alarm	Low Alarm
Default	≥ 21.75 mA	≤ 3.75 mA
NAMUR compliant(1)	≥ 22.5 mA	≤ 3.6 mA
Custom levels(2)	20.2 - 23.0 mA	3.4 - 3.8 mA

(1) Analog output levels are compliant with NAMUR recommendation NE 43, see option codes C4 or C5.

(2) Low alarm must be 0.1 mA less than low saturation and high alarm must be 0.1 mA greater than high saturation.

If the device is configured for HART7 Revision 7, failure information will be passed as a status along with the Process Variable.

Output Code F, W, and X

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

Temperature Limits

Ambient

-40 to 185 °F (-40 to 85 °C)
With LCD display(1) (2): -40 to 175 °F (-40 to 80 °C)

(1) For the standard 3051, LCD display may not be readable and LCD updates will be slower at temperatures below -22 °F (-30 °C).

(2) Wireless LCD display may not be readable and LCD updates will be slower at temperature below -4 °F (-20 °C).

Storage(1)

-50 to 230 °F (-46 to 110 °C)
With LCD display: -40 to 185 °F (-40 to 85 °C)
With Wireless Output: -40 °F to 185 °F (-40 °C to 85 °C)

(1) If storage temperature is above 85°C, perform a sensor trim prior to installation.

Process

At atmospheric pressures and above. See Table 10.

Table 10. 3051 Process Temperature Limits

3051CD, 3051CG, 3051CF, 3051CA	
Silicone Fill Sensor(1)	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C)(2)
with Traditional Flange	–40 to 300 °F (–40 to 149 °C)(2)(3)
with Level Flange	–40 to 300 °F (–40 to 149 °C)(2)
with 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C)(2)
Inert Fill Sensor(1)	–40 to 185 °F (–18 to 85 °C)(4)(5)
3051T (Process Fill Fluid)	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	–22 to 250 °F (–30 to 121 °C)(2)
3051L Low-Side Temperature Limits	
Silicone Fill Sensor(1)	–40 to 250 °F (–40 to 121 °C)(2)
Inert Fill Sensor(1)	0 to 185 °F (–18 to 85 °C)(2)
3051L High-Side Temperature Limits (Process Fill Fluid)	
Syltherm® XLT	–100 to 300 °F (–73 to 149 °C)
D.C. Silicone 704®	32 to 400 °F (0 to 205 °C)
D.C. Silicone 200	–40 to 400 °F (–40 to 205 °C)
Inert	–50 to 350 °F (–45 to 177 °C)
Glycerin and Water	0 to 200 °F (–18 to 93 °C)
Neobee M-20	0 to 400 °F (–18 to 205 °C)
Propylene Glycol and Water	0 to 200 °F (–18 to 93 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(3) 3051CD0 process temperature limits are –40 to 212 °F (–45 to 100 °C)

(4) 160 °F (71 °C) limit in vacuum service.

(5) Not available for 3051CA.

Humidity Limits

0–100% relative humidity

Turn-On Time

Performance within specifications less than 2.0 seconds (10.0 s for PROFIBUS PA protocol) after power is applied to the transmitter.(1)

(1) Does not apply to wireless option code X.

Volumetric Displacement

Less than 0.005 in^3 (0,08 cm^3)

Damping

4-20 mA HART

Enhanced 3051

Analog output response to a step input change is user-enterable from 0.0 to 60 seconds for one time constant. This software damping is in addition to sensor module response time.

Standard 3051

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

FOUNDATION fieldbus

Transducer block: 0.4 seconds fixed
AI Block: User configurable

PROFIBUS PA

AI Block only: User configurable

Physical Specifications

Electrical Connections

1/2–14 NPT, G1/2, and M20 × 1.5 conduit. The polymer housing (housing code P) has no conduit entries. *HART* interface connections fixed to terminal block for output code A and to 701P Power Module for Output Code X.

Process Connections

Rosemount 3051C

1/4–18 NPT on 2 1/8-in. centers
1/2–14 NPT on 2-, 2 1/8-, or 2 1/4-in. centers

Rosemount 3051L

High pressure side: 2-, 3-, or 4-in., ASME B 16.5 (ANSI) Class 150, 300 or 600 flange; 50, 80 or 100 mm, PN 40 or 10/16 flange
Low pressure side: 1/4–18 NPT on flange 1/2–14 NPT on adapter

Rosemount 3051T

1/2–14 NPT female.
A DIN 16288 Male (available in SST for Range 1–4 transmitters only)
Autoclave type F-250-C (Pressure relieved 9/16–18 gland thread; 1/4 OD high pressure tube 60° cone; available in SST for Range 5 transmitters only).

Rosemount 3051CF

For 3051CFA, see 00813-0100-4485 Rosemount 485 Annubar
For 3051CFC, see 00813-0100-4485 Rosemount 405 Compact Orifice Plate
For 3051CFP, see 00813-0100-4485 Rosemount 1195 Integral Orifice

Process-Wetted Parts

Drain/Vent Valves

316 SST, Alloy C-276, or Alloy 400 material (Alloy 400 not available with 3051L)

Process Flanges and Adapters

Plated carbon steel, SST cast CF-8M (cast version of 316 SST, material per ASTM-A743), C-Type cast alloy CW12MW, or cast alloy M30C

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

Isolating Diaphragm Material	3051CD 3051CG	3051T	3051CA
316L SST	•	•	•
Alloy C-276	•	•	•
Alloy 400	•		•
Tantalum	•		
Gold-plated Alloy 400	•		•
Gold-plated SST	•		•

Rosemount 3051L Process Wetted Parts

Flanged Process Connection (Transmitter High Side)

Process Diaphragms, Including Process Gasket Surface

316L SST, Alloy C-276, or Tantalum

Extension

CF-3M (Cast version of 316L SST, material per ASTM-A743), or Alloy C-276. Fits schedule 40 and 80 pipe.

Mounting Flange

Zinc-cobalt plated CS or SST

Reference Process Connection (Transmitter Low Side)

Isolating Diaphragms

316L SST or Alloy C-276

Reference Flange and Adapter

CF-8M (Cast version of 316 SST, material per ASTM-A743)

Non-Wetted Parts

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP 68
Housing Material Code P: PBT/PC with NEMA 4X and IP66/67/68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST, material per ASTM-A743)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy K-500

Sensor Module Fill Fluid

Coplanar uses Silicone or inert Halocarbon
In-line series uses silicone Fluorinert® FC-43

Process Fill Fluid (3051L only)

Syltherm XLT, D.C. Silicone 704,
D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Paint

Polyurethane

Cover O-rings

Buna-N
Silicone (for wireless option code X)

Power Module

Field replaceable, keyed connection eliminates the risk of incorrect installation, Intrinsically Safe Lithium-thionyl chloride Power Module with PBT enclosure.

Shipping Weights

Table 11. Transmitter Weights without Options[1]

Transmitter	Standard 3051 In lb. (kg)	Wireless In lb. (kg)
3051C	6.0 (2,7)	3.9 (1,8)
3051T	3.0 (1,4)	1.9 (0,86)
3051L	Table 12 on page 52	Table 12 on page 52

(1) Transmitter weights include the sensor module and housing only (aluminum for standard 3051 and polymer for wireless).

Table 12. 3051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb. (kg)	4-in. Ext. lb. (kg)	6-in. Ext. lb. (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
2-in., 600	15.3 (6,9)	—	—	—
3-in., 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table 13. Transmitter Option Weights

Code	Option	Add lb. (kg)
J, K, L, M	Stainless Steel Housing (T)	3.9 (1,8)
J, K, L, M	Stainless Steel Housing (C, L, H, P)	3.1 (1,4)
M4/M5	LCD display for wired transmitter	0.5 (0,2)
M5	LCD Display for Wireless Output	0.1 (0,04)
B4	SST Mounting Bracket for Coplanar Flange	1.0 (0,5)
B1, B2, B3	Mounting Bracket for Traditional Flange	2.3 (1,0)
B7, B8, B9	Mounting Bracket for Traditional Flange	2.3 (1,0)
BA, BC	SST Bracket for Traditional Flange	2.3 (1,0)
H2	Traditional Flange	2.4 (1,1)
H3	Traditional Flange	2.7 (1,2)
H4	Traditional Flange	2.6 (1,2)
H7	Traditional Flange	2.5 (1,1)
FC	Level Flange—3 in., 150	10.8 (4,9)
FD	Level Flange—3 in., 300	14.3 (6,5)
FA	Level Flange—2 in., 150	10.7 (4,8)
FB	Level Flange—2 in., 300	14.0 (6,3)
FP	DIN Level Flange, SST, DN 50, PN 40	8.3 (3,8)
FQ	DIN Level Flange, SST, DN 80, PN 40	13.7 (6,2)
WSM	SST Sensor Module	1.0 (0,45)
	Power Module (701PGNKF)	0.4 (0,18)

Product Certifications

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific
Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China
Emerson Process Management LTDA — Sorocaba, Brazil
Emerson Process Management (India) Pvt. Ltd. — Daman, India

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

HART Protocol

E5 Explosion-Proof and Dust Ignition Proof
Certificate No: 0T2H0.AE
Applicable Standards: FM Class 3600 – 1998, FM Class 3615 – 2006, FM Class 3810 – 2005, ANSI/NEMA 250 - 2003

Markings: Explosion-Proof for Class I, Division 1, Groups B, C, and D.

Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G; and Class III, Division 1.
T5 (Ta = -50 °C to +85 °C), Factory Sealed, Enclosure Type 4x

I5 Intrinsically Safe and Non-Incendive
Certificate No: 1Q4A4.AX
Applicable Standards: FM Class 3600 – 1998, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005
Markings: Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019 and 00375-1130 (When used with a Field Communicator);
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code: T4 (Ta = -50 °C to +70 °C), T5 (Ta = -50 °C to +40 °C), Enclosure Type 4x.

Special Conditions for Safe Use:

1.) The Model 3051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

2.) The Model 3051 transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

CSA international

All CSA hazardous location approved transmitters are certified to ANSI/ISA 12.27.01-2003.

C6 Explosionproof, Dust-Ignitionproof, Intrinsically Safe and Division 2
Certificate No.: 1053834
Applicable Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof for Class I, Division 1, Groups B, C and D. Dust-Ignitionproof for Class II and Class III, Division 1, Groups E, F and G.
Intrinsically safe for Class I, Division 1, Groups A, B, C and D when connected in accordance with Rosemount drawing 03031-1024. Temperature Code T3C.
Suitable for Class I, Division 2 Groups A, B, C, and D.
Enclosure type 4X, factory sealed. Single Seal (See Drawing 03031-1053).

European certifications

E8 ATEX Flame-Proof and Dust
Certification No.: KEMA00ATEX2013X, Baseefa11ATEX0275
Applicable Standards: EN60079-0: 2012, EN60079-1: 2007, EN60079-26: 2007, IEC 60079-0:2011, EN60079-31:2009
Markings: Ex II 1/2 G, Ex d IIC T6 (–50 ≤ Ta ≤ 65 °C) Ga/Gb,
Ex d IIC T5 (–50 ≤ Ta ≤ 80 °C) Ga/Gb,
Ex II D Ex ta IIIC T50°C T_{500} 60°C Da
CE 1180

Process Temp	Ambient Temp	Temp Class
-50 to 65	-50 to 65	T6
-50 to 80	-50 to 80	T5

Special Conditions for Safe Use (X):

1.) In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

2.) This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

3.) The capacitance of the wrap around label to the enclosure, 1.6E-9 F, exceeds the limit in Table 9 of IEC 60079-0. The user shall determine suitability for the specific application.

4.) Wait at least 2 minutes after powering down device before opening covers, when a hazardous atmosphere is present.

I1 ATEX Intrinsic Safety and Dust
Certificate No.: BAS 97ATEX1089X
Applicable Standards: IEC60079-0:2011, EN60079-11: 2012, EN60079-31: 2009,
Markings: Ex II 1 GD, Ex ia IIC T4 Ga (–60 ≤ Ta ≤ +70 °C),
Ex ia IIC T5 Ga (–60 ≤ Ta ≤ +40 °C)
Ex ta IIIC T50 °C T_{500} 60°C Da
IP66,
CE 1180

Table 14. Input Parameters

U_i = 30V
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 µF

Special Conditions for Safe Use (X):

1.) The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

2.) The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion if located in Zone 0.

N1 ATEX Non-incendive/Type n and Dust
Certification No.: BAS 00ATEX3105X
Applicable Standards: IEC60079-0:2011, EN60079-15:2010, EN60079-31:2009
Markings: Ex II 3 GD, Ex nA IIC Gc T5 (–40 ≤ Ta ≤ 70 °C),
Ex ta IIIC T50 °C T_{500} 60°C Da, IP66
CE 1180

Specific Conditions for Safe Use (X):

1.) The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-15. This must be taken into account when installing the apparatus.

2.) This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime. In case of repair, contact the manufacturer for more information on the dimensions of the flameproof joints.

Japanese certifications

E4 TIIS Flame-Proof

Markings: Ex d IIC T6

Certificate	Description
TC15850	3051C/D/1 4–20 mA HART — no meter
TC15851	3051C/D/1 4–20 mA HART — with meter
TC15854	3051T/G/1 4–20 mA HART, SST, Silicon — no meter
TC15855	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — no meter
TC15856	3051T/G/1 4–20 mA HART, SST, Silicon — with meter
TC15857	3051T/G/1 4–20 mA HART, Alloy C-276, Silicon — with meter

I4 TIIS Intrinsic Safety
Certification No.: TC16406
Markings: Ex ia IIC T4

IECEx certifications

E7 IECEx Flame-proof and Dust
Certification No.: IECEx KEM 09.0034X, IECEx BAS 10.0034
Applicable Standards: IEC60079-0:2011, IEC60079-1:2007, IEC60079-26:2006, IEC60079-31:2008
Markings: Ex d IIC T5...T6 Ga/Gb, T5 (-50 °C ≤ Ta ≤ 80 °C)/T6 (-50 °C ≤ Ta ≤ 65 °C), Ex ta IIIC T50°C T_{500}60°C Da

Process Temp	Ambient Temp	Temp Class
-50 to 65	-50 to 65	T6
-50 to 80	-50 to 80	T5

Conditions of Certification (X):

1.) This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

2.) For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

3.) The capacitance of the wrap around label to the enclosure, 1.6E-9 F, exceeds the limit in Table 9 of IEC 60079-0. The user shall determine suitability for the specific application.

4.) Wait at least 2 minutes after powering down device before opening covers, when a hazardous atmosphere is present.

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Applicable Standards: IEC60079-0:2011, IEC 60079-11: 2011
Markings: Ex ia IIC T5 Ga (-60°C ≤ Ta ≤ 40°C), Ex ia IIC T4 Ga (-60°C ≤ Ta ≤ 70°C)

Table 15. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 μF
L_i = 0

Conditions of Certification (X):

1.) If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by IEC 60079-11. This must be taken into account when installing the apparatus.

2.) The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

N7 IECEx Type 'n'
Certification No.: IECEx BAS 09.0077X
Applicable Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T5 Gc (-40 ≤ Ta ≤ 70 °C)

Conditions of Certification (X):

The apparatus is not capable of withstanding the 500V insulation test required by IEC 60079-15. This must be taken into account when installing the apparatus.

Inmetro certifications

E2 Flameproof
Certificate No: CEPEL 97.0073X (Mfg USA and Singapore)
Certificate No: CEPEL 07.1383X (Mfg Brazil)
Applicable Standards: IEC60079-0:2008, IEC60079-1:2009, IEC60079-26:2008, IEC60529:2009
Markings: Ex d IIC T6 Ga/Gb (-50°C ≤ T_a ≤ +65°C)
Ex d IIC T5 Ga/Gb (-50°C ≤ T_a ≤ +80°C)
IP66W

I2 Intrinsic Safety
Certificate No.: CEPEL 97.0072X (Mfg USA and Singapore)
Certificate No.: CEPEL 07.1412X (Mfg Brazil)
Applicable Standards: IEC60079-0:2008, IEC60079-11:2009, IEC60079-26:2008, IEC60529:2009
Markings: Ex ia IIC Ga T5 (-20°C ≤ T_a ≤ +40°C)
Ex ia IIC Ga T4 (-20°C ≤ T_a ≤ +70°C)
IP66W

Table 16. Input Parameters

U_i = 30 V
I_i = 200 mA
P_i = 0.9 W
C_i = 0.012 μF
L_i = Desprezivel

Specific Conditions for Safe Use (X):

See Certificate.

China certifications

E3 Flameproof and Dust
NEPSI Certificate No.: GYJ091065X
Applicable Standards: GB3836.1-2000, GB3836.4-2000,GB4208-1993, GB12476-2000
Markings: Ex d II C T5/T6, -50°~+80°C (T5), -50°~+65°C (T6), DIP A21 TA T90°C, IP66

Specific Conditions for Safe Use (X):

Refer to Appendix B of the Rosemount 3051 reference manual (00809-0100-4001).

I3 Intrinsic Safety and Dust
NEPSI Certificate No: GYJ091066X
Applicable Standards: GB3836.1-2000, GB3836.2-2000,GB4208-1993, GB12476-2000
Markings: Ex ia II C T4/T5, -60°~+40°C (T5), -60°~+70°C (T4), DIP A21 TA T80°C

Specific Conditions for Safe Use (X):

Refer to Appendix B of the Rosemount 3051 reference manual (00809-0100-4001).

N3 China Type n - Non-Sparking
NEPSI Certificate No.: GYJ101111X
Applicable Standards: GB3836.1-2000, GB3836.8-2003
Markings: Ex nA nL IIC T5 (-40 °C < TA < 70 °C)

Specific Conditions for Safe Use (X):
Refer to Appendix B of the Rosemount 3051 reference manual (00809-0100-4001).

Combinations of certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 – E5, I5

K6 – C6, E8, I1

K7 – E7, I7, N7

K8 – E8, I1, N1

KB – E5, I5, E6, C6

KD – E5, I5, E6, C6, E8, I1

Foundation™ Fieldbus and Profibus PA Protocols

Hazardous Locations Certifications

North American Certifications

FM Approvals

E5 Explosion-Proof and Dust Ignition Proof
Certificate No: 0T2H0.AE
Applicable Standards: FM Class 3600 – 1998, FM Class 3615 – 2006, FM Class 3810 – 2005, ANSI/NEMA 250 - 2003
Markings: Explosion-Proof for Class I, Division 1, Groups B, C, and D.
Dust-Ignition-Proof for Class II, Division 1, Groups E, F, G, and Class III, Division 1.
T5 (T_a = -50 °C to +85 °C), Factory Sealed, Enclosure Type 4x.

I5 Intrinsically Safe and Non-Incendive
Certificate No: 1Q4A4.AX
Applicable Standards: FM Class 3600 – 1998, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005
Markings: Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 03031-1019 and 00375-1130 (When used with a Field Communicator);
Non-incendive for Class I, Division 2, Groups A, B, C, and D.
Temperature Code: T4 (Ta = -50 °C to +60 °C), Enclosure Type 4x.

Special Conditions for Safe Use (X):

1.) The Model 3051 transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

2.) The Model 3051 transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

Canadian Standards Association (CSA)

All CSA hazardous approved transmitters are certified per ANSI/ISA 12.27.01-2003.

C6 Explosionproof, Dust-Ignitionproof, Intrinsically Safe and Division 2
Certificate No.: 1053834
Applicable Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof for Class I, Division 1, Groups B, C and D.
Dust-Ignitionproof for Class II and Class III, Division 1, Groups E, F and G.
Intrinsically safe for Class I, Division 1, Groups A, B, C and D when connected in accordance with Rosemount drawing 03031-1024.
Temperature Code T3C.
Suitable for Class I, Division 2 Groups A, B, C, and D.
Enclosure type 4X, factory sealed. Single Seal (See Drawing 03031-1053).

European Certifications

I1 ATEX Intrinsic Safety and Dust
Certificate No.: BAS 97ATEX1089X
Applicable Standards: IEC60079-0:2011, EN60079-11: 2012, EN60079-31: 2009,
Markings: Ex II 1 GD, Ex ia IIC T4 Ga (–60 ≤ Ta ≤ +60 °C),
Ex ta IIIC T50 °C T_{500} 60°C Da,
CE1180

Table 17. Input Parameters

U_i = 30V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 μF

Special Conditions for Safe Use (X):

1.) The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

2.) The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion if located in Zone 0.

IA ATEX FISCO Intrinsic Safety
Certificate No.: BAS 97ATEX1089X
Applicable Standards: IEC60079-0:2011, EN60079-11: 2012, EN60079-31: 2009,
Markings: Ex II 1 GD, Ex ia IIC T4 Ga (–60 ≤ Ta ≤ +60 °C),
Ex ta IIIC T50 °C T_{500} 60°C Da, Ui = 30 V Ii = 200 mA Pi = 0.9 W Ci = 0.012 μF, IP66,
CE1180

Table 18. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 μF
L_i = ≤ 10 μH

Special Conditions for Safe Use (X):

1.) The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-11. This must be taken into account when installing the apparatus.

2.) The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion if located in Zone 0.

N1 ATEX Non-incendive/Type n and Dust
Certification No.: BAS 00ATEX3105X
Applicable Standards: IEC60079-0:2011, EN60079-15:2010, EN60079-31:2009
Markings: Ex II 3 GD, Ex nA IIC Gc T5 (–40 ≤ Ta ≤ 70 °C),
Ex ta IIIC T50 °C T_{500} 60°C Da, IP66
CE

Special Conditions for Safe Use (X):

1.) The apparatus is not capable of withstanding the 500 V insulation test required by EN60079-15. This must be taken into account when installing the apparatus.

2.) This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime. In case of repair, contact the manufacturer for more information on the dimensions of the flameproof joints.

E8 ATEX Flameproof and Dust
Certification No.: KEMA00ATEX2013X, Baseefa11ATEX0275
Applicable Standards: EN60079-0: 2012, IEC60079-0:2011, EN60079-1:2007, EN60079-26:2007, EN60079-31:2009
Markings: Ⓔx II 1/2 G, Ex d IIC T6 (–50 ≤ Ta ≤ 65 °C) Ga/Gb, Ex d IIC T5 (–50 ≤ Ta ≤ 80 °C) Ga/Gb, Ⓔx II 1 D, Ex ta IIIC T50°C T_{500}60°C Da
CE1180

Process Temp	Ambient Temp	Temp Class
-50 to 65	-50 to 65	T6
-50 to 80	-50 to 80	T5

Special Conditions for Safe Use (X):

1.) In case of repair, contact the manufacturer for information on the dimensions of the flameproof joints.

2.) This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

3.) The capacitance of the wrap around label to the enclosure, 1.6E-9 F, exceeds the limit in Table 9 of IEC 60079-0. The user shall determine suitability for the specific application.

4.) Wait at least 5 minutes after powering down device before opening covers, when a hazardous atmosphere is present.

IECEx Certifications

I7 IECEx Intrinsic Safety
Certification No.: IECEx BAS 09.0076X
Applicable Standards: IEC60079-0:2011, IEC 60079-11:2011
Markings: Ex ia IIC T4 Ga (-60°C ≤ Ta ≤ 60°C)

Table 19. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF
L_i = 0 µH

Special Conditions for Safe Use (X):

1.) If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500V insulation test required by IEC 60079-11. This must be taken into account when installing the apparatus.

2.) The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

E7 IECEx Flame-proof
Certification No.: IECEx KEM 09.0034X
Applicable Standards: IEC60079-0:2011, IEC60079-1:2007-04, IEC60079-26:2006,
Markings: Ex d IIC T5...T6 Ga/Gb, T5 (-50 °C ≤ Ta ≤ 80 °C)/T6 (-50 °C ≤ Ta ≤ 65 °C)

Process Temp	Ambient Temp	Temp Class
-50 to 65	-50 to 65	T6
-50 to 80	-50 to 80	T5

Special Conditions for Safe Use (X):

1.) This device contains a thin wall diaphragm. Installation, maintenance, and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.

2.) For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

3.) The capacitance of the wrap around label to the enclosure, 1.6E-9 F, exceeds the limit in Table 9 of IEC 60079-0. The user shall determine suitability for the specific application.

4.) Wait at least 5 minutes after powering down device before opening covers, when a hazardous atmosphere is present.

N7 IECEx Type 'n'
Certification No.: IECEx BAS 09.0077X
Applicable Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T5 Gc (-40 ≤ Ta ≤ 70 °C)

Special Conditions for Safe Use (X):

The apparatus is not capable of withstanding the 500V insulation test required by IEC 60079-15. This must be taken into account when installing the apparatus.

TIIS Certifications

E4 TIIS Flame-Proof
Ex d IIC T6

Certificate	Description
TC15852	3051C/D/1 FOUNDATION Fieldbus — no display
TC15853	3051C/D/1 FOUNDATION Fieldbus — with display
TC15858	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — no display
TC15859	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — no display
TC15860	3051T/G/1 FOUNDATION Fieldbus, SST, Silicon — with display
TC15861	3051T/G/1 FOUNDATION Fieldbus, Alloy C-276, Silicon — with display

Inmetro certifications

E2 Flameproof
Certificate No: CEPEL 97.0073X (Mfg USA and Singapore)
Certificate No: CEPEL 07.1383X (Mfg Brazil)
Applicable Standards: IEC60079-0:2008, IEC60079-1:2009, IEC60079-26:2008, IEC60529:2009
Markings: Ex d IIC T6 Ga/Gb (-50°C ≤ Ta ≤ +65°C)
Ex d IIC T5 Ga/Gb (-50°C ≤ Ta ≤ +80°C)
IP66W

I2 Intrinsic Safety
Certificate No.: CEPEL 97.0072X (Mfg USA and Singapore)
Certificate No.: CEPEL 07.1412X (Mfg Brazil)
Applicable Standards: IEC60079-0:2008, IEC60079-11:2009, IEC60079-26:2008, IEC60529:2009
Markings: Ex ia IIC Ga T4 (-20°C ≤ Ta ≤ +60°C)
IP66W

Table 20. Input Parameters

U_i = 30 V
I_i = 300 mA
P_i = 1.3 W
C_i = 0.012 μF
L_i = desprezivel

Special Conditions for Safe Use (X):

See Certificate.

China Certifications

E3 Flameproof
NEPSI Certificate No.: GYJ091065X
Applicable Standards: GB3836.1-2000, GB3836.4-2000,GB4208-1993, GB12476-2000
Markings: Ex d II C T5/T6, -50°~+80°C (T5), -50°~+65°C (T6), DIP A21 TA T90°C, IP66

Special Conditions for Safe Use (X):

Refer to Appendix B of Rosemount 3051 reference manual (00809-0100-4001).

I3 Intrinsic Safety
NEPSI Certificate No: GYJ091067X
Applicable Standards: GB3836.1-2000, GB3836.2-2000,GB4208-1993, GB12476-2000
Markings: Ex ia IIC T4 (-60°C ~+60°C), DIP A20 TA T70°C

Special Conditions for Safe Use (X):

Refer to Appendix B of Rosemount 3051 reference manual (00809-0100-4001).

N3 China Type n - Non-Sparking
NEPSI Certificate No.: GYJ101111X
Applicable Standards: GB3836.1-2000, GB3836.8-2003
Markings: Ex nA nL IIC T5 (-40 °C ≤ TA ≤ 70 °C)

Special Conditions for Safe Use (X):

Refer to Appendix B of Rosemount 3051 reference manual (00809-0100-4001).

Combinations of Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

K5 – E5, I5
K6 – E5, I5, C6, E1, I1
K7 – E7, I7, N7
K8 – E8, I1, N1
KB – E5, I5, E1, I1
KD – E5, I5, E6, C6, I1

IEC 62591 (WirelessHART Protocol)

Approved manufacturing locations

Rosemount Inc. — Chanhassen, Minnesota USA
Fisher-Rosemount GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European directive information

The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

Telecommunication compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary location certification for FM

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American certifications

Factory Mutual (FM) approvals

I5 FM Intrinsically Safe
Certificate No: 3045342
Applicable Standards: Class 3600:2011, Class 3610:2010, Class 3810: 2005
Markings: Intrinsically Safe for Class I, Division I, Groups A, B, C, D
Zone Marking: Class I Zone 0, AEx ia IIC
T4 (-40 °C to 70 °C)
Intrinsically Safe when installed according to Rosemount Drawing 03031-1062
Enclosure Type 4X/IP66/IP68

Specific Conditions for Safe Use:

The inline pressure sensor may contain more than 10% aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.

The surface resistivity of the transmitter is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

The Model 3051 Wireless pressure Transmitter shall only be used with the 701PGNKF Rosemount Smartpower Battery Pack.

CSA - Canadian Standards Association

I6 CSA Intrinsically Safe
Certificate No: 2526009
Applicable Standards: CSA C22.2 No. 0-M91, CSA C22.2 No. 159-92
Markings: Intrinsically Safe For Class I, Division I, Groups A, B, C, D
T4 (-40 °C to 70 °C)
Intrinsically safe when installed according to Rosemount drawing 03031-1063
Enclosure Type 4X/IP66/IP68

European certifications

I1 ATEX Intrinsic Safety
Certificate No: Baseefa12ATEX0228X
Applicable Standards: EN60079-11:2012, EN60079-0:2012
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C)
Ex II 1G
IP66/68
CE 1180

Specific Conditions for Safe Use (X):

The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.

For use with Rosemount 701PGNKF only

I7 IECEx Intrinsic Safety
Certificate No: IECEx BAS 12.0124X
Applicable Standards: IEC60079-11:2011, IEC60079-0:2011
Markings: Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ 70 °C)
IP66/68

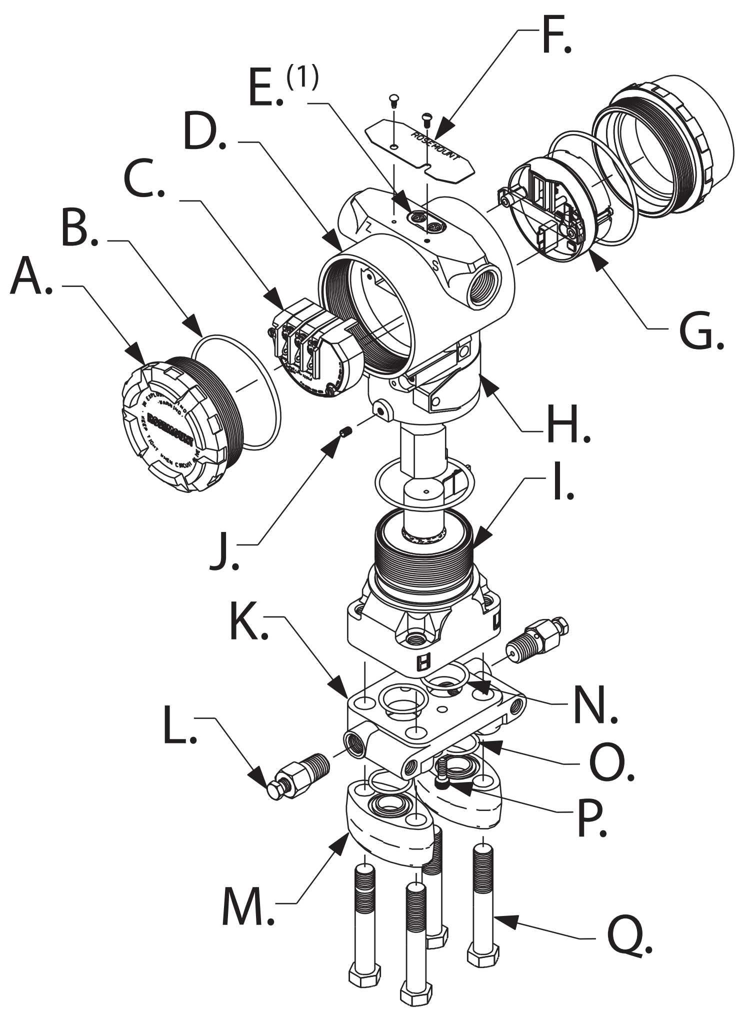
Specific Conditions for Safe Use:

The plastic enclosure may constitute a potential electrostatic ignition risk and must not be rubbed or cleaned with a dry cloth.

For Use with Rosemount 701PGNKF only

Standard 3051 Dimensional Drawings

Standard 3051C Exploded View

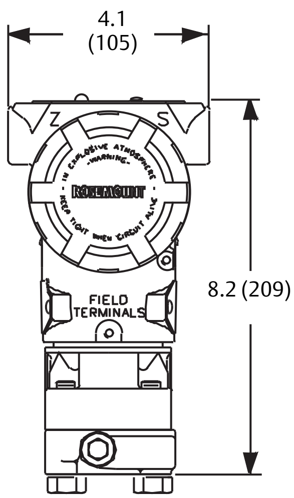


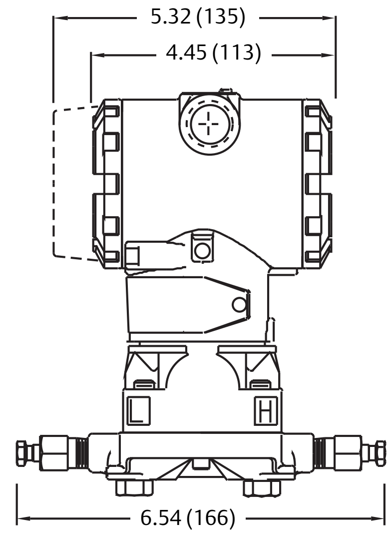
1) Span and Zero Adjustment Buttons are standard with 4-20 mA. Local Operator Interface buttons are optional for PROFIBUS PA protocol. Local Configuration Buttons are not available with FOUNDATION fieldbus.

Standard 3051C Exploded View Labels

A. Cover B. Cover O-ring C. Terminal Block D. Electronics Housing E. Local Configuration Buttons F. Certification Label	G. Electronics Board H. Name Plate I.Sensor Module J. Housing Rotation Set Screw (180 degree maximum rotation without further disassembly) K. Coplanar Flange L. Drain/Vent Valve	M. Flange Adapters N. Process O-Ring O. Flange Adapter O-Ring P. Flange Alignment Screw (not pressure retaining) Q. Flange Bolts

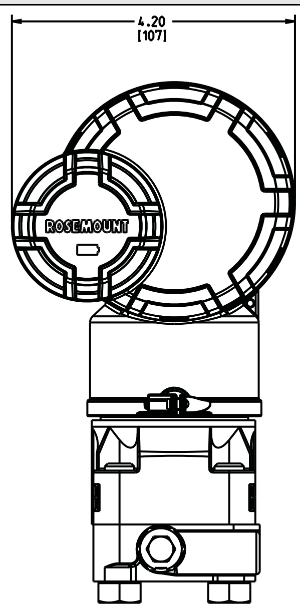
Standard 3051C Coplanar Flange(1)

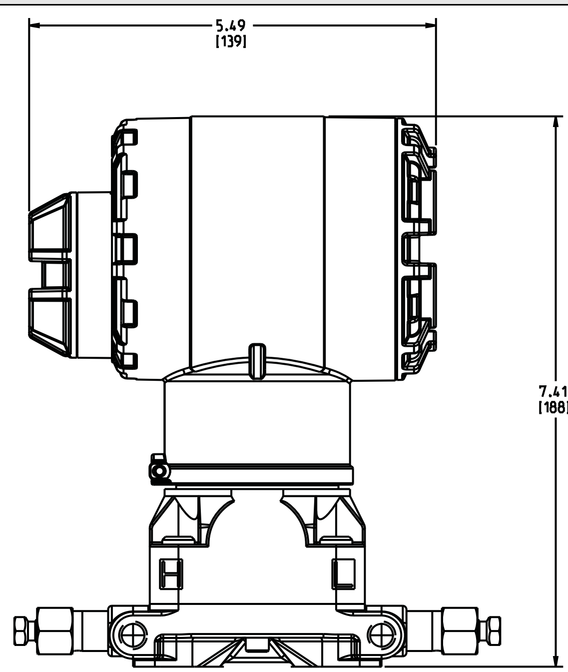




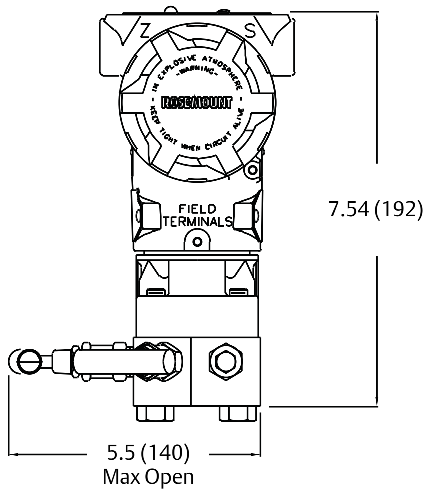
(1) For FOUNDATION fieldbus and PROFIBUS PA transmitters with LCD Display, housing length is 5.78 in. (147 mm).

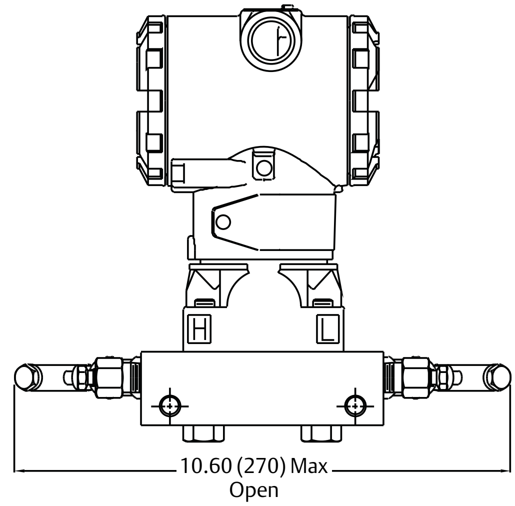
3051 Wireless Housing with Coplanar Flange





Standard 3051C Coplanar Flange with Rosemount 305 3-Valve Coplanar Integral Manifold

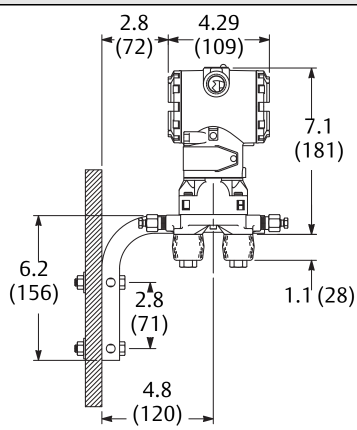


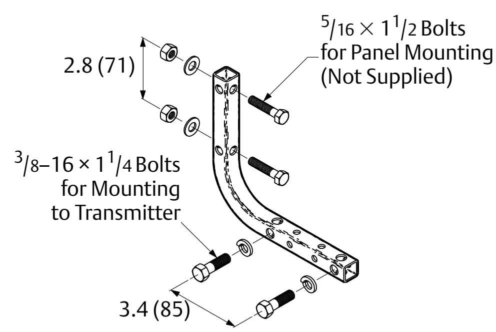


Dimensions are in inches (millimeters)

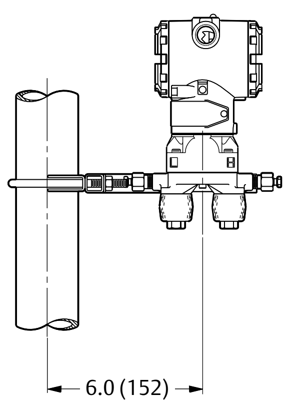
Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

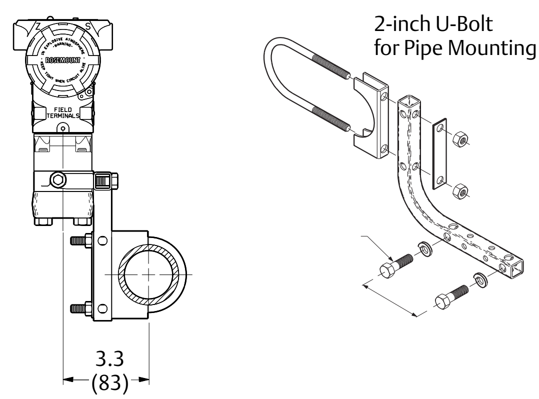
PANEL MOUNTING





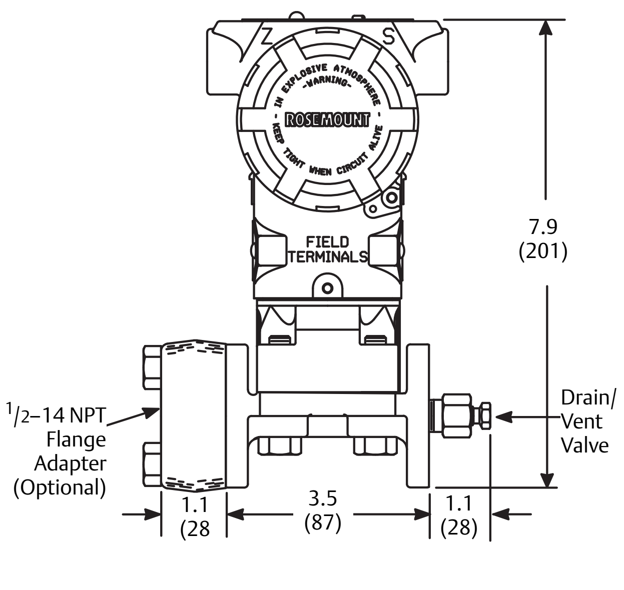
PIPE MOUNTING

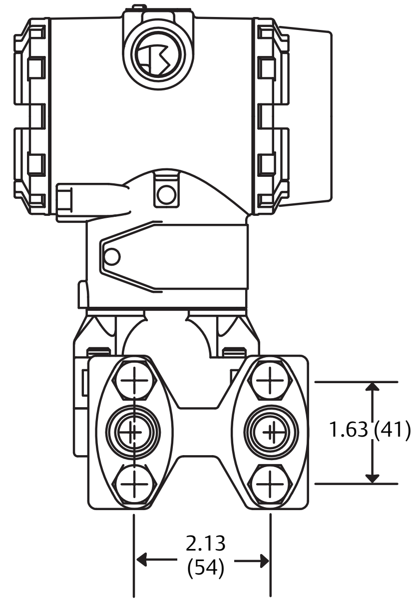




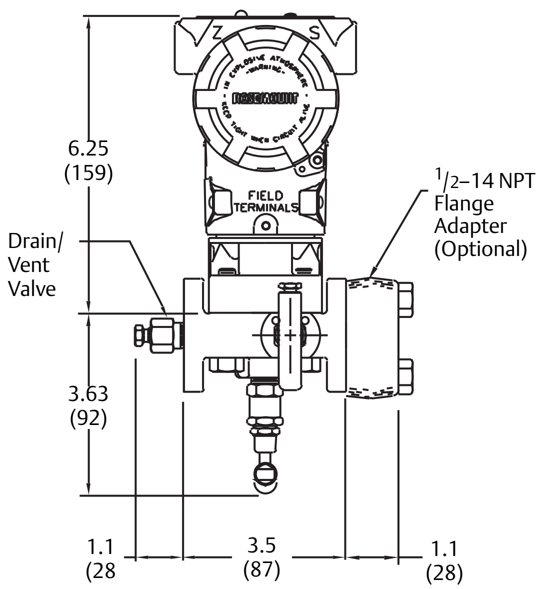
Dimensions are in inches (millimeters)

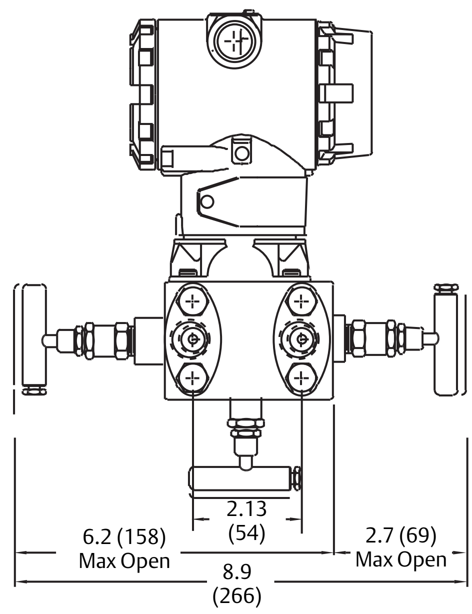
Standard 3051C Coplanar with Traditional Flange





Standard 3051C Coplanar with Rosemount 305 3-Valve Traditional Integral Manifold

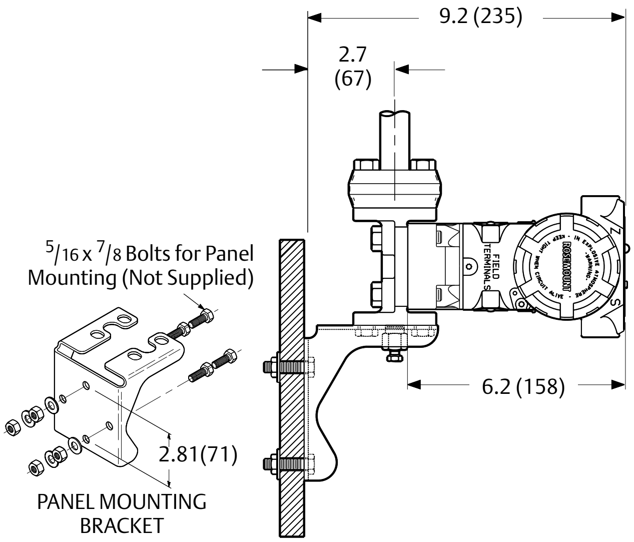




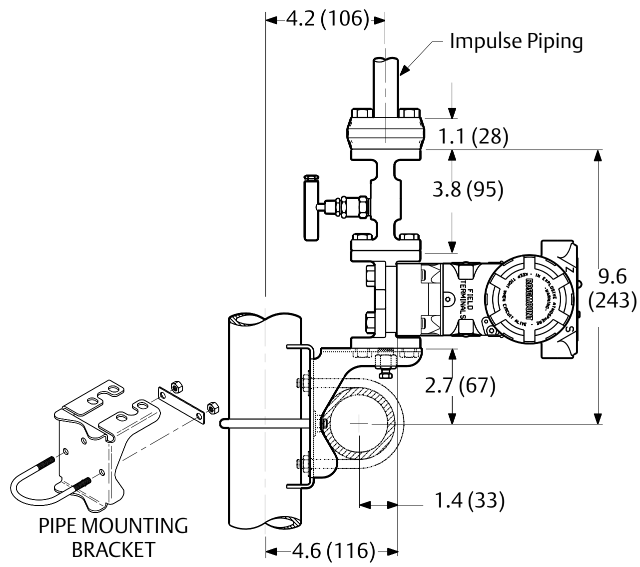
Dimensions are in inches (millimeters)

Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

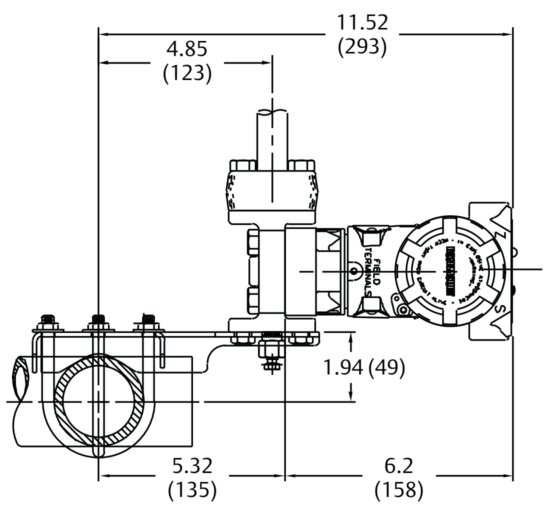
Panel Mounting Bracket (option B2/B8)



2-in. Pipe Mounting Bracket (option B1/B7/BA)

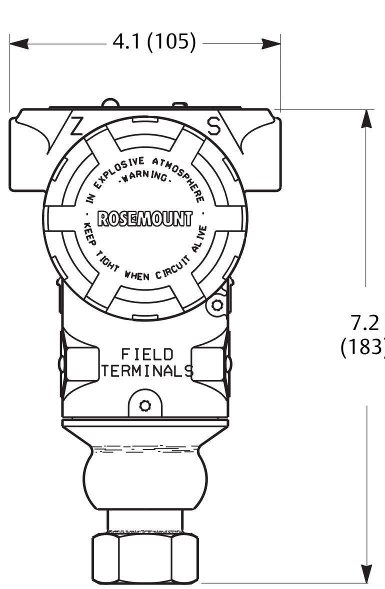


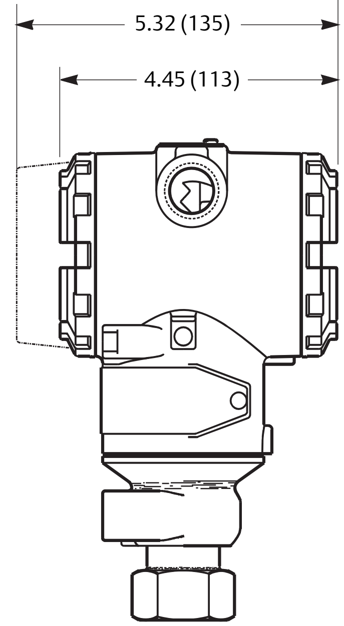
2-in. Pipe Mounting Bracket (option B3/B9/BC)



Dimensions are in inches (millimeters)

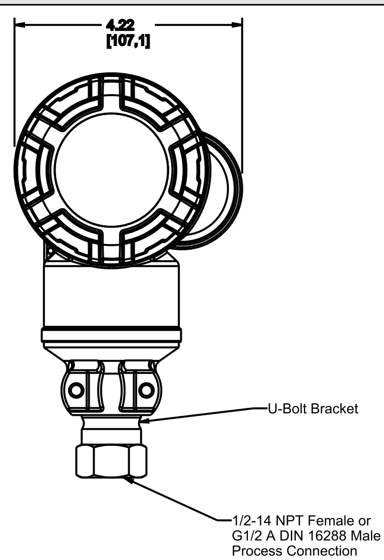
Standard 3051T Dimensional Drawings(1)

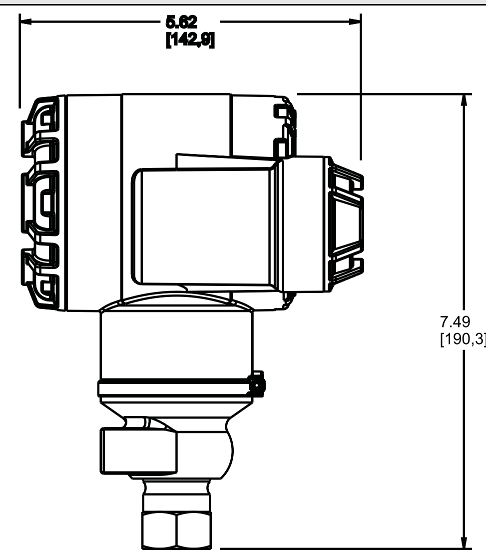




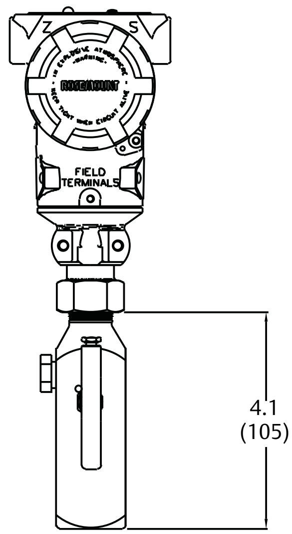
(1) For FOUNDATION fieldbus and PROFIBUS PA transmitters with LCD Display, housing length is 5.78 in. (146 mm).

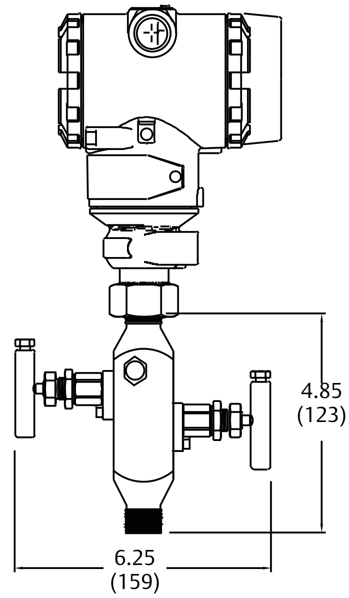
3051T Wireless Housing Dimensional Drawings





Standard 3051T with Rosemount 306 2-Valve I Integral Manifold

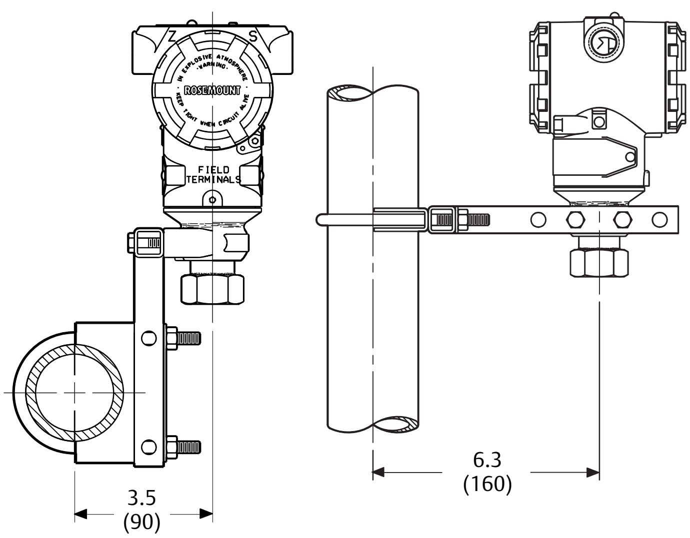




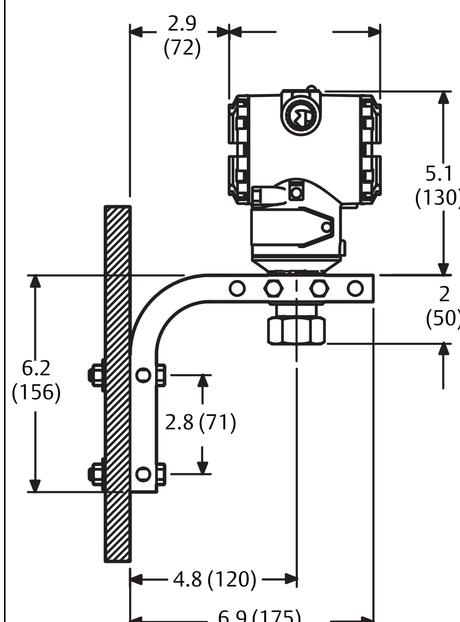
Dimensions are in inches (millimeters)

Standard 3051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe Mounting

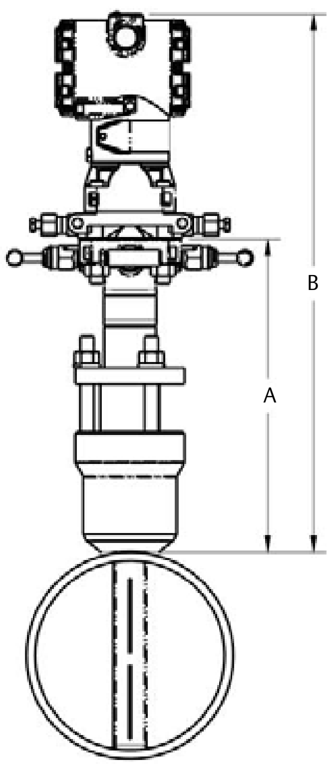
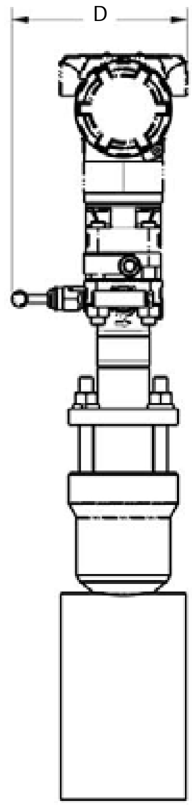
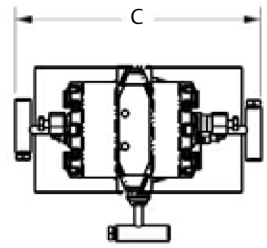


Panel Mounting



Dimensions are in inches (millimeters)

Rosemount Standard 3051CFA Pak-Lok Annubar Flowmeter[1]

Front View	Side View	Top View
		

(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 21. Standard 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.60 (370.8)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	16.35 (415.3)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount Standard 3051CFC Compact Orifice Flowmeter

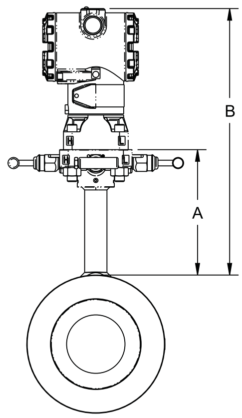
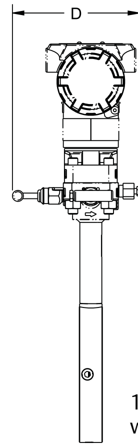
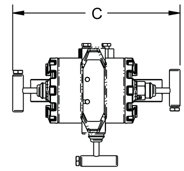
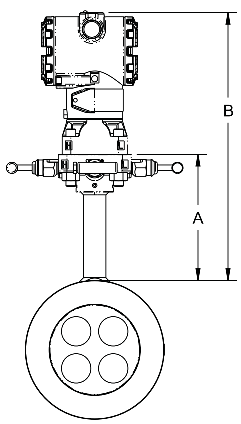
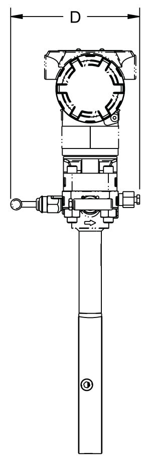
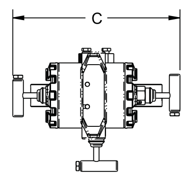
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)		 1.13-in. (28.7 mm) wafer thickness	
Conditioning Orifice Plate (Primary Element Type code C)			

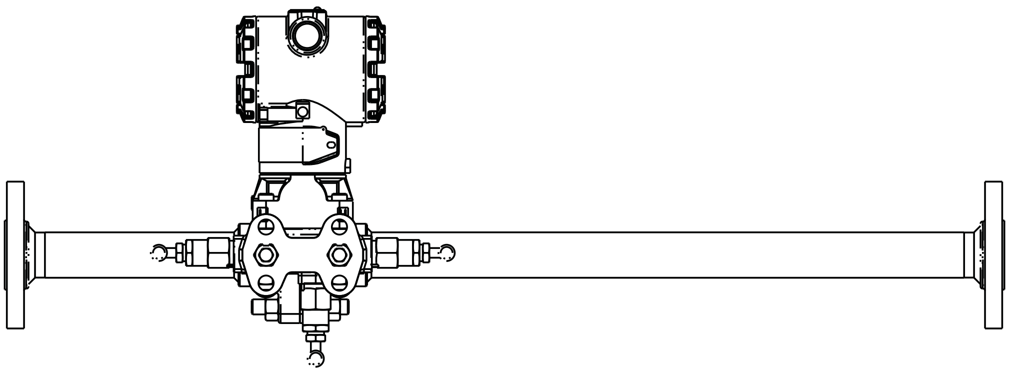
Table 22. Dimensional Drawings

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

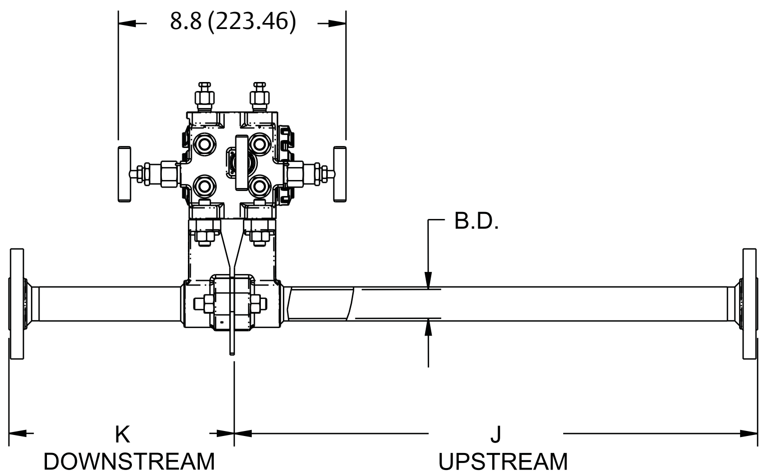
Dimensions are in inches (millimeters)

Rosemount Standard 3051CFP Integral Orifice Flowmeter

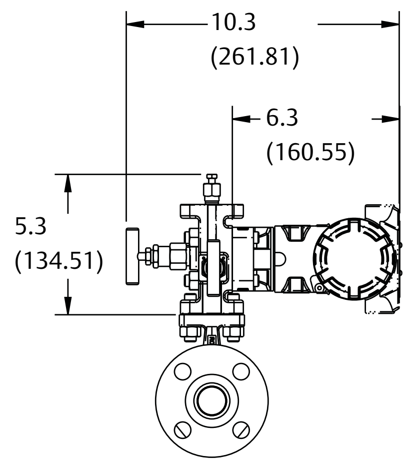
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

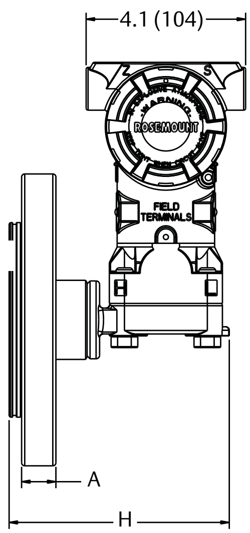
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)[1]	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)

Dimensions are in inches (millimeters).

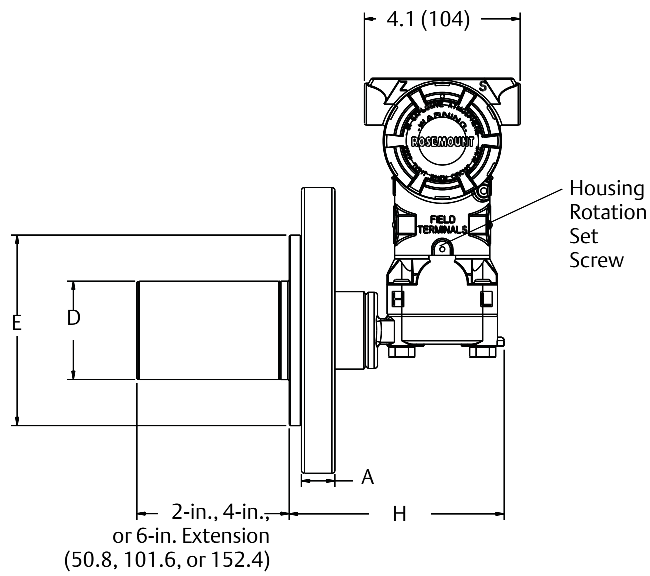
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Standard 3051L Dimensional Drawings

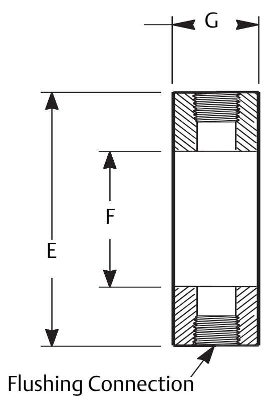
2-in. Flange Configuring (Flush Mount Only)



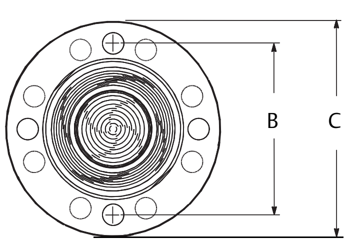
3- and 4-in. Flange Configuration

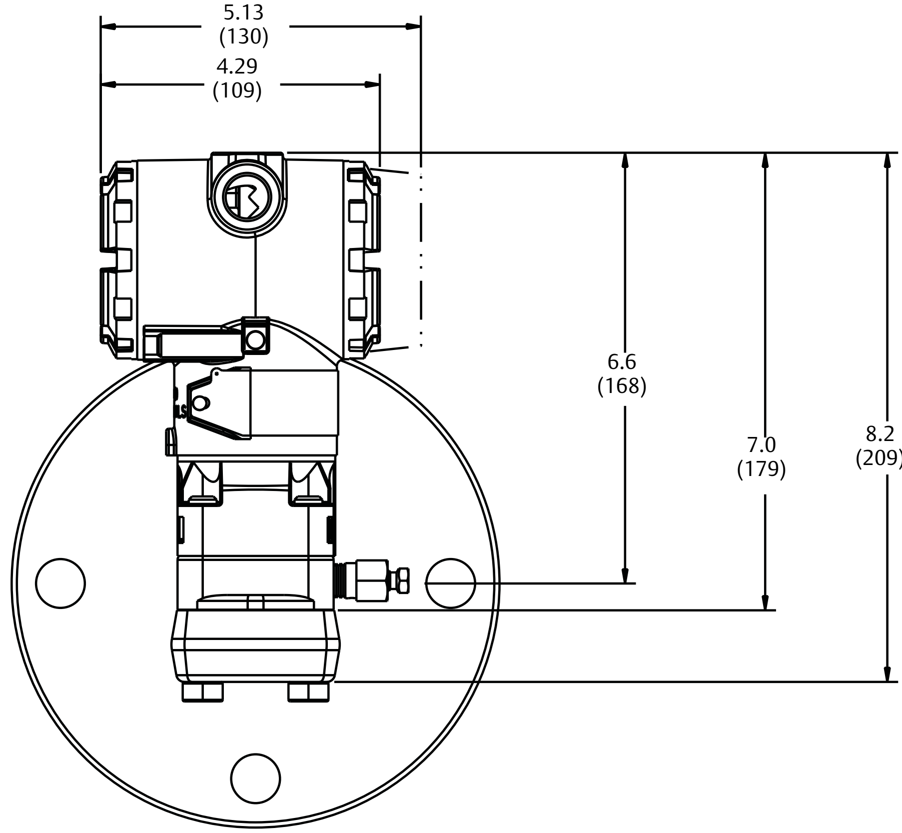


Optional Flushing Connection Ring (Lower Housing)



Diaphragm Assembly and Mounting Flange

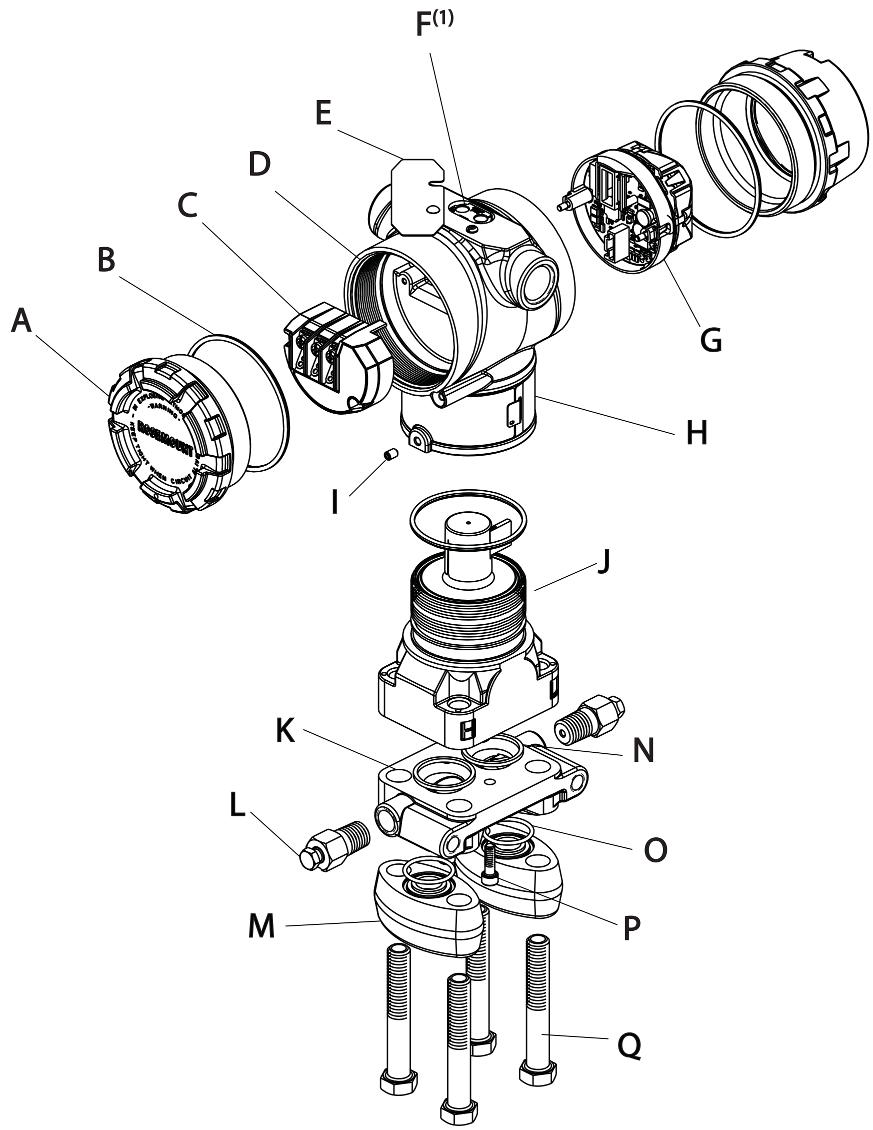




Dimensions are in inches (millimeters)

Enhanced 3051 Dimensional Drawings

Enhanced 3051C Exploded View

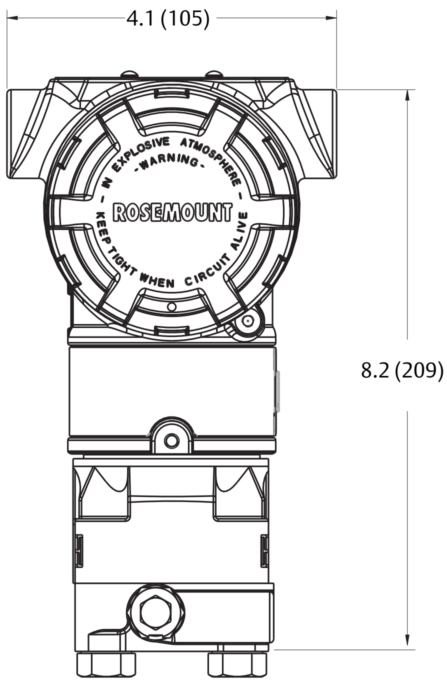


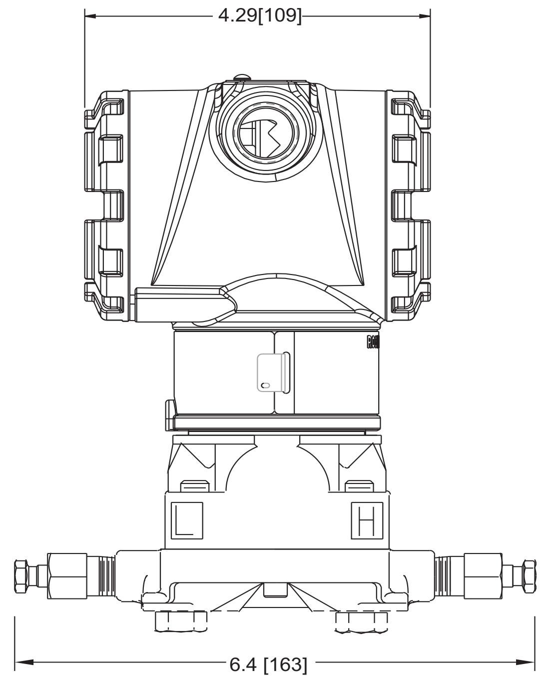
1) Local Configuration Buttons are optional on the enhanced 3051, and can be ordered as Analog Zero and Span, Digital Zero or LOI buttons.

Enhanced 3051C Exploded View labels

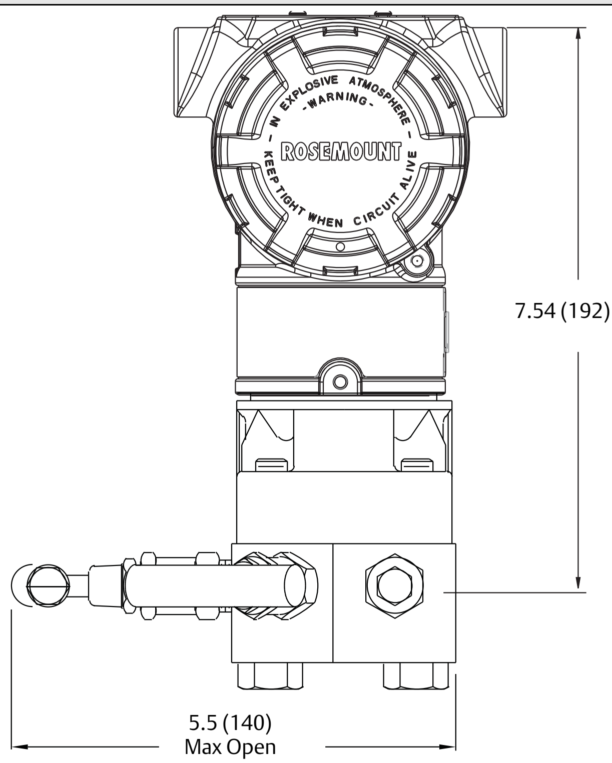
A. Cover B. Cover O-ring C. Terminal Block D. Electronics Housing E. Configuration Buttons Cover F. Local Configuration Buttons	G. Electronics Board H. Name Plate I. Housing Rotation Set Screw (180 degree maximum rotation without further disassembly) J. Sensor Module K. Coplanar Flange L. Drain/Vent Valve	M. Flange Adapters N. Process O-Ring O. Flange Adapter O-Ring P. Flange Alignment Screw (not pressure retaining) Q. Flange Bolts

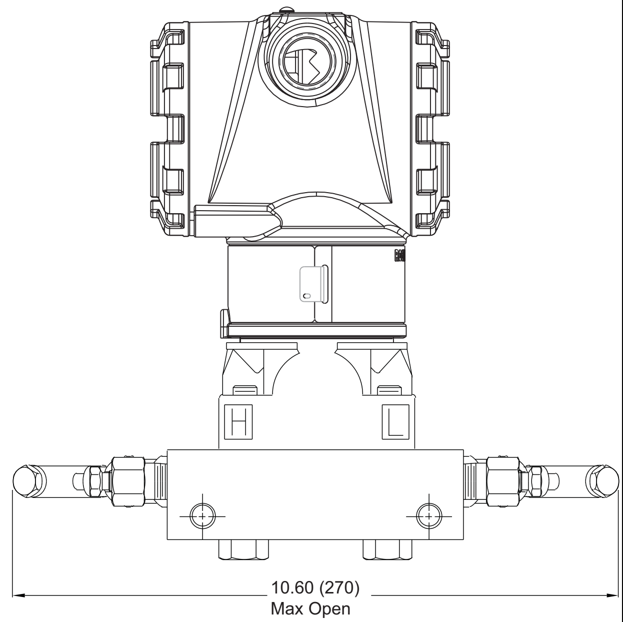
Enhanced 3051C Coplanar Flange





Enhanced 3051C Coplanar Flange with Rosemount 305 3-Valve Coplanar Integral Manifold



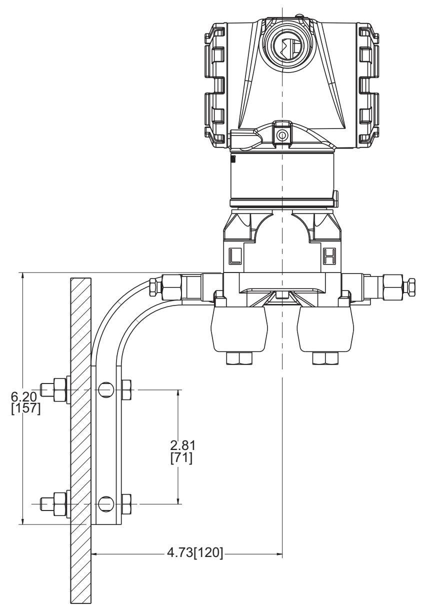


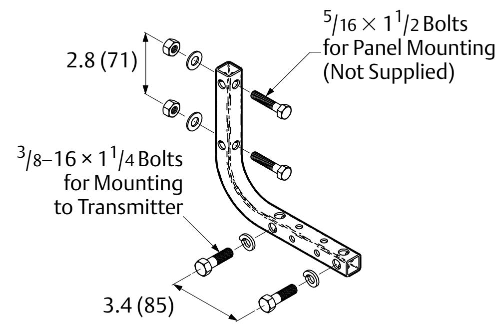
Dimensions are in inches (millimeters)

Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

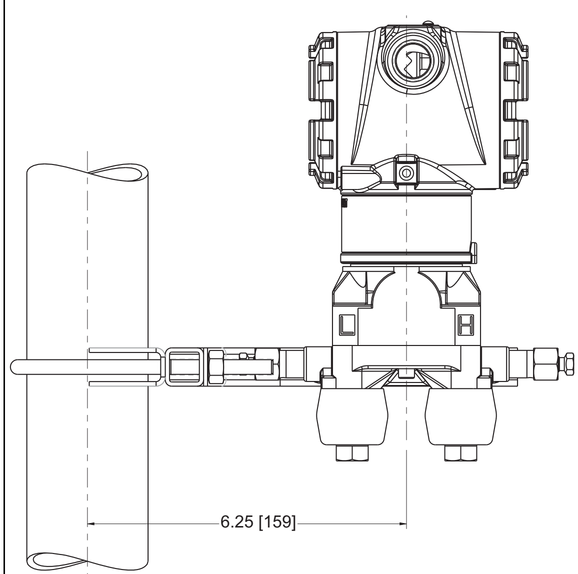
PANEL MOUNTING

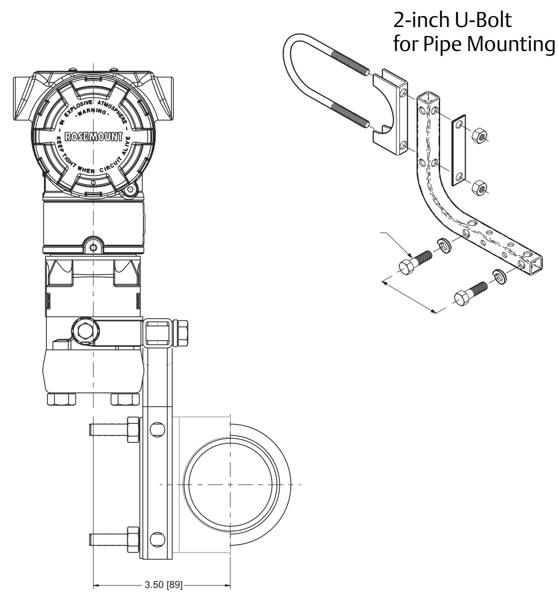
PANEL MOUNTING





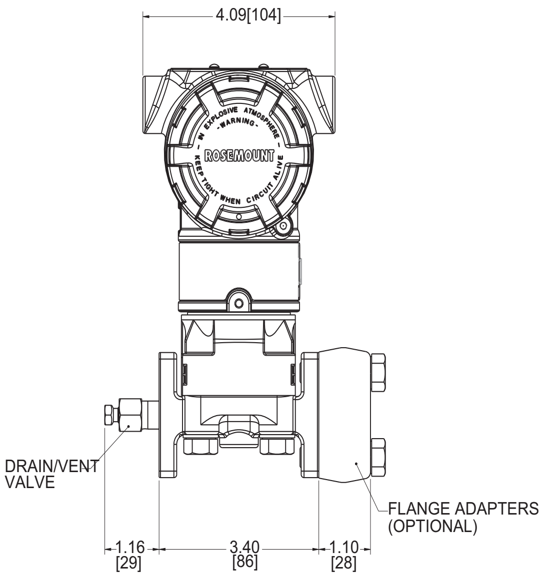
PIPE MOUNTING

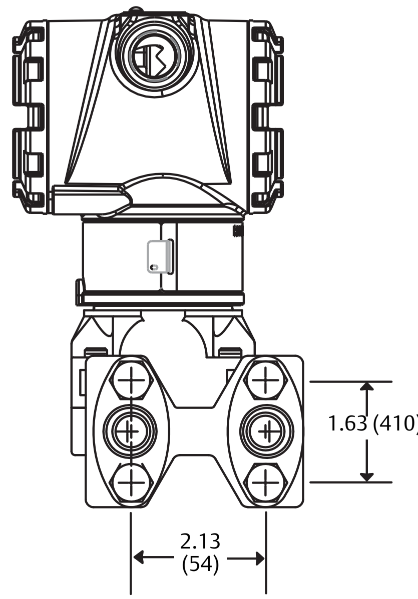




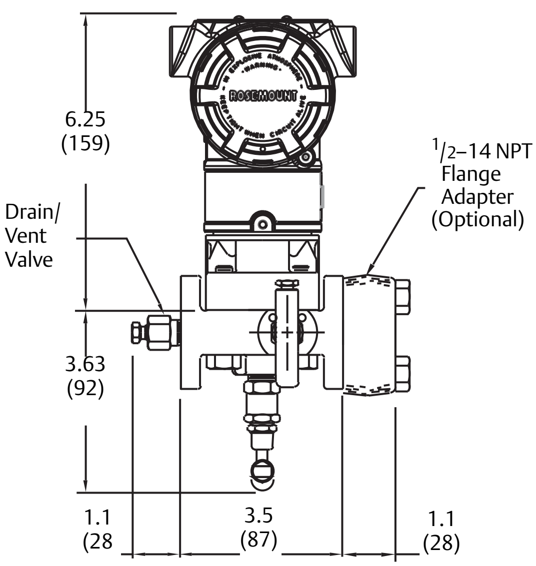
Dimensions are in inches (millimeters)

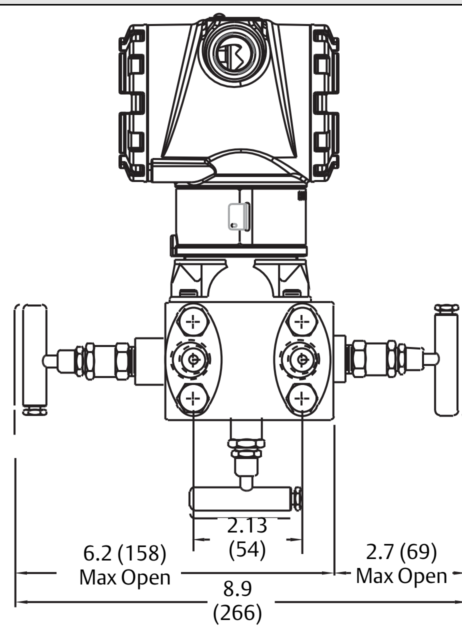
Enhanced 3051C Coplanar with Traditional Flange





Enhanced 3051C Coplanar with Rosemount 305 3-Valve Traditional Integral Manifold

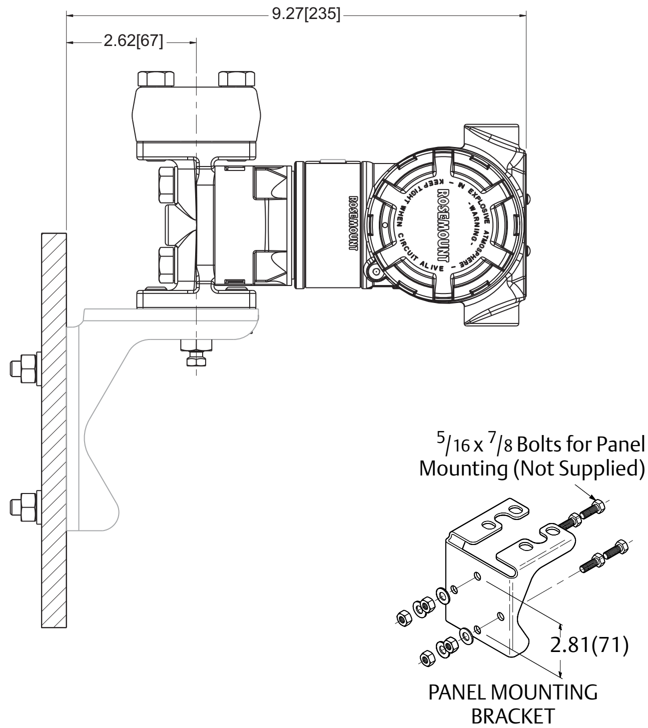




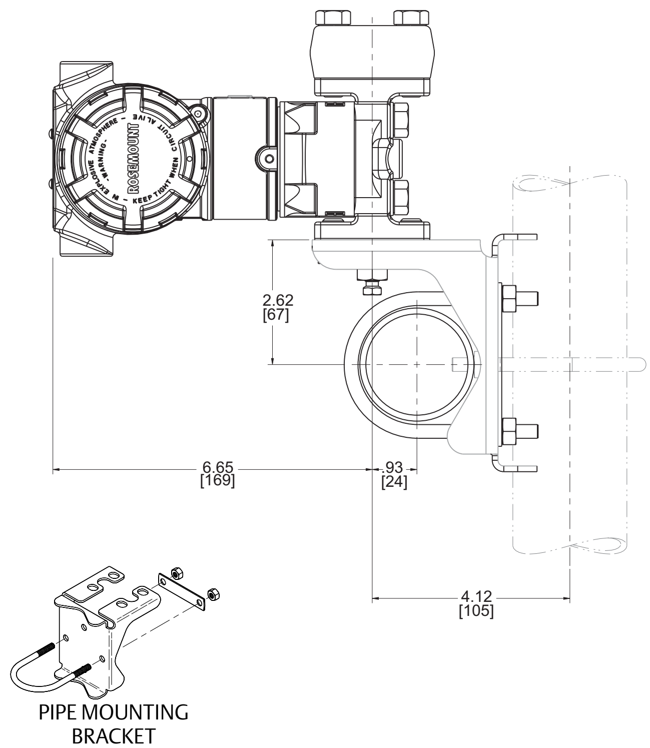
Dimensions are in inches (millimeters)

Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

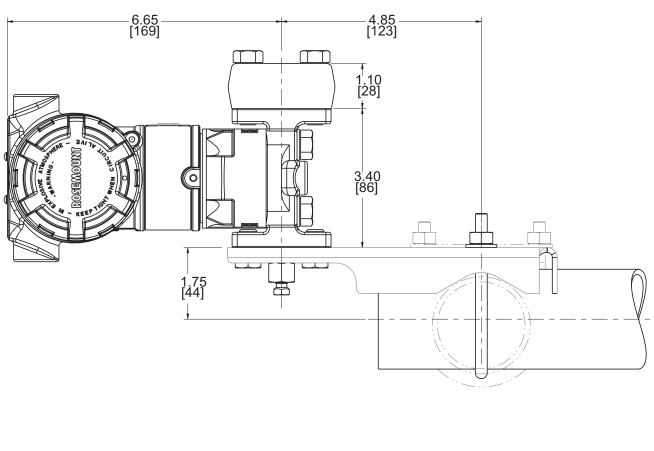
Panel Mounting Bracket (option B2/B8)



2-in. Pipe Mounting Bracket (option B1/B7/BA)

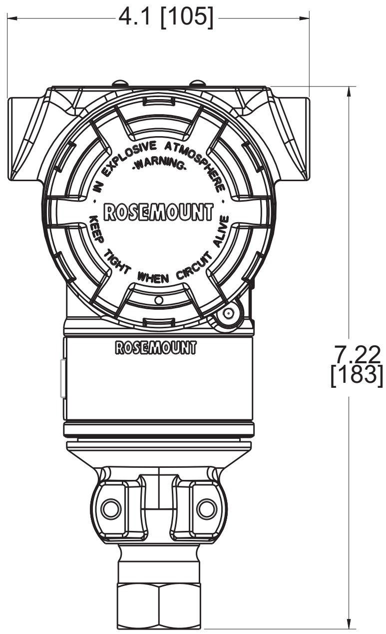


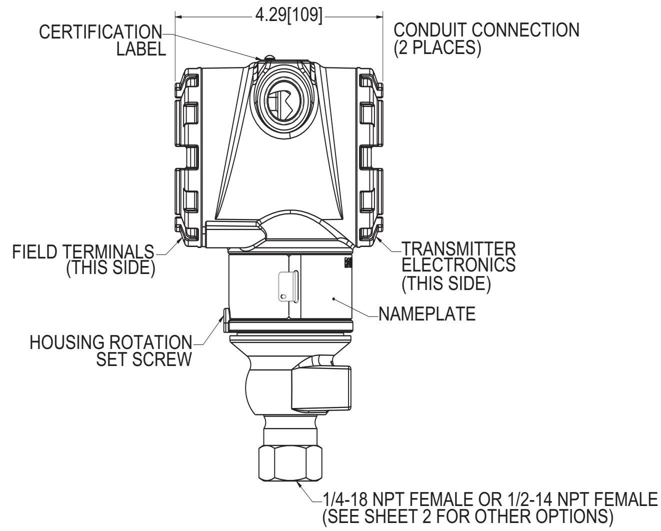
2-in. Pipe Mounting Bracket (option B3/B9/BC)



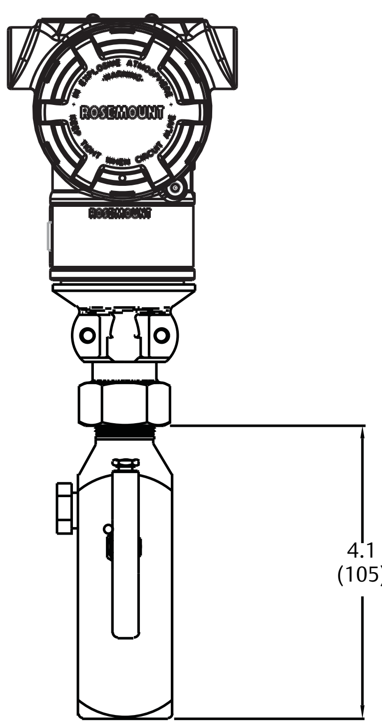
Dimensions are in inches (millimeters)

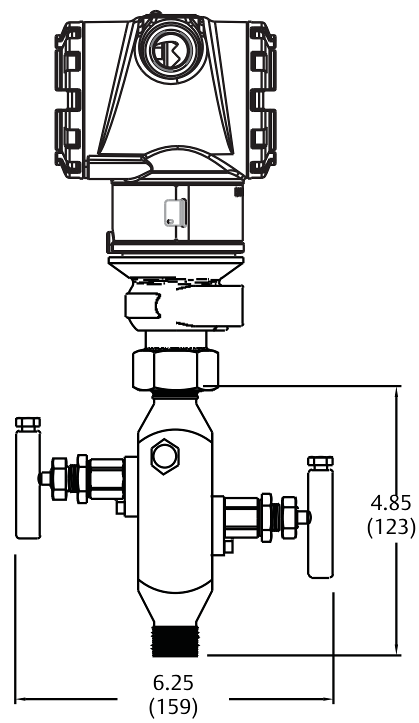
Enhanced 3051T Dimensional Drawings





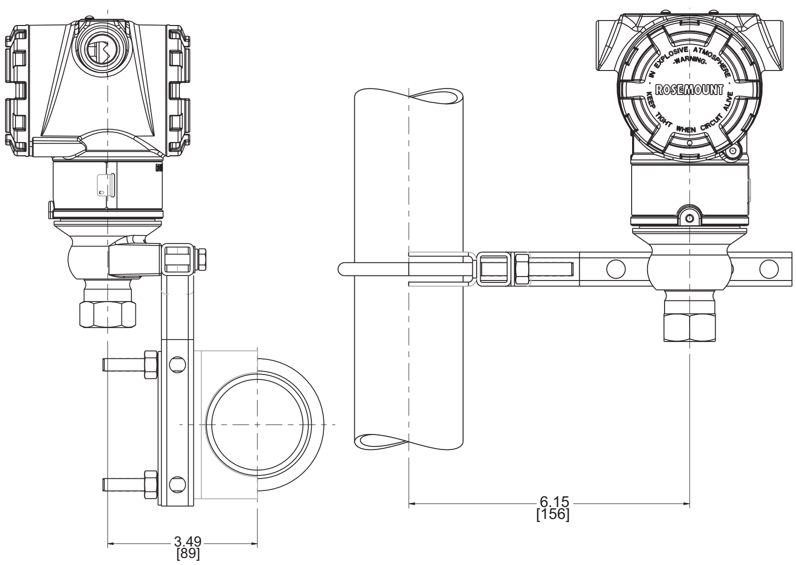
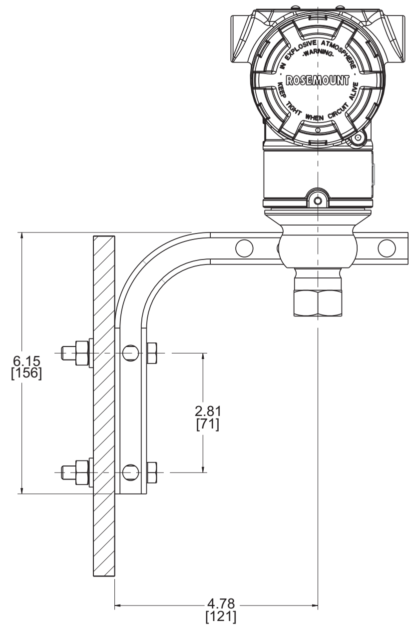
Enhanced 3051T with Rosemount 306 2-Valve I Integral Manifold





Dimensions are in inches (millimeters)

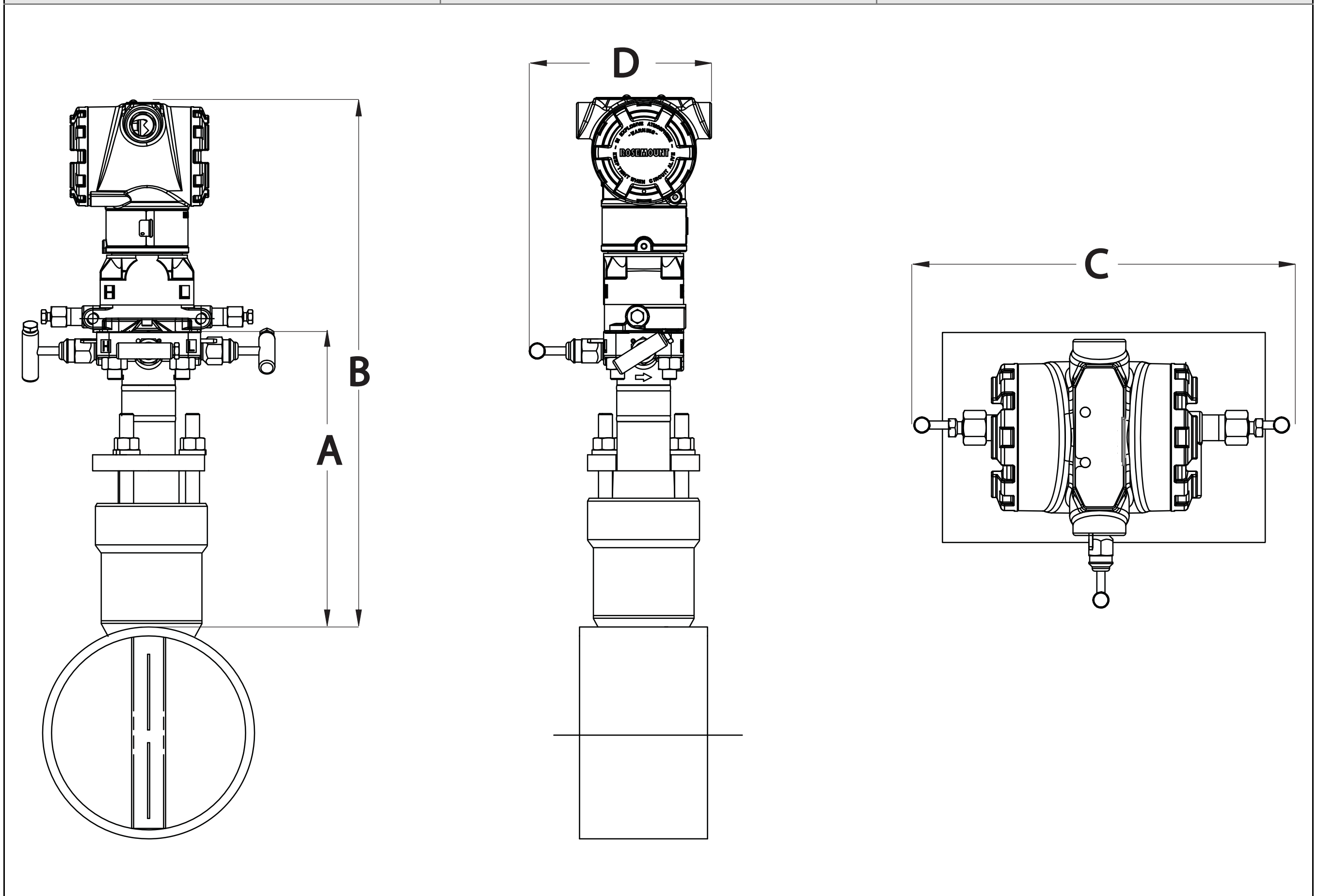
Enhanced 3051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe Mounting	Panel Mounting
	

Dimensions are in inches (millimeters)

Rosemount Enhanced 3051CFA Pak-Lok Annubar Flowmeter[1]

Front View	Side View	Top View

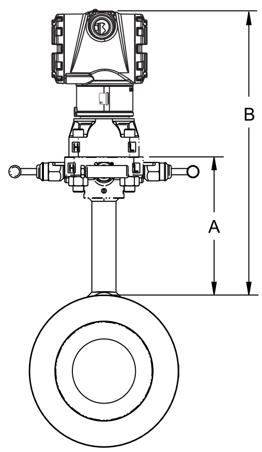
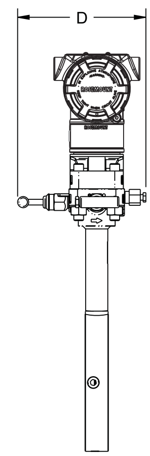
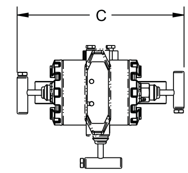
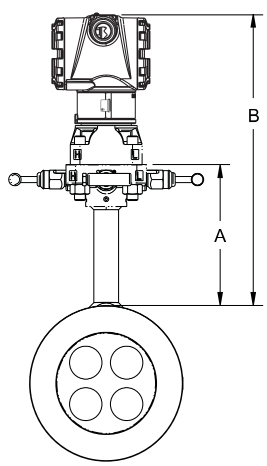
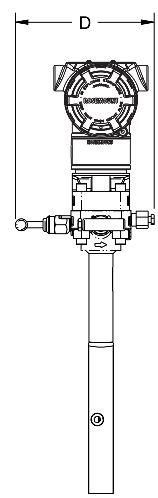
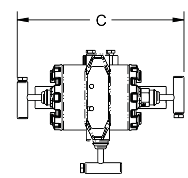


(1) The Pak-Lok Annubar model is available up to 600# ANSI (1440 psig at 100 °F (99 bar at 38 °C)).

Table 23. Enhanced 3051CFA Pak-Lok Annubar Flowmeter Dimensional Data

Sensor Size	A (Max)	B (Max)	C (Max)	D (Max)
1	8.50 (215.9)	14.60 (370.8)	9.00 (228.6)	6.00 (152.4)
2	11.0 (279.4)	16.35 (415.3)	9.00 (228.6)	6.00 (152.4)
3	12.00 (304.8)	19.10 (485.1)	9.00 (228.6)	6.00 (152.4)
Dimensions are in inches (millimeters)				

Rosemount Enhanced 3051CFC Compact Orifice Flowmeter

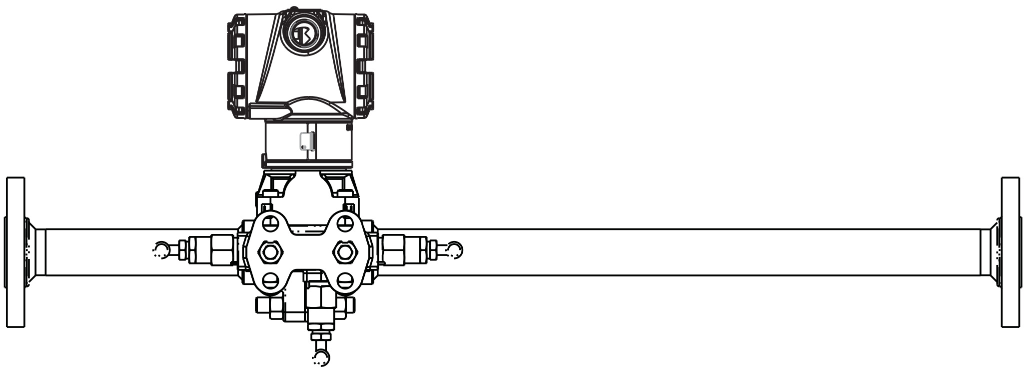
	Orifice Plate Side View	Orifice Plate Front View	Orifice Plate Top View
Compact Orifice Plate (Primary Element Type code P)			
Conditioning Orifice Plate (Primary Element Type code C)			

Primary Element Type	A	B	Transmitter Height	C	D
Type P and C	5.62 (143)	Transmitter Height + A	6.27 (159)	7.75 (197) - closed 8.25 (210) - open	6.00 (152) - closed 6.25 (159) - open

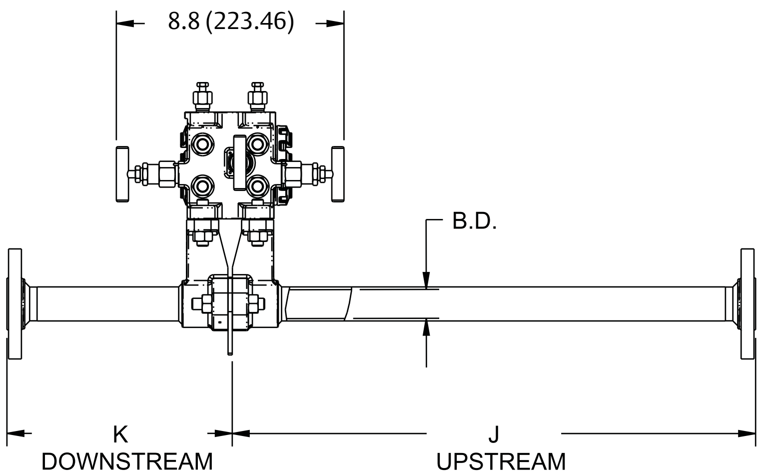
Dimensions are in inches (millimeters)

Rosemount Enhanced 3051CFP Integral Orifice Flowmeter

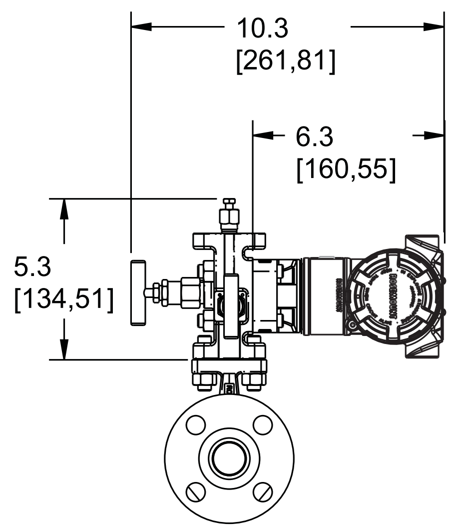
Side View



Bottom View



Front View



Dimensions are in inches (millimeters).

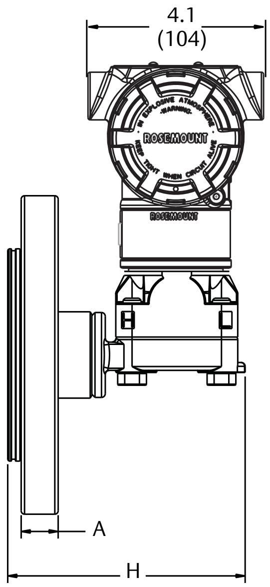
	Line Size		
Dimension	**1/2-in. (15 mm)**	**1-in. (25 mm)**	**1 1/2-in. (40 mm)**
J (Beveled/Threaded pipe ends)	12.54 (318.4)	20.24 (514.0)	28.44 (722.4)
J (RF slip-on, RTJ slip-on, RF-DIN slip on)	12.62 (320.4)	20.32 (516.0)	28.52 (724.4)
J (RF 150#, weld neck)	14.37 (364.9)	22.37 (568.1)	30.82 (782.9)
J (RF 300#, weld neck)	14.56 (369.8)	22.63 (574.7)	31.06 (789.0)
J (RF 600#, weld neck)	14.81 (376.0)	22.88 (581.0)	31.38 (797.1)
K (Beveled/Threaded pipe ends)	5.74 (145.7)	8.75 (222.2)	11.91 (302.6)
K (RF slip-on, RTJ slip-on, RF-DIN slip on)(1)	5.82 (147.8)	8.83 (224.2)	11.99 (304.6)
K (RF 150#, weld neck)	7.57 (192.3)	10.88 (276.3)	14.29 (363.1)
K (RF 300#, weld neck)	7.76 (197.1)	11.14 (282.9)	14.53 (369.2)
K (RF 600#, weld neck)	8.01 (203.4)	11.39 (289.2)	14.85 (377.2)
B.D. (Bore Diameter)	0.664 (16.87)	1.097 (27.86)	1.567 (39.80)

Dimensions are in inches (millimeters).

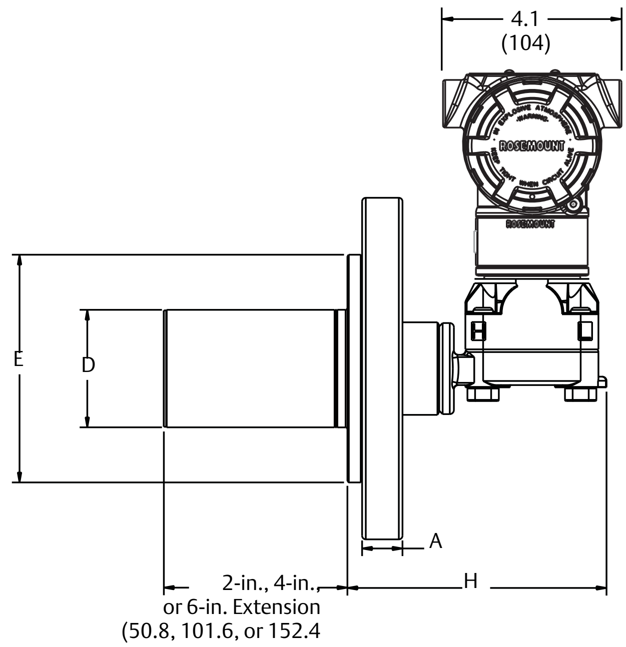
(1) Downstream length shown here includes plate thickness of 0.162-in. (4.11 mm).

Enhanced 3051L Dimensional Drawings

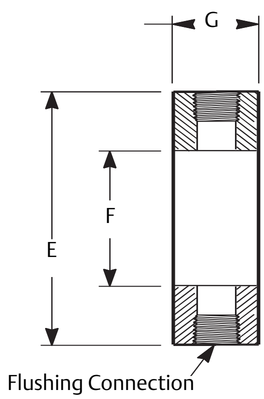
2-in. Flange Configuring (Flush Mount Only)



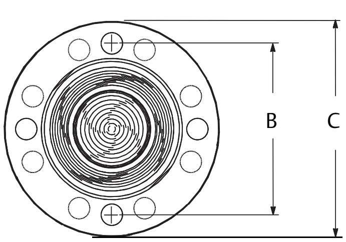
3- and 4-in. Flange Configuration

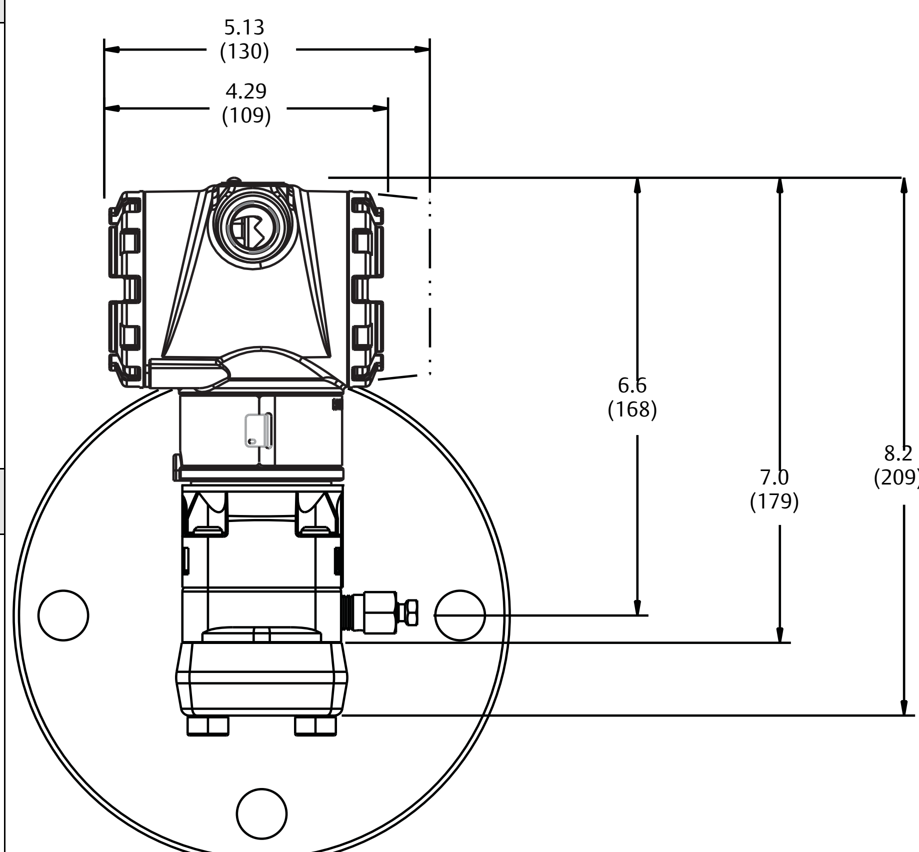


Optional Flushing Connection Ring (Lower Housing)



Diaphragm Assembly and Mounting Flange





Dimensions are in inches (millimeters)

Table 24. 3051L Dimensional Specifications

Class(1)	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Extension Diameter(1) D	O.D. Gasket Surface E
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	NA	3.6 (92)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 600	2 (51)	1.00 (25)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.25 (32)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	NA	4.0 (102)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)
DIN 2501 PN 10/16	DN 100	20 mm	180 mm	220 mm	8	18 mm	89 mm	6.2 (158)

Dimensions are in inches (millimeters)

(1) Tolerance are 0.040 (1.02), - 0.020 (0.51)

Class(1)	Pipe Size	Process Side F	Lower Housing G		H
			1/4-in. NPT	1/2 -in. NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	7.65 (194)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	7.65 (194)
DIN 2501 PN 10–40	DN 50	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10/16	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

(1) Tolerances are 0.040 (1.02), –0.020 (0.51).

Options

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

ENGINEERING UNITS *Differential/Gage*: *Absolute/3051TA*:	inH_2O (Range 0, 1, 2, and 3) psi (Range 4 and 5) psi (all ranges)
4 mA [(1)]:	0 (engineering units above)
20 mA [(1)]:	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
LCD Display:	Installed or none
Alarm[(1)]:	High
Software tag:	(Blank)

(1) Not applicable to FOUNDATION fieldbus, PROFIBUS PA, or wireless.

Custom Configuration[(1)]

If Option Code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output Information
- Transmitter Information
- LCD Display Configuration
- Hardware Selectable Information
- Signal Selection
- Wireless Information
- Scaled Variable
- and more

Refer to the “Rosemount 3051 Configuration Data Sheet” document number 00806-0100-4007 for enhanced 3051, or 00806-0100-4001 for 3051.

For Wireless refer to the “Rosemount 3051 Wireless Configuration Data Sheet” document number 00806-0100-4100.

Tagging (3 options available)

- Standard SST hardware tag is wired to the transmitter. Tag character height is 0.125 in. (3,18 mm), 56 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request, 56 characters maximum.
- Tag may be stored in transmitter memory. Character limit is dependent on protocol.
  - HART Revision 5: 8 characters
  - HART Revision 7 and Wireless: 32 characters
  - FOUNDATION fieldbus: 32 characters
  - PROFIBUS PA: 32 characters

(1) Not applicable to FOUNDATION fieldbus or PROFIBUS PA protocols.

Commissioning Tag[(2)]

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Optional Rosemount 304, 305 or 306 Integral Manifolds

Factory assembled to 3051C and 3051T transmitters. Refer to the following Product Data Sheet (document number 00813-0100-4839 for Rosemount 304 and 00813-0100-4733 for Rosemount 305 and 306) for additional information.

Other Seals

Refer to Product Data Sheet 00813-0100-4016 for additional information.

Output Information

Output range points must be the same unit of measure. Available units of measure include:

Pressure			
atm	$inH_20@4\ °C$[(1)]	g/cm^2	psi
mbar	mmH_2O	kg/cm^2	torr
bar	mmHg	Pa	$cmH_20@4\ °C$[(1)]
inH_20	$mmH_20@4\ °C$[(1)]	kPa	cmHG@0 °C[(1)]
inHg	ftH_20	MPa[(1)(2)]	$ftH_20@60\ °F$[(1)]
hPa[(1)]	$inH_20@60\ °F$[(1)]	kg/SqM[(1)]	$mH_20@4\ °C$[(1)]
mHg@0 °C[(1)]	Psf[(1)]	$ftH_2O@4C$[(1)]	
Flow[(2)(3)]			
bbl	kg	cm^3	
ft^3	lb	m^3	
gal	L	ton	
Level[(3)]			
%	ft	cm	
in	mm		

(1) Available with enhanced 3051 and Wireless.

(2) Available on PROFIBUS PA.

(3) All flow units are available per second, minute, hour or day.

Display and Interface options

M4 Digital Display with Local Operator Interface (LOI)

- Available for enhanced 4-20 mA HART and PROFIBUS PA

M5 Digital Display

- 2-Line, 5-Digit LCD for standard 4-20 mA HART
- 2-Line, 8-Digit LCD for enhanced 4-20 mA HART, FOUNDATION fieldbus and PROFIBUS PA
- 3-Line, 7-Digit LCD for Wireless
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

(2) Only applicable to FOUNDATION fieldbus.

Configuration Buttons[1]

Rosemount 3051 will ship with Analog Zero and Span buttons standard unless otherwise specified. Enhanced Rosemount 3051 requires option D4 (Analog Zero and Span), DZ (Digital Zero), or M4 (LOI) for local configuration buttons.
The Rosemount 3051 Wireless Transmitter is available with a Digital Zero button installed with or without the LCD digital display.

Transient Protection

T1 Integral Transient Protection Terminal Block
Meets IEEE C62.41, Category Location B
6 kV crest (0.5 μs - 100 kHz)
3 kA crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

Bolts for Flanges and Adapters

- Options permit bolts for flanges and adapters to be obtained in various materials
- Standard material is plated carbon steel per ASTM A449, Type 1

L4 Austenitic 316 Stainless Steel Bolts
L5 ASTM A 193, Grade B7M Bolts
L6 Alloy K-500 Bolts

Conduit Plug

DO 316 SST Conduit Plug
Single 316 SST conduit plug replaces carbon steel plug

Rosemount 3051C Coplanar Flange and 3051T Bracket Option

B4 Bracket for 2-in. Pipe or Panel Mounting
- For use with the standard Coplanar flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

Rosemount 3051C Traditional Flange Bracket Options

B1 Bracket for 2-in. Pipe Mounting
- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for Panel Mounting
- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat Bracket for 2-in. Pipe Mounting
- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 Bracket with SST Bolts
- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 Bracket with SST Bolts
- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 Bracket with SST Bolts
- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless Steel B1 Bracket with SST Bolts
- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless Steel B3 Bracket with SST Bolts
- B3 bracket in stainless steel with Series 300 stainless steel bolts

Emerson Process Management
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1-800-999-9307
T (International) (952) 906-8888
F (952) 906 8889
www.rosemount.com

Emerson Process Management Latin America
1300 Concord Terrace, Suite 400
Sunrise Florida 33323 USA
Tel + 1 954 846 5030

Emerson Process Management Asia Pacific Pte Ltd
1 Pandan Crescent
Singapore 128461
Tel +65 6777 8211
Fax +65 6777 0947
Service Support Hotline : +65 6770 8711
Email : Enquiries@AP.EmersonProcess.com

Emerson Process Management
Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

Standard Terms and Conditions of Sale can be found at www.rosemount.com\terms_of_sale
The Emerson logo is a trade mark and service mark of Emerson Electric Co.
Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc.
PlantWeb is a registered trademark of one of the Emerson Process Management group of companies.
HART and WirelessHART are registered trademarks of the HART Communication Foundation
All other marks are the property of their respective owners.
© 2012 Rosemount Inc. All rights reserved.

00813-0100-4408
Rev. BK
October 2021

For more information: **www.emerson.com**

©2021 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. Rosemount is a mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

ROSEMOUNT™

EMERSON™

Reference Manual
00809-0100-4001, Rev KA
May 2017

Rosemount™ 3051 Pressure Transmitter

with HART® Protocol

HART COMMUNICATION PROTOCOL

EMERSON

Contents

Section 1: Introduction

1.1 Using this manual 1
1.2 Models covered 1
1.3 Product recycling/ disposal 2

Section 2: Configuration

2.1 Overview 3
2.2 Safety messages 3
2.3 Commissioning 4
2.3.1 Setting the loop to manual 4
2.3.2 Wiring diagrams 4
2.4 Configuration data review 6
2.5 Field Communicator 7
2.5.1 Field Communicator user interface 7
2.6 Field Communicator menu trees 8
2.7 Traditional Fast Key sequence 12
2.8 Check output 14
2.8.1 Process variables 15
2.8.2 Sensor temperature 15
2.9 Basic setup 15
2.9.1 Set process variable units 15
2.9.2 Set output (transfer function) 16
2.9.3 Rerange 17
2.9.4 Damping 20
2.10 LCD display 21
2.10.1 LCD display configuration for 4–20 mA HART only 21
2.10.2 Custom display configuration 4–20 mA HART only 22
2.11 Detailed setup 23
2.11.1 Failure mode alarm and saturation 23
2.11.2 Alarm and saturation levels for burst mode 24
2.11.3 Alarm and saturation values for multidrop mode 24
2.11.4 Alarm level verification 24
2.12 Diagnostics and service 24
2.12.1 Loop test 24
2.13 Advanced functions 26
2.13.1 Saving, recalling, and cloning configuration data 26

2.13.2 Burst mode 28
2.14 Multidrop communication 29
2.15 Changing a transmitter address 30
2.15.1 Communicating with a multidropped transmitter 30
2.15.2 Polling a multidropped transmitter 30

Section 3: Installation

3.1 Overview 31
3.2 Safety messages 31
3.3 General considerations 32
3.4 Mechanical considerations 32
3.5 Draft range considerations 33
3.6 Environmental considerations 33
3.7 HART installation flowchart 34
3.8 Installation procedures 35
3.8.1 Mount the transmitter 35
3.8.2 Impulse piping 39
3.8.3 Process connections 41
3.8.4 Inline process connection 42
3.8.5 Housing rotation 43
3.8.6 LCD display 44
3.8.7 Configure security and alarm 44
3.9 Electrical considerations 46
3.9.1 Conduit installation 46
3.9.2 Wiring 46
3.9.3 Transient protection terminal block 48
3.9.4 Grounding 50
3.10 Hazardous locations certifications 51
3.11 Rosemount 305, 306, and 304 Manifolds 51
3.11.1 Rosemount 305 Integral Manifold installation procedure 52
3.11.2 Rosemount 306 Integral Manifold installation procedure 53
3.11.3 Rosemount 304 Conventional Manifold installation procedure 53
3.11.4 Manifold operation 53
3.12 Liquid level measurement 59
3.12.1 Open vessels 59
3.12.2 Closed vessels 59

Section 4: Operation and Maintenance

4.1 Overview . . . 63
4.2 Safety messages . . . 63
4.3 Calibration overview . . . 64
4.3.1 Determining calibration frequency . . . 66
4.3.2 Selecting a trim procedure . . . 68
4.4 Analog output trim . . . 68
4.4.1 Digital-to-Analog trim . . . 69
4.4.2 Digital-to-Analog trim using other scale . . . 70
4.4.3 Recall factory trim—analog output . . . 71
4.5 Sensor trim . . . 71
4.5.1 Sensor trim overview . . . 71
4.5.2 Zero trim . . . 72
4.5.3 Sensor trim . . . 73
4.5.4 Recall factory trim—sensor trim . . . 74
4.5.5 Line pressure effect (range 2 and 3) . . . 74
4.5.6 Compensating for line pressure . . . 75

Section 5: Troubleshooting

5.1 Overview . . . 77
5.2 Safety messages . . . 77
5.3 Diagnostic messages . . . 79
5.4 Disassembly procedures . . . 84
5.4.1 Remove from service . . . 84
5.4.2 Remove terminal block . . . 84
5.4.3 Remove the electronics board . . . 85
5.4.4 Remove the sensor module from the electronics housing . . . 85
5.5 Reassembly procedures . . . 85
5.5.1 Attach the electronics board . . . 86
5.5.2 Install the terminal block . . . 86
5.5.3 Reassemble the Rosemount 3051C process flange . . . 86

Appendix A: Specifications and Reference Data

A.1 Performance specifications . . . 89
A.1.1 Conformance to specification (±3s [Sigma]) . . . 89
A.1.2 Reference accuracy . . . 89
A.1.3 Total performance . . . 90
A.1.4 Long term stability . . . 90

A.1.5 Dynamic performance 91
A.1.6 Line pressure effect per 1000 psi (6,9 MPa) 91
A.1.7 Ambient temperature effect per 50 °F (28 °C) 91
A.1.8 Mounting position effects 92
A.1.9 Vibration effect 92
A.1.10 Power supply effect 92
A.1.11 Electromagnetic compatibility (EMC)92
A.1.12 Transient protection (option code T1) 92
A.2 Functional specifications 93
A.2.1 Range and sensor limits 93
A.2.2 Zero and span adjustment requirements (HART and Low Power) 94
A.2.3 Service 94
A.2.4 4–20 mA (output code A) 94
A.2.5 Foundation Fieldbus (output code F) and PROFIBUS® (output code W) 94
A.2.6 Foundation Fieldbus function block execution times 95
A.2.7 Foundation Fieldbus parameters 95
A.2.8 Standard function blocks 95
A.2.9 Backup Link Active Scheduler (LAS) 95
A.2.10 Advanced control function block suite (option code A01) 95
A.2.11 Foundation Fieldbus Diagnostics Suite (option code D01) 96
A.2.12 Low Power (output code M) 96
A.2.13 Static pressure limit 96
A.2.14 Burst pressure limits 97
A.2.15 Failure mode alarm 97
A.2.16 Temperature limits 98
A.3 Physical specifications 99
A.3.1 Electrical connections 99
A.3.2 Process connections 99
A.3.3 Process-wetted parts 99
A.3.4 Rosemount 3051L process wetted parts 99
A.3.5 Non-wetted parts 100
A.3.6 Shipping weights 100
A.4 Dimensional drawings 101
A.5 Ordering information 113
A.6 Options 130
A.7 Spare parts 136

Appendix B: Product Certifications

B.1 European directive information 145
B.2 Ordinary location certification 145
B.3 North America 145
B.4 Europe 146
B.5 International 148
B.6 Brazil 149
B.7 China 150
B.8 Japan 151
B.9 Technical Regulations Customs Union (EAC) 151
B.10 Combinations 151
B.11 Conduit plugs and adapters 152
B.12 Additional Certifications 152
B.13 Approval drawing 153
B.13.1 Factory mutual 03031-1019 153
B.13.2 Canadian standards association (CSA) 03031-1024 166

Rosemount™ 3051 Pressure Transmitter

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central
Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

North American Response Center
Equipment service needs.

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Emerson™ representative.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

⚠WARNING

Explosions could result in death or serious injury.

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 3051 Pressure Transmitter. The sections are organized as follows:

Section 2: Configuration contains mechanical and electrical installation instructions, and field upgrade options.

Section 3: Installation provides instruction on commissioning and operating Rosemount 3051 transmitters. Information on software functions, configuration parameters, and online variables is also included.

Section 4: Operation and Maintenance contains operation and maintenance techniques.

Section 5: Troubleshooting provides troubleshooting techniques for the most common operating problems.

Appendix A: Specifications and Reference Data supplies reference and specification data, as well as ordering information.

Appendix B: Product Certifications contains intrinsic safety approval information, European ATEX directive information, and approval drawings.

1.2 Models covered

The following transmitters are covered by this manual:

Rosemount 3051C Coplanar™ pressure Transmitter

- Rosemount 3051CD Differential Pressure Transmitter
  - Measures differential pressure up to 2000 psi (137,9 bar).
- Rosemount 3051CG Gage Pressure Transmitter
  - Measures gage pressure up to 2000 psi (137,9 bar).
- Rosemount 3051CA Absolute Pressure Transmitter
  - Measures absolute pressure up to 4000 psia (275,8 bar).

Rosemount 3051T In-Line pressure Transmitter

- Rosemount 3051T Gage and Absolute Pressure Transmitter
  - Measures gage pressure up to 10000 psi (689,5 bar).

Rosemount 3051L Liquid Level Transmitter

- Provides precise level and specific gravity measurements up to 300 psi (20,7 bar) for a wide variety of tank configurations.

Note
For transmitters with FOUNDATION™ Fieldbus, see Rosemount 3051 Reference Manual.
For transmitters with PROFIBUS® PA, see Rosemount 3051 Reference Manual.

1.3 Product recycling/ disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

Section 2 Configuration

Overview . . . . . page 3
Safety messages . . . . . page 3
Commissioning . . . . . page 4
Configuration data review . . . . . page 6
Field Communicator menu trees . . . . . page 8
Traditional Fast Key sequence . . . . . page 12
Check output . . . . . page 14
Basic setup . . . . . page 15
LCD display . . . . . page 21
Detailed setup . . . . . page 23
Diagnostics and service . . . . . page 24
Advanced functions . . . . . page 26
Multidrop communication . . . . . page 29

2.1 Overview

This section contains information on commissioning and tasks that should be performed on the bench prior to installation.

Field Communicator and AMS Device Manager instructions are given to perform configuration functions. For convenience, Field Communicator Fast Key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

2.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

WARNING

Explosions could result in death or serious injury.

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an explosion-proof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

2.3 Commissioning

Commissioning consists of testing the transmitter and verifying transmitter configuration data. The Rosemount™ 3051 Pressure Transmitters can be commissioned either before or after installation. Commissioning the transmitter on the bench before installation using a Field Communicator or AMS Device Manager ensures that all transmitter components are in working order.

⚠ To commission on the bench, required equipment includes a power supply, a milliamp meter, and a Field Communicator or AMS Device Manager. Wire equipment as shown in Figure 2-1 and Figure 2-2. To ensure successful communication, a resistance of at least
250 ohms must be present between the Field Communicator loop connection and the power supply. Connect the Field Communicator leads to the terminals labeled “COMM” on the terminal block.

Set all transmitter hardware adjustments during commissioning to avoid exposing the transmitter electronics to the plant environment after installation.

When using a Field Communicator, any configuration changes made must be sent to the transmitter by using the Send key. AMS Device Manager configuration changes are implemented when the Apply button is clicked.

2.3.1 Setting the loop to manual

Whenever sending or requesting data that would disrupt the loop or change the output of the transmitter, set the process application loop to manual. The Field Communicator or AMS Device Manager will prompt you to set the loop to manual when necessary. Acknowledging this prompt does not set the loop to manual. The prompt is only a reminder; set the loop to manual as a separate operation.

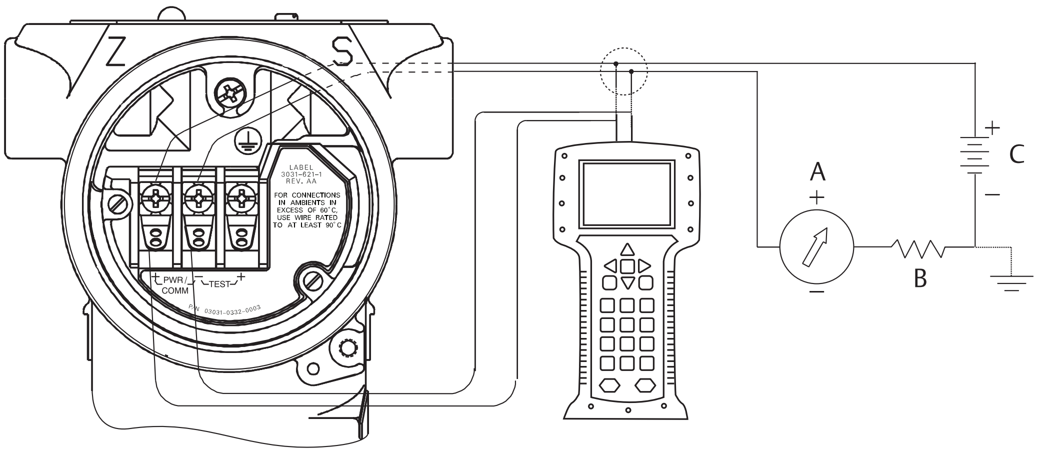
2.3.2 Wiring diagrams

Connect the equipment as shown in Figure 2-1 for 4–20 mA HART® or Figure 2-2 for 1-5 Vdc HART Low Power. To ensure successful communication, a resistance of at least 250 ohms must be present between the Field Communicator loop connection and the power supply. The Field Communicator or AMS Device Manager may be connected at “COMM” on the transmitter terminal block or across the load resistor.

Connecting across the “TEST” terminals will prevent successful communication for 4–20 mA HART output.

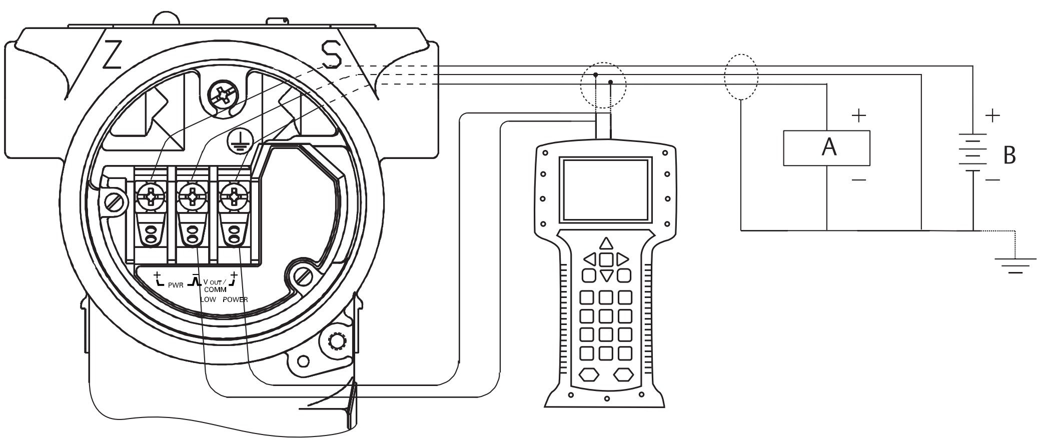
Turn on the Field Communicator by pressing the ON/OFF key or log into AMS Device Manager. The Field Communicator or AMS Device Manager will search for a HART-compatible device and indicate when the connection is made. If the Field Communicator or AMS Device Manager fail to connect, it indicates that no device was found. If this occurs, refer to Section 5: Troubleshooting.

Figure 2-1. Wiring (4–20 mA)



A. Current meter
B. $R_L \geq 250\,\Omega$
C. 24 Vds supply

Figure 2-2. Wiring (Low-Power)



A. Voltmeter
B. 6 - 14 Vdc supply

2.4 Configuration data review

Note
Information and procedures in this section that make use of Field Communicator Fast Key sequences and AMS Device Manager assume that the transmitter and communication equipment are connected, powered, and operating correctly.

The following is a list of factory default configurations. These can be reviewed by using the Field Communicator or AMS Device Manager.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 5
Traditional 1–5 Vdc Fast Keys	1, 5
Device Dashboard Fast Keys	1, 7

Enter the Fast Key sequence to view the configuration data.

Transmitter model	Type
Tag	Range
Date	Descriptor
Message	Minimum and maximum sensor limits
Minimum span	Units
4 and 20 mA points	Output (linear or sq. root)
Damping	Alarm setting (high, low)
Security setting (on, off)	Local zero/span keys (enabled, disabled)
Integral display	Sensor fill
Isolator material	Flange (type, material)
O-ring material	Drain/Vent
Remote seal (type, fill fluid, isolator material, number)	Transmitter S/N
Address	Sensor S/N

AMS Device Manager

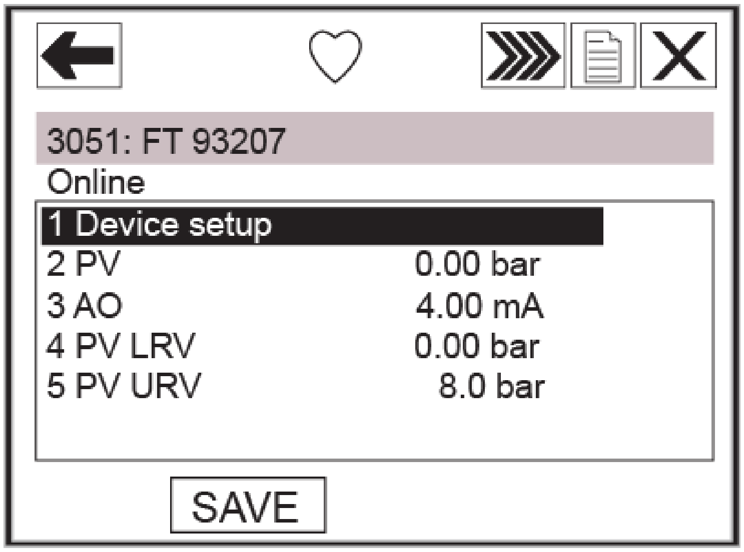
Right click on the device and select **Configuration Properties** from the menu. Select the tabs to review the transmitter configuration data.

2.5 Field Communicator

(Version 1.8)

2.5.1 Field Communicator user interface

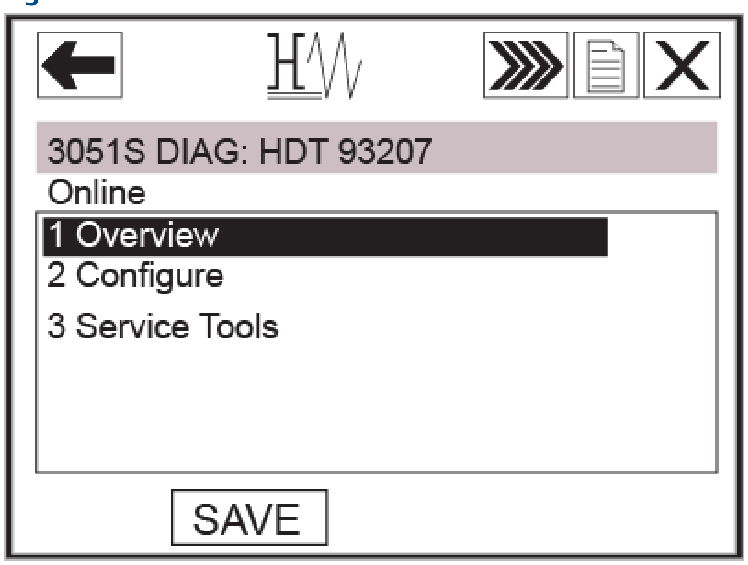
Figure 2-3. Traditional Interface



The corresponding menu trees can be viewed on page 8 and page 9.

The Fast Key sequence can be viewed on page 12.

Figure 2-4. Device Dashboard



The corresponding menu trees can be viewed on page 10 through page 12.

The Fast Key sequence can be viewed on page 14.

2.6 Field Communicator menu trees

Figure 2-5. Rosemount 3051 Traditional HART Menu Tree For 4-20 Ma HART Output

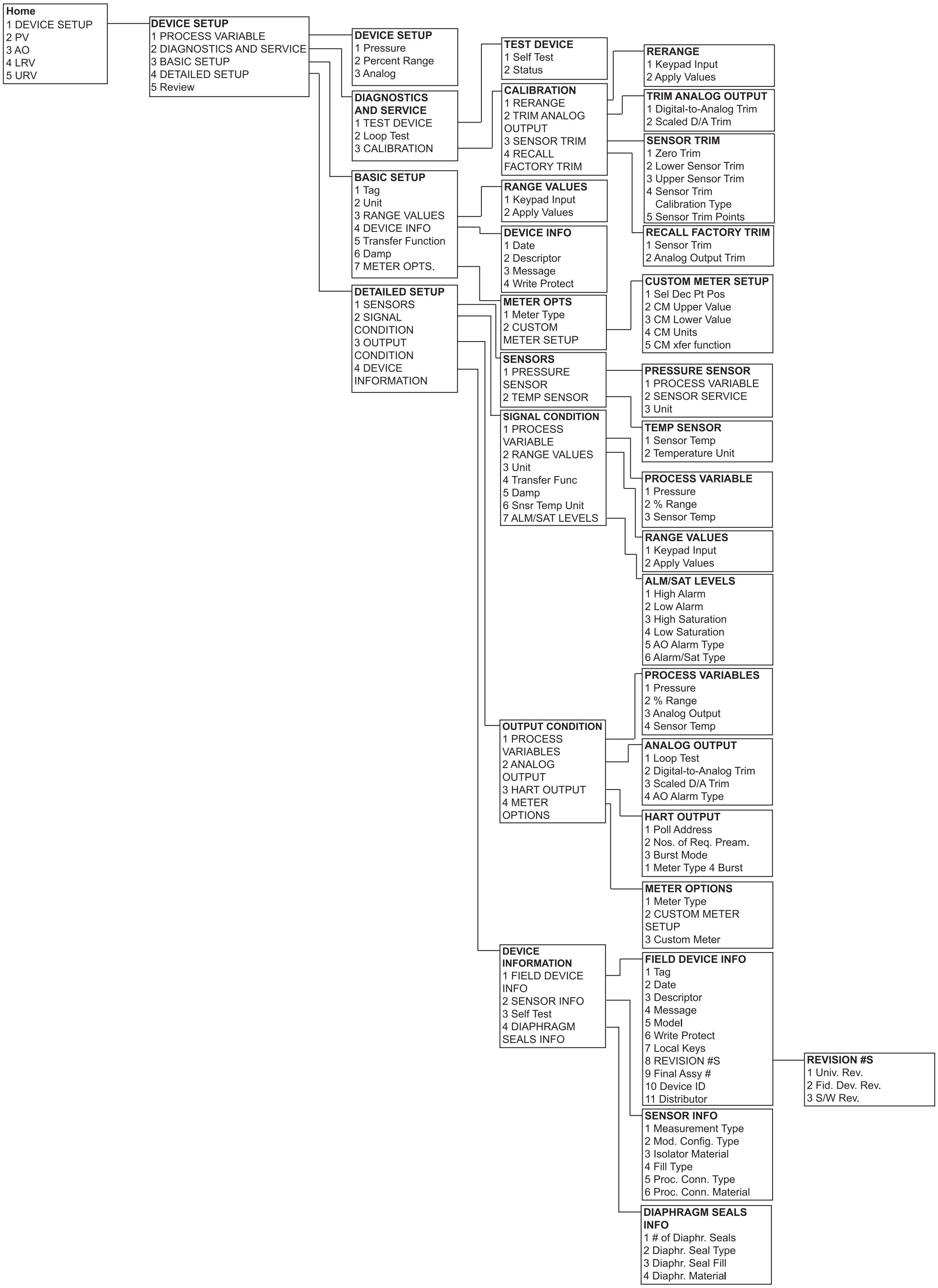


Figure 2-6. Rosemount 3051 Traditional HART Menu Tree for 1-5 Vdc Low Power

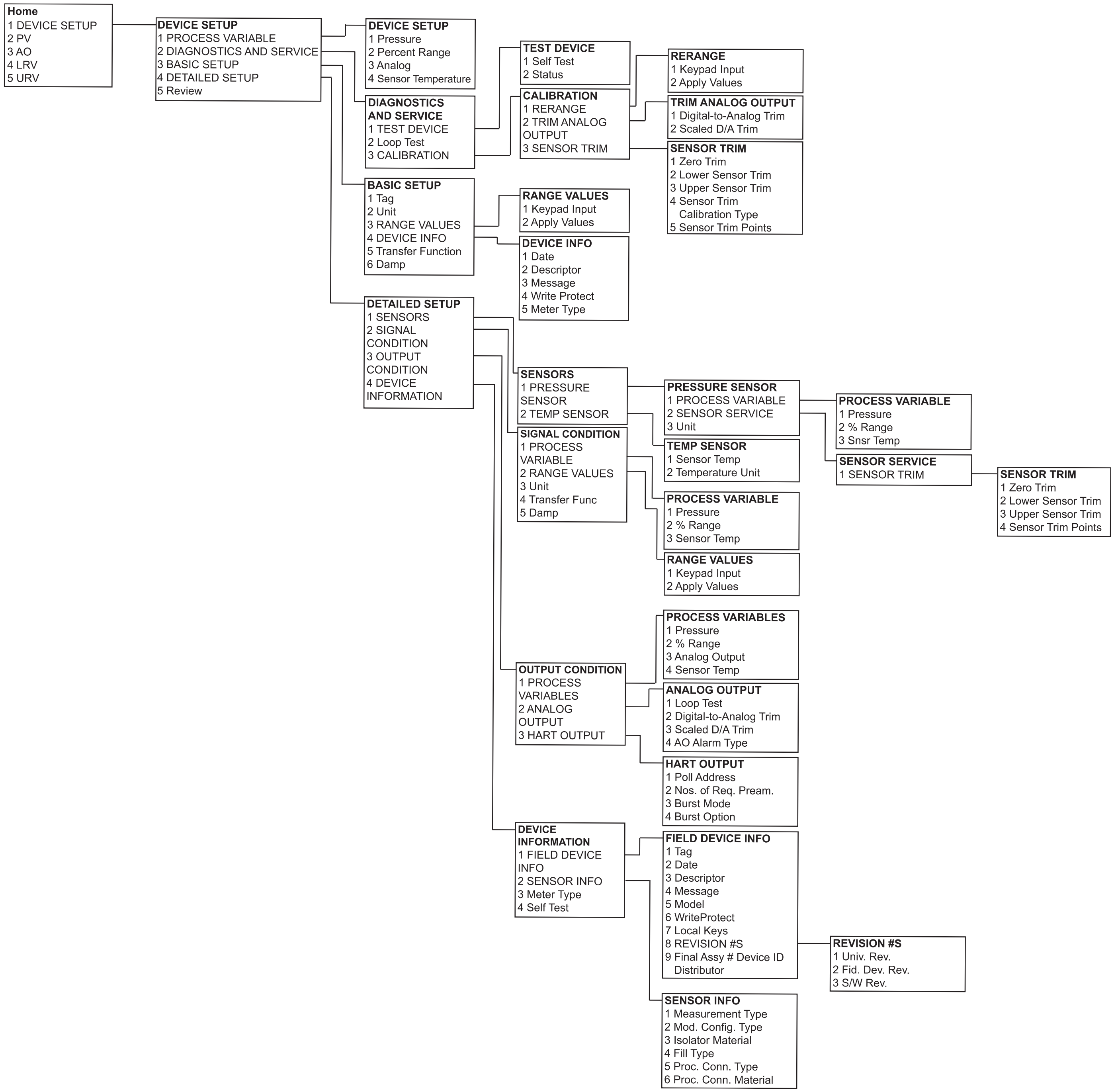


Figure 2-7. Overview

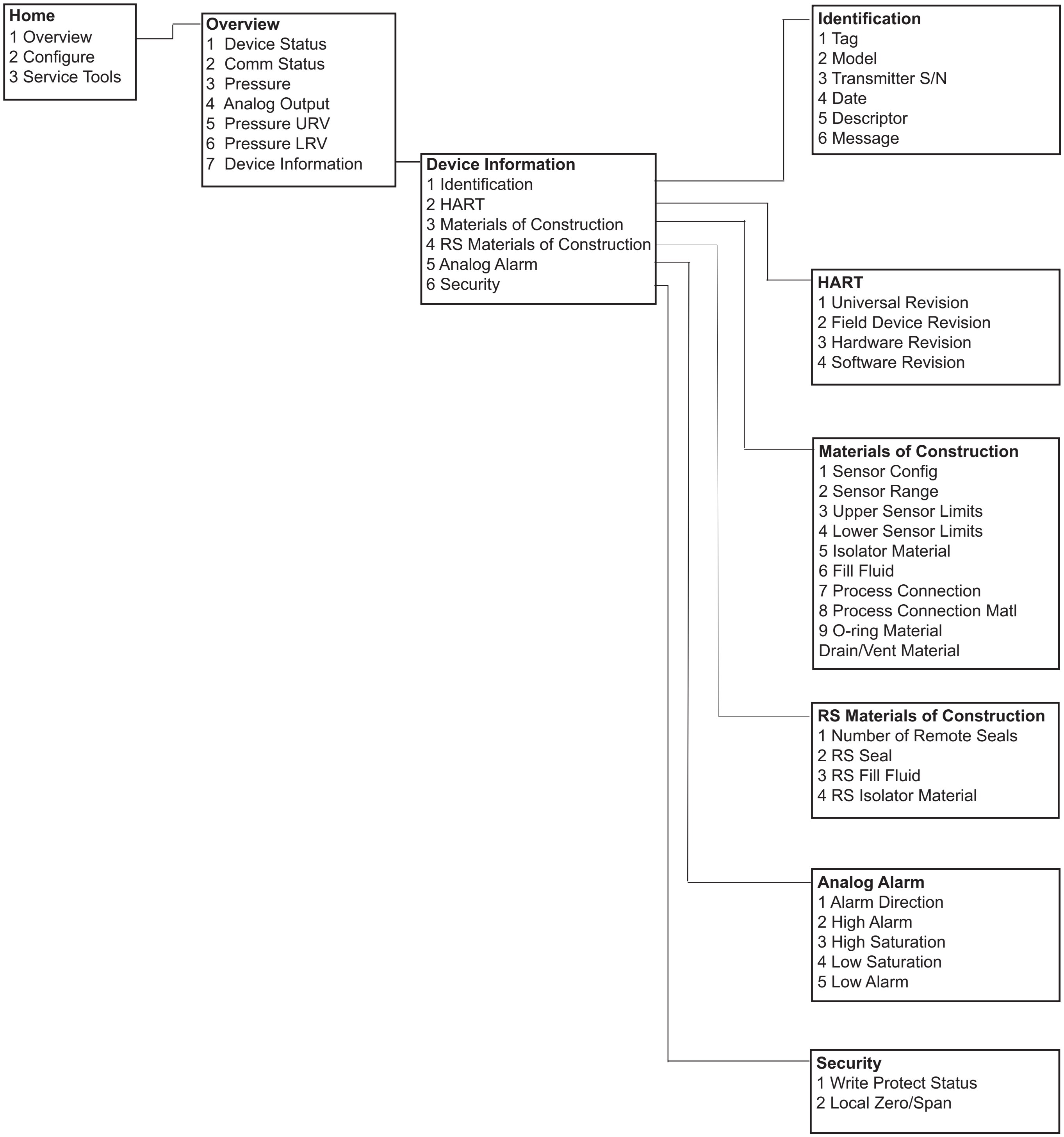


Figure 2-8. Configure

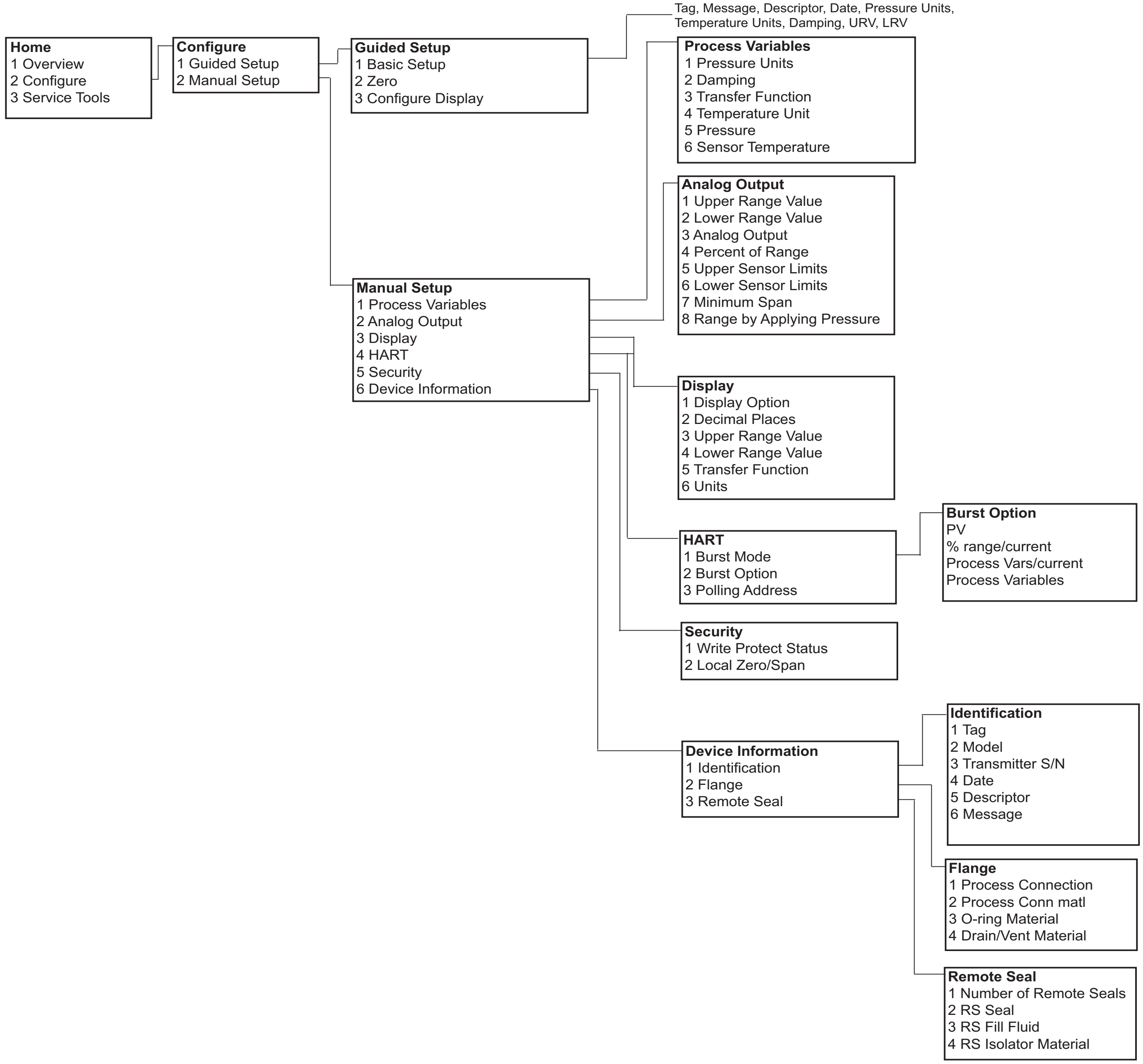
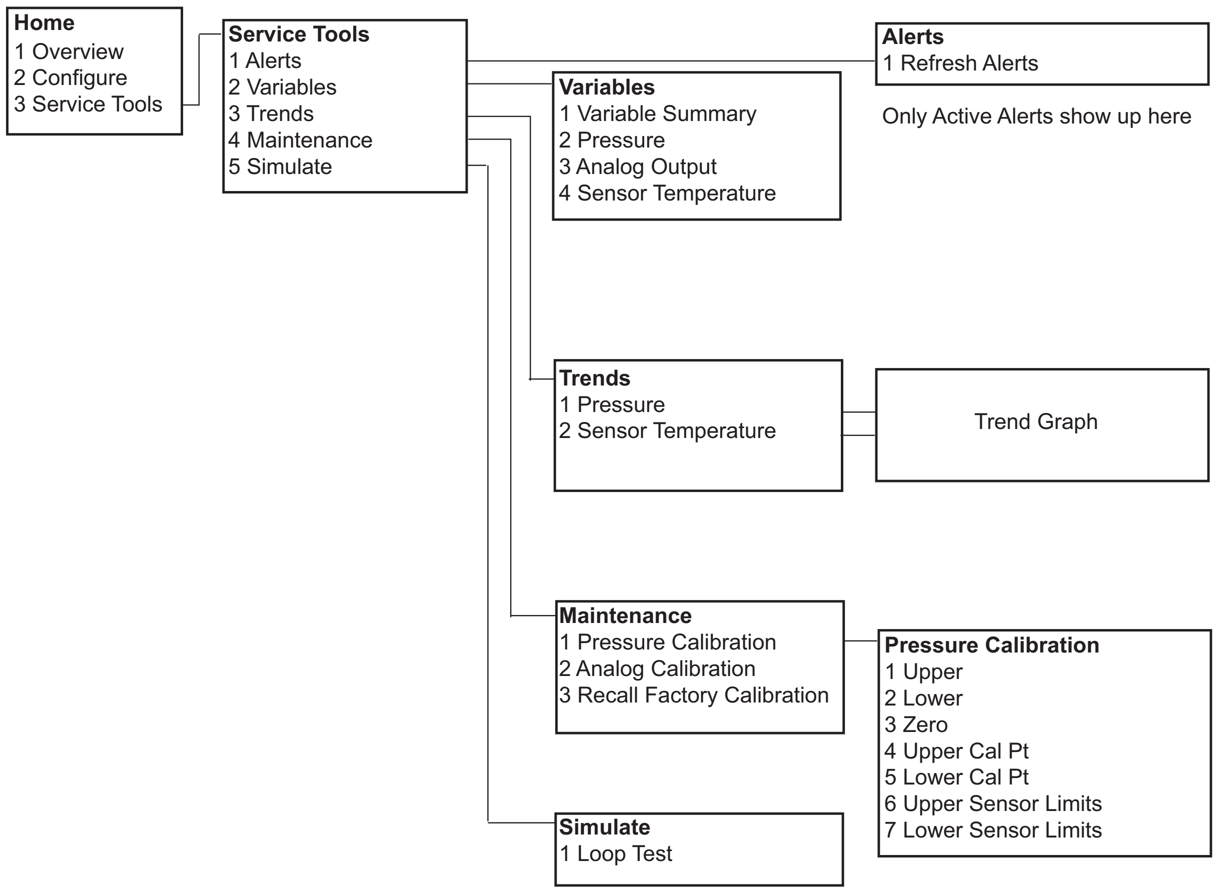


Figure 2-9. Service Tools



2.7 Traditional Fast Key sequence

A check (√) indicates the basic configuration parameters. At minimum, these parameters should be verified as part of the configuration and startup procedure.

Table 2-1. Traditional Fast Key Sequence

	Function	4–20 mA HART	1–5 Vdc HART low power
√	Alarm and Saturation Levels	1, 4, 2, 7	N/A
	Analog Output Alarm Type	1, 4, 3, 2, 4	1, 4, 3, 2, 4
	Burst Mode Control	1, 4, 3, 3, 3	1, 4, 3, 3, 3
	Burst Operation	1, 4, 3, 3, 4	1, 4, 3, 3, 4
	Custom Meter Configuration	1, 3, 7, 2	N/A
	Custom Meter Value	1, 4, 3, 4, 3	N/A
√	Damping	1, 3, 6	1, 3, 6
	Date	1, 3, 4, 1	1, 3, 4, 1
	Descriptor	1, 3, 4, 2	1, 3, 4, 2

Table 2-1. Traditional Fast Key Sequence

	Function	4–20 mA HART	1–5 Vdc HART low power
	Digital To Analog Trim (4-20 mA Output)	1, 2, 3, 2, 1	1, 2, 3, 2, 1
	Disable Local Span/Zero Adjustment	1, 4, 4, 1, 7	1, 4, 4, 1, 7
	Field Device Information	1, 4, 4, 1	1, 4, 4, 1
	Full Trim	1, 2, 3, 3	1, 2, 3, 3
	Keypad Input – Rerange	1, 2, 3, 1, 1	1, 2, 3, 1, 1
	Local Zero and Span Control	1, 4, 4, 1, 7	1, 4, 4, 1, 7
	Loop Test	1, 2, 2	1, 2, 2
	Lower Sensor Trim	1, 2, 3, 3, 2	1, 2, 3, 3, 2
	Message	1, 3, 4, 3	1, 3, 4, 3
	Meter Options	1, 4, 3, 4	N/A
	Number of Requested Preambles	1, 4, 3, 3, 2	1, 4, 3, 3, 2
	Poll Address	1, 4, 3, 3, 1	1, 4, 3, 3, 1
	Poll a Multidropped Transmitter	Left Arrow, 4, 1, 1	Left Arrow, 4, 1, 1
√	Range Values	1, 3, 3	1, 3, 3
	Rerange	1, 2, 3, 1	1, 2, 3, 1
	Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2	1, 2, 3, 2, 2
	Self Test (Transmitter)	1, 2, 1, 1	1, 2, 1, 1
	Sensor Info	1, 4, 4, 2	1, 4, 4, 2
	Sensor Temperature	1, 1, 4	1, 1, 4
	Sensor Trim Points	1, 2, 3, 3, 4	1, 2, 3, 3, 4
	Status	1, 2, 1, 2	1, 2, 1, 2
√	Tag	1, 3, 1	1, 3, 1
√	Transfer Function (Setting Output Type)	1, 3, 5	1, 3, 5
	Transmitter Security (Write Protect)	1, 3, 4, 4	1, 3, 4, 4
	Trim Analog Output	1, 2, 3, 2	1, 2, 3, 2
√	Units (Process Variable)	1, 3, 2	1, 3, 2
	Upper Sensor Trim	1, 2, 3, 3, 3	1, 2, 3, 3, 3
	Zero Trim	1, 2, 3, 3, 1	1, 2, 3, 3, 1

Table 2-2. Device Dashboard Fast Key Sequence

Function	4–20 mA HART
Alarm and saturation levels	1, 7, 5
Analog output alarm type	1, 7, 5
Burst mode control	2, 2, 4, 1
Burst option	2, 2, 4, 2
Custom display configuration	2, 2, 3
Damping	2, 2, 1, 2
Date	2, 2, 6, 1, 4
Descriptor	2, 2, 6, 1, 5
Digital to analog trim (4 - 20 mA output)	3, 4, 2
Disable zero and span adjustment	2, 2, 5, 2
Field device information	2, 2, 6
Loop test	3, 5, 1
Lower sensor trim	3, 4, 1, 2
Message	2, 2, 6, 1, 6
Poll address	2, 2, 4, 3
Range values	1, 5
Rerange with keypad	1, 5
Scaled D/A trim (4–20 mA output)	3, 4, 2
Sensor temperature/trend	3, 3, 2
Tag	2, 2, 6, 1, 1
Transfer function	2, 2, 1, 3
Transmitter security (write protect)	2, 2, 5, 1
Units	2, 2, 1, 1
Upper sensor trim	3, 4, 1, 1
Zero trim	3, 4, 1, 3

2.8 Check output

Before performing other transmitter on-line operations, review the digital output parameters to ensure that the transmitter is operating properly and is configured to the appropriate process variables.

2.8.1 Process variables

The process variables for the Rosemount 3051 provide transmitter output, and are continuously updated. The pressure reading in both engineering units and percent of range will continue to track with pressures outside of the defined range from the lower to the upper range limit of the sensor module.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 1
Traditional 1–5 Vdc Fast Keys	1, 1
Device Dashboard Fast Keys	3, 2

The process variable menu displays the following process variables:

- Pressure
- Percent of range
- Analog output

AMS Device Manager

Right click on the device and select **Process Variables...** from the menu.The *Process Variable* screen displays the following process variables:

- Pressure
- Percent of range
- Analog output

2.8.2 Sensor temperature

The Rosemount 3051 contains a temperature sensor near the pressure sensor in the sensor module. When reading this temperature, keep in mind the sensor is not a process temperature reading.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 1, 4
Traditional 1–5 Vdc Fast Keys	1, 1, 4
Device Dashboard Fast Keys	3, 2, 4

Enter the Fast Key sequence “Sensor Temperature” to view the sensor temperature reading.

AMS Device Manager

Right click on the device and select **Process Variables...** from the menu. *Snsr Temp* is the sensor temperature reading.

2.9 Basic setup

2.9.1 Set process variable units

The *PV Unit* command sets the process variable units to allow you to monitor your process using the appropriate units of measure.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 3, 2
Traditional 1–5 Vdc Fast Keys	1, 3, 2
Device Dashboard Fast Keys	2, 2, 1, 1

Enter the Fast Key sequence “Set Process Variable Units.” Select from the following engineering units:

- inH_2O
- inHg
- ftH_2O
- mmH_2O
- mmHg
- psi
- bar
- mbar
- g/cm^2
- kg/cm^2
- Pa
- kPa
- torr
- atm
- inH_2O at 4 °C
- mmH_2O at 4 °C

AMS Device Manager

Right click on the device and select **Configure** from the menu. In the *Basic Setup* tab, select **Unit** from the drop down menu to select units.

2.9.2 Set output (transfer function)

The Rosemount 3051 has two output settings: linear and square root. Activate the square root output option to make analog output proportional to flow. As input approaches zero, the Rosemount 3051 automatically switches to linear output in order to ensure a more smooth, stable output near zero (see Figure 2-10).

For 4–20 mA HART output, the slope of the curve is unity (y = x) from 0 to 0.6 percent of the ranged pressure input. This allows accurate calibration near zero. Greater slopes would cause large changes in output (for small changes at input). From 0.6 to 0.8 percent, curve slope equals 42 (y = 42x) to achieve continuous transition from linear to square root at the transition point.

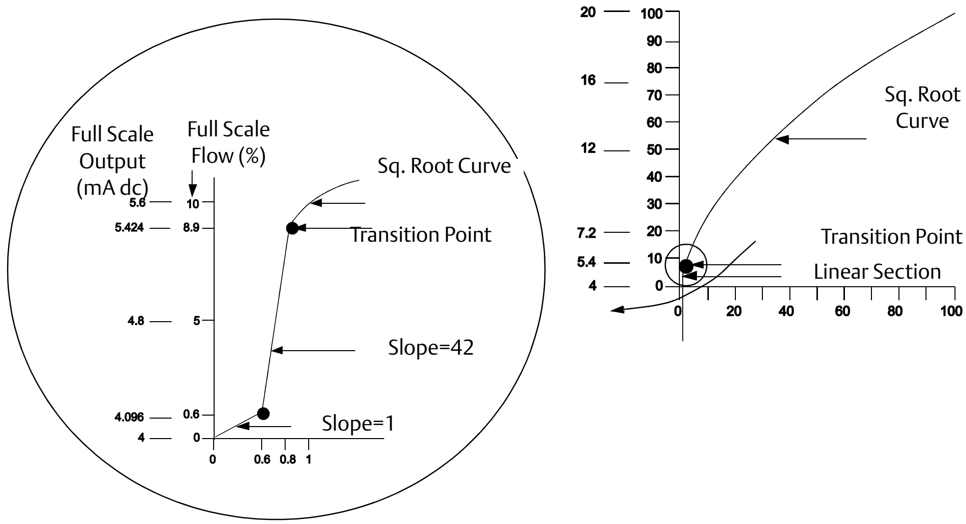
Field Communicator

Traditional 4–20 mA Fast Keys	1, 3, 5
Traditional 1–5 Vdc Fast Keys	1, 3, 5
Device Dashboard Fast Keys	2, 2, 1, 3

AMS Device Manager

1. Riht click on the device and select **Configure** from the menu.
2. In the *Basic Setup* tab, use Xfer fnctn drop down menu to select output, click **Apply**.
3. After carefully reading the warning provided, select **yes**.

Figure 2-10. 4-20 mA HART Square Root Output Transition Point



Note
For a flow turndown of greater than 10:1 it is not recommended to perform a square root extraction in the transmitter. Instead, perform the square root extraction in the system.

2.9.3 Rerange

The *Range Values* command sets each of the lower and upper range analog values (4 and 20 mA points and 1 and 5 Vdc points) to a pressure. The lower range point represents 0 percent of range and the upper range point represents 100 percent of range. In practice, the transmitter range values may be changed as often as necessary to reflect changing process requirements. For a complete listing of range & sensor limits, refer to "Range and sensor limits" on page 93.

Note
Transmitters are shipped from Emerson™ fully calibrated per request or by the factory default of full scale (zero to upper range limit).

Note
Regardless of the range points, the Rosemount 3051 will measure and report all readings within the digital limits of the sensor. For example, if the 4 and 20 mA points are set to 0 and 10 inH_2O, and the transmitter detects a pressure of 25 inH_2O, it digitally outputs the 25 inH_2O reading and a 250% of range reading.

Select from one of the methods below to rerange the transmitter. Each method is unique; examine all options closely before deciding which method works best for your process.

- Rerange with a Field Communicator or AMS Device Manager only.
- Rerange with a pressure input source and a Field Communicator or AMS Device Manager.
- Rerange with a pressure input source and the local zero and span buttons (option D4).

Note
If the transmitter security switch is **ON,** adjustments to the zero and span will not be able to be made. Refer to "Configure security and alarm" on page 44 for security information.

Rerange with a Field Communicator or AMS Device Manager only.

The easiest and most popular way to rerange is to use the Field Communicator only. This method changes the range values of the analog 4 and 20 mA points (1 and 5 Vdc points) independently without a pressure input. This means that when you change either the 4 or 20 mA setting, you also change the span.

An example for the 4–20 mA HART output:

If the transmitter is ranged so that

4 mA = 0 inH_2O, and
20 mA = 100 inH_2O,

and you change the 4 mA setting to 50 inH_2O using the communicator only, the new settings are:

4 mA = 50 inH_2O, and
20 mA = 100 inH_2O.

Note that the span was also changed from 100 inH_2O to 50 inH_2O, while the 20 mA setpoint remained at 100 inH_2O.

To obtain reverse output, simply set the 4 mA point at a greater numerical value than the 20 mA point. Using the above example, setting the 4 mA point at 100 inH_2O and the 20 mA point at 0 inH_2O will result in reverse output.

Field Communicator

Traditional 4-20 mA Fast Keys	1, 2, 3, 1
Traditional 1-5 Vdc Fast Keys	1, 2, 3, 1
Device Dashboard Fast Keys	2, 2, 2, 1

From the *HOME* screen, enter the Fast Key sequence "Rerange with a Communicator Only."

AMS Device Manager

Right click on the device and select **Configure** from the menu. In the *Basic Setup* tab, locate the Analog Output box and perform the following procedure:

1. Enter the lower range value (LRV) and the upper range value (URV) in the fields provided. Select **Apply**.
2. After carefully reading the warning provided, select **yes**.

Rerange with a pressure input source and a Field Communicator or AMS Device Manager

Reranging using the Field Communicator and applied pressure is a way of reranging the transmitter when specific 4 and 20 mA points (1 and 5 Vdc points) are not calculated.

Note
The span is maintained when the 4 mA point (1 Vdc point) is set. The span changes when the 20 mA point (5 Vdc point) is set. If the lower range point is set to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 1, 2
Traditional 1–5 Vdc Fast Keys	1, 2, 3, 1, 2
Device Dashboard Fast Keys	2, 2, 2, 8

From the *HOME* screen, enter the Fast Key sequence Rerange with a pressure input source and a Field Communicator or AMS Device Manager .

AMS Device Manager

1. Right click on the device, select **Calibrate**, then **Apply** values from the menu.
2. Select **Next** after the control loop is set to manual.
3. From the *Apply Values* menu, follow the on-line instructions to configure lower and upper range values.
4. Select **Exit** to leave the *Apply Values* screen.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

Rerange with a pressure input source and the local zero and span buttons (option D4)

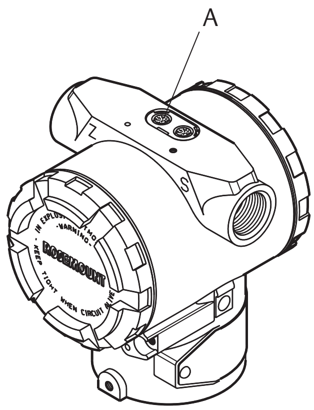
Reranging using the local zero and span adjustments (see Figure 2-11 on page 20) and a pressure source is a way of reranging the transmitter when specific 4 and 20 mA (1 and 5 Vdc) points are not known and a communicator is not available.

Note
When you set the 4 mA (1 Vdc) point the span is maintained; when you set the 20 mA (5 Vdc) point the span changes. If you set the lower range point to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

To rerange the transmitter using the span and zero buttons, perform the following procedure:

1. Loosen the screw holding the certifications label on the top of the transmitter housing. Slide the label to expose the zero and span buttons. See Figure 2-11.
2. Apply the desired 4 mA (1 Vdc) pressure value to the transmitter. Push and hold the zero adjustment button for at least two seconds but no longer than 10 seconds.
3. Apply the desired 20 mA (5 Vdc) pressure value to the transmitter. Push and hold the span adjustment button for at least two seconds but no longer than 10 seconds.

Figure 2-11. Zero and Span Button



A. Span and zero adjustment buttons

Note

The span is maintained when the 4 mA point (1 Vdc point) is set. The span changes when the 20 mA point (5 Vdc point) is set. If the lower range point is set to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

2.9.4 Damping

The "Damp" command introduces a delay in the micro-processing which increases the response time of the transmitter; smoothing variations in output readings caused by rapid input changes. Determine the appropriate damping setting based on the necessary response time, signal stability, and other requirements of the loop dynamics within your system. The default damping value is 0.4 seconds and it can be set to any of ten pre-configured damping values between 0 and 25.6 seconds. See list below.

- 0.00 second
- 0.05 second
- 0.10 second
- 0.20 second
- 0.40 second
- 0.80 second
- 1.60 seconds
- 3.20 seconds
- 6.40 seconds
- 12.8 seconds
- 25.6 seconds

The current damping value can be determined by executing the Field Communicator Fast Keys or going to *Configure* in AMS Device Manager.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 3, 6
Traditional 1–5 Vdc Fast Keys	1, 3, 6
Device Dashboard Fast Keys	2, 2, 1, 2

AMS Device Manager

1. Right click on the device and select **Configure** from the menu.
2. In the *Basic Setup* tab, enter the damping value in the *Damp* field, select **Apply**.
3. After carefully reading the warning provided, select **yes**.

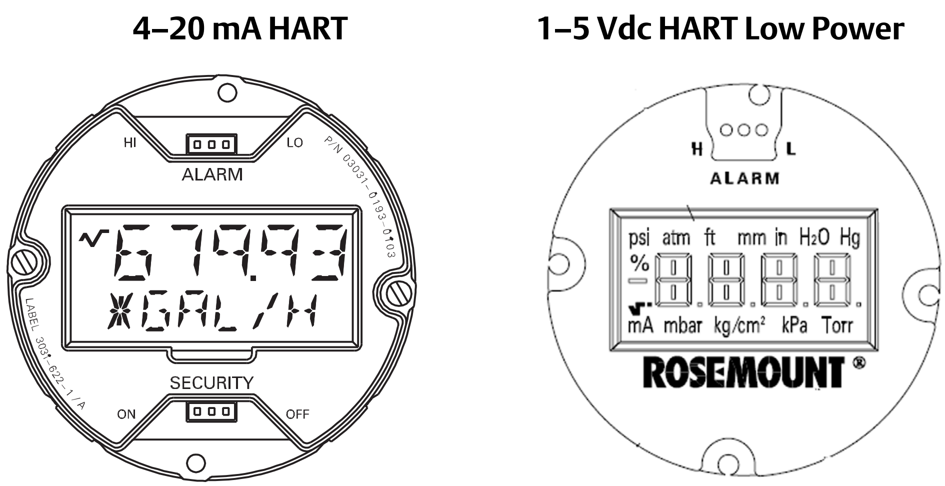
2.10 LCD display

The LCD display connects directly to the interface board which maintains direct access to the signal terminals. The display indicates output and abbreviated diagnostic messages. A display cover is provided to accommodate the display.

For 4–20 mA HART output, the LCD display features a two-line display. The first line of five characters displays the actual measured value, the second line of six characters displays the engineering units. The LCD diplay can also show diagnostic messages. Refer to Figure 2-12.

For 1–5 Vdc HART Low Power output, the LCD display features a single-line display with four characters that display the actual value. The LCD display can also show diagnostic messages. Refer to Figure 2-12.

Figure 2-12. LCD Display



2.10.1 LCD display configuration for 4–20 mA HART only

The factory default alternates are between Engineering Units and % of Range. The LCD Display Configuration command allows customization of the LCD display to suit application requirements. The LCD display will alternate between the selected items

- Eng. Units only
- % of Range only
- Custom Display only
- Alternate Eng. Units and % of Range
- Alternate Eng. Units and Custom Display
- Alternate % of Range and Custom Display

Field Communicator

Traditional 4-20 mA Fast Keys	1, 3, 7
Device Dashboard Fast Keys	2, 2, 3

To change the standard default to one of the above options, follow these steps:

1. From the communicators main menu select **1: Device Setup, 3: Basic Setup, 7: Meter Options.**
2. Select **1: Meter Type**. Using the up or down arrows scroll up or down until the desired display has been highlighted. Press **ENTER, SEND,** and **HOME**.

AMS Device Manager

1. Right click on the device and select **Configuration Properties** from the menu.
2. In the *Local Display* tab, locate the *Meter Type* area. Select the desired options to suit your application needs, select **Apply**.
3. An *Apply Parameter Modification* screen appears, enter desired information and select **OK**.
4. After carefully reading the warning provided, select **OK**.

2.10.2 Custom display configuration 4–20 mA HART only

The user-configurable scale is a feature that enables the LCD display to show flow, level, or custom pressure units. With this feature you can define the decimal point position, the upper range value, the lower range value, the engineering units, and the transfer function.The display can be configured using a Field Communicator or AMS Device Manager.

The user-configurable scale feature can define:

- decimal point position
- upper range values
- lower range values
- engineering units
- transfer function

To configure the display with a Field Communicator, perform the following procedure:

1. Change the Meter Type to "Custom Meter" by using the Fast Key sequence under "LCD display configuration for 4–20 mA HART only" on page 21.
2. Next from the *ONLINE* screen, Select **1: Device Setup, 3: Basic Setup, 7: Meter Options, 2: Meter Options, 2: Custom Meter Setup**.
3. To specify decimal point position:
   a. Select ***1: Sel dec pt pos***. Select the decimal point representation that will provide the most accurate output for your application. For example, when outputting between zero and 75 GPM, select *XX.XXX* or use the decimal point examples below:
   XXXXX
   XXXX.X
   XXX.XX
   XX.XXX
   X.XXXX

Note
Make sure the selection has been sent and the decimal point has changed before proceeding to the next step.

   b. Select **SEND.**
4. To specify a custom upper range value:
   a. Select **2: CM Upper Value**. Type the value that you want the transmitter to read at the 20 mA point.
   b. Select **SEND.**

⚠ See "Safety messages" on page 3 for complete warning information.

5. To specify a custom lower range value:
   a. Select **3: CM Lower Value**. Type the value that you want the transmitter to read at the 4 mA point.
   b. Select **SEND.**
6. To define custom units:
   a. Select **4: CM Units**. Enter the custom units (five characters maximum) to show on LCD display.
   b. Select **SEND.**
7. To select the transmitter transfer function for the display:
   a. Select **5: CM xfer fnct**. Enter the transmitter transfer function for the display. Select **sq root** to display flow units. The custom meter transfer function is independent of the analog output transfer function.
8. Select **SEND** to upload the configuration to the transmitter.

2.11 Detailed setup

2.11.1 Failure mode alarm and saturation

The Rosemount 3051 Transmitters automatically and continuously perform self-diagnostic routines. If the self-diagnostic routines detect a failure, the transmitter drives its output outside of the normal saturation values. The transmitter will drive its output low or high based on the position of the failure mode alarm jumper. See Table 2-3, Table 2-4, and Table 2-5 for failure mode and saturation output levels. To select alarm position, see "Configure security and alarm" on page 44.

Table 2-3. 4–20 mA HART Alarm and Saturation Values

Level	4–20 mA saturation	4–20 mA alarm
Low	3.9 mA	≤ 3.75 mA
High	20.8 mA	≥ 21.75 mA

Table 2-4. NAMUR-Compliant Alarm and Saturation Values

Level	4–20 mA saturation	4–20 mA alarm
Low	3.8 mA	≤ 3.6 mA
High	20.5 mA	≥ 22.5 mA

Table 2-5. 1–5 Vdc HART Low-Power Alarm and Saturation Values

Level	1–5 V saturation	1–5 V alarm
Low	0.97 V	≤ 0.95 V
High	5.20 V	≥ 5.4 V

⚠CAUTION

Alarm level values will be affected by analog trim. Refer to "Digital-to-Analog trim" on page 69.

Note
When a transmitter is in an alarm condition, the Field Communicator indicates the analog output the transmitter would drive if the alarm condition did not exist. The transmitter will alarm high in the event of failure if the alarm jumper is removed.

2.11.2 Alarm and saturation levels for burst mode

Transmitters set to burst mode handle saturation and alarm conditions differently.

Alarm conditions

- Analog output switches to alarm value.
- Primary variable is burst with a status bit set.
- Percent of range follows primary variable .
- Temperature is burst with a status bit set.

Saturation

- Analog output switches to saturation value.
- Primary variable is burst normally.
- Temperature is burst normally.

2.11.3 Alarm and saturation values for multidrop mode

Transmitters set to multidrop mode handle saturation and alarm conditions differently.

Alarm conditions

- Primary variable is sent with a status bit set.
- Percent of range follows primary variable .
- Temperature is sent with a status bit set.

Saturation

- Primary variable is sent normally.
- Temperature is sent normally.

2.11.4 Alarm level verification

If the transmitter electronics board, sensor module, or LCD display is repaired or replaced, verify the transmitter alarm level before returning the transmitter to service. This feature is also useful in testing the reaction of the control system to a transmitter in an alarm state. To verify the transmitter alarm values, perform a loop test and set the transmitter output to the alarm value (see Tables 2-3, 2-4, and 2-5 on page 23, and “Loop test” on page 24).

2.12 Diagnostics and service

Diagnostics and service functions listed below are primarily for use after field installation. The Loop Test feature is designed to verify proper loop wiring and transmitter output.

2.12.1 Loop test

The loop test command verifies the output of the transmitter, the integrity of the loop, and the operations of any recorders or similar devices installed in the loop.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 2
Traditional 1–5 Vdc Fast Keys	1, 2, 2
Device Dashboard Fast Keys	3, 5, 1

To initiate a loop test, perform the following procedure:

1. For 4–20 mA HART output, connect a reference meter to the transmitter by either connecting the meter to the test terminals on the terminal block, or shunting transmitter power through the meter at some point in the loop.

   For 1–5 Vdc Low Power HART output, connect a reference meter to the V_{out} terminal.
2. From the *HOME* screen, enter the Fast Key sequence “Loop Test” to verify the output of the transmitter.
3. Select **OK** after the control loop is set to manual (see “Setting the loop to manual” on page 4).
4. Select a discrete milliamp level for the transmitter to output. At the *CHOOSE ANALOG OUTPUT* prompt select **1: 4mA (1 Vdc)**, select **2: 20mA (5 Vdc)**, or select **3: “Other”** to manually input a value.
   a. If you are performing a loop test to verify the output of a transmitter, enter a value between 4 and 20 mA (1 and 5 Vdc).
   b. If you are performing a loop test to verify alarm levels, enter the value representing an alarm state (see Tables 2-3, 2-4, and 2-5 on page 23).
5. Check that the reference meter displays the commanded output value.
   a. If the values match, the transmitter and the loop are configured and functioning properly.
   b. If the values do not match, the meter may be attached to the wrong loop, there may be a fault in the wiring or power supply, the transmitter may require an output trim, or the reference meter may be malfunctioning.

After completing the test procedure, the display returns to the *Loop Test* screen to select another output value or to end loop testing.

AMS Device Manager

1. Right click on the device and select **Diagnostics and Test**, then Loop Test from the menu.
2. For 4-20 mA HART output, connect a reference meter to the transmitter by either connecting the meter to the test terminals on the terminal block, or shunting transmitter power through the meter at some point in the loop.

   For 1-5 Vdc Low Power HART output, connect a reference meter to the V_{out} terminal.
3. Select **Next** after setting the control loop to manual.
4. Select desired analog output level. Select **Next**.
5. Select **Next** to acknowledge output being set to desired level.
6. Check that the reference meter displays the commanded output value.
   a. If the values match, the transmitter and the loop are configured and functioning properly.
   b. If the values do not match, the meter may be attached to the wrong loop, there may be a fault in the wiring or power supply, the transmitter may require an output trim, or the reference meter may be malfunctioning.

After completing the test procedure, the display returns to the *Loop Test* screen to choose another output value or to end loop testing.

7. Select **End** and click **Next** to end loop testing.
8. Select **Next** to acknowledge the loop can be returned to automatic control.
9. Select **Finish** to acknowledge the method is complete.

2.13 Advanced functions

2.13.1 Saving, recalling, and cloning configuration data

Use the cloning feature of the Field Communicator or the AMS Device Manager "User Configuration" feature to configure several Rosemount 3051 Transmitters similarly. Cloning involves configuring a transmitter, saving the configuration data, then sending a copy of the data to a separate transmitter. Several possible procedures exist when saving, recalling, and cloning configuration data. For complete instructions refer to the Field Communicator Reference Manual or AMS Device Manager online guides. One common method is as follows:

Field Communicator

Traditional 4–20 mA Fast Keys	left arrow, 1, 2
Traditional 1–5 Vdc Fast Keys	left arrow, 1, 2
Device Dashboard Fast Keys	3, 4, 3

1. Completely configure the first transmitter.
2. Save the configuration data:
   a. Select **SAVE** from the Field Communicator *HOME/ONLINE* screen.
   b. Ensure that the location to which the data will be saved is set to MODULE. If it is not, select ***1: Location*** to set the save location to MODULE.
   c. Select ***2: Name***, to name the configuration data. The default is the transmitter tag number.
   d. Ensure that the data type is set to STANDARD. If the data type is NOT STANDARD, select ***3: Data Type*** to set the data type to STANDARD.
   e. Select **SAVE**.
3. Connect and power the receiving transmitter and Field Communicator.
4. Select the back arrow from the *HOME/ONLINE* screen. The Field Communicator menu appears.
5. Select **1: Offline, 2: Saved Configuration, 1: Module Contents** to reach the *MODULE CONTENTS* menu.
6. Use the **DOWN ARROW** to scroll through the list of configurations in the memory module, and use the **RIGHT ARROW** to select and retrieve the required configuration.
7. Select **1: Edit**.
8. Select **1: Mark All.**
9. Select **Save**.
10. Use the **DOWN ARROW** to scroll through the list of configurations in the memory module, and use the **RIGHT ARROW** to select the **configuration** again.

11. Select **3: Send** to download the configuration to the transmitter.
12. Select **OK** after the control loop is set to manual.
13. After the configuration has been sent, select **OK** to acknowledge that the loop can be returned to automatic control.

When finished, the Field Communicator informs you of the status. Repeat steps 3 through 13 to configure another transmitter.

Note
The transmitter receiving cloned data must have the same software version (or later) as the original transmitter.

AMS Device Manager creating a reusable copy

To create a reusable copy of a configuration perform the following procedure:

1. Completely configure the first transmitter.
2. Select **View** then **User Configuration View** from the menu bar (or click the toolbar button).
3. In the *User Configuration* window, right click and select **New** from the *context* menu.
4. In the *New* window, select a device from the list of templates shown, and select **OK**.
5. The template is copied into the User Configurations window, with the tag name highlighted; rename it as appropriate and press **Enter**.

Note
A device icon can also be copied by dragging and dropping a device template or any other device icon from AMS Device Manager Explorer or Device Connection View into the User Configurations window.

The *Compare Configurations* window appears, showing the current values of the copied device on one side and mostly blank fields on the other (User Configuration) side.

6. Transfer values from the current configuration to the user configuration as appropriate or enter values by typing the values into the available fields.
7. Select **Apply** to apply the values, or select **OK** to apply the values and close the window.

AMS Device Manager applying a user configuration

Any amount of user configurations can be created for the application. They can also be saved, and applied to connected devices or to devices in the device list or plant database.

Note
When using AMS Device Manager Revision 6.0 or later, the device to which the user configuration is applied, must be the same model type as the one created in the user configuration. When using AMS Device Manager Revision 5.0 or earlier, the same model type and revision number are required.

To apply a user configuration perform the following procedure:

1. Select the desired user configuration in the *User Configurations* window.
2. Drag the icon onto a like device in AMS Device Manager Explorer or Device Connection View. The *Compare Configurations* window opens, showing the parameters of the target device on one side and the parameters of the user configuration on the other.
3. Transfer parameters from the user configuration to the target device as desired. Click **OK** to apply the configuration and close the window.

2.13.2 Burst mode

When configured for burst mode, the Rosemount 3051 provides faster digital communication from the transmitter to the control system by eliminating the time required for the control system to request information from the transmitter. Burst mode is compatible with the analog signal. Because the HART protocol features simultaneous digital and analog data transmission, the analog value can drive other equipment in the loop while the control system is receiving the digital information. Burst mode applies only to the transmission of dynamic data (pressure and temperature in engineering units, pressure in percent of range, and/or analog output), and does not affect the way other transmitter data is accessed.

Access to information other than dynamic transmitter data is obtained through the normal poll/response method of HART Communication. A Field Communicator, AMS Device Manager or the control system may request any of the information that is normally available while the transmitter is in burst mode. Between each message sent by the transmitter, a short pause allows the Field Communicator, AMS Device Manager or a control system to initiate a request. The transmitter will receive the request, process the response message, and then continue “bursting” the data approximately three times per second.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 4, 3, 3, 3
Traditional 1–5 Vdc Fast Keys	1, 4, 3, 3, 3
Device Dashboard Fast Keys	2, 2, 4, 1

AMS Device Manager

Right click on the device and select **Configure** from the menu.

1. In the *HART* tab, use the drop down menu to select **“Burst Mode ON or OFF.”** For *“Burst option”* select the desired properties from the drop down menu. Burst options are as follows:
   – PV
   – % range/current
   – Process vars/crnt
   – Process variables
2. After selecting options click **Apply**.
3. After carefully reading the warning provided, select **yes**.

2.14 Multidrop communication

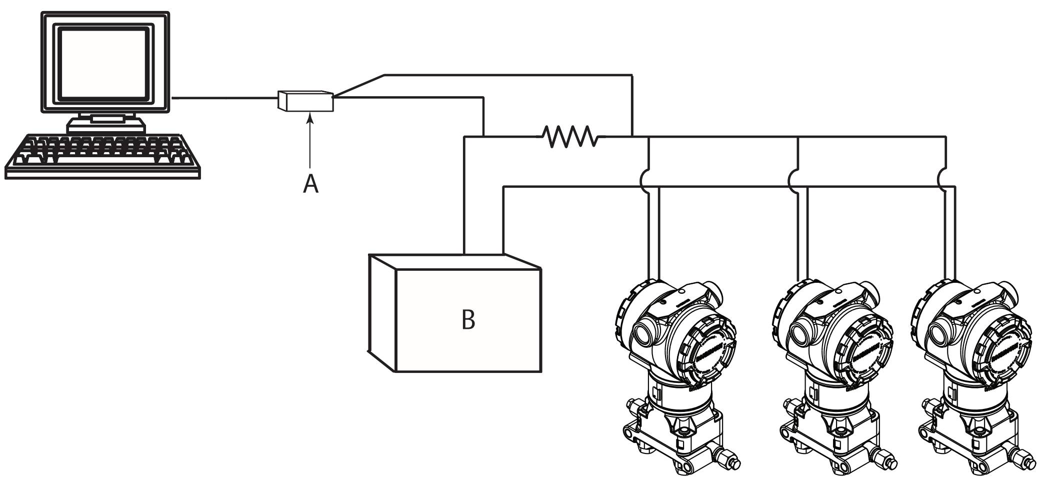
Multidropping transmitters refers to the connection of several transmitters to a single communications transmission line. Communication between the host and the transmitters takes place digitally with the analog output of the transmitters deactivated. With smart communications protocol, up to fifteen transmitters can be connected on a single twisted pair of wires, or over leased phone lines.

Multidrop installation requires consideration of the update rate necessary from each transmitter, the combination of transmitter models, and the length of the transmission line. Communication with transmitters can be accomplished with HART modems and a host implementing HART protocol. Each transmitter is identified by a unique address (1–15) and responds to the commands defined in the HART protocol. Field Communicators and AMS Device Manager can test, configure, and format a multidropped transmitter the same way as a transmitter in a standard point-to-point installation.

Figure 2-13 shows a typical multidrop network. This figure is not intended as an installation diagram.

Note
A transmitter in multidrop mode has the analog output fixed at 4 mA. If an LCD display is installed to a transmitter in multidrop mode, it will alternate the display between “current fixed” and the specified LCD display output(s).

Figure 2-13. Typical Multidrop Network



The Rosemount 3051 is set to address zero (0) at the factory, which allows operation in the standard point-to-point manner with a 4–20 mA output signal. To activate multidrop communication, the transmitter address must be changed to a number from one to 15. This change deactivates the 4–20 mA analog output, sending it to 4 mA. It also disables the failure mode alarm signal, which is controlled by the upscale/downscale switch position. Failure signals in multidropped transmitters are communicated through HART messages.

2.15 Changing a transmitter address

To activate multidrop communication, the transmitter poll address must be assigned a number from one to 15, and each transmitter in a multidropped loop must have a unique poll address.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 4, 3, 3, 1
Traditional 1–5 Vdc Fast Keys	1, 4, 3, 3, 1
Device Dashboard Fast Keys	1, 2

AMS Device Manager

Right click on the device and select **Configuration Properties** from the menu.

1. In the *HART* tab, in *the ID* box, enter poll address located in the *Poll addr* box, select **Apply**.
2. After carefully reading the warning provided, select **yes**.

2.15.1 Communicating with a multidropped transmitter

Field Communicator

Traditional 4–20 mA Fast Keys	1, 4, 3, 3, 2
Traditional 1–5 Vdc Fast Keys	1, 4, 3, 3, 2
Device Dashboard Fast Keys	1, 2

To communicate with a multidropped transmitter, configure the Field Communicator to poll for a non-zero address.

1. From the *HOME* screen, enter the Fast Key sequence "Communicating with a Multidropped Transmitter."
2. On the polling menu, scroll down and select **Digital Poll.** In this mode, the Field Communicator automatically polls for devices at addresses 0–15 upon start up.

AMS Device Manager

Click on the HART modem icon and select **Scan All Devices.**

2.15.2 Polling a multidropped transmitter

Polling a multidropped loop determines the model, address, and number of transmitters on the given loop.

Field Communicator

Traditional 4–20 mA Fast Keys	Left arrow, 4, 1
Traditional 1–5 Vdc Fast Keys	Left arrow, 4, 1
Device Dashboard Fast Keys	1, 2

AMS device manager

Click on the HART modem icon and select **Scan All Devices.**

Section 3 Installation

Overview . . . . page 31
Safety messages . . . . page 31
General considerations . . . . page 32
Mechanical considerations . . . . page 32
Draft range considerations . . . . page 33
Environmental considerations . . . . page 33
HART installation flowchart . . . . page 34
Installation procedures . . . . page 35
Electrical considerations . . . . page 46
Hazardous locations certifications . . . . page 51
Rosemount 305, 306, and 304 Manifolds . . . . page 51
Valve Components . . . . page 58

3.1 Overview

The information in this section covers installation considerations for the Rosemount™ 3051 Pressure Transmitter with HART® protocols. A Quick Start Guide for HART protocol is shipped with every transmitter to describe basic pipe-fitting and wiring procedures for initial installation. Dimensional drawings for each transmitter variation and mounting configuration are included on page 38.

3.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠WARNING

Explosions could result in death or serious injury.

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

⚠WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Replacement equipment or spare parts not approved by Emerson™ for use as spare parts could reduce the pressure retaining capabilities of the transmitter and may render the instrument dangerous.

- Use only bolts supplied or sold by Emerson as spare parts.
- Refer to “Spare parts” on page 136 for a complete list of spare parts.

Improper assembly of manifolds to traditional flange can damage sensor module.

- For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact sensor module housing.

3.3 General considerations

Measurement accuracy depends upon proper installation of the transmitter and impulse piping. Mount the transmitter close to the process and use a minimum of piping to achieve best accuracy. Keep in mind the need for easy access, personnel safety, practical field calibration, and a suitable transmitter environment. Install the transmitter to minimize vibration, shock, and temperature fluctuation.

Important

Install the enclosed pipe plug (found in the box) in unused conduit opening with a minimum of five threads engaged to comply with explosion-proof requirements.

Refer to Material Selection Consideration for Pressure Transmitters Technical Note for material compatibility considerations.

3.4 Mechanical considerations

Note

For steam service or for applications with process temperatures greater than the limits of the transmitter, do not blow down impulse piping through the transmitter. Flush lines with the blocking valves closed and refill lines with water before resuming measurement.

Note

When the transmitter is mounted on its side, position the coplanar flange to ensure proper venting or draining. Mount the flange as shown in Figure 3-8 on page 41, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

3.5 Draft range considerations

Installation

For the Rosemount 3051CD0 Draft Range Pressure Transmitter, it is best to mount the transmitter with the isolators parallel to the ground. Installing the transmitter in this way reduces oil head effect and provides for optimal temperature performance.

Be sure the transmitter is securely mounted. Tilting of the transmitter may cause a zero shift in the transmitter output.

Reducing process noise

There are two recommended methods of reducing process noise: output damping and, in gage applications, reference side filtering.

Output damping

The output damping for the Rosemount 3051CD0 is factory set to 3.2 seconds as a default. If the transmitter output is still noisy, increase the damping time. If faster response is needed, decrease the damping time. Damping adjustment information is available on page 20.

Reference side filtering

In gage applications it is important to minimize fluctuations in atmospheric pressure to which the low side isolator is exposed.

One method of reducing fluctuations in atmospheric pressure is to attach a length of tubing to the reference side of the transmitter to act as a pressure buffer.

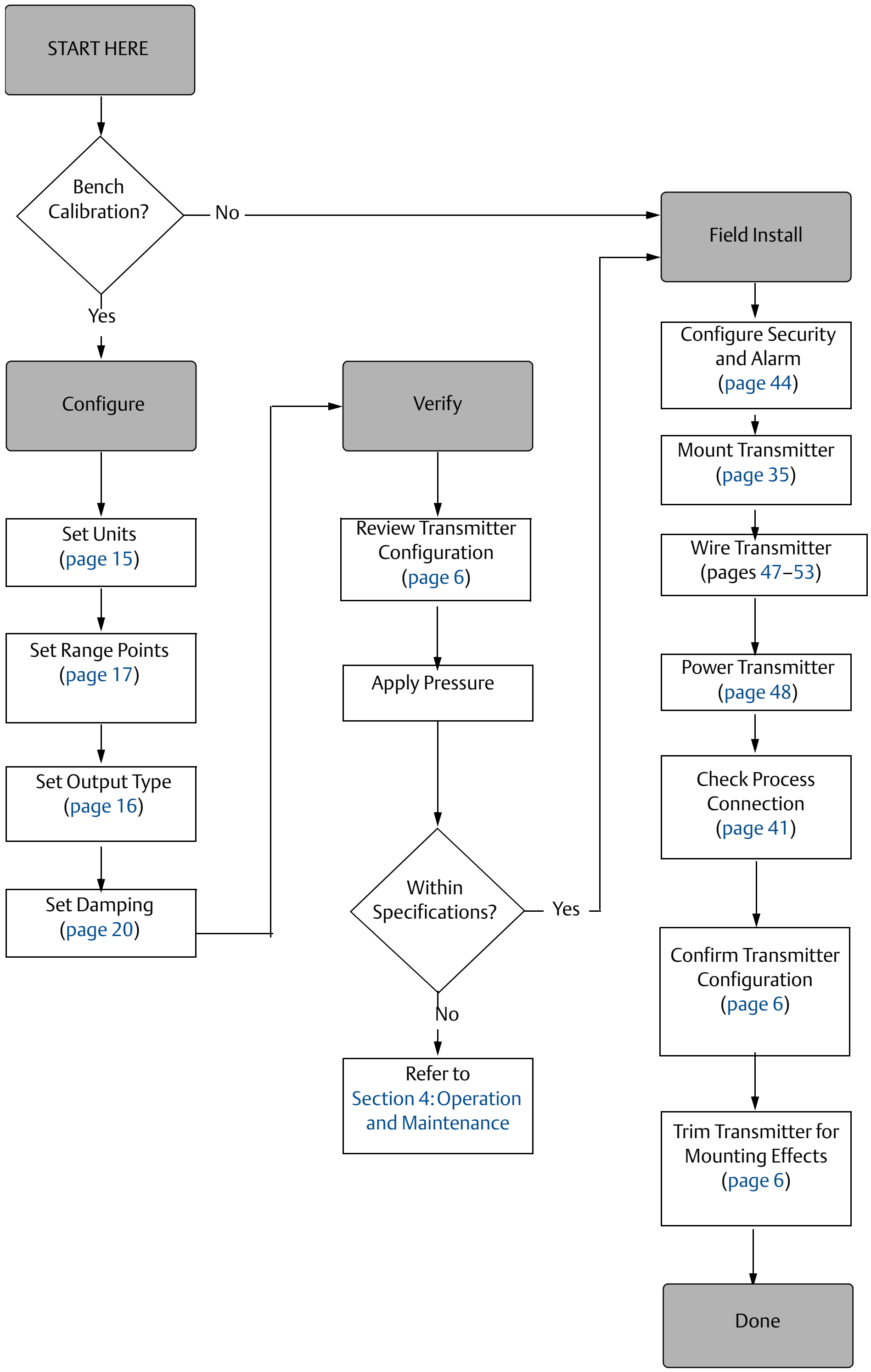
Another method is to plumb the reference side to a chamber that has a small vent to atmosphere. If multiple draft transmitters are being used in an application, the reference side of each device can be plumbed to a chamber to achieve a common gage reference.

3.6 Environmental considerations

Best practice is to mount the transmitter in an environment that has minimal ambient temperature change. The transmitter electronics temperature operating limits are –40 to 185 °F (–40 to 85 °C). Refer to Figure 2-12 on page 21 that lists the sensing element operating limits. Mount the transmitter so that it is not susceptible to vibration and mechanical shock and does not have external contact with corrosive materials.

3.7 HART installation flowchart

Figure 3-1. HART Flowchart



3.8 Installation procedures

3.8.1 Mount the transmitter

For dimensional drawing information refer to Appendix A: Specifications and Reference Data on page 89.

Process flange orientation

Mount the process flanges with sufficient clearance for process connections. For safety reasons, place the drain/vent valves so the process fluid is directed away from possible human contact when the vents are used. In addition, consider the need for a testing or calibration input.

Note
Most transmitters are calibrated in the horizontal position. Mounting the transmitter in any other position will shift the zero point to the equivalent amount of liquid head pressure caused by the varied mounting position. To reset zero point, refer to "Sensor trim" on page 71.

Housing rotation

See "Housing rotation" on page 43.

Terminal side of electronics housing

Mount the transmitter so the terminal side is accessible. Clearance of 0.75-in. (19 mm) is required for cover removal. Use a conduit plug in the unused conduit opening.

Circuit side of electronics housing

Provide 0.75-in. (19 mm) of clearance for units with out an LCD display. Three inches of clearance is required for cover removal if a meter is installed.

Cover installation

Always ensure a proper seal by installing the electronics housing cover(s) so that metal contacts metal. Use Rosemount O-rings.

Environmental seal for housing

Thread sealing (PTFE) tape or paste on male threads of conduit is required to provide a water/dust tight conduit seal and meets requirements of NEMA® Type 4X, IP66, and IP68. Consult factory if other Ingress Protection ratings are required.

For M20 threads, install conduit plugs to full thread engagement or until mechanical resistance is met.

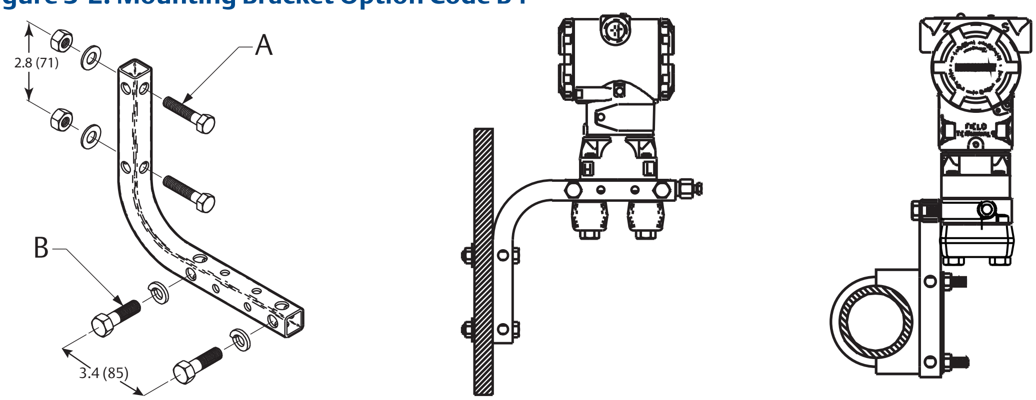
Mounting brackets

Rosemount 3051Transmitters may be panel-mounted or pipe-mounted through an optional mounting bracket. Refer to Table 3-1 for the complete offering and see Figure 3-2 through Figure 3-5 on pages 36 and 37 for dimensions and mounting configurations.

Table 3-1. Rosemount 3051 Mounting Brackets

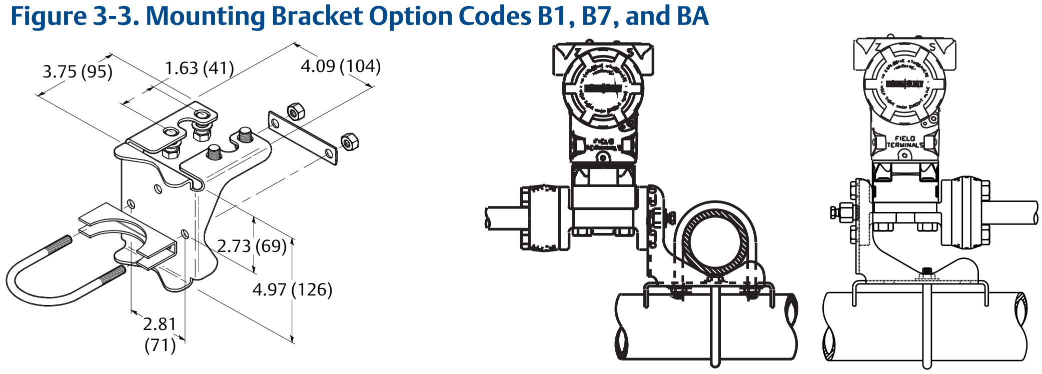
Option code	Process connections			Mounting			Materials			
	Coplanar	In-line	Traditional	Pipe mount	Panel mount	Flat panel mount	CS bracket	SST bracket	CS bolts	SST bolts
B4	X	X	N/A	X	X	X	N/A	X	N/A	X
B1	N/A	N/A	X	X	N/A	N/A	X	N/A	X	N/A
B2	N/A	N/A	X	N/A	X	N/A	X	N/A	X	N/A
B3	N/A	N/A	X	N/A	N/A	X	X	N/A	X	N/A
B7	N/A	N/A	X	X	N/A	N/A	X	N/A	N/A	X
B8	N/A	N/A	X	N/A	X	N/A	X	N/A	N/A	X
B9	N/A	N/A	X	N/A	N/A	X	X	N/A	N/A	X
BA	N/A	N/A	X	X	N/A	N/A	N/A	X	N/A	X
BC	N/A	N/A	X	N/A	N/A	X	N/A	X	N/A	X

Figure 3-2. Mounting Bracket Option Code B4



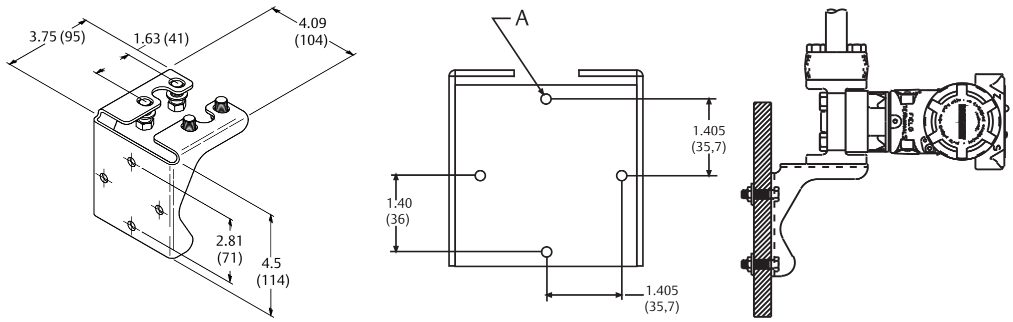
A. 5/16 × 1 1/2 bolts for panel mounting (not supplied)
B. 3/8–16 × 1 1/4 bolts for mounting to transmitter
Dimensions are in inches (millimeters)

Figure 3-3. Mounting Bracket Option Codes B1, B7, and BA



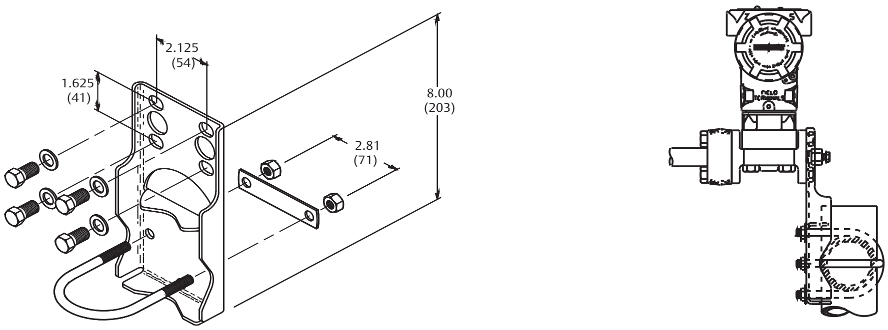
Dimensions are in inches (millimeters).

Figure 3-4. Panel Mounting Bracket Option Codes B2 and B8



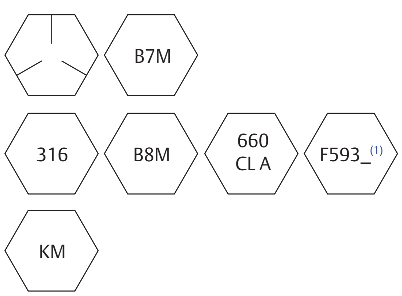
A. Mounting holes 0.375 diameter (10)
Dimensions are in inches (millimeters).

Figure 3-5. Flat Mounting Bracket Option Codes B3 and BC



Dimensions are in inches (millimeters).

Flange bolts



Carbon Steel (CS) head markings

Stainless Steel (SST) head markings

Alloy K-500 head marking

1. The last digit in the F593_ head marking may be any letter between A and M.

The Rosemount 3051 can be shipped with a coplanar flange or a traditional flange installed with four 1.75-in. flange bolts. Mounting bolts and bolting configurations for the coplanar and traditional flanges can be found on page 39. Stainless steel bolts supplied by Emerson Process Management are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Emerson are identified by their head markings:

Bolt installation

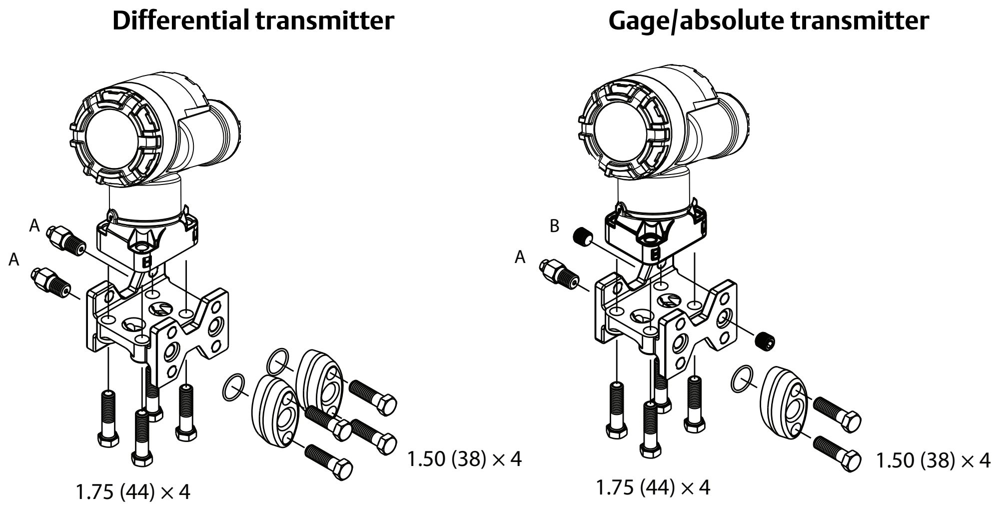
⚠ Only use bolts supplied with the Rosemount 3051 or sold by Emerson as spare parts for the transmitter. Use the following bolt installation procedure:

1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a crossing pattern (see Table 3-2 for torque values).
3. Torque the bolts to the final torque value using the same crossing pattern.

Table 3-2. Bolt Installation Torque Values

Bolt material	Initial torque value	Final torque value
CS-ASTM-A445 Standard	300 in-lb (34 N-m)	650 in-lb (73 N-m)
316 SST—Option L4	150 in-lb (17 N-m)	300 in-lb (34 N-m)
ASTM-A-19 B7M—Option L5	300 in-lb (34 N-m)	650 in-lb (73 N-m)
Alloy 400—Option L6	300 in-lb (34 N-m)	650 in-lb (73 N-m)

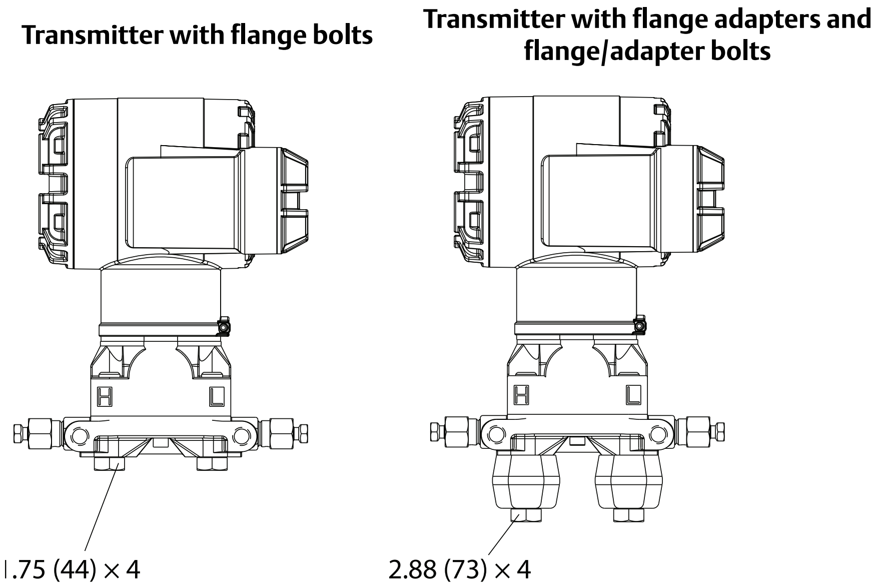
Figure 3-6. Traditional Flange Bolt Configurations



A. Drain/vent
B. Plug
Dimensions are in inches (millimeters).

⚠ See "Safety messages" on page 31 for complete warning information.

Figure 3-7. Mounting Bolts and Bolt Configurations for Coplanar Flange



Dimensions are in inches (millimeters).

Description	Qty	Size in. (mm)
Differential pressure		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	4	2.88 (73)
Gage/absolute pressure[1]		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	2	2.88 (73)

1. Rosemount 3051T transmitters are direct mount and do not require bolts for process connection.

3.8.2 Impulse piping

The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements. There are five possible sources of error: pressure transfer, leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, and density variations between the legs.

The best location for the transmitter in relation to the process pipe is dependent on the process. Use the following guidelines to determine transmitter location and placement of impulse piping:

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1 in./ft (8 cm/m) upward from the transmitter toward the process connection.
- For gas service, slope the impulse piping at least 1 in./ft (8 cm/m) downward from the transmitter toward the process connection.

- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, make the purge connection close to the process taps and purge through equal lengths of the same size pipe. Avoid purging through the transmitter.
- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Maintain equal leg of head pressure on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

Mounting requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 3-8 for examples of the following mounting configurations:

Liquid flow measurement

- Place taps to the side of the line to prevent sediment deposits on the transmitter's process isolators.
- Mount the transmitter beside or below the taps so gases can vent into the process line.
- Mount drain/vent valve upward to allow gases to vent.

Gas flow measurement

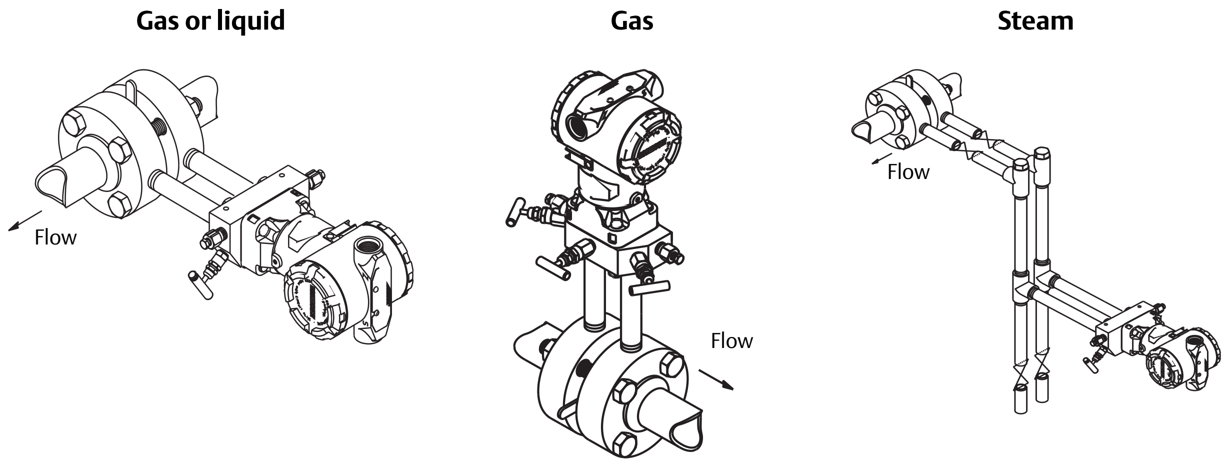
- Place taps in the top or side of the line.
- Mount the transmitter beside or above the taps so liquid will drain into the process line.

Steam flow measurement

- Place taps to the side of the line.
- Mount the transmitter below the taps to ensure that the impulse piping will stay filled with condensate.
- In steam service above 250 °F (121 °C), fill impulse lines with water to prevent steam from contacting the transmitter directly and to ensure accurate measurement start-up.

Note
For steam or other elevated temperature services, it is important that temperatures at the process connection do not exceed the transmitter's process temperature limits.

Figure 3-8. Installation Examples



3.8.3 Process connections

Coplanar or traditional process connection

Install and tighten all four flange bolts before applying pressure, or process leakage will result. When properly installed, the flange bolts will protrude through the top of the sensor module housing. Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

Flange adapters

Rosemount 3051DP and GP process connections on the transmitter flanges are $^1/_4$–18 NPT. Flange adapters are available with standard $^1/_2$–14 NPT Class 2 connections. The flange adapters allow users to disconnect from the process by removing the flange adapter bolts. Use plant-approved lubricant or sealant when making the process connections. Refer to "Dimensional drawings" on page 101 for the distance between pressure connections. This distance may be varied ±$^1/_8$-in. (3.2 mm) by rotating one or both of the flange adapters.

To install adapters to a coplanar flange, perform the following procedure:

1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the O-ring installed.
3. Clamp the adapters and the coplanar flange to the transmitter sensor module using the larger of the bolts supplied.
4. Tighten the bolts. Refer to "Flange bolts" on page 37 for torque specifications.

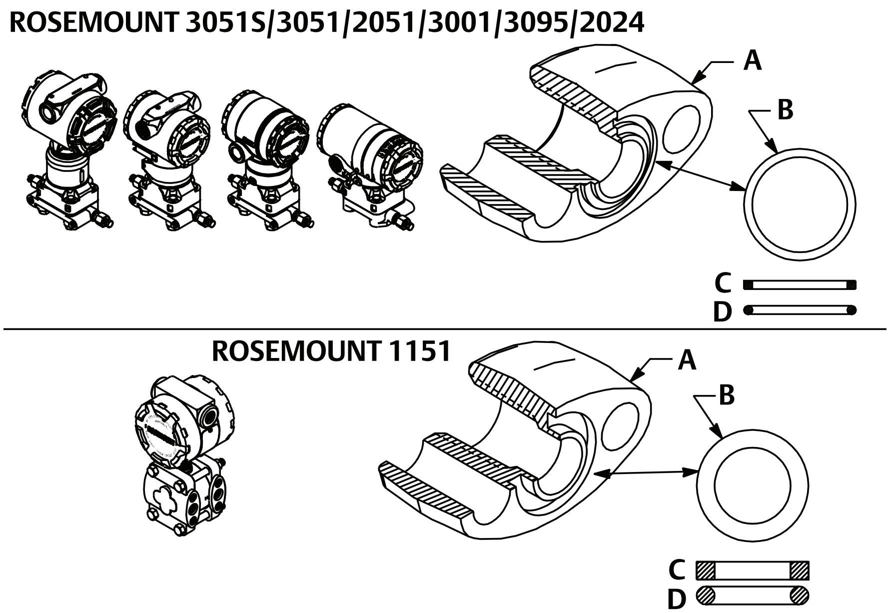
Whenever you remove flanges or adapters, visually inspect the PTFE O-rings. Replace with O-ring designed for Rosemount transmitter if there are any signs of damage, such as nicks or cuts. Undamaged O-rings may be reused. If you replace the O-rings, retorque the flange bolts after installation to compensate for cold flow. Refer to the process sensor body reassembly procedure in Section 5: Trouble-shooting.

O-rings

The two styles of Rosemount flange adapters (Rosemount 1151 and Rosemount 3051S/3051/2051/3095) each require a unique O-ring. Use only the O-ring designed for the corresponding flange adaptor.

⚠WARNING

Failure to install proper flange adapter O-rings may cause process leaks, which can result in death or serious injury. The two flange adapters are distinguished by unique O-ring grooves. Only use the O-ring that is designed for its specific flange adapter, as shown below.



A. Flange Adapter
B. O-ring
C. PTFE
D. Elastomer

When compressed, PTFE O-rings tend to “cold flow,” which aids in their sealing capabilities.

Note
PTFE O-rings should be replaced if the flange adapter is removed.

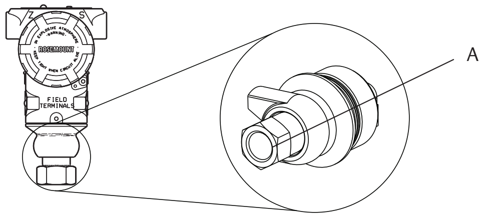
3.8.4 Inline process connection

Inline gage transmitter orientation

The low side pressure port on the inline gage transmitter is located in the neck of the transmitter, behind the housing. The vent path is 360 degrees around the transmitter between the housing and sensor (See Figure 3-9).

Keep the vent path free of any obstruction, such as paint, dust, and lubrication by mounting the transmitter so that the process can drain away.

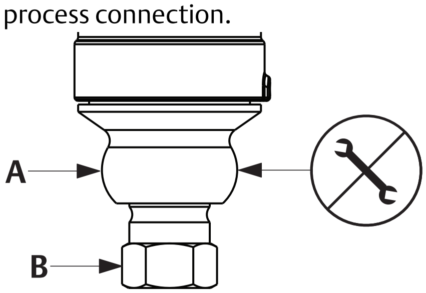
Figure 3-9. In-Line Gage Low Side Pressure Port



A. Low side pressure port (atmospheric reference)

⚠ WARNING

Do not apply torque directly to the sensor module. Rotation between the sensor module and the process connection can damage the electronics. To avoid damage, apply torque only to the hex-shaped process connection.



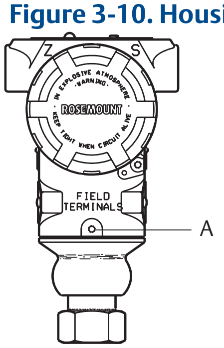
A. Sensor module
B. Process connection

3.8.5 Housing rotation

The electronics housing can be rotated up to 180 degrees in either direction to improve field access, or to better view the optional LCD display. To rotate the housing, perform the following procedure:

1. Loosen the housing rotation set screw using a 5/64-in. hex wrench.
2. Turn the housing left or right up to 180° from its original position. Over rotating will damage the transmitter.
3. Retighten the housing rotation set screw.

Figure 3-10. Housing Rotation

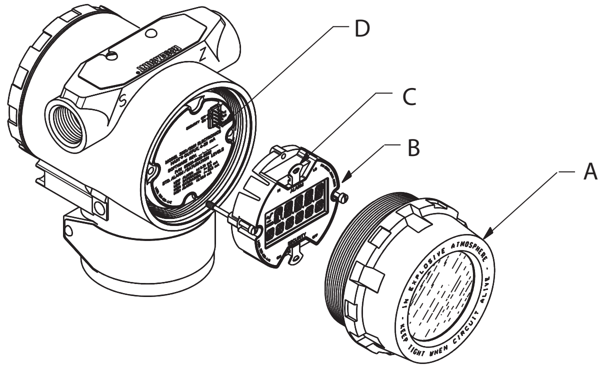


A. Housing rotation set screw (5/64-in.)

3.8.6 LCD display

Transmitters ordered with the LCD option are shipped with the display installed. Installing the display on an existing Rosemount 3051 Transmitter requires a small instrument screwdriver.

Figure 3-11. LCD Display



A. Extended cover
B. LCD display
C. Jumpers (top and bottom)
D. Interconnecting pins

3.8.7 Configure security and alarm

Security (write protect)

There are three security methods with the Rosemount 3051Transmitter:

1. Security jumper: prevents all writes to transmitter configuration.
2. Local keys (local zero and span) software lock out: prevents changes to transmitter range points via local zero and span adjustment keys. With local keys security enabled, changes to configuration are possible via HART.
3. Physical removal of local keys (local zero and span) magnetic buttons: removes ability to use local keys to make transmitter range point adjustments. With local keys security enabled, changes to configuration are possible via HART.

You can prevent changes to the transmitter configuration data with the write protection jumper. Security is controlled by the security (write protect) jumper located on the electronics board or LCD display. Position the jumper on the transmitter circuit board in the "ON" position to prevent accidental or deliberate change of configuration data.

If the transmitter write protection jumper is in the "ON" position, the transmitter will not accept any "writes" to its memory. Configuration changes, such as digital trim and reranging, cannot take place when the transmitter security is on.

Note
If the security jumper is not installed, the transmitter will continue to operate in the security OFF configuration.

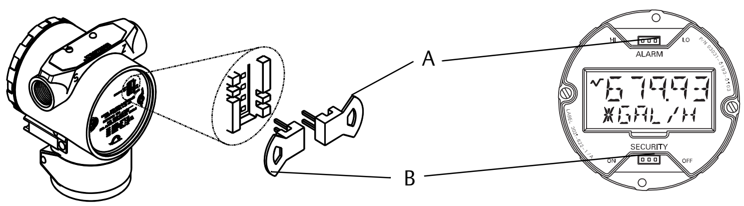
Configuring transmitter security and alarm jumper procedure

To reposition the jumpers, follow the procedure described below.

1. Do not remove the transmitter covers in explosive atmospheres when the circuit is live. If the transmitter is live, set the loop to manual and remove power.
2. ⚠ Remove the housing cover opposite the field terminal side. Do not remove the transmitter covers in explosive atmospheres when the circuit is live.
3. Reposition the jumpers as desired.
   – Figure 3-12 shows the jumper positions for the 4-20 mA HART Transmitter.
   – Figure 3-13 shows the jumper positions for the 1-5 HART Vdc Low Power Transmitter.
4. ⚠ Reattach the transmitter cover. Always ensure a proper seal by installing the electronics housing covers so that metal contacts metal to meet explosion-proof requirements.

Figure 3-12. 4–20 mA HART Electronics Board

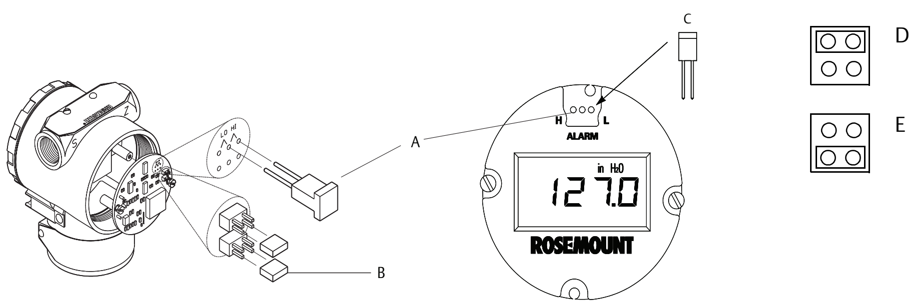
Without LCD display meter | **With LCD display**



A. Alarm
B. Security

Figure 3-13. 1-5 Vdc HART Low Power Transmitter Electronics Boards

Without LCD display meter | **With LCD display** | **Transmitter security jumper positions**



A. Alarm
B. Security
C. Jumper

D. Write protect ON
E. Write protect OFF

Note
Security jumper not installed = not write protected
Alarm jumper not installed = high alarm

3.9 Electrical considerations

Note
Make sure all electrical installation is in accordance with national and local code requirements.

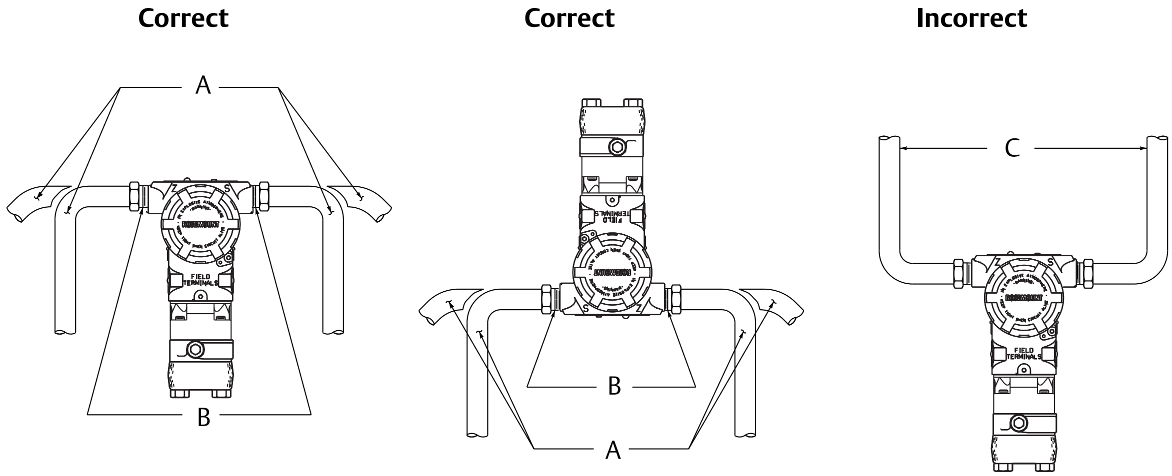
3.9.1 Conduit installation

⚠CAUTION

If all connections are not sealed, excess moisture accumulation can damage the transmitter. Make sure to mount the transmitter with the electrical housing positioned downward for drainage. To avoid moisture accumulation in the housing, install wiring with a drip loop, and ensure the bottom of the drip loop is mounted lower than the conduit connections or the transmitter housing.

Recommended conduit connections are shown in Figure 3-14.

Figure 3-14. Conduit Installation Diagrams



A. Possible conduit line positions
B. Sealing compound
C. Conduit lines

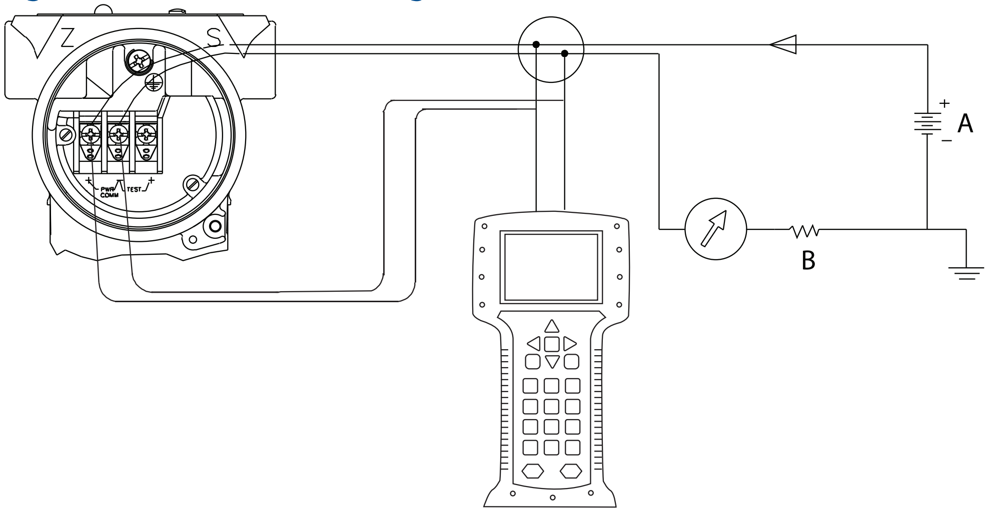
3.9.2 Wiring

⚠CAUTION

Do not connect the power signal wiring to the test terminals. Voltage may burn out the reverse-polarity protection diode in the test connection.

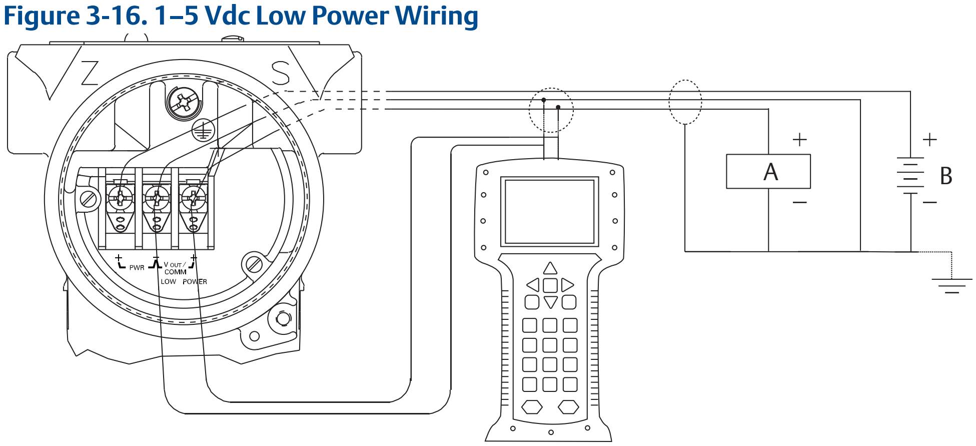
Note
Use shielded twisted pairs to yield best results. To ensure proper communication, use 24 AWG or larger wire, and do not exceed 5000 ft (1500 m).

Figure 3-15. 4–20 mA HART Wiring



A. Power supply
B. RL ≥ 250Ω

Figure 3-16. 1–5 Vdc Low Power Wiring



A. Voltmeter
B. Power supply

Perform the following procedure to make wiring connections:

1. ⚠ Remove the housing cover on terminal compartment side. Do not remove the cover in explosive atmospheres when the circuit is live. Signal wiring supplies all power to the transmitter.
2. ⚠ For 4–20 mA HART output, connect the positive lead to the terminal marked (+) and the negative lead to the terminal marked (pwr/comm-). Do not connect powered signal wiring to the test terminals. Power could damage the test diode.

   For 1–5 Vdc HART Low Power output, connect the positive lead to the terminal marked (+ pwr) and the negative lead to the terminal marked (pwr-). Connect signal lead to V_{out} /comm+.

⚠ See "Safety messages" on page 31 for complete warning information.

3. Ensure full contact with Terminal Block screw and washer. When using a direct wiring method, wrap wire clockwise to ensure it is in place when tightening the terminal block screw.

Note
The use of a pin or ferrule wire terminal is not recommended as the connection may be more susceptible to loosening over time or under vibration.

4. Plug and seal unused conduit connection on the transmitter housing to avoid moisture accumulation in the terminal side. Install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

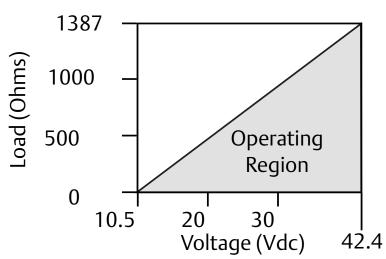
Power supply for 4-20 mA HART

Transmitter operates on 10.5 –42.4 Vdc. The dc power supply should provide power with less than two percent ripple.

Note
A minimum loop resistance of 250 ohms is required to communicate with a Field Communicator. If a single power supply is used to power more than one Rosemount 3051 Transmitter, the power supply used, and circuitry common to the transmitters, should not have more than 20 ohms of impedance at 1200 Hz.

Figure 3-17. Load Limitation

Maximum loop resistance = 43.5 * (Power supply voltage – 10.5)



The Field Communicator requires a minimum loop resistance of 250Ω for communication.

The total resistance load is the sum of the resistance of the signal leads and the load resistance of the controller, indicator, and related pieces. Note that the resistance of intrinsic safety barriers, if used, must be included.

Power supply for 1–5 Vdc HART low power

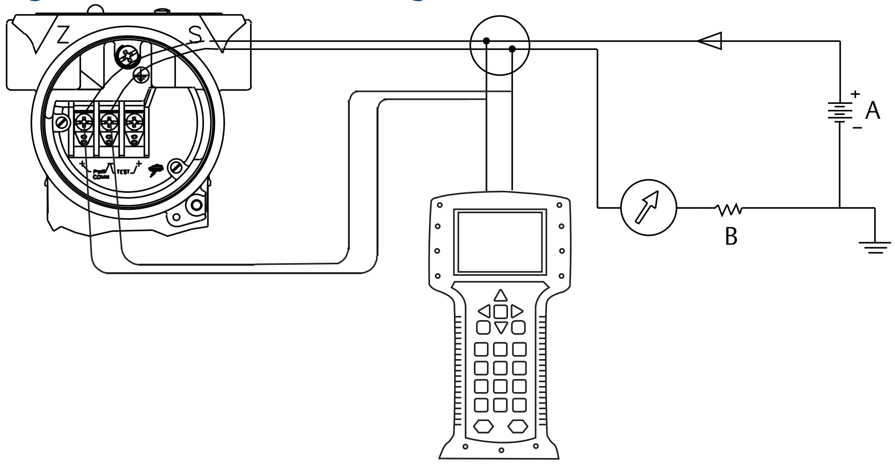
Low power transmitters operate on 6–14 Vdc. The dc power supply should provide power with less than two percent ripple. The V_{out} load should be 100 kΩ or greater.

3.9.3 Transient protection terminal block

The transmitter will withstand electrical transients of the energy level usually encountered in static discharges or induced switching transients. However, high-energy transients, such as those induced in wiring from nearby lightning strikes, can damage the transmitter.

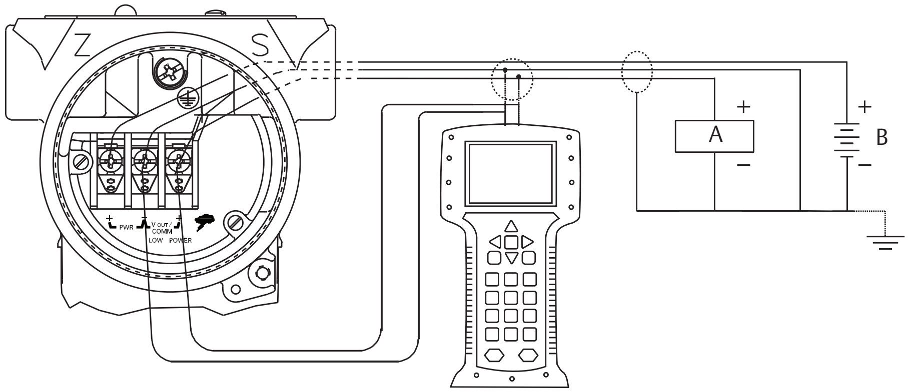
The transient protection terminal block can be ordered as an installed option (option code T1 in the transmitter model number) or as a spare part to retrofit existing Rosemount 3051 Transmitters in the field. See "Spare parts" on page 136 for spare part numbers. The lightning bolt symbol shown in Figure 3-18 and Figure 3-19 identifies the transient protection terminal block.

Figure 3-18. 4–20 mA HART Wiring with Transient Protection



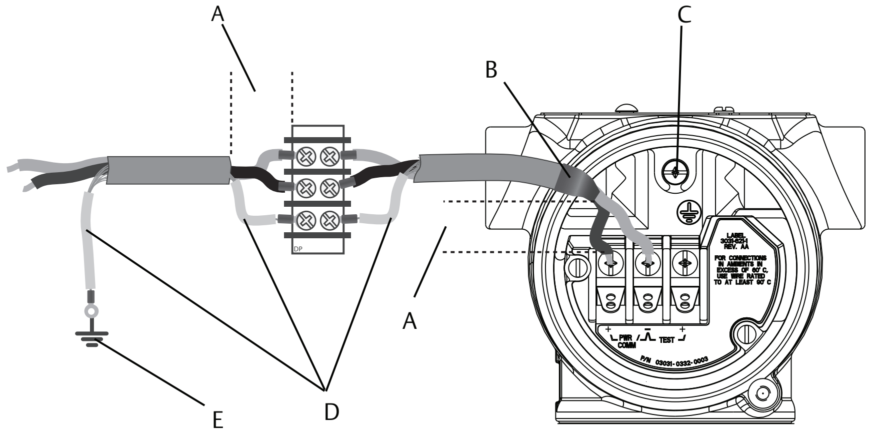
A. Prower supply
B. RL ≥ 250Ω

Figure 3-19. 1–5 Vdc Low Power Wiring with Transient Protection



A. Voltmeter
B. Power supply

Figure 3-20. Wiring Pair and Ground



A. Minimize distance
B. Trim shield and insulate
C. Ground for transient protection
D. Insulate shield
E. Connect shield back to the power supply ground

Note
The transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded. Use the guidelines to ground the transmitter case. Refer to page 50.

Do not run the transient protection ground wire with signal wiring as the ground wire may carry excessive current if a lightning strike occurs.

3.9.4 Grounding

⚠ Use the following techniques to properly ground the transmitter signal wiring and case:

Signal wiring

Do not run signal wiring in conduit or open trays with power wiring or near heavy electrical equipment. It is important that the instrument cable shield be:

- Trimmed close and insulated from touching the transmitter housing
- Connected to the next shield if cable is routed through a junction box
- Connected to a good earth ground at the power supply end

For 4–20 mA HART output, the signal wiring may be grounded at any one point on the signal loop or may be left ungrounded. The negative terminal of the power supply is a recommended grounding point.

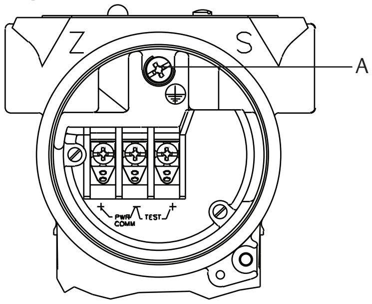
For 1–5 Vdc HART Low Power output, the power wires may be grounded at only one point or left ungrounded. The negative terminal of the power supply is a recommended grounding point.

Transmitter case

Always ground the transmitter case in accordance with national and local electrical codes. The most effective transmitter case grounding method is a direct connection to earth ground with minimal impedance. Methods for grounding the transmitter case include:

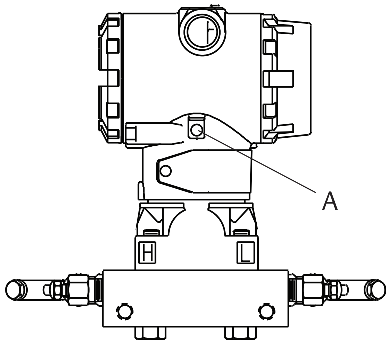
- Internal ground connection: The internal ground connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (⏚). The ground connection screw is standard on all Rosemount 3051 Transmitters. Refer to Figure 3-21.

Figure 3-21. Internal Ground Screw



A. Internal ground connection screw

Figure 3-22. External Ground Assembly



A. External ground assembly

Note

Grounding the transmitter case via threaded conduit connection may not provide sufficient ground continuity.

3.10 Hazardous locations certifications

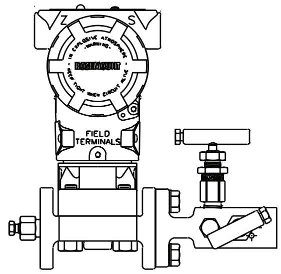
⚠ Individual transmitters are clearly marked with a tag indicating the approvals they carry. Transmitters must be installed in accordance with all applicable codes and standards to maintain these certified ratings. Refer to Appendix B: Product Certifications for information on these approvals.

3.11 Rosemount 305, 306, and 304 Manifolds

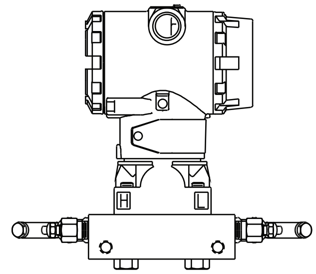
The Rosemount 305 Integral Manifold is available in two designs: traditional and coplanar. The traditional integral manifold can be mounted to most primary elements with mounting adapters in the market today. The Rosemount 306 Integral Manifold is used with the Rosemount 3051T In-Line Transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar).

Figure 3-23. Manifolds

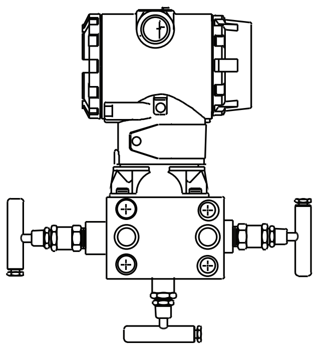
Rosemount 3051C and 304 Conventional



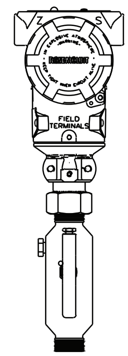
Rosemount 3051C and 305 Integral Coplanar



Rosemount 3051C and 305 Integral Traditional



Rosemount 3051T and 306 In-Line



3.11.1 Rosemount 305 Integral Manifold installation procedure

To install a Rosemount 305 Integral Manifold to a Rosemount 3051 Transmitter:

⚠ 1. Inspect the PTFE sensor module o-rings. Undamaged O-rings may be reused. If the o-rings are damaged (if they have nicks or cuts, for example), replace with O-rings designed for Rosemount transmitter.

Important
If replacing the O-rings, take care not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm while you remove the damaged O-rings.

2. Install the integral manifold on the sensor module. Use the four 2.25-in. manifold bolts for alignment. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See “Flange bolts” on page 37 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.

⚠ See “Safety messages” on page 31 for complete warning information.

3. If the PTFE sensor module O-rings have been replaced, the flange bolts should be re-tightened after installation to compensate for cold flow of the O-rings.

Note
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate mounting effects.

3.11.2 Rosemount 306 Integral Manifold installation procedure

The Rosemount 306 Manifold is for use only with a Rosemount 3051T In-Line Transmitter.

⚠ Assemble the Rosemount 306 Manifold to the Rosemount 3051T In-Line Transmitter with a thread sealant.

3.11.3 Rosemount 304 Conventional Manifold installation procedure

To install a Rosemount 304 Conventional Manifold to a Rosemount 305T Transmitter:

1. Align the conventional manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See "Flange bolts" on page 37 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.
3. Leak-check assembly to maximum pressure range of transmitter.

3.11.4 Manifold operation

⚠ WARNING

Improper installation or operation of manifolds may result in process leaks, which may cause death or serious injury.

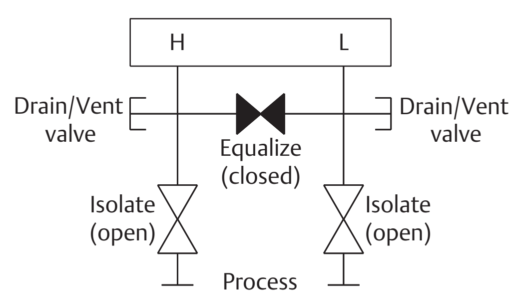
Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate any shift due to mounting effects. See "Sensor trim overview" on page 71.

Coplanar transmitters

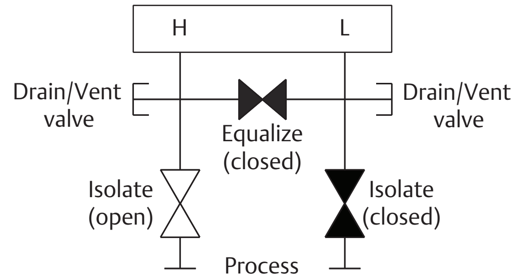
3- and 5-valve manifolds

Performing zero trim at static line pressure

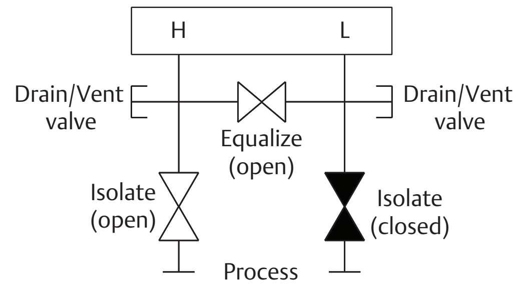
In normal operation the two isolate (block) valves between the process ports and transmitter will be open and the equalize valve will be closed.



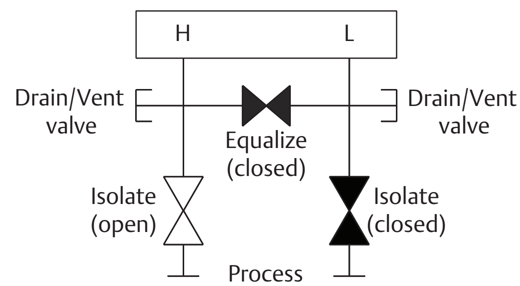
1. To zero trim the transmitter, close the isolate valve on the low side (downstream) side of the transmitter.



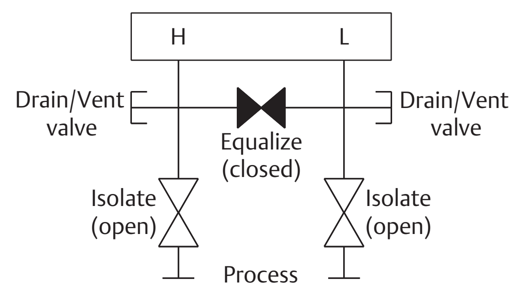
2. Open the equalize valve to equalize the pressure on both sides of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



3. After performing a zero trim on the transmitter, close the equalize valve.



4. Finally, to return the transmitter to service, open the low side isolate valve.

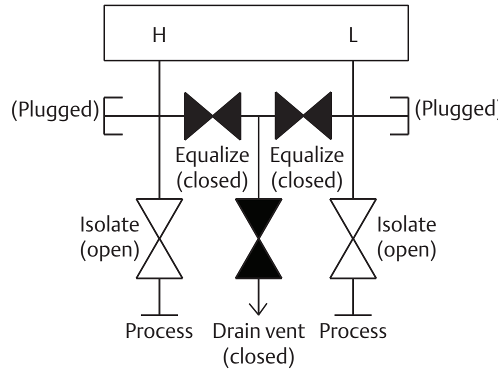


5-valve natural gas manifold

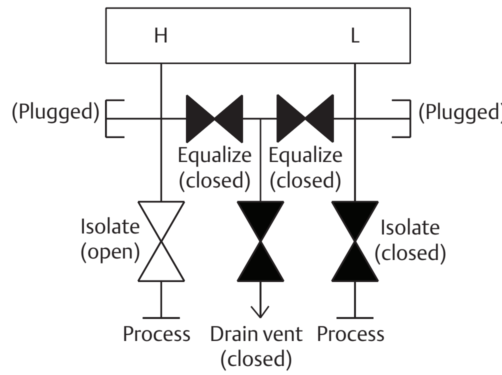
Performing zero trim at static line pressure

5-valve natural gas configurations shown:

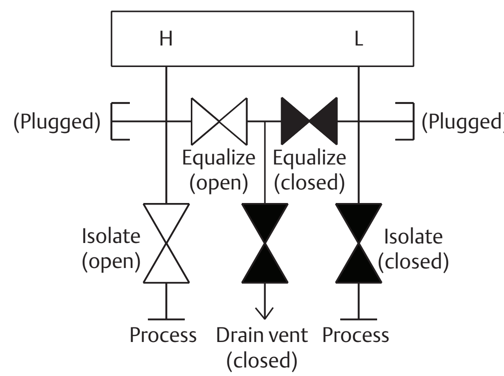
In normal operation, the two isolate (block) valves between the process ports and transmitter will be open, and the equalize valves will be closed. Vent valves may be opened or closed.



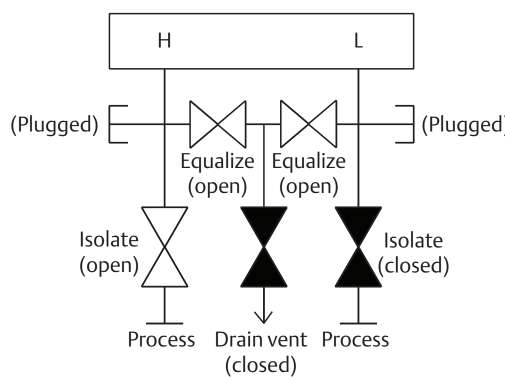
1. To zero trim the transmitter, first close the isolate valve on the low pressure (downstream) side of the transmitter and the vent valve.



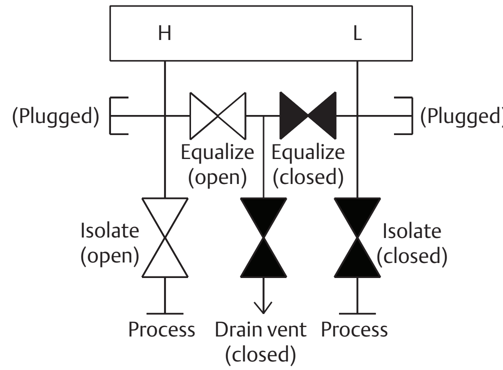
2. Open the equalize valve on the high pressure (upstream) side of the transmitter.



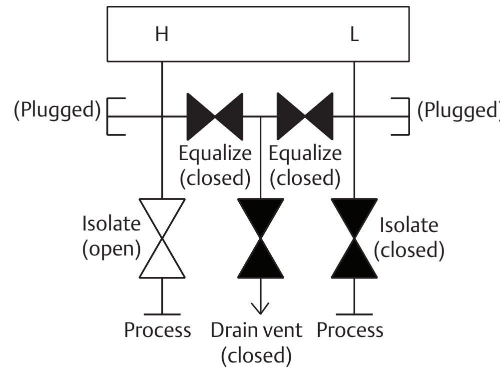
3. Open the equalize valve on the low pressure (downstream) side of the transmitter. The manifold is now in the proper configuration for performing a zero trim on the transmitter.



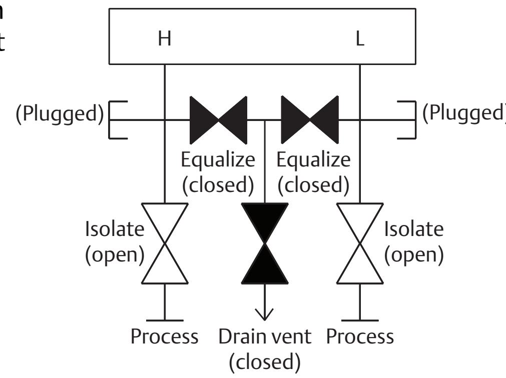
4. After performing a zero trim on the transmitter, close the equalize valve on the low pressure (downstream) side of the transmitter.



5. Close the equalize valve on the high pressure (upstream) side.



6. Finally, to return the transmitter to service, open the low side isolate valve and vent valve. The vent valve can remain open or closed during operation.

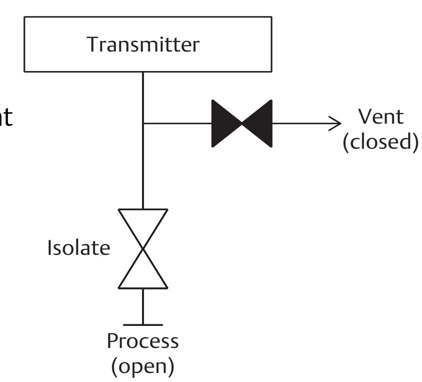


In-line transmitter

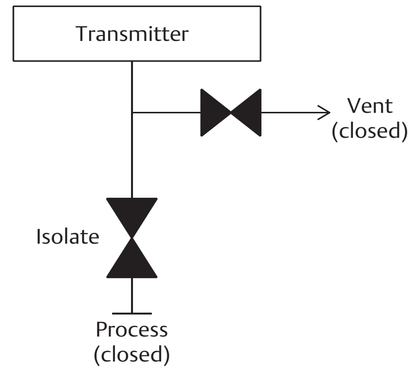
2-valve and block and bleed style manifolds

Isolating the transmitter

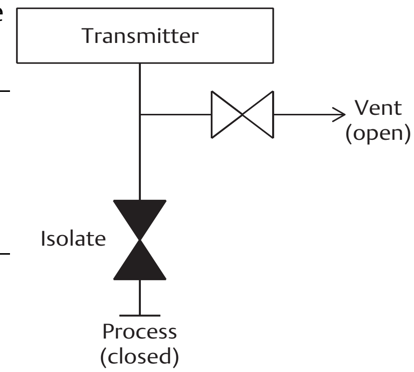
In normal operation the isolate (block) valve between the process port and transmitter will be open and the test/vent valve will be closed. On a block and bleed style manifold, a single block valve provides transmitter isolation and a bleed screw provides drain/vent capabilities.



1. To isolate the transmitter, close the isolate valve.



2. To bring the transmitter to atmospheric pressure, open the vent valve or bleed screw.



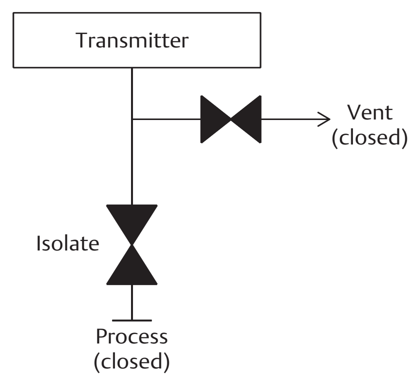
Note

A 1/4-in. male NPT pipe plug may be installed in the test/vent port and will need to be removed with a wrench in order to vent the manifold properly.

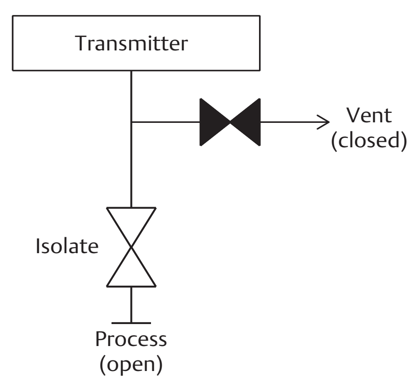
⚠ Always use caution when venting directly to atmosphere.

---

3. After venting to atmosphere, perform any required calibration and then close the test/vent valve or replace the bleed screw.



4. Open the Isolate (block) valve to return the transmitter to service.



Adjusting valve packing

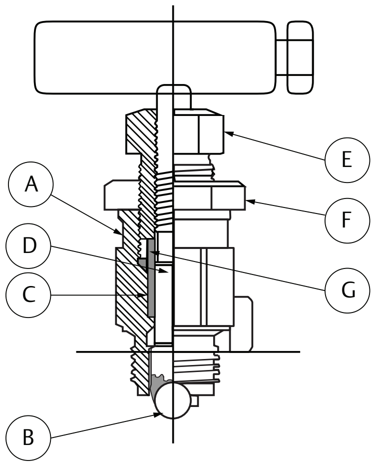
Over time, the packing material inside a Rosemount manifold may require adjustment in order to continue to provide proper pressure retention. Not all Rosemount manifolds have this adjustment capability. The Rosemount manifold model number will indicate what type of stem seal or packing material has been used.

The following steps are provided as a procedure to adjust valve packing:

1. Remove all pressure from device.
2. Loosen manifold valve jam nut.
3. Tighten manifold valve packing adjuster nut $^1/_4$ turn.
4. Tighten manifold valve jam nut.
5. Re-apply pressure and check for leaks.

Above steps can be repeated, if necessary. If the above procedure does not result in proper pressure retention, the complete manifold should be replaced.

Figure 3-24. Valve Components



A. Bonnet
B. Ball seat
C. Packing
D. Stem

E. Packing adjuster
F. Jam nut
G. Packing follower

3.12 Liquid level measurement

Differential pressure transmitters used for liquid level applications measure hydrostatic pressure head. Liquid level and specific gravity of a liquid are factors in determining pressure head. This pressure is equal to the liquid height above the tap multiplied by the specific gravity of the liquid. Pressure head is independent of volume or vessel shape.

3.12.1 Open vessels

A pressure transmitter mounted near a tank bottom measures the pressure of the liquid above.

Make a connection to the high pressure side of the transmitter, and vent the low pressure side to the atmosphere. Pressure head equals the liquid's specific gravity multiplied by the liquid height above the tap.

Zero range suppression is required if the transmitter lies below the zero point of the desired level range. Figure 3-25 shows a liquid level measurement example.

3.12.2 Closed vessels

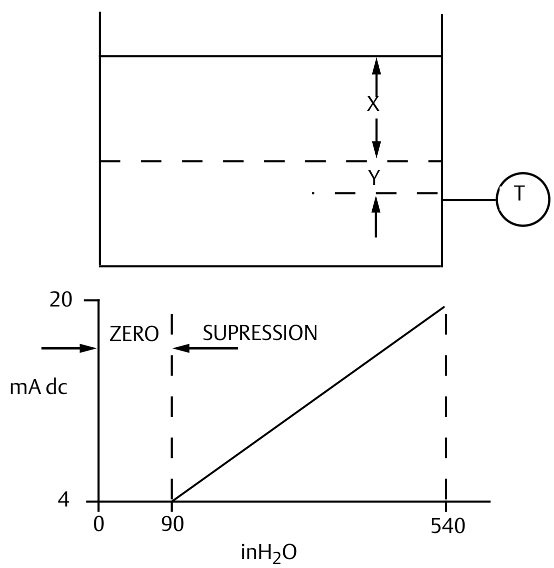
Pressure above a liquid affects the pressure measured at the bottom of a closed vessel. The liquid specific gravity multiplied by the liquid height plus the vessel pressure equals the pressure at the bottom of the vessel.

To measure true level, the vessel pressure must be subtracted from the vessel bottom pressure. To do this, make a pressure tap at the top of the vessel and connect this to the low side of the transmitter. Vessel pressure is then equally applied to both the high and low sides of the transmitter. The resulting differential pressure is proportional to liquid height multiplied by the liquid specific gravity.

Dry leg condition

Low-side transmitter piping will remain empty if gas above the liquid does not condense. This is a dry leg condition. Range determination calculations are the same as those described for bottom-mounted transmitters in open vessels, as shown in Figure 3-25.

Figure 3-25. Liquid Level Measurement Example



Let X equal the vertical distance between the minimum and maximum measurable levels (500-in.).

Let Y equal the vertical distance between the transmitter datum line and the minimum measurable level (100-in.).

Let SG equal the specific gravity of the fluid (0.9).

Let h equal the maximum head pressure to be measured in inches of water.

Let e equal head pressure produced by Y expressed in inches of water.

Let Range equal e to e + h.

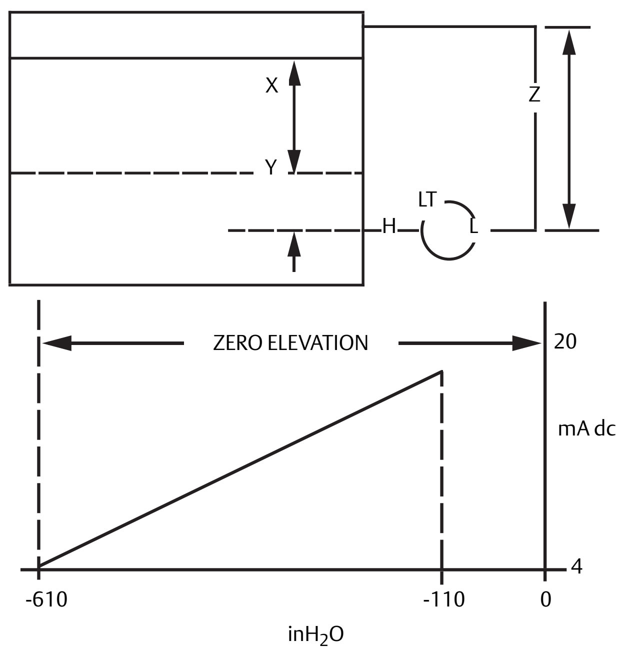
Then h = (X)(SG)
= 500 × 0.9
= 450 inH_2O
e = (Y)(SG)
= 100 × 0.9
= 90 inH_2O
Range = 90 to 540 inH_2O

Wet leg condition

Condensation of the gas above the liquid slowly causes the low side of the transmitter piping to fill with liquid. The pipe is purposely filled with a convenient reference fluid to eliminate this potential error. This is a wet leg condition.

The reference fluid will exert a head pressure on the low side of the transmitter. Zero elevation of the range must then be made. See Figure 3-26.

Figure 3-26. Wet Leg Example



Let X equal the vertical distance between the minimum and maximum measurable levels (500-in.).

Let Y equal the vertical distance between the transmitter datum line and the minimum measurable level (50-in.).

Let z equal the vertical distance between the top of the liquid in the wet leg and the transmitter datum line (600-in.).

Let SG1 equal the specific gravity of the fluid (1.0).

Let SG2 equal the specific gravity of the fluid in the wet leg (1.1).

Let h equal the maximum head pressure to be measured in inches of water.

Let e equal the head pressure produced by Y expressed in inches of water.

Let s equal head pressure produced by z expressed in inches of water.

Let Range equal e – s to h + e – s.

Then h = (X)(SG1)
= 500×1.0
= 500 inH_2O

e = (Y)(SG1)
= 50×1.0
= 50 inH_2O

s = (z)(SG2)
= 600×1.1
= 660 inH_20

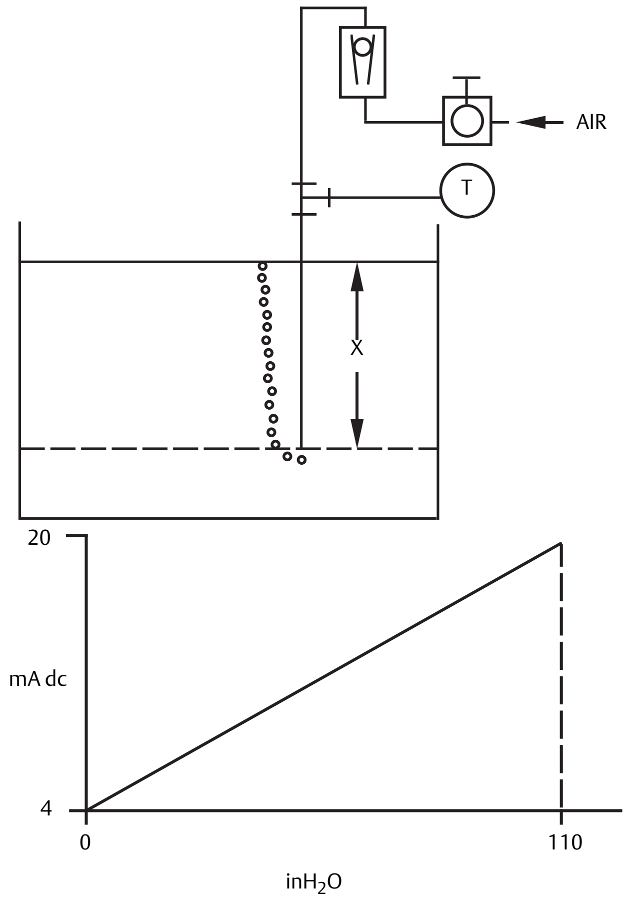
Range = e – s to h + e – s
= 50 – 660 to 500 + 50 – 660
= –610 to –110 inH_20

Bubbler system in open vessel

A bubbler system that has a top-mounted pressure transmitter can be used in open vessels. This system consists of an air supply, pressure regulator, constant flow meter, pressure transmitter, and a tube that extends down into the vessel.

Bubble air through the tube at a constant flow rate. The pressure required to maintain flow equals the liquid's specific gravity multiplied by the vertical height of the liquid above the tube opening. Figure 3-27 shows a bubbler liquid level measurement example.

Figure 3-27. Bubbler Liquid Level Measurement Example



Let X equal the vertical distance between the minimum and maximum measurable levels (100 in.).
Let SG equal the specific gravity of the fluid (1.1).
Let h equal the maximum head pressure to be measured in inches of water.
Let Range equal zero to h.

Then h = (X)(SG)
$= 100 \times 1.1$
$= 110$ inH_2O

Range = 0 to 110 inH_2O

Section 4 Operation and Maintenance

Overview . . . . page 63
Safety messages . . . . page 63
Calibration overview . . . . page 64
Analog output trim . . . . page 68
Sensor trim . . . . page 71

4.1 Overview

This section contains information on calibrating and diagnostics messages on Rosemount™ 3051 Pressure Transmitters.

Field Communicator and AMS Device Manager instructions are given to perform configuration functions. For convenience, Field Communicator Fast Key sequences are labeled “Fast Keys” for each software function below the appropriate headings.

4.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠ WARNING

Explosions could result in death or serious injury.

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosionproof/flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

4.3 Calibration overview

Calibration is defined as the process required to optimize transmitter accuracy over a specific range by adjusting the factory sensor characterization curve located in the microprocessor. Possible procedures are:

- Reranging: Setting the lower and upper range points (4 and 20 mA or 1 and 5 Vdc) points at required pressures. Reranging does not change the factory sensor characterization curve. Refer to page 17.
- Analog output trim: Adjusts the transmitter's analog characterization curve to match the plant standard of the control loop. There are two types of digital-to-analog output trims. Refer to page 68.
  - Digital-to-Analog output trim on 4–20 mA HART output (page 69)
  - Digital-to-Analog output trim on 4–20 mA HART output using other scale (page 70)
- Sensor trim: Adjusts the position of the factory sensor characterization curve due to a change in the sensor characteristics over time or a change in test equipment. Trimming has two steps, zero and sensor trims. Refer to page 72 and page 73.
- Zero trim (page 72)
- Sensor trim (page 73)

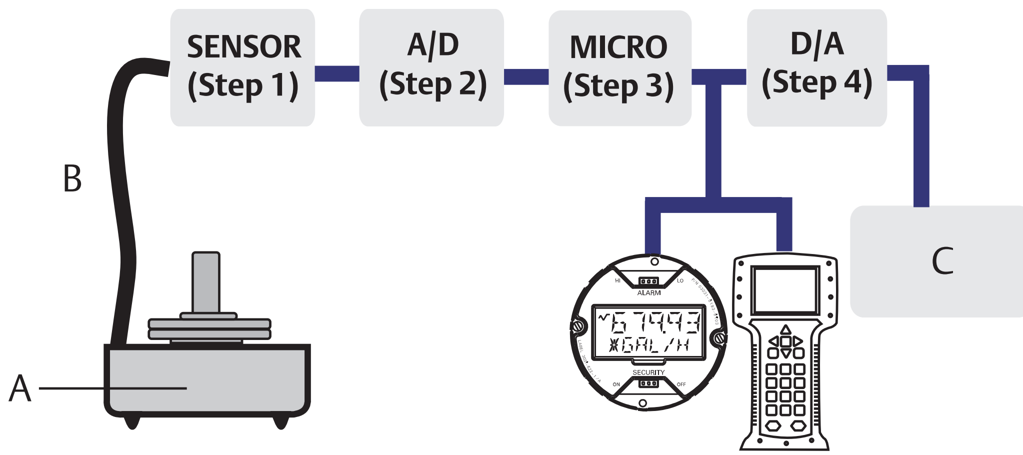
Figure 4-1 on page 65 illustrates Rosemount 3051 Transmitter data flow. Data flow can be summarized in four major steps:

1. A change in pressure is measured by a change in the sensor output (sensor signal).
2. The sensor signal is converted to a digital format that is understood by the microprocessor (Analog-to-Digital Signal Conversion). Sensor trim functions affect this value. Select these options to alter the digital signal on the LCD or Field Communicator.
3. Corrections are performed in the microprocessor to obtain a digital representation of the process input (Digital PV).
4. The Digital PV is converted to an analog value (Digital-to-Analog signal conversion). Rerange and analog trim functions affect this value. Select these options to change the range points (4–20 mA or 1–5 Vdc).

For a summary of recommended calibration procedures, refer to Table 4-1 on page 65. Also, Figure 4-1 on page 65 identifies the approximate transmitter location for each calibration task. Data flows from left to right and a parameter change affects all values to the right of the changed parameter.

Figure 4-1. Transmitter Data Flow with Calibration Options

Transmitter Ranged 0 to 100 inH_2O (0 to 0,25 bar)



A. Pressure source
B. Output: 100 inH_2O
C. Output 20.00 mA

Table 4-1. Recommended Calibration Tasks

Transmitter	Bench calibration tasks	Field calibration tasks
3051CD, 3051CG, 3051L, 3051TG, Range 1-4	1. Set output configuration parameters: a. Set the range points. b. Set the output units. c. Set the output type. d. Set the damping value. 2. Optional: Perform a sensor trim. (Accurate pressure source required.)	1. Reconfigure parameters if necessary. 2. Zero trim the transmitter to compensate for mounting effects or static pressure effects. 3. Optional: Perform an analog output trim. (Accurate multimeter required)
3051CA, 3051TA, 3051TG, Range 5	1. Set output configuration parameters: a. Set the range points. b. Set the output units. c. Set the output type. d. Set the damping value. 2. Optional: Perform a sensor trim if equipment available (accurate absolute pressure source required), otherwise perform the low trim value section of the sensor trim procedure.	1. Reconfigure parameters if necessary. 2. Perform low trim value section of the sensor trim procedure to correct for mounting position effects. 3. Optional: Perform an analog output trim (Accurate multimeter required)

Note

The Rosemount 3051has been carefully calibrated at the factory. Trimming adjusts the position of the factory characterization curve. It is possible to degrade performance of the transmitter if any trim is done improperly or with inaccurate equipment.

Note

A Field Communicator is required for all sensor and output trim procedures. Rosemount 3051C Range 4 and Range 5 Transmitters require a special calibration procedure when used in differential pressure applications under high static line pressure (see"Select Finish to acknowledge the method is complete." on page 74).

4.3.1 Determining calibration frequency

Calibration frequency can vary greatly depending on the application, performance requirements, and process conditions. Use the following procedure to determine calibration frequency that meets the needs of your application.

1. Determine the performance required for your application.
2. Determine the operating conditions.
3. Calculate the Total Probable Error (TPE).
4. Calculate the stability per month.
5. Calculate the calibration frequency.

Sample calculation for a standard Rosemount 3051C

Step 1: Determine the performance required for your application.

Required performance:	0.30% of span

Step 2: Determine the operating conditions.

Transmitter:	Rosemount 3051CD, Range 2 [URL=250 inH_2O(623 mbar)]
Calibrated span:	150 inH_2O (374 mbar)
Ambient temperature change:	± 50 °F (28 °C)
Line pressure:	500 psig (34,5 bar)

Step 3: Calculate total probable error (TPE).

$$\text{TPE} = \sqrt{(\text{ReferenceAccuracy})^2 + (\text{TemperatureEffect})^2 + (\text{StaticPressureEffect})^2} = 0.117\% \text{ of span}$$

Where:

Reference accuracy = ± 0.065% of span

Ambient temperature effect = $\pm\left(\frac{(0.0125 \times \text{URL})}{\text{Span}} + 0.0625\right)\%$ per 50 °F = $\pm 0.0833\%$ of span

Span static pressure effect[(1)] =

0.1% reading per 1000 psi (69 bar) = ±0.05% of span at maximum span

1. Zero static pressure effect removed by zero trimming at line pressure.

Step 4: Calculate the stability per month.

$$\text{Stability} = \pm\left[\frac{(0.0125 \times \text{URL})}{\text{Span}}\right]\% \text{ of span for 5 years} = \pm 0.0035\% \text{ of span per month}$$

Step 5: Calculate calibration frequency.

$$\text{Cal. Freq.} = \frac{(\text{Req. Performance} - \text{TPE})}{\text{Stability per Month}} = \frac{(0.30\% - 0.117\%)}{0.0035\%} = (52)\text{months}$$

Sample calculation for Rosemount 3051C with P8 option (0.04% accuracy & 5-year stability)

Step 1: Determine the performance required for your application.

Required performance:	0.30% of span

Step 2: Determine the operating conditions.

Transmitter:	Rosemount 3051CD, Range 2 (URL=250 inH_2O [623 mbar])
Calibrated span:	150 inH_2O (374 mbar)
Ambient temperature change:	± 50 °F (28 °C)
Line pressure:	500 psig (34,5 bar)

Step 3: Calculate total probable error (TPE).

$$\text{TPE} = \sqrt{(\text{ReferenceAccuracy})^2 + (\text{TemperatureEffect})^2 + (\text{StaticPressureEffect})^2} = 0.105\% \text{ of span}$$

Where:

Reference Accuracy = ± 0.04% of span

Ambient Temperature Effect =

$$\pm\left(\frac{0.0125 \times \text{URL}}{\text{Span}} + 0.0625\right)\% \text{ per } 50\ °\text{F} = \pm 0.0833\% \text{ of span}$$

Span Static Pressure Effect[1] =

$$0.1\% \text{ reading per } 1000 \text{ psi } (69 \text{ bar}) = \pm 0.05\% \text{ of span at maximum span}$$

1. Zero static pressure effect removed by zero trimming at line pressure.

Step 4: Calculate the stability per month.

$$\text{Stability} = \pm\left[\frac{(0.125 \times \text{URL})}{\text{Span}}\right]\% \text{ of span for 5 years} = \pm 0.0035\% \text{ of span per month}$$

Step 5: Calculate calibration frequency.

$$\text{Cal. Freq.} = \frac{(\text{Req. Performance} - \text{TPE})}{\text{Stability per Month}} = \frac{(0.3\% - 0.105\%)}{0.0035\%} = 27 \text{ months}$$

4.3.2 Selecting a trim procedure

To decide which trim procedure to use, you must first determine whether the analog-to-digital section or the digital-to-analog section of the transmitter electronics need calibration. Refer to Figure 4-1 and perform the following procedure:

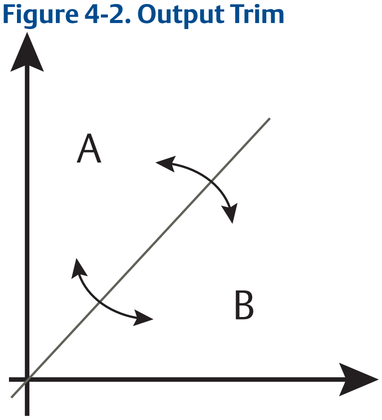
1. Connect a pressure source, a Field Communicator or AMS Device Manager, and a digital readout device to the transmitter.
2. Establish communication between the transmitter and the Field Communicator.
3. Apply pressure equal to the upper range point pressure.
4. Compare the applied pressure to the pressure process variable valve on the *Process Variables* menu on the Field Communicator or the *Process Variables* screen in AMS Device Manager. For instructions on how to access process variables, see page 15 of Section 2: Configuration.
   a. If the pressure reading does not match the applied pressure (with high-accuracy test equipment), perform a sensor trim. See "Sensor trim overview" on page 71 to determine which trim to perform.
5. Compare the Analog Output (AO) line, on the Field Communicator or AMS Device Manager, to the digital readout device.

If the AO reading does not match the digital readout device (with high-accuracy test equipment), perform an analog output trim. See "Analog output trim" on page 68.

4.4 Analog output trim

The analog output trim commands allow you to adjust the transmitter's current output at the 4 and 20 mA (1 and 5 Vdc) points to match the plant standards. This command adjusts the digital to analog signal conversion.

Figure 4-2. Output Trim



A. Output trim
B. Characterization curve

4.4.1 Digital-to-Analog trim

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 2, 1
Traditional 1–5 Vdc Fast Keys	1, 2, 3, 2, 1
Device Dashboard Fast Keys	3, 4, 2

To perform a digital-to-analog trim with a Field Communicator, perform the following procedure.

1. From the *HOME* screen, enter the Fast Key sequence “Digital-to-Analog Trim”. Select **OK** after setting the control loop to manual, see “Setting the loop to manual” on page 4.
2. For 4–20 mA HART output, connect a reference meter to the transmitter by either connecting the meter to the test terminals on the terminal block, or shunting transmitter power through the meter at some point in the loop.

   For 1–5 Vdc Low Power HART output, connect a reference meter to the V_{out} terminal.
3. Select **OK** after connecting the reference meter.
4. Select **OK** at the *SETTING FLD DEV OUTPUT TO 4 MA (1 Vdc)* prompt. The transmitter outputs 4.0 mA.
5. Record the actual value from the reference meter, and enter it at the *ENTER METER VALUE* prompt. The Field Communicator prompts you to verify whether or not the output value equals the value on the reference meter.
6. Select **1: Yes,** if the reference meter value equals the transmitter output value, or **2: No** if it does not.
   a. If 1 is selected: Yes, proceed to Step 7.
   b. If 2 is selected: No, repeat Step 5.
7. Select **OK** at the *SETTING FLD DEV OUTPUT TO 20 MA (5 Vdc)* prompt, and repeat steps 5 and 6 until the reference meter value equals the transmitter output value.
8. Select **OK** after the control loop is returned to automatic control.

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **D/A trim** from the menu.
2. Select **Next** after setting the control loop to manual.
3. Select **Next** after connecting the reference meter.
4. Select **Next** at the *Setting fld dev output to 4 mA (1 Vdc)* screen.
5. Record the actual value from the reference meter, and enter it at the *Enter meter value* screen and select **Next**.
6. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Select **Next**.
   a. If Yes is selected, proceed to Step 7.
   b. If No is selected, repeat Step 5.
7. Click **Next** at the *Setting fld dev output to 20 mA (5 Vdc)* screen.
8. Repeat steps 5–6 until the reference meter equals the transmitter output value.

9. Select **Next** to acknowledge the loop can be returned to automatic control.
10. Select **Finish** to acknowledge the method is complete.

4.4.2 Digital-to-Analog trim using other scale

The scaled D/A trim command matches the 4 and 20 mA (1 and 5 Vdc) points to a user selectable reference scale other than 4 and 20 mA (i.e. 2 to 10 volts if measuring across a 500 ohm load, or zero to 100 percent if measuring from a Distributed Control System [DCS]). To perform a scaled D/A trim, connect an accurate reference meter to the transmitter and trim the output signal to scale, as outlined in the output trim procedure.

Note
Use a precision resistor for optimum accuracy. If you add a resistor to the loop, ensure that the power supply is sufficient to power the transmitter to a 20 mA output with additional loop resistance. Refer to "Power supply for 4-20 mA HART" on page 48.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 2, 2
Traditional 1–5 Vdc Fast Keys	1, 2, 3, 2, 2
Device Dashboard Fast Keys	3, 4, 2

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **Scaled D/A trim** from the menu.
2. Select **Next** after setting the control loop to manual.
3. Select **Change** to change scale, select **Next**.
4. Enter Set scale-Lo output value, select **Next**.
5. Enter Set scale-Hi output value, select **Next**.
6. Select **Next** to proceed with Trim.
7. Select **Next** after connecting the reference meter.
8. Select **Next** at the *Setting fld dev output to 4 mA* screen.
9. Record the actual value from the reference meter, and enter it at the *Enter meter value* screen and select **Next**.
10. Select **Yes**, if the reference meter value equals the transmitter output value, or **No** if it does not. Select **Next**.
    a. If Yes is selected, proceed to Step 11.
    b. If No is selected, repeat Step 9.
11. Select **Next** at the *Setting fld dev output to 20 mA* screen.
12. Repeat steps 9–10 until the reference meter equals the transmitter output value.
13. Select **Next** to acknowledge the loop can be returned to automatic control.
14. Select **Finish** to acknowledge the method is complete.

4.4.3 Recall factory trim—analog output

The recall factory trim—analog output command allows the restoration of the as-shipped factory settings of the analog output trim. This command can be useful for recovering from an inadvertent trim, incorrect plant standard or faulty meter. This command is only available with 4-20 mA output.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 4, 2
Device Dashboard Fast Keys	3, 4, 3

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **Recall Factory Trim** from the menu.
1. Select **Next** after setting the control loop to manual.
2. Select **Analog output trim** under *Trim to recall* and select **Next**.
3. Select **Next** to acknowledge restoration of trim values is complete.
4. Select **Next** to acknowledge the loop can be returned to automatic control.
5. Select **Finish** to acknowledge the method is complete.

4.5 Sensor trim

4.5.1 Sensor trim overview

Trim the sensor using either sensor or zero trim functions. Trim functions vary in complexity and are application-dependent. Both trim functions alter the transmitter's interpretation of the input signal.

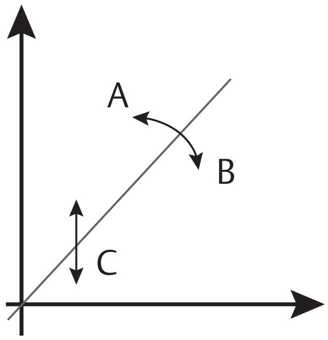
Zero trim is a single-point offset adjustment. It is useful for compensating for mounting position effects and is most effective when performed with the transmitter installed in its final mounting position. Since this correction maintains the slope of the characterization curve, it should not be used in place of a sensor trim over the full sensor range.

When performing a zero trim, ensure that the equalizing valve is open and all wet legs are filled to the correct levels.

Note
Do not perform a zero trim on Rosemount 3051T Absolute Pressure Transmitters. Zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on a Rosemount 3051T Absolute Pressure Transmitter, perform a low trim within the sensor trim function. The low trim function provides an offset correction similar to the zero trim function, but it does not require zero-based input.

Sensor trim is a two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. Always adjust the low trim value first to establish the correct offset. Adjustment of the high trim value provides a slope correction to the characterization curve based on the low trim value. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature.

Figure 4-3. Sensor Trim



A. Upper sensor trim
B. Sensor characterization curve
C. Lower sensor trim

4.5.2 Zero trim

Note
The transmitter PV at zero pressure must be within three percent of URL in order to calibrate using the zero trim function.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 3, 1
Traditional 1–5 Vdc Fast Keys	1, 2, 3, 3, 1
Device Dashboard Fast Keys	3, 4, 1, 3

Calibrate the sensor with a Field Communicator using the zero trim function as follows:

1. Vent the transmitter and attach a Field Communicator to the measurement loop.
2. From the *HOME* screen, follow the Fast Key sequence “Zero Trim”.
3. Follow the commands provided by the Field Communicator to complete the zero trim adjustment.

AMS Device anager

1. Right click on the device and select **Calibrate**, then **Zero trim** from the menu.
2. Select **Next** after setting the control loop to manual.
3. Select **Next** to acknowledge warning.
4. Select **Next** after applying appropriate pressure to sensor.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

4.5.3 Sensor trim

Note
Use a pressure input source that is at least four times more accurate than the transmitter, and allow the input pressure to stabilize for ten seconds before entering any values.

Field Communicator

Traditional 4–20 mA Fast Keys	1, 2, 3, 3
Traditional 1–5 Vdc Fast Keys	1, 2, 3, 3
Device Dashboard Fast Keys	3, 4, 1

To calibrate the sensor with a Field Communicator using the sensor trim function, perform the following procedure:

1. Assemble and power the entire calibration system including a transmitter, Field Communicator, power supply, pressure input source, and readout device.
2. From the *HOME* screen, enter the Fast Key sequence under "Sensor Trim".
3. Select **2: Lower sensor trim**. The lower sensor trim value should be the sensor trim point that is closest to zero.

Examples:

Calibration: 0 to 100 inH_2O – lower trim = 0, upper trim = 100

Calibration: –100 to 0 inH_2O – lower trim = 0, upper trim = –100

Calibration: –100 to 100 inH_2O – lower trim = -100 or 100, upper trim = –100 or 100

Note
Select pressure input values so that lower and upper values are equal to or outside the 4 and 20 mA (1 and 5 Vdc) points. Do not attempt to obtain reverse output by reversing the high and low points. This can be done by going to "Rerange" on page 17 of Section 2: Configuration. The transmitter allows approximately five percent deviation.

4. Follow the commands provided by the Field Communicator to complete the adjustment of the lower value.
5. Repeat the procedure for the upper value, replacing **2: Lower sensor trim** with **3: Upper sensor trim** in Step 3.

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **Sensor trim** from the menu.
2. Select **Lower sensor trim**. The lower sensor trim value should be the sensor trim point that is closest to zero.
3. Select **Next** after setting the control loop to manual.
4. Select **Next** after applying appropriate pressure to sensor.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.
7. Right click on the device and select **Calibrate**, select **Sensor trim** from the menu.
8. Select **Upper sensor trim** and repeat Step 6.

4.5.4 Recall factory trim—sensor trim

The recall factory trim—sensor trim command allows the restoration of the as-shipped factory settings of the sensor trim. This command can be useful for recovering from an inadvertent zero trim of an absolute pressure unit or inaccurate pressure source. This command is only available with 4-20 mA output.

Field Communicator

4–20 mA Fast Keys	1, 2, 3, 4, 1
Device Dashboard Fast Keys	3, 4, 3

AMS Device Manager

1. Right click on the device and select **Calibrate**, then **Recall Factory Trim** from the menu.
2. Select **Next** after setting the control loop to manual.
3. Select **Sensor trim** under *Trim to recall* and click **Next**.
4. Select **Next** to acknowledge restoration of trim values is complete.
5. Select **Next** to acknowledge the loop can be returned to automatic control.
6. Select **Finish** to acknowledge the method is complete.

4.5.5 Line pressure effect (range 2 and 3)

The following specifications show the static pressure effect for the Rosemount 3051Range 2 and Range 3 Pressure Transmitters used in differential pressure applications where line pressure exceeds 2000 psi (138 bar).

Zero effect

±0.1% of the upper range limit plus an additional ±0.1% of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example: Line pressure is 3000 psi (207 bar) for Ultra performance transmitter. Zero effect error calculation:

$\pm\{0.05 + 0.1 \times [3 \text{ kpsi} - 2 \text{ kpsi}]\} = \pm 0.15\%$ of the upper range limit

Span effect

Refer to "Line pressure effect per 1000 psi (6,9 MPa)" on page 91.

4.5.6 Compensating for line pressure

Rosemount 3051 Range 4 and 5 Pressure Transmitters require a special calibration procedure when used in differential pressure applications. The purpose of this procedure is to optimize transmitter performance by reducing the effect of static line pressure in these applications. The differential pressure transmitters (Ranges 1, 2, and 3) do not require this procedure because optimization occurs in the sensor.

Applying high static pressure to Rosemount 3051 Range 4 and 5 Pressure Transmitters causes a systematic shift in the output. This shift is linear with static pressure; correct it by performing the sensor trim procedure on page 73.

The following specifications show the static pressure effect for Rosemount 3051 Range 4 and 5 Transmitters used in differential pressure applications:

Zero effect

±0.1% of the upper range limit per 1000 psi (69 bar) for line pressures from 0 to 2000 psi (0 to 138 bar)

For line pressures above 2000 psi (138 bar), the zero effect error is ±0.2% of the upper range limit plus an additional ±0.2% of upper range limit error for each 1000 psi (69 bar) of line pressure above 2000 psi (138 bar).

Example: Line pressure is 3000 psi (3 kpsi). Zero effect error calculation:

$\pm \{0.2 + 0.2 \text{ mm} \times [3 \text{ kpsi} - 2 \text{ kpsi}]\} = \pm 0.4\%$ of the upper range limit

Span effect

Correctable to ±0.2% of reading per 1000 psi (69 bar) for line pressures from 0 to 3626 psi (0 to 250 bar)

The systematic span shift caused by the application of static line pressure is –1.00% of reading per 1000 psi (69 bar) for Range 4 transmitters, and –1.25% of reading per 1000 psi (69 bar) for Range 5 transmitters.

Use the following example to compute corrected input values.

Example

A Range 4 transmitter with model number 3051_CD4 will be used in a differential pressure application where the static line pressure is 1200 psi (83 bar). The transmitter output is ranged with 4 mA at 500 inH_2O (1.2 bar) and 20 mA at 1500 inH_2O (3.7 bar).

To correct for systematic error caused by high static line pressure, first use the following formulas to determine corrected values for the low trim and high trim.

Low trim value

LT = LRV - (S/100 × P/1000 × LRV)

Where:	LT =	Corrected low trim value
	LRV =	Lower range value
	S =	Span shift per specification (as a percent of reading)
	P =	Static line pressure in psi

In this example:

LRV =	500 inH_2O (1.24 bar)
S =	-1.00%
P =	1200 psi
LT =	500 inH_2O - (-1%/100 ×1200 psi/1000 × 500 inH_2O)
LT =	506 inH_2O

High trim value

HT = (URV - (S/100 × P/1000 ×URV)

Where:	HT =	Corrected high trim value
	URV =	Upper range value
	S =	Span shift per specification (as a percent of reading)
	P =	Static line pressure in psi

In this example:

URV =	1500 inH_2O (3.74 bar)
S =	–1.00%
P =	1200 psi
HT =	1500 – (–1%/100 × 1200 psi/1000 × 1500 inH_2O)
HT =	1518 inH_2O

Complete the sensor trim procedure as described on page 73. In the example above, at step 4, apply the nominal pressure value of 500 inH_2O. However, enter the calculated correct lower trim (LT) value of 506 inH_2O with the Field Communicator. Repeat the procedure for the upper value.

Note
The range values for the 4 and 20 mA (1 and 5 Vdc) points should be at the nominal URV and LRV. In the example above, the values are 1500 inH_2O and 500 inH_2O respectively. Confirm the values on the *HOME* screen on the Field Communicator. Modify, if needed, by following the steps in the “Rerange” on page 17.

Section 5 Troubleshooting

Overview .... page 77
Safety messages .... page 77
Diagnostic messages .... page 79
Disassembly procedures .... page 84
Reassembly procedures .... page 85

5.1 Overview

Table 5-1 provides summarized maintenance and troubleshooting suggestions for the most common operating problems.

If you suspect malfunction despite the absence of any diagnostic messages on the Field Communicator display, consider using Table 5-1 on page 78 to identify any potential problem.

5.2 Safety messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

⚠WARNING

Explosions could result in death or serious injury.

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Review the approvals section of this manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Table 5-1. Troubleshooting for 4-20 mA output

Symptom	Corrective actions
Transmitter milliamp reading is zero	Verify power is applied to signal terminals
	Check power wires for reversed polarity
	Verify terminal voltage is 10.5 to 42.4 Vdc
	Check for open diode across test terminal
Transmitter not communicating with Field Communicator	Verify the output is between 4 and 20 mA or saturation levels
	Verify terminal voltage is 10.5 to 42.4 Vdc
	Verify clean DC Power to transmitter (Max AC noise 0.2 volts peak to peak)
	Check loop resistance, 250 Ω minimum (PS voltage -transmitter voltage/loop current)
	Have Field Communicator poll for all addresses
Transmitter milliamp reading is low or high	Verify applied pressure
	Verify 4 and 20 mA range points
	Verify output is not in alarm condition
	Verify if 4–20 mA output trim is required
Transmitter will not respond to changes in applied pressure	Check test equipment
	Check impulse piping or manifold for blockage
	Verify the transmitter is not in multidrop mode
	Verify applied pressure is between the 4 and 20 mA set points
	Verify output is not in alarm condition
	Verify transmitter is not in Loop Test mode
Digital pressure variable reading is low or high	Check test equipment (verify accuracy)
	Check impulse piping for blockage or low fill in wet leg
	Verify transmitter is calibrated properly
	Verify pressure calculations for application
Digital pressure variable reading is erratic	Check application for faulty equipment in pressure line
	Verify transmitter is not reacting directly to equipment turning on/off
	Verify damping is set properly for application
Milliamp reading is erratic	Verify power source to transmitter has adequate voltage and current
	Check for external electrical interference
	Verify transmitter is properly grounded
	Verify shield for twisted pair is only grounded at one end

5.3 Diagnostic messages

In addition to the output, the LCD display meter shows abbreviated operation, error, and warning messages for troubleshooting the transmitter. Messages appear according to their priority, with normal operating messages appearing last. To determine the cause of a message, use a Field Communicator or AMS Device Manager to further interrogate the transmitter. A description of each LCD display diagnostic message follows.

Error

Error messages appear on the LCD display to inform you of serious problems affecting the operation of the transmitter. The LCD displays an error message until the error condition is corrected, and the analog output is driven to the specified alarm level. No other transmitter information is displayed during an alarm condition.

Fail

The transmitter CPU board and the sensor module are incompatible. See "Disassembly procedures" on page 84.

Fail Module

The sensor module is disconnected or is malfunctioning. Verify that the sensor module ribbon cable is connected to the back of the electronics board. If the ribbon cable is properly connected, there is a problem within the sensor module. Possible sources of problems include:

- Pressure or temperature updates are not being received in the sensor module.
- A non-volatile memory fault that will effect transmitter operation has been detected in the module by the memory verification routine.

Some non-volatile memory faults are user-repairable. Use a Field Communicator to diagnose the error and determine if it is repairable. Any error message that ends in "FACTORY" is not repairable. In cases of non user-repairable errors, you must replace the transmitter.

Fail Elect

The transmitter electronics board is malfunctioning due to an internal fault. Some of the FAIL ELECT errors are user-repairable. Use a Field Communicator to diagnose the error and determine if it is repairable. Any error message that ends in "FACTORY" is not repairable. In cases of non user-repairable errors, you must replace the electronics board. See "Disassembly procedures" on page 84.

Fail Config

A memory fault has been detected in a location that could affect transmitter operation, and is user-accessible. To correct this problem, use a Field Communicator to interrogate and reconfigure the appropriate portion of the transmitter memory.

Warnings

Warnings appear on the LCD display to alert you of user-repairable problems with the transmitter, or current transmitter operations. Warnings appear alternately with other transmitter information until the warning condition is corrected or the transmitter completes the operation that warrants the warning message.

Press Limit

The process variable read by the transmitter is outside of the transmitter's range.

Temp Limit

The secondary temperature variable read by the transmitter is outside of the transmitter's range.

Curr Fixed

The transmitter is in multidrop mode. The analog output is not tracking pressure changes.

Curr Saturd

The pressure read by the module is outside of the specified range, and the analog output has been driven to saturation levels.

Loop Test

A loop test is in progress. During a loop test or 4–20 mA trim, the analog output is set to a fixed value. The meter display alternates between the current selected in milliamps and "LOOP TEST."

Xmtr Info

A non-volatile memory fault has been detected in the transmitter memory by the memory verification routine. The memory fault is in a location containing transmitter information. To correct this problem, use a Field Communicator to interrogate and reconfigure the appropriate portion of the transmitter memory. This warning does not effect the transmitter operation.

Operation

Normal operation messages appear on the LCD display meter to confirm actions or inform you of transmitter status. Operation messages are displayed with other transmitter information, and warrant no action to correct or alter the transmitter settings.

Zero Pass

The zero value, set with the local zero adjustment button, has been accepted by the transmitter, and the output should change to 4 mA (1 Vdc).

Zero Fail

The zero value, set with the local zero adjustment button, exceeds the maximum rangedown allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

Span Pass

The span value, set with the local span adjustment button, has been accepted by the transmitter, and the output should change to 20 mA (5 Vdc).

Span Fail

The span value, set with the local span adjustment button, exceeds the maximum rangedown allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

Local Dsbld

This message appears during reranging with the integral zero and span buttons and indicates that the transmitter local zero and span adjustments have been disabled. The adjustments may have been disabled by the transmitter security jumper on the transmitter circuit board or through software commands from the Field Communicator. See "Security (write protect)" on page 44 for information on the position of the security jumper and information on software lockout.

Write Protect

This message appears if you attempt to change the transmitter configuration data while the security jumper is in the ON position. See "Security (write protect)" on page 44 for more information about the security jumper.

Field Communicator diagnostics

Table 5-2 is a list of messages used by the Field Communicator (HC) and their corresponding descriptions.

Variable parameters within the text of a message are indicated with <*variable parameter*>.

Reference to the name of another message is identified by *[another message]*.

Table 5-2. Field Communicator Messages

Message	Description
1k snsr EEPROM error-factory ON	Replace the transmitter
1k snsr EEPROM error-user-no out ON	Use the Field Communicator to reset the following parameters: remote seal isolator, remote seal fill fluid, flange material, o-ring material, transmitter type, remote seal type, flange type, meter type, number of remote seals.
1k snsr EEPROM error-user ON	Perform a full trim to recalibrate the transmitter.
4k micro EEPROM error-factory ON	Replace the electronics board.
4k micro EEPROM error-user-no out ON	Use the Field Communicator to reset the message field.
4k micro EEPROM error-user ON	Use the Field Communicator to reset the following parameters: units, range values, damping, analog output, transfer function, tag, scaled meter values. Perform a D/A trim to ensure that the error is corrected.
4k snsr EEPROM error-factory ON	Replace the transmitter.
4k snsr EEPROM error-user ON	Use the Field Communicator to reset the temperature units and the calibration type.
Add item for ALL device types or only for this ONE device type.	Asks the user whether the hot key item being added should be added for all device types or only for the type of device that is connected.
Command Not Implemented	The connected device does not support this function.
Communication Error	The communicator and the device are not communicating correctly. Check all connections between the Field Communicator and the device and resend the information.
Configuration memory not compatible with connected device	The configuration stored in memory is incompatible with the device to which a transfer has been requested.
CPU board not initialized ON	The electronics board is not initialized. Replace the electronics board.
CPU EEPROM write failure ON	Message sent to electronics board from HART® signal failed. Replace the electronics board.
Device Busy	The connected device is busy performing another task.

Message	Description
Device Disconnected	The device failed to respond to a command. Check all connections between the Field Communicator and the device and resend the command.
Device write protected	Device is in write-protect mode. Data can not be written.
Device write protected. Do you still want to shut off?	Device is in write-protect mode. Press **YES** to turn the Field Communicator off and lose the unsent data.
Display value of variable on hotkey menu?	Asks whether the value of the variable should be displayed adjacent to its label on the hotkey menu if the item being added to the hotkey menu is a variable.
Download data from configuration memory to device	Press the **SEND** softkey to transfer information from the communicator memory to the device.
Exceed field width	Indicates that the field width for the current arithmetic variable exceeds the device-specified description edit format.
Exceed precision	Indicates that the precision for the current arithmetic variable exceeds the device-specified description edit format.
Ignore next 50 occurrences of status?	Select **YES** to ignore the next 50 occurrences of device status, or select **NO** to display every occurrence.
Illegal character	An invalid character for the variable type was entered.
Illegal date	The day portion of the date is invalid.
Illegal month	The month portion of the date is invalid.
Illegal year	The year portion of the date is invalid.
Incompatible CPU board and module ON	Upgrade the electronics board or the sensor module to the current revision.
Incomplete exponent	The exponent of a scientific notation floating point variable is incomplete.
Incomplete field	The value entered is not complete for the variable type.
Looking for a device	Polling for multidropped devices at addresses 1–15.
Local buttons operator error ON	Illegal pressure applied during zero or span operation. Repeat the process after verifying the correct pressures.
Mark as read only variable on hotkey menu?	Asks whether the user should be allowed to edit the variable from the hotkey menu if the item being added to the hotkey menu is a variable.
Module EEPROM write failure ON	Message sent to the module from the HART signal failed. Replace the transmitter.
No device configuration in configuration memory	There is no configuration saved in memory available to re-configure off-line or transfer to a device.
No Device Found	Poll of address zero fails to find a device, or poll of all addresses fails to find a device if auto-poll is enabled.
No hotkey menu available for this device.	There is no menu named “hotkey” defined in the device description for this device.
No pressure updates ON	No pressure updates being received from the sensor module. Verify that the sensor module ribbon cable is attached correctly. Or replace the transmitter.
No offline devices available.	There are no device descriptions available to be used to configure a device offline.
No simulation devices available.	There are no device descriptions available to simulate a device.

Message	Description
No temperature updates ON	No temperature updates being received from the sensor module. Verify that the sensor module ribbon cable is attached correctly. Or replace the transmitter.
No UPLOAD_VARIABLES in ddl for this device	There is no menu named "upload_variables" defined in the device description for this device. This menu is required for offline configuration.
No Valid Items	The selected menu or edit display contains no valid items.
OFF KEY DISABLED	Appears when the user attempts to turn the HC off before sending modified data or before completing a method.
Online device disconnected with unsent data. RETRY or OK to lose data.	There is unsent data for a previously connected device. Press **RETRY** to send data, or press **OK** to disconnect and lose unsent data.
Out of memory for hotkey configuration. Delete unnecessary items.	There is no more memory available to store additional hotkey items. Unnecessary items should be deleted to make space available.
Overwrite existing configuration memory	Requests permission to overwrite existing configuration either by a device-to-memory transfer or by an offline configuration. User answers using the softkeys.
Press OK...	Press the OK softkey. This message usually appears after an error message from the application or as a result of HART communications.
Restore device value?	The edited value that was sent to a device was not properly implemented. Restoring the device value returns the variable to its original value.
ROM checksum error ON	Checksum of transmitter software has detected a fault. Replace the electronics board.
Save data from device to configuration memory	Prompts user to press **SAVE** softkey to initiate a device-to-memory transfer.
Saving data to configuration memory.	Data is being transferred from a device to configuration memory.
Sending data to device.	Data is being transferred from configuration memory to a device.
Sensor board not initialized ON	The sensor module electronics board is not initialized. Replace the transmitter.
There are write only variables which have not been edited. Please edit them.	There are write-only variables which have not been set by the user. These variables should be set or invalid values may be sent to the device.
There is unsent data. Send it before shutting off?	Press **YES** to send unsent data and turn the HC off. Press NO to turn the HC off and lose the unsent data.
Too few data bytes received	Command returns fewer data bytes than expected as determined by the device description.
Transmitter Fault	Device returns a command response indicating a fault with the connected device.
Units for <variable label> has changed. Unit must be sent before editing, or invalid data will be sent.	The engineering units for this variable have been edited. Send engineering units to the device before editing this variable.
Unsent data to online device. SEND or LOSE data	There is unsent data for a previously connected device which must be sent or thrown away before connecting to another device.
Upgrade 275 software to access XMTR function. Continue with old description?	The communicator does not contain the most recent Rosemount™ 3051 Pressure Transmitter Device Descriptors (DDs). Select **YES** to communicate using the existing DDs. Select **NO** to abort communication.

Message	Description
Use up/down arrows to change contrast. Press DONE when done.	Gives direction to change the contrast of the HC display.
Value out of range	The user-entered value is either not within the range for the given type and size of variable or not within the min/max specified by the device.
<message> occurred reading/writing <variable label>	Either a read/write command indicates too few data bytes received, transmitter fault, invalid response code, invalid response command, invalid reply data field, or failed pre- or post-read method; or a response code of any class other than SUCCESS is returned reading a particular variable.
<variable label> has an unknown value. Unit must be sent before editing, or invalid data will be sent.	A variable related to this variable has been edited. Send related variable to the device before editing this variable.

5.4 Disassembly procedures

⚠ Do not remove the instrument cover in explosive atmospheres when the circuit is live.

5.4.1 Remove from service

Follow these steps:

- Follow all plant safety rules and procedures.
- Isolate and vent the process from the transmitter before removing the transmitter from service.
- Remove all electrical leads and disconnect conduit.
- Remove the transmitter from the process connection.
- The Rosemount 3051C Transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation.
- The Rosemount 3051T Transmitter is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process. Do not wrench on neck of transmitter.
- Do not scratch, puncture, or depress the isolating diaphragms.
- Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
- For the Rosemount 3051C, whenever you remove the process flange or flange adapters, visually inspect the PTFE O-rings. Replace the O-rings if they show any signs of damage, such as nicks or cuts. Undamaged O-rings may be reused.

5.4.2 Remove terminal block

Electrical connections are located on the terminal block in the compartment labeled “FIELD TERMINALS.”

1. Remove the housing cover from the field terminal side.
2. Loosen the two small screws located on the assembly in the 9 o’clock and 5 o’clock positions.
3. Pull the entire terminal block out to remove it.

⚠ See “Safety messages” on page 77 for complete warning information.

5.4.3 Remove the electronics board

The transmitter electronics board is located in the compartment opposite the terminal side. To remove the electronics board perform the following procedure:

1. Remove the housing cover opposite the field terminal side.
2. If you are disassembling a transmitter with a LCD display, loosen the two captive screws that are visible on the right and left side of the meter display.
3. ⚠ Loosen the two captive screws that anchor the board to the housing. The electronics board is electrostatically sensitive; observe handling precautions for static-sensitive components. Use caution when removing the LCD display as there is an electronic pin connector that interfaces between the LCD display and electronics board. The two screws anchor the LCD display to the electronics board and the electronics board to the housing.
4. Using the two captive screws, slowly pull the electronics board out of the housing. The sensor module ribbon cable holds the electronics board to the housing. Disengage the ribbon cable by pushing the connector release.

5.4.4 Remove the sensor module from the electronics housing

1. Remove the electronics board. Refer to "Remove the electronics board" on page 85.

Important
To prevent damage to the sensor module ribbon cable, disconnect it from the electronics board before you remove the sensor module from the electrical housing.

---

2. Carefully tuck the cable connector completely inside of the internal black cap.

Note
Do not remove the housing until after you tuck the cable connector completely inside of the internal black cap. The black cap protects the ribbon cable from damage that can occur when you rotate the housing.

---

3. Loosen the housing rotation set screw with a $^5/_{64}$-in. hex wrench, and loosen one full turn.
4. Unscrew the module from the housing, making sure the black cap and sensor cable do not catch on the housing.

5.5 Reassembly procedures

1. Inspect all cover and housing (non-process wetted) O-rings and replace if necessary. Lightly grease with silicone lubricant to ensure a good seal.
2. Carefully tuck the cable connector completely inside the internal black cap. To do so, turn the black cap and cable counterclockwise one rotation to tighten the cable.
3. Lower the electronics housing onto the module. Guide the internal black cap and cable through the housing and into the external black cap.
4. Turn the module clockwise into the housing.

Important
Make sure the sensor ribbon cable and internal black cap remain completely free of the housing as you rotate it. Damage can occur to the cable if the internal black cap and ribbon cable become hung up and rotate with the housing.

⚠ 5. Thread the housing completely onto the sensor module. The housing must be no more than one full turn from flush with the sensor module to comply with explosion proof requirements.

6. Tighten the housing rotation set screw using a $^{5}/_{64}$-in. hex wrench.

5.5.1 Attach the electronics board

1. Remove the cable connector from its position inside of the internal black cap and attach it to the electronics board.
2. Using the two captive screws as handles, insert the electronics board into the housing. Make sure the posts from the electronics housing properly engage the receptacles on the electronics board. Do not force. The electronics board should slide gently on the connections.
3. Tighten the captive mounting screws.

⚠ 4. Replace the electronics housing cover. The transmitter covers must be engaged metal-to-metal to ensure a proper seal and to meet Explosionproof requirements.

5.5.2 Install the terminal block

1. Gently slide the terminal block into place, making sure the two posts from the electronics housing properly engage the receptacles on the terminal block.
2. Tighten the captive screws.
3. Replace the electronics housing cover. The transmitter covers must be fully engaged to meet Explosion-Proof requirements.

5.5.3 Reassemble the Rosemount 3051C process flange

1. Inspect the sensor module PTFE o-rings. Undamaged o-rings may be reused. Replace o-rings that show any signs of damage, such as nicks, cuts, or general wear.

Note
If you are replacing the O-rings, be careful not to scratch the o-ring grooves or the surface of the isolating diaphragm when removing the damaged O-rings.

⚠ See "Safety messages" on page 77 for complete warning information.

2. Install the process connection. Possible options include:
    a. Coplanar process flange:
        – Hold the process flange in place by installing the two alignment screws to finger tightness (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
        – Install the four 1.75-in. flange bolts by finger tightening them to the flange.
    b. Coplanar process flange with flange adapters:
        – Hold the process flange in place by installing the two alignment screws to finger tightness (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
        – Hold the flange adapters and adapter o-rings in place while installing the four configurations, use four 2.88-in. bolts. For gage pressure configurations, use two 2.88-in. bolts and two 1.75-in. bolts.
    c. Manifold:
        – Contact the manifold manufacturer for the appropriate bolts and procedures.
3. Tighten the bolts to the initial torque value using a crossed pattern. See Table 5-3 for appropriate torque values.

Table 5-3. Bolt Installation Torque Values

Bolt material	Initial torque value	Final torque value
CS-ASTM-A445 standard	300 in-lb. (34 N-m)	650 in-lb. (73 N-m)
316 SST—option L4	150 in-lb. (17 N-m)	300 in-lb. (34 N-m)
ASTM-A-19 B7M—option L5	300 in-lb. (34 N-m)	650 in-lb. (73 N-m)
ASTM-A-193 Class 2, Grade B8M—option L8	150 in-lb. (17 N-m)	300 in-lb. (34 N-m)

Note
If you replaced the PTFE sensor module O-rings, re-torque the flange bolts after installation to compensate for cold flow.

Note
After replacing O-rings on Range 1 transmitters and re-installing the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours. Then re-tighten the flange bolts in a cross pattern, and again expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.

Appendix A Specifications and Reference Data

Performance specifications . . . . page 89
Functional specifications . . . . page 93
Physical specifications . . . . page 99
Dimensional drawings . . . . page 101
Ordering information . . . . page 113
Options . . . . page 130
Spare parts . . . . page 136

A.1 Performance specifications

This product data sheet covers both HART® and FOUNDATION™ Fieldbus protocols unless specified.

A.1.1 Conformance to specification (±3σ [Sigma])

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least ±3σ.

A.1.2 Reference accuracy

Rosemount models[1]	Standard	High accuracy option
3051CD, 3051CG Range 0 (CD)	±0.10% of span For spans less than 2:1, accuracy = ±0.05% of URL	N/A
Range 1	±0.10% of span For spans less than 15:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]\%$ of Span	N/A
Ranges 2–5	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]\%$ of Span	Ranges 2–4 High accuracy option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]\%$ of Span
3051T Ranges 1–4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]\%$ of Span	Ranges 1–4 High accuracy option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]\%$ of Span
Range 5	±0.075% of span	N/A

3051CA Ranges 1–4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2–4 High Accuracy Option, P8 ±0.04% of span For spans less than 5:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
3051H/3051L All ranges	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	N/A

1. Total performance is determined by performing a root sum square calculation on reference accuracy, ambient temperature effect, and line pressure effect errors. For FOUNDATION Fieldbus transmitters, use calibrated range in place of span. For zero based spans, reference conditions, silicone oil fill, SST materials, Coplanar flange (Rosemount 3051C) or 1/2 in. - 18 NPT (Rosemount 3051T) process connections, digital trim values set to equal range points.

A.1.3 Total performance

For ±50 °F (28 °C) temperature changes, up to 1000 psi (6,9 MPa) line pressure (CD only), from 1:1 to 5:1 rangedown.

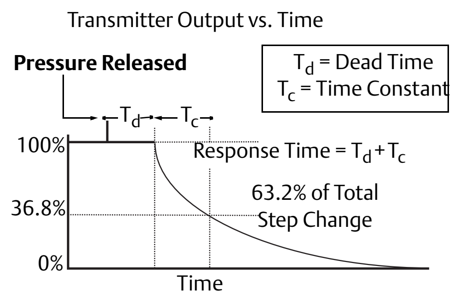
Rosemount models	Total performance
3051C Ranges 2-5	±0.15% of span
3051T Ranges 1-4	±0.15% of span

A.1.4 Long term stability

Rosemount models	Long term stability
3051C Ranges 2-5	±0.125% of URL for five years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6,9 MPa) line pressure.
3051CD Low/Draft Range Ranges 0-1	±0.2% of URL for one year
3051T Ranges 1-4	±0.125% of URL for one years ±50 °F (28 °C) temperature changes, and up to 1000 psi (6,9 MPa) line pressure.
3051H Ranges 2-3 Ranges 4-5	±0.1% of URL for 1 year ±0.2% of URL for 1 year

A.1.5 Dynamic performance

	4–20 mA (HART protocol)[1]	**Fieldbus protocol[2]**	**Typical HART transmitter response time**
Total response time ($T_d + T_c$)[3]:			
Rosemount 3051C, Ranges 2–5: Range 1: Range 0: Rosemount 3051T: Rosemount 3051H/L:	100 ms 255 ms 700 ms 100 ms Consult factory	152 ms 307 ms 752 ms 152 ms Consult factory	
Dead time (Td)	45 ms (nominal)	97 ms	
Update rate	22 times per second	22 times per second	



1. Dead time and update rate apply to all models and ranges; analog output only
2. Transmitter Fieldbus output only, segment macro-cycle not included.
3. Nominal total response time at 75 °F (24 °C) reference conditions.

A.1.6 Line pressure effect per 1000 psi (6,9 MPa)

Rosemount models[1]	**Line pressure effect**
3051CD	
Range 0	Zero error[2] ±0.125% of URL/100 psi (6,89 bar)
Range 1	±0.25% of URL/1000 psi (68,9 bar)
Ranges 2–3	±0.05% of URL/1000 psi (68,9 bar) for line pressures from 0 to 2000 psi (0 to 13,7 MPa)
Range 0	Span error ±0.15% of reading/100 psi (6,89 bar)
Range 1	±0.4% of reading/1000 psi (68,9 bar)
Ranges 2–3	±0.1% of reading/1000 psi (68,9 bar)
3051HD	i (68,9 bar) for line pressures from 0 to 2000 psi (0 to 13,7 MPa)
All ranges	Zero error[1] ±0.1% of URL/1000 ps
All ranges	Span error ±0.1% of reading/1000 psi (68,9 bar)

1. For zero error specifications for line pressures above 2000 psi (137,9 bar) or line pressure effect specifications for DP Ranges 4-5, see "Compensating for line pressure" on page 75.
2. Can be calibrated out at line pressure.

A.1.7 Ambient temperature effect per 50 °F (28 °C)

Rosemount models	**Ambient temperature effect**
3051CD/CG	
Range 0	±(0.25% URL + 0.05% span)
Range 1	±(0.1% URL + 0.25% span)
Ranges 2–5	±(0.0125% URL + 0.0625% span) from 1:1 to 5:1 ±(0.025% URL + 0.125% span) from 5:1 to 100:1

Rosemount models	Ambient temperature effect
3051T Range 1	±(0.025% URL + 0.125% span) from 1:1 to 10:1 ±(0.05% URL + 0.125% span) from 10:1 to 100:1
Range 2–4	±(0.025% URL + 0.125% span) from 1:1 to 30:1 ±(0.035% URL + 0.125% span) from 30:1 to 100:1
Range 5	±(0.1% URL + 0.15% span)
3051CA All ranges	±(0.025% URL + 0.125% span) from 1:1 to 30:1
	±(0.035% URL + 0.125% span) from 30:1 to 100:1
3051H All ranges	±(0.025% URL + 0.125% span + 0.35 inH_2O) from 1:1 to 30:1
	±(0.035% URL + 0.125% span + 0.35 inH_2O) from 1:1 to 30:1
3051L	See Emerson Process Management Instrument Toolkit™ software.

A.1.8 Mounting position effects

Rosemount models	Mounting position effects
3051C	Zero shifts up to ±1.25 inH_2O (3,11 mbar), which can be calibrated out. No span effect.
3051H	Zero shifts up to ±5 inH_2O (12,43 mbar), which can be calibrated out. No span effect.
3051L	With liquid level diaphragm in vertical plane, zero shift of up to 1 inH_2O (2,49 mbar). With diaphragm in horizontal plane, zero shift of up to 5 inH_2O (12,43 mbar) plus extension length on extended units. All zero shifts can be calibrated out. No span effect.
3051T/CA	Zero shifts up to 2.5 inH_2O (6,22 mbar), which can be calibrated out. No span effect.

A.1.9 Vibration effect

Less than ±0.1% of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10–60 Hz 0.21mm displacement peak amplitude/ 60–2000 Hz 3g).

A.1.10 Power supply effect

Less than ±0.005% of calibrated span per volt.

A.1.11 Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN61326. Maximum deviation < 1% Span during EMC disturbance[1].

A.1.12 Transient protection (option code T1)

Meets IEEE C62.41, Category Location B

6 kV crest (0.5 µs - 100 kHz)
3 kV crest (8 × 20 microseconds)
6 kV crest (1.2 × 50 microseconds)

1. *During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.*

A.2 Functional specifications

A.2.1 Range and sensor limits

Table A-1. Rosemount 3051CD, 3051CG, 3051L, and 3051H Range and Sensor Limits

Range	Minimum span	
	Rosemount 3051CD[1], CG, L, H	Upper (URL)
0	0.1 inH_2O (0,25 mbar)	3.0 inH_2O (7,47 mbar)
1	0.5 inH_2O (1,2 mbar)	25 inH_2O (62,3 mbar)
2	2.5 inH_2O (6,2 mbar)	250 inH_2O (0,62 bar)
3	10 inH_2O (24,9 mbar)	1000 inH_2O (2,49 bar)
4	3 psi (0,20 bar)	300 psi (20,6 bar)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)

1. Range 0 only available with Rosemount 3051CD. Range 1 only available with Rosemount 3051CD or 3051CG.

Table A-2. Rosemount 3051CD, 3051CG, 3051L, and 3051H Range and Sensor Limits

Range	Lower (LRL)					
	Rosemount 3051C Differential	Rosemount 3051 Gage	Rosemount 3051L Differential	Rosemount 3051L Gage	Rosemount 3051H Differential	Rosemount 3051H Gage
0	–3.0 inH_2O (-7,47 mbar)	N/A	N/A	N/A	N/A	N/A
1	–25 inH_2O (–62,1 mbar)	–25 inH_2O (–62,1 mbar)	N/A	N/A	N/A	N/A
2	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)	–250 inH_2O (–0,62 bar)
3	–1000 inH_2O (–2,49 bar)	0.5 psia (34,5 mbar abs)	–1000 inH_2O (–2,49 bar)	0.5 psia (34,5 mbar abs)	–1000 inH_2O (–2,49 bar)	0.5 psia (34,5 mbar abs)
4	–300 psi (–20,6 bar)	0.5 psia (34,5 mbar abs)	–300 psi (–20,6 bar)	0.5 psia (34,5 mbar abs)	–300 psi (–20,6 bar)	0.5 psia (34,5 mbar abs)
5	– 2000 psi (–137,9 bar)	0.5 psia (34,5 mbar abs)	N/A	N/A	– 2000 psi (–137,9 bar)	0.5 psia (34,5 mbar abs)

Table A-3. Range and Sensor Limits

Rosemount 3051CA				Rosemount 3051T				
Range	Minimum span	Range and sensor limits: Upper (URL)	Range and sensor limits: Lower (LRL)	Range	Minimum span	Range and sensor limits: Upper (URL)	Range and sensor limits: Lower (LRL)	Lower[(1)] (LRL) (Gage)
1	0.3 psia (20,6 mbar)	30 psia (2,07 bar)	0 psia (0 bar)	1	0.3 psi (20,6 mbar)	30 psi (2,07 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
2	1.5 psia (0,103 bar)	150 psia (10,3 bar)	0 psia (0 bar)	2	1.5 psi (0,103 bar)	150 psi (10,3 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
3	8 psia (0,55 bar)	800 psia (55,2 bar)	0 psia (0 bar)	3	8 psi (0,55 bar)	800 psi (55,2 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
4	40 psia (2,76 bar)	4000 psia (275,8 bar)	0 psia (0 bar)	4	40 psi (2,76 bar)	4000 psi (275,8 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
				5	2000 psi (137,9 bar)	10000 psi (689,4 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)

1. Assumes atmospheric pressure of 14.7 psig.

A.2.2 Zero and span adjustment requirements (HART and Low Power)

Zero and span values can be set anywhere within the range limits stated in Table A-1, Table A-2, and Table A-3.

Span must be greater than or equal to the minimum span stated in Table A-1, Table A-2, and Table A-3.

A.2.3 Service

Liquid, gas, and vapor applications

A.2.4 4–20 mA (output code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

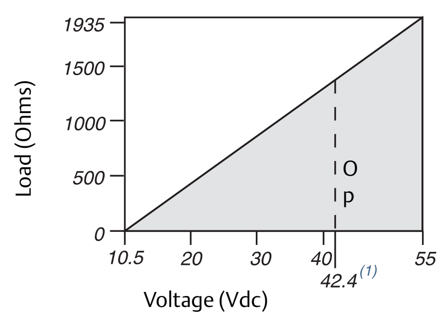
Power supply

External power supply required. Standard transmitter (4–20 mA) operates on 10.5 to 55 Vdc with no load.

Load limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 (Power Supply Voltage – 10.5)



Communication requires a minimum loop resistance of 250 ohms.

1. For CSA approval, power supply must not exceed 42.4 V.

A.2.5 FOUNDATION Fieldbus (output code F) and PROFIBUS® (output code W)

Power supply

External power supply required; transmitters operate on 9.0–32.0 Vdc transmitter terminal voltage.

Current draw

17.5 mA for all configurations (including LCD display option)

A.2.6 FOUNDATION Fieldbus function block execution times

Block	Execution time
Resource	N/A
Transducer	N/A
LCD Block	N/A
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds
Input selector	30 milliseconds
Arithmetic	35 milliseconds
Signal characterizer	40 milliseconds
Integrator	35 milliseconds

A.2.7 FOUNDATION Fieldbus parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

A.2.8 Standard function blocks

Resource block

Contains hardware, electronics, and diagnostic information.

Transducer block

Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD display block

Configures the local display.

Two analog input blocks

Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID block

Contains all logic to perform PID control in the field including cascade and feedforward.

A.2.9 Backup Link Active Scheduler (LAS)

The transmitter can function as a LAS if the current link master device fails or is removed from the segment.

A.2.10 Advanced control function block suite (option code A01)

Input selector block

Selects between inputs and generates an output using specific selection strategies such as minimum, maximum, midpoint, average or first “good.”

Arithmetic block

Provides pre-defined application-based equations including flow with partial density compensation, electronic remote seals, hydrostatic tank gauging, ratio control and others.

Signal characterizer block

Characterizes or approximates any function that defines an input/output relationship by configuring up to twenty X, Y coordinates. The block interpolates an output value for a given input value using the curve defined by the configured coordinates.

Integrator block

Compares the integrated or accumulated value from one or two variables to pre-trip and trip limits and generates discrete output signals when the limits are reached. This block is useful for calculating total flow, total mass, or volume over time.

A.2.11 FOUNDATION Fieldbus Diagnostics Suite (option code D01)

The Rosemount 3051C FOUNDATION Fieldbus Diagnostics provide Abnormal Situation Prevention (ASP) indictation. The integral Statistical Process Monitoring (SPM) technology calculates the mean and standard deviation of the process variable 22 times per second. The Rosemount 3051C ASP algorithm uses these values and highly flexible configuration options for customization to many user-defined or application specific abnormal situations. The detection of plugged impulse lines is the first available predefined application.

A.2.12 Low Power (output code M)

Output

Three wire 1–5 Vdc or 0.8–3.2 Vdc (Option Code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the HART protocol. Low-power transmitter operates on 6–14 Vdc with no load.

Power consumption

3.0 mA, 18–36 mW

Minimum load impedance

100 kΩ (V_{out} wiring)

Indication

Optional 5-digit LCD display

Overpressure Limits

Rosemount 3051CD/CG

- Range 0: 750 psi (51,7 bar)
- Range 1: 2000 psig (137,9 bar)
- Ranges 2–5: 3626 psig (250 bar)
  4500 psig (310,3 bar) for option code P9

Rosemount 3051CA

- Range 1: 750 psia (51,7 bar)
- Range 2: 1500 psia (103,4 bar)
- Range 3: 1600 psia (110,3 bar)
- Range 4: 6000 psia (413,7 bar)

Rosemount 3051H

- All Ranges: 3626 psig (25 MPa)

Rosemount 3051TG/TA

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

For Rosemount 3051L or level flange option codes FA, FB, FC, FD, FP, and FQ, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

Table A-4. Rosemount 3051L and Level Flange Rating Limits

Standard	Type	CS rating	SST rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
ANSI/ASME	Class 600	1480 psig	1440 psig
At 100 °F (38 °C), the rating decreases with increasing temperature.			
DIN	PN 10–40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
DIN	PN 25/40	40 bar	40 bar
At 248 °F (120 °C), the rating decreases with increasing temperature.			

A.2.13 Static pressure limit

Rosemount 3051CD Only

Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310, 3 bar) for Option Code P9).

Range 0: 0.5 psia and 750 psig (3, 4 bar and 51, 7 bar)

Range 1: 0.5 psia and 2000 psig (3, 4 bar and 137, 9 bar)

A.2.14 Burst pressure limits

Burst pressure on Coplanar, traditional, or 3051H process flange is 10000 psig (69 MPa).

Burst pressure for the 3051T is:

Ranges 1–4: 11000 psi (75,8 MPa)

Range 5: 26000 psig (179 MPa)

A.2.15 Failure mode alarm

Output code A

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 3.75 mA or to 21.75 mA to alert the user. NAMUR-compliant values are available, option code C4. High or low alarm signal is user-selectable by internal jumper.

Output code M

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 0.94 V or above 5.4 V to alert the user (below 0.75 V or above 4.4 V for Option C2). High or low alarm signal is user-selectable by internal jumper.

Output code F and W

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

A.2.16 Temperature limits

Ambient

–40 to 185 °F (–40 to 85 °C)

With LCD display[1]: –40 to 175 °F (–40 to 80 °C)

Storage

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

Process

At atmospheric pressures and above. See Table A-5

Table A-5. Rosemount 3051 Process Temperature Limits

Rosemount 3051CD, 3051CG, 3051CA	
Silicone fill sensor[1]	N/A
with coplanar flange[2]	–40 to 250 °F (–40 to 121 °C)
with traditional flange[2][3]	–40 to 300 °F (–40 to 149 °C)
with Level Flange[2]	–40 to 300 °F (–40 to 149 °C)
with Rosemount 305 Integral Manifold[2]	–40 to 300 °F (–40 to 149 °C)
Inert Fill Sensor[1][4][5]	–40 to 185 °F (–40 to 85 °C)
Rosemount 3051H (process fill fluid)[1]	
Silicone 200	–40 to 375 °F (–40 to 191 °C)
Inert	–50 to 350 °F (–45 to 177 °C)
Neobee M-20®	0 to 375 °F (–18 to 191 °C)
Rosemount 3051T (process fill fluid)[1][2]	
Silicone fill sensor	–40 to 250 °F (–40 to 121 °C)
Inert fill sensor	–22 to 250 °F (–30 to 121 °C)
Rosemount 3051L low-side temperature limits[1][2]	
Silicone fill sensor	–40 to 250 °F (–40 to 121 °C)
Inert fill sensor	0 to 185 °F (–18 to 85 °C)
Rosemount 3051L high-side temperature limits (process fill fluid)	
Syltherm® XLT	–100 to 300 °F (–73 to 149 °C)
D.C.® Silicone 704	32 to 400 °F (0 to 205 °C)
Silicone 200	–40 to 400 °F (–40 to 205 °C)
Inert	–50 to 350 °F (–45 to 177 °C)
Glycerin and Water	0 to 200 °F (–18 to 93 °C)
Neobee M-20	0 to 400 °F (–18 to 205 °C)
Propylene Glycol and Water	0 to 200 °F (–18 to 93 °C)

1. Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio (0.6:1 ratio for the Rosemount 3051H).
2. 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.
3. 3051CD0 process temperature limits are –40 to 212 °F (–45 to 100 °C)
4. 160 °F (71 °C) limit in vacuum service.
5. Not available for Rosemount 3051CA.

Humidity limits

0–100 percent volumetric displacement

1. LCD display may not be readable and LCD updates will be slower at temperatures below -4 °F (-20 °C).

Less than 0.005 in^3 (0,08 cm^3)

Damping

Analog output response to a step input change is user-selectable from zero to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

A.3 Physical specifications

A.3.1 Electrical connections

$^1/_2$–14 NPT, G$^1/_2$, and M20 × 1.5 (CM20) conduit. HART interface connections fixed to terminal block.

A.3.2 Process connections

All Models except Rosemount 3051L and 3051T

$^1/_4$–18 NPT on 2$^1/_8$-in. centers

$^1/_2$–14 NPT on 2-, 2$^1/_8$-, or 2$^1/_4$-in. centers

Rosemount 3051L

High pressure side: 2-, 3-, or 4-in., ASME B 16.5 (ANSI) Class 150, 300 or 600 flange; 50, 80 or 100 mm, PN 40 or 10/16 flange

Low pressure side: $^1/_4$–18 NPT on flange $^1/_2$–14 NPT on adapter

Rosemount 3051T

$^1/_2$–14 NPT female. A DIN 16288 male (available in SST for Range 1–4 transmitters only), or autoclave type F-250-C (Pressure relieved $^9/_{16}$–18 gland thread; $^1/_4$ OD high pressure tube 60 degrees cone; available in SST for range 5 transmitters only).

A.3.3 Process-wetted parts

Drain/vent valves

316 SST, Alloy C-276, or Alloy 400/K-500[(1)] material (Drain vent seat: Alloy 400, Drain vent stem: Alloy K-500)

1. Alloy 400/K-500 is not available with Rosemount 3 051L or 3051H.

Process flanges and adapters

Plated carbon steel

SST: CF-8M (Cast 316 SST) per ASTM A743
Cast C-276: CW-12MW per ASTM A494
Cast Alloy 400: M-30C per ASTM A494

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process isolating diaphragms

Isolating diaphragm material	3051CD/CG	3051T	3051CA	3051H
316L SST	•	•	•	•
Alloy C-276	•	•	•	•
Alloy 400	•	N/A	•	N/A
Tantalum	•	N/A	N/A	•
Gold-plated Alloy 400	•	N/A	•	N/A
Gold-plated SST	•	N/A	•	N/A

A.3.4 Rosemount 3051L process wetted parts

Flanged process connection (transmitter high side)

Process diaphragms, including process gasket surface

- 316L SST, Alloy C-276, or Tantalum
- Extension
- CF-3M (Cast version of 316L SST, material per ASTM-A743), or Alloy C-276. Fits schedule 40 and 80 pipe.
- Mounting flange
- Zinc-cobalt plated CS or SST

Reference process connection (transmitter low side)

Isolating diaphragms

316L SST or Alloy C-276

Reference flange and adapter

CF-8M (Cast version of 316 SST, material per ASTM-A743)

A.3.5 Non-wetted parts

Electronics housing

Low copper aluminum or SST: CF-3M or CF-8M (Cast version of 316L or 316 SST, material per ASTM-A743). NEMA 4X, IP 65, IP 66

Coplanar sensor module housing

CF-3M (Cast version of 316L SST, material per ASTM-A743)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)
ASTM F593G, Condition CW1 (Austenitic 316 SST)
ASTM A193, Grade B7M (zinc plated alloy steel)
Alloy 400

Sensor module fill fluid

Silicone oil (Silicone 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 3051T)

Process fill fluid (Rosemount 3051L and 3051H only)

Rosemount 3051L: Syltherm XLT, D.C. Silicone 704, Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Rosemount 3051H: inert, Neobee M-20, or Silicone 200

Paint

Polyurethane

Cover O-rings

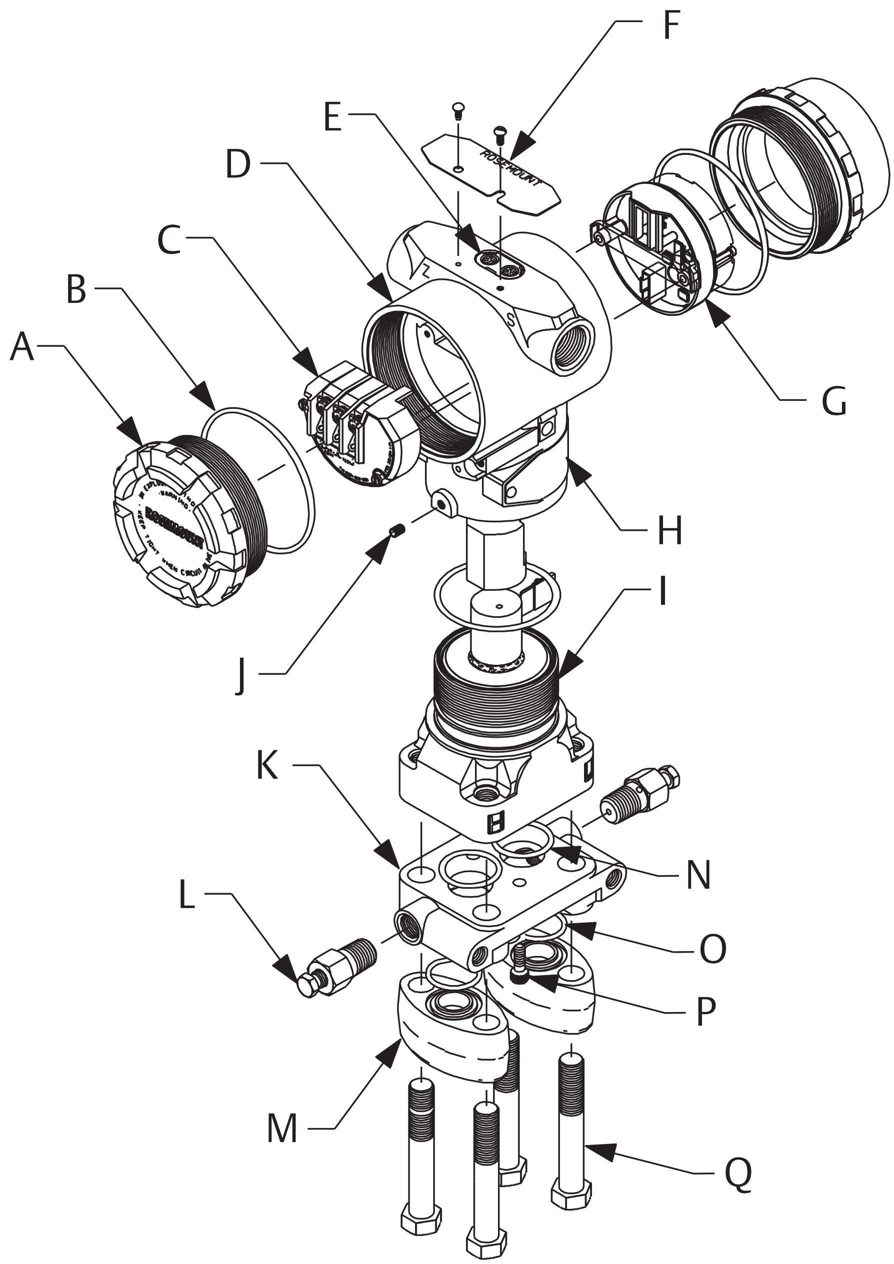
Buna-N

A.3.6 Shipping weights

Refer to "Shipping weights" on page 132.

A.4 Dimensional drawings

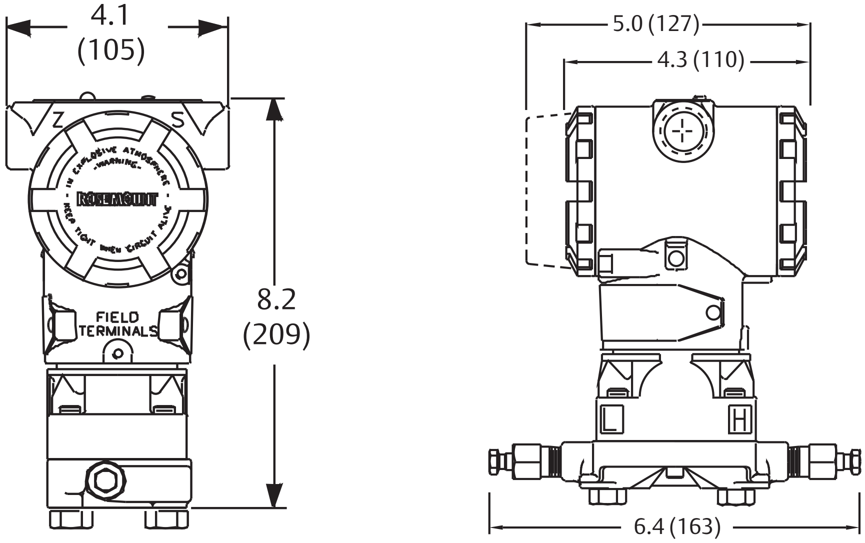
Figure A-1. Rosemount 3051 Exploded View



A. Cover
B. Cover O-ring
C. Terminal block
D. Electronic housing
E. Span and zero adjustments[1]
F. Certification label
G. Electronics board
H. Nameplate
I. Sensor module
J. Housing rotation set screw (180° maximum housing rotation without further disassembly)
K. Coplanar flange
L. Drain/vent valve
M. Flange adapters
N. Process O-ring
O. Flange adapter O-ring
P. Flange alignment screw (not pressure retaining)
Q. Flange bolts

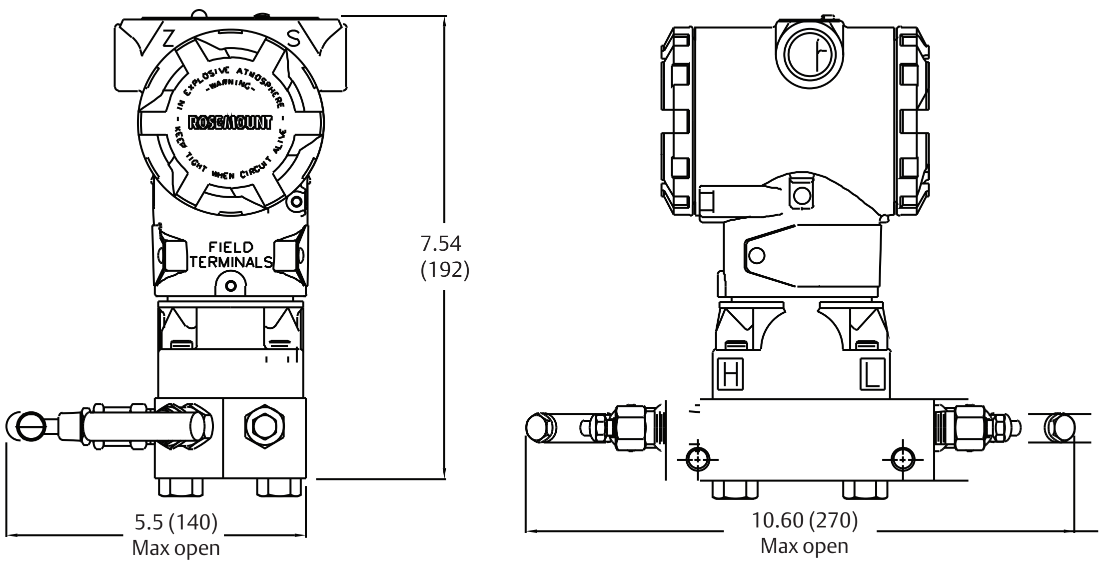
1. Span and Zero Adjustments are not available with Fieldbus or PROFIBUS Protocols.

Figure A-2. Rosemount 3051C Coplanar Flange



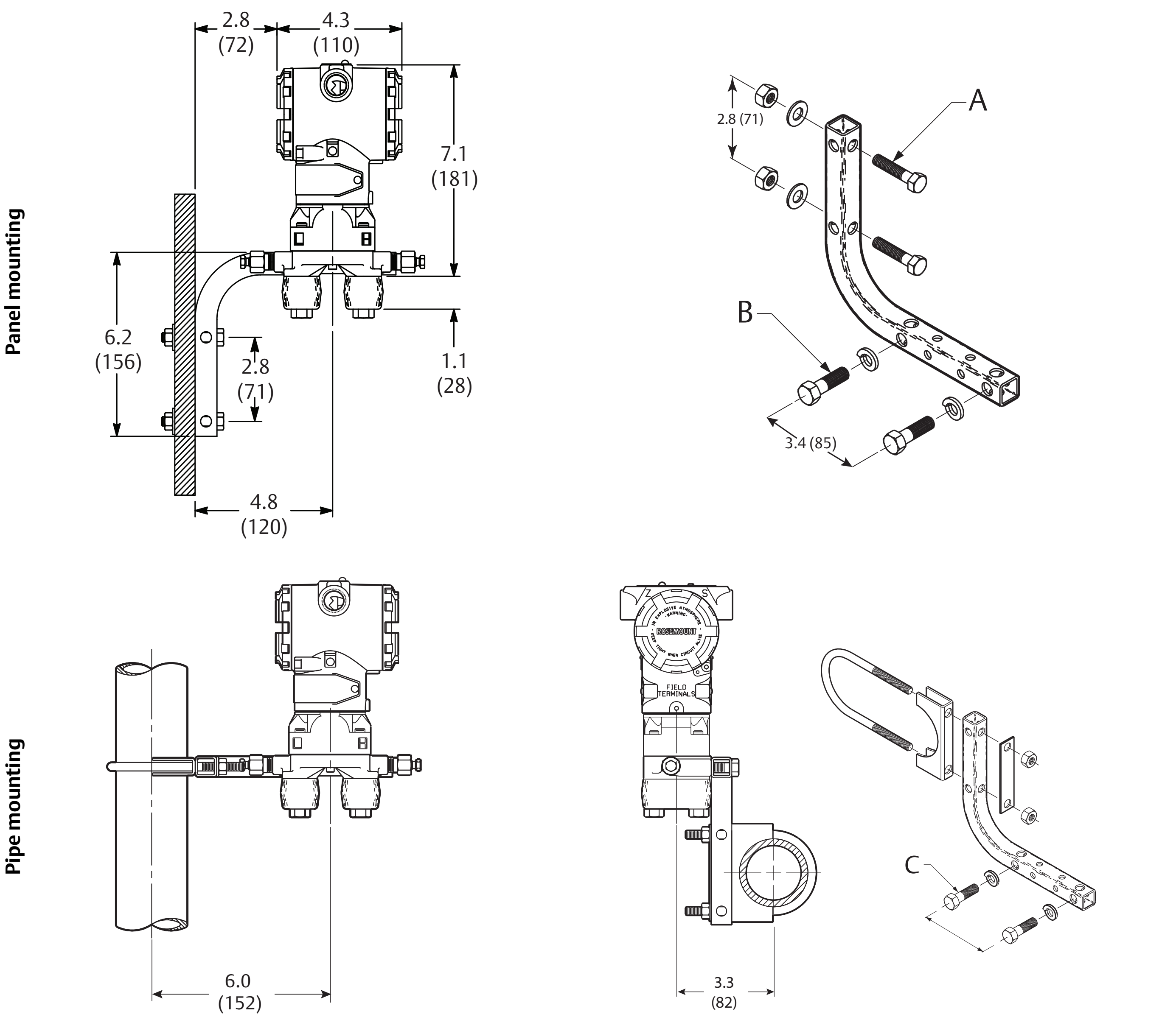
Dimensions are in inches (millimeters).

Figure A-3. Rosemount 3051C Coplanar Flange with Rosemount 305 Coplanar Manifold



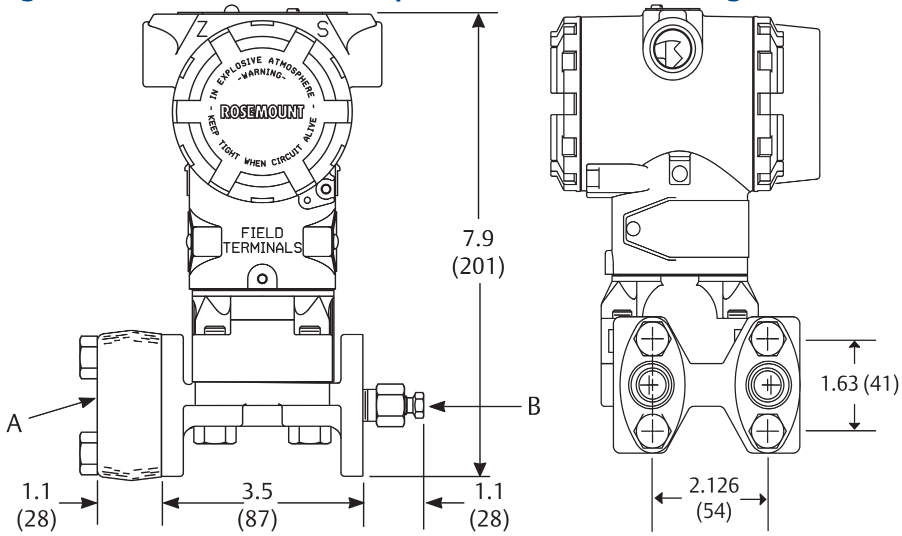
Dimensions are in inches (millimeters).

Figure A-4. Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting



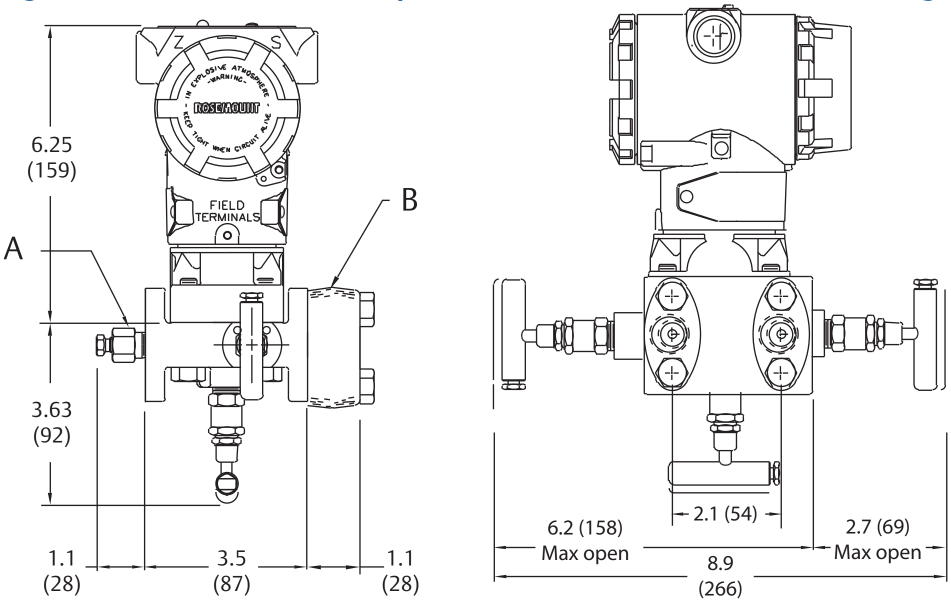
A. $^5/_{16} \times 1^1/_2$ bolts for panel mounting (not supplied)
B. $^3/_8$–16 $\times 1^1/_4$ bolts for mounting to transmitter
C. 2-in U-bolt for pipe mounting
Dimensions are in inches (millimeters).

Figure A-5. Rosemount 3051C Coplanar with Traditional Flange



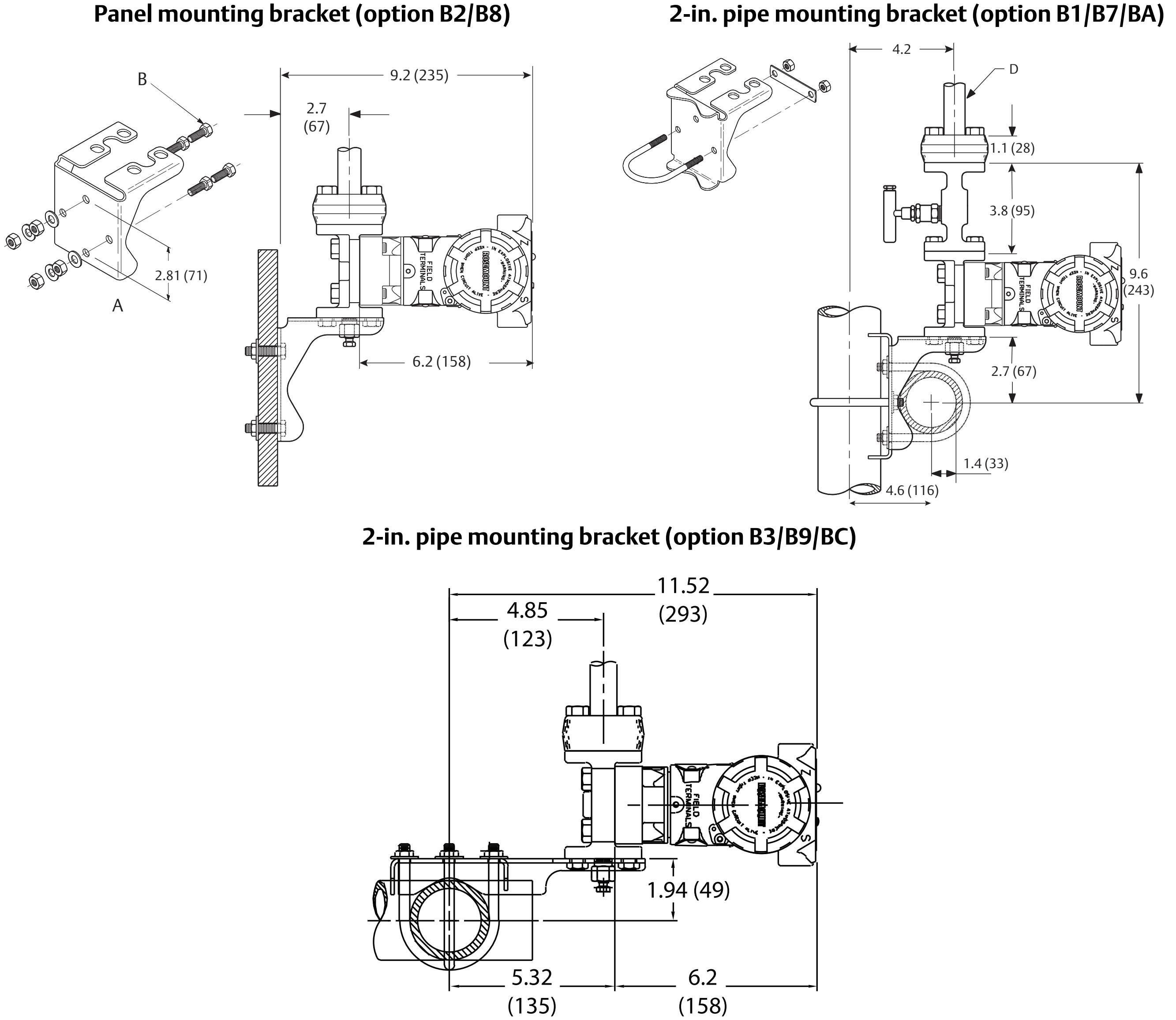
A. 1/2–14 NPT flange adapter (optional)
B. Drain/vent valve
Dimensions are in inches (millimeters).

Figure A-6. Rosemount 3051C Coplanar with Rosemount 305 Traditional Integral Manifold



Dimensions are in inches (millimeters).

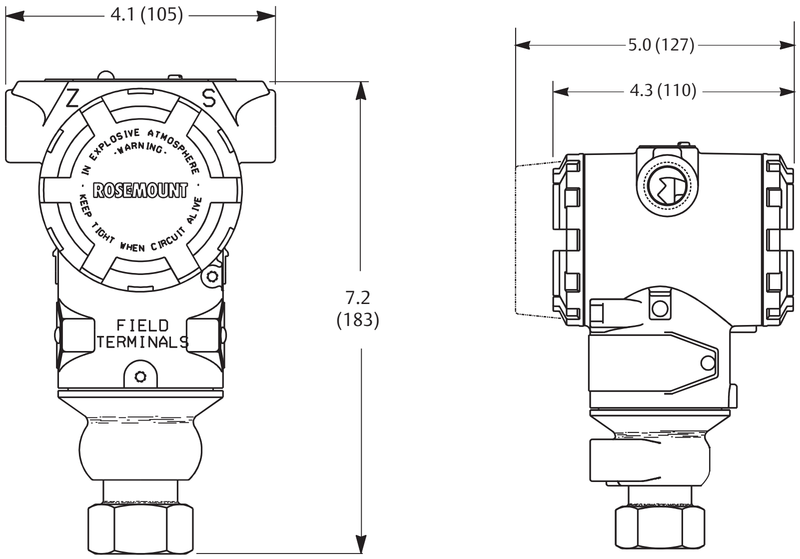
Figure A-7. Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting



A. Panel mounting bracket
B. $^5/_{16} \times ^7/_8$ bolts for panel mounting (not supplied)
Dimensions are in inches (millimeters).

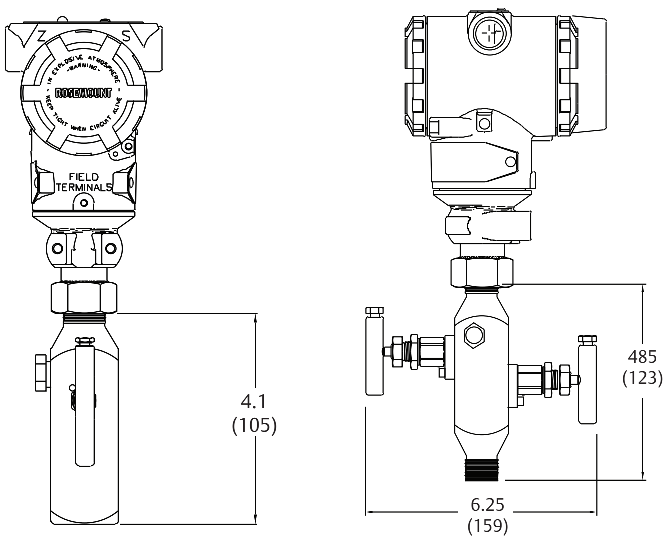
C. Pipe mounting bracket
D. Impulse piping

Figure A-8. Rosemount 3051T



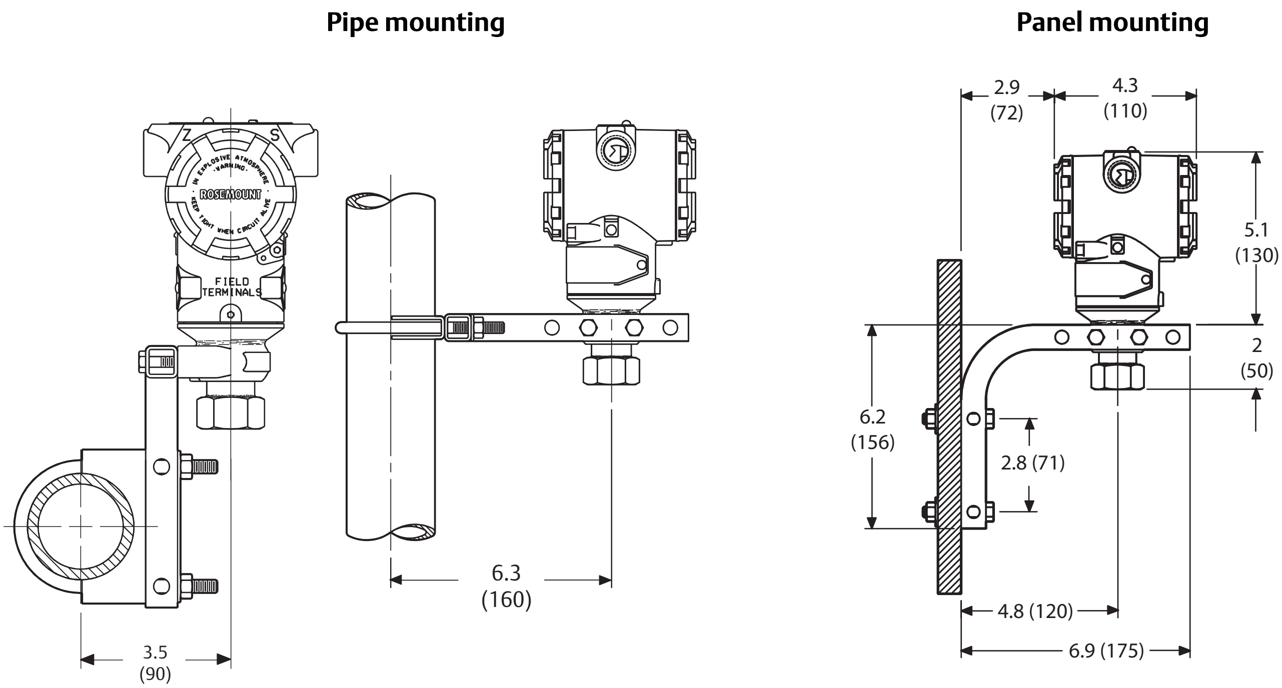
Dimensions are in inches (millimeters).

Figure A-9. Rosemount 3051T with Rosemount 306 Integral Manifold



Dimensions are in inches (millimeters).

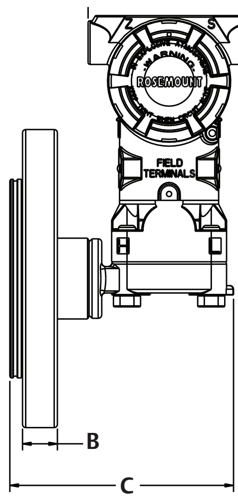
Figure A-10. Rosemount 3051T Typical Mounting Configurations with Optional Mounting Bracket



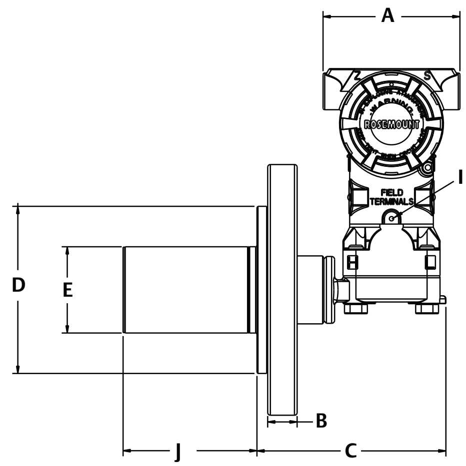
Dimensions are in inches (millimeters).

Figure A-11. Rosemount 3051L

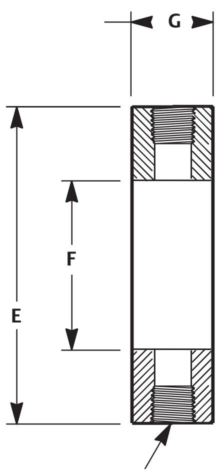
2-in. flange configuring (flush mount only)



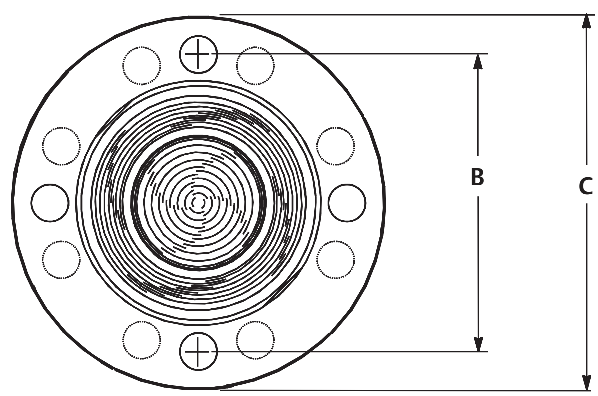
3- and 4-in. flange configuration



Optional flushing connection ring (lower housing)



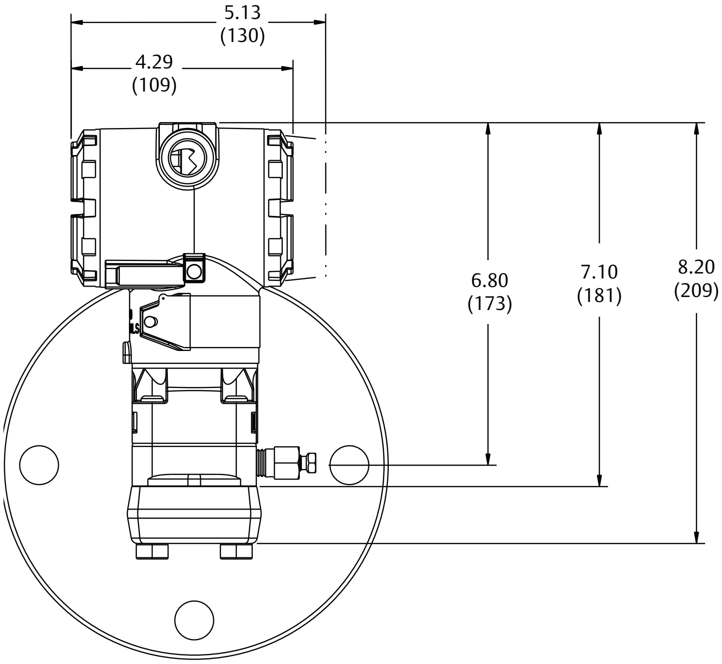
Diaphragm assembly and mounting flange



For A to H, refer to Table A-6.
I. Housing rotation set screw
Dimensions are in inches (millimeters).

J. Extension 2, 4, or 6 (51, 102, or 152)
K. Flushing connection

Figure A-12. Diaphragm Assembly and Mounting Flange



Dimensions are in inches (millimeters).

Table A-6. Rosemount 3051L Dimensional Specifications

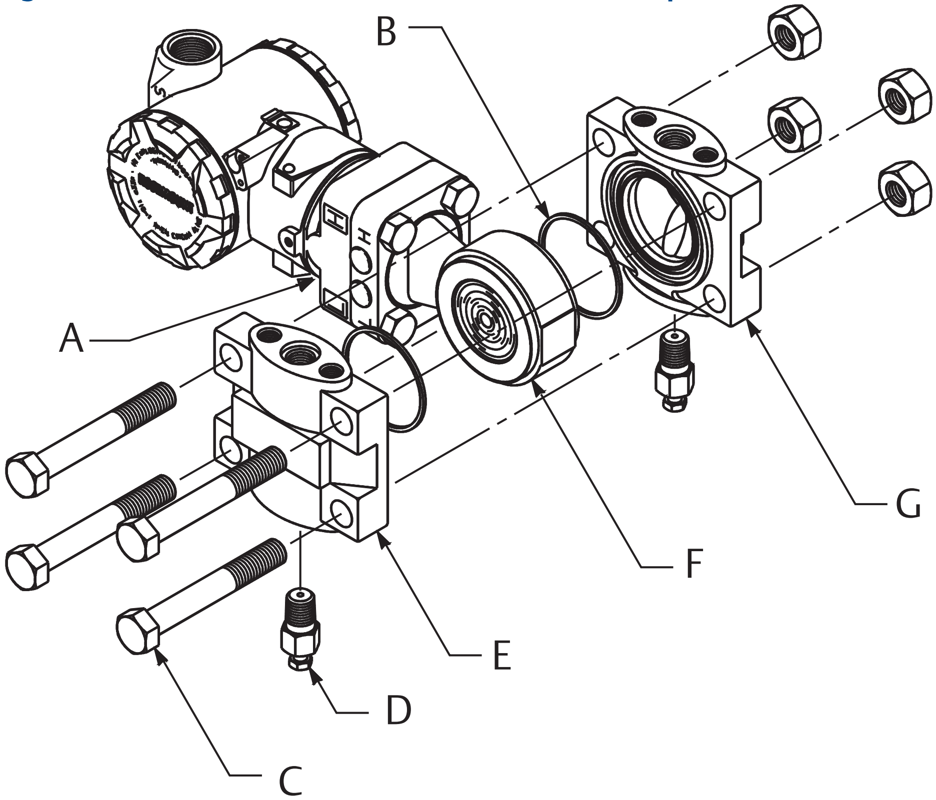
Class[(1)]	Pipe size	Flange thickness A	Bolt circle diameter B	Outside diameter C	No. of bolts	Bolt hole diameter	Extension diameter[(1)] D	O.D. gasket surface E
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	N/A	3.6 (92)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 600	2 (51)	1.00 (25)	5.0 (127)	6.5 (165)	8	0.75 (19)	N/A	3.6 (92)
	3 (76)	1.25 (32)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	NA	4.0 (102)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	66 mm	5.4 (138)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)
DIN 2501 PN 10/16	DN 100	20 mm	180 mm	220 mm	8	18 mm	89 mm	6.2 (158)

1. Tolerances are 0.040 (1,02), –0.020 (0,51).

Class(1)	Pipe size	Process side F	Lower housing G		H
			1/4 NPT	1/2 NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 600	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	7.65 (194)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	7.65 (194)
DIN 2501 PN 10–40	DN 50	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10/16	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

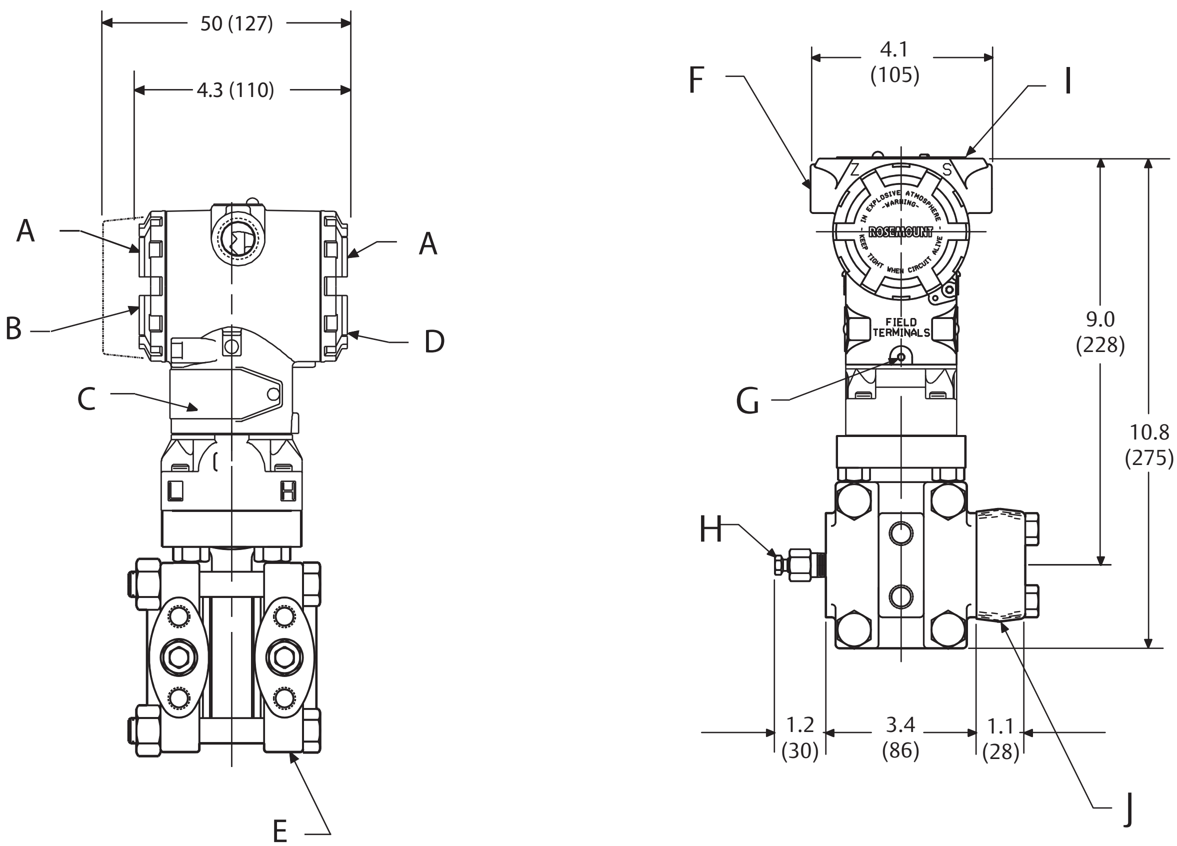
1. Tolerances are 0.040 (1,02), –0.020 (0,51).

Figure A-13. Rosemount 3051H Pressure Transmitter Exploded View



A. Sensor module
B. secondary filled system
C. Flange bolts
D. Drain/vent valve
E. Low side process flange
F. Process isolating diagram
G. High side process flange

Figure A-14. Rosemount 3051H Pressure Transmitter

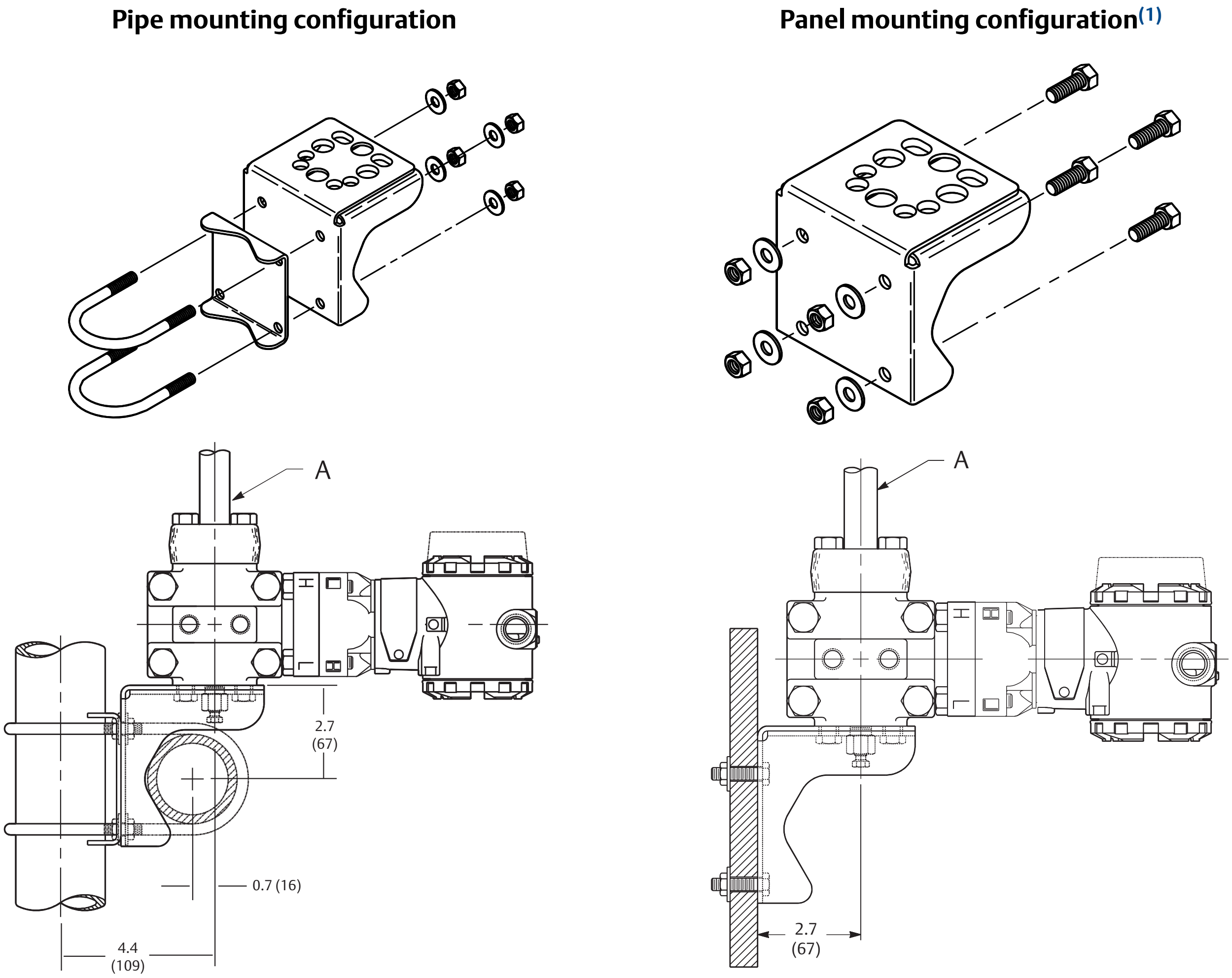


A. 0.75 (19) clearance for cover removal
B. Transmitter circuitry
C. Nameplate
D. Terminal connections
E. 1/2–18 NPT on process flange for pressure connection without the use of mounting adapters
F. 1/2–14 NPT conduit connection (two places, other sizes available)
G. Housing rotation set screw
H. Drain/vent valve
I. Certification label
J. 1/2–14 NPT on Optional Mounting Adapters[1]

Dimensions are in inches (millimeters).

1. Adapters can be rotated to give adapter connection centers of 2.00 (51), 2.126 (54), or 2.25 (57).

Figure A-15. Rosemount 3051H Mounting Brackets for 2-in. Pipe and Panel Mount (Option Code B5/B6)



A. Impulse piping
Dimension are in inches (millimeters).

1. $^{7}/16 - 20 \times {}^{3}/4$ bolts supplied for attaching bracket to transmitter.

A.5 Ordering information

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Transmitter type			
3051C	Coplanar pressure transmitter			
Measurement Type				
D	Differential			★
G	Gage			★
A	Absolute			
Pressure ranges (range/min. span)				
	Rosemount 3051CD	**Rosemount 3051CG**(1)	**Rosemount 3051CA**	
1	–25 to 25 inH_2O/0.5 inH_2O (–62,2 to 62,2 mbar/1,2 mbar)	–25 to 25 inH_2O/0.5 inH_2O (–62,1 to 62,2 mbar/1,2 mbar)	0 to 30 psia/0.3 psia (0 to 2,1 bar/20,7 mbar)	★
2	–250 to 250 inH2O/2.5 inH_2O (–623 to 623 mbar/6,2 mbar)	–250 to 250 inH_2O/2.5 inH_2O (–621 to 623 mbar/6,2 mbar)	0 to 150 psia/1.5 psia (0 to 10,3 bar/0,1 bar)	★
3	–1000 to 1000 inH_2O/10 inH_2O (–2,5 to 2,5 bar/25 mbar)	–393 to 1000 inH_2O/10 in H_2O (–0,98 to 2,5 bar/25 mbar)	0 to 800 psia/8 psia (0 to 55,2 bar/0o,55 bar)	★
4	–300 to 300 psi/3 psi (–20,7 to 20,7 bar/0,2 bar)	–14.2 to 300 psi/3 psi (–0,98 to 20,7 bar/0,2 bar)	0 to 4000 psia/40 psia (0 to 275,8 bar/2,8 bar)	★
5	–2000 to 2000 psi/20 psi (–137,9 to 137,9 bar/1,4 bar)	–14.2 to 2000 psig/20 psi (–0,98 to 137,9 bar/1,4 bar)	N/A	★
0(2)	–3 to 3 inH_2O/0.1 inH_2O (–7,5 to 7,5 mbar/0,25 mbar)	N/A	N/A	
Output				
A	4–20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W(3)	PROFIBUS PA Protocol			★
M(4)	Low-Power, 1–5 Vdc with Digital Signal Based on HART Protocol (See Option C2 for 0.8–3.2 V dc)			
Materials of construction				
	Process flange type	**Flange material**	**Drain/vent**	
2	Coplanar	SST	SST	★
3(5)	Coplanar	Cast C-276	Alloy C-276	★
4	Coplanar	Cast Alloy 400	Alloy 400/K-500	★
5	Coplanar	Plated CS	SST	★
7(5)	Coplanar	SST	Alloy C-276	★
8(5)	Coplanar	Plated CS	Alloy C-276	★
0	Alternate flange—see options on page 130			★

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Isolating diaphragm			
2(5)	316L SST		★
3(5)	Alloy C-276		★
4	Alloy 400		
5(6)	Tantalum ()		
6	Gold-plated Alloy 400 (Use in combination with O-ring Option Code B.)		
7	Gold-plated SST		
O-ring			
A	Glass-filled PTFE		★
B	Graphite-filled PTFE		★
Sensor fill fluid			
1	Silicone		★
2	Inert fill (differential and gage only)		★
	Housing material	**Conduit entry size**	
A	Polyurethane-covered aluminum	1/2–14 NPT	★
B	Polyurethane-covered aluminum	M20 × 1.5 (CM20)	★
J	SST	1/2–14 NPT	★
K	SST	M20 × 1.5 (CM20)	★
D	Polyurethane-covered aluminum	G1/2	
M	SST	G1/2	

Options (Include with selected model number)

Plantweb™ control functionality		
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	★
Plantweb diagnostic functionality		
D01	FOUNDATION Fieldbus Diagnostics Suite	★
Alternate Flange		
H2	Traditional flange, 316 SST, SST drain/vent	★
H3(5)	Traditional Flange, Alloy C, Alloy C-276 drain/vent	★
H4	Traditional Flange, Monel, Monel drain/vent	★
H7(5)	Traditional Flange, 316 SST, Alloy C-276 drain/vent	★
HJ	DIN Compliant Traditional Flange, SST, 1/16 in. adapter/manifold bolting	★
FA	Level Flange, SST, 2 in., ANSI Class 150, vertical mount	★
FB	Level Flange, SST, 2 in., ANSI Class 300, vertical mount	★

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

FC	Level Flange, SST, 3 in., ANSI Class 150, vertical mount	★
FD	Level Flange, SST, 3 in., ANSI Class 300, vertical mount	★
FP	DIN Level Flange, SST, DN 50, PN 40, vertical mount	★
FQ	DIN Level Flange, SST, DN 80, PN 40, vertical mount	★
HK	DIN Compliant Traditional Flange, SST, 10 mm adapter/manifold bolting	
HL(7)	DIN Compliant Traditional Flange, SST, 12 mm adapter/manifold bolting	
Integral assembly(8)		
S3	Assemble to Rosemount 405 Compact Orifice Plate	★
S5	Assemble to Rosemount 305 Integral Manifold (specified separately, see the Rosemount Manifolds Product Data Sheet)	★
S6	Assemble to Rosemount 304 Manifold or Connection System	★
Integral mount primary element(8) (9)		
S4	Assemble to Rosemount Annubar or Rosemount 1195 Integral Orifice ()	★
Seal assemblies(8)		
S1	Assemble to one Rosemount 1199 seal	★
S2	Assemble to two Rosemount 1199 seals	★
All-welded seal assemblies (for high vacuum applications)(8)		
S0	One seal, all-welded system (direct mount connection type)	★
S7	One seal, all-welded system (capillary connection type)	★
S8	Two seals, all-welded system (capillary connection type)	★
S9	Two seals, all-welded system (one direct mount and one capillary connection type)	★
Mounting bracket		
B1	Traditional flange bracket for 2-in. pipe mounting, CS bolts	★
B2	Traditional flange bracket for panel mounting, CS bolts	★
B3	Traditional flange flat bracket for 2-in. pipe mounting, CS bolts	★
B4	Coplanar flange bracket for 2-in. pipe or panel mounting, all SST	★
B7	B1 bracket with Series 300 SST bolts	★
B8	B2 bracket with Series 300 SST bolts	★
B9	B3 bracket with Series 300 SST bolts	★
BA	SST B1 bracket with Series 300 SST bolts	★
BC	SST B3 bracket with Series 300 SST bolts	★

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Product certifications		
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
E2	INMETRO Flameproof	★
E3	China Flameproof	★
E4(10)	TIIS Flame-proof	★
E5	FM Explosion-proof, Dust Ignition-Proof	★
E7(11)	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof and Dust	★
I1(11)	ATEX Intrinsic Safety and Dust	★
I2	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I4	TIIS Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I7(11)	IECEx Intrinsic Safety	★
IA	ATEX FISCO Intrinsic Safety; for FOUNDATION Fieldbus protocol only	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION ieldbus protocol only	★
K2	INMETRO Flameproof, Instrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	★
K6(11)	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
K7(11)	IECEx Flame-proof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8(11)	ATEX Flameproof, Intrinsic Safety, Type n, Dust (combination of E8, I1, and N1)	★
KB	FM and CSA Explosion-proof, Dust Ignition Proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD(10)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1(10)	ATEX Type n and Dust	★
N3	China Type n	★
N7(11)	IECEx Type n	★
Custody transfer(15)(12)		
C5	Measurement Canada accuracy approval	★
Bolting material		
L4	Austenitic 316 SST bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Display type		
M4[13]	LCD display with Local Operator Interface	★
M5	LCD display for aluminum housing (housing codes A, B, C, and D only)	★
M6	LCD display for SST housing (housing codes J, K, L, and M only)	★
Calibration certificate		
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration certification and tamper evident seal	★
Material Traceability Certification[14]		
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
QS	Certificate of FMEDA Data	★
Zero/span adjustment[15][16]		
J1	Local zero adjustment only	★
J3	No local zero or span adjustment	★
Transient protection terminal block		
T1	Transient protection terminal block	★
Software configuration[15]		
C1	Custom software configuration (Completed Rosemount 3051 Configuration Data Sheet required with order)	★
Low power output[15]		
C2	0.8–3.2 Vdc Output with Digital Signal Based on HART Protocol (Output Code M only)	
Gage pressure calibration		
C3	Gage Calibration (Rosemount 3051CA4 only)	★
Alarm limit[15][17]		
C4	Analog output levels compliant with NAMUR Recommendation NE 43, Alarm High	★
CN	Analog output levels compliant with NAMUR Recommendation NE 43, Alarm Low	★
Pressure testing		
P1	Hydrostatic testing with certificate	
Cleaning process area		
P2	Cleaning for special service	
P3	Cleaning for <1 PPM chlorine/fluorine	

Table A-7. Rosemount 3051C Coplanar Pressure Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Pressure calibration		
P4	Calibrate at Line Pressure (Specify Q48 on order for corresponding certificate)	
High accuracy		
P8	0.04% accuracy to 5:1 turndown (Range 2-4)	★
Flange adapters		
DF	1/2–14 NPT flange adapter(s)	★
Vent/drain valves		
D7	Coplanar flange without drain/vent ports	
Conduit plug		
DO	316 SST Conduit Plug	★
RC1/4 RC1/2 process connection		
D9	JIS Process Connection—RC 1/4 flange with RC 1/2 flange adapter	
Max static line pressure		
P9	4500 psig static pressure limit (Rosemount 3051CD Ranges 2–5 only)	★
Ground screw(10)		
V5	External ground screw assembly	★
Drinking water approval		
DW	NSF drinking water approval	★
Surface finish		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size mini, 4-pin, male connector (minifast®)	★
Typical model number: 3051CD 2 A 2 2 A 1 A B4		

1. Rosemount 3051CG lower range limit varies with atmospheric pressure.
2. Rosemount 3051CD0 is available only with Output Code A, Process Flange Code 0 (Alternate Flange H2, H7, HJ, or HK), Isolating Diaphragm Code 2, O-ring Code A, and Bolting Option L4.
3. Option code M4 - LCD display with Local Operator Interface required for local addressing and configuration.
4. Not available with hazardous locations certification Options Codes I1, N1, E4, K6, and K8.
5. Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
6. Available on Rosemount 3051CD and CG, Ranges 2–5 only. Not available on Rosemount 3051CA.
7. Not available on Rosemount 3051CD0
8. “Assemble-to” items are specified separately and require a completed model number.
9. With the primary element installed, the maximum operating pressure will equal the lesser of either the transmitter or the primary element. Option is available for factory assembly to range 1–4 transmitters only.

10. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
11. Not available with Low Power code M.
12. Limited availability depending on transmitter type and range. Contact an Emerson representative.
13. Available only with output code W - PROFIBUS PA.
14. Only available for the sensor module housing and Coplanar or traditional flanges and adapters (3051C), and for the sensor module housing and low-volume Coplanar flange and adapter (Rosemount 3051C with Option Code S1).
15. Not available with Fieldbus (output code F) or PROFIBUS (output code W).
16. Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
17. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

Table A-8. Rosemount 3051L Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Transmitter type		
3051T	Pressure transmitter		
Pressure type			
G	Gage		★
A	Absolute		★
Pressure upper range limit - configurable description			
	Rosemount 3051TG(1)	**Rosemount 3051TA**	
1	30 psi (2,1 bar)	30 psia (2,1 bar)	★
2	150 psi (10,3 bar)	150 psia (10,3 bar)	★
3	800 psi (55,2 bar)	800 psia (55,2 bar)	★
4	4000 psi (275,8 bar)	4000 psia (275,8 bar)	★
5	10000 psi (689,5 bar)	10000 psia (689,5 bar)	★
Transmitter output			
A	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION Fieldbus Protocol		★
W(2)	PROFIBUS PA Protocol		★
M	Low-Power 1–5 Vdc with Digital Signal Based on HART Protocol		
Process connection style			
2B	1/2–14 NPT Female		★
2C	G1/2 A DIN 16288 Male (Available in SST for Range 1–4 only)		★
2F	Coned and threaded, compatible with autoclave Type F-250-C (Includes gland and collar, available in SST for Range 5 only)		
61	Non-threaded Instrument flange (Range 1-4 only)		
	Isolating diaphragm	**Process connection wetted parts material**	
2(3)	316L SST	316L SST	★
3(3)	Alloy C-276	Alloy C-276	★
Sensor fill fluid			
1	Silicone		★
2	Inert (Fluorinert® FC-43)		★
	Housing material	**Conduit entry size**	
A	Polyurethane-covered Aluminum	1/2–14 NPT	★
B	Polyurethane-covered Aluminum	M20 × 1.5 (CM20)	★
J	SST	1/2–14 NPT	★
K	SST	M20 × 1.5 (CM20)	★

Table A-8. Rosemount 3051L Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

D	Polyurethane-covered Aluminum	G½	
M	SST	G½	

Options (Include with selected model number)

Plantweb control functionality		
A01	Advanced control function block suite	★
Plantweb diagnostic functionality		
D01	FOUNDATION Fieldbus Diagnostics Suite	★
Integral assembly(4)		
S5	Assemble to Rosemount 306 Integral Manifold	★
Seal assemblies(4)		
S1	Assemble to one Rosemount 1199 seal	★
Mounting bracket		
B4	Bracket for 2-in. pipe or panel mounting, all SST	★
Product certifications		
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
E2	INMETRO Flameproof	★
E3	China Flameproof	★
E4(5)	TIIS Flameproof	★
E5	FM Explosion-proof, Dust Ignition-proof	★
E7(5)	IECEx Flameproof, Dust Ignition-proof	★
E8	ATEX Flameproof and Dust	★
I1(5)	ATEX Intrinsic Safety and Dust	★
I2	INMETRO Intrinsic Safety	★
I3	China Intrinsic Safety	★
I5	FM Intrinsically Safe, Division 2	★
I7(5)	IECEx Intrinsic Safety	★
IA	ATEX Intrinsic Safety for FISCO; for FOUNDATION Fieldbus protocol only	★
IE	FM FISCO Intrinsically Safe; for FOUNDATION Fieldbus protocol only	★
K2	INMETRO Flameproof, Intrinsic Safety	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
K6(5)	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
K7(5)	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8(5)	ATEX Flame-proof, Intrinsic Safety, Type n, Dust (combination of E8, I1, and N1)	★

Table A-8. Rosemount 3051L Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
KD[5]	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
N1[5]	ATEX Type n Certification and Dust	★
N3	China Type n	★
N7[5]	IECEx Type n Certification	★
Custody transfer[6]		
C5	Measurement Canada Accuracy Approval	★
Calibration certification		
Q4	Calibration Certificate	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration Certification and tamper evident seal	★
Material Traceability Certification[7]		
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality Certification for Safety		
QS	Certificate of FMEDA Data	★
QT	Safety certified to IEC 61508 with Certificate of FMEDA data	★
Zero/span adjustment[8][9]		
J1	Local zero adjustment only	★
J3	No local zero or span adjustment	★
D1	Hardware adjustments (zero, span, alarm, security)	
Display type		
M4[10]	LCD display with Local Operator Interface	★
M5	LCD display	★
M6	LCD display for SST Housing (housing codes J, K, L and M only)	★
Conduit plug		
DO	316 SST Conduit Plug	★
Transient terminal block		
T1	Transient protection terminal block	★
Software configuration[8]		
C1	Custom Software Configuration (Completed Configuration Data Sheet required with order)	★
C2	0.8–3.2 Vdc output with digital signal based on HART Protocol (output code M only)	

Table A-8. Rosemount 3051L Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Alarm limit		
C4[9][11]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	★
CN[9][11]	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Low Alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★
Pressure testing		
P1	Hydrostatic Testing with Certificate	
Cleaning process area		
P2	Cleaning for special service	
P3	Cleaning for <1 PPM chlorine/fluorine	
High accuracy		
P8	0.04% accuracy to 5:1 turndown (Range 2–4)	★
Ground screw[12]		
V5	External ground screw assembly	★
Drinking water approval		
DW	NSF drinking water approval	★
Surface finish		
Q16	Surface finish certification for sanitary remote seals	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size Mini, 4-pin, male connector (minifast®)	★
Typical model number: 3051T G 5 F 2A 2 1 A B4		

1. Rosemount 3051TG lower range limit varies with atmospheric pressure.
2. Option code M4 - LCD Display with Local Operator Interface required for local addressing and configuration.
3. Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
4. "Assemble-to" items are specified separately and require a completed model number.
5. Not available with low-power Option Code M.
6. Limited availability depending on transmitter type and range. Contact an Emerson Representative.
7. This option applies to the process connection only.
8. Not available with fieldbus (output code F) or PROFIBUS protocols (output code W).
9. Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
10. Available only with output code W - PROFIBUS PA.
11. NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
12. The V5 option is not needed with T1 option; external ground screw assembly is included with the T1 option.

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Transmitter type			
3051L	Liquid level transmitter			
Pressure range				
2	−250 to 250 inH_2O (−0,6 to 0,6 bar)			★
3	−1000 to 1000 inH_2O (−2,5 to 2,5 bar)			★
4	−300 to 300 psi (−20,7 to 20,7 bar)			★
Transmitter output				
A	4–20 mA with Digital Signal Based on *HART* Protocol			★
F	FOUNDATION Fieldbus Protocol			★
W(1)	PROFIBUS PA Protocol			★
M(2)	Low-Power 1–5 Vdc with Digital Signal Based on HART Protocol (See option code C2 for 0.8–3.2 Vdc Output)			
Process Connection Size, Material, Extension length (High Side)				
Code	**Process connection size**	**Material**	**Extension length**	
G0(3)	2-in./DN 50	316L SST	Flush mount only	★
H0(3)	2-in./DN 50	Alloy C-276	Flush mount only	★
J0	2-in./DN 50	Tantalum	Flush mount only	★
A0(3)	3-in./DN 80	316L SST	Flush mount	★
A2(3)	3-in./DN 80	316L SST	2-in./50 mm	★
A4(3)	3-in./DN 80	316L SST	4-in./100 mm	★
A6(3)	3-in./DN 80	316L SST	6-in./150 mm	★
B0(3)	4-in./DN 100	316L SST	Flush mount	★
B2(3)	4-in./DN 100	316L SST	2-in./50 mm	★
B4(3)	4-in./DN 100	316L SST	4-in./100 mm	★
B6(3)	4-in./DN 100	316L SST	6-in./150 mm	★
C0(3)	3-in./DN 80	Alloy C-276	Flush mount	★
C2(3)	3-in./DN 80	Alloy C-276	2-in./50 mm	★
C4(3)	3-in./DN 80	Alloy C-276	4-in./100 mm	★
C6(3)	3-in./DN 80	Alloy C-276	6-in./150 mm	★
D0(3)	4-in./DN 100	Alloy C-276	Flush mount	★
D2(3)	4-in./DN 100	Alloy C-276	2-in./50 mm	★
D4(3)	4-in./DN 100	Alloy C-276	4-in./100 mm	★
D6(3)	4-in./DN 100	Alloy C-276	6-in./150 mm	★
E0	3-in./DN 80	Tantalum	Flush mount only	★
F0	4-in./DN 100	Tantalum	Flush mount only	★

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Mounting flange size, rating, material (high side)				
M	2-in.	ANSI/ASME B16.5 Class 150	CS	★
A	3-in.	ANSI/ASME B16.5 Class 150	CS	★
B	4-in.	ANSI/ASME B16.5 Class 150	CS	★
N	2-in.	ANSI/ASME B16.5 Class 300	CS	★
C	3-in.	ANSI/ASME B16.5 Class 300	CS	★
D	4-in.	ANSI/ASME B16.5 Class 300	CS	★
P	2-in.	ANSI/ASME B16.5 Class 600	CS	★
E	3-in.	ANSI/ASME B16.5 Class 600	CS	★
X(3)	2-in.	ANSI/ASME B16.5 Class 150	SST	★
F(3)	3-in.	ANSI/ASME B16.5 Class 150	SST	★
G(3)	4-in.	ANSI/ASME B16.5 Class 150	SST	★
Y(3)	2-in.	ANSI/ASME B16.5 Class 300	SST	★
H(3)	3-in.	ANSI/ASME B16.5 Class 300	SST	★
J(3)	4-in.	ANSI/ASME B16.5 Class 300	SST	★
Z(3)	2-in.	ANSI/ASME B16.5 Class 600	SST	★
L(3)	3-in.	ANSI/ASME B16.5 Class 600	SST	★
Q	DN 50	PN 10-40 per EN 1092-1	CS	★
R	DN 80	PN 40 per EN 1092-1	CS	★
S	DN 100	PN 40 per EN 1092-1	CS	★
V	DN 100	PN 10/16 per EN 1092-1	CS	★
K(3)	DN 50	PN 10-40 per EN 1092-1	SST	★
T(3)	DN 80	PN 40 per EN 1092-1	SST	★
U(3)	DN 100	PN 40 per EN 1092-1	SST	★
W(3)	DN 100	PN 10/16 per EN 1092-1	SST	★
7(3)	4 in.	ANSI/ASME B16.5 Class 600	SST	★
1	N/A	10K per JIS B2238	CS	
2	N/A	20K per JIS B2238	CS	
3	N/A	40K per JIS B2238	CS	
4(3)	N/A	10K per JIS B2238	316 SST	
5(3)	N/A	20K per JIS B2238	316 SST	
6(3)	N/A	40K per JIS B2238	316 SST	

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Code	Process fill-high pressure side	Specific gravity	Temperature limits (ambient temperature of 70 °F [21 °C])		
A	Syltherm XLT	0.85	–102 to 293 °F (-75 to 145 °C)		★
C	Silicone 704	1.07	32 to 401 °F (0 to 205 °C)		★
D	Silicone 200	0.93	–49 to 401 °F (–45 to 205 °C)		★
H	Inert (Halocarbon)	1.85	–49 to 320 °F (–45 to 160 °C)		★
G	Glycerine and Water	1.13	5 to 203 °F (-15 to 95 °C)		★
N	Neobee M-20	0.92	5 to 401 °F (-15 to 205 °C)		★
P	Propylene Glycol and Water	1.02	5 to 203 F (-15 to 95 °C)		★
Low Pressure Side (3)					
	Configuration	**Flange adapter**	**Diaphragm Material**	**Sensor Fill Fluid**	
11	Gage	SST	316L SST	Silicone	★
21	Differential	SST	316L SST	Silicone	★
22	Differential	SST	Alloy C-276	Silicone	★
2A	Differential	SST	316L SST	Inert (Halocarbon)	★
2B	Differential	SST	Alloy C-276	Inert (Halocarbon)	★
31	Tuned-system assembly with remote seal	None	316L SST	Silicone (requires option code S1)	★
O-ring					
A	Glass-filled PTFE				★
	Housing material	**Conduit entry size**			
A	Aluminum	1/2–14 NPT			★
B	Aluminum	M20 × 1.5			★
J	SST	1/2–14 NPT			★
K	SST	M20 × 1.5			★
D	Aluminum	G1/2			
M	SST	G1/2			

Options (Include with selected model number)

Plantweb control functionality		
A01	FOUNDATION Fieldbus advanced control function block suite	★

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Plantweb Diagnostic Functionality		
D01	FOUNDATION Fieldbus Diagnostics Suite	★
Seal assemblies(4)		
S1	Assembled to One Rosemount 1199 Seal (Requires 1199M)	★
Product certifications		
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe, Division 2	★
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
I1(5)	ATEX Intrinsic Safety and Dust	★
N1(5)	ATEX Type n Certification and Dust	★
E8	ATEX Flameproof and Dust	★
E4(5)	TIIS Flameproof	★
C6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2	★
K6(5)	CSA and ATEX Explosion-proof, Intrinsically Safe, and Division 2 (combination of C6 and K8)	★
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, and Division 2 (combination of K5 and C6)	★
K7(5)	IECEx Flameproof, Dust Ignition-proof, Intrinsic Safety, and Type n (combination of I7, N7, and E7)	★
K8(5)	ATEX Flame-proof and Intrinsic Safety Approvals (combination of I1 and E8)	★
KD(5)	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe (combination of K5, C6, I1, and E8)	★
I7(5)	IECEx Intrinsic Safety	★
E7(5)	IECEx Flameproof, Dust Ignition-proof	★
N7(5)	IECEx Type n Certification	★
IA	ATEX FISCO Intrinsic Safety	★
IE	FM FISCO Intrinsically Safe	★
E2	INMETRO Flameproof	★
I2	INMETRO Intrinsic Safety	★
K2	INMETRO Flameproof, Intrinsic Safety	★
E3	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Type n	★
Bolting material		
L4	Austenitic 316 SST bolts	★
L5	ASTM A 193, Grade B7M bolts	★
L6	Alloy K-500 bolts	★
L8	ASTM A 193 Class 2, Grade B8M bolts	★

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Display type		
M4(6)	LCD display with Local Operator Interface	★
M5	LCD display for aluminum housing (housing codes A, B, C, and D only)	★
M6	LCD display for SST housing (housing codes J, K, L, and M only)	★
Calibration certification		
Q4	Calibration Certificate	★
QP	Calibration Certificate and tamper evident seal	★
QG	Calibration Certificate and GOST Verification Certificate	★
Material traceability certification		
Q8	Material Traceability Certification per EN 10204 3.1	★
Quality certification for safety(7)		
QS	Prior-use certificate of FMEDA data	★
Toolkit total system performance reports		
QZ	Remote seal system performance calculation report	★
Conduit electrical connector		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size mini, 4-pin, male connector (minifast®)	★
Hardware adjustments(8)(9)		
J1	Local zero adjustment only	★
J3	No local zero or span adjustment	★
Transient protection(10)		
T1	Transient protection terminal block	★
Software configuration(8)		
C1	Custom Software Configuration (Completednt Rosemount 3051 Configuration Data Sheet required with order)	★
Low power output(8)		
C2	0.8–3.2 Vdc Output with digital signal based on HART Protocol (Available with Output code M only)	★
Alarm limit		
C4(8)(12)	NAMUR alarm and saturation levels, high alarm	★
CN(8)(12)	NAMUR alarm and saturation levels, low alarm	★
CR	Custom alarm and saturation signal levels, high alarm	★
CS	Custom alarm and saturation signal levels, low alarm	★
CT	Low alarm (standard Rosemount alarm and saturation levels)	★

Table A-9. Rosemount 3051L Liquid Level Transmitter Ordering Information

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Conduit plug				
D0	316 SST Conduit Plug			★
Ground screw[11]				
V5	External ground screw assembly			★
Lower housing flushing connection options				
	Ring material	**Number**	**Size (NPT)**	
F1	316 SST	1	$^1/_4$–18 NPT	★
F2	316 SST	2	$^1/_4$–18 NPT	★
F3	Alloy C-276	1	$^1/_4$–18 NPT	★
F4	Alloy C-276	2	$^1/_4$–18 NPT	★
F7	316 SST	1	$^1/_2$–14 NPT	★
F8	316 SST	2	$^1/_2$–14 NPT	★
F9	Alloy C-276	1	$^1/_2$–14 NPT	★
F0	Alloy C-276	2	$^1/_2$–14 NPT	★
Typical model number: 3051L 2 A A0 D 21 A A F1				

1. Option code M4 - LCD display with Local Operator Interface required for local addressing and configuration.
2. Not available with hazardous certification Option Codes I1, N1, E4, K6, and K8.
3. Materials of Construction comply with metallurgical requirements highlighted within NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
4. “Assemble-to” items are specified separately and require a completed model number.
5. Not available with low-power Option Code M
6. Available only with output code W - PROFIBUS PA.
7. Only available with HART 4–20 mA output (output code A).
8. Not available with Fieldbus (output code F) or PROFIBUS protocols (output code W).
9. Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
10. The T1 option is not needed with FISCO Product Certifications; transient protection is included in the FISCO product certification codes IA, IE, IF, and IG.
11. The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

A.6 Options

Standard configuration

Unless otherwise specified, transmitter is shipped as follows:

Differential/gage: Absolute/ Rosemount 3051T:	inH_2O (Range 0, 1, 2, and 3) psi (Range 4 and 5) psi (all ranges)
4 mA (1 Vdc)[(1)]:	0 (engineering units above)
20 mA (5 Vdc):	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Integral meter:	Installed or none
Alarm[(1)]:	Upscale
Software tag:	N/A

1. Not applicable to Fieldbus.

Custom configuration HART protocol only[(1)]

If option code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

- Output information
- Transmitter information
- LCD display configuration
- Hardware selectable information
- Signal selection

Refer to the HART Protocol C1 Option Configuration Data Sheet.

Tagging (3 options available)

- Standard SST hardware tag is wired to the transmitter. Tag character height is 0.125-in. (3,18 mm), 56 characters maximum.
- Tag may be permanently stamped on transmitter nameplate upon request, 56 characters maximum.
- Tag may be stored in transmitter memory (30 characters maximum). Software tag is left blank unless specified.

Commissioning tag (fieldbus only)

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Optional Rosemount 304, 305, or 306 Integral Manifolds

Factory assembled to Rosemount 3051C and 3051T transmitters. Refer to Rosemount Manifolds Product Data Sheet. for additional information.

Optional diaphragm and sanitary seals

Refer to Rosemount DP Level Transmitters and 1199 Seal System Product Data Sheet for additional information.

Output Information[(1)]

Output range points must be the same unit of measure. Available units of measure include:

inH_2O	inH_2O@4 °C[(1)]	psi	Pa
inHg	ftH_2O	bar	kPa
mmH_2O	mmH_2O@4 °C[(1)]	mbar	torr
mmHg	g/cm^2	kg/cm^2	atm

1. Not available on low power or previous versions.

LCD display

M5 Digital Display, 5-Digit, 2-Line LCD

- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90 degree rotation capability for easy viewing

1. Not applicable to Fieldbus.

M6 Digital display with 316 stainless steel cover

- For use with stainless steel housing option (housing codes J, K, and L)

Local span and zero adjustment(1)

Transmitters ship with local span and zero adjustments standard unless otherwise specified.

- Non-interactive external zero and span adjustments ease calibration
- Magnetic switches replace standard potentiometer adjustments to optimize performance

J1 Local zero adjustment only

J3 No local zero or span adjustment

Bolts for flanges and adapters

- Options permit bolts for flanges and adapters to be obtained in various materials
- Standard material is plated carbon steel per ASTM A449, Type 1

L4 Austenitic 316 stainless steel bolts

L5 ASTM A 193, Grade B7M bolts

L6 Alloy K-500 bolts

Rosemount 3051C Coplanar Flange and Rosemount 3051T bracket option

B4 Bracket for 2-in. pipe or panel mounting

- For use with the standard Coplanar flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

Rosemount 3051H bracket options

B5 Bracket for 2-in. pipe or panel mounting

- For use with the Rosemount 3051H Transmitter for high process temperatures
- Carbon steel construction with carbon steel bolts

B6 B5 Bracket with SST bolts

- Same bracket as the B5 option with Series 300 stainless steel bolts.

Traditional flange bracket options

B1 Bracket for 2-in. pipe mounting

- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for panel mounting

- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat Bracket for 2-in. Pipe Mounting

- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 bracket with SST bolts

- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 bracket with SST bolts

- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 bracket with SST bolts

- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless steel B1 bracket with SST bolts

- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless steel B3 bracket with SST bolts

- B3 bracket in stainless steel with Series 300 stainless steel bolts

Shipping weights

Table A-10. Transmitter Weights without Options

Transmitter	Add weight In lb (kg)
Rosemount 3051C	6.0 (2,7)
Rosemount 3051L	Table A-11
Rosemount 3051H	13.6 (6,2)
Rosemount 3051T	3.0 (1,4)

Table A-11. Rosemount 3051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., Class 150	12.5 (5,7)	N/A	N/A	N/A
3-in., Class 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., Class 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., Class 300	17.5 (7,9)	N/A	N/A	N/A
3-in., Class 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., Class 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
2-in., Class 600	15.3 (6,9)	N/A	N/A	N/A
3-in., Class 600	25.2 (11,4)	27.2 (12,3)	28.2 (12,8)	29.2 (13,2)
DN 50/PN 40	13.8 (6,2)	N/A	N/A	N/A
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table A-12. Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless steel housing (T)	3.9 (1,8)
J, K, L, M	Stainless steel housing (C, L, H, P)	3.1 (1,4)
M5	LCD display for Aluminum Housing	0.5 (0,2)
M6	LCD display for SST Housing	1.25 (0,6)
B4	SST mounting bracket for coplanar flange	1.0 (0,5)
B1, B2, B3	Mounting bracket for traditional flange	2.3 (1,0)
B7, B8, B9	Mounting bracket for traditional flange	2.3 (1,0)
BA, BC	SST bracket for traditional flange	2.3 (1,0)
B5, B6	Mounting bracket for 3051H	2.9 (1,3)
H2	Traditional flange	2.4 (1,1)
H3	Traditional flange	2.7 (1,2)
H4	Traditional flange	2.6 (1,2)
H7	Traditional flange	2.5 (1,1)
FC	Level Flange—3 in., Class 150	10.8 (4,9)

Table A-12. Transmitter Options Weights

Code	Option	Add lb (kg)
FD	Level Flange—3 in., Class 300	14.3 (6,5)
FA	Level Flange—2 in., Class 150	10.7 (4,8)
FB	Level Flange—2 in., Class 300	14.0 (6,3)
FP	DIN Level Flange, SST, DN 50, PN 40	8.3 (3,8)
FQ	DIN Level Flange, SST, DN 80, PN 40	13.7 (6,2)

Table A-13. Rosemount 3051C Differential/Gage Pressure Transmitter Range Limits[1]

Units	Range 1 span		Range 2 span		Range 3 span		Range 4 span		Range 5 span	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
inH_2O	0.5	25	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.03678	1.8389	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.04167	2.08333	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	12.7	635.5	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.01806	0.903	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00125	0.06227	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	1.2454	62.2723	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	1.26775	63.3875	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00127	0.0635	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	124.545	6227.23	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.12545	6.2272	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00123	0.06146	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092

1. When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.

Table A-14. Rosemount 3051L/3051H Pressure Transmitter Range Limits(1)

	Range 2 span		Range 3 span		Range 4 span		Range 5 span	
Units	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
inH_2O	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092

1. When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.

Table A-15. Rosemount 3051T Gage and Absolute Pressure Transmitter Range Limits (Range 1 and 2)(1)

Units	Range 1 span		Range 2 span	
	Min	**Max**	**Min**	**Max**
inH_2O	8.30397	831.889	41.5198	4159.45
inHg	0.61081	61.0807	3.05403	305.403
ftH_2O	0.69199	69.3241	3.45998	345.998
mmH_2O	211.10	21130	1054.60	105460.3
mmHg	15.5145	1551.45	77.5723	7757.23
psi	0.3	30	1.5	150
bar	0.02068	2.06843	0.10342	10.3421
mbar	20.6843	2068.43	103.421	10342.11
g/cm^2	21.0921	2109.21	105.461	10546.1
kg/cm^2	0.02109	2.10921	0.10546	10.5461
Pa	2068.43	206843	10342.1	1034212
kPa	2.06843	206.843	10.3421	1034.21
torr	15.5145	1551.45	77.5726	7757.26
atm	0.02041	2.04138	0.10207	10.2069

1. When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.

Table A-16. Rosemount 3051T Gage and Absolute Pressure Transmitter Range Limits (Range 3, 4 and 5)(1)

Units	Range 3 span		Range 4 span		Range 5 span	
	Min	Max	Min	Max	Min	Max
inH_2O	221.439	22143.9	1107.2	110720	55360	276799
inHg	16.2882	1628.82	81.441	8144.098	4072.04	20360.2
ftH_2O	18.4533	1845.33	92.2663	9226.63	4613.31	23066.6
mmH_2O	5634.66	563466	28146.1	2814613	1407301	7036507
mmHg	413.72	41372	2068.6	206860.0	103430	517151
psi	8	800	40	4000	2000	10000
bar	0.55158	55.1581	2.75791	275.7905	137.895	689.476
mbar	551.581	55158.1	2757.91	275790.5	137895	689476
g/cm^2	561.459	56145.9	2807.31	280730.6	140614	703067
kg/cm^2	0.56246	56.2456	2.81228	281.228	140.614	701.82
Pa	55158.1	5515811	275791	27579054	13789500	68947600
kPa	55.1581	5515.81	275.791	27579.05	13789.5	68947.6
torr	413.721	413721	2068.6	206859.7	103430	517151
atm	0.54437	54.4368	2.72184	272.1841	136.092	680.46

1. When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.

Table A-17. Rosemount 3051C Absolute Pressure Transmitter Range Limits(1)

	Range 1 span		Range 2 span		Range 3 span		Range 4 span	
Units	Min	Max	Min	Max	Min	Max	Min	Max
inH_2O	8.30397	831.889	41.5198	4151.98	221.439	22143.9	1107.2	110720
inHg	0.61081	61.0807	3.05403	305.403	16.2882	1628.82	81.441	8144.098
ftH_2O	0.69199	69.3241	3.45998	345.998	18.4533	1845.33	92.2663	9226.63
mmH_2O	211.10	21130	6.35308	635.308	5634.66	563466	28146.1	2814613
mmHg	15.5145	1551.45	1055.47	105547	413.72	41372	2068.6	206860.0
psi	0.3	30	1.5	150	8	800	40	4000
bar	0.02068	2.06843	0.10342	10.342	0.55158	55.1581	2.75791	275.7905
mbar	20.6843	2068.43	103.421	10342.1	551.581	55158.1	2757.91	275790.5
g/cm^2	21.0921	2109.21	105.27	105.27	561.459	56145.9	2807.31	280730.6
kg/cm^2	0.02109	2.10921	0.10546	10.546	0.56246	56.2456	2.81228	281.228
Pa	2068.43	206843	10342.1	1034210	55158.1	5515811	275791	27579054
kPa	2.06843	206.843	10.3421	1034.21	55.1581	5515.81	275.791	27579.05
torr	15.5145	1551.45	77.5726	7757.26	413.721	413721	2068.6	206859.7
atm	0.02041	2.04138	0.10207	10.207	0.54437	54.4368	2.72184	272.1841

1. When using a Field Communicator, ±5% adjustment is allowed on the sensor limit to allow for unit conversions.

A.7 Spare parts

Rosemount 3051C Gage and Differential Sensor Modules (minimum span/range)		Silicone fill Part number	Inert fill Part number
Note: One spare part is recommended for every 50 transmitters. Note: Listed by Range and Process Isolator Order Numbers.			
	Gage pressure range	**Differential pressure range**	
Range 1	**–25 to 25 inH_2O/0.5 inH_2O**	**–25 to 25 inH_2O/0.5 inH_2O**	
316L SST		03031-1045-0012	03031-1145-0012
Alloy C-276		03031-1045-0013	03031-1145-0013
Alloy 400		03031-1045-0014	03031-1145-0014
Gold-plated Alloy 400		03031-1045-0016	03031-1145-0016
Gold-plated 316 SST		03031-1045-0017	03031-1145-0017
Range 2	**–250 to 250 inH_2O/2.5 inH_2O**	**–250 to 250 inH_2O/2.5 inH_2O**	
316L SST		03031-1045-0022	03031-1145-0022
Alloy C-276		03031-1045-0023	03031-1145-0023
Alloy 400		03031-1045-0024	03031-1145-0024
Tantalum		03031-1045-0025	03031-1145-0025
Gold-plated Alloy 400		03031-1045-0026	03031-1145-0026
Gold-plated 316 SST		03031-1045-0027	03031-1145-0027
Range 3	**–407 to 1000 inH_2O/10 inH_2O**	**–1000 to 1000 inH_2O/10 inH_2O**	
316L SST		03031-1045-0032	03031-1145-0032
Alloy C-276		03031-1045-0033	03031-1145-0033
Alloy 400		03031-1045-0034	03031-1145-0034
Tantalum		03031-1045-0035	03031-1145-0035
Gold-plated Alloy 400		03031-1045-0036	03031-1145-0036
Gold-plated 316 SST		03031-1045-0037	03031-1145-0037
Range 4	**–14.2 to 300 psi/3 psi**	**–300 to 300 psi/3 psi**	
316L SST		03031-1045-2042	03031-1145-2042
Alloy C-276		03031-1045-2043	03031-1145-2043
Alloy 400		03031-1045-2044	03031-1145-2044
Tantalum		03031-1045-2045	03031-1145-2045
Gold-plated Alloy 400		03031-1045-2046	03031-1145-2046
Gold-plated 316 SST		03031-1045-2047	03031-1145-2047

Range 5	**–14.2 to 2000 psi/20 psi**	**-2000 to 2000psi/20 psi**	
316L SST		03031-1045-2052	03031-1145-2052
Alloy C-276		03031-1045-2053	03031-1145-2053
Alloy 400		03031-1045-2054	03031-1145-2054
Tantalum		03031-1045-2055	03031-1145-2055
Gold-plated Alloy 400		03031-1045-2056	03031-1145-2056
Gold-plated 316 SST		03031-1045-2057	03031-1145-2057

Rosemount 3051C absolute sensor modules (minimum span/range)	**Silicone fill**
	Part number
Range 1, 0 to 30 psia/0.3 psia	
316L SST	03031-2020-0012
Alloy C-276	03031-2020-0013
Alloy 400	03031-2020-0014
Gold-plated Alloy 400	03031-2020-0016
Gold-plated 316 SST	03031-2020-0017
Range 2, 0 to 150/1.5 psia	
316L SST	03031-2020-0022
Alloy C-276	03031-2020-0023
Alloy 400	03031-2020-0024
Gold-plated Alloy 400	03031-2020-0026
Gold-plated 316 SST	03031-2020-0027
Range 3, 0 to 800 psia/8 psia	
316L SST	03031-2020-0032
Alloy C-276	03031-2020-0033
Alloy 400	03031-2020-0034
Gold-plated Alloy 400	03031-2020-0036
Gold-plated 316 SST	03031-2020-0037
Range 4, 0 to 400 psia/40 psia	
316L SST	03031-2020-0042
Alloy C-276	03031-2020-0043
Alloy 400	03031-2020-0044
Gold-plated Alloy 400	03031-2020-0046
Gold-plated 316 SST	03031-2020-0047

Electronics board assemblies	Part number
4–20 mA HART Standard	03031-0001-0002
4–20 mA HART NAMUR compliant	03031-0001-0003
1–5 Vdc HART Low Power	03031-0001-1001
FOUNDATION Fieldbus	03031-0001-2001
PROFIBUS PA	03031-0001-2101
LCD display	
LCD display kits	
4–20 mA HART - Aluminum	03031-0193-0101
4–20 mA HART - 316 SST	03031-0193-0111
1–5 Vdc HART Low Power - Aluminum	03031-0193-0001
1–5 Vdc HART Low Power - 316 SST	03031-0193-0011
Fieldbus (FOUNDATION or PROFIBUS PA) - Aluminum	03031-0193-0104
Fieldbus (FOUNDATION or PROFIBUS PA) - 316 SST	03031-0193-0112
LCD display only	
4–20 mA HART	03031-0193-0103
1–5 Vdc HART Low Power	03031-0193-0003
Fieldbus (FOUNDATION or PROFIBUS PA)	03031-0193-0105
Terminal block assemblies	
4–20 mA HART output	
Standard terminal block	03031-0332-0003
Transient terminal block (option T1)	03031-0332-0004
1–5 Vdc HART low power output	
Standard terminal block	03031-0332-1001
Transient terminal block (option T1)	03031-0332-1002
Fieldbus (FOUNDATION or PROFIBUS PA)	
Standard terminal block	03031-0332-2001
Transient terminal block (option T1)	03031-0332-2002
FISCO terminal block	03031-0332-2005
Electrical housings (without terminal block)	
Standard - Aluminum	
1/2 - 14 NPT conduit entry	03031-0635-0001
M20 conduit entry	03031-0635-0002
G1/2 conduit entry	03031-0635-0004

Standard - 316 SST	
1/2–14 NPT conduit entry	03031-0635-0041
M20 conduit entry	03031-0635-0042
1–5 Vdc HART low power - aluminum	
1/2–14 NPT conduit entryver	03031-0635-0101
1–5 Vdc HART low power - 316 SST	
1/2–14 NPT conduit entry	03031-0635-0141
Housing conduit plugs	**Part number**
1/2 NPT Conduit plug	03031-0544-0003
M20 Conduit plug	03031-0544-0001
G1/2 Conduit plug	03031-0544-0004
Housing covers (include o-ring)	
Field terminal cover - Aluminum	03031-0292-0001
Field terminal cover - 316 SST	03031-0292-0002
HART electronics cover - Aluminum	03031-0292-0001
HART electronics cover - 316 SST	03031-0292-0002
HART LCD display cover - Aluminum	03031-0193-0002
HART LCD display cover - 316 SST	03031-0193-0012
Fieldbus extended electronics cover - Aluminum	03031-0292-0003
Fieldbus extended electronics cover - 316 SST	03031-0292-0004
Fieldbus extended LCD Display cover - Aluminum	03031-0193-0007
Fieldbus extended LCD Display cover - 316 SST	03031-0193-0013
Miscellaneous hardware	
Local zero and span kit	03031-0293-0002
External ground screw assembly (option V5)	03031-0398-0001
Flanges	
Differential Coplanar Flange	
316 SST	03031-0388-0022
Cast C-276	03031-0388-0023
Cast Alloy 400	03031-0388-0024
Nickel-plated carbon steel	03031-0388-0025
Gage/Absolute Coplanar Flange	
316 SST	03031-0388-1022
Cast C-276	03031-0388-1023
Cast Alloy 40	03031-0388-1024
Nickel-plated carbon steel	03031-0388-1025
Coplanar flange alignment screw (package of 12)	03031-0309-0001

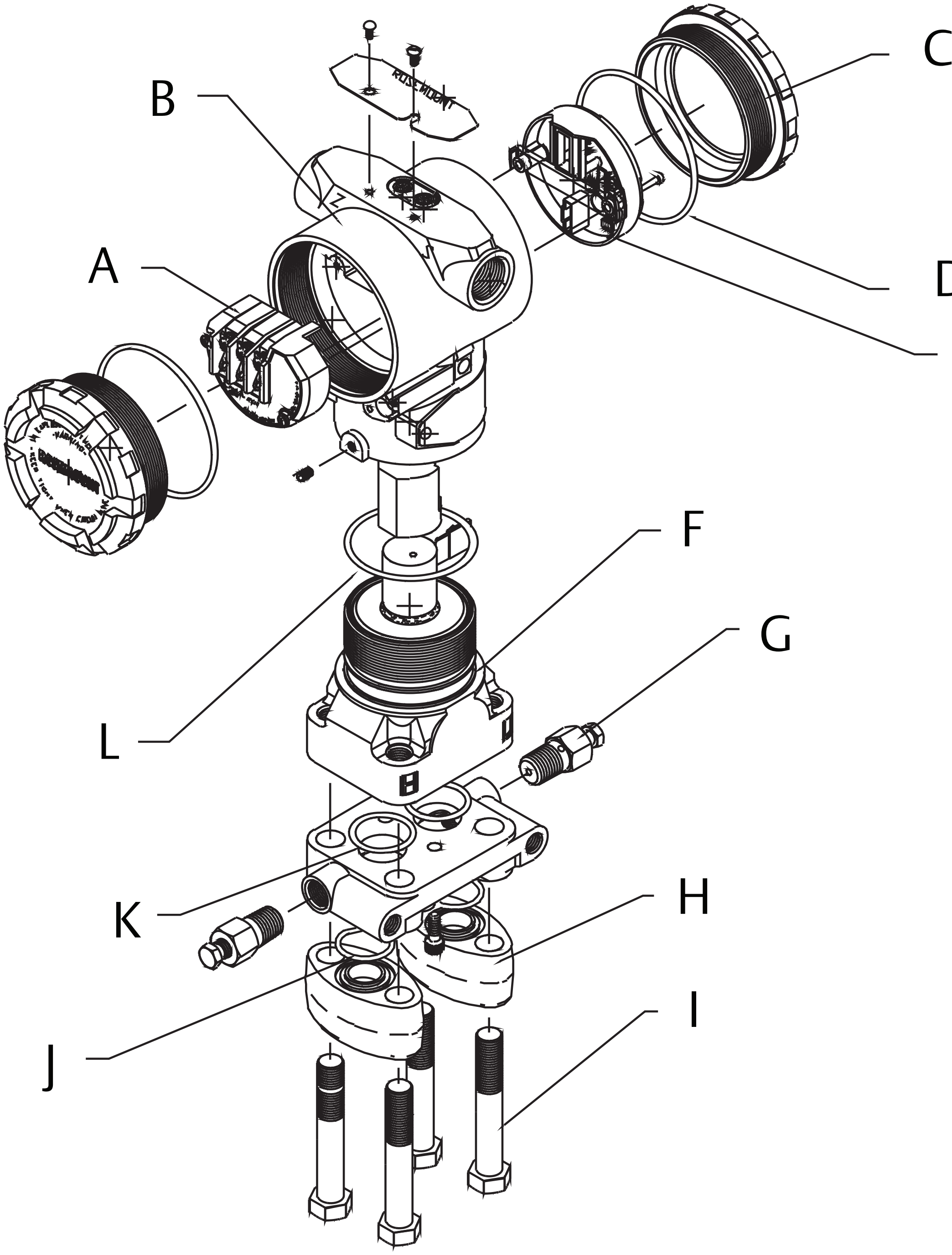
Traditional Flange	
316 SST	03031-0320-0002
Cast C-276	03031-0320-0003
Cast Alloy 400	03031-0320-0004
316 SST - DIN Compliant (option code HJ)	03031-1350-0012
Level Flange, Vertical Mount	
2-in., Class 150, SST	03031-0393-0221
2-in., Class 300, SST	03031-0393-0222
3-in., Class 150, SST	03031-0393-0231
3-in., Class 300, SST	03031-0393-0232
DIN, DN 50, PN 40	03031-0393-1002
DIN, DN 80, PN 40	03031-0393-1012
Flange adapter kits (each kit contains parts for one DP transmitter or two GP/AP transmitters)	**Part number**
CS bolts, glass-filled PTFE O-Rings	
SST adapters	03031-1300-0002
Cast Alloy C-276 adapters	03031-1300-0003
Alloy 400 adapters	03031-1300-0004
Nickel-plated carbon steel adapters	03031-1300-0005
SST bolts, glass-filled PTFE O-Rings	
SST adapters	03031-1300-0012
Cast Alloy C-276 adapters	03031-1300-0013
Alloy 400 adapters	03031-1300-0014
Nickel-plated carbon steel adapters	03031-1300-0015
CS bolts, graphite-filled PTFE O-Rings	
SST adapters	03031-1300-0102
Cast Alloy C-276 adapters	03031-1300-0103
Alloy 400 adapters	03031-1300-0104
Nickel-plated carbon steel adapters	03031-1300-0105
SST bolts, graphite-filled PTFE O-Rings	
SST adapters	03031-1300-0112
Cast Alloy C-276 adapters	03031-1300-0113
Alloy 400 adapters	03031-1300-0114
Nickel-plated carbon steel adapters	03031-1300-0115
Flange adapters	
$^1/_2$–14 NPT adapters	
316 SST	02024-0069-0002
Cast C-276	02024-0069-0003

Cast Alloy 400	02024-0069-0004
Nickel-plated carbon steel	02024-0069-0005
Socket weld adapters	
316 SST	02024-0069-1002
Cast C-276	02024-0069-1003
Cast Alloy 400	02024-0069-1004
O-ring packages (package of 12)	**Part number**
Electronics housing, cover	03031-0232-0001
Electronics housing, module	03031-0233-0001
Process flange, glass-filled PTFE (White)	03031-0234-0001
Process flange, graphite-filled PTFE (Black)	03031-0234-0002
Process flange for Rosemount 3051H, PTFE (White)	02051-0167-0001
Flange adapter, glass-filled PTFE (Light Brown)	03031-0242-0001
Flange adapter, graphite-filled PTFE (Black)	03031-0242-0002
Bolt kits	
Coplanar flange	
Flange bolt kit (44 mm [1.75-in.]) (set of 4)	
Carbon steel	03031-0312-0001
316 SST	03031-0312-0002
ASTM A 193, Grade B7M	03031-0312-0003
Alloy K-500	03031-0312-0004
Flange/adapter bolt kit (73 mm [2.88 in.]) (set of 4)	
Carbon steel	03031-0306-0001
316 SST	03031-0306-0002
ASTM A 193, Grade B7M	03031-0306-0003
Alloy K-500	03031-0306-0004
Traditional flange	
Differential flange/adapter bolt kit (44 mm [1.75 in.]) (set of 8)	
Carbon steel	03031-0307-0001
316 SST	03031-0307-0002
ASTM A 193, Grade B7M	03031-0307-0003
Alloy K-500	03031-0307-0004
Gage/absolute flange/adapter bolt kit (44 mm [1.75 in.]) (set of 6)	
Carbon steel	03031-0307-1001
316 SST	03031-0307-1002
ASTM A 193, Grade B7M	03031-0307-1003
Alloy K-500	03031-0307-1004

Conventional manifold/traditional flange bolts	
Carbon steel	Use bolts supplied with manifold
316 SST	Use bolts supplied with manifold
Level Flange, Vertical Mount Bolt Kit (Set of 4)	
Carbon steel	03031-0395-0001
316 SST	03031-0395-0002
Rosemount 3051H process flange bolt kit (Set of 4)	
Carbon steel	02051-0164-0001
316 SST	02051-0164-0002
Drain/vent valve kits (each kit contains parts for one transmitter)	**Part number**
Differential drain/vent kits	
316 SST stem and seat kit	01151-0028-0022
Alloy C-276 stem and seat kit	01151-0028-0023
Alloy K-500 stem and Alloy 400 seat kit	01151-0028-0024
316 SST ceramic ball drain/vent kit	03031-0378-0022
Alloy C-276 ceramic ball drain/vent kit	03031-0378-0023
Alloy 400/K-500 ceramic ball drain/vent kit	03031-0378-0024
Gage/absolute drain/vent kits	
316 SST stem and seat kit	01151-0028-0012
Alloy C-276 stem and seat kit	01151-0028-0013
Alloy K-500 stem and Alloy 400 seat kit	01151-0028-0014
316 SST ceramic ball drain/vent kit	03031-0378-0012
Alloy C-276 ceramic ball drain/vent kit	03031-0378-0013
Alloy 400/K-500 ceramic ball drain/vent kit	03031-0378-0014
Mounting brackets	
Rosemount 3051C and 3051L Coplanar flange bracket kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0003
Rosemount 3051T Inline bracket kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0004
Rosemount 3051C traditional flange bracket kits	
B1 bracket, 2-in. pipe mount, CS bolts	03031-0313-0001
B2 bracket, panel mount, CS bolts	03031-0313-0002
B3 flat bracket, 2-in. pipe mount, CS bolts	03031-0313-0003
B7 (B1 bracket, SST bolts)	03031-0313-0007
B8 (B2 bracket, SST bolts)	03031-0313-0008
B9 (B3 bracket, SST bolts)	03031-0313-0009
BA (SST B1 bracket, SST bolts)	03031-0313-0011
BC (SST B3 bracket, SST bolts)	03031-0313-0013

Rosemount 3051H bracket kits	
B5 universal bracket, 2-in. pipe and panel mount, CS bolts	03051-1081-0001
B6 universal bracket, 2-in. pipe and panel mount, SST bolts	03051-1081-0002
FOUNDATION Fieldbus upgrade kit	
Aluminum Housing	03031-0198-0001
316 SST Housing	03031-0198-0002

Figure A-16. Spare Parts Diagram



A. Terminal block
B. Electronics housing
C. Housing cover
D. Electronics housing cover O-ring
E. Electronics board
F. Sensor module
G. Drai.n/vent valve
H. Flange adapter
I. Flange adapter bolts
J. Flange adapter O-ring
K. Process O-ring
L. Electronics housing module O-ring

Appendix B Product Certifications

Rev 1.7

European directive information . . . . . page 145
Ordinary location certification . . . . . page 145
Approval drawing . . . . . page 153

B.1 European directive information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

B.2 Ordinary location certification

As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

B.3 North America

E5 USA Explosionproof (XP) and Dust-Ignitionproof (DIP)
Range 1-5
Certificate: 0T2H0.AE
Standards: FM Class 3600 - 2011, FM Class 3615 - 2006, FM Class 3810 - 2005, ANSI/NEMA 250 - 2003
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II, DIV 1, GP E, F, G; CL III; T5(–50 °C ≤ T_a ≤ +85 °C); Factory Sealed; Type 4X
Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2 No. 213 - M1987
Markings: XP Class I, Division 1, Groups B, C and D, T5, (–50 °C ≤ Ta ≤ 85°C) Suitable for Class I, Zone 1, Group I IB+H2, T5; DIP Class II and Class III, Division 1, Groups E, F and G, T5, (–50 °C ≤ Ta ≤ 85°C); Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

I5 USA Intrinsic Safety (IS) and Nonincendive (NI)
Range 1-5
Certificate: FM16US0120X
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005, ANSI/NEMA 250 - 2008
Markings: IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III; DIV 1 when connected per Rosemount drawing 03031-1019; NI CL 1, DIV 2, GP A, B, C, D; T4(–50 °C ≤ T_a ≤ + 70 °C) [HART], T5(–50 °C ≤ T_a ≤ +40 °C) [HART]; T4(–50 °C ≤ T_a ≤ +60 °C) [Fieldbus/PROFIBUS]; Type 4x

Special Conditions for Safe Use (X):

1. The Rosemount 3051 Transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The Rosemount 3051 Transmitter with the transient terminal block (Option code T1) will not pass the 500Vrms dielectric strength test and this must be taken into account during installation.

Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92

Markings: IS Class I, II, III, Division 1 Groups A, B, C, D, E, F, and G when connected in accordance with Rosemount drawing 03031-1024, Suitable for Class I, Zone 0 Group IIC; Class I, Division 2, Groups A, B, C and D; NIFW; Suitable for Class I Zone 2, Group IIC; HART: T4 (-60 °C ≤ T_a ≤ 70 °C); T5 (-60 °C ≤ T_a ≤ 40 °C) Fieldbus/PROFIBUS: T4 (-60 °C ≤ T_a ≤ 60 °C) Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

IE USA FISCO
Range 1-5
Certificate: FM16US0120X
Standards: FM Class 3600 - 2011, FM Class 3610 - 2010, FM Class 3611 - 2004, FM Class 3810 - 2005
Markings: IS CL I, DIV 1, GP A, B, C, D when connected per Rosemount drawing 03031-1019 (-50 °C ≤ T_a ≤ +60 °C); Type 4x

Special Conditions for Safe Use (X):

1. The Rosemount 3051 Transmitter housing contains aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact and friction.
2. The Rosemount 3051 Transmitter with the transient terminal block (option code T1) will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

Range 6
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92
Markings: IS Class I, Division 1 Groups A, B, C, D, T4 (-60 °C ≤ T_a ≤ +60 °C) when connected in accordance with Rosemount drawing 03031-1024, Suitable for Class I, Zone 0 Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

C6 Canada Explosionproof, Dust-Ignitionproof, Intrinsic Safety and Nonincendive
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2. No.157-92, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof for Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5 (-50 °C ≤ T_a ≤ 85 °C); Dust-Ignitionproof Class II, III, Division 1, Groups E, F, G, T5 (-50 °C ≤ T_a ≤ 85 °C); Class III Division 1; Intrinsically Safe Class I, Division 1 Groups A, B, C, D when connected in accordance with Rosemount drawing 03031-1024, Temperature Code T4; Suitable for Class I, Zone 0; Class I Division 2 Groups A, B, C and D, T5 (-50 °C ≤ T_a ≤ 85 °C); Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

E6 Canada Explosionproof, Dust-Ignitionproof and Division 2
Certificate: 1053834
Standards: ANSI/ISA 12.27.01-2003, CSA Std. C22.2 No. 30 -M1986, CSA Std. C22.2 No.142-M1987, CSA Std. C22.2 No. 213 - M1987
Markings: Explosionproof Class I, Division 1, Groups B, C and D; Suitable for Class I, Zone 1, Group IIB+H2, T5(-50°C ≤ T_a ≤ 85°C); Dust-Ignitionproof for Class II and Class III, Division 1, Groups E, F and G; T5 (-50 °C ≤ T_a ≤ 85 °C); Class I, Division 2, Groups A, B, C and D; T5 (-50 °C ≤ T_a ≤ 85 °C); Suitable for Class I Zone 2, Group IIC; Type 4X; Factory Sealed; Single Seal (See drawing 03031-1053)

B.4 Europe

E8 ATEX Flameproof and Dust
Certificate: KEMA00ATEX2013X; Baseefa11ATEX0275X
Standards: EN60079-0:2012 + A11:2013, EN60079-1:2014, EN60079-26:2015, EN60079-31:2009
Markings: Ⓔx II 1/2 G Ex db IIC T6...T4 Ga/Gb, T6 (-60 °C ≤ T_a ≤+70°C), T4/T5(-60 °C ≤ T_a ≤ +80 °C);
Ⓔx II 1 D Ex ta IIIC T95 °C T_{500}105 °C Da (-20 °C ≤ T_a ≤ +85 °C)

Table B-1. Process Temperature

Temperature class	Process temperature
T6	–60 °C to +65 °C
T5	–60 °C to +80 °C
T4	–60 °C to +120 °C

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I1 ATEX Intrinsic Safety and Dust
Certificate: BAS97ATEX1089X; Baseefa11ATEX0275X
Standards: EN60079-0:2012, EN60079-11:2012, EN60079-31:2009
Markings: HART: II 1 G Ex ia IIC T5/T4 Ga, T5 (-60 °C $\leq T_a \leq$ +40 °C), T4(-60 °C $\leq T_a \leq$ +70 °C)
Fieldbus/PROFIBUS: II 1 G Ex ia IIC Ga T4(-60°C $\leq T_a \leq$ +60°C)
DUST: II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (-20 °C $\leq T_a \leq$ +85 °C)

Table B-2. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of EN60079-11:2012. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion if located in Zone 0.
3. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

IA ATEX FISCO
Certificate: BAS97ATEX1089X
Standards: EN60079-0:2012, EN60079-11:2009
Markings: II 1 G Ex ia IIC T4 Ga (–60 °C $\leq T_a \leq$ + 60 °C)

Table B-3. Input Parameters

Parameters	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 µH

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of EN60079-11:2012. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however care should be taken to protect it from impact or abrasion if located in Zone 0.

N1 ATEX Type n and Dust
Certificate: BAS00ATEX3105X; Baseefa11ATEX0275X
Standards: EN60079-0:2012, EN60079-15:2010, EN60079-31:2009
Markings: II 3 G Ex nA IIC T5 Gc (–40 °C $\leq T_a \leq$ + 70 °C); II 1 D Ex ta IIIC T95 °C T_{500} 105 °C Da (–20 °C $\leq T_a \leq$ +85 °C)

Special Conditions for Safe Use (X):

1. This apparatus is not capable of withstanding the 500 V insulation test that is required by clause 6.8.1 of EN60079-15. This must be taken into account when installing the apparatus.
2. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

B.5 International

E7 IECEx Flameproof and Dust
Certificate: IECEx KEM 09.0034X; IECEx BAS 10.0034X
Standards: IEC60079-0:2011, IEC60079-1:2014-06, IEC60079-26:2014-10,IEC60079-31:2008
Markings: Ex db IIC T6…T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C);
Ex ta IIIC T95 °C T_{500}105 °C Da (-20 °C ≤ T_a ≤ +85 °C)

Table B-4. Process Temperature

Temperature class	Process temperature
T6	–60 °C to +70 °C
T5	–60 °C to +80 °C
T4	–60 °C to +80 °C

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.
4. Some variants of the equipment have reduced markings on the nameplate. Refer to the Certificate for full equipment marking.

I7 IECEx Intrinsic Safety
Certificate: IECEx BAS 09.0076X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: HART: Ex ia IIC T5/T4 Ga, T5(-60 °C ≤ T_a ≤ +40 °C), T4(-60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4(–60 °C ≤ T_a ≤ +60 °C)

Table B-5. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 µF	0 µF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IECEx Mining (Special A0259)
Certificate: IECEx TSA 14.0001X
Standards: IEC60079-0:2011, IEC60079-11:2011
Markings: Ex ia I Ma (–60 °C ≤ T_a ≤ +70 °C)

Parameter	HART	Fieldbus/ PROFIBUS	FISCO
Voltage U_i	30 V	30 V	17.5 V
Current I_i	200 mA	300 mA	380 mA
Power P_i	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	<5 nF
Inductance L_i	0 mH	0 mH	<10 µH

Special Conditions for Safe Use (X):

1. If the apparatus is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by IEC60079-11. This must be taken into account when installing the apparatus.
2. It is a condition of safe use that the above input parameters shall be taken into account during installation.
3. It is a condition of manufacture that only the apparatus fitted with housing, covers and sensor module housing made out of stainless steel are used in Group I applications.

N7 IECEx Type n
Certificate: IECEx BAS 09.0077X
Standards: IEC60079-0:2011, IEC60079-15:2010
Markings: Ex nA IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)

Special Conditions for Safe Use (X):

1. The apparatus is not capable of withstanding the 500 V insulation test required by IEC60079-15. This must be taken into account when installing the apparatus.

B.6 Brazil

E2 INMETRO Flameproof
Certificate: UL-BR 13.0643X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-1:2009 + Errata 1:2011, ABNT NBR IEC60079-26:2008 + Errata 1:2008
Markings: Ex db IIC T6...T4 Ga/Gb, T6(–60 °C ≤ T_a ≤ +70 °C), T4/T5(–60 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. This device contains a thin wall diaphragm less than 1 mm thickness that forms a boundary between zone 0 (process connection) and zone 1 (all other parts of the equipment). The model code and datasheet are to be consulted for details of the diaphragm material. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for installation and maintenance shall be followed in detail to assure safety during its expected lifetime.
2. Flameproof joints are not intended for repair.
3. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that could cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

I2 INMETRO Intrinsic Safety
Certificate: UL-BR 13.0584X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009
Markings: HART: Ex ia IIC T5/T4 Ga, T5(–60 °C ≤ T_a ≤ +40°C), T4(–60 °C ≤ T_a ≤ +70 °C)
Fieldbus/PROFIBUS: Ex ia IIC T4 Ga (–60 °C ≤ T_a ≤ +60 °C)

Table B-6. Input Parameters

Parameter	HART	Fieldbus/PROFIBUS
Voltage U_i	30 V	30 V
Current I_i	200 mA	300 mA
Power P_i	0.9 W	1.3 W
Capacitance C_i	0.012 μF	0 μF
Inductance L_i	0 mH	0 mH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IRC 60079-11. This must be taken into account when installing the equipment.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

IB INMETRO FISCO
Certificate: UL-BR 13.0584X
Standards: ABNT NBR IEC60079-0:2008 + Errata 1:2011, ABNT NBR IEC60079-11:2009
Markings: Ex ia IIC T4 Ga (-60 °C ≤ T_a ≤ +60 °C)

Table B-7. Input Parameters

Parameters	FISCO
Voltage U_i	17.5 V
Current I_i	380 mA
Power P_i	5.32 W
Capacitance C_i	<5 nF
Inductance L_i	<10 μH

Special Conditions for Safe Use (X):

1. If the equipment is fitted with an optional 90V transient suppressor, it is not capable of withstanding the 500 V insulation test required by ABNT NBR IEC 60079-11. This must be taken into account when installing the equipment.
2. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.

B.7 China

E3 China Flameproof
Certificate: GYJ14.1041X; GYJ15.1368X [Flowmeters]
Standards: GB12476-2000; GB3836.1-2010, GB3836.2-2010, GB3836.20-2010
Markings: Ex d IIC T6/T5 Ga/Gb, T6(–50 °C ≤ T_a ≤ +65 °C), T5(–50 °C ≤ T_a ≤ +80 °C)

Special Conditions for Safe Use (X):

1. The relation between ambient temperature arrange and temperature class is as follows:

Ta	Temperature Class
–50 °C~ +80 °C	T5
–50 °C~ +65 °C	T6

When used in a combustible dust environment, the maximum ambient temperature is 80 °C.

2. The earth connection facility in the enclosure should be connected reliably.
3. Cable entry certified by notified body with type of protection Ex d IIC in accordance with GB3836.1-2000 and GB3836.2-2000, should be applied when installed in a hazardous location. When used in combustible dust environment, cable entry in accordance with IP66 or higher level should be applied.
4. Obey the warning "Keep tight when the circuit is alive."
5. End users are not permitted to change any internal components.
6. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996, GB12476.2-2006, GB15577-2007

I3 China Intrinsic Safety
Certificate: GYJ13.1362X; GYJ15.1367X [Flowmeters]
Standards: GB3836.1-2010, GB3836.4-2010, GB3836.20-2010, GB12476.1-2000
Markings: Ex ia IIC Ga T4/T5

Special Conditions for Safe Use (X):

1. Symbol "X" is used to denote specific conditions of use:
   a. If the apparatus is fitted with an optional 90 V transient suppressor, it is not capable of withstanding the 500 V insulation test for one minute. This must be taken into account when installing the apparatus.
   b. The enclosure may be made of aluminum alloy and given a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion if located in Zone 0.
2. The relation between T code and ambient temperature range is:

Model	T Code	Temperature Range
HART	T5	–60 °C ≤ T_a ≤ +40 °C
HART	T4	–60 °C ≤ T_a ≤ +70 °C
Fieldbus/PROFIBUS/ FISCO	T4	–60 °C ≤ T_a ≤ +60 °C

3. Intrinsically Safe parameters:

Parameter	HART	Fieldbus/ PROFIBUS	FISCO
Voltage U_i	30 V	30 V	17.5 V
Current I_i	200 mA	300 mA	380 mA
Power P_i	0.9 W	1.3 W	5.32 W
Capacitance C_i	0.012 µF	0 µF	<5 nF
Inductance L_i	0 mH	0 mH	<10 µH

Note

FISCO parameters apply to both Group IIC and IIB.

[For Flowmeters] When Rosemount 644 Temperature Transmitter is used, the Rosemount 644 Transmitter should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of both Rosemount 644 Transmitter and associated apparatus. The cables between Rosemount 644 Transmitter and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.

4. Transmitters comply with the requirements for FISCO field devices specified in IEC60079-27:2008. For the connection of an intrinsically safe circuit in accordance with FISCO Model, FISCO parameters are listed in the table above.
5. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.
6. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded cable has to be grounded reliably in a non-hazardous area.
7. End users are not permitted to change any intern components but to settle the problem in conjunction with the manufacturer to avoid damage to the product.
8. During installation, use and maintenance of this product, observe the following standards: GB3836.13-1997, GB3836.15-2000, GB3836.16-2006, GB50257-1996, GB12476.2-2006, GB15577-2007

N3 China Type n
Certificate: GYJ15.1105X
Standards: GB3836.1-2010, GB3836.8-2003
Markings: Ex nA nL IIC T5 Gc (-40 °C ≤ T_a ≤ +70 °C)

Special Condition for Safe Use (X):

1. Symbol “X” is used to denote specific conditions of use: The apparatus is not capable of withstanding the 500 V test to earth for one minute. The must be taken into consideration during installation.

B.8 Japan

E4 Japan Flameproof
Certificate: TC20577, TC20578, TC20583, TC20584 [HART]; TC20579, TC20580, TC20581, TC20582 [Fieldbus]
Markings: Ex d IIC T5

B.9 Technical Regulations Customs Union (EAC)

EM EAC Flameproof
Certificate: RU C-US.GB05.B.01197
Markings: Ga/Gb Ex d IIC T5/T6 X, T5(–60 °C ≤ T_a ≤ +80°C), T6(–60 °C ≤ T_a ≤ +65 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

IM EAC Intrinsically Safe
Certificate: RU C-US.GB05.B.01197
Markings: HART: 0Ex ia IIC T4/T5 Ga X, T4(–60 °C ≤ T_a ≤ +70 °C), T5(-60 °C ≤ T_a ≤ +40 °C)
Fieldbus/PROFIBUS: 0Ex ia IIC T4 Ga X (–60 °C ≤ T_a ≤ +60 °C)

Special Condition for Safe Use (X):

1. See certificate for special conditions.

B.10 Combinations

K2 Combination of E2 and I2
K5 Combination of E5 and I5
K6 Combination of C6, E8, and I1
K7 Combination of E7, I7, and N7
K8 Combination of E8, I1, and N1
KB Combination of E5, I5, and C6
KD Combination of E8, I1, E5, I5, and C6
KM Combination of EM and IM

B.11 Conduit plugs and adapters

IECEx Flameproof and Increased Safety
Certificate: IECEx FMG 13.0032X
Standards: IEC60079-0:2011, IEC60079-1:2007, IEC60079-7:2006-2007
Markings: Ex de IIC Gb

ATEX Flameproof and Increased Safety
Certificate: FM13ATEX0076X
Standards: EN60079-0:2012, EN60079-1:2007, IEC60079-7:2007
Markings: Ⓔx II 2 G Ex de IIC Gb

Table B-8. Conduit Plug Thread Sizes

Thread	Identification mark
M20 × 1.5	M20
1/2 –14 NPT	1/2 NPT

Table B-9. Thread Adapter Thread Sizes

Male Thread	Identification mark
M20 × 1.5 – 6H	M20
1/2–14 NPT	1/2 –14 NPT
3/4 –14 NPT	3/4 –14 NPT
Female Thread	**Identification mark**
M20 × 1.5 – 6H	M20
1/2–14 NPT	1/2–14 NPT
G1/2	G1/2

Special Conditions for Safe Use (X):

1. When the thread adapter or blanking plug is used with an enclosure in type of protection increased safety “e” the entry thread shall be suitably sealed in order to maintain the ingress protection rating (IP) of the enclosure.
2. The blanking plug shall not be used with an adapter.
3. Blanking Plug and Threaded Adapter shall be either NPT or Metric thread forms. G1/2 thread forms are only acceptable for existing (legacy) equipment installations.

B.12 Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 09-HS446883A-5-PDA
Intended Use: Marine & Offshore Applications - Measurement of either gauge or absolute pressure for liquid, gas and vapor.

SBV Bureau Veritas (BV) Type Approval
Certificate: 23155
Requirements: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Pressure transmitter type 3051 cannot be installed on diesel engines

SDN Det Norske Veritas (DNV) Type Approval
Certificate: TAA000004F
Intended Use: DNV GL Rules for Classification - Ships and offshore units
Application:

Location Classes	
Temperature	D
Humidity	B
Vibration	A
EMC	B
Enclosure	D

SLL Lloyds Register (LR) Type Approval
Certificate: 11/60002
Application: Environmental categories ENV1, ENV2, ENV3, and ENV5

C5 Custody Transfer - Measurement Canada Accuracy Approval
Certificate: AG-0226; AG-0454; AG-0477

B.13 Approval drawing

B.13.1 Factory mutual 03031-1019

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AE	ADD 3051G	RTC1019922	J.G.	7/11/05
AF	ADD FISCO DETAILS	RTC1021913	N.J.H.	7/9/06
AG	ADD FISCO ENTITY PARAMETERS TO SHT 12	RTC1022876	N.J.H.	10/27/06

ENTITY APPROVALS FOR

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH
3051G	

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-5
OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 6-7
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 8-12
ALL OUTPUT CODES NONINCENDIVE SEE SHEET 13

THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE F.M. APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED IN THE CLASS I, II, AND III, DIVISION 1 GROUPS INDICATED, TEMP CODE T4. ADDITIONALLY, THE ROSEMOUNT 751 FIELD SIGNAL INDICATOR IS F.M. APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

Form Rev AC

CONTRACT NO.

DR. MIKE DOBE 03/21/89
CHK'D
APP'D. KELLY ORTH 03/22/89
APP'D. GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

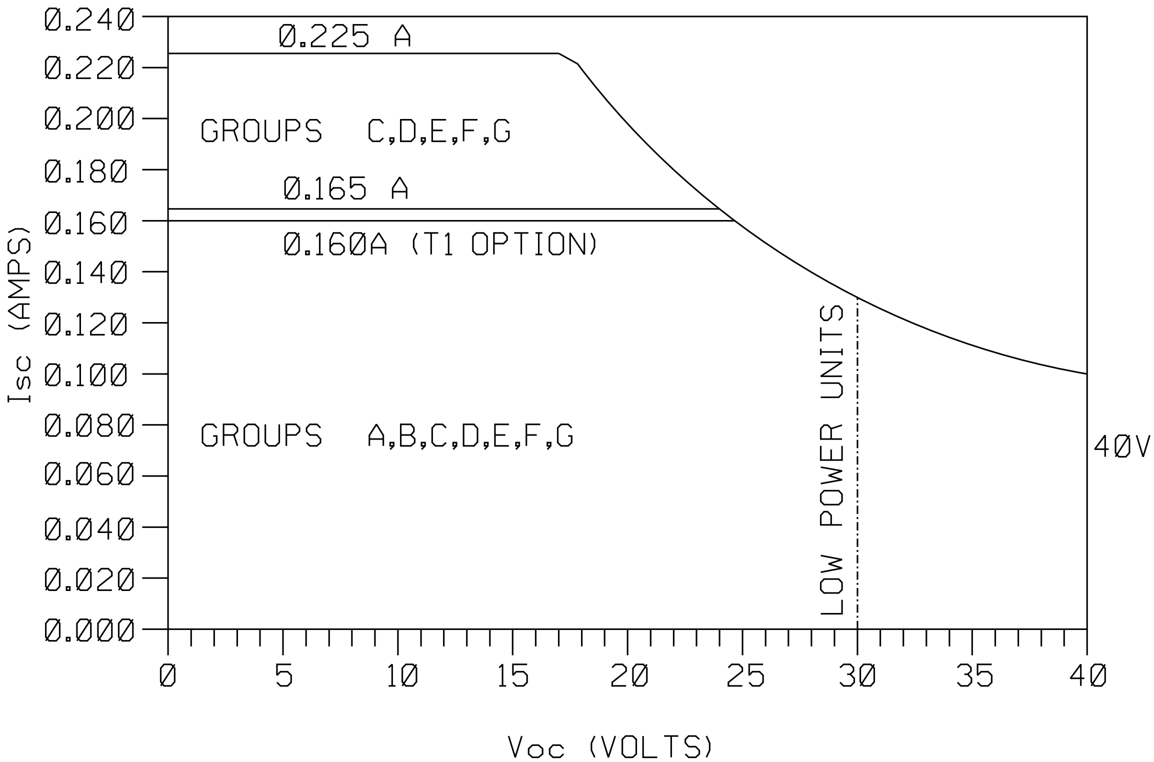
TITLE INDEX OF I.S. & NONINCENDIVE F.M. FOR 3051C/L/P/H/T AND 3001C/S

SIZE A | FSCM NO | DWG NO. 03031-1019

SCALE N/A | WT. | SHEET 1 OF 13

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODES A & M)
Pmax = 1WATT

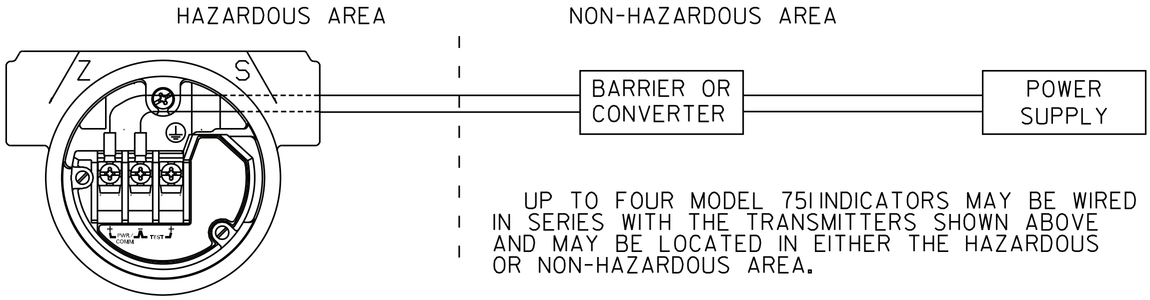


Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA	CAD MAINTAINED (MicroStation)				
DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. Ø3Ø31-1Ø19		
ISSUED	SCALE N/A	WT. ————	SHEET 2 OF 13		

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

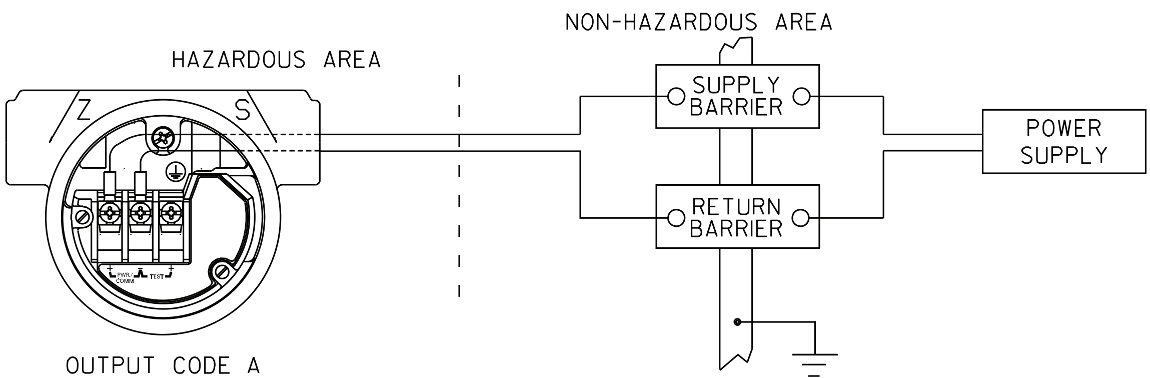
CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

OUTPUT CODE A
MODELS INCLUDED
305IC, L, P, H, T, CA, G
300IC, CL, CH, S, SL, SH

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



OUTPUT CODE A
MODELS INCLUDED
305IC, L, P, H, T, CA, G
300IC, CL, CH, S, SL, SH

UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX.POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (Ci) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (Li) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 40V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 40V
I_{MAX} = 165mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01μf	C_A IS GREATER THAN .01μf
L_I =10μH	L_A IS GREATER THAN 10μH

* FOR T1 OPTION:

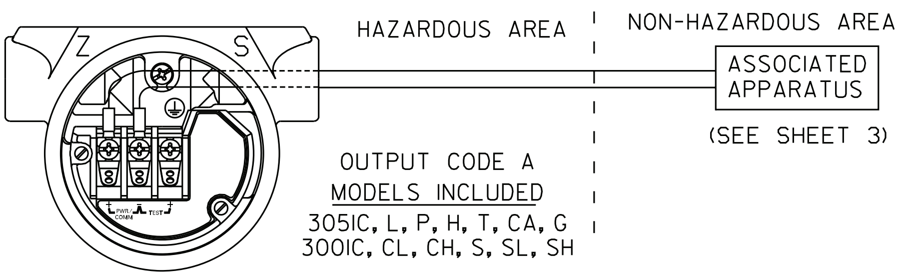
Imax = 160mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 160mA
L_I =1.05mH	L_A IS GREATER THAN 1.05mH

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 40V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 40V
I_{MAX} = 225mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01μf	C_A IS GREATER THAN .01μf
L_I =10μH	L_A IS GREATER THAN 10μH

* FOR T1 OPTION:

L_I =1.05mH	L_A IS GREATER THAN 1.05mH



OUTPUT CODE A
MODELS INCLUDED
305IC, L, P, H, T, CA, G
300IC, CL, CH, S, SL, SH

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA	CAD MAINTAINED (MicroStation)			
DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019	
ISSUED	SCALE N/A	WT. ————	SHEET 4 OF 13	

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

MODEL 3051G

FOR OUTPUT CODE A

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 30V	Vt or Voc IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 165mA	It or Isc IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	(Voc X Isc/4) or (Vt X It/4) IS LESS THAN OR EQUAL TO 1 WATT
C_I = 0.01 μF	C_A IS GREATER THAN 0.01 μF + C_{CABLE}
L_I = 10 μH	L_A IS GREATER THAN 10 μH + L_{CABLE}

FOR T1 OPTION:

I_{MAX} = 160mA	It or Isc IS LESS THAN OR EQUAL TO 145mA
L_I = 1.06 mH	L_A IS GREATER THAN 1.06 mH + L_{CABLE}

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 30V	Vt or Voc IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 225mA	It or Isc IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	(Voc X Isc/4) or (Vt X It/4) IS LESS THAN OR EQUAL TO 1 WATT
C_I = 0.01 μF	C_A IS GREATER THAN 0.01 μF + C_{CABLE}
L_I = 10 μH	L_A IS GREATER THAN 10 μH + L_{CABLE}

FOR T1 OPTION:

L_I = 1.06 mH	L_A IS GREATER THAN 1.06 mH + L_{CABLE}

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ————	SHEET 5 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

FOR OUTPUT CODE M

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 165mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{oc} \times I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .042μf	C_A IS GREATER THAN .042μf
L_I =10μH	L_A IS GREATER THAN 10μH

* FOR T1 OPTION:

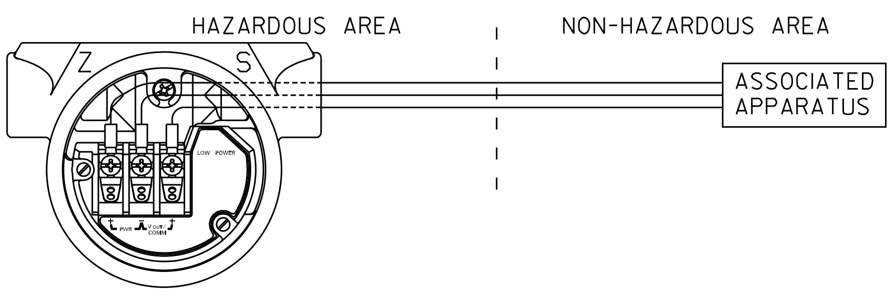
L_I =0.75mH	L_A IS GREATER THAN 0.75mH

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 225mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{oc} \times I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .042μf	C_A IS GREATER THAN .042μf
L_I =10μH	L_A IS GREATER THAN 10μH

* FOR T1 OPTION:

L_I =0.75mH	L_A IS GREATER THAN 0.75mH



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

305IC	305IH
305IL	305ICA
305IP	305IT

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

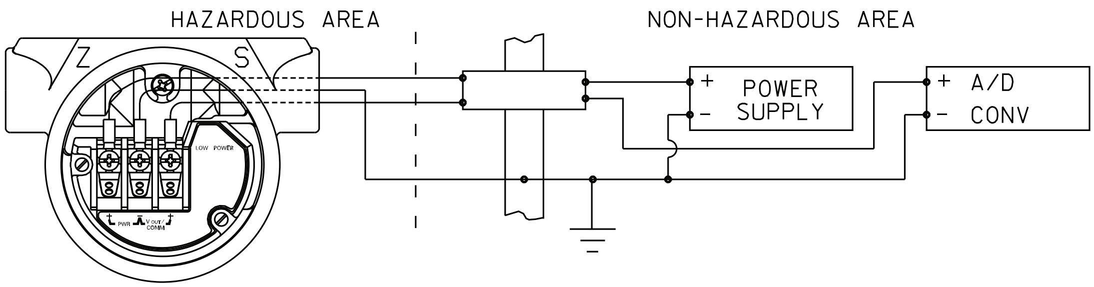
CAD MAINTAINED (MicroStation)

DR. MIKE DOBE	SIZE A	FSCM NO	DWG NO. 03031-1019	
ISSUED	SCALE N/A	WT. ————	SHEET 6 OF 13	

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

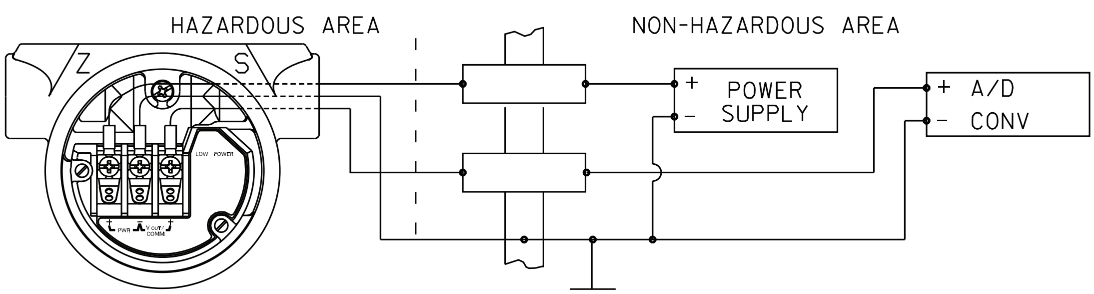
CIRCUIT DIAGRAM 3
ONE DUAL CHANNEL BARRIER



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

305IC	305IH
305IL	305ICA
305IP	305IT

CIRCUIT DIAGRAM 4
TWO SINGLE CHANNEL BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED
IN THIS CONFIGURATION)



OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

305IC	305IH
305IL	305ICA
305IP	305IT

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. SANDI MANSON	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ————	SHEET 7 OF 13

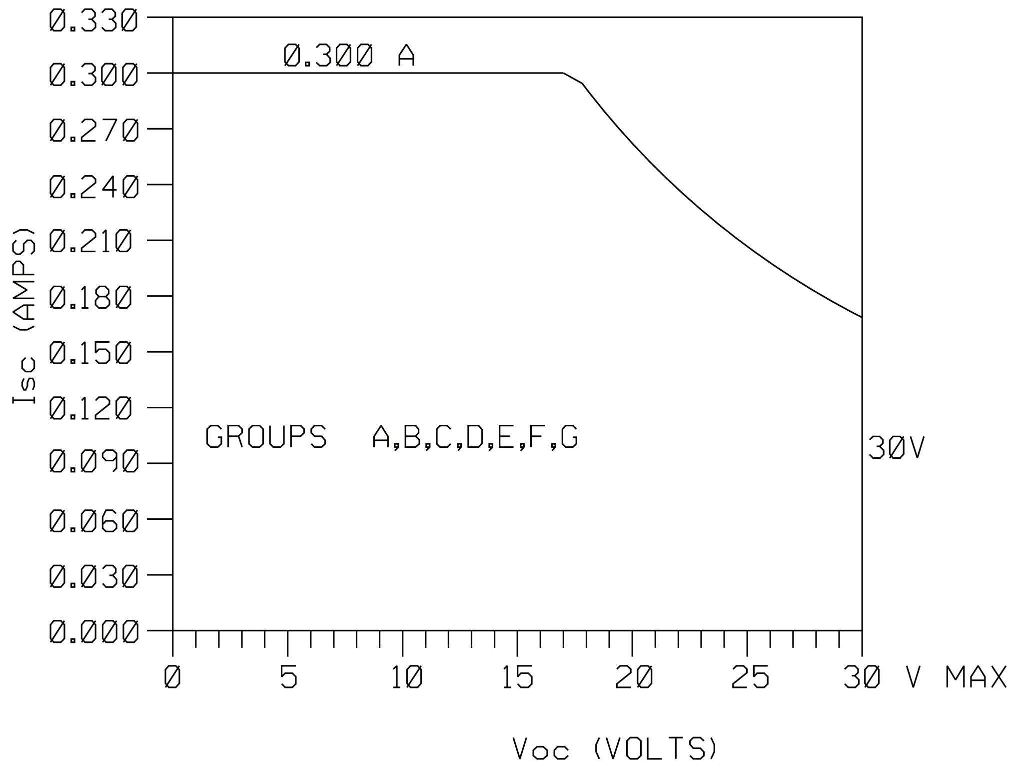
Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

3051 WITH FOUNDATION FIELDBUS OR PROFIBUS. (OUTPUT CODE F OR W)

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODE F OR W)

Pmax = 1.3 WATT



Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

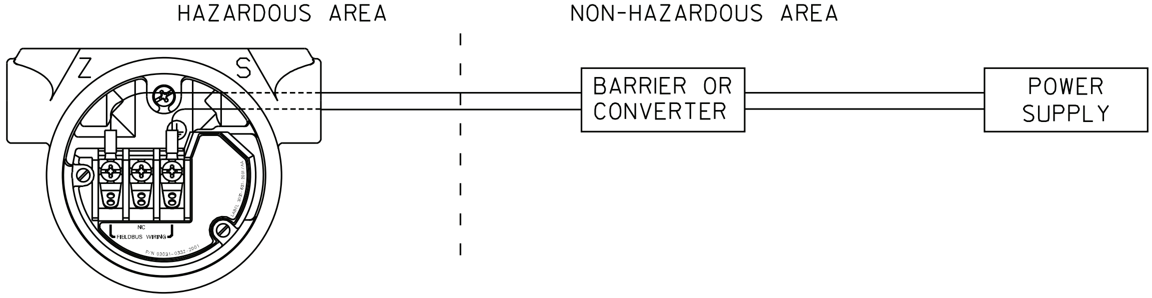
CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT.	SHEET 8 OF 13

Form Rev AC

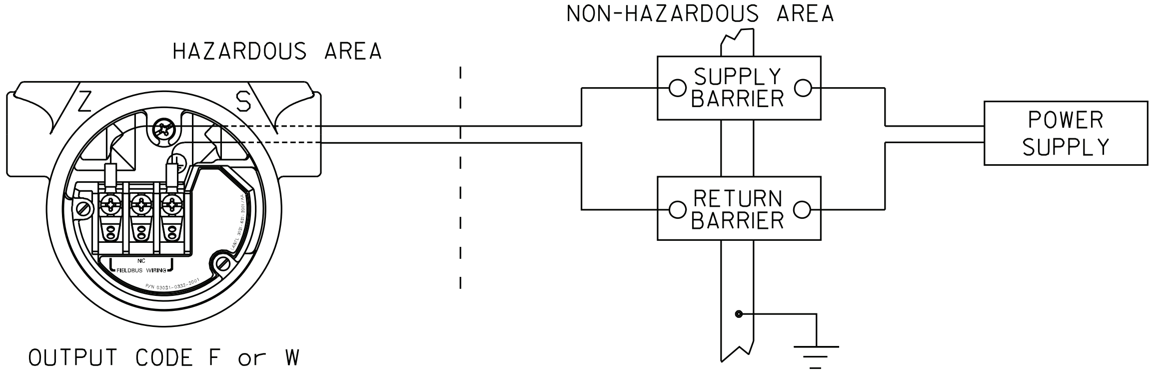
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL



OUTPUT CODE F or W
MODELS INCLUDED
305IC, L, P, H, T, CA
300IC, CL, CH

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



OUTPUT CODE F or W
MODELS INCLUDED
305IC, L, P, H, T, CA
300IC, CL, CH

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. Ø3031-1Ø19
ISSUED	SCALE N/A	WT. ————	SHEET 9 OF 13

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

ENTITY CONCEPT APPROVALS

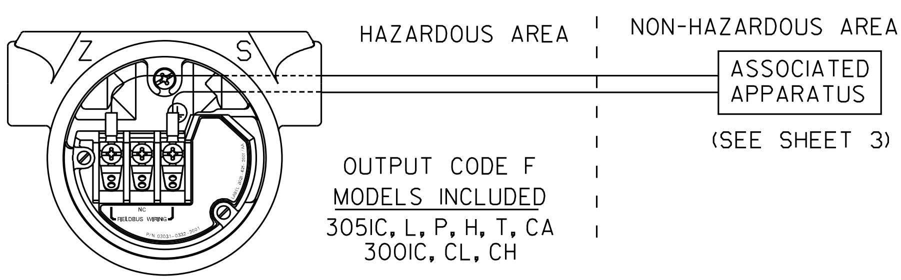
THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX.POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (Ci) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (Li) OF THE INTRINSICALLY SAFE APPARATUS.

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

FOR OUTPUT CODE F or W

CLASS I, DIV. 1, GROUPS A, B, C AND D

V_{MAX} = 30V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 300mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_{MAX} = 1.3 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
C_I = 0 μf	C_A IS GREATER THAN 0 μf
L_I = 0 μH	L_A IS GREATER THAN 0 μH



OUTPUT CODE F
MODELS INCLUDED
305IC, L, P, H, T, CA
300IC, CL, CH

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA	CAD MAINTAINED (MicroStation)		
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ———	SHEET 10 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_1 or Vmax), THE CURRENT (I_1 or Imax), AND THE POWER (P_1 or Pma) THAT INTRINSICALLY SAVE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (Uo, Voc, or Vt), THE CURRENT (Io, Isc, or It), AND THE POWER (Po or Pmax) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_1) AND THE INDUCTANCE (L_1) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10µH RESPECTVELY.
ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELDBUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE Uo (or Voc or Vt) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 µA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R':	15...150 OHM/km
INDUCTANCE PER UNIT LENGTH L':	0.4...1mH/KM
CAPACITANCE PER UNLIT LENGTH C':	80...200nF

C' = C' LINE/LINE +0.5C' LINE/SCREEN, IF BOTH LINES ARE FLOATING, OR
C' = C' LINE/LINE +C' LINE/SCREEN, IF THE SCREEN IS CONNECTED TO ONE LINE

TRUNK CABLE LENGTH:	≤ 1000 m
SPUR CABLE LENGTH:	≤ 30 m
SPLICE LENGTH:	≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

R = 90...100 OHMS C = 2.2µF

AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

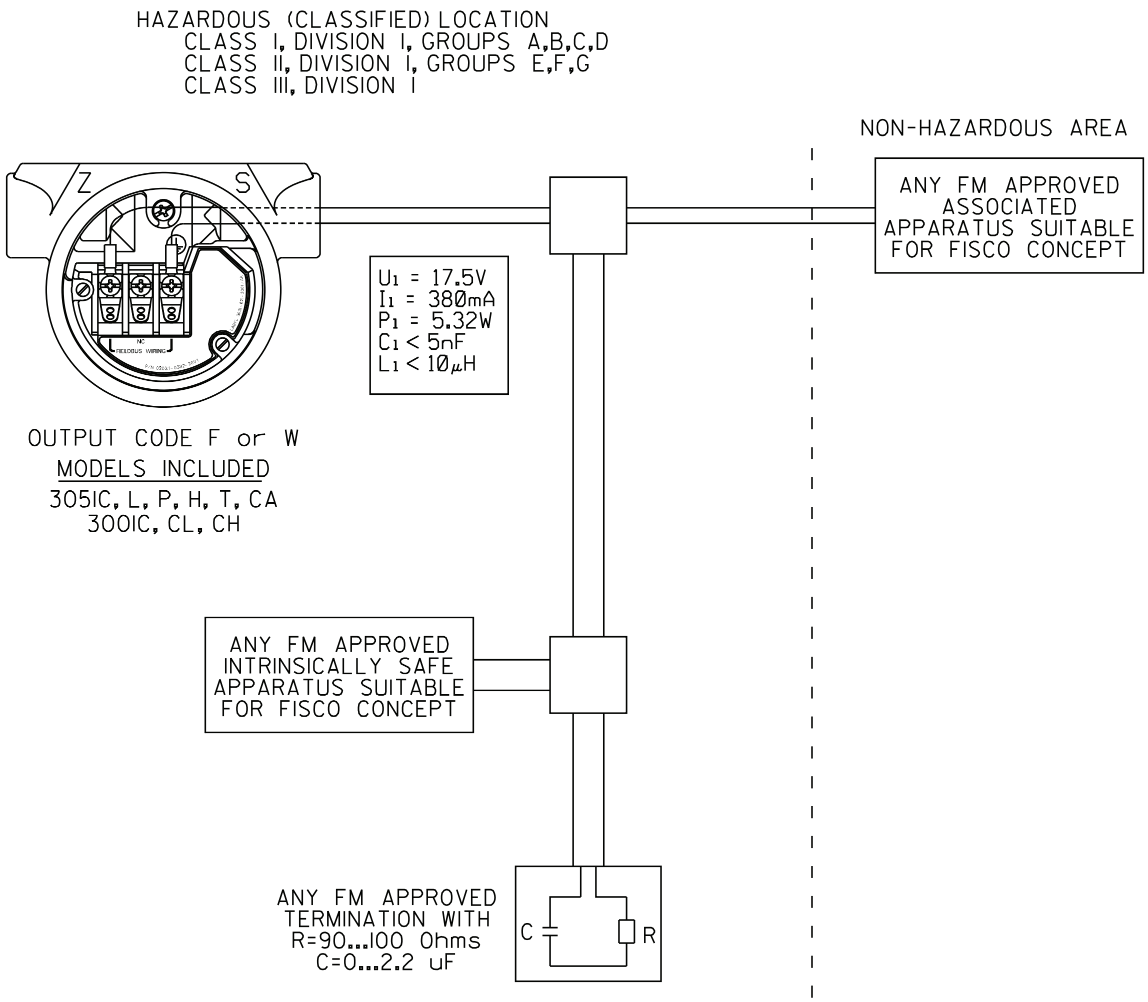
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1019	
ISSUED	SCALE N/A	WT.		SHEET 11 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				



Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

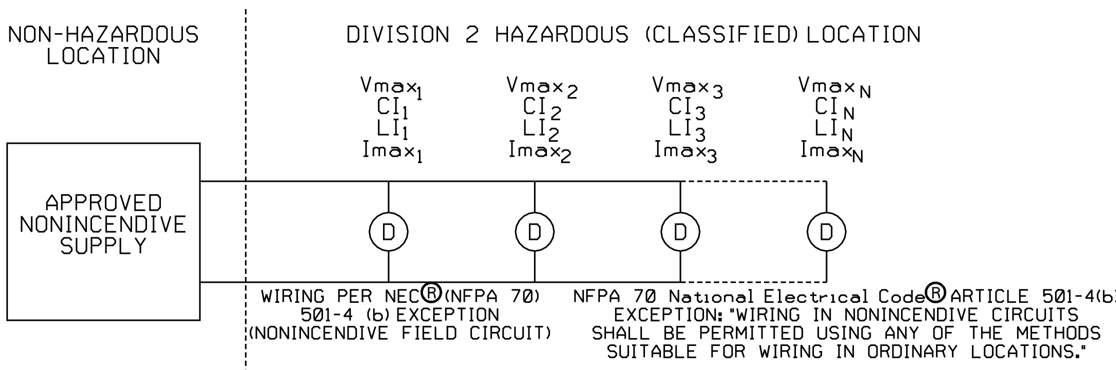
CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. Ø3Ø31-1Ø19
ISSUED	SCALE N/A	WT.	SHEET 12 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AG				

NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS



IN NORMAL OPERATION
DEVICES CONTROL THROUGH–CURRENT

PARAMETERS DEVICE

$Voc <= \text{Minimum of } (Vmax_1, Vmax_2, \ldots, Vmax_N)$

$Imax_1 >= Iq_1 + Isignal_1$

$Imax_2 >= Iq_1 + Isignal_2$

.
.
.

$Imax_N >= Iq_N + Isignal_N$

$Ca <= Ci_1 + Ci_2 + \ldots + Ci_N + Ccable$

$La <= Li_1 + Li_2 + \ldots + Li_N + Lcable$

Imax for an individual device = Iq + Isignal

Iq =Quiescent current through device
(Maximum quiescent current for the device)

Isignal =Signaling current through device
(Protocol may limit signaling to one device at a time)

$\text{Operating Imax} = Iq_1 + Iq_2 + \ldots + Iq_N + I_{signal}\,max$

$I_{signal}\,max = \text{Max. of } (Isignal_1, Isignal_2, \ldots, Isignal_N)$

ROSEMOUNT 3051/3001

	4-20mA / HART	FIELDBUS (F or W)
Vmax	40v	30v
Maximum normal operating current	22mA	27mA
Ca	.010uF	0uF
La	10uH	0uH

ROSEMOUNT 3051 TRANSMITTERS ARE CURRENT CONTROLLERS ON INDIVIDUAL PARALLEL BRANCHES WITH RESPECT TO THE POWER SUPPLY. IN NONINCENDIVE INSTALLATIONS THE Imax FOR EACH TRANSMITTER IS NOT RELATED TO THE MAXIMUM CURRENT OF THE POWER SUPPLY (Isc) IN THE SAME MANNER AS FOR TRANSMITTER INSTALLED PER I.S. REQUIREMENTS, BECAUSE NONINCENDIVE REQUIREMENTS INCLUDE ONLY NORMAL OPERATING CONDITIONS.

REFERENCE: APPENDIX A7.3 (FM3611)

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Jon Steffens	SIZE A	FSCM NO	DWG NO. 03031-1019
ISSUED	SCALE N/A	WT. ————	SHEET 13 OF 13

Form Rev AC

B.13.2 Canadian standards association (CSA) 03031-1024

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA	ADD FIELDBUS	RTC1004232	M.L.M.	5/28/98
AB	ADD PROFIBUS, ENTITY PARAMETERS	RTC1008326	P.C.S.	2/4/00
AC	REM It, Vt FROM ENTITY PARAMETERS	RTC1009279	W.C.R.	7/11/00
AD	ADD FISCO FIELDBUS	RTC1012624	J.P.W.	4/4/02

APPROVALS FOR

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH

OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-3
OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 3-4
OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 5-7
OUTPUT CODES A,F,W I.S. ENTITY PARAMETERS SHEET 8-9

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2.5]
.XX ± .02 [0.5]
.XXX ± .010 [0.25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.
DR. Mike Dobe 08/27/90
CHK'D
APP'D. GLEN MONZO 8/31/90
APP'D. GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE: INDEX OF I.S. CSA FOR 3051C/L/P/H/T & 3001C/S

SIZE A | FSCM NO | DWG NO. 03031-1024
SCALE N/A | WT. | SHEET 1 OF 9

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

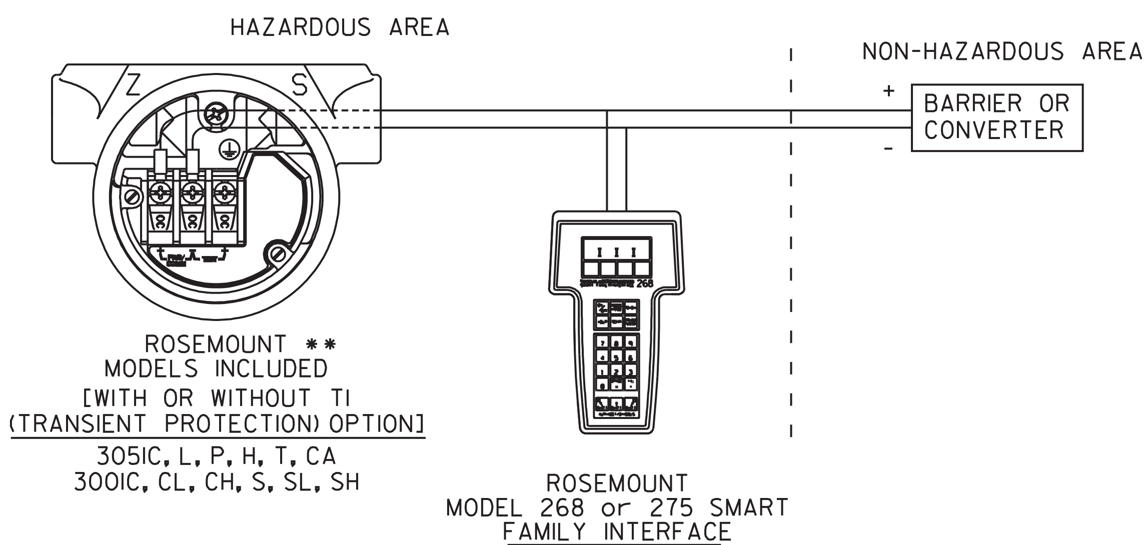
CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

4-20 mA, ("A" OUTPUT CODE)



✱✱ FOR THE LOW POWER OPTION, SEE PAGE 4 FOR THE CIRCUIT CONNECTION WITH BARRIER OR CONVERTER. FOR FIELDBUS OPTIONS("F" or "W" OUTPUT CODE), SEE PAGE 5 FOR PARAMETERS AND CIRCUIT CONNECTION TO BARRIER.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Mike Dobe 08/27/90	SIZE A	FSCM NO	DWG NO.	03031-1024
ISSUED	SCALE N/A	WT. ————	SHEET 2 OF 9	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

4-20 mA, ("A" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	* 30 V OR LESS 330 OHMS OR MORE * 28 V OR LESS 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE * 22 V OR LESS 180 OHMS OR MORE	GROUPS A, B, C, D
FOXBORO CONVERTER 2AI-I2V-CGB, 2AI-I3V-CGB, 2AS-I3I-CGB, 3A2-I2D-CGB, 3A2-I3D-CGB, 3AD-I3I-CGB, 3A4-I2D-CGB, 2AS-I2I-CGB, 3F4-I2DA		GROUPS B, C, D
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D

LOW POWER, ("M" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	Supply $\leq$ 28V, $\geq$ 300 Ω Return $\leq$ 10V, $\geq$ 47 Ω	GROUPS A, B, C, D
	Supply $\leq$ 30V, $\geq$ 150 Ω Return $\leq$ 10V, $\geq$ 47 Ω	GROUPS C, D

* MAY BE USED WITH ROSEMOUNT MODEL 268 or 275 SMART FAMILY INTERFACE.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

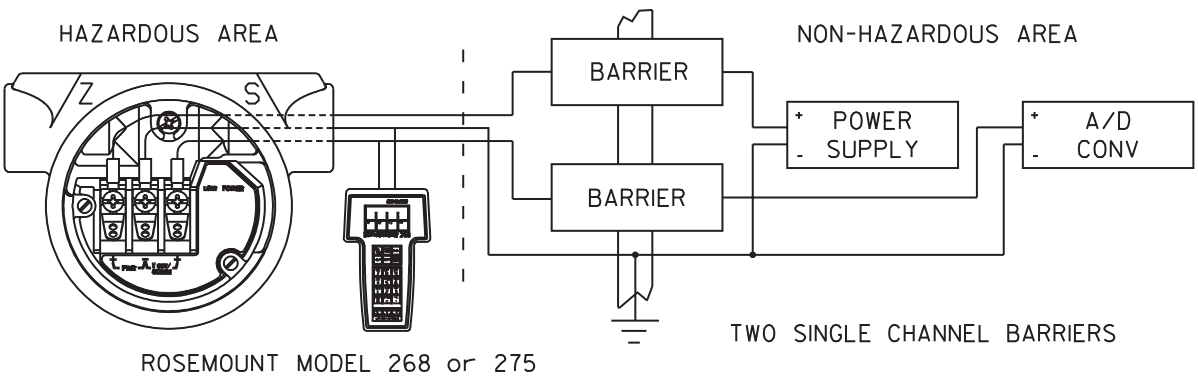
CAD MAINTAINED (MicroStation)

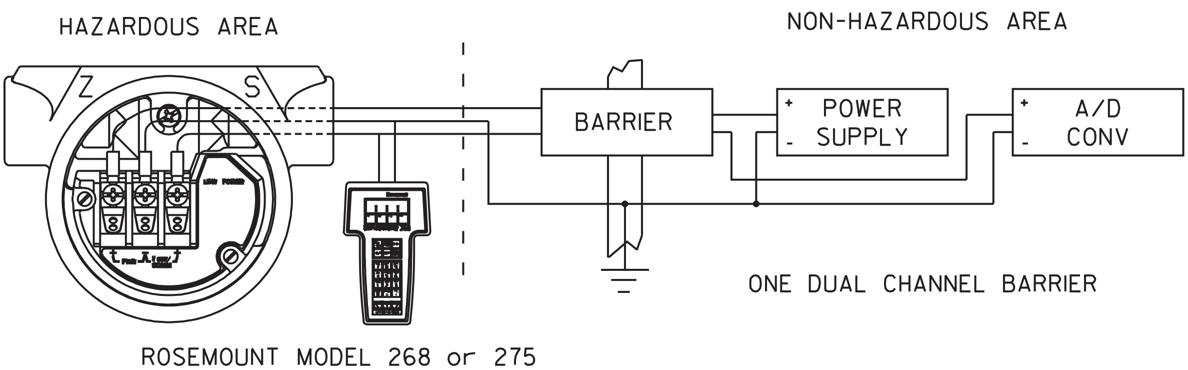
DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 9

Form Rev AD

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

CSA INTRINSIC SAFETY APPROVALS
305IC LOW POWER CIRCUIT CONNECTION WITH INTRINSIC SAFETY BARRIERS
Ex ia
INTRINSICALLY SAFE/SECURITE INTRINSEQUE
LOWPOWER, ("M" OUTPUT CODE)





APPROVED FOR CLASS I, DIVISION I, GROUPS A,B,C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 28 VOLTS OR LESS AND 300 OHMS OR MORE IN +PWR LINE, AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE, OR ONE CSA APPROVED DUAL CHANNEL SAFETY BARRIER WITH IDENTICAL APPROVED SAFETY PARAMETERS CONNECTED IN LIKE MANNER, AS ABOVE.

APPROVED FOR CLASS I, DIVISION I, GROUPS C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 30 VOLTS OR LESS AND 150 OHMS OR MORE IN +PWR LINE AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. SANDI MANSON	SIZE A	FSCM NO	DWG NO.	03031-1024
ISSUED	SCALE N/A	WT.		SHEET 4 OF 9

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

FIELDBUS, ("F" or "W" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS 300 OHMS OR MORE 28 V OR LESS 235 OHMS OR MORE 25 V OR LESS 160 OHMS OR MORE 22 V OR LESS 100 OHMS OR MORE	GROUPS A, B, C, D

CSA INTRINSIC SAFETY APPROVALS

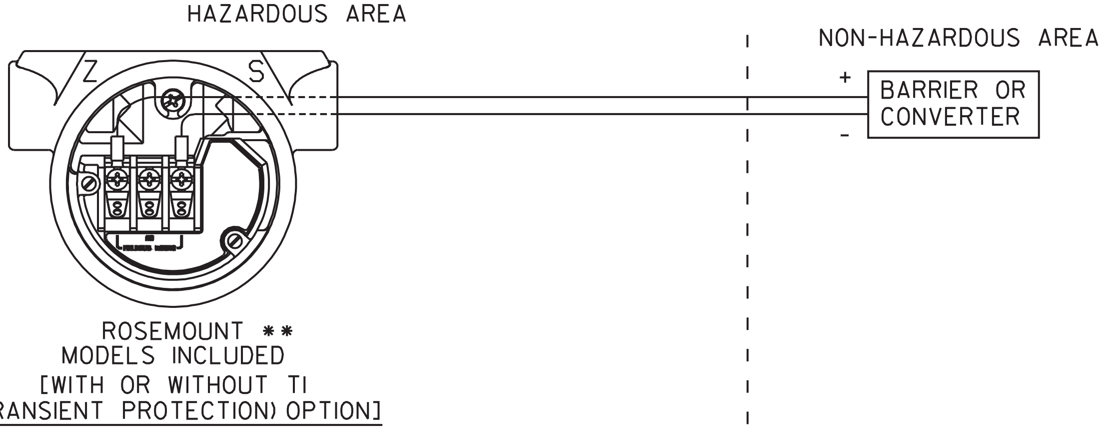
CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE

FIELDBUS, ("F" or "W" OUTPUT CODE)

HAZARDOUS AREA



ROSEMOUNT **
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]

3051C, L, P, H, T, CA
3001C, CL, CH, S, SL, SH

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 03031-1024		
ISSUED	SCALE N/A	WT. ———	SHEET 5 OF 9		

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_i or V_{max}), THE CURRENT (I_i or I_{max}), AND THE POWER (P_i or P_{ma}) THAT INTRINSICALLY SAVE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (U_o, V_{oc}, or V_t), THE CURRENT (I_o, I_{sc}, or I_t), AND THE POWER (P_o or P_{max}) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND THE INDUCTANCE (L_i) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10μH RESPECTVELY.
ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELDBUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE U_o (or V_{oc} or V_t) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 μA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R':	15...150 OHM/km
INDUCTANCE PER UNIT LENGTH L':	0.4...1mH/KM
CAPACITANCE PER UNLIT LENGTH C':	80...200nF

C' = C' LINE/LINE +0.5C' LINE/SCREEN, IF BOTH LINES ARE FLOATING, OR
C' = C' LINE/LINE +C' LINE/SCREEN, IF THE SCREEN IS CONNECTED TO ONE LINE

TRUNK CABLE LENGTH:	≤ 1000 m
SPUR CABLE LENGTH:	≤ 30 m
SPLICE LENGTH:	≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

R = 90...100 OHMS   C = 2.2μF

AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

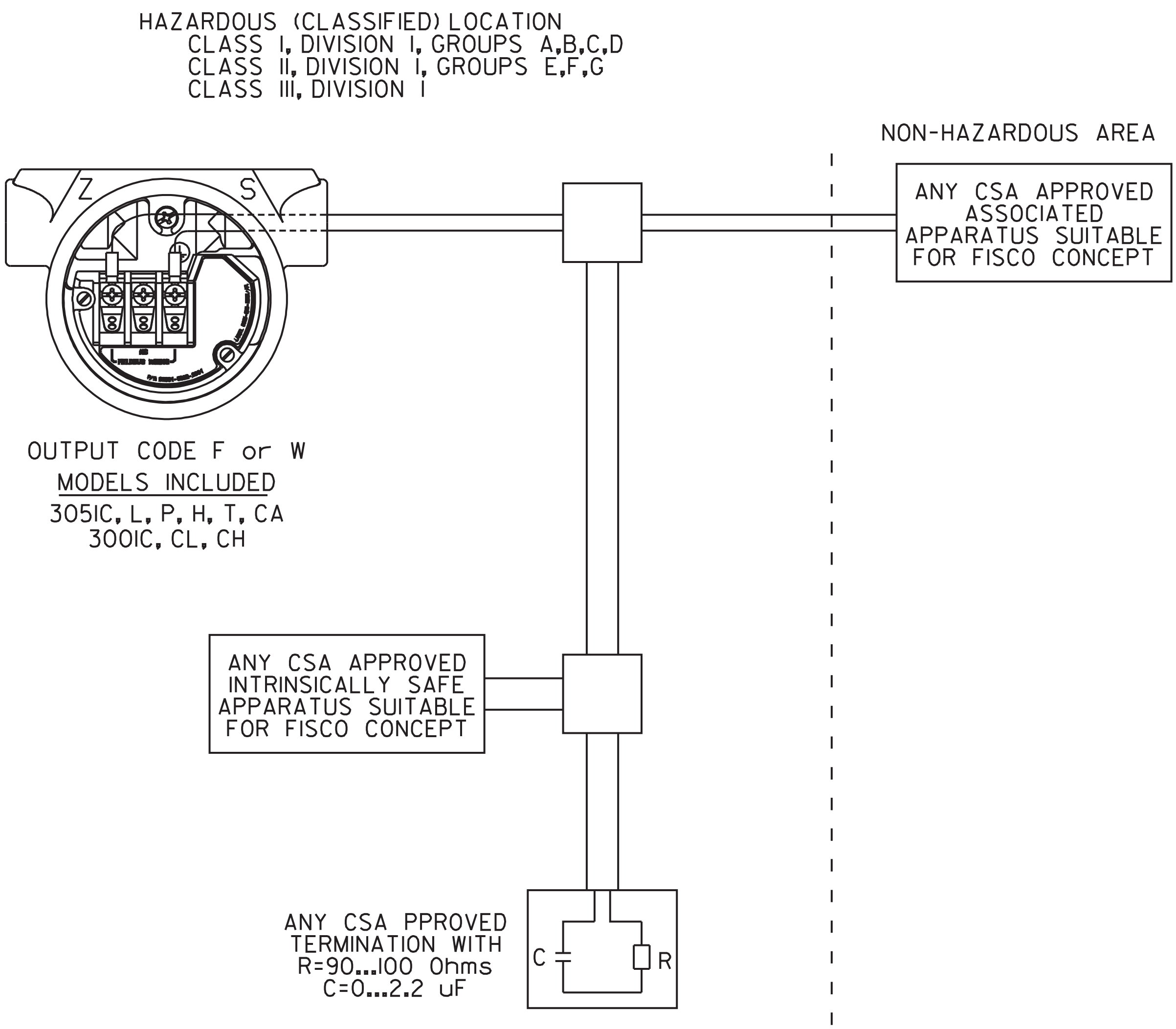
NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

Rosemount Inc. **8200 Market Boulevard** **Chanhassen, MN 55317 USA**	CAD MAINTAINED (MicroStation)			
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO.	03031-1024
ISSUED	SCALE N/A	WT. ————	SHEET 6 OF 9	

Form Rev AD

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				



Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

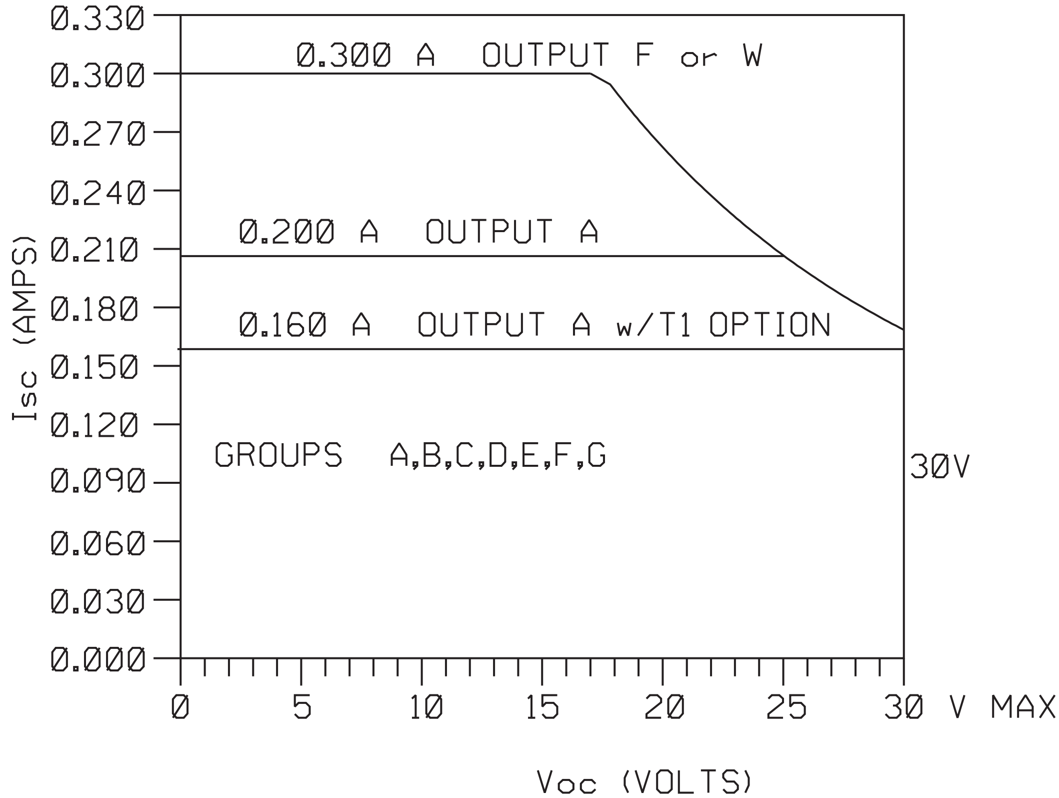
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO.	03031-1024
ISSUED	SCALE N/A	WT. ————	SHEET 7 OF 9	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

3051 I.S. ENTITY PARAMETERS.
(OUTPUT CODE A,F, or W)

BARRIER PARAMETERS (APPLICABLE TO OUTPUT CODE A,F, or W)

Pmax = 1.3 WATT OUTPUT F or W
Pmax = 1.0 WATT OUTPUT A



Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA	CAD MAINTAINED (MicroStation)		
DR. JON STEFFENS	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT. ————	SHEET 8 OF 9

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AD				

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc) AND MAX. SHORT CIRCUIT CURRENT (Isc) AND MAX.POWER (Voc X Isc/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPUT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C1) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L1) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A

CLASS I, DIV. 1, GROUPS A, B, C AND D

V_{MAX} = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 200mA	I_{SC} IS LESS THAN OR EQUAL TO 200mA
P_{MAX} = 1 WATT	$(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01μf	C_A IS GREATER THAN .01μf + C CABLE
L_I =10μH	L_A IS GREATER THAN 10μH + L CABLE

* FOR T1 OPTION:

Imax = 160mA	I_{SC} IS LESS THAN OR EQUAL TO 160mA
L_I =1.05mH	L_A IS GREATER THAN 1.05mH + L CABLE

FOR OUTPUT CODE F or W

CLASS I, DIV. 1, GROUPS A, B, C AND D

V_{MAX} = 30V	V_{OC} IS LESS THAN OR EQUAL TO 30V
I_{MAX} = 300mA	I_{SC} IS LESS THAN OR EQUAL TO 300mA
P_{MAX} = 1.3 WATT	$(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
C_I = 0μf	C_A IS GREATER THAN 0μf + C CABLE
L_I = 0μH	L_A IS GREATER THAN 0μH + L CABLE

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR. JON STEFFENS	SIZE A	FSCM NO		DWG NO.	03031-1024
ISSUED	SCALE N/A	WT.		SHEET 9 OF 9	

Form Rev AB

Global Headquarters
Emerson Automation Solutions
6021 Innovation Blvd.
Shakopee, MN 55379, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@Emerson.com

North America Regional Office
Emerson Automation Solutions
8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office
Emerson Automation Solutions
1300 Concord Terrace, Suite 400
Sunrise, FL 33323, USA
+1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@Emerson.com

Europe Regional Office
Emerson Automation Solutions Europe GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
+41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office
Emerson Automation Solutions Asia Pacific Pte Ltd
1 Pandan Crescent
Singapore 128461
+65 6777 8211
+65 6777 0947
Enquiries@AP.Emerson.com

Middle East and Africa Regional Office
Emerson Automation Solutions
Emerson FZE P.O. Box 17033
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
+971 4 8118100
+971 4 8865465
RFQ.RMTMEA@Emerson.com

Linkedin.com/company/Emerson-Automation-Solutions

Twitter.com/Rosemount_News

Facebook.com/Rosemount

Youtube.com/user/RosemountMeasurement

Google.com/+RosemountMeasurement

Standard Terms and Conditions of Sale can be found on the Terms and Conditions of Sale page.
The Emerson logo is a trademark and service mark of Emerson Electric Co.
Coplanar, Instrument Toolkit, Plantweb,Rosemount , and Rosemount logotype are trademarks of Emerson.
Fluorinert is a trademark of 3M.
Syltherm 800 and D.C. Silicone 704 are registered trademarks of Dow Corning Corporation.
Neobee is a registered trademark of Stepan Specialty Products, LLC.
HART is a registered trademark of the FieldComm Group.
FOUNDATION Fieldbus is a trademark of the FieldComm Group.
eurofast and minifast are registered trademark of TURCK.
All other marks are the property of their respective owners.
© 2017 Emerson. All rights reserved.

ROSEMOUNT™

EMERSON™

Data Sheet

ASHCROFT®
Trust the shield.®

1279 Duragauge® Pressure Gauge

FEATURES

- Custom dial printing options
- Micrometer adjustable pointer
- ***PLUS***™ Performance option dampens vibration, shock and pulsation effects
- Pressure range from Vacuum to 30,000 psi

TYPICAL USES

- Refineries
- Chemical and petrochemical plants
- Offshore oil rigs
- Water and wastewater pressure control
- Pulp and water
- Mining and metals
- Equipment skids
- Specialized OEM equipment
- Cryogenics

RUSH GOLD Service

PLUS! Performance

1279
4½˝ dial size

ALL PROVINCES CRN REGISTERED

SPECIFICATIONS

Accuracy:	±0.5% of span (ASME B40.100 Grade 2A)
Size:	4½˝
Range:	Vacuum, Compound to 30,000 psi
Process Connection Location:	Lower, back, side, top
Process Connection:	¼ NPT Male, ½ NPT Male, 9⁄16-18 UNF-2B (high pressure connection)
Case Style:	Solid front with pressure relief back
Window:	Glass (STD.), acrylic, shatter proof glass, non-glare glass (OPT.)
Movement:	Rotary, adjustable, 400 SS, Teflon® coated
Movement Materials:	400 SS, Teflon® coated pinion gear and segment
Dial:	Aluminum, white background, black scale
Pointer:	Micrometer, adjustable, aluminum
Weather Protection:	Dry case: Case not sealed, recommended for weather protected environment only Liquid filled or field fillable: IP66 or NEMA 4X (S&P tube and socket), NEMA 4 (A&R tube and socket Hermetically sealed: IP66
Dampening Options:	Liquid: glycerin, silicone, Halocarbon®, ***PLUS!***™ Performance
Mounting:	Stem, surface (STD.), flush, pipe, remote (OPT.)
Approvals:	CRN

WETTED COMPONENTS

Bourdon Tube	Process Connection Materials	Joints
316L SS	316L SS	Welded
316L SS	Steel	Welded
K-Monel® 500 Tube	Monel® 400	Welded
C510 Phos. Bronze	Brass	Silver brazed

KEY BENEFITS

- **Available with a wide variety of accessory and diaphragm seal assemblies**
- **Available with high process temperature dissipation siphons**

MIN/MAX TEMPERATURE LIMITS

Version	Ambient	Process	Storage
Dry	-20°F to 200°F (-29°C to 93°C)	-20°F to 250°F (-29°C to 121°C)	-40°F to 250°F (-40°C to 121°C)
PLUS!™	-40°F to 150°F (-40°C to 66°C)	-40°F to 200°F (-40°C to 93°C)	-40°F to 150°F (-40°C to 66°C)
Glycerin fill	20°F to 150°F (-7°C to 66°C)	20°F to 150°F (-7°C to 66°C)	0°F to 150°F (-18°C to 66°C)
Silicone fill	-40°F to 150°F (-40°C to 66°C)	-40°F to 200°F (-40°C to 93°C)	-40°F to 150°F (-40°C to 66°C)
Halocarbon® fill	-40°F to 150°F (-40°C to 66°C)	-40°F to 200°F (-40°C to 93°C)	-40°F to 150°F (-40°C to 66°C)

NON-WETTED COMPONENTS

Case	Ring	Pressure Relief Back
Phenolic	Threaded, Polycarbonate (Meets UL 94 V-0)	Polycarbonate (Meets UL 94 V-0)

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2018 Ashcroft Inc. 1279_gauge_ds4.0, Rev. D, 07/18

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

1279 Duragauge® Pressure Gauge

451279 S S 04 L XLL SG #30

ORDERING CODE Example:	451279	S	SH	04	L	XLL	15#
Dial Size/Model Code							
451279 - 4½″ solid front	451279						
System (tube and process connection)							
A - Bronze tube, brass process connection, Max. pressure connection 1,000 psi							
P - K-Monel® 500 tube, Monel® 400 process connection, Max. pressure 30,000 psi							
R - 316L SS tube, steel process connection, Max. pressure 30,000 psi							
S - 316 SS tube, 316L SS process connection, Max. pressure 30,000 psi		S					
Case Design							
S - Solid front case, dry							
SH - Solid front case, dry, hermetically sealed			SH				
SL - Solid front case, liquid filled (glycerin STD.)							
Process Connection Sizes							
02 - ¼ NPT Male, N/A for ranges over 20,000 psi							
04 - ½ NPT Male, N/A for ranges over 20,000 psi				04			
09 - 9/16-18 UNF-2B, high pressure fitting, pressures over 20,000 psi (STD.)							
AM - AND 10050-4 (¼ tubing connection)							
RW - SAE 7/16-20 Straight thread							
Process Connection Location							
L - Lower					L		
B - Back							
D - Side (3 o'clock)							
E - Side connection (9 o'clock)							
T - Top connection							
Options (If choosing an option(s) must include a "X") (See Table 1 on page 5 for more options)						X__	
GV - Silicone case fill							
GX - Halocarbon® case fill							
LL - ***PLUS!***™ Performance						LL	
NH - SS tag wired to case							
PD - Acrylic window (STD. with liquid filled or hermetically sealed cases)							
C4 - Individual calibration chart (in accordance with ASME B40.100:2013. Accuracy traceable to NIST)							
6B - Cleaned for oxygen service SG = Safety Glass							
Range (coding examples only, see range table on page 3 for all standard ranges)							
Single Scales							
15# - 15 psi							15#
1BR - 1 bar							
1KG - 1 kg/cm^2							
100KP - 100 kPa							
Dual Scales							
15#/BR - 15 psi inner scale, 1 bar outer scale							
1BR/# - 1 bar inner scale, 15 psi outer scale							

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2018 Ashcroft Inc. 1279_gauge_ds4.0, Rev. D, 07/18

ashcroft.com
info@ashcroft.com
1.800.328.8258

1279 Duragauge® Pressure Gauge

STANDARD PRESSURE RANGES

	psi	bar	kPa	mPa	kg/cm²
Vacuum	30IMV	N1BR	N100KP	N1MP	N1KG
	–	N1/0.6BR	N100/60KP	0.1/0.06MP	N1/0.6KG
Compound	V/15#	–	–	–	–
	–	N1/1.5BR	N100/150KP	N0.1/0.15MP	N1/1.5KG
	V/30#	–	–	–	–
	–	N1/3BR	N100/300KP	N0.1/0.3MP	N1/3KG
	V/60#	–	–	–	–
	–	N1/5BR	N100/500KP	N0.1/0.5MP	N1/5KG
	V/100#	–	–	–	–
	–	N1/9BR	N100/900KP	N0.1/0.9MP	N1/9KG
Positive Pressure	15#	1BR	100KP	0.1MP	1KG
	20#	–	–	–	–
	–	1.6BR	160KP	0.16MP	1.6KG
	30#	–	–	–	–
	–	2.5BR	250KP	0.25MP	2.5KG
	60#	4BR	400KP	0.4MP	4KG
	–	6BR	600KP	0.6MP	6KG
	100#	–	–	–	–
	120#	–	–	–	–
	–	10BR	1000KP	1MP	10KG
	160#	–	–	–	–
	200#	–	–	–	–
	–	16BR	1600KP	1.6MP	16KG
	300#	–	–	–	–
	–	25BR	2500KP	2.5MP	25KG
	400#	–	–	–	–
	500#	–	–	–	–
	600#	40BR	4000KP	4MP	40KG
	800#	–	–	–	–
	–	60BR	6000KP	6MP	60KG
	1000#	–	–	–	–
	1500#	100BR	10000KP	10MP	100KG
	2000#	–	–	–	–
	–	160BR	16000KP	16MP	160KG
	3000#	–	–	–	–
	–	250BR	25000KP	25MP	250KG
	4000#	–	–	–	–
	5000#	–	–	–	–
	6000#	400BR	40000KP	40MP	400KG
	8000#	–	–	–	–
	–	600BR	60000KP	60MP	600KG
	10000#	–	–	–	–
	15000#	1000BR	100000KP	100MP	1000KG
	20000#	-	-	-	-
	-	1600BR	-	160MP	1600KG
	30000#	-	-	-	-
		2500BR	-	250MP	2500KG

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2018 Ashcroft Inc. 1279_gauge_ds4.0, Rev. D, 07/18

ashcroft.com
info@ashcroft.com
1.800.328.8258

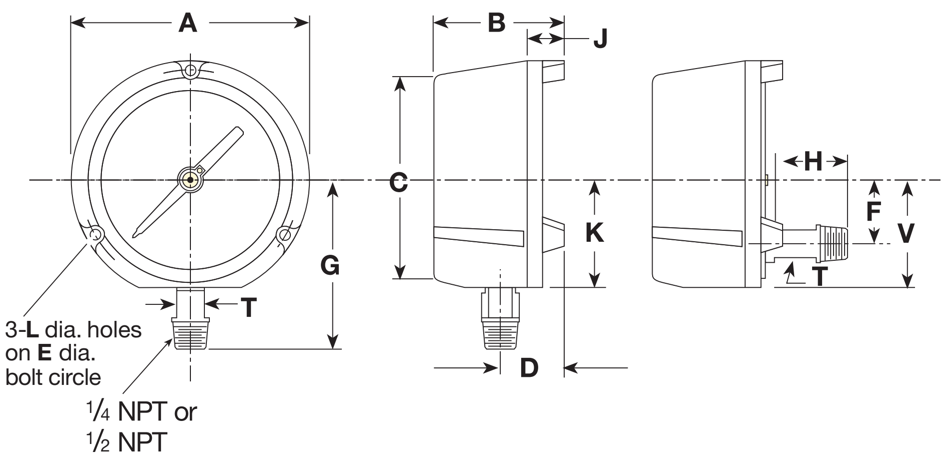
ASHCROFT®
Trust the shield.®

1279 Duragauge® Pressure Gauge

DIMENSIONS in [ ] are millimeters

For reference only, consult Ashcroft for specific dimensional drawings

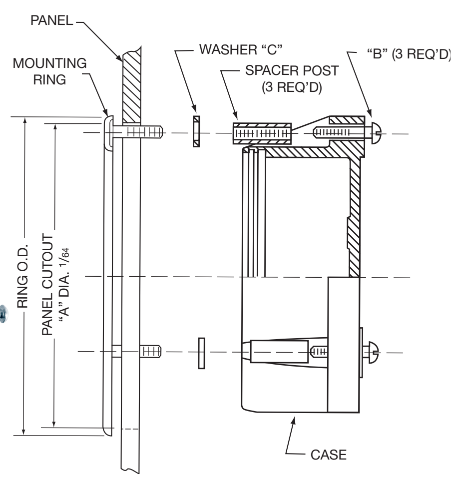
Dial Size Inches	A	B	C	D	E	F	G	H	J	K	T	V	Weight oz / kg
4½	5.81 [147.6]	3.36 [85.3]	5.07 [128.7]	1.06 [40.6]	5.375 [137]	1.62 [41.2]	3.92 [99.6]	0.73 [18.4]	0.22 [5.5]	2.62 [66.7]	0.94 [23.9]	2.625 [67]	2.5 (Dry) 3.5 (L.F.)



1278M Series Flush Mounting Ring

1278M Series Flush Mounting Ring. Used to flush mount gauge case 1279(*)S. Black finish (STD.); Polished SS finish (OPT.)

Gauge Size Inches	Ring O.D.	"A" DIA.	"B" Size of 3 Screws	"C" Size of Washers
4½	6 [152]	5.625 [148]	#10-24 x 1⅝	7/16 x 17/64 x ⅝



All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2018 Ashcroft Inc. 1279_gauge_ds4.0, Rev. D, 07/18

ashcroft.com
info@ashcroft.com
1.800.328.8258

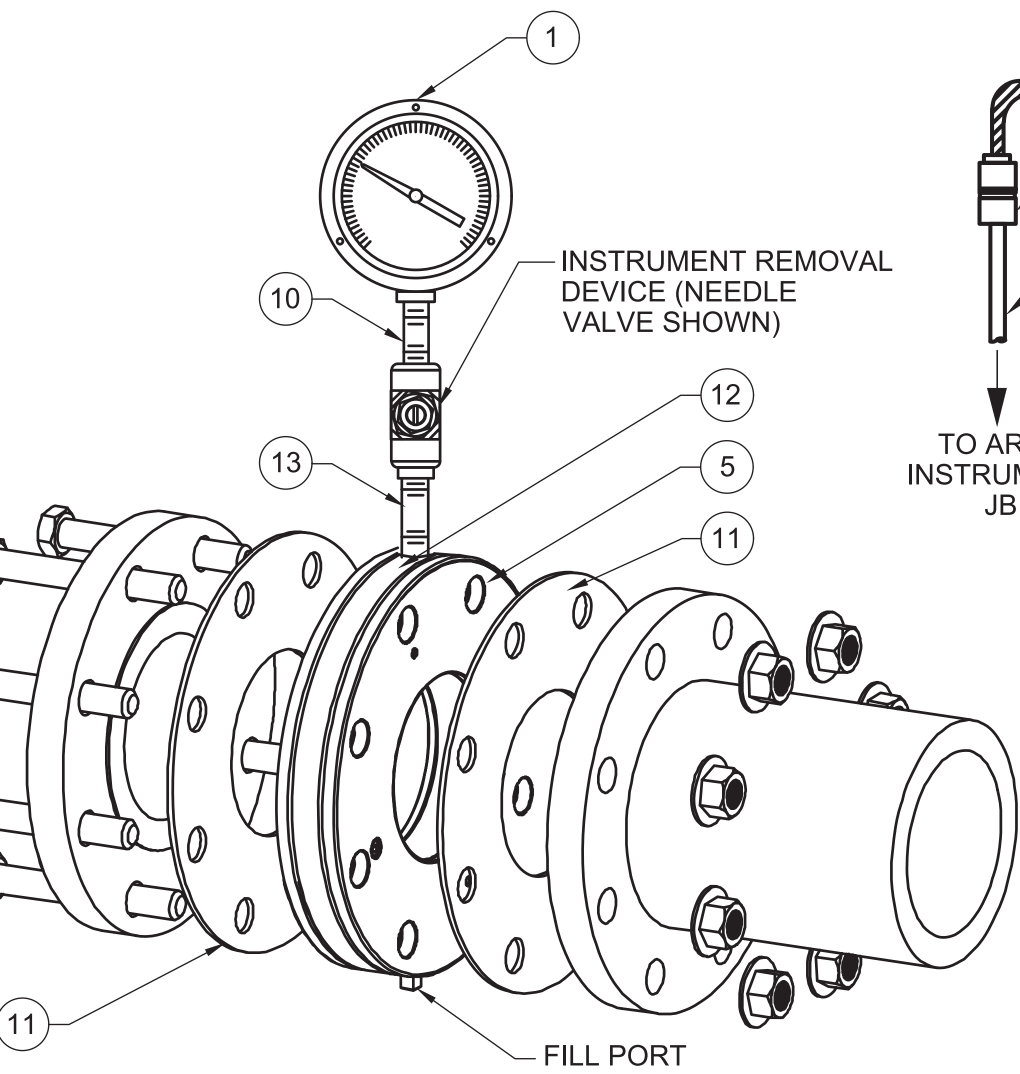
ASHCROFT®
Trust the shield.®

1279 Duragauge® Pressure Gauge

TABLE 1 - OPTIONS	
CODE	**OPTION**
AB	Gauges calibrated to compensate for absolute pressure
DA	Dial marking (text marking on the dial)
EP	Maximum pointer (adjustable, N/A with liquid filled or hermetically sealed cases)
GV	Silicone case fill
GX	Halocarbon® case fill
HY	Hydrostatic/pneumatic testing (system pressurized to 150% of rated system pressure for 5 minutes. Overload stop STD.)
LL	***PLUS!***™
NG	Non-glare glass (N/A with liquid fill or hermetically sealed cases)
NH	SS tag wired to case
OS	Overload stop
PD	Acrylic window (STD. with liquid filled or hermetically sealed cases)
SH	Red set hand, stationary
SG	Safety glass
TS	Throttle screw (STD. with liquid filled, hermetically sealed or ***PLUS!***™ Performance)
VS	Underload stop
C4	Individual calibration chart (in accordance with ASME B40.100:2013. Accuracy traceable to NIST)
6B	Cleaned for oxygen service
56	Flush mounting ring

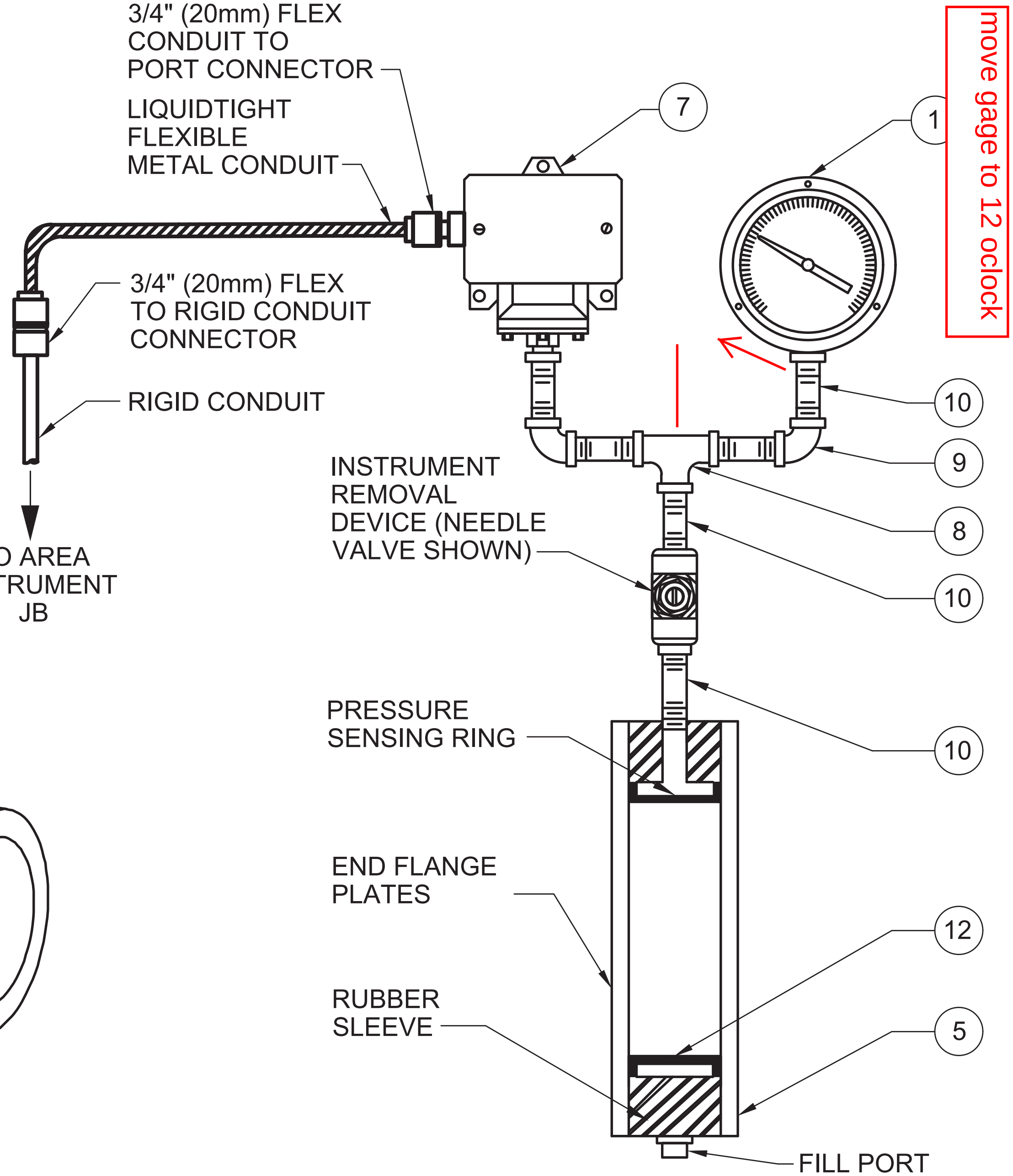
All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2018 Ashcroft Inc. 1279_gauge_ds4.0, Rev. D, 07/18

ashcroft.com
info@ashcroft.com
1.800.328.8258



CROSS-SECTION
EXPLODED-VIEW

PRESSURE GAUGE WITH ANNULAR SEAL



CROSS-SECTION
SIDE-VIEW

PRESSURE GAUGE AND SWITCH WITH ANNULAR SEAL

PRESSURE GAUGE INSTALLATION, OPERATION AND MAINTENANCE

I&M008-10098-5/02 (250-1353-L) Rev. 12/15

CONTENTS

			Page
1.0	**Selection and Application**		
	1.1	Range	4
	1.2	Temperature	4
	1.3	Media	4
	1.4	Oxidizing media	4
	1.5	Pulsation/Vibration	4
	1.6	Gauge fills	4
	1.7	Mounting	4
2.0	**Temperature**		
	2.1	Ambient Temperature	4
	2.2	Accuracy	4
	2.3	Steam service	4
	2.4	Hot or very cold media	4
	2.5	Diaphragm seals	5
	2.6	Autoclaving	5
3.0	**Installation**		
	3.1	Installation Location	5
	3.2	Gauge reuse	5
	3.3	Tightening of gauge	5
	3.4	Process isolation	5
	3.5	Surface mounting	5
	3.6	Flush mounting	5
4.0	**Operation**		
	4.1	Frequency of inspection	5
	4.2	In-service inspection	5
	4.3	When to check accuracy	5
	4.4	When to recalibrate	5
	4.5	Other considerations	5
	4.6	Spare parts	5
5.0	**Gauge Replacement**		5
6.0	**Accuracy: Procedures/Definitions**		6
	6.1	Calibration - Rotary movement gauges	7
7.0	**Diaphragm Seals**		
	7.1	General	8
	7.2	Installation	8
	7.3	Operation	8
	7.4	Maintenance	8
	7.5	Failures	8
8.0	**Dampening Devices**		
	8.1	General	8
	8.2	Throttle Screws & Plugs	8
	8.3	Ashcroft Pulsation Dampener	8
	8.4	Ashcroft Pressure Snubber	8
	8.5	Ashcroft Needle Valves	8
	8.6	Chemiquip® Pressure Limiting Valves	8
9.0	**Test Equipment & Tool Kits**		
	9.1	Pressure Instrument Testing Equipment	9
	9.2	Tools & Tool Kits	9
	9.3	Kits to Convert a Dry Gauge to a Liquid Filled or Weather Proof Case Gauge	9
	9.4	2½ & 3½ 1009 Duralife® Gauge Tools	10
Appendix			
	Type 1188 Bellows Gauge Calibration Procedure		11
	Type 1009 Calibration Procedure (Vacuum-Previous Style)		12
	Type 1009 Calibration Procedure (Pressure-Previous Style)		13
	Type 1009 Calibration Procedure (Pressure & Vacuum-Current Style)		14
	Type 1279 & 1379 I&M Liquid Fill Conversion Instruction		15-16
	Type 1082 Calibration Procedure		17-18

Cover photo courtesy of Johnson/Yokogawa Co.

Chemiquip® is a registered trademark of Chemiquip Products Co. Inc.

1.0 SELECTION & APPLICATION

Users should become familiar with ASME B40.100 (Gauges – Pressure Indicating Dial Type – Elastic Element) before specifying pressure measuring gauges. That document – containing valuable information regarding gauge construction, accuracy, safety, selection and testing – may be ordered from:

ASME International
Three Park Avenue
New York, N.Y. 10016-5990
800-843-2763 (US/Canada)
001-800-843-2763 (Mexico)
973-882-1170 outside North America
email: infocentral@asme.org
www.asme.org

WARNING: To prevent misapplication, pressure gauges should be selected considering media and ambient operating conditions. Improper application can be detrimental to the gauge, causing failure and possible personal injury, property damage or death. The information contained in this manual is offered as a guide in making the proper selection of a pressure gauge. Additional information is available from Ashcroft Inc.

The following is a highlight of some of the more important considerations:

1.1 Range – The range of the instrument should be approximately twice the maximum operating pressure. Too low a range may result in (a) low fatigue life of the elastic element due to high operating stress and (b) susceptibility to overpressure set due to pressure transients that exceed the normal operating pressure. Too high a range may yield insufficient resolution for the application.

1.2 Temperature – Refer to Section 2 of this manual for important information concerning temperature related limitations of pressure gauges, both dry and liquid filled.

1.3 Media – The material of the process sensing element must be compatible with the process media. Use of a diaphragm seal with the gauge is recommended for process media that (a) is corrosive to the process sensing element; (b) contain heavy particulates (slurries) or (c) are very viscous including those that harden at room temperature.

1.4 Oxidizing media – Gauges for direct use on oxidizing media should be specially cleaned. Gauges for oxygen service should be ordered to variation X6B and will carry the ASME required dial marking "USE NO OIL" in red letters. Gauges for direct use on other oxidizing media may be ordered to variation X6W. They will be cleaned but carry no dial marking. *PLUS!*™ Performance gauges or Halocarbon filled gauge or diaphragm fill is required for use with oxidizing media; order variation XCF.

1.5 Pulsation/Vibration – Pressure pulsation can be dampened by several mechanisms; the patented *PLUS! Performance* gauge will handle the vast majority of applications. One exception to this is high frequency pulsation which is difficult to detect. The only indication may be an upscale zero shift due to movement wear. These applications should be addressed with a liquid filled gauge, or in extreme cases, a remotely mounted liquid filled gauge connected with a length of capillary line. The small diameter of the capillary provides excellent dampening, but can be plugged. The Ashcroft 1106 pulsation dampener and 1112 snubber are auxiliary devices which dampen pulsation with less tendency to plug.

1.6 Gauge fills. – Once it has been determined that a liquid filled gauge is in order, the next step is selecting the type of fill. **Glycerin** satisfies most applications. While being the least expensive fill, its usable temperature range is 20/180°F. **Silicone** filled gauges have a broader service range: –40/250°F. Oxidizing media require the use of **Halocarbon,** with a service range of –40/250°F. Pointer motion will be slowed at the low end of the low end of these temperature ranges.

1.7 Mounting – Users should predetermine how the gauge will be mounted in service: stem (pipe), wall (surface) or panel (flush). Ashcroft wall or panel mounting kits should be ordered <u>with</u> the gauge. See Section 3.

2.0 TEMPERATURE

2.1 Ambient Temperature – To ensure long life and accuracy, pressure gauges should preferably be used at an ambient temperature between –20 and +150°F (–30 to +65°C). At very low temperatures, standard gauges may exhibit slow pointer response. Above 150°F, the accuracy will be affected by approximately 1.5% per 100°F. Other than discoloration of the dial and hardening of the gasketing and degradation of accuracy, non-liquid filled Type 1279 (phenolic case) and 1379 (aluminum case) Duragauge® gauge, with standard glass windows, can withstand continuous operating temperatures up to 250°F. Unigauge models 2½˝ and 3½˝ 1009 and 1008S liquid filled gauges can withstand 200°F but glycerin fill and the acrylic window of Duragauge® gauges will tend to yellow. Silicone fill will have much less tendency to yellow. Low pressure, liquid filled Types 1008 and 1009 gauges may have some downscale errors caused by liquid fill expansion. This can be alleviated by venting the gauge at the top plug (pullout the blue plug insert). To do this the gauge must be installed in the vertical position.

Although the gauge may be destroyed and calibration lost, gauges can withstand short times at the following temperatures: gauges with all welded pressure boundary joints, 750°F (400°C); gauges with silver brazed joints, 450°F (232°C) and gauges with soft soldered joints, 250°F (121°C). For expected long term service below –20°F (–30°C) Duragauge® and 4½˝ 1009 gauges should be hermetically sealed and specially lubricated; add "H" to the product code for hermetic sealing. Add variation XVY for special lubricant. Standard Duralife® gauges may be used to –50°F (–45°C) without modification.

2.2 Accuracy – Heat and cold affect accuracy of indication. A general rule of thumb for **dry gauges** is 0.5% of full scale change for every 40°F change from 75°F. Double that allowance for gauges with hermetically sealed or liquid filled cases, except for Duragauge® gauges where no extra allowance is required due to the elastomeric, compensating back. Above 250°F there may exist very significant errors in indication.

2.3 Steam service – In order to prevent live steam from entering the Bourdon tube, a siphon filled with water should be installed between the gauge and the process line. Siphons can be supplied with ratings up to 4,000 psi. If freezing of the condensate in the loop of the siphon is a possibility, a diaphragm seal should be used to isolate the gauge from the process steam. Siphons should also be used whenever condensing, hot vapors (not just steam) are present. Super heated steam should have enough piping or capillary line ahead of the siphon to maintain liquid water in the siphon loop.

2.4 Hot or very cold media – A five foot capillary line assembly will bring most hot or cold process media within the recommended gauge ambient temperature range. For media above

750°F (400°C) the customers should use their own small diameter piping to avoid possible corrosion of the stainless steel. The five foot capillary will protect the gauges used on the common cryogenic (less than –300°F (200°C) gases, liquid argon, nitrogen, and oxygen.) The capillary and gauge must be cleaned for oxygen service. The media must not be corrosive to stainless steel, and must not plug the small bore of the capillary.

2.5 Diaphragm seals – A diaphragm seal should be used to protect gauges from corrosive media, or media that will plug the instrument. Diaphragm seals are offered in a wide variety of designs and corrosion resistant materials to accommodate almost any application and most connections. Visit www.ashcroft.com for details.

2.6 Autoclaving – Sanitary gauges with clamp type connections are frequently steam sterilized in an autoclave. Gauges equipped with polysulfone windows will withstand more autoclave cycles than those equipped with polycarbonate windows. Gauges equipped with plain glass or laminated safety glass **should not be autoclaved.** Gauge cases should be vented to atmosphere (removing the rubber fill/safety plug if necessary) **before** autoclaving to prevent the plastic window from cracking or excessively distorting. If the gauge is liquid filled, the fill should be drained from the case and the front ring loosened before autoclaving.

3.0 INSTALLATION

3.1 Location – Whenever possible, gauges should be located to minimize the effects of vibration, extreme ambient temperatures and moisture. Dry locations away from very high thermal sources (ovens, boilers etc.) are preferred. If the mechanical vibration level is extreme, the gauge should be remotely located (usually on a wall) and connected to the pressure source via flexible tubing.

3.2 Gauge reuse – ASME B40.100 recommends that gauges not be moved indiscriminately from one application to another. The cumulative number of pressure cycles on an in-service or previously used gauge is generally unknown, so it is generally safer to install a new gauge whenever and wherever possible. This will also minimize the possibility of a reaction with previous media.

3.3 Tightening of gauge – Torque should never be applied to the gauge case. Instead, an open end or adjustable wrench should always be used on the wrench flats of the gauge socket to tighten the gauge into the fitting or pipe. NPT threads require the use of a suitable thread sealant, such as pipe dope or teflon tape, and must be tightened very securely to ensure a leak tight seal.

CAUTION: Torque applied to a diaphragm seal or its attached gauge, that tends to loosen one relative to the other, can cause loss of fill and subsequent inaccurate readings. Always apply torque **only** to the wrench flats on the lower seal housing when installing filled, diaphragm seal assemblies or removing same from process lines.

3.4 Process isolation – A shut-off valve should be installed between the gauge and the process in order to be able to isolate the gauge for inspection or replacement without shutting down the process.

3.5 Surface mounting – Also known as wall mounting. Gauges should be kept free of piping strains. The gauge case mounting feet, if applicable, will ensure clearance between the pressure relieving back and the mounting surface.

3.6 Flush mounting – Also known as panel mounting. The applicable panel mounting cutout dimensions can be found at www.ashcroft.com

4.0 OPERATION

4.1 Frequency of inspection – This is quite subjective and depends upon the severity of the service and how critical the accuracy of the indicated pressure is. For example, a monthly inspection frequency may be in order for critical, severe service applications. Annual inspections, or even less frequent schedules, are often employed in non-critical applications.

4.2 In-service inspection – If the accuracy of the gauge cannot be checked in place, the user can at least look for (a) erratic or random pointer motion; (b) readings that are suspect – especially indications of pressure when the user believes the true pressure is 0 psig. Any gauge which is obviously not working or indicating erroneously, should be immediately valved-off or removed from service to avoid a possible pressure boundary failure.

4.3 When to check accuracy – Any suspicious behavior of the gauge pointer warrants that a full accuracy check be performed. Even if the gauge is not showing any symptoms of abnormal performance, the user may want to establish a frequency of bench type inspection.

4.4 When to recalibrate – This depends on the criticality of the application. If the accuracy of a 3-2-3% commercial type gauge is only 0.5% beyond specification, the user must decide whether it's worth the time and expense to bring the gauge back into specification. Conversely if the accuracy of a 0.25% test gauge is found to be 0.1% out of specification then the gauge should be recalibrated.

4.5 Other considerations – These include (a) bent or unattached pointers due to extreme pressure pulsation; (b) broken windows which should be replaced to keep dirt out of the internals; (c) leakage of gauge fill; (d) case damage – dents and/or cracks; (e) any signs of service media leakage through the gauge including its connection; (f) discoloration of gauge fill that impedes readability.

4.6 Spare parts – As a general rule it is recommended that the user maintain in inventory one complete Ashcroft® instrument for every ten (or fraction thereof) of that instrument type in service.

5.0 GAUGE REPLACEMENT

It is recommended that the user stock one complete Ashcroft® instrument for every ten (or fraction thereof) of that instrument type in service. With regard to gauges having a service history, consideration should be given to discarding rather than repairing them. Gauges in this category include the following:

- **a.** Gauges that exhibit a span shift greater than 10%. It is possible the Bourdon tube has suffered thinning of its walls by corrosion.
- **b.** Gauges that exhibit a zero shift greater than 25%. It is likely the Bourdon tube has seen significant overpressure leaving residual stresses that may be detrimental to the application.
- **c.** Gauges which have accumulated over 1,000,000 pressure cycles with significant pointer excursion.
- **d.** Gauges showing any signs of corrosion and/or leakage of the pressure system.
- **e.** Gauges which have been exposed to high temperature or exhibit signs of having been exposed to high temperature – specifically 250°F or greater for soft soldered systems; 450°F or greater for brazed systems; and 750°F or greater for welded systems.

f. Gauges showing significant friction error and/or wear of the movement and linkage.

g. Gauges having damaged sockets, especially damaged threads.

h. Liquid filled gauges showing loss of case fill.

NOTE: ASME B40.100 does not recommend moving gauges from one application to another. This policy is prudent in that it encourages the user to procure a new gauge, properly tailored by specification, to each application that arises.

6.0 ACCURACY: PROCEDURES/DEFINITIONS

Accuracy inspection – Readings at approximately five points equally spaced over the dial should be taken, both upscale and downscale, before and after lightly rapping the gauge to remove friction. **A pressure standard with accuracy at least four times greater than the accuracy of the gauge being tested is recommended.**

Equipment – A finely regulated pressure supply will be required. It is critical that the piping system associated with the test setup be leaktight. The gauge under test should be positioned as it will be in service to eliminate positional errors due to gravity.

Method – ASME B40.100 recommends that **known** pressure (based on the reading from the pressure standard used) be applied to the gauge under test. Readings including any error from the nominal input pressure, are then taken from the gauge under test. The practice of aligning the pointer of the gauge under test with a dial graduation and then reading the error from the master gauge ("reverse reading") can result in inconsistent and misleading data and should NOT be used.

Calibration chart – After recording all of the readings it is necessary to calculate the errors associated with each test point using the following formula: ERROR in percent = 100 times (TRUE VALUE minus READING) ÷ RANGE. Plotting the individual errors (Figure 1) makes it possible to visualize the total gauge characteristic. The plot should contain all four curves: upscale – before rap; upscale – after rap; downscale – before rap; downscale – after rap. "*Rap*" means lightly tapping the gauge **before** reading to remove friction as described in ASME B40.100.

Referring to Figure 1, several classes of error may be seen:

Zero – An error which is approximately equal over the entire scale. This error can be manifested when either the gauge is

FIG. 1

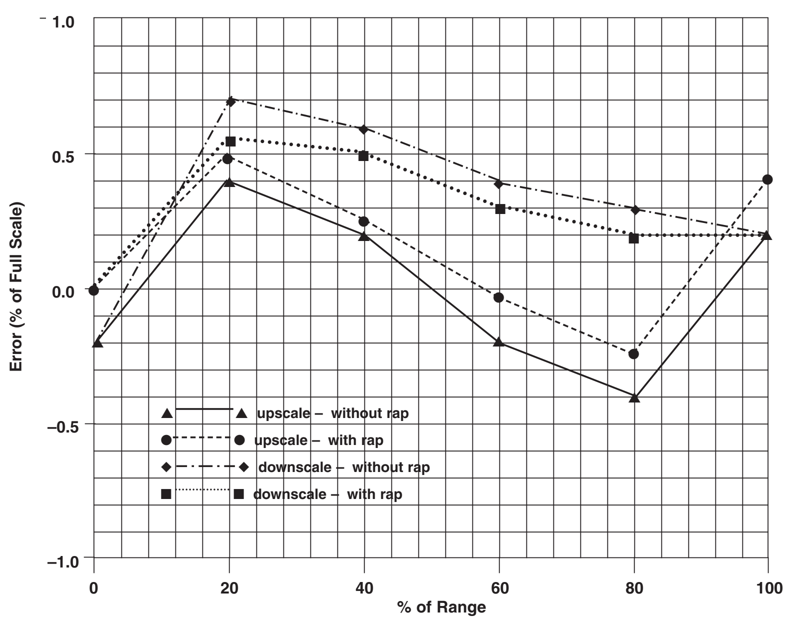
TYPICAL CALIBRATION CHART

INDICATED VALUE (PSI)

True Value – PSI	Increasing – Without RAP	Increasing – With RAP	Decreasing – Without RAP	Decreasing – With RAP
0	–.4	0	–.4	0
40	+.8	+1.0	+1.4	+1.1
80	+.4	+.5	+1.2	+1.0
120	–.4	–1.0	+.8	+.6
160	–.8	–.5	+.6	+.4
200	+.4	+.8	+.4	+.4

ERROR (% OF FULL SCALE)

True Value – % of Range	Increasing – Without RAP	Increasing – With RAP	Decreasing – Without RAP	Decreasing – With RAP
0	–.20	0	–.20	0
20	+.40	+.50	+.70	+.55
40	+.20	+.25	+.60	+.50
60	–.20	–.05	+.40	+.30
80	–.40	–.25	+.30	+.20
100	+.20	+.40	+.20	+.20



dropped or overpressured and the Bourdon tube takes a permanent set. This error may often be corrected by simply repositioning the pointer. Except for test gauges, it is recommended that the pointer be set at midscale pressure to “split” the errors.

Span – A span error exists when the error at full scale pressure is different from the error at zero pressure. This error is often proportional to the applied pressure. Most Ashcroft gauges are equipped with an internal, adjusting mechanism with which the user can correct any span errors which have developed in service.

Linearity – A gauge that has been properly spanned can still be out of specification at intermediate points if the response of the gauge as seen in Figure 1 (Typical Calibration Chart) is not linear. The Ashcroft Duragauge® pressure gauge is equipped with a rotary movement feature which permits the user to minimize this class of error. Other Ashcroft gauge designs (e.g., 1009 Duralife®) require that the dial be moved left or right prior to tightening the dial screws.

Hysteresis – Some Bourdon tubes have a material property known as hysteresis. This material characteristic results in differences between the upscale and downscale curves. This class of error can **not** be eliminated by adjusting the gauge movement or dial position.

Friction – This error is defined as the difference in readings before and after lightly tapping the gauge case at a check point. Possible causes of friction are burrs or foreign material in the movement gearing, “bound” linkages between the movement and the bourdon tube, or an improperly tensioned hairspring. If correcting these potential causes of friction does not eliminate excessive friction error, the movement should be replaced.

6.1 Calibration – Rotary Movement Gauges and Type 1259 Gauges – Inspect gauge for accuracy. Many times gauges are simply “off zero” and a simple pointer adjustment using the micrometer pointer is adequate. If inspection shows the gauge warrants recalibration to correct span and/or linearity errors, proceed as follows:

a. Remove ring, window and, if solid front case, the rear closure assembly.

b. Pressurize the gauge **once** to full scale and back to zero.

c. Refer to Figure 2 (Ashcroft System Assembly w/Rotary Gear Movement) for a view of a typical Ashcroft rotary system assembly with component parts identified. Refer to

FIG. 2 ASHCROFT SYSTEM ASSEMBLY W/ROTARY GEAR MOVEMENT

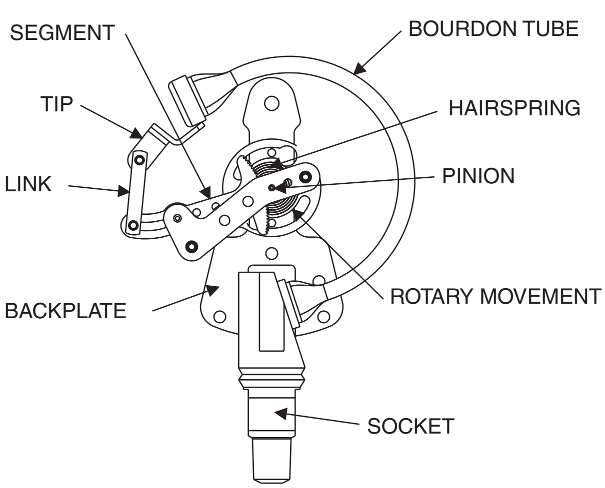


FIG. 2A ASHCROFT TYPE 1259 SYSTEM ASSEMBLY

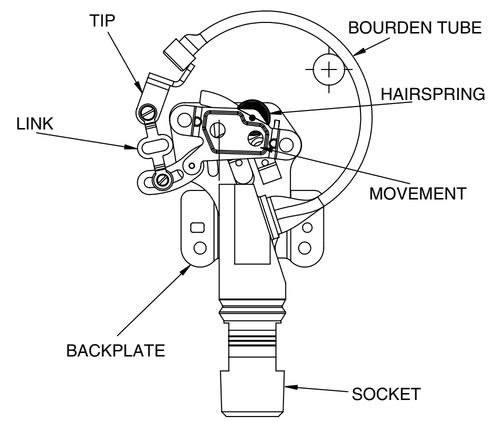


Figure 2A for link configuration of Type 1259 gauge.

d. Adjust the micrometer pointer so that it rests at the true zero position. For open front gauges the pointer and dial must also be disassembled and the pointer should then be lightly pressed onto the pinion at the 9:00 o’clock position.

e. Apply full scale pressure and note the magnitude of the span error. With open front gauges, ideal span (270 degrees) will exist when at full scale pressure the pointer rests exactly at the 6:00 o’clock position.

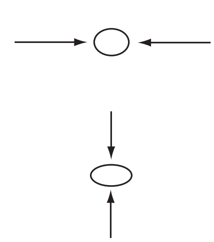
f. If the span has shifted significantly (span error greater than 10%), the gauge should be replaced because there may be some partial corrosion inside the Bourdon tube which could lead to ultimate failure. If the span error exceeds 0.25%, loosen the lower link screw and move the lower end of the link toward the movement to increase span or away to decrease span. An adjustment of 0.004 inch will change the span by approximately 1%. This is a repetitive procedure which often requires more than one adjustment of the link position and the subsequent rechecking of the errors at zero and full scale pressure.

g. Apply midscale pressure and note error in reading. Even though the gauge is accurate at zero and full scale, it may be inaccurate at the midpoint. This is called linearity error. For corrections to linearity with the Type 1259

FIG. 2B LINEARITY ADJUSTMENT & LINK CONFIGURATION FOR ASHCROFT TYPE 1259

To increase pointer indication at mid-scale, use a pliers to open the link.

To decrease pointer indication at mid-scale, use a pliers to close the link.



gauges refer to Figure 2B. For rotary movement gauges, note the following: if the error is positive, the movement should be rotated counter clockwise. Rotating the movement one degree will change this error by approximately 0.25%. Rotating the movement often affects span and it should be subsequently rechecked and readjusted if necessary according to step 6.1e and 6.1f.

h. While recalibrating the gauge, the friction error – difference in readings taken with and without rap – should be noted. This error should not exceed the basic accuracy of the gauge. If the friction error is excessive, the movement should be replaced. One possible cause of excessive friction is improper adjustment of the hairspring. The hairspring torque,or tension, must be adequate without being excessive. The hairspring should also be level, unwind evenly (no turns rubbing) and it should never tangle.

NOTES:

1 For operation of test gauge external zero reset, refer to page 17.

2 For test gauge calibration procedure, refer to Figure 2 on page 18.

7.0 DIAPHRAGM SEALS

7.1 General – A diaphragm seal (isolator) is a device which is attached to the inlet connection of a pressure instrument to isolate its measuring element from the process media. The space between the diaphragm and the instrument's pressure sensing element is solidly filled with a suitable liquid. Displacement of the liquid fill in the pressure element, through movement of the diaphragm, transmits process pressure changes directly to a gauge, switch or any other pressure instrument. When diaphragm seals are used with pressure gauges, an additional 0.5% tolerance must be added to the gauge accuracy because of the diaphragm spring rate.

Used in a variety of process applications where corrosives, slurries or viscous fluids may be encountered, the diaphragm seal affords protection to the instrument where:

- The process fluid being measured would normally clog the pressure element.
- Pressure element materials capable of withstanding corrosive effects of certain fluids are not available.
- The process fluid might freeze due to changes in ambient temperature and damage the element.

7.2 Installation – Refer to bulletin OH-1 for information regarding (a) seal configurations; (b) filling fluids; (c) temperature range of filling fluids; (d) diaphragm material pressure and temperature limits; (e) bottom housing material pressure and temperature limits; (f) pressure rating of seal assembly; (g) accuracy/temperature errors of seal assembly; (h) diaphragm seal displacement. The volumetric displacement of the diaphragm must at least equal the volumetric displacement of the measuring element in the pressure instrument to which the seal is to be attached.

It is imperative that the pressure instrument/diaphragm seal assembly be **properly** filled prior to being placed in service. Ashcroft diaphragm seal assemblies should only be filled by a seal assembler certified by Ashcroft Inc. Refer to section 3.3 for a cautionary note about not applying torque on either the instrument or seal relative to the other.

7.3 Operation – All Ashcroft® diaphragm seals, with the exception of Type 310 mini-seals, are continuous duty. Should the pressure instrument fail, or be removed accidentally or deliberately, the diaphragm will seat against a matching surface preventing damage to the diaphragm or leakage of the process fluid.

7.4 Maintenance – Clamp type diaphragm seals – Types 100, 200 and 300 – allow for replacement of the diaphragm or diaphragm capsule, if that ever becomes necessary. The Type 200 top housing must also be replaced with the diaphragm. With all three types the clamping arrangement allows field disassembly to permit cleaning of the seal interior.

7.5 Failures – Diaphragm failures are generally caused by either corrosion, high temperatures or fill leakage. Process media build-up on the process side of the diaphragm can also require seal cleaning or replacement. Consult Customer Service, Stratford CT for advice on seal failures and/or replacement.

WARNING: All seal components should be selected considering process and ambient operating conditions to prevent misapplication. Improper application could result in failure, possible personal injury, property damage or death.

8.0 DAMPENING DEVICES

8.1 General – Some type of dampening device should be used whenever the pressure gauge may be exposed to repetitive pressure fluctuations that are fairly rapid, high in magnitude and especially when transitory pressure spikes exceeding the gauge range are present (as with starting and stopping action of valves and pumps). A restricted orifice of some kind is employed through which pressure fluctuations must pass before they reach the Bourdon tube. The dampener reduces the magnitude of the pressure pulse thus extending the life of the Bourdon tube and movement. This reduction of the pressure pulsation as "seen" by the pressure gauge is generally evidenced by a reduction in the pointer travel. If the orifice is very small the pointer may indicate the average service pressure, with little or no indication of the time varying component of the process pressure.

Commonly encountered media (e.g. – water and hydraulic oil) often carry impurities which can plug the orifice over time thus rendering the gauge inoperative until the dampener is cleaned or replaced.

Highly viscous media and media that tend to periodically harden (e.g., asphalt) require a diaphragm seal be fitted to the gauge. The seal contains an internal orifice which dampens the pressure fluctuation within the fill fluid.

8.2 Throttle Screws & Plugs – These accessories provide dampening for the least cost. They have the advantage of fitting completely within the gauge socket and come in three types: (a) a screwed-in type which permits easy removal for cleaning or replacement; (b) a pressed in, non-threaded design and (c) a pressed in, threaded design which provides a highly restrictive, helical flow path. Not all styles are available on all gauge types.

8.3 Ashcroft Pulsation Dampener – Type 1106 Ashcroft pulsation dampener is a moving pin type in which the restricted orifice is the clearance between the pin and any one of five preselected hole diameters. Unlike a simple throttle screw/plug, this device has a self-cleaning action in that the pin moves up and down under the influence of pressure fluctuations.

8.4 Ashcroft Pressure Snubber – The heart of the Type 1112 pressure snubber is a thick porous metal filter disc. The disc is available in four standard porosity grades.

8.5 Ashcroft Needle Valves – Type 7001 thru 7004 steel needle valves provide varying degrees of dampening. These devices, in the event of plugging, can easily be opened to allow the pressure fluid to clear away the obstruction.

8.6 Chemiquip® Pressure Limiting Valves – Model PLV-255, PLV-2550, PLV-5460, PLV-5500 and PLV-6430, available with and without built-in snubbers, automatically "shut off" at adjustable preset values of pressure to protect the gauge from damage to overpressure. They are especially useful on hydraulic systems wherein hydraulic transients (spikes) are common.

9.0 TEST EQUIPMENT & TOOL KITS

See our website www.ashcroft.com for more details

9.1 Pressure Instrument Testing Equipment

Type 1305D Deadweight Tester

Type 1327D Pressure Gauge Comparator

Type 1327CM "Precision" Gauge Comparator

9.2 Tools & Tool Kits For Recalibration of 4½˝ and Larger Gauges

Type 2505 universal carrying case for 1082 test gauge

Type 266A132-01 span wrench for 1082 test gauge

Type 1281 socket O-Ring kit for 1279/1379 lower connect

Type 1285 4½˝ ring wrench for 1279/1379 lower & back connect

Type 1286 6˝ ring wrench for 1379 lower & back connect

Type 3220 pointer puller (all gauges except 1009 Duralife®)

Type 3530 pinion back-up tool for 1009 Duralife®

Type 3220 Handjack set

Type 1105 Tool Kit

9.3 Kits to Convert a Dry Gauge to a Liquid Filled or Weather Proof Case Gauge

Type 1280 conversion kit for 4½˝ lower connect 1279/1379

Type 1283 conversion kit for 4½˝ back connect 1279/1379

Type 1284 conversion kit for 6˝ lower & back connect

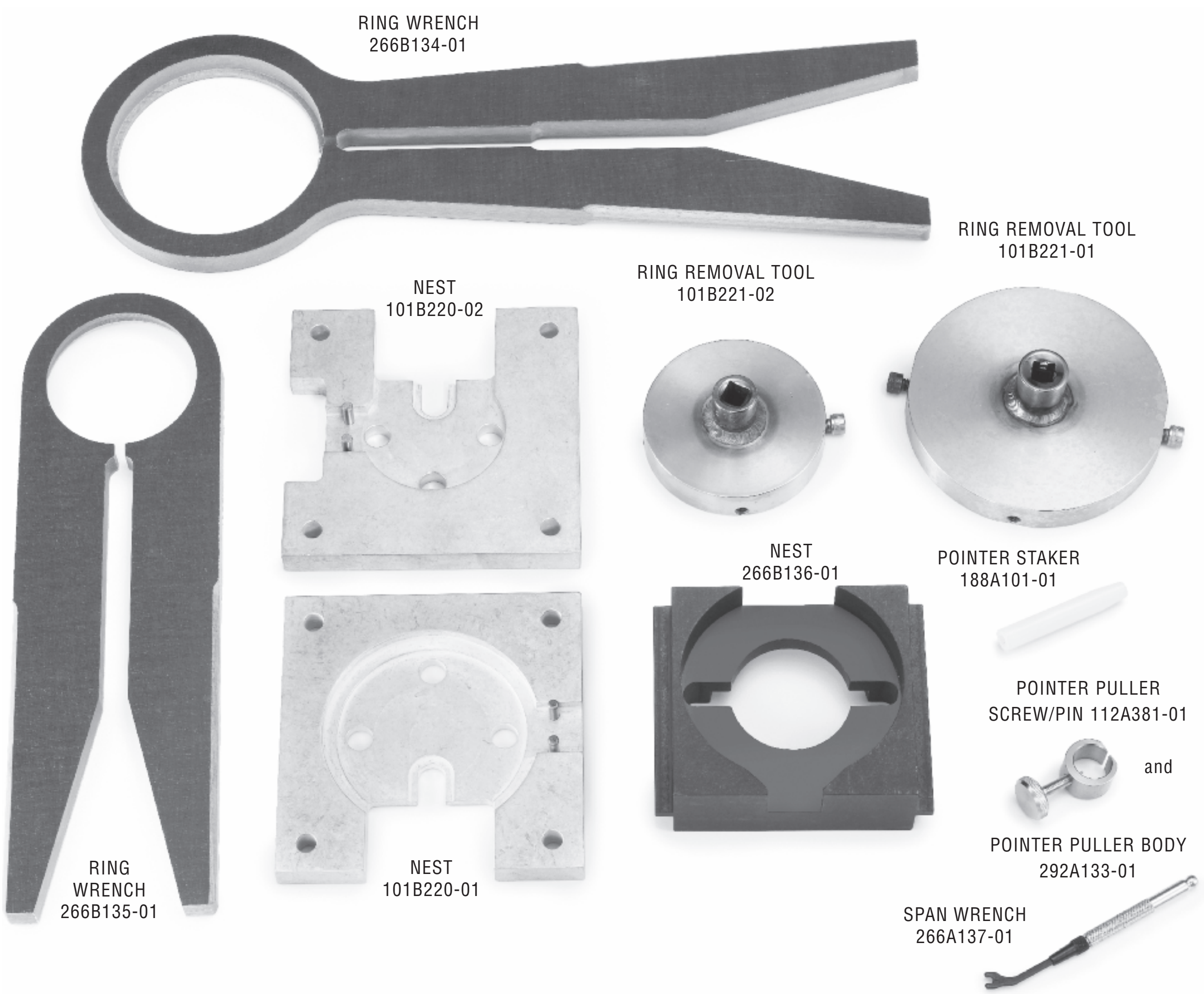
TYPE 1105
TOOL KIT

TYPE 3220
HAND JACK SET

9.4 2½ & 3½ 1009 Duralife® Gauge Tools

Description	Part No.
Pointer Puller Screw/Pin(2)(3)(4)	112A381-01
Pointer Puller Body(2)(3)(4)	292A133-01
Pointer Staker(2)(4)	188A101-01
Span Wrench(2)(5) (to adjust span)	266A137-01
Ring Wrench 3½˝(1)(5) (for ring removal) (35 1009)	266B134-01
Ring Wrench 2½˝(1)(5) (for ring removal) (25 1009)	266B135-01
Nest 2½˝ & 3½˝(1)(5) (to hold gauge for ring removal) (25/35 1009)	266B136-01
Ring Removal Tool(6) (25 1009)	101B221-02
Ring Removal Tool(6) (35 1009)	101B221-01
Nest 2½˝(6) (to hold gauge for ring removal) (25 1009)	101B220-02
Nest 3½˝(6) (to hold gauge for ring removal) (35 1009)	101B220-01
Type 1230 throttle plug insertion (¼ NPT) for 1009 Duralife®)	1230
Type 1231 throttle plug insertion (½ NPT) for 1009 Duralife® (body only)	1231
Tool to open orifice on push-in throttle plug	101A206-01

(1) Formerly 1206T Tool Kit.
(2) Formerly some parts in 1205T Tool Kit.
(3) Both parts must be purchased together.
(4) Previous and current design.
(5) Previous design only.
(6) Current design only.



CALIBRATION & TROUBLE CORRECTION DIAGRAM

- **RANGE SPAN ADJUSTMENT**
  - **RANGE TOO SHORT** Adjust slide “S” inward
  - **RANGE TOO LONG** Adjust slide “S” outward
- **POINTER JUMPING**
  - **STICKY PARTS** Clean all bearings and gear teeth
  - **LOOSE HAIRSPRING** Remove backlash by disengaging pinion & rotate to tighten
  - **COUNTER BALANCE RUBBING** Bend if necessary to clear socket in travel
- **SLUGGISH MOVEMENT**
  - **TIGHT HAIRSPRING** Loosen by disengaging pinion & rotate
- **NON LINEAR**
  - **NON LINEAR FIRST 3RD.** → **ADJ. ANGLE OF PULL BY INCREASING ANGLE “A”**
  - **NON LINEAR LAST 3RD.** → **ADJ. ANGLE OF PULL BY DECREASING ANGLE “A”**

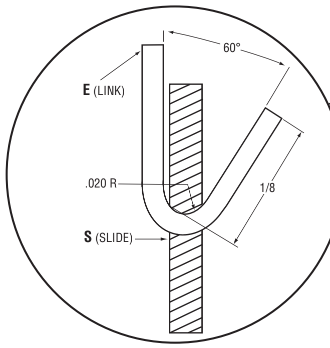
NOTE: After adjusting range span, set both movement stops. Set the underload stop so that the pointer will stop at zero. Set the overload stop so that the pointer will pass the maximum range approximately 5˝.

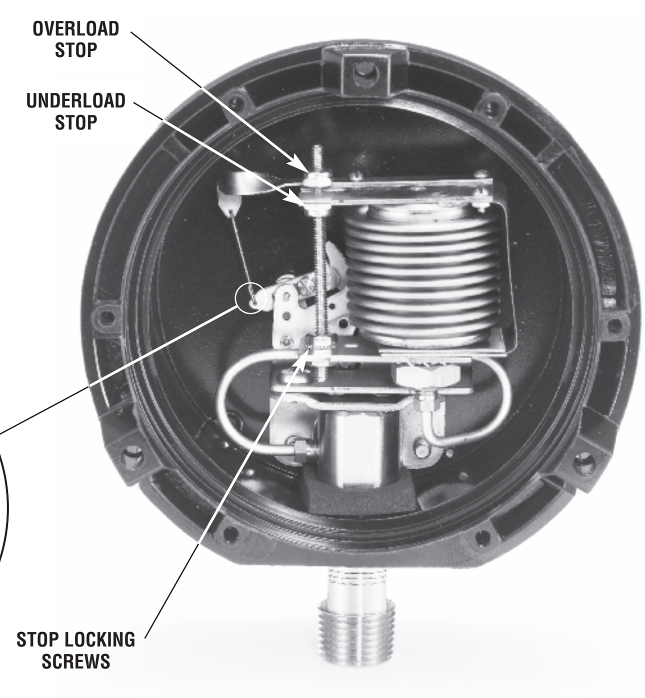
After adjusting span re-zero pointer by removing from pinion and re-assembling at the proper dial mark.

NOTE: To increase or decrease angle “A,“ bend tip inward or outward as required. Doing this may run the movement segment off the pinion. This can be corrected by cutting off one end off the link “E” decreasing its length, or makin a new length from .032 dia. phos. bronze wire.
Caution: When reproducing link end, follow figure 44 very closely. this will prevent too much play, or, binding in operation.

REF: Replacing System Bellows
After assembling bellows to the gauge socket securely, subject system to 30 psi for five minutes, allowing bellows to travel approximately 1/8˝ against the overload stop. After this, heat treat system for 15 hours at 250°F, this procedure is necssary to prevent gauge drift.

SLIDE AND LINK (angle “A”)
Enlarged view of slide and link





© Ashcroft Inc., 250 E. Main St., Stratford, CT 06614-5145, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10173-3/10 (1188)

1. Remove ring, window and gasket pointer.

2. Using a pencil, refer to dial and mark the 0 and 25˝ Hg positions on the case flange.

3. Remove dial.

4. Apply 25˝ Hg vac.

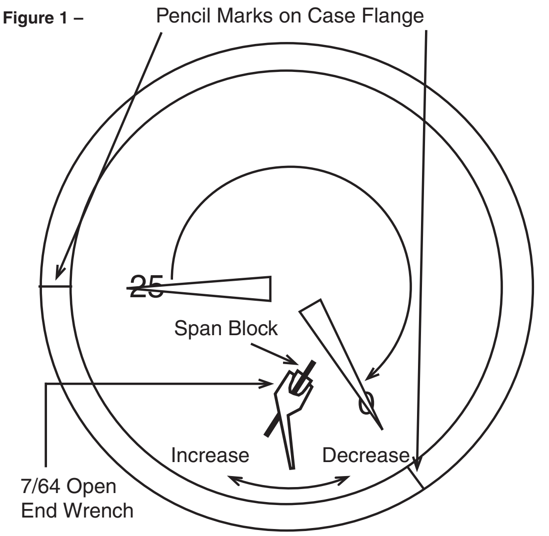
5. Lightly press pointer onto pinion carefully aligning it with the 25˝ Hg vac. mark on the flange.

6. Release vacuum fully.

7. Note agreement of pointer to zero mark on flange.

8. If span is high or low, turn span block as shown in Figure 1.

Figure 1 –



9. Repeat steps 4 through 8 until span is correct.

10. Remove pointer.

11. With 25˝ Hg vac applied, reassemble dial, dial screws (finger tight) and point.

12. Apply 15˝ Hg vac. and note accuracy of indication. If required, slide dial left or right to reduce error to 1% maximum.

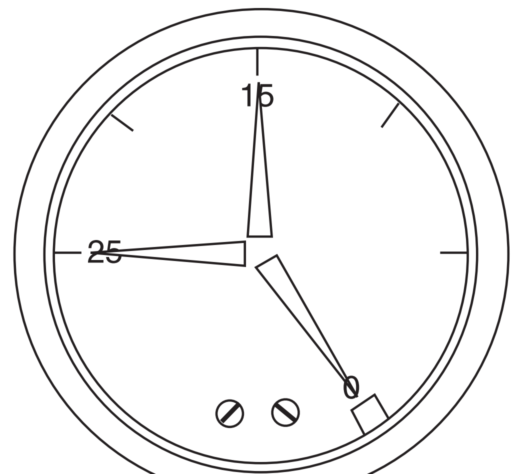
13. Firmly tighten dial screws.

14. Firmly tap pointer onto pinion.

15. recheck accuracy at 15 and 25˝ Hg vac. (Figure 2).

16. Reassemble window, gasket and ring.

Figure 2 –

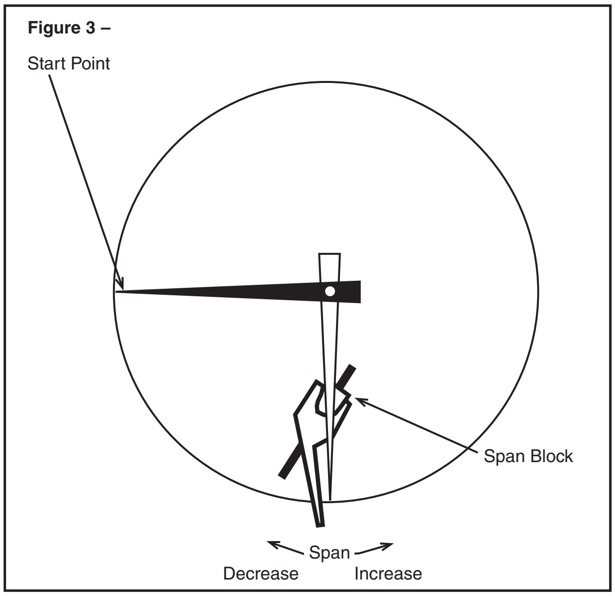


Notes: See page 10 for any tools required to calibrate.

For models produced prior to September 2008 for 2½˝ version and December 2008 for 3½˝ version.
Back of gauge will have a date code sticker.

© 2010 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614-5145, USA, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10077 9/01 AMR 05/10

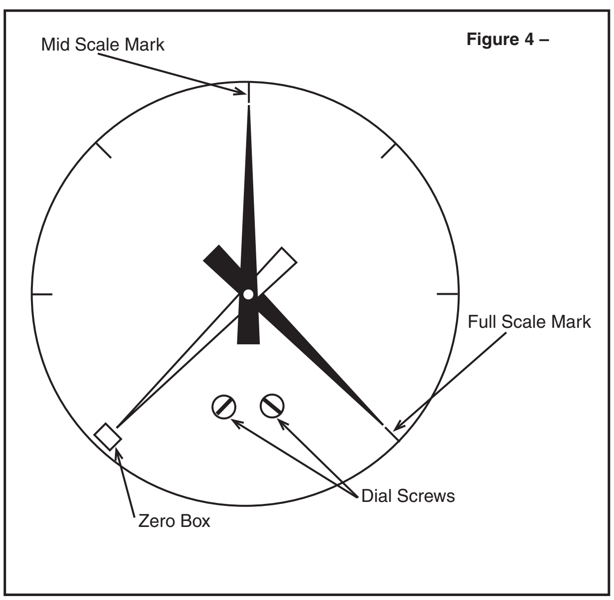
Step 1. With the dial off, install pointer at 9 o'clock "lightly," Figure 3.



Step 2. Go to full scale pressure…rotate span block with tool until pointer rests at 6 o'clock.

Step 3. Go to zero pressure (9 o'clock)…if pointer has not moved away from start point, go to Step 4. If pointer has moved, repeat Step 1 until span is correct.

Step 4. Install dial with screws snug.



Step 5. Install pointer centered in zero box, Figure 4.

Step 6. Go to full scale pressure…check that pointer is within 1% of full scale mark. If not, remove pointer and dial and return to step 1, Figure 4.

Step 7. Go to mid-scale pressure…rotate dial until mid-scale mark is aligned with pointer, Figure 4.

Step 8. Tighten dials screws and stake on pointer.

Step 9. Check zero and full scale. Reassemble window, gasket and ring.

Notes: See page 10 for any tools required to calibrate.

For models produced prior to September 2008 for 2½˝ version and December 2008 for 3½˝ version.
Back of gauge will have a date code sticker.

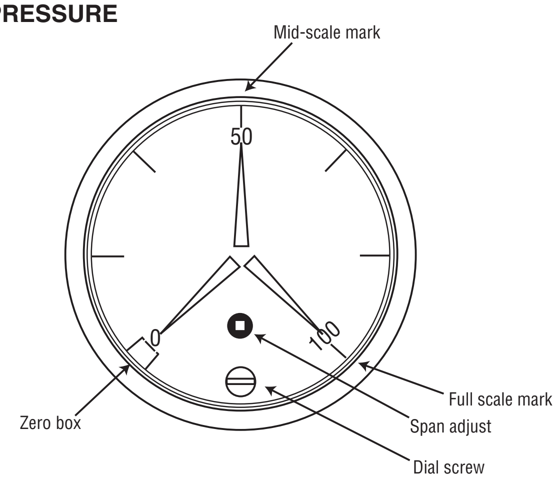
© 2010 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614-5145, USA, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10077 9/01 AMR 05/10

ASHCROFT® Current Type 1009 Duralife® Calibration Procedure – Pressure and Vacuum Range

Calibration – 1009 Duralife® Gauge –
Inspect gauge for accuracy. At times gauges are simply "off zero" and opening the ventable plug at the top of the gauge will relieve internal gauge pressure and correct the offset. If this is not adequate and inspection shows that the gauge warrants recalibration to correct zero, span and/or linearity errors, proceed as follows:

Remove ring, window, and gasket using Ashcroft Ring Removal Tools P/N 101B220-02 and 101B221-02 for 2½" gauges and 101B220-01 and 101B221-01 for 3½" gauges.

PRESSURE



Positive Pressure Ranges –

1. Adjust pointer with a slotted screwdriver until it is in the center of the zero box. This is often all that is required it correct calibration issues.

2. Apply full scale pressure. If error exceeds 1% rotate the black span adjustment device with a #0 square drive bit. Clockwise increases span, counterclockwise decrease span.

3. Fully exhaust pressure and check that pointer still is still in the zero box. If not, repeat step 1 and 2

4. Once 0 and full scale are within tolerance, pressurize gauge to mid-scale.

5. If gauge is within 1%, calibration is complete. If not loosen the dial screw and rotate dial left or right to adjust midpoint. Retighten dial screw.

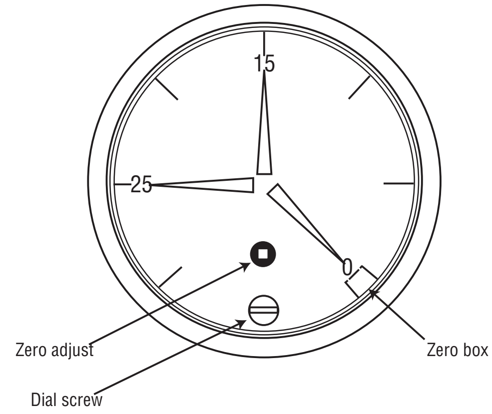
6. If an adjustment was made in step 5, recheck the gauge at zero and full scale, adjust accordingly until zero, mid and full scale points are in tolerance.

Vacuum Range –

1. Adjust pointer with a slotted screwdriver until it is in the center of the zero box. This is often all that is required it correct calibration issues.

2. Apply 25 inches Hg vacuum. If the error exceeds 1% adjust pointer with a slotted screwdriver until gauge is within tolerance.

VACUUM



3. Vent to 0 pressure and check pointer position in the zero box. If error exceeds 1% rotate the black span adjustment device with a #0 square drive bit. Clockwise rotation moves pointer clockwise, counter-clockwise rotation moves the pointer counterclockwise.

4. Repeat step 1 and 2 until 0 and 25 inches of Hg are within gauge tolerance.

5. Apply 15 inches Hg vacuum. If gauge is within 1%, calibration is complete. If not loosen the dial screw and rotate dial left or right to adjust midpoint. Retighten dial screw.

6. If an adjustment was made in step 4, recheck the gauge at zero and 25 inches of Hg vacuum, adjust accordingly until zero, 15 and 25 inches Hg are in tolerance.

7. Continue below.
Re-assemble window and ring to gauge:

a. If plastic window is used, push window back into front of gauge, ensure the o-ring does not roll out of window groove (lubricate if necessary). Align the tabs of the window with the tabs of the case front. Once window is in place, install ring and tighten with tools referenced above and shown on page 10.

b If safety glass is used, reinstall window, gasket, and ring. Ensure that the gasket is seated properly under all four tabs of the ring and does not wrinkle when ring is tightened.

Note: Tighten ring: Apply 120-200inlb of torque. Rotate ring clockwise to tighten. Warning: over tightening of safety glass may induce cracking.

Notes: See page 10 for any tools required to calibrate.

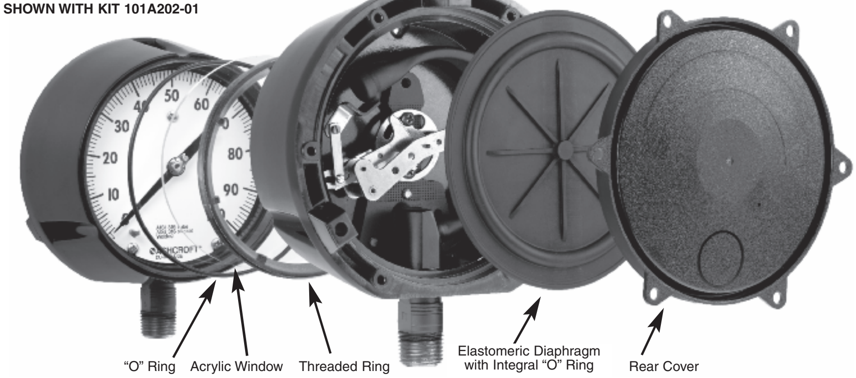
For models produced after September 2008 for 2½˝ version and December 2008 for 3½˝ version.
Back of gauge will have a date code sticker.

© 2010 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614-5145, USA, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10081-05/10 AMR 05/10

TYPE 1279 & 1379 SOLID FRONT DURAGAUGE®
PRESSURE GAUGE CONVERSION INSTRUCTIONS TO:
- **Convert A Standard Dry Gauge To A Liquid Filled Gauge**
- **Convert A Standard Dry Gauge To A Dry, Weatherproof IP66 Gauge**

ASHCROFT®

TYPICAL 45-1279_S-04L-100* GAUGE
SHOWN WITH KIT 101A202-01



	1279		1379		
	4½″ LOWER	4½″ BACK	4½″ LOWER	4½″ BACK	6″ LOWER & BACK
KIT PART NO.	101A202-01	101A203-01	1280	1283	1284
	QUANTITY INCLUDED				
ACRYLIC WINDOW	1	1	1	1	1
FRONT O-RING	1	1	1	1	1
DIAPHRAGM(1)	1	1	1	1	2(1-LC:1-BC)
REAR COVER	1	1	1	1	2(1-LC:1-BC)
COVER SCREWS	4	4	-	-	-
THROTTLE SCREWS	2	2	2	2	2
GARTER SPRING	–	1	1	1	1
FILL IDENTIFICATION	1	1	1	1	1
THREADED RING	–	–	1	1	1
TOP FILL PLUG	–	–	1	1	–

1. When Halocarbon fill is a requirement, rear case diaphragm bladder material is Viton instead of the standard Buna diaphragm bladder. Consult factory for part number.

TEMPERATURE LIMITS[1]				60 psi and Under Down Scale Zero Shift Required
	Ambient	Process	Storage	
Dry (IP66)	–20/200°F (–29/93°C)	–20/250°F(1) (–29/121°C)	–40/250°F (–40/121°C)	NONE
LF (glycerin)	20/150°F (7/66°C)	20/200°F (7/93°C)	0/150°F (–18/66°C)	NONE
(silicone)	–40/150°F (–40/66°C)	–40/200°F (–40/93°C)	–40/150°F (–40/66°C)	.12 psi
(halocarbon)	–40/150°F (–40/66°C)	–40/200°F (–40/93°C)	–40/150°F (–40/66°C)	.12 psi

Note: Other than discoloration of the dial and hardening of the gasketing that may occur as ambient or process temperatures exceeds 150°F, non-liquid-filled gauges with standard glass windows, can withstand continuous operating temperatures up to 250°F (121°C). Liquid-filled gauges can withstand 200°F (93°C) but glycerin fill and acrylic window will tend to yellow. Accuracy at temperatures above or below the reference ambient temperature of 68°F will be affected by approximately .4% per 25°F. Gauges with welded joints will withstand 750°F (450°F (232°C) with silver brazed joints) for short times without rupture, although other parts of the gauge will be destroyed and calibration will be lost. For continuous use and for process or ambient temperatures above 250°F (121°C), a diaphragm seal or capillary or siphon is recommended.
(1) Available for temperature below –20°F, see Production Information page ASH-PI-21B for details

1. Unscrew front threaded ring (turn CCW). Remove and discard glass window. For range spans 60 psi and under, shift pointer down scale by the amount shown in the table. With either the glass or plastic window, replace the O-ring with one furnished in the kit.

2. Remove protective paper from acrylic plastic window taking care not to scratch window. Assemble window in gauge.

3. Moisten face of threaded ring with silicone oil or silicone grease where ring bears up against window. Replace front threaded ring and tighten firmly hand tight. See instructions on reverse side for applying proper torque to ring to establish desired squeeze on O-ring seal. **(Fig. 4).**

It is important to hold gauge **rigidly,** otherwise ring lugs may be damaged during removal or assembly process.

4. From rear of gauge, remove and discard these parts: rear cover and cover gaskets from case.
Note: Disregard Step Nos. 5a and 5b if converting to hermetically sealed version.
When converting a 45-1379 with the top fill hole configuration, p/n 256A176-01 fill plug is required and must be ordered separately.

5. Filling Procedures:

a. Manual Filling Procedure: Place gauge face down on bench and **tip gauge** by blocking up front with a ⅜ inch block at the 12 o'clock dial position. Tipping of the gauge is necessary so fluid will flow into front cavity of the case. Pour in fill liquid to within about 1/16 inch of rear seal lip. When bubbles stop rising, front cavity is filled. Remove ⅜ inch block and pour in liquid until level is about 1/16 inch below rear seal-ing lip.
Note: An alternative method of filling is to fill the front dial cavity, adding the front window, etc., as in Step No. 3. Then fill the rear of the gauge. This method eliminates the need to tip the gauge.

b. Vacuum Pump Fill Procedure: (This procedure is recommended when filling a large number of gauges.) Place gauge face down and insert a ⅛ inch diameter tube, connected to a vacuum pump, through the 12 o'clock position hole in the rear, solid front portion of the case **(see Fig. 5).** Evacuate the air from the front dial cavity while pouring in the fill fluid through the case back. The vacuum will displace the air with fluid. When the dial cavity is solidly filled, remove the tubing and continue to pour the fill fluid to within 1/16 inch BELOW the O-ring channel lip.
Pre-measuring fill amount is not necessary with above methods. For reference, amount of fill is approximately 400 ml. or 14 fluid oz. (4½″ GA.) and 455 ml. or 16 fluid oz. (6″ GA.).

c. Note: The liquid fill level should be ⅜″ (±⅛) as measured from the inside of the ring at the 12:00 o'clock position.

6. On lower connection gauges, assemble rear seal diaphragm to case.
For back connection gauges see instructions on reverse side. **(Fig. 2/4).**

7. For 1279:
Assemble rear cover and six self tapping screws in a criss-cross pattern and torque to 12 in lbs. (±2 in lbs.)
For 1379:
- Thread rear ring and torque to 200 in lbs
- Install stainless steel back cover using two screws. Torque screws to 14 in lbs. (±2 in lbs.)

8. Assemble throttle screw to threaded hole in socket.
Note: If system is monel (socket wrench flat stamped "PHS" or "PH") use monel throttle screw.

9. Check appropriate box on fill identification label, and peel off label back, and attach fill label to gauge case.

10. If gauge is to be repackaged:
a. Include enclosed instruction sheet inside carton.
b. Change type number on carton label to:
(1) Hermetically Sealed – 1279(*)SH.
(2) Liquid Filled – 1279(*)SL.
*Bourdon Tube System Code

Glycerin or silicone should not be used in applications involving Oxygen, Chlorine, Nitric Acid, Hydrogen Peroxide or other strong oxidizing agents, because of danger of spontaneous chemical reaction, ignition or explosion. Halocarbon should be specified. Products with this fill can be ordered from factory.

The use of fluids other than those listed in the table above (for example, Hydrocarbon-based oils) may result in leakage caused by a reaction between the fluid and the elastomeric seals. Consult the factory before filling with any other fluid.

© 2015 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA, Tel: 203-378-8281, Fax 203-385-0402 www.ashcroft.com
All sales subject to standard terms and conditions of sale. All rights reserved. I&M008-10090 (84B276) Rev 10/15

TYPE 1279 & 1379 SOLID FRONT DURAGAUGE® PRESSURE GAUGE CONVERSION INSTRUCTIONS TO:
- **Convert A Standard Dry Gauge To A Liquid Filled Gauge**
- **Convert A Standard Dry Gauge To A Dry, Weatherproof IP66 Gauge**

ASHCROFT®

INSTRUCTIONS FOR USING CONE TOOL AND RING WRENCH

Garter Spring & Diaphragm Assembly (Back Connection Gauge Only)

A. Place cone tool over socket shank as shown.

B. Moisten lip of socket and outer O-ring surface with silicone oil or grease.

C. Place diaphragm with rib side facing upward over cone into case grove.
Diaphragm O-ring must be completely in socket-shank grove.

D. Place garter spring over cone as shown and slide onto diaphragm in socket grove

E. Assemble rear cover with screws per step 7.

Front Ring Assembly (All Gauges)

A. Assemble ring to case by hand to start.

B. Place ring on wrench as shown

C. Use ½″ drive extension and torque ring to 200 in. lb

Alternate Method

A. Tighten ring snugly by hand

B. Mark case and ring.

C. Turn ring another 100 to 120 degrees (slightly less than ½ turn) using the ring wrench and ½″ drive socket wrench or place the blunt end of a wooden or plastic dowel against a ring lug and tap with a hammer.

BACK CONNECTION ASSEMBLED GAUGE

Fig. 2

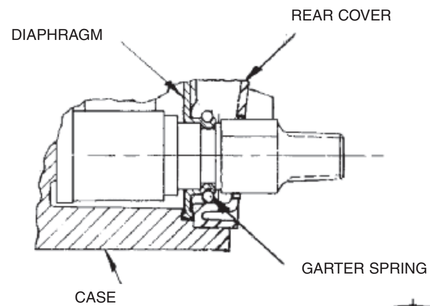


Fig. 3

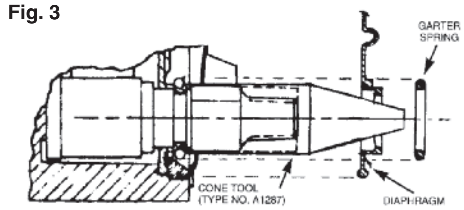
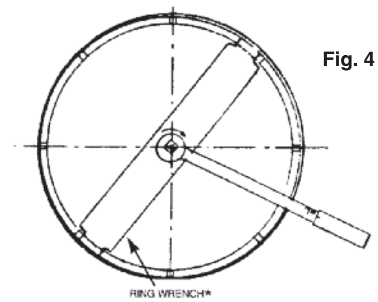


Fig. 4



INSTRUCTIONS FOR LIQUID FILLING ASHCROFT® TYPE 1279 AND 1379 SOLID FRONT DURAGAUGE® PRESSURE GAUGES USING A VACUUM PUMP

A. Insert a length of ⅛″ diameter tubing through the 12 o'clock position hole in the rear, solid front portion of the case, as shown.

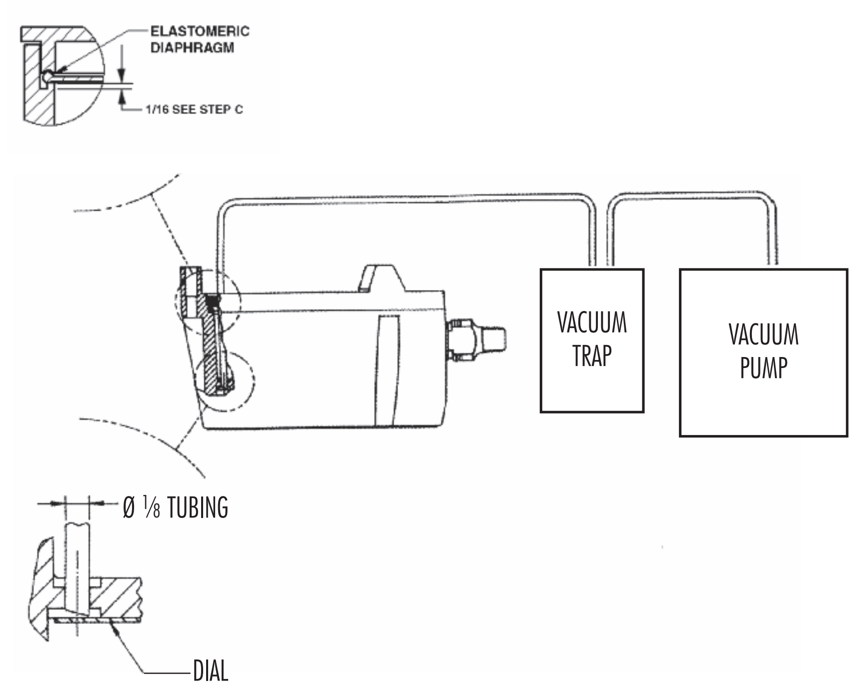
B. Evacuate the air from the front dial cavity while pouring in the fill fluid through the case back. The vacuum will displace the air with fluid.*

C. When the dial cavity is solidly filled, remove the tubing and continue to pour the fill fluid to within 1⁄16″ below the o-ring channel lip, as shown.

D. When converting a 45-1379 with the top fill hole configuration, p/n 256A176-01 fill plug is required and must be ordered separately.

*To prevent breakage, reduce vacuum to 15 in. Hg for plain glass and safety glass.

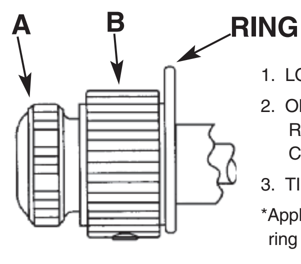
Fig. 5



© 2015 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA, Tel: 203-378-8281, Fax 203-385-0402 www.ashcroft.com
All sales subject to standard terms and conditions of sale. All rights reserved. I&M008-10090 (84B276) Rev 10/15

INSTRUCTIONS FOR USE OF EXTERNAL EASY ZERO™ ADJUST FEATURE*

Fig. 1



1. LOOSEN RING-LOCKING SCREW **A**.
2. OBTAIN REQUIRED ADJUSTMENT BY ROTATING KNOB **B** CLOCKWISE OR COUNTER-CLOCKWISE.
3. TIGHTEN SCREW **A** DOWN ON KNOB **B**.

*Applicable only for test gauge with hinged ring design.

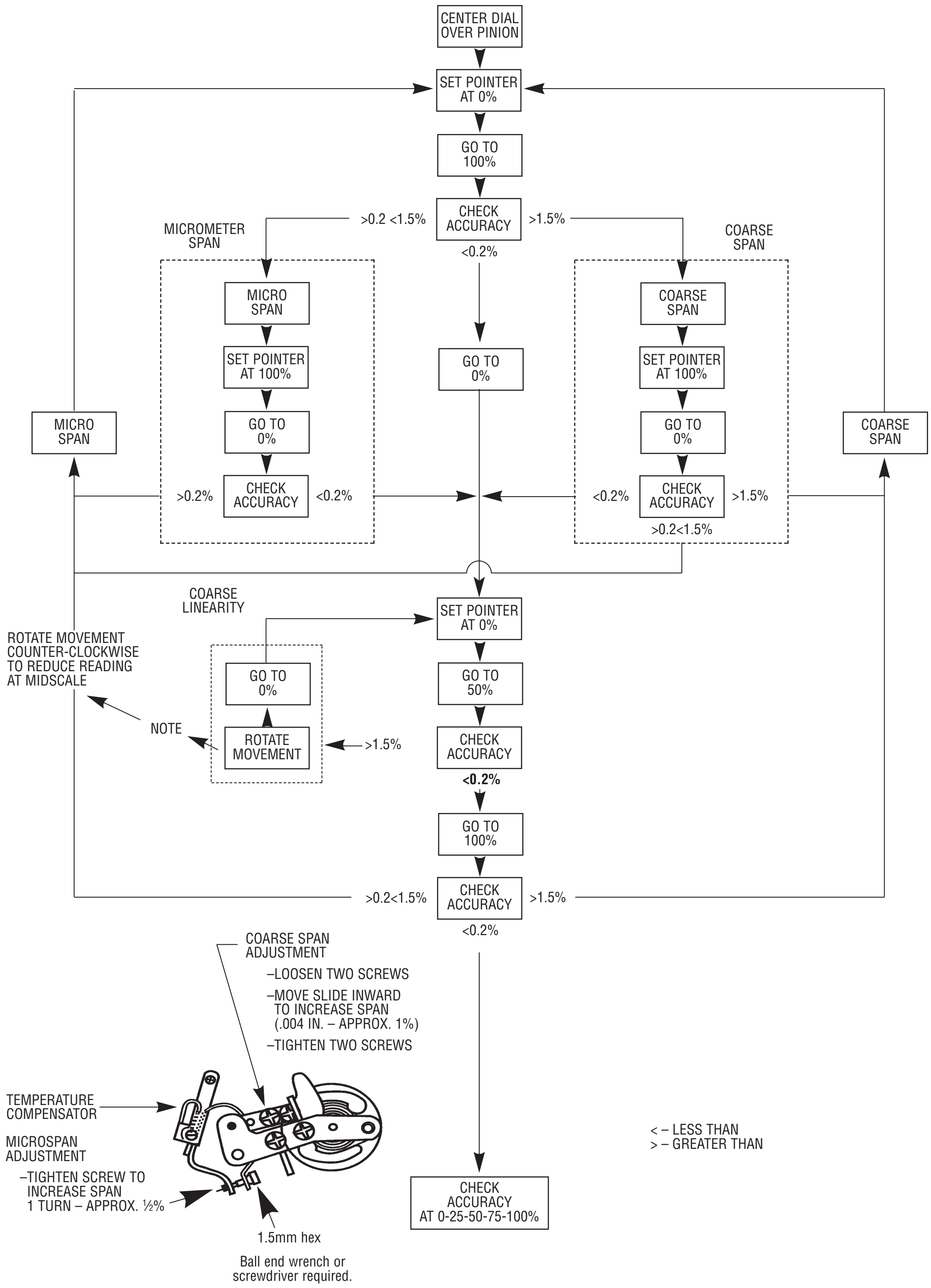
ADDITIONAL CALIBRATION INSTRUCTIONS

1) "Standards shall have nominal errors no greater than ¼ of these permitted for the gauge being tested." *(Ref: ASME B40=100-1998)*
2) The instrument used as the calibration standard should have a maximum range no greater than 2x that of the gauge being tested. (i.e. Do not use a 400psi standard to test a 15psi gauge.)
3) "Known pressure shall be applied at each test point on increasing pressure (or vacuum) from one end to the other end of the scale. At each test point the gauge shall be . . .
lightly tapped, and then read . . ."
(*Ref: ASME B40.1 ¶ 6.2.4.1*)
4) To read gauge indication, move eye over red pointer tip at OD of printed dial until red reflection in mirror band is no longer visible, and then read the pointer position in reference to the dial.

© Ashcroft Inc., 250 E. Main St., Stratford, CT 06614-5145, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10082 11/01 RevB (250-2917-4) AMR 10/07

Fig. 2

THIS TEST GAUGE IS PROVIDED WITH A MICROSPAN™ ADJUSTMENT TO SIMPLIFY CALIBRATION. THE FLOW CHART BELOW OUTLINES THE RECOMMENDED CALIBRATION PROCEDURE



© Ashcroft Inc., 250 E. Main St., Stratford, CT 06614-5145, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M008-10082 11/01 Rev C (250-2917-4) 12/15

Ashcroft Inc.,
250 East Main Street
Stratford, CT 06614-5145
U.S.A.
Tel: 203-378-8281
Fax: 203-385-0408 (Domestic)
Fax: 203-385-0357 (International)
email: info@ashcroft.com
www.ashcroft.com
I&M008-10098-5/02 (250-1353-L) Rev. 12/15

Visit our web site www.ashcroft.com

ASHCROFT®
Trust the shield.®

P-Series Explosion Proof Pressure Switches

FEATURES

- Precision SPDT snap-acting micro switch
- Setpoint adjustable from 15-100% of range
- Single or dual adjustable set points
- Fixed or adjustable deadband
- Wide selection of switch elements
- Fixed or adjustable deadband

TYPICAL USES

- Refineries
- Chemical and Petrochemical Plants
- Steel Mills
- Water and Sewage Treatment Plants
- Pumps, Compressors and Turbines
- Boilers and Burners
- Reverse Osmosis Systems and Filters

RUSH GOLD Service

P-Series
Explosion-Proof Enclosure

P-Series
Explosion-Proof Enclosure
Differential Pressure Switch

SPECIFICATIONS

Set Repeatability (Accuracy):	±1% of span (Additional setpoint shift of ±1% of range per 50°F from initial setpoint set at 70°F typical)
Switch Type:	SPDT or 2 SPDT with independent setpoints
Setpoint:	Single setpoint, fixed deadband Single setpoint, adjustable deadband Dual independent setpoints, fixed deadband
Deadband:	Fixed or adjustable deadband
Enclosure Ratings:	NEMA 7 & 9, IP66
Enclosure Material:	Epoxy coated aluminum
Process Connection:	¼ NPT Female, ½ NPT Female, ¼ NPT Female and ½ NPT Male Combination
Electrical Termination:	¾ NPT Female

APPROVALS

Explosion Proof:	UL, CSA CLASS I DIV 1 GROUPS B, C, & D CLASS II DIV 1 GROUPS E, F, & G
Standard:	CRN

KEY BENEFITS

- **Epoxy-coated aluminum enclosures provide added protection in harsh environments**
- **Dual chamber design provides safe setpoint adjustment even with power connected**
- **Designed for use in wide range of applications**
- **Easily configurable to meet your application requirements**
- **Hermetically sealed micro switches offer improved reliability and safety (UL Class I Div II approval)**

WETTED COMPONENTS

Actuator Seal	Process Connection:	
	Pressure Switches	**Differential Switches**
Buna-N®, Teflon®, Viton®, 316L SS, or Monel®	316L SS or Monel® for psi ranges Epoxy coated carbon steel or 316L SS for IW ranges	Nickel plated brass or 316L SS for psid ranges Epoxy coated carbon steel or 316L SS for IWD ranges

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. p_press_switch_ds_RevD_02-19-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

P-Series Explosion Proof Pressure Switches

PPD N 7 GG B 25 30#

ORDERING CODE Example:	PPSN7	G	S	25	X6B	100#
Enclosure – Pressure Switch						
PPSN7 - Single setpoint, fixed deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2	PPSN7					
PPDN7 - Two independent adjustable setpoints, fixed deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2						
PPAN7 - Single setpoint, adjustable deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2						
Enclosure – Differential Pressure Switch						
PDSN7 - Single setpoint, fixed deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2						
PDDN7 - Two independent adjustable setpoints, fixed deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2						
PDAN7 - Single setpoint, adjustable deadband, N7-NEMA 7 & 9, IP66, explosion proof Div, 1 & 2						
Switch Elements For Single Setpoint with Adjustable Deadband - UL/CSA Listed						
H - General purpose, 10A - 125/250 Vac. ½A, 125Vdc, ¼A, 250Vdc						
J - Hermetically sealed, general pupose - 11A, - 125/250 Vac, 5A, 30Vdc						
Single/Dual Switch Setpoint with Fixed Deadband - UL/CSA Listed						
C/CC - Heavy duty ac, 22A - 125/250 Vac						
E/EE - Manual reset acutates on decreasing pressure 15A, 125/250 Vac 6A, 130 Vdc (no hazardous approval)						
F/FF - Sealed environment proof, 15A - 125/250 Vac. (estimated dc rating - 4A, 28Vdc, not UL listed)						
G/GG - General purpose, 15A - 125/250/480 Vac, ½A - 125 Vdc, ¼A - 250 Vdc (not listed at 480 Vac)		G				
H/HH - General purpose, 10A - 125/250 Vac 10A, Vdc						
J/JJ - Hermetically sealed switch, general purpose, 11A, 125/250 Vac, 5A, 30 Vdc						
K/KK - Narrow deadband, 15A - 125/250 Vac. (estimated dc rating, 0.4A, 120 Vdc, not UL listed)						
L/LL - Hermetically sealed switch, gold contacts, 1A - 125 Vac						
M/MM - Low level (gold) contacts, 1A - 125 Vac						
P/PP - Hermetically sealed AC - 5A, 125/250 Vac. (estimated dc rating - 2.5A, 28Vdc, not UL listed)						
S/SS - Heavy duty dc, 10A - 125 Vac or dc, ⅛ HP - 125 Vac or dc.						
U/UU - Manual reset actuates on increasing pressure 15A, 125/250 Vac, 6A, 130Vdc (no hazardous approval)						
Y/YY - High temperature 300°F (148°C) ambient, 15A, 125/250 Vac						
W/WW - Ammonia service - 5A, 125/250 Vac, 6A, 30 Vdc						

Actuator Seal

Material	Temperature Limits: Ambient	Temperature Limits: Process		S
B - Buna-N®	-20°F to 150°F	0°F to 150°F		
V - Viton®	-20°F to 150°F	20°F to 300°F		
T - Teflon®	-20°F to 150°F	0°F to 150°F		
S - 316L SS	-20°F to 150°F	20°F to 300°F	Not available in vacuum, & inches of water ranges or pressures above 1,000 psi	S
P - Monel®	-20°F to 150°F	20°F to 300°F	Not available in vacuum, & inches of water ranges or pressures above 1,000 psi	

	25	X6B	100#
Process Connections			
25- ¼ NPT Female	25		
06- ¼ NPT Female and ½ NPT Male combination			
07- ½ NPT Female			
Options - Select from Table 4 on page 4 (If choosing an option(s) must include an "X")		X _ _	
6B - Cleaned for oxygen service (NA w BUNA-N actuator seal)		6B	
Pressure Range (select from pressure range tables on page 3)			
100# - 100 psi			100#

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. p_press_switch_ds_RevD_02-19-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

P-Series Explosion Proof Pressure Switches

TABLE 1 - PRESSURE/VACUUM RANGES

Nominal Ranges			Overpressure Ratings		Approximate Deadband Switch Element for Buna-N® Diaphragm — See multiplier TABLE 3 for additional material multipliers								
					PPA	PPS				PPD			
					Switch Element								
			Proof psi	Minimum Burst psi	J, H	G	J, H	K, F	P	GG	JJ, HH	KK, FF	PP
Vacuum													
30IMV	–760mmHg	-100 kPa	250	400	7-26	3-5	3-6.5	1-2	1-2.5	3-5	4-6.5	1-2	1-2.5
Compound													
30IMV/ 15#	–760mmHg/ 1.0 kg/cm^2	-100 kPa 100 kPa	250	400	10-25 4-13	3-5 1-2	4-6 1-3.5	1-2 0.5-1	1-2.5 0.5-1.2	3-5 2-4	2.5-4.5 1.3	1-2 0.5-1	1-2.5 0.5-1.=2
Pressure													
30IW	750mmH$_2$0	7.5 kPa	20	35	4-27	1.5-3.5	2-5	0.5-1	0.5-2	1.5-3.5	2-5	0.5-1	0.5-2
60IW	1,500mmH$_2$0	15 kPa	20	35	5-54	1.5-3.5	2.5-5	0.5-1.3	1-2	1.5-3.5	2.5-5	0.5-1.3	1-2
100IW	2,500mmH$_2$0	25 kPa	20	35	8.5-90	4-6	4-8.5	1-2	1-3	4-7	4-8.5	1-2	1-3
150IW	3,750mmH$_2$0	37 kPa	20	35	18-135	5.0-11	10-18	1.5-3	2-6	8-14	10-18	1.5-3	2-6
15#	1.0 kg/cm^2	100 kPa	500	1,500	2.5-13	1-2	1-3	0.5-1	0.5-1.2	1-2	1-3	0.5-1	0.5-1.2
30#	2.0 kg/cm^2	200 kPa	500	1,500	3-26	1-2.5	2-4.5	0.5-1.5	0.5-1.5	1-2.5	2-4.5	0.5-1.5	0.5-1.5
60#	4.0 kg/cm^2	400 kPa	500	1,500	5-54	2-4	4-7	1-2	1-2.5	2-4	4-7	1-2	1-2.5
100#	7.0 kg/cm^2	700 kPa	1,000	3,000	10-90	5-7	5-10	1-2.5	2-4	5-7	5-10	1-2.5	2-4
200#	14 kg/cm^2	1,400 kPa	1,000	3,000	20-180	10-15	10-18	1-4	5-8	10-20	15-35	3-6	5-8
400#	28 kg/cm^2	2,800 kPa	2,400	3,000	45-360	16-30	16-45	4-8	5-15	16-30	16-45	4-8	5-15
600#	42 kg/cm^2	4,200 kPa	2,400	3,000	75-540	16-50	20-75	5-15	6-25	16-50	20-75	5-15	6-25
1000#	70 kg/cm^2	7,000 kPa	12,000	14,000	160-900	75-130	50-160	7-30	10-85	75-130	50-160	7-30	10-85
2000#	140 kg/cm^2	14,000 kPa	12,000	14,000	350-1,800	150-200	150-350	20-50	25-110	15-200	150-350	20-50	25-110
3000#	210 kg/cm^2	21,000 kPa	12,000	14,000	400-2,600	180-250	180-400	30-70	50-250	180-250	180-400	30-70	50-250

TABLE 2 - DIFFERENTIAL PRESSURE RANGES

Nominal Ranges		Overpressure Ratings		Approximate Deadband Switch Element for Buna-N® Diaphragm — See multiplier TABLE 3 for additional material multipliers								
				PDA	PDS				PDD			
				Switch Element								
		Static psi	Minimum Proof psi	J, H	G	J, H	K, F	P	GG	JJ, HH	KK, FF	PP
Differential Pressure												
30IWD	–760mmHg	5.4	21.6	5.5-27	3-5	4-6.5	0.5-1	0.5-2	3-5	4-6.5	0.5-1	0.5-2
60IWD	1,500mmH$_2$0	5.4	21.6	5.5-54	3-5	4.5-6.5	0.5-1.3	1-2	3.5	4-6.5	0.6-1.3	1-2
100IWD	2,500mmH$_2$0	5.4	21.6	8.5-90	4-6	4.0-8.5	1-2	1-3	4-7	4-8.5	1-2	1-3
150IWD	3,750mmH$_2$0	5.4	21.6	18-135	5-11	10-18	1.5-3	2-6	8-12	10-18	1.5-3	2-6
30#D	1.0 kg/cm^2	500	1,500	2.5-13	1-2	1-3	0.5-1	0.5-1.2	1-2	1-3	0.5-1	0.5-1.2
60#D	2.0 kg/cm^2	500	2,000	6.5-54	1-2.5	2-4.5	1-1.5	1-1.5	1-2.5	2-4.5	0.5-1.5	0.5-1.5
100#D	7.0 kg/cm^2	1,000	4,000	10-90	5-7	5-10	1-2.5	2-4	5-7	5-10	1-2.5	2-4
200#D	14 kg/cm^2	1,000	4,000	20-180	10-15	10-18	1-4	5-8	10-20	10-18	3-6	5-8
400#D	28 kg/cm^2	1,000	8,000	45-360	16-30	16-45	4-8	5-15	16-30	16-45	4-8	5-15

TABLE 3 - DEADBAND MULTIPLIER TABLE

Diaphragm Material	Multiply	Notes
Buna-N®	1.0	Multiplier table for additional diaphragm materials
Viton®	1.4	
Teflon®	1.7	
316 SS	1.7	Not applicable for adjustable deadband units PPA, PDA
Monel®	1.7	

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. p_press_switch_ds_RevD_02-19-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

P-Series Explosion Proof Pressure Switches

TABLE 4 - OPTIONS		Pressure		Differential Pressure		Notes
Code	Description	psi	inH_2O	psid	inH_2O	
CH	Chained cover	•	•	•	•	
FP	Fungus proofing	•	•	•	•	
FS	Factory adjusted setpoints (Supply static pressure for D/P switches)	•	•	•	•	
G9	Fire safe actuator	•				SS and Monel Actuator only
HS	High static operating pressure for psi range D/P			•		15# & 30# with B or V actuator seals only
HY	Hydrostatic testing	•	•	•	•	
HX	High operating pressure for inH_2O ranges 40 psi Static (Pressure and D / P) 100 psi Proof (Pressure) 160 psi Proof (D / P)		•	•		
JL	¾˝ to ½˝ Reducing bushing	•	•	•	•	
K3	Terminal blocks	•	•	•	•	
LE	6ft Wired leads	•	•	•	•	
MA	NACE (MR-01-75)	•	•	•	•	Only with Monel actuator seal
MD	Metric range on label	•	•	•	•	
NH	Tagging SS	•	•	•	•	
PM	¾˝ Sealed conduit connection with 16˝ lead wires	•	•	•	•	
TA	316 SS pressure connection for H_2O ranges		•		•	
TM	2˝ Pipe mounting bracket	•	•	•	•	
UD	316 SS Pressure Connection for psid ranges			•		Standard on models with S actuator seal
C4	Calibration chart	•	•	•	•	
C8	CSA approval	•	•	•	•	
D2	Dual seal rating	•			•	Must order with XC8
6B	Cleaned for oxygen service	•		•		N/A with BUNA-N® actuator seal

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. p_press_switch_ds_RevD_02-19-21

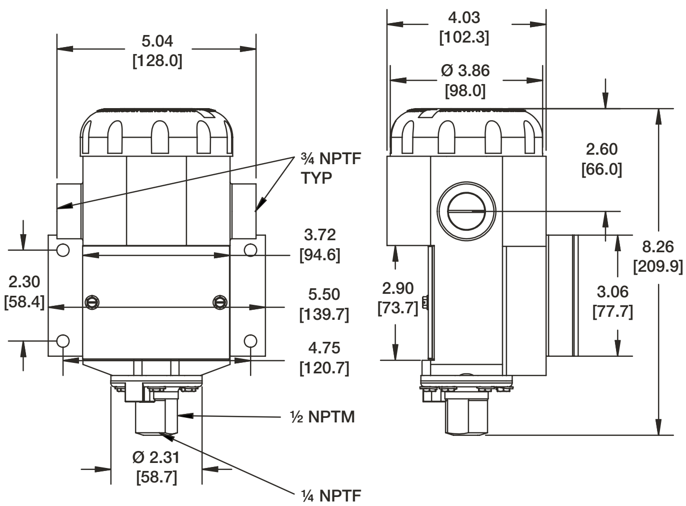
ashcroft.com
info@ashcroft.com
1.800.328.8258

P-Series Explosion Proof Pressure Switches

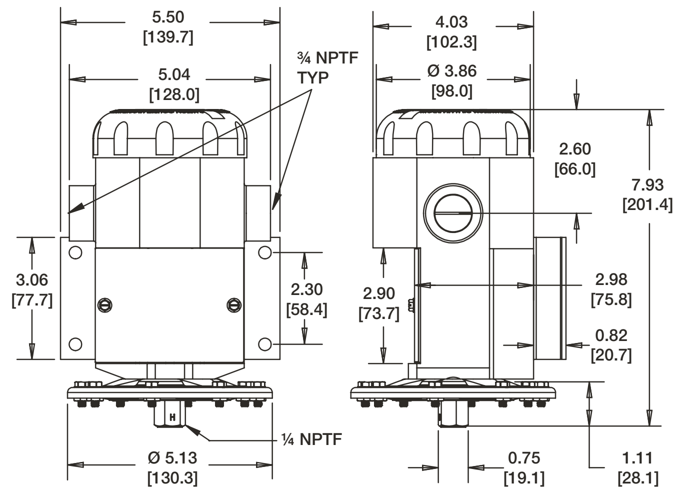
DIMENSIONS in [ ] are millimeters

For reference only, consult Ashcroft for specific dimensional drawings.

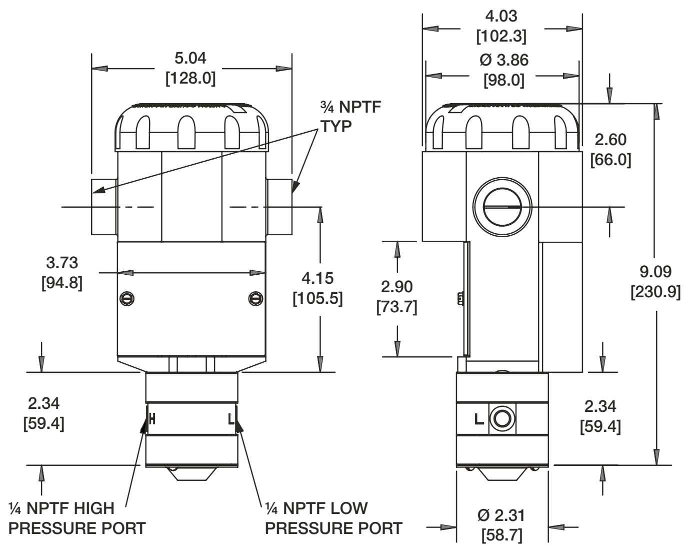
PRESSURE SWITCH – PSI RANGES



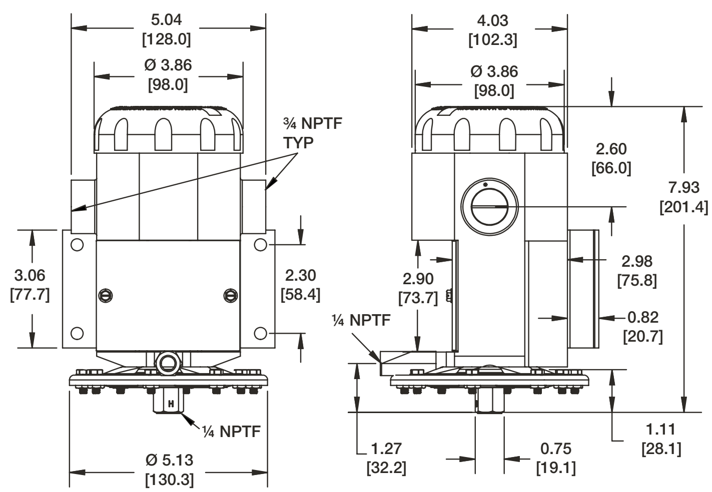
PRESSURE SWITCH – INCHES OF WATER RANGES



DIFFERENTIAL PRESSURE SWITCH – PSI DIFFERENTIAL RANGES



DIFFERENTIAL PRESSURE SWITCH – INCHES OF WATER RANGES

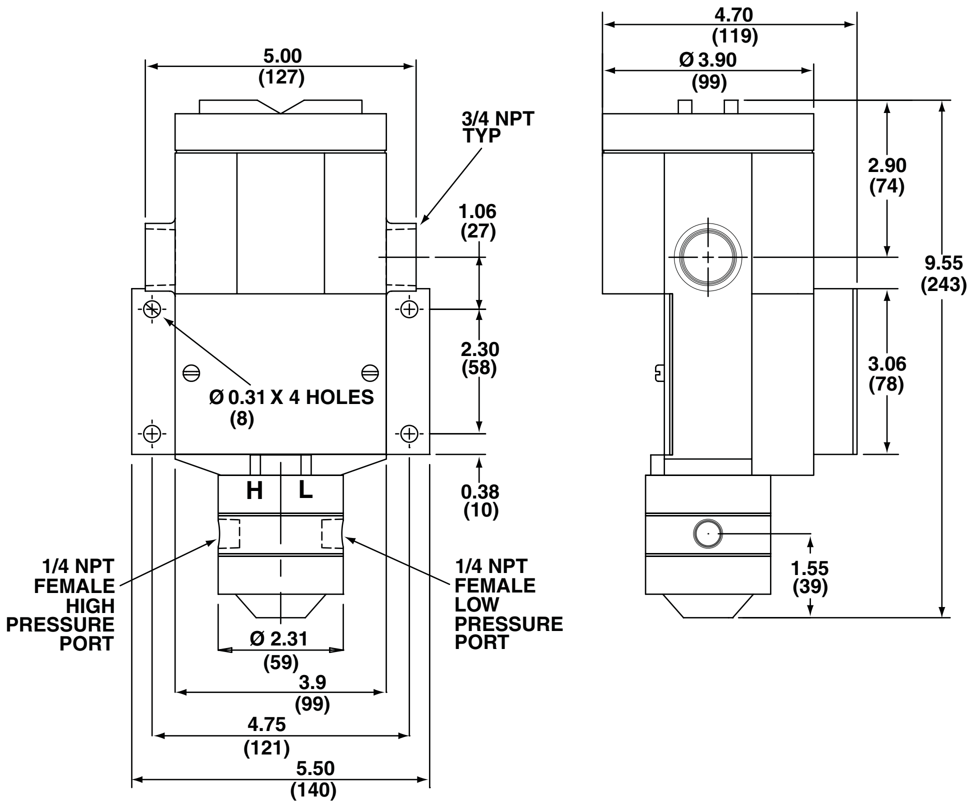


All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. p_press_switch_ds_RevD_02-19-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

Installation and Maintenance Instructions for ASHCROFT® P-Series Snap Action Switches for Differential Pressure Control

ASHCROFT®



STANDARD RANGES
15, 30, 60, 100, 200, 400 psid

INTRODUCTION

The Ashcroft pressure control is a precision device which features a snap action switch. Fixed deadband is available with single or dual SPDT Independently adjustable switches with various electrical ratings. Adjustable deadband is available with a SPDT switch with various electrical ratings. Several wetted material constructions for compatibility with pressure media may be obtained.

The “P” Series Ashcroft snap action pressure switch is available in both standard NEMA-4 and explosion-proof NEMA 7 & 9 configurations. The enclosure is an epoxy coated aluminum casting.

INSTALLATION

This control is a precision Instrument and should never be left with internal components exposed. During installation ensure that covers are in place and conduit openings are sealed.

MOUNTING

Four holes in the bracket supplied are used in surface mounting of the control. Location of these holes is shown on the general dimension drawings. An optional pipe mounting bracket is also available. Mount on a vibration tree surface or pipe. When tightening control to pressure line, always use the wrench flats or hex on the pressure connection. Never tighten by twisting the case.

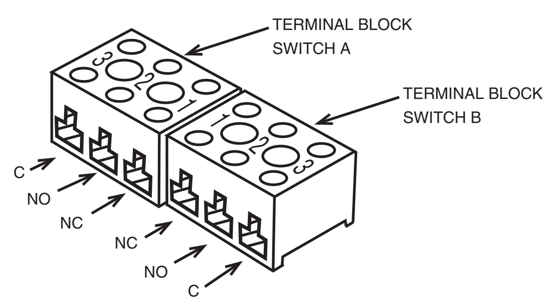
PRESSURE CONNECTIONS

For operation as a differential pressure control-connect the high pressure to the side port marked “H” and the low pressure to the side port marked “L.”

ELECTRICAL CONNECTION

Remove top cover, cover unscrews (CCW).

On all units except one with terminal blocks – wire directly to the switch according to circuit requirements. Units with terminal blocks – wire directly to terminal blocks as required. Terminals are marked common, norm open and norm closed.

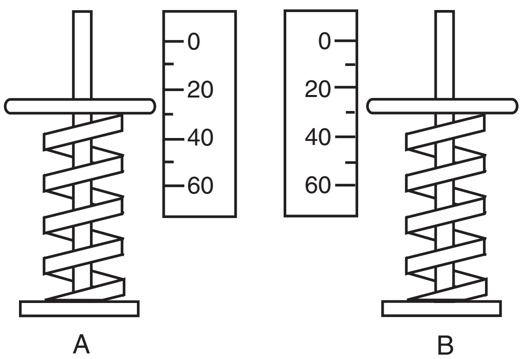


© 2007 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614-5145, USA, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M009-10011-10/00 (250-2550) AMR 12/07

Installation and Maintenance Instructions for ASHCROFT® P-Series Snap Action Switches for Differential Pressure Control

CONDUIT CONNECTIONS
Two ¾ NPT holes are provided, one fitted with a plug, the other with a cap. It is recommended that Teflon tape or other sealant be used on conduit bushing or plug threads to ensure integrity of the enclosure. NEMA 7 & 9 enclosures require proper conduit seals and breathers as per the National Electrical Code.

SETPOINT ADJUSTMENTS
Series PD-S Single Switch – Remove front cover, held in place by two screws. For setpoint adjustment to within ±1% of nominal range, use a suitable reference such as an Ashcroft Duragauge or test gauge. Monitor switch with a suitable pilot light or meter. Apply LOW pressure. Then apply HIGH pressure to the required setpoint and turn the adjusting wheel until the switch changes mode. When the setpoint has been achieved, raise and lower HIGH pressure to insure that differential pressure between HIGH and LOW pressures is correct.



Series PD-D Dual Switch – Remove front cover, held in place by two screws. There are two range adjusting wheels. The adjusting wheel on the left (labeled A) controls the left switch, the adjusting wheel on the right (labeled B) controls the right switch. The switches are set independently.

Note: The units are calibrated at the factory such that for proper operation switch B setpoint must be set higher than switch A setpoint.

For setpoint adjustment to within ±1% of nominal range mount the switch on a calibration stand, and use a suitable reference such as an Ashcroft Duragauge or test gauge. Monitor switch with a suitable pilot light or meter.

Apply LOW pressure. Then apply HIGH pressure to the required setpoint and turn adjusting wheel until the switch changes mode. When the setpoint has been achieved raise and lower the pressure to insure the setpoint is correct. This must be done for both setpoint A and setpoint B.

Series PD-A Adjustable Deadband Switch – Remove front cover, held in place by two screws. The adjusting wheel labeled A controls the re-setpoint of the switch. The adjusting wheel labeled B controls the setpoint of the switch.

Note: The units are calibrated at the factory such that for proper operation setpoint B is always higher than re-setpoint A.

For accurate setpoint adjustment, mount the switch on a calibration stand, and use a suitable reference such as an Ashcroft Duragauge or Test Gauge. Monitor switch with a suitable pilot light or meter. Apply low pressure. Then apply high pressure to the required setpoint. Move adjusting wheel for switch B until switch changes mode. Then lower the HIGH pressure to the re-setpoint and move adjusting whee: for switch A until the switch changes mode. Raise and lower HIGH pressure to insure that differential pressure between HIGH and LOW pressure is correct. Repeat as necessary.

© 2007 Ashcroft Inc., 250 East Main Street, Stratford, CT 06614-5145, USA, Tel: 203-378-8281, Fax: 203-385-0499, www.ashcroft.com
All sales subject to standard terms and conditions of sale. I&M009-10011-10/00 (250-2550) AMR 12/07

Data Sheet

81 Bolt-thru Isolation Ring

FEATURES

- 360° Instrument rotation with SQR™ option
- Selection of 1˝ through 10˝ nominal pipe size
- Non-clogging/low maintenance
- Complete instrument protection
- Ensure reliable/accurate pressure readings
- Optional retrofit end plates to replace competitive units

TYPICAL USES

- Water and wastewater
- Mining

81 Bolt-thru Isolation Ring

Nominal Size: 1˝ to 10˝

SPECIFICATIONS	
Sizes:	1˝ to 10˝
Instrument Connection Size:	¼ NPT Female, ½ NPT Female
Pressure Rating (MAWP):	Per customer flanges: ASME B16.5 150 or 300 Class Pressures
Fill:	Glycerin: 0 °F to 400 °F (-18 °C to 204 °C) Silicone (10Cst): –40 °F to 500 °F (–40 °C to 260 °C) Silicone (50Cst): –40 °F to 600 °F (–40 °C to 316 °C) Halocarbon®: –70 °F to 300 °F (–57 °C to 149 °C)
Instrument Removal:	Direct-mount, Needle valve, Safe Quick Release (SQR™), Needle valve and SQR™ (02T conn.)
Added Tolerance:	±0.5% typical
Approvals:	CRN

WETTED COMPONENTS	
End Plate Material	Flexible Liner
Carbon steel, 316L SS, PVDF, Acetal, CPVC	Buna, PTFE, EPDM, Natural rubber, and Viton®

NON-WETTED COMPONENTS	
Body	Instrument Fittings
Carbon Steel, 316 Stainless steel	Adapters: 316L SS Needle Valve: 316l SS SQR: Zinc-plated carbon steel

MIN/MAX TEMPERATURE LIMITS

Liner	Temperature Limits
Buna-N	–30 °F to 225 °F (–34 °C to 107 °C)
Teflon	–15 °F to 350 °F (–25 °C to 177 °C)
Viton	–15 °F to 350 °F (–25 °C to 177 °C)
Natural Rubber	–30 °F to 225 °F (–34 °C to 107 °C)
EPDM	–40 °F to 300 °F (–40 °C to 149 °C)

KEY BENEFITS

- **Reliable when continuous pressure measurements are needed**
- **Non-clogging and low maintenance**
- **Complete instrument protection**

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. 81_bolt-thru_ring_ds_RevI_10-22-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

81 Bolt-thru Isolation Ring

81 06 T S S 02T V 150 XDJ H7

ORDERING CODE	Example:
	81 02 E B B 02T N 300 XCK H3 NH
Seal Type	
81 - Bolt-thru isolation ring	81
Process Connection Size	
02 - 2˝ (see table 2 on page 3)	02
Inner Flexible Wall	
E - Buna-N	E
T - PTFE (available in 2˝ to 10˝)	
Y - Viton®	
R - Natural rubber	
P - EPDM	
End Plate Material	
A - Acetal, (150-class only)	
B - Carbon steel	B
S - 316L Stainless steel	
K - CPVC (available in 1˝, 1.5˝ and 2˝ sizes), (150-class only)	
F - PVDF, (150-class only)	
Body Material	
B - Carbon steel	B
S - 316L Stainless steel	
Instrument Connection Size	
02T - ¼ NPT Female	02T
04T - ½ NPT Female (ring body tapped with ¼ NPT connection; 04T connection utilizes ¼-½ NPT adapter)	
Instrument Removal Option	
N - Direct-mount	N
V - Needle valve	
Q - Safe Quick Release (SQR™)	
Z - Needle valve and SQR (requires 02T instrument connection)	
Pressure Class	
150 - 150-class ASME	
300 - 300-class ASME	300
Options (if choosing option(s) must include an "X")	X__
Fill Fluid (see table 3 on page 3 for more available fill fluids)	
CG - Glycerin	
CK - Silicone 50cSt	CK
CF - Halocarbon®	
CT - 50/50 Ethylene Glycol/water	
Multiple Instrument Assemblies (contact factory for additional arrangements or custom orientations.)	
H3 - ¼ NPT gauge/ ¼ NPT Male transducer/ 02T isolation ring	H3
H5 - ½ NPT gauge/ ½ NPT Male switch/ 04T isolation ring	
H6 - ½ NPT gauge/2 ½ NPT Male switches/ 02T isolation ring	
H7 - ¼ NPT gauge/ ¼ NPT Female switch/ 02T isolation ring	
Optional Features	
IR - Retrofit end plates (custom end plates widths for drop-in replacements)	
NH - Stainless steel tag wired to ring	NH
Q8 - Elbow for vertical pipe installation (02T connection only)	

Consult factory for multiple instrument assemblies, welded assembly options, additional process connection sizes and fill fluids

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. 81_bolt-thru_ring_ds_RevI_10-22-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®

81 Bolt-thru Isolation Ring

TABLE 2 – PROCESS CONNECTION TABLE

Process Connection Code (Nominal Size)	Type 81 (Ordering Code)
1˝	01
1.5˝	15
2˝	02
3˝	03
4˝	04
5˝	05
6˝	06
8˝	08
10˝	10

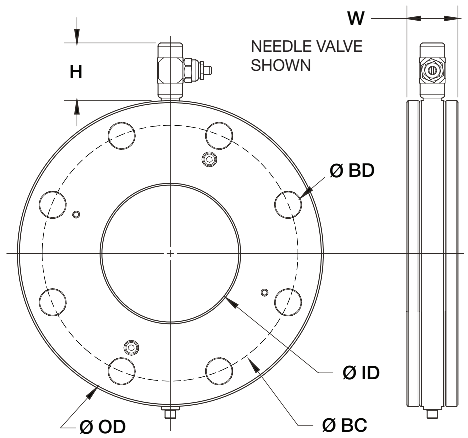
Consult factory for larger sizes

TABLE 3 – FILL FLUID TABLE

Fill Fluid	Temperature Range	Code
Glycerin	0°F to 400°F (-18°C to 204°C)	CG
Silicone 10cSt	-40°F to 500°F (-40°C to 260°C)	DJ
Silicone 50cSt	-40°F to 500°F (-40°C to 260°C)	CK
Halocarbon®	-80°F to 390°F (60°C to 200°C)	CF
50/50 Ethylene Glycol/Water	-25°F to 190°F (-32°C to 88°C)	CT

DIMENSIONS in inches

For reference only, consult Ashcroft for specific dimensional drawings



ANSI ASME Class	Nom. Pipe Size	Inner Dia. (ID)	Outer Dia. (OD)	Width (W) (Metalic Endplates only)	Width (W) *see note	Bolt Circle (BC)	Bolt Dia. (BD)	No. Of Bolt Holes	Instrument Removal (H)			Weight Lbs. (Std. CS/SS end plates)
									Direct	Safe Quick Release	Needle Valve	
	1˝	1.05	4.25	2.00	2.13	3.12	0.625	4	0	2.04	1.70	5.7
	1.5˝	1.61	5.00	2.00	2.13	3.88	0.625	4	0	2.04	1.70	7.9
	2˝	2.07	6.00	2.00	2.13	4.75	0.75	4	0	2.04	1.70	12.0
	3˝	3.07	7.50	2.00	2.13	6.00	0.75	4	0	2.04	1.70	18.4
150	4˝	4.03	9.00	1.50	2.13	7.50	0.75	8	0	2.04	1.70	18.6
	5˝	5.05	10.00	1.50	2.25	8.50	0.88	8	0	2.04	1.70	21.0
	6˝	6.07	11.00	1.50	2.25	9.50	0.88	8	0	2.04	1.70	23.9
	8˝	7.98	13.50	1.50	2.50	11.75	0.88	8	0	2.04	1.70	34.5
	10˝	10.02	16.00	1.50	2.75	14.25	1.00	12	0	2.04	1.70	44.5
	2˝	2.07	6.50	2.00	2.13	5.00	0.75	8	0	2.04	1.70	13.8
	3˝	3.07	8.25	2.00	2.13	6.62	0.88	8	0	2.04	1.70	22.0
	4˝	4.03	10.00	1.50	2.13	7.88	0.88	8	0	2.04	1.70	24.5
300	5˝	5.05	11.00	1.50	2.25	9.25	0.00	8	0	2.04	1.70	32.0
	6˝	6.07	12.50	1.50	2.25	10.62	0.88	12	0	2.04	1.70	34.9
	8˝	7.98	15.00	1.50	2.50	13.00	1.00	12	0	2.04	1.70	47.1
	10˝	10.02	17.50	1.50	2.75	15.25	1.13	16	0	2.04	1.70	58.8

*Widths for all rings ordered with XIR retrofit option, and all K, F, and A endplate materials.
When selecting an instrument, refer to the Min/Max Guide for compatibility with this isolation ring or scan the QR code to the right.

All specifications are subject to change without notice.
All sales subject to standard terms and conditions.
©2021 Ashcroft Inc. 81_bolt-thru_ring_ds_RevI_10-22-21

ashcroft.com
info@ashcroft.com
1.800.328.8258

646 West 9th Avenue
Midvale, Utah 84047
Office: (801) 566-7200
Fax: (801) 255-0835

Commissioning Documents

TO BE PROVIDED