1066 Liquid Analytical Fieldbus pH/ORP Transmitter

ROSEMOUNT® Analytical

EMERSON™ Process Management

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Essential Instructions
Read this page before proceeding

Emerson designs, manufactures, and tests its Rosemount Analytical products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product. If this Instruction Manual is not the correct manual, telephone 1-800-854-8257 and the requested manual will be provided. Save this Instruction Manual for future reference.
- If you do not understand any of the instructions, contact your Emerson representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

WARNING: EXPLOSION HAZARD

DO NOT OPEN WHILE CIRCUIT IS LIVE. ONLY CLEAN WITH DAMP CLOTH.

NOTICE

The basic device description for the 1066pH can be downloaded from the Fieldbus Foundation website: www.fieldbus.org.

AMS Device Manager Installation files and DTM files can be downloaded from the Emerson Asset Optimization website: www.assetweb.com.

Files for the Model 475 and 375 Communicator can be downloaded at www.fieldcommunicator.com, or contact your local Emerson Process Management Service Group or National Response Center (1-800-654-7768).

Electrostatic ignition hazard.
Special condition for safe use (when installed in hazardous area)

1. The plastic enclosure, excepting the front panel, must only be cleaned with a damp cloth. The surface resistivity of the non-metallic enclosure materials is greater than one gigaohm. Care must be taken to avoid electrostatic charge build-up. The 1066 Transmitter must not be rubbed or cleaned with solvents or a dry cloth.
2. The panel mount gasket has not been tested for type of protection IP66 or Class II and III. Type of protection IP66 and Class II, III refer the enclosure only.

3. The surface resistivity of the non-metallic enclosure materials is greater than one gigaohm. Care must be taken to avoid electrostatic charge build-up. The Model 1066 Transmitter must not be rubbed or cleaned with solvents or a dry cloth.
4. Special Condition of Use of 1066-C-FF/FI-67 and 1066-T-FF/FI-67. For use with simple apparatus model series 140, 141, 142, 150, 400, 401, 402, 402VP, 403, 403VP, 404, and 410VP contacting conductivity sensors and model series 222, 225, 226, 228 toroidal sensors.

About this document

This manual contains instructions for installation and operation of the Model 1066 Smart Transmitter. The following list provides notes concerning all revisions of this document.

Rev. Level	Date	Notes
A	9/2013	This is the initial release of the product manual. The manual has been reformatted to reflect the Emerson documentation style and updated to reflect any changes in the product offering.

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Section 1: Quick Start Guide

1.1

1. For mechanical installation instructions, see page 8 for panel mounting and page 9 for pipe or wall mounting.
2. Wire the sensor to the main circuit board. See page 14 for wiring instructions. Refer to the sensor instruction sheet for additional details. Make loop power connections.
3. Once connections are secured and verified, apply Fieldbus power to the transmitter.
4. When the transmitter is powered up for the first time, Quick Start screens appear. Quick Start operating tips are as follows:
   a. A highlighted field shows the position of the cursor.
   b. To move the cursor left or right, use the keys to the left or right of the ENTER key. To scroll up or down or to increase or decrease the value of a digit use the keys above and below the ENTER key. Use the left or right keys to move the decimal point.
   c. Press ENTER to store a setting. Press EXIT to leave without storing changes. Pressing EXIT during Quick Start returns the display to the initial start-up screen (select language).
5. Choose the desired language and press ENTER.
6. Choose measurement, pH, ORP, or Redox and press ENTER.

a. For pH, choose preamplifier location. Select Analyzer to use the integral preamplifier in the transmitter; select Sensor/J-Box if your sensor is SMART or has an integral preamplifier or if you are using a remote preamplifier located in a junction box.

7. Choose temperature units: °C or °F.
8. After the last step, the main display appears. The outputs are assigned to default values.
9. To return the transmitter to the factory default settings, choose Program under the main menu, and then scroll to Reset.

11. Please call the Rosemount Analytical Customer Support Center at 1-800-854-8257 if you need further support.

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Section 2: Description and Specifications

2.1 Features and Applications

The Model 1066 Fieldbus transmitter supports continuous measurement of one liquid analytical input.

The design supports easy internal access and wiring connections.

ANALYTICAL INPUTS: pH and ORP sensors with or without Rosemount Analytical preamplifiers, and Rosemount Analytical Smart pH sensors.

LARGE DISPLAY: The high-contrast LCD provides live measurement readouts in large digits and shows up to four additional variables or diagnostic parameters.

DIGITAL COMMUNICATIONS: Fieldbus ITK 6

MENUS: Menu screens for calibrating and programming are simple and intuitive. Plain language prompts and Help screens guide the user through the procedures. All menu screens are available in eight languages. Live process values are displayed during programming and calibration.

FAULT AND WARNING HELP SCREENS: Fault and warning messages include help screens that provide useful troubleshooting tips to the user. These on-screen instructions are intuitive and easy to use.

DIAGNOSTICS: The transmitter continuously monitors itself and the sensor for problems. A display banner on the screen alerts Technicians to Fault and/or Warning conditions.

LANGUAGES: Emerson extends its worldwide reach by offering eight languages – English, French, German, Italian, Spanish, Portuguese, Chinese and Russian.

INPUT DAMPENING: is automatically enabled to suppress noisy process readings.

SMART-ENABLED pH: The Rosemount Analytical SMART pH capability eliminates field calibration of pH probes through automatic upload of calibration data and history.

AUTOMATIC TEMPERATURE COMPENSATION: pH measurements require temperature compensation. The 1066 will automatically recognize Pt100 or Pt1000 RTD built into the sensor or, temperature from a temperature measurement on the bus can be linked to and used by the 1066 for temperature compensation.

2.2 Transmitter Performance Specifications

2.2.1 Performance Specifications - Transmitter (pH input)

Measurement Range [pH]: 0 to 14 pH
Accuracy: ±0.01 pH ±1mV @ 25°C ± 0.03 pH
Diagnostics: Glass impedance, Reference impedance, Slope and Offset (mV)
Temperature coefficient: ±0.002pH/ ºC
Solution temperature correction: Pure water, dilute base and custom.
Buffer recognition: NIST, DIN 19266, JIS 8802, and BSI.
Input filter: Time constant 1 - 999 sec, default 4 sec.
Response time: 5 seconds to 95% of final reading

2.2.2 Performance Specifications - Transmitter (ORP input)

Measurement Range [ORP]: -1400 to +1400 mV
Accuracy: ± 1 mV
Temperature coefficient: ±0.12mV/°C
Input filter: Time constant 1 - 999 sec, default 4 sec.
Response time: 5 seconds to 95% of final reading
Recommended Sensors for ORP: All standard ORP sensors
Recommended Sensors for pH: All standard pH sensors. Supports SMART pH sensors from Rosemount Analytical.

2.3 Basic Fieldbus Specifications

The 1066pH, the first pH transmitter registered to ITK 6, has the following basic features:

DIAGNOSTICS: Full comprehensive sensor, transmitter, and calibration diagnostics, which are available to the bus via Field Diagnostics.

COMMON SOFTWARE DOWNLOAD SPECIFICATION: Allows software upgrades to be downloaded to the transmitter, while it is in service.

LINK ACTIVE SCHEDULER: Allows the 1066pH to function as a Linkmaster.

4 AI FUNCTION BLOCKS: For PV (pH, ORP, Redox), temperature, reference electrode impedance, and glass electrode impedance.

AO FUNCTION BLOCK: Allows the transmitter to use a temperature measurement from the bus for temperature compensation.

ADDITIONAL FUNCTION BLOCKS: Are provided for use by the 1066-P-FF or other transmitters on the segment, and include:

MATH FUNCTION BLOCKS: Arithmetic and Integrator

ANALOG CONTROL FUNCTION BLOCKS: PID Control, Input Selector, Signal Characterizer, Control Selector, and Output Splitter.

Input: One isolated pH/ORP sensor input.

Power & Load Requirements: Fieldbus power voltage at 9 to 32 VDC. Current required is 18 mA.

2.4 Specifications - Enclosure

Case: Polycarbonate. IP66 (CSA, FM), NEMA 4X (CSA)

Dimensions: Overall 155 x 155 x 131mm (6.10 x 6.10 x 5.15 in.). Cutout: 1/2 DIN 139mm x 139mm (5.45 x 5.45 in.)

Conduit openings: Six. Accepts PG13.5 or 1/2 in. conduit fittings

Display: Monochromatic graphic liquid crystal display. No backlight. 128 x 96 pixel display resolution. Active display area: 58 x 78mm (2.3 x 3.0 in.). All fields of the main instrument display can be customized to meet user requirements.

Ambient temperature and humidity: -20 to 65°C (-4 to 149°F), RH 5 to 95% (non-condensing).

Storage Temperature: -20 to 70°C (-4 to 158°F)

RFI/EMI: EN-61326 CE

Complies with the following Standards:

CSA: C22.2 No 0 – 10; C22.2 No 0.4 – 04; C22.2 No. 25-M1966: , C22.2 No. 94-M1991: , C22.2 No.142-M1987: , C22.2 No. 157-M1992: , C22.2 No. 213-M1987: , C22.2 No. 60529:05

ATEX: IEC 60079-0:2011, 60079-11:2011

IECEx: IEC 60079-0: 2011 Edition: 6.0, I EC 60079-11 : 2011-06 Edition: 6.0

FM: 3600: 2011, 3610: 2010, 3611: 2004, 3810: 2005, IEC 60529:2004, ANSI/IEC 60079-0: 2009, ANSI/IEC 60079-11: 2009

Hazardous Location Approvals

Intrinsic Safety (with appropriate safety barrier):

Class I, II, III, Div. 1
Groups A-G
T4 Tamb = -20°C to 65°C

IECEx BAS 11.90098X
EEx ia IIC
T4 Tamb = -20°C to 65°C

ATEX

CE 1180 II 1 G
Baseefa04ATEX0195X
EEx ia IIC
T4 Tamb = -20°C to 65°C

Class I, II & III, Division 1, Groups A-G T4
Tamb = -20°C to 40°C for -FI option
Tamb = -20°C to 65°C for -HT and -FF options

Class I, Zone 0, AEx ia IIC T4
Tamb = -20°C to 40°C for -FI option
Tamb = -20°C to 65°C for -HT and -FF options

Non-Incendive:

Class I, Div. 2, Groups A-D
Dust Ignition Proof
Class II & III, Div. 1, Groups E-G
NEMA 4/4X, IP66 Enclosure
T4 Tamb = -20°C to 65°C

Class I, Division 2 Groups A-D
Dust Ignition proof

Class II & III, Division 1, Groups E-G
IP66 enclosure
Tamb = -20°C to 40°C for -FI option
Tamb = -20°C to 65°C for -HT and -FF options

Weight/Shipping Weight: 2 lbs/3 lbs (1 kg/1.5 kg)

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Section 3: Installation

3.1 Unpacking and inspection

Inspect the shipping container. If it is damaged, contact the shipper immediately for instructions. Save the box. If there is no apparent damage, unpack the container. Be sure all items shown on the packing list are present. If items are missing, notify Rosemount Analytical immediately.

3.2 Installation – general information

1. Although the transmitter is suitable for outdoor use, do not install in direct sunlight or in areas of extreme temperatures.
2. Install the transmitter in an area where vibration and electromagnetic and radio frequency interference are minimized or absent.
3. Keep the transmitter and sensor wiring at least one foot from high voltage conductors. Be sure there is easy access to the transmitter.
4. The transmitter is suitable for panel, pipe, or surface mounting.
5. The transmitter case has six 1/2-inch (PG13.5) conduit openings. Use separate conduit openings for the power/output cable and the sensor cable.
6. Use weathertight cable glands to keep moisture out to the transmitter. If conduit is used, plug and seal the connections at the transmitter housing to prevent moisture from getting inside the instrument.

3.3 Preparing conduit openings

There are six conduit openings in all configurations of Model 1066. (Note four enclosure opening plugs will be provided upon shipment.)
Conduit openings accept 1/2-inch conduit fittings or PG13.5 cable glands. To keep the case watertight, block unused openings with NEMA 4X or IP65 conduit plugs.

NOTE: Use watertight fittings and hubs that comply with your requirements. Connect the conduit hub to the conduit before attaching the fitting to the transmitter.

Electrical installation must be in accordance with the National Electric Code (ANSI/NFPA-70) and/or any other applicable national or local codes.

FIGURE 3-1. Panel Mounting Dimensions

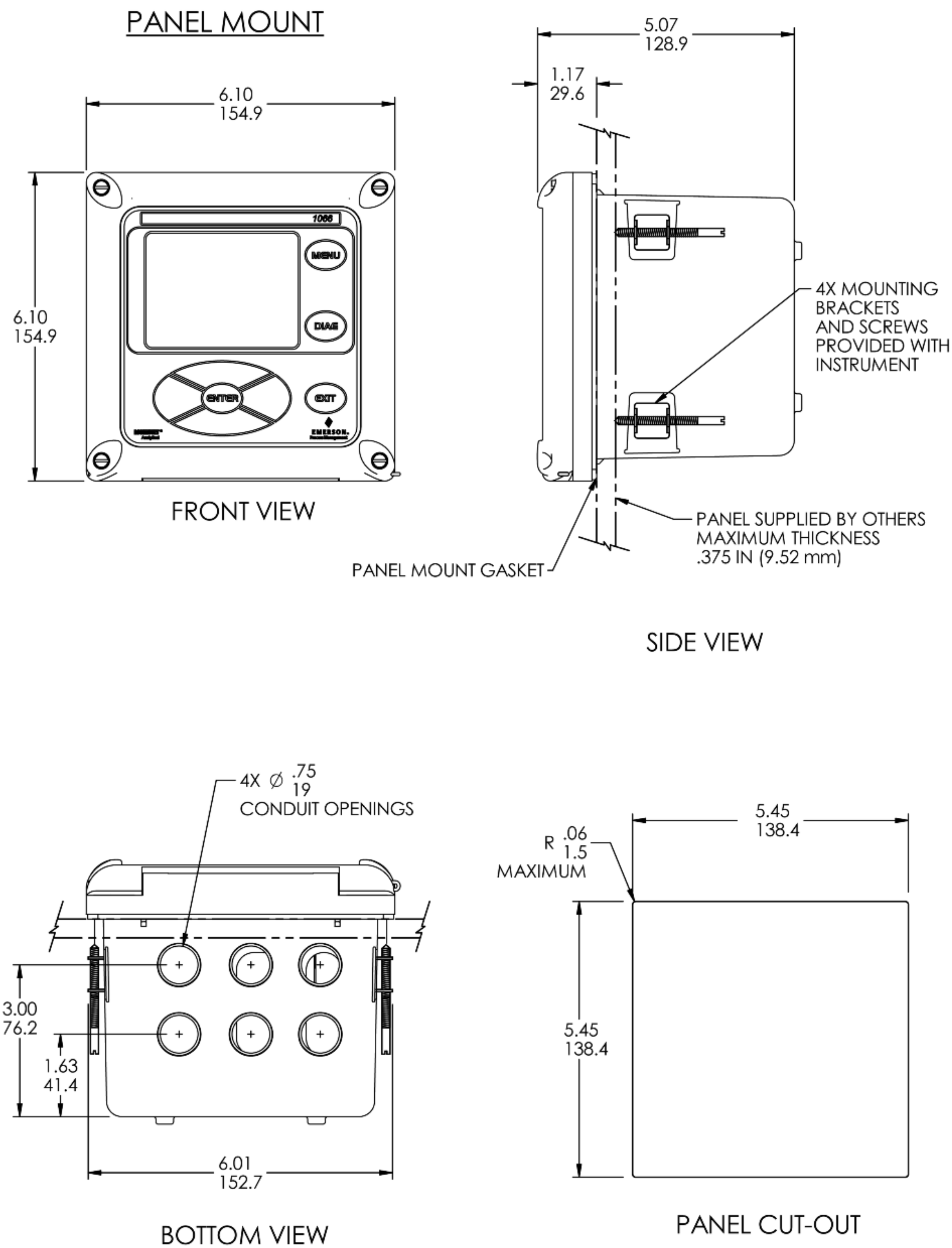
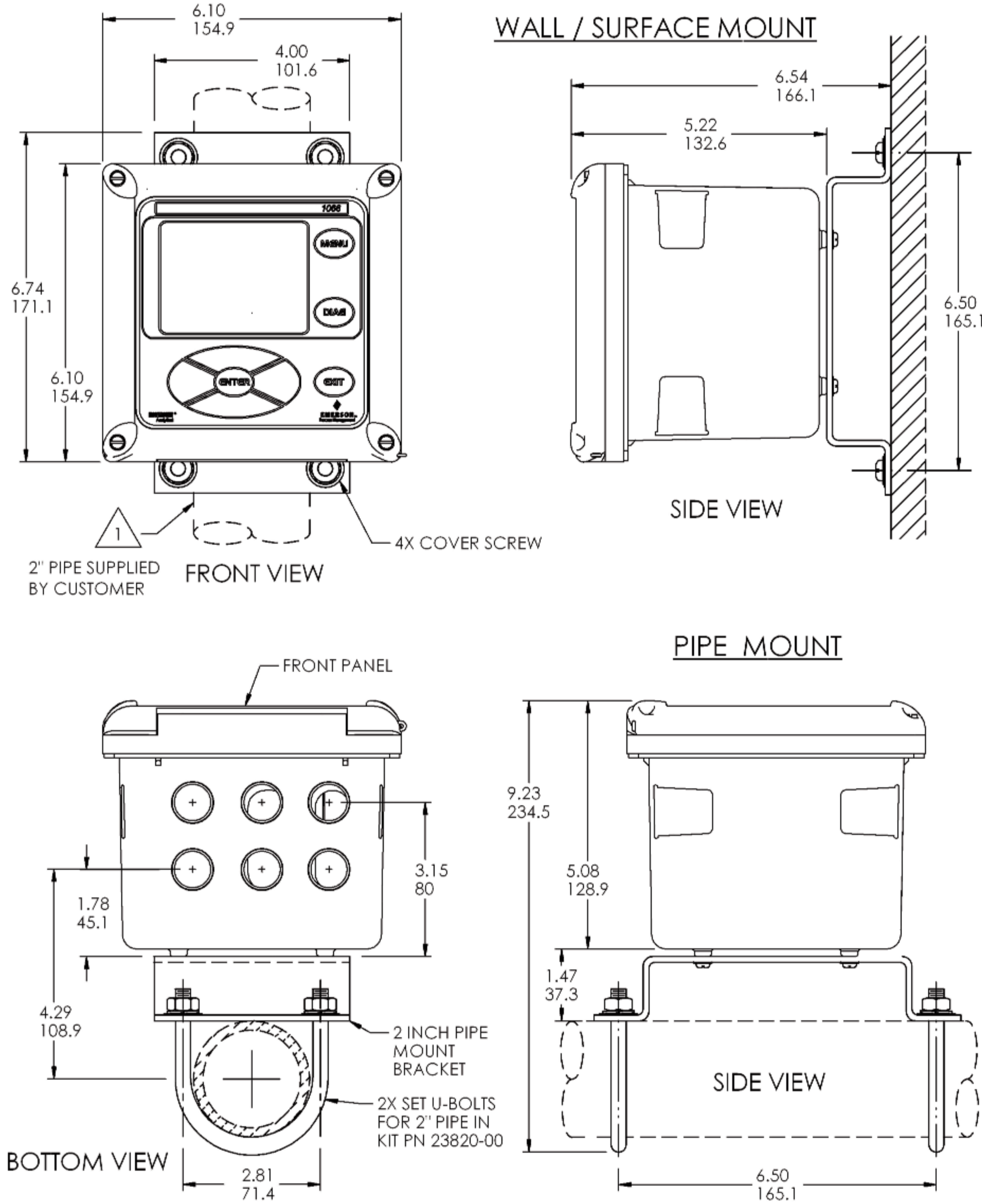


FIGURE 3-2. Pipe and wall mounting dimensions (Mounting bracket PN: 23820-00)



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Section 4: Wiring Instructions

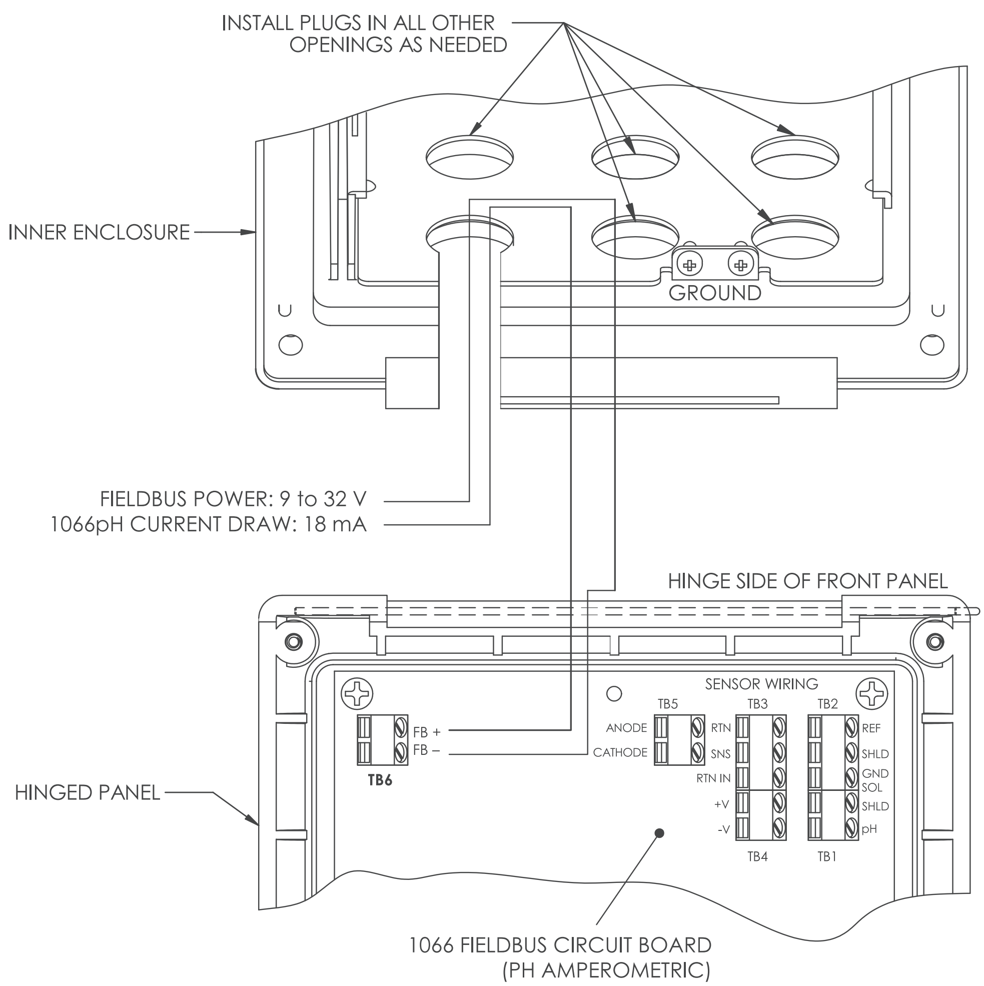
4.1 General Information

All wiring connections are located on the main circuit board. The front panel is hinged at the bottom. The panel swings down for access to the wiring locations.

4.2 Power Supply Wiring

Run the power/signal wiring through the opening nearest TB2. Use shielded cable and ground the shield at the power supply. Fieldbus power is generally not grounded to the transmitter enclosure.

FIGURE 4-1. Power Supply Wiring



TB6 / POWER INPUT IS POLARITY INSENSITIVE

4.3 Sensor Wiring

4.3.1 General

Wire the correct sensor leads to the main board using the lead locations marked directly on the board. Rosemount Analytical SMART pH sensors can be wired to the 1066 using integral cable SMART sensors or compatible VP8 pH cables. After wiring the sensor leads, carefully take up the excess sensor cable through the cable gland.

Keep sensor and output signal wiring separate from loop power wiring. Do not run sensor and power wiring in the same conduit or close together in a cable tray.

4.3.2 Sensor Wiring Details

Sensor wiring should follow the order of the above drawing. The terminals are as follows:

TB3 RTD Input Terminal: The leads for a 3-wire RTD should be landed as shown in the drawing. If a 2-wire RTD is used, the RTD Return and RTD Sense terminals must be jumpered to avoid an RTD Sense Line Open Warning.

TB2 Reference and Solution Ground: The reference electrode lead and its shield, and the solution ground leads should be landed as shown. If the sensor does not have a solution ground, there are two alternatives:

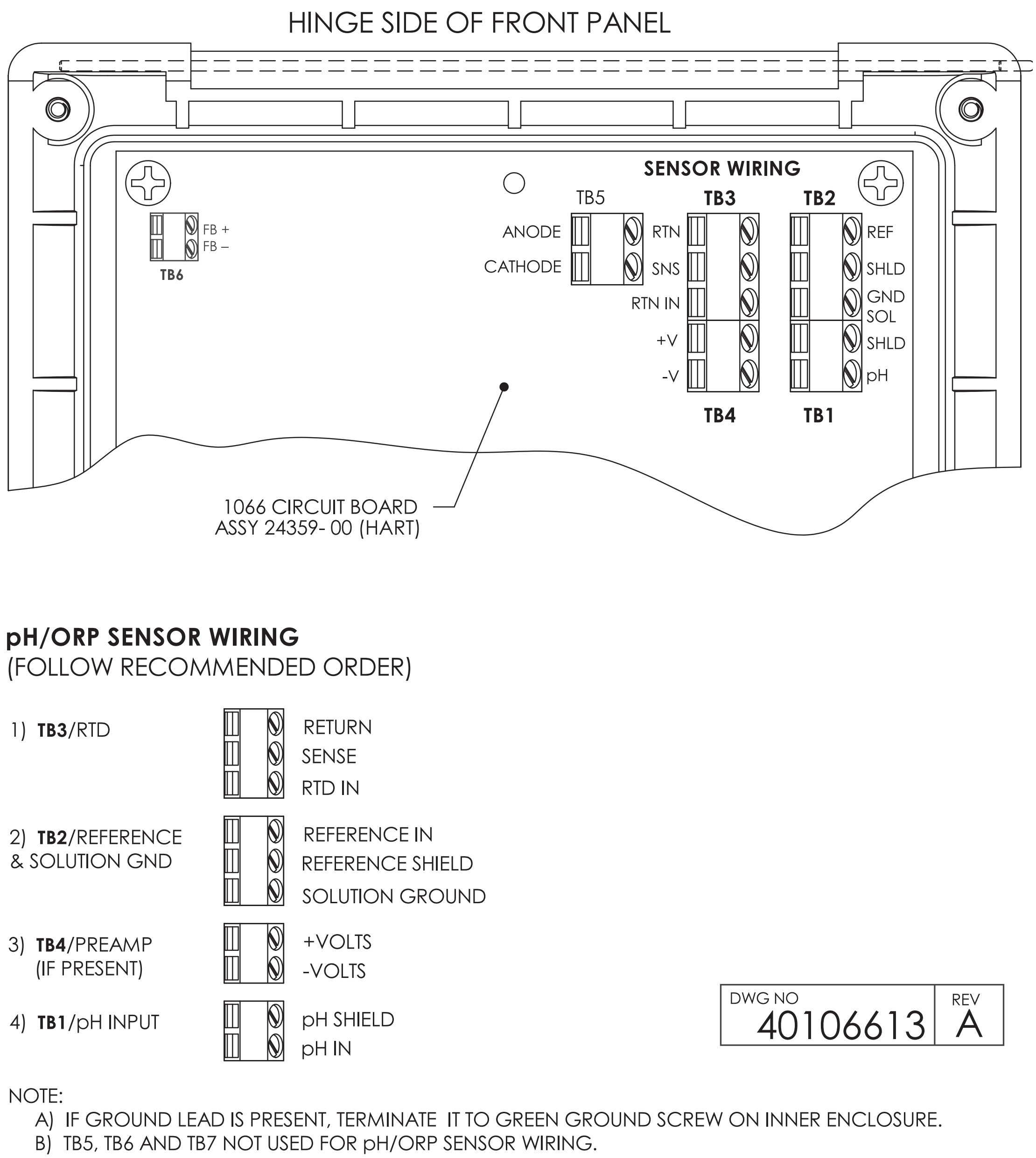
1. The Reference In and Solution Ground terminals can be jumpered. If this is done, the reference impedance will read a constant value of 0 kohm.
2. The second alternative is to leave the solution ground terminal open, and set the Reference Impedance parameter (Reference Z) in the Program Menu (see Section 7.3.7) to High, which turns off the reference impedance measurement. If the solution ground terminal is left open without doing this, there will be a constant High Reference Impedance Fault Alarm.

TB4 Preamplifier Power: The power leads from a pH sensor or a preamplifier in a junction box are landed on this terminal, which provide power to the preamplifier.

TB1 pH Electrode Input: The pH electrode lead and its shield are landed on this terminal as show.

Smart pH Sensors: Smart pH sensors have a ground lead (not to be confused with a solution ground lead) that should be connected to the enclosure ground, which is shown in the power wiring drawing.

FIGURE 4-2. pH/ORP sensor wiring to the 1066 printed circuit board



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Section 5: Intrinsically Safe Installation

5.1 All Intrinsically Safe Installations

FIGURE 5-1. CSA Installation

APROVED MODELS
1066-AA-BB-69 XMTR

WHERE 'AA' = MEASUREMENT TYPE, EXAMPLES:
P = pH/ORP
C L = AMPEROMETRIC CHLORINE
DO = AMPEROMETRIC DISSOLVED OXYGEN
OZ = AMPEROMETRIC OZONE
C = CONTACTING CONDUCTIVITY
T = TOROIDAL CONDUCTIVITY
WHERE 'BB' = ANALOG/DIGITAL OUTPUT TYPE, EXAMPLE:
AN = 4-20 mA ANALOG CURRENT LOOP OUTPUT
HT = 4-20 mA ANALOG CURRENT LOOP OUTPUT AND HART COMMUNICATION
FF = FOUNDATION FIELDBUS DIGITAL COMMUNICATION OPTION
FI = FISCO (FIELDBUS INSTRINSICALLY SAFE CONCEPT) DIGITAL COMMUNICATION OPTION
WHERE -69 SIGNIFIES THAT THE INSTRUMENT WILL BE MARKED WITH THE CSA LOGO FOR INTRINSIC SAFETY APPROVAL.

18. NON-INCENDIVE FIELD WIRING METHODS MAY BE USED FOR CONNECTING SENSORS TO THE INSTRUMENT. ATTACHED SENSORS MUST BE CSA APPROVED AS NON-INCENDIVE FOR CLASS 1, DIVISION 2, GROUPS ABCD WITH ENTITY INPUT REQUIREMENTS LESS THAN THOSE LISTED IN TABLES I AND II OR BE CLASSIFIED AS "SIMPLE APPARATUS". SIMPLE APPARATUS ARE DEVICES WHICH ARE INCAPABLE OF GENERATING OR STORING MORE THAN 1.2 V, 0.1 A, 25 mW OR 20 μJ (pH, AMPEROMETRIC SENSORS WITHOUT PREAMPS AND CONTACTING CONDUCTIVITY SENSORS QUALIFY AS SIMPLE APPARATUS).
17. INSTALLATION TO BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE.
16. DIVISION 2 WIRING METHOD.
15. 1066 MUST NOT BE CONNECTED TO EQUIPMENT GENERTING MORE THAN 250 VAC.
14. 1066 MODELS WITH P/CL/DO/OZ OPTIONS INCLUDE INTEGRAL PREAMPLIFIER CIRCUITRY. AN EXTERNAL PREAMPLIFIER MAY ALSO BE USED. THE OUTPUT PARAMETERS SPECIFIED IN TABLE II ARE VALID FOR EITHER PREAMPLIFIER. PREAMPLIFIERS MEETING THESE OUTPUT PARAMETERS INCLUDE ROSEMOUNT 23546-00, 23538-00, 23561-00 AND 1700702 PREAMPLIFIER ASSEMBLIES. A WEATHER RESISTANT ENCLOSURE MUST HOUSE THE TYPE 23546-00 REMOTE PREAMPLIFIER.
13. CONTACTING CONDUCTIVITY SENSORS, AMPEROMETRIC AND pH SENSORS WITHOUT PREAMPS SHALL MEET THE REQUIREMENTS OF SIMPLE APPARATUS AS DEFINED IN ANSI/ISA RP12.6 AND THE NEC, ANSI/NFPA 70. THEY CAN NOT GENERATE NOR STORE MORE THAN 1.5 V, 100 mA, 25 mW OR A PASSIVE COMPONENT THAT DOES NOT DISSIPATE MORE THAN 1.3W.
12. THE MODEL 1066T HAS SYSTEM APPROVAL FOR USE WITH MODELS 222, 225, 226, 228, 242 AND 245 TOROIDAL SENSORS. 1066 MODELS WITH P/CL/DO/OZ/C OPTIONS HAVE OUTPUT ENTITY PARAMETERS WHICH ALLOW THE USE OF VARIOUS SENSORS; SO LONG AS THE CAPACITANCE AND INDUCTANCE OF THE LOAD CONNECTED TO THE SENSOR TERMINALS DO NOT EXCEED THE VALUES SPECIFIED IN TABLE I WHERE:
$Ca \geq Ci$ (SENSOR) + Ccable; $La \geq Li$ (SENSOR) + Lcable.
11. ANY SINGLE SHUNT ZENER DIODE SAFETY BARRIER APPROVED BY CSA HAVING THE FOLLOWING OUTPUT PARAMETERS:
SUPPLY/SIGNAL TERMINALS TB6-1 AND 2 FOR FIELDBUS OPTION OR TB6-1, 2 AND 3 FOR HART AND -AN-OPTIONS. ALSO TB7-1 AND 2 IF ANALOG OUTPUT 2 IS USED.
Voc OR Vt $\leq$ 30 V FOR 1066-AA-HT/AN/FF-69.
Isc OR It $\leq$ 200 mA FOR 1066-AA-HT/AN-69; $\leq$ 300 mA FOR 1066-AA-FF-69.
Pmax $\leq$ 0.9 W FOR 1066-AA-HT/AN-69; $\leq$ 1.3 W FOR 1066-AA-FF-69.
10. THE INTRINSICALLY SAFE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE DEVICES WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:

FIELD DEVICE INPUT		ASSOCIATED APPARATUS OUTPUT
Vmax OR Ui	$\geq$	Voc, Vt OR Uo
Imax OR Ii	$\geq$	Isc, It OR Io
Pmax OR Pi	$\geq$	Po
Ci + Ccable	$\leq$	Ca, Ct OR Co
Li + Lcable	$\leq$	La, Lt OR Lo

9. INTRINSICALLY SAFE APPARATUS (MODEL 1066, SMART THUM WIRELESS ADAPTER, MODEL 375, 475) AND ASSOCIATED APPARATUS (SAFETY BARRIER) SHALL MEET THE FOLLOWING REQUIREMENTS: THE VOLTAGE (Vmax) AND CURRENT (Imax) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Vt) AND CURRENT (Isc OR It) WHICH CAN BE DEVELOPED BY THE ASSOCIATED APPARATUS (SAFETY BARRIER). IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (Ci) AND INDUCTANCE (Li) OF THE INTRINSICALLY SAFE APPARATUS, INCLUDING INTERCONNECTING WIRING, MUST BE EQUAL OR LESS THAN THE CAPACITANCE (Ca) AND INDUCTANCE (La) WHICH CAN BE SAFELY CONNECTED TO THE APPARATUS. (REF. TABLES I, II AND III).
8. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
7. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
6. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE CANADIAN ELECTRICAL CODE, CSA C22.1, PART 1, APPENDIX F.
5. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. METAL CONDUIT IS NOT REQUIRED IN INTRINSICALLY SAFE INSTALLATIONS. HOWEVER, IF CONDUIT IS USED, BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION.
3. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 Ohm.
2. THE ASSOCIATED APPARATUS MUST BE CSA APPROVED.
1. NO REVISION TO DRAWING WITHOUT PRIOR CSA APPROVAL.

NOTES: UNLESS OTHERWISE SPECIFIED

TABLES IA AND IIA ARE FOR pH, CHLORINE, DISSOLVED OXYGEN AND OZONE OPTIONS

TABLE IA (FOR 1066-P/CL/DO/OZ)

GAS GROUPS	OUTPUT PARAMETERS	
	Ca (μF)	La (mH)
A, B	1.5	0.280
C	9.9	1.1
D	39	2.2

TABLE IIA (FOR 1066-P/CL/DO/OZ)

OUTPUT PARAMETERS	MODEL 1066 TB1-1 THRU 12
Uo	11.76 V
Io	353 mA
Po	420 mW

TABLES IB AND IIB ARE FOR CONTACTING CONDUCTIVITY

TABLE IB (FOR 1066-C)

GAS GROUPS	OUTPUT PARAMETERS	
	Ca (μF)	La (mH)
A, B	1.5	0.28
C	9.9	1.1
D	42	2.2

TABLE IIB (FOR 1066-C)

OUTPUT PARAMETERS	MODEL 1066 TB1-1 THRU 12
Uo	5.88 V
Io	505 mA
Po	214 mW

TABLE III

1066 SUPPLY ENTITY PARAMETERS					
MODEL NO.	Vmax (VDC)	Imax (mA)	Pmax (W)	Ci (nF)	Li (mH)
1066-AA-HT/AN-69 LOOP POWER SIGNAL TERMINALS TB6 -1, -2 & -3	30	200	0.9	0	0
1066-AA-HT/AN-69 ANALOG OUTPUT 2 SIGNAL TERMINALS TB7 -1 & -2	30	200	0.9	0	0
1066-AA-FF-69 LOOP POWER SIGNAL TERMINALS TB6 -1 & -2	30	300	1.3	0	0
1066-AA-FI-69 LOOP POWER SIGNAL TERMINALS TB6 -1 & -2	17.5	380	5.32	0	0

ENTITY PARAMETERS: REMOTE TRANSMITTER INTERFACE							
MODEL NO.	Vmax IN: Vdc	Imax IN:mA	Pamx IN: W	Ci (μF)	Li (mH)	Voc max OUT: Vdc	Isc max OUT:uA
375 OR 475	30	200	1.0	0.0	0.0	1.9	32

(475 INSTALLATION DRAWING IS 00475-1130)

RELEASE DATE	ECO NO	REV	SCHEMATIC, INSTALLATION MODEL 1066 XMTR, (CSA)
JUL 13, 2011	LQD10467	B	DWG NO 1400669 REV C

FIGURE 5-2. CSA Installation

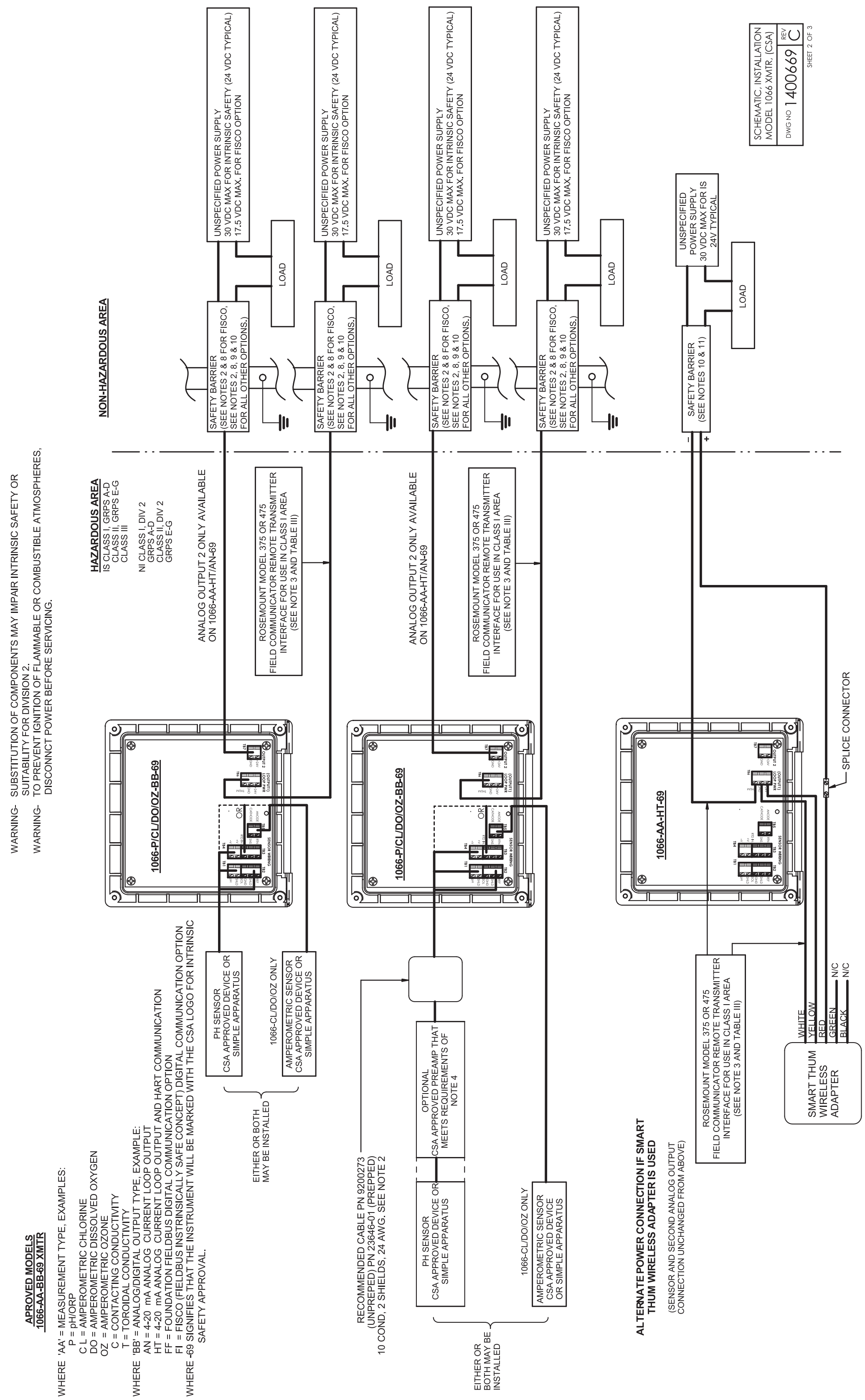

FIGURE 5-3. CSA Installation

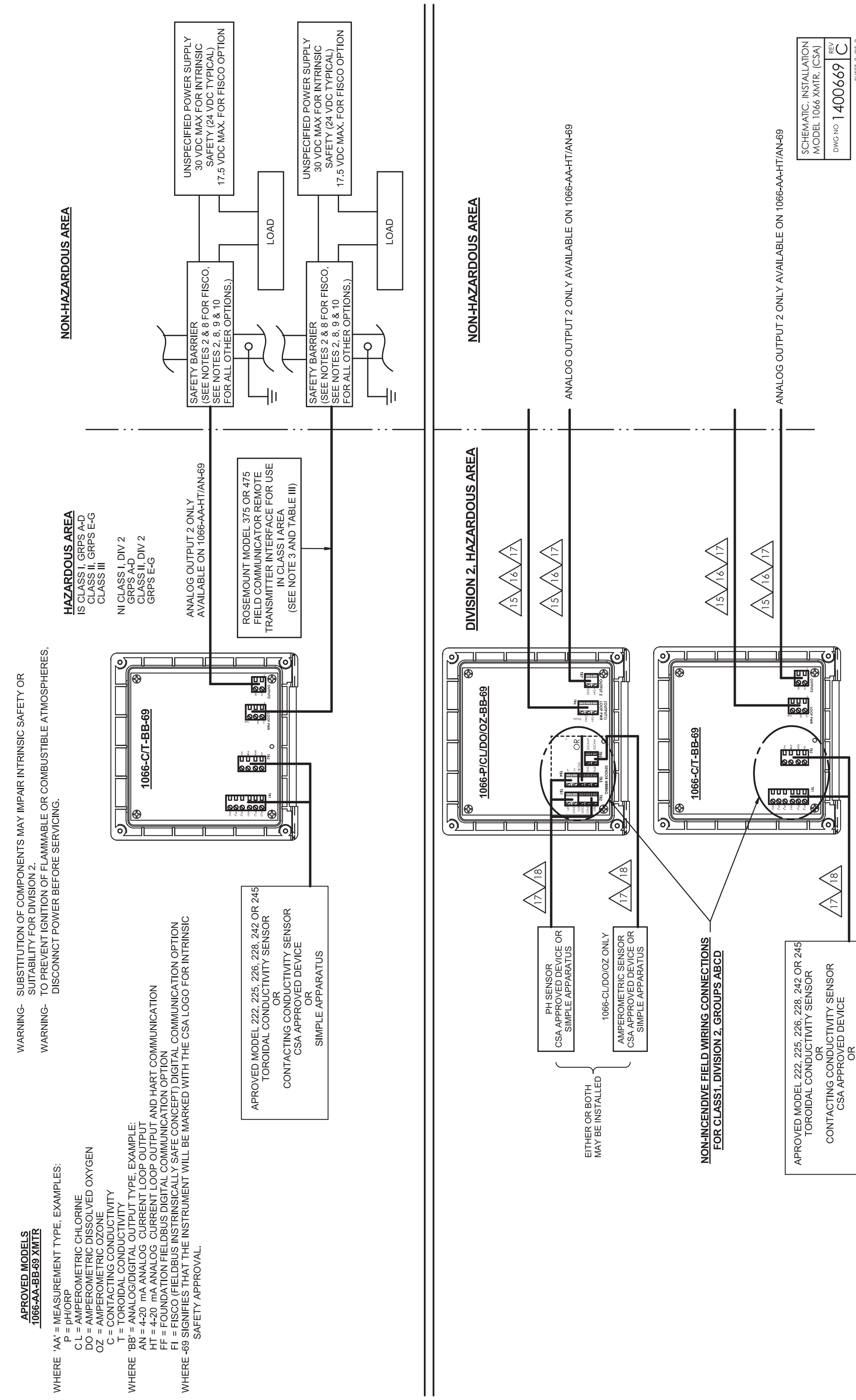

FIGURE 5-4. CSA Installation, label information

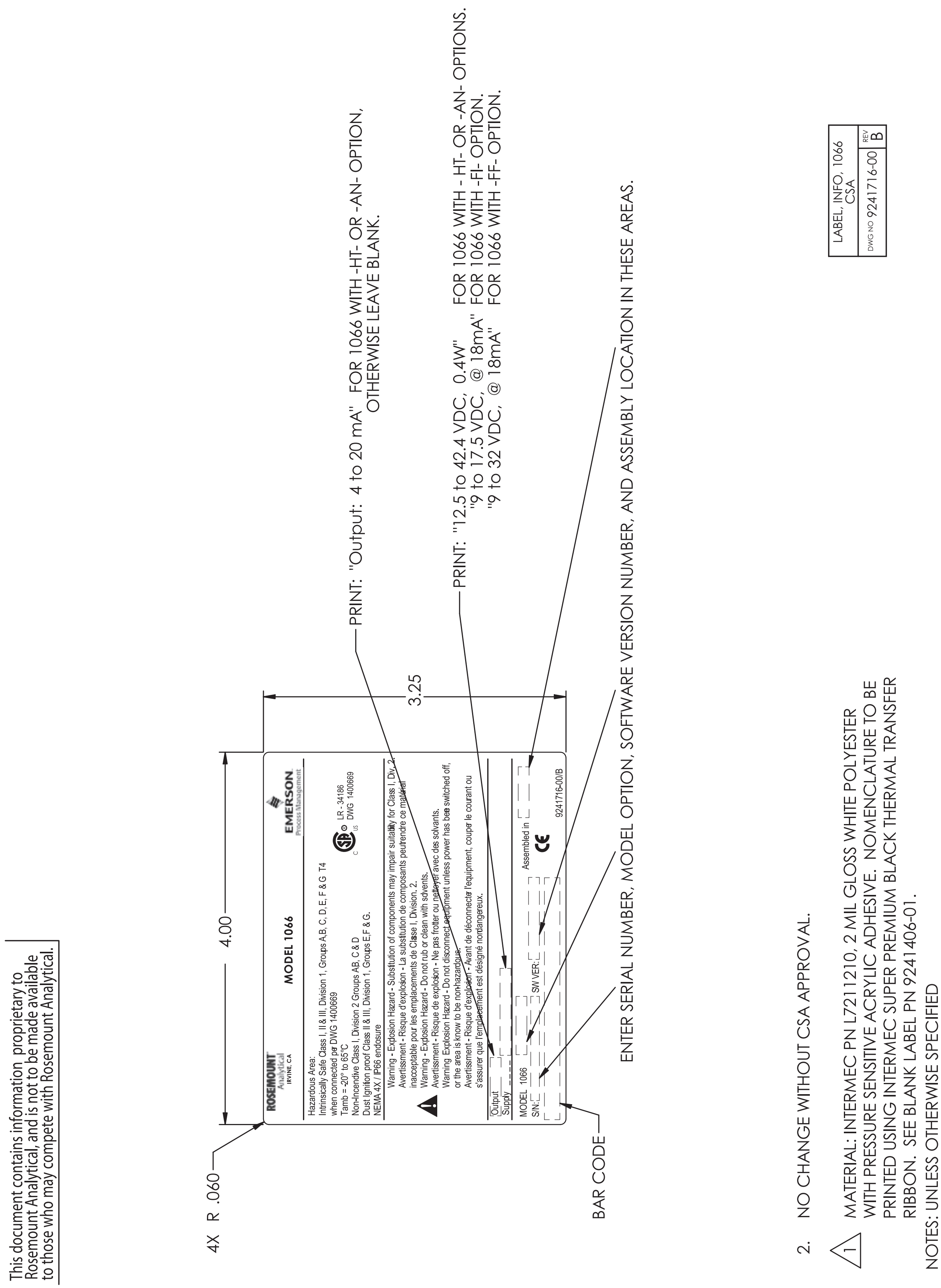

FIGURE 5-5. ATEX, IECEx Label Information

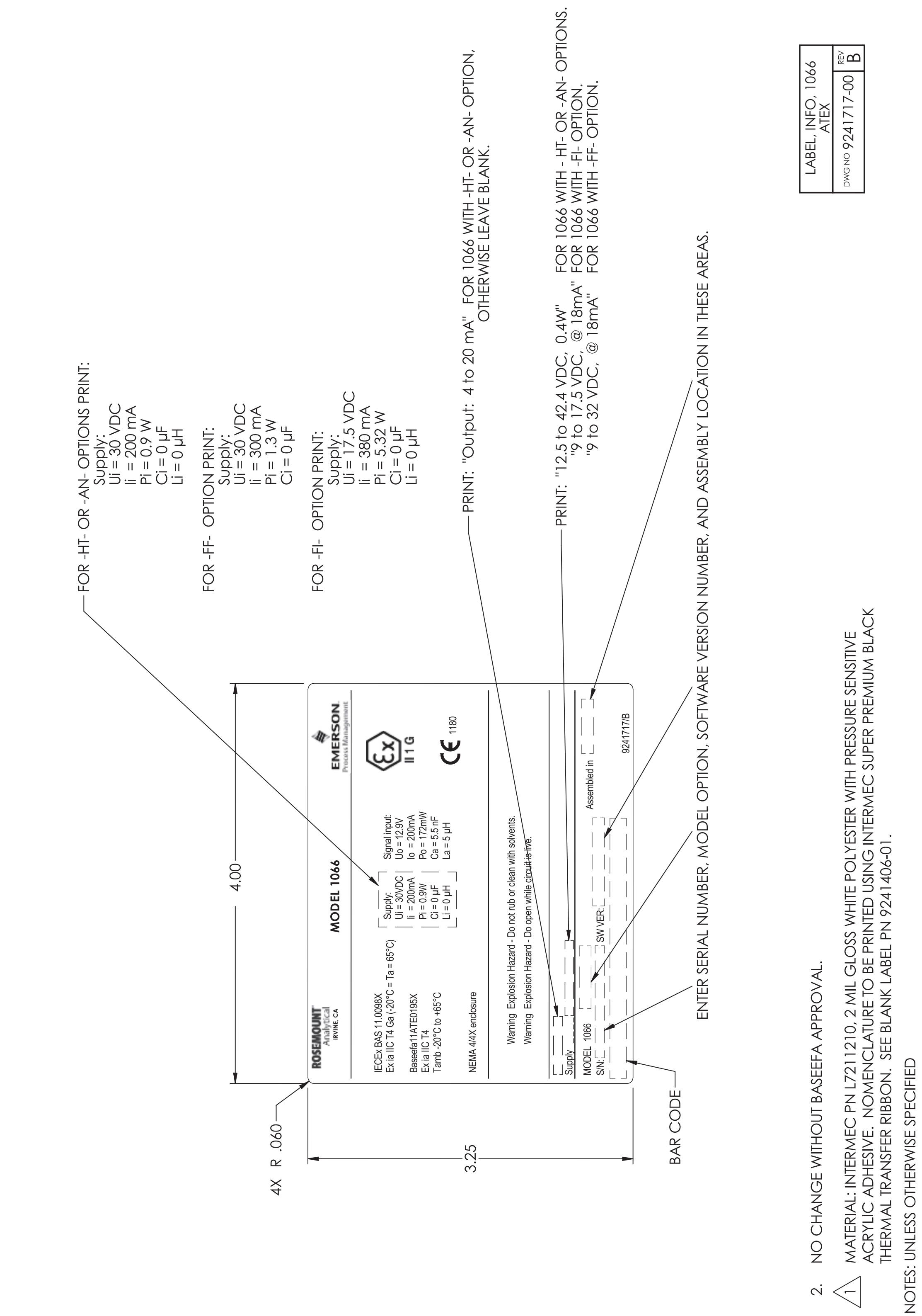

FIGURE 5-6. FM Installation

THIS DOCUMENT IS CERTIFIED BY FM REV A
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REV
REVISIONS NOT PERMITTED W/O AGENCY APPROVAL

APROVED MODELS 1066-AA-BB-67 XMTR

WHERE 'AA' = MEASUREMENT TYPE:
P = pH/ORP
C L = AMPEROMETRIC CHLORINE
DO = AMPEROMETRIC DISSOLVED OXYGEN
OZ = AMPEROMETRIC OZONE
C = CONTACTING CONDUCTIVITY
T = TOROIDAL CONDUCTIVITY
WHERE 'BB' = ANALOG/DIGITAL OUTPUT TYPE:
AN = 4-20 mA ANALOG CURRENT LOOP OUTPUT
HT = 4-20 mA ANALOG CURRENT LOOP OUTPUT AND HART COMMUNICATION
FF = FOUNDATION FIELDBUS DIGITAL COMMUNICATION OPTION
FI = FISCO (FIELDBUS INSTRINSICALLY SAFE CONCEPT) DIGITAL COMMUNICATION OPTION
WHERE -67 SIGNIFIES THAT THE INSTRUMENT WILL BE MARKED WITH THE FM LOGO FOR INTRINSIC SAFETY APPROVAL.

19 A 1066 WITH THE -FI OPTION MAY BE INSTALLED PER THE FISCO INSTRUCTIONS OR PER THE INTRINSICALLY SAFE INSTRUCTIONS ON THIS DRAWING.

18 IF USING MODEL 375 OR 475 COMMUNICATOR, OR MODEL 775 THUM WIRELESS ADATER, MANUFACTURE'S INSTALLATION DRAWING MUST BE FOLLOWED.

17 INSTALLATION TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

16 NON-INCENDIVE FIELD WIRING METHODS MAY BE USED FOR CONNECTING SENSORS TO THE INSTRUMENT. ATTACHED SENSORS MUST BE FM APPROVED AS NON-INCENDIVE FOR CLASS 1, DIVISION 2, GROUPS ABCD WITH ENTITY INPUT VALUES OF Vmax AND Imax ≥ Voc (Vt) AND Isc (It) LISTED IN TABLE IIA/IIB AND THE Ci AND Li OF THE SENSOR AND INTERCONNECTED WIRING MUST BE ≤ THE VALUES OF Ca AND La LISTED IN TABLES IA/IB OR BE CLASSIFIED AS "SIMPLE APPARATUS". SIMPLE APPARATUS ARE DEVICES WHICH ARE INCAPABLE OF GENERATING OR STORING MORE THAN 1.2 V, 0.1 A, 25 mW OR 20 µJ (pH OR AMPEROMETRIC SENSORS WITHOUT PREAMPS AND CONTACTING CONDUCTIVITY SENSORS QUALIFY AS SIMPLE APPARATUS).

15 DIVISION 2 WIRING METHOD PER THE NEC (EXCLUDING NONINCENDIVE FIELD WIRING).

14. METAL CONDUIT IS NOT REQUIRED FOR INTRINSICALLY SAFE INSTALLATIONS. HOWEVER, IF CONDUIT IS USED, BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION.

13. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.

12. THE ASSOCIATED APPARATUS MUST BE FM APPROVED AND MUST BE RESISTIVELY LIMITED HAVING LINEAR OUTPUTS.

11. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.

10. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.

9. THE INTRINSICALLY SAFE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE DEVICES WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:

FIELD DEVICE INPUT		ASSOCIATED APPARATUS OUTPUT
Vmax OR Ui	≥	Voc, Vt OR Uo
Imax OR Ii	≥	Isc, It OR Io
Pmax OR Pi	≥	Po
Ci + Ccable	≤	Ca, Ct OR Co
Li + Lcable	≤	La, Lt OR Lo

8. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 Ohm.

7. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.

6. CONTACTING CONDUCTIVITY SENSORS, AMPEROMETRIC AND pH SENSORS WITHOUT PREAMPS SHALL MEET THE REQUIREMENTS OF SIMPLE APPARATUS AS DEFINED IN ANSI/ISA RP12.6 AND THE NEC, ANSI/NFPA 70. THEY CAN NOT GENERATE NOR STORE MORE THAN 1.5 V, 100 mA, 25 mW OR A PASSIVE COMPONENT THAT DOES NOT DISSIPATE MORE THAN 1.3W.

5. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE, (ANSI/NFPA 70) SECTIONS 504 AND 505.

4. WHEN CONNECTIONS ARE MADE TO 1066-AA-HT/AN-67 OPTION ANALOG OUTPUT 2 (TB7-1 & -2), SEPARATE WIRING AND A SECOND BARRIER ARE REQUIRED. THE WIRING FROM EACH BARRIER MUST BE INSTALLED AS SEPARATE INTRINSICALLY SAFE CIRCUITS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

3. INTRINSICALLY SAFE APPARATUS (MODEL 1066, SMART THUM WIRELESS ADAPTER, MODEL 375, 475) AND ASSOCIATED APPARATUS (SAFETY BARRIER) SHALL MEET THE FOLLOWING REQUIREMENTS: THE VOLTAGE (Vmax) AND CURRENT (Imax) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Vt) AND CURRENT (Isc OR It) WHICH CAN BE DEVELOPED BY THE ASSOCIATED APPARATUS (SAFETY BARRIER). IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (Ci) AND INDUCTANCE (Li) OF THE INTRINSICALLY SAFE APPARATUS, INCLUDING INTERCONNECTING WIRING, MUST BE EQUAL OR LESS THAN THE CAPACITANCE (Ca) AND INDUCTANCE (La) WHICH CAN BE SAFELY CONNECTED TO THE APPARATUS. (REF. TABLES I, II AND III).

2. THE MODEL 1066-C/T HAS SYSTEM APPROVAL FOR USE WITH MODELS 222, 225, 226 & 228 TOROIDAL SENSORS OR 140, 141, 142, 150, 400, 401, 402, 402VP, 403, 403VP, 404& 410VP CONTACTING CONDUCTIVITY SENSOR. CABLE LENGTH FOR CONDUCTIVITY SENSORS MUST BE LESS THAN 200'. 1066 MODELS WITH P/CL/DO/OZ/C OPTIONS HAVE OUTPUT ENTITY PARAMETERS WHICH ALLOW THE USE OF VARIOUS SENSORS WHICH MAY BE SIMPLE APPARATUS OR HAVE FM APPROVED ENITY PARAMETERS; SO LONG AS THE CAPACITANCE AND INDUCTANCE OF THE LOAD CONNECTED TO THE SENSOR TERMINALS DO NOT EXCEED THE VALUES SPECIFIED IN TABLE I WHERE:
Ca > Ci (SENSOR) + Ccable; La > Li (SENSOR) + Lcable.

1. ANY SINGLE SHUNT ZENER DIODE SAFETY BARRIER APPROVED BY FM HAVING THE FOLLOWING OUTPUT PARAMETERS: SUPPLY/SIGNAL TERMINALS TB6-1 AND 2 FOR FIELDBUS OPTION OR TB6-1, 2 AND 3 FOR HART AND -AN-OPTIONS. ALSO TB7-1 AND 2 IF ANALOG OUTPUT 2 IS USED.
Voc OR Vt < 30 V FOR 1066-'AA'-HT/AN/FF-67; ≤ 17.5 Vdc FOR 1066-'AA'-FI-67.
Isc OR It < 200 mA FOR 1066-'AA'-HT/AN-67; < 300 mA FOR 1066-'AA'-FF-67; ≤ 380mA FOR 1066-'AA'-FI-67.
Pmax < 0.9 W FOR 1066-'A'A-HT/AN-67; < 1.3 W FOR 1066-'AA'-FF-67; ≤ 5.32W FOR 1066-'AA'-FI-67.

REVISION

LTR	ECO	DESCRIPTION	BY	DATE	CHECKED/APPROVED
B	LQD10696	SEE ECO	CH	8-9-12	JP / DOC

TABLE I (FOR 1066-P/CL/DO/OZ)

GAS GROUPS	OUTPUT PARAMETERS	
	Ca (µF)	La (mH)
II C	1.70	5.16
II B	11.6	20.7
II A	47.9	41.41

TABLE II (FOR 1066-PLCL/DO/OZ)

OUTPUT PARAMETERS	MODEL 1066 TB1 - 1 THRU 12
Uo (Vt)	11.328 V
Io (It)	82.86 mA
Po (Pt)	117.33 mW

TABLE III

1066 ENTITY PARAMETERS SUPPLY

MODEL NO.	Vmax (Vdc)	Imax (mA)	Pmax (W)	Ci (nF)	Li (µH)
1066-'AA'-**HT/AN**-67 LOOP POWER SIGNAL TERMINALS TB6 - 1, -2 AND -3	30	200	0.9	0	8.95
1066-'AA'-**HT/AN**-67 ANALOG OUTPUT 2 SIGNAL TERMINALS TB6 - 1AND -2	30	200	0.9	0	5.97
1066-'AA'-**FF**-67 LOOP POWER SIGNAL TERMINALS TB6 - 1AND -2	30	300	1.3	0	0
1066-'AA'-**FI**-67 LOOP POWER SIGNAL TERMINALS TB6 - 1AND -2	17.5	300	5.32	0	0

ENTITY PARAMETERS: REMOTE TRANSMITTER INTERFACE

MODEL NO.	Vmax IN	Imax IN	Pamx IN	Ci (µF)	Li (mH)	Voc max OUT	Isc max OUT
375 OR 475	30 Vdc	200 mA	1.0 W	0.0	0.0	1.9 Vdc	32 µA

(475 INSTALLATION DRAWING IS 00475-1130)

20. THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (Ui OR Vmax), THE CURRENT (Ii OR Imax) AND THE POWER (Pi OR Pmax) WHICH AN INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE CONSIDERING FAULTS, MUST BE EQUAL OR GREATER THAN VOLTAGE (Uo,Voc OR Vt), THE CURRENT (10, Isc OR It) AND THE POWER (Po OR Pmax) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. IN ADDITION, THE MAXIMUM UNPROTECTED CAPACITANCE (Ci) AND THE INDUCTANCE (Li) OF EACH APPARATUS (OTHER THAN THE TERMINATION) CONNECTED TO THE FIELDBUS MUST BE LESS THAN OR EQUAL TO 5nF and 10 uH RESPECTIVELY.

IN EACH SEGMENT ONLY ONE ACTIVE DEVICE, NORMALLY THE ASSOCIATED APPARATUS, IS ALLOWED TO PROVIDE THE NECESSARY ENERGY FOR THE FIELDBUS SYSTEM. THE VOLTAGE Uo (OR Voc OR Vt) OF THE ASSOCIATED APPARATUS IS LIMITED TO ARANGE OF 14 VTO 24 Vdc ALL OTHER EQUIPMENT CONNECTED TO THE BUS CABLE HAS TO BE PASSIVE, MEANING THAT THEY ARE NOT ALLOWED TO PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50uA FOR EACH CONNECTED DEVICE. SEPARATELY POWERED EQUIPMENT NEEDS GALVANIC ISOLATION TO ASSURE THAT THE INTRINSICALLY SAFE FIELDBUS CIRCUIT REMAINS PASSIVE.

THE CABLE USED TO INTERCONNECT DEVICES NEEDS TO HAVE THE PARAMETERS IN THE FOLLOWING RANGE:

Loop Resistance R:	15...... 150 Ohm/km
Inductance per unit length L:	0.4.......1 mH/km
Capacitance per unit length C:	80.........200 nF

C =Cline/line + 0.5C line/screen, if both lines are floating, or
C= Cline/line + C line/screen, if the screen is connected to one line

Length of trunk cable:	less than or equal to 1000m
Length of spur cable:	less than or equal to 30m
Length of spur splice:	less than or equal to 1m

AT EACH END OF THE TRUNK CABLE AN APPROVED INFALLIBLE LINE TERMINATION WITH THE FOLLOWING PARAMETERS IS SUITABLE:
R=90.....100 Ohm C=0.....2.2 uF

ONE OF THE ALLOWED TERMINATIONS MIGHT ALREADY BE INTEGRATED IN THE ASSOCIATED APPARATUS. THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED DUE TO I.S. REASONS. IF THE ABOVE RULES ARE RESPECTED, UP TO ATOTAL LENGTH OF 1000 m (SUM OF TRUNK AND ALL SPUR CABLES) OF CABLE IS PERMITED. THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT IMPAIR THE INTRINSIC SAFETY OF THE INSTALLATION.

FEB 14, 2012	LQD10595	A	SCHEMATIC, INSTALLATION MODEL 1066 XMTR, (FM)	
RELEASE DATE	ECO NO	REV	DWG NO 1400670	REV B

FIGURE 5-7. FM Installation

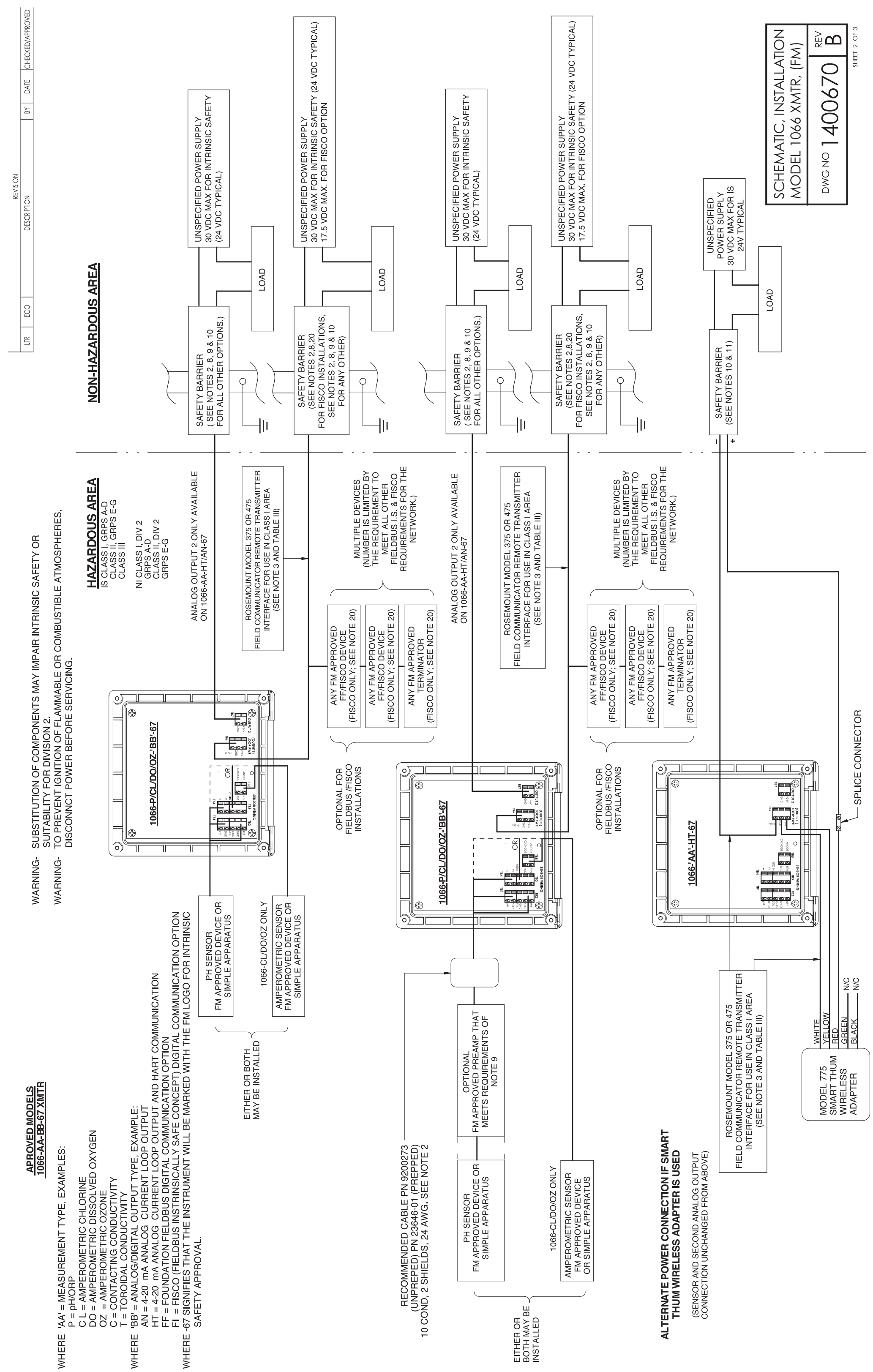


FIGURE 5-7. FM Installation

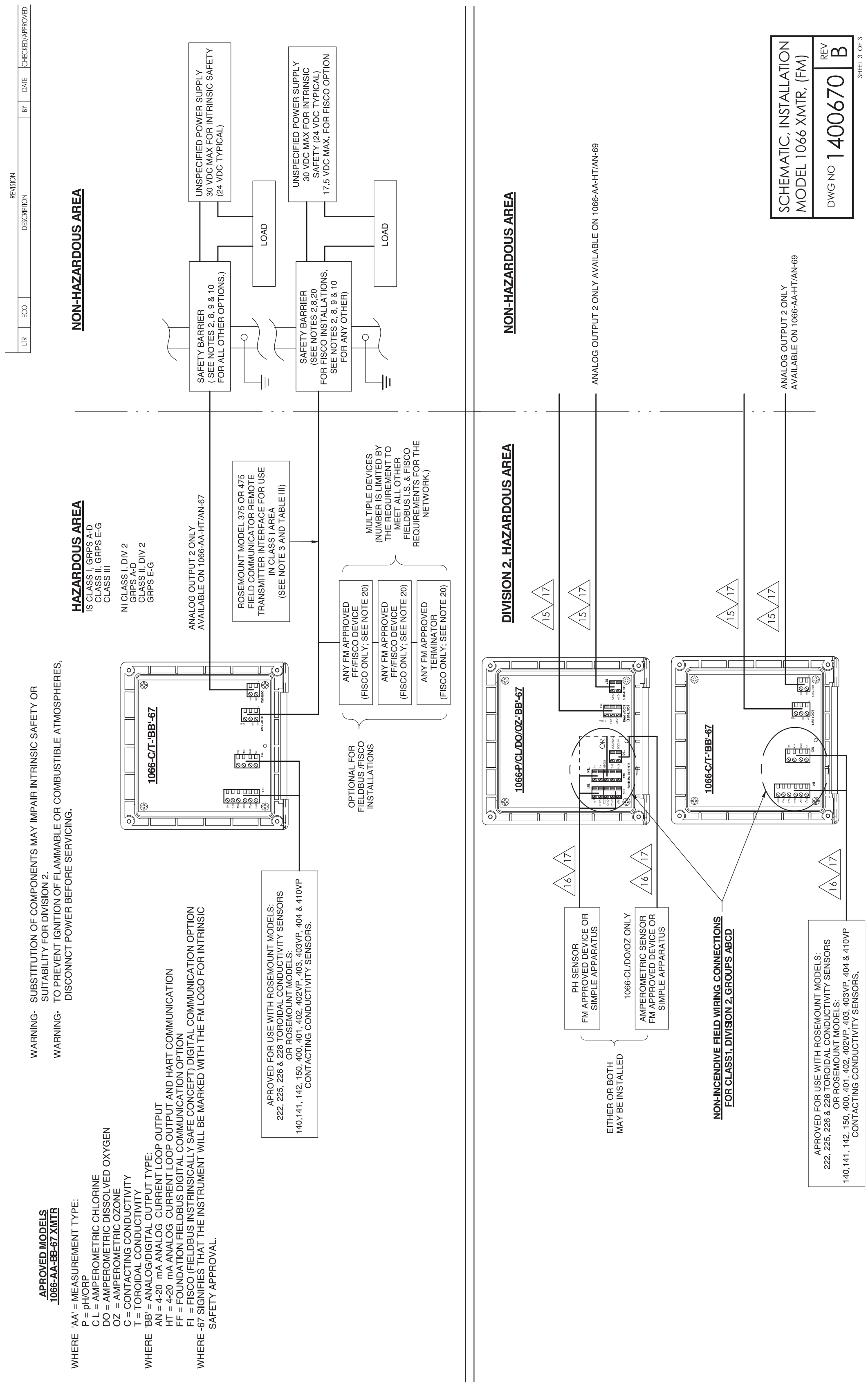
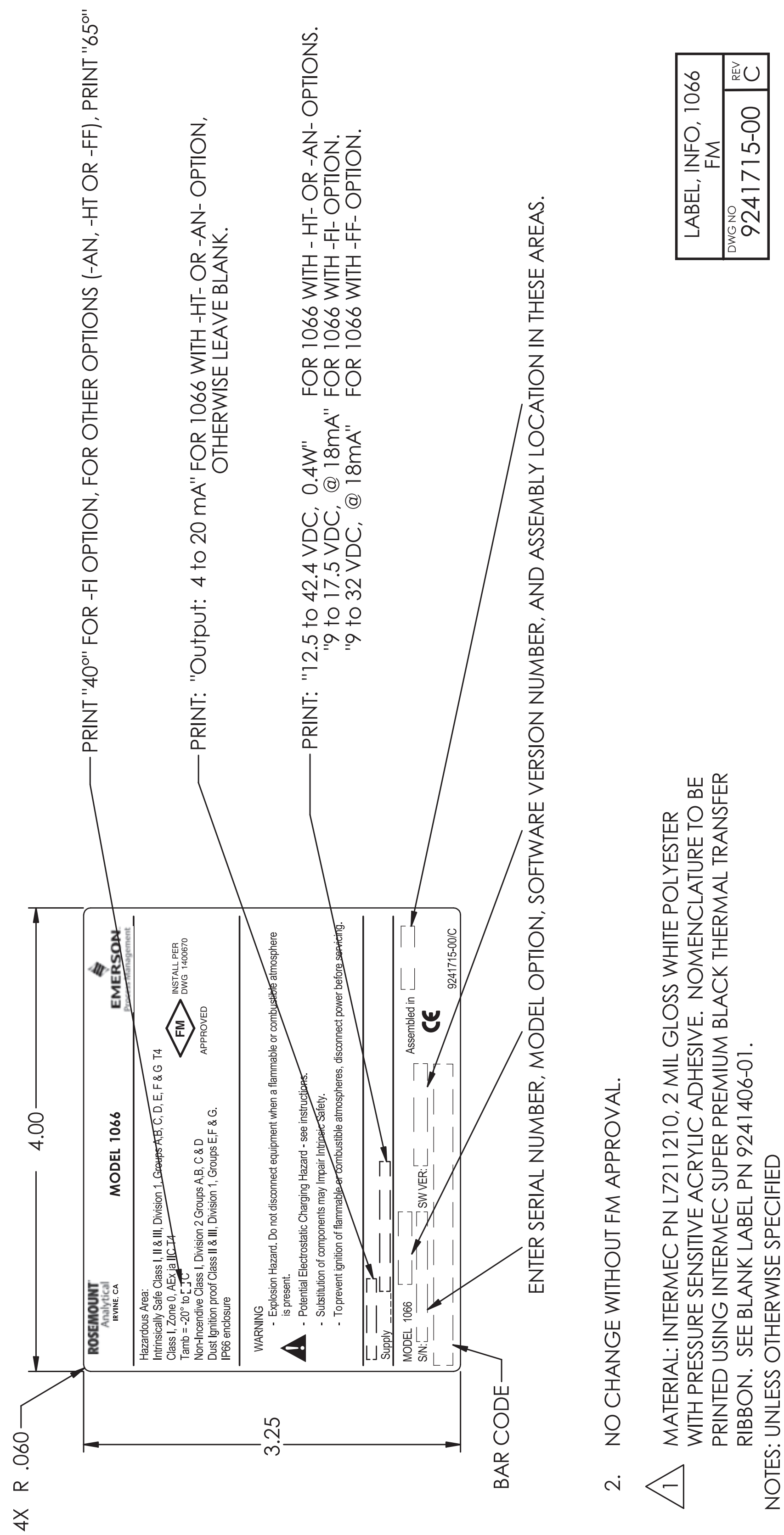


FIGURE 5-7. FM label information



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Section 6: Display and Operation

6.1 User Interface

The 1066 has a large display which shows the measurement readout and temperature in large digits and up to four additional process variables or diagnostic parameters concurrently. The displayed variables can be customized to meet user requirements. This is called display Format. The intuitive menu system allows access to Calibration, View of Configuration in the Auto Mode, Programming, and Display functions. In addition, a dedicated DIAG button is available to provide access to useful operational and Help screens for diagnostic information at locally. The display flashes Fault and/or Warning when these conditions occur.

Calibrate

Program

View Configuration

Display

6.2 Instrument Keyboard

There are four Function keys and four Selection keys on the instrument keypad.

Function Keys:

The **MENU key** is used to access menus for programming and calibrating the instrument. Four top-level menu items appear when pressing the MENU key:

- Calibrate: calibrate the attached the main measurement and temperature.
- Program: Program the measurement, temperature, security and reset the device.
- View Configuration: View the configuration in the Automatic Mode
- Display: Program display format, language, warnings, and contrast

Pressing **MENU** from the main (live values) screen always causes the main menu screen to appear.

Pressing the **DIAG** key displays active Faults and Warnings, and provides detailed instrument information and sensor diagnostics including: Faults, Warnings, Sensor information, and Software version.

Pressing **DIAG** provides useful diagnostics and information: Measurement, Raw Signal Value (Millivolts), Reference Offset, Temperature, Temperature Offset, Temperature Sensor Resistance, software version.

The ENTER key. Pressing ENTER stores numbers and settings and moves the display to the next screen.

The EXIT key. Pressing EXIT returns to the previous screen without storing changes.

Selection Keys:

Surrounding the ENTER key, four Selection keys – up, down, right and left, move the cursor to all areas of the screen while using the menus.

Selection keys are used to:

1. Select items on the menu screens
2. Scroll up and down the menu lists

3. Enter or edit numeric values
4. Move the cursor to the right or left
5. Select measurement units during operations

6.3 Main Display

The 1066 displays the primary measurement value and temperature, and up to four secondary measurement values, a fault and warning banner, and a digital communications icon.

Process Measurements:

One process variable and process temperature is displayed by default. For all configurations, the Upper display area shows the live process variable and the Center display area shows the Temperature (default screen settings). The temperature shown can be the temperature as measured by the pH or ORP sensor, or by another Fieldbus transmitter linked to the 1066, or it can be the manual temperature used for temperature compensation. Each of these is shown as follows:

- Temperature from the pH/ORP sensor: **25.0 C**
- Temperature from Fieldbus: Tff **25.0 C**
- Manual Temperature: Tm **25.0 C**

Secondary Values:

Up to six secondary values are shown in display quadrants at the bottom half of the screen. All four secondary value positions can be programmed by the user to any of the following parameters:

- Millivolt Input
- pH Electrode Slope
- Reference Offset
- Glass Electrode Impedance
- Reference Electrode Impedance
- Transducer Block Mode (Actual)

Fault and Warning Banner:

The words “Fault” or “Warning” will appear at the bottom of the display, if a problem is found with the transmitter or the sensor, or a calibration error occurs. A fault requires immediate attention. A warning indicates a problematic condition or an impending failure. For troubleshooting assistance, press the Diag button.

Note: The display of warnings at the bottom of the display can be suppressed by selecting Warnings and entering Disable in Display Menu.

6.4 Formatting the Main Display

The main display screen can be programmed with the **Transducer Block** in the **Automatic Mode** as follows:

1. Press MENU
2. Scroll down to **Display.** Press **ENTER.**
3. **Main Format** will be highlighted. Press **ENTER.**
4. The sensor 1 process value will be highlighted in reverse video. Press the selection keys to navigate down to the screen sections that you wish to program. Press **ENTER.**
5. Choose the desired display parameter or diagnostic for each of the four display sections in the lower screen.
6. Continue to navigate and program all desired screen sections. Press **MENU** and **EXIT.** The screen will return to the main display.

6.5 Setting a Security Code

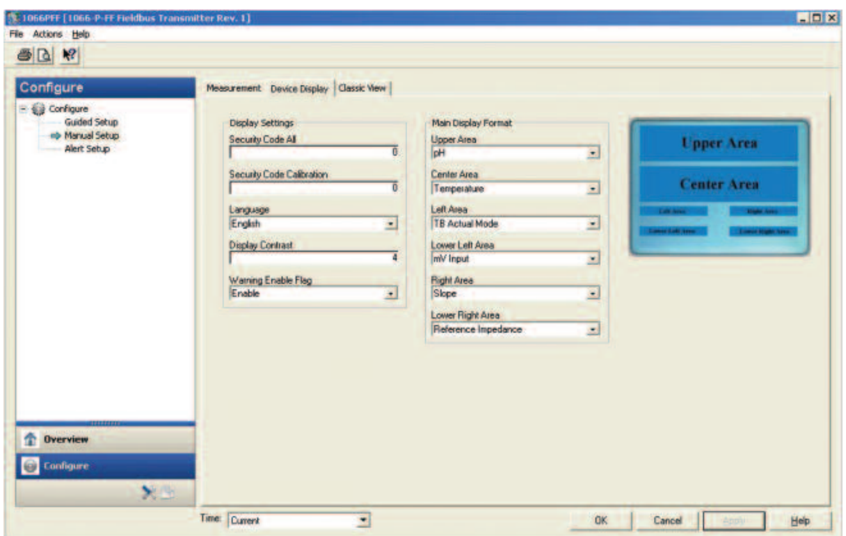
The security codes prevent accidental or unwanted changes to program settings, displays, and calibration, by using 3 digit security codes. The 1066 has two levels of security to control access and use of the instrument to different types of users. The two levels of security are:

- **All:** This is the supervisory security level. It blocks access to all menu functions, including Programming, Calibration, and Display.
- **Calibration:** This is the operator or technician level menu. It allows access only to calibration.

To turn off either security code, simply enter '000'.

To access **Security**, select **Program** and then scroll down to and select **Security**.

FIGURE 6-1. Display Formatting in AMS using Fieldbus



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Section 7: Programming Measurements / pH Measurement Programming

This section outlines how the various configuration parameters affect the measurement, and how to access them.

Note: Accessing the **Program** menu places the **Transducer Block in the Out of Service Mode**. This will cause all measurement channels to have a **BAD** status (Bad: Out of Service), which can affect the control system. Before programming the 1066 pH should be removed from automatic control. When the **Program** menu is exited, the **Transducer Block** will be returned to the Automatic mode.

Note: If you want to simply review the configuration parameters of the 1066 pH, use the **Main** menu item **View Configuration**. This will allow you to look at the configuration with the **Transducer Block in the Automatic** mode, and thus avoid any affect on the control system.

7.1 Accessing Configuration

To configure pH:

1. Press **MENU**
2. Scroll down to **Program**. Press **ENTER**.
3. Scroll down to **Measurement**. Press **ENTER**.

To change any parameter, scroll to the desired item and press **ENTER**.

The following sub-sections provide an explanation of each parameter and an explanation of its function in the measurement, and how it can be configured to meet the needs of a particular application.

7.2 Choosing Temperature Units and Automatic/Manual Temperature Compensation

7.2.1 Temperature Units

In the **Program** Menu, select **Temperature** and press the **ENTER**.

The first item listed is **Units**. Select either the desired temperature units (C or F). This is the only temperature related configuration for ORP or Redox measurements, since they do not use temperature compensation.

7.2.2 pH Temperature Compensation

pH measurements do require temperature compensation. The Model 1066 performs temperature compensation automatically by applying a temperature correction algorithm to compensate the pH sensor millivolt output for changes in the output due to changes in the sensor temperature.

The second item in the Temperature menu selects the source of the temperature to be used for temperature compensation. These are:

- **Auto/Sensor:** This selection uses the temperature element in the pH sensor as the source for temperature compensation, and is most commonly used.
- **Auto/Fieldbus:** This selection uses a temperature measurement linked to the 1066 from a Fieldbus transmitter on the segment, which measures temperature. Using this feature requires a link from the AI (Analog Input) Block of the transmitter providing the temperature to the AO (Analog Output) Block of the 1066pH on Channel 5. **(See Section 7.5.2).**

  Note: For an accurate pH measurement, the location of the temperature measurement on the bus should be near the pH sensor, so that its temperature is the same as the temperature of the pH sensor.
- **Manual:** This selection is used when the process temperature is tightly controlled, or there is no temperature element (RTD) in the pH sensor, and using a temperature measurement from Fieldbus is not an option. Selecting **Manual** brings up the parameter **Manual Temp**, which is the constant temperature value to be used for temperature compensation.

7.3 Measurement

In the **Program** Menu, select **Measurement** and press the **ENTER** button. This brings up a list of parameters as described below:

7.3.1 Measurement

Select the main measurement of the 1066 as **pH**, **ORP** or **Redox**, and press the **ENTER**.

7.3.2 Preamp

Select the location of the **preamplifier** as **Sensor/JBox** for pH sensors with an internal preamp or installations using a junction box with a preamplifier. **Note:** Smart pH sensors use a sensor mounted preamplifier and will automatically select this option when connected. For pH sensors without preamplifiers, select Analyzer to turn on the preamplifier in the 1066. When in doubt as to which to select, consult the pH or ORP sensor documentation.

7.3.3 Solution Temperature Compensation (pH only)

The temperature compensation selected in the Temperature Menu, corrects the millivolt output of the pH sensor for changes due to temperature. However, in some cases the actual pH of a solution will change with temperature. For example, an alkaline solution with a pH of 9.0 at 25 C (77 F) will have a pH of 8.0 at 60 C (140 F). Changes in solution pH with temperature can be compensated using solution temperature compensation.

Selecting **Sol'n Temp Corr** provides the following choices for solution temperature correction:

- **Ultra Pure Water:** Provide solution temperature compensation for very low conductivity water approaching pure water.
- **High pH:** Provide solution temperature compensation for alkaline solution, which exhibit a characteristic pH change with temperature.
- **Ammonia:** Provides compensation for water treated with ammonia, typically used in power applications.
- **Custom:** Provides a linear temperature solution compensation for a solution with a known temperature behavior. Selecting this option brings up the parameter **TCoeff**, which is the solution temperature coefficient in pH/deg C. The temperature coefficient determined by testing the solution should be entered for this parameter.
- **Off:** This selection turns the solution temperature off, and is the default value.

7.3.4 ISO pH (pH only)

ISO pH is the isopotential pH of the pH sensor and is virtually always 7.00 pH. It should be left at 7.00 pH unless a special type of pH sensor is being used, like a non-glass pH sensor, e.g. antimony metal pH sensor.

Note: If you are using a nonstandard pH sensor the isopotential point, which is the isopotential pH and the isopotential voltage will be different from a standard pH sensor isopotential point of 7.00 pH and 0.0 mV. The isopotential pH for a non-standard pH sensor can easily be changed, but the corresponding isopotential voltage will likely not be 0.0 mV. The documented isopotential voltage for the sensor should be noted and the maximum reference electrode offset (**Max Ref Offset, see Section 8.1.3**) should be set to the isopotential voltage plus 15 mV.

7.3.4 Resolution (pH only)

Toggles the displayed resolution of the pH measurement between 0.01 pH and 0.1 pH.

7.3.5 Filter

Sets the time constant of the input filter in seconds, over the range of 0 to 999 seconds, with a default value of 5 seconds.

7.3.6 Filter Type

This parameter toggles the type of filtering between **Continuous** and **Adaptive**.

- Continuous filtering at time constants of less than 10 seconds provides a windowed average of the last 5 seconds and reaches 100% of the change in 5 seconds. At time constants above 10 seconds it provides a running average.
- Adaptive filtering provides a quick response to changes above a threshold value. It should not be used with noisy measurements as large sudden changes will not be filtered.

7.3.7 Reference Z

This parameter is used to change the input of the 1066 to receive the millivolt signal from a sensor having, by design, high reference impedance. The default reference impedance setting is the Low which accommodates reference impedances up to **1,000 kohm (1 Mohm)**. By choosing **High**, the 1066 will accommodate sensors with reference impedances up to **2,000 Mohm**. When High is chosen, the reference impedance diagnostic alarm is disabled. The vast majority of sensors have reference impedance well below 1,000 kohm, and so **Reference Z** is normally left at **Low**.

High reference impedance can also be used with sensors without solution grounds to suppress a High Reference Impedance alert, when the solution ground terminal in the 1066pH is left open.

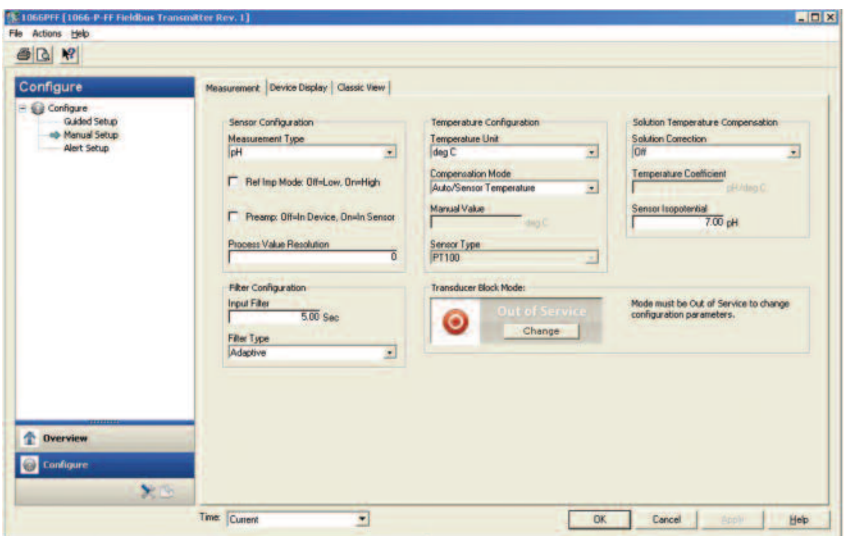
7.4 Reset

In the Main Menu, scroll down to and select **Reset Analyzer**. There are two reset options:

- **Factory Defaults:** Restores all the configuration parameters and calibration constants to their factory default values.
- **Sensor Cal Only:** Restores only the sensor calibration constants to their factory default values, which include pH slope, zero offset and temperature offset.

All the above measurement configuration parameters are available using Fieldbus as shown by the AMS window below:

FIGURE 7-1. Measurement Configuration in AMS using Fieldbus



7.5 Fieldbus Analog Input and Output Block Configuration

All Fieldbus applications use at least one AI (Analog Input) Block to publish the Primary Value (pH, ORP, or Redox) to the bus. Other applications might require temperature, reference impedance, or glass electrode impedance to also be published to the bus.

When pH temperature compensation uses temperature from the bus, an AO (Analog Output) Block must be configured to link the measurement on the bus to the 1066pH transmitter. The following sections show how to quickly configure these outputs and inputs.

Note: This procedure has to be performed using a Fieldbus configurator.

7.5.1 Fieldbus Analog Input Block Configuration

To configure an AI block, the channel of the desired measurement must be chosen along with its unit, and how the measurement is handled by the AI block must be selected. These steps can be summarized as follows:

1. Place the AI Block in the **OOS (Out of Service)** Mode
2. Set the AI Block parameter **Channel** to channel of the desired measurement.
3. Set the **LType** (linearization type) to **Direct**
4. Set the AI Block parameter **XD_SCALE.UNIT** to the unit used by the 1066pH for the selected measurement.
5. If the AI Block is going to be used for control or other actions in the control system, the AI Block will be linked to the other function blocks involved, which will be configured to meet the requirements of the application.
6. Place the AI Block back into the **Auto (Automatic)** mode.

The configuration parameters for each measurement of the 1066pH can be summarized as follows:

7.5.1.1 Primary Value (pH, ORP, Redox)

- **Channel: Channel 1**
- **LType: Direct**
- **XD_SCALE.UNIT: pH (for pH measurements) or mV (for ORP/Redox)**

7.5.1.2 Temperature

- **Channel: Channel 2**
- **LType: Direct**
- **XD_SCALE.UNIT: C or F (the unit used by the 1066pH)**

Note: The Channel 2 value of temperature is the temperature being used for temperature compensation. Therefore:

- If Sensor Temperature (Auto/Sensor) is used, Channel 2 will be the Sensor Temperature.

- If Fieldbus Temperature (Auto/Fieldbus) is used, Channel 2 will be the same as the temperature from the bus.
- If Manual Temperature (Manual) is used, Channel 2 will be the Manual Temperature.

It usually only makes sense to configure an AI Block for Temperature if Auto/Sensor temperature compensation is being used. Otherwise, the temperature published by the 1066pH will be a duplicate of a temperature measurement already on the bus, or will be a constant Manual value.

7.5.1.3 Reference Electrode Impedance

- **Channel: Channel 3**
- **LType: Direct**
- **XD_SCALE.UNIT: kohm**

7.5.1.4 Glass Electrode Impedance

- **Channel: Channel 4**
- **LType: Direct**
- **XD_SCALE.UNIT: Mohm**

7.5.2 Fieldbus Analog Output Block Configuration

AO (Analog Output) Blocks are primarily used to input control signals to final control elements such as control values. To perform this task, AO blocks have a number of parameters to allow it to be configured to meet the needs of a variety of applications.

This is not the case with the AO Block used by the 1066pH. The AO Block in the 1066pH is only used bring a temperature measurement from the bus into the 1066pH for temperature compensation. To do this it only uses one AO Block configuration parameter, **Channel**, which is always set to **Channel 5**. This makes configuration easy.

Note: The only I/O parameter of the AO Block used by the 1066pH is **CAS_IN** (Cascade Input).

It is important to note that an AO Block's CAS_IN parameter only reads the numerical **Value** of the temperature measurement linked to it, and not the **Units** of the measurement.

- As a result, the units of the temperature measurement being input to the 1066pH must match the temperature units used by the 1066pH.
- Otherwise, a measurement of 77 F being brought into a 1066pH using degree C unit would be read as 77 C, instead of the correct 25 C.

If there is a compelling reason for the temperature measurement on the bus to use different units than the 1066pH, the Arithmetic function block in the 1066pH can be used between the AI Block of the temperature and the AO Block of the 1066pH to convert the temperature units.

The configuration steps for the 1066pH AO Block can be summarized as follows:

1. Place the AO Block in the **OOS (Out of Service)** Mode
2. Set the AO Block parameter **Channel** to **Channel 5**.

3. Check that the temperature units of the temperature on the bus match the temperature units used by the 1066pH.
4. Using a Fieldbus configurator link the temperature measurement output to the **CAS_IN** of the 1066ph AO Block.
5. Place the AO Block back into the **Auto (Automatic)** mode.

The setting for the 1066pH AO Block can be summarized as follows:

AO Block Temperature Input

- **Channel: Channel 5**
- **AO Block Link to the Temperature Measurement: CAS_IN**

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Section 8: Calibration

8.1 Introduction

New sensors must be calibrated before use. Recalibration is also necessary at frequencies determined by the nature of the application, and experience.

The following calibration routines are available are:

- **Auto Calibration:** Automatic Buffer Calibration provides routines, which help prevent errors being made during calibration:
  - Recognition of the buffer value from a list of standard buffers
  - Temperature compensation of the buffer value
  - The use of a stabilization routine to ensure that the pH measurement in the buffer has reached its final value.
- **Manual Calibration:** A standard two point pH buffer calibration
- **Standardization:** A single point calibration of pH, ORP, or Redox in a standard solution or based on a grab sample measurement.
- **Entering Known Slope and Reference Offset Values:** A pH sensor can be calibrated in the instrument shop or laboratory, and the resulting slope and zero offset values noted and simply be entered into the 1066, when the sensor is installed.
- **SMART Sensor Calibration:** A SMART pH sensor comes pre-calibrated from the factory and can simply be connected to the 1066 pH and its calibration constants will be uploaded to the 1066pH. Buffer calibrations can be done in the shop or lab with an RAI Smart Sensor capable transmitter and the sensor can then be connected to the 1066pH. The slope and zero from the fresh calibration will be uploaded to the 1066pH.

8.1.1 Calibration and Calibration Setup

Note: Accessing the **Calibration** menu places the **Transducer Block in the Manual Mode**. This will cause all measurement channels to have a **BAD** status **(Bad: Manual)**, which can affect the control system. Before programming the 1066 pH should be removed from automatic control. When the **Program** menu is exited, the **Transducer Block** will be returned to the **Automatic** mode.

8.1.2 Auto Calibration Setup

To navigate to Auto Calibration setup, follow the following sequence of selections: Main menu **Calibration** → **pH** → **Buffer Cal** → **Auto** → **Setup**.

The setup parameters are as follows:

- **Buffer:** Selects the buffer type from the list of standard buffers:
  - **Standard:** (Includes NIST buffers and 7.01 pH buffer)
  - **DIN 19267**
  - **Ingold**
  - **Merck**
  - **Fisher**
- **Stable Time:** The time period used to determine that a stable pH measurement has been reached. Available values are 0 to 256 seconds, and the default value is 10 seconds.
- **Stable Delta:** The change in pH over the stabilization time, which indicates the measurement, has stabilized. Available values are 0.02 to 0.50 pH, and the default value is 0.02 pH.

8.1.3 Minimum / Maximum Slope and Reference Offset Setup

A successful buffer calibration calculates new slope and reference offset values, which are used by the transmitter to calculate pH from the millivolt signal from the pH sensor and temperature, replacing the old slope and zero values. A conventional pH sensor has an ideal slope and reference offset of 59.16 mV/pH and 0 mV respectively. In practice, the actual slope will be somewhat less than the ideal value and will tend to decrease somewhat as the sensor ages. The reference offset will usually have an offset from the 0 mV ideal value due to effects of the process on the reference electrode junction and age.

There are minimum and maximum slope values in the transmitter, which limit the slope value that will be accepted as the result of a calibration. If these are exceeded, a calibration error is set and this new value for slope does not replace the existing value in the transmitter. Likewise, if the reference offset limit is exceeded, a reference offset error is set and its new value is not used. These conditions can result from a sensor that has reached the end of its life or from poor technique or errors made during calibration.

The slope and reference offset limits have default values but can be changed to meet more stringent slope requirements or special applications in the case of reference offset. To navigate to the slope and reference offset values follow the following sequence of selections: **Main** menu → **Program** → **Diagnostic Setup**.

The setup parameters are as follows:

- **Max Slope:** The default value is 62.00 mV/pH, which can be lowered to provide a tighter limit on the acceptable slope.
- **Min Slope:** The default value is 40.00 mV/pH, which can be raised to provide a tighter limit on the acceptable slope.
- **Max Ref Offset:** The default value is an absolute value of 60 mV, which can be lowered or raised. Some caution should be used in lowering this value as reference offsets of + 15 mV are normal in certain applications. Raising it above 60 mV in a normal application can mask a case of reference poisoning, but may be necessary if using a non-standard pH sensor.

ORP and Redox do not have a slope value, but they do have a reference offset value, and a maximum reference offset can be set for these applications as well.

8.1.4 Calibration Procedures

8.1.4.1 Calibration When Using Temperature from Fieldbus

For an accurate pH measurement, the temperature of the pH sensor must be accurately measured. This is also true when performing a calibration because an inaccurate pH measurement during calibration will result in errors in the calibration, which might not be outside the slope and reference offset limits, and can go undetected.

If a temperature measurement from a transmitter on the bus is used by the 1066pH for temperature compensation (**Temp Comp = Auto/Fieldbus**), removing the pH sensor from the process will result in the 1066 pH using the process temperature that is likely different from the temperature of the pH sensor in the buffer or standard solution. This can lead to an erroneous calibration. To deal with this possibility, the calibration routines in the 1066 pH add the following steps when temperature compensation (**Temp Comp**) is set to **Auto/Fieldbus**:

- **2 Point Buffer Calibrations:** During buffer calibrations, both automatic and manual, it is assumed that the pH sensor has been removed from the process, which means that the temperature from the bus is no longer the same as the temperature of the pH sensor. A choice is given to use the temperature measurement from the pH sensor (**Temp Comp = Auto/Sensor**), or use a manually entered temperature (**Temp Comp = Manual**). When either choice is made, the temperature compensation is automatically changed accordingly, the calibration proceeds, and at the end of the calibration the temperature compensation is automatically changed back to Temp Comp = Auto/Fieldbus.
- **pH Standardization:** Having an accurate representative temperature is equally import to ensure an accurate standardization. However, standardizations are often done using a grab sample of the process and the pH sensor will remain online, in the process, during the whole procedure. In the case of standardizations, the calibration procedure will first ask: **Is the pH sensor in the process?** If the answer is **"Yes"**, the standardization proceeds. If the answer is **"No"**, the choice is give between using temperature from the sensor or manual temperature as was the case with buffer calibrations.

8.1.4.2 Using Automatic Buffer Calibration

Navigate to automatic buffer calibration: **Main** menu → **Calibrate** → **pH** → **Buffer Cal** → **Auto** → **Start Auto Cal**

Automatic Buffer Calibration Steps:

Prompt: Place sensor in Buffer 1

Prompt: Please wait (for stabilization)

Prompt: Buffer 1; recognized pH of Buffer 1;

Press **Enter** to store Buffer 1 pH, or if the value displayed is not the pH value of the buffer being used, use the **Up** and **Down Arrow Keys** to move to the next higher or lower pH value.

Prompt: Place sensor in Buffer 2

Prompt: Please wait (for stabilization)

Prompt: Buffer 2; recognized pH of Buffer 2;

Press **Enter** to store Buffer 1 pH, or if the value displayed is not the pH value of the buffer being used, use the Up and Down Arrow Keys to move to the next higher or lower pH value.

Prompt: Calibration in Progress, please wait

If the slope is within the min/max slope limits and the reference offset if with the offset limits, the new slope and reference offset values are shown and the calibration is completed.

If the slope or reference offset has exceeded the minimum/maximum limits, the following prompt is shown:

Prompt: Offset Error; Calculated Slope and Reference Offset; the Slope and Reference Offset limits are shown; Press **EXIT**

The calibration must be repeated, or the sensor must be replaced.

8.1.4.3 Using Manuel Buffer Calibration

Navigate to the manual buffer calibration: **Main** menu → **Calibrate** → **pH** → **Buffer Cal** → **Auto** → **Manual**

Manual Buffer Calibration Steps:

Prompt: Buffer 1 or Buffer 2

Place the pH sensor in your first buffer and let the pH measurement stabilize. Make sure that the pH sensor has warmed or cooled to the temperature of the buffer solution

Choose Buffer 1 and press **ENTER**

Prompt: Buffer 1 value

Adjust the Buffer 1 to the value of your first buffer and press **ENTER**

Prompt: Buffer 1 or Buffer 2

Place the pH sensor in your second buffer and let the pH measurement stabilize.

Choose Buffer 2 and press **ENTER**

Prompt: Buffer 2 value

Adjust the Buffer 2 to the value of your buffer and press **ENTER**

Prompt: Calibration in Progress, please wait

If the slope is within the min/max slope limits and the reference offset if with the offset limits, the new slope and reference offset values are shown and the calibration is completed.

If the slope or reference offset has exceeded the minimum/maximum limits, the following prompt is shown:

Prompt: Offset Error; Calculated Slope and Reference Offset; the Slope and Reference Offset limits are shown; Press **EXIT**

The calibration must be repeated or the sensor must be replaced.

Note: The pH of buffers change with temperature to at least some extent. For the best accuracy during Manual calibration, the temperature of the buffer solution being used should be noted, and the pH value of the buffer at that temperature (usually printed on the buffer bottle) should be used. Always allow enough time for the sensor to reach the same temperature as the buffer.

8.1.4.4 Using Standardization

Standardization is most commonly done with the sensor in the process. A sample (grab sample) or the process is taken when the measured value and temperature are stable, and the value measured by the transmitter is noted. After careful handling of the sample, it is measured using a referee analyzer in the laboratory or at the sample point. The difference between the on line value measured by the transmitter and the value measured by the referee analyzer is calculated. This difference is then used to adjust the measurement of the on line transmitter.

Standardization can also be done using a standard of know pH (or ORP or Redox). The transmitter measurement is simply adjusted to match the know value.

When standardizing ORP or Redox, a couple of things should be noted: First, an ORP standard can be used to standardize a Redox measurement because Redox is just the negative value of ORP. So, a 300 mV ORP standard would correspond to -300 mV in terms of Redox.

The second is how the millivolt value of the ORP is defined. ORP standards can be defined relative to a **SHE** (Standard Hydrogen Electrode) reference or an **Ag/AgCl** (silver/silver chloride) reference. Since virtually all ORP sensors use an Ag/AgCl reference, the ORP value defined for an Ag/AgCl reference should be used.

Navigate to standardization: **Main** menu → **Calibrate** → **pH (ORP/Redox)** → **Standardize**

Standardization Steps:

Prompt: Enter value

If you are using a standard solution, place the sensor in the standard, let the measurement value stabilize, and use the value of the standard (pH, ORP, or Redox) as the standardization value.

If the sensor is on line, use a standardization value based on the difference between the online measurement (pH, ORP, Redox) when the grab sample was taken and the value determined by the referee analyzer.

Adjust the value to the standardization value and press Enter

Prompt: Calibration in Progress, please wait

If the standardization is successful, the transmitter returns to the calibrate pH menu.

If the reference offset has exceeded the maximum limit, the following prompt is shown:

Prompt: Offset Error; Calculated Reference Offset; Max: Reference Offset error limit; Press **Exit**.

The standardization must be repeated, or the sensor must be replaced.

8.1.4.5 Entering Calibration Constant(s) from a Pre-Calibrated Sensor

After calibrating a pH or ORP sensor in the laboratory or shop, record the **Slope** and **Offset** for pH sensors or the **Offset** for ORP sensors.

Navigate to standardization: **Main** menu → **Calibrate** → **pH (ORP/Redox)** and enter the calibration constant(s) and install the sensor.

Depending on the (ionic) composition of the process solution, standardization may be required after the pH sensor has stabilized, to compensate for effects of the process solution on the liquid junction of the reference electrode.

8.1.4.6 Calibration Using the Rosemount Analytical Smart pH Sensor

The Smart pH sensor can be calibrated in the laboratory or shop using a Rosemount Analytical transmitter capable of Smart sensor communications. Presently these include the transmitter models 1056, Model 56, 6081pH, and the 1066pH. Smart sensor communications is independent of any communication protocol used by the transmitter, so the transmitter used in the lab or shop can have HART, Fieldbus, Profibus DP, or only a 4-20 mA output.

After a successful calibration in the lab or shop, simply connect the sensor the 1066pH and the new calibration constants will be uploaded to the transmitter.

Depending on the (ionic) composition of the process solution, standardization may be required after the pH sensor has stabilized, to compensate for effects of the process solution on the liquid junction of the reference electrode.

8.2 Temperature Calibration

Temperature calibration is a single point calibration, which should be based on an accurate thermometer measurement or the measurement of a calibrated temperature transmitter.

Navigate to temperature calibration: **Main Menu** → **Calibrate** → **Temperature**

Prompt: The existing temperature measurement

Enter the temperature of the referee thermometer or temperature transmitter measurement.

Prompt: Cal in progress. Pease wait

If the change in temperature is less than 5 C (9 F), calibration is completed and the screen returns to the Calibrate.

If the change in calibration is greater than 5 C (9 F), the following prompt appears:

Prompt: Temp Offset > 5 C (9 F); Continue? Yes, No

If ‘No” is chosen, the screen returns to **Calibrate**.

If ‘Yes” is chosen, the temperature offset is accepted. The screen returns to **Calibrate** menu.

Note: By choosing **“Yes”**, any temperature calibration value can be accepted, and accepting a change larger than 5 C (9 F) should be carefully considered, unless it is to correct an earlier calibration error.

After a temperature calibration value is accepted, the temperature offset is updated to reflect the change in temperature, which can be viewed in the **Diagnostics** menu in **Temperature**.

Note on Using Temperature from Fieldbus for Temperature Compensation:

If the pH sensor being used has a temperature element (RTD), it is useful to calibrate its temperature measurement even though temperature from Fieldbus will be used for temperature compensation.

Calibrating the pH sensor temperature measurement allows the temperature measurement from the sensor to be accurate when doing buffer calibrations or standardizations with the pH sensor out of the process. It also provides a backup temperature, if the temperature measurement from Fieldbus is lost.

To do this at setup, change the temperature compensation to **Auto/Sensor**, calibrate the sensor temperature, and return the temperature compensation back to **Auto/Fieldbus**.

All of the calibration setup described earlier and the calibration routines described above are available using Fieldbus as shown in the AMS window below, and well as the calibration history of Smart pH Sensors:

FIGURE 8-1. 1066pH Calibration using Fieldbus

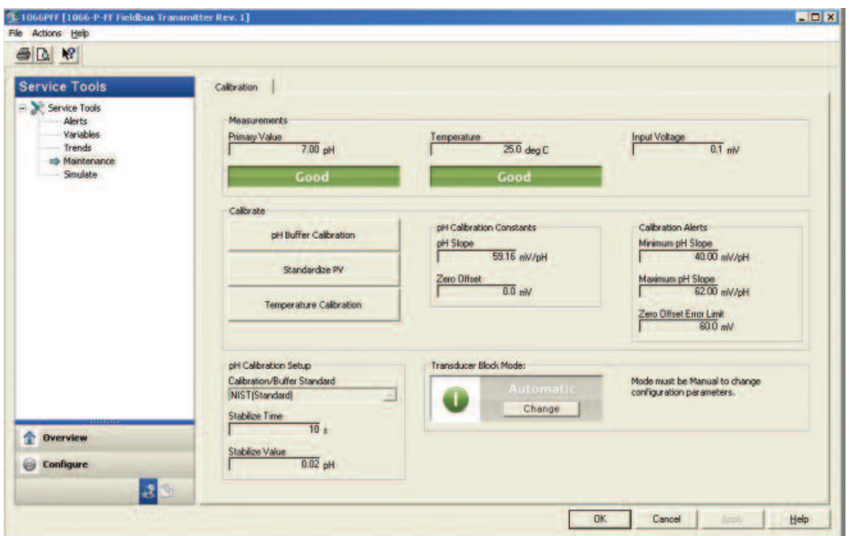
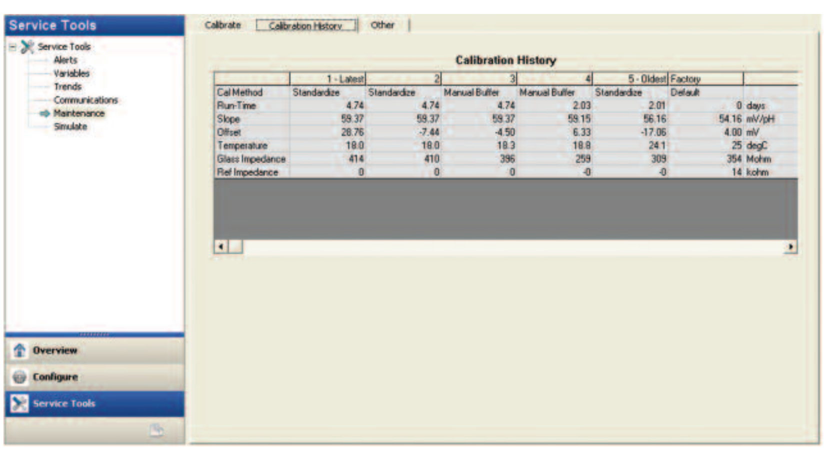


FIGURE 8-2. Smart Sensor Calibration History



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Section 9: Diagnostics

9.1 Introduction

There are a number of diagnostic messages to alert the user to issues with the transmitter, sensor, or a failed calibration. Most of these require no configuration. Only the minimum/maximum slope and reference offset calibrations, in the previous section can be configured, and the sensor impedance diagnostics.

9.2 Sensor Impedance Diagnostics

9.2.1 pH Electrode Impedance Diagnostics

A glass pH electrode forms the pH measuring circuit with the reference electrode or solution ground through the process solution. The glass electrode itself typically has an impedance of hundreds of Mohm and this high impedance is the basis for pH electrode impedance diagnostics.

The measurement of glass impedance is complicated by the fact that it is highly temperature dependant, decreasing by about half for every 8 C increase in temperature. The glass impedance is compensated to 25 C, by an algorithm which provides compensation up to a temperature where the raw glass impedance becomes too low to be accurately measured. Above this temperature the glass impedance measurement is turned off. Glass impedance temperature correction (**Z Temp Correct'n**) can be turned on or off in the 1066pH.

The impedance of a glass pH electrode is not a simple resistance, but also includes capacitance, which makes a simple measurement of glass impedance time dependent. If the impedance is measured over a short time, the measured impedance will not will not have time to reach its final value, and the measured impedance will be less than the actual value.

The 1066pH glass impedance can use two types of glass impedance measurement, **Basic** and **Advanced**. The **Basic** measurement type is fine for detecting low glass impedance, but when a more accurate measurement of high glass impedance is desired, the **Advanced** type should be chosen.

9.2.1.1 Broken Glass Diagnostics

If the pH electrode is cracked or broken, the process solution penetrates the glass, creating a short through the glass, and the impedance drops precipitously. Low glass electrode impedance can be used to detect a broken or cracked electrode, which is no longer functional. This diagnostic will also detect a short in the pH measuring circuit, which also causes the pH measurement to fail. The low impedance limit is set to **1 Mohm**.

9.2.1.1 High Glass Impedance Diagnostics

As a glass electrode ages, its impedance increases and causes sluggish electrode response. Severe coating of the glass electrode can also have the same effect, as can a bad connection. A high glass impedance fault alarm (**GI Fault High**) can be set at up to 2,000 Mohm and has a default value of 1,500 Mohm.

9.2.1.2 Reference Electrode Impedance Diagnostics

In a pH or ORP measurement, the reference electrode serves two purposes. The first is to provide a know potential (millivolts) at any given temperature, by using a silver chloride wire (AgCl) in a potassium chloride solution (KCl). The second purpose is to complete the pH measuring circuit by electrolytic conduction through a liquid junction which can be a porous ceramic or polymeric material called the liquid junction.

Electric conduction operates by diffusion of ions from the KCl fill solution into the process solution, and by diffusion of ions from the process solution into the liquid junction. For a successful pH or ORP measurement, this diffusion process must be maintained, but some ions in the process solution can react with silver ions in the reference solution causing a precipitation which can plug the reference junction. Other components in the process solution can coat the liquid junction. In either case, the diffusion process of ions is hindered, which increases the reference impedance. If the liquid junction if completely plugged, it creates an open circuit in the pH measurement circuit, and the pH measurement will drift.

If a pH or ORP sensor used has a **solution ground**, which is a simple metal grounding electrode on the sensor, the impedance of the reference electrode can be measured. Reference electrode impedance is largely due to the conduction at the liquid junction. Reference impedance is much simpler to measure than glass electrode impedance since it for the most part lacks the temperature dependence and capacitance of glass electrode measurement. Reference impedance is much lower than glass electrode impedance and is typically in the range of 1 to a few hundred kohm. It is an excellent tool for detecting plugging of the liquid junction by precipitation or coating of the liquid junction and the whole sensor as well.

Note: A sensor with a **solution ground** is necessary to measure reference electrode impedance.

9.2.2 Setting Up Sensor Impedance Diagnostics

Navigate to standardization: **Main** menu → **Program** → **Diagnostic Setup**

9.2.2.1 Diagnostics

This parameter turns sensor impedance diagnostics on or off.

9.2.2.2 Z Temp Correct’n (Glass Impedance Temperature Correction)

This parameter turns glass impedance temperature compensation on or off.

9.2.2.3 GI Measurement

This parameter selects either **Basic** or **Advanced** glass impedance measurement types.

9.2.2.4 GI Fault High

This parameter sets the high glass impedance fault limit up to 2,000 Mohm. The default is 1,500 Mohm.

9.2.2.5 Ref Fault High

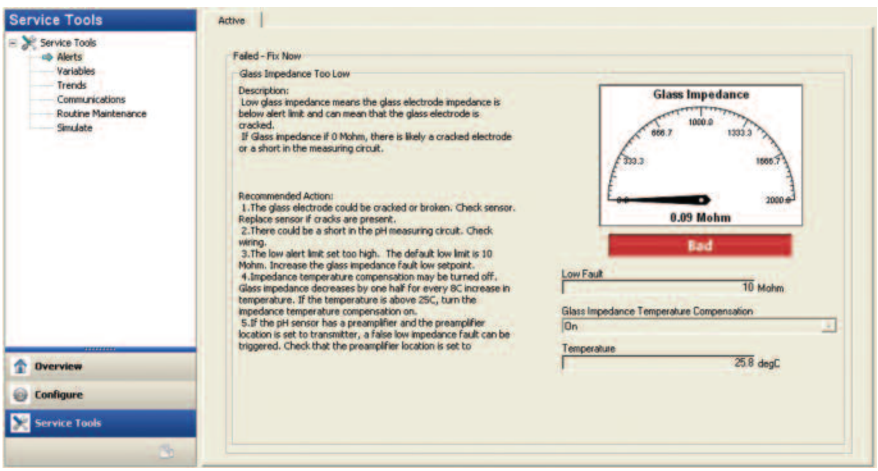
This parameter sets the high reference electrode impedance fault limit up to 999 kohm. The default is 500 kohm.

9.3 Diagnostics Alarms

Diagnostic alarms, in general, alert users to sensor or transmitter problems. In addition, there are notifications of events, such as calibrations, which serve to provide useful information to plant and batch historians that calibrations have, in fact, been done. All of the 1066pH diagnostic alerts are listed on the following two pages along with the recommended action and help information.

Individual alerts are available using Fieldbus, which provide not only information about the alert, but also static and dynamic parameter information useful for troubleshooting the alert:

FIGURE 9-1. 1066pH Alert



In addition to providing notification of sensor and transmitter conditions, diagnostics alerts also affect the status of the measurements affected by the conditions to provide a means to inform the control system of the validity the measurements it is acting on. These effects on status can be summarized below:

Alert	Status Effect(s)
Temperature Error	pH – Bad Temperature – Bad
Broken pH Glass	pH – Bad
pH Glass Impedance Too High	pH – Bad
Reference Impedance Too High	pH/ORP/Redox – Uncertain
pH Slope Too High Cal Error	pH – Uncertain
pH Slope Too Low Cal Error	pH – Uncertain
Zero Offset Too High Cal Error	pH/ORP/Redox – Uncertain
Temp Input from Fieldbus Bad	pH – Bad Temperature – Bad
Check Function; NV Memory Failure; FF Electronics Failure	All Measured Variables – Bad

TABLE 9-1. Alert List

Alerts	Recommended Action	Help
Temperature Error	Check the temperature sensor and its wiriing.	There is an open or short in the RTD measuring circuit. The temperature value will appear very high with an open circuit, and very low with a short circuit. As a temporary fix, temperature compensation can be put in the manual mode, and the manual temperature set to a value corresponding to the known process temperature.
pH Glass Impedance Too High	Check pH sensor for coating.	The glass electrode impedance is above the glass fault high setpoint. Note: The generally recommended glass fault high setpoint is 1,500 Mohm. The glass electrode may be severely coated, or there is a loose connection in the pH sensor or solution ground wiring.
Broken pH Glass	Check pH sensor glass for cracks.	The glass electrode impedance is below 1 Mohm. The pH electrode is cracked or broken, or there is a short in the pH measuring circuit; check pH sensor wiring. If the pH sensor has a preamplifier, check that the preaplifier location parameter is set to "Sensor/JBox".
Reference Impedance Too High	The reference electrode may be plugged or severely coated, or the sensor is out of the process.	The reference electrode high alarm may be due to coating or plugging of the reference electrode, a miswire, or a reference electrode at the end of its useful life. A high reference impedance alarm can be caused by setting the high reference alarm limit too low; the recommened alarm limit is 500 kohm. Check that the sensor is fully immersed in the process. If the process solution contains non-aqueous solvents, the high reference alarm limit might have to be increased.
RTD Sense Line Open	Check the temperature sensor and its wiring.	The sense line for the PT-100 or PT-1000 RTD is open or, less likely, the RTD sesne wire is excessively long or highly resistive. If a 2-wire PT-100 or PT-1000 RTD is being used for temperature compensation, jumper the RTD Return and RTD Sense terminals in the transmitter.
pH Slope Too High Cal Error	The pH Slope is > maximum slope limit. There may hve been procedural errors made during the last buffer calibration.	If a buffer calibration results in a high slope error, the results of the previous buffer calibration, the pH electrode slope and reference offset are retained by the transmitter. A slope greater than 62 mV/pH usually indicates that there was an error made during calibration, because the theoretical slope limit is 59 mV/pH. The buffers and calibration technique should be check and the calibration repeated.
pH Slope Too Low Cal Error	The pH Slope is < minimum slope limit. The pH electrode may be worn out and should be replaced, or there were procedural errors made during the last buffer calibration.	If a buffer calibration results in a low slope error, the results of the previous buffer calibration, the pH electrode slope and reference offset, are retained by the transmitter. A slope below 40 mV/pH indicates that the pH electrode is worn out. If the pH electrode is coated, it should be cleaned and the buffer calibration retried. If the calibration of the cleaned pH sensor continues to give a low slope alarm, the pH sensor should be replaced.
Zero Offset Too High Cal Error	The Zero Offset from the last calibration or standardization is beyond the zero limit. The reference electrode may be poisoned.	This alarm can indicate that the reference electrode has been poisoned. The usual value for the zero offset limit is 60 mV, which is equivalent to approximately 1 pH. Zero offset limit values less than 20 mV, can lead to erroneous alarms; check the alarm limit. This alarm can also result from errors made during calibration or standardization.
Temperature High	Check the temperature sensor, its wiring and the process temperature.	The measured temperature is greater than 150°C (302°F). As a temporary fix, temperature compensation can be put in the manual mode, and the manual temperature set to a value corresponding to the known process temperature. The process temperature could be high, and could result in damage to the sensor. But if it is not, check the measured temperature and the measured RTD resistance, if they correlate with a chart of Pt100 or Pt 1000 RTD values, then there is a bad RTD connection or a faulty RTD. If the measured temperature and RTD resistance, don't correleate, try calibrating the temperature.
Temperature Low	Check the temperature sensor, its wiring and the process temperature.	The measured temperature is less than -15°C (5°F). As a temporary fix, temperature compensation can be put in the manual mode, and the manual temperature set to a value corresponding to the known process temperature. The process temperature could be low, and could result in damage to the sensor. But if it is not, check the measured temperature and the measured RTD resistance, if they correlate with a chart of Pt100 or Pt 1000 RTD values, then there is a bad RTD connection or a faulty RTD. If the measured temperature and RTD resistance, don't correleate, try calibrating the temperature.

TABLE 9-1. Alert List continued

Alerts	Recommended Action	Help
pH Voltage Too High	Check the pH sensor and its wiring.	The indicated pH is outside the range of the transmitter due to miswiring, or a major failure of the pH sensor. Check the sensor wiring. Check the setting of the preamp location to ensure that it corresponds to the actual location of the preamp. If the preamp location is OK, the sensor is likely faulty. Check the pH reading with a new pH sensor. If the problem persists, check the transmitter with a simulated millivolt signal, and replace if it is found faulty.
Field Value PV Simulated	The primary variable value is being simulated by the transmitter.	The primary variable value is being simulated by the transmitter. The simulated primary variable value is shown on the transmitter's local display and published to Fieldbus. The primary value can be returned to the actual value by disabling simulation.
Temp. Std In Progress	A Temperature Standardization has recently been done. No action necessary.	None.
Auto Buffer Stabilizing	Automatic buffer calibration stabilization has recently occurred. No action necessary.	None.
Calibration In Progress	A pH buffer calibration has recently been done. No action necessary.	None.
Standardization In Progress	A pH standardization has recently been done. No action necessary.	None.
Temperature Input from Fieldbus - Bad Status	Check the transmitter providing the temperature measurement and the AO Block.	As a temporary fix, set the temperature compensation to Auto/Sensor if the sensor has a temperature element. If there is no temperature element in the sensor, temperature compensation can be set to Manual.
Device Electronic Faults	Cycle power to the transmitter.	The transmitter has detected an electronic fault. Cycle the power to the transmitter. If the alert persists, replace the transmitter.
Device Electronic Warnings	Cycle power to the transmitter.	The transmitter has detected an electronic warning. If Keypad Error is indicated in the Warning Details, this means that a key on the local interface is stuck. Other than preventing local access to the transmitter, the transmitter can still be accessed using Fieldbus. For the other conditions, Cycle the power to the transmitter. If the alert persists, replace the transmitter.
QuickStart Menu On	The QuickStart basic setup menu is being displayed on the device display.	The QuickStart menu is displayed on the device display to prompt the user to do a basic setup locally. A basic set can be done at the device display, and the display will return to normal.
Check Function	If TB is in OOS mode	Check the transducer Block Mode.
NV Memory Failure	Lost Static or NV Data or Checksum fail or Memory Block never initialized	Check the device configuration for changes in the block parameter values. Reset the device to clear the error. Download a Device Configuration. Note: If the failure reoccurs it may indicate a faulty EEPROM memory chip and the electronics must be replaced.
FF Electronics Failure	The device has detected a fault with an electrical component on the Fieldbus electronics module.	Replace the electronics.

The status of all the measured parameters of the 1066pH can be viewed quickly using Fieldbus:

FIGURE 9-2. Good Measurement Status

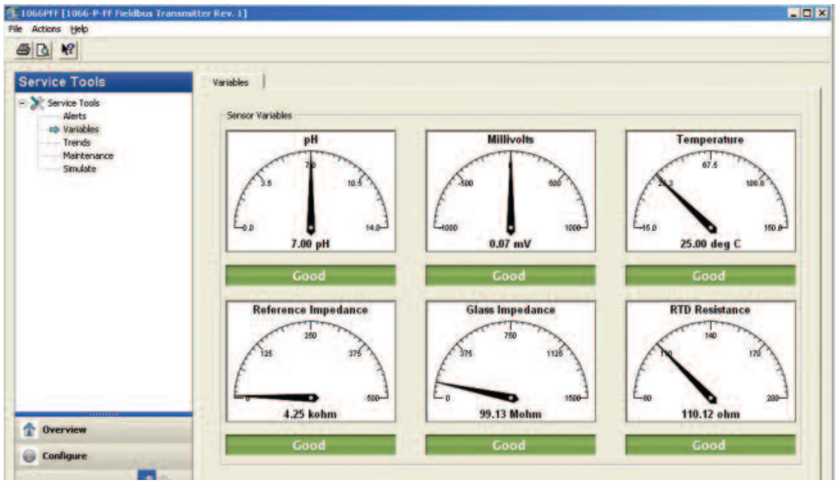
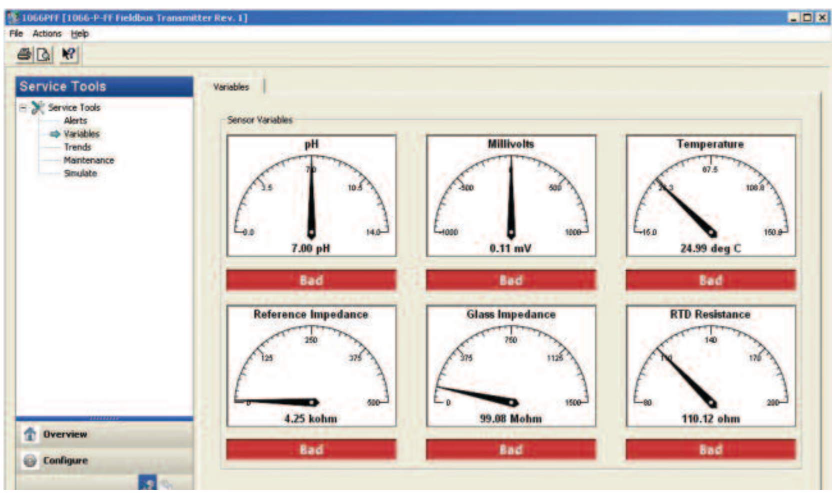


FIGURE 9-3. Bad Measurement Status



9.4 Field Diagnostics

As outline previously, the diagnostic alerts provided by the 1066pH are presented on the local display and by Fieldbus, and affect the status of measurements. However, these alerts are specific to the particular transmitter involved and do not reflect the importance that of transmitter to the overall process.

Field Diagnostics makes it possible rate and prioritized the diagnostic alarms of each transmitter based on the importance of its measurement to the overall process. Thus, a problem with a transmitter providing a key measurement would require immediate attention by operators and maintenance personnel, while a less important measurement could be routed to maintenance personnel by the host without disturbing operators.

9.4.1 Alarm Categories (NAMUR NE-107)

Field Diagnostics uses the classification of NAMUR NE-107, which are defined as follows:

- **Failure –** Output signal invalid due to malfunction in the field device or its peripherals e.g. a broken glass electrode.
- **Out of Specification –** The device is operating outside its specified range or an internal diagnostic indicates deviations from measured or set values due to internal problems in the device or process characteristics e.g. a high temperature condition.
- **Maintenance –** Although the output signal is valid, the wear reserve is nearly exhausted or a function will soon be restricted due to operational conditions.
- **Check Function –** Output signal temporarily invalid (e.g. frozen) due to on-going work on the device.

9.4.2 Field Diagnostics Configuration

Field Diagnostics can be configured to meet the requirements of the transmitter application and tested using the following actions:

- **Map –** Maps alarms to a particular alarm category
- **Priority –** Sets the priority of each alarm category
- **Mask –** Suppresses the broadcast of any alarm or alarms to the host
- **Simulate –** Allows alarms to be manually simulated; requires the simulate jumper to be in place on the 1066pH circuit board.

9.4.3 PlantWeb Alerts

Legacy hosts, such as DeltaV version 10.3, cannot implement Field Diagnostics, but can implement PlantWeb Alerts. The 1066pH also supports PlantWeb Alerts, which has different categories for classifying diagnostic alarms. They are:

- **Failed**
- **Maintenance**
- **Advisory**
- **No Category**

9.4.4 PlantWeb Alerts Configuration

As with Field Diagnostics, PlantWeb Alerts can be configured per the application requirements:

- **Enable (Map) –** Maps alarms to a particular alarm category
- **Priority –** Sets the priority of each alarm category

- **Mask –** Suppresses the broadcast of any alarm or alarms to the host
- **Simulate –** Allows alarms to be manually simulated; requires the simulate jumper to be in place on the 1066pH circuit board.

When the 1066pH is connected to Fieldbus host it employs Field Diagnostics. If it is connected to a legacy host (DeltaV) supporting PlantWeb Alerts, the 1066pH will determine that Field Diagnostics are not supported using the value of a Resource Block parameter. If Field Diagnostics is not supported, the 1066pH will automatically present alarm categorization using PlantWeb Alerts.

Section 10: Fieldbus Specifications

10.1 General Specifications

Model: 1066-P-FF pH Fieldbus Transmitter
Type: pH/ORP/Redox Transmitter
Device ITK Profile: 6 (Released for ITK 6.0.0 / 6.0.1)
Manufacturer Identification (MANUFAC_ID): 0x524149
Device Type (DEV_TYPE): 0x4089
Device Revision (DEV_REV): 0x01
Physical Layer Profiles: 111,113,511
Linkmaster: Yes
Number of Link Objects: 20
VCR's supported: 20

Mandatory Features:

- Resource Block
- Alarm and Events
- Function Block Linking
- Trending
- Multi-Bit Alert Reporting
- Field Diagnostics

Additional Features:

- Common Software Download
- Block Instantiation
- Supports DeltaV Auto Commissioning
- Supports DeltaV Auto Replacement
- Supports DeltaV Firmware Live Download
- PlantWeb Alerts with re-annunciation / multibit
- Supports Easy Configuration Assistant

Function Blocks (Execution Time):

- 4 – Analog Input Blocks (15 ms)
- Analog Output Blocks (20 ms)
- Proportional Integral Derivative (25 ms)
- Arithmetic (25 ms)
- Input Selector (25 ms)

- Integrator (25 ms)
- Signal Characterizer (30 ms)

Custom Function Blocks (Execution Time):

- Control Selector (15 ms)
- Output Selector (20 ms)

Power:

- Two Wire Device; Fieldbus Polarity Insensitive
- Current Draw: 18 mA (9 to 32 VDC)
- Device Certifications: IS / FISCO
- Maximum certified input Voltage for IS: 30V
- Maximum certified input current for IS: 300mA
- Maximum certified input power for IS: 1.3W
- Internal Capacitance (Ci): 0 nF
- Internal Inductance (Li): 0 µH

10.2 Resource Block

The Resource Block parameter table is shown in Table 10-1 on the following pages. Parameters 1 through 41 are standard Fieldbus Resource Block parameters; parameters 42 through 66 support Field Diagnostics. Parameters 67 through 92 are Emerson device specific parameters which support Common Software Download and PlantWeb Alerts.

10.3 User Transducer Block 1200

This transducer block contains the parameters and methods for operation, configuration k and calibration of the 1066pH. A table of its parameters appears in Table 10-2 on the following pages..

10.3.1 Transducer Block Modes

The User Transducer Block per ITK 6 specifications has 3 modes of operation which determines which parameters can be written to and the status of the measured variables. These can be summarized as follows:

- **Automatic Mode**
  - All parameters related to configuration of the local display can be written to.
  - The Primary Value can be simulated
  - Status of measured variables: Good

- **Manual Mode**
  - All parameters used for configuring and performing calibration including writing to calibration constants (pH slope and reference offset) can be written to
  - Temperature Compensation Type and Manual Temperature which allows these parameters to be changed during calibration routines and methods
  - Status of measured variables: Bad/Manual
- **Out of Service Mode**
  - All parameters not designated as read only can be written to, including parameters writeable in the Manual Mode.
  - Status of measured variables: Bad/Out of Service

10.3.2 Simulation of the Primary Variable

The primary Variable (pH, ORP, Redox) can be simulated in all the available modes of the block (Automatic, Manual, and Out of Service) and is accessible only to a Fieldbus host or configurator. There are two parameters involved, which are configured as follows:

- PV_SIMULATE_ENABLE – set to Enable
- PV_SIMULATE_VALUE – set to the desired PV value
- PV simulation results in the alert "Field Value PV Simulated"

10.4 Factory Transducer Block 3800 (FTB)

Note: This transducer block is only used for factory calibration and has no useful user configurable parameters. If this transducer block is accessed and any changes are made, they will not be written to the transmitter. No error messages will be displayed indicating that writing to the factory transducer block was not successful.

10.5 AI Function Block

Major use is simply publishing primary and secondary measurements. Other uses can include:

Rescaling Measurements: Example, NaOH concentration in % by weight to NaOH concentration in degree Baume.

High/Low Alarming: Example, using AI.OUT_D for USP alarming of Raw Conductivity in the Biotech industry.

10.6 AO Function Block

The only use of the AO Block in this series of transmitters is to bring in a measurement from Fieldbus to compensate the main measurement.

10.7 Arithmetic Function Block

Can do useful calculations:

- Using conductivity ratios to calculate Reverse Osmosis Efficiency or Steam Quality.
- Calculate mass flow from concentration and mass or volumetric flow.

10.8 Integrator Function Block

Can totalize:

Reagent and general flow

Total Mass: Example: accumulated dissolved solids in a demineralizer, by:

- Using Conductivity to measure mg/l or mg/l Dissolved Solids
- Combining Dissolved Solids with Flow in an Arithmetic Block
- Totalizing the results

10.9 Input Selector Function Block

- Can average or select middle value of 3 measurements, recommended in some pH applications.
- Can select between 2 conductivity technologies in a conductivity application with an extremely wide range of conductivities.

10.10 Signal Characterizer Function Block

- Can convert a concentration in weight to weight basis to weight per volume concentration.
- Can linearize non-linear measurements.

10.11 PID Control Function Block

- Has all the necessary logic function to perform PID Control and supports standard and series forms of the PID equation.

Detailed Information for the above Function Blocks can be found in "Foundation Fieldbus Blocks" (publication 00809-0100-4783). Download at RosemountAnalytical.com

10.12 Control Selector Function Block

- Selects the low, middle or high value of control block outputs.
- Can provide override control using a second control block.

10.13 Output Splitter Function Block

- Takes a single input and calculates two outputs based on specified coordinate values.
- Can be used with two control valves to provide control for a non-linear control problem, such as pH control.

10.14 Fieldbus EDD and DTM Download Sites

- Basic DD files: www.fieldbus.org
- AMS Installation and DTM Files: www.assetweb.com
- 475 and 375 Communicator Support:
  - File download: www.fieldcommunicator.com
  - Local Emerson Process Service Group or National Response Center (1-800-654-7768)

TABLE 10-1. Resource Block Parameters

Index	Parameter Mnemonic	Description
1	ST_REV	The revision level of the static data associated with the function block. To support tracking changes in static parameter attributes, the associated block's static revision parameter will be incremented each time a static parameter attribute value is changed. Also, the associated block's static revision parameter may be incremented if a static parameter attribute is written but the value is not changed.
2	TAG_DESC	The user description of the intended application of the block.
3	STRATEGY	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
4	ALERT_KEY	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	MODE_BLK	The actual, target, permitted, and normal modes of the block.
6	BLOCK_ERR	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
7	RS_STATE	State of the function block application state machine.
8	TEST_RW	Read/write test parameter - used only for conformance testing.
9	DD_RESOURCE	String identifying the tag of the resource which contains the Device Description for this resource.
10	MANUFAC_ID	Manufacturer identification number - used by an interface device to locate the DD file for the resource.
11	DEV_TYPE	ciated with the resource - used by interface devices to locate the DD file for the resource.
12	DEV_REV	Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource.
13	DD_REV	Revision of the DD associated with the resource - used by an interface device to locate the DD file for the resource.
14	GRANT_DENY	Options for controlling access of host computer and local control panels to operating, tuning and alarm parameters of the block.
15	HARD_TYPES	The types of hardware available as channel numbers.
16	RESTART	Allows a manual restart to be initiated. Several degrees of restart are possible. They are 1: Run, 2: Restart resource, 3: Restart with defaults, and 4: Restart processor.
17	FEATURES	Used to show supported resource block options.
18	FEATURE_SEL	Used to select resource block options.
19	CYCLE_TYPE	Identifies the block execution methods available for this resource.
20	CYCLE_SEL	Used to select the block execution method for this resource.
21	MIN_CYCLE_T	Time duration of the shortest cycle interval of which the resource is capable.
22	MEMORY_SIZE	Available configuration memory in the empty resource. To be checked before attempting a download.
23	NV_CYCLE_T	Minimum time interval specified by the manufacturer for writing copies of NV parameters to non-volatile memory. Zero means it will never be automatically copied. At the end of NV_CYCLE_TIME, only those parameters which have changed (as defined by the manufacturer) need to be updated in NVRAM
24	FREE_SPACE	Percent of memory available for further configuration. Zero in a preconfigured resource.
25	FREE_TIME	Percent of the block processing time that is free to process additional blocks.
26	SHED_RCAS	Time duration at which to give up on computer writes to function block RCas locations. Shed from RCas shall never happen when SHED_RCAS = 0.
27	SHED_ROUT	Time duration at which to give up on computer writes to function block ROut locations. Shed from Rout shall never happen when SHED_ROUT = 0.
28	FAULT_STATE	Condition set by loss of communication to an output block, fault promoted to an output block or a physical contact. When Fault State condition is set, Then output function blocks will perform their FSTATE actions.
29	SET_FSTATE	Allows the Fault State condition to be manually initiated by selecting Set.
30	CLR_FSTATE	Writing a Clear to this parameter will clear the device fault state if the field condition, if any, has cleared.
31	MAX_NOTIFY	Maximum number of unconfirmed notify messages possible.
32	LIM_NOTIFY	Maximum number of unconfirmed alert notify messages allowed.
33	CONFIRM_TIME	The time the resource will wait for confirmation of receipt of a report before trying again. Retry shall not happen when CONFIRM_TIME = 0.
34	WRITE_LOCK	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated.
35	UPDATE_EVT	This alert is generated by any change to the static data.

TABLE 10-1. Resource Block Parameters continued

Index	Parameter Mnemonic	Description
36	BLOCK_ALM	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
37	ALARM_SUM	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.
38	ACK_OPTION	Selection of whether alarms associated with the block will be automatically acknowledged.
39	WRITE_PRI	Priority of the alarm generated by clearing the write lock.
40	WRITE_ALM	This alert is generated if the write lock parameter is cleared.
41	ITK_VER	Major revision number of the interoperability test case used in certifying this device as interoperable. The format and range of the version number is defined and controlled by the Fieldbus Foundation. Note: The value of this parameter will be zero (0) if the device has not been registered as interoperable by the FF.
42	FD_VER	A parameter equal to the value of the major version of the Field Diagnostics specification that this device was designed to.
43	FD_FAIL_ACTIVE	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.
44	FD_OFFSPEC_ACTIVE	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.
45	FD_MAINT_ACTIVE	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.
46	FD_CHECK_ACTIVE	This parameter reflects the error conditions that are being detected as active as selected for this category. It is a bit string, so that multiple conditions may be shown.
47	FD_FAIL_MAP	This parameter maps conditions to be detected as active for this alarm category. Thus the same condition may be active in all, some, or none of the 4 alarm categories.
48	FD_OFFSPEC_MAP	This parameter maps conditions to be detected as active for this alarm category. Thus the same condition may be active in all, some, or none of the 4 alarm categories.
49	FD_MAINT_MAP	This parameter maps conditions to be detected as active for this alarm category. Thus the same condition may be active in all, some, or none of the 4 alarm categories.
50	FD_CHECK_MAP	This parameter maps conditions to be detected as active for this alarm category. Thus the same condition may be active in all, some, or none of the 4 alarm categories.
51	FD_FAIL_MASK	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.
52	FD_OFFSPEC_MASK	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.
53	FD_MAINT_MASK	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.
54	FD_CHECK_MASK	This parameter allows the user to suppress any single or multiple conditions that are active, in this category, from being broadcast to the host through the alarm parameter. A bit equal to '1' will mask i.e. inhibit the broadcast of a condition, and a bit equal to '0' will unmask i.e. allow broadcast of a condition.
55	FD_FAIL_ALM	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.
56	FD_OFFSPEC_ALM	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.
57	FD_MAINT_ALM	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.
58	FD_CHECK_ALM	This parameter is used primarily to broadcast a change in the associated active conditions, which are not masked, for this alarm category to a Host System.
59	FD_FAIL_PRI	This parameter allows the user to specify the priority of this alarm category.
60	FD_OFFSPEC_PRI	This parameter allows the user to specify the priority of this alarm category.
61	FD_MAINT_PRI	This parameter allows the user to specify the priority of this alarm category.

TABLE 10-1. Resource Block Parameters continued

Index	Parameter Mnemonic	Description
62	FD_CHECK_PRI	This parameter allows the user to specify the priority of this alarm category.
63	FD_SIMULATE	This parameter allows the conditions to be manually supplied when simulation is enabled. When simulation is disabled both the diagnostic simulate value and the diagnostic value track the actual conditions. The simulate jumper is required for simulation to be enabled and while simulation is enabled the recommended action will show that simulation is active.
64	FD_RECOMMEN_ACT	This parameter is a device enumerated summarization of the most severe condition or conditions detected. The DD help should describe by enumerated action, what should be done to alleviate the condition or conditions. 0 is defined as Not Initialized, 1 is defined as No Action Required, all others defined by manuf.
65	FD_EXTENDED_ACTIVE_1	An optional parameter or parameters to allow the user finer detail on conditions causing an active condition in the FD_*_ACTIVE parameters.
66	FD_EXTENDED_MAP_1	An optional parameter or parameters to allow the user finer control on enabling conditions contributing to the conditions in FD_*_ACTIVE parameters.
67	COMPATIBILITY_REV	Last compatible device revision
68	HARDWARE_REV	Hardware revision of that hardware which has the resource block in it.
69	SOFTWARE_REV	Software revision of source code which has resource block in it.
70	PD_TAG	PD tag description of device
71	DEV_STRING	This is used to load new licensing into the device. The value can be written but will always read back with a value of 0.
72	MISC_OPTIONS	Indicates which miscellaneous licensing options are enabled.
73	OUTPUT_BOARD_SN	Output board serial number.
74	FINAL_ASSY_NUM	The same final assembly number placed on the neck label.
75	DOWNLOAD_MODE	Gives access to the boot block code for over the wire downloads 0 = Un-initialized 1 = Run Mode 2 = Download Mode
76	HEALTH_INDEX	Parameter representing the overall health of the device, 100 being perfect and 1 being non-functioning.
77	FAILED_PRI	Designates the alarming priority of the FAILED_ALM and also used as switch b/w FD and legacy PWA. If value is greater than 1 than PWA alerts will be active in device else device will have Field Diagnostics alerts.
78	RECOMMENDED_ACTION	Enumerated list of recommended actions displayed with a device alert.
79	FAILED_ALM	Alarm indicating a failure within a device which makes the device non-operational.
80	MAINT _ALM	Alarm indicating the device needs maintenance soon. If the condition is ignored, the device will eventually fail.
81	ADVISE _ALM	Alarm indicating advisory alarms. These conditions do not have a direct impact on the process or device integrity.
82	FAILED_ENABLE	Enabled FAILED_ALM alarm conditions. Corresponds bit for bit to the FAILED_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. This parameter is the Read Only copy of FD_FAIL_MAP.
83	FAILED_MASK	Mask of Failure Alarm. Corresponds bit for bit to the FAILED_ACTIVE. A bit on means that the failure is masked out from alarming. This parameter is the Read Only copy of FD_FAIL_MASK.
84	FAILED_ACTIVE	Enumerated list of advisory conditions within a device. All open bits are free to be used as appropriate for each specific device. This parameter is the Read Only copy of FD_FAIL_ACTIVE.
85	MAINT_PRI	Designates the alarming priority of the MAINT_ALM.
86	MAINT_ENABLE	Enabled MAINT_ALM alarm conditions. Corresponds bit for bit to the MAINT_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. This parameter is the Read Only copy of FD_OFFSPEC_MAP
87	MAINT _MASK	Mask of Maintenance Alarm. Corresponds bit for bit to the MAINT_ACTIVE. A bit on means that the failure is masked out from alarming. This parameter is the Read Only copy of FD_OFFSPEC_MASK
88	MAINT _ACTIVE	Enumerated list of advisory conditions within a device. All open bits are free to be used as appropriate for each specific device This parameter is the Read Only copy of FD_OFFSPEC_ACTIVE

TABLE 10-1. Resource Block Parameters continued

Index	Parameter Mnemonic	Description
89	ADVISE_PRI	Designates the alarming priority of the ADVISE_ALM.
90	ADVISE_ENABLE	Enabled ADVISE_ALM alarm conditions. Corresponds bit for bit to the ADVISE_ACTIVE. A bit on means that the corresponding alarm condition is enabled and will be detected. A bit off means the corresponding alarm condition is disabled and will not be detected. This parameter is the Read Only copy of FD_MAINT_MAP
91	ADVISE _MASK	Mask of Advisory Alarm. Corresponds bit for bit to the ADVISE_ACTIVE. A bit on means that the failure is masked out from alarming. This parameter is the Read Only copy of FD_MAINT_MASK
92	ADVISE _ACTIVE	Enumerated list of advisory conditions within a device. All open bits are free to be used as appropriate for each specific device This parameter is the Read Only copy of FD_MAINT_ACTIVE

TABLE 10-2. Transducer Block Parameters

		PARAMETER NAME	Description	VALID RANGE	Units/ Enumerations	Write Mode	RO or RW
1		ST_REV	The revision number of the static data.	0-65535			RO
2		TAG_DESC	The user description of the intended application of the block.	32 ASCII characters		OOS, Auto	RW
3		STRATEGY	Used to help identify grouping of blocks.	0-65535			RW
4		ALERT_KEY	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	1 to 255			RW
5		MODE_BLK	The actual, target, permitted, and normal modes of the block.				
	1	TARGET	Target mode	OOS, MAN and Auto			RW
	2	ACTUAL	Actual mode	OOS, MAN and Auto			RO
	3	PERMITTED	Permitted mode	OOS, MAN and Auto			RW
	4	NORMAL	Normal mode	Auto			RW
6		BLOCK_ERR	Hardware/software error status associated with the block. 0 = Inactive, 1 = Active				RO
7		UPDATE_EVT	This alert is generated by any change to the static data.				
	1	UNACKNOWLEDGED	Unacknowledged				RO
	2	UPDATE_STATE	Update State				RO
	3	TIME_STAMP	Time Stamp				RO
	4	STATIC_REVISION	Static Revision				RO
	5	RELATIVE_INDEX	Relative Index				RO
8		BLOCK_ALM	Alarm generated by block_err.				
	1	UNACKNOWLEDGED	Unacknowledged				RO
	2	ALARM_STATE	Alarm State				RO
	3	TIME_STAMP	Time Stamp				RO
	4	SUB_CODE	Sub-code				RO
	5	VALUE	Value				RO

TABLE 10-2. Transducer Block Parameters continued

		PARAMETER NAME	Description	VALID RANGE	Units/ Enumerations	Write Mode	RO or RW
9		TRANSDUCER_ DIRECTORY	A directory that specifies the number and starting indices of the transducers in the transducer block.				RO
10		TRANSDUCER_ TYPE	Identifies the transducer that follows.	100 to 111 Standard 32768 to 65534 Manufacturer Specific	108 = Standard pH 109 = Standard ORP 110 = Standard pH/ ORP		RO
11		XD_ ERROR	Extensions to BLOCK_ERR indicated by the “OTHER” bit 0 being set.				RO
12		COLLECTION_ DIRECTORY	A directory that specifies the number, starting indices, and DD item IDs of the data collections in each transducer within a transducer block.				RO
13		PRIMARY_VALUE_TYPE	Primary Value Type	100 to 124 Standard 32768 to 65534 Manufacturer Specific	111=pH 114=ORP 0xFFF4 = Redox If a smart pH sensor is being used, primary_variable_ type is pH and is Read Only	OOS	RW
14		PRIMARY_VALUE	P V			AUTO, OOS, MAN	RW
	1	STATUS	Process Value Status				RO
	2	VALUE	Process Value		unit = PRIMARY_VALUE_ RANGE.UNITS_ INDEX		RO
15		PRIMARY_VALUE_RANGE	PV Range				
	1	EU_100	Engineering Unit URV	pH: 14.00 pH ORP/Redox : 1400 mV			RO
	2	EU_0	Engineering Unit LRV	pH: 0.00 pH ORP/Redox: -1400 mV			RO
	3	UNITS_INDEX	Process Value Unit	pH : 1422 = pH ORP/Redox : 1243 = mV	1422 = pH 1243 = mV		RO
	4	DECIMAL	Process Value Resolution				RO
16		SENSOR_TYPE_PH	Sensor Type	100 to 150		OOS	RW
17		SENSOR_MV	Sensor Voltage		unit = mV		
	1	STATUS	Sensor mv status				RO
	2	VALUE	Sensor mv value				RO
18		CAL_POINT_HI	2nd buffer calibration point	0 to 14	pH	OOS/ MAN	RW
19		CAL_POINT_LO	1st buffer calibration point	0 to 14	pH	OOS/ MAN	RW
20		CAL_MIN_SPAN	Minimum required span for a successful 2-point pH calibration				RO
21		SLOPE	pH Slope	40 to 62		OOS / MAN	RW
22		SLOPE_UNIT	pH Slope unit		1585 = mV/pH		RO
23		ZERO	Zero Offset	0 to 999		OOS / MAN	RW
24		ZERO_UNIT	Zero Offset Unit		1243 = mV		RO

TABLE 10-2. Transducer Block Parameters continued

		PARAMETER NAME	Description	VALID RANGE	UNITS/ Enumerations	Write Mode	RO or RW
25		ISOPOTENTIAL_PH	Sensor isopotential	0 to 14	0 to 14 pH	OOS	RW
26		SENSOR_CAL_METHOD	Sensor calibration method	1 to 3	1 = Single point 2 = Dual point 3 = Dual point plus temperature	OOS/ MAN	RW
27		SENSOR_CAL_DATE	Date			OOS	RW
28		TEMPERATURE	Temperature				RO
	1	STATUS	Temperature Value Status				RO
	2	VALUE	Temperature Value		unit = TEMPERATURE_UNIT		RO
29		TEMPERATURE_UNIT	Temperature Unit		1001 = ºC 1002 = ºF	OOS	RW
30		SENSOR_TEMP_COMP	PV Temp Comp		1 = Manual 2 = Auto / Sensor Temp 3 = Auto / Fieldbus Temp	OOS / MAN	RW
31		SENSOR_TEMP_MAN_ VALUE	Manual Temperature		unit = TEMPERATURE_UNIT	OOS / MAN	RW
32		SENSOR_TYPE_TEMP	RTD Type		127=Unknown 128 = PT100 148 = PT1000		RO
33		SENSOR_CONNECTION_ TEMP	Temp Sensor Connection	3	3 = 3 wire RTD		RO
34		SAMPLE_CAL	Sample Cal: pH or ORP single point calibration	pH: 0.00 to 14.00 pH ORP: -1400 to 1400 mV Redox: -1400 to 1400 mV		OOS/ MAN	RW
35		TEMPERATURE_COEFF	Temperature Coeff: rate of change of pH with temperature	(-9999.0) to 9999.0	unit = pH/ ºC	OOS	RW
36		TEMP_SENSOR_CAL	Adjust Temperature	(-15) to 150 C	ºC	OOS/ MAN	RW
37		GLASS_IMPEDANCE	Sensor glass electrode impedance				
	1	STATUS	Sensor glass impedance status				RO
	2	VALUE	Sensor glass impedance value		unit = MΩ		RO
38		REFERENCE_ IMPEDANCE	Sensor reference electrode impedance				
	1	STATUS	Reference impedance status				RO
	2	VALUE	Reference impedance value		unit = KΩ		RO
39		SW_REV_LEVEL	Software version				RO
40		HW_REV_LEVEL	Hardware version				RO
41		FINAL_ASSEMBLY_ NUMBER	Final Assembly Number	max= 0x00FFFFFF			RO
42		RESET_CONFIG_ CHANGED_FLAG	Reset Config Changed				RW
43		RESET_TRANSDUCER	Perform Device Reset		1 = Power On Reset 2 = Reset User EEPROM 3 = Reset All EEPROM (Factory only function) 4 = Reset Sensor Calibration 5 = Turn Off Quickstart	OOS	RW
44		ADDITIONAL_ TRANSMITTER_STATUS	Additional Transmitter Status				RO

TABLE 10-2. Transducer Block Parameters continued

		PARAMETER NAME	Description	VALID RANGE	UNITS/ Enumerations	Write Mode	RO or RW
45		FLAG_BITS	Configuration Flags		Bit 15: Ref Z mode 0=Low,1=High Bit 13: Pre-amp location(Read only in case of smart pH sensor) 0 = transmitter, 1 = sensor Bit 11: GlassZ Temp. Comp. 0=Man,1=Auto Bit 10: GlassZ Type 0=Basic,1=Advanced	OOS	RW
46		LOI_CONFIG_ SECURITY_CODE	Local operator interface configuration security code	000 to 999		AUTO, MAN, OOS	RW
47		LOI_CALIBRATION_ SECURITY_CODE	Local operator interface calibration security code	000 to 999		AUTO, MAN, OOS	RW
48		BUFFER_STANDARD	The table of Buffer Standard used in Automatic Buffer recognition		0 = Manual 1 = NIST(standard) 2 = DIN 3 = Ingold 4 = Merck 5 = Fisher	OOS/ MAN	RW
49		STABILIZE_TIME	Period of time the reading should be stable before accepting the reading as a calibration entry	0 to 256	unit = sec.	OOS/ MAN	RW
50		BEGIN_AUTOCALIBRATION	Initiate the automatic pH buffer recognition for calibration	1 to 2	none	MAN / OOS	RW
51		AUTOBUFFER_INDEX	Index to buffer tables			OOS/ MAN	RW
52		AUTOBUFFER_VALUE	Value of selected buffer	0 to 14.00	pH		RO
53		SELECT_NEXT_ AUTOBUFFER	Selects the next Buffer Standard in a standard table	1	none	MAN / OOS	WO
54		SELECT_PREVIOUS_ AUTOBUFFER	Selects the previous Buffer Standard in a standard table	1	none	MAN / OOS	WO
55		AUTOBUFFER_NUMBER	Indicates the first or second calibration point	1 to 2	none	MAN / OOS	RW
56		STABILIZE_VALUE	Maximum reading fluctuation before accepting the reading as a calibration entry	0.02 to 0.5	0.02 to 0.50 pH	OOS/ MAN	RW
57		ENABLE_DIAGNOSTIC_ FAULT_SETPOINTS	Enable or disable diagnostic features		0 = Off, 1 = On	OOS	RW
58		GLASS_FAULT_HIGH_S ETPOINT	Glass impedance fault high limit	0 to 2000	Mohm	OOS	RW
59		REF_IMP_FAULT_HIGH_ SETPOINT	Reference impedance fault high limit	0 to 9,999	Kohm	OOS	RW
60		ZERO_OFFSET_ERROR_ LIMIT	Maximum acceptable zero offset	0 to 999	mV	OOS/ MAN	RW
61		MINIMUM_PH_SLOPE		0 to 99.99	1585 = mV/pH	OOS/ MAN	RW
62		MAXIMUM_PH_SLOPE		0 to 99.99	1585 = mV/pH	OOS/ MAN	RW
63		SOLN_TEMP_CORR_ TYPE	Solution temperature correction type		0 = Off 1 = Ultra Pure 2 = High pH 3 = Ammonia 4 = Custom	OOS	RW
64		PV_SIMULATE_ENABLE	Enable or disable PV simulation		0 = Disable, 1 = Enable	AUTO, MAN, OOS	RW
65		PV_SIMULATE_VALUE	Replaces the normal PV value when pv simulation is enabled	0 to 14		AUTO, MAN, OOS	RW

TABLE 10-2. Transducer Block Parameters continued

		PARAMETER NAME	Description	VALID RANGE	UNITS/ Enumerations	Write Mode	RO or RW
66		ELECTRONICS_FAULT_DETAILS	Bits for providing details of Electronic Failure Alert	1 = CPU Error 2 = Factory Data Error 3 = HW--SW Mismatch 4 = Internal Comm Error 5 = Self Test Failure	1 = CPU Error 2 = Factory Data Error 3 = HW--SW Mismatch 4 = Internal Comm Error 5 = Self Test Failure		RO
67		ELECTRONICS_WARNING_DETAILS	Bits for providing details of Electronic Failure Warning	1 = Keypad Error 2 = User Data Error 3 = Need Factory Calibration 4 = Software Mismatch	1 = Keypad Error 2 = User Data Error 3 = Need Factory Calibration 4 = Software Mismatch		RO
68		SENSOR_SN	Sensor serial number.			AUTO, MAN, OOS	RW
69		PROBLEM_INDEX	Problem Index				RO
70		TB_DEVICE_REV	Device revision used for detecting hw/sw incompatibility between the ff and device card.				RO
71		LANGUAGE	Language		0 = English 1 = Francais 2 = Espanol 3 = Deutsch 4 = Italiano 5 = Portugues 6 = Chinese 7 = Russian		RW
72		LEFT_SIDE_DISPLAY	Left Side of Display		0 = Blank 1 = Manual Temperature 2 = mV Input 3 = Slope 4 = Reference Offset 5 = Glass Impedance 6 = Reference Impedance 7 = TB Actual Mode		RW
73		RIGHT_SIDE_DISPLAY	Right Side of Display		same as above		RW
74		LOWER_LEFT_SIDE_DISPLAY	Lower Left Side of Display		same as above		RW
75		LOWER_RIGHT_SIDE_DISPLAY	Lower Right Side of Display		same as above		RW
76		DISPLAY_WARNINGS	Warnings Display		1 = enable, 0 = disable		RW
77		CONTRAST	Contrast		1...10	AUTO, MAN, OOS	RW
78		TEMP_LIMIT_MIN	Minimum temperature limit	(-100) to 100	ºC		RO
79		TEMP_LIMIT_MAX	Maximum temperature limit	0 to 300	ºC		RO
80		MODEL_NUMBER	sensor information model number				RO
81		DATE_CODE	sensor information date code				RO
82		SMART_PH_SW_VERSION	Smart pH sensor software version				RO
83		SMART_PH_MODEL_NUMBER	Smart pH sensor Model Number				RO
84		SMART_PH_SERIAL_NUMBER	Smart pH sensor Serial Number				RO

TABLE 10-2. Transducer Block Parameters continued

		PARAMETER NAME	Description	VALID RANGE	UNITS/ Enumerations	Write Mode	RO or RW
85		CALIBRATION_HISTORY_1					
	1	CAL_HISTORY_RUN_TIME	Run-time	0 to 40000			RO
	2	CAL_HISTORY_METHOD	Method		0 = none 1= 2-pt auto-buffer 2 = 2-pt manual-buffer 3 = 1pt standardize 4 = manual entry 5 = factory reset		RO
	3	CAL_HISTORY_SLOPE	Slope	0 to 99.99			RO
	4	CAL_HISTORY_OFFSET	Offset	0 to 999			RO
	5	CAL_HISTORY_ TEMPERATURE	Temperature	-999 to 999			RO
	6	CAL_HISTORY_GLASS_ IMPEDANCE	Glass impedance	0 to 2,000			RO
	7	CAL_HISTORY_REFERE NCE_IMPEDANCE	Ref Impedance	0 to 1,000			RO
86		CALIBRATION_HISTORY_2	Same Subindices as above				
87		CALIBRATION_HISTORY_3	Same Subindices as above				
88		CALIBRATION_HISTORY_4	Same Subindices as above				
89		CALIBRATION_HISTORY_5	Same Subindices as above				
90		MANUFACTURING_ INFORMATION					
	1	MI_SLOPE	Slope	0 to 99.99			RO
	2	MI_OFFSET	Offset	0 to 999			RO
	3	MI_TEMPERATURE_OFFSET	Temperature	-999 to 999			RO
	4	MI_GLASS_IMPEDANCE	Glass Impedance	0 to 2,000			RO
	5	MI_REFERENCE_ IMPEDANCE	Ref Impedance	0 to 1,000			RO
91		TEMP_SENSOR_OHMS	RTD resistance				
	1	STATUS	RTD resistance status				RO
	2	VALUE	RTD resistance value				RO
92		UPPER_AREA_DISPLAY			0= Blank 1= PV 2= Temperature	AUTO, MAN, OOS	RW
93		CENTER_AREA_DISPLAY			0= Blank 1= PV 2= Temperature	AUTO, MAN, OOS	RW
94		INPUT_FILTER_TIME_SEC	Input Filter	0 to 999	Seconds	OOS	RW
95		SMART_SENSOR_ CONNECTION_STATE	Smart_sensor_connection_ states related to smart pH sensor connection states		0x01 : SMART_SENSOR_ DISCONNECT, //smart sensor is not detected (Default) 0x02: SMART_SENSOR_ CONNECTED, //smart sensor is connected without an error. 0x03 : SMART_SENSOR_ CONNECTED_ERROR = 3, //smart sensor is connected but some error(s) detected		RO
96		CALCULATED_ZERO_ OFFSET	Zero offset calculated during a pH calibration	-400 to 400	mV		RO
97		CALCULATED_PH_SLOPE	pH slope calculated during a pH calibration	0.00 to 200	mV/pH		RO
98		TEMPERATURE_OFFSET	The temperature can resulting from a temperature standardization	-200 to 200	TEMPERATURE_UNIT		RO
99		FILTER_TYPE	Toggles between two types of filtering		1 = Adaptive, 2 = Continuous	OOS / MAN	RW
100		CALIBRATION_ METHODS_OPTIONS					

Section 11: Return of Material

11.1 General

To expedite the repair and return of instruments, proper communication between the customer and the factory is important. Before returning a product for repair, call 1-949-757-8500 for a Return Materials Authorization (RMA) number.

11.2 Warranty Repair

The following is the procedure for returning instruments still under warranty:

1. Call Rosemount Analytical for authorization.
2. To verify warranty, supply the factory sales order number or the original purchase order number. In the case of individual parts or sub-assemblies, the serial number on the unit must be supplied.
3. Carefully package the materials and enclose your "Letter of Transmittal" (see Warranty). If possible, pack the materials in the same manner as they were received.
4. Send the package prepaid to:

   Rosemount Analytical

   2400 Barranca Parkway

   Irvine, CA 92606

   Attn: Factory Repair

   RMA No. ____________

   Mark the package: Returned for Repair

   Model No. ___________

IMPORTANT

Please see second section of "Return of Materials Request" form. Compliance with the OSHA requirements is mandatory for the safety of all personnel. MSDS forms and a certification that the instruments have been disinfected or detoxified are required.

11.3 Non-Warranty Repair

The following is the procedure for returning for repair instruments that are no longer under warranty:

1. Call Rosemount Analytical for authorization.
2. Supply the purchase order number, and make sure to provide the name and telephone number of the individual to be contacted should additional information be needed.
3. Do Steps 3 and 4 of Section 10.2.

NOTE

Consult the factory for additional information regarding service or repair.

ROSEMOUNT Analytical

EC Declaration of Conformity

CE

We, Emerson Process Management, Blegistrasse 21, Barr, Switzerland CH 6341 declare under our sole responsibility that the product,

Model 1066-AA-BB-CC Smart-enabled, 2-wire Transmitter;

Where AA is:
- P (pH/ORP measurement)
- CL (Chlorine measurement)
- DO (Dissolved Oxygen measurement)
- OZ (Ozone measurement)

Where BB is:
- HT (Analog/HART communication)
- FF (Fieldbus communication)
- FI (FISCO communication)

Where CC is:
- 60 (Not labeled for agency)
- 73 (Labeled for Atex/IECEx)

manufactured by, **Emerson Process Management, Rosemount Analytical Inc., 2400 Barranca Parkway, Irvine California 92606 USA**
to which this declaration relates, is in conformity with the provisions of the European Community Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Community notified body certification, as shown in the schedule.

(signature)

Andy Kemish
(name printed)

Vice President Analytical Europe
(function name)

November 17, 2011
(date of issue)

Schedule

EMC Directive (2004/108/EC)
Harmonized standard used: EN 61326-1: 2006

ATEX Directive (94/9/EC)
Provisions of the directive fulfilled by the equipment:
Equipment Group II, Category 1 G (Ex ia IIC T4)

Intrinsically Safe Certificate: Baseefa11ATEX0195X
Special Condition for safe use:
The plastic enclosure, excluding the front panel, may constitute a potential electrostatic ignition risk and must only be cleaned with a damp cloth.

Harmonized standards used: 60079-0:2011 60079-11:2011

ATEX Notified Body for EC Type Examination Certificate & Quality Assurance:
Baseefa [Notified Body Number: 1180], Rockhead Business Park, Staden Lane Buxton, Derbyshire SK17 9RZ, United Kingdom

CE marking was first affixed to this product in 2011

EMERSON.
Process Management

ROSEMOUNT
Analytical

EC Declaration of Conformity

CE

We, **Emerson Process Management, Blegistrasse 21, Baar, Switzerland CH 6341** declare under our sole responsibility that the product,

Model 1066-AA-BB-CC Smart-enabled, 2-wire Transmitter;

Where AA is:
C (Contacting Conductivity measurement)
T (Toroidal Conductivity measurement)

Where BB is:
HT (Analog/HART communication)
FF (Fieldbus communication)
FI (FISCO communication)

Where CC is:
60 (Not labeled for agency)
73 (Labeled for Atex/IECEx)

manufactured by, **Emerson Process Management, Rosemount Analytical Inc., 2400 Barranca Parkway, Irvine California 92606 USA**
to which this declaration relates, is in conformity with the provisions of the European Community Directives, including the latest amendments, as shown in the attached schedule.

Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Community notified body certification, as shown in the schedule.

(signature)
Andy Kemish
(name printed)

Vice President Analytical Europe
(function name)
March 13, 2012
(date of issue)

Schedule

EMC Directive (2004/108/EC)
Harmonized standard used: EN 61326-1: 2006

CE marking was first affixed to this product in 2012

EMERSON.
Process Management

Fieldbus Foundation

Device Registration

Manufacturer	Emerson Process Management, Rosemount Analytical Inc. 2400 Barranca Parkway Irvine, CA 92606 USA
Model	1066-P-FF pH Fieldbus Transmitter
Type	pH Transmitter
Device ITK Profile	6
Manufacturer Identification (MANUFAC_ID)	0x524149
Device Type (DEV_TYPE)	0x4089
Device Revision (DEV_REV)	0x01
Physical Layer Profiles	111, 113, 511
Device Test Campaign	IT078300
Stack Test Campaign	CT0113FF
Device Support File Test Campaign	IT078300
Physical Layer Test Report	PT-373
Device Description	0101.ffo (CRC: 0x12DB56AB) 0101.sym (CRC: 0x8947F28B) 0101.ff5 (CRC: 0x50C05783) 0101.sy5 (CRC: 0xA879E7D1)
Capability File	010102.cff (CRC: 0x2BB7BD)
Mandatory Features	Resource Block Alarms and Events Function Block Linking Trending Multi-Bit Alert Reporting Field Diagnostics
Function Blocks	Analog Inputs Analog Output Proportional Integral Derivative Arithmetic Input Selector Integrator Signal Characterizer
Additional Features	Common Software Download Block Instantiation
Registration Number	IT/078300/1
Registration Program	FF-524-1.9
Date Issued	2011-11-03

Authorized Mark

Use of mark subject to
Graphic Identify Standards Guide
(MT-042)

FOUNDATION

Richard J. Timoney
President and Chief Executive Officer

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