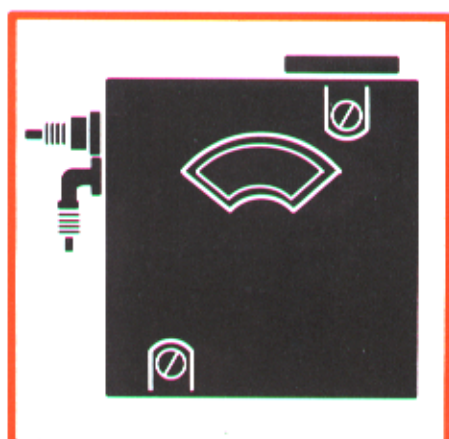
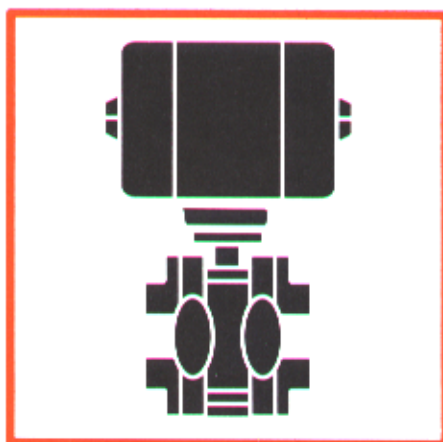
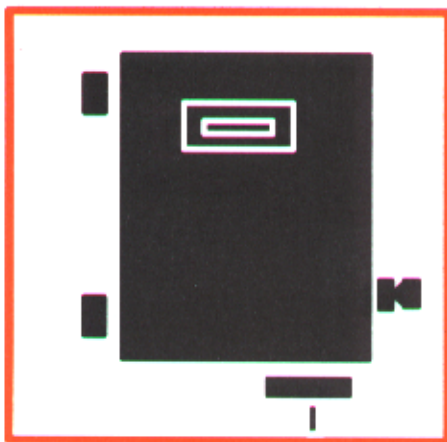
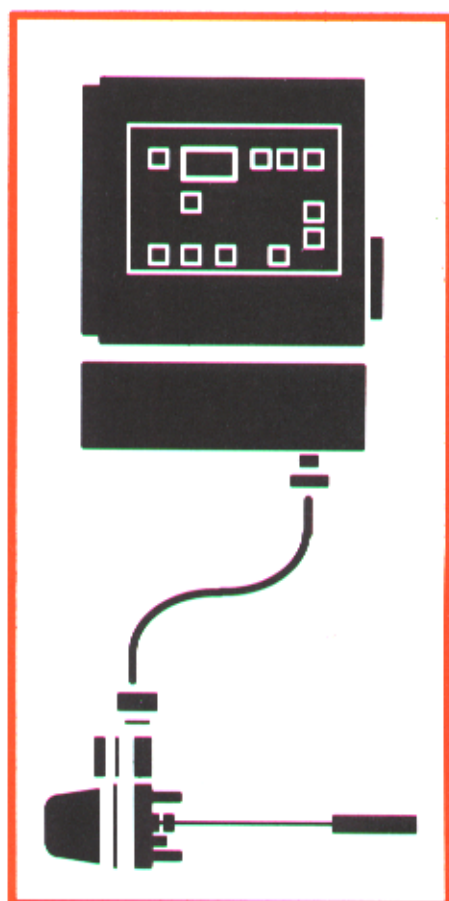
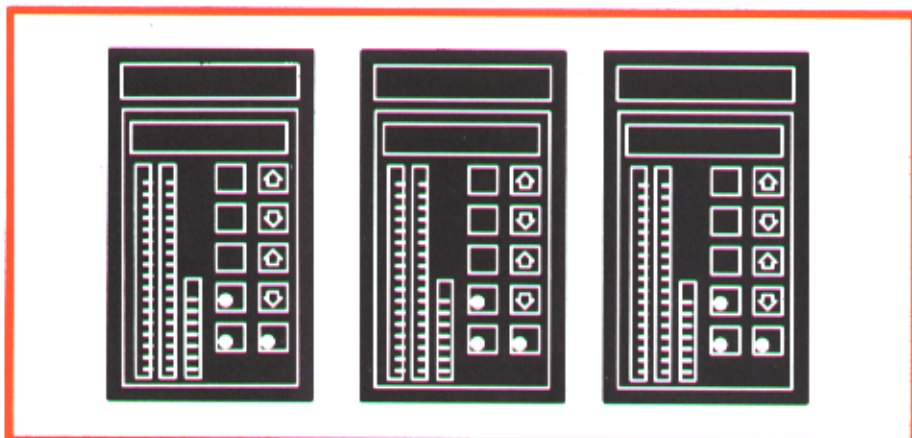




platinum standard™ Series Smart Pressure Transmitter Type PTSP



Preface

This publication is for the use of technical personnel responsible for the installation, calibration, operation, maintenance, and repair of the Type PTSP Platinum Standard Smart Pressure Transmitter.

It is important for safety and operating reasons to read and understand this instruction. Until doing so, do not install or complete any tasks or procedures related to calibration, operation, maintenance, or repair.

List of Effective Pages

Total number of pages in this instruction is 78, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through viii	Original
1-1 through 1-13	Original
2-1 through 2-7	Original
3-1 through 3-8	Original
4-1 through 4-6	Original
5-1 through 5-8	Original
6-1 through 6-8	Original
7-1 through 7-3	Original
8-1 through 8-7	Original
9-1 through 9-6	Original
Index-1 through Index-4	Original

When an update is received, insert the latest changed pages and dispose of the superseded pages.

NOTE: On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.

Table of Contents

	<i>Page</i>
SECTION 1 - INTRODUCTION	1-1
OVERVIEW	1-1
INTENDED USER	1-1
EQUIPMENT DESCRIPTION	1-1
FEATURES	1-1
EQUIPMENT APPLICATION	1-3
INSTRUCTION CONTENT	1-3
HOW TO USE THIS INSTRUCTION	1-4
REFERENCE DOCUMENTS	1-4
NOMENCLATURE	1-5
SPECIFICATIONS	1-7
Common Specifications	1-7
Type PTSPG Gage Pressure Transmitter Specifications	1-9
Type PTSPA Absolute Pressure Transmitter Specifications	1-10
OPTIONS AND ACCESSORIES	1-10
SECTION 2 - DESCRIPTION AND OPERATION	2-1
INTRODUCTION	2-1
FUNCTIONAL OPERATION	2-1
Cell and Characterization Board Assembly	2-2
Electronics Assembly	2-2
EZ CAL Option	2-3
Communications	2-4
Temperature Compensation	2-4
Diagnostics	2-6
Software Functions	2-6
Function Generator	2-7
SECTION 3 - INSTALLATION	3-1
INTRODUCTION	3-1
UNPACKING AND INSPECTION	3-1
LOCATION CONSIDERATIONS	3-1
SETUP AND PHYSICAL INSTALLATION	3-1
Mounting	3-2
Electronics Housing Orientation	3-3
Indicator Orientation	3-3
EZ CAL Option	3-3
Piping	3-4
Wiring	3-4
Analog Mode	3-4
Digital Mode	3-7
Grounding	3-8
SELECTING DEFAULTS	3-8
HAZARDOUS LOCATION INSTALLATIONS (FLAMMABLE ATMOSPHERES)	3-8
SECTION 4 - CALIBRATION	4-1
INTRODUCTION	4-1
CALIBRATION PROCEDURES	4-1
Equipment Required for Calibration	4-1
Analog Mode Calibration	4-2
Bench Calibration	4-2

Table of Contents (continued)

	<i>Page</i>
<hr/>	
SECTION 4 - CALIBRATION (continued)	
D/A adjustment (fine tuning the analog loop)	4-3
Digital Mode Calibration	4-4
RERANGING THE ANALOG OUTPUT	4-5
REZERO PROCEDURE	4-6
VERIFYING CALIBRATION WITH THE EZ CAL OPTION	4-6
<hr/>	
SECTION 5 - OPERATING PROCEDURES	5-1
INTRODUCTION	5-1
OPERATOR INTERFACE	5-1
CONFIGURATION PROCEDURE	5-1
ID Tag	5-1
Select Mode	5-1
Channel Number	5-2
Transmitter Type	5-2
Output Type	5-2
Output Action	5-2
Damping Adjustment.....	5-2
Primary Engineering Units.....	5-3
Primary Upper and Lower Range Values	5-3
Startup and Failure Conditions	5-3
Secondary Engineering Units.....	5-4
Secondary Lower and Upper Range Values	5-4
Cell Temperature Alarm Limits	5-4
Get Config Key.....	5-4
Send Config Key	5-5
View Config Key.....	5-5
OPERATIONAL FUNCTIONS.....	5-5
Special Feature Key	5-5
Fix Output/Cancel Fix Output	5-5
Local LCD Setup	5-5
Standard Configuration.....	5-5
Output Key.....	5-6
Monitor Output.....	5-6
Monitor Input.....	5-6
Monitor Cell Temperature.....	5-6
Monitor Secondary Engineering Units.....	5-6
Status Key.....	5-6
F1 Key.....	5-7
CONFIGURATION LOCKOUT PROCEDURE.....	5-7
<hr/>	
SECTION 6 - TROUBLESHOOTING	6-1
INTRODUCTION	6-1
ERROR MESSAGES AND CORRECTIVE ACTION	6-1
<hr/>	
SECTION 7 - MAINTENANCE	7-1
INTRODUCTION	7-1
PREVENTIVE MAINTENANCE SCHEDULE.....	7-1
PREVENTIVE MAINTENANCE PROCEDURES	7-2
Checking Connections	7-2
Indicator Window Cleaning	7-2

Table of Contents (continued)

	<i>Page</i>
<hr/>	
SECTION 7 - MAINTENANCE (continued)	
Transmitter Exterior Cleaning	7-3
<hr/>	
SECTION 8 - REPAIR AND REPLACEMENT PROCEDURES	8-1
INTRODUCTION	8-1
COMPONENT REMOVAL AND INSTALLATION PROCEDURES	8-1
Cell and Characterization Board Assembly Removal	8-3
Cell and Characterization Board Assembly Installation	8-4
Amplifier Assembly Removal	8-5
Amplifier Assembly Installation	8-5
Electronics Housing and Housing Cover Replacement	8-5
O-Ring Replacement	8-6
OPTIONAL EQUIPMENT REMOVAL AND INSTALLATION PROCEDURES	8-6
Indicator Removal	8-6
Indicator Installation	8-6
EZ CAL Option Removal	8-7
EZ CAL Option Installation	8-7
Tagging Replacement (Wired Stainless Steel)	8-7
<hr/>	
SECTION 9 - SUPPORT SERVICES	9-1
INTRODUCTION	9-1
REPLACEMENT PARTS	9-1
SPARE PARTS LISTS	9-1
O-Ring Kits	9-2
Electronics Kits	9-2
Hardware Kits	9-3
Cell with Characterization Board Assembly Replacements	9-5
TRAINING	9-6
TECHNICAL DOCUMENTATION	9-6
<hr/>	

List of Figures

<i>No.</i>	<i>Title</i>	<i>Page</i>
2-1.	Type PTSP Transmitter	2-1
2-2.	Cell and Characterization Board Assembly	2-2
2-3.	Electronics Block Diagram	2-3
2-4.	Analog Point-to-Point Wiring	2-5
2-5.	Digital Field Bus Wiring	2-5
2-6.	Communication Noise Rejection	2-6
2-7.	Function Generator Example	2-7
3-1.	External and Mounting Dimensions	3-2
3-2.	Gas Pressure Installation	3-5
3-3.	Vapor Pressure Installation	3-5
3-4.	Liquid Pressure Installation	3-6
4-1.	Calibration Setup (Typical)	4-2
5-1.	Lockout Jumper	5-8
6-1.	Troubleshooting Flowchart (Sheet 1 of 3)	6-6

List of Figures (continued)

<i>No.</i>	<i>Title</i>	<i>Page</i>
6-2.	Troubleshooting Flowchart (Sheet 2 of 3)	6-7
6-3.	Troubleshooting Flowchart (Sheet 3 of 3)	6-8
8-1.	Internal Transmitter Components.....	8-2
8-2.	External Transmitter Components.....	8-3

List of Tables

<i>No.</i>	<i>Title</i>	<i>Page</i>
1-1.	Reference Documents	1-4
1-2.	Nomenclature.....	1-5
1-3.	Common Specifications	1-7
1-4.	Ambient Condition Limits for Certified Applications	1-9
1-5.	Type PTSPG Gage Pressure Transmitter Specifications.....	1-9
1-6.	Type PTSPA Absolute Pressure Transmitter Specifications	1-11
1-7.	Options and Accessories.....	1-12
4-1.	Analog Mode Calibration Tolerances	4-3
4-2.	Digital Mode Calibration Tolerances.....	4-5
6-1.	Error Messages.....	6-2
6-2.	Output Troubleshooting	6-5
7-1.	Preventive Maintenance Schedule.....	7-2
9-1.	O-Rings, Cell and Cover.....	9-2
9-2.	Amplifier Assembly (Compensated)	9-2
9-3.	Indicator, Add-On.....	9-2
9-4.	Indicator, Spare.....	9-2
9-5.	EZ CAL Option	9-3
9-6.	Process Adapters	9-3
9-7.	Electronics Housing.....	9-4
9-8.	Cover, Housing.....	9-4
9-9.	Tag, Stainless Steel, Wired.....	9-5

Safety Summary

SPECIFIC WARNINGS

Consider the corrosive properties of the measured substance when selecting piping materials. Degradation of the piping can upset the process. Some process upsets can injure personnel and damage equipment. (p. 3-4)

When pressurizing, avoid overloading and pressure hammer. Refer to the introduction section for the pressure limits of the cell. Exceeding this pressure could result in damage to the cell and cause serious injury to personnel. (p. 3-4)

Explosionproof/dust-ignitionproof installations and intrinsically safe installations in Class II or Class III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be nonhazardous at the time. (p. 4-1, 8-1)

The outputs of smart devices change to a fixed value during initialization and detected failure conditions. These values must be selected by the user to ensure safe operation. (p. 5-3)

System maintenance must be performed only by qualified personnel and only after securing equipment controlled by the circuit. Altering or removing components from an active circuit may upset the process being controlled. (p. 8-1)

SPECIFIC CAUTIONS

Do not remove the cell lock and rotate the electronics housing about the cell. Doing so can damage the cell cable and will void the warranty. (p. 3-3)

If the cell and characterization board assembly has been cleaned for oxygen and chlorine service, do not compromise the integrity of this cleaning during these procedures. Impurities will react with oxygen and chlorine and damage the transmitter and the process. (p. 7-3, 8-1)

Clean the diaphragms with a soft rag and appropriate solvent. The use of metal brushes, blades, or other tools will damage the diaphragms. (p. 7-3)

Trademarks and Registrations

Registrations and trademarks used in this document include:

™EZ CAL	Trademark of Elsig Bailey Process Automation.
™Platinum Standard	Trademark of Elsig Bailey Process Automation.
®Hastelloy	Registered trademark of Haynes International, Incorporated.
®Teflon	Registered trademark of E. I. DuPont de Nemours Company, Incorporated.
®HART	Registered trademark of HART Communication Foundation.
®NEVER-SEEZ	Registered trademark of USM Corporation.
®Dow Corning	Registered trademark of Dow Corning Corporation.

SECTION 1 - INTRODUCTION

OVERVIEW

The Type PTSP Platinum Standard Smart Pressure Transmitter accurately measures absolute or gage pressure of corrosive and noncorrosive liquids, vapors, and gases. It may be configured to provide a polled digital process variable signal (digital field bus mode) or a four to 20-milliampere process variable signal (analog mode).

It is important for safety and operating reasons to read and understand this manual. Until doing so, do not install or complete any tasks or procedures related to installation, calibration, operation, maintenance, or repair.

INTENDED USER

The information in this publication is a guide for technical personnel responsible for the installation, calibration, operation, maintenance, and repair of the Type PTSP Platinum Standard Smart Pressure Transmitter.

EQUIPMENT DESCRIPTION

The Type PTSP pressure transmitter consists of a cell and characterization board assembly and an electronics assembly. The electronics package uses the latest microprocessor technology, allowing calibration, operation, and troubleshooting from a local or remote location.

The Type STT Smart Transmitter Terminal communicates with the transmitter to configure, calibrate, check transmitter status, and perform other interactions with the transmitter. The EZ CAL™ option allows calibration validation without the Type STT terminal. An optional LCD (liquid crystal display) shows output in percent and user-defined secondary engineering units, input in primary engineering units, cell temperature, and the transmitter ID tag. An analog meter is also available for local output indication for those applications where the transmitter operates at temperature extremes (refer to Table 1-3 for the temperature limits).

FEATURES

Accurate, Stable, and Reproducible Measurements. Silicon piezo-resistive cell technology provides precise, stable, and reproducible pressure measurements.

Standard Hastelloy® C-276 Wetted Diaphragm. This corrosion resistant material is compatible with most substances. It reduces stock and minimizes purchase variations.

Easy Zero and Span Validation. The nonintrusive EZ CAL option does not violate the transmitter case. It allows zero and span validation to previously defined pressure values without the use of the Type STT terminal. The EZ CAL option may be supplied at delivery or added in the field, and can be used on any Type PTSP pressure transmitter (except those with stainless steel housings).

Turndown Ratios from 1:1 to 40:1. Most Type PTSP pressure transmitters have a turndown ratio range from 1:1 to 40:1.

Enhanced Remote Communications. Communicates with the Type STT Smart Transmitter Terminal. This hand-held communication device uses a high frequency AC signaling method known as FSK (frequency shift keying). This communication method functions in the high noise environment found in many factories. The Type STT terminal communicates with the transmitter anywhere there is access to the signal wires within 1.6 kilometers (1.0 mile) of the transmitter. This parallel connection does not disrupt the isolated analog four to 20-milliamper process variable signal. The terminal is also available in French and Spanish language versions. Types STT04 terminals and later have the ability to communicate with HART devices.

Optional Two-Line, Seven Character Liquid Crystal Display. Displays output in percent and user-defined secondary engineering units, input in primary engineering units, cell temperature, and transmitter ID tag. An analog meter is also available for those applications where the transmitter operates outside the temperature limits of the LCD. Both are easily installed for convenient local indication.

Advanced Electronics Insures Reliability. The amplifier assembly uses surface mount technology, designed to exceed 50 years MTBF (mean time between failure).

Dual Cover Housing. Immune to RFI (radio frequency interference).

Reduced Installation and Service Costs. Remote communications, modular plug-in electronics, and long-term stability reduce installation and service time.

Direct Replacement of Existing Analog Two-Wire Transmitters. Transmitters used in the analog mode replace most four to 20-milliamper output pressure transmitters that operate over a two-wire system.

Digital Field Bus Compatibility. When used as a high speed digital communicating device, analog signal processing does not occur. This results in an overall accuracy that is improved by more than three times compared to a traditional analog system. Such applications are INFI 90[®] OPEN supported.

Transmitter Diagnostics. The transmitter performs a series of self-checks, monitoring such areas as configuration integrity and input circuitry. A user-defined cell temperature alarm is available. These diagnostics reduce troubleshooting and service time.

Agency Certifications. Designed to comply with FM (Factory Mutual) and CSA (Canadian Standards Association) certifications as intrinsically safe, explosionproof, and nonincendive. Selected transmitters may be supplied with CENELEC (European Committee for Electrotechnical Standardization) or SAA (Standards Association of Australia) certifications on special order. A NEMA 4X and IP67 housing makes the transmitter suitable for corrosive environments. The standard electronics housing is made of a low copper (less than one percent) Aluminum alloy. A polyurethane coating on the housing provides environmental protection.

EQUIPMENT APPLICATION

Uses for the transmitter include process control applications in the power generation, gas, water, petroleum, pulp and paper, and food industries.

INSTRUCTION CONTENT

This instruction is organized into nine sections.

Introduction	Describes this instruction and the transmitter. Includes reference documents, nomenclature, specifications, and options and accessories.
Description and Operation	Describes the functional operation of the transmitter and associated equipment. It also includes information about special applications such as the function generator.
Installation	Provides procedures for placing the transmitter into service.
Calibration	Identifies the calibration status of the transmitter and provides calibration check procedures. Calibration and validation procedures using both the Type STT terminal and EZ CAL option appear here.
Operating Procedures (Transmitter Configuration)	Addresses startup procedures, configuring, and monitoring of the Type PTSP pressure transmitter (using the Type STT terminal), and the procedures that make the unit operational.

- Troubleshooting** Provides steps that aid in solving operating difficulties that can occur, tables that list corrective action for error messages, and a troubleshooting flowchart.
- Maintenance** Contains preventive maintenance schedules and procedures.
- Repair and Replacement Procedures** Details procedures involved in replacing transmitter components.
- Support Services** Provides spare parts lists and ordering information for replacement parts.

HOW TO USE THIS INSTRUCTION

Read this entire instruction through in sequence before attempting to install, calibrate, operate, troubleshoot, service, or repair the transmitter. After becoming completely familiar with the transmitter and this instruction, it may be used as a reference.

Throughout this instruction, the following text conventions generally apply.

Display Item Any item displayed on a screen appears as italic text. Example:

Running

REFERENCE DOCUMENTS

Table 1-1 lists Bailey-Fischer & Porter documents referred to in this instruction.

Table 1-1. Reference Documents

Number	Description
B8113038	Board level wiring diagram
C-E21-50	Platinum Standard Series Smart Transmitters for Pressure, Flow and Level Measurements, Type PTS Specification
D3055062	Dimension drawing for Type PTSP pressure transmitters
D3055064	Dimension drawing for optional indicator
D3055065	User field connections
I-E96-302	Field Bus I/O Module (IMFBS01) Instruction
I-G18-1	Instrument Connecting Piping
P-E21-001	Installing a 4 to 20 mA Transmitter in a Hazardous Location
WBPEEU110502A0	Type STT Smart Transmitter Terminal Instruction

NOMENCLATURE

The Type PTSP pressure transmitter has 15 nomenclature positions. Positions five through 15 each have customer selectable options. Use Table 1-2 to select or verify transmitter type.

Table 1-2. Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Platinum Standard Smart Pressure Transmitter P Type Cell				
P	T	S	P	-	-	-	-	-	-	-	-	-	-	-					
Measurement application																			
A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Absolute pressure				
G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gage pressure				
Measurement range¹																			
		Nominal Range		Minimum Range										Types					
		kPa	psi	kPa	psi														
E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 200	0 - 30	0 - 5	0 - 0.8	PTSPA
F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 690	0 - 100	0 - 69	0 - 10	PTSPG
G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 3,000	0 - 450	0 - 75	0 - 11.3	PTSPA
G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 3,000	0 - 450	0 - 200	0 - 30	PTSPG
J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 40,000	0 - 5,800	0 - 1,000	0 - 145	All
Diaphragm material and fill fluid																			
		Diaphragm Material		Fill Fluid										Types					
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hastelloy C-276	Silicone oil (ordered most)			All
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gold plated Hastelloy C-276	Silicone oil			
A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hastelloy C-276	Fluorinated oil			
B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gold plated Hastelloy C-276				
E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hastelloy C-276	Fluorinated oil - cleaned for O ₂ and Cl ₂ service			
F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gold plated Hastelloy C-276				
Pressure connection material																			
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Stainless steel 316 (ordered most)				
A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hastelloy C-276				
M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	For remote seal use (direct mount)				
0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	Not used - enter zeros				

Table 1-3. Common Specifications (continued)

Property	Characteristic/Value						
	Parameter	Electronics ¹		Cell ^{1,2}		LCD ³	
		°C	°F	°C	°F	°C	°F
Temperature limits for electronics, cell, and optional liquid crystal display	Normal operating	-40 to +85	-40 to +185	-40 to +85	-40 to +185	0 to +50	+32 to +122
	Extreme operating	-50 to +85	-58 to +185	-50 to +120	-58 to +248	0 to +50	+32 to +122
	Storage/transport	-55 to +85	-67 to +185	-55 to +85	-67 to +185	-20 to +70	-4 to +158
Supply voltage	12 to 53 VDC (12 to 42 VDC for CSA certified applications) ^{4,5} . Installation category III.						
Power supply effect							
Analog mode	±0.005% of URL per volt						
Digital field bus mode	±0.003% of URL per volt						
Output signal							
Analog	4 to 20 mA						
Digital	Bailey FSK communications						
Output current limiting							
Maximum	≥21.6 mA						
Minimum	≤3.7 mA						
Loop load limits	Refer to Figure 2-4						
Damping/response time (one time constant - approximately 62% of final reading)	Analog and digital response to a step input change is adjustable from 0.0 to 32.0 secs and is entered during configuration. This value is in addition to: Cell response time: dependent on cell and fill fluid Electronics response time: approximately 0.3 sec						
RFI/EMI effects	≤±0.1% of URL in fields from 4 to 1,000 MHz at 10 V/m						
Surge tolerance	Complies to IEEE 472 test criteria. 2.5 kV, 1.5 MHz at 10 V/m						
Vibration effect	±0.1% of URL for 1 g from 1 to 2,000 Hz in any axis of the transmitter						
Enclosure rating	NEMA 4X and IP67						
FM/CSA certifications ^{6,7}							
Explosionproof and dust-ignitionproof	Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; Class III						
Intrinsically safe	Classes I, II and III, Division 1; applicable groups when connected per drawing B222611						
Nonincendive	Class I, Division 2, Groups A, B, C and D; Class II, Division 2, Groups E, F and G; Class III						

NOTES:

1. The normal operating temperature range is that at which the transmitter meets all specifications. The extreme operating temperature range is that at which the transmitter remains powered without damage.
2. All transmitters with fluorinated oil filled cells can only be operated in temperatures from -10° to +80°C (+14° to +176°F).
3. The normal operating temperature range for the LCD is that at which the LCD remains functional. Exceeding those conditions may cause the LCD to go blank. The transmitter remains functional to its operating limits. When the temperature returns to the acceptable range, the display is restored; however, the life of the display may be reduced.
4. The minimum supply voltage necessary to support communications is 17.0 VDC.
5. Add 0.4 VDC to all minimum supply voltage values if using the lightning arrester option.
6. Refer to Table 1-4 for the ambient condition limits for certified applications.
7. The transmitters are only certified for those agencies and classes indicated on the certification label. Do not install the transmitters in locations for which they are not suited. Refer to nomenclature position 12.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Table 1-4. Ambient Condition Limits for Certified Applications

Agency	Category	T _{max}		T _{min}		P _{max}		P _{min}		O _{2max}
		°C	°F	°C	°F	kPa	psia	kPa	psia	%
FM	Explosionproof	80	176	-40	-40	108	15.7	86	12.5	21
	Dust-ignitionproof									
	Intrinsic safety	65 (T4)	149 (T4)							
	Nonincendive									
CSA	Explosionproof	60	140	-40	-40	108	15.7	86	12.5	21
	Dust-ignitionproof									
	Intrinsic safety	40 (T3C)	104 (T3C)							
		60 (T3A)	140 (T3A)							
	Nonincendive	60 (T4A)	140 (T4A)							

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Type PTSPG Gage Pressure Transmitter Specifications

Table 1-5 lists the specifications unique to Type PTSPG gage pressure transmitters.

Table 1-5. Type PTSPG Gage Pressure Transmitter Specifications

Property	Characteristic/Value																																																																																
Measurement range, turndown ratio, zero suppression, and zero elevation	<p>Lower range value (zero) and upper range value (100%) can be calibrated at any value of pressure, provided that:</p> <ol style="list-style-type: none"> Their algebraic difference (the calibrated span) corresponds to an authorized TDR. Both are within the following acceptable limits. <table border="1"> <thead> <tr> <th rowspan="3">Type</th> <th colspan="6">International System Units</th> </tr> <tr> <th colspan="2">Range Limits¹ (kPa)</th> <th colspan="4">Span and Turndown Ratio (TDR)</th> </tr> <tr> <th>Upper</th> <th>Lower</th> <th colspan="2">Nominal (kPa)</th> <th colspan="2">Minimum (kPa)</th> </tr> </thead> <tbody> <tr> <td>PTSPGF</td> <td>690</td> <td>-100</td> <td>690</td> <td>1:1 TDR</td> <td>69</td> <td>10:1 TDR</td> </tr> <tr> <td>PTSPGG</td> <td>3,000</td> <td>0</td> <td>3,000</td> <td>1:1 TDR</td> <td>200</td> <td>15:1 TDR</td> </tr> <tr> <td>PTSPGJ</td> <td>40,000</td> <td>0</td> <td>40,000</td> <td>1:1 TDR</td> <td>1,000</td> <td>40:1 TDR</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="3">Type</th> <th colspan="6">American Units</th> </tr> <tr> <th colspan="2">Range Limits¹ (psi)</th> <th colspan="4">Span and Turndown Ratio (TDR)</th> </tr> <tr> <th>Upper</th> <th>Lower</th> <th colspan="2">Nominal (psi)</th> <th colspan="2">Minimum (psi)</th> </tr> </thead> <tbody> <tr> <td>PTSPGF</td> <td>100</td> <td>-14</td> <td>100</td> <td>1:1 TDR</td> <td>10</td> <td>10:1 TDR</td> </tr> <tr> <td>PTSPGG</td> <td>450</td> <td>0</td> <td>450</td> <td>1:1 TDR</td> <td>30</td> <td>15:1 TDR</td> </tr> <tr> <td>PTSPGJ</td> <td>5,800</td> <td>0</td> <td>5,800</td> <td>1:1 TDR</td> <td>145</td> <td>40:1 TDR</td> </tr> </tbody> </table>	Type	International System Units						Range Limits ¹ (kPa)		Span and Turndown Ratio (TDR)				Upper	Lower	Nominal (kPa)		Minimum (kPa)		PTSPGF	690	-100	690	1:1 TDR	69	10:1 TDR	PTSPGG	3,000	0	3,000	1:1 TDR	200	15:1 TDR	PTSPGJ	40,000	0	40,000	1:1 TDR	1,000	40:1 TDR	Type	American Units						Range Limits ¹ (psi)		Span and Turndown Ratio (TDR)				Upper	Lower	Nominal (psi)		Minimum (psi)		PTSPGF	100	-14	100	1:1 TDR	10	10:1 TDR	PTSPGG	450	0	450	1:1 TDR	30	15:1 TDR	PTSPGJ	5,800	0	5,800	1:1 TDR	145	40:1 TDR
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Table 1-5. Type PTSPG Gage Pressure Transmitter Specifications (continued)

Property	Characteristic/Value																								
Reference accuracy - per IEC 770 and SAMA PMC 31.1	The reference accuracy includes the effects of linearity, hysteresis, repeatability, and deadband. These values are for transmitters with zero based spans, silicone oil fill, and Hastelloy C-276 isolating diaphragms at a reference temperature of 25°C (77°F). The value listed may vary depending on the URL and calibrated span of the particular transmitter.																								
PTSPGF	$\pm 0.20\%$ of span or $\pm \frac{0.016 \times URL}{Span}$ (% of span), whichever is greater																								
PTSPGG and PTSPGJ	$\pm 0.10\%$ of span or $\pm \frac{0.008 \times URL}{Span}$ (% of span), whichever is greater																								
Pressure limits	The minimum sustained absolute pressure is 3.4 kPa (0.5 psi). The maximum overpressure is listed in the following table. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">Type</th> <th colspan="2">URL</th> <th colspan="2">Overpressure Limit</th> </tr> <tr> <th>(kPa)</th> <th>(psi)</th> <th>(kPa)</th> <th>(psi)</th> </tr> </thead> <tbody> <tr> <td>PTSPGF</td> <td>690</td> <td>100</td> <td>1,250</td> <td>180</td> </tr> <tr> <td>PTSPGG</td> <td>3,000</td> <td>450</td> <td>6,000</td> <td>870</td> </tr> <tr> <td>PTSPGJ</td> <td>40,000</td> <td>5,800</td> <td>41,368</td> <td>6,000</td> </tr> </tbody> </table>	Type	URL		Overpressure Limit		(kPa)	(psi)	(kPa)	(psi)	PTSPGF	690	100	1,250	180	PTSPGG	3,000	450	6,000	870	PTSPGJ	40,000	5,800	41,368	6,000
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Overpressure effect	This value is for transmitters with zero based spans, silicone oil fill, and Hastelloy C-276 isolating diaphragms at a reference temperature of 25°C (77°F). $\pm 0.05\%$ of URL for line pressures 1.5 times URL.																								
Ambient temperature effect on zero and span	These values are for transmitters with zero based spans, silicone oil fill, and Hastelloy C-276 isolating diaphragms. The effects listed are for a variation of $\pm 25^\circ\text{C}$ ($\pm 45^\circ\text{F}$) from a calibration done at a temperature between -30° and $+80^\circ\text{C}$ (-22° and $+176^\circ\text{F}$), as long as the variation does not take the transmitter out of the temperature specifications listed in Table 1-3.																								
PTSPGF	$\pm(0.15\% \text{ URL} + 0.10\% \text{ span})$																								
PTSPGG and PTSPGJ	$\pm(0.08\% \text{ URL} + 0.10\% \text{ span})$																								
Weight	1.3 kg (2.9 lbs) without options or accessories.																								

NOTE:

1. Types PTSPGG and PTSPGJ pressure transmitters are not compensated for barometric pressure. Type PTSPGF pressure transmitters are not linearized or thermally stabilized below atmospheric pressure.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Type PTSPA Absolute Pressure Transmitter Specifications

Table 1-6 lists the specifications unique to the Type PTSPA absolute pressure transmitter.

OPTIONS AND ACCESSORIES

Table 1-7 lists the options and accessories available with the Type PTSP pressure transmitter.

Table 1-6. Type PTSPA Absolute Pressure Transmitter Specifications

Property	Characteristic/Value																																																								
Measurement range, turndown ratio, zero suppression, and zero elevation	<p>Lower range value (zero) and upper range value (100%) can be calibrated at any value of pressure, provided that:</p> <ol style="list-style-type: none"> 1. Their algebraic difference (the calibrated span) corresponds to an authorized TDR. 2. Both are within the following acceptable limits. <table border="1"> <thead> <tr> <th rowspan="3">Type</th> <th colspan="4">International System Units</th> </tr> <tr> <th colspan="2">Range Limits (kPa)</th> <th colspan="2">Span and Turndown Ratio (TDR)</th> </tr> <tr> <th>Upper</th> <th>Lower</th> <th>Nominal (kPa)</th> <th>Minimum (kPa)</th> </tr> </thead> <tbody> <tr> <td>PTSPA E</td> <td>200</td> <td>0</td> <td>200 1:1 TDR</td> <td>5 40:1 TDR</td> </tr> <tr> <td>PTSPA G</td> <td>3,000</td> <td>0</td> <td>3,000 1:1 TDR</td> <td>75 40:1 TDR</td> </tr> <tr> <td>PTSPA J</td> <td>40,000</td> <td>0</td> <td>40,000 1:1 TDR</td> <td>1,000 40:1 TDR</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="3">Type</th> <th colspan="4">American Units</th> </tr> <tr> <th colspan="2">Range Limits (psi)</th> <th colspan="2">Span and Turndown Ratio (TDR)</th> </tr> <tr> <th>Upper</th> <th>Lower</th> <th>Nominal (psi)</th> <th>Minimum (psi)</th> </tr> </thead> <tbody> <tr> <td>PTSPA E</td> <td>30</td> <td>0</td> <td>30 1:1 TDR</td> <td>0.8 40:1 TDR</td> </tr> <tr> <td>PTSPA G</td> <td>450</td> <td>0</td> <td>450 1:1 TDR</td> <td>11 40:1 TDR</td> </tr> <tr> <td>PTSPA J</td> <td>5,800</td> <td>0</td> <td>5,800 1:1 TDR</td> <td>145 40:1 TDR</td> </tr> </tbody> </table>	Type	International System Units				Range Limits (kPa)		Span and Turndown Ratio (TDR)		Upper	Lower	Nominal (kPa)	Minimum (kPa)	PTSPA E	200	0	200 1:1 TDR	5 40:1 TDR	PTSPA G	3,000	0	3,000 1:1 TDR	75 40:1 TDR	PTSPA J	40,000	0	40,000 1:1 TDR	1,000 40:1 TDR	Type	American Units				Range Limits (psi)		Span and Turndown Ratio (TDR)		Upper	Lower	Nominal (psi)	Minimum (psi)	PTSPA E	30	0	30 1:1 TDR	0.8 40:1 TDR	PTSPA G	450	0	450 1:1 TDR	11 40:1 TDR	PTSPA J	5,800	0	5,800 1:1 TDR	145 40:1 TDR
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Pressure limits	<p>The minimum sustained absolute pressure is 3.4 kPa (0.5 psi). The maximum overpressure is listed in the following table.</p> <table border="1"> <thead> <tr> <th rowspan="2">Type</th> <th colspan="2">URL</th> <th colspan="2">Overpressure Limit</th> </tr> <tr> <th>(kPa)</th> <th>(psi)</th> <th>(kPa)</th> <th>(psi)</th> </tr> </thead> <tbody> <tr> <td>PTSPA E</td> <td>200</td> <td>30</td> <td>600</td> <td>87</td> </tr> <tr> <td>PTSPA G</td> <td>3,000</td> <td>450</td> <td>6,000</td> <td>870</td> </tr> <tr> <td>PTSPA J</td> <td>40,000</td> <td>5,800</td> <td>41,368</td> <td>6,000</td> </tr> </tbody> </table>	Type	URL		Overpressure Limit		(kPa)	(psi)	(kPa)	(psi)	PTSPA E	200	30	600	87	PTSPA G	3,000	450	6,000	870	PTSPA J	40,000	5,800	41,368	6,000																																
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Weight	1.3 kg (2.9 lbs) without options or accessories.																																																								

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Table 1-7. Options and Accessories

Item	Description
Type STT Smart Transmitter Terminal	Hand-held device for calibration, configuration, monitoring, and troubleshooting. Also communicates with HART devices.
EZ CAL option ¹	External nonintrusive device for zero and span validation. Add on kit no. 258562_1.
Liquid crystal display option ¹	Two-line, seven-character display for local output indication. Displays output in percent and user-defined secondary engineering units, input in primary engineering units, cell temperature, and transmitter ID tag. Mounts in four orientations for easy viewing. Refer to Table 1-3 for the temperature limitations. Add on kit no. 258550_1 (aluminum cover) or 258550_5 (stainless steel cover).
Analog meter option ¹	Provides local output indication for those applications where the transmitter operates outside the temperature limits of the LCD. Linear 0 to 100 and square root 0 to 10 graduations on same scale. Add on kit no. 258550_2 (aluminum cover) or 258550_6 (stainless steel cover).
Process adapter option ¹ (straight)	½ NPT male to female stainless steel 316 or Hastelloy C-276. Part no. 1951753_.
Process adapter (football style)	½ NPT stainless steel 316 for connection to flanged manifold. Part no. 1948994_1.
Mounting bracket option ¹	Universal support for mounting on panel or 1.5 in. to 2.0-in. pipe. Available in Zinc-plated, chromate-dipped carbon steel, or stainless steel 316.
Degreasing option ¹	For use in oxygen or chlorine service.
Gold plated Hastelloy C-276 diaphragm option ¹	For use in hydrogen service.
Tantalum diaphragm	For use with highly corrosive fluids.
Remote diaphragm seals	For use with high temperature and corrosive fluids or where impulse line clogging may be a problem.
Lightning arrestor option ¹	Mounts internally to suppress lightning induced transients. Tested to suppress 10 successive 8 by 20 µsec pulses with a peak value of 20 kA (reference IEEE C62.41).
Antistatic kit	Contains static-dissipative work surface (mat), ground cord assembly, wrist bands, and alligator clip for personnel working on devices containing semiconductor components. Kit no. 1948385_1.
Available drawings B8113038 D3055062 D3055064 D3055065	Board level wiring diagram. Dimension drawing for Type PTSP pressure transmitters. Dimension drawing for optional indicator. User field connections.

Table 1-7. Options and Accessories (continued)

Item	Description		
Configuration option ¹	The transmitters are delivered with a standard configuration. Custom configurations can be ordered by selecting that option in nomenclature position 15. The factory programmed configuration is listed below, as well as a column to aid in ordering custom configurations.		
	Parameter	Standard Configuration	Custom Configuration
	ID tag	PTS	
	Operating mode	Analog	
	Output function	Linear - normal acting	
	Damping	0.5 sec	
	Engineering units (EU)	in. H ₂ O/psi	
	Lower range value (LRV)	0.0	
	Upper range value (URV)	URL of transmitter	
	Initialize output	Low	
	Fail output	Low	
	Secondary EU	..MA	
	Secondary LRL	4.00	
	Secondary URL	20.00	
Cell temp. low alarm	-40°C		
Cell temp. high alarm	85°C		

NOTE:

1. These items are selected via nomenclature in Table 1-2.

SECTION 2 - DESCRIPTION AND OPERATION

INTRODUCTION

This section describes the Type PTSP Platinum Standard Smart Pressure Transmitter. It also includes information about special functions such as the function generator. Refer to Figure 2-1 for an illustration of the transmitter.

Type PTSP pressure transmitters measure absolute and gage pressures of corrosive or noncorrosive liquids, vapors, and gases. The transmitter can be configured to provide a polled digital process variable signal (digital field bus mode) or a four to 20-milliampere process variable signal (analog mode). Uses for the transmitter include process control applications in the electric, gas, water, chemical, petroleum, pulp and paper, and food industries.

FUNCTIONAL OPERATION

The Type PTSP pressure transmitter has two major sections: a cell and characterization board assembly, and an electronics assembly. The Type STT Smart Transmitter Terminal communicates with the Type PTSP pressure transmitter. The EZ CAL option provides a way to validate the zero and span of the transmitter without using the Type STT terminal.

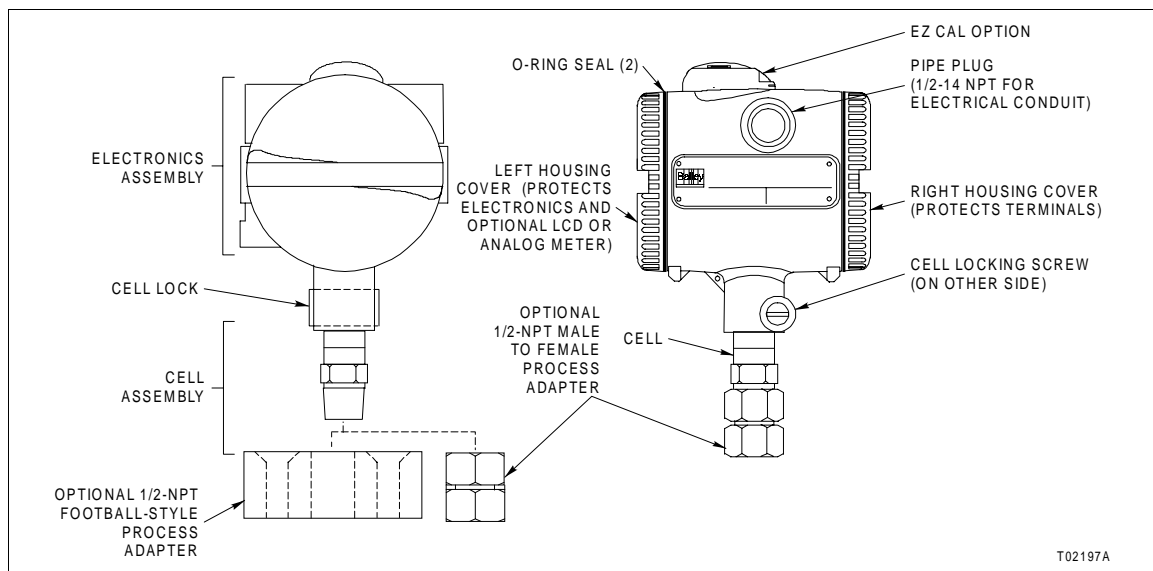


Figure 2-1. Type PTSP Transmitter

Cell and Characterization Board Assembly

Type PTSP pressure transmitters use an electrically isolated piezo-resistive monocrystal silicon chip as the sensing device. A Wheatstone bridge is implanted on the silicon chip in the deflecting areas of the sensor.

The pressure transfers through the fill fluid (silicone oil or fluorinated oil) that is between the isolating diaphragm and the silicon chip (Fig. 2-2). The resistance of the bridge varies as a function of the pressure. A regulated current, applied to the bridge, results in an unbalanced voltage across the bridge. This voltage is proportional to the applied pressure.

The cell and characterization board are a matched set and may not be separated. For more information on the characterization board, refer to **Electronics Assembly**.

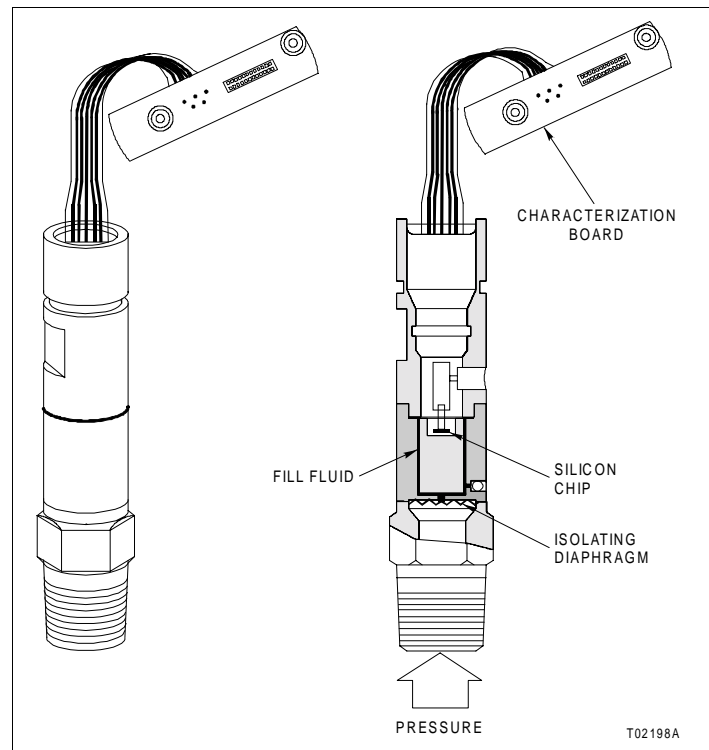


Figure 2-2. Cell and Characterization Board Assembly

Electronics Assembly

Figure 2-3 shows the Type PTSP pressure transmitter electronics in block diagram form. All calibration, configuration, and compensation data are stored in both the main and characterization boards. The output of the cell goes into a custom analog to digital converter on the LSI smart chip via the characterization board. The microcontroller requests the digital outputs of the custom analog to digital converter. It uses these

digital outputs and the memory stored on the characterization board to calculate an output for the transmitter. This output is then available as a four to 20-milliamper output or a polled digital process variable signal.

The transmitters include a lockout jumper that when activated, prevents any alterations to the calibration or configuration (Fig. 5-1).

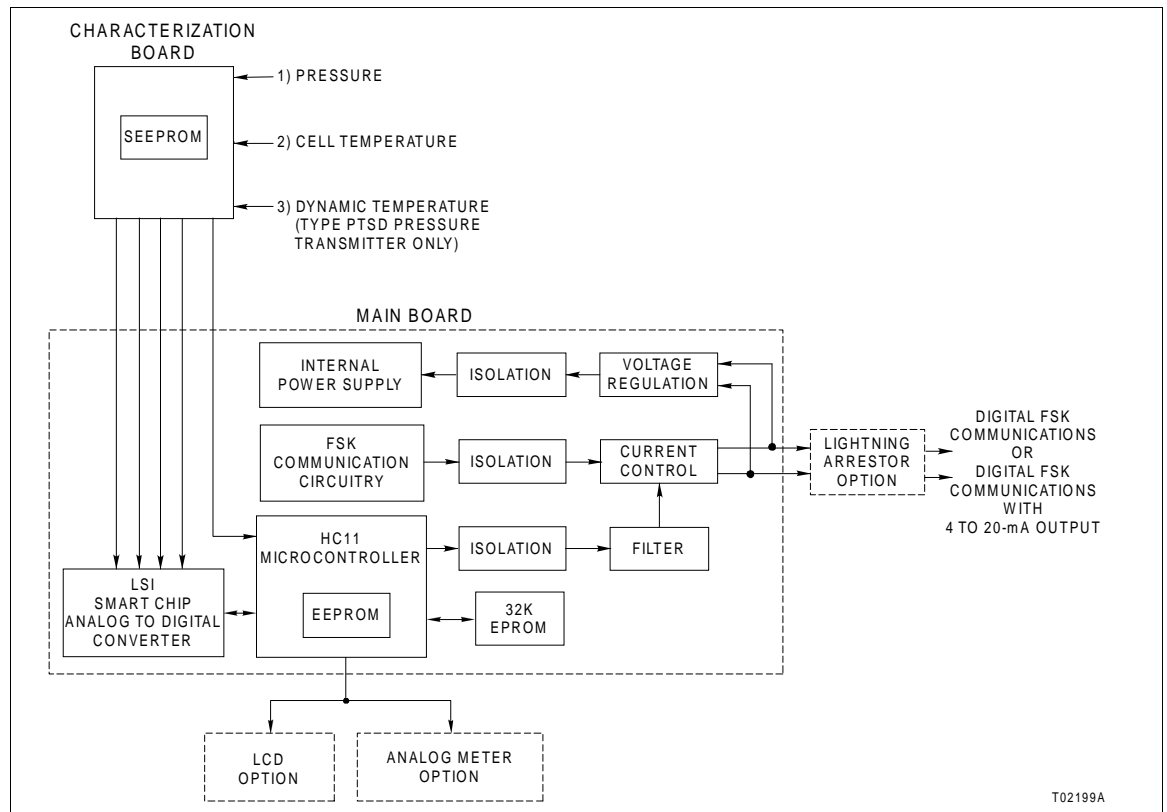


Figure 2-3. Electronics Block Diagram

EZ CAL Option

NOTE: The EZ CAL option is for zero and span validation only. Do not use it to change the calibrated span of the transmitter. The EZ CAL option provides no means to indicate if an error is made.

After mounting the EZ CAL option, one of two magnetically coupled components responds to the moving of a magnet in the EZ CAL option. When validating the zero, adjust the input pressure to the configured zero value and turn and hold the adjustment screw on the EZ CAL option in the zero direction for at least three seconds. This causes the electronics to automatically adjust the output to zero percent. To validate the span, set the input pressure to the configured span value, depress the span lock and turn and hold the adjustment screw on the EZ CAL option in the span direction for at least three

seconds. This causes the electronics to automatically adjust the output to 100 percent. Span or zero or both may be adjusted.

Communications

A high frequency AC voltage signal imposed on the signal wires, known as FSK (frequency shift keying), allows communications between the Type PTSP pressure transmitter and the Type STT terminal. The location of the Type PTSP pressure transmitter may be up to 1.6 kilometers (1.0 mile) from the Type STT terminal. The FSK method provides excellent noise immunity for remote communications. A minimum of 250-ohms loop resistance is necessary to support communications (Fig. 2-4). This is true whether the transmitter is configured in the analog (four to 20 milliamperes) point-to-point mode or the digital field bus mode. The Type STT terminal connects to the target transmitter anywhere there is access to the signal leads of the transmitter (for point-to-point wiring, the Type STT terminal must be connected between the device and the 250-ohm resistance). The clip leads connect across the signal leads independent of signal direction or polarity. Since the communication signal, a high frequency AC, has a zero DC average, it has no effect on the output. Two different frequency levels transmit a logic zero or a logic one.

Configuring the transmitter in the digital mode (refer to [Section 5](#)) causes the microcontroller to set the output of the transmitter to less than four milliamperes for low power consumption. The transmitter then provides a digital process variable signal. The transmitter reports its output (in percent) up to ten times per second for control purposes (Fig. 2-5).

NOTE: Refer to the *Field Bus I/O Module (IMFBS01) Instruction* for wiring practices and output update times.

The FSK communication technique makes it possible to communicate in the presence of electrical noise. Figure 2-6 shows how the ability to communicate varies with the amplitude and frequency of the noise. This graph represents a typical installation and applies only when one noise frequency is present. The graph indicates that the FSK communication technique tolerates up to two volts of noise amplitude at 60 hertz. This tolerance decreases as the noise frequency approaches the FSK communication frequencies of 19.0 kilohertz and 30.5 kilohertz.

Temperature Compensation

The transmitter electronics monitor the temperature of the cell assembly. This is accomplished by monitoring the resistance of one of the legs of the Wheatstone bridge within the cell. This technique provides a true cell temperature measurement, and

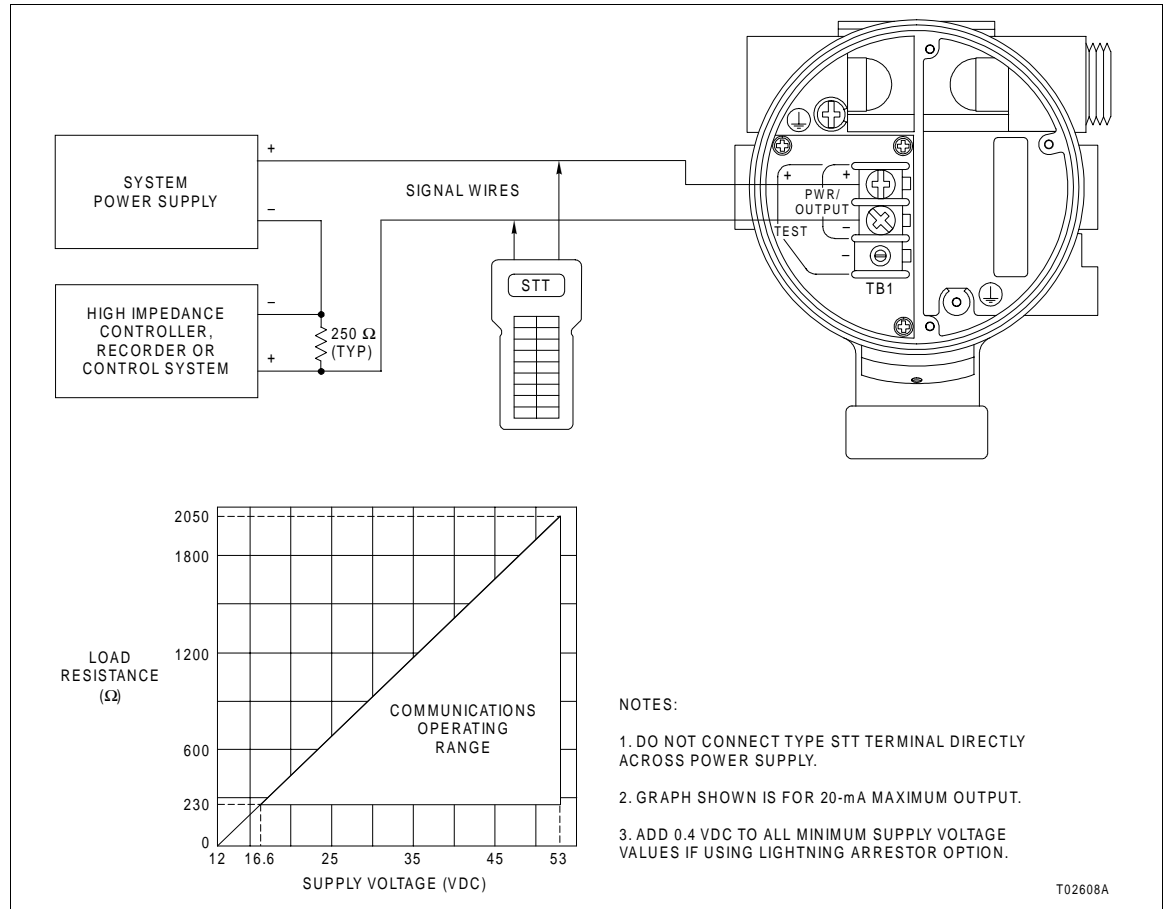


Figure 2-4. Analog Point-to-Point Wiring

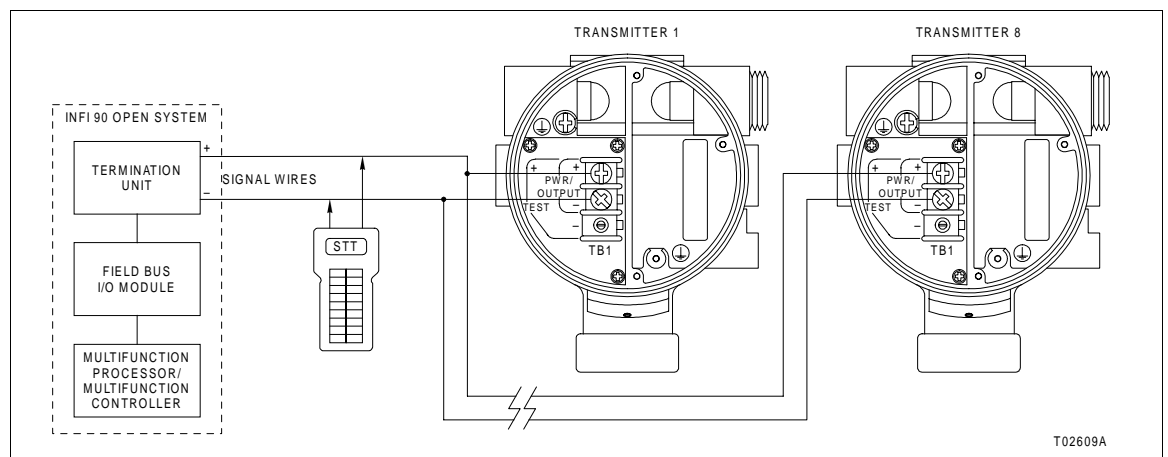


Figure 2-5. Digital Field Bus Wiring

the transmitter uses it to calculate an advanced correction for the cell output based on the programmed cell temperature characteristics. The transmitter also compensates the four to 20-milliamper output for temperature changes within the

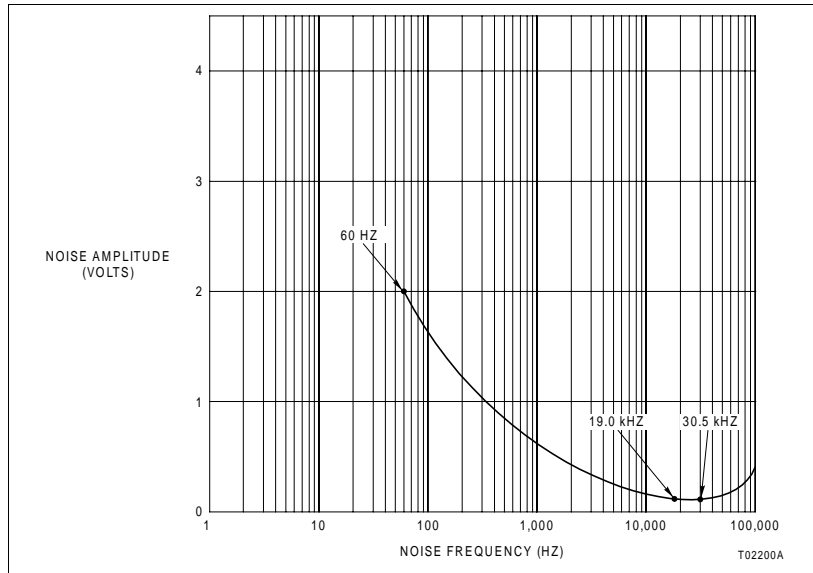


Figure 2-6. Communication Noise Rejection

electronics housing. The cell temperature can be monitored on the Type STT terminal.

Diagnostics

Continuous self-diagnostics are accessible on demand through the Type STT terminal. Areas monitored include: cell; cell temperature; electronics temperature; calibration; configured pressure limits; input circuits; analog to digital converter; microcontroller ROM, SEEPROM, EEPROM; and reference voltages. Diagnostics identify the malfunctioning section of the transmitter. The diagnostics may indicate if a calibration error occurs.

Software Functions

Configuration and operational commands allow the input of an ID tag for the transmitter configuration, selection of engineering units (primary and secondary), and definition of the output. The output can be a linear representation of the input or a function generator that follows a curve consisting of six straight line segments. The output can be set for normal or reverse acting and fixed to a specific value for plant startup and troubleshooting purposes. Other commands allow the output to be set to default values upon transmitter power up and failure. The Type STT terminal also supports configuration, input, output, and transmitter status monitoring. A damping command is also available.

Function Generator

The function generator is a curve consisting of six straight line segments programmed into the transmitter via the Type STT terminal. This makes it possible to program the output to follow the input in a way that is specific to a certain application.

The first and last points of the curve (P0 and P6) are predefined at zero-percent input and output, and 100-percent input and output respectively. The other five points (P1, P2, P3, P4, and P5) are user defined. Refer to [Section 5](#) and the **Type STT Smart Transmitter Terminal Instruction** for more information on the function generator.

Figure 2-7 shows a function generator used to control the output of a transmitter. This transmitter is connected to a tank with a varying shape. The function generator makes it possible to approximate the changes in shape of the tank, and thus to track the volume of the liquid in the tank.

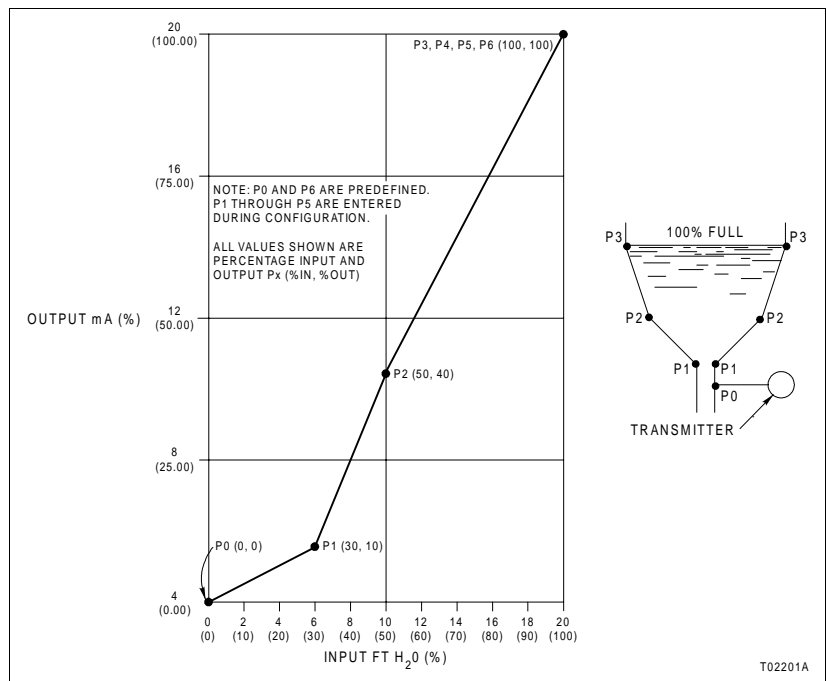


Figure 2-7. Function Generator Example

SECTION 3 - INSTALLATION

INTRODUCTION

This section aids in all levels of the installation process. The goal is to provide clear procedures for placing the transmitter into service.

NOTE: Refer to *Installing a 4 to 20 mA Transmitter in a Hazardous Location* and ANSI/ISA RP12.6, *Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations* when applicable.

UNPACKING AND INSPECTION

1. Check for any obvious damage to the carton or its contents. If damage is evident, notify the carrier and a sales representative.
2. Remove any loose packing from the carton.
3. Carefully remove the transmitter from the carton.
4. Inspect the nameplate to verify the unit received matches the desired function.
5. If the transmitter is to be stored prior to installation, pack it in the original container, if possible. Store in an area free from corrosive vapors and extremes in temperature and humidity. Install the covers and seal all wiring inlets.

NOTE: Storage temperatures must not exceed the limits listed in Table 1-3.

LOCATION CONSIDERATIONS

Because of process and economic considerations, pressure transmitters must often be installed in harsh environments. The transmitter should, however, be located so as to minimize the effects of temperature gradients and fluctuations, and to avoid shock and vibration.

When mounting the unit, be sure to leave ample clearance to open the cover of the electronics (Fig. 3-1). Wire the transmitter with twisted, shielded pairs for best results. Avoid sources of RFI (radio frequency interference).

SETUP AND PHYSICAL INSTALLATION

The quality of the measurement depends on the correct installation of the transmitter. This includes the orientation, pipe

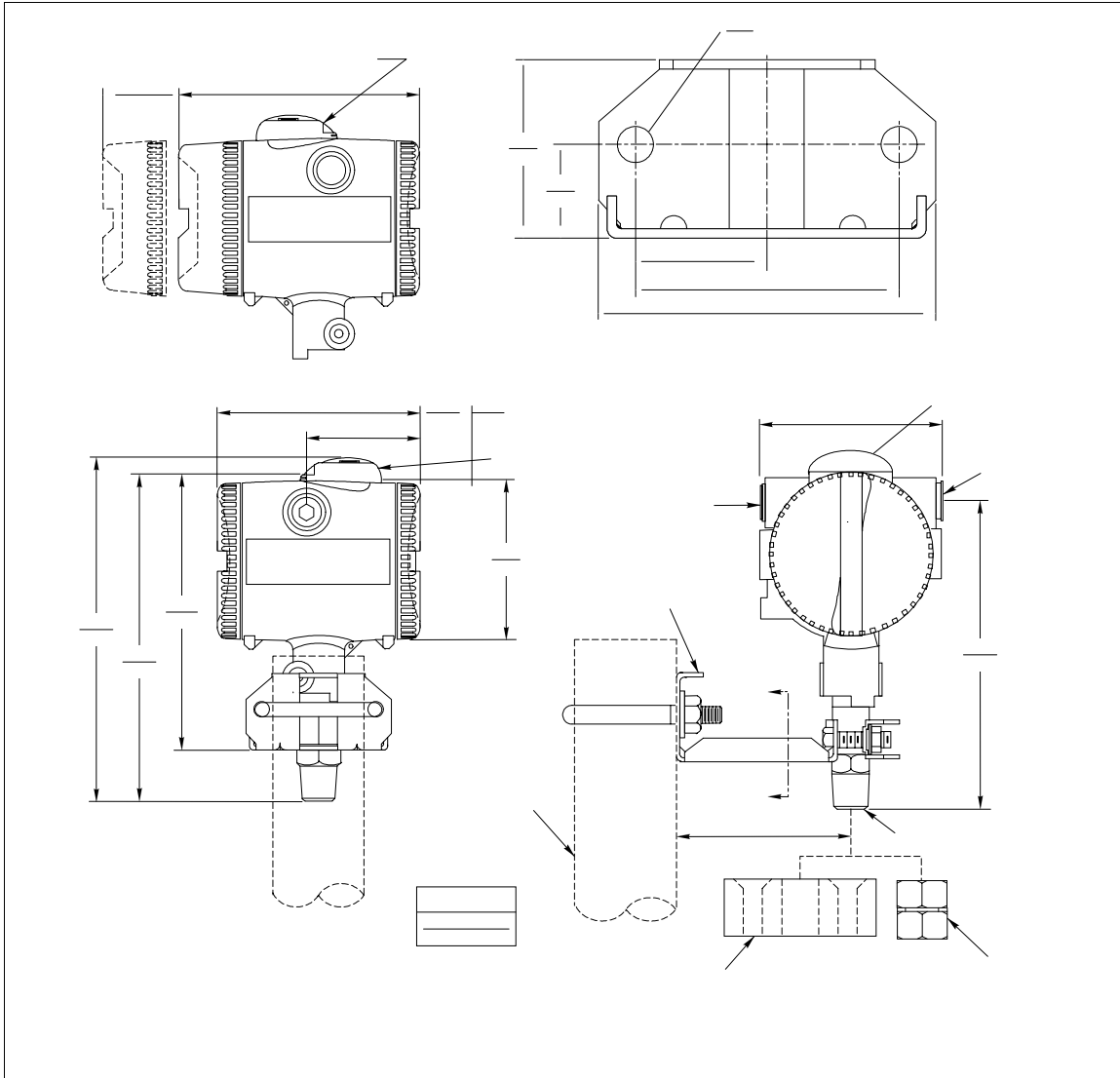


Figure 3-1. External and Mounting Dimensions

connections, and wiring. Refer to the **Instrument Connecting Piping** instruction and **ASME/ANSI Code for Pressure Piping** (ANSI B31.1) when applicable.

Mounting

Since the transmitter weighs only 1.3 kilograms (2.9 pounds), and the end of the measuring cell is 1/2-NPT male threaded, direct connection to the process is possible. Figure 3-1 shows the external and mounting dimensions. There is an optional 1/2-NPT female process adapter available when required. Refer to Tables 1-2 and 1-7 for more information on the process adapter.

If needed, there is a universal support to mount the transmitter to a panel or 1.5 to 2.0-inch pipe. Refer to Tables 1-2 and

1-7 for more information on the mounting bracket. Figure 3-1 also shows this mounting scheme.

ELECTRONICS HOUSING ORIENTATION

CAUTION

<p>Do not remove the cell lock and rotate the electronics housing about the cell. Doing so can damage the cell cable and will void the warranty.</p>

The electronics housing is not designed to rotate about the cell. The cell lock has a flat on it that matches with a flat on the cell. Do not remove the cell lock unless performing the repair and replacement procedures in [Section 8](#).

Make orientation adjustments to the electronics housing by using the process connection or the process adapters.

INDICATOR ORIENTATION

The transmitter is shipped with the indicator in the upright (zero-degree) position. If desired, rotate the indicator 270 degrees in increments of 90 degrees.

1. Remove the left housing cover from the electronics housing (Fig. 2-1).
2. Remove the four screws that secure the indicator to the amplifier assembly (Fig. 8-1).
3. Gently pull on the indicator to unplug it from the amplifier assembly.
4. Align the connector on the back of the indicator with one of the four meter openings in the amplifier assembly (Fig. 8-1). The alignment of the connector depends on the desired viewing orientation. Gently press the indicator down to seat the mating connectors.
5. Install the four screws that secure the indicator to the amplifier assembly.
6. Coat the threads of the housing cover with a light coating of DRI-GLIDE graphite sealant (Man-Gill Chemical Corporation).
7. Replace the left housing cover.

EZ CAL OPTION

1. The transmitter is delivered with a logo nameplate in place of the EZ CAL option. Lift up on the logo nameplate to snap its tab out of the EZ CAL option mounting hole.
2. Position the EZ CAL option on the top of the transmitter as shown in Figure 3-1 and install the mounting screw.

Piping**WARNING**

Consider the corrosive properties of the measured substance when selecting piping materials. Degradation of the piping can upset the process. Some process upsets can injure personnel and damage equipment.

Piping should be in accordance with ANSI Code B31.1 for pressure piping.

WARNING

When pressurizing, avoid overloading and pressure hammer. Refer to the introduction section for the pressure limits of the cell. Exceeding this pressure could result in damage to the cell and cause serious injury to personnel.

The nameplate indicates the maximum allowable pressure. Do not exceed this value when pressurizing the cell.

The piping between the primary element and the transmitter must transfer the process pressure at the pipe taps to the transmitter. Possible sources of error in this pressure transfer are:

- Leaks.
- Friction loss, if continuous purging is used.
- Trapped gas in a liquid line.
- Trapped condensates in a gas line.

Figures 3-2, 3-3, and 3-4 show several installation examples. These are typical piping arrangements only. They are intended as generalized guides, and may not necessarily reflect the exact configuration required for the particular service.

Wiring

There are two possible wiring configurations for the Type PTSP pressure transmitter.

NOTE: Never connect the loop wiring to the test terminals.

ANALOG MODE

In the analog mode of operation, the electrical connections are made in the typical two-wire, four to 20-milliamper configuration as shown in Figure 2-4. There is a + (positive) and - (negative) terminal provided at the transmitter to identify the signal leads (Fig. 2-4).

NOTE: Insure that the temperature rating of the wire is suitable for the environment.

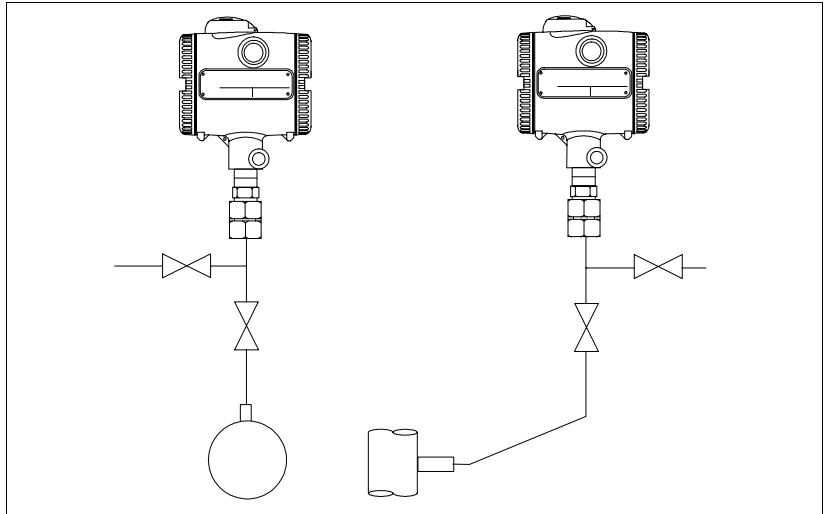


Figure 3-2. Gas Pressure Installation

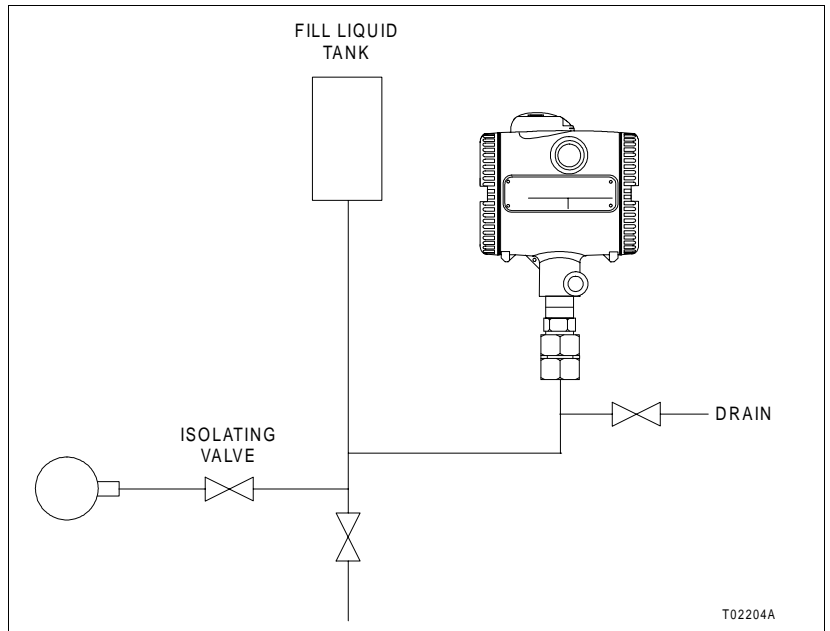


Figure 3-3. Vapor Pressure Installation

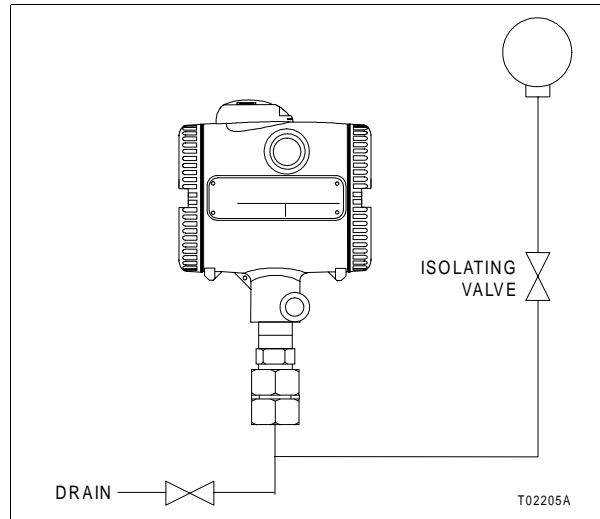


Figure 3-4. Liquid Pressure Installation

The signal terminals located in the electronics housing accept wire sizes up to 14 AWG. The signal wiring supplies all power to the transmitter. The power supply limits are 12 to 53 VDC (12 to 42 VDC for certified applications) across the transmitter inputs. Refer to Figure 2-4 for the load resistance limits, or use the equation:

$$R_{max} = \frac{V - 12.00}{0.02}$$

NOTES:

1. The equation for load resistance is based on a maximum output of 20 milliamperes with the - (negative) TEST terminal jumper screw tightened. In some cases (initialize high, fail high, overpressure conditions, etc.) the output may be higher. If this value is known, it can be used in the denominator of the equation instead of 0.02.
2. If the - (negative) TEST terminal jumper screw is loosened ½-turn, the minimum supply voltage is 12.7 VDC.
3. If using the optional lightning arrester, add 0.4 VDC to all minimum supply voltage values.

The power supply and load resistance are variable over the entire operating region shown in Figure 2-4.

The TEST terminals have the same four to 20-milliamperes signal as the PWR/OUTPUT terminals. Loosen the - (negative) TEST terminal jumper screw ½-turn for calibration or testing.

Signal wiring should be shielded. Use twisted pairs for best results. Connect the shield at the ground terminal inside the electronics housing (Fig. 2-4) or at the receiver.

NOTE: Connect the shield at one end only. Connecting the shield at both ends may result in a ground loop condition.

DIGITAL MODE

In the digital mode of operation there is no four to 20-milliampere signal. The transmitter draws less than four milliamperes to maintain operation (Fig. 2-5).

NOTE: Refer to the *Field Bus I/O Module (IMFBS01) Instruction* for wiring practices and output update times.

In the digital mode, the process variable signal of each transmitter is a digitally polled variable. The field bus module sequentially polls each transmitter output on the bus. Each transmitter on the bus has its own unique address that is assigned during configuration. Refer to **Channel Number** in Section 5 for information on configuring the transmitter address. The address allows the field bus module to distinguish between transmitters on the loop.

Each transmitter present on the bus is wired from the control system to the + (positive) and - (negative) terminals of the transmitter. Connect all transmitters on the bus in parallel.

The minimum power supply voltage required for the loop is determined by:

$$\begin{aligned} \text{minimum supply voltage} = \\ 12 \text{ volts} + (0.004 \times \text{no. of transmitters on bus} \times \text{load resistance}) \end{aligned}$$

The load resistance must include the system input resistance and the resistance of the wire. No meters or measuring devices are to be included in the field bus loop since the transmitters are not delivering an analog process variable. Power supply regulation is not critical as long as the voltage remains above the minimum calculated value.

The Type STT terminal can be connected anywhere there is access to the signal leads. Since the Type STT terminal also has its own bus address, it can be connected to the bus while the system is online. Only one Type STT terminal can be connected to the bus at any one time. While the field bus I/O module is online, the Type STT terminal can monitor any transmitter on the bus.

In order to change any calibration or configuration parameters of transmitters using the Type STT terminal, the field bus I/O module must be instructed to bring the desired transmitter offline.

Signal wiring should not be run in conduit or open trays with wiring used to power other devices and should not be run near heavy electrical equipment. Twisted shielded pairs are recommended for best results. Reverse polarity protection is built into the transmitter to protect it against accidental reversal of the field wiring connections.

GROUNDING

Signal wiring may be either ungrounded (floating) or grounded at any one point in the signal loop. If more than one transmitter is connected to a single power supply, grounding should be at the supply. The transmitter housing must also be grounded. A ground terminal is provided inside the electronics housing (Figs. 2-4 and 2-5).

SELECTING DEFAULTS

The configuration of process control equipment within a particular system dictates the response to the controlled process of that system. Configuration may include such items as cross-limits, interlocks and alarms dealing with bad quality, and safety control equipment. Modern electronic process control equipment based on semiconductor technology is highly reliable and can be expected to provide long trouble-free service. However, component failures that disrupt process control are still possible. In addition, power line induced failures, failures caused by human error, static discharge, conducted and radiated EMI, acts of nature such as lightning strikes, and accidents can cause disruption of process control.

Refer to **Section 5** to select defaults for failure conditions.

HAZARDOUS LOCATION INSTALLATIONS (FLAMMABLE ATMOSPHERES)

The Type PTSP Platinum Standard Smart Pressure Transmitter must not be located in a hazardous (classified) location unless factory marked as suitable for that location. This equipment must be installed and operated according to ***Installing a 4 to 20 mA Transmitter in a Hazardous Location***.

SECTION 4 - CALIBRATION

INTRODUCTION

WARNING

Explosionproof/dust-ignitionproof installations and intrinsically safe installations in Class II or Class III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be nonhazardous at the time.

This section identifies the calibration status of the unit and provides the calibration check procedures. Calibration and validation procedures using both the Type STT terminal and the EZ CAL option appear here.

CALIBRATION PROCEDURES

If the standard configuration is ordered, the Type PTSP pressure transmitter will be set close to a zero based full scale span. A custom calibration can be factory supplied or implemented in the field.

The Type PTSP pressure transmitter operates in either the analog mode or the digital mode. Calibration procedures differ depending on the selected mode of operation.

The **analog** mode of operation allows both a complete bench calibration and a D/A adjustment. The D/A adjustment compensates for slight inaccuracies in the four to 20-milliamper current loop (or in receiving devices such as recorders). Use this procedure only when the system has first been installed or if something in the four to 20-milliamper current loop has changed. The **digital** mode of operation allows only a bench calibration.

NOTE: This section is meant as a generalized guide and does not go through the step-by-step procedures required of the Type STT terminal. Although the menus that appear on the Type STT terminal display are easy to follow, consult the **Type STT Smart Transmitter Terminal Instruction** while performing these procedures.

Equipment Required for Calibration

- DC power supply, 24, ± 1 VDC (recommended).
- Digital multimeter (DMM) - 4- $\frac{1}{2}$ digit display minimum with an accuracy at least four times greater than that of the transmitter (Tables 1-5 and 1-6).
- 250-ohm (± 0.01 -percent) resistor, $\frac{1}{2}$ -watt minimum.

- Pressure source with an accuracy at least four times greater than that of the transmitter (Tables 1-5 and 1-6).
- Type STT Smart Transmitter Terminal.

Analog Mode Calibration

Use these procedures for validation of transmitter calibration before installation, after an inadvertent overpressure condition, or after the replacement of components. If the checkout indicates an incorrect calibration, continue with the procedure to calibrate the transmitter.

BENCH CALIBRATION

1. Mount and connect the transmitter in a calibration setup such as the one shown in Figure 4-1.

NOTE: Turn the - (negative) test terminal jumper screw ½-turn counterclockwise.

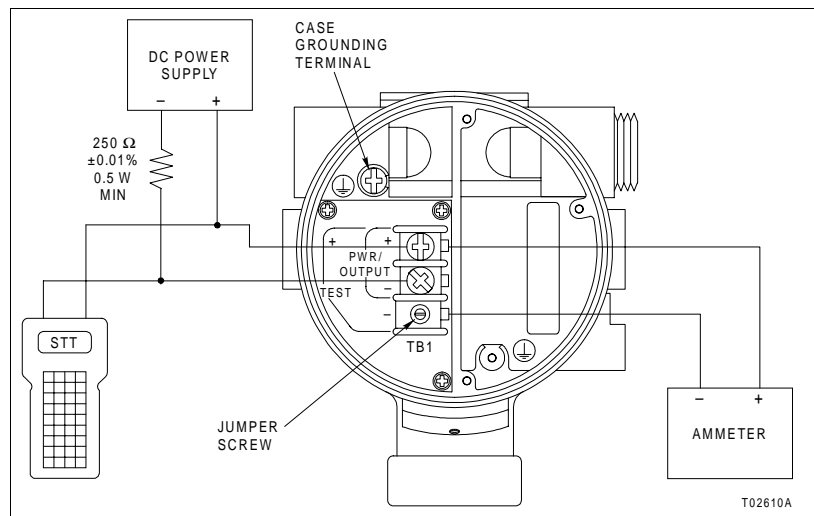


Figure 4-1. Calibration Setup (Typical)

2. Orient the transmitter in the same position as the final installation.
3. Allow the transmitter to stabilize for 15 minutes after power up.
4. Connect the pressure source to the cell.
5. Apply a pressure to the cell equal to the configured or desired lower range value.
6. The milliammeter should read 4.000 mA plus or minus the tolerance for the particular transmitter listed in Table 4-1.

7. Apply a pressure to the cell equal to the configured or desired upper range value.
8. The milliammeter should read 20.000 mA plus or minus the tolerance for the particular transmitter listed in Table 4-1.
9. If the output is not within the limits specified in Steps 6 and 8, calibrate the unit. To do so, press the CALIBRATE key on the Type STT terminal and follow the procedure in the **Type STT Smart Transmitter Terminal Instruction**.
10. Turn the - (negative) test terminal jumper screw clockwise until tight.

Table 4-1. Analog Mode Calibration Tolerances

Type	Tolerance	
	mA	VDC (across precision resistor)
PTSPAG	0.016	0.004
PTSPAJ		
PTSPGG		
PTSPGJ		
PTSPAЕ	0.032	0.008
PTSPGF		

D/A ADJUSTMENT (FINE TUNING THE ANALOG LOOP)

This procedure does not require removal of the covers from the electronics housing. Compensation for slight inaccuracies in the four to 20-milliamperе current loop (or in receiving devices such as recorders) is accomplished by accessing the calibration menu on the Type STT terminal while it is connected to the target Type PTSP pressure transmitter. This procedure does not adjust the zero or span of the transmitter and only applies when first installing the system or if something in the four to 20-milliamperе current loop has changed. To adjust the zero of the transmitter, refer to **REZERO PROCEDURE**.

Either connect the DMM, set to measure DC milliamperes, in series with the four to 20-milliamperе current loop, or make a parallel connection across the precision 250-ohm resistor shown in Figure 2-4, with the DMM set to measure VDC. With the latter setup, the four to 20-milliamperе output corresponds to one to five VDC.

NOTES:

1. These notes only apply when measuring VDC across the 250-ohm resistor shown in Figure 2-4.

2. The loop resistor must have a tolerance of 0.01 percent or better in order for this procedure to be valid.
3. If a resistor value other than a 250 ohms is used, the voltage output will be different according to Ohms law:

$$(V = I \times R)$$

4. Throughout this procedure, the voltage values, based on a 250-ohm resistor, will be shown in parentheses following the milliamperes values.

1. Press the CALIBRATE key on the Type STT terminal.
2. Use the up arrow and down arrow keys to scroll through the menu and select *D-A ADJUSTMENT*.
3. Press the ENTER key.
4. The instruction, *ADJUST TO 4 mA THEN HIT ENTER* appears on the display. Use the up arrow and down arrow keys to adjust the output to 4.000 mA (1.000 VDC) plus or minus the tolerance for the particular transmitter listed in Table 4-1. If using a receiving device (e.g. recorder), adjust for a zero-percent indication.
5. Press the ENTER key.
6. The message, *ADJUST TO 20 mA THEN HIT ENTER* appears on the display. Use the up arrow and down arrow keys to adjust the output to 20.000 mA (5.000 VDC) plus or minus the tolerance for the particular transmitter listed in Table 4-1. If using a receiving device, adjust for a 100-percent indication.
7. Press the ENTER key.

Digital Mode Calibration

1. Mount and connect the transmitter in a calibration setup such as the one shown in Figure 4-1.

NOTE: Turn the - (negative) test terminal jumper screw ½-turn counterclockwise.

2. Orient the transmitter in the same position as the final installation.
3. Connect the pressure source to the cell.
4. Apply a pressure to the cell equal to the configured or desired lower range value.
5. Since the transmitter configuration is for digital operation, the milliammeter should read below four milliamperes.

6. Press the OUTPUT key on the Type STT terminal, then select *MONITOR OUTPUT*.
7. The Type STT terminal should display 0.00% plus or minus the tolerance for the particular transmitter listed in Table 4-2.

Table 4-2. Digital Mode Calibration Tolerances

Type	Tolerance (%)
PTSPAG	0.10
PTSPAJ	
PTSPGG	
PTSPGJ	
PTSPAE	0.20
PTSPGF	

8. Apply a pressure to the cell equal to the configured or desired upper range value.
9. Since the transmitter is configured for digital operation, the milliammeter should read below four milliamperes.

NOTE: If the four to 20-milliamper output changes with respect to pressure, then the unit is not in the digital mode. To enter this mode, press the CONFIGURE key on the Type STT terminal and follow the step-by-step procedures in the *Type STT Smart Transmitter Terminal Instruction*. Use the SEND CONFIG key to download the new configuration to the transmitter (refer to Section 5).

10. Press the OUTPUT key on the Type STT terminal and select *MONITOR OUTPUT*.
11. The Type STT terminal should display 100.00% ($\pm 0.15\%$).
12. If the digital output is not within the limits stated in Steps 7 and 11, calibrate the transmitter. To do so, press the CALIBRATE key on the Type STT terminal and follow the procedures in the *Type STT Smart Transmitter Terminal Instruction*.
13. Turn the - (negative) test terminal jumper screw clockwise until tight.

RERANGING THE ANALOG OUTPUT

By pressing the RERANGE key on the Type STT terminal, the current (four to 20-milliamper) output can be quickly reranged to represent a different portion of the input span. This procedure bypasses the need to completely configure the Type PTSP pressure transmitter. Damping, engineering units,

and the temperature alarm can also be adjusted during rerange.

NOTE: The transmitter output is based on the values entered in this procedure. The terminal will not reject invalid ranges; therefore, it is imperative that the operator know the range limits specified for the transmitter. Refer to Table 1-2 for the proper ranges.

REZERO PROCEDURE

This procedure zeroes the transmitter only and does not compensate for slight inaccuracies in the four to 20-milliamperere current loop. To adjust for these inaccuracies, refer to **D/A ADJUSTMENT (FINE TUNING THE ANALOG LOOP)**.

By pressing the REZERO key on the Type STT terminal, the transmitter can be zeroed without performing a complete bench calibration. There is no effect on the span of the transmitter.

VERIFYING CALIBRATION WITH THE EZ CAL OPTION

NOTE: The EZ CAL option is for zero and span validation only. Do not use it to make large adjustments to the zero or span of the transmitter. The EZ CAL option provides no means to indicate if an error is made.

1. If not installed, refer to the **Section 3** for installation procedures.
2. Open the dust cover on the EZ CAL option.
3. Connect the pressure source to the cell.
4. Apply a pressure to the cell equal to the configured lower range value.
5. Turn and hold the adjustment screw on the EZ CAL option in the zero direction (indicated on the EZ CAL option) for at least three seconds. The transmitter automatically adjusts the output to zero percent.
6. Apply a pressure to the cell equal to the configured upper range value.
7. Depress the span lock and turn and hold the adjustment screw on the EZ CAL option in the span direction (indicated on the EZ CAL option) for at least three seconds. The transmitter automatically adjusts the output to 100 percent.

SECTION 5 - OPERATING PROCEDURES

INTRODUCTION

This section addresses start-up procedures, configuration, and monitoring of the Type PTSP Platinum Standard Smart Pressure Transmitter and the procedures that make it operational.

OPERATOR INTERFACE

The Type PTSP pressure transmitter can be monitored and controlled using the Type STT terminal. Connect the Type STT terminal across the signal wires in a parallel connection (Figs. 2-4 and 2-5) wherever there is convenient access. (For point-to-point wiring, the Type STT terminal must be connected between the transmitter and the 250-ohm resistor.) Refer to the ***Type STT Smart Transmitter Terminal Instruction*** for detailed information and data entry procedures.

NOTE: All of the menu items that appear on the Type STT terminal may not apply to the Type PTSP pressure transmitter.

CONFIGURATION PROCEDURE

Configuration of the transmitter includes defining an identification tag, primary lower and upper range values, digital or analog mode of operation, primary engineering units, secondary engineering units and secondary lower and upper range values, output parameters, cell temperature alarm limits, and a damping constant. Use the CONFIGURE key and follow the step-by-step procedures in the ***Type STT Smart Transmitter Terminal Instruction***. Once a configuration has been saved in the Type STT terminal, download it to a connected transmitter using the SEND CONFIG key. The remainder of this section explains the configuration parameters.

ID Tag

The transmitter ID tag is a 14-character alphanumeric tag that can be programmed into the transmitter. It is different than the transmitter address. The ID tag is entered during configuration for identification purposes. To display the ID tag on the terminal screen, press the STATUS key.

Select Mode

Select either the analog mode or the digital mode. If the digital mode is selected, the transmitter does not output a four to 20-milliampere signal in proportion to the input. The output

will be locked below four milliamperes. If the analog mode is specified instead, the transmitter will provide a four to 20-milliamperes output signal.

Although there are no harmful effects to the transmitter or the loop, do not connect a transmitter configured for the analog mode to a field bus. The field bus will not support analog output devices.

Channel Number

The transmitter address (displayed as *CHANNEL #* on the Type STT terminal display) is used for field bus transmitters. Each transmitter on the field bus must have a separate address. The address range is one through 15.

Transmitter Type

This menu displays types of Bailey-Fischer & Porter smart transmitters. Choose the *PTS* selection by using the up arrow and down arrow keys and then pressing the ENTER key.

Output Type

The output of the transmitter must be specified as linear with respect to the input. Also, the output can be specified as the volume of a spherical or flat ended horizontal tank, or as a function generator that follows a six-segment linear function. If a function generator is chosen, five input and output points must also be specified as a percent of input. Note that the first and the last point on the curve are assumed to be zero and 100 percent respectively. Program five other points between these two values (refer to **Function Generator** in Section 2).

Output Action

A transmitter in the normal-acting mode has an output that increases with increasing input. The output of a transmitter in the reverse acting mode decreases with increasing input.

Damping Adjustment

Damping adjustments have no effect on the calibration or accuracy of the transmitter; however, damping can be used to smooth out a fluctuating process signal. Damping is adjustable and provides single (1τ) time constant values from 0.00 to 32.00 seconds. A damping adjustment of 32.00 seconds would be used for a very noisy signal and a damping adjustment of 0.00 seconds would be used for an extremely quiet signal.

Primary Engineering Units

Primary engineering units are programmable. The selections appearing on the Type STT terminal display are:

- *iH2O* — inches of water.
- *mmHG* — millimeters of mercury.
- *cmH2O* — centimeters of water.
- *PSI* — pounds per square inch.
- *MPA* — megapascals.
- *kPA* — kilopascals.
- *BARS* — bars.
- *mBARS* — millibars.
- *Kgcm2* — kilograms per square centimeter.

Primary Upper and Lower Range Values

The range of the transmitter may be set electronically to any value from zero to 100 percent (-100 kPa (-14 psi) to 100 percent for Type PTSPGF pressure transmitters) of the upper range limit to suit a specific application, provided the values are acceptable to the transmitter (refer to Table 1-2 for the nominal and minimum ranges of the transmitters).

Startup and Failure Conditions

WARNING

The outputs of smart devices change to a fixed value during initialization and detected failure conditions. These values must be selected by the user to ensure safe operation.

On power up, there is a four-second initialization period during which the output of the transmitter is in transition from nonpowered (no current output) and an output of either above 100 percent or below zero percent as defined during configuration.

If in the analog mode, *INITIALIZE LOW* sets the output to below zero percent (approximately 3.7 milliamperes) while *INITIALIZE HIGH* sets the output to above 100 percent (approximately 22 milliamperes).

If in the digital mode, *INITIALIZE LOW* sets the output to below zero percent (approximately 3.7 milliamperes) while *INITIALIZE HIGH* sets the output to above 100 percent. However, the current stays at approximately 3.7 milliamperes. The default initialization value is low (below zero percent). After initialization, the output ramps up or down to the correct value.

If during its continual diagnostics the microcomputer detects an error that is fatal to the transmitter or system, the transmitter output goes to a predetermined fail level. This level

must be selected during configuration. The default value is low (below zero percent). Table 6-1 shows what types of errors cause the transmitter to enter the fail mode.

NOTE: For a transmitter in the normal acting mode, output corresponding to zero-percent input would be four milliamperes and output corresponding to 100-percent input would be 20 milliamperes. For a transmitter in the reverse acting mode, output corresponding to zero-percent input would be 20 milliamperes and output corresponding to 100-percent input would be four milliamperes.

Secondary Engineering Units

Secondary engineering units are programmable. These units are in a free form format of seven characters. Program any seven characters into the transmitter, such as *MA* or *GAL/HR*. These units are used in conjunction with the secondary lower and upper range numeric values.

Use the up arrow and down arrow keys or the decimal number keys to select the secondary units.

NOTE: The secondary engineering units are left justified when displayed on the local LCD. If desired, enter dummy characters to center or right justify the display.

Secondary Lower and Upper Range Values

The secondary lower and upper range values of the transmitter can be set to any range within ± 99999 . These ranges can be monitored by the Type STT terminal or displayed on the optional LCD of the transmitter. The ranges are a function of the output of the device. The output can be polled from the device or displayed on the optional LCD. These ranges have no effect on the calibration of the transmitter and are used to report the output of the transmitter in user-defined units.

Cell Temperature Alarm Limits

This sets the alarm limits for the cell temperature. The default values are -50.00-degrees Celsius and +120.00-degrees Celsius. Program the alarm limits anywhere between these two values.

Get Config Key

Once a Type PTSP pressure transmitter has been configured, the configuration that has been loaded into the transmitter memory may be reviewed by pressing the GET CONFIG key on the Type STT terminal (refer to the **Type STT Smart Transmitter Terminal Instruction**). The configuration is not stored in the Type STT terminal memory unless *YES* is chosen when

STORE THIS CONFIGURATION? appears on the Type STT terminal display.

Send Config Key

The SEND CONFIG key allows selection of a configuration from the terminal memory to be sent to the transmitter (refer to the **Type STT Smart Transmitter Terminal Instruction**).

View Config Key

Pressing the VIEW CONFIG key allows the parameters of the working configuration to be viewed, but not changed (refer to the **Type STT Smart Transmitter Terminal Instruction**).

OPERATIONAL FUNCTIONS

Operational functions for the Type PTSP pressure transmitter are performed by using the SPECIAL FEATURE, OUTPUT, STATUS, and F1 keys on the Type STT terminal.

Special Feature Key

Press the SPECIAL FEATURE key on the Type STT terminal and follow the procedures in the **Type STT Smart Transmitter Terminal Instruction**.

FIX OUTPUT/CANCEL FIX OUTPUT

For system troubleshooting purposes, the Type PTSP pressure transmitter output can be set to a constant, specified as a percent of the four to 20-milliampere signal. Press the SPECIAL FEATURE key and select *FIX OUTPUT* from the menu of the Type STT terminal (refer to the **Type STT Smart Transmitter Terminal Instruction**). To cancel *FIX OUTPUT*, press the SPECIAL FEATURE key, then select *CANCEL FIX OUTPUT*.

LOCAL LCD SETUP

The local LCD can be programmed to display output in percent and user-defined secondary engineering units, input in primary engineering units, cell temperature, and transmitter ID tag.

STANDARD CONFIGURATION

This function allows the configuration of the transmitter to be changed back to the original configuration entered at the factory.

Output Key

Press the OUTPUT key on the Type STT terminal and follow the procedures in the ***Type STT Smart Transmitter Terminal Instruction***.

MONITOR OUTPUT

The Type PTSP pressure transmitter output can be monitored by pressing the OUTPUT key on the Type STT terminal, and choosing *MONITOR OUTPUT* from the display menu (refer to the ***Type STT Smart Transmitter Terminal Instruction***). The output displays as a percent, rather than in milliamperes, and updates once per second.

MONITOR INPUT

The input to the Type PTSP pressure transmitter can be monitored by using the OUTPUT key on the Type STT terminal and selecting *MONITOR INPUT* from the displayed menu (refer to the ***Type STT Smart Transmitter Terminal Instruction***). The input displays in engineering units and updates once per second.

MONITOR CELL TEMPERATURE

By pressing the OUTPUT key on the Type STT terminal and selecting *TEMPERATURE*, the Type STT terminal displays the ambient temperature of the cell in degrees Celsius.

MONITOR SECONDARY ENGINEERING UNITS

The secondary engineering units variable can be monitored by the Type STT terminal by pressing the OUTPUT key and selecting *SECONDARY UNITS*. The output reflects the output of the transmitter, but it is a percentage of the secondary lower and upper range values and displays in secondary engineering units.

Example: If the secondary lower range value is 10.0 gal/hr, the secondary upper range value is 100.0 gal/hr and the output of the transmitter is at 75 percent, the display reads 75-percent range or 77.5 GAL/HR.

Status Key

The status of the transmitter, determined from results of the continuous self-diagnostics, can be checked using the STATUS key on the Type STT terminal. Refer to **Section 6** for the corrective action necessary.

F1 Key

The Type STT terminal allows configurations to be copied to and from Type STC cartridges. Multiple configuration copies overwrite existing configurations on the terminal or cartridge, regardless of the amount of memory space available. Perform this function by pressing the F1 key on the Type STT terminal. Refer to the **Type STT Smart Transmitter Terminal Instruction** for more information.

CONFIGURATION LOCKOUT PROCEDURE

The Type PTSP pressure transmitter has a lockout feature. When engaged, configuration and calibration information is unalterable. This has no effect on the monitoring of transmitter functions. Refer to Figure 5-1 for the location of the jumper on the amplifier assembly.

1. Remove power from the transmitter.
2. Remove the left housing cover (Fig. 2-1) from the transmitter.
3. If there is an optional meter, remove the four indicator screws (Fig. 8-1) and unplug it from the amplifier assembly. If there is no optional meter, skip to Step 4.
4. Use needle nose pliers to change the jumper position. **Position B** locks the configuration and **Position A** enables configuration.
5. Reverse this procedure to put the transmitter back into service.

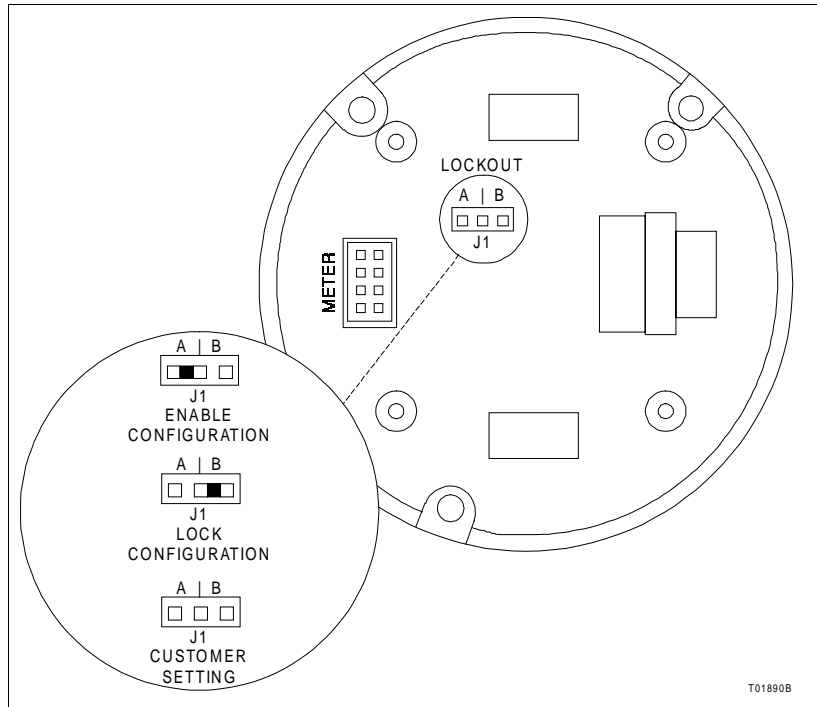


Figure 5-1. Lockout Jumper

SECTION 6 - TROUBLESHOOTING

INTRODUCTION

If the Type PTSP Platinum Standard Smart Pressure Transmitter cannot implement a command, the Type STT terminal is prompted. Pressing the STATUS key on the Type STT terminal causes it to display an error message relating to the existing problem. If an error occurs, but is corrected before the Type STT terminal is connected (such as a temporary over-pressure condition), the error is stored and is indicated once the terminal is connected and the STATUS key is pressed. Table 6-1 shows these error messages, the probable cause of the malfunction and the recommended corrective action. Table 6-2 lists possible output problems and the recommended corrective action. A troubleshooting flowchart appears in Figures 6-1, 6-2, and 6-3.

NOTE: More than one error can be present on one transmitter; however, only one error at a time can be displayed on the Type STT terminal. As such, error messages on the Type STT terminal are based on a priority structure. The error holding the most significance to the system will be displayed first and any others that follow will appear according to their rank on the priority structure.

ERROR MESSAGES AND CORRECTIVE ACTION

This section contains all of the possible error messages pertaining to the Type PTSP pressure transmitter that can display on the Type STT terminal. Table 6-1 lists the messages in alphabetical order and has four columns:

1. The **Message** column lists the errors (alphabetically) exactly as they appear on the smart terminal.
2. The **Fail Mode** column indicates if the error causes the Type PTSP pressure transmitter to enter the fail mode. Refer to **Startup and Failure Conditions** in Section 5 for more information.
3. The **Probable Cause** column provides a brief explanation of the cause of the error.
4. The **Corrective Action** column lists corrective actions to take for each error.

Table 6-1. Error Messages

Message	Fail Mode	Probable Cause	Corrective Action
Calibration required	No	Cell not calibrated with present amplifier board.	Calibrate transmitter.
Cannot save, configuration too large	No	Transmitter type not supported by Type STT terminal firmware revision level.	Consult Bailey Controls Company regarding latest Type STT terminal firmware revision.
Cell characterization board EEPROM failure	Yes	Damage to cell characterization board.	Turn Type STT terminal off and then on. If error still exists after reset, replace cell and characterization board assembly (Section 8).
Cell temperature over alarm	No	Cell temperature under/over alarm limit.	Correct temperature problem.
Cell temperature under alarm			Change alarm value. Refer to Type STT Smart Transmitter Terminal Instruction .
Cell temperature over limit	No	Cell temperature input exceeds upper factory limit.	Remove source of temperature extreme.
Cell temperature under limit	No	Cell temperature input exceeds lower factory limit.	Remove source of temperature extreme.
Config “tagname” already exists	No	Attempted to copy configuration to cartridge or transmitter where it already exists.	Erase old configuration before copying new one. Refer to Type STT Smart Transmitter Terminal Instruction .
Damaged cell or characterization board	Yes	Cell or characterization board disconnected.	Make sure cell, characterization board, and amplifier assembly are mounted properly.
		Cell or characterization board damaged.	Replace cell and characterization board assembly (Section 8).
Electronics temperature measurement failure	No	Hardware failure of on-board temperature sensor.	Replace amplifier assembly (Section 8).
Electronic temperature out of range	No	Temperature inside electronics housing exceeds limit set at factory.	Remove source of temperature extreme.
Error! Attempt to configure duplicate address	No	Attempt was made to assign analog mode transmitter address on FBM.	Be sure transmitter is in correct mode (analog or digital). Use VIEW key on Type STT terminal to verify mode. Refer to Type STT Smart Transmitter Terminal Instruction for details.
		Attempt was made to assign digital mode transmitter to occupied FBM address.	Assign transmitter to unoccupied address or channel number of FBM.

Table 6-1. Error Messages (continued)

Message	Fail Mode	Probable Cause	Corrective Action
Field device can't execute command: FBM on-line	No	The Type STT terminal cannot change any transmitter parameters while the field bus is active.	Transmitter must be brought off-line. This can be done from the MFC/MFP module by tuning the function code. NOTE: To bring transmitter offline, the FBM can be unplugged from the rack. Be aware that by doing this, communication is lost for all other transmitters on the bus. When FBM is unplugged, there is a two-minute time-out period until the Type STT terminal will be allowed to change parameters. After the two-minute period, the transmitter allows the Type STT terminal access.
Field device can't execute command: Invalid command	No	Incorrect syntax.	Wrong transmitter type selected in configuration.
		Excessive line noise.	Check line noise. Use oscilloscope to determine if line noise is excessive.
		Type STT terminal failure.	Verify Type STT terminal operation. Verify by using another Type STT terminal known to be operational.
Field device can't execute command: Lockout engaged	No	Unable to configure or calibrate.	Hardware lock active. Refer to CONFIGURATION LOCKOUT PROCEDURE in Section 5.
Field device can't execute: Data out of range	Yes	Transmitter sent data that is out of acceptable range.	Press VIEW key on Type STT terminal to verify parameters of configuration and consult appropriate device instruction for correct parameters.
Field device configuration does not match STT's	No	Configuration of transmitter does not exactly match corresponding configuration in Type STT terminal.	Rerange was executed without updating Type STT terminal configuration. Perform GET CONFIG (Section 5).
Field device main electronics EEPROM failure	Yes	Memory problem.	Remove power from transmitter and reapply. If error still exists after reset, replace amplifier assembly (Section 8).
Field device input over range	No	Input exceeds cell specification.	Correct process input.
Field device input under range			

Table 6-1. Error Messages (continued)

Message	Fail Mode	Probable Cause	Corrective Action
Field device not responding	No	Type STT terminal not connected properly.	Check Type STT terminal wiring connections. Refer to Figure 2-4 or 2-5 for correct wiring arrangements.
		Short in communication wire.	Perform a continuity check to determine if a short exists.
		Transmitter does not have minimum of 17 VDC across inputs.	Correct power problem.
		Not using correct communication method.	Turn off Type STT terminal. Turn on and select <i>FSK/BUS</i> and press ENTER again. ID tags appear on screen. Select ID tag of transmitter, or select one appearing within brackets if unsure of ID tag. Press ENTER. Press STATUS key. If this error message is still present, go to next step.
		Transmitter or Type STT terminal defective.	If available, verify that Type STT terminal is functional by connecting to another transmitter. Replace Type STT terminal if not functional. If Type STT terminal is functional, replace amplifier assembly in transmitter (Section 8).
Field device not supported by cartridge or handheld	No	Field device type not supported by release of Type STT terminal firmware and cartridge.	Check to see if correct cartridge is inserted into Type STT terminal.
Field device output is fixed or in adj. mode	No	Type STT terminal turned off while 4 to 20-mA output was being calibrated.	Power down transmitter and power up transmitter.
		Transmitter cannot execute command because of fix output.	Take transmitter out of fix output. Refer to Type STT Smart Transmitter Terminal Instruction .
Field device RAM failure	Yes	Memory problem.	Replace amplifier assembly (Section 8).
Input applied incorrectly, calibration failure	No	Calibrated input outside factory allowable limits.	Correct signal and calibrate (Section 8).
Span & zero key misoperation	No	Misoperation of EZ CAL option.	Try again.
		Damaged EZ CAL option.	Replace EZ CAL option (Section 8).
		Damaged amplifier assembly.	Replace amplifier assembly (Section 8).
Sorry, that routine not implemented in ROM D10	No	Cartridge not compatible.	Purchase latest Type STT terminal firmware. Refer to spare parts lists in Type STT Smart Transmitter Terminal Instruction .
Unknown error	No	Transmitter reported an error not understood by Type STT terminal.	Contact Bailey Technical Support.

Table 6-2. Output Troubleshooting

Fault	Probable Cause	Corrective Action
High output	Transmitter electronics connections.	Make sure all pins and receptacles are clean.
		Check cell connections.
	Transmitter electronics failure.	Press STATUS key and refer to Table 6-1 and Figure 6-1.
Erratic output	Cell.	Press STATUS key and refer to Table 6-1 and Figure 6-1.
	Loop wiring.	Check for intermittent shorts, open circuits, and multiple grounds.
	Process fluid pulsation.	Increase damping.
		Install dampers in pressure piping.
	Pressure piping.	Check for entrapped gas in liquid lines and for liquid in dry lines.
	Transmitter electronics connections.	Make sure pins and receptacles are clean.
Check cell connections.		
	Transmitter electronics failure.	Press STATUS key and refer to Table 6-1 and Figure 6-1.
Low output or no output	Power supply.	Check output of power supply.
	Loop wiring.	Check for shorts, open circuits, and multiple grounds.
		Check polarity of connections.
		Check loop impedance.
	Process connection.	Check installation and condition of process connection.
		Note any changes in process properties that may affect output.
	Pressure piping.	Check that pressure connection is correct.
		Check for leaks or blockage.
		Check that blocking valves are fully open and bypass valves are tightly closed.
		Check for entrapped gas in liquid lines and for liquid in dry lines.
Check that density of fluid in pressure piping is unchanged.		
Check for sediment at transmitter process connection.		
Device in digital mode.	If analog output is desired, configure the transmitter using CONFIGURE key, then press SEND CONFIG.	

Table 6-2. Output Troubleshooting

Fault	Probable Cause	Corrective Action
Low output or no output (continued)	Transmitter electronics connections.	Check for shorts in cell leads.
		Make sure pins and receptacles are clean.
		Check cell connections.
	Transmitter electronics failure.	Press STATUS key and refer to Table 6-1 and Figure 6-1.
Cell.	Press STATUS key and refer to Table 6-1 and Figure 6-1.	

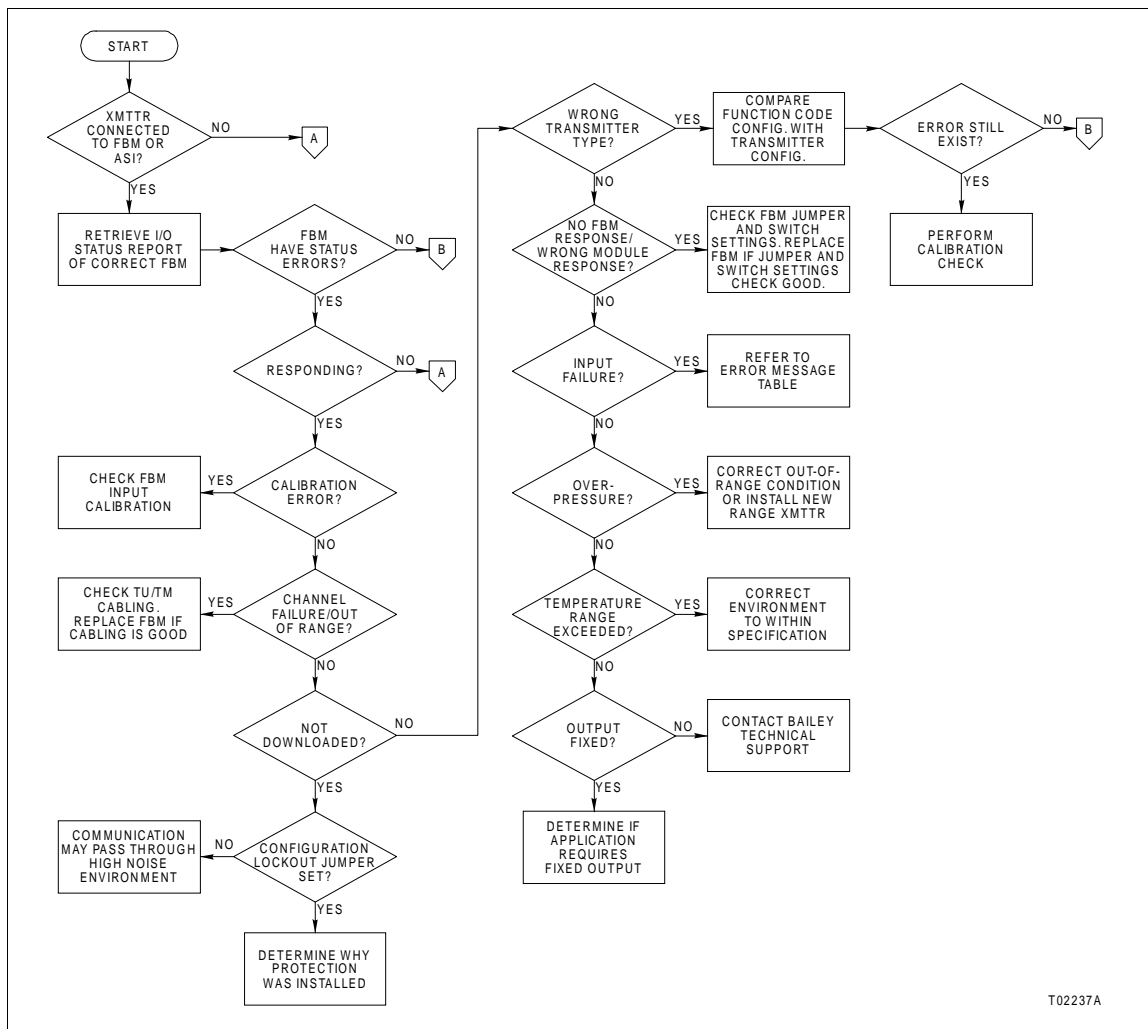
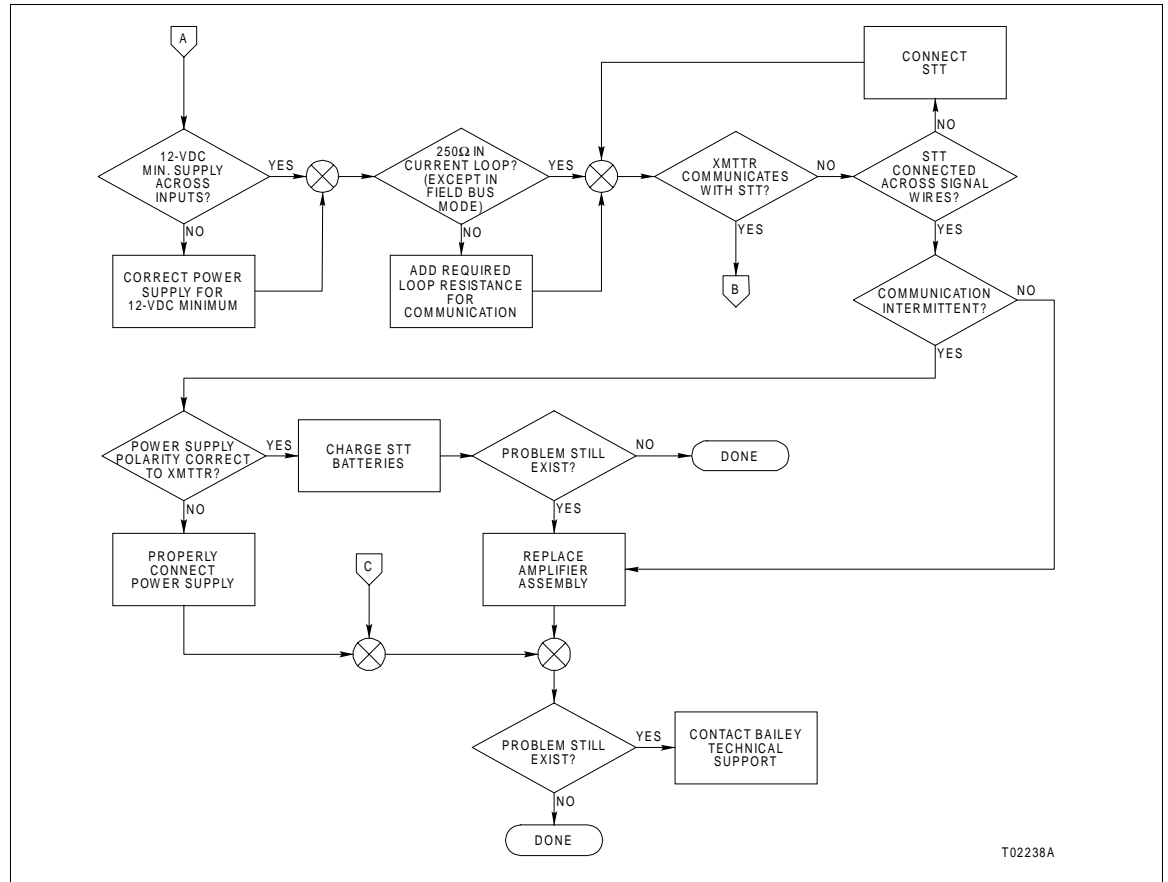


Figure 6-1. Troubleshooting Flowchart (Sheet 1 of 3)



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Figure 6-2. Troubleshooting Flowchart (Sheet 2 of 3)

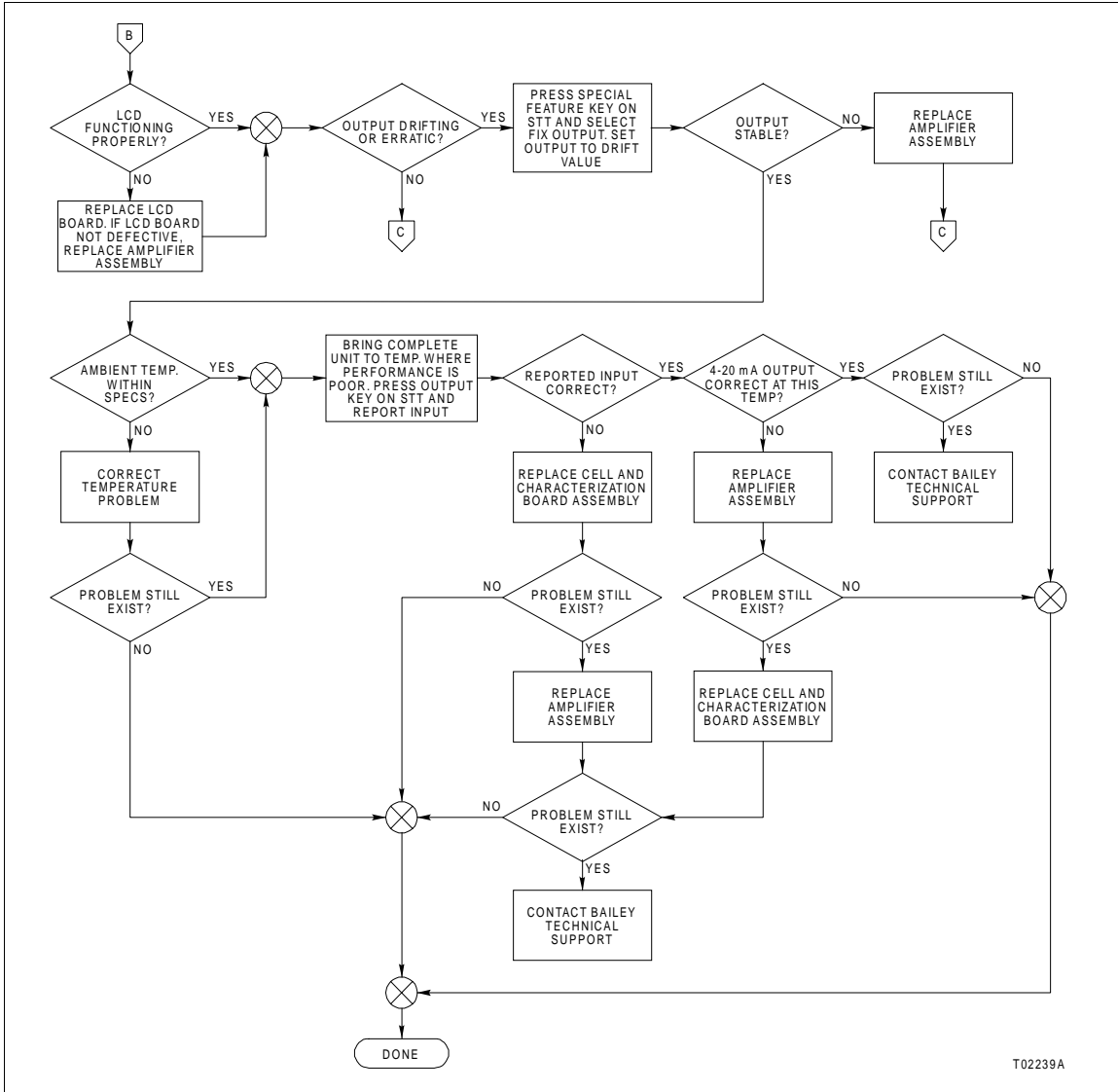


Figure 6-3. Troubleshooting Flowchart (Sheet 3 of 3)

SECTION 7 - MAINTENANCE

INTRODUCTION

WARNING

System maintenance must be performed only by qualified personnel and only after securing the equipment controlled by the circuit. Altering or removing components from an active circuit may upset the controlled process leading to personnel injury and equipment damage.

Explosionproof/dust-ignitionproof installations and intrinsically safe installations in Class II or Class III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be nonhazardous at the time. Failure to follow this warning can lead to unsafe conditions that can injure personnel and damage equipment.

The reliability of any stand-alone product or control system is affected by the maintenance of the equipment. Bailey-Fischer & Porter recommends that all equipment users practice a preventive maintenance program that will keep the equipment operating at an optimum level.

NOTE: Refer to the *Installing a 4 to 20 mA Transmitter in a Hazardous Location* application guide when applicable.

Personnel performing preventive maintenance should meet the following qualifications:

- Be qualified electrical technicians or engineers that know the proper use of test equipment.
- Be familiar with the Type PTSP Platinum Standard Smart Pressure Transmitter and associated equipment and have experience working with process control systems.

PREVENTIVE MAINTENANCE SCHEDULE

The Type PTSP Transmitter has no moving parts and requires limited maintenance when operated under normal conditions.

Table 7-1 is the preventive maintenance schedule for the Type PTSP transmitter. The table lists the tasks in groups according to their specified maintenance interval. Some tasks in Table 7-1 are self-explanatory. Instructions for tasks that require further explanation are covered under **PREVENTIVE MAINTENANCE PROCEDURES**.

If the transmitter is inoperative, or if operation is faulty, refer to **Section 6**.

Table 7-1. Preventive Maintenance Schedule¹

Task	Frequency
Clean indicator window (if supplied). See procedure.	3 months
Clean transmitter exterior. See procedure.	
Check and tighten all wiring connections, including power and ground connections. See procedure.	
Clean sediment and deposits from connecting piping (procedure depends on the installation and the process).	
Check and tighten piping connections (procedure depends on the installation and the process).	
Check and tighten all conduit connections (procedure depends on the installation and the process).	6 months
Calibrate the unit. Refer to Section 4.	12 months
Change O-rings. Refer to Section 8.	
Complete all applicable tasks in this table.	Shutdown ²

NOTES:

1. Environmental conditions might warrant more frequent attention.
2. Shutdown is usually defined as an occurrence that happens on a frequency level of greater than one year.

PREVENTIVE MAINTENANCE PROCEDURES

This section covers tasks from Table 7-1 that require specific instructions or further explanation:

- Checking and tightening all wiring connections.
- Cleaning the indicator window (if supplied).
- Cleaning the exterior of the transmitter.

Checking Connections

The equipment needed to perform this procedure is a flat-blade screwdriver.

Check all signal wiring, power, and ground connections within the transmitter to verify their integrity. When checking connections, always turn the screw in the direction to tighten only. If the connection is loose, it will be tightened. If the connection is tight, the tightening action will verify that it is secure. There must not be any motion done to loosen the connection.

Indicator Window Cleaning

The equipment required to perform this procedure is:

- Window cleaning solution.
- Soft, lint-free cloth.

1. Spray the window cleaning solution on the soft, lint-free cloth. Do not spray directly on the indicator window.

2. Wipe the indicator window with the soft, lint-free cloth until all deposits are removed and the indicator can be easily viewed.

Transmitter Exterior Cleaning

The equipment needed to perform this procedure is dependent upon the standard cleaning procedures employed by the customer.

CAUTION

If the cell with characterization board assembly has been cleaned for oxygen and chlorine service, do not compromise the integrity of this cleaning during these procedures. Impurities will react with oxygen and chlorine and damage the transmitter and the process.

Clean the diaphragms with a soft rag and appropriate solvent. The use of metal brushes, blades, or other tools will damage the diaphragms.

When cleaning the exterior of the transmitter, it is common to hose the unit down to free it of dust and process deposits. When this is done, the temperature of the medium (water, steam, or air) should not exceed the specifications of the transmitter and associated components (Table 1-3).

SECTION 8 - REPAIR AND REPLACEMENT PROCEDURES

INTRODUCTION

WARNING

Explosionproof/dust-ignitionproof installations and intrinsically safe installations in Class II or Class III hazardous locations require that the assembly be kept tight while circuits are live unless the location is known to be nonhazardous at the time.

System maintenance must be performed only by qualified personnel and only after securing equipment controlled by the circuit. Altering or removing components from an active circuit may upset the process being controlled.

This section contains procedures for replacement of transmitter components in the field.

The design of the Type PTSP pressure transmitter allows replacement of components in as little as five minutes. All calibration and configuration data are stored on both the amplifier assembly and characterization board.

Replacement of the amplifier assembly requires no configuration, as the characterization board automatically downloads this information into the amplifier assembly. Replacement cell and characterization board assemblies come with the standard factory configuration (refer to Table 1-7) and that data transfers to the original amplifier assembly. If a configuration other than the standard is required, the transmitter must go through either a step-by-step configuration or must have a configuration downloaded from the Type STT terminal as described in Section 5. In either case, calibrate the transmitter according to the procedures in Section 4-1.

COMPONENT REMOVAL AND INSTALLATION PROCEDURES

CAUTION

If the cell and characterization board assembly has been cleaned for oxygen and chlorine service, do not compromise the integrity of this cleaning during these procedures. Impurities will react with oxygen and chlorine and damage the transmitter and the process.

Use Figures 8-1 and 8-2 as visual aids when performing these procedures.

All procedures assume replacement of the O-rings whenever a component sealed by the O-ring is removed.

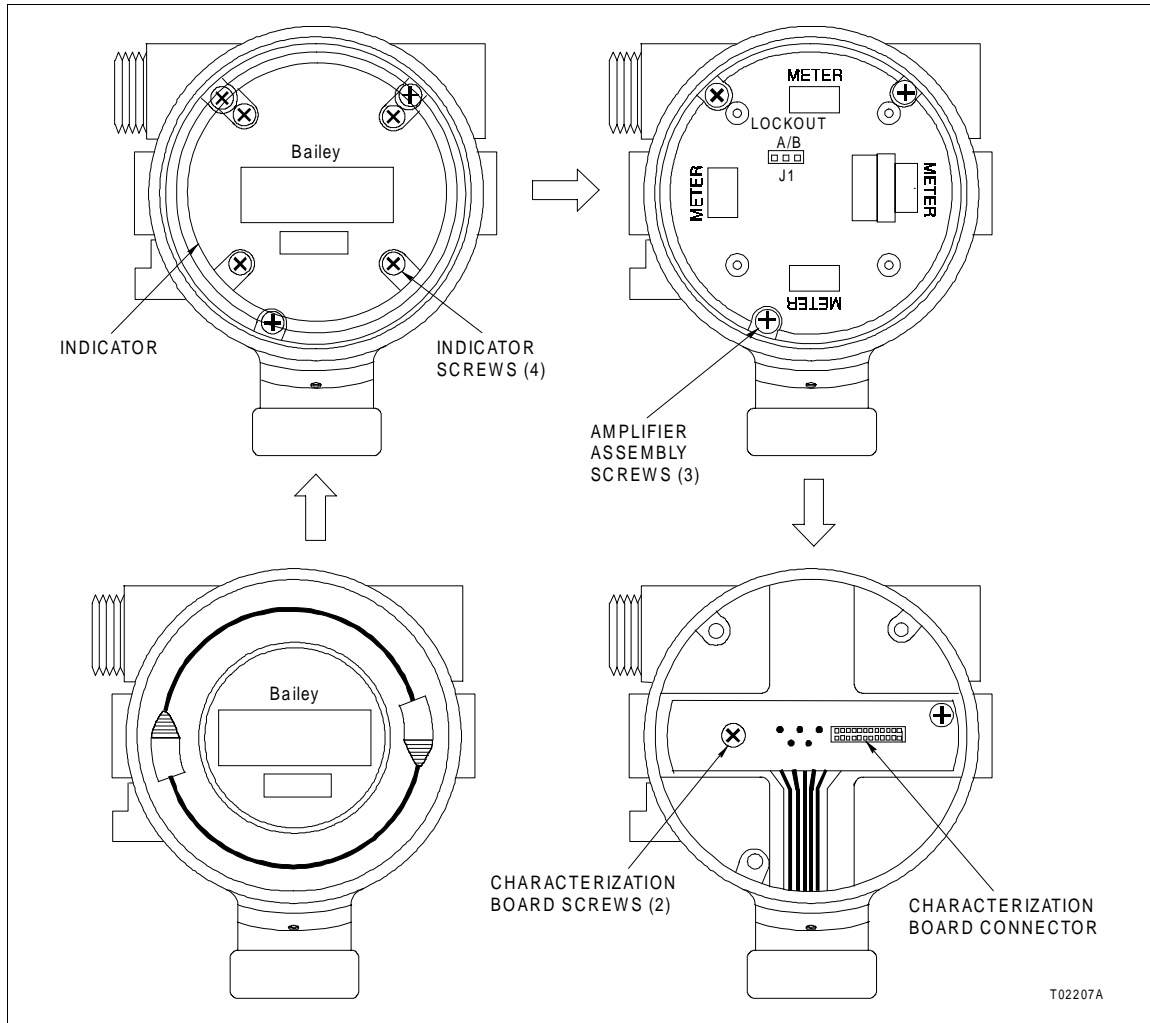


Figure 8-1. Internal Transmitter Components

The items needed to perform these procedures are:

- Spare parts kit identified in **Section 9** for the particular component to be replaced.
- O-ring kits identified in **Section 9** for the particular application.
- 4-mm Allen wrench.
- Phillips screwdriver.
- Flat-blade screwdriver.
- DRI-GLIDE graphite sealant (Man-Gill Chemical Company) or equivalent.
- Dow Corning® No. 4 compound.

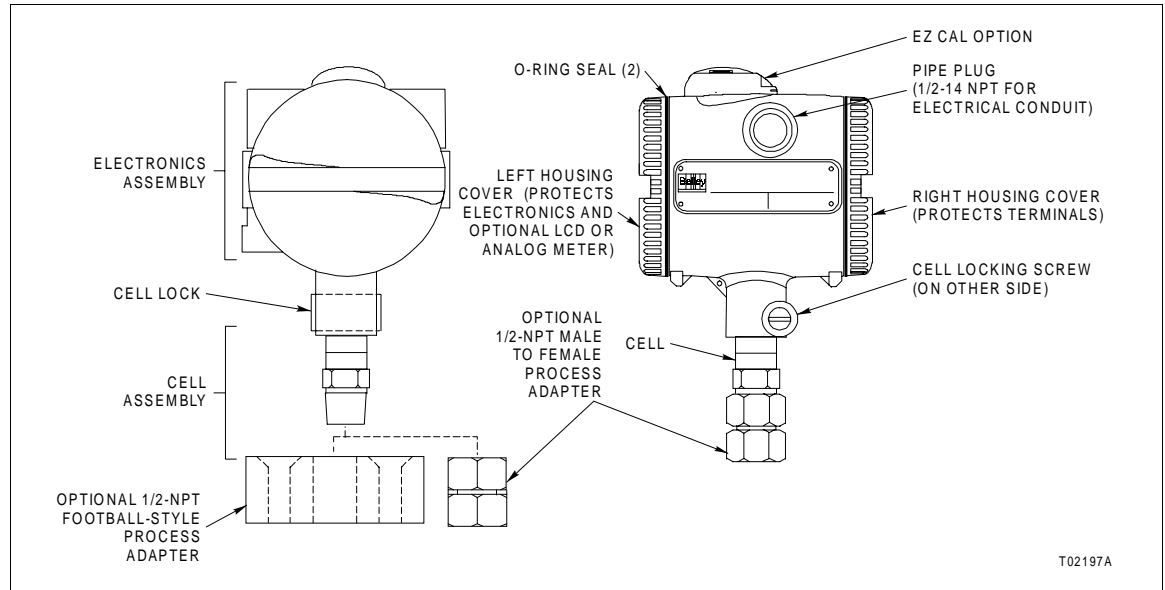


Figure 8-2. External Transmitter Components

- Needle nose pliers or similar tool to remove the O-rings.

Cell and Characterization Board Assembly Removal

NOTE: The cell and characterization board are a matched set. If performing this procedure to remove and install the same cell (for instance, to change the O-rings or clean the cell), the characterization board does not need replacing. If performing this procedure to replace the cell with a new cell, replace the entire cell and characterization board assembly.

1. Remove the transmitter from the process.
2. Remove the left housing cover from the electronics housing (Fig. 8-2).
3. Use the Phillips screwdriver to remove the three screws that secure the amplifier assembly to the electronics housing (Fig. 8-1).
4. Gently pull the amplifier assembly out of the electronics housing to unplug it from the characterization board connector (Fig. 8-1).
5. Remove the two screws securing the characterization board to the electronics housing (Fig. 8-1).
6. Use the 4-mm Allen wrench to remove the cell locking screw (Fig. 8-2).
7. Remove the cell lock (Fig. 8-2).

8. Carefully remove the cell and characterization board assembly, feeding the cell cable and characterization board through the opening left in the electronics housing by the cell.
9. Remove the cell and cover O-rings (Fig. 8-2).

Cell and Characterization Board Assembly Installation

1. Refer to **Section 9** and determine the proper replacement cell and cover O-rings for the application.
2. Coat the O-rings with a film of Dow Corning No. 4 compound and install.
3. Coat the upper portion of the cell with a light coating of the DRI-GLIDE sealant.
4. Feed the characterization board and cell cable through the opening in the bottom of the electronics housing, being careful not to damage the cell cable.
5. Mount the cell into the electronics housing so that the flat on the cell faces the hole for the cell lock.
6. Install the cell lock and tighten the cell locking screw (Fig. 8-2).
7. Mount the characterization board to the electronics housing and install the two screws (Fig. 8-1).
8. Align the rectangular opening on the bottom of the amplifier assembly with the characterization board connector and install the amplifier assembly into the electronics housing. Gently press it down to seat the mating connectors.
9. Install the three screws to secure the amplifier assembly to the electronics housing.
10. Grease the threads of the housing cover with a light film of the DRI-GLIDE sealant.
11. Install the housing cover.

NOTE: There will be a delay after initial power up when a new cell and characterization board assembly and amplifier assembly are mated.
12. If this is a new cell and characterization board assembly, and a configuration other than the standard factory configuration is desired (Table 1-7), perform the configuration procedures in **Section 5**.
13. Perform the calibration procedures in **Section 4**.

14. Install the transmitter on the process.

Amplifier Assembly Removal

Perform Steps 1 through 4 in the ***Cell and Characterization Board Assembly Removal*** section.

Amplifier Assembly Installation

1. Refer to **Section 9** and determine the proper replacement cover O-rings.
2. Coat the O-rings with a film of Dow Corning No. 4 compound and install.
3. Perform Steps 8 through 11 in the ***Cell and Characterization Board Assembly Installation*** section.
4. Perform the calibration procedures in **Section 4**.

NOTE: This procedure assumes replacement of the amplifier assembly only. This means that the original configuration is still present in the characterization board memory and will be automatically downloaded to the amplifier assembly.

5. Install the transmitter on the process.

Electronics Housing and Housing Cover Replacement

Use this procedure if the electronics housing sustains damage, but the internal components and cell are unaffected.

1. Remove the transmitter from the process.
2. Remove the housing covers from the electronics housing (Fig. 8-2). If the housing covers **do not** require replacing, go to Step 3. If the housing covers **do** require replacing, go to Step 6.
3. Remove the housing cover O-rings (Fig. 8-2).
4. Refer to **Section 9** and determine the proper cover O-rings.
5. Coat the cover O-rings with a film of Dow Corning No. 4 compound and install.
6. Perform Steps 3 through 8 in the ***Cell and Characterization Board Assembly Removal*** section.
7. Discard the old electronics housing and housing covers (if required).
8. Refer to **Section 9** and determine the proper cell O-ring (Fig. 8-2).

9. Coat the cell O-ring with a film of Dow Corning No. 4 compound and install.
10. Perform Steps 3 through 11 in the **Cell and Characterization Board Assembly Installation** section.
11. Perform the calibration checks in **Section 4** to verify the calibration has not changed.
12. Install the transmitter on the process.

O-Ring Replacement

All O-ring replacement procedures are incorporated in the steps for the replacement of various transmitter components.

OPTIONAL EQUIPMENT REMOVAL AND INSTALLATION PROCEDURES

Use Figures **8-1** and **8-2** as visual aids when performing these procedures.

Indicator Removal

1. Remove the transmitter from the process.
2. Remove the left housing cover from the electronics housing (Fig. **8-2**).
3. Remove the four screws that secure the indicator to the amplifier assembly (Fig. **8-1**).
4. Gently pull on the indicator to unplug it from the amplifier assembly.
5. Remove the housing cover O-ring.

Indicator Installation

1. Align the connector on the back of the indicator with one of the four meter openings in the amplifier assembly (Fig. **8-1**). The alignment of the connector depends on the desired viewing orientation. Gently press the indicator down to seat the mating connectors.
2. Install the four screws that secure the indicator to the amplifier assembly.
3. Refer to **Section 9** and identify the housing cover O-rings.
4. Coat the O-rings with a film of Dow Corning No. 4 compound and install.

5. Coat the threads of the housing cover with a light coating of DRI-GLIDE sealant.
6. Install the housing cover.
7. Install the transmitter on the process.

EZ CAL Option Removal

1. Use the flat-blade screwdriver to remove the mounting screw that secures the EZ CAL option to the electronics housing.
2. Remove the EZ CAL option.

EZ CAL Option Installation

1. Position the EZ CAL option on the electronics housing as shown in Figure 3-1.
2. Use the flat-blade screwdriver to install and tighten the mounting screw.

Tagging Replacement (Wired Stainless Steel)

1. Remove the old tag from the transmitter.
2. Run the wire through the tagging hole in the electronics housing and twist the ends together.

SECTION 9 - SUPPORT SERVICES

INTRODUCTION

Bailey Controls Company is ready to help in the use, application, and repair of its products. Contact your nearest sales office to make requests for sales, applications, installation, repair, overhaul, and maintenance contract services.

REPLACEMENT PARTS

When making repairs, order replacement parts from an authorized Bailey Controls Company sales representative. Provide the following information:

1. Part description, part number, and quantity.
2. Nomenclature and serial numbers (if applicable).
3. Bailey Controls Company instruction number, page number, and reference figure that identifies the part.

When ordering standard parts from Bailey Controls Company, use the part numbers and descriptions from the spare parts lists. Order parts without commercial descriptions from the nearest Bailey Controls Company sales office.

SPARE PARTS LISTS

Tables 9-1 through 9-9 list spare parts and kits. All kits are delivered with a copy of the kit drawing. This drawing lists the individual parts contained in the kit and their part numbers. To order compensated spare or replacement cell with characterization board assemblies, refer to **Cell with Characterization Board Assembly Replacements**.

The **Applicable Types** column is included to indicate the nomenclature of the transmitter as originally supplied. Dashes in any of the 15 nomenclature positions indicate that any possible selection for that position can apply.

O-Ring Kits

Table 9-1. O-Rings, Cell and Cover

O-Ring ¹	Kit Number	Material	Applicable Types
Cell	258556_7	Buna-N	All
Cover	258556_8		

NOTE:

1. Each kit contains 10 O-rings.

Electronics Kits

Table 9-2. Amplifier Assembly (Compensated)

Kit Number ¹	Applicable Types
258546_1	All

NOTE:

1. Each kit contains one amplifier assembly.

Table 9-3. Indicator, Add-On

Kit Number ¹	Indicator Type	Cover Material	Applicable Types														
			Position														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258550_1	LCD	Aluminum	P	T	S	P	-	-	-	-	-	-	-	-	1	0	-
258550_2	Analog meter		P	T	S	P	-	-	-	-	-	-	-	-	1	1	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	3	-
			P	T	S	P	-	-	-	-	-	-	-	-	-	1	4
258550_5	LCD	Stainless steel	P	T	S	P	-	-	-	-	-	-	-	A	0	-	
258550_6	Analog meter		P	T	S	P	-	-	-	-	-	-	-	-	A	1	-
			P	T	S	P	-	-	-	-	-	-	-	-	A	3	-
			P	T	S	P	-	-	-	-	-	-	-	-	-	A	4

NOTE:

1. Each kit contains one indicator, one cover with window, and 0.25 oz. of NEVER-SEEZ lubricant.

Table 9-4. Indicator, Spare

Kit Number ¹	Indicator Type	Applicable Types														
		Position														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258550_3	LCD	P	T	S	P	-	-	-	-	-	-	-	-	-	A	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	B	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	D	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	E	-

Table 9-4. Indicator, Spare (continued)

Kit Number ¹	Indicator Type	Applicable Types														
		Position														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258550_4	Analog meter	P	T	S	P	-	-	-	-	-	-	-	-	-	M	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	N	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	Q	-
		P	T	S	P	-	-	-	-	-	-	-	-	-	R	-

NOTE:

1. Each kit contains one indicator; one O-ring, cover; and 0.25 oz. of NEVER-SEEZ lubricant.

Table 9-5. EZ CAL Option

Kit Number ¹	Applicable Types														
	Position														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258562_1	P	T	S	P	-	-	-	-	-	-	-	1	3	-	-
	P	T	S	P	-	-	-	-	-	-	-	1	4	-	-
	P	T	S	P	-	-	-	-	-	-	-	1	D	-	-
	P	T	S	P	-	-	-	-	-	-	-	1	E	-	-
	P	T	S	P	-	-	-	-	-	-	-	1	Q	-	-
	P	T	S	P	-	-	-	-	-	-	-	1	R	-	-

NOTE:

1. Each kit contains one complete EZ CAL module.

Hardware Kits

Table 9-6. Process Adapters

Adapter Number	Adapter Type	Applicable Types														
		Position														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1951753_1	Male to female stainless steel 316	P	T	S	P	-	-	-	-	-	-	A	-	-	-	-
		P	T	S	P	-	-	-	-	-	-	B	-	-	-	-
		P	T	S	P	-	-	-	-	-	-	C	-	-	-	-
1951753_2	Male to female Hastelloy C-276	P	T	S	P	-	-	-	-	-	-	M	-	-	-	-
		P	T	S	P	-	-	-	-	-	-	N	-	-	-	-
		P	T	S	P	-	-	-	-	-	-	P	-	-	-	-

Table 9-7. Electronics Housing

Kit Number ¹	Cover Type	Applicable Types														
		Position														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258554_1	Aluminum housing with standard terminal block	P	T	S	P	-	-	-	-	-	-	-	-	1	0	-
		P	T	S	P	-	-	-	-	-	-	-	-	1	3	-
		P	T	S	P	-	-	-	-	-	-	-	-	1	A	-
		P	T	S	P	-	-	-	-	-	-	-	-	1	D	-
		P	T	S	P	-	-	-	-	-	-	-	-	1	M	-
258554_2	Stainless steel housing with standard terminal block	P	T	S	P	-	-	-	-	-	-	-	A	0	-	
		P	T	S	P	-	-	-	-	-	-	-	A	A	-	
		P	T	S	P	-	-	-	-	-	-	-	A	M	-	
258554_3	Aluminum housing with terminal block/lightning arrestor assembly	P	T	S	P	-	-	-	-	-	-	-	1	1	-	
		P	T	S	P	-	-	-	-	-	-	-	1	4	-	
		P	T	S	P	-	-	-	-	-	-	-	1	B	-	
		P	T	S	P	-	-	-	-	-	-	-	1	E	-	
		P	T	S	P	-	-	-	-	-	-	-	1	N	-	
258554_4	Stainless steel housing with terminal block/lightning arrestor assembly	P	T	S	P	-	-	-	-	-	-	-	A	1	-	
		P	T	S	P	-	-	-	-	-	-	-	A	B	-	
		P	T	S	P	-	-	-	-	-	-	-	A	N	-	

NOTE:

1. Each kit contains one electronics housing; two O-rings, cover; one O-ring, cell; and 0.25 oz. of NEVER-SEEZ[®] lubricant. The electronics housing is supplied with all components installed, except cell with characterization board assembly, amplifier assembly, and housing covers.

Table 9-8. Cover Housing

Kit Number ¹	Cover Type	Cover Material	Applicable Types														
			Position														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258555_1	Standard	Aluminum	P	T	S	P	-	-	-	-	-	-	-	-	1	0	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	1	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	3	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	4	-

Table 9-8. Cover, Housing (continued)

Kit Number ¹	Cover Type	Cover Material	Applicable Types														
			Position														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258555_2	Cover with window	Aluminum	P	T	S	P	-	-	-	-	-	-	-	-	1	A	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	B	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	D	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	E	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	M	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	N	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	Q	-
			P	T	S	P	-	-	-	-	-	-	-	-	1	R	-
258555_3	Standard	Stainless steel	P	T	S	P	-	-	-	-	-	-	-	A	0	-	
			P	T	S	P	-	-	-	-	-	-	-	-	A	1	-
258555_4	Cover with window	Stainless steel	P	T	S	P	-	-	-	-	-	-	-	-	A	A	-
			P	T	S	P	-	-	-	-	-	-	-	-	A	B	-
			P	T	S	P	-	-	-	-	-	-	-	-	A	M	-
			P	T	S	P	-	-	-	-	-	-	-	-	A	N	-

NOTE:

1. Each kit contains one housing cover with O-ring installed and 0.25 oz. NEVER-SEEZ lubricant.

Table 9-9. Tag, Stainless Steel, Wired

Kit Number ¹	Applicable Types														
	Position														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
258557_1	P	T	S	P	-	-	-	-	-	-	-	-	-	-	2
	P	T	S	P	-	-	-	-	-	-	-	-	-	-	6
	P	T	S	P	-	-	-	-	-	-	-	-	-	-	C
	P	T	S	P	-	-	-	-	-	-	-	-	-	-	G

NOTE:

1. Each kit contains 10 stainless steel tags with 6-in. wires attached.

Cell with Characterization Board Assembly Replacements

To order compensated spare or replacement cell with characterization board assemblies:

1. Obtain the first eight characters of the transmitter nomenclature from the nameplate.
2. If position 5 contains a G, replace it with a 5. If position 5 contains an A, replace it with a 6.
3. Add an A1 to the end to complete the 10-position nomenclature of the compensated cell with characterization board assembly.

Example 1: A replacement cell with characterization board assembly is required for a Type PTSPGF1100021E2 pressure transmitter. Following the procedure:

1. The first eight characters of the transmitter nomenclature are **PTSPGF11**.
2. Since position 5 contains a G, it is replaced with a 5, yielding **PTSP5F11**.
3. Adding an A1 to the end results in the 10-position nomenclature for the compensated spare or replacement cell with characterization board assembly, **PTSP5F11A1**.

Example 2: A replacement cell with characterization board assembly is required for a Type PTSPAGAA00M01M0 pressure transmitter. Following the procedure:

1. The first eight characters of the transmitter nomenclature are **PTSPAGAA**.
2. Since position 5 contains an A, it is replaced with a 6, yielding **PTSP6GAA**.
3. Adding an A1 to the end results in the 10-position nomenclature for the compensated spare or replacement cell with characterization board assembly, **PTSP6GAAA1**.

TRAINING

Bailey Controls Company has a modern training facility available for training personnel. On-site training is also available. Contact a Bailey Controls Company sales office for specific information and scheduling.

TECHNICAL DOCUMENTATION

Additional copies of this instruction, or other Bailey Controls Company instructions, can be obtained from the nearest Bailey Controls Company sales office at a reasonable charge.

Index (continued)

OUTPUT key	5-6
SPECIAL FEATURE key	5-5
STATUS key	5-6
Operator interface	5-1
Options	1-12
O-ring replacement.....	8-6
Output	
Current limiting.....	1-8
Signal.....	1-8
Output action	5-2
OUTPUT key	5-6
Output type	5-2
Overpressure	
Effect.....	1-10
Limit	1-11
P	
Piping	
Installation.....	3-4
Power supply	3-5, 3-7
Power supply effect	1-8
Pressure	
Limits	1-10, 1-11
Preventive maintenance	7-1
Indicator window	7-2
Procedures	7-2
Schedule.....	7-1
Transmitter exterior.....	7-3
Primary engineering units.....	5-3
Primary upper and lower range values.....	5-3
PTHPA	
Specifications	
Measurement range.....	1-11
Overpressure limit.....	1-11
Pressure limits	1-11
Reference accuracy	1-11
Stability	1-11
Temperature effect.....	1-11
Turndown ratio	1-11
Weight.....	1-11
Zero elevation	1-11
Zero suppression	1-11
PTHPG	
Specifications.....	1-9, 1-11
Measurement range	1-9
Overpressure effect	1-10
Pressure limits	1-10
Reference accuracy	1-10
Temperature effect.....	1-10
Turndown ratio.....	1-9
Weight.....	1-10
Zero elevation.....	1-9
Zero suppression.....	1-9
R	
Reference accuracy	1-10, 1-11
Reference conditions	1-7
Remote diaphragm seals	1-12
Repair and replacement	
Amplifier assembly	
Installation	8-5
Removal	8-5
Cell and characterization board	8-4
Cell and characterization board assembly	8-3
Electronics housing and cover	8-5
Equipment required.....	8-1
EZ CAL option	
Installation	8-7
Removal	8-7
Indicator	
Installation	8-6
Removal	8-6
Optional equipment.....	8-6
O-rings	8-6
Tagging	8-7
Replacement parts.....	9-1
Rerange	4-5
Reranging the analog output.....	4-5
Resistance, load limits	3-5
Rezero	4-6
RFI/EMI effects	1-8
S	
Secondary engineering units	5-4, 5-6
Secondary lower and upper range values	5-4
Select mode	5-1
SEND CONFIG key	5-5
Setup and physical installation.....	3-1
Software functions	2-6
Spare parts lists	9-1
SPECIAL FEATURE key	5-5
Specifications	1-7, 1-9, 1-11
Common.....	1-7
Damping	1-8
Enclosure rating	1-8
Humidity limits	1-7
Loop load limits	1-8
Output current limiting	1-8
Output signal	1-8
Power supply effect	1-8
Reference conditions.....	1-7

Index (continued)

RFI/EMI effects.....	1-8	Tantalum diaphragm.....	1-12
Supply voltage.....	1-8	Technical documentation.....	9-6
Surge tolerance.....	1-8	Temperature	
Temperature limits.....	1-8	Effect.....	1-10, 1-11
Vibration effect.....	1-8	Limits.....	1-8
PTHPA		Temperature compensation	
Measurement range.....	1-11	Functional description.....	2-4
Overpressure limit.....	1-11	Tolerances for calibration.....	4-3, 4-5
Pressure limits.....	1-11	Training.....	9-6
Reference accuracy.....	1-11	Transmitter	
Stability.....	1-11	Exterior cleaning.....	7-3
Temperature effect.....	1-11	Transmitter type.....	5-2
Turndown ratio.....	1-11	Troubleshooting	
Weight.....	1-11	Error messages.....	6-1
Zero elevation.....	1-11	Turndown ratio.....	1-9, 1-11
Zero suppression.....	1-11		
PTHPG.....	1-9, 1-11	U	
Measurement range.....	1-9	Unpacking and inspection.....	3-1
Overpressure effect.....	1-10		
Pressure limits.....	1-10	V	
Reference accuracy.....	1-10	Vapor pressure installation.....	3-5
Temperature effect.....	1-10	Vibration effect.....	1-8
Turndown ratio.....	1-9	VIEW CONFIG key.....	5-5
Weight.....	1-10		
Zero elevation.....	1-9	W	
Zero suppression.....	1-9	Weight.....	1-10, 1-11
Stability.....	1-11	Wiring	
Standard configuration.....	5-5	Installation.....	3-4
Startup and failure conditions.....	5-3	Analog point-to-point mode.....	3-4
STATUS key.....	5-6	Digital field bus mode.....	3-7
STT.....	3-7	Grounding.....	3-8
Configuration procedure.....	5-1		
Error messages.....	6-1	Z	
Functional description.....	2-4	Zero	
Operator interface.....	5-1	Elevation.....	1-9, 1-11
Supply voltage.....	1-8	Suppression.....	1-9, 1-11
Surge tolerance.....	1-8		
T			
Tagging replacement.....	8-7		

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