

ST 3000 Smart Transmitter Series 900 Models

34-ST-03-74
10/2002

Specification and Model Selection Guide

STD904	Differential	0 to 400 inH ₂ O	0 to 1,000 mbar
STG90L	Gauge	0 to 500 psi	0 to 35 bar

Introduction

In 1983, Honeywell introduced the first Smart Pressure Transmitter—the ST 3000®. In 1989, Honeywell launched the first all digital, bi-directional protocol for smart field devices. Today, its ST 3000 Series 900 Pressure Transmitters continue to bring proven “smart” technology to a wide spectrum of pressure measurement applications. Honeywell STD 904 and STG90L transmitters are designed for applications where highest accuracy is not required. STD904 transmitter applications include water flow for utilities. The STG90L gauge pressure transmitter is typically used for pressure in water and gas lines. The STD904 and STG90L transmitter are built to the highest manufacturing standards for reliability and long life. The STD904 and STG90L transmitters can be installed in hazardous environments with options available to meet specific application needs.

All ST 3000 transmitters can provide a 4-20 mA output, Honeywell Digitally Enhanced (DE) output, HART® output, or FOUNDATION™ Fieldbus output. When digitally integrated with Honeywell's Process Knowledge System™, EXPERION PKS™, ST 3000 instruments provide a more accurate process variable as well as advanced diagnostics.

Honeywell's cost-effective ST 3000 S900 transmitters lead the industry in reliability and stability:

- Stability = +/-0.01% per year
- Reliability = 470 years MTBF



Figure 1—Series 900 Pressure Transmitters feature proven piezoresistive sensor technology.

The devices provide comprehensive self-diagnostics to help users maintain high uptime, meet regulatory requirements, and attain high quality standards. S900 transmitters allow smart performance at analog prices. Accurate, reliable and stable, Series 900 transmitters offer greater turndown ratio than conventional transmitters.

"Honeywell transmitters operating in the digital mode using Honeywell's Digitally Enhanced (DE) protocol make diagnostics available right at the control system's human interface. Equally important, transmitter status information is continuously displayed to alert the operator immediately of a fault condition. Because the process variable (PV) status transmission precedes the PV value, we are guaranteed that a bad PV is not used in a control algorithm. In addition, bi-directional communication provides for remote transmitter configuration directly from the human interface, enabling management of the complete loop."

Maureen Atchison, DuPont
Site Electrical & Instrumentation Leader

Description

The ST 3000 transmitter can replace any 4 to 20 mA output transmitter in use today and operates over a standard two-wire system.

The measuring means is a piezoresistive sensor, which actually contains three sensors in one. It contains a differential pressure sensor, a temperature sensor, and a static pressure sensor.

Microprocessor-based electronics provide higher span-turndown ratio, improved temperature and pressure compensation, and improved accuracy.

The transmitter's meter body and electronics housing resist shock, vibration, corrosion, and moisture. The electronics housing contains a compartment for the single-board electronics, which is isolated from an integral junction box. The single-board electronics is replaceable and interchangeable with any other ST 3000 Series 100 or Series 900 model transmitter.

Like other Honeywell transmitters, the ST 3000 features two-way communication between the operator and the transmitter through our Smart Field Configurator (SFC). You can connect the SFC anywhere that you can access the transmitter signal lines.

The SCT 3000 Smartline® Configuration Toolkit provides an easy way to configure instruments using a personal computer. The toolkit enables configuration of devices before shipping or installation. The SCT 3000 can operate in the offline mode to configure an unlimited number of devices. The database can then be loaded downline during commissioning.

Features

- Choice of linear or square root output conformity is a simple configuration selection.
- Direct digital integration with Experion PKS and other control systems provides local measurement accuracy to the system level without adding typical A/D and D/A converter inaccuracies.
- Unique piezoresistive sensor automatically compensates input for temperature and static pressure. Added "smart" features include configuring lower and upper range values, simulating accurate analog output, and selecting preprogrammed engineering units for display.
- Smart transmitter capabilities with local or remote interfacing means significant manpower efficiency improvements in commissioning, start-up, and ongoing maintenance functions.

Specifications

Operating Conditions

Parameter	Reference Condition (at zero static)		Rated Condition		Operative Limits		Transportation and Storage	
	°C	°F	°C	°F	°C	°F	°C	°F
Ambient Temperature	25 ±1	77 ±2	-40 to 85	-40 to 185	-40 to 85	-40 to 185	-55 to 125	-67 to 257
Meter Body Temperature	25 ±1	77 ±2	-40 to 110	-40 to 230	-40 to 125	-40 to 257	-55 to 125	-67 to 257
Humidity %RH	10 to 55		0 to 100		0 to 100		0 to 100	
Overpressure								
STD904 psi	0		3000		3000			
bar	0		210		210			
STG90L psi	0		750		750			
bar	0		50		50			
Vacuum Region - Minimum Pressure								
mmHg absolute	Atmospheric		25		2 (short term*)			
inH ₂ O absolute	Atmospheric		13		1 (short term*)			
Supply Voltage, Current, and Load Resistance	Voltage Range: 10.8 to 42.4 Vdc at terminals Current Range: 3.0 to 21.8 mA Load Resistance: 0 to 1440 ohms (as shown in Figure 2)							

* Short term equals 2 hours at 70°C (158°F)

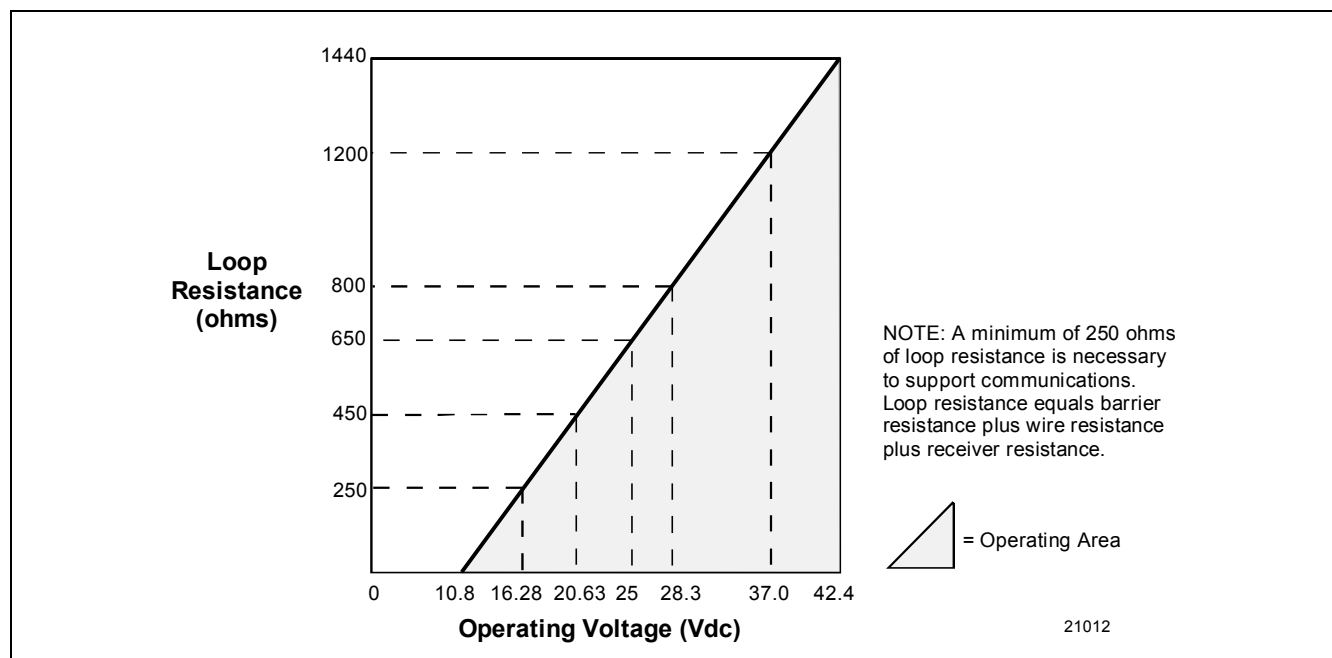


Figure 2 —Supply voltage and loop resistance chart.

Specifications - Performance Under Rated Conditions* - Model STD904

Parameter	Description
Upper Range Limit inH₂O mbar	400 (39.2°F/4°C is standard reference temperature for inH ₂ O range.) 1000
Minimum Span inH₂O mbar	16 Note: Recommended minimum span in square root mode is 20 inH ₂ O (50 mbar). 40
Turndown Ratio	25 to 1
Zero Elevation and Suppression	–5 to +100% URL.
Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability) <ul style="list-style-type: none"> Accuracy includes residual error after averaging successive readings. For HART use Analog Mode specifications. 	In Analog Mode: ±0.15% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (25 inH ₂ O), accuracy equals: $\pm 0.075 + 0.075 \left(\frac{25 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.075 + 0.075 \left(\frac{62 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$ In Digital Mode: ±0.125% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (25 inH ₂ O), accuracy equals: $\pm 0.05 + 0.075 \left(\frac{25 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.05 + 0.075 \left(\frac{62 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$
Zero Temperature Effect per 28°C (50°F)	In Analog Mode: ±0.325% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.0125 + 0.3125 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.0125 + 0.3125 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$ In Digital Mode: ±0.3125% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.3125 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.3125 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$
Combined Zero and Span Temperature Effect per 28°C (50°F)	In Analog Mode: ±0.6% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.20 + 0.40 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.20 + 0.40 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$ In Digital Mode: ±0.575% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.175 + 0.40 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.175 + 0.40 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$
Zero Static Pressure Effect per 1000 psi (70 bar)	±0.3% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.0125 + 0.2875 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.0125 + 0.2875 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$
Combined Zero and Span Static Pressure Effect per 1000 psi (70 bar)	±0.6% of span. For URV below reference point (50 inH ₂ O), effect equals: $\pm 0.20 + 0.40 \left(\frac{50 \text{ inH}_2\text{O}}{\text{span inH}_2\text{O}} \right) \text{ or } \pm 0.20 + 0.40 \left(\frac{125 \text{ mbar}}{\text{span mbar}} \right) \text{ in } \% \text{ span}$
Stability	±0.03% of URL per year

*Performance specifications are based on reference conditions of 25°C (77°F), zero (0) static pressure, 10 to 55% RH.

Specifications - Performance Under Rated Conditions* - Model STG90L

Parameter		Description
Upper Range Limit	psi bar	500 35
Minimum Span	psi bar	20 1.4
Turndown Ratio		25 to 1
Zero Elevation and Suppression		No limit except minimum span from absolute 0 (zero) to +100% URL. Specifications valid over this range.
Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability) <ul style="list-style-type: none"> Accuracy includes residual error after averaging successive readings. For HART use Analog Mode specifications. 		In Analog Mode: ±0.15% of calibrated span or upper range value (URV), whichever is greater, terminal based. In Digital Mode: ±0.125% of calibrated span or upper range value (URV), whichever is greater, terminal based.
Zero Temperature Effect per 28°C (50°F)		In Analog Mode: ±0.325% of span. For URV below reference point (50 psi), effect equals: $\pm 0.0125 + 0.3125 \left(\frac{50 \text{ psi}}{\text{span psi}} \right)$ or $\pm 0.0125 + 0.3125 \left(\frac{3.5 \text{ bar}}{\text{span bar}} \right)$ in % span In Digital Mode: ±0.3125% of span. For URV below reference point (50 psi), effect equals: $\pm 0.3125 \left(\frac{50 \text{ psi}}{\text{span psi}} \right)$ or $\pm 0.3125 \left(\frac{3.5 \text{ bar}}{\text{span bar}} \right)$ in % span
Combined Zero and Span Temperature Effect per 28°C (50°F)		In Analog Mode: ±0.6% of span. For URV below reference point (50 psi), effect equals: $\pm 0.20 + 0.40 \left(\frac{50 \text{ psi}}{\text{span psi}} \right)$ or $\pm 0.20 + 0.40 \left(\frac{3.5 \text{ bar}}{\text{span bar}} \right)$ in % span In Digital Mode: ±0.575% of span. For URV below reference point (50 psi), effect equals: $\pm 0.175 + 0.40 \left(\frac{50 \text{ psi}}{\text{span psi}} \right)$ or $\pm 0.175 + 0.40 \left(\frac{3.5 \text{ bar}}{\text{span bar}} \right)$ in % span
Stability		±0.03% of URL per year

*Performance specifications are based on reference conditions of 25°C (77°F), zero (0) static pressure, 10 to 55% RH, and 316L Stainless Steel barrier diaphragm.

Specifications - Performance Under Rated Conditions - All Models

Parameter	Description
Output (two-wire)	Analog 4 to 20 mA or DE digital communications mode. Option available for HART protocol.
Supply Voltage Effect	0.005% span per volt.
Damping Time Constant	Adjustable from 0 to 32 seconds digital damping.
CE Conformity (Europe)	89/336/EEC, Electromagnetic Compatibility (EMC) Directive.
Option Lightning Protection (Code "LP")	Leakage Current: 10 microamps max. @ 42.4 VDC, 93°C Impulse Rating: 10/20 µ sec. 5,000 Amps (50 strikes) 10,000 Amps (20 strikes) (rise/decay) 10/1000 µ sec. 250 Amps (1000 strikes) 500 Amps (400 strikes)

Physical and Approval Bodies

Parameter	Description
Barrier Diaphragms Material	316L Stainless Steel
Process Head Material	316 Stainless Steel
Head Gaskets (STD904 only)	Teflon
Meter Body Bolting (STD904 only)	Carbon Steel (Zinc plated, standard) or A286 SS (NACE) bolts and 302/304 SS (NACE) nuts for heads and 316 SS (NACE) bolts for adapters (standard option).
Mounting Bracket	Carbon Steel (Zinc-plated) or Stainless Steel angle bracket or Carbon Steel flat bracket available (standard options).
Fill Fluid	Silicone DC 200 oil
Electronic Housing	Epoxy-Polyester hybrid paint. Low Copper-Aluminum. Meets NEMA 4X (watertight) and NEMA 7 (explosionproof). Stainless steel optional.
Process Connections STD904 STG90L	1/4-inch NPT; 1/2-inch NPT with adapter, standard option; DIN. 1/2-inch NPT
Wiring	Accepts up to 16 AWG (1.5 mm diameter).
Mounting	Can be mounted in virtually any position using the standard mounting bracket. Bracket is designed to mount on 2-inch (50 mm) vertical or horizontal pipe. See Figure 3.
Dimensions	See Figures 4 and 5.
Net Weight STD904 STG90L	9 pounds (4.1 Kg) 3.8 pounds (1.7Kg)
Approval Bodies - Hazardous Areas	Approved as explosion proof and intrinsically safe for use in Class I, Division 1, Groups A, B, C, D locations, and nonincendive for Class I, Division 2, Groups A, B, C, D locations. Approved EEx ia IIC T4, T5, T6 and EEx d IIC T5, T6 per ATEX standards. See attached Model Selection Guide for options.
Pressure Equipment Directive (97/23/EC)	The ST 3000 pressure transmitters listed in this Specification have no pressurized internal volume or have a pressurized internal volume rated less than 1,000 bar (14,500 psig) and/or have a maximum volume of less than 0.1 liter. Therefore, these transmitters are either; not subject to the essential requirements of the directive 97/23/EC (PED, Annex 1) and shall not have the CE mark, or the manufacturer has the free choice of a module when the CE mark is required for pressures > 200 bar (2,900 psig).

NOTE: Pressure transmitters that are part of safety equipment for the protection of piping (systems) or vessel(s) from exceeding allowable pressure limits, (equipment with safety functions in accordance with Pressure Equipment Directive 97/23/EC article 1, 2.1.3), require separate examination.

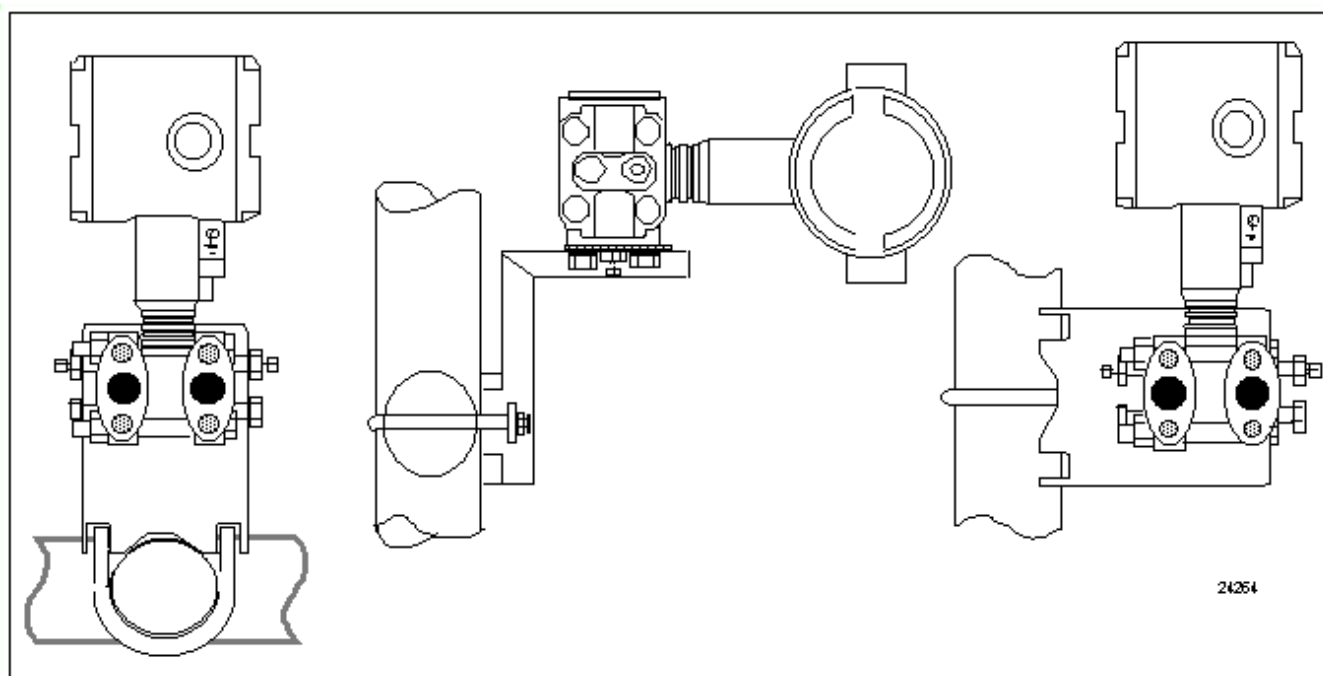


Figure 3 —Examples of typical mounting positions for model STD904.

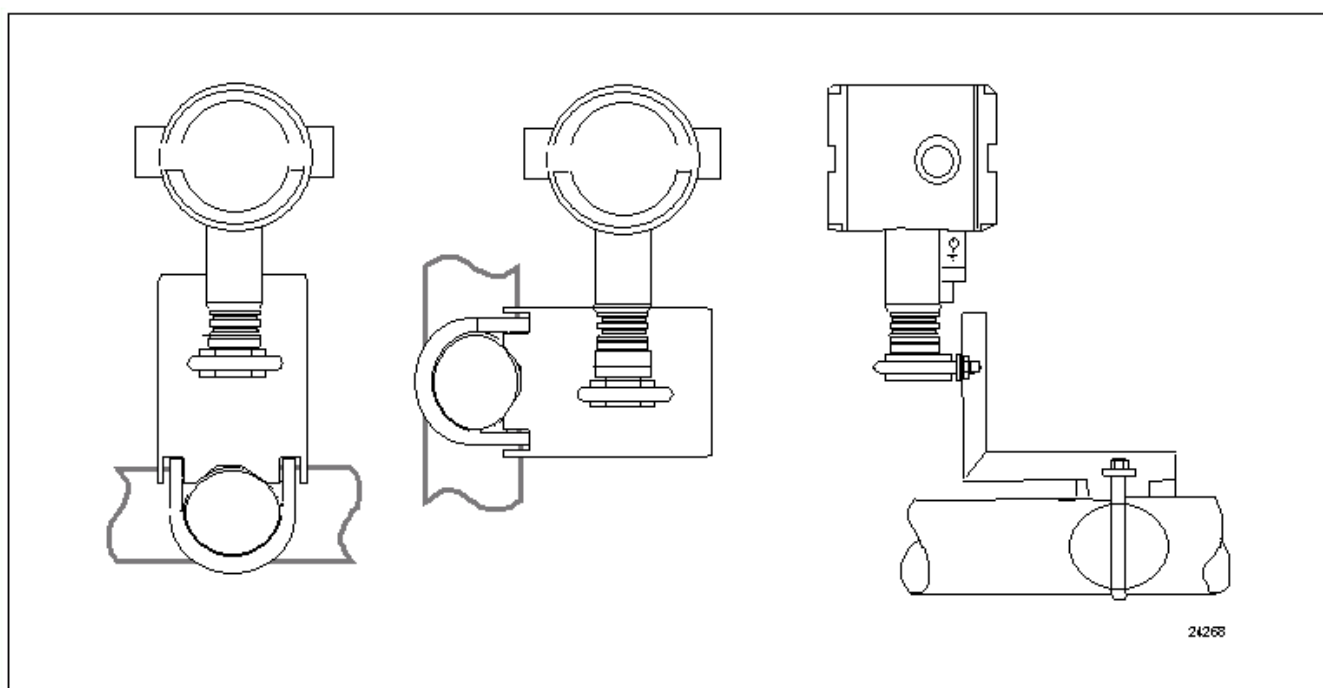


Figure 4 —Examples of typical mounting positions for model STG90L. Note that a mounting bracket is not required for in-line models.

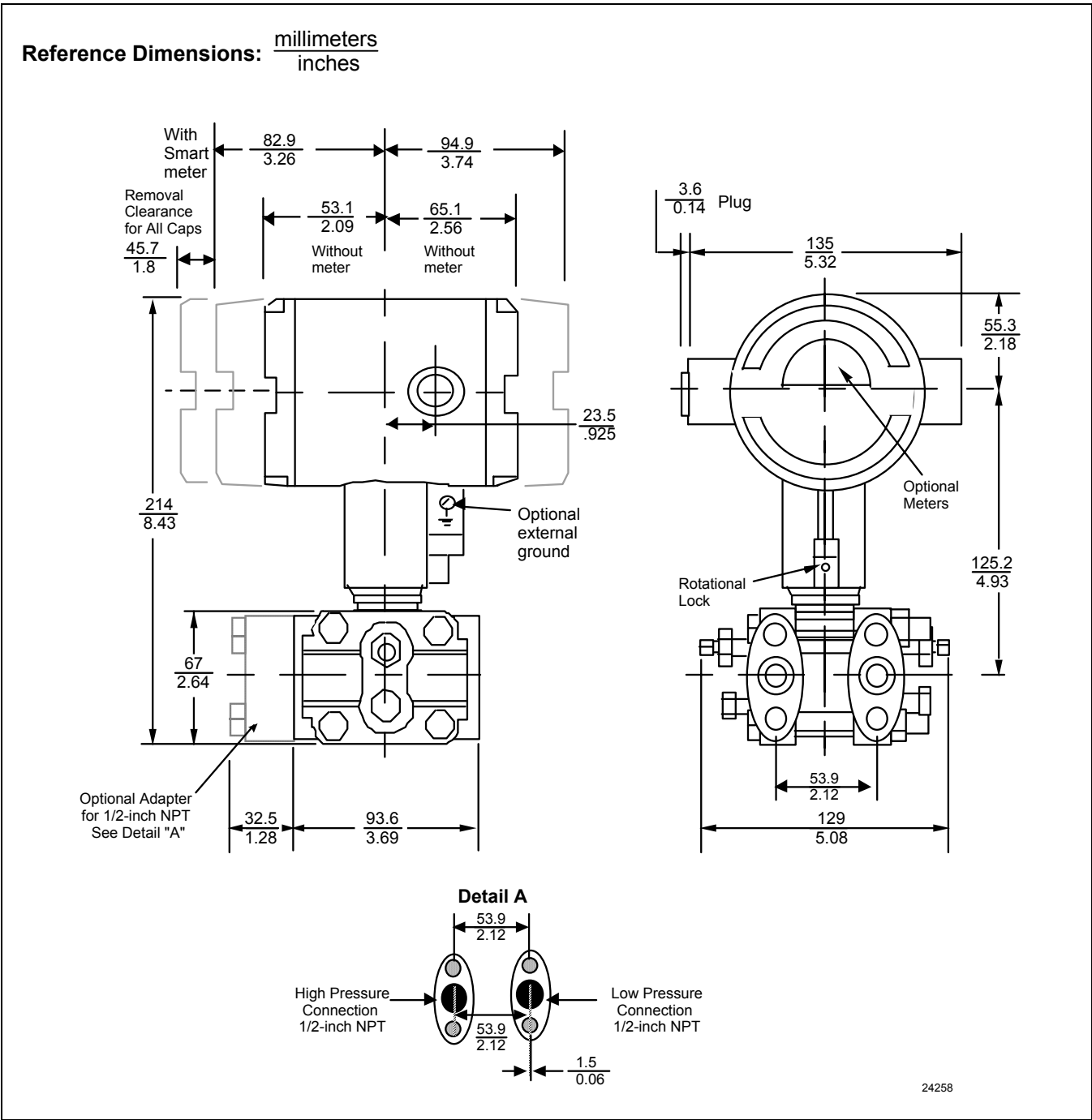


Figure 5 —Typical model STD904 mounting dimensions for reference.

Reference Dimensions: $\frac{\text{millimeters}}{\text{inches}}$

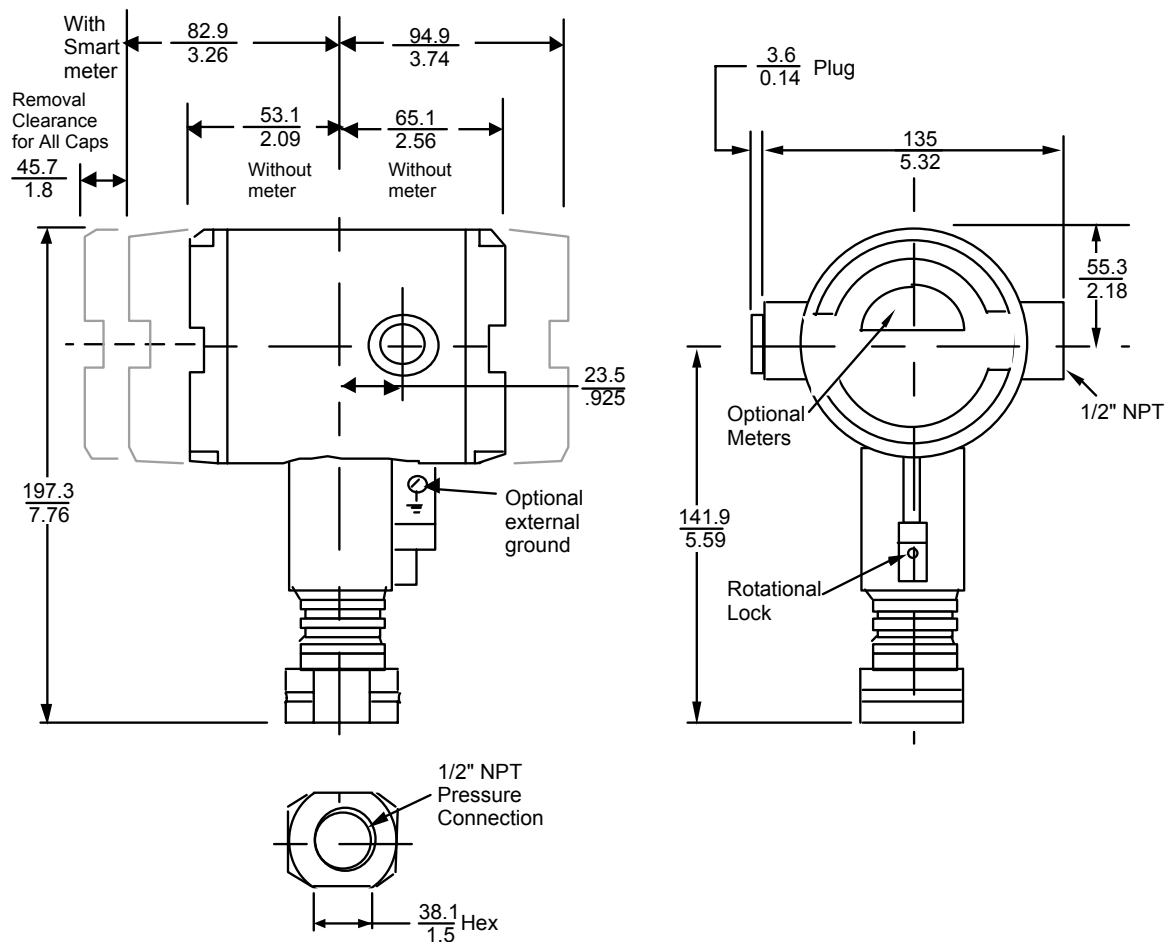


Figure 6 —Typical model STG90L mounting dimensions for reference.

Options	Ordering Information
<p>Mounting Bracket The angle mounting bracket is available in either zinc-plated carbon steel or stainless steel and is suitable for horizontal or vertical mounting on a two-inch (50 millimeter) pipe, as well as wall mounting. An optional flat mounting bracket is also available in carbon steel for two-inch (50 millimeter) pipe mounting.</p> <p>Indicating Meter Two integral meter options are available. An analog meter (option ME) is available with a 0 to 100% linear scale. The Smart Meter (option SM) provides an LCD display for both analog and digital output and can be configured to display pressure in pre-selected engineering units.</p> <p>Lightning Protection (Option LP) A terminal block is available with circuitry that protects the transmitter from transient surges induced by nearby lightning strikes.</p> <p>HART Protocol Compatibility (Option HC) An optional electronics module is available for the ST 3000 that provides HART Protocol compatibility. Transmitters with the HART Option are compatible with the AMS System. (Contact your AMS Supplier if an upgrade is required.)</p> <p>Indicator Configuration (Option CI) Provides custom configuration of Smart Meters.</p> <p>Tagging (Option TG) Up to 30 characters can be added on the stainless steel nameplate mounted on the transmitter's electronics housing at no extra cost. Note that a separate nameplate on the meter body contains the serial number and body-related data. A stainless steel wired on tag with additional data of up to 4 lines of 28 characters is also available. The number of characters for tagging includes spaces.</p> <p>Transmitter Configuration (Option TC) The factory can configure the transmitter linear/square root extraction, damping time, LRV, URV and mode (analog/digital) and enter an ID tag of up to eight characters and scratchpad information as specified.</p> <p>Custom Calibration and ID in Memory (Option CC) The factory can calibrate any range within the scope of the transmitter's range and enter an ID tag of up to eight characters in the transmitter's memory.</p> <p><i>Specifications are subject to change without notice. (Note that specifications may differ slightly for transmitters manufactured before October 30, 1995.)</i></p>	<p>Contact your nearest Honeywell sales office, or</p> <p>In the U.S.: Honeywell Industrial Automation & Control 16404 North Black Canyon Hwy. Phoenix, AZ 85053 1-800-288-7491</p> <p>In Canada: The Honeywell Centre 155 Gordon Baker Rd. North York, Ontario M2H 3N7 1-800-461-0013</p> <p>In Latin America: Honeywell Inc. 480 Sawgrass Corporate Parkway, Suite 200 Sunrise, FL 33325 (954) 845-2600</p> <p>In Europe and Africa: Honeywell S. A. Avenue du Bourget 1 1140 Brussels, Belgium</p> <p>In Eastern Europe: Honeywell Praha, s.r.o. Budejovicka 1 140 21 Prague 4, Czech Republic</p> <p>In the Middle East: Honeywell Middle East Ltd. Khalifa Street, Sheikh Faisal Building Abu Dhabi, U. A. E.</p> <p>In Asia: Honeywell Asia Pacific Inc. Honeywell Building, 17 Changi Business Park Central 1 Singapore 486073 Republic of Singapore</p> <p>In the Pacific: Honeywell Pty Ltd. 5 Thomas Holt Drive North Ryde NSW Australia 2113 (61 2) 9353 7000</p> <p>In Japan: Honeywell K.K. 14-6 Shibaura 1-chrome Minato-ku, Tokyo, Japan 105-0023</p> <p>Or, visit Honeywell on the World Wide Web at: http://www.honeywell.com</p>

Model Selection Guide (34-ST-16-55)

Instructions

- Select the desired Key Number. The arrow to the right marks the selection available.
- Make one selection from each table, I and II, using the column below the proper arrow.
Select as many Table III options as desired (if no options or approvals are desired, specify 9X).
A (♦) denotes unrestricted availability. A letter denotes restricted availability.
Restrictions follow Table IV.

Key Number I II III (Optional) IV
----- - --- - ----- - --.,----- + XXXX

KEY NUMBER Availability

Span	
0-16" to 0-400" H ₂ O/0-62 to 0-1000 mbar	STD904
Body Rating: 3000 psi (210 bar)	▼

TABLE I - METER BODY

	Wetted Process Heads	Vent/Drain Valves and Plugs	Barrier Diaphragms		
Material of Const.	316 St. St.	316 St. St.	316 LSS	E__	♦
Fill Fluid	Silicone			_1_	♦
Process Head	1/4" NPT			__A	♦
Configuration	1/2" NPT with Adapter (on 1/4" NPT Head)			__H	t

TABLE II

No Selection	00000	♦
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** Vent/Drains are Teflon coated for lubricity.

TABLE III - OPTIONS

	Selection	▼
None	00	♦
HART™ Protocol Compatible Electronics	HC	e
Analog Meter (0-100 Even 0-10 Square Root)	ME	♦
Smart Meter	SM	♦
Custom Configuration of Smart Meter	CI	m
Local Zero and Span	ZS	s
Lightning Protection	LP	♦
Custom Calibration and I.D. in Memory	CC	♦
Transmitter Configuration	TC	♦
Write Protection	WP	♦
Stainless Steel Customer Wired-On Tag	TG	♦
(4 lines, 28 characters per line, customer supplied information)		
Stainless Steel Customer Wired-On Tag (blank)	TB	♦
Adapter Flange - 1/2" NPT St. Steel	S2	c
Mounting Bracket - Carbon Steel	MB	♦
Mounting Bracket - ST. ST.	SB	♦
Flat Mounting Bracket - Carbon Steel	FB	♦
1/2" NPT to M20 316SS Conduit Adapter (BASEEFA EEx d IIC)	A1	n
1/2" NPT to 3/4" NPT 316 SS Conduit Adapter	A2	u
Calibration Test Report and Certificate of Conformance (F3399)	F1	♦
Certificate of Conformance (F3391)	F3	♦
Certificate of Origin (F0195)	F5	♦
NACE Certificate (F0198)	F7	♦
Additional Warranty - 1 year	W1	♦
Additional Warranty - 2 years	W2	♦
Additional Warranty - 3 years	W3	♦
Additional Warranty - 4 years	W4	♦

Model Selection Guide, cont.

TABLE III - OPTIONS (continued)			Selection	Availability
Approval Body	Approval Type	Location or Classification		
No hazardous location approvals			9X	♦
Factory Mutual	Explosion Proof	Class I, Div. 1, Groups A,B,C,D	1C	♦
	Dust Ignition Proof	Class II, III Div. 1, Groups E,F,G		
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D		
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G		
CSA	Explosion Proof	Class I, Div. 1, Groups B,C,D	2J	♦
	Dust Ignition Proof	Class II, III, Div. 1, Groups E,F,G		
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G		
SA (Australia)	Intrinsically Safe	Ex ia IIC T4	4G	♦
	Non-Incendive	Ex n IIC T6 (T4 with SM option)		
ATEX*	Intrinsically Safe, Zone 0/1	Ex II 1 G EEx ia IIC T4, T5, T6	3S	♦
	Flameproof, Zone 1	Ex II 2 G EEx d IIC T5, T6, Enclosure IP 66/67	3D	♦
	Non-Sparking, Zone 2	Ex II 3 G EEx nA, IIC T6 (Honeywell). Enclosure IP 66/67	3N	♦

*See ATEX installation requirements in the ST 3000 User's Manual 97/23/EC Pressure Equipment Directive (PED)

The ST 3000 pressure transmitters listed in this Model Selection Guide are in conformity with the essential requirements of the PED. A formal statement from TÜV Industry Service Group of TÜV America, Inc., a division of TÜV Süddeutschland, a Notified Body regarding the Pressure Equipment Directive, is available upon request

TABLE IV

Factory Identification	XXXX	♦
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RESTRICTIONS

Restriction Letter	Table	Available Only With Selection	Table	Not Available With Selection
a		Approval Body pending		
b		Select only one option from this group		
c	I	-- H		
e			III	4G
m	III	SM		
n			III	1C, 2J
s			III	ME
t	III	Select from Table III S2		
u	III	1C, 2J		

Note: See ST-83 and User's Manual for part numbers.
See ST-OE-9 for OMS Order Entry Information including TC, manuals, certificates, drawings and SPINS.
See ST-OD-1 for tagging, ID, Transmitter Configuration (TC) and calibration including factory default values.

Model Selection Guide, cont.

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HART* is a trademark of the Hart Communication Foundation.

FOUNDATION™ is a trademark of the Fieldbus Foundation.

Honeywell

Industrial Measurement and Control

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