Honeywell

ST 3000 Smart Transmitter
Series 900 Absolute Pressure Models

STA922	0 to 780 mmHgA	0 to 1,040 mbarA
STA940	0 to 500 psia	0 to 35 barA

34-ST-03-66
10/99

Specification and Model Selection Guide

Function

Honeywell's ST 3000® Series 900 Absolute Pressure Transmitters bring proven "smart" technology to a wide spectrum of absolute pressure measurement applications. They transmit an output signal proportional to the measured variable in either an analog 4 to 20 milliampere format or in a digital DE protocol format for direct digital integration with our TDC 3000®X control system. Additional protocol options available for the ST 3000 Series 900 transmitters include FOUNDATION™ Fieldbus[1] and HART® [2]. See the Model Selection Guide for help in selecting the correct ordering code for the desired protocol.

In the standard transmitter you easily select the analog or digital transmission format through the Smart Field Communicator (SFC®) which is the common hand-held operator interface for our DE-based Smartline™ Transmitters. All configuration, operation, and communications functions are under the control of the ST 3000 Smart Transmitter's microprocessor and are accessible through the SFC.

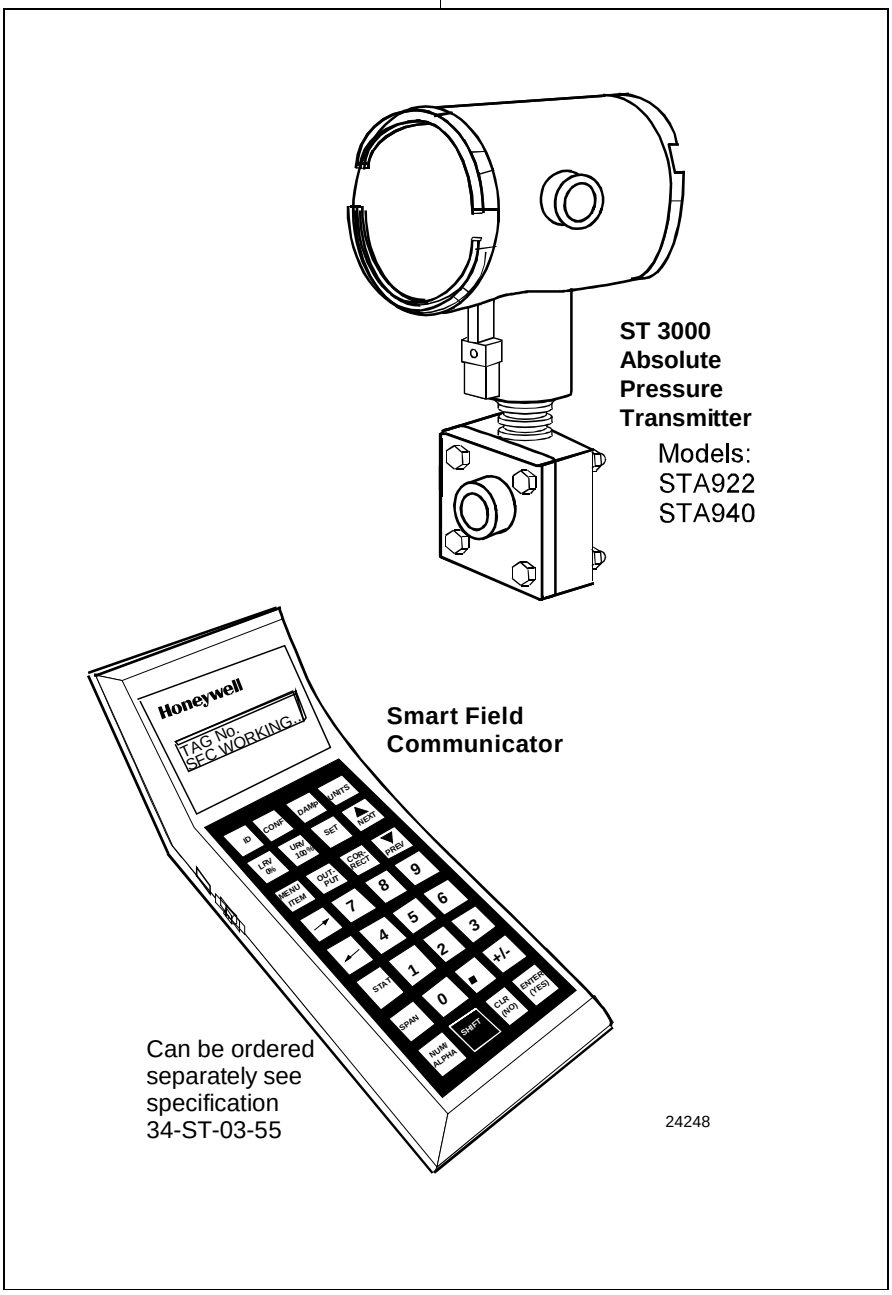

Figure 1—Series 900 Absolute Pressure Transmitters feature proven "smart" technology and come in two models to meet varying application needs.

[1] FOUNDATION™ Fieldbus is a trademark of the Fieldbus Foundation.

[2] HART is a registered trademark of the Hart Communication Foundation.

Features

- Only need two models to cover wide range of pressure measurements
- Direct digital integration with TDC 3000^X system 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.
- 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.

Description

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

The measuring means is a piezoresistive sensor that actually contains a pressure sensor and a temperature sensor. Microprocessor-based electronics provide higher span-turndown ratio, improved temperature compensation, and improved accuracy.

Like other Smartline Transmitters, the ST 3000 features two-way communication between the operator and the transmitter through our SFC. You can connect the SFC anywhere that you can access the transmitter signal lines, and it provides the capabilities of transmitter adjustments and diagnostics from remote locations, such as the control room.

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 900 or Series 100e model transmitter.

Specifications

Operating Conditions – All Models

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	-25 to 70	-13 to 158	-40 to 85	-40 to 185	-55 to 125	-67 to 257
Meter Body Temperature								
STA922	25±1	77±2	See Figure 2		See Figure 2		-55 to 125	-67 to 257
STA940	25±1	77±2	-25 to 70	-13 to 158	-40 to 80	-40 to 176	-55 to 125	-67 to 257
Humidity %RH	10 to 55		0 to 100		0 to 100		0 to 100	
Overpressure								
STA922 **mmHgA**	0		Full vacuum to 1550		Full vacuum to 1550			
mbarA	0		Full vacuum to 2066		Full vacuum to 2066			
STA940, **psia**	0		750		750			
barA	0		52		52			
Vacuum Region - Minimum Pressure								
STA922	See Figure 2.							
STA940	Operate within specifications above 25 mmHgA (33 mbarA). Short term exposure (2 hours at 70°C/158°F) to full vacuum will not result in damage.							
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 3)							

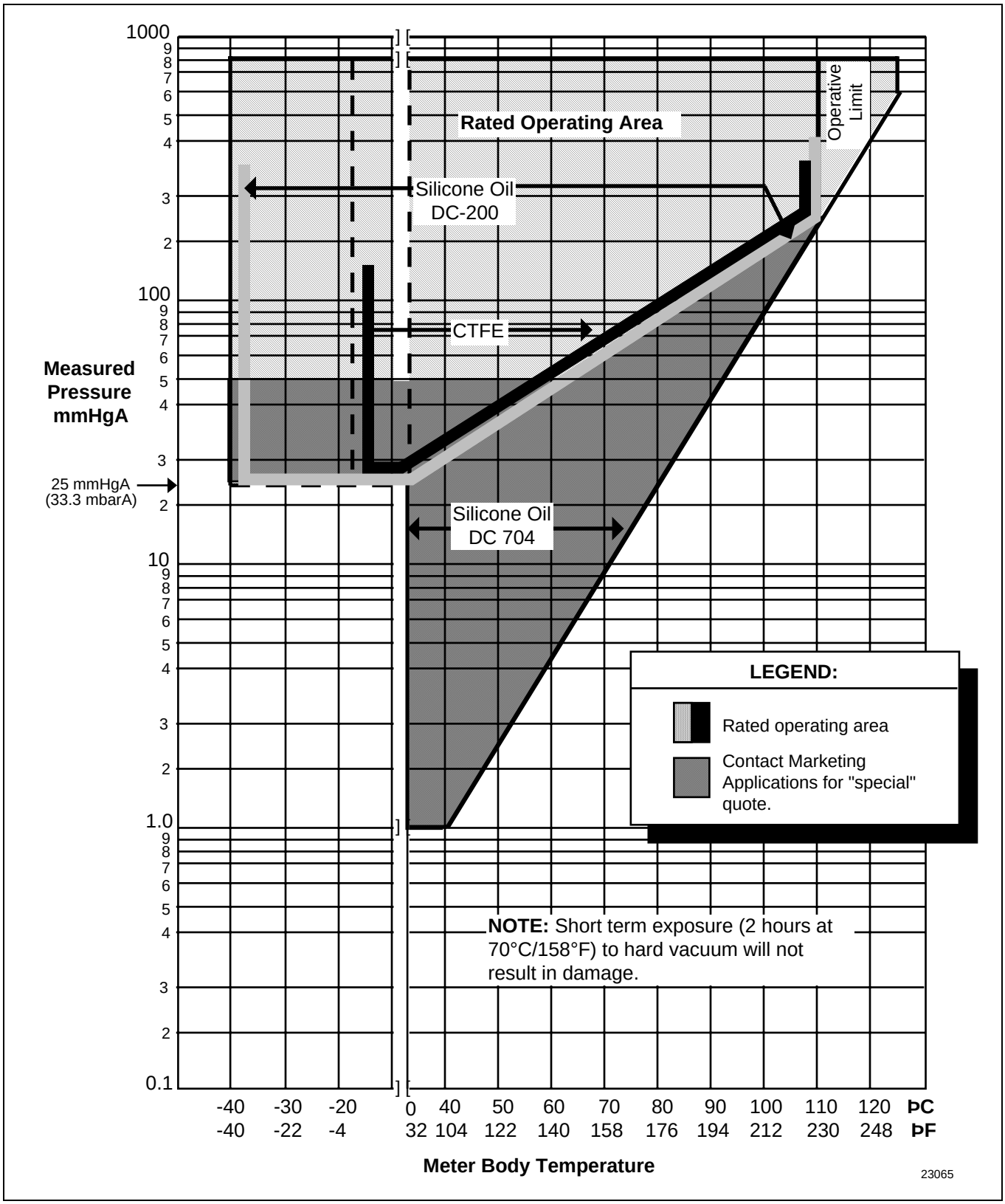

Figure 2—Measured pressure versus meter body temperature chart for model STA922

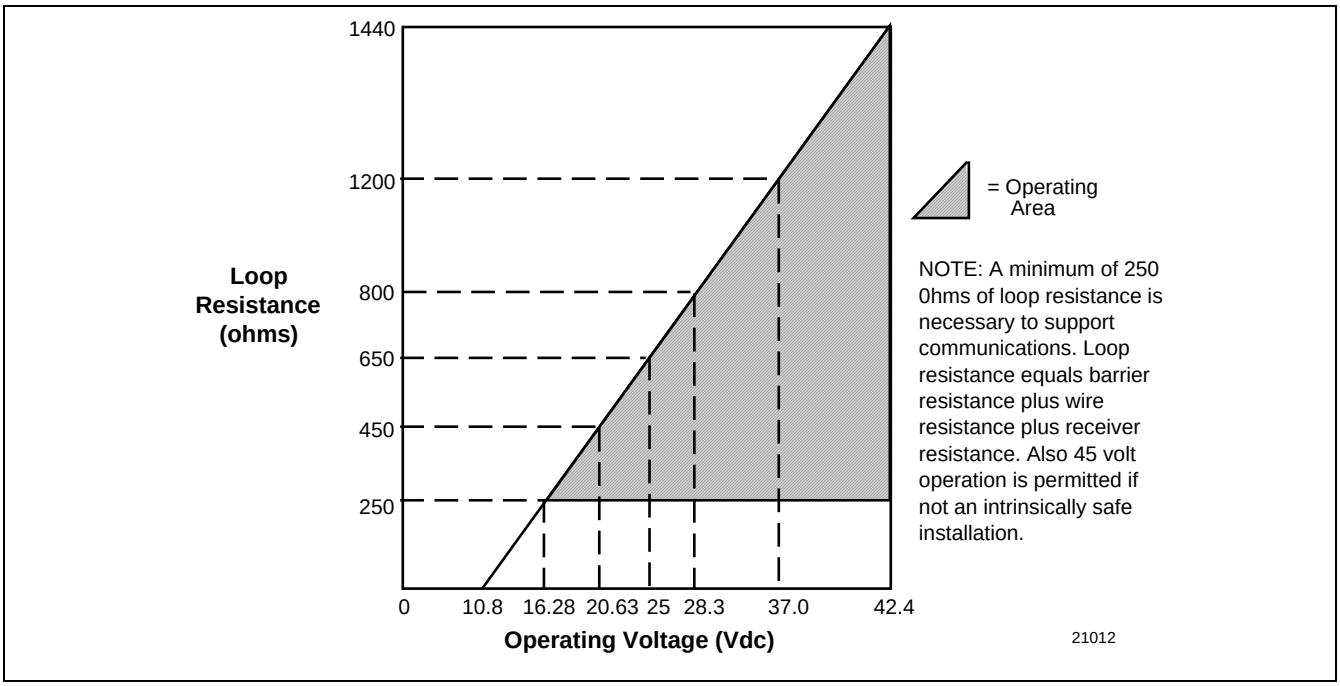

Figure 3—Supply voltage and loop resistance chart

Performance Under Rated Conditions* - Models STA922 (0 to 780 mmHgA/1040 mbarA)

Parameter	Description
Upper Range Limit **mmHgA** **mbarA**	780 (0°C/32°F is standard reference temperature for mmHg range.) 1040
Minimum Span **mmHgA** **mbarA**	50 67
Turndown Ratio	15 to 1
Zero Suppression	No limit except minimum span within 0 (zero) to +100% URL.
Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability) • *Accuracy includes residual error after averaging successive readings.* • *For FOUNDATION Fieldbus use Digital Mode specifications. For HART use Analog Mode specifications.*	**In Analog Mode:** ±0.10% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (90 mmHgA), accuracy equals: $\pm 0.05 + 0.05 \left(\frac{90 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.05 + 0.05 \left(\frac{120 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span **In Digital Mode:** ±0.075% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (90 mmHgA), accuracy equals: $\pm 0.025 + 0.05 \left(\frac{90 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.025 + 0.05 \left(\frac{120 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span
Zero Temperature Effect per 28°C (50°F)	**In Analog Mode:** ±0.1625% of span. For URV below reference point (180 mmHgA), effect equals: $\pm 0.0125 + 0.15 \left(\frac{180 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.0125 + 0.15 \left(\frac{240 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span **In Digital Mode:** ±0.15% of span. For URV below reference point (180 mmHgA), effect equals: $\pm 0.15 \left(\frac{180 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.15 \left(\frac{240 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span

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

Performance Under Rated Conditions - Models STA922 (0 to 780 mmHgA/1040 mbarA), Continued

Parameter	Description
Combined Zero and Span Temperature Effect per 28°C (50°F)	**In Analog Mode:** ±0.25% of span. For URV below reference point (180 mmHgA), effect equals: $\pm 0.10 + 0.15 \left(\frac{180 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.10 + 0.15 \left(\frac{240 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span **In Digital Mode:** ±0.225% of span. For URV below reference point (180 mmHgA), effect equals: $\pm 0.075 + 0.15 \left(\frac{180 \text{ mmHgA}}{\text{span mmHgA}}\right)$ or $\pm 0.075 + 0.15 \left(\frac{240 \text{ mbarA}}{\text{span mbarA}}\right)$ in % span

Performance Under Rated Conditions* - Models STA940 (0 to 500 psia/35 barA)

Parameter	Description
Upper Range Limit **psia** **barA**	500 35
Minimum Span **psia** **barA**	20 1.4
Turndown Ratio	25 to 1
Zero Suppression	No limit except minimum span within 0 (zero) to +100% URL.
Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability) • *Accuracy includes residual error after averaging successive readings.* • *For FOUNDATION Fieldbus use Digital Mode specifications. For HART use Analog Mode specifications.*	**In Analog Mode:** ±0.10% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (20 psia), accuracy equals: $\pm 0.05 + 0.05 \left(\frac{20 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.05 + 0.05 \left(\frac{1.4 \text{ barA}}{\text{span barA}}\right)$ in % span **In Digital Mode:** ±0.075% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (20 psia), accuracy equals: $\pm 0.025 + 0.05 \left(\frac{20 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.025 + 0.05 \left(\frac{1.4 \text{ barA}}{\text{span barA}}\right)$ in % span
Zero Temperature Effect per 28°C (50°F)	**In Analog Mode:** ±0.1625% of span. For URV below reference point (50 psia), effect equals: $\pm 0.0125 + 0.15 \left(\frac{50 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.0125 + 0.15 \left(\frac{3.5 \text{ barA}}{\text{span barA}}\right)$ in % span **In Digital Mode:** ±0.15% of span. For URV below reference point (50 psia), effect equals: $\pm 0.15 \left(\frac{50 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.15 \left(\frac{3.5 \text{ barA}}{\text{span barA}}\right)$ in % span
Combined Zero and Span Temperature Effect per 28°C (50°F)	**In Analog Mode:** ±0.25% of span. For URV below reference point (50 psia), effect equals: $\pm 0.10 + 0.15 \left(\frac{50 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.10 + 0.15 \left(\frac{3.5 \text{ barA}}{\text{span barA}}\right)$ in % span **In Digital Mode:** ±0.225% of span. For URV below reference point (50 psia), effect equals: $\pm 0.075 + 0.15 \left(\frac{50 \text{ psia}}{\text{span psia}}\right)$ or $\pm 0.075 + 0.15 \left(\frac{3.5 \text{ barA}}{\text{span barA}}\right)$ in % span

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

Performance Under Rated Conditions - General for all Models

Parameter	Description
Output (two-wire)	Analog 4 to 20 mA or DE digital communications mode. Options available for FOUNDATION Fieldbus and 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.
Lightning Protection Option (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 SS, Hastelloy C-276
Process Head Material	316 SS, Carbon Steel (zinc-plated), Hastelloy C-276
Head Gaskets	Viton is standard. Teflon is optional but not recommended for leak-proof service under full vacuum.
Meter Body Bolting	Carbon Steel (zinc-plated, standard) or A286 SS (NACE) bolts and 302/304 SS (NACE) nuts for heads.
Mounting Bracket	Carbon Steel (zinc-plated) or Stainless Steel angle bracket or Carbon Steel flat bracket available.
Fill Fluid	Silicone DC 200 oil or CTFE (Chlorotrifluoroethylene) Note that DC 704 is available – Please contact Product Marketing.
Electronic Housing	Epoxy-Polyester hybrid paint. Low Copper-Aluminum. Meets NEMA 4X (watertight) and NEMA 7 (explosion proof). Stainless steel optional.
Process Connections	1/2-inch NPT, DIN
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 4.
Dimensions	See Figure 5.
Net Weight	10 pounds (4.5 Kg)
Approval Bodies	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 T5 and EEx d IIC T6 per CENELEC standards; and Ex N II T5 per BS 6941. Series 900 with HC (HART) Compatibility is self certified for Zone 2, T5, maximum 42V/22 mA.

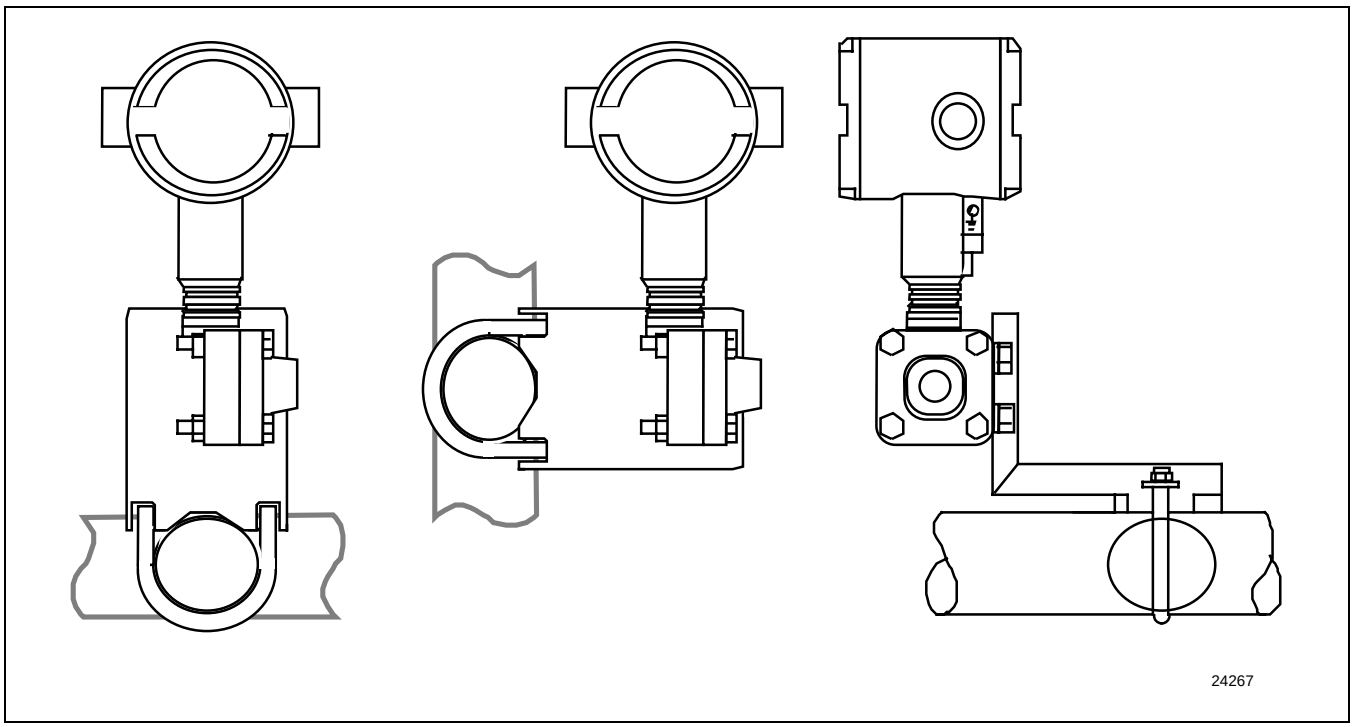

Figure 4—Examples of typical mounting positions

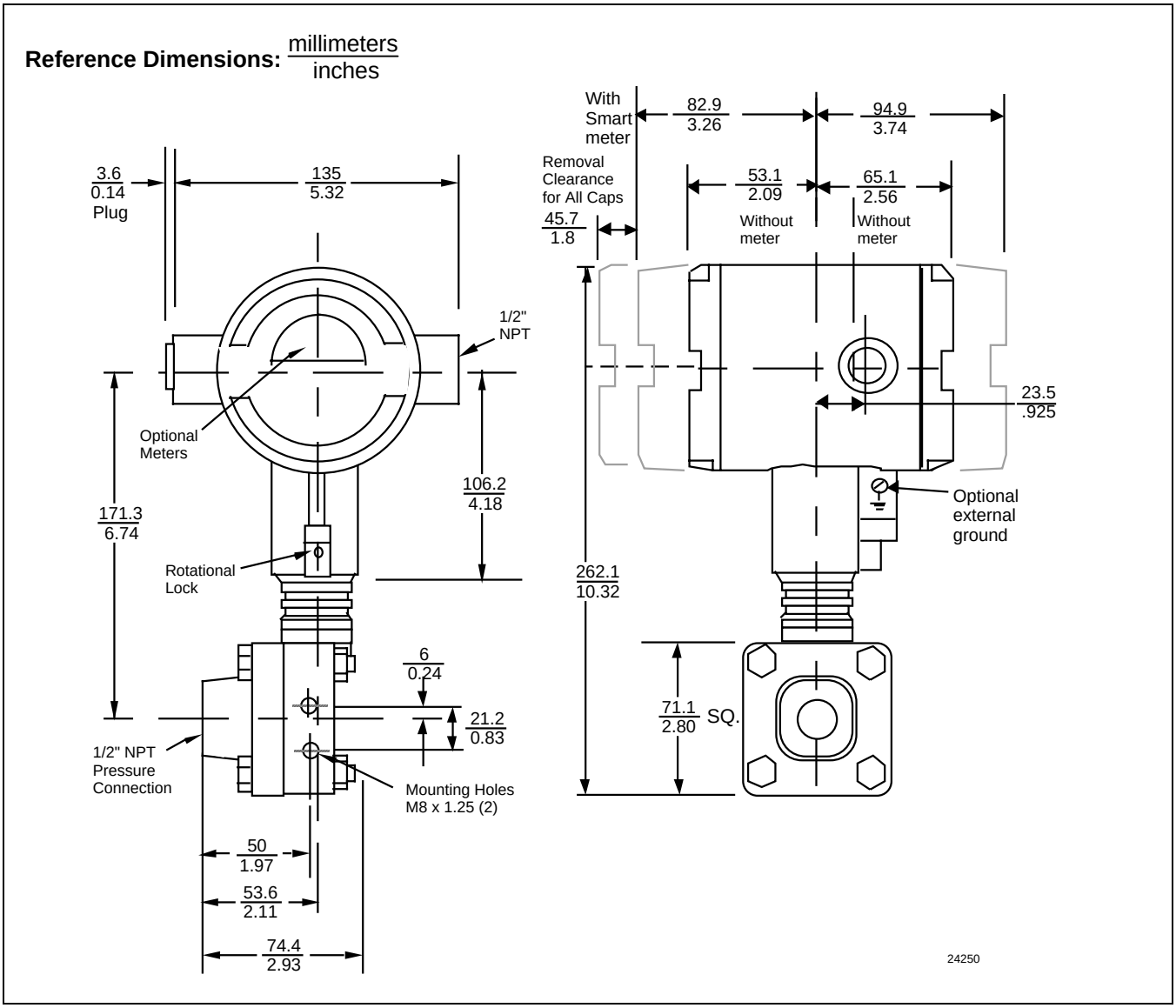

Figure 5—Typical mounting dimensions for reference

Options

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.

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.

Lightning Protection
A terminal block is available with circuitry that protects the transmitter from transient surges induced by nearby lightning strikes.

HART Protocol Compatibility (Option HC)
An optional electronics module is available for the Series 900 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.)

Configuration of the HART Option transmitter is accomplished using a Universal HART Communicator. For full functionality the communicator must contain the Honeywell Device Description (DD). Contact your nearest Honeywell office or distributor for further information regarding this option.

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.

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.

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.

FOUNDATION Fieldbus (Option FF)
Equips transmitter with FF protocol for use in 31.25 kbit/s FF networks. See document 34-ST-03-72 for additional information on ST 3000 Fieldbus transmitters.

Specifications are subject to change without notice.
(Note that specifications may differ slightly for transmitters manufactured before October 30, 1995.)

Ordering Information

Contact your nearest Honeywell sales office, or

In the U.S.:
Honeywell
Industrial Automation & Control
16404 N. Black Canyon Highway
Phoenix, AZ 85023
1-800-288-7491

In Canada:
The Honeywell Centre
155 Gordon Baker Rd.
North York, Ontario
M2H 3N7
1-800-461-0013

In Latin America:
Honeywell Inc.
480 Sawgrass Corporate Parkway,
Suite 200
Sunrise, FL 33325
(954) 845-2600

In Europe:
Honeywell PACE
1, Avenue du Bourget
B-1140 Brussels, Belgium
[32-2] 728-2111

In Asia:
Honeywell Asia Pacific Inc.
Room 3213-25
Sun Hung Kai Centre
No. 30 Harbour Road
Wanchai, Hong Kong
2829-8298

In the Pacific:
Honeywell Limited
5 Thomas Holt Drive
North Ryde NSW 2113
Australia
(61 2) 9353 7000

Or, visit Honeywell on the World Wide Web at:
http://www.honeywell.com

Model Selection Guide

34-ST-16-26

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 are desired, specify 00). A dot denotes unrestricted availability. A letter denotes restricted availability. Restrictions follow Table IV.

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

KEY NUMBER

Span		Selection	Availability
Absolute	0-50 to 0-780 mmHgA/0-67 to 1040 mbar A.	STA922	↓
Pressure	0-20 to 0-500 psia/0-1.4 to 0-35 bar abs	STA940	↓

TABLE I - METER BODY

	Wetted Process Head ***	Vent/Drain Valve **	Barrier Diaphragms		
Material of Construction	Carbon Steel *	316 St. St.	316 LSS	A _ _	•
	Carbon Steel *	316 St. St.	Hastelloy C	B _ _	•
	316 St. St.	316 St. St.	316 LSS	E _ _	•
	316 St. St.	316 St. St.	Hastelloy C	F _ _	•
	Hastelloy C	Hastelloy C	Hastelloy C	J _ _	•
Fill Fluid	Silicone DC200 ****			_ 1 _	•
	CTFE			_ 2 _	•
Process Head Configuration	1/4" NPT			_ _ A	
	1/2" NPT with Adapter			_ _ G	
	1/2" NPT			_ _ G	•

TABLE II

No Selection	00000	•

***** Carbon Steel heads are zinc-plated. Not recommended for water service due to hydrogen migration. Use Stainless Steel heads.

****** Vent/Drains are Teflon coated for lubricity.

******* The standard reference head for the STG9XX is carbon steel (zinc-plated). See Table III for a stainless steel reference (HR) head option.

******** If STA922 operating below 50mm HgA, see Figure 2 in Specification 34-ST-03-65 and contact Marketing Applications for a "Special" Silicone DC704 quote.

Note: End vent drain valve standard for STG9XX.
End vent drain valves are not available on STA9XX.

Model Selection Guide, continued

TABLE III - OPTIONS	Selection	Availability STA9 22 40	
None	00	•	
Viton Process Head Gaskets (teflon is standard)	VT		
Teflon Process Head Gaskets (viton is standard)	TF	•	
A286SS (NACE) Bolts and 302/304SS (NACE) Nuts for Heads	CR	•	
Analog Meter (0-100 Even 0-10 Square Root)	ME	•	b
Smart Meter	SM	•	
Stainless Steel Customer Wired-On Tag (4 lines, 28 characters per line, customer supplied information)	TG	•	
Stainless Steel Customer Wired-On Tag (blank)	TB	•	
Adapter Flange - 1/2" NPT St. Steel	S1		
Adapter Flange - 1/2" NPT Hastelloy-C	T1		
Modified DIN Process Heads - 316SS	DN	v	
Mounting Bracket - Carbon Steel	MB	•	
Mounting Bracket - ST. ST.	SB	•	b
Flat Mounting Bracket - Carbon Steel	FB	•	
316 ST.ST. Electronics Housing with M20 Conduit Connections	SH	m	
1/2" NPT to M20 316SS Conduit Adapter (BASEEFA EEx d IIC)	A1	n	b
1/2" NPT to 3/4" NPT 316 SS Conduit Adapter	A2	u	
Side Vent/Drain	SV		
Custom Calibration and I.D. in Memory	CC	•	
Transmitter Configuration	TC	•	
Write Protection	WP	•	
Lightning Protection	LP	•	
St. St. Reference Head (Carbon Steel standard)	HR	•	
Clean Transmitter for Oxygen or Chlorine Service with Certificate	0X	h	
Over-Pressure Leak Test with F3392 Certificate	TP	•	
Additional Warranty - 1 year	W1	•	
Additional Warranty - 2 years	W2	•	b
Additional Warranty - 3 years	W3	•	
Additional Warranty - 4 years	W4	•	
Blind DIN SS Flanges Mounted with NACE Bolts	B1	•	
Low Temperature - -50°C Ambient Limit	LT		
Calibration Test Report and Certificate of Conformance (F3399)	F1	•	b
Certificate of Conformance (F3391)	F3	•	
Certificate of Origin (F0195)	F5	•	
NACE Certificate (F0198)	F7	o	
HART® Protocol Compatible Electronics	HC	e	b
FOUNDATION Fieldbus Communications	FF	r	

Table III continued next page

Model Selection Guide, continued

TABLE III - OPTIONS (continued)

Approval Body	Approval Type	Location or Classification	Selection	Availability STA9 22 40
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		
Zone 2 (Europe)	Self-Declared per 94/9/EC (ATEX4)	Ex II 3 GD T (1) X (1) T4 at Tamb. 93ºC, T5 at Tamb. 80ºC, T6 at Tamb. 65ºC	3N	•
SA (Australia)	Intrinsically Safe	Ex ia IIC T4	4H	a
	Non-Incendive	Ex n IIC T6 (T4 with SM option)		
	Flame Proof	Ex d IIC T6		
LCIE	Flame Proof/ CENELEC	EEx d IIC T6	3A	•
	Intrinsically Safe/ CENELEC	EEx ia IIC T5		
	Flame Proof/ CENELEC	EEx d IIC T6	3D	•

b

TABLE IV

Factory Identification	XXXX	•

Model Selection Guide, continued

RESTRICTIONS

Restriction		Available Only With		Not Available With
Letter	**Table**	**Selection**	**Table**	**Selection**
a	Approval Body Pending			
b	Select only one option from this group			
e	III	1C, 2J, 3D, 3N, 9X		
h	I	_ 2 _		
m			III	ZS, 1C, 2J
n			III	1C, 2J
o	III	CR or B1		
r	III	1C, 2J, 3A, 3D, 3N, 4H, 9X		
s			III	FF, ME
u	III	1C, 2J		
v	I	E _ G, F _ G		
x	III	FF, SM		

Note: See 13:ST-29 and User's Manual for part numbers.
See 13:ST-OE-9 for OMS Order Entry Information including TC, manuals, certificates, drawings and SPINS.
See 13:ST-OD-1 for tagging, ID, Transmitter Configuration (TC) and calibration including factory default values.
To request a quotation for a non-published "special", fax RFQ to Marketing Applications.

Honeywell

Industrial Automation and Control
Honeywell Inc.
16404 North Black Canyon Highway
Phoenix, Arizona 85023-3099