ДАТЧИКИ ДАВЛЕНИЯ

Технические характеристики

на STR12D, STR13D,

STR14A, STR14G, STR17G

ST 3000 Smart Transmitter

Series 100 Remote Diaphragm Seals Models

STR12D	0-10 to 0-400 inH_2O	0-25 to 0-1000 mbar
STR13D	0-5 to 0-100 psid	0-0.35 to 0-7 b
STR14G	0-5 to 0-500 psig	0-0.35 to 0-35 b
STR17G	0-100 to 0-3000 psig	0-7 to 0-210 bar
STR14A	0-5 to 0-500 psia	0-0.35 to 0-35 bar

34-ST-03-64

Specification and Model Selection Guide

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 100 Remote Seal Transmitters continue to bring proven "smart" technology to a wide spectrum of measurement applications. Typical applications include high accuracy level measurement in pressurized vessels in the chemical and hydrocarbon processing industries. A second application consists of accurate flow measurement for slurries and high viscosity fluids in the chemical industry. Honeywell remote seal transmitters demonstrate proven reliability in hundreds on installations in a wide variety of industries and applications with a wide variety of secondary fill fluids for corrosive or high temperature process fluids.

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 high-performance ST 3000 S100 transmitters lead the industry in:

- Accuracy
- Stability
- Reliability
- Rangeability
- Warranty

Includes Lifetime™ Transmitters:

- Total Accuracy = ±0.0375%
- Stability = ±0.01% per year
- Reliability = 470 years MTBF
- Rangeability = 400 to 1
- Lifetime Warranty = 15 years

Figure 1—Series 100 Remote Seal Pressure Transmitters feature proven piezoresistive sensors and advanced seal technology with standard weld connections.

The devices provide comprehensive self-diagnostics to help users maintain high uptime, meet regulatory requirements, and attain high quality standards. S100 transmitters are ideal for critical applications, such as custody transfer of natural gas and energy and material balances, where accuracy and stability are of the utmost importance.

"Our commitment to Honeywell field instruments is based on seamless integration with our Honeywell system and the enhanced fault detection that the Honeywell DE protocol offers. Honeywell instruments also offer us a better way of ensuring database integrity over simple analog instruments. In addition, Honeywell's high-quality support has enabled us to better implement solutions to some of our more difficult problems. We have used Honeywell differential pressure smart transmitters for the past eight years. Based on their accuracy and low failure rates, we are now targeting critical flow applications that require the robustness that these transmitters bring."

DCS Systems Engineer
International Integrated Oil Company

Description of Diaphragm Seals

Diaphragm seals are traditionally used when a standard pressure transmitter should not be exposed to the process pressure directly. Diaphragm seals typically protect the pressure transmitter from one or more damaging aspects of the process media. Consideration for using a diaphragm seal should be made in the following circumstances.

- High Process Temperature
- Process Media is Viscous or Contains Suspended Solids
- Process Media is Subject to Solidifying
- Process Media is Corrosive
- Process Application Requires Sanitary Connections
- Process Application Subjects the Measuring Instrument to Hydrogen Permeation
- Tank Level Applications with Maintenance Intensive Wet Legs
- Tank Application with Density or Interface Measurements
- Measuring Instrument Requires Remote Mounting

The following diaphragm seals are standard from Honeywell (please call your local salesperson if you do not see the product you need for your application):

Figure 2 - Flush Flange Seals can be used with differential, gauge and absolute pressure transmitters and are available with 3" ANSI Class 150, ANSI Class 300 and DIN DN80-PN40 process connections. Flush flange seals can also be provided with Lowers. Lowers are essentially calibration rings, which allow flushing connections if needed – see Figure 31.

Figure 2

Figure 3 - Flange Seal with Extended Diaphragm can be used with differential, gauge and absolute pressure transmitters and are available with 3" and 4" ANSI Class 150, ANSI Class 300, DIN DN80-PN40 and DIN DN100-PN40 process connections. 2", 4" and 6" extension lengths are available.

Figure 3

Figure 4 - Pancake Seals can be used with differential, gauge and absolute pressure transmitters and are available with 3" ANSI Class 150, 300 and 600 process connections.

Figure 4

Figure 5 - Chemical Tee "Taylor" Wedge seals can be used with differential pressure transmitters and are available with Taylor Wedge 5" O.D. process connection.

Figure 5

Description of Diaphragm Seals	
Figure 6 - Seals with Threaded Process Connections can be used with differential, gauge and absolute pressure transmitters and are available with ½", ¾" and 1" NPT Female process connections.	 **Figure 6**
Figure 7 - Sanitary Seals can be used with differential, gauge and absolute pressure transmitters and are available with 3" and 4" Tri-Clover-Tri-Clamp process connections.	 **Figure 7**
Figure 8 - Saddle Seals can be used with differential, gauge and absolute pressure transmitters and are available with 3" and 4" (6 bolt or 8 bolt designs) process connections.	 **Figure 8**
Figure 9 - Calibration Rings are available with Flush Flange Seals and Pancake Seals. Flushing ports (1/4" or ½") are available with calibration rings.	 **Figure 9**
Figure 10 - Stainless Steel Armor and PVC Coated Stainless Steel Armor Capillaries are available with Honeywell Remote Seal Solutions.	 **Figure 10**
Figure 11 - 2" Stainless Steel Nipples are available for Close-Coupled remote seal solutions.	 **Figure 11**

Figure 12 - Welded Meter Body for All-Welded Remote Seal Solution. The welded ST 3000 meter body is an important part of an All-Welded Remote Seal Solution, which is commonly used in Vacuum applications.	 **Figure 12**

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 and configuration capability between the operator and the transmitter through several Honeywell field-rated portable configuration devices, including the Smart Field Communicator (SFC) and the Multiple Communication Configurator (MC ToolKit). While both are made for in-field use, the MC Toolkit also can be ordered for use in intrinsically safe environments.

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 down-line 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 – All Models

Parameter	Reference Condition		Rated Condition		Operative Limits		Transportation and Storage	
	°C	°F	°C	°F	°C	°F	°C	°F
Ambient Temperature *	25 ±1	77 ±2	—	—	—	—	–55 to 90	–67 to 194
Humidity RH	10 to 55		0 to 100		0 to 100		0 to 100	
Maximum Allowable Working Pressure (MAWP)	MAWP is minimum of Body Rating or Seal Rating (See Model Selection Guide for Seal MAWP) **Body** — **MAWP** STR12D — 2500 psig (172 bar) Bolted Process Heads Table I _ _ A STR13D — 2500 psig (172 bar) Bolted Process Heads Table I _ _ A STR12D — 1450 psig (100 bar) All Welded Process Heads Table I _ _ C STR13D — 1450 psig (100 bar) All Welded Process Heads Table I _ _ C STR14G — 500 psig (35 bar) STR17G — 3000psig (207 bar) STR14A — 500 psia (35 bar).							
Vacuum Region - Minimum Pressure mmHg absolute	Atmospheric (See Figure 15 for vacuum limitations.)							
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 16)							

* Ambient Tem erature Limit is a function of Process Interface Temperature. (See Figure 13.)

Performance Under Rated Conditions * - Model STR12D (0-10 to 0-400 inH_2O)

Parameter	Description
Upper Range Limit ** inH2O mbar	400 (39.2°F/4°C is standard reference temperature for inH_2O range.) 1000
Minimum Span inH2O mbar	10 Note: Recommended minimum span in square root mode is 20 inH_2O (50 mbar). 25
Turndown Ratio	40 to 1
Zero Elevation and Suppression	No limit except minimum span within ±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:** ±0.2% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (50 inH_2O), accuracy equals: $\pm 0.1 + 0.1 \left(\frac{50\ \text{in}H_2O}{\text{span in}H_2O}\right)$ or $\pm 0.1 + 0.1 \left(\frac{125\ \text{mbar}}{\text{span mbar}}\right)$ in % of span **In Digital Mode:** ±0.175% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (50 inH_2O), accuracy equals: $\pm 0.075 + 0.10 \left(\frac{50\ \text{in}H_2O}{\text{span in}H_2O}\right)$ or $\pm 0.075 + 0.10 \left(\frac{125\ \text{mbar}}{\text{span mbar}}\right)$ in % of span
Combined Zero and Span Temperature Effect per 28°C (50°F) * **	**In Analog Mode:** ±1.2% of span. For URV below reference point (200 inH_2O), effect equals: $\pm 0.2 + 1.0 \left(\frac{200\ \text{in}\ H_2O}{\text{span in}\ H_2O}\right)$ or $\pm 0.2 + 1.0 \left(\frac{500\ \text{mbar}}{\text{span mbar}}\right)$ In % span **In Digital Mode:** ±1.175% of span. For URV below reference point (200 inH_2O), effect equals: $\pm 0.175 + 1.0 \left(\frac{200\ \text{in}\ H_2O}{\text{span in}\ H_2O}\right)$ or $\pm 0.175 + 1.0 \left(\frac{500\ \text{mbar}}{\text{span mbar}}\right)$ In % span

* 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.

** Transmitter URL limit or maximum seal pressure rating, whichever is lower.

*** Specification applies to transmitters with 2 seals only. Apply 1.5 times factor to temperature effect for capillary lengths greater than 10 feet.

Performance Under Rated Conditions * - Model STR13D (0-5 to 0-100 psid)

Parameter	Description
Upper Range Limit ** **psid** **bar**	100 7
Minimum Span **psid** **bar**	5 0.35
Turndown Ratio	20 to 1
Zero Elevation and Suppression	No limit except minimum span within –18% and +100% of URL. Specifications valid from –5% to 100% of URL.
Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability) • *Stated accuracy **does not** apply for models with 2.9 inch diameter remote seal diaphragms.* • *Accuracy includes residual error after averaging successive readings.* • *For FOUNDATION Fieldbus use Digital Mode specifications. For HART use Analog Mode specifications.*	**In Analog Mode:** ±0.1% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (30 psi), accuracy equals: $\pm 0.05 + 0.05 \left(\frac{30\ \text{psi}}{\text{span psi}}\right)$ or $\pm 0.05 + 0.05 \left(\frac{2\ \text{bar}}{\text{span bar}}\right)$ in % of span **In Digital Mode:** ±0.075% of calibrated span or upper range value (URV), whichever is greater, terminal based. For URV below reference point (30 psi), accuracy equals: $\pm 0.025 + 0.05 \left(\frac{30\ \text{psi}}{\text{span psi}}\right)$ or $\pm 0.025 + 0.05 \left(\frac{2\ \text{bar}}{\text{span bar}}\right)$ in % of span
Combined Zero and Span Temperature Effect per 28°C (50°F) ***	**In Analog Mode:** ±0.33% of span. For URV below reference point (60 psi), effect equals: $\pm 0.05 + 0.2 \left(\frac{60\ \text{psi}}{\text{span psi}}\right)$ or $\pm 0.05 + 0.28 \left(\frac{4\ \text{bar}}{\text{span bar}}\right)$ In % span **In Digital Mode:** ±0.305% of span. For URV below reference point (60 psi), effect equals: $\pm 0.025 + 0.25 \left(\frac{60\ \text{psi}}{\text{span psi}}\right)$ or $\pm 0.025 + 0.28 \left(\frac{4\ \text{bar}}{\text{span bar}}\right)$ In % span

* 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.

** Transmitter URL limit or maximum seal pressure rating, whichever is lower.

*** Specification applies to transmitters with 2 seals only. Apply 1.5 times factor to temperature effect for capillary lengths greater than 10 feet.

Performance Under Rated Conditions * - Model STR14G (0-5 to 0-500 psig)

Parameter	Description
Upper Range Limit ** psig bar	500 35
Minimum Span psig bar	5 0.35
Turndown Ratio	100 to 1
Zero Elevation and Suppression	No limit except minimum span from absolute zero to 100% of URL. Specifications valid over this range.
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:** ±0.1% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (20 psi), accuracy equals: $\pm 0.05 + 0.05 \left(\frac{20 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.05 + 0.05 \left(\frac{1.4 \text{ bar}}{\text{span bar}}\right)$ in % of span **In Digital Mode:** ±0.075% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (20 psi), accuracy equals: $\pm 0.025 + 0.05 \left(\frac{20 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.025 + 0.05 \left(\frac{1.4 \text{ bar}}{\text{span bar}}\right)$ in % of span

* 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.

** Transmitter URL limit or maximum seal pressure rating, whichever is lower.

Performance Under Rated Conditions * - Model STR17G (0-100 to 0-3000 psig)

Parameter	Description
Upper Range Limit ** psig bar	3000 210
Minimum Span psig bar	100 7
Turndown Ratio	30 to 1
Zero Elevation and Suppression	No limit except minimum span from absolute zero to 100% of URL. Specifications valid over this range.
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:** ±0.15% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (300 psi), accuracy equals: $\pm 0.10 + 0.05 \left(\frac{300 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.10 + 0.05 \left(\frac{21 \text{ bar}}{\text{span bar}}\right)$ in % of span **In Digital Mode:** ±0.125% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (300 psi), accuracy equals: $\pm 0.075 + 0.05 \left(\frac{300 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.075 + 0.05 \left(\frac{21 \text{ bar}}{\text{span bar}}\right)$ in % of span

* 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.

** Transmitter URL limit or maximum seal pressure rating, whichever is lower.

Performance Under Rated Conditions * - Model STR14A (0-5 to 0-500 psia)

Parameter	Description
Upper Range Limit ** psia bar absolute	500 35
Minimum Span psia bar absolute	5 0.35
Turndown Ratio	100 to 1
Zero Elevation and Suppression	No limit except minimum span from 0 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:** ±0.1% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (20 psi), accuracy equals: $\pm 0.05 + 0.05 \left(\frac{20 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.05 + 0.05 \left(\frac{1.4 \text{ bar}}{\text{span bar}}\right)$ in % of span **In Digital Mode:** ±0.075% of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (20 psi), accuracy equals: $\pm 0.025 + 0.05 \left(\frac{20 \text{ psi}}{\text{span psi}}\right)$ or $\pm 0.025 + 0.05 \left(\frac{1.4 \text{ bar}}{\text{span bar}}\right)$ in % of span

* 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.

** Transmitter URL limit or maximum seal pressure rating, whichever is lower.

Performance Under Rated Conditions – General for all Models

Parameter	Description
Output (two-wire)	Analog 4 to 20 mA or digital communications DE mode. Options available for FOUNDATION Fieldbus and HART protocol.
Supply Voltage Effect	±0.005% of span per volt.
Damping Time Constant	Adjustable from 0 to 32 seconds digital damping.
RFI Protection (Standard)	Negligible (20 to 1000 MHz at 30 volts per meter).
CE Conformity (Europe)	89/336/EEC, Electromagnetic Compatibility (EMC) Directive.
NAMUR NE 43 Compliance Option	Transmitter failure information is generated when the measuring information is invalid or no longer present. Failure information is transmitted as a current signal but outside the normal 4-20 mA measurement signal level. Transmitter failure values are: ≤ 3.6 mA and ≥ 21.0 mA. The normal signal range is ≥ 3.8 mA and ≤ 20.5 mA.
SIL 2/3 Compliance	SIL certified to IEC 61508 for non-redundant use in SIL 2 related Safety Systems (single use) and for redundant (multiple) use in SIL 3 Safety Systems through TÜV Nord Sys Tec GmbH & Co. KG under the following standards: IEC61508-1: 1998; IEC 61508-2: 2000; IEC61508-3: 1998.

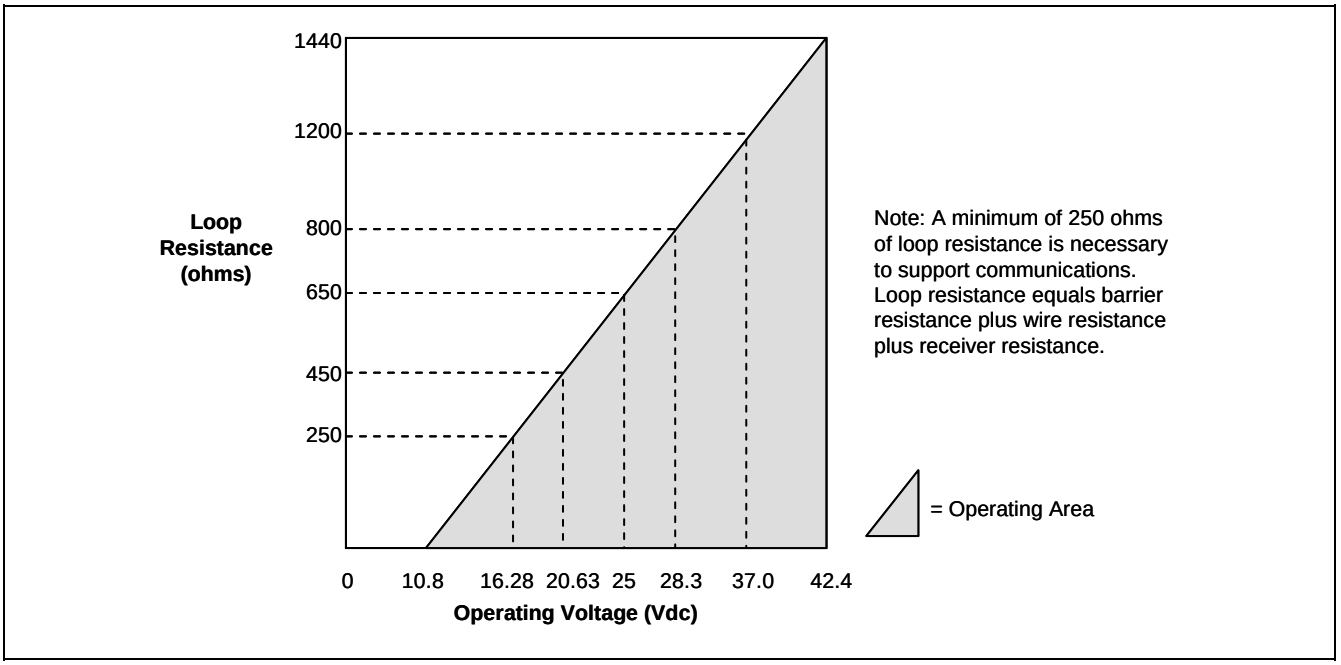
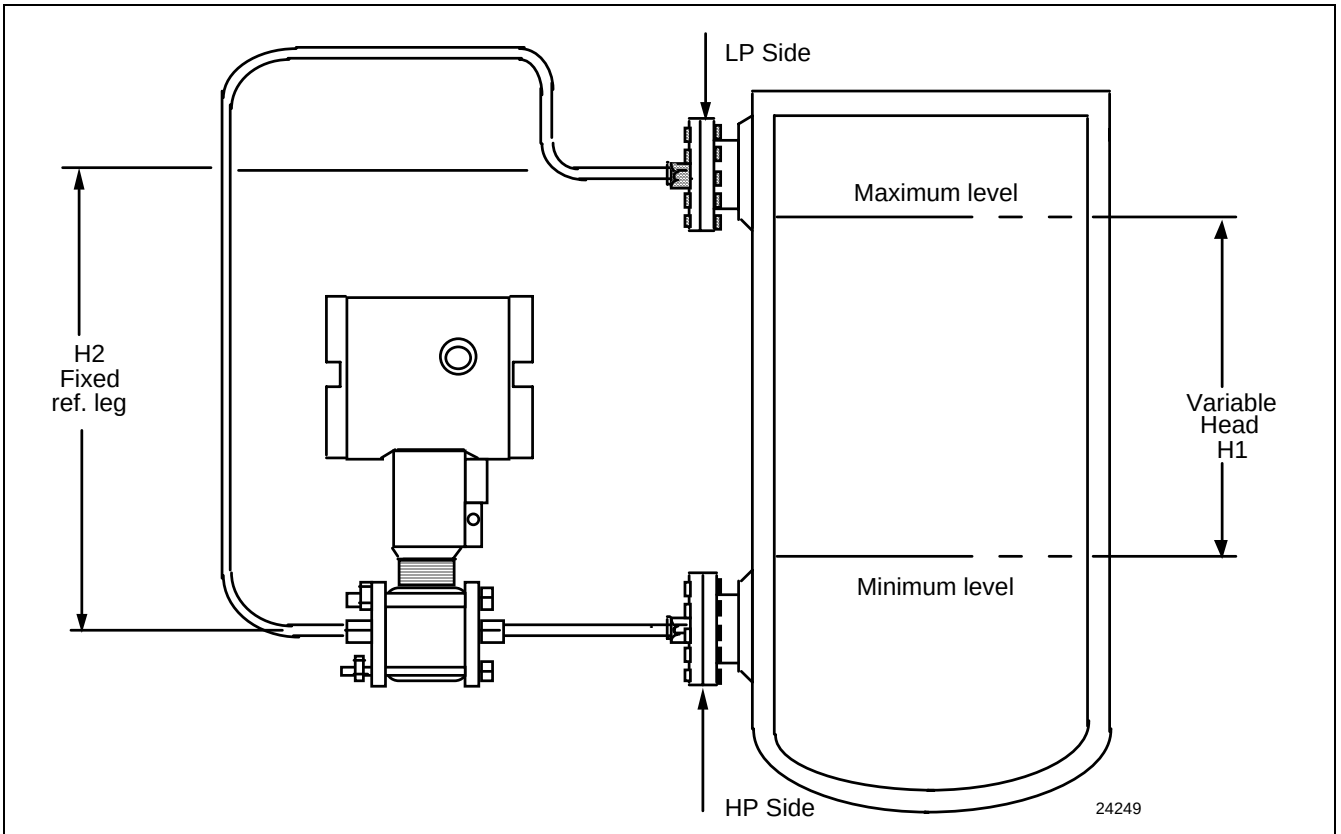


Figure 16—Supply voltage/loop resistance chart.



NOTE: Lower flange seal should not be mounted over 22 feet below or above the transmitter for silicone fill fluid (11 feet for CTFE fill fluid) with tank at one atmosphere. The combination of tank vacuum and high pressure capillary head effect should not exceed 9 psi vacuum (300 mmHg absolute).

Consult Honeywell for installation of STR13D.

Figure 17—The ST 3000 transmitter with remote diaphragm seals shown mounted on a tank.

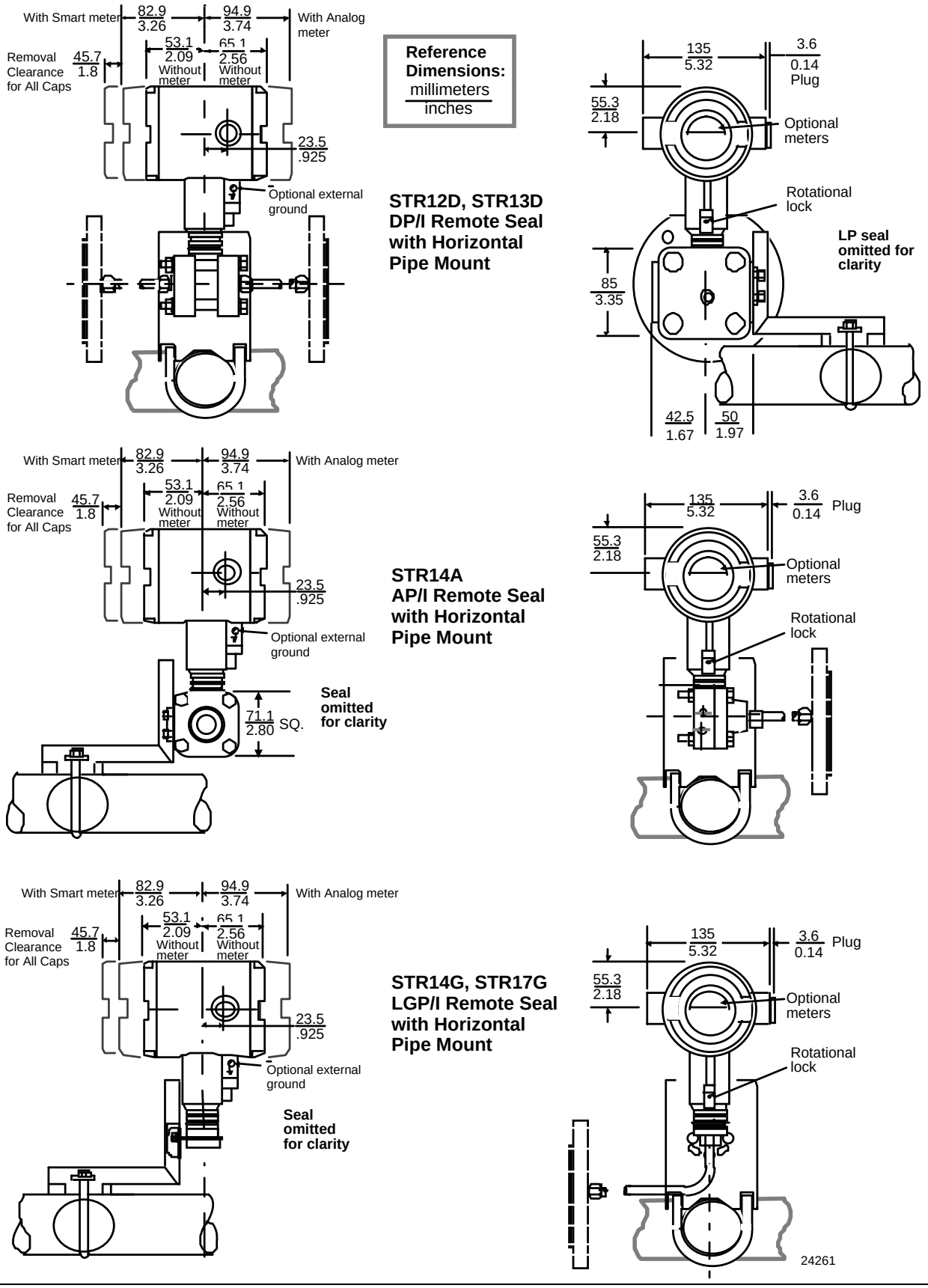


Figure 20a —Approximate horizontal mounting dimensions for Remote Seal Transmitter.

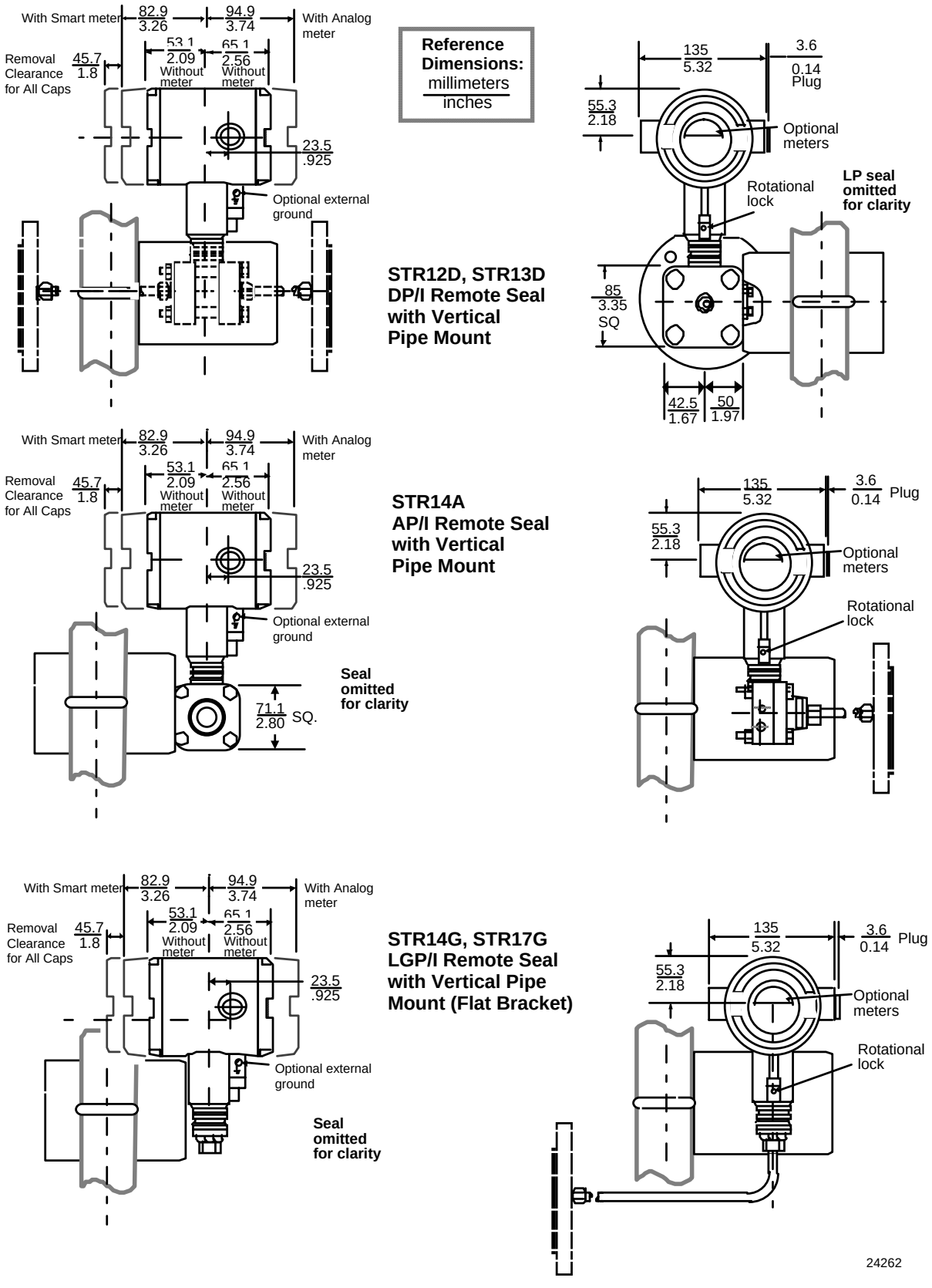


Figure 20b —Approximate vertical mounting dimensions for Remote Seal Transmitter.

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