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ДАТЧИКИ ДАВЛЕНИЯ

Технические характеристики
на STA722/72L/74L/740/77L



STA700 SmartLine Absolute Pressure Specification 34-ST-03-100



Introduction

Part of the SmartLine® family of products, the STA700 and STA70L are suitable for monitoring, control and data acquisition. STA70X products feature piezoresistive sensor technology combining pressure sensing with on chip temperature compensation capabilities providing high accuracy, stability and performance over a wide range of application pressures and temperatures. The SmartLine family is also fully tested and compliant with Experion® PKS providing the highest level of compatibility assurance and integration capabilities. SmartLine easily meets the most demanding application needs for pressure measurement applications.

Best in Class Features:

- Accuracy up to 0.065 % of calibrated span
- Automatic temperature compensation
- Rangeability up to 100:1
- Response times as fast as 100ms
- Alphanumeric display capabilities
- External zero, span, & configuration capability
- Polarity insensitive electrical connections
- On-board diagnostic capabilities
- Integral Dual Seal design for safety based on ANSI/NFPA 70-202 and ANSI/ISA 12.27.0
- Full compliance to SIL 2/3 requirements as a standard.
- Modular design characteristics

Span & Range Limits:

Model	URL mmHgA (mbarA)	LRL mmHgA (mbarA)	Min Span mm HgA (mbarA)	MAWP mmHgA (mbarA)
STA722/72L	780 (1040)	0 (0)	50 (65.0)	780 (1040)
Model	psia (barA)	psi (barA)	psi (barA)	psia (barA)
STA740/74L	500 (35)	0 (0)	5 (.35)	500 (35)
STA77L	3000 (210)	0 (0)	30 (2.1)	3000 (210)



Figure 1 – STA700 Absolute Pressure Transmitters feature field-proven piezoresistive sensor technology

Communications/Output Options:

- Honeywell Digitally Enhanced (DE)
- HART® (version 7.0)
- FOUNDATION™ Fieldbus

All transmitters are available with the above listed communications protocols.

Description

The SmartLine family pressure transmitters are designed around a high performance piezo-resistive sensor. This one sensor actually integrates multiple sensors linking process pressure measurement with on-board static pressure (DP Models) and temperature compensation measurements. This level of performance allows the ST 700 to replace most competitive transmitters available today.

Indication/Display Option

The ST 700 modular design accommodates a basic alphanumeric LCD display.

Basic Alphanumeric LCD Display Features

- Modular (may be added or removed in the field)
- 0, 90,180, & 270 degree position adjustments
- Configurable (HART only) and standard (Pa, KPa, MPa, KGcm², Torr, ATM, inH₂O, mH₂O, bar, mbar, inH₂O, inHG, FTH₂O, mmH₂O, mm HG, & psi) measurement units
- 2 Lines 16 Characters (4.13H x 1.83W mm)
- Square root output indication (√)

Simple LCD Display Features

- Modular (may be added or removed in the field)
- Supports HART protocol variant
- 0, 90,180, & 270 degree position adjustments
- Configurable (HART only) and standard (Pa, KPa, MPa, KGcm², Torr, ATM, inH₂O, mH₂O, bar, mbar, inH₂O, inHG, FTH₂O, mmH₂O, mm HG, & psi) measurement units.
- Supports Flow engineering units
- 2 Lines 6 digits PV (9.95H x 4.20W mm) 8 Characters
- Square root output indication (√) and Write protect Indication
- Built in Basic Device Configuration through Internal Buttons – Range/Engineering Unit/Loop Test /Loop Calibration/Zero /Span Setting

Diagnostics

SmartLine transmitters all offer digitally accessible diagnostics which aid in providing advanced warning of possible failure events minimizing unplanned shutdowns, providing **lower overall operational costs**

System Integration

- SmartLine communications protocols all meet the most current published standards for HART/DE/Fieldbus.
- Integration with Honeywell's Experion PKS offers the following unique advantages.
 - Tamper reporting
 - FDM Plant Area Views with Health summaries
 - All ST 700 units are Experion tested to provide the highest level of compatibility assurance

Configuration Tools

External Three Button Configuration Option

Suitable for all electrical and environmental requirements, SmartLine offers the ability to configure the transmitter and display via three externally accessible buttons when a display option is selected. Zero/span capabilities are also optionally available via these buttons with or without selection of the display option.

Internal Two Button Configuration Option

The Simple display has two buttons that can be used for Basic configuration such as re ranging, PV Engineering unit setting, Zero/Span settings and Loop testing and calibration functions

Hand Held Configuration

SmartLine transmitters feature two-way communication and configuration capability between the operator and the transmitter. This is accomplished via Honeywell's field-rated Multiple Communication Configurator (MCT404). The MCT404 is capable of field configuring DE and HART Devices and can also be ordered for use in intrinsically safe environments. All Honeywell transmitters are designed and tested for compliance with the offered communication protocols and are designed to operate with any properly validated hand held configuration device.

Personal Computer Configuration

Honeywell's SCT 3000 Configuration Toolkit provides an easy way to configure Digitally Enhanced (DE) instruments using a personal computer as the configuration interface. Field Device Manager (FDM) Software and FDM Express are also available for managing HART & Fieldbus device configurations.

Modular Design

To help contain maintenance & inventory costs, all ST 700 transmitters are modular in design supporting the user's ability to replace meter bodies, add indicators or change electronic modules without affecting overall performance or approval body certifications. Each meter body is uniquely characterized to provide in-tolerance performance over a wide range of application variations in temperature and pressure and due to the Honeywell advanced interface, electronic modules may be swapped with any electronics module without losing in-tolerance performance characteristics.

Modular Features

- Meter body replacement
- Exchange/replace electronics/comms modules*
- Add or remove integral indicator*
- Add or remove lightning protection (terminal connection)*

* Field replaceable in all electrical environments (including IS) except flameproof without violating agency approvals.

With no performance effects, Honeywell's unique modularity results in **lower inventory needs and lower overall operating costs**.

Performance Specifications

Reference Accuracy: (conformance to +/-3 Sigma)

Model	URL	LRL	Min Span	Maximum Turndown Ratio	Stability (% URL/Year for five years)	Reference Accuracy % Span ^{1,2}
STA722	780 mmHgA (1040 mbarA)	0.0 mmHgA (0.0 mbarA)	50 mmHgA (65.0 mbarA)	15:1	0.020	0.065%
STA740	500 psia (35 barA)	0.0 mmHgA (0.0 mbarA)	5 psia (0.35 barA)	100:1		
STA72L	780 mmHgA (1040 mbarA)	0.0 mmHgA (0.0 mbarA)	50 mmHgA (65.0 mbarA)	15:1		
STA74L	500 psia (35 barA)	0.0 mmHgA (0.0 mbarA)	5 psia (0.35 barA)	100:1		
STA77L	3000 psi (210 barA)	0.0 mmHgA (0.0 mbarA)	30 psia (2.1 barA)	100:1		

Zero and span may be set anywhere within the listed (URL/LRL) range limits

Accuracy at Specified Span and Temperature: (Conformance to +/-3 Sigma)

Model	URL	Turn downs greater than	Accuracy ^{1,2} (% of Span)			Temperature Effect (% Span/50°F)	
			A	B	C (see URL units)	D	E
STA722	780 mmHgA (1040 mbarA)	8.7:1	0.015	0.05	90(120)	0.065	0.045
STA740	500 psia (35 barA)	25:1			20(1.4)	0.050	0.010
STA72L	780 mmHgA (1040 mbarA)	5.6:1			140(187)	0.065	0.100
STA74L	500 psia (35 barA)	25:1			20(1.4)	0.050	0.015
STA77L	3000 psi (210 barA)	6:1			500(35)	0.050	0.010
Turn Down Effect						Temp Effect	
_____						_____	
% Span						% Span per 28°C (50°F)	

Total Performance (% of Span):

$$\text{Total Performance Calculation: } = \pm \sqrt{(\text{Accuracy})^2 + (\text{Temperature Effect})^2}$$

Total Performance Examples (for comparison): @ 5:1 Turndown, +/-50 °F (28°C) shift

STA722 @ 156 mmHgA: 0.297% of span

STA72L @ 156 mmHgA: 0.569% of span

STA740 @ 100 psia: 0.119% of span

STA74L @ 100 psia: 0.141% of span

STA77L @ 600 psia: 0.119% of span

Typical Calibration Frequency:

$$\pm \left[A + B \left(\frac{C}{\text{Span}} \right) \right] \pm \left[D + E \left(\frac{\text{URL}}{\text{Span}} \right) \right]$$

Calibration verification is recommended every two (2) years

Notes:

- Terminal Based Accuracy - Includes combined effects of linearity, hysteresis, and repeatability. Analog output adds 0.005% of span.
- For zero based spans and reference conditions of: 25 °C (77°F), 10 to 55% RH, and 316 Stainless Steel barrier diaphragm.

Operating Conditions – All Models

Parameter	Reference Condition		Rated Condition		Operative Limits		Transportation and Storage	
	°C	°F	°C	°F	°C	°F	°C	°F
Ambient Temperature¹	25±1	77±2	-40 to 85	-40 to 185	-40 to 85	-40 to 185	-55 to 120	-67 to 248
Meter Body Temperature²								
STA722/STA72L	25±1	77±2	See Figure 1		See Figure 1		-55 to 125	-67 to 257
STA740, 74L, 77L	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	
Vacuum Region - Minimum Pressure STA722, 72L, 740, 74L, 77L	See Figure 2. Operate within specifications above 25 mmHgA (33 mbarA). Short term ³ exposure to full vacuum will not result in damage.							
Supply Voltage, Current, and Load Resistance (HART & DE)	10.8 to 42.4 Vdc at terminals (IS versions limited to 30 Vdc) 0 to 1,440 ohms (as shown in Figure 3)							
Maximum Allowable Working Pressure (MAWP)^{4, 5}	STA722, 72L = 780 mmHgA, 1,040 mbarA STA740, 74L = 500 psia, 35 barA STA77L = 3,000 psia, 210 barA							

¹ LCD Display operating temperature -20°C to +70°C. Storage temperature -30°C to 80°C.

² Silicone 704 minimum temperature rating is 0°C (32°F)

³ Short term equals 2 hours at 70°C (158°F)

⁴ Units can withstand overpressure of 1.5 x MAWP without damage

⁵ Consult factory for MAWP of ST 700 transmitters with CRN approval

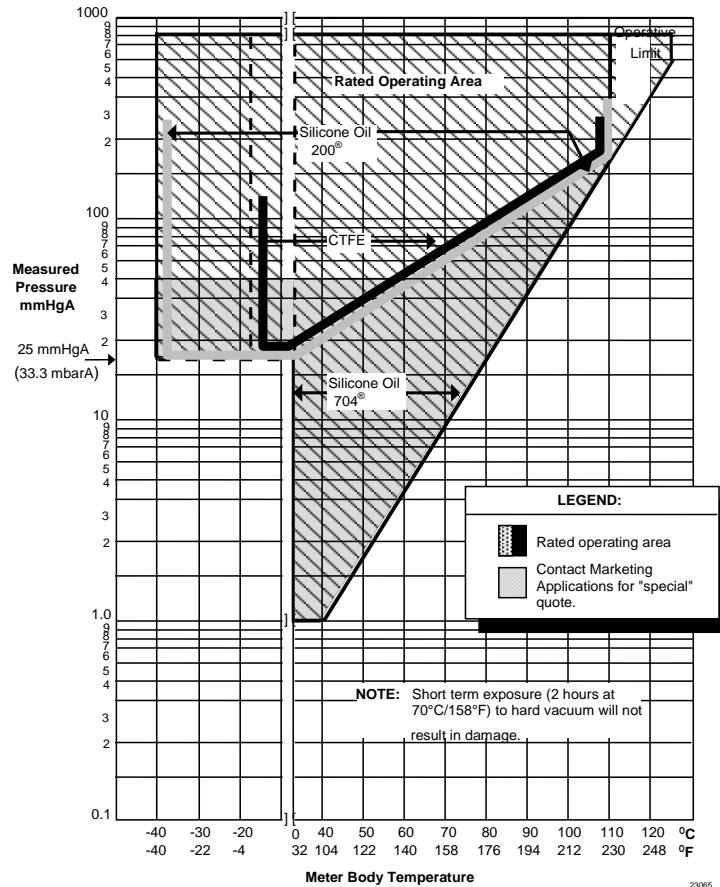
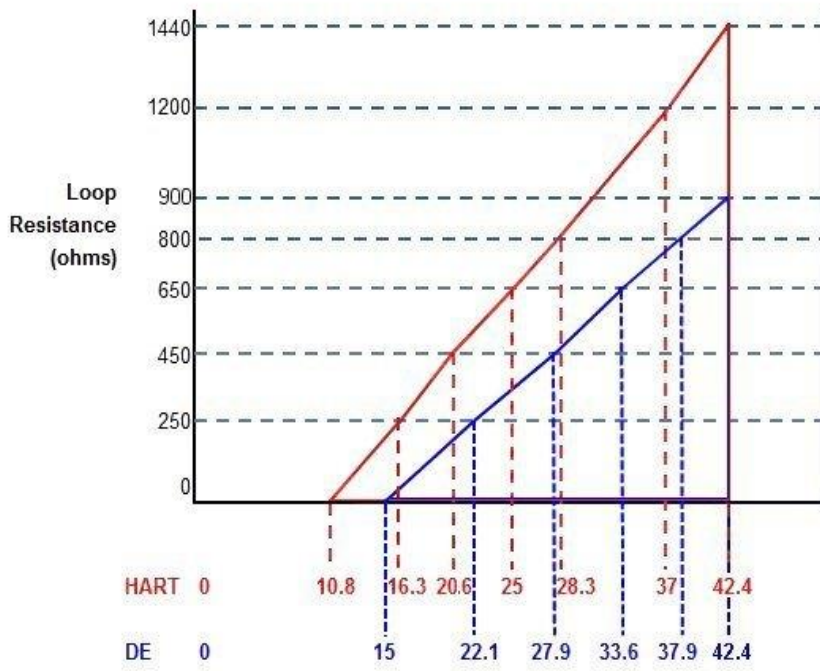
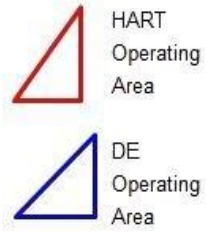


Figure 2 - Measured pressure versus meter body temperature chart for STA722, 72L



Note:
 A minimum of 250 ohms of loop resistance is required to support communications.
 Loop resistance = barrier resistance
 + wire resistance
 + receiver resistance
 + peripheral device resistance



For DE, $R_{max} = 35 * (\text{Power Supply Voltage} - 15)$
For HART, $R_{max} = 45.6 * (\text{Power Supply Voltage} - 10.8)$

Figure 2 - Supply voltage and loop resistance chart & calculations

Performance Under Rated Conditions – All Models

Parameter	Description									
Analog Output Digital Communications:	Two-wire, 4 to 20 mA (HART & DE Transmitters only) Honeywell DE, HART 7 protocol or FOUNDATION Fieldbus ITK 6.0.1 compliant All transmitters, irrespective of protocol have polarity insensitive connection.									
HART & DE Output Failure Modes (NAMUR for DE Units requires selecting display and configuration buttons or factory configuration)	<table> <thead> <tr> <th></th> <th>Honeywell Standard:</th> <th>NAMUR NE 43 Compliance:</th> </tr> </thead> <tbody> <tr> <td>Normal Limits:</td> <td>3.8 – 20.8 mA</td> <td>3.8 – 20.5 mA</td> </tr> <tr> <td>Failure Mode:</td> <td>≤ 3.6 mA and ≥ 21.0 mA</td> <td>≤ 3.6 mA and ≥ 21.0 mA</td> </tr> </tbody> </table>		Honeywell Standard:	NAMUR NE 43 Compliance:	Normal Limits:	3.8 – 20.8 mA	3.8 – 20.5 mA	Failure Mode:	≤ 3.6 mA and ≥ 21.0 mA	≤ 3.6 mA and ≥ 21.0 mA
	Honeywell Standard:	NAMUR NE 43 Compliance:								
Normal Limits:	3.8 – 20.8 mA	3.8 – 20.5 mA								
Failure Mode:	≤ 3.6 mA and ≥ 21.0 mA	≤ 3.6 mA and ≥ 21.0 mA								
Supply Voltage Effect	0.005% of span per volt.									
Transmitter Turn on Time (includes power up & test algorithms)	HART or DE: 2.5 sec Foundation Fieldbus: Host dependant									
Response Time (delay + time constant)	<table> <thead> <tr> <th><u>DE/HART Protocol</u></th> <th><u>FOUNDATION Fieldbus</u></th> </tr> </thead> <tbody> <tr> <td>100ms</td> <td>150ms (Host Dependant)</td> </tr> </tbody> </table>	<u>DE/HART Protocol</u>	<u>FOUNDATION Fieldbus</u>	100ms	150ms (Host Dependant)					
<u>DE/HART Protocol</u>	<u>FOUNDATION Fieldbus</u>									
100ms	150ms (Host Dependant)									
Damping Time Constant	HART: Adjustable from 0 to 32 seconds in 0.1 increments. Default Value: 0.5 seconds DE: Discrete values 0, .16, .32, .48, 1, 2, 4, 8, 16, 32 seconds. Default Value: 0.48 seconds									
Vibration Effect	Less than +/- 0.1% of URL w/o damping Per IEC60770-1 field or pipeline, high vibration level (10-2000Hz: 0.21 displacement/3g max acceleration)									
Electromagnetic Compatibility	Meets IEC61326-3-1									
Lightning Protection Option	Leakage Current: 10uA max @ 42.4VDC 93C Impulse rating: 8/20uS 5000A (>10 strikes) 10000A (1 strike min.) 10/1000uS 200A (> 300 strikes)									

Materials Specifications (see model selection guide for availability/restrictions with various models)

Parameter	Description
Barrier Diaphragms Material	STA700: 316L SS, Hastelloy® C-276 ² , Monel® 400 ³ , Tantalum STA70L: 316L SS, Hastelloy C-276
Process Head Material	STA700: Carbon Steel (Zinc Plated) ⁵ , 316 SS ⁴ , Hastelloy® C-276 ⁶ , Monel® 400 ⁷ STG70L: 316L SS, Hastelloy® C-276 ⁶
Vent/Drain Valves & Plugs ¹	STA700: 316 SS ⁴ , Hastelloy C-276 ² , Monel 400 ⁷ STA70L: N/A
Head Gaskets	STA700: Glass-filled PTFE standard. Viton® and graphite are optional. STA70L: N/A
Meter Body Bolting	STA700: Carbon Steel (Zinc plated) standard. Options include 316 SS, NACE A286 SS bolts and nuts or NACE A286 SS bolts and 304 SS nuts STA70L: N/A
Mounting Bracket	Carbon Steel (Zinc-plated) or 304 Stainless Steel or 316 Stainless Steel. See Figures 4 & 5
Fill Fluid	Silicone 200, CTFE (Chlorotrifluoroethylene) or Silicone 704
Electronic Housing	Pure Polyester Powder Coated Low Copper (<0.4%)-Aluminum. Meets NEMA 4X, IP66, IP67 and NEMA 7 (explosion proof). All stainless steel housing is optional.
Process Connections	STA700: ½ -inch NPT (female), DIN 19213 (standard) STA70L: ½ -inch NPT (female), ½ -inch NPT male, 9/16 Aminco, DIN19213. G½ -B Male Thread
Wiring	Accepts up to 16 AWG (1.5 mm diameter).
Dimensions	See Figure 4 & 5
Net Weight	STA700: 8.3 pounds (3.8 Kg). STA70L: 3.6 pounds (1.6 Kg) with Aluminum Housing

¹ Vent/Drains are sealed with Teflon®

² Hastelloy® C-276 or UNS N10276

³ Monel® 400 or UNS N04400

⁴ Supplied as 316 SS or as Grade CF8M, the casting equivalent of 316 SS.

⁵ Carbon Steel heads are zinc-plated and not recommended for water service due to hydrogen migration. For that service, use 316 stainless steel wetted Process Heads.

⁶ Hastelloy® C-276 or UNS N10276. Supplied as indicated or as Grade CW12MW, the casting equivalent of Hastelloy® C-276

⁷ Monel® 400 or UNS N04400. Supplied as indicated or as Grade M30C, the casting equivalent of Monel® 400

Communications Protocols & Diagnostics

HART Protocol

Version:

HART 7

Power Supply

Voltage: 10.8 to 42.4Vdc at terminals

Load: Maximum 1440 ohms See figure 2

Minimum Load: 0 ohms. (For handheld communications a minimum load of 250 ohms is required)

Foundation Fieldbus (FF)

Power Supply Requirements

Voltage: 9.0 to 32.0Vdc at terminals

Steady State Current: 17.6mAdc

Software Download Current: 27.4mAdc

Available Function Blocks

Block Type	Qty	Execution Time
Resource	1	n/a
Transducer	1	n/a
Diagnostic	1	n/a
Analog Input	1*	30 ms
PID w/Autotune	1	45 ms
Integrator	1	30 ms
Signal Char (SC)	1	30 ms
LCD Display	1	n/a
Flow Block	1	30 ms
Input Selector	1	30 ms
Arithmetic	1	30 ms

* AI block may have two (2) additional instantiations.

All available function blocks adhere to FOUNDATION Fieldbus standards. PID blocks support ideal & robust PID algorithms with full implementation of Auto-tuning.

Link Active Scheduler

Transmitters can perform as a backup Link Active Scheduler and take over when the host is disconnected. Acting as a LAS, the device ensures scheduled data transfers typically used for the regular, cyclic transfer of control loop data between devices on the Fieldbus.

Number of Devices/Segment

Entity IS model: 6 devices/segment

Schedule Entries

18 maximum schedule entries

Number of VCR's: 24 max

Compliance Testing: Tested according to ITK 6.0.1

Software Download

Utilizes Class-3 of the Common Software Download procedure as per FF-883 which allows the field devices of any manufacturer to receive software upgrades from any host.

Honeywell Digitally Enhanced (DE)

DE is a Honeywell proprietary protocol which provides digital communications between Honeywell DE enabled field devices and Hosts.

Power Supply

Voltage: 10.8 to 42.4Vdc at terminals

Load: Maximum 1440 ohms See figure 2

Standard Diagnostics

ST 700 top level diagnostics are reported as either critical or non-critical and readable via the DD/DTM tools or integral display as shown below.

Critical Diagnostics

HART DD/DTM Tools	Basic Display	Simple Display
Electronic Module DAC Failure	Electronics module fault	Fault Comm EI
Meter Body NVM Corrupt	Meter Body fault	Fault Mtrbody
Config. Data Corrupt	Electronics module fault	Fault Comm EI
Electronic Module Diag Failure	Electronics module fault	Fault Comm EI
Meter Body Critical Failure	Meter Body fault	Fault Mtrbody
Sensor Comms Timeout	Meter Body Comm fault	Fault Mbd Com

Non-Critical Diagnostics

HART DD/DTM Tools
Display Failure
Electronic Module Comm Failure
Meter Body Excess Correct
Sensor Over Temperature
Fixed Current Mode
PV Out of Range
No Factory Calibration
No DAC Compensation
LRV Set Error – Zero Config. Button
URV Set Error – Zero Config. Button
AO Out of Range
Loop Current Noise
Meter Body Unreliable Comm
Tamper Alarm,
No DAC Calibration
Sensor Supply Voltage Low

Refer to ST 700 diagnostics tech note for additional level diagnostic information.

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