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УРОВНЕМЕРЫ

Технические характеристики
на

Smart Servo 954

INTRODUCING THE SMART SERVO 954

Honeywell Enraf has ensured that the industry's best tank gauging solution is now even better. Designed for measuring varied liquids in any type of storage tank, our new Smart Servo 954 is a reliable, versatile and accurate automatic tank gauge. This instrument advances the art of tank gauging by combining proven technology with enhanced electronics and software, as well as increased intelligence. And, it stands up to the most demanding process conditions.

THE INNOVATIVE DESIGN OF THE SMART SERVO 954 INCORPORATES:

- Patented algorithms for greater precision in all applications
- Adaptive dynamic compensations to improve measurement under adverse conditions
- Unique force transducer technology to optimize stable operation
- Advanced drum calibration for guaranteed accuracy
- "SIL-by-design" features with unique diagnostics for reliable operation (IEC 61508)
- Separate terminal compartment for ease of wiring
- Safety approvals and certifications from legal metrology institutes worldwide
 - NMI approvals
 - OIML R85 and varied liquids compliance

State-of-the-art Features

The Smart Servo 954 was designed to incorporate a host of innovative, best-in-class features.

For example, its unique, fully capable software supports diagnostics on SIL-rated loops. An option slot for additional functionalities allows the connection of temperature measuring elements for spot/average product and vapor

phase temperature, as well as product temperature profiles.

The new gauge is equipped with a Servo Auto Test feature, which increases safety, integrity and diagnostic coverage, and enables usage in overfill protection loops. It can be included in SIL-2 safety loops, and if used in a redundant configuration, is suitable for SIL-3-rated loops.



A FLEXIBLE AND ADAPTABLE SOLUTION

Honeywell Enraf servo gauging systems provide a flexible and adaptable solution for a wide range of terminal operations.

They are suitable for:

- Product and gas temperature with spot or average temperature measurement, or temperature profiling
- Product level
- Interface level
- Density measurement and profiling
- Direct water bottom measurement or via capacitive probes
- Average continuous density monitoring connecting one or more HART pressure transmitters
- TUV SIL certified NO/NC alarm relay contact and/or 4-20mA Analog output for direct connection to Safety or Distributed control system
- Easy integration with Honeywell Experion DCS system & Safety Manager ESD system
- Measurement ranges up to 150 m
- Working pressure up to 40 bar

BENEFITS TO YOUR BOTTOM LINE

Honeywell Enraf Smart Servo 954 is the most reliable, versatile and accurate automatic tank gauge available.

- Accurate measurement in liquids including vaporized applications
- Improve reliability under dynamic conditions
- Maximize storage capacity with lowest safety diagnostic cycle time
- Enhanced safety with SIL certified AO/DO options for overfill prevention
- Modular design for ease of maintenance
- Simple & cost effective migrations for legacy & 3rd party gauge
- One stop integrated gauging solution for all your terminal needs



Technical Specifications

DATA COMMUNICATION

Honeywell Bi-phase mark (Pos 7 = B)

| | |
|-----------------------|--|
| Baud rate | 1200 / 2400 bps |
| Cable characteristics | 2 wires, twisted pair, Rmax = 200 Ohm / line, Cmax = 1uF; cable length: 10 km (6 miles) or more *1 |
| Isolation voltage | > 1,500 V |
| Lightning protection | Full galvanic separation via isolating transformers |
| Protocol | Standard Honeywell fieldbus (Serial, ASCII, GPU protocol) |
| Common mode rejection | > 150 dB |

TRL/2 Communication Protocol TRL/2 Communication Protocol TRL/2 Communication Protocol (Pos 7 = T)

| | |
|----------------------|---|
| Protocol | Modbus RTU; Communication: TRL/2 100/90 KHz FSK |
| Baud rate | 4800, 8 bits and 1 stop bit. |
| Lightning protection | Opto-isolators |
| Cabling | 18 AWG (minimum) with shielded twisted pair, max 4 km with max 8 multi drop Gauge connections |
| Physical layer | Logic 1 is represented by 100kHz and Logic 0 by 90kHz:(+/-3%) |
| Voltage levels | 3.6V +/- 10%. |
| Power rating | At 12V Nominal current drawn by TRL/2 module alone is 40mA (+/- 10%), [power consumption is 480mW (+/- 10%)]. The worst case current/power drawn with below mentioned conditions is 60mA. |

HART® Slave – Multidrop and/or 4-20 mA (Pos 7 = H)

| | |
|-------------------------------|--|
| Protocol | Communications: HART® 7 |
| Analog output loop (non-I.S.) | Active or Passive; selectable by jumper <ul style="list-style-type: none"> – Active: output voltage: 20V ±5% – Passive: minimum external supply voltage: 11.5 V maximum external supply voltage: 30 V (55 V with serial resistor) |
| Accuracy | ±0.1% of actual measurement |
| Cable characteristics | 2 wires, shielded, twisted pair |

ALARM CONTACT OPTIONS

| | |
|---------------------------|---|
| Hardware alarms (1x SPDT) | 250 VAC, 2 A (40 VDC, 2 A) |
| Hardware alarms (2x SPDT) | 250 VAC, 2 A (40 VDC, 2 A) |
| Relay operation | <ul style="list-style-type: none"> – Normally Open/Normally Closed contact: selectable by jumper – Normally Energized / Normally De-energized: configurable by software setting – PV Monitor (any of the measured parameters, configurable by software setting) – Remote control (configurable by software setting) |

SIL 2/3 SAFETY FUNCTIONS ALARM CONTACTS OPTIONS

| | |
|------------------------------------|---|
| SIL Digital Output | 1 x SIL DO contact (1 x SPDT contact, 2 A at 250 Vac or 2 A at 40 Vdc, Pmax = 500 W) 2 x SIL DO contact (2 x SPDT contact, 2 A at 250 Vac or 2 A at 40 Vdc, Pmax = 500 W) |
| SIL Analog Output | SIL AO NAMUR NE43 compliant |
| SIL Digital Output + Analog Output | SIL AO + 1 SIL DO contact NAMUR NE43 compliant (1 x SPDT contact, 2 A at 250 Vac or 2 A at 40 Vdc, Pmax = 500 W) SIL AO + 2 SIL DO contacts NAMUR NE43 compliant (2 x SPDT contact, 2 A at 250 Vac or 2 A at 40 Vdc, Pmax = 500 W) |

Continued...

Notes:

HART® is a registered trademark of the HART Communications Foundation.

*1 Distances of more than 10 km possible depending on amount of field instruments and cabling topology.

*2 Under reference conditions.

*3 With VITO temperature probe or Spot (PT100).

*4 Various generally available types of elements (RTD, MRT) can be selected.

*5 Under reference conditions

*6 Minimum product density between layers: 10.0 kg/m³ (6.25 lb/ft³)

*7 In extreme environments the accuracy could be affected depending on the thermal expansion coefficient of the wetted parts.

Technical Specifications (continued)

INPUT

VITO Input for Temperature and Water Probe

| | |
|-----------------------|--|
| Communications | Proprietary HART® (Ex-i) |
| Cable characteristics | 2 wires, shielded, twisted pair, Cmax = 1 µF, Lmax = 9 mH, Rmax = 25 Ω / line |
| Accuracy | <ul style="list-style-type: none"> – Temperature measurement: ±0.1 °C (±0.18 °F) *2, *3 – Water level measurement: ±2 mm (0.078") *3 |
| Resolution | <ul style="list-style-type: none"> – Temperature measurement: 0.01 °C (0.01 °F) – Water level measurement: 0.1 mm (0.01") |

Spot RTD Input

| | |
|-----------------------|---|
| Configurations | <ul style="list-style-type: none"> – 3 wire or 4 wire RTD, one element or two elements *4 – MPT or MRT up to 6 elements with 2 common ground wires *4 |
| Cable characteristics | Shielded, Rmax = 100 Ω / line, Cmax = 1 µF, Lmax = 10.5 mH |
| Accuracy | ±0.1 °C (±0.18 °F) |
| Resolution | 0.01 °C (0.01 °F) |

HART® Input

| | |
|-----------------------------|---|
| Configurations | <p>Options</p> <ul style="list-style-type: none"> – 5 HART® inputs and / or HIMS density calculation – VITO sensors and / or 3 HART® inputs – 3 HART® input, HIMS density calculation and VITO sensors |
| Max. instruments per module | 5 (digital) or 1 (analog) |
| Communications | HART® (revision 4) |
| Cable characteristics | 2 wires, shielded, twisted pair, Cmax = 1 µF, Lmax = 9 mH, Rmax = 25 Ω / line |
| Other Options | |
| Cable entries | Adapters available to fit other sizes cable glands |

INSTRUMENT MEASURING SPECIFICATION

Level measuring range

| | |
|--------------------------------|--|
| Standard | 27 m (88 ft) Pos 18 = A, B, C |
| Extended | <p>37 m (121 ft) Pos 18 = E, F</p> <p>40 m (131 ft) Pos 18 = H,</p> <p>45 m (147 ft) Pos 18 = K,</p> <p>35 m (115 ft) (with measuring wire up to 150 m (492 ft)) Pos 18 = M; For longer ranges, please contact factory</p> |
| Measuring accuracy level | <p>40 m (131.2 ft): < ± 0.4 mm (± 0.016") *5;</p> <p>40 m (131.2 ft): OIML R85 certified (Pos 5 = X); 45 meter with +- 1 mm accuracy</p> <p>last 35 meter with +- 1 mm accuracy on 150 m wire</p> |
| Measuring accuracy interface | < ± 2 mm (± 0.08") *6 |
| Measuring accuracy temperature | < ± 0.1 °C (± 0.18 °F) *5 |
| Sensitivity | ≤ 0.1 mm (± 0.004") *5 |
| Repeatability | ≤ 0.1 mm (± 0.004") *5 |

Density Measurement

| | |
|----------------------------------|---|
| Density measurement | With density firmware (Pos 20 = D and density displacer (Pos 19 - E or F) |
| Measuring accuracy servo density | < ± 3 kg/m3 (± 0.19 lb/ft3) |

MECHANICAL

| | |
|-------------------------|---|
| Flange | See 'Identification Code' Pos 14-16 |
| Dimensions | See 'Dimensional Drawing' |
| Weight | |
| Medium pressure version | 16 kg (35 lb) |
| Chemical version | 21 kg (46 lb) |
| High pressure version | 26 kg (57 lb) |
| Cable entries | 4 x ¾" NPT threaded (2* I.S. + 2* non-I.S.) |

Technical Specifications (continued)

PROCESS

Operating pressure

M and C versions

Up to 6 bar / 0.6 MPa (90 psi); Pos 14

H version

Up to 40 bar / 4 MPa (600 psi) (up to 25 bar / 2.5 MPa in acc. to PED); Pos 14

Temperature

Max. process temperature

+200 °C (+392 °F), drum housing must be kept below +65 °C (+149 °F) *7

Min. process temperature

-200 °C (-328 °F), drum housing must be kept above -40 °C (-40 °F) *7

PROCESS WETTED MATERIALS

Drum compartment

Cast aluminum Int. reg. AA A356 EN1706 AC-AISI7Mg0.3; Pos 14 = A or M Stainless steel ASTM A351, CF-8M, G-X6 CrNiMo 18 10 (1.4408); Pos 14 = H or C

Measuring drum, drum shaft

Stainless steel (1.4401) EN10088 AISI 316

Measuring wire

See 'Identification Code'; Pos 18

Magnet cap

Stainless steel (1.4401) EN10088 AISI 316

O-rings

Drum cover Silicone/FEP; others FPN (Viton®); Special O-ring (Perlas®) available for demanding chemical applications (such as Ammonia), part nr. S0854969

ENCLOSURE MATERIALS

Servo comp. and cover

All types cast aluminum Int. reg. AA A356 EN1706 AC-AISI7Mg0.3

Finish aluminum parts

Conforms to MIL-DTL-5541F

ENVIRONMENTAL SAFETY

Ambient temperature

-40 °C to +65 °C (-40 °F to +149 °F)

Storage temperature

-50 °C to +70 °C (-58 °F to +158 °F)

Protection class

IP66 / IP67 according to EN 60529 (NEMA 4X)

Safety

Explosion proof

- II 1/2 G Ex d IIB T6 Ga/Gb or Ex de IIB T6 Ga/Gb or Ex d [Ia Ga] IIB T6 Ga/Gb or Ex de [Ia Ga] IIB T6 Ga/Gb; acc. to ATEX KEMA
 - Class I, Division 1, Group C & D; acc. to FM
 - Class I, Group C & D acc. to CSA certificate
- Consult factory for other approvals and updates

ELECTRICAL

Power supply

Autoselect 65 Vac to 240 Vac, 50/60 Hz and/or 24 Vdc to 65 Vdc

Power rating

11 Wmax continuously

MIGRATION OPTION

Migration kit 954 (Pos 4: Option M)

Migration Kit 954 - Enraf Servo 854 ATG to Servo 954 hardware migration kit

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