

HART UNIVERSAL TEMPERATURE TRANSMITTER

SEM310 / SEM310X

- > HART 5,6,7 COMPATIBLE
- > UNIVERSAL INPUT, DUAL CHANNEL
- > ATEX & IEC Ex Version
- > MATHS FUNCTIONS
- > SENSOR CHARACTERISTICS DOWNLOAD VIA USB PORT
ALLOWS FOR CUSTOM TYPES
- > FLASH TESTED TO 4 KV DC



> INTRODUCTION

The SEM310 is a HART 5,6, or 7 compatible universal transmitter. It accepts RTD, Thermocouple, Potentiometer or millivolt input signals and converts them to the industry standard (4 to 20) mA transmission signal. Alternatively HART multidrop mode can be selected.

The SEM310 is programmed using a standard USB lead. The ATEX / IECEx version (SEM310X) is programmed with a ATEX / IECEx approved communication lead (USBX Config).

Both versions use our free configuration USBSpeedlink software downloaded from our web site. Standard features can also be programmed using HART communication.

> ENHANCED FEATURES

Some of the enhanced SEM310 features are as follows;

SENSOR REFERENCING

The SEM310 sensor referencing via the Windows based USBSpeedlink software allows for close matching to a known reference sensor eliminating possible sensor errors.

USER CALIBRATION

In addition to sensor referencing, user offset and current output trimming is possible via the USB and HART commands.

CUSTOM LINEARISATION

The SEM310 can be programmed with a custom linearization to suit nonstandard sensors or sensors with unusual or unique characteristics. Consult the sales office for details.

SENSOR BURN OUT DETECTION

If a sensor wire is broken or becomes disconnected the SEM310 output will automatically go to its user defined level (upscale or downscale) or pre-set value.

OUTPUT CURRENT PRESET

For ease of system calibration and commissioning the output can be set to a pre-defined level anywhere within the (4 to 20) mA range.

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HART UNIVERSAL TEMPERATURE TRANSMITTER

➤ SPECIFICATIONS @20 °C

ELECTRICAL INPUT

| Range + Options | Accuracy | Stability |
|---|---|--|
| Resistance | | |
| (10 to 10000) Ω Excitation 200 uA Lead resistance (0 to 20) Ω (2,3 or 4 Wire connection) | (10 to 500) Ω ± 0.055 Ω, (500 to 2500) Ω ± 0.5 Ω, (2500 to 10500) Ω ± 0.15 % of reading (+ Lead error on 2 wire) | (0 to 500) Ω 0.013 Ω/°C, (500 to 2500) Ω 0.063 Ω/°C, (2500 to 10500) Ω 0.27 Ω/°C |
| Slide Wire | | |
| (0 to 100) % Travel Wire resistance (1 to 100) KΩ | ± 0.1 % | ± 0.001%/°C |
| mV | | |
| (-205 to 205) mV DC (-1000 to 1000) mV DC | ± 0.02 mV ± 10.0 mV | ± 0.005 mV/°C ± 0.02 mV/°C |

SENSOR INPUT

RTD (Single/ 2 wire Dual Channel; isolated tip only for Dual operation)

| Type | Range | Accuracy/Stability |
|--|------------------|--|
| Pt100 (IEC) | (-200 to 850) °C | 0.2°C ± (±0.05% of reading) (Plus sensor) |
| Pt500 (IEC) | (-200 to 750) °C | |
| Pt1000 (IEC) | (-200 to 600) °C | |
| Ni100 | (-60 to 180) °C | |
| Ni120 | (-80 to 260) °C | |
| Ni1000 | (-60 to 180) °C | |
| Cu53 | (-50 to 180) °C | |
| Cu100 | (-80 to 260) °C | |
| Cu1000 | (-80 to 260) °C | |
| Library more (standards/types) Including silicon sensors | | |

Thermocouple (Single/Dual Channel; isolated tip only for Dual operation)

| Type | Range | Accuracy/Stability |
|---|-------------------|--|
| K | (-200 to 1370) °C | ± 0.1 % of full scale ± 0.5 °C (Plus sensor Error) |
| J | (-100 to 1200) °C | |
| N | (-200 to 1300) °C | |
| E | (-200 to 1000) °C | |
| T | (-200 to 400) °C | ± 0.2 % of full scale ± 0.5 °C (Plus sensor Error) |
| R | (0 to 1760) °C | ± 0.1 % of full scale ± 0.5 °C over range (800 to 1760) °C (Plus sensor Error) |
| S | (0 to 1760) °C | |
| L | (-100 to 600) °C | ± 0.1 % of full scale ± 0.5 °C (Plus sensor Error) |
| U | (0 to 600) °C | |
| B | (-200 to 1300) °C | |
| C | (0 to 2300) °C | |
| D | (0 to 2300) °C | |
| G | 0 to 2300) °C | |
| Library contains more (standards/types) | | |

DUAL CHANNEL OPERATION

| | |
|---------------------|--|
| Thermocouples A & B | Functions; Average, Redundancy, A + B, A - B, Highest, Lowest |
| mV A & B | Functions; Average, A + B, A - B, Highest, Lowest |
| RTD A & B | Two wire connection. Functions; Average, A + B, A - B, Highest, Lowest |

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AMBIENT SENSOR (Cold Junction)

| Type | Range | Accuracy/Stability |
|--------------------------|----------------|---------------------|
| Thermistor 10K Beta 3380 | (-40 to 85) °C | ±0.2 °C ±0.05 °C/°C |

OUTPUT

| Type/options | Range | Accuracy/Stability/Notes |
|--------------------------|---|--|
| Two wire current | (4 to 20) mA | (mA Out/ 2000) or 5 uA whichever is the greater, Drift 1 uA/°C |
| User set minimum current | (3.5 to 4.0) mA 3.8 mA default | |
| User set maximum current | (20 to 23.0) mA 20.5 mA default | |
| User set error current | (3.5 to 23.0) mA | |
| User Pre-set current | (20 to 23.0) mA | For diagnostics |
| Current loop off | 3.5 mA | Hart multi-drop communications |
| Loop effect | ± 0.2 uA/V | |
| Loop supply | 10 to 30 V DC | SELV |
| Max load | $[(V \text{ supply} - 10)/20] K \Omega$ | 700 Ω @ 24 V DC |
| Protection | Reverse and over voltage | |

USB USER INTERFACE

Approved USB configuration lead required for SEM310X

| Type/options/function | Description | Notes |
|------------------------|---|---|
| USB 2.0 | Mini B USB Approved configuration lead SEM310X | USB powers device for config Only. Power loop for live data. |
| Baud Rate | 38,400 | |
| Sensor configuration | Sensor type Sensor offset Sensor fail high or low Pre-set sensor value Set damping Set No. wires resistance Input Set fixed or auto cold junction | TC/mV/RTD/Ohms/Slide wire Dual TC/mV/RTD Dual use separate offsets Dual Share sensor fail For diagnostics 2, 3 or 4 wire |
| Profiler configuration | Set profiler input range Set profiler segments Enter profile X~Y values Set profiler output units Set the output process range TC & RTD input only set units | In sensor units (4 to 22) segments Profiler set up |
| Output signal | Select the process range for re-transmission Set minimum current Set maximum current Set the error current Trim 4.0 mA signal Trim 20 mA signal Pre-set Loop current Turn loop current off | Set in profiler out units (3.5 to 4.0) mA (20 to 23.0) mA (3.5 to 23.0) mA (3.8 to 4.5) mA (19.5 to 20.5) mA 3.5 mA |
| Damping | User set PV damping | 1 to 32 seconds to reach 70% of final value |

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USB USER INTERFACE Continued

| Type\options\function | Description | Notes |
|--|---|-------|
| HART information | Read/write tag number Read/write tag date Set polling address Read/write description Read/write message Read/write final assembly number Read/write long tag Read and set RTC Read HART version | |
| HART specification | Read manufacturers ID Read short ID Read HART revision Read device revision Read software revision Read hardware revision Read unique ID Read No. pre-ambls Read maximum No. variables Read No. of configuration changes Extended device status Extended manufacturers ID Extended distributes ID Device profile Device ID1, ID2 & ID3 | |
| Type\Function\options Description Type HART Protocol 1200 baud FSK Version Hart 5 to 7 compatible Universal commands | 1.Read primary variable (PV) 2.Read loop current and percentage of range 3.Read dynamic variables and Loop current 7.Read loop configuration 8.Read dynamic variable classifications 9.Read device variables with status 12.Read message 13.Read tag, descriptor and date 14.Read primary variable transducer Information 15.Read device information 16.Read final assembly number 17.Write message 18.Write tag, descriptor and date 19.Write final assembly number 20.Read long tag 22.Write long tag 38.Reset configuration changed flag 48.Read additional device status | |
| Additional universal commands | 0. Read unique ID 6. Write polling address 11. Read unique ID associated with tag 21. Read unique ID associated with long tag | |
| Common practice commands | 34. Write PV damping value 35. Write PV range 40. Enter/exit fixed current mode 41. Perform self-test 42. Perform device reset 44. Write PV units 45. Trim loop current zero 46. Trim loop current gain 49. Write primary variable transducer serial number 71. Lock device 76. Read lock device state | |

HART UNIVERSAL TEMPERATURE TRANSMITTER

| Type/options/function | Description | Notes |
|-----------------------|---|--|
| Diagnostics | Read (PV, mA, ambient °C, error & power off) logs points back from device Set the log period Clear log and start new log Export log data Detect open circuit sensor wire Cal date, certificate number, calibrated by | Up to 150 points Log Rate (1 to 60) readings per hour |
| Live Data | Read sensor signal Read profiler input signal Read profiler output signal Read ambient temperature Read % output Read mA output | |

GENERAL

| Function | Description |
|----------------|---|
| Isolation | Flash tested 5 Seconds 4 KV DC, working voltage 50 V AC |
| Reading update | 200 ms |
| Response time | 500 ms to reach 70% final value |
| Warm up | 2 minutes |
| Start-up time | 5 seconds |

AMBIENT

| Function | Description |
|-------------|---|
| Temperature | Operating/Storage (-40 to 85) °C |
| Humidity | Operating/Storage (10 to 95) % Non-condensing |
| Protection | >= IP65 |

CONNECTIONS

| | |
|--------|--|
| Output | Screw terminals (1 to 2) |
| Input | Screw terminals (3 to 6) |
| USB | Mini USB for SEM310, approved configuration lead for SEM310X |

APPROVALS

| | |
|-------|---------------------------------------|
| EMC | BS EN 61326 Industrial |
| ATEX | Ex ia IIC T4 Ga Ex ia IIIC T135 Da |
| IECEX | Ex ia T4 Ga Ex ia IIIC T135 Da |

MECHANICAL

| | |
|----------------|----------------------------------|
| Enclosure | DIN standard size terminal block |
| Material | ABS flammability UL94-V0 |
| Dimensions | 44 mm diameter 24 mm height |
| Weight | Approximately 43 g |
| Fixing centres | 33 mm |
| Centre hole | 6.3 mm |
| Colour | Black SEM310, Blue SEM310X |

ORDER CODE

