HART UNIVERSAL TEMPERATURE TRANSMITTER

SEM310 / SEM310X

> **HART 5,6,7 COMPATABLE**

> **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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STATUS INSTRUMENTS

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	±0.02 mV	±0.005 mV/°C
(-1000 to 1000) mV DC	±10.0 mV	±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

STATUS INSTRUMENTS

HART UNIVERSAL TEMPERATURE TRANSMITTER

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 supply – 10)/20) K Ω	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

STATUS INSTRUMENTS

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-ambles 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	

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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-VO
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

SERIES —●— SEM310

SEM310X