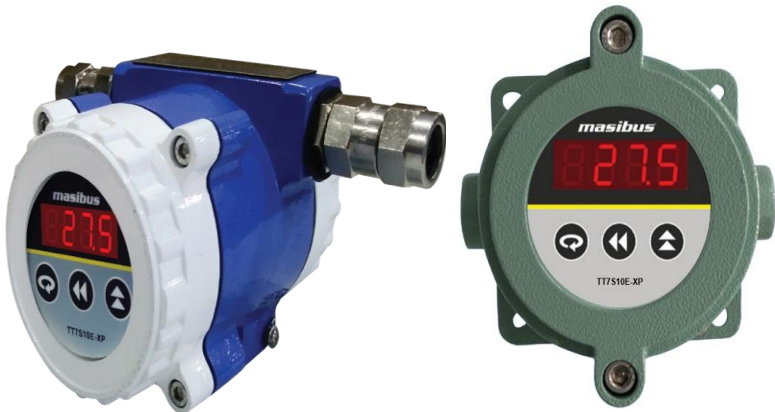


Field Mounted HART Temperature Transmitter TT7S10E-XP



Dual Compartment

Single Compartment

masibus
A Sonepar Company
Masibus Automation and Instrumentation Pvt. Ltd

SPECIFICATION

INPUT	
Input Type	
RTD:	PT100 3/4-WIRE
Resistance/Potentiometer:	0 to 2500Ω
T/C:	E,J,K,T,B,R,S,N with internal CJC (ANSI standard)
LINEAR:	0 to 75mv/500mVDC, 0/4-20 mA
RTD/Resistance/Potentiometer excitation Current	~0.2 mA
Input Impedance for mV Input	≥ 1M ohms
Input Impedance for mA Input	≤ 10 ohms
Sensor Break current	<1 uA
Input Range	Refer Table-1.1
Zero & Span Adjust	Adjustable either from Touch keys, mTRAN Software or HART Modem
Accuracy	Refer Table-1.2
CJC Error	±2 °C
ADC Resolution	17bit
Stability	±0.1% per year
Response time	≤ 250ms
Digital Filter	0-20 User Programmable
Sensor open Detection	Available (Not Applicable on 0-20mA)
Allowable wiring resistance for RTD	Maximum 15 ohms/wire (Resistance between all wires should be equal)
CMRR	>120 dB
NMRR	~40 dB
Temp-co	< 100ppm

OUTPUT	
Current Output (2-Wire)	4-20mA or 20-4mA (User Programmable)
Output Accuracy	± 0.04% of Full Span
Sensor break Output	≤ 3.6 or ≥21.0mA programmable.
Output load	R load = (V supply - 12.5)/0.021 Ohm

DISPLAY & KEYS	
Display Type	0.4" 4 Digit 7 Segment Red LED
Keys	3 Touch keys (ENT, ESC, INC) for configuration, calibration and Operation

COMMUNICATION	
Interface	TTL(3 Wire)
Protocol	Modbus-RTU
Slave ID	1
Baud rate	9600 bps

HART FUNCTIONALITY*	
HART Protocol	HART 7
HART Physical layer	FSK 1200
Boud rate	1200 bps
NAMUR compliance	Output limit and failure current acc. To NAMUR NE 43
Available command	Device information, Range, Unit, Damping value, Polling address, Output trimming, Tag, Message, Descriptor, Date
Identification command	Generic mode: 0, 1, 3, 6, 12, 13, 14, 17, 18, 34, 35, 40, 42, 44, 45, 46.
*Note: Features available only in Dual Compartment	

	TT7S10E-XP Single compartment	TT7S10E-XP Dual compartment
Mounting	Wall (Std) or 2" Pipe mount (optional)	Wall (Std) or 2" Pipe mount (optional)
Dimensions in mm	140(H) x 145(W) x 80(D)	100(H) x 100(W) x 145(D)
Weight (without mounting clamps)	~1 Kg	~1.65 Kg
Enclosure Material	Aluminium Alloy LM-6	
Ingress Protection	IP65	IP66
Area Classification	Zone 1 & 2, Gas Group: IIA & IIB	
Cable entry size	2 nos. of M20 double compression cable glands	

POWER SUPPLY	
Standard	12.5 - 36 VDC – 2 wire
Reverse Polarity Protection	Yes

ENVIRONMENTAL	
Operating temperature	0 to 80°C
Storage temperature	-20 to 85 °C
Humidity	30% to 95% RH(Non-condensing)

Table-1.1		
Input	Input Type	Range
Thermocouple	E	-200 to 1000 °C
	J	-200 to 1200 °C
	K	-200 to 1370 °C
	T	-200 to 400 °C
	B	450 to 1800 °C
	R	0 to 1750 °C
	S	0 to 1750 °C
	N	-200 to 1300 °C
RTD	PT100 3/4 Wire	-200 to 850 °C
Linear V	0 to 75mV / 0 to 500mV DC	-1999 to 9999
Linear mA	0 to 20mA / 4 to 20mA	-1999 to 9999
Resistance/Potentiometer	0 to 2500Ω	-1999 to 9999

Table-1.2				
Input Type	Range	Min span	A/D Acc.	D/A Acc.
E	-200 to 1000 °C	50	0.6 °C	0.04% of Span
J	-200 to 1200 °C	50	0.6 °C	
K	-200 to 1370 °C	50	0.6 °C	
T	-200 to 400 °C	50	0.6 °C	
B	450 to 1800 °C	100	1.5 °C	
R	0 to 1750 °C	100	1.5 °C	
S	0 to 1750 °C	100	1.5 °C	
N	-200 to 1300 °C	50	0.6 °C	
PT100 3/4 wire	-200 to 850 °C	100	0.5 °C	
Resistance 0 to 2500Ω	-1999 to 9999	2500	1.5 Ω	
0 – 75 mV		100	0.020 mV	
0 – 500 mV	-1999 to 9999	100	0.400 mV	
0 to 20mA / 4 to 20mA	-1999 to 9999	20	0.008 mA	

Note 1: Total Accuracy = (A/D Accuracy / Span + D/A Accuracy).
Example: when selecting Pt100 with measurement range of 0 to 800 °C
0.5°C / 800°C×100% of span +0.04% of span = 0.1% of span

SAFETY / WARNING PRECAUTIONS
To ensure that the device can be operated safely, and all functions can be used, please read these instructions carefully.
Installation and Start-up must be carried out by qualified personnel only. The relevant country-specific regulations must also be observed.
Before start-up it is particularly important to ensure:

- Terminal wiring: check that all cables are correctly connected according to the connection diagram
- All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for voltage, current and temperature rating of the system.

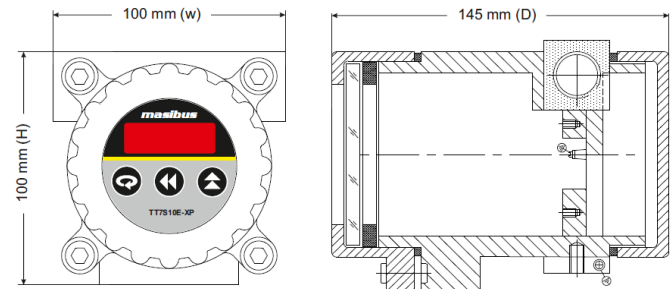
- Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.

WARRANTY
Warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

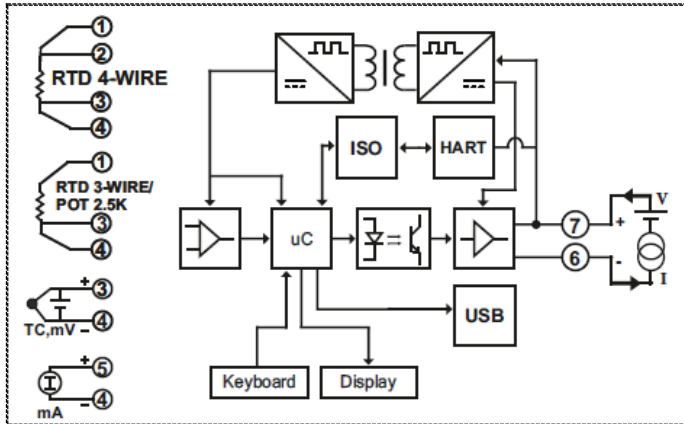
Masibus is not liable for special, indirect or consequential damages or for loss of profit or for expenses sustained as a result of a device malfunction, incorrect application or adjustment.

Masibus total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

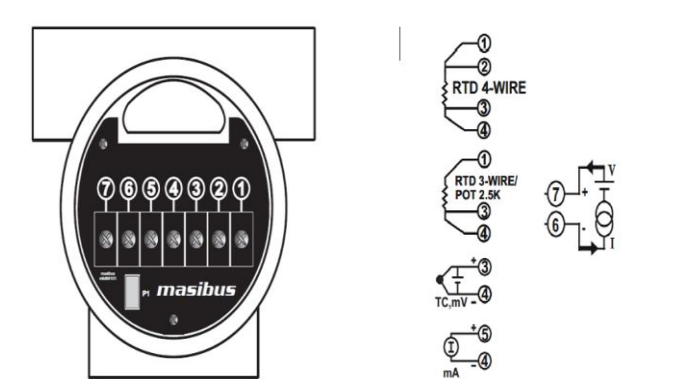
OVERALL DIMENSIONS (In mm)



BLOCK DIAGRAM



Terminal Connection



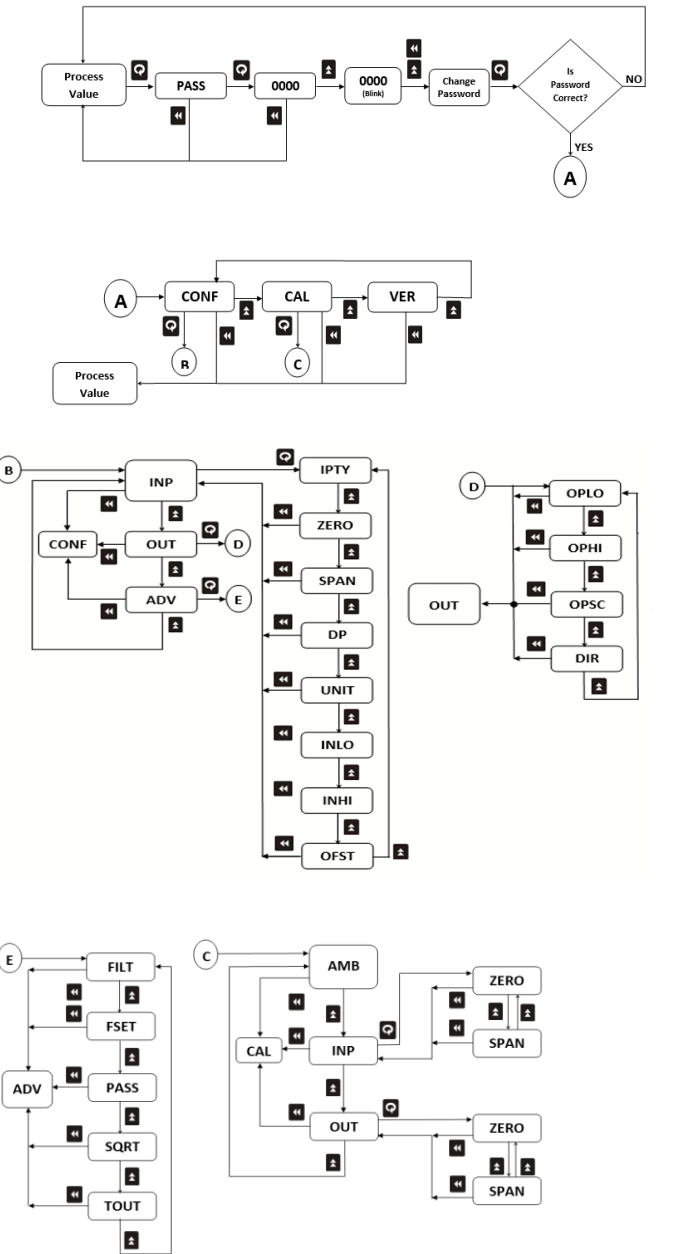
PARAMETER SETTINGS



- ENT KEY
- ESC/SHIFT KEY
- UP/INC KEY

For Thermocouple input type, Press UP/INC key to read device ambient temperature in RUN mode.

Menu Layout



Display	Name	Description
PASS (PR55)	PASSWORD	If a user enters the correct password, the user can configure or calibrate the device. If a wrong password is entered, the device goes to run mode again and shows PV Value.
CONF (ConF)	Configuration Mode	To Enter into Configuration Mode to Configure the parameters of Instrument.

CAL1 (CAL)	Calibration Mode	To Enter in Calibration Mode to Calibrate the Instrument.
VER (uEr)	Version	Shows the Version of the Current Firmware.
INPT (inPt)	Input	For Input Parameters. In Conf mode, user can set input Configuration and in Cal mode, user can calibrate input.
OPT (oPt)	Output	For Output Parameters. In Conf mode, user can set Output Configuration and in cal mode, user can calibrate output.
ADV (Rdu)	Advance	To configure advanced parameters shown in menu layout Section "E".
IPTY (iPtY)	Input Type	To Change the input type of the unit.
ZERO (ZEro)	Zero (Conf. mode)	Can be set to any value within the Input Range & less than SPAN Value. Value of Zero must be less than Span Value by 10.
SPAN (SPAn)	Span (Conf. mode)	Can be set to any value within the Input Range & greater the ZERO Value. Value of Span must be greater than Zero Value by 10.
UNIT (Un) t	Unit	Configure the Engineering Unit for Process Input Value only for TC/RTD (°C, °F, °K).
INLO (inLo)	InLO	Used for Input Low and Hi Value Select. INHI – INLO >10. Applicable for Linear/POT Input Type.
INHI (inH) i	InHI	
DP (dP)	Decimal Point	To Set position of Decimal Point on Process Value. Applicable for Linear/POT Input Type.
E-TC (E-tC)	E-TC	Input type
J-TC (J-tC)	J-TC	Input type
K-TC (K-tC)	K-TC	Input type
T-TC (t-tC)	T-TC	Input type
B-TC (b-tC)	B-TC	Input type
R-TC (r-tC)	R-TC	Input type
S-TC (s-tC)	S-TC	Input type
N-TC (n-tC)	N-TC	Input type
RTD3 (r-t-d3)	RTD 3-WIRE	Input type
500 (500)	0-500 mV	Input type
0-75 (0-75)	0-75 mV	Input type
P2.5K (P2.5K)	Pot 2.5K ohm	Input type
RTD4 (r-t-d4)	RTD 4-WIRE	Input type
4-20 (4-20)	4-20 mA	Input type
0-20 (0-20)	0-20 mA	Input type
OPLO (oPLo)	Output Lo	O/P Low value limit will be limited between 0-25% of O/P Span value. Output will not be scaled but will be limited to configured % of output.
OPHI (oPH) i	Output HI	O/P Hi value limit will be limited between 75-100 % of O/P Span value. Output will not be scaled but will be limited to configured % of output.
OPSC (oPSC)	OPEN Sensor Indication	To set O/P to either Upscale or Downscale when Input is OPEN.(Not applicable for 0-20mA)
DIR (d ir)	Output Direction	To set Retransmission O/P Direction to either Direct or Reverse.
FILT (F iLt)	Filter	To set Digital filter for PV Value (0 to 20). The value of Filter will determine the ability of filtering noise. When a large value is set, the measurement of input is stabilized but the response speed is slow. When the device is under examination at laboratory, "FILT" should be set to 0 or 1 to shorten the response time.
FSET (F5Et)	Factory Reset	To retrieve the factory setting.
PASS (PR55)	Change Password	To change the Password of device to Enter in Configuration/Calibration Mode.
SQRT (SqrT)	Square Root	Applicable for Linear/POT Input with Options of YES or NO. By using Square Root, Output will be displayed as per equation "PV = SQRT [{(input reading –config. IP Zero)/ (config. IP Span –config. IP Zero)}* Config.OP Span] + Config.OP Zero."
TOUT (toUt)	Timeout	Time Setting to Return in RUN mode while no key operation. Timeout Range is between 10 to 300 seconds.
AMB (Rñb)	Ambient Calibration	To Calibrate the Ambient Temperature. Applicable only if TC input Type is selected.
ZERO (ZEro)	Zero (Cal. mode)	To Calibrate the Input/output Zero.
SPAN (SPAn)	Span (Cal. mode)	To Calibrate the Input/output Span.
OFFSET (Of5t)	PV Offset	It is a PV bias used for PV correction

MODBUS Parameters Details:

Analog Parameters	Address	Type of Access	Parameter Type	Values Applicable
Ambient Temperature	30001	Read	Int	-
Process value	30002	Read	Int	-
Input type	40001	Read/write	Int	1-12, 16, 26, 27
AMB calibration value	40002	Read/write	Int	100 - 3532
Zero calibration of Input Value	40003	Read/write	Int	As per Table 1.2
Span calibration of Input Value	40004	Read/write	Int	As per Table 1.2
Zero calibration of retransmission (4 mA)	40005	Read/write	Int	3000-5000
Span calibration of retransmission (20 mA)	40006	Read/write	Int	19000-21000
I/P Zero	40007	Read/write	Int	As per Input Range
I/P Span	40008	Read/write	Int	As per Input Range
Direction for RTR OP	40009	Read/write	Int	1 - 2
Open sensor for RTR OP	40010	Read/write	Int	1 - 2
PV Offset	40011	Read/write	Int	-250 - 250
Digital filter	40012	Read/write	Int	0-20
Output Calibration Mode Entering(Zero Calibration(1),Span Calibration(2),Exit-Run Mode(3))	40013	Read/write	Int	1-3
Engineering Units	40014	Read/write	Int	1 To 3
Factory Reset	40015	Read/write	Int	1-2
O/P Lo (% of O/P Zero range) for O/P1	40016	Read/write	Int	0-25
O/P High (% of O/P Span range) for O/P1	40017	Read/write	Int	75-100
O/P Z (% of O/P Zero) of O/P 1 for scaling	40018	Read/write	Int	0-30
O/P S (% of O/P Span) of O/P 1 for scaling	40019	Read/write	Int	70-100
I/P Lo	40020	Read/write	Int	-1999 To 9999
I/P Hi	40021	Read/write	Int	-1999 To 9999
Square root	40022	Read/write	Int	1-2
Decimal Point	40023	Read/write	Int	0 – 3
Auto CJC	40024	Read/write	Int	0 – 1
Fix CJC	40025	Read/write	Int	0 – 800

40001. I/P type

1. E-TC
2. J-TC
3. K-TC
4. T-TC
5. B-TC
6. R-TC
7. S-TC
8. N-TC
9. RTD-3W
10. 0-500mV
11. 0-75mV
12. POT 2.5K
16. RTD-4W
26. 4-20 mA
27. 0-20 mA

40009.Direction for Current Output

1. DIRT
2. REVr

40010.OPSE for Current Output

1. DNsc
2. UPsc

Input type	Input Cal. Range for Modbus
E- TC	-2000 to 10000
J- TC	-2000 to 12000
K- TC	-2000 to 13700
T- TC	-2000 to 4000
B- TC	4500 to 18000
R- TC	0 to 17500
S- TC	0 to 17500
N- TC	-2000 to 13000
RTD 3/4 Wire	-2000 to 8500
Linear(0-75mV,0-500mV, 4-20mA , 0-20mA)	-1999 to 9999*
Potentiometer	-1999 to 9999*

* For Linear, mA and Potentiometer input type, Input cal. Range depends on Zero and Span Range Configured in Device.

In mTran Software, All Values must be enter without decimal point in input calibration field. I.e. To Calibrate at 102.5 or 10.25, User have to enter 1025 in input calibration field.

- Process Value of device will show "over" when process value is higher than 5% of individual span. At that time Device will send '32766' by Modbus to PC.
- Same way when process value is lower than 1 % of individual zero, Device will show "undr" on its display but it will send '32765' by Modbus to PC.
- If process value is out of limit for particular I/P type, then device will show "Open" on display but it will send '32767' by Modbus to PC.

mTran Software Modes

RUN Mode:

- Run Mode displays process values, Input Types, Range High, Range Low, Ambient Temperature,
- Start communication button is available in the screen. So User Can Start/Stop Communication and select the COM Port from any window.



CONFIG Mode:

- In configuration mode user can set I/P type, Range low, Range high, PV Low, PV High, O/P Low, O/P High, O/P Zero, O/P Span, Digital filter, Open sensor O/P (Upscale/Downscale), Output type (Direct/Reverse), Unit (Deg C, Deg F, Deg K), Square root (Square root PV on/off).
- User can see updated process values in all screens.
- After successfully write/download, the status message displays in status box.



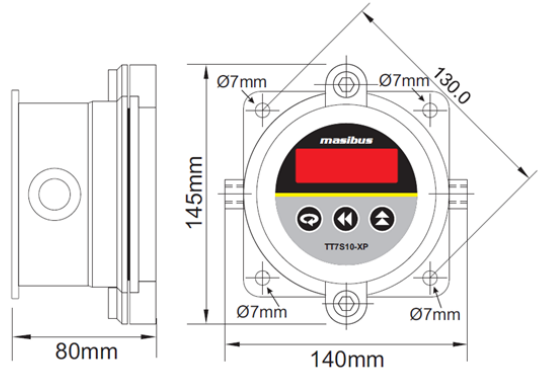
CALIBRATION Mode:

- In calibration mode user can write CAL-Zero, CAL-Span, Ambient Calibration, output-Zero Calibration and output-Span Calibration.
- After successfully write/download, the status message displays in status box.

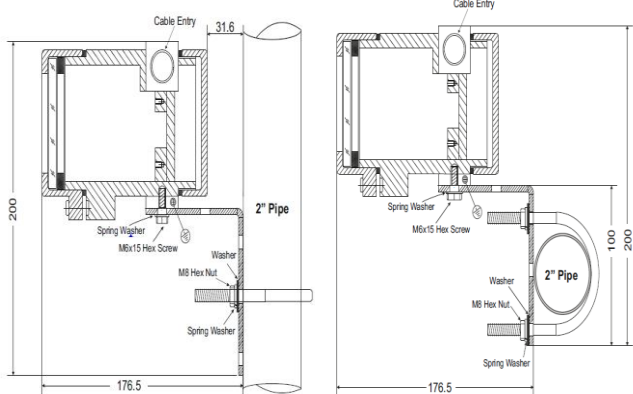
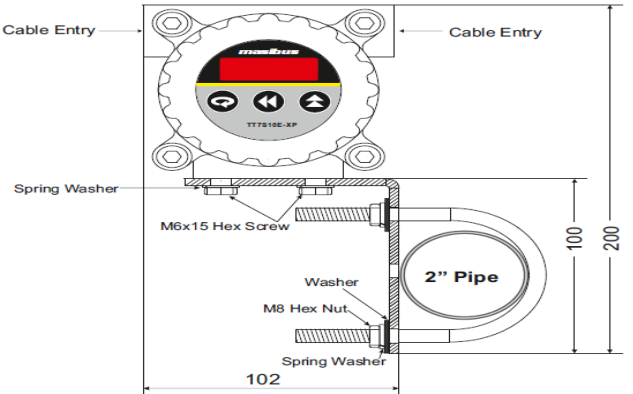
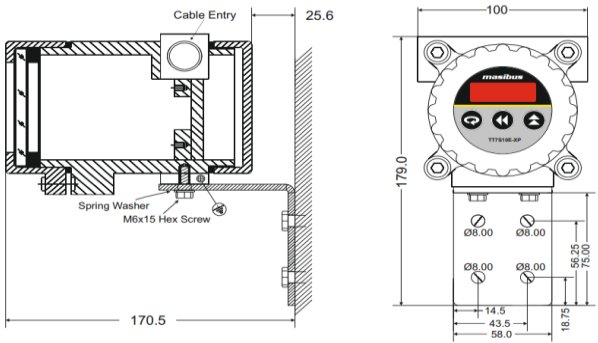


Mounting Positions

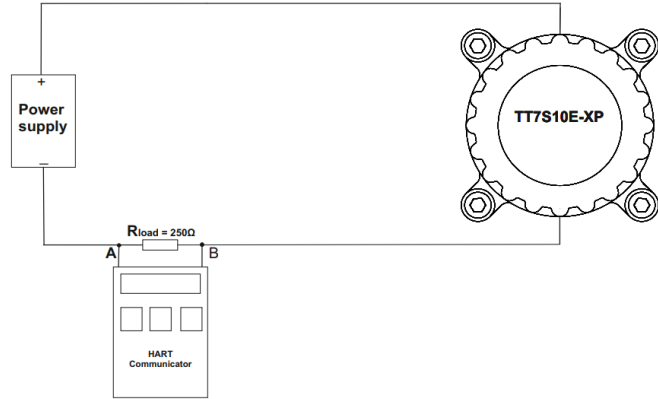
- **Single Compartment**



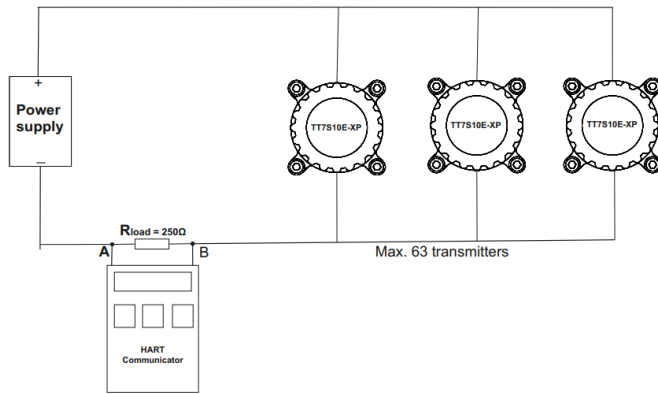
- **Dual Compartment**



Interconnection between TT7S10E-XP AND HART Configuration tool



Point-to-point mode



Multi-drop mode

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