TEKON
WIRELESS SENSORS TECHNOLOGY

THM502-I

RTD AND OHM MODBUS TEMPERATURE TRANSMITTER

Tekon Electronics In Head Temperature Transmitters are specifically designed to meet the most rigorous requirements of operation in the industrial process environments. Due to their reduced dimensions they can be installed in the the DIN Form B sensor connection head in place of traditional terminal blocks.

THM502-I is a temperature transmitter which accepts PT100, PT500 and PT1000 temperature sensors (resistance thermometers with 2,3 or 4-wire configuration) and resistance sensors to make it available in a Modbus RTU slave register.

Dimensions 45Ø x 23 mm

Weight: Approx. 50g

Material: Nylon 66

Protection Index: IP40

KEY FEATURES

PT100, PT500 AND PT1000 SENSOR INPUT
2, 3 AND 4 WIRES

RESISTANCE SENSOR INPUT

1,5KV AC GALVANIC ISOLATION

MODBUS RTU SLAVE PROTOCOL
RS-485

CONTINUOUS OPERATING STATUS MONITORING
AND SELF-DIAGNOSTIC

HIGH PRECISION AND ACCURACY

HIGH EMC PERFORMANCE

WIDE MEASUREMENT RANGE

DS_INHD_THM502-I_E01A

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TECHNICAL SPECIFICATIONS

INPUT
RESISTANCE THERMOMETER (RTD)

Measured variable	Temperature
Sensor type	PT100, PT500, PT1000
Connection	1 Resistance thermometer (RTD) in 2, 3 and 4-wire system
Units	ºC / ºF / K (configurable)
Sensor current	200 μA
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Always active (cannot be disabled)
Measuring range	Not configurable (See "Measuring accuracy" table)
Characteristic curve	Temperature-linear
Cable resistance per wire (max.)	50 Ω
Effect of sensor cable resistance	< 0,0015 Ω / Ω - 3 wires < 0,0005 Ω / Ω - 4 wires

INPUT
RESISTANCE-BASED SENSOR (R)

Measured variable	Resistance
Sensor type	Resistance, Potentiometers
Connection	3 wires
Units	Ω
Sensor current	200 μA
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Always active (cannot be disabled)
Measuring range	Not configurable (See "Measuring Accuracy" table)

MEASUREMENT ACCURACY

Reference conditions	
Auxiliary power	24V DC $\pm$ 1%
Ambient temperature	23ºC
Warm-up time	2 min
Digital measuring errors	See table "Measuring accuracy" table
Internal temperature measure error	< $\pm$ 0,50 ºC
Influence of ambient temperature	
on RTD measurement	< $\pm$ 0,01 ºC / ºC
on linear resistance	< $\pm$ 0,002 Ω / ºC
EMC - immunity influence (IEC 61326-1)	< $\pm$ 0,14% of span (RTD PT100)
Extended EMC immunity (NAMUR NE 21, A criterion, burst)	< $\pm$ 0,003% of span (RTD PT100)

COMMON SPECIFICATIONS

Isolation voltage (test | operation)	1,5 kV AC | 48 V AC
Internal power dissipation	40 mW to 0,5 W
Voltage drop	12 VDC

Effect of supply voltage variation	< 0,003% of span / V DC
Response time 90%	< 1s
Power-up time (RTD)	< 1s

OUTPUT - MODBUS	
Physical layer	RS-485
Slave address range	From 1 to 100
Support baud rates	4800, 9600, 19200, 38400, 56000, 57600, 115200 (configurable)
Supported parity	Odd/Even/None (configurable)
Stop bits	1 or 2 (configurable)
Response time	<100ms
Comunication start up time (after power ON) [1]	5 s

OPERATING ENVIRONMENT	
Ambient temperature range	-20 to 80ºC
Storage temperature range	-20 to 80ºC
Relative humidity	≤95%, without condensation

FACTORY DEFAULT SETTINGS	
Sensor	PT100 with 3-wire circuit
Temperature format	Celsius (ºC)
Modbus settings	
Baudrate	9600 bps
Parity	None
Data bits	8
Stop bits	2
Slave address (Node Index)	1
Modbus register - Value	Register value
Acquisition mode configuration	4 (PT100 3W)
Temperature format configuration	1 (ºC)

CERTIFICATIONS AND APPROVALS	
EN 61326	Electrical equipment for measurement, control and laboratory use. EMC requirements.
IEC 61000-4-2	Electrostatic discharge immunity test
IEC 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electrical fast transient/burst/immunity test
IEC061000-4-5	Surge immunity test

POWER SUPPLY	
Power supply	5 to 24 V DC ±10%
Power consumption (max.)	0,3 W

CASING

Material	Nylon 66
Weight	Approx. 50g
Dimensions	See "Dimensional drawings"
Cross section	2,5 mm ^{2}
Protection index	IP40

[1] Five seconds window, after power ON, to enter in configuration mode using Tekon Configurator Software. Check "Installation Guige" for more information.

MODBUS ADDRESSES

MODBUS TABLE (HOLDING REGISTERS)

Description	Address	Type	Values
Sensor status	13	UINT16	1 - Reading OK 2 - Open circuit 3 - Short circuit 6 - Internal temperature below the minimum allowed limit 7 - Internal temperature above the minimum allowed limit
Acquisition mode configuration	15	UINT16	1 - Linear resistance 3 - PT100 2W 4 - PT100 3W 5 - PT100 4W 13 - PT500 2W 14 - PT500 3W 15 - PT500 4W 16 - PT1000 2W 17 - PT1000 3W 18 - PT1000 4W
Internal temperature (simple resolution)	16	UINT16	Temperature value from the internal sensor multiplied by 10
External temperature (simple resolution)	17	UINT16	Temperature value from the internal sensor multiplied by 10
Temperature format configuration	18	UINT16	1 - ºC 2 - ºF 3 - K
Internal temperature (full resolution)	21	FLOAT32	Formato: CD AB (little endian byte swap)
External temperature (full resolution)	23	FLOAT32	Formato: CD AB (little endian byte swap)
Modbus slave address	42	UINT16	
Modbus baudrate	43	FLOAT32	Formato: CD AB (little endian byte swap)
Modbus parity	45	UINT16	
Sensor resistance measured	52	FLOAT32	Formato: CD AB (little endian byte swap)
Device model	54	UINT16	69 - THM502-I
FW version: Major | Minor	56	UINT16	
FW revision	57	UINT16	
HW version: Major | Minor	58	UINT16	
System state	59	UINT16	1 - Normal running 2 - Configuration 3 - Tekon user configuration 5 - Load default settings 255 - Deadlock
Modbus stop bits	64	UINT16	

MEASURING ACCURACY

RESISTANCE THERMOMETER (RTD)

SENSOR	RANGE (ºC)	ACCURACY (ºC)	RESOLUTION (ºC)
PT100	-210 to 850	< ± 0,2	0,05
PT500	-210 to 850	< ± 0,2	0,05
PT1000	-210 to 850	< ± 0,2	0,05

LINEAR RESISTANCE

SENSOR	RANGE (Ω)	ACCURACY (Ω)	RESOLUTION (Ω)
Ohm	0 to 6000	< ± 1	0,2

TECHNICAL DRAWINGS AND INFORMATION

DIMENSIONAL DRAWINGS & INSTALLATION DIAGRAM
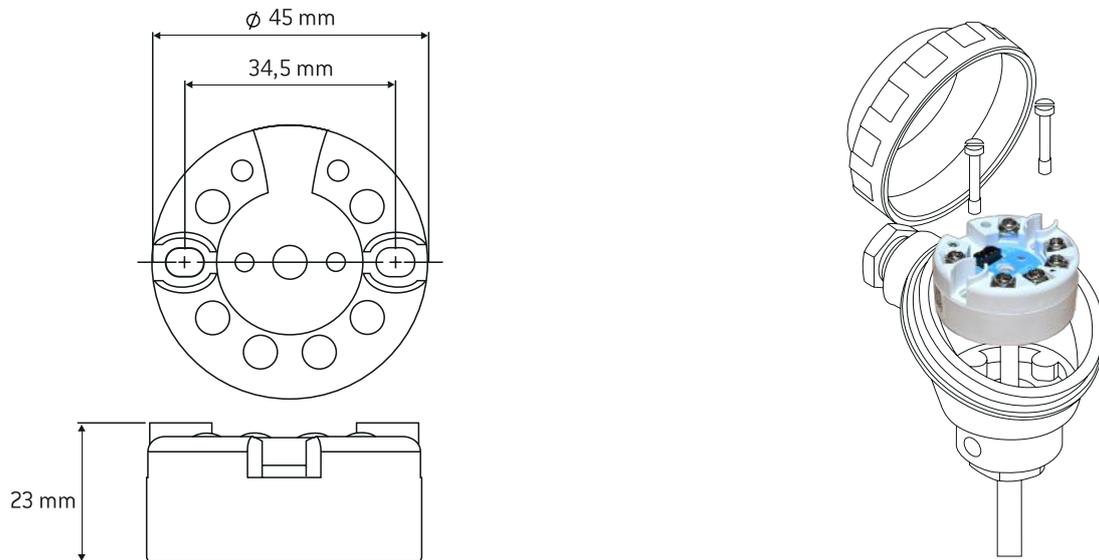
ELECTRICAL CONNECTIONS

RESISTANCE THERMOMETER

RTD 2W

RTD 3W

RTD 4W

W = WIRES

RS485

POWER SUPPLY
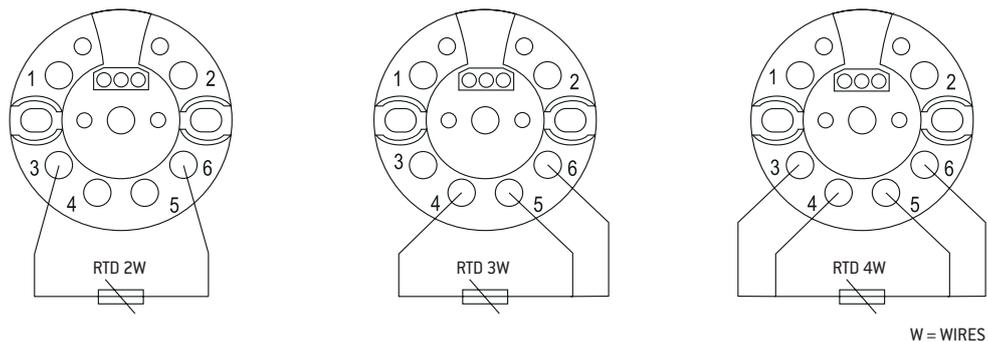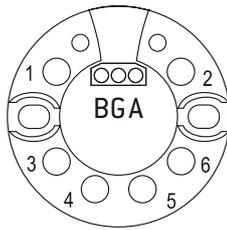
RESISTANCE SENSOR

A: TxD- / RxD-
B: TxD + / RxD+
G: C common signal reference ground

STATUS LED

LED 1 **LED 3** **LED 2**
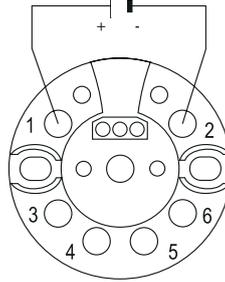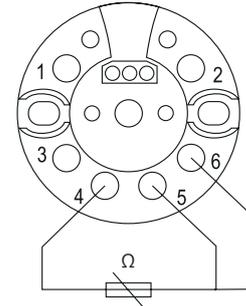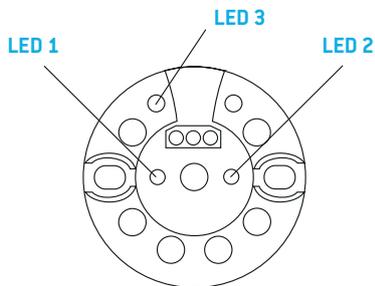
LED 1 (RED)	LED 2 (BLUE)	LED 3 (RED/ GREEN)	
OFF	BLINK	Rx Modbus Tx Modbus	No sensor error Configuration mode
FLASH	BLINK		Sensor error Configuration mode
OFF	ON		No sensor error Normal mode
FLASH	ON		Sensor error Normal mode

CONFIGURATION MODE
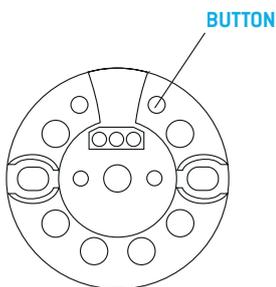
BUTTON

Enter and exit configuration mode

Press button for 5 seconds to enter configuration mode and press button for 5 seconds to exit configuration mode

BLOCK DIAGRAM
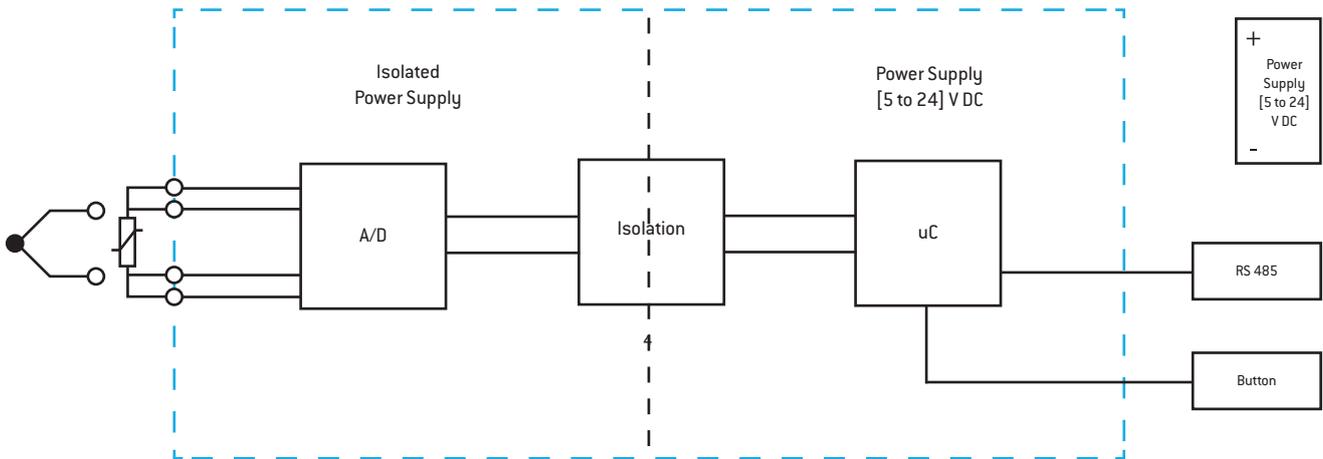
RELATED PRODUCTS

RS485 TO USB CONVERTER CABLE
REF.: PA123790400
Cable to connect THM502-I temperature head transmitter to USB port.

REVISION HISTORY

VERSION
E01A