

# Series 441 Installation and Operating Instructions

## 1 SAFETY NOTES

Safe and secure operation of the head transmitter can only be guaranteed if the operating instructions and all safety notes contained are understood and followed.

### 1.1 Correct Use

The unit is a universal, presettable temperature transmitter for resistance thermometer (RTD), thermocouple (TC) as well as resistance and voltage sensors. The unit is constructed for mounting in a connection head (form B) and a field housing. The manufacturer cannot be held responsible for damage caused by misuse of the unit.

### 1.2 Installation, commissioning and operation

The unit is constructed using the most up-to-date production equipment and complies with the safety requirements of the EU guidelines. If it is installed incorrectly or misused certain application dangers can occur. Trained personnel must do installation, wiring and maintenance of the unit. These personnel must have read and understood these instructions and must follow them to the letter.

## 2 FUNCTION AND SYSTEM CONSTRUCTION

### 2.1 Function

Provides electronic monitoring and transformation of various input signals into an analog output signal in industrial temperature measurement. The head transmitter is mounted in a connection head form B or separated from the sensor in a field housing. Setting up of the head transmitter is done using PC and configuration software. The configuration kit is required for setting up the head transmitter.

### 2.2 Measurement system

Transforming the following input signals:

- Resistance thermometers (RTD) and resistance sensors (in 2, 3 or 4 wire connection systems)
- Thermocouples (TC)
- Voltage sensors into a scalable analog output signal (4...20 or 20...4) mA

Fault monitoring of:

- Measurement range override or undercut
- Sensor breakage and short circuit - not for thermocouples (TC)

## 3 INSTALLATION

### 3.1 Installation conditions

Ambient temperature: (-40 to 85) °C [-40 to 185] °F

Installation area: Field housing; connection head Form B according to DIN 43 729

Installation angle: No limit

Safety notes: The unit must only be powered by a power supply that operates using an IEC 61010-1 compliant energy limited circuit.

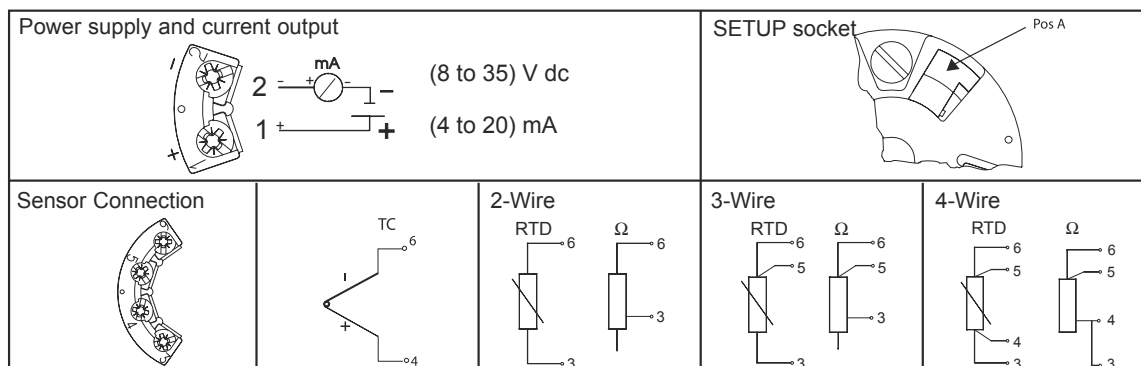
### 3.2 Installation

- Feed the sensor leadwires through the central hole in the head transmitter
- Position the head transmitter in the connection head in such way so that the current output terminals (terminals 1 and 2) are towards the cable entry gland.
- Feed the installation screws through the holes in the head transmitter.
- Screw the head transmitter into the field housing using a screwdriver while not over tightening.

## 4 WIRING

### 4.1 Overview

#### Terminal layout



## 4.2 Measurement unit connection

**Attention:** Switch off power supply before opening the housing cover. Do not install or connect the unit to power. If this is not followed parts of the electronic circuit will be damaged.

- Sensors: Connect the sensor lead to the respective head transmitter terminals (Terminals 3 to 6) by following the wiring diagram (see figure 4.1).
- Output signal and power supply: Open the PG cable gland on the head transmitter or field housing. Feed the cable through the opening in the PG cable gland and then connect the cable cores to terminals 1 and 2 according to the wiring diagram (see figure 4.1).
- PC configuration (SETUP socket): Open the flap on the SETUP socket (Figure 4.1, Pos. A) and connect the SETUP connection cable.

**Note:** The screws on the terminals must be screwed tightly. Head transmitter configuration during measurement operation is possible. There is no need to disconnect leads.

## POTENTIAL LEVELING

Please take note when installing the head transmitter remotely in a field housing. The screen on the (4 to 20) mA signal output must have the same potential as the screen at the sensor connections. When using earthed thermocouples, screening of the output (4 to 20) mA cable is recommended. In plants with strong electromagnetic fields, screening of all cables with a low ohm connection to the transmitter housing is recommended.

## 5 OPERATION

### 5.1 Short form instructions (SETUP)

PRESETTABLE PARAMETERS	
Standard settings	<ul style="list-style-type: none"> <li>• Sensor type</li> <li>• Connection mode (2, 3 or 4 wire connection)</li> <li>• Units (°C or °F)</li> <li>• Measurement range start (depends on sensor)</li> <li>• Measurement range end (depends on sensor)</li> </ul>
Expanded settings	<ul style="list-style-type: none"> <li>• Cold junction compensation (internal/external on TC connection)</li> <li>• Compensation resistance (0 to 20) Ω on 2 wire connection</li> <li>• Fault condition reaction (<math>\leq 3.6</math> mA or <math>\geq 21.0</math> mA)</li> <li>• Output (analog standard/inverse)</li> <li>• Damping (0 to 8) s</li> <li>• Offset (-9.9 to +9.9) °C [-17.8 to +17.8] °F</li> <li>• Measurement point identification/TAG Service functions</li> </ul>
Service functions	<ul style="list-style-type: none"> <li>• Simulation (on/off)</li> </ul>

For detailed TransComm operating instructions, please read the online documentation contained in the software.

### 5.2 Communication

The head transmitter must be set up using a PC and configuration kit. The following points must be taken into account if trouble free setting up is to be achieved:

- Configuration software installation
- Connect the head transmitter to the PC using the connection cable from the configuration kit.

CONFIGURATION SOFTWARE INSTALLATION	
System conditions	<ul style="list-style-type: none"> <li>• IBM PC or compatible computer (minimum Pentium 166 MHz)</li> <li>• Windows 95/98/ME/NT4.0/2000</li> <li>• 64 MB RAM</li> <li>• Minimum 30 MB free memory on hard drive</li> <li>• CD-ROM drive</li> <li>• Screen resolution 800 x 600 Pixel</li> <li>• Free serial interface</li> </ul>
Recommended minimum configuration	<ul style="list-style-type: none"> <li>• Pentium 400 MHz</li> <li>• 128 MB main RAM</li> <li>• 120 MB free hard drive memory</li> <li>• Screen resolution 1024 x 768 Pixel</li> </ul>
Installation start	<p>Start Windows</p> <ol style="list-style-type: none"> <li>1. Place installations-CD in the respective drive</li> <li>2. Start "Install.exe" and follow the installation instructions</li> <li>3. If required the help/operating manual can be printed out once the software has been successfully installed.</li> </ol>

## Connecting the head transmitter to the PC using the configuration kit connection cable

1. Connect the SETUP connector of the interface cable to the SETUP socket in the head transmitter (see figure 4.1, Pos. A).
2. Connect the RS232C connector to a free serial interface socket on the PC. In order to achieve optimum connection tighten the RS232C connector screws to the PC.

**Note:** Configuration of the head transmitter must be done with power applied.

## 6 COMMISSIONING

### 6.1 Installation check

Monitor all connections making sure they are tight. In order to guarantee fault free operation the terminal screws must be tight onto the connection cables. The unit is now ready for operation.

### 6.2 Commissioning

Once the power supply has been connected the head transmitter is operational.

### Set up using the PC configuration software

The head transmitter left the factory with a default parameter configuration. If no customer specific configuration was mentioned on the order the default parameter configuration is constructed as follows:

Sensor	Pt100 (RTD)
Connection mode	3-wire
Measurement range and units	(0 to 100) °C

**Hint:** If a change has been made to the measurement point then the head transmitter can be re-configured. In order to re-configure the parameters follow these instructions:

- Install the configuration software and make connection to the PC (see Chapter 5, Operation).
- For detailed operating instructions for the PC configuration software, please read the online documentation contained in the software.

### Interactive setting up of the temperature transmitter

Customer specific linearization and sensor matching is done using the TransComm configuration software. The program calculates the linearization coefficients X0 to X4, that need to be entered into the PC configuration software.

### 6.3 Function check

Measuring the analogue (4 to 20) mA output signal or following failure signals:

Measurement range undercut	Linear fall to 3.8 mA
Measurement range excess	Linear rise to 20.5 mA
Sensor break; sensor short circuit	$\leq 3.6$ mA or $\geq 21.0$ mA selectable

## 7 MAINTENANCE

The head transmitter is maintenance free.

## 8 FAULT FINDING

### 8.1 Repair concept and disposal

Due to its construction, the head transmitter cannot be repaired. When disposing of the head transmitter please take note of the local disposal regulations.

### 8.2 Faultfinding and repairs

Trouble shooting in general

FAULT	CAUSE	ACTION/CURE
No communication	2 wire connection incorrect	Re-connect correctly (see connection diagram)
	No power supply to the 2 wire connection	Check the current loop
	Power supply too low (< 8 V dc)	Check power supply
	Interface cable defective	Check the interface cable
	PC-interface defective	Check the interface of your PC
	Head transmitter defective	Replace head transmitter

## Trouble shooting on RTDs (Pt100/Pt500/Pt1000/Ni100)

FAULT	CAUSE	ACTION/CURE
Current ( $\leq 3.6$ or $\geq 21.0$ ) mA	Sensor defective	Check sensor
	Incorrect RTD connection	Connect the cables correctly (see connection diagram)
	Incorrect 2 wire connection	Connect the cables correctly (see connection diagram)(Polarity)
	No power supply on the 2 wire connection	Check the current loop; the supply should be $> 8$ V dc
	Incorrect transmitter programming (number of wires)	Change parameter 'connection mode' (see chap. Operation)
	Programming	Thermocouple set up (see chap. Operation). Change to RTD
	Head transmitter defective	Replace head transmitter
Incorrect or inaccurate measured value	Sensor is incorrectly installed	Reinstall sensor correctly
	Heat dissipation via sensor	Monitor sensor installation positioning
	Incorrect transmitter programming (number of wires)	Change parameter 'connection mode'
	Incorrect transmitter programming (scale)	Change scale
	Wrong RTD set up	Change parameter 'sensor type'
	Sensor connection (2 wire)	Monitor sensor connection
	Sensor cable resistance not compensated (2 wire)	Compensate cable resistance
	Offset incorrectly set up	Monitor offset

## Trouble shooting for thermocouple connection (TC)

FAULT	CAUSE	ACTION/CURE
Current ( $\leq 3.6$ or $\geq 21.0$ ) mA	Incorrect sensor connection	Connect the sensor correctly (see connection diagram)(Polarity)
	Sensor defective	Check sensor
	Incorrectly set up	Sensor type 'RTD' is set up. Set up the correct thermocouple
	Incorrect 2 wire connection (current loop)	Connect the cables correctly (see connection diagram)
	No power supply on the 2 wire connection	Check current loop; the supply should be $> 8$ V dc
	Head transmitter defective	Replace head transmitter
	Incorrect or inaccurate measured value	Sensor is incorrectly installed
Heat conducted via sensor		Check sensor installation positioning
Transmitter programming faulty (scale)		Change scale
Wrong thermocouple set up		Change parameter 'sensor type'
Incorrect cold junction set up		See chapter 'Operation'
Offset incorrectly set up		Check offset
Fault due to grounded thermoelement (Interference voltages incurred)		Use ungrounded thermocouple sensor