

PERFORMANCE
MADE
SMARTER

Product Manual **7501**

Field mounted HART temperature transmitter



TEMPERATURE | I.S. INTERFACES | COMMUNICATION INTERFACES | MULTIFUNCTIONAL | ISOLATION | DISPLAY

No. 7501V100-UK
From serial no.: 15080001

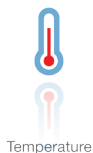
PR
electronics

6 Product Pillars

to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.



Temperature

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.



I.S. Interface

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.



Communication

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. The detachable 4501 Local Operator Interface (LOI) allows for local monitoring of process values, device configuration, error detection and signal simulation. The next generation, our 4511 Remote Operator Interface (ROI) does all that and more, adding remote digital communications via Modbus/RTU, while the analog output signals are still available for redundancy.

With the 4511 you can further expand connectivity with a PR gateway, which connects via industrial Ethernet, wirelessly through a Wi-Fi router or directly with the devices using our Portable Plant Supervisor (PPS) application. The PPS app is available for iOS, Android and Windows.



Multifunction

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.



Isolation

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.



Display

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals, and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry, and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.

Field mounted HART temperature transmitter 7501

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Warning



Only technicians, who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these, should connect the device.

Should there be any doubt as to the correct handling of the device, please contact your local distributor or PR electronics A/S.

Mounting and connection of the device should comply with national legislation for mounting of electric materials.

Repair of the device must be done by PR electronics A/S only.

Do not remove the transmitter cover in explosive atmospheres when the circuit is alive.

The transmitter cover must be fully engaged to meet the explosion proof requirements.

If installed under high-vibration conditions, the transmitter may require supplementary support.

For installation in hazardous area the corresponding installation drawing must be followed in detail.

Take care not to generate mechanical sparking when accessing the instrument and peripheral devices in a hazardous location.

Field mounted HART temperature transmitter 7501

- RTD, TC, Ohm, and bipolar mV input and analog output
- High definition local operator interface (LOI) with 3 optical buttons
- Selectable red or white backlight
- Ex d explosion proof / flame proof
- HART 7 functionality with HART 5 compatibility

High definition display

- 0, 90, 180, & 270 degree position adjustments.
- Monitoring, programming and diagnostics view.
- Extensive diagnostics with flashing red or white backlight
- Supports 7 languages.

Local operator interface (LOI)

- 3 optical buttons; up, down and enter.
- Dynamically adaptive to wear or accumulation of dirt.
- Immune to interference from ambient light sources.
- Useable with or without gloves.

Configuration

- From the LOI through the PR guided menu.
- PReset and HART modem.
- HHC, DCS or AMS via HART.

Mounting / installation

- For installation in zone 0, 1, 2 and zone 20, 21, 22, in mines M1 and in Class 1, Division 1 and 2 applications.
- Hardware assessed with SFF value of 69%.
- Mounting on 1.5"-2" pipe bracket or on wall / bulkhead.

Application

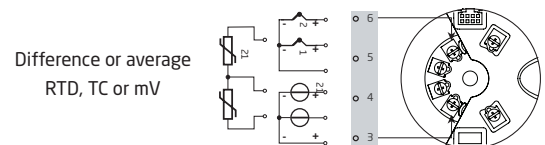
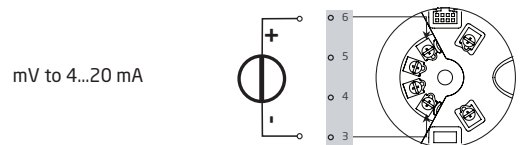
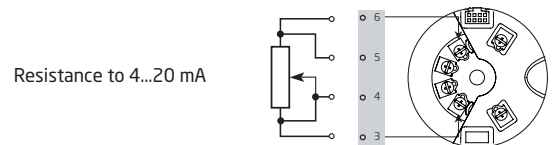
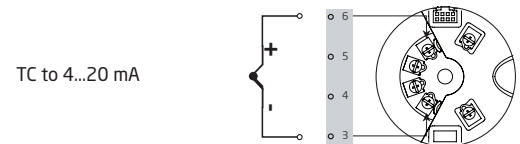
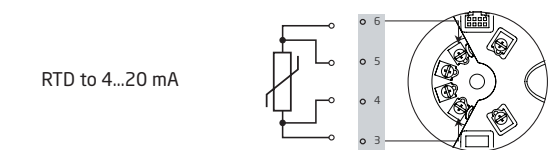
- Linearized temperature measurement with TC and RTD sensors e.g. Pt100 and Ni100.
- HART communication and 4...20 mA analog PV output for individual, difference or average temperature measurement of up to two RTD or TC input sensors.
- Conversion of linear resistance to a standard analog current signal, e.g from valves or Ohmic level sensors.
- Amplification of bipolar mV signals to standard 4...20 mA current signals.
- Up to 63 transmitters (HART 7) can be connected in a multidrop communication setup.

Technical characteristics

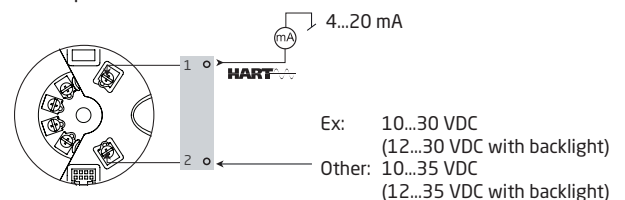
- NAMUR NE21, NE43 and NE89.
- HART protocol revision can be changed by user configuration to either HART 5 or HART 7 protocol.

Applications

Input signals:



2-wire output and HART:



Order

Type	Housing	Local operator interface			O-ring	Conduit thread	Paint type	Transmitter	Approvals
		Optical buttons	Display						
7501	Low copper aluminum : A	No	No	:1	-40 to +85 °C : A silicone rubber	M20x1,5 6H : 1 ½ NPT mod : 2	Epoxy : A Epoxy + polyurethane : B	Yes : 1 No (comes with a connection kit) : 2	General purpose : 1 Hazardous area : 2
		No	Yes	:2					
		Yes	Yes	:3					

Order example: 7501A3B1A12Y

Accessories

8550 = Blind plug M20 incl. silicone O-ring

8551 = Blind plug ½NPT

8552 = Pipe-mounting bracket P5-B-N (1½"-2")

Technical data

Environmental conditions:

Operating temperature	
with silicone O-ring	-40°C to +85°C
with FKM O-ring	-20°C to +85°C
Reduced LCD performance below -20°C and above +70°C	
Storage temperature	-40°C to +85°C
Calibration temperature	20...28°C
Relative humidity	0...100% RH (condensing)
Protection degree	IP54 / IP66 / IP68 / type 4X

Mechanical specifications:

Dimensions	Ø 110 mm
Dimensions, H x W x D	109 x 145 x 125.5 mm
Weight approx.	1.3 kg
Wire size.	0.13...1.5 mm ² / AWG 26...16 stranded wire
Screw terminal torque.	0.4 Nm
Vibration.	IEC 60068-2-6 : 2007
2...25 Hz.	±1.6 mm
25...100 Hz	±4 g

Display:

Display resolution	96 x 64 pixels
Number of digits	5
Response time, button to display	< 150 ms
Backlight	Selectable ON / OFF
Backlight color	Selectable white or red
Error indication	Selectable white or red (flashing)

Common electrical specifications:

Supply voltage, DC:	
Ex ia, intrinsically safe	10...30 VDC (12...30 VDC with backlight)
Other.	10...35 VDC (12...35 VDC with backlight)
Isolation - test / working	1.5 kVAC / 50 VAC
Signal / noise ratio.	> 60 dB
Communications interface	HART
Start-up time (transmitter to display).	Max. 5 s
Response time (programmable)	1...60 s
Long term stability.	0.1% of span / year

Accuracy, the greater of general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	$\leq \pm 0.05\%$ of span	$\leq \pm 0.01\%$ of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
RTD	$\leq \pm 0.2^\circ\text{C}$	$\leq \pm 0.01^\circ\text{C}/^\circ\text{C}$
Lin. R	$\leq \pm 0.1 \Omega$	$\leq \pm 10 \text{ m}\Omega / ^\circ\text{C}$
Volt	$\leq \pm 10 \mu\text{V}$	$\leq \pm 1 \mu\text{V} / ^\circ\text{C}$
TC type: E, J, K, L, N, T, U	$\leq \pm 1^\circ\text{C}$	$\leq \pm 0.05^\circ\text{C} / ^\circ\text{C}$
TC type: B, R, S, W3, W5, LR	$\leq \pm 2^\circ\text{C}$	$\leq \pm 0.2^\circ\text{C} / ^\circ\text{C}$

EMC - immunity influence.	$< \pm 0.1\%$ of span
Extended EMC immunity: NAMUR NE 21, A criterion, burst	$< \pm 1\%$ of span

TC B¹ accuracy specification range $> 400^\circ\text{C}$
 TC B² accuracy specification range $> 160^\circ\text{C} < 400^\circ\text{C}$
 TC B³ accuracy specification range $> 85^\circ\text{C} < 160^\circ\text{C}$
 TC B⁴ accuracy specification range $< 85^\circ\text{C}$

TC cold junction compensation. $< \pm 1.0^\circ\text{C}$
 Max. offset on input signal 50% of selec. max. value

Input specifications:

RTD input types:

Pt50, Pt100, Pt200, Pt500, Pt1000, Ni50, Ni100, Ni120, Ni1000

RTD type	Min. value	Max. value	Min. span	Standard
Pt100	-200°C	+850°C	25°C	IEC 60751
Ni100	-60°C	+250°C	25°C	DIN 43760
Lin. R	0 Ω	5000 Ω	30 Ω	----

Cable resistance per wire (max.). 5 Ω

(up to 50 Ω per wire is possible with reduced measurement accuracy)

Sensor current Nom. 0.2 mA

TC input types:

Type	Min. temperature	Max. temperature	Min. span	Standard
B	0°C	+1820°C	100°C	IEC584
E	-100°C	+1000°C	50°C	IEC584
J	-100°C	+1200°C	50°C	IEC584
K	-180°C	+1372°C	50°C	IEC584
L	-200°C	+900°C	50°C	DIN 43710
LR	-200°C	+800°C	50°C	GOST 3044-84
N	-180°C	+1300°C	50°C	IEC584
R	-50°C	+1760°C	100°C	IEC584
S	-50°C	+1760°C	100°C	IEC584
T	-200°C	+400°C	50°C	IEC584
U	-200°C	+600°C	50°C	DIN 43710
W3	0°C	+2300°C	100°C	ASTM E988-90
W5	0°C	+2300°C	100°C	ASTM E988-90

Cold junction compensation (CJC):

Constant, internal or external via a Pt100 or Ni100 sensor

mV input:

Voltage input range	-800...+800 mV
Min. span	2.5 mV
Input resistance	10 MΩ

Output specifications:

Signal range.	4...20 mA
Min. signal range.	16 mA
Updating time	440 ms
Load resistance.	$\leq (V_{\text{supply}} - 10) / 0.023 [\Omega]$
with backlight	$\leq (V_{\text{supply}} - 12) / 0.023 [\Omega]$
Sensor error detection, programmable	3.5...23 mA
(shorted sensor error detection is ignored at TC and mV input)	
NAMUR NE43 Upscale	23 mA
NAMUR NE43 Downscale.	3.5 mA
HART protocol revisions.	HART 7 and HART 5

Approvals:

EMC 2004/108/EC.	EN 61326-1
Rohs	2001/695/EU

Marine approval:

Det Norske Veritas, Ships & Offshore.	Standard for Certification No. 2.4 (Pending)
GL.	Pending

Ex / I.S.:

ATEX 94/9/EC	DEKRA 15 ATEX 0058 X
IECEX.	IECEX DEK 15.0039 X
FM	3055380
CSA	Yes
EAC Ex	Yes
INMETRO	Yes
Nepsi.	Yes

Mechanical specifications

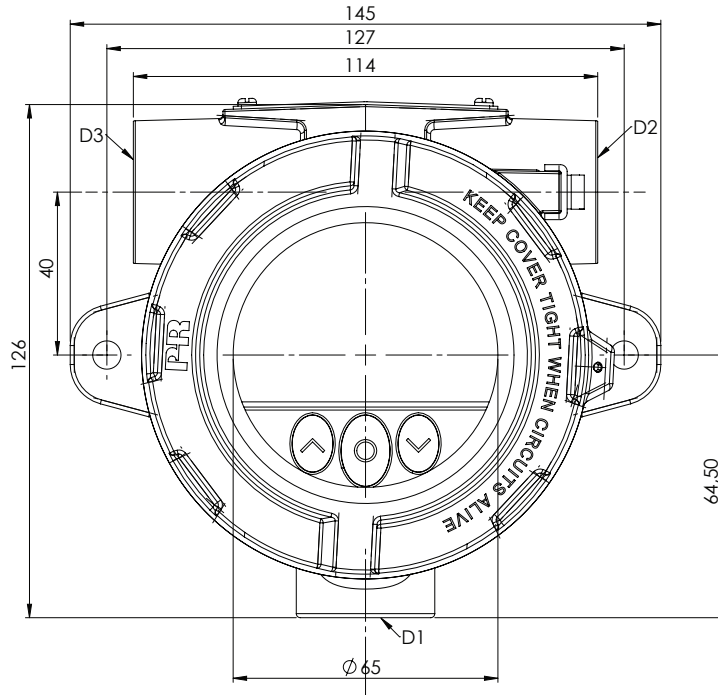


It is important to be careful when screwing the cover on or off. The thread surface must be free of any grains, pellets or other impurities as these can cause the cover to seize or damage the threads.

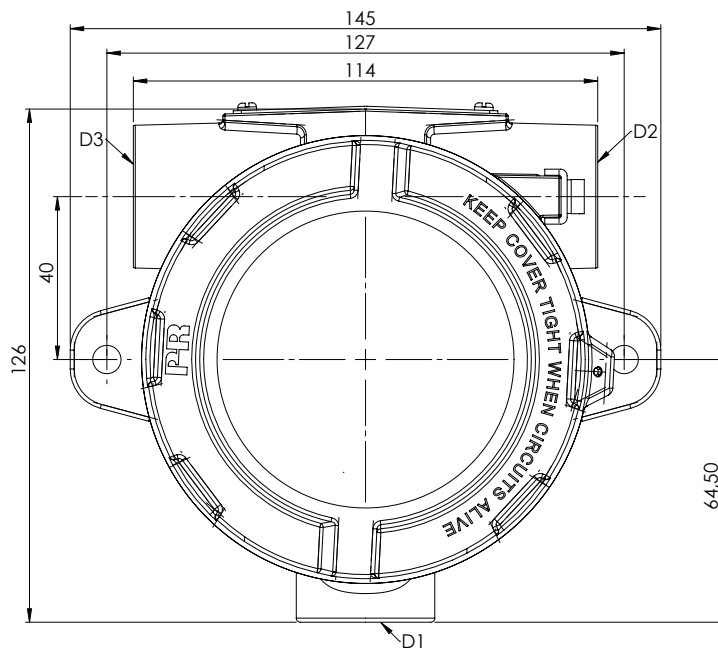
! Never use force to screw on the cover.

Should it be necessary to open the connection head cover after operation in maximum temperature, please be aware that the cover may be blocked (does not give when attempting to open it by hand). In this case, keep the cover under tension with your hand and hit the cover gently with a rubber hammer.

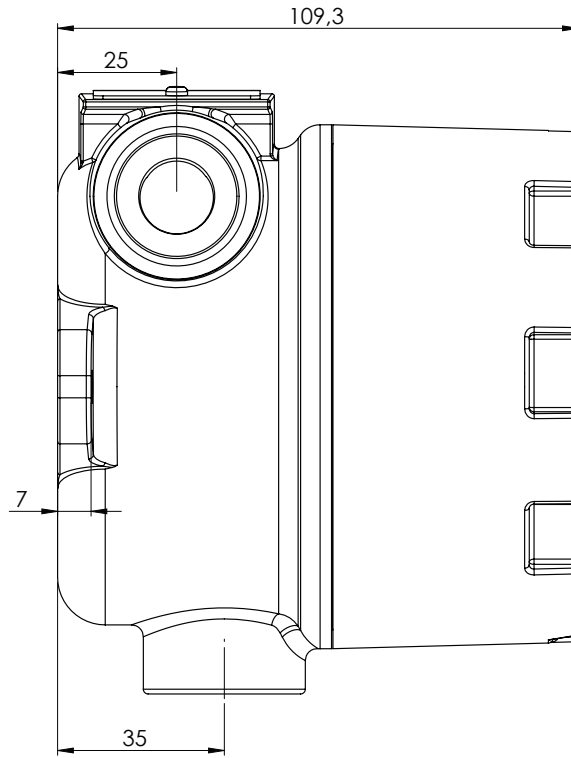
Front view - with buttons and display



Front view - no buttons or display

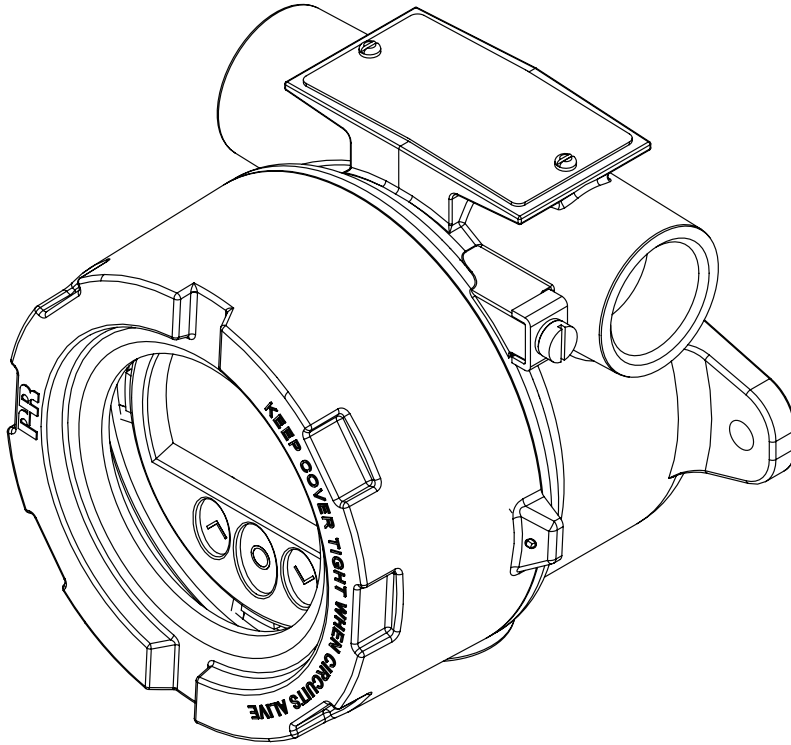


Side view

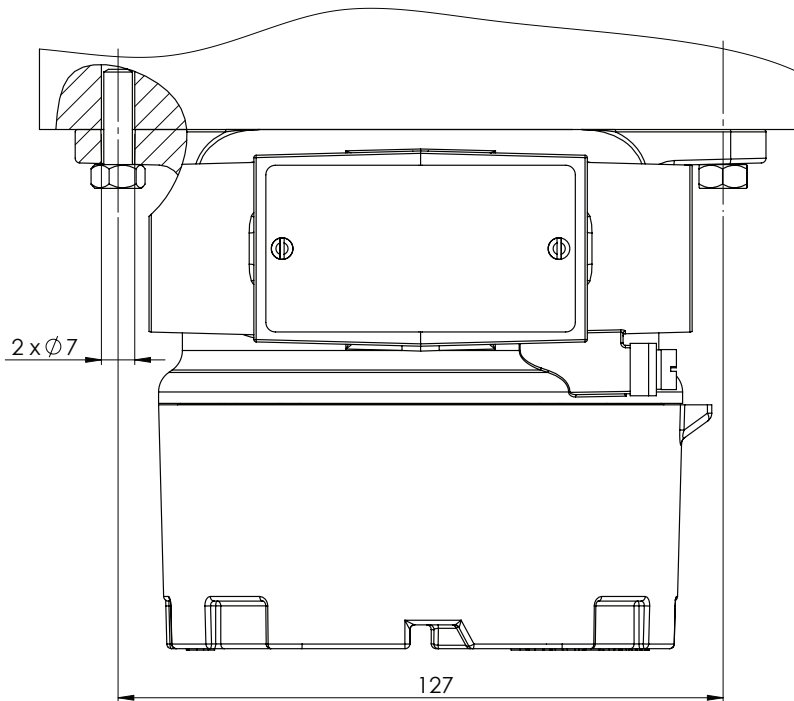


Mounting

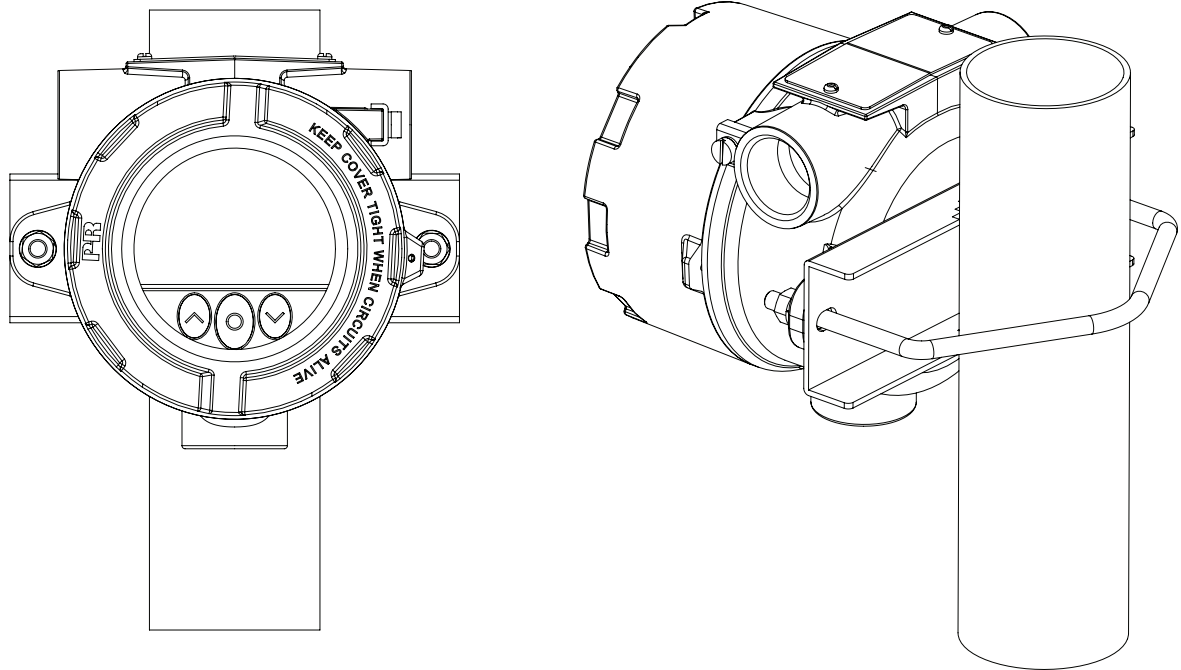
Wall-mounting - side view



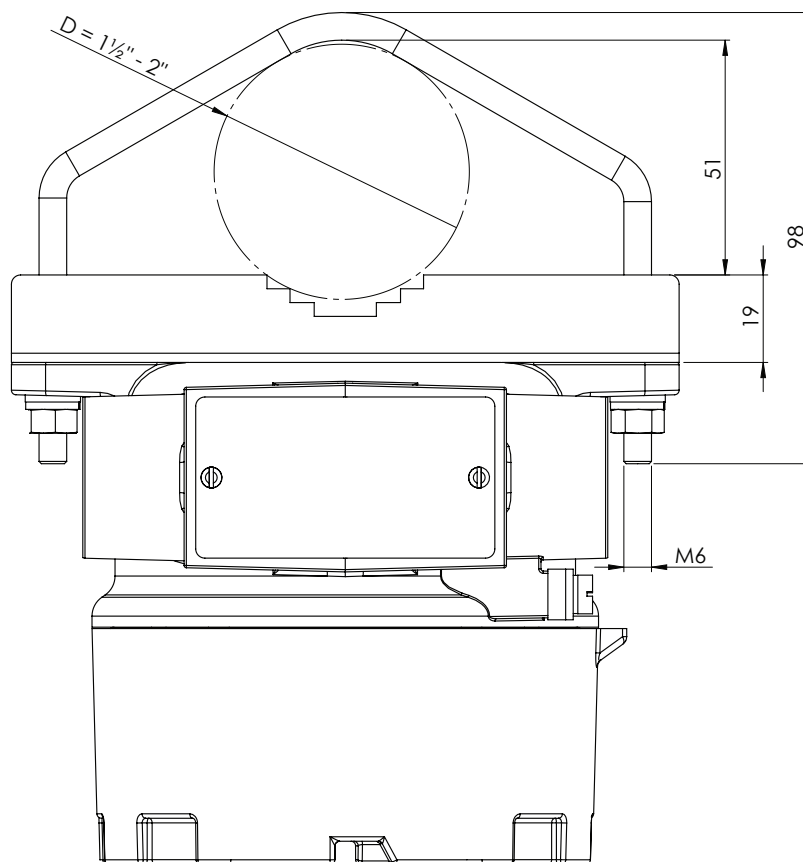
Wall-mounting - top view



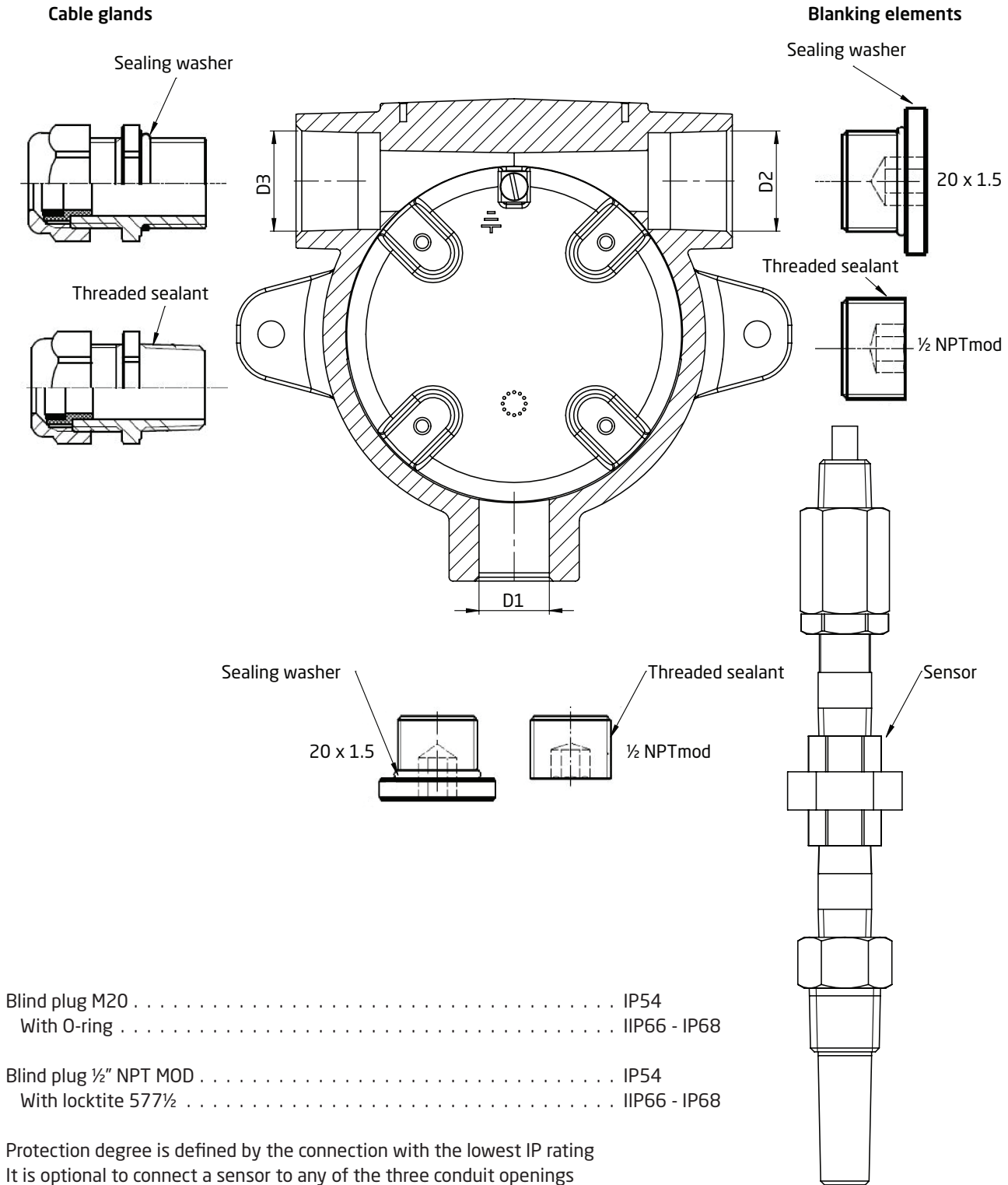
Pipe-mounting - front and back view



Pipe-mounting - top view



Protection degree



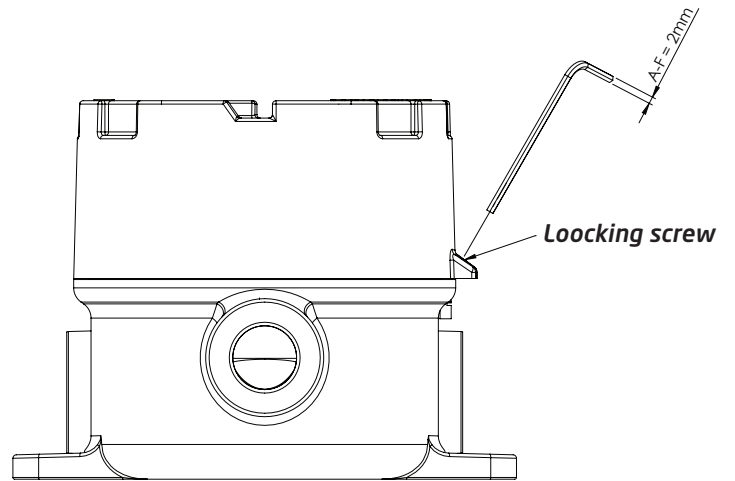
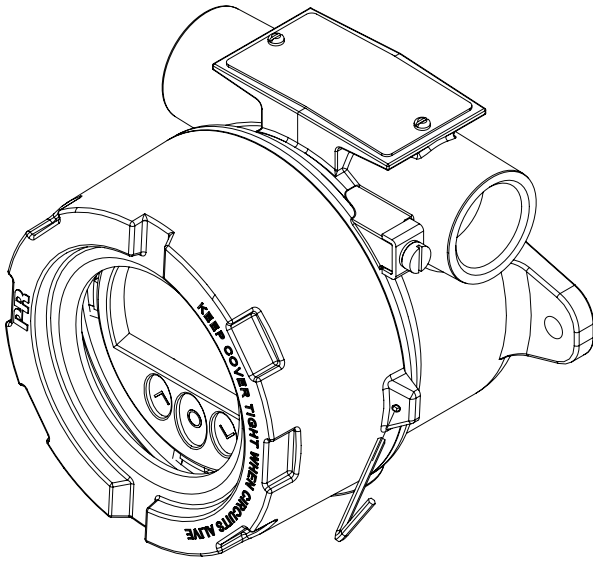
Earth terminal and protection terminal

Placement	Type	Cable cross section [mm ²]	
		Stranded wire	Solid wire
Inside	Protection terminal	1.5	2.5
Outside	Earth terminal	4.0	6.0

Assembly and disassembly

To connect sensor wires to the 7501 or change the orientation of the display, the housing must be disassembled and the internal device must be extracted. This can be done in six easy steps.

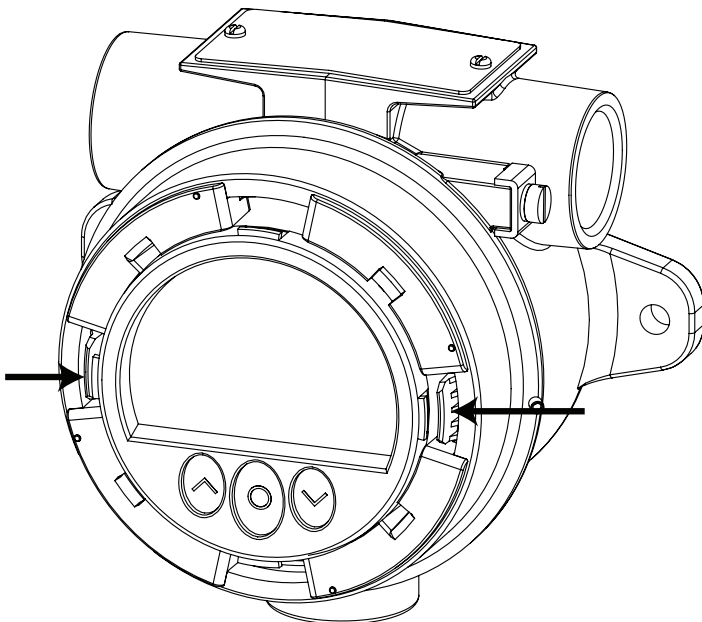
!! Disconnect power to the device before disassembly.

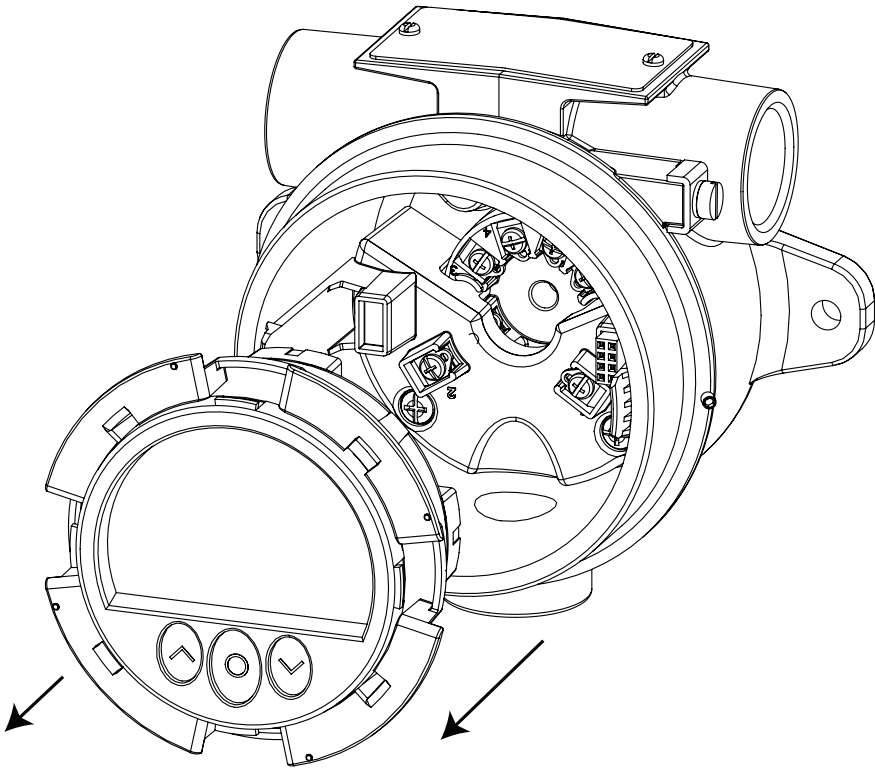


1. Release the **locking screw**, using a hex spanner with a cross-flat of 2 [mm]. This screw is situated on the housing top.
2. Unscrew the **housing lid** by turning it counterclockwise.

Point 3 and 4 only apply to devices with buttons and display.

3. Press and hold the two clamps located on the left and right side of the **display unit**.

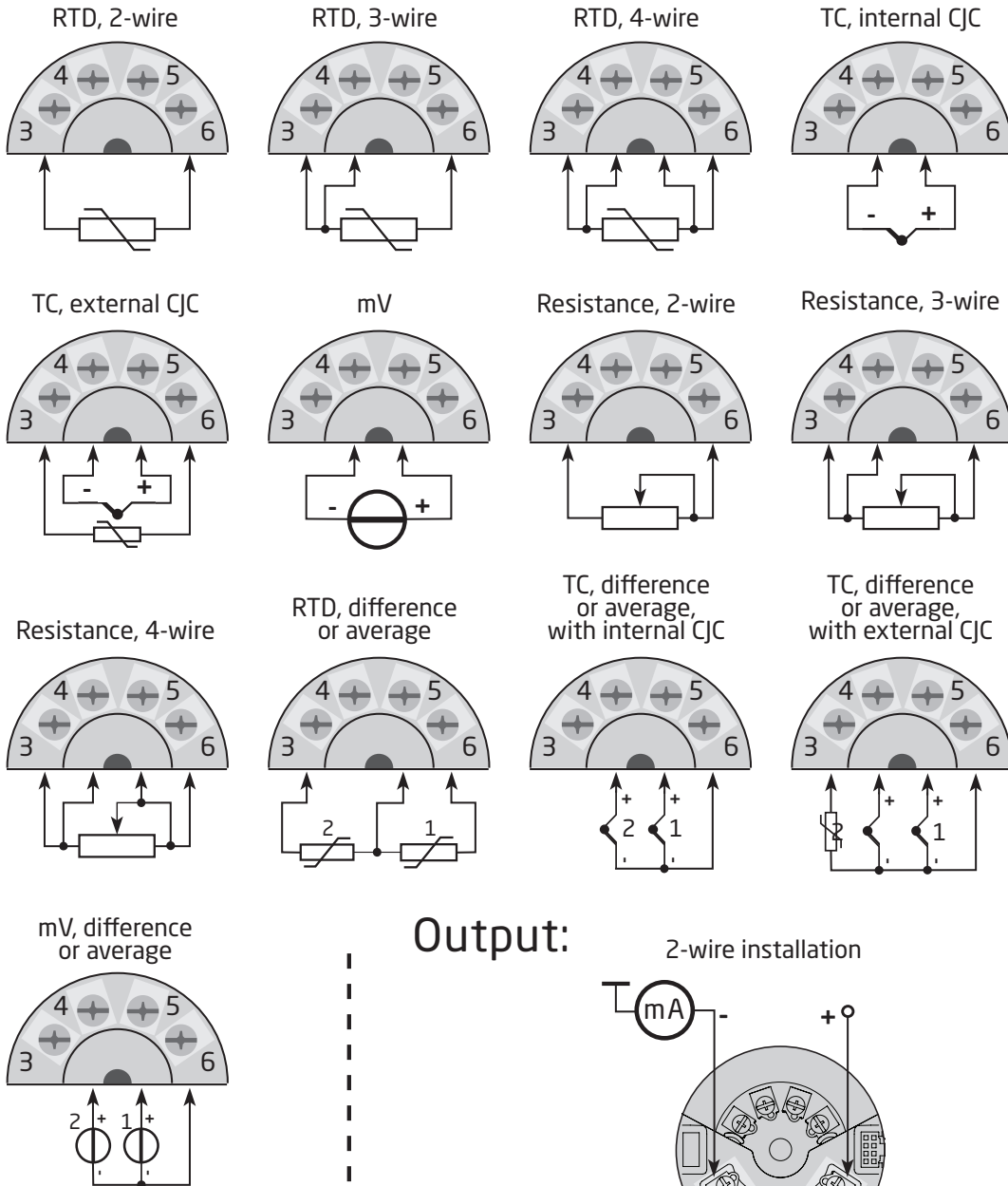




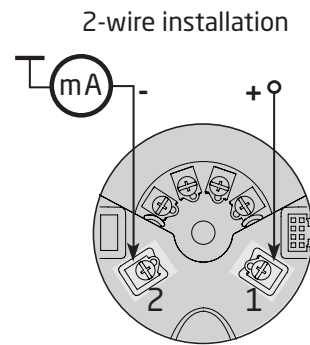
4. While holding the clamps, pull the **display unit** outwards to remove it.
5. The display can now be turned in steps of 90 degrees for best viewing angle.
6. See the section **Connections** for information on connecting sensors to the internal 5337.

Connections




Input:



Output:




Optical buttons


The user interface features 3 optical buttons: ,  and . The buttons can be operated both with or without gloves. The buttons are immune to interference from ambient light sources and other panel meters (e.g. other 7501 devices mounted in close proximity).


Additionally, the optical buttons are adaptive, meaning that they will adapt to wear and e.g. dirt left on the surface. The buttons work both with and without a front cover mounted.

Operating the optical buttons

The optical buttons are used for operating and programming the 7501. They offer multi-functionality depending on whether you press or long-press them. With the exception of the calibration and simulation menus (see the section **Display menu**), the display will return to the monitor view if no key-press is registered within one minute.


 In monitor view: switch to next process variable.
Elsewhere: increase the value of the selected parameter.



 In monitor view: switch to previous process variable.
Elsewhere: decrease the value of the selected parameter.

 Accept chosen value and proceed to next parameter


Hold  Progressively increase (scroll) the numerical value


Hold  Progressively decrease (scroll) the numerical value


Hold  Ignore the chosen value and return to previous parameter

Hold  +  Unlock the monitor view and enter configuration menu¹

Key presses are reflected in the symbols bar with the following symbols:

 Up button is pressed

 Down button is pressed

 Enter button is pressed

Display

The 96 x 64 pixel display can be rotated in 90-degree increments for easy vertical or horizontal viewing. The adjustable backlight enables you to view process values in all lighting conditions without an external light source, and it can be configured to flash if an error occurs. Both the optional backlight and the flashing error backlight can be selected as red or white, or turned off completely.







Display views

The appearance of the display will change to reflect the state of the 7501. This allows for easy and intuitive operation, status indication and guides you in configuring the device.



¹ If error color (see section the **Display menu**) is set to red or white and the display backlight is flashing, the first key press cancels the flashing backlight.

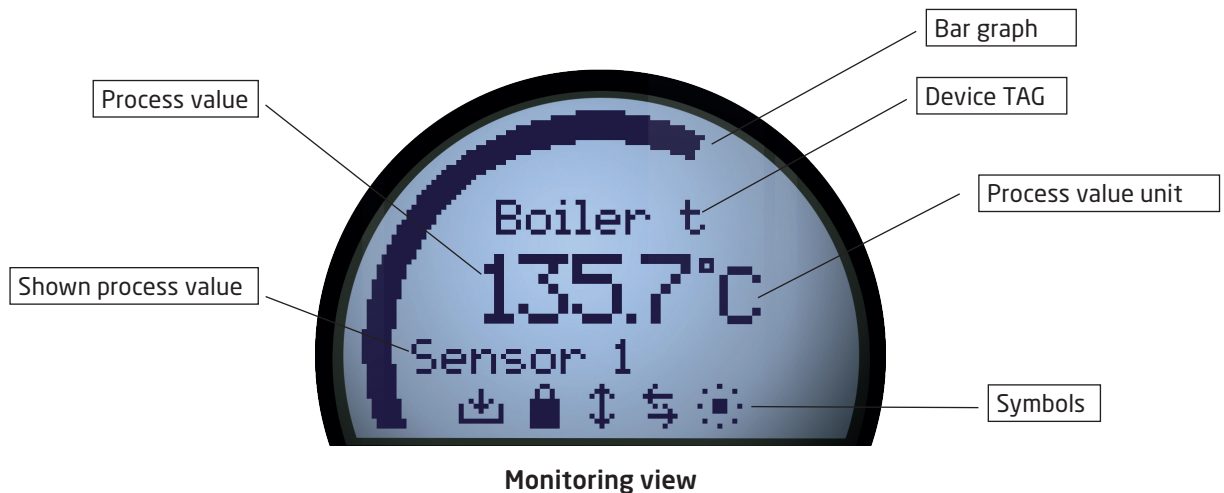
Symbol identification

The symbols bar provides information on the state of the device. Information such as HART communication, write protection and process value tendency is shown.





-  Saving configuration to internal memory
-  Device is locked or write-protected
-  Current process value tendency indicators
-  External HART communication indicator
-  Internal communication indicator
-  External HART communication error

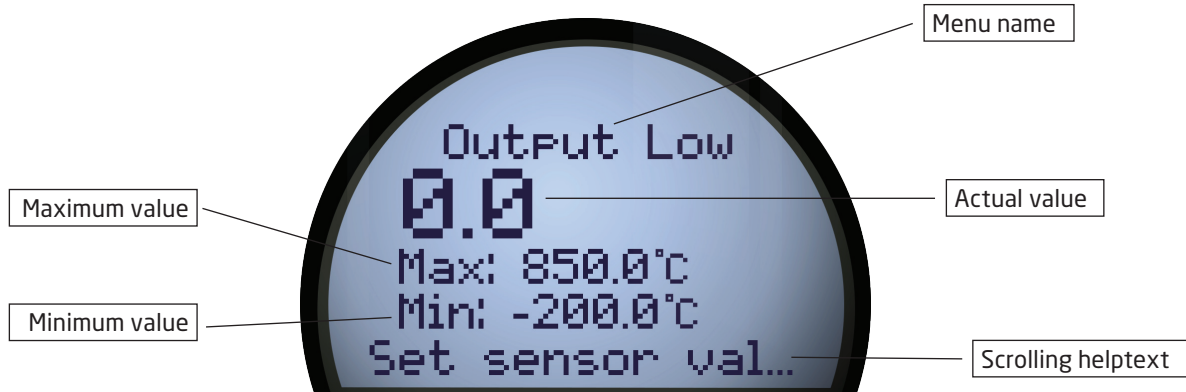
Monitoring view

Through the housing glass, you can easily monitor the process value in the configured units. A bar graph indicates the process magnitude at a glance. The device tag is shown at the top of the display. The device tag makes it easy to identify the displayed process value and it can be changed by pressing either the  or  optical button. At the bottom of the display, the symbols present information on the current state of the device.



Programming view

To enter the programming view, press and hold the  and  optical buttons. The programming views will guide you in a fast and intuitive way when setting up the device. The name of the selected parameter is shown at the top of the display with the currently selected value just below. The value can be changed by pressing the  or  optical buttons. Where applicable, information on legal range and currently configured units will also be displayed. At the bottom, a scrolling help text will give you information on the parameter you are modifying.



Programming view

Diagnostics view

If a sensor error or device error occur, the display can be configured to flash in red or white backlight. The display will show the type of status/error in large letters and a scrolling help text will present you with further information. The device tag is shown at the top of the display and at the bottom the symbols bar indicates the state of the device. For a detailed description of the different types of diagnostics messages shown please refer to the section **Device and sensor status indication**.



Diagnostics view

Configuration

When configuring the 7501, you will be guided through all parameters and you can choose the settings which fit the application. For each menu there is a scrolling help text which is automatically shown in the display. Configuration is carried out by use of the three optical buttons. When configuration is completed, or the display times out, the display will return to monitor view.

Device and sensor status indication

The 7501 is capable of displaying diagnostics information for the sensors and the device. These diagnostics can be divided into 4 categories: Sensor status, sensor errors, device status and device errors.

Sensor status ²	
Sensor 1 exceeds upper sensor limit	IN.HI ²
Sensor 1 exceeds lower sensor limit	IN.LO ²
Sensor 2 exceeds upper sensor limit	IN.HI ²
Sensor 2 exceeds lower sensor limit	IN.LO ²
CJC sensor exceeds upper CJC sensor limit	IN.HI ²
CJC sensor exceeds lower CJC sensor limit	IN.LO ²

Sensor errors	
Sensor 1 error	SE1.ER ³
Sensor 2 error	SE2.ER ³
CJC sensor error	CJC.ER ³
Internal temperature sensor error	CJC.ER

Device status	
Configuration is being re-synchronized	SYNC.DEV ⁴
New device attached and configuration is being updated	NEW.DEV ⁴
Last process calibration failed	CA.ER ⁵

Device errors ⁶	
A/D converter error	ADC.ER ⁶
EEPROM memory error	EE.ER ⁶
RAM memory error	RA.ER ⁶
Flash memory error	FL.ER ⁶
Exception error during code execution	SW.ER ⁶
Internal communication error	COM.ER ⁶

² The scrolling help text will inform you of the affected sensor.

³ Check wiring and replace sensor if necessary.

⁴ This message will disappear after a few seconds and the display will enter monitoring view.

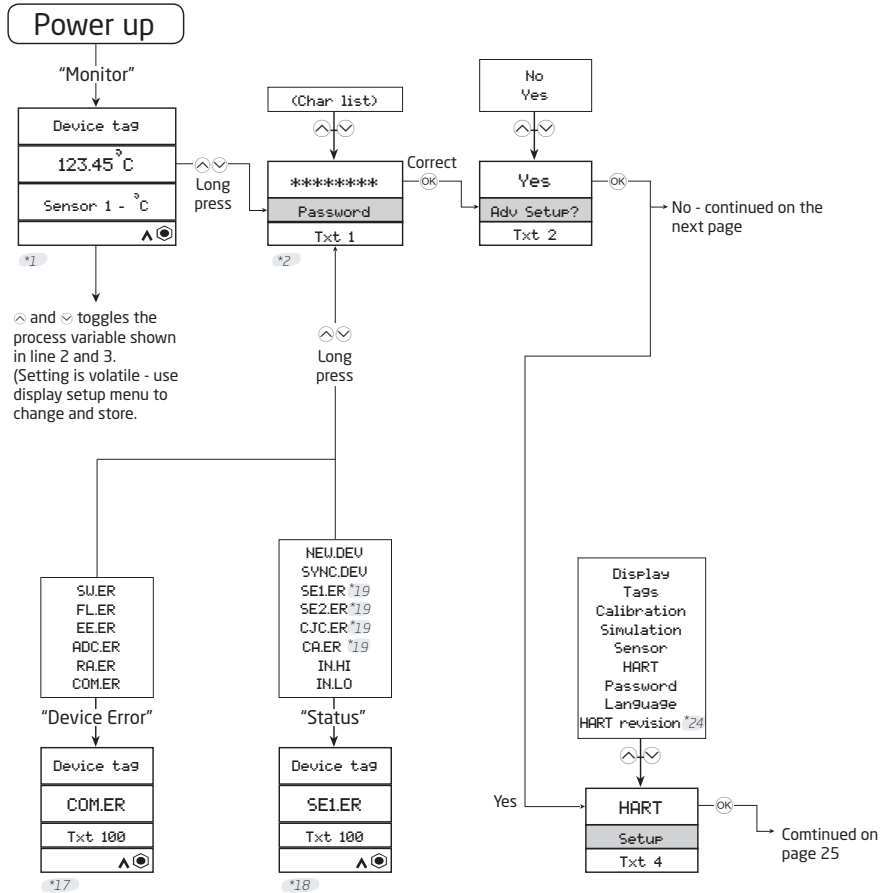
⁵ Perform a new process calibration or reset the calibration to cancel this error. See the section **Display**.

⁶ A device malfunction has occurred. To clear this error, repower the device or reconfigure using the display. If the error is persistent, it will reappear and the device may have to be replaced.

Display menu

Exiting the monitor view allows you to configure the 7501, using the optical buttons (see the section **Operating the optical buttons**). The display menu is divided into 2 parts: Basic configuration and Advanced configuration. The advanced configuration menu is sub-divided into 9 parts: Display, Tags, Calibration, Simulation, Sensor, HART, Password, Language and HART Revision.

If the 7501 has been password-protected, the correct password must be entered to proceed to the desired configuration menu. The menu can be temporarily locked because it is receiving a configuration on the HART interface or because it is synchronising configuration parameters with the internal device.



*1 If no keys are pressed for 60 s in any menu (10 minutes for Sim and Cal), no parameters are saved and the "Monitor" menu is shown.

*2 Only shown if password is enabled.

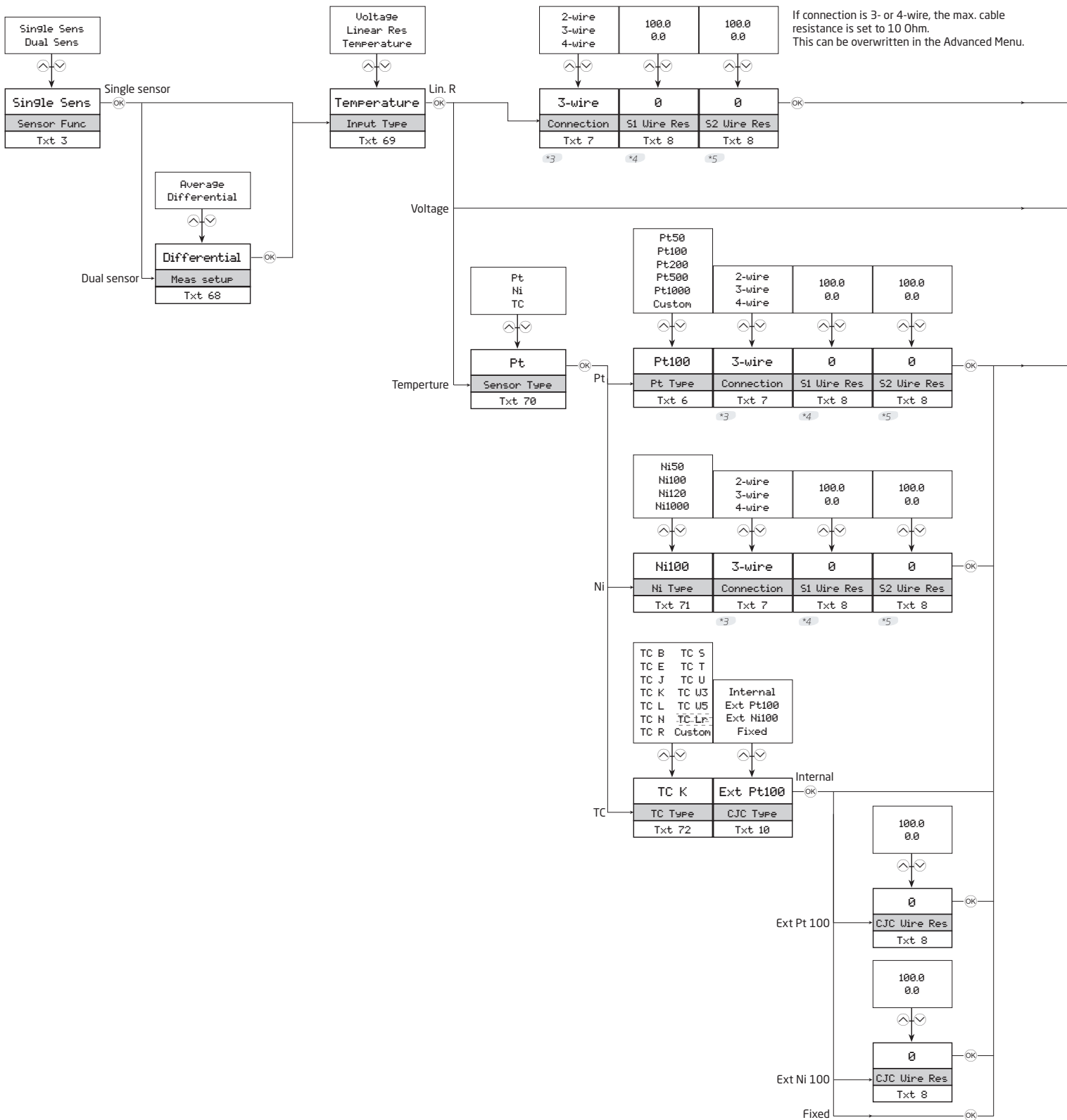
*17 Will be forced into this state if any device error occurs (from any other menu).

*18 Warning state: will be forced into this state if sensor error or overrange is present. Only from "Monitor" menu.

*19 First long press of ⏴ and ⏵ simultaneously will stop backlight flash but not exit view. Second long press will enter configuration menu (if allowed).

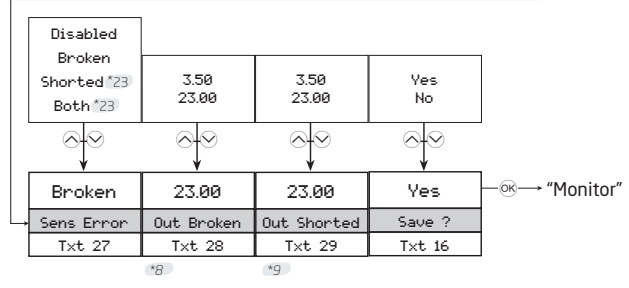
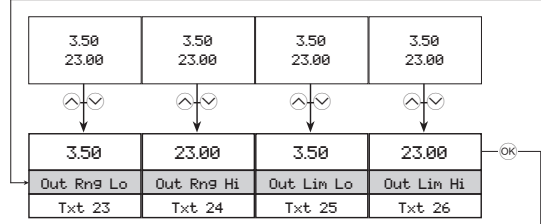
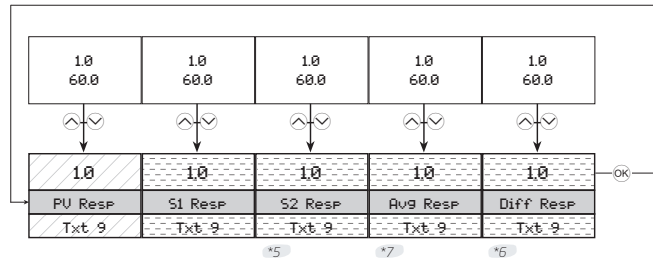
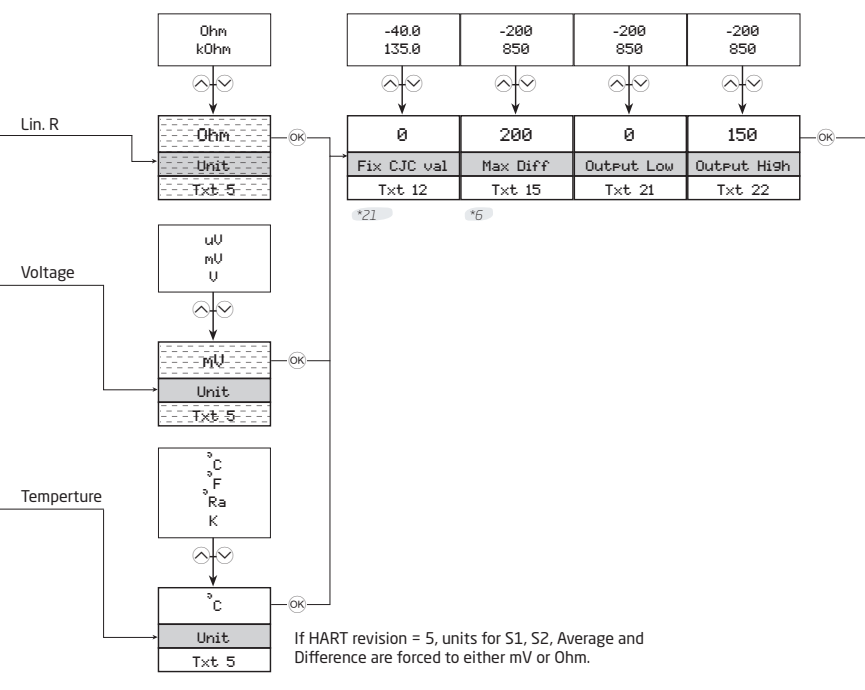
*24 Not shown if change of protocol is not possible.

Basic configuration



- *3 Only shown if single sensor function is selected.
- *4 Only shown if 2-wire sensor connection is selected.
- *5 Only shown if dual sensor function is selected.

Not available in HART 5 mode

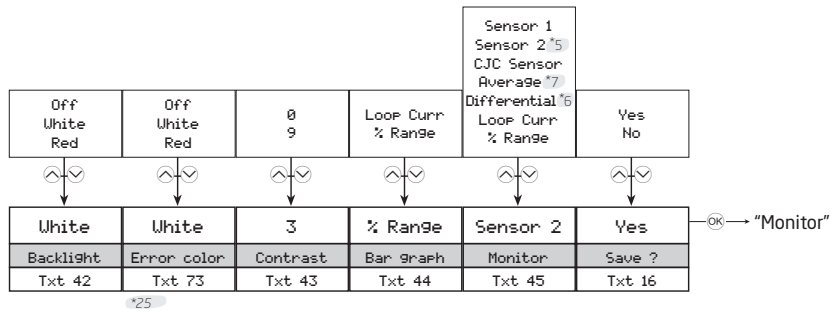


- *5 Only shown if dual sensor function is selected.
- *6 Only shown if differential sensor function is selected.
- *7 Only shown if average sensor function is selected.

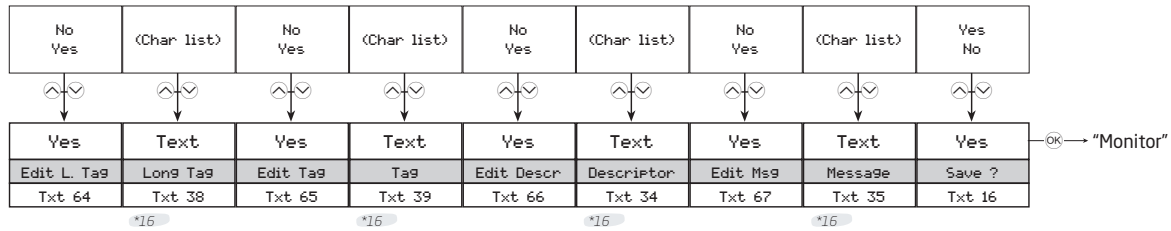
- *8 Only shown if sensor breakage detection is activated.
- *9 Only shown if sensor shortage detection is activated.
- *21 Only shown if TC, fixed CJC is selected.

- *23 Selection not available for Voltage Input Type and TC Sensor Type with internal/fixd CJC.
- Not available in HART 5 mode
- Not available in HART 7 mode

Display



Tags



*5 Only shown if dual sensor function is selected.

*6 Only shown if differential sensor function is selected.

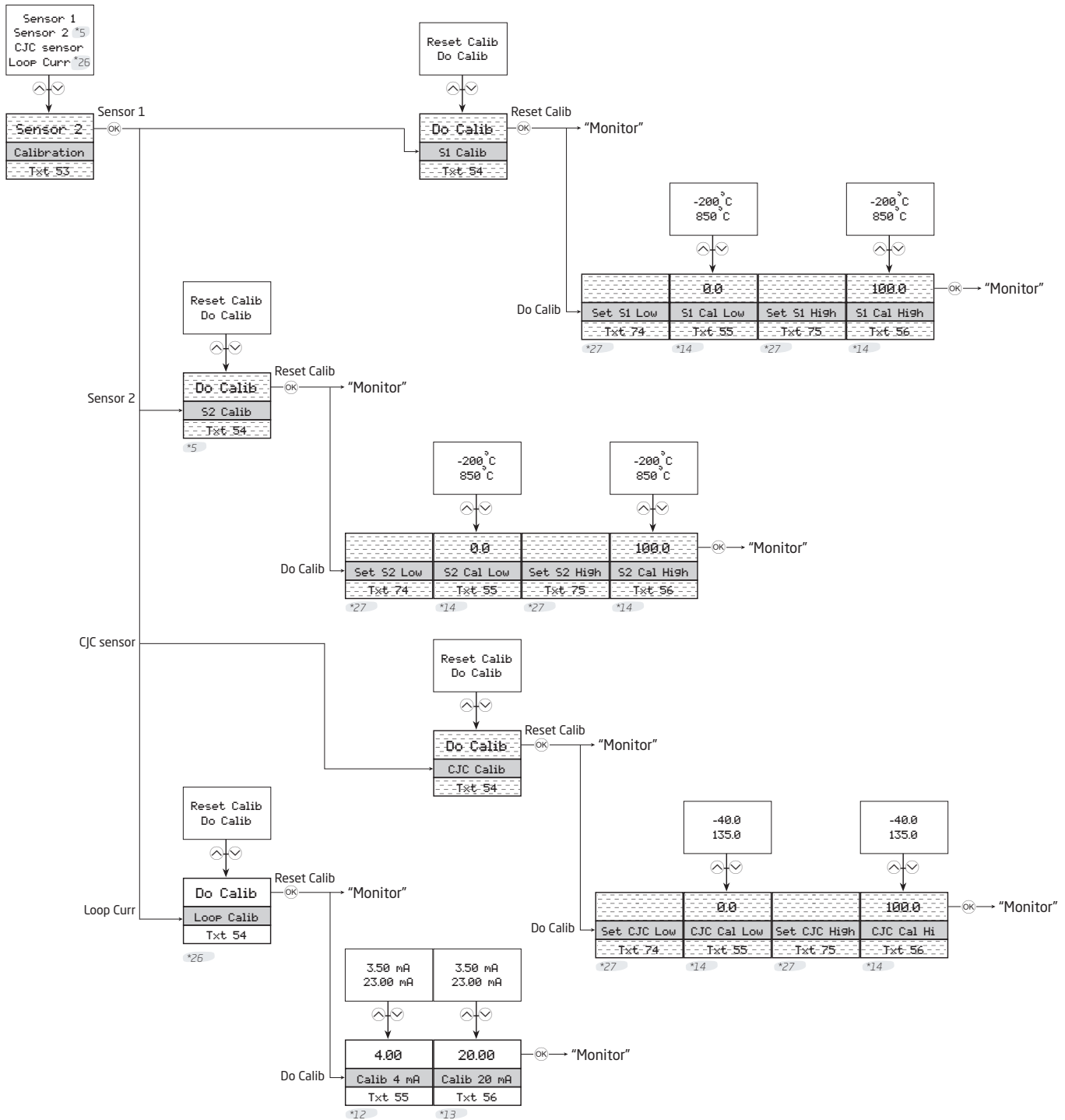
*7 Only shown if average sensor function is selected.

*16 Only shown if "Yes" was selected in the previous menu.

*25 Not shown if backlight is off.

Calibration

The device can be process-calibrated in two points to fit a given input signal. A low input signal (not necessarily 0%) is applied and the actual value is entered. Secondly a high input signal (not necessarily 100%) is applied and the actual value is entered. If you accept to use the calibration (by selecting Yes in the Save menu) the device will work according to the new adjustments. You can return the device to factory calibration points by selecting Reset Calibration from the Calibration menu. Please note that while performing a calibration the programming mode will not time out.



*5 Only shown if dual sensor function is selected.

*14 Default value is current input value. No timeout in this menu.

Not available in HART 5 mode



*12 4 mA fixed output configured internally.

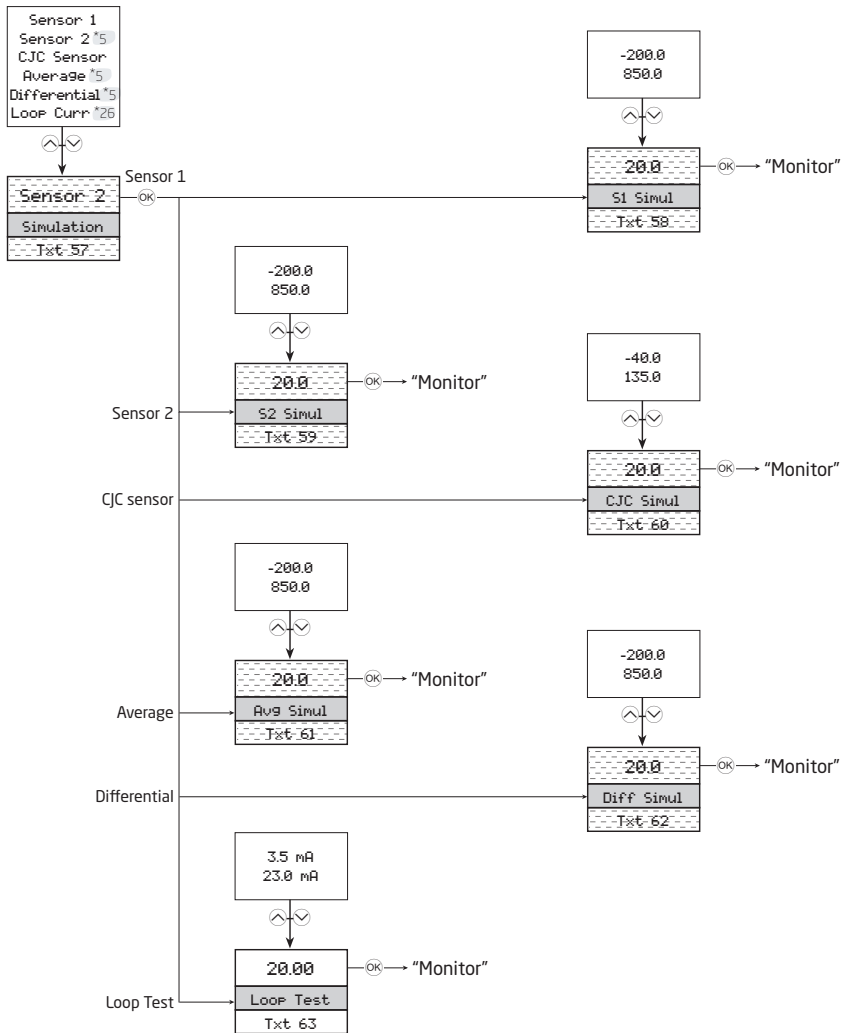
*26 Not possible if Loop Current is not active.

*13 20 mA fixed output configured internally.

*27 No timeout in this menu.

Simulation

The 7501 allows you to simulate process values by entering the simulation menu. Using the  and  optical buttons, the simulated value can be increased and decreased (see the section **Operating the optical buttons**). Please note that while performing a calibration the display will not time out.



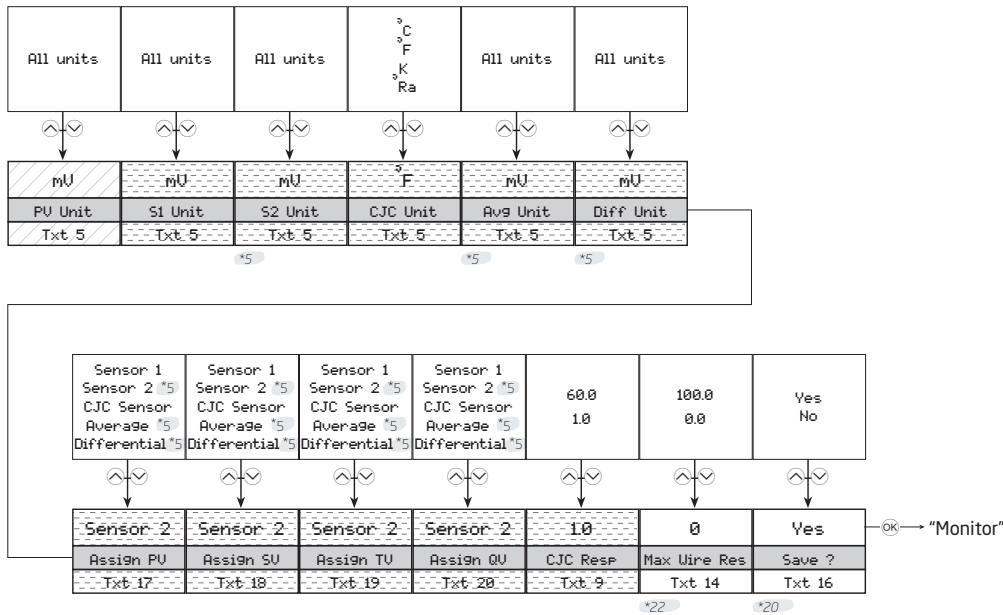
*5 Only shown if dual sensor function is selected.

*26 Not possible if Loop Current is not active.

Not available in HART 5 mode

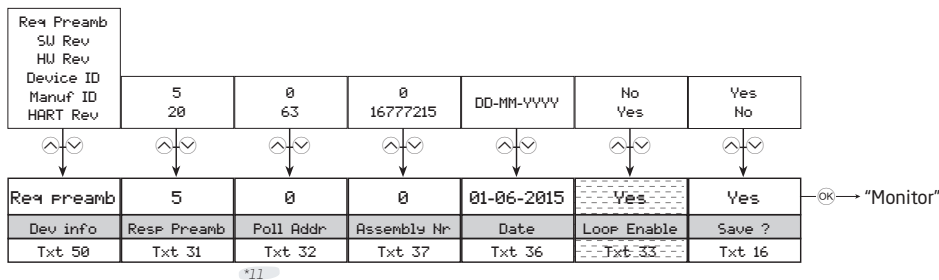
Sensor

The sensor menu allows you to make more detailed configuration of your sensor values, which are not available in the basic configuration menu. These involve selecting from a large amount of process variable units, changing the sensor assignment to PV, SV, TV and QV and specifying the CJC response time. Please note that performing a basic configuration (see the section **Basic configuration**) will overwrite these changes.



HART

Under this menu you will find special parameters pertaining to HART. It will provide you with general information regarding number of request preambles, software and hardware revisions, device and manufacture IDs and HART revision. The menu will also allow you to specify number of response preambles, polling address, assembly number and date.



*5 Only shown if dual sensor function is selected.

*20 Values may be overwritten when normal menu is saved.

Not available in HART 5 mode

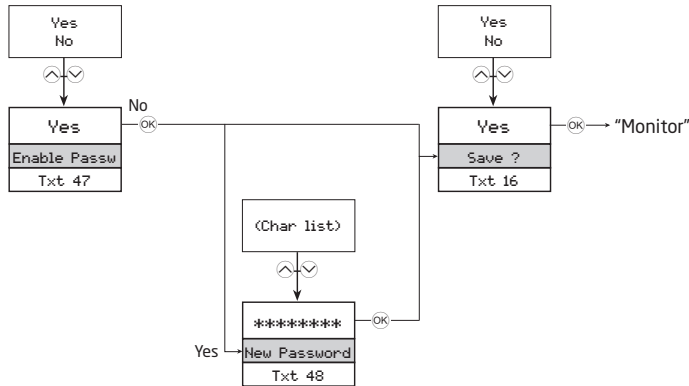
*11 Range is 0..15 in HART 5 mode.

*22 Only shown if 3- or 4-wire connection is selected.

Not available in HART 7 mode

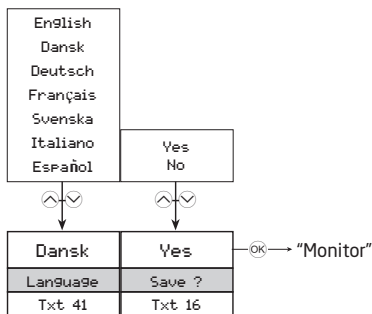
Password

Here you can choose to enable or disable password protection of the 7501. The password must consist of exactly 8 characters, available in the Latin 1 character set, and will protect the device against unauthorized modifications to the configuration. The device is delivered default without a password.



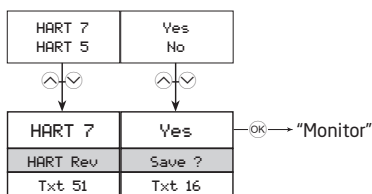
Language

In this menu you can choose between seven different language versions of the help text that will appear in the menu (see the section **Display**). You may choose from the following languages: English, Dansk, Deutsch, Français, Svenska, Italiano and Español.



HART Revision

Changing the HART revision is done from this menu. Select the desired HART revision and press the \odot button. Select Yes to effect the change in the Save menu. Please note that changing the HART revision will reboot the device, during which time the display may become blank for a few seconds. If HART 7 is selected the device will appear as 7501 in the HART interface. If HART 5 is selected the device will appear as 7501H5/5335V2 in the HART interface.



*24

*24 Not shown if change of protocol is not possible

Help text overview

- [01] Set correct password
- [02] Enter Advanced setup menu?
- [03] Select single sensor functionality
Select dual sensor functionality
- [04] Enter Display setup
Enter Tags setup
Enter Process calibration
Enter Simulation mode
Enter Advanced sensor setup
Enter HART setup
Enter Password setup
Enter Language setup
Enter HART Revision setup
- [05] Select measurement unit
- [06] Select custom RTD as sensor type
Select Pt50 as sensor type
Select Pt100 as sensor type
Select Pt200 as sensor type
Select Pt500 as sensor type
Select Pt1000 as sensor type
- [07] Select 2-Wire sensor connection
Select 3-Wire sensor connection
Select 4-Wire sensor connection
- [08] Set actual cable resistance in 2 wires
- [09] Set response time
- [10] Select Internal CJC sensor
Select Pt100 as external CJC sensor type
Select Ni100 as external CJC sensor type
Select Fixed CJC
- [12] Set fixed CJC value
- [13] Disable sensor 2
Enable sensor 2
- [14] Set maximum cable resistance in 2 wires
- [15] Set max. value for individual sensors for differential measurement
- [16] Save configuration?
- [17] Map sensor1 to PV and output loop current
Map sensor2 to PV and output loop current
Map CJC sensor to PV and output loop current
Map Internal temperature to PV and output loop current
Map Avg measurement to PV and output loop current
Map differential measurement to PV and output loop current
- [18] Map sensor1 to SV
Map sensor2 to SV
Map CJC sensor to SV
Map Internal temperature to SV
Map Avg measurement to SV
Map differential measurement to SV
- [19] Map sensor1 to TV
Map sensor2 to TV
Map CJC sensor to TV
Map Internal temperature to TV
Map Avg measurement to TV
Map differential measurement to TV
- [20] Map sensor1 to QV
Map sensor2 to QV
Map CJC sensor to QV
Map Internal temperature to QV
Map Avg measurement to QV
Map differential measurement to QV
- [21] Set sensor value for analog output low
- [22] Set sensor value for analog output high
- [23] Set output current at 0% input range
- [24] Set output current at 100% input range
- [25] Set output current lower limit
- [26] Set output current upper limit
- [27] Disable sensor error detection
Enable sensor wire breakage detection
Enable sensor shortage detection
Enable both sensor wire breakage and sensor shortage detection
- [28] Set output current in case of sensor wire breakage
- [29] Set output current in case of sensor shortage
- [31] Set number of preambles in HART response frames
- [32] Set polling address
- [33] Disable loop current signal (no analog output)
Enable loop current signal (analog output)
- [34] Write description of the device
- [35] Write message on the device
- [36] Set user date on device
- [37] Set the final assembly number
- [38] Write long tag
- [39] Write tag
- [41] Select language
- [42] Disable LCD backlight
Select white LCD backlight
Select red LCD backlight
- [43] Adjust LCD contrast
- [44] Select loop current for bar graph indicator
Select % of range for bar graph indicator
- [45] Select Sensor1 for process monitor view
Select Sensor2 for process monitor view
Select CJC Sensor for process monitor view
Select Average measurement for process monitor view
Select differential measurement for process monitor view
Select loop current for process monitor view
Select % of range for process monitor view
- [47] Enable password protection?
- [48] Set new password
- [50] Minimum number of preambles in requests
Software revision level
Hardware revision level
Device identification
Manufacturerer identification
HART protocol revision level
- [51] Set HART protocol revision 7
Set HART protocol revision 5

[53]	Enter sensor1 calibration menu	[100]	
	Enter sensor2 calibration menu	SW.ER	Exception error during code execution
	Enter CJC sensor calibration menu	FL.ER	Flash memory error
	Enter output loop current calibration menu	EE.ER	EEPROM memory error
[54]	Reset calibration to factory default	ADC.ER	A/D converter error
	Perform process calibration	RA.ER	RAM memory error
[55]	Set value for low calibration point	COM.ER	Internal communication error
[56]	Set value for high calibration point	NEW.DEV	New device attached - configuration is being updated - please wait
[57]	Simulate sensor1 input		
	Simulate sensor2 input	SYNC.DEV	Configuration is being re-synchronized - please wait
	Simulate CJC sensor input	SE1.ER	Sensor 1 error, check wiring and replace sensor if necessary
	Simulate average measurement		
	Simulate differential measurement	SE2.ER	Sensor 2 error, check wiring and replace sensor if necessary
	Simulate output loop current		
[58]	Set sensor1 simulation value	CJC.ER	CJC Sensor error, check wiring and replace sensor if necessary
[59]	Set sensor2 simulation value		
[60]	Set CJC sensor simulation value	CJC.ER	Internal temperature sensor error
[61]	Set average measurement simulation value	CA.ER	Last process calibration failed to succeed - please retry
[62]	Set differential measurement simulation value		
[63]	Set output loop current simulation value	IN.HI / IN.LO	Sensor 1 is out of range
[64]	Edit the long tag?	IN.HI / IN.LO	Sensor 2 is out of range
[65]	Edit the tag?	IN.HI / IN.LO	CJC sensor is out of range
[66]	Edit the descriptor?	IN.HI / IN.LO	Sensor 1 or Sensor 2 measurement is out of range
[67]	Edit the message?		
[68]	Select averaging of sensor 1 and sensor 2		
	Select differential measurement:		
	sensor 1 - sensor 2		
[69]	Select voltage input		
	Select linear resistance input		
	Select temperature input		
[70]	Select Pt sensor type		
	Select Ni sensor type		
	Select TC sensor type		
[71]	Select Ni50 as sensor type		
	Select Ni100 as sensor type		
	Select Ni120 as sensor type		
	Select Ni1000 as sensor type		
[72]	Select TC-B as sensor type		
	Select TC-E as sensor type		
	Select TC-J as sensor type		
	Select TC-K as sensor type		
	Select TC-L as sensor type		
	Select TC-N as sensor type		
	Select TC-R as sensor type		
	Select TC-S as sensor type		
	Select TC-T as sensor type		
	Select TC-U as sensor type		
	Select TC-W3 as sensor type		
	Select TC-W5 as sensor type		
	Select TC-Lr as sensor type		
	Select Custom TC as sensor type		
[73]	Disable LCD error backlight		
	Select white LCD error backlight		
	Select red LCD error backlight		
[74]	Apply low calibration point value and wait until stable		
[75]	Apply high calibration point value and wait until stable		

Available units

The following table lists the available units. Please note that most of these are only available from the Sensor menu (see the section **Display menu**).

Menu #	HART #	Text	Types
0	32	°C	<- Sensor specific types
1	33	°F	
2	34	°R	
3	35	K	
4	37	Ohm	
5	163	kOhm	
6	240	µV	
7	36	mV	
8	58	V	
9	39	mA	
10	57	%	
11	1	inH ₂ O	<- Pressure units
12	2	inHg	
13	3	ftH ₂ O	
14	4	mmH ₂ O	
15	5	mmHg	
16	6	psi	
17	7	bar	
18	8	mbar	
19	9	g/cm ²	
20	11	Pa	
21	12	kPa	
22	13	torr	
23	14	atm	
24	237	MPa	
25	17	l/min	<-Volume flow units
26	19	m ³ /h	
27	22	gal/s	
28	24	l/s	
29	25	ml/d	
30	26	ft ³ /s	
31	130	ft ³ /h	
32	27	ft ³ /d	
33	28	m ³ /s	
34	29	m ³ /d	
35	121	m ³ n/h	
36	132	bbl/s	
37	134	bbl/h	
38	135	bbl/d	
39	136	gal/h	
40	138	l/h	
41	235	gal/d	
42	20	ft/s	<-Velocity units
43	21	m/s	
44	114	in/s	
45	120	m/h	

Menu #	HART #	Text	Types
46	40	gal	<- Volume units
47	41	l	
48	43	m ³	
49	46	bbl	
50	110	bush	
51	111	yd ³	
52	112	ft ³	
53	113	in ³	
54	166	m ³ n	
55	167	ln	
56	236	hl	
57	44	ft	<- Length units
58	45	m	
59	47	in	
60	48	cm	
61	49	mm	
62	50	min	<-Time units
63	51	s	
64	52	h	
65	53	d	
66	60	g	<- Mass units
67	61	kg	
68	62	t	
69	63	lb	
70	64	ShTon	
71	65	LTon	
72	125	oz	
73	70	g/s	<- Mass flow units
74	71	g/min	
75	72	g/h	
76	73	kg/s	
77	75	kg/h	
78	76	kg/d	
79	77	t/min	
80	78	t/h	
81	79	t/d	
82	80	lb/s	
83	82	lb/h	
84	83	lb/d	
85	90	SGU	<- Mass per volume units
86	91	g/cm ³	
87	92	kg/m ³	
88	95	g/ml	
89	96	kg/l	
90	97	g/l	
91	146	µg/L	

Menu #	HART #	Text	Types
92	147	µg/m ³	
93	54	cSt	<- Viscosity units
94	55	cP	
95	69	N/m	<- Energy (work) units
96	128	kW/h	
97	162	Mcal	
98	164	MJ	
99	165	Btu	
100	127	kW	<- Power units
101	129	hp	
102	141	MJ/h	
103	142	Btu/h	
104	117	deg/s	<- Angular velocity units
105	118	rev/s	
106	119	rpm	
107	38	Hz	<- Miscellaneous
108	56	µMho	
109	59	pH	
110	66	mS/cm	
111	67	µS/cm	
112	68	N	
113	139	ppm	
114	143	deg	
115	144	rad	
116	148	%Cs	
117	149	Vol%	
118	153	pF	
119	154	ml/l	
120	155	µl/l	
121	161	%LEL	
122	169	ppb	
123	251	<blank>*	<- Special units
124	252	?	
125	253	Spcl	
*No characters shown			

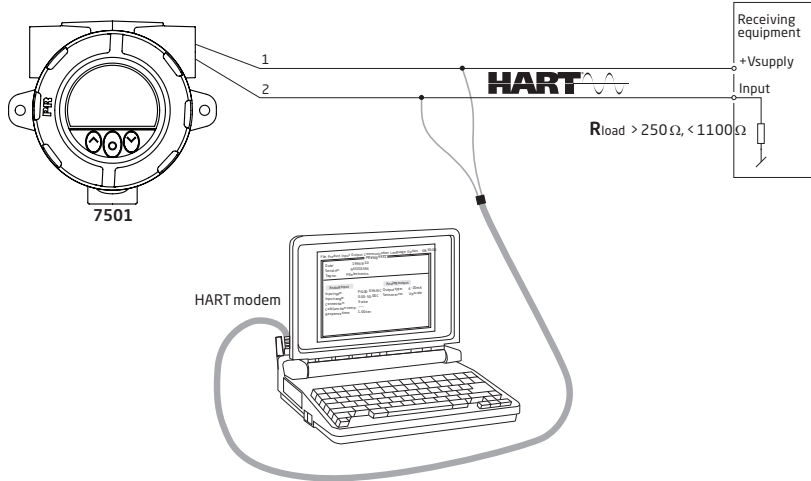
Programming

The 7501 can be configured in one of the following 3 ways:

- Via the optical buttons and the display (see the section **Display menu**).
- With a HART modem and the PReset software.
- With a HART compliant handheld communicator having the 7501H5 or 7501H7 DD driver installed.

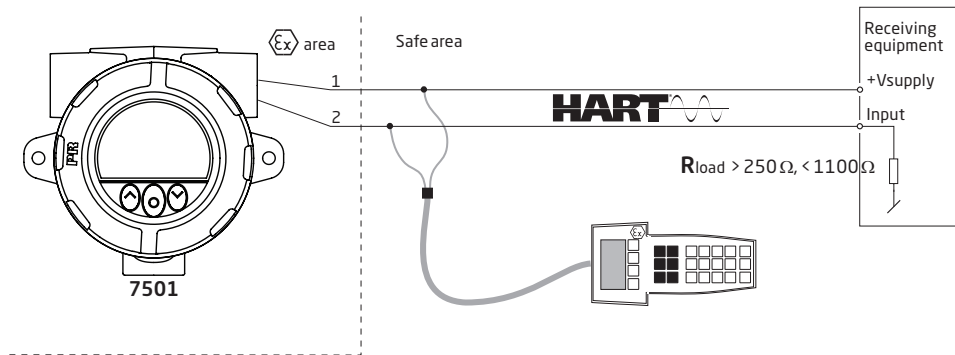
1: HART modem

For programming please refer to the drawing below.



2: HART communicator





For programming please refer to the drawing below. To get access to product-specific commands, the HART communicator must be loaded with the 7501 H5 / 7501 H7 DD driver. This can be ordered either from the HART Communication Foundation or from PR electronics.



Changing the HART protocol version

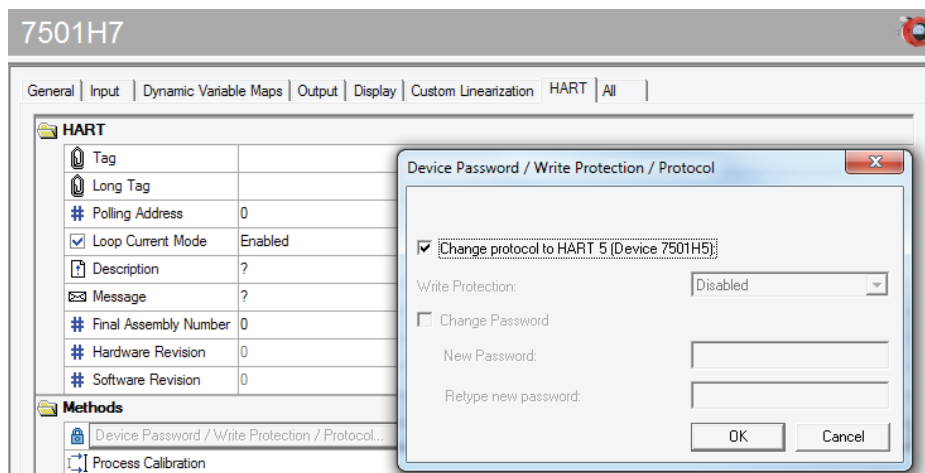
It is possible to change the HART protocol revision of the device by means of the display, utilizing the PReset software and a HART modem or other HART configuration tools such as handheld HART terminals.

Changing the HART revision using the display and the optical buttons

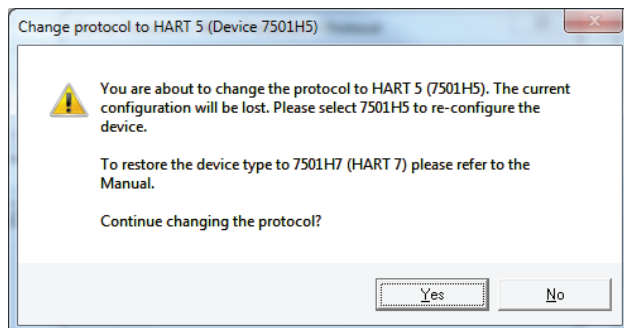
Changing the revision is done from the HART revision view under the Advanced menu. Use the  or  optical buttons to select the desired HART revision. Press the  button to accept the revision and change to the Save view. Select Yes and press  to acknowledge the change or **No** to cancel.

Changing the HART revision using the PReset software

Select either 7501H5 or 7501H7 depending on which protocol revision the 7501 is currently running. Click on the HART tab and then on **Device Password / Write Protection / Protocol....** In the newly opened window check the “**Change protocol to HART #**” (# being the desired revision) then acknowledge by pressing the OK button.



The following warning appears:



Click **Yes** to accept the changes.

Changing the HART revision using a handheld terminal

- Drive the 7501 device Online and enter **Device setup - Diag/Service**.
- Select **Write protection** and **Write protect** by entering “*****” (eight stars).
- Select **New password** - type “*****” (eight stars) and then “**HARTREV5**” or “**HARTREV7**” depending on the desired revision
- Select **Write enable** and enter “-CHANGE-”.

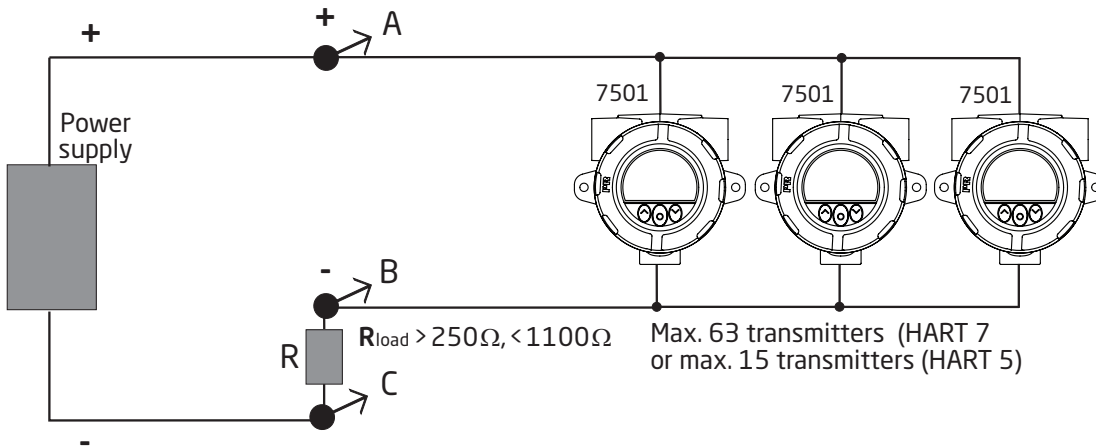
Connection of transmitters in multidrop mode

The outputs of maximum 63 transmitters can be connected in parallel for a digital HART 7 communication on 2-wires. For HART 5 the outputs of maximum 15 transmitters can be connected in the same way.

Before they are connected, each transmitter must be configured with a unique polling address ranging from one to 63 (HART 7) or 15 (HART 5). If two transmitters are configured with the same address, both will be excluded. The transmitter must be configured for multidrop mode (with a fixed output signal of 4 mA). The maximum current in the loop is therefore 252 mA (HART 7) or 60 mA (HART 5).

The communication is done by means of either a HART communicator or a HART modem.

The PReset configuration software can configure the individual transmitter for multidrop mode and provide it with a unique polling address.

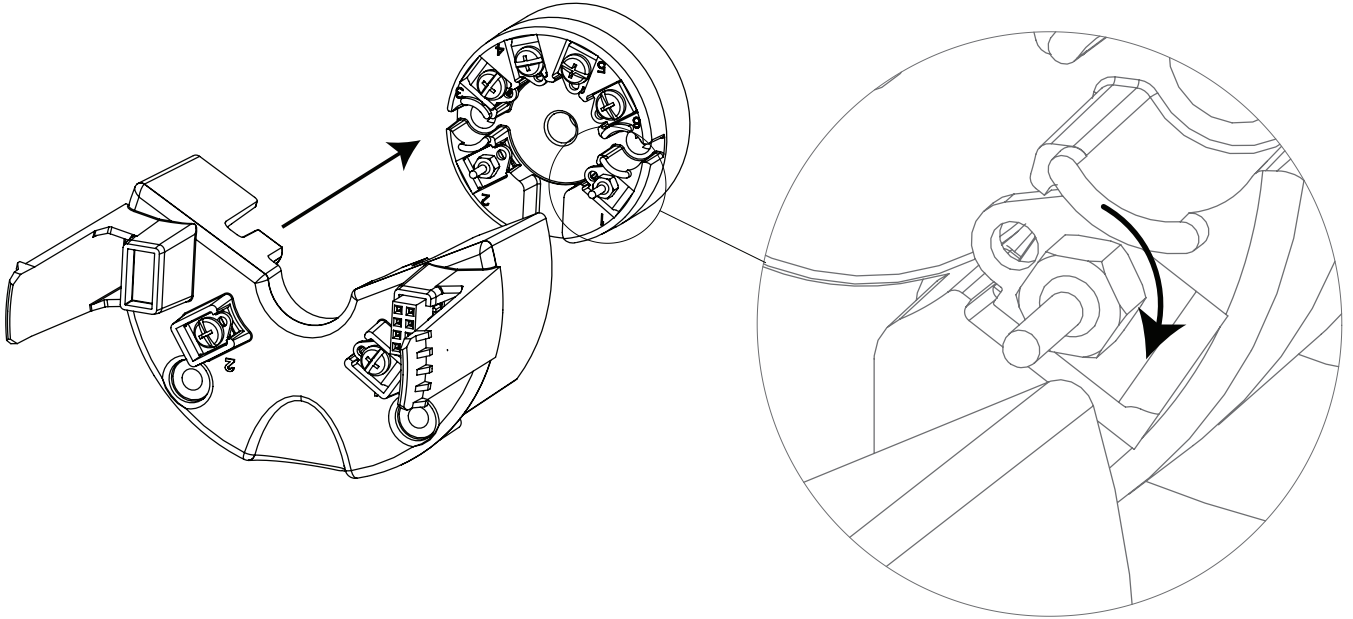


The HART communicator or HART modem can be connected across AB or BC.

Retrofit

The 7501 can be retrofitted with any 5335 or 5337 transmitter. This allows for easy use of existing devices. The following gives you a short guide on how to perform this task.

Before proceeding please refer to the section **Assembly and disassembly** for information on extracting and reassembling the main unit. Then follow the three easy steps below.



1. On the 5335 / 5337, remove the terminal 1 and 2 screws using a screwdriver.
2. Attach the connector pins to the 5335 / 5337 connector 1 and 2.
Screw torque on connector pins = 0.4 Nm.
3. Mount the device in the main unit, making sure the connectors meet.

The first time power is applied to the retrofitted 7501, it will synchronize with the configuration parameters from the attached 5335 / 5337. This process will take approximately 30 seconds and during this **NEW.DEV** will appear in the display.

Warning:

For Ex installation the customer must assure that the installed transmitter has all the necessary approvals applicable for the place of installation.

Once a 5335 / 5337 unit which has been fitted into the 7501, it must not be taken out and used in other applications.

Appendix

ATEX Installation Drawing

IECEX installation drawing

FM Installation Drawing

7501 ATEX Installation



For safe installation of 7501 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards (EN60079-14) that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

Ex ia installation:

ATEX Certificate DEKRA 15ATEX0058 X

Marking



II 1 G Ex ia IIC T6...T4 Ga
II 1 D Ex ia IIIC T100°C Da
I M1 Ex ia I Ma

Standards: EN 60079-0: 2012, EN 60079-11: 2012, EN60079-26:2007

Hazardous area

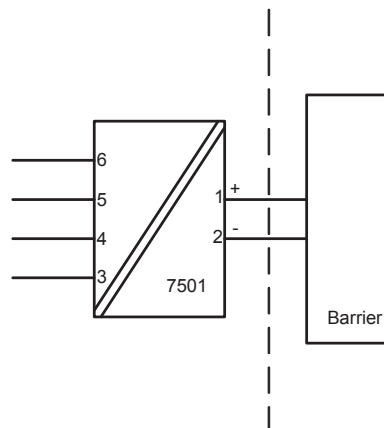
Zone 0, 1, 2, 20, 21, 22, and M1

T4: $-40 \leq T_a \leq 85^\circ\text{C}$ T100 °C

T5: $-40 \leq T_a \leq 60^\circ\text{C}$ T75 °C

T6: $-40 \leq T_a \leq 45^\circ\text{C}$ T55 °C

Non Hazardous Area



Sensor

Terminal: 3,4,5,6

Uo: 9.6 VDC

Io: 28 mA

Po: 67 mW

Lo: 35 mH

Co: 3.5 µF

Supply

Terminal: 1,2

Ui: 30 VDC

Ii: 120 mA

Pi: 0.84 W

Li: 0 µH

Ci: 2 nF

Ex ia installation

General installation instructions

The sensor circuit is not infallibly galvanic isolated from the supply output circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac during 1 minute.

The enclosure must be connected to the potential matching line

Applied screw terminal torque is max 0.4 Nm on all terminals.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate or this manual.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.


For installation in Mines / EPL Ma or in zone 0 / EPL Ga, the transmitter must be installed such, that even in the event of rare incidents, ignition sources due to impact and friction, sparks are excluded.

Protection degree of IP 54 according to EN 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to EN 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

Ex nA, ic installation:

Certificate DEKRA 15ATEX0058 X

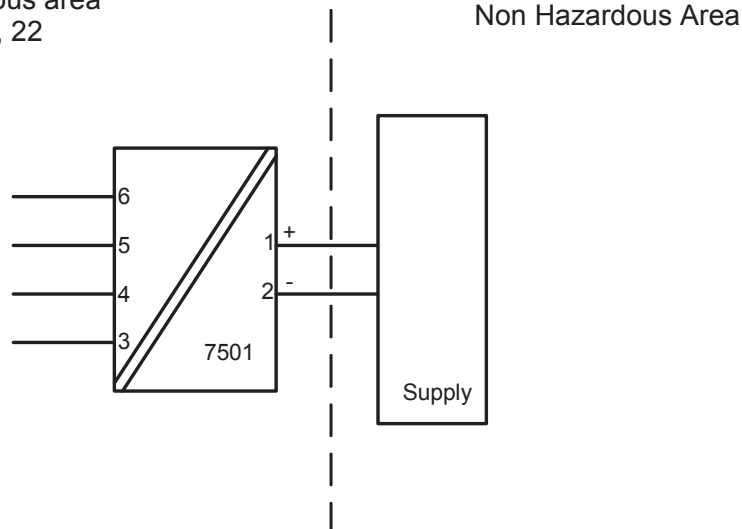
Marking  II 3 G Ex nA IIC T6...T4 Gc
II 3 G Ex ic IIC T6...T4 Gc
II 3 D Ex ic IIIC T100°C Dc

Standards: EN 60079-0:2012, EN 60079-11:2012, EN60079-15:2010

T4: $-40 \leq T_a \leq 85^\circ\text{C}$ T100
T6: $-40 \leq T_a \leq 60^\circ\text{C}$ T85

Hazardous area
Zone 2, 22

Non Hazardous Area



Sensor
Terminal: 3,4,5,6
Ex ic
Uo: 9.6 VDC
Io: 28 mA
Po: 67 mW
Lo: 45 mH
Co: 28 μF

Supply
Terminal: 1,2
Ex ic
Ui: 35 VDC
Li: 0 μH
Ci: 2 nF

Supply
Terminal: 1,2
Ex nA
U : 35 VDC
I : 4-20 mA

Ex nA, ic installation:

For an ambient temperature exceeding 70 °C, heat resistant cables and cable glands suitable for at least 90°C shall be used.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

The transmitter must be installed such, that even in the event of rare incidents, ignition sources due to impact and friction, sparks are excluded.

The enclosure must be connected to the potential matching line

Applied screw terminal torque is max 0.4 Nm on all terminals.

Protection degree of IP 54 according to EN 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to EN 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

Ex d, tb installation:

ATEX Certificate DEKRA 15ATEX0058 X

Marking



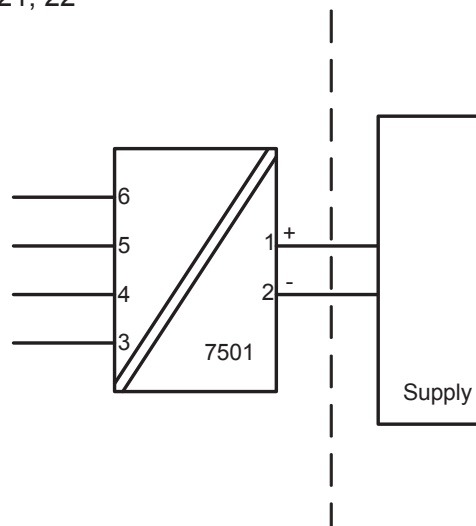
II 2 G Ex d IIC T6...T4 Gb
II 2 D Ex tb IIIC T100°C Db

Standards: EN 60079-0:2012, EN 60079-1:2007, EN 60079-26:2007, EN60079-31:2009

T4,T5: $-20/-40 \leq T_a \leq 85^\circ\text{C}$ T100°C
T6: $-20/-40 \leq T_a \leq 70^\circ\text{C}$ T85°C

Hazardous area
Zone 1, 2, 21, 22

Non Hazardous Area



Terminal: 1,2
Supply: 9.5-35 VDC
Current: 23 mA

Terminal: 3,4,5,6
Sensor: RTD or TC

O-ring Sealing

Silicone rubber: $-40^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$
FKM rubber: $-20^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$

Ex d, tb installation:

Unused cable entries must be sealed by the blanking elements supplied with the 7501 or other Ex d and/or Ex tb certified blanking elements.

Only Ex d certified cable and cable glands shall be used that are suitable for the application and correctly installed.

Protection degree of IP 54 according to EN 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to EN 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

The display cover must be screwed all the way in and the safety catch must be fastened before putting into service. Do not open display cover until 30 minutes after disconnecting power to the equipment allowing internal capacitors to discharge, or do not open display cover unless area is known to be safe

For an ambient temperature exceeding 70 °C, heat resistant cables and cable glands suitable for at least 90°C shall be used.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate. The sensor shall be suitable for use as entry device on an Ex d enclosure and shall not add volume to the 7501 enclosure. The thread of the sensor must be in compliance with EN60079-1 / EN60079-31.

The enclosure must be connected to the potential matching line.

Applied screw terminal torque is max 0.4 Nm on all terminals.

When the process temperature range exceeds the service temperature range it shall be verified by on-site temperature measurements, taking the worst case conditions into account, that the service temperature does not exceed the range of the module.

Warning

Special care must be taken to avoid the build-up of electrostatic charge on the enclosure from repeated charging process e.g. high speed flowing liquids, airborne transfer of powders or plastic foils and other electrostatic charges to the surface.

No modification to the enclosure is allowed by the customer except as mentioned in the manual or installation drawing.

7501 IECEx Installation



For safe installation of 7501 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards (IEC60079-14) that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

Ex ia installation:

Certificate IECEx DEK 15.0039 X

Marking
 Ex ia IIC T6...T4 Ga
 Ex ia IIIC T100°C Da
 Ex ia I Ma

Standards: IEC 60079-0: 2011, IEC 60079-11: 2011, IEC 60079-26: 2007

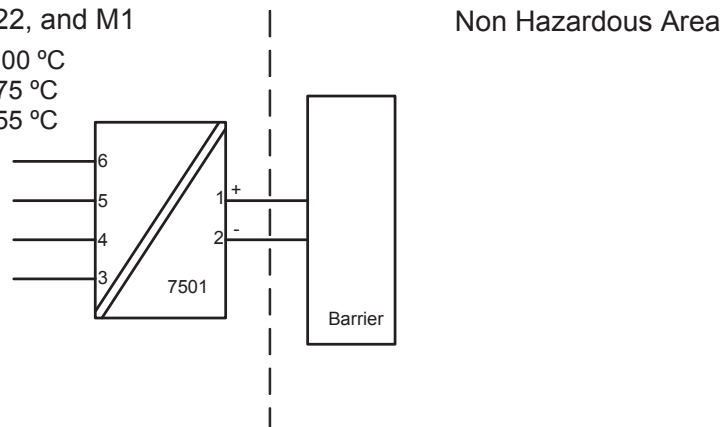
Hazardous area

Zone 0, 1, 2, 20, 21, 22, and M1

T4: $-40 \leq T_a \leq 85^\circ\text{C}$ T100 °C

T5: $-40 \leq T_a \leq 60^\circ\text{C}$ T75 °C

T6: $-40 \leq T_a \leq 45^\circ\text{C}$ T55 °C



Sensor

Terminal: 3,4,5,6

Uo: 9.6 VDC

Io: 28 mA

Po: 67 mW

Lo: 35 mH

Co: 3.5 µF

Supply

Terminal: 1,2

Ui: 30 VDC

Ii: 120 mA

Pi: 0.84 W

Li: 0 µH

Ci: 2 nF

Ex ia installation

General installation instructions

The sensor circuit is not infallibly galvanic isolated from the supply output circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac during 1 minute.

The enclosure must be connected to the potential matching line

Applied screw terminal torque is max 0.4 Nm on all terminals.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate or in this manual.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For installation in Mines /EPL Ma or in zone 0 / EPL Ga, the transmitter must be installed such, that even in the event of rare incidents, ignition sources due to impact and friction, sparks are excluded.

Protection degree of IP 54 according to IEC 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to IEC 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

Ex nA, ic installation:

Certificate IECEX DEK 15.0039 X

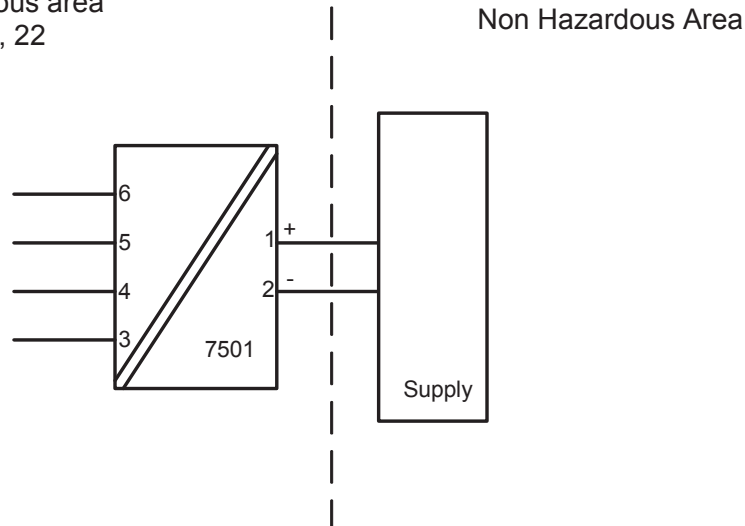
Marking Ex nA IIC T6...T4 Gc
Ex ic IIC T6...T4 Gc
Ex ic IIIC T100°C Dc

Standards: IEC 60079-0: 2011, IEC 60079-11: 2011, IEC 60079-15: 2010

T4: -40 ≤ Ta ≤ 85°C T100
T6: -40 ≤ Ta ≤ 60°C T85

Hazardous area
Zone 2, 22

Non Hazardous Area



Sensor
Terminal: 3,4,5,6
Ex ic
Uo: 9.6 VDC
Io: 28 mA
Po: 67 mW
Lo: 45 mH
Co: 28 µF

Supply
Terminal: 1,2
Ex ic
Ui: 35 VDC
Li: 0 µH
Ci: 2 nF

Supply
Terminal: 1,2
Ex nA
U : 35 VDC
I : 4-20 mA

Ex nA, ic installation:

For an ambient temperature exceeding 70°C, heat resistant cables and cable glands suitable for at least 90°C shall be used.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

The transmitter must be installed such, that even in the event of rare incidents, ignition sources due to impact and friction, sparks are excluded.

The enclosure must be connected to the potential matching line

Applied screw terminal torque is max 0.4 Nm on all terminals.

Protection degree of IP 54 according to EN 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to EN 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

Ex d, tb installation:

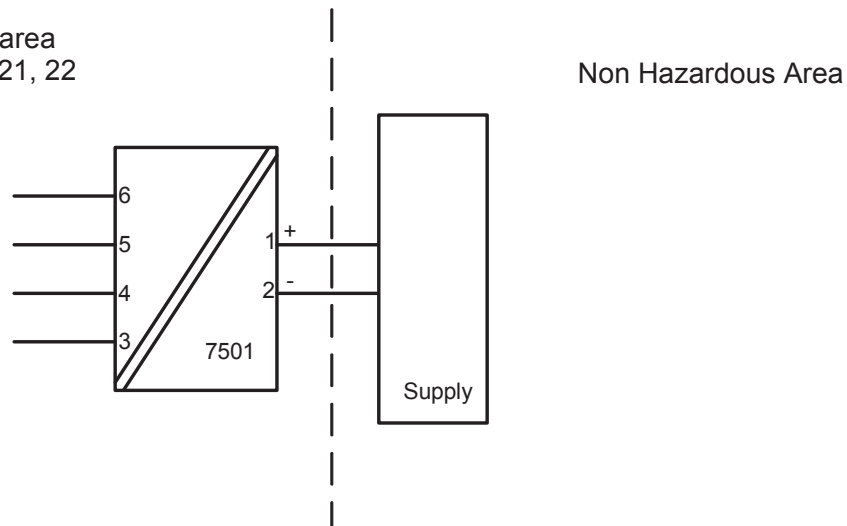
Certificate IEC DEK 15.0039 X

Marking Ex d IIC T6...T4 Gb
Ex tb IIIC T100°C Db

Standards: IEC 60079-0: 2011, IEC 60079-1: 2007, IEC 60079-26:2007 IEC 60079-31: 2008

T4, T5: $-20/-40 \leq T_a \leq 85^\circ\text{C}$ T100°C
T6: $-20/-40 \leq T_a \leq 70^\circ\text{C}$ T85°C

Hazardous area
Zone 1, 2, 21, 22



Terminal: 1,2
Supply: 9.5-35 VDC
Current: 23mA

Terminal: 3,4,5,6
Sensor: RTD or TC

O-ring Sealing
Silicone rubber: $-40^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$
FKM rubber: $-20^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$

Ex d, tb installation

Unused cable entries must be sealed by the blanking elements supplied with the 7501 or other Ex d and/or Ex tb certified blanking elements.

Only Ex d certified cable and cable glands shall be used that are suitable for the application and correctly installed.

Protection degree of IP 54 according to IEC 60529 is achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed.

Protection degree of IP 68 according to IEC 60529 is only achieved if Ex d certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant added to the threads of the sensor, blanking elements and cable glands.

The display cover must be screwed all the way in and the safety catch must be fastened before putting into service. Do not open display cover until 30 minutes after disconnecting power to the equipment allowing internal capacitors to discharge, or do not open display cover unless area is known to be safe

For an ambient temperature exceeding 70 °C, heat resistant cables and cable glands suitable for at least 90°C shall be used.

If the transmitter is physically connected to a possible source of heating or cooling, e.g. by mounting to a process pipe or a temperature sensor, the temperature at the point of connection shall be within the ambient temperature range as given in the certificate. The sensor shall be suitable for use as entry device on an Ex d enclosure and shall not add volume to the 7501 enclosure. The thread of the sensor must be in compliance with EN60079-1 / EN60079-31.

The enclosure must be connected to the potential matching line.

Applied screw terminal torque is max 0.4 Nm on all terminals.

When the process temperature range exceeds the service temperature range it shall be verified by on-site temperature measurements, taking the worst case conditions into account, that the service temperature does not exceed the range of the module.

Warning

Special care must be taken to avoid the build-up of electrostatic charge on the enclosure from repeated charging process e.g. high speed flowing liquids, airborne transfer of powders or plastic foils and other electrostatic charges to the surface.

No modification to the enclosure is allowed by the customer except as mentioned in the manual or installation drawing.

FM Installation drawing 7501



For safe installation of 7501 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Intrinsic safe installation:

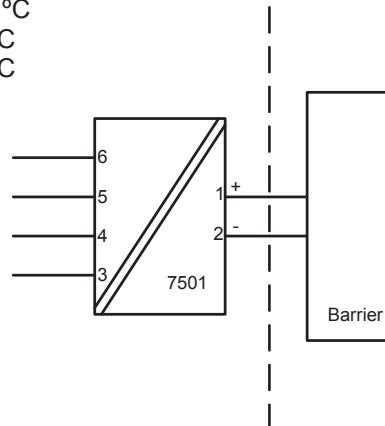
Hazardous classified Location
Class I, Division 1 or 2, Groups, ABCD
Class I, Zone 0, IIC
Protection: Indoor and Outdoor NEMA 4X / IP66

Non classified Location

T4: $-40 \leq T_a \leq 85^\circ\text{C}$ T100 °C
T5: $-40 \leq T_a \leq 60^\circ\text{C}$ T75 °C
T6: $-40 \leq T_a \leq 40^\circ\text{C}$ T55 °C

Terminal: 3,4,5,6

Uo: 9.6 VDC
Io: 28 mA
Po: 67 mW
Lo: 35 mH
Co: 3.5 μF



The barrier must not be connected to any associated apparatus which uses or generates more than 250 VRMS

Terminal: 1,2

Ui: 30 VDC
Ii: 120 mA
Pi: 0.84 W
Li: 0 μH
Ci: 2 nF

UM < 250V
Voc or Uo < Vmax or Ui
Isc or Io < Imax or Ii
Po < Pi
Ca or Co > Ci + Ccable
La or Lo > Li + Lcable

The entity concept

The Transmitter must be installed according to National Electrical Code (ANSI-NFPA 70) and shall be installed with the enclosure, mounting, and spacing segregation requirement of the ultimate application.

Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM, provided that the agency's criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

The entity concept criteria are as follows:

The intrinsically safe devices, other than barriers, must not be a source of power.

The maximum voltage $U_i(V_{MAX})$ and current $I_i(I_{MAX})$, and maximum power $P_i(P_{max})$, which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage (U_o or V_{OC} or V_t) and current (I_o or I_{SC} or I_t) and the power P_o which can be delivered by the barrier.

The sum of the maximum unprotected capacitance (C_i) for each intrinsically device and the interconnecting wiring must be less than the capacitance (C_a) which can be safely connected to the barrier.

The sum of the maximum unprotected inductance (L_i) for each intrinsically device and the interconnecting wiring must be less than the inductance (L_a) which can be safely connected to the barrier.

The entity parameters U_o, V_{OC} or V_t and I_o, I_{SC} or I_t , and C_a and L_a for barriers are provided by the barrier manufacturer.

Explosion proof installation:

Hazardous area
 Class I, Division 1 or 2, Groups ABCD
 Class II Division 1, Groups EFG
 Class III Division 1
 Ex d IIC T6...T4 T100°C Gb
 Ex tb IIIC T100°C Db
 Protection: Indoor and Outdoor NEMA 4X or IP66

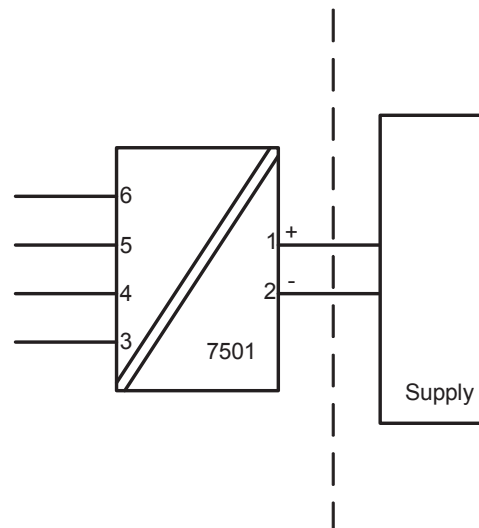
Non Hazardous Area

T4,T5: -20/-40 ≤ Ta ≤ 85°C T100 °C
 T6: -20/-40 ≤ Ta ≤ 70°C T85 °C

Terminal: 1,2
 Supply: 9.5-35 VDC
 Current: 23 mA

Terminal: 3,4,5,6
 Sensor: RTD or TC

O-ring Sealings
 Silicone rubber: -40°C ≤ Ta ≤ +85°C
 FKM rubber: -20°C ≤ Ta ≤ +85°C



Explosion proof installation.

The enclosure must be installed such, that even in the event of rare incidents, ignition sources due to impact and friction, sparks are excluded.

Unused cable entries must be sealed by approved sealing plugs.

Certified cable and cable glands shall be used that are suitable for the application and correctly installed or the cables must be run in conduit.

For an ambient temperature exceeding 70 °C, heat resistant cables and cable glands suitable for at least 90°C shall be used.

For process temperatures above 85°C or below -20/-40°C installer must verify by measurements that the service temperature of the 7501 module is held within this range taking worst conditions into account.

The display cover must be screwed all the way in and the safety catch must be fastened before operation.

Protection degree of IP 66 or TYPE4X is only achieved if certified cable glands or conduit entry devices are used that are suitable for the application and correctly installed with sealing washers or Loctite sealant is added to the threads of the sensor, blanking elements and cable glands.

The enclosure must be connected to the potential matching line.

Warning.

Do not open display cover unless area is known to be safe.

For installation in Canada the following must be taken into account:

All openings for conduit and sensor connection must be in NPT threads.

For Class I Group A installation, conduit seal is required within 18 inches of enclosure.

Document history

The following list provides notes concerning revisions of this document.

Rev. ID	Date	Notes
100	1524	initial release of the product

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