

## **INSTRUCTION MANUAL** "Intelligent" Temperature transmitters

# SERIES TT-4000





• Warning •

Read the recommendations and warnings in this manual before the instrument is installed. For personal safety, optimal use and maintenance of the Series TT-4000, these instructions should be studied carefully. Manufactured by:



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#### 1. INTRODUCTION

The SERIES TT-4000 is a complete Stainless Steel temperature transmitter, based on a Pt100 element (<sup>1</sup>/<sub>3</sub> DIN Class B). The range of standard elements can be set between -50 and 200 °C. Other ranges are available on request. The Pt100 element is mounted in a stainless steel welding nipple (sensor position 9). To obtain an accurate and fast measurement, the diameter of the insert must be as small as possible. The resistance change of the Pt100 element due to temperature is converted into a proportional 4-20 mA signal (2-wire).

Various process connections can be made including milk couplings (DN25, 40 and 50), Tri-clamp (1, 1  $\frac{1}{2}$ " or 2") and hygienic weld-on-nipples ( $\frac{3}{4}$  "BSP, Ø 28 mm). Thermowells are fully welded and manufactured from bar stock. They are available in various designs and materials.

#### 2. DIMENSIONAL DRAWINGS

#### Series TT-4000





Front view: Transparent cover, option "I" (extra price)

Description	Material
Cover	SS 304
Display with navigation button	
Cover with venting	SS 304
Venting	PA
M20 x 1,5 cable entry (without gland) *	
O-Ring	EPDM
Electronic housing	SS 304
	Description Cover Display with navigation button Cover with venting Venting M20 x 1,5 cable entry (without gland) * O-Ring Electronic housing

	Description	Material
8	Extended connection	SS 316
9	Process connection	SS 304
10	Insert	SS 316 L
(13)	M20 x 1.5 cable entry (without gland) *	
(14)	M20 x 1.5 cable entry (Blanking plug)	PE

\* As standard the Series 4000 will be supplied with **two** cable entries M20 x 1,5. A cable gland can be supplied by request (extra costs).

#### Series TT-4000 - Remote





1234	<b>Description</b> Cover Display with navigation button Cover with venting Venting	Material SS 304 SS 304 PA	8 9 13 14	Description Extended connection M12 Connector M20 x 1.5 cable entry (without gland) * M20 x 1.5 cable entry (Blanking plug)	<b>Material</b> SS 316 SS 304
) 6 7	M20 x 1,5 cable entry (without gland) * O-Ring Electronic housing	EPDM SS 304	U		

\* As standard the Series 4000 will be supplied with **two** cable entries M20 x 1,5. A cable gland can be supplied by request (extra costs).

#### 3. INSTALLING THE TRANSMITTER

The diaphragm of the transmitter is protected with a special protection cap. Protect the diaphragm until installation takes place. **Do not damage or bend the temperature sensor.** 

#### 3.1 INSTALLING WELD-ON NIPPLE

A certified welder should perform the installation of the weld-on nipple. Weld with Argon, MIG or TIG, with the smallest welding pin possible.

- 1. Cut a hole in the process vessel or pipe for a precise fit of the weld-on nipple. The hole should be a tight fit when coupled with the weld-on nipple.
- 2. Prepare the hole by bevelling the edge to accept filler material.
- 3. Remove the weld-on nipple from the transmitter.

Remove the gasket and O-Ring out of the weld-on nipple!



#### WARNING

Improper installation may result in distortion of the weld-on nipple. Excessive heat will distort the weld-on nipple. Weld in sections as shown in the figure left. Allow adequate cooling between passes. <u>To reduce the chances of distortion to the</u> weld-on nipple, use a mandrel.

Determine (before welding) the position of the electronic housing, so that the cable entry and the venting are in the right position. After welding these positions are fixed.

- 4. Position the weld-on nipple in the vessel hole and tack six places. The weld sequence is shown in the figure above.
- 5. Weld the weld-on nipple in place using 0,03 to 0,045 in. (0,762 to 1,143 mm) stainless rod as filler material in the bevelled area. Adjust amperage for penetration.
- 6. Remove the mandrel after the welding operation.

#### 3.2 MOUNTING POSITION

When the transmitter is mounted horizontally, the cable gland must be pointed downwards.

#### 3.6 CALIBRATION

All transmitters are fully calibrated at the factory, to customer specified range. If the calibration is not specified, the transmitter will be calibrated at 0 - 100 °C.

Illustrative side view

#### 3.7 WIRING

Under the cover (3) you will find the terminal board.



The figure above shows the wiring connection of the transmitter. The 2-wires must be connected to + and - on the terminal board. The wiring terminals can be operated without a screwdriver. The opening levers of the terminals can be lifted and pressed down by hand. Lift the opening levers of the terminals and insert the corresponding wires. Press down the levers by hand, the terminal spring will close and the wire is clamped. *Optionally a secondary 4-20 mA output is available on request.* 

The transmitter is connected with standard two-wire shielded cable. Do not run signal wiring in open trays with power wiring, or near heavy electrical equipment (e.g. Frequency controllers or heavy pumps).

Reversing the polarity will not damage the transmitter, but the transmitter will not function until the + and – are properly connected.

#### 3.8 GROUNDING

The transmitter must always be connected to ground. In case the process connection is already connected to ground (e.g. by the tank or pipe line) do not connect the instrument to ground. **Please ensure that the instrument is not connected to ground twice to prevent an "Earth loop".** 

#### 4. **REMAINING**

#### 4.1 EXTERNAL LOAD

External loads must be placed in the negative side of the 2-wire loop. The minimum power supply is based on the total circuit resistance. The maximum external load (RI max.) for 24 Vdc will be 600  $\Omega$  (Ohm). At higher power supply, the external load can be up to max. 1200  $\Omega$  / 36 Vdc.



#### With a loop resistance of 250 $\Omega$ a power supply of at least 17 Vdc must be used.



#### 4.2 $C \in / EMC-RULES$

All Klay transmitters are manufactured in accordance with the RFI / EMC directives and comply with the CE standard. All transmitters are fitted with RFI filters, which provide optimum, trouble-free operation. Our products are in conformity with EMC-Directive 2014/30/EU based on test results using harmonized standards.

#### 4.3 TRACEBILITY / YEAR OF MANUFACTURING

The year of manufacturing of the transmitter can be traced as follows: take the first two numbers from the serial number that is engraved in the transmitter and add 1970 to it. Example: Serial Number 4302123. The year of manufacturing is 1970 + 43 = 2013.

#### 4.4 **INTRINSICALLY SAFE (Option Ex)**

The Series TT-4000 is available for intrinsically safe for use in zone 0.



ATEX - KIWA 15ATEX0031 X II 1G Ex ia IIC T5...T4 Ga (-20 < T<sub>amb</sub> < 70 °C) II 1G Ex ia IIC T6 Ga (-20 < T<sub>amb</sub> < 31 °C)



IECEx - KIWA 15.0014X Ex ia IIC T5...T4 Ga (-20 < T<sub>amb</sub> < 70 °C) Ex ia IIC T6 Ga (-20 < T<sub>amb</sub> < 31 °C)

For detailed explanation see "EU-Declaration of conformity" on the last page of this manual. For use in an Intrinsically Safe area, use a certified power supply from 12 - 30 Vdc. Installation of this device must be carried out by a certified mechanic or installer.

Transmitter type and options	Equipment category	<b>Temperature Class</b>	Ambient temperature range
Pressure / Level Transmitter	ll 1G	T5 T4	-20 °C to +70 °C
Series 4000 and Series 4000-SAN			D
With closed covers			Process temperature range:
			-20 °C to +100 °C
Pressure / Level Transmitter	ll 1G	T5 T4	-20 °C to +70 °C
Series 4000 and Series 4000-SAN			
With transparent indicator cover (Option I)			Process temperature range:
			-20 °C to +100 °C
Pressure / Level Transmitter	II 1G	Т6	-20 °C to +31 °C
Series 4000 and Series 4000-SAN			
With closed covers			Process temperature range:
			-20 °C to +50 °C
Pressure / Level Transmitter	II 1G	Т6	-20 °C to +31 °C
Series 4000 and Series 4000-SAN			
With transparent indicator cover (Option I)			Process temperature range:
			-20 °C to +50 °C
Option, Electrical variant	Temperature Class	Ambient	Process Temperature
		Temperature	
Single 4-20 mA output	T4	-20° C to + 70° C	-20° C to + 100° C
G190, with dual 4-20 mA Output			
G185, with single 4-20 mA output	T5	-20° C to + 70° C	-20° C to + 100° C
	Т6	-20° C to + 31° C	-20° C to + 50° C

#### **Electrical Data**

Temperature Transmitter Series TT-4000 and TT-4000-Remote

Supply/output circuit (terminals + and -): in type of protection intrinsic safety Ex ia IIC only for connection to a certified intrinsically safe circuit, only with a supply range from 12 till 30 Vdc, with the following maximum values:

 $U_i$  = 30 Vdc;  $I_i$  = 110 mA;  $P_i$  = 0,9 W;  $L_i$  = 1,4 mH;  $C_i$  = 41 nF (without cable between terminals + and -) Temperature Transmitter Series TT-4000 and TT-4000-Remote (Option G190)

Supply/output circuit (terminals + and -) and a 2<sup>nd</sup> Supply/output circuit (terminals + and -): in type of protection intrinsic safety Ex ia IIC only for connection to a certified intrinsically safe circuit, only with a supply range from 12 till 30 Vdc, separate for each output, with the following maximum values:

 $U_i$  = 30 Vdc;  $I_i$  = 110 mA;  $P_i$  = 0,9 W;  $L_i$  = 0,08 mH;  $C_i$  = 41 nF (without cable between terminals + and -) The maximum values are applicable for each output. The maximum connected power for each output is 0,9 W. Not available for T5 and T6.

#### Instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

#### Special conditions for Safe use in Zone 0

- As standard the transmitter is supplied without a certified cable gland. The cable entry is fitted with a PE blanking plug for protection during transport. Remove the blanking plug after installing the transmitter. When using a gland make sure it is certified and complying with applicable protection level of the transmitter.
- Always use the covers supplied by Klay Instruments B.V.
- From safety point of view, the transmitter must be connected to ground

All certifications are in compliance with ATEX and IECEx scheme rules, and the International Standards: EN IEC 60079-0: 2018, EN 60079-11: 2012, IEC 60079-0:2017 and IEC 60079-11:2011. The transmitters are certified for use in hazardous areas by KIWA Nederland B.V.



DO NOT REMOVE OR UNSCREW THE COVER(S) WHEN AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.

#### 5. GRAPHIC DISPLAY AND NAVIGATION BUTTON

The Series 4000 has a multifunctional display where different values can be displayed simultaneously. The display is equipped with a backlight. The entire menu is controlled by a navigation button. The navigation button has the following possibilities of movement: up, down, left, and right. The navigation button needs to be pushed when conformation or saving is needed.



Move the navigation button up or down to browse through various menus. These movements can be distinct in choices of: program points, navigation through menu's and increase or decrease measurement value's.



Move the navigation button left or right to navigate horizontally through the menu or positions on the display.



It is always possible to return to the previous menu. Move the navigation button to the left to return to the previous menu.



By pushing the navigation button each choice will be **confirmed** or a setting will be **saved**.



Figure 1. Display Series TT-4000, fully rotatable (360°)

#### 5.1 GRAPHIC DISPLAY READOUT

When the transmitter is powered, a flash screen with the name of the transmitter (Series 4000) and the software version appear for a few seconds. After this the home screen will show the measured value setting as set in the factory.



#### **EXPLANATION OF SYMBOLS:**

- 1. HART<sup>®</sup> Protocol: Displays a HART symbol, when HART protocol option is available.
- 2. Bargraph 0-100 % from span: Displays the percentage of the measured span.
- 3. Write protection on/off: Displays if protection against adjustments and configuration is on or off
- 4. Secondary Measurement: Displays a secondary chosen measurement.
- 5. Measurement: Displays the temperature, percentage or a selectable unit.
- 6. Unit: Displays the selected unit.

#### 5.2 SUMMARY PROGRAMMING POINTS

PROGRAM POINT	NAME	FUNCTION
P100	Menu-Exit menu	Start and exit
P101	ZERO value	Zero adjustment (ZERO 4 mA) with or without process temperature
P102	SPAN value	Span adjustment (SPAN 20 mA) with or without process temperature
P104	UNITS	Selection of engineering unit to be displayed
P105	REVERSE mA	Output selection 4-20 mA or 20-4 mA
P106	DAMPING	Adjustable damping (0,00 till 25,00 s)
P107	LANGUAGE	Language choice between: English, Dutch, German, Russian, Polish and French.
P108	DEVICE SETUP	Configuration of: Protection, Alarm, Backlight, Temperature, Secondary value, (Set time and HART Version, only when HART protocol is present.)
P109	READOUT	Readout options on display: Current, unit, percentage and temperature
P110	CURRENT SIMULATION	Current simulation 4-20 mA (Stepwise or free adjustable)
P112	BURST MODE	Configuration for burst mode (Only when HART protocol is present.)
P113	INFORMATION	Contact information of Klay Instruments, made settings, and software revision
P114	FACTORY	Only available for the manufacturer
P115	FACTORY	Only available for the manufacturer

#### 6. EXPLANATION PROGRAMMING POINTS



#### 6.1 ZERO ADJUSTMENT (ZERO, 4 mA)

The transmitter is set to 0 °C at 4 mA.

Zero value The ZERO can be adjusted at a lower or higher point. This will be explained step by step by an example.



Example: Increase ZERO till +10 °C.

- 1. The measuring unit of the transmitter is set to Celsius degrees. If not this can be selected by choosing the right measuring unit in program point P104 – UNITS (paragraph 6.4)
- 2. Navigate to program point P101 ZERO Value, and push the navigation button to enter the menu.
- 3. Two choices appear on the screen: "set manual" and "use process" **Set manual** = Configuration without test temperature. **Use process** = Configuration with process temperature.
- **4.** Choose "Set manual", +000.0 (°C) will appear on the display.
- 5. Increase this value with the navigation button to +10 °C, at the bottom of the screen the URV is displayed and changes according to the adjusted zero. push to confirm, and select SAVE to save the setting.
- 6. The transmitter will return to the home screen. The zero (4 mA) is adjusted to +10°C.

The menu zero adjustment also has the choice of "use process". The transmitter can be adjusted to zero in a real process situation. When chosen, the transmitter will measure the temperature in an actual process. This measurement will be used as the zero value. (4 mA)

- 1. Navigate to program point **P101**, and push the button to enter the menu.
- 2. Choose "use process", and push to confirm. The transmitter will display the actual measured temperature.
- 3. Push the navigation button to confirm, and select **SAVE** to save the setting.
- 4. The transmitter will return to the main menu.



#### 6.2 SPAN ADJUSTMENT (SPAN, 20 mA)

This setting can be used to adjust the range (SPAN) according to an entered value or adjusted with or without an applied temperature. The maximum temperature which can be measured (20 mA) is the measurement at

ZERO (P101) + the entered value SPAN (P102). If the ZERO (P101) is increased, then the maximum measured value will automatically be set higher at same rate as the zero. The following example will explained step by step.



- 1. Example: Measurement range +10 till +110 °C = 4 20 mA.
- 2. The span must be set at 100 °C.
- 3. The zero was set in the previous menu (P101) at +10°C.
- 4. Navigate to program point P102 SPAN Value, and push the navigation button to enter the menu.
- 5. Two choices appear on the screen: Set manual and "Use process"
- 6. Choose Set manual, a value will appear on the screen.
- 7. Adjust the SPAN with the navigation button to +110 °C. and select SAVE to save the setting
- 8. The transmitter will return to the home screen.

The menu span adjustment also has the option of "use process". The transmitter can be adjusted to the span in a real process situation. When chosen, the transmitter will measure the temperature in an actual process. This measurement will be used as the span value. (20 mA)

- 1. Navigate to program point **P102**, and push the button to enter the menu.
- 2. Choose "use process", and push to confirm. The transmitter display the measured temperature.
- 3. Push the navigation button to confirm, and select **SAVE** to save the setting.

#### KLAY-INSTRUMENTS



#### 6.4 DISPLAY SETTING OF UNITS

Two engineering units can be displayed on the display. Factory setting =  $^{\circ}C$  (Celsius)

- 1. Navigate to program point P104 UNIT, and push the navigation button to enter the menu.
- **2.** Several engineering units can be selected. Each selected engineering unit is automatically converted to the correct value of the corresponding unit.
- 3. Navigate through this menu and choose the required unit, push to confirm.
- **4.** The Save **a** icon will be displayed to indicate that the setting is saved.
- 5. The transmitter will return to the main menu; the measured reading will be displayed in the chosen unit in the home screen.

For correct conversion between both temperature scales the following conversion calculation must be used.





CAUTION: The selected temperature unit is only visible on the display, when UNITS is chosen in P109 – Readout.



**6.5 OUTPUT SELECTION 4-20 mA or 20-4 mA** The transmitter is standard set to 4-20 mA.



- 1. Navigate to program point P105 Reverse mA, and push the navigation button to enter the menu.
- 2. Two choices appear on the screen: 4-20 mA and 20-4 mA
- **3.** Make an <u>output</u> choice and push to confirm.
- **4.** The Save *icon* will be displayed to indicate that the setting is saved.
- **5.** The transmitter will return to the main menu.



#### 6.6 DAMPING ADJUSTMENT

The transmitter has an adjustable damping between 0,00 to 25,00 seconds. <u>Factory setting = 0,00 seconds</u>



- 1. Navigate to program point P106 DAMPING, and push the navigation button to enter the menu.
- 2. Two choices appear on the screen: Set and Reset
- **3.** Make a choice and push to confirm.

Choosing Set allows a value to be set between 0,00 and 25,00 seconds.

- Select Set, and push the button to confirm.
- Adjust the damping with the navigation button, push to confirm.
- The Save 📝 icon will be displayed to indicate that the setting is saved.
- The transmitter will return to the main menu.

Choosing Reset will put the setting back to factory setting (0,0 seconds)

- Select Reset, and push the button to confirm.
- The Save *icon* will be displayed to indicate that the setting is saved, the setting will be put back to factory setting 0,00 s.
- The transmitter will return to the main menu.

#### K KLAY-INSTRUMENTS



#### 6.7 LANGUAGE

In this menu the preferred menu language can be selected.

- 1. Navigate to program point P107 LANGUAGE, and push the navigation button to enter the menu.
- 2. Five choices appear on the screen: English, Dutch, Spanish, German, Russian, Polish and French.
- **3.** Make a choice and push to confirm.
- **4.** The Save *real icon will be displayed to indicate that the setting is saved.*
- 5. The transmitter will return to the main menu.



#### 6.8 DEVICE SETUP

In this menu, several operational settings can be made for the transmitter.



- 1. Navigate to program point P108 Device Setup, and push the navigation button to enter the menu.
- Eight choices appear on the screen: Protection Alarm output Backlight Temp units Temp min/max – Sec. Value - Set Time and HART<sup>®</sup> Version (Set time and HART<sup>®</sup> version are only available when HART<sup>®</sup> protocol is present in the transmitter)
- 3. Choose the desired option, push to confirm.
- **4.** Below are the choices displayed. They can be selected and configured using the navigation button.
  - Protection:
    - Local: The local protection for adjusting settings locally on the transmitter.
    - **External**: The external security for adjusting settings remotely on the transmitter by HART<sup>®</sup> protocol.
  - Alarm output:
    - Low: The lower limit of the lowest permissible current value. (3,2 mA)
      High: The upper limit of the maximum permissible current value (22,8 mA)
      When exceeding the above limits, a warning symbol will display on the screen.
  - **Backlight**: Choice between: **On**, **Sleep mode** (Turn off backlight after 5 minutes) and **Off**. The intensity of the backlight is depending on the output current.
  - Temp units: Choice between: Celsius and Fahrenheit.
  - **Temp min/max:** Two choices appear on the screen: **Readout** and **Reset** By choosing **Readout** the last measured minimum and maximum temperature values of process and ambient appear. For the process temperature, a new value is stored in a change of temperature more than 2 ° C. For the ambient temperature this is 5 ° C. By choosing **Reset** the previous stored values will be deleted.
  - Sec. Value: Four choices appear on the screen for the secondary readout on the main screen: Current, Unit, Rate and Temperature.
  - Set Time: (Only available when using HART<sup>®</sup> 7 Protocol) An input screen to enter the date and time will appear.
  - HART<sup>®</sup> version: Choice between: HART<sup>®</sup> 5.0 and HART<sup>®</sup> 7.0.
  - HART<sup>®</sup> 5.0: Means: (address is from 0 to 15)
    - address 0 -> current on 4-20mA
    - address 15 -> current fixed 4 mA
  - HART<sup>®</sup> 7.0: Means: (address is from 0 to 63)
    - Address 0 -> power on or off
  - **Poll address**: Can be entered. The default address is 0 with current on.



#### 6.9 READOUT

In this menu, the readout on the display is determined. This is the type of measurement that appears on the home screen. <u>Factory Setting = Unit</u>

- 1. Navigate to program point P109 READOUT, and push the navigation button to enter the menu.
- Four choices appear on the screen: Current = Present current value (4-20mA) Temperature Unit = Unit as chosen in P104 Percentage = 0-100% Ambient Temperature = Ambient temperature (Temperature inside the electronic housing)
- 3. Navigate to the desired choice, confirm the selection by pushing the navigation button. The Save icon will be displayed to indicate that the setting is saved.
- 4. The transmitter will return to the main menu.



#### 6.10 CURRENT SIMULATION (4-20 mA)

The transmitter can simulate an output between 4-20 mA. Using five predefined steps or a free selectable value between 3,80 mA to 20,8 mA (Transmitters with HART<sup>®</sup> Protocol 3,90 mA to 20,8 mA)



- 1. Navigate to program point P110 CURR SIMU, and push the navigation button to enter the menu.
- 2. Two choices appear on the screen: "Set" and "Free"
- 3. Choosing Set allows a value to be set in five steps: 4, 8, 12, 16, 20 mA
  - By default, the current simulation is **Not active**, as shown in the display
  - Choose one of the five steps, and push to confirm
  - The status on the display will change to **Active** and the current simulation is started for the selected step.
  - Push the navigation button to de-activate the current simulation.
  - Move the navigation button to the left to go back and leave this menu.
- 4. With the option Free, a current between 4 and 20 mA can be configured.
  - By default, the current simulation is **Not active**, as shown in the display.
  - Enter the desired value, and push to confirm.
  - The status on the display will change to **Active** and the current simulation is started for the selected value.
  - Push the navigation button to de-activate the current simulation.
  - Move the navigation button to the left to go back and leave this menu.



#### 6.12 BURST MODE

The transmitter (Only when HART<sup>®</sup> is present) can be configured for Burst mode. This will enable continuously broadcasting standard HART<sup>®</sup> reply messages.



- 1. Navigate to program point P115 Burst Mode and push the navigation button to enter the menu.
- **2.** A message appears on the screen, push to enter this menu.
- 3. Three choices appear on the screen: "0", "1" and "2"
- **4.** With these choices, three distinct types of burst messages can be configured. Make a choice, and push the button to confirm.

- 5. Four choices appear on the screen: Mode Cntrl, Cmd number, Period and Trigger with these choices the chosen burst message (0,1 and 2) can be configured. Select Mode Cntrl, and push to confirm.
- 6. Two choices appear on the screen: "On" and "Off"
  - Choose **On** to turn on burst mode.
  - Choose **Off** to turn off burst mode.
- **7.** Select Cmd number, and push to confirm. Five choices appear on the screen:
  - Cmd 01 = PRIMARY VARIABLE
  - Cmd 02 = CURRENT AND PERCENT OF RANGE
  - Cmd 03 = DYNAMIC VARIABLES AND CURRENT
  - Cmd 09 = DEVICE VARIABLES WITH STATUS
  - Cmd 48 = ADDITIONAL TRANSMITTER STATUS

Choose the preferable burst mode, and push to confirm.

- 8. Select Period, and push to confirm.
  - Two choices appear on the screen: "Max Time" and "Min Time"
    - Select **Max Time** to set the maximum amount of time when the message will be send. This value can be set from 0.5 to 3600 seconds.
    - Select **Min Time** to set the minimum amount of time when the message will be send. This value can be set from 0.5 to 3600 seconds.

Enter the preferred value, and push to confirm.

- 9. Select Trigger, and push to confirm.
- **10.** Five choices appear on the screen:
  - **Continuous=** The Burst message is send continuously.
  - **Windowed** = The Burst message is triggered when the measured value deviates more than the specified trigger value.
  - **Rising** = The Burst message is triggered when measured value rises above the triggered value.
  - Falling = The Burst message is triggered when measured value falls below the triggered value.
  - **On-Change** = The Burst message is triggered when any value in the measuring is changing. Choose the desired burst mode, and set the preferred parameters.



#### 6.13 INFORMATION

This menu shows a collection of information from the transmitter and contact information from the manufacturer.



- 1. Navigate to program point P113 Information and push the button to confirm.
- 2. Push the navigation button up and down to see all of the information
- **3.** Push the button to leave this menu.

Below is a representation of this information screen:

Klay Instruments		
www.klay.nl		
+31521591550		
Version	-	Software revision
No:	-	Serial number transmitter
Zero	-	Zero
Span	-	Span
Damping	-	Damping (in seconds)
Output	-	Output 4-20 or 20-4 mA
Local Prot	-	Protection On or Off
Alarm	-	Alarm output (3.2 or 22.8 mA)
Sec. Value	-	Selected secondary configuration
Backlight	-	Backlight On, Sleep mode or Off
Temp	-	Temperature unit Celsius or Fahrenheit
HART® version	-	HART® version 5 or 7(when HART® is present)

#### 6.14 FACTORY

Only available for the manufacturer.

#### 6.15 FACTORY

 $\mathbf{\Lambda}$ 

Only available for the manufacturer.

#### 7. PROGRAMMING THE SERIES TT-4000

#### 7.1 PROGRAMMING via HART

When using HART<sup>®</sup> or a Hand Held Terminal (HHT), a minimum resistance of **250**  $\Omega$  must be present in the loop of the 2-wire system. This is necessary for proper communication (see drawing below). A power supply of at least **17 Vdc** must be used.

The Series TT-4000 can be easily programmed with the Hand Held Terminal (HHT) from the "HART<sup>®</sup> Foundation" (type 275 or 375 HART<sup>®</sup> Communicator).

#### This is only possible if the option H (HART protocol) is chosen.

**Option 1**: HART<sup>®</sup> Handheld terminal connected across the transmitter.



### There is an instruction manual available which is a guide for installing and using the Klay Series 4000 HART DTM. This DTM is developed to make configuration changes of Klay Series 4000 HART

transmitters easy. This DTM can be used with almost every FDT-container. The most recent version of the DTM file (zip file) is available on: <u>www.klay-instruments.com</u> under section "Downloads", Software, Series 4000 zip files. Unzip and run the **DTM Klay Series 4000 HART.exe**.

#### 7.2 ROTATABLE DISPLAY

The display of the Series TT-4000 is fully rotatable. To rotate the display, place a small screw driver into the recess on top of the display. Turn it by hand by moving the screw driver into the desired direction, use the other hand to guide this movement to avoid any damages. The display can be turned both left and right.



#### 8. **SPECIFICATIONS**

Manufacturer		Klay Instruments B.V.		
Instrument		TT-4000		
Output		4-20 mA Option: HART® Protocol		
Power Suppl	'y	Standard: Ex : HART <sup>®</sup> :	12 – 36 Vdc 12 – 30 Vdc 17 – 36 Vdc (Standard) min. 250 Ω 17 – 30 Vdc (Ex) min. 250 Ω	
Accuracy		0,075%		
Process Temperature				
	Standard	-50 °C to +200	°C (-58 °F to 392 °F)	
	Ex - Temperature Class T5T4	-20 °C to +100	°C (-4 °F to 212 °F)	
	Ex - Temperature Class T6	-20 °C to +50 °	°C (-4 °F to 176 °F)	
Ambient Ter	nperature			
	Standard	-20 °C to 70 °C	C (-4 °F to 158 °F)	
	Ex - Temperature Class T5T4	-20 °C to 70 °C	C (-4 °F to 158 °F)	
	Ex - Temperature Class T6	-20 °C to 31 °C	C (-4 °F to 104 °F)	
Damping		0,00 seconds	to 25,00 seconds	
		Standard: 0,00	) seconds.	
Protection Grade		IP66		
Material	Housing	AISI 304 (Optio	onal AISI 316)	
	"Wetted" parts	AISI 316 L (Oth	ner materials on request)	

#### 9. PRECAUTIONS AND WARNINGS

- Check if the specifications of the transmitter meet the needs of the process conditions
- WELDING INFORMATION: When using the Series TT-4000 with weld-on nipple, the welding information on page 6 must be followed exactly. This is very important to prevent distortion of the weld-on nipples. It also prevents the screw thread from being deformed.
- Prevent any damaging of the transmitter.
- As soon as the wiring is brought inside through the cable gland and connected to the terminal board, make sure the cable gland is tightly fixed, so that moisture cannot enter into the electronic housing.
- Avoid high pressure water-jets pointed at the venting.
- If the ambient conditions are very wet, we advise to use a venting through the cable. A special vented cable can be connected on request. (The normal venting will be removed) In that case the transmitter is IP68.
- The covers ① and ③ must be fully engaged, so that moisture cannot ingress into the electronic housing.
- WARRANTY: The warranty is 1 year from delivery date. Klay Instruments B.V. does not accept liability for consequential damage of any kind due to use or misuse of the Series 4000. Warranty will be given, to be decided by the manufacturer. Transmitter must be shipped prepaid to the factory on manufacturers authorization.
- NOTE: Klay Instruments B.V. reserves the right to change its specifications at any time, without notice. Klay Instruments B.V. is not an expert in the customer's process (technical field) and therefore does not warrant the suitability of its product for the application selected by the customer.

#### Manufactured by:

**KLAY-INSTRUMENTS B.V.** 

Nijverheidsweg 5 P.O. Box 13 Tel: +31-521-591550 Fax: +31 -521-592046 7991 CZ DWINGELOO 7990 AA DWINGELOO The Netherlands E-mail: info@klay.nl Attachment: EU-DECLARATION OF CONFORMITY

# EU-DECLARATION OF CONFORMITY

#### Klay Instruments B.V.

Nijverheidsweg 5, 7991 CZ Dwingeloo, The Netherlands

Certify that the equipment intended for use in potentially explosive atmospheres, indicated here after: Electronic Pressure / Level Transmitter Series 4000, Series 4000-SAN and Series 4000-VALVE Differential Pressure Transmitter Series DP-4000

Temperature Transmitter TT-4000 and TT-4000-REMOTE

Are in accordance with:

- Directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres).
- Directive 2014/30/EU (Electro Magnetic Compatibility).
- Harmonized standards:
- EN 60079-0: 2018 (General rules)
- EN 60079-11:2012 (Equipment protection by intrinsic safety "i")
- EN 61326-1: 2013 (3,Electrical equipment for measurement, control and laboratory use– Part 1)
- EN-ISO-IEC 80079-34:2018 (Potentially explosive atmospheres Application of Quality Systems)
- IEC 61000-6-2:2001 (EMC, Immunity in industrial location)
- IEC 61000-6-3:2001 (EMC, Emission in industrial location)
- IEC 61000-6-4:2001 (EMC, Emission in industrial location)
- IEC 61298-3 (Test for the effects of influence quantities. Test 13.1 Common mode interference and 13.2 Normal mode interference (series mode)).
- The type (protection mode Intrinsic Safety "ia") which has been the subject of; *EC-type Examination, Certificate Number:* KIWA 15ATEX0031 X, Issue 2 Delivered by Kiwa Nederland B.V. (Unit Kiwa ExVision), Wilmersdorf 50, 7327 AC Apeldoorn, The Netherlands, Notified body No. 0063

Manufacturing plant in Dwingeloo which has been the subject of; *Production Quality Assurance, Notification Number:* DEKRA 12ATEXQ0041, Issue 4 Delivered by DEKRA Certification, Meander 1051, 6825 MJ Arnhem, The Netherlands, Notified body No. 0344

	Date: Ma E. Timme Managing	y 25 <sup>th</sup> , 2021 er g Director – Klay Instruments B.V.	Signature:	J imme
Æx>	The mark zone 0:	king of the equipment for gas group for use in	II 1 G Ex ia IIC T4 Ga II 1 G Ex ia IIC T5 Ga II 1 G Ex ia IIC T6 Ga	or and
		equipment for use in industries above ground firedamp).	(and not in mines endai	ngered by
	1	equipment for use in Zone 0		

G	equipment for use with gas, vapours or mists			
Ex	equipment in compliance with European standards for explosive atmospheres			
ia	equipment in compliance with specific building rules for intrinsically save equipment			
IIC	equipment for use with gas of subdivision C			
T4	equipment whose surface temperature does not exceed 135°C when used in an ambient temperature < 70°C.			
T5	equipment whose surface temperature does not exceed 100°C when used in an ambient temperature < 70°C.			
Т6	equipment whose surface temperature does not exceed 85°C when used in an ambient temperature < 31°C for the highest temperature class T6.			
Ingress Pro REMOTE:	otection Grade, Series 4000, 4000-SAN, 4000-VALVE, DP-4000, TT-4000 and TT-4000- IP 66.			
Furthermore, whatever the protection mode, only use cable glands with a protection degree o				
at least IP 66. Be sure the cable diameter complies with the selected cable gland. Tighten the				
cable gland in a proper way. Never forget to mount the covers of the electronics housings in a proper way.				
For other technical details, refer to the instruction manuals of the transmitters				