NIVELCO

THERMOPOINT

TM / J-500 / 600
Multipoint temperature transmitters

User's and Programming manual

5th edition

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Thank you for choosing a NIVELCO instrument.
We are sure that you will be satisfied throughout its use!

1. INTRODUCTION

1.1. APPLICATION

THERMOPOINT TM/TJ – 500/600 series two-wire temperature transmitters are suitable for continuous multipoint temperature-measurement, -indication and -transmission of normal and hazardous liquids, powders or granular solids. The sensor of the instrument is located in a rigid or flexible tube, or an antistatic plastic coated steel wire rope depending on the measured material and the insertion length. Insertion length and process connection of the instruments are as per the order codes (see **chapter 2**). Intelligent electronics and HART communication provide application possibilities for many different tasks.

2. ORDER CODES

Not all combinations possible!

THERMOPOINT multipoint temperature transmitters:

T☐ ☐- ☐ ☐ ☐-☐- Ex *

TYPE	CODE
Multipoint transmitter	M
Multipoint transmitter + display	J

PROBE / PROCESS CONNECTION	CODE
Rod / 1" NPT	A
Rod / M20x1,5	J
Cable / 1 ½ " BSP	K
Cable / 1 ½" NPT	E
Coated cable / 1 ½" BSP	H
Coated cable / 1 ½" NPT	C
Rod / 1" BSP	R

HOUSING	CODE
Aluminium	5
Plastic	6**

NUMBER OF SENSORS	CODE
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F

LENGTH	CODE
1 m	1
2 m	2
3 m	3
4 m	4
5 m	5
6 m	6
7 m	7
8 m	8
9 m	9
10 m	A
.	.
.	.
.	.
.	.
30 m	Z

OUTPUT/EX	CODE
HART	4
HART / Ex ia IIIC	5
HART / Ex ia IIB	6
HART / Ex ta/tb IIIC	8

** The order code of an Ex version should end in "Ex"!*

*** Only normal or Ex ia version is available*

3. TECHNICAL DATA

3.1. GENERAL DATA

Type		RIGID TUBE VERSION T□R-□□□-□, T□A-□□□-□, T□J-□□□-□	FLEXIBLE TUBE VERSION T□K-□□□-□, T□E-□□□-□	FLEXIBLE, PLASTIC COATED TUBE VERSION T□H-□□□-□, T□C-□□□-□
Nominal length		1 m ... 4 m	2 m ... 30 m	2 m ... 30 m
Material of the tube		1.4571 stainless steel		Antistatic PE coated stainless steel
Max. medium pressure		2.5 MPa (25 bar)	1.6 MPa (16 bar)	0.3 MPa (3 bar)
Medium temperature		-40 °C ... +105 °C (for max. 1 hour: +125 °C)		-30 °C ... +80 °C (for max. 1 hour: +85 °C)
Measurement accuracy		-30 ºC ... -10 ºC: ±2 °C -10 ºC ... +85 ºC: ±0,5 °C +85 ºC ... +125 ºC: ±2 °C		
Resolution (digital)		0.1 °C		
Material of wetted parts		1.4571 stainless steel		1.4571 stainless steel: + Antistatic PE
Ambient temperature		Plastic housing : -20 ºC ... +65 ºC	Aluminium housing: -30 ºC ... +65 ºC	with SAP-300 display module: -20 ºC ... +65 ºC
Output	Analogue	4 – 20 mA		
	Digital	4 – 20 mA + HART communication (minimal loop resistance: 250 ohm)		
	Display	SAP-300 LCD		
Error indication		3.8 mA or 22 mA		
Output load		$R_t = (U_t – 12.5V) / 0.004$ A, U_t = power supply voltage		
Power supply		Ex type: 12.5 V ... 30 VDC Normal type: 12V….36 VDC		
Electrical protection		Class III.		
Ingress protection		IP 67		
Process connection		As per order codes		
Electrical connection		M 20 x1.5 cable gland, outer diameter of the cable: ∅ 6 …∅12 mm, wire cross section max.1.5 mm^2		
Housing		Aluminium (paint coated EN AC-42000) or plastic (PBT)		
Mass		1.7 kg + tube: 0.6 kg/m	2.9 kg + tube: 0.3 kg/m + 3 kg	2.9 kg + tube: 0.7 kg/m

3.2. ADDITIONAL DATA FOR EX APPROVED MODELS

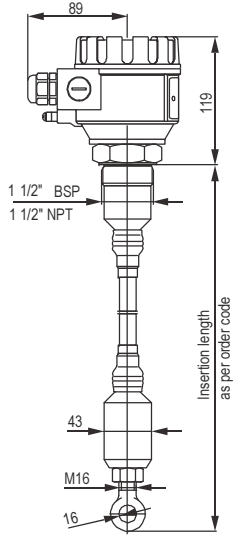
Type	T□R-5□□-6 Ex T□R-6□□-6 Ex T□A-5□□-6 Ex T□A-6□□-6 Ex T□J-5□□-6 Ex T□J-6□□-6 Ex T□K-5□□-6 Ex T□K-6□□-6 Ex T□E-5□□-6 Ex T□E-6□□-6 Ex T□H-5□□-6 Ex T□C-5□□-6 Ex	T□H-5□□-5 Ex T□C-5□□-5 Ex	T□H-5□□-8 Ex T□C-5□□-8 Ex
Protection type	ia	ia IIIC	ta IIIC
Ex marking	Ⓔx II 1G Ex ia IIB T6…T4 Ga	Ⓔx II 1 D Ex ia IIIC T85°C Da	Ⓔx II 1/2 D Ex ta/tb IIIC T85°C Da/Db
Ex electrical limit data	Only Ex ia certified power supply should be used! U_{imax} ≤ 30 V DC I_{imax} ≤ 140 mA P_{imax} ≤ 1 W C_i ≤ 15 nF L_i ≤ 200 µH		U_{max} < 30 V DC I_{max} < 200 mA P≈6W
Power supply	Ui = 12.5 V … 30 V DC		
Medium temperature limit data	See: table 3.2.1	-10 °C … +80 °C	
Ambient temperature	With plastic housing: -20 °C … +65 °C, With metal housing: –30 °C … +65 °C, With SAP-300 display: -20 °C … +65 °C		
Electrical protection	Class III.		
Ingress protection	IP 67		
Process connection	As per order code		
Cable glands	2x M20x1.5 cable glands		2x M20x1.5 certified cable glands
Cable outer diameter	Ø 7 … 13 mm		
Electrical connection	Wire cross section: 0.5 … 1.5 mm²		

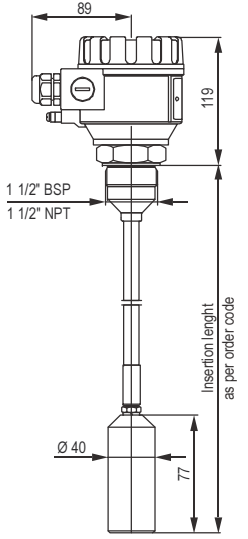
3.2.1. Medium Temperature Limit Data

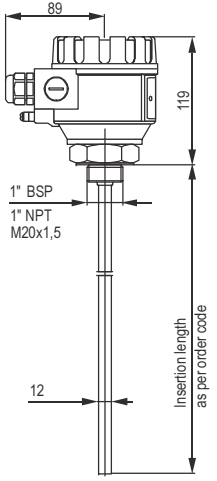
Housing and probe types	Medium temperature	Temperature Class
Metal housing with rigid or flexible probe	–30 °C … +80 °C –30 °C … +95 °C –30 °C … +105 °C	T6 T5 T4
Plastic housing with rigid or flexible probe	–30 °C … +80 °C –30 °C … +95 °C –30 °C … +105 °C	T6 T5 T4
Metal housing with plastic coated flexible probe	–20 °C … +80 °C –20 °C … +80 °C	T6 T5

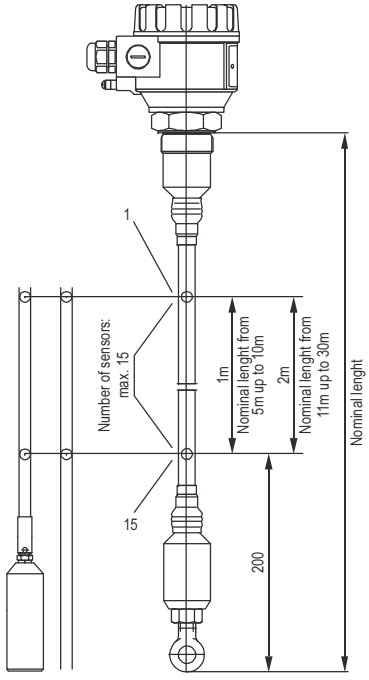
3.3. DIMENSIONS

FOR SOLIDS	FOR LIQUIDS		POSITION OF SENSORS IN STANDARD VERSION*
T□H-□□□-□ , T□C-□□□-□	T□K-□□□-□ , T□E-□□□-□	T□R-□□□-□ , T□A-□□□-□ , T□J-□□□-□	









** Different scale is available in case of special orders*

3.4. ACCESSORIES

- User's and programming manual,
- Warranty Card,
- Declaration of Conformity,
- 2 pcs M20x1.5 cable glands.

4. INSTALLATION AND WIRING

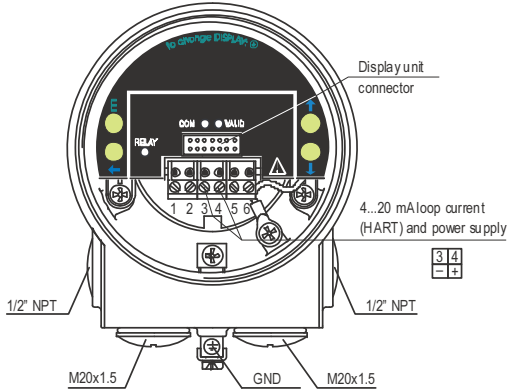
During the installation the following instructions should be taken into consideration:

- Depending on the thermal characteristics of the measured material the sensor should be installed proper distance from the silo wall,
- Depending on the cross section of the silo several sensors should be installed,
- In case of temperature measurement of granular solids static data of the silo roof should be checked and if necessary proper mechanical solution should be performed to relieve the roof.

Place of the installation should be selected to provide proper place allowing easy access for installation, calibration and monitoring.
Instruments can be equipped with flange or threaded connection according to the process connection selection.
Housing of the instrument can be rotated. After the installation turn the housing to the best position for reading display.

4.1. WIRING

- The transmitter is designed to operate in 2-wire systems with 12…36 V DC power supply voltage. Resistance of the units in the loop current depends on the applied supply voltage.
- Shielded cable should be used for wiring.
- Screw terminals can be accessed after removing the housing cover and the display module (if there is).
- The unit should be grounded by the grounding screw.
- The unit should be connected to the #3(–) and #4(+) terminals.
- Power on the instrument following the wiring. Necessary programming can be done.
- After wiring and programming ensure proper sealing and closing of the cover.



The instrument may be damaged by electrostatic discharge (ESD) via its terminal, thus apply the precautions commonly used to avoid electrostatic discharge e.g. by touching a properly grounded point before removing the cover of the enclosure.

4.2. SPECIAL CONDITIONS FOR SAFE USE

- Intrinsically safe units should be powered by intrinsically safe (Ex ia IIB) certified and approved devices.
- In case of intrinsically safe (with II 1G Ex ia IIB T6...T4 Ga protection marking) equipment versions with metallic enclosure, the aluminum-content of the enclosure exceeds the limit, thus the equipment should be protected against impacts and friction effects. The size of the macrolon window of intrinsically safe equipment with metallic enclosure exceeds the limit, thus the devices likewise the versions with plastic enclosure should be protected against electrostatic charges. Cleaning of these units is allowed only with a wet rag!
- Transmitters with protection by enclosure protection mode should be operated only with approved devices in accordance to the specified parameters in the technical data table.
- Multipoint temperature transmitters for solids have a measuring (medium) temperature range between -20 ºC and +85 ºC.
- The instrument should be grounded by its grounding screw to the EP system.
- Heat-resistance of the cable insulation should meet the ambient temperature requirements of the application place.
- The parameters of the sealing ring in respect of chemical and flameproofness shall be observed as specified in the instruction manual.

5. PUTTING INTO OPERATION, PROGRAMMING

THERMOPOINT TM_ / TJ_-500 (600) instruments can be adjusted and programmed with SAP-300 display unit.

Without SAP-300 the following LEDs can be seen :

- **VALID** Indicates the measuring capability of the unit. If lit, the input signal is stabilised. If blinking, the input signal is changing.
- **COM** Indicates digital (HART) communication. During Remote programming LEDs are continuously illuminated.

When SAP-300 display is present, LEDs are not visible; functions are taken over by the display. In default state SAP display shows the table of the measured temperature values (**see chapter 5.1**)

Programming is supported by a text-based menu. Navigation is done by using the Ⓔ / ▲ / ▼ / ◄ buttons.

The instrument can operate without the SAP-300 module as well. Programming can be done only by using SAP-300 display module locally or by HART (REMOTE PROGRAMMING) communication system remotely.

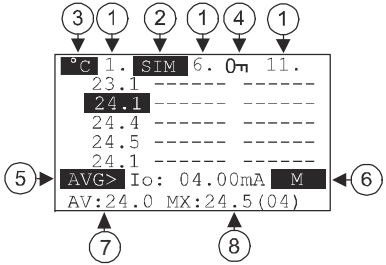
The SAP-300 is a 64x128 dot-matrix LCD display which can be plugged into the transmitter. (Universal – usable
in other NIVELCO devices as well – provided that the system software supports SAP-300.)

Warning!

The SAP-300 module is based on LCD technology, so please make sure it is not exposed to permanent heat or direct sunlight, in order to avoid damage of the display unit. If the instrument cannot be protected against direct sunlight or high temperature that is beyond the standard operating temperature range of the SAP-300, please do not leave the SAP display in the instrument.

5.1. MEASURING WITH THE SAP-300 DISPLAY MODULE

Elements of the display:



1, **Measured temperature values.** According to the increasing number from the top to the bottom and from left to right. Instrument can operate with maximum 15 sensors. 6 horizontal lines indicate the lack or the error of the sensor. The #1 sensor is the closest to the electronic housing, the following sensors are tagged with the next numbers increasingly. The last numbered sensor is at the bottom. The last measured value is indicated by inverse inscription. The device moves on the next sensor value approximately in every 1 sec.

2, **Indication of simulation.** In this case the display and output show the values of the simulation and not the measured value.

3, **Dimension of the measured values.**

4, **Indication of Menu Lock:** If key symbol is visible, the unit is protected with a password. When entering the menu, the instrument asks for the correct password. If REM message is visible, the instrument is in remote programming mode and the menu cannot be accessed.

5, **Source of transmitted PV (Primary Value).** (see 5.3.1.1)

AVG>	PV is the average of the measured temperatures.
MAX>	PV is the maximal value of the measured temperatures. In the 8th cell between brackets there is the number of the (first) sensor measuring the maximum temperature.
<01>	PV is the measured temperature of a selected sensor. The number of the selected sensor is between <> marks.

6, **Calculated value of the output current.** After the dimension, the mode of current output is indicated by inverse inscription:

M	Manual mode (see 5.3.2.1)
E!	Analogue transmission reacts to a programmed failure condition if an upper or lower fault current is programmed.
H	HART address, which is not 0, so 4mA overwrites the output current (see 5.3.3)

Any possible errors during measurement are shown in the lower part of the display.

7, **Average of measured values.**

8, **Maximum of the measured values and place (first occurrence) of the maximal value.**

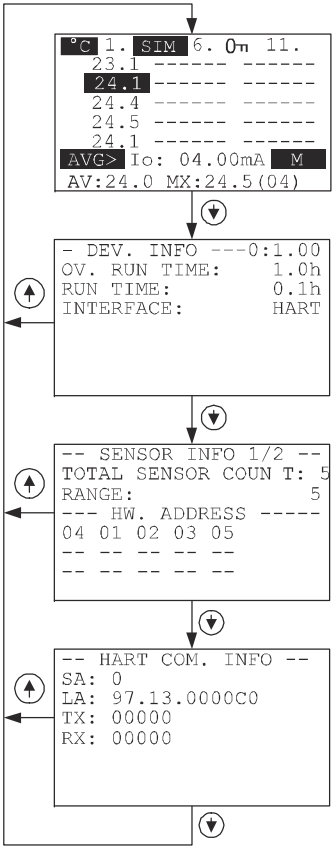
Information displays

Press Ⓓ button to cycle between the information displays.

1. The general information display (DEV. INFO): overall running time (OV. RUN TIME), run time after power on (RUN TIME), type of interface (INTERFACE).
2. Sensor information: number of the temperature sensors in the probe (TOTAL SENSOR COUNT), number of the highest numbered sensor (RANGE).
3. Information of HART communication (Short address, Manufacturer ID, Device Type-code, Rx-Tx message counters – for debugging).

The informative display switches back to main screen after 30 seconds.

By pressing the Ⓤ button the user can get back to main screen at any time. Pressing the Ⓔ button in any of the displays the user can entering the menu. After exiting the menu always the main screen will be shown.



5.2. PROGRAMMING WITH THE SAP-300 DISPLAY MODULE

When entering the menu the instrument makes a copy of the actual parameters, all changes are done to this duplicated parameter set. During programming the instrument keeps measuring and transmitting with the current (and intact) parameter set. After exiting the menu the instrument replaces the original parameters with the new parameter set and will measure according to the new parameters. This means that the change of the parameters does not become immediately effective when pressing the Ⓔ button!

Entering the menu can be done by pressing the Ⓔ button, while exiting the menu can be done by pressing the ⓔ button.
If the instrument is left in programming mode after 30 minutes it will automatically return to measuring mode and all changes will be unsaved. If the SAP-300 is removed, the instrument immediately exits from the menu and all changes will be unsaved.

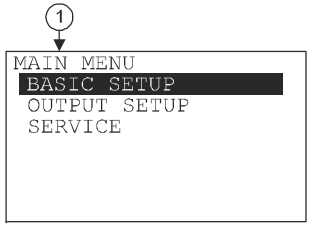
As programming with SAP-300 (manual programming) and HART (remote mode) programming is not possible at the same time, use only one programming method at one time. Measured values can be read out through HART at any time.

5.2.1. Components of the programming interface

The parameters of the instrument are grouped according to their functions. The programming interface consists of lists, dialog windows, edit windows and report windows.

Lists

Navigation between the lines of a list can be done by pressing ⓤ / ⓓ buttons. Pressing the Ⓔ button activates a list item. Selected list item is marked with inverse colour. Exit from a list by pressing the ⓔ button.



Menu list

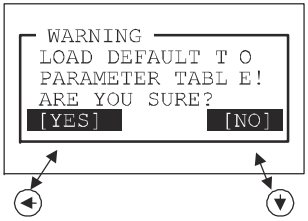
Menu list is a specialized list. Its characteristic is that upon selecting a list item we directly get into another list, and these lists are opening from each other in different levels. The menu header (1) helps to navigate.

Entering the menu can be done by pressing the Ⓔ button. Navigation between the menu items can be done by pressing the ⓤ / ⓓ buttons. Enter to the selected menu by pressing the Ⓔ button. The selected list item is marked with inverse colour.

Exit from a submenu with ⓔ button. Pressing the ⓔ button in the main menu will exit programming mode and the instrument will return to measuring mode.

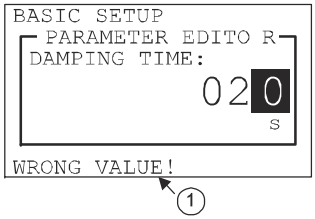
Dialog window

The system sends messages or warnings using dialog windows. These usually can be acknowledged by pressing the ◄ button or the user can choose between two options (usually YES or NO) by pressing ◄ / ▼ buttons. In some cases to correct an error one of the parameters has to be changed!



Edit window

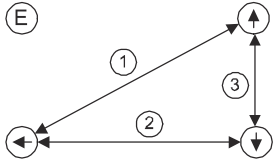
An edit window is used for modifying a numeric parameter value. The selected character can be changed using the ▲ / ▼ buttons. The cursor can be moved to left, using the ◄ button. The direction of the cursor movement through the digits is right to left. Changed value can be validated by pressing the E button. The software checks if the entered value is appropriate, exiting the edit window is only possible after entering a correct value. If the entered value is uninterpretable the software sends an error message in the bottom line (1) of the display.



Edit window – button combinations

In the edit window the following button combinations are available:

1. Recalling the parameters to the state before editing (◄ + ▲, pressed for 3 secs.);
2. Recalling default parameters (◄ + ▼, pressed for 3 secs.);
3. Inserting (currently) measured value to the edit window (▲ + ▼, pressed for 3 secs.)
   Only for certain parameters!



5.2.2. Menu structure

Main menu

BASIC SETUP	Parameter group of the basic measurement parameters
OUTPUT SETUP	Parameter group of the output parameters
SERVICE	Service functions, calibration, test and simulation

5.3. PROGRAMMABLE FEATURES DESCRIPTION

5.3.1. Basic measurement settings

5.3.1.1 Source of transmitted PV (Primary Value)

Parameter: P01: a

Menu path: BASIC SETUP / PRIMARY VALUE

Default value:	AVERAGE

Description: The selected value will be the base of the analogue and the digital (HART) transmitted Primary Value.

- AVERAGE
- SELECTED SENSOR
- MAXIMUM

All sensor data can be queried digitally, but the transmitted Primary Value can be selected in this Parameter.

5.3.1.2 Temperature measurement unit

Parameter: P02: a

Menu path: BASIC SETUP/ UNIT/ TEMPERATURE UNIT

Default value:	ºC

Description: Dimension of the temperature measurement:

- ºC
- ºF

5.3.1.3 Damping time

Parameter: P20

Menu path: BASIC SETUP / DAMPING TIME

Default value:	0 sec

Description: Damping time is used to damp the unwanted fluctuations of the output and display.
If the measured temperature changes rapidly the new value will settle with 1% accuracy after this set time.

5.3.2. Analogue output

5.3.2.1 Output current mode

Parameter: P12: b
Menu path: OUTPUT SETUP / ANALOG OUTPUT / CURRENT MODE

Default value:	AUTO

Description: Transmission mode of the current output [AUTO, MANUAL]

- AUTO The output current is calculated from the Primary Value (P01: a), output is active.
- MANUAL The output current is fixed at a constant (set) value. In this mode the setting of the error current is irrelevant. The set (current) value overwrites the 4mA output of HART multidrop mode!

5.3.2.2 Output current value 4mA

Parameter: P10
Menu path: OUTPUT SETUP / ANALOG OUTPUT / 4mA VALUE

Default value:	-10 (ºC)

Description: Transmitted value is assigned to 4mA output current.
The transmitted value is in accordance to the Primary Value (P01: a). The assignation can be (normal) when the change of the measured value and change of the output current are the same, or it can be reversed (inverse operation).

5.3.2.3 Output current value 20mA

Parameter: P11
Menu path: OUTPUT SETUP / ANALOG OUTPUT / 20mA VALUE

Default value:	+85 (ºC)

Description: Transmitted value is assigned to 20mA output current.
The transmitted value is in accordance to the Primary Value (P01: a). The assignation can be (normal) when the change of the measured value and change of the output current are the same, or it can be reversed (inverse operation).

5.3.2.4 Output current error mode

Parameter: P12: a
Menu path: OUTPUT SETUP / ANALOG OUTPUT / ERROR MODE

Default value:	22mA

Description: Error indication on the current output:

- OFF Error indication is OFF. The device transmits in accordance to the last calculation.
- 3.8 mA In case of error, the output current gets 3.8 mA.
- 22 mA In case of error, the output current gets 22 mA

Warning! This error indication is active unless the failure is fixed, or until the failure terminates! The Manual mode and the HART mode overwrite the error current.

5.3.2.5 Fixed output current

Parameter: P08
Menu path: OUTPUT SETUP / ANALOG OUTPUT / MANUAL VALUE

Default value:	4mA

Description: Parameter for setting the fixed output current.
Values between 3.8 and 20.5 can be entered. The output current will be set to the entered value and analogue transmission will be suspended. The set (current) value overwrites the 4mA output of HART multidrop mode. (see 5.3.2.1)

5.3.3. Digital output

HART short address

Parameter: P19
Menu path: OUTPUT SETUP / SERIAL OUTPUT / ADDRESS

Default value:	01

Description: HART short address
The short address can be set between 0 and 15. If there is only one device, the short address can be 0, and this case the device transmits 4-20mA on its output. In Multidrop (if there is more than one device) mode short address should differ from zero, and this case the output current is fixed to 4mA. The fixed 4mA output can be overwritten as described in chapter 5.3.2.5.

5.3.4. Service functions

5.3.4.1 Security codes

User security code

Parameter: --
Menu path: SERVICE / SECURITY / USER LOCK
Description: Setting or unlocking the user security code.
The instrument can be protected against unauthorized programming with a 4 digit PIN (Personal Identification Number) code.
If either of the digits differs from 0 the code is active. If zero is specified, then the secret code has been deleted!
In case of Active code, this code is requested at menu entry.

Service code

Parameter: --
Menu path: SERVICE / SECURITY / SERVICE LOCK
Description: Setting of the service code (only for trained personnel!)

5.3.4.2 Loop current test

Parameter: P80
Menu path: SERVICE / OUTPUT TEST / ANALOG OUTPUT
Description: Loop current test (mA)
Entering to this parameter the display and the output show the current value according to the actual measured value. In test mode values between 3.9 and 20.5 can be entered into this parameter. The output current will be set to the entered value. The measured current on the output should be equal to the set value.
In test mode a dialog window warns the user of the fixed output current until the user exits the warning message window. Exiting can be done by pressing the Ⓔ button.

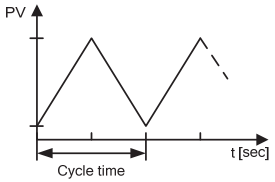
5.3.4.3 Temperature simulation

This function helps the user to check the outputs and the connected processing units
After finishing of the settings the unit should be returned into Measurement mode to start the simulation.

Temperature simulation mode

Parameter:	P84: a		
Menu path:	SERVICE / TEMP. SIMULATION / MODE	Default value:	0

Description: Simulation mode:

OFF	No PV simulation	
FIX VALUE	Simulation value is according to the sum of the bottom value of the simulation and the number of the sensor	
TRIANGLE WAVE	The simulated value changes linearly between the set low and high values with an adjustable cycle time	 PV: Primary Value
SQUARE WAVE	The simulated value jumps between the set low and high values with an adjustable cycle time	

Temperature simulation cycle

Parameter:	P85		
Menu path:	SERVICE / TEMP. SIMULATION / TIME	Default value:	60 sec
Description:	Cycle time of the simulation		

Bottom value of the Temperature simulation

Parameter:	P86		
Menu path:	SERVICE / TEMP. SIMULATION / BOTTOM VALUE	Default value:	-10 °C
Description:	Lowest value of the simulation		

Upper value of the Temperature simulation

Parameter: P87
Menu path: SERVICE / TEMP. SIMULATION / UPPER VALUE
Description: Highest value of the simulation

Default value:	85 ºC

5.3.4.4 Load default values

Parameter: --
Menu path: SERVICE / DEFAULTS / LOAD DEFAULT
Description: This command loads all default values of the instrument.
After loading the default values the parameters can be freely changed, the effect of the changes does not affect the measurement until the user exits programming mode and returns to measurement mode. Before loading the defaults the software asks for a confirmation warning the user that all user parameters will be lost!

5.3.4.5 Restart

Parameter: --
Menu path: SERVICE / RESTART
Description: Restarts the instrument (Cold boot) (Reloads parameters from the non-volatile memory)

5.4. ERROR CODES

Message on the screen	Error description	Procedure
MEMORY ERROR	Memory error in the electronics	Contact the service!
NO INPUT SIGNAL	Hardware error	Contact the service!
EE COM. ERROR	Hardware error	Contact the service!
MATH. OVERLOAD	Display overflow	Check the programming!
SENSOR NOT FOUND	Hardware error	Contact the service!
SENS. ZERO ADDR.	Hardware error	Contact the service!
SENS. MULT. ADDR.	Hardware error	Contact the service!
SENS. MISS. ADDR.	Hardware error	Contact the service!
SENS. SHORT CIRC.	Hardware error	Contact the service!
EE CHK ERROR	Parameter checksum error	Restart the unit in SERVICE / RESTART menu (or power off and on the instrument) and check / repeat programming! If the problem persists contact the service!
INTEGRITY ERROR	Incorrect parameter values. Stored parameters are damaged.	Restart the unit in SERVICE / RESTART menu (or power off and on the instrument) and check / repeat programming! If the problem persists contact the service!
AC COM. ERROR	Hardware error	Contact the service!

5.5. RS485 COMMUNICATION VIA MULTICONT PROCESS CONTROLLER

5.5.1. Remote data query with HART protocol

Knowing the HART commands of the transmitters, with the help of USER RS485 interface of MultiCONT process controller (this case MultiCONT acts as a bridge) there is a possibility to query the data of the connected transmitters. This can be done the following way:

- the MASTER inserts the HART frame to the data field of the HART frame, which is sent by the MultiCONT to the transmitters
- the MultiCONT „unpack" the HART frame (received from the MASTER) and sent to the transmitter
- the MultiCONT „pack" the HART answer of the transmitter and send it o the MASTER in the data field of the HART frame

Detailed description of the remote programming can be found in „USER RS485 protocol for MultiCONT" programming manual.

Denominations: PA, SD and AD fields: see details in the 6.1. chapter: Command Structure*

MASTER → MultiCONT (request)

Index: list number of the transmitter

PA	SD	AD	CD=241 (F1h)	BC=2h	CSD=232 (E8h)	Index=0	FCS(XOR)

In case of ' Index≠0 ' Index error will be sent in the answer!

MultiCONT → MASTER (answer)

PA	SD	AD	CD=241(F1h)	BC=48(30h)	Status S(0) and S(1)	DATA D(0)..D(45)	FCS(XOR)

The status bytes are described in details in the 6.1.1. chapter*

The content of the DATA field

BYTE NUMBER	NAME	DATA TYPE	NOTE
0…3	MultiCONT status	Bit32	
4	**CSD:** sub-command code	Unsigned 8	CSD=232(E8h)
5	**Index** : list number of the transmitter	Unsigned 8	Index=0…Dn-1 (see 6.2.5.7. chapter)*
6	Number of sensors in a probe (1..15)	Unsigned 8	
7	Dimension	Unsigned 8	°C= 32(20h) or °F=33(21h)
8..37	Sensor temperatures x10 S1..S15 in order	Signed int 16	
38..39	Transmitted Primary Value (PV) x10	Signed int 16	(MAX, SELECTED SENSOR, AVG)
40…42	Date of last transmitter refresh	Date*	
43..45	Time of last transmitter refresh	Time*	

* This chapter is in the „Description of the USER RS485 protocol for MultiCONT" programming manual.

5.5.2. Remote data query with MODBUS protocol

Knowing the HART commands of the transmitters, with the help of USER RS485 interface of MultiCONT process controller (this case MultiCONT acts as a bridge) there is a possibility to query the data of the connected transmitters. This can be done the following way:

- the MASTER inserts the HART frame to the data field of the MODBUS frame, which is sent by the MultiCONT to the transmitters
- the MultiCONT „unpack" the HART frame and sent to the transmitter
- the MultiCONT „pack" the HART answer of the transmitter and send it o the MASTER in the data field of the MODBUS frame

Detailed description of the further communication possibilities can be found in „USER RS485 protocol for MultiCONT" programming manual

Denominations: ADDR, FNC and BCNT fields: see details in the 7. chapter: Command Structure *

MASTER → MultiCONT (request)

ADDR	FNC=03h	START	QUANTITY		CRC	
		7000h+N*0040h+00..14h	HI=00h	LO=01h…16h	HI	LO

N=0…Dn-1, where Dn is the number of the HART devices (see: Table of system variables 0012h address)*

MultiCONT → MASTER (answer)

ADDR	FNC=03h	BCNT(byte number)	DATA bytes in the read address B(0)…B(BCNT-1)	CRC	
				HI	LO

BYTE NUMBER	NAME	DATA TYPE	NOTE
7000h	Number of sensors in a probe (1..15)	Unsigned 16	
7001h	Dimension	Unsigned 16	°C or °F
7002h	S1 Sensor temperature x10	Signed Int 16	
7003h	S2 Sensor temperature x10	Signed Int 16	
⋮	Sn Sensor temperature x10	Signed Int 16	
700ah	S9 Sensor temperature x10	Signed Int 16	
700bh	S10 Sensor temperature x10	Signed Int 16	
700ch	S11 Sensor temperature x10	Signed Int 16	
700dh	S12 Sensor temperature x10	Signed Int 16	
700eh	S13 Sensor temperature x10	Signed Int 16	
700fh	S14 Sensor temperature x10	Signed Int 16	
7010h	S15 Sensor temperature x10	Signed Int 16	
7011h	Transmitted Primary Value (PV) x10	Signed Int 16	(MAX, SELECTED SENSOR, AVG)
7012h	Date of last transmitter refresh	Date	
7014h	Time of last transmitter refresh	Time	

6. MAINTENANCE AND REPAIR

The unit does not require routine maintenance. Repairs during or after the warranty period are carried out exclusively at the Manufacturer's.

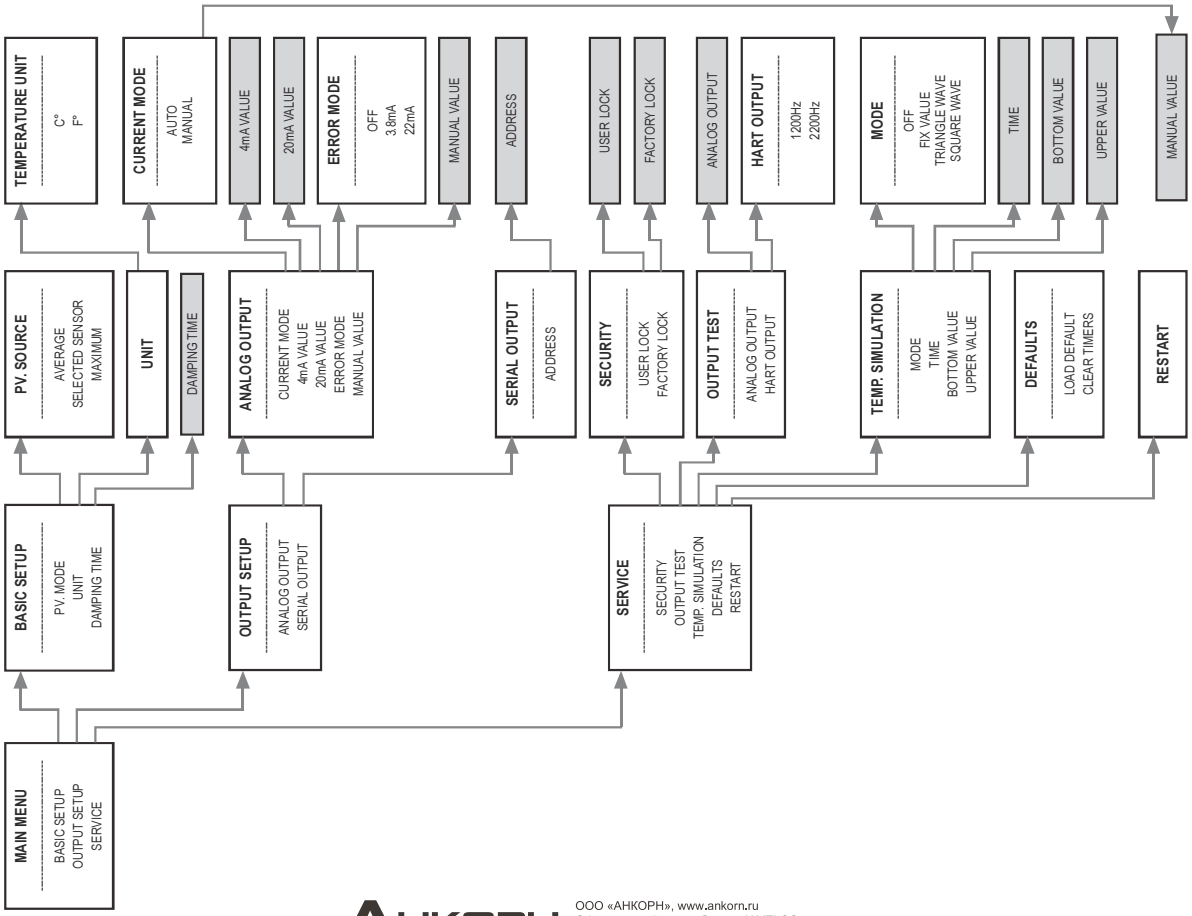
7. STORAGE

Ambient temperature:	-25 ºC …+60 ºC
Relative humidity:	max. 98%

8. WARRANTY

NIVELCO provides warranty of 3 (three) years in compliance with details described in the Warranty Card.

9. MENU MAP



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