DATCON

INDUSTRIAL MEASUREMENT

DT4120 xx xx xx xx

Resistance Thermometer

Operating Instructions

CE   DNV
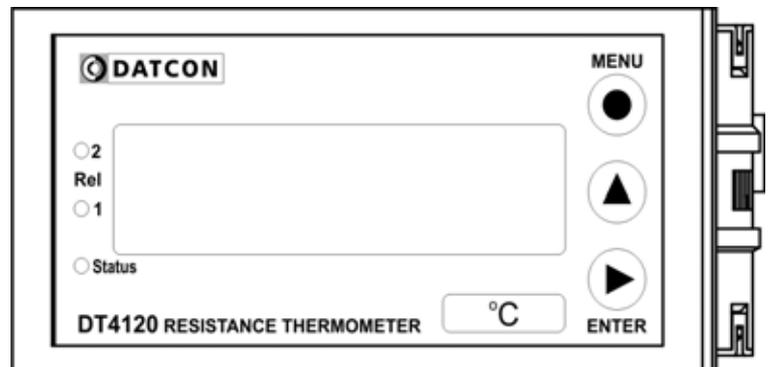
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1. About this document

1.1. Function

This operating instructions manual has all the information you need for quick set-up and safe operation of DT4120 xx xx xx xx.
Please read this manual before you start setup.

1.2. Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3. Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution, warning, danger
This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.

List
The dot set in front indicates a list with no implied sequence.

Sequence
Numbers set in front indicate successive steps in a procedure.

Parting
Parting set in between the elements of a list.
It's meaning: only one element can be choosen from the list.

2. For your safety

2.1. Authorized personnel

All operations described in this operating instructions manual must be carried out only by trained and authorized specialist personnel. For safety and warranty reasons, any internal work on the instruments must be carried out only by DATCON personnel.

2.2. Appropriate use

DT4120 xx xx xx xx Resistance Thermometer enable process temperature, resistance value or potentiometer wiper position to be displayed on the control panel. Detailed information on the application range of the instrument is available in chapter „Product description".

2.3. Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, or damage to system components through incorrect mounting or adjustment.

2.4. General safety instructions

The DT4120 xx xx xx xx is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standard as well as all prevailing safety regulations and accident prevention rules.

2.5. CE conformity

A DT4120 xx xx xx xx is in conformity with the provisions of the following standards:
EN 61326-1:2006 (EMC)
EN 61010-1:2001 (Safety)

2.6. Environmental instructions

Protection of the environment is one of our most important duties. Please take note of the instructions written in the following chapters:

• Chapter **3.4. Storage and transport**

• Chapter **9.2. Disposal**

3. Product description

3.1. Delivery configuration

Delivered items

The scope of delivery encompasses:

- DT4120 xx xx xx xx
- 1 pc. panel sealing (1)
- 2 pc. mounting clamps (enclosed in a nylon bag)
- 1 pc. 4 element plug in terminal (analogue or communication option) (2)
- documentation:
  this operating instructions manual
  certification
  warranty

3.2. Type designation

3.3. Principle of operation

Area of application

DT4120 xx xx xx xx Resistance Thermometer enable process temperature, resistance value or potentiometer's wiper position to be displayed on the control panel.
Pt100 / Pt500 / Pt1000 temperature sensor, resistor or potentiometer can be connected to the input of the instrument, either with 2, 3 or 4 wire.
Large 14.2 mm height LED display make process value easily visible at a distance. The displayed value is proportional to the temperature (sensing by Pt100 / Pt500 / Pt1000 sensors) or to the resistor value or to the position of potentiometer's wiper.
Easy on-site configuration through the front panel membrane keypad is a major advantage of the microcontroller-based technology. The configuration parameters: input type, input connection, signal filtering, output scaling, display refresh rate, limit modes, limit values, etc. are stored in EEPROM. The settings are protected by a two-level password against unauthorized manipulation.
Options:

• Two normally open relay contacts (SPST) for limit switching or for simple control tasks.

• 4-20 mA / 0-20 mA galvanic isolated scaleable analogue output. The output can be active (A) or passive (P).

• RS232 galvanic isolated communication output with MODBUS RTU slave protocol. Only one instrument can be connected to the PLC or to the computer.

• RS485 galvanic isolated communication output with MODBUS RTU slave protocol. 32 instruments can be connected to the PLC or to the computer.
Note: either analogue or communication option can be implemented at the same time.

Operating principle

The measuring current flows through the sensor / resistance / potentiometer connected to the input. The voltage drop on the measuring sensor is compared with the voltage drop on the internal reference resistor. The voltage difference is led to a 21 bit A/D converter. The digital output signal of the A/D converter is processed by a microcontroller.
The microcontroller drives the 5 digit LED display, processes the front panel membrane keypad, drives the limit relays, the analogue output and the communication output.

Power supply

The instrument has two power supply version:
DT4120 xx xx xx: 18-40 V AC/DC   3VA / 3.5 W
DT4120 xx xx xx PS: 180-250 V AC/DC   3VA / 3.5 W

3.4. Adjustment

The DT4120 xx xx xx xx can be adjusted through the 3 button front panel keypad. All configuration parameters are stored in the instrument EEPROM for unlimited time, even when the supply voltage beeng switched off.
The instrument doesn't need any internal adjustment.

3.5. Display, indicators

The following figure shows the front panel of the instrument:
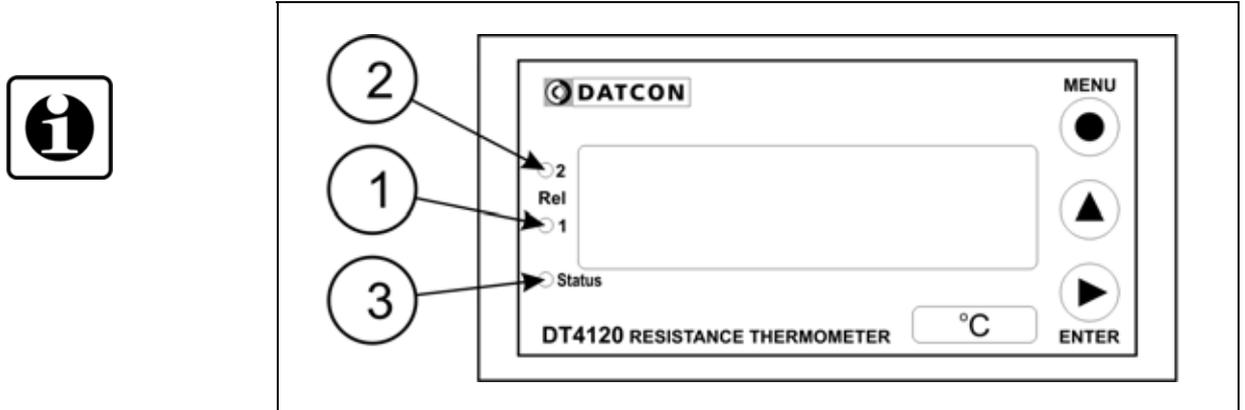
1. 5 digit 7 segment LED for displaying the measured value and the mnemonic messages.
2. „**Rel1**" yellow indicator for indicating that limit output 1 is in "on-state" (LIMIT1).
3. „**Rel2**" yellow indicator for indicating that limit output 2 is in "on-state" (LIMIT2).
4. „**Status**" yellow indicator for indicating that a succesfull data exchange has granted through the communication output.

3.6. Storage and transport

This instrument should be stored and transport in places whose climatic conditions are in accordance with Chapter **10.1. Technical specifications**, as described under the title: Environmental conditions.

The packaging of DT4120 xx xx xx xx consist of enviroment-friendly, recyclable cardboard is used to protect the instrument against the impacts of normal stresses occurring during transportation. The corrugated cardboard box is made from environment-friendly, recyclable paper. The inner protective material is nylon, which should be disposed of via specialised recycling companies.

4. Mounting

4.1. General instructions

Use the enclosed seal between the instrument and the panel when mounting the instrument to assure IP 65 from the front.

Mounting positions

Select a mounting position you can easily read the display reach for mounting and connecting the instrument and that minimises the hazard of water, dust or dump getting into the instrument.

4.2. Main dimensions of the instrument

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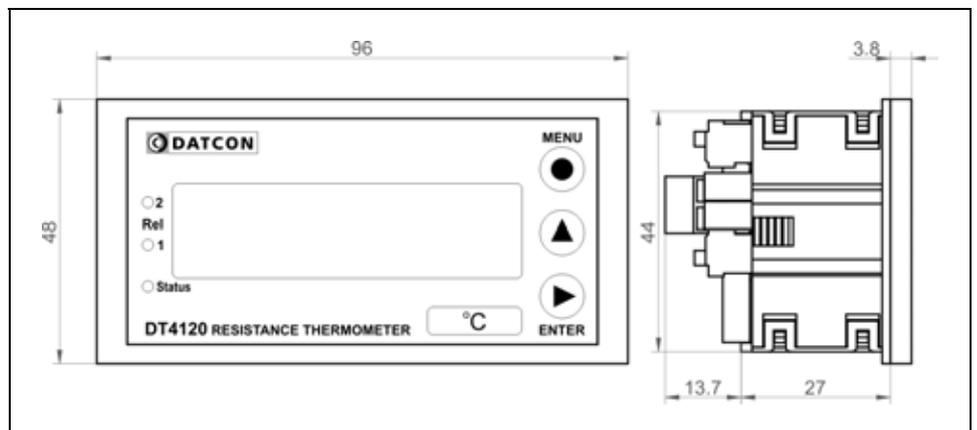
4.3. Mounting

Preparatory steps

The instrument is housed in a DIN standard 96 x 48 x 50 mm ABS case. It can be fix in the panel with the two enclosed mounting clamps.

Dimensions of panel cutout

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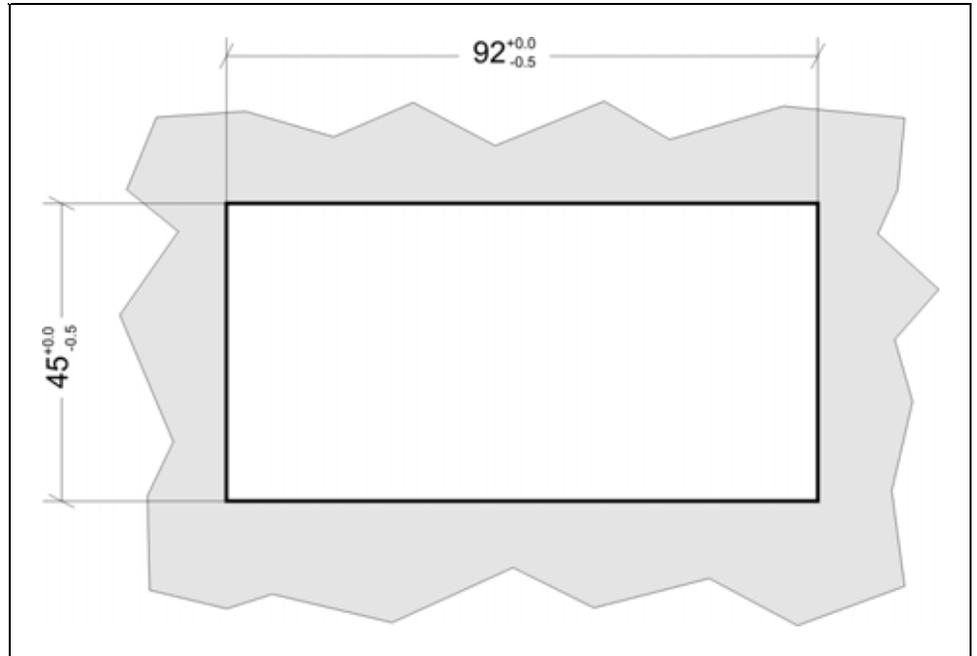
1. Cut-out the panel according to the figure shows above.

The cut-out needs special tools, it must be carried out by trained specialist personnel.

Mounting with the mounting clamps
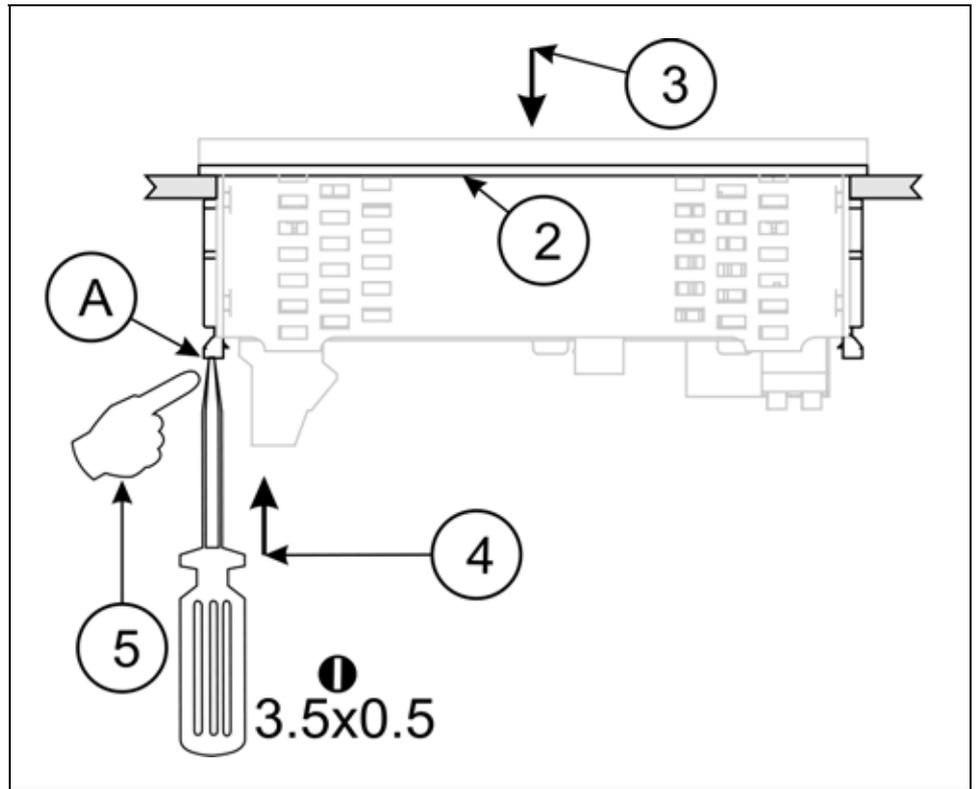
2. Put on the enclosed seal onto the instrument case from the rear side and fit it to the instrument holding frame (Figure step 2).

3. Put the instrument into the prepared cut-out until it possible and check the fitting of the seal between case and mounting surface.

4. Put one of the enclosed mounting clamp onto the tip of a screwdriver (A) and put the clamp with the help of the screwdriwer into the hole on the side of the instrument.

5. Push the mounting clamp with your finger tip as far as you can while keeping the case in it's position.

Repeat the 4., 5. steps with the other clamp.

Please do not exercise forces higher than necessary, as it may cause damages to the clamp.

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5. Connecting

5.1. Preparing the connection

Always observe the following safety instructions:

• Connect or disconnect only in the complete absence of line voltage

• Take note the data concerning on the overcurrent protection in installation.

• Use only a screwdriver with appropriate head

Select connecting cable Take note the suitability of the connecting cable
(wire cross-section, insulation, etc.).
You may use either solid conductor or flexible conductor.
In case of using flexible conductor use crimped wire end.
In case of mains connection the wire cross-section should
be 1.0 mm^2 (min.).
In case of connection communication cables take note the
concerning prescriptions (www.modbus.org).
It's an important rule that the power cables and signal
cables should lead on a separate way.

Preparing cables Prepare the cable for the connection.
Strip approx. 8 mm insulation.
In case of using flexible cable, use crimped wire end.

5.2. Connecting the mains

The following figure shows the wiring plan, connecting the DT4120 xx xx xx PS type instrument to the mains:

Wiring plan, connecting the instrument to the mains
(see also "Application example")

In case of DC supply the polarity is indifferent
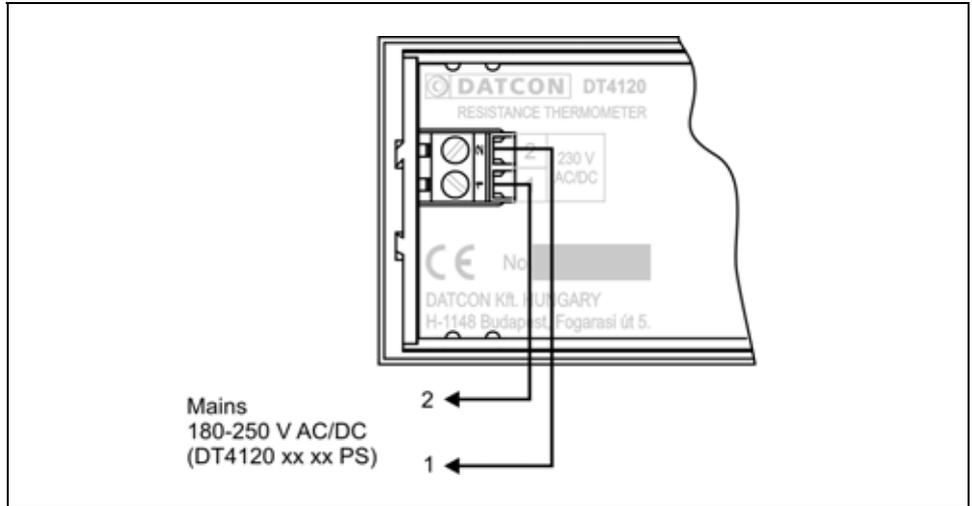
The following figure shows the wiring plan, connecting the DT4120 xx xx xx type instrument to the low voltage power supply:

Wiring plan, connecting the instrument to the mains
(see also "Application example")

In case of DC supply the polarity is indifferent

1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

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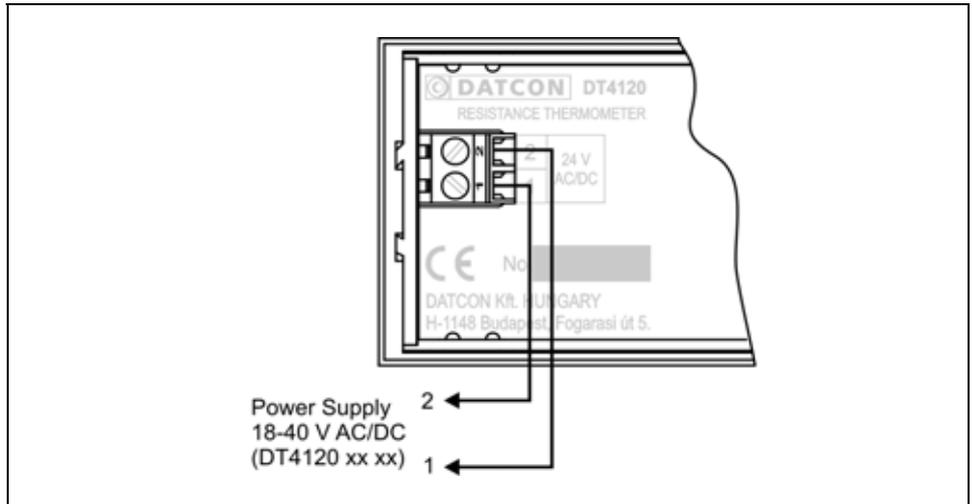
5.3. Connecting the sensor to the input

The following figure shows the wiring plan, connecting the input:

Wiring plan, connecting the input
(see also "Application example")
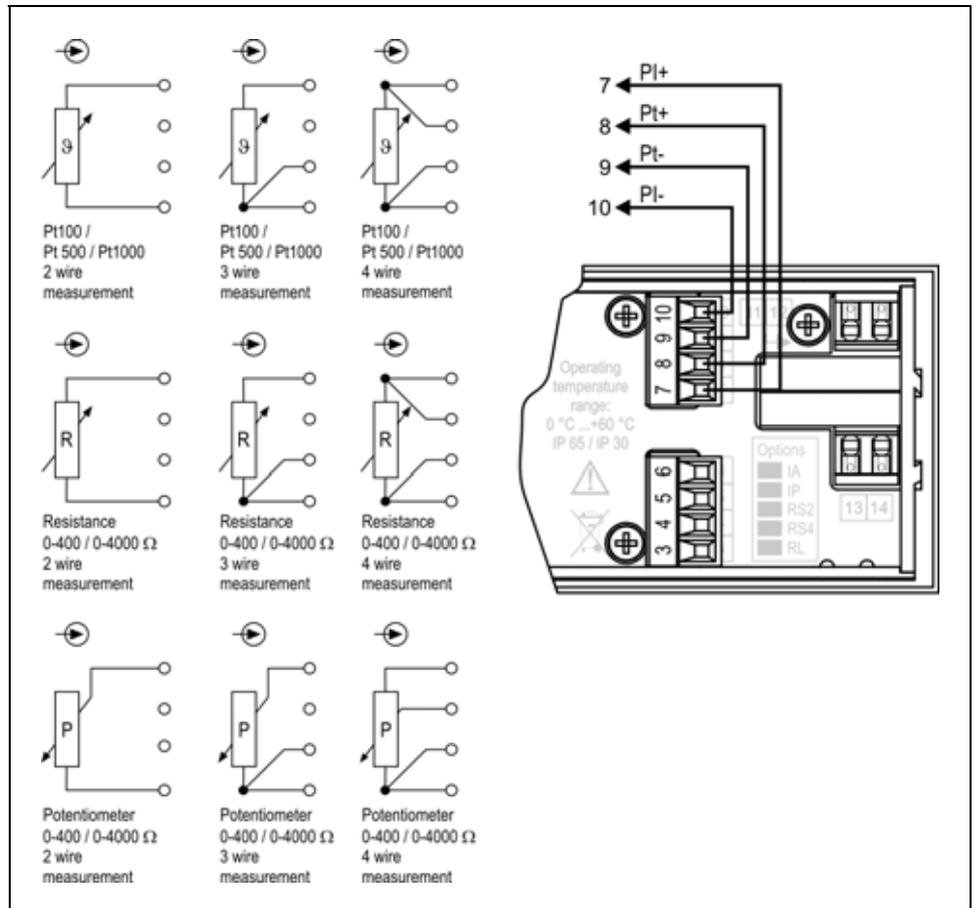
Be careful the polarity of the cables

1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

5.4. Connecting the limit relay outputs (option).

The following figure shows the wiring plan, connecting the limit relay outputs:

Wiring plan, connecting the limit relay outputs
(see also "Application example")
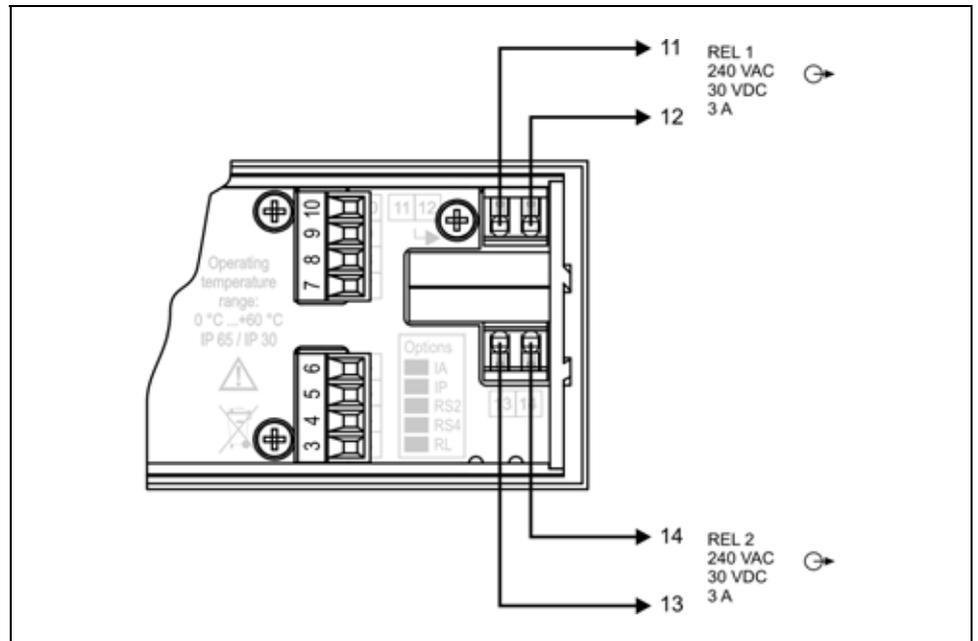
The push-in direct connector assemblies used allow a fast connection of the cables.
Follow the next steps:

1. Push the stripped cable-end until it possible into the terminal assembly. In the case of flexible cable-ends, you can facilitate opening the connection part by pushing down the white button.

2. By pushing the wire in, the self-closing connection is being established. Check it by pulling it outwards firmly.

(3. When you are going to disassemble the cable, push down the white button by a screwdriver, and pull the cable-end out.)

The button can be pushed down easily. Please do not exercise forces higher than necessary, as it may cause damages to the terminal assembly.

5.5. Connecting the analogue output (option).

The following figure shows the wiring plan, connecting analogue output in case of active (DT4120 xx xx IA xx) or in case of passive (DT4120 xx xx IP xx) output:

Wiring plan, connecting the analogue output
(see also "Application example")
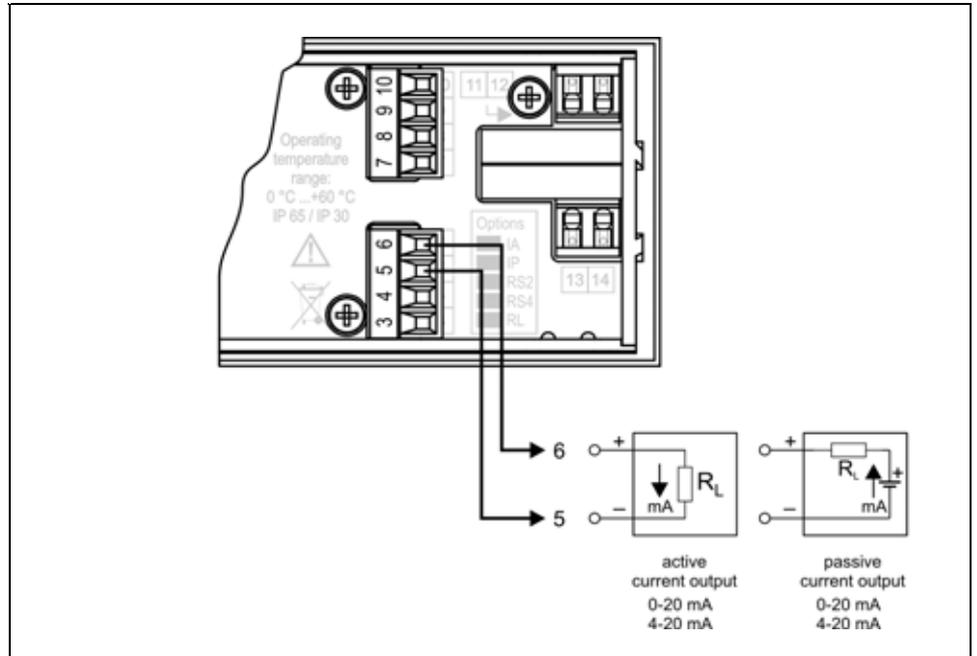
Be careful the polarity of the cables.

1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

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5.6. Connecting the RS232 Modbus communication output (option).

The following figure shows the wiring plan, connecting the RS232 Modbus communication output
(DT4120 xx xx RS2 xx):

Wiring plan, connecting the RS232 output
(see also "Application example")

Be careful the polarity of the cables.
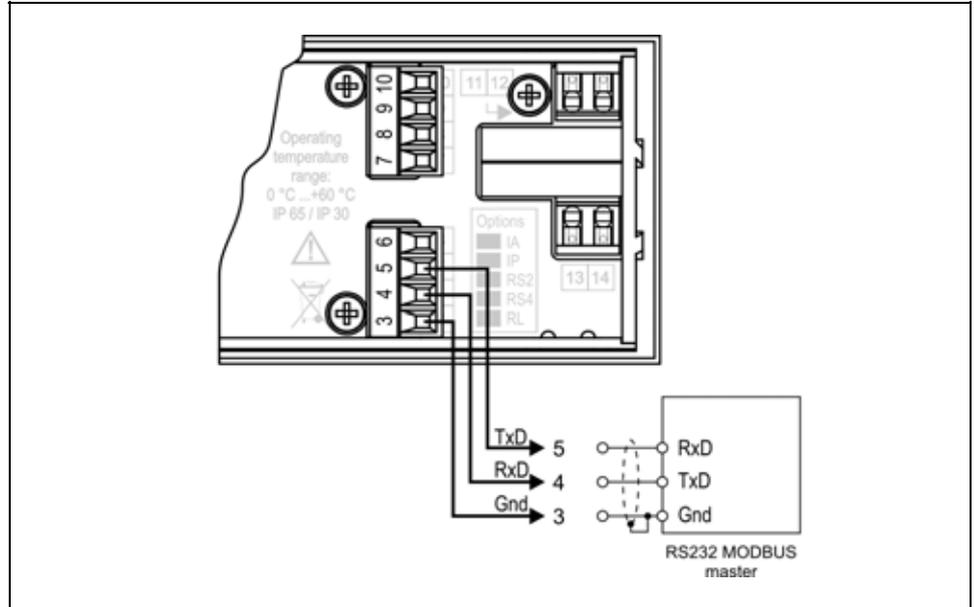
The RS-232 Modbus communication output should be used for short distance communication. The maximum distance is < 10-15 m, it depends on the communication speed.
You can find useful information about the Modbus communication at www.modbus.org.

1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

5.7. Connecting the RS485 Modbus communication output (option).

The following figure shows the wiring plan, connecting the RS485 Modbus communication output
(DT4120 xx xx RS4 xx):

Wiring plan, connecting the RS485 output
(see also "Application example")

Be careful the polarity of the cables.
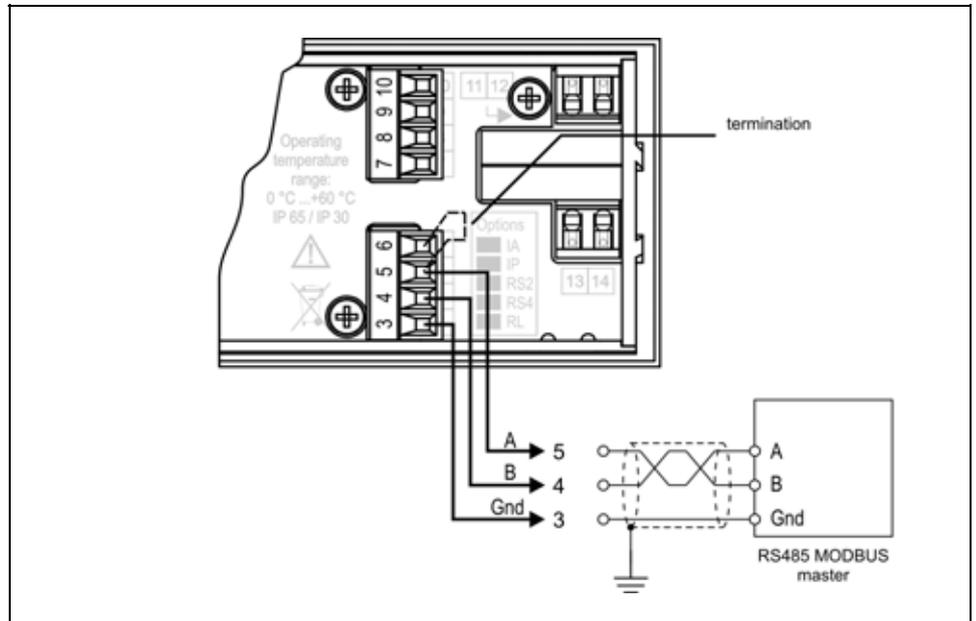
The RS-485 Modbus communication output should be used for long distance communication. 32 instrument can be connected to the PLC or to the computer.
You can find useful information about the Modbus communication at www.modbus.org.

1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

Checking the connections

Check if the cables are connected properly (have you connected all the cables, have you connected to the right place, do not the cable-ends touch each other).

Put the instrument under supply voltage

Put the instrument under supply voltage
After you have completed the connections, put the instrument under supply voltage. If the supply connection is correct the display gives light.

6. Display and manual controls

6.1. The first start-up

The display
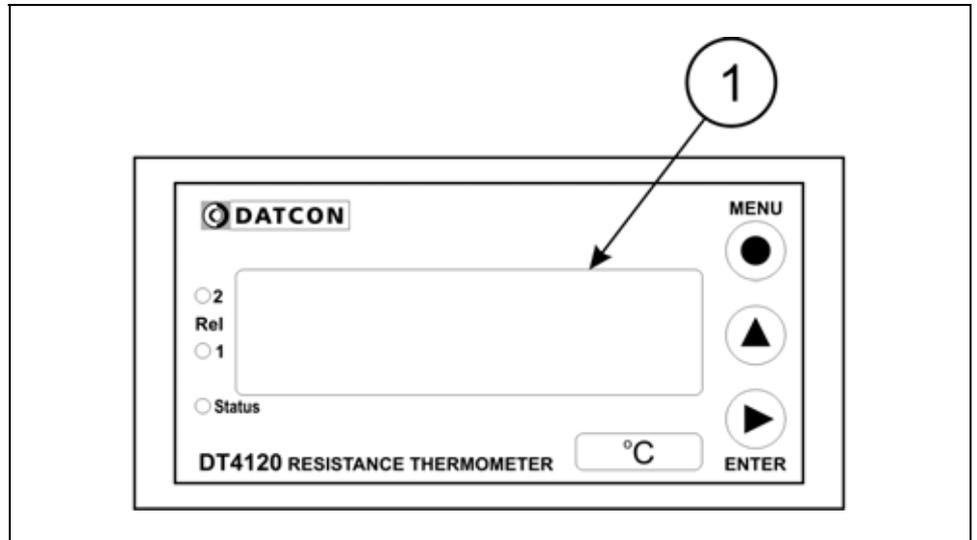
The display is indicated by the arrow (1)

The factory default setting is:
Pt100 or Pt1000 measurement (depens on the type), 4 wire connection.
The display of the instrument shows the measured temperature:
Accordingly, if the temperature is 24.2 degrees centigrade,

the following is shown on the display: 024.2.

If it is 123.7 °C, then: 123.7.

In the case of an error message

If anything else appears on the display instead of the input temperature (e.g. a message with blinking letters), then it is an error message of the instrument.

In order to define the error more accurately, please go to Chapter **6.2.**.

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6.2. Characters and mnemonics appearing on the display

DT4120 xx xx xx xx has a 7-segment type display. It means that maximum 7 bars are used to form each characters. The numbers can be read easily, some of the letters, marks however, looks unusual:

I = 1, *2* = 2, *3* = 3, *4* = 4, *5* = 5,

6 = 6, *7* = 7, *8* = 8, *9* = 9, *0* = 0

A = A, *b* = B, *c* = C, *d* = D, *E* = E, *F* = F, *9* = G,

h = H, *ı* = I, *J* = J, *H* = K, *L* = L, *m̄* = M, *n* = N,

o = O, *P* = P, *q* = Q, *r* = R, *5* = S, *t* = T, *U* = U,

u = V, *!!* = W, *H* = X, *Y* = Y, *2* = Z

All mnemonics (code words, 5 digit length max.) presented on the display comes from English expressions in abbreviated form.
The following part gives a list of the possible mnemonics and their meaning. The left-side column shows the characters appearing on the display. The right-side column gives first the meaning, then the full English word in brackets and, after the hyphen, and explanation may be given.

Login text

    dt

DT - Datcon instrument

    4 120

4120 - Type of the instrument

    no.oPt

No output option is installed. (**No Opt**ion = no option)-the message is blinking.

    rS.232

RS-**232** output option is installed.

    rS.485

RS-**485** output option is installed.

    An.PAS

Passive analogue option is installed. (**An**alog, **Pas**sive)

    An.ACt

Active analogue option is installed. (**An**alog, **Act**ive)

Error messages

E.Ad.Un
A/D underflow (**E**rror: **AD Un**derflow)
Reason of error: input signal is under of the measuring range.

E.Ad.ou
A/D overflow (**E**rror: **A/D O**verflow)
Reason of error: input signal is over of the measuring range.

UndEr
Display under (**Underf**low)
Reason of error: value to be displayed is < -9999.

ouErF
Display overflow (**Overf**low)
Reason of error: value to be displayed is > 99999.

E.ñ ..ñA
Missing Minimum-maximum values
(**E**rror: Missing **Mi**nimum-**Ma**ximum)

E.SAuE
Saving the last settings was not successful (**E**rror: **Save**)

ScALE
Scaleing error (**Scale**)
Reason of error: the given physical value is not correct.

Messages of critical errors

In case of a critical error call manufacturer sertvice department!

S. Adc
A/D converter error (**S**ervice: **ADC**)

S.EEPr
EEPROM error (**S**ervice: **EEPR**OM)

S. cAL
Calibration error (**S**ervice: **Cal**ibration)
Factory calibration is damaged.

S.A.cAL
Analogue output calibration error (**S**ervice: **A**nalog **Cal**ibration)
Factory calibration is damaged.

S.FAct
Factory settings (**S**ervice: **Fact**ory Settings)
Data stored in EEPROM are damaged (factory calibration also).

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During code writing

codE

Code? (**Code**) - type in the code!

bAd.co

Bad code (**Bad Co**de)

USEr

A User login took place (**User**)

SUPEr

A Supervisor login took place (**Super**viso**r**)

During setting

LO.L ﹉

The typed number is lower than allowed (**Lo**w **Lim**it)

h﹐.L ﹉

The typed number is higher than allowed (**Hi**gh **Lim**it)

‒ ‒ ‒ ‒ ‒

Low numeric value not possible to display

‒ ‒ ‒ ‒ ‒

High numeric value not possible to display

rEtYP

Re-type it please (**Re**-**typ**e)

EScAP

Automatic escaping (Auto **Escap**e)-over 4 minutes

EHﬢt

Exit from the setting (**Exit**)

bUSY

Calculations is in progress, please wait (**Busy**)

rEAdY

The requested operation has been completed (**Ready**)

Error

Error (**Error**)

SAvE

The saving settings is in progress (**Save**)

no

No, I don't want this menu item (**No**)

YES

Yes, the menu can be started (**Yes**)

Minimum-maximum value display (▲ gomb)

ﬦﬢn ﹉

Minimum value (**Minim**um)

ﬦAH ﹉

Maximum value (**Maxim**um)

Fﬢrﬦﬗ

Firmware version (**Firmw**are)

Limit display

L ‒ ‒

Both limit outputs are switched off

L ﬠ

The limit output No.1 is switched on (**Lim**it **1**)

L ﬡ

The limit output No.2 is switched on (**Lim**it **2**)

L ﬠﬡ

Both limit outputs are switched on

6.3. Manual controls, display, indicators

DT4120 xx xx xx xx can be adjusted by the membrane push-buttons indicated by **(1)**, **(2)**, and **(3)** in the drawing.

Functions of the push-buttons during measurement
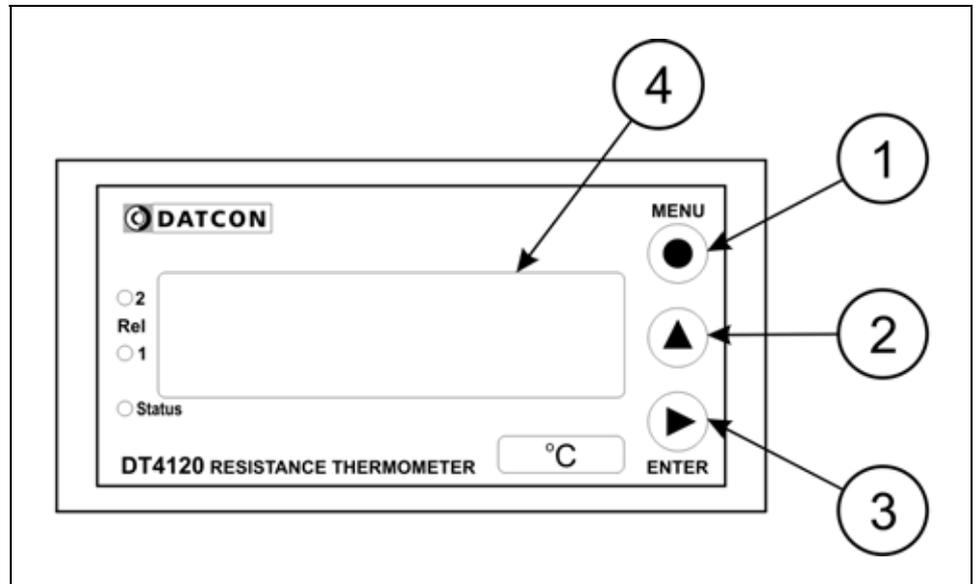
(1) MENU button: Entering the menu
When you push this button, the instrument will ask for a password (code) in accordance with Chapter **7.1. Typing the code (password) in**, when the right code has been given, it enters into the menu. **During this time the measurement is suspended, and the state of limit outputs don't change, the communication option doesn't work and on the analogue output flows error current (3.2 mA or 20.8 mA)**. If no keys are pressed for a period of 4 minutes, the instrument restarts and the measurement goes on.

(2) ▲ button: displaying minimum value, maximum value, firmware version. The above values and the firmware version remains on the display as long as the button is being pressed.
Using this function:

1. Press the ▲ button as long as you see this: ͞ı͞ı ıɳ ͞ıı.
This mnemonic indicates that it will be displayed the minimum value measured after the last clear.
2. Keeping the button pressed down, after 1.5 sec the minimum value will be displayed as long as the button is pressed down.
3. Press the ▲ button second time as long as

you see this: ͞ıAH ͞ıı.
The mnemonic indicates that it will be displayed the maximum value measured after the last clear.
4. Keeping the button pressed down, after 1.5 sec the maximum value will be displayed as long as the button is pressed down.
5. Press the ▲ button third time as long as you see this:

F ır ͞ıЦ. The mnemonic indicates that it will be displayed the firmware version.
6. Keeping the button pressed down, after 1.5 sec the firmware version will be displayed as long as the button is pressed down.
Format: Y, M, DD, where Y=year, H=month, and NN=day).

Comments:

• Pressing the ▲ button repeatedly, the above process starts from operation „1.", enable to display the three values sequentially.

• When you release the ▲ button more than 5 sec. and you press down the button ▲ again the minimum value will be displayed independently of which value would be the next one. The reason of this operation mode is to get used this sequence: minimum value, maximum value, firmware version.

• To clear minimum and maximum values is possible as written in 14. Menu item, after log in as a supervisor **(Clear Minimum and maximum values).**

(3) ENTER button: displaying the status of the limit output and clearing the alarm (alarm acknwledgement).
It's functionality depends on the operating mode of displaying the limits. In default factory setting this function is switched off, therefore pushing the button does not cause any changes. Detailed description is in Chapter **7.3. Display modes of limit output status**.

indicators

The following figure shows the 3 yellow indicator on the left side of DT4120 xx xx xx xx front panel:
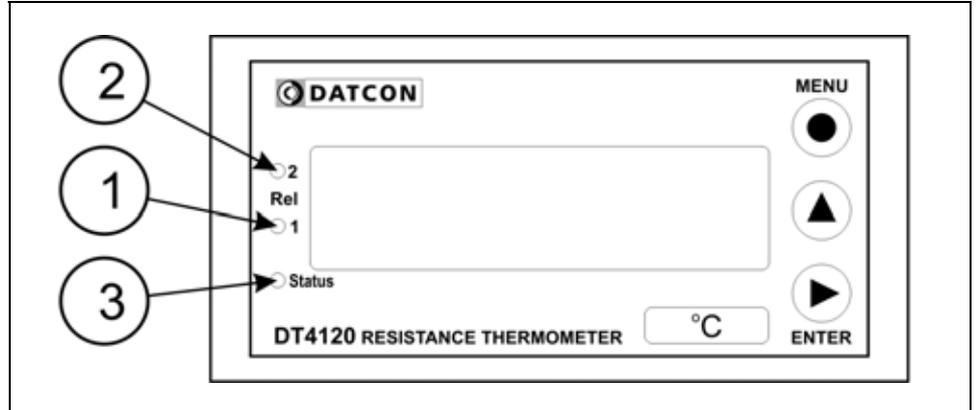
(1) Rel 1: limit output indicator (yellow)
indicates that the limit output 1 is in "on-state" (LIMIT1).

(2) Rel 2: limit output indicator (yellow)
indicates that the limit output 1 is in "on-state" (LIMIT2).

(3) Status: Communication status indicator (yellow)
The indicator gives light for 0.1 sec when a succesfull data exchange has granted through the communication output.

7. Setting-up

7.1. Typing the code (password) in

The importance of the code

You may enter the menu only after you have typed your code in. The code is made from 3 numeric characters. This solution prevents unauthorised persons from changing the settings of the instrument.

Levels of authorisation

• **User level**: allows the modification of the most necessary parameters only. The rest of the menu is not even shown for users. The user code default factory setting is: **0000**.

• **Supervisor level**: allows the modification of all parameters for the authorised person. The supervisor code default factory setting is: **1000**.

Typing the code in

1. Press the **MENU** button. The blinking `codE` mnemonic shows that the device is asking for the code.

2. Three zeros appear: `0000`. The zero at the left side is blinking.

• Pressing the ▲ button you can increase the value of the blinking number:

`1`, `2`, `3`, `4`, `5`, `6`, `7`, `8`, `9`, `0`, etc.

• Pressing the ► button to select the next digit.
3. Pressing the ▲ and the ► buttons, type in either the user code or the supervisor code.
4. Press the **MENU** button. If a correct code has been type

in, the mnemonic `USEr` (login as a user) or the

mnemonic `SUPEr` (login as a supervisor) is displayed and stays there for 2.5 seconds; then the first menu item is

shown on the display: `01.br i`.
5. If an incorrect code has been typing in, the mnemonic

`bAd.co` (**BAD C**ode) is shown on the display and stays there for 2.5 seconds; then the instrument exits from the menu, and goes on with the measurement.
Start typing the code in again from Point 1.

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Automatic exit from the request for the code

If no buttons are pressed, the instrument displays the mnemonic $ESCAP$ (**A**uto **Esc**ape) after 1 minute has passed from the last pressing of a button, and it RESTARTS, i. e. goes back to the measuring mode. This solution is due to security: unauthorised persons, after 4 minute, will not be able to change the settings of the instrument, should it be left alone for some reason.

7.2. The menu structure

01: Display brightness
31. page

02: Number of connection wires
32. page

03: Two wire zeroing
34. page

04: Ptxxx correction points
36. page

05: Measuring mode selection
40. page

06: Leading zeroes enable / disable
42. page

07: Display value rounding
44. page

08: Averaging number
45. page

09: Display refresh time
47. page

10: #1 Limit output
11: #2 Limit output
48. page

12: Limit display mode
54. page

13: Clear Min. / max. values
56. page

14: Analogue output select
57. page

15: Assign 4 mA to low value
58. page

16: Assign 20 mA to high value
60. page

17: MODBUS settings
62. page

18: Tests
65. page

19: User code
68. page

20: Supervisor code
70. page

21. Potentiometer settings
72. page

22: Factory default setting
76. page
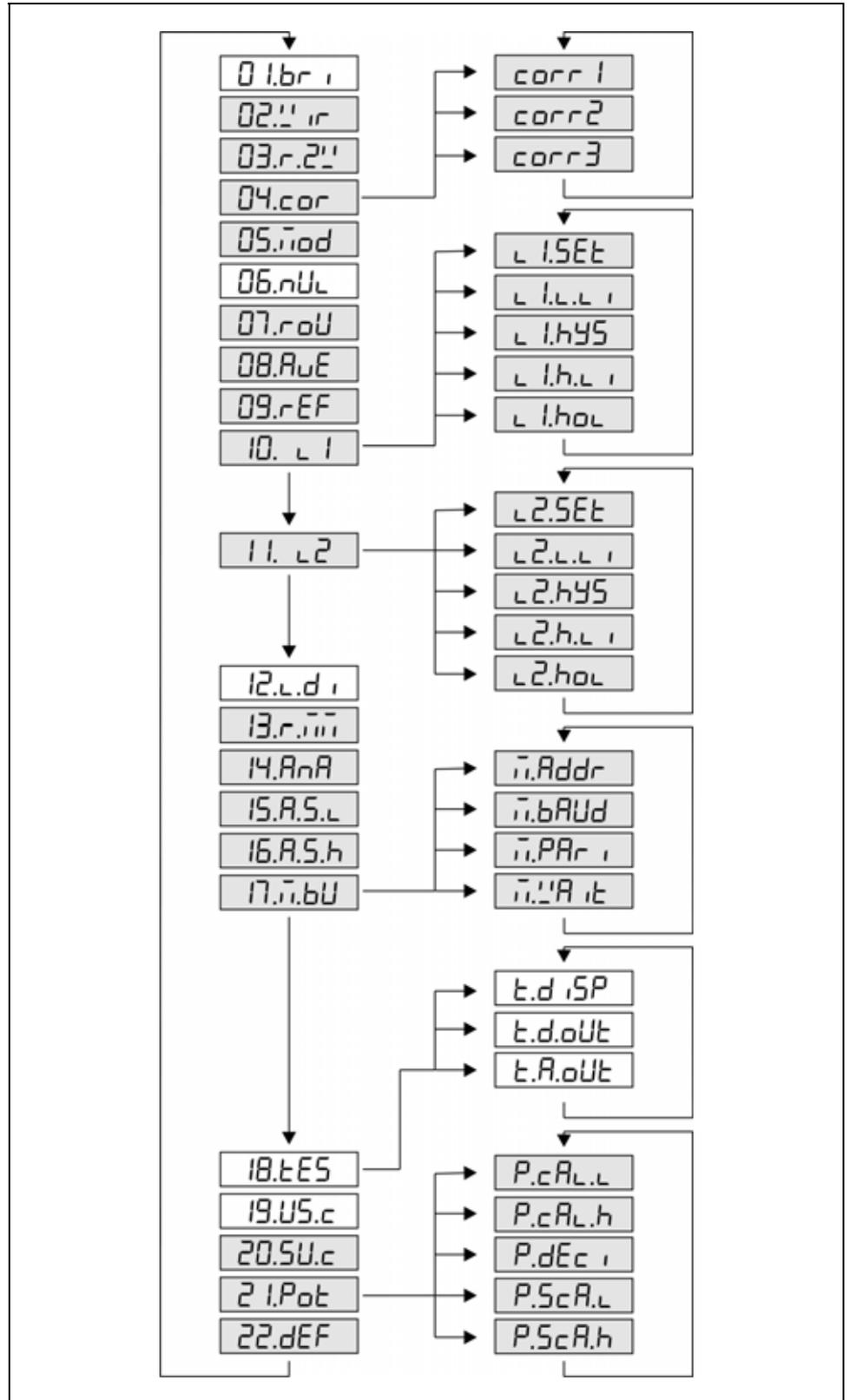
Comment:
The menu items shown in grey appear only in the case of a supervisor-level login.

7.3. Display brightness (01. menu item)

Function

The brightness can be set between 10-100%, in 10% steps. [factory default: 100%]

Sequence of operations

1. Enter the menu by the user or the supervisor code. Chapter **7.1. Typing the code in** describes how you can type the code in.

You see on the display: $0\ 1.br\ 1$.(**Bri**ghtness = brightness)

2. Enter the given menu item by pressing the **ENTER** button.

3. You can read the mnemonic: $br\ 100$. (**Br**ightness = brightness). The value 100 is blinking, it signs that it can be modify.

4. Pressing the ▲ button, select the desired value.

For example: you see on the display: $br\ 050$. If you have choosen 50%.

Exit from the menu item

1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $0\ 1.br\ 1$.

(2. If you want to change the settings you have done just now, or if you just want to check what you have typed in, go on with the operation from point 2 of the **Sequence of operations**.)

(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from the menu

1. Press the **MENU** button. First the mnemonic $5Au E$

(**Save**), then the mnemonic $EH\ it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.4. Connecting wire setting (02. menu item)

Function

The Pt1xx / resistance / potentiometer can be connected to the input either with 4 / 3 / 2 wire.
The 4 wire connection gives the best result: the instrument is able to compensate the connecting cable and contact resistances. The 3 wire mode is a compromise it may give a good result when all the 3 wire have the same resistance. The two wire mode is the cheapest mode, use only when there is no other possibility.
[Factory default: 4 wire.]

Sequence of operations

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**.

You see on the display: $0 1.br 1$.
2. Keep stepping by pressing the ▲ button as long as you see this menu item: $02.'' ir$.(**Wir**e = wire).
3. Enter the menu item by pressing the **ENTER** button.

4. You see the mnemonic: $4'' irE$. on the display.
The left digit is blinking indicating that it can be modify.
4. Pressing the ▲ button you can select the required wire mode:

• $4'' irE$ = 4 wire [Factory default]

• $3'' irE$ = 3 wire

• $2'' irE$ = 2 wire

Note: The selected mode have to be in compliance with the sensor connection.

Exit from the menu item

1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $02.'' ir$.
(2. If you want to change the settings you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3. of the **Sequence of operations**.)
(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from the menu

Press the **MENU** button. First the mnemonic $5Au\mathcal{E}$ (**Save**), then the mnemonic $\mathcal{E}H$ $i\mathcal{E}$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.5. Two wire zeroing (03. menu item)

Function

When the Pt1xx / resistance / potentiometer is connected to the input with two wire, the wire resistance will cause a measurement error. With this function can be compensated this error. (The compensation will work only properly at the same ambient temperature.)
[Factory default: wire resistance = 0 Ohm.]

Note: At **Pt1000** type instrument the procedure is the same but the measured resistance is displayed in one decimal format.

Sequence of operations

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 1.br 1$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $03.r.2U$.(**R**esistance **2 W**ire = 2 wire resistance mode).

$06.nUL$ (**Nul**l = zero).

3. Enter the menu item by pressing the **ENTER** button.
4. When the earlier selected wire mode is not 2 wire you will see: $FA iL$ (**Fail**ed = feiled). The mnemonic is blinking. The instrument will enter into 2 wire mode (**Chapter 7.4,** 02. menu item), here you can select the two wire mode.
5. You will see on the display the measured resistance value in two (Pt100) or one (Pt1000) decimal format.
6. Shorten the two wire at the sensor side (Pt1xx, resistance, potentiometer). You will see on the display the resistance of the connecting wire.
E. g.: the wire resistance is 5.23 Ohm, you will se on the display: $0 15.23$.
7. If the measured value is stable (the last digit may change) press the **ENTER** button.

8. You will see on the display: no. The message is blinking indicating that it can be modify.
9. Pressing the **MENU** button you can exit from this menu item so the instrument will taken into account the last stored wire resistance.

10. Pressing the ▲ button you you can select: YES.

11. Press the **ENTER** button. The instrument will store the wire resistance and you will see: $rEAdY$ (**Ready** = ready) message.

Exit from the menu item 1. The instrument exit from this menu item automatically and you will see on the display: $03.r.2\underline{u}$.

(2. If you want to change the settings you have done just now, go on with the operation from point 3 of the **Sequence of operations**.)

(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from the menu

Press the **MENU** button. First the mnemonic $SAuE$ (**Save**), then the mnemonic $EHit$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

DATCON

7.6. Pt1xx correction values (04. menu item)

Function

The real Pt1xx characteristics may differ from the theoretical R-°C curve. The difference will cause a measurement error on temperature measurement. When you are capable to calibrate the Pt1xx sensor on minimum 3 points you will know the resistance difference of the theoretical and real characteristics. Using this resistance values, the instrument will correct the measurement error on this points exactly by adding the correction values and - using interpolation method - on all other points of the whole characteristics. For the best curve fitting it is recommended to choose the correction points at about 20%; 50%; 80% of the measurement range.

Note: The accuracy of this correction method depends on the accuracy of the calibrating instrument.

Example

Example:
The measurement range is 50 °C - 150 °C.
Calibrate the Pt100 sensor on the following temperatures: 70 °C; 100 °C; 130 °C.

1. Make a table according this:

Temperature (°C)	R nominal (ohm)	R measured (ohm)	Rn - Rm (ohm)
70	127.08	126.76	**0.32**
100	138.51	138.49	**0.02**
130	149.83	149.91	**-0.08**

Use the **bold** resistance values for correction according the following steps:

Sequence of operation

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 1.br 1$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $04.cor$.(**Cor**rection points = correction points).

3. Enter the menu item by pressing the **ENTER** button.

4. You see the mnemonic: $corr\ 1$ on the display.
The digit "1" is blinking indicating that it can be modify.
It's meaning is: first correction point.
Enter the menu item by pressing the **ENTER** button.

5. You see on the display: -200.0 (Factory default).

The left digit ($-$) is blinking indicating that it can be modify.
6. Pressing the ► button you can select the next digit.
7. Pressing the ▲ button you can increase the value of the blinking digit:

$1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1$, etc.

8. When the left digit is selected, pressing ▲ button, the sequence is:

$1, 2, 3, 4, 5, 6, 7, 8, 9, -, 0, 1$, etc.

So you can enter the desired temperature value between -200.0 °C - 800.0 °C.
9. Type-in the first temperature value taken from the table

above: 70.0 °C: 0070.0.

10. After entering the temperature value press **MENU** button, than you can type-in the correction resistance value (Rn - Rm) in two decimal format.

Factory default value is: 0.00 Ohm: 00.00.
You can modify this value to the value taken from the table above. The range of the correction resistance value is between: -2.00 Ohm-2.00 Ohm.

This value is in this example 0.32 Ohm: 00.32.

11. After entering the correction value press **MENU** button.

You will see: $corr1$ on the display.

12. For entering the second correction value press ▲ button.

You will see: $corr2$ on the display. Enter the menu item by pressing the **ENTER** button.

13. According with steps 5.-10. enter the next correction values using the same procedure:
temperature: 100.0 °C, resistance: 0.02 Ohm.

14. After entering the correction value press **MENU** button.

You will see: $corr2$ on the display.

15. For entering the third correction value press ▲ button.

You will see: $corr3$ on the display. Enter the menu item by pressing the **ENTER** button.

16. According with steps 5.-10. enter the next correction values using the same procedure:
temperature: 130.0 °C, resistance: -0.08 Ohm.

17. After entering the correction value press **MENU** button.

You will see: $corr3$ on the display.

(18. If you don't want to exit the menu (you want to check or you want do further settings), then you may select the desired menu items by pressing the ▲ button:

$corr1$, $corr2$, $corr3$

Note:
You can enter the correction values:

$corr1$, $corr2$, $corr3$ in an optional sequence, for example:

$corr3$ $corr1$, $corr2$

Exit from the menu item
1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $04.cor$.

Note:
If you enter the same temperature for two or three correction points the instrument will give an error message:

You will see for two seconds FA iL (fail = fail) on the display, the message is blinking.

Than you will see $corr$ 1 mnemonic on the display. Check the entered value and correct it.
(2. When you are going to modify the setting go on from the **Sequence of operation** step 3.)
(3. If you don't want to exit the menu (you want to check the settings or you want do further settings), then you may select the desired menu items by pressing the ▲ button.

Exit from the menu
1. Press the **MENU** button. First the mnemonic $5AuE$

(**Save**), then the mnemonic EH it (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.7. Input mode setting (05. menu item)

Function

The instrument has four measuring modes:
• Pt100, Pt500, Pt1000 temperature
• potentiometer %
• potentiometer scaled
• resistance
[Factory default: temperature measurement.]

Sequence of operation

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 1.br i$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $05.\text{mod}$.(**Mod**e = mode.

3. Enter the menu item by pressing the **ENTER** button.

4. You see the mnemonic: $Pt\ 100$ or $Pt\ 1000$ (depends on the type) on the display. The mnemonic is blinking indicating that it can be modify.

5. Pressing the ▲ button you select from the input modes.

• $Pt\ 100$ = Pt100 (Pt1000) temperature measurement, measured in °C, with 0.1°C resolution [Factory default].

• $Po.PEr$ = **Po**tentiometer **Per**cent: Potentiometer measurement, measured in percent between 0-100%, with 1% resolution. or

• $Po.ScA$ = **Po**tentiometer **Sca**led: Potentiometer measurement with scaled output, with selectable number of decimals (between 1-4).

• ohm = Resistance measurement in ohm with two decimal resolution.

Note: before selecting potentiometer modes ($Po.PEr$ or $Po.ScA$) it should calibrate the potentiometer.
The calibrating means it should be define the start and the end points of the potentiometer's wiper. When the potentiometer is not calibrated you will see $E.P.cAL$ (Error: Potentiometer Calibration = potentiometer calibration error) message on the display. The message is blinking.

Exit from menu item

1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $\text{05.}\overline{\text{m}}\text{od}$.
(2. If you want to change the settings you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3. of the **Sequence of operations**.)
(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from menu

Press the **MENU** button. First the mnemonic $5\text{R}u\text{E}$ (**Save**), then the mnemonic $EH\,it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.8. Enable / disable displaying the leader zeros (06. menu item)

Function

Leader zero: the zeros that stand in front of an integer of no value. E.g. the instrument displays the value 5.2 together with the leader zeros:

⊔⊔5.2 (default factory setting), or without the leader

zeros: 5.2 .

In this menu item you can either disable displaying of the leader zeros, or you can enable this function again.

Sequence of operation

1. Enter the menu by typing a supervisor code.
The way the code should be type is described in Chapter

7.1. Typing the code in. You see on the display: ⊔ 1.br ı .
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: ⊔6.nUL (**Nul**l = zero).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this nULL on the display. The text is blinking indicating that it can be modify.
5. You may switch between the two operating modes by pressing ▲ button.

• nULL = the leader zeros are shown on the display (Factory default setting).

• SPcE = the leader zeros are not shown on the display.

Comment: one zero directly before the decimal point is always shown on the display.

Exit from menu item

1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $\mathit{06.nUL}$.
(2. If you want to change the settings you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3. of the **Sequence of operations**.)
(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from menu

Press the **MENU** button. First the mnemonic SAuE (**Save**), then the mnemonic $\mathit{EH\,it}$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.9. Rounding displayed value (07. menu item)

Function

In some case it can be useful to round the displayed value. E.g. the measured physical quantity is noisy.
In this menu item you can select a rounding value.

Sequence of operation

1. Enter the menu by typing a supervisor code.
The way the code should be type is described in Chapter

7.1. Typing the code in. You see on the display: $0 1.br 1$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $07.roU$ (**Rou**nding = rounding).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this $ro \quad 1$. on the display. The text is blinking indicating that it can be modify.
5. Pressing the ▲ button you can select from the following options:

- $ro \quad 1$ = no rounding [Factory default]

- $ro \quad 2$ = rounding to 2

- $ro \quad 5$ = rounding to 5

- $ro \quad 10$ = rounding to 10

- $ro \quad 20$ = rounding to 20

- $ro \quad 50$ = rounding to 50

- $ro \quad 100$ = rounding to 100

Exit from menu item

1. After finishing the settings, press the **MENU** button to exit

from the given menu item, and you see: $07.roU$.
(2. If you want to change the settings you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3. of the **Sequence of operations**.)
(3. If you don't want to exit the menu (you want to do further settings), then you may select the desired menu items by pressing the ▲ button.)

Exit from menu

Press the **MENU** button. First the mnemonic $5AuE$ (**Save**),

then the mnemonic $EH it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.10. The number of averaged measurements
(08. menu item)

Function

The instrument performs cca. 12 measurements in each seconds (5 measurements in 3 wire measuring mode). The displayed measurement result is generated as the average of several measurements.
Here you can define the number of measurements that should be used for calculating the averaged numerical value. By increasing this number the display stability increases, but the signal settling time becomes lower. [Default factory setting: 16]

Sequence of operations

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 \ 1.br \ \iota$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $08.AuE$ (**Ave**raging = átlagolás).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this $AuE \ 16$ on the display. The mnemonic is blinking it signs that it can be modify.
5. Pressing the ▲ button select the number of measurements to be averaged for the displayed numerical value from the followings: 32, 64, 1, 2, 4, 8, 16. [Factory default: 16].

Note 1: When you choose 1 the displayed value equals to tle last measured value.

Note 2: the settlig time after stabilizing the input current =
= number of averaging / 12 [seconds].

Number of averaging: 1   Settling time: 0.1 second
Number of averaging: 2   Settling time: 0.2 second
Number of averaging: 4   Settling time: 0.4 second
Number of averaging: 8   Settling time: 0.7 second
Number of averaging: 16   Settling time: 1.4 second
Number of averaging: 32   Settling time: 2.7 second
Number of averaging: 64   Settling time: 5.4 second

The data given above concern for 4 wire or 2 wire mode. In case of 3 wire mode the settling times must multiply by 2.5.

Exit from the menu item
1. After finishing the setting, press the **MENU** button, to exit from the menu item, and you see this: $\mathit{OB.AuE}$.
(2. If you want to change the setting you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3 of the **Sequence of operations**.)
(3. If you don't want to exit the menu, as you want to do further settings, then you may select the desired menu items by pressing the ▲ button.)

Exit from the menu
1. Press the **MENU** button. First the mnemonic SAuE (**Save**), then the mnemonic EHit (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.11. Display refresh time (09. menu item)

Function

The instrument performs cca. 12 measurements in each seconds. It's too fast to see the changing of the measurement value.
Here you can define the time periods by which the instrument displays the new measurement values.
[Factory default: 0.5 second]

Sequence of operations

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 1.br 1$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $09.rEF$ (**Ref**resh = refresh).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this $rEF0.5$. on the display. It's meaning: refresh in each 0.5 seconds). The 0.5 numerical value is blinking it signs that it can be modify.
5. Pressing the ▲ button select the time periods by which the instrument should display the new measurement values. You can choose from the followings: 1.0 second / 1.5 seconds / 2.0 seconds / 0.1 seconds / 0.3 second / 0.5 second. [Factory default: 0.5 second].

Exit from the menu item

1. After finishing the setting, press the **MENU** button, to exit the menu item, and you see this: $09.rEF$.
(2. If you want to change the setting you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3 of the **Sequence of operations**.)
(3. If you don't want to exit the menu, as you want to do further settings, then you may select the desired menu items by pressing the ▲ button.)

Exit from the menu

1. Press the **MENU** button. First the mnemonic $5RuE$ (**Save**), then the mnemonic $EH it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.12. Setting limit outputs (10., 11. menu item)

Function

The instrument has two optional limit outputs. They are identical with each other, and work independently. Operation: the instrument keeps comparing the displayed physical value with the (adjustable) limit value. It switches the output ON or outpot OFF depending whether the displayed value is higher or lower than the limit value.

Setting the operating mode
Sequence of operations

1. Enter the menu with the supervisor code.
The way the code should be type in can be found in Chapter **7.1. Typing the code in**. You see on the display:

$0 1.br i$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $10. L 1$ (**L**imit**1** = limit 1).
3. Enter the menu item by pressing the **ENTER** button.

4. 4. You see this: $L 1.SEt$ on the display.
L1 (**L**imit 1) means: limit output No. 1.
Blinking SS (**S**etting**s**) means: settings. Here you can define the operating mode for the limit output. Enter by pressing the **ENTER** button.
5. Keep stepping by pressing the ▲ button you can select the desired limit-output operating mode.

• oFF: the output is always in switched off condition. [default factory setting]

• $h i9h$: (**High**). The output gets switched on, when the displayed physical value is higher than or equal with the low limit value (L.LI).

• $Lo'!$: (**Low**) The output gets switched on, when the displayed physical value is lower than the low limit value (L.LI).

• $in5 id$: (**Insid**e) The output gets switched on, when the displayed physical value is between the low limit value (L.LI) and the higher limit value (H.LI).

Setting the operating mode
Sequence of operations

- `oUtS` ₁: (**Outsi**de) The output gets switched on, when the displayed physical value isn't between the low limit value (L.LI) and the high limit value (H.LI).

- `� Arᴍ` (**Warm**) The output gets switched on, when the displayed physical value is lower than the low limit value (L.LI), When the displayed current value is higher or equal than L.LI, than the state of output doesn't change.
The output gets switched off when the displayed current value is higher than the upper limit value (H.LI). When the displayed current value is lower or equal than H.LI, than the state of limit output doesn't change.
This operating mode is used in other DATCON instruments. Here you can use it at any control task where the AC current is the process value and you can control the process through the limit outputs.

- `COOL` (**Cool**) The output gets switched on, when the displayed physical value is higher than the high limit value (H.LI). When the displayed current value is lower or equal than H.LI, than the state of limit output doesn't change.
The output gets switched off when the displayed current value is lower than the lower limit value (L.LI). When the displayed current value is lower or equal than L.LI, than the state of limit output doesn't change.
This operating mode is used in other DATCON instruments. Here you can use it at any control task where the temperature is the process value and you can control the process through the limit outputs.

- `on`: (**On** = switched on) The output is switched on independently from the measured value.

Exit from the operating mode menu item

6. After selecting the limit output mode press **MENU button** you will see: `L l.SEt`.

7. If you had selected the `oFF` or the `on` mode, there is no need to do any further settings. For finishing the operation, please go on from the point **Exit from the menu item**.

**Low limit value
Sequence of operations**

8. Keep stepping by pressing the ▲ button as long as you see this sub-menu item: ∟ *l.∟.∟ ι* (Limit**1 L**ow **Li**mit = = limit 1, low limit value). Here you can define the numerical value by which the device will compare the measured physical values.

9. Enter by pressing the **ENTER** button.

10. You see this *000.00* on the display and the left digit is blinking, indicating that the digit can be modify by pressing the ▲ button.

11. Pressing the ▲ button you can increase the value of the blinking digit:

l, 2, 3, 4, 5, 6, 7, 8, 9, 0, l, etc.

12. Pressing the ► button you can select the next digit.

13. When the left digit is selected, pressing ▲ button, the sequence is:

l, 2, 3, 4, 5, 6, 7, 8, 9, -, 0, l, etc.

So you can set any value between -9999-99999.

14. After you have defined the value for the limit, press the **MENU** button to exit from the sub-menu item, and you see this: ∟ *l.∟.∟ ι*.

15. When you don't want to set hysteresis and you had selected the *h ιgh* or the *∟o∐* modes there is no need to do any further settings. For finishing the operation, please go on from the point **Exit from the menu item.**

**Hysteresis of the low limit
Sequence of operations**

16. Keep stepping by pressing the ▲ button as long as you see this sub-menu item: ∟ *l.hy5* (Limit**1 Hys**teresis = = limit 1, hysteresis) means: the hysteresis of the low limit value. Here you can define a numerical value which provides the hysteresis of the low limit value (L1.L.LI) by having **added to and subtracted from** it. Consequently, the actual hysteresis is twice the value defined here.

View of the used terms
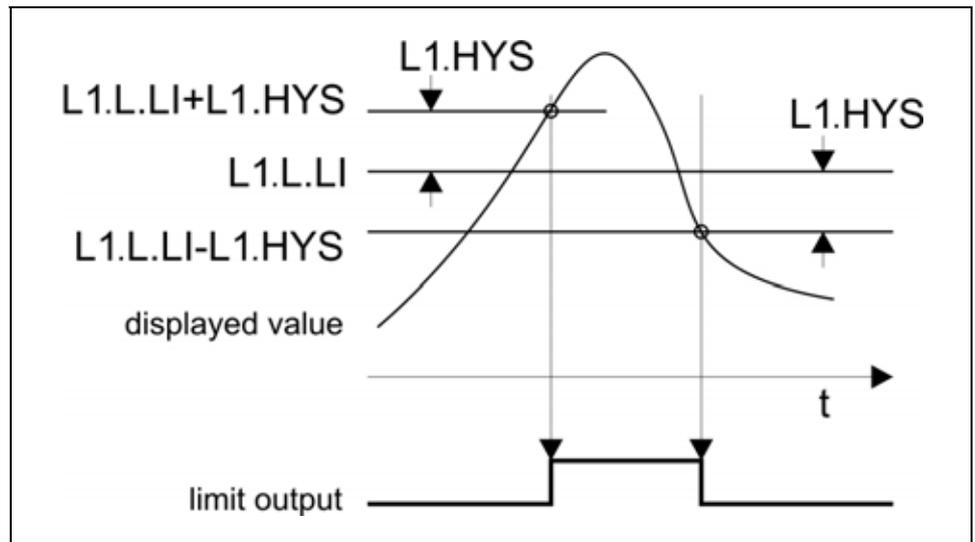
The figure shows the limit output change vs. input signal, where the value of hysteresis is > 0.

Remark: this operation is working in the mode: $h\,igh$.

Setting the hysteresis value
Sequence of operations

17. Enter by pressing the **ENTER** button.

18. You see 000.00 hysteresis value (factory default). It means there is no hysteresis. The value of the hysteresis can be set in the range of 000.00-300.00. (When the setting value is out of range you will see an error message on the display and the instrument substitute the wrong value for 000.00 or for 300.00, so you can not set invalid value. The digit at the left side is blinking.

19. Pressing ► button you can select the next digit.

20. Pressing ▲ button you can increase the value of the blinking digit:

$1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9,\ 0$, etc.

21. After you have set the value of the hysteresis, press the **MENU** button to exit from the sub-menu item, and you see this: $L\,1.hYS$.

22. If you had selected the $high$ or the $Lo\underline{w}$ limit-value operating mode, there is no need to do further settings. For finishing the operation, go on with the steps from the part: **Exit from the menu item**.
Remark: the value you have set here will be the hysteresis value of the high limit also.

**High limit value
Sequence of operation**

23. Keep stepping by pressing the ▲ button as long as you see this sub-menu item: ∟ *1.h.∟ 1* (Limit**1** **H**igh **Li**mit = limit 1, high limit value). Here you can define a second numerical value with which the instrument will compare the displayed value when the selected operating mode is *nS id* or

oUtS 1 or *'Ar̄* or *cooL*. In other operating modes this value has no effect on the operation.

24. Enter by pressing the **ENTER** button.

25. You see this: *000.00* on the display. (If you have changed the low limit value and the value is greater than the value of high limit than the low limit value will get the value of high limit, so the low limit value can not be greater then the high limit value. The digit at the left side is blinking.

26. Pressing the ► button you can select the next digit.

27. Pressing the ▲ button you can increase the value of the blinking digit:

1, 2, 3, 4, 5, 6, 7, 8, 9, 0, etc.

28. When the digit on the left side is selected pressing the ▲ button the sequence is as follows:

1, 2, 3, 4, 5, 6, 7, 8, 9, -, 0, 1, etc.

so you can set any number between -9999-99999.

29. After setting the limit value press **MENU** button to exit from this sub-menu item and you see this: ∟ *1.h.∟ 1*.

30. If you don't want to keep the limit output in on state (hold mode) while acknowledgement no need further settings. For finishing the operation, go on with the steps from the part: **Exit from the menu item**.

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Limit output hold mode	In case of basic operating mode the limit output is switching on or switching off when the conditions are exist. In limit output hold mode the output is kept in switched state and only by pressing **ENTER** button can be reset (limit signaling acknowledge).

Sequence of operations 31. Keep stepping by pressing the ▲ button as long as you see this sub-menu item: ∟ l.hoʟ (**L**imit**1 Hol**d = limit 1, hold).
32. Enter by pressing the **ENTER** button.
33. By pressing ▲ button you can switch on or off the hold mode:

- oFF: (**Off** = switched off). The limit output is working according the display value and the limit value setting (factory default).

- hoʟd: (**Hold** = hold). The limit output is switching on according the display value and the limit value setting, but it switching only off by pressing **ENTER** button (limit signaling acknowledge).

Exit from the menu item 1. After finishing the settings, press the **MENU** button to exit from the menu item, and you see this: ∟ l.hoʟ . Press the **MENU** button to exit from the menu item, and you see this:

 l0. ∟ l.

(2. If you want to change the setting you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3 of the **Sequence of operations.**)
(3. When you don't want to exit menu because you are going to do other settings in other menu items press ▲ button to step to the following menu item.

Exit from the menu

Press the **MENU** button. First the mnemonic 5AuE (**Save**), then the mnemonic EH it (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.13. Limit output state display mode (12. menu item)

Function

The state of limit outputs may present on the display. Here you can set the condition of presenting the states. [Factory default: dynamic]

Sequence of operations

1. Enter the menu by typing the user or supervisor code. The way the code should be type in is described in Chapter

7.1. You see this on the display: `0 1.br 1`.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: `12.L.d 1` (**Li**mit **Di**splaying = limit displaying).

3. Enter the menu item by pressing the **ENTER** button.

4. You see this on the display: `dYnAii`. The mnemonic is blinking, signaling that it can be modify.

5. Pressing ▲ button select the displaying mode. You can choose from the following:

- `dYnAii` (**Dynam**ic = dynamic)

It displays the limit output state as far as the **ENTER** button is pressed. [Factory default]

- `t iiEd` (**Timed** = timed)

It displays the limit output state as far as the **ENTER** button is pressed and 2.5 sec. long after releasing button.

- `StAt 1` (**Stati**c = static)

Pressing **ENTER** button the limit output display can be switch on or switch off.

- `chAn9` (**Chang**ing = changing)

Changing the state any of the limit outputs (switch on or switch off) it displays the state automatically for 2.5 sec. long.
Keeping the **ENTER** button pressed it displays the measuring value.

- `PEr io` (**Perio**dical = periodical)

It changes between the limit display and measuring display mode in 2.5 sec. period.
Keeping the **ENTER** button pressed it displays the measuring value.

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Sequence of operations

- ◻◻ (**On** = switched on)
It displays the limit output state continuously.
Keeping the **ENTER** button pressed it displays the
measuring value.

- ◻FF (**Off** = switched off)
There is no limit output display.

Remark:
Independent from the limit output state display mode the
front panel indicators always signal the limit output states.

Exit from the menu item

1. After finishing the setting, press the **MENU** button to exit

from the menu item, and you see this: *l2.L.d ı*.
(2. If you want to change the setting you have done just
now, or if you just want to check what you have typed in, go
on with the operation from point 3 of the **Sequence of
operations.**)
(3. If you don't want to exit the menu, as you want to do
further settings, then you may select the desired menu
items by pressing the ▲ button.)

Exit from the menu

Press the **MENU** button. First the mnemonic *SAᴜE* (**Save**),

then the mnemonic *EH ıt* (**Exit**) are shown on the display.
With this the storing of the settings is completed. The
instrument has exited the menu and goes on with the
measurement.

7.14. Clear minimum and maximum values
(13. menu item)

Function

To clear the measured and stored mimimum and maximum values.

Sequence of operations

1. Enter the menu by typing the supervisor code.
The way the code should be type in is described in Chapter **7.1. Typing the code in.** You see this on the display:

$0\ 1.br\ 1$.

2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $13.r.\overline{mm}$ (**R**eset **M**inimum-**M**aximum = clear minimum-maximum value).

3. Enter the menu item by pressing the **ENTER** button.

4. The mnemonic no is shown on the display. The mnemonic is blinking.

5. Now you still have the possibility to exit. If you want to exit, as you do not want to clear the minimum and maximum values after all, press the **MENU** button.

6. If you want to clear the minimum and maximum values, press the ▲ button to change the „NO" to „YES".

• no = I do not want to clear

• YES = I want to clear

7. Press **ENTER** button you will see on the display:

$rEAdY$ (**Ready** = ready) the clear has done.

Exit from the menu item

1. After you have performed the setting, press the **MENU** button. This takes you out from the menu item, and you see

this: $3.r.\overline{mm}$.

(2. If you do not want to exit from the menu because you want to perform other settings too, you may press the ▲ button to select the desired menu item.)

Exit from the menu

Press the **MENU** button. First the mnemonic $SAuE$ (**Save**),

then the mnemonic $EH\ it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

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7.15. Analoge output signal setting (14. menu item)

Function

In this menu item you can choose between 4-20 mA and 0-20 mA output current. [Factory default: 4-20 mA]

Sequence of operations

1. Enter the menu by typing a supervisor code.

The way the code should be type is described in Chapter

7.1. Typing the code in. You see on the display: $\boldsymbol{0}\ \boldsymbol{l.br}\ \boldsymbol{\iota}$.
2. Keep stepping by pressing the ▲ button as long as you see this menu item: $\boldsymbol{l4.AnA}$ (**Ana**log = analog).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this: $\boldsymbol{\iota.4-20}$ on the display The text is blinking, signaling that it can be modify
5. Pressing ▲ button you can choose between the two output signal:

- $\boldsymbol{\iota.4-20}$: 4-20 mA current output [Factory default]

- $\boldsymbol{\iota.0-20}$: 0-20 mA current output.

Exit from the menu item

1. After you have performed the setting, press the **MENU** button. This takes you out from the menu item, and you see this: $\boldsymbol{l4.AnA}$.
(2. If you want to change the setting you have done just now, or if you just want to check what you have typed in, go on with the operation from point 3 of the **Sequence of operations**.)
(3. If you do not want to exit from the menu because you want to perform other settings too, you may press the ▲ button to select the desired menu item.)

Exit from the menu

Press the **MENU** button. First the mnemonic $\boldsymbol{SAuE}$ (**Save**),

then the mnemonic $\boldsymbol{EH\ \iota t}$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement

7.16. Assignment analog output low (start) value to display value (scaling) (15. menu item)

Function

Here you can assign analog output start value (0 mA or 4 mA) to the measured (temperature, resistance, potentiometer position) value. This way you can assign any phisical range to any output range.
[Factory default: -200.0 °C. so in case of a measured value -200.0 °C the output value will be 4 mA (or 0 mA).]

Notice! For scaling the analog output must be assign the analog output high (end) value also. (Next menu item)

Sequence of operations

1. Enter the menu by typing the supervisor code.
The way the code should be type in is described in Chapter **7.1. Typing the code in.** You see this on the display:

$0 1.b r i$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $15.A.5.L$.(**A**nalog **S**cale **L**ow = analog scale low value).

3. Enter the menu item by pressing the **ENTER** button.

4. The number: 00.000. is shown on the display. The number is blinking, signaling that it can be modify.

5. Pressing the ► button you can select the next digit.

6. Pressing the ▲ button you can increase the value of the blinking digit:

1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, etc.

7. When the digit on the left side is selected pressing the ▲ button the sequence is as follows:

1, 2, 3, 4, 5, 6, 7, 8, 9, $-$, 0, 1, etc. so you can set any number between -9999-99999.

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Exit from the menu item
1. After finishing the setting, press the **MENU** button, to exit from the menu item, and you see this: *IS.A.S.L* .
(2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)
(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu
Press the **MENU** button. First the mnemonic *SAuE* (**Save**), then the mnemonic *EHit* (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.17. Assignment analog output high (end) value to display value (scaling) (16. menu item)

Function

Here you can assign analog output high value (20 mA) to the display (AC current) value. This way you can assign any phisical range to any output range.
[Factory default: 800.0 °C. so in case of a measured value -800.0 °C the output value will be 20 mA.]

Notice! For scaling the analog output must be assign the analog output low (start) value also. (Previous menu item)

Sequence of operations

1. Enter the menu by typing the supervisor code.
The way the code should be type in is described in Chapter **7.1. Typing the code in.** You see this on the display:

$0 1.br\ i$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $16.R.5.h$.(**A**nalog **S**cale **H**igh = analog scale high value).
3. Enter the menu item by pressing the **ENTER** button.

4. The number: 0800.0 is shown on the display. The number is blinking, signaling that it can be modify.
5. Pressing the ► button you can select the next digit.
6. Pressing the ▲ button you can increase the value of the blinking digit:

$1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1$, etc.

7. When the digit on the left side is selected pressing the ▲ button the sequence is as follows:

$1, 2, 3, 4, 5, 6, 7, 8, 9, -, 0, 1$, etc. so you can set any number between -9999-99999.

Exit from the menu item

1. After finishing the setting, press the **MENU** button, to exit from the menu item, and you see this: $15.A.5.L$.

(2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)

(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu

Press the **MENU** button. First the mnemonic $5RuE$ (**Save**), then the mnemonic EH $ıt$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.18. MODBUS communication settings (17. menu item)

Function

Communication with MODBUS RTU slave protocol.
The instrument can be connected to a PLC or to a computer.
Here you can find how to set communication parameters.
Note 1:
When no communication option is installed than these parameters are indifferent.
Note 2:
You have to set at the PLC or at the computer the same communication parameters as here.

MODBUS slave address setting
Sequence of operations

Enter the menu by typing a supervisor code.
The way the code should be type is described in Chapter

7.1. Typing the code in. You see on the display: $0 \textit{l.br} \textit{\iota}$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $\textit{I7.\bar{n}.bU}$ (**M**OD**BU**S).
3. Enter the menu item by pressing the **ENTER** button.

4. The mnemonic: $\textit{\bar{n}.Addr}$ (**M**ODBUS **Addr**ess = MODBUS cím) is shown on the display. Here you can set the MODBUS slave address. Enter the menu item by pressing the **ENTER** button.

5. You will see: $\textit{000}$ on the display. The number on the left is blinking, signaling that it can be modify.
6. Pressing the ► button you can select the next digit.
7. Pressing the ▲ button you can increase the value of the blinking digit:

$\textit{I}$, $\textit{2}$, $\textit{3}$, $\textit{4}$, $\textit{5}$, $\textit{6}$, $\textit{7}$, $\textit{8}$, $\textit{9}$, $\textit{0}$, $\textit{I}$, etc.

8. After setting the MODBUS slave address, press **MENU** button. The address range is: 0-247, if you set greater

number you will see $h \textit{\iota.L} \textit{\bar{n}\bar{\iota}}$ error message and the address will be set to 247. When you set 0 MODBUS address the MODBUS communication will be switched off. [Factory setting.]

Pressing the **MENU** button you will see: $\textit{\bar{n}.Addr}$ and the instrument exits from the menu item.

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MODBUS data rate setting
Sequence of operations

9. Keep stepping by pressing the ▲ button as long as you see this menu item: ⊓.bAUd (**M**ODBUS **Baud** Rate = MODBUS bit / seconds rate).
10. Enter the menu item by pressing the **ENTER** button.

11. You will see: 9600 on the display. Here you can select Baud rate.
12. Pressing ▲ button you can select from the following data rates:

*   300: (**300** = 300 bit / seconds).

*   600: (**600** = 600 bit / seconds).

*   1200: (**1200** = 1200 bit / seconds).

*   2400: (**2400** = 2400 bit / seconds).

*   4800: (**4800** = 4800 bit / seconds).

*   9600: (**9600** = 9600 bit / seconds). [Factory default]
13. After selecting data rate press **MENU** button, you will see: ⊓.bAUd and the instrument exits from the menu item.

MODBUS parity setting
Sequence of operations

14. Keep stepping by pressing the ▲ button as long as you see this menu item: ⊓.PAr ı (**M**ODBUS **Pari**ty = MODBUS parity).
15. Enter the menu item by pressing the **ENTER** button.

16. You will see: EuEn (**Even** = even) on the display. By pressing ▲ button, you can select the parity.

*   odd: (**Odd** = odd).

*   nonE: (**None** = no parity).

*   EuEn: (**Even** = even). [Factory default]
17. After selecting parity, press **MENU** button, you will see: ⊓.PAr ı and the instrument exits from the menu item.

MODBUS respons delay-time setting (ms)
Sequence of operations

18. Keep stepping by pressing the ▲ button as long as you see this menu item: $\overline{\Pi}.\underline{\ }'\!H\ \iota\underline{E}$ (**M**ODBUS **Wait** = MODBUS wait).

19. Enter the menu item by pressing the **ENTER** button.

20. You will see: $\square\square\square$ on the display. The number on the left is blinking, signaling that it can be modify.
Here you can set the response delay time in milliseconds (the delay time between getting a command and sending a response).
[Factory default: 0 ms. no delay.]

21. Pressing the ► button you can select the next digit.

22. Pressing the ▲ button you can increase the value of the blinking digit:

I, 2, 3, 4, 5, 6, 7, 8, 9, 0, I, etc.

23. after setting the response delay time press **MENU** button. The response delay time can be in the 0-255 range.

If you set greater number you will see $h\ \iota L\ \overline{\Pi}\overline{\Pi}$ error message and the delay time will be set to 255. Pressing the **MENU** button you will see: $\overline{\Pi}.\underline{\ }'\!H\ \iota\underline{E}$ and the instrument exits from the menu item.

Exit from the menu item

1. After finishing the setting, press the **MENU** button, to exit from the menu item, and you see this: $I\!7.\overline{\Pi}.b\underline{U}$.

 (2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)
(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu

Press the **MENU** button. First the mnemonic $5H\underline{u}E$ (**Save**), then the mnemonic $EH\ \iota\underline{E}$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.19. Tests (18. menu item)

Function

Testing the display, the digital outputs and the analog output.

Display test
Sequence of operations

1. Enter the menu by typing either the user code or the supervisor code.
The way the code should be type in is described in Chapter

7.1. Typing the code in You see this: $0 \; 1.br \; \iota$.
2. Keep stepping by pressing ▲ button as long as you see

this menu item: $18.tE5$ (**Tes**t = test).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this: $t.d \; \iota 5P$ (**T**est: **Disp**lay = display test).
It's meaning: Display test. If you want to test the display, press the **ENTER** button.

5. You see on the display: $8.8.8.8.8.$. In this case all the segments on the display get switched on.
6. By pressing the ▲ button several times you can select from several test patterns by which you can decide whether the display is good or not.

E.g.: $\_\_\_\_\_$, $. . . . .$, 12345, $AbcdE$, etc..
7. You may exit from the display test by pressing the **MENU**

button. You see this: $t.d \; \iota 5P$.
If you want to exit from the display test continue from the part: **Exit from the menu item**.

Digital (relay) output test
Sequence of operations

8. Keep stepping by pressing ▲ button as long as you see this menu item: **Ŀ.d.oUŀ** (**T**est: **D**igital **Out**put = digital output test).
9. Enter the menu item by pressing the **ENTER** button.

10. You see: **Ŀ _ _ on** on the display. Meaning L: limit output (**L**imit), meaning the two underline: first and second limit outputs are in off state.
11. Pressing the ▲ button, you can switch the outputs on or off.:

- **Ŀ _ _** : both are switched OFF.

- **Ŀ 1_** : 1. ON; 2. OFF.

- **Ŀ _2**: 1. OFF; 2. ON.

- **Ŀ 12**: both are switched ON.

Rel1, Rel2 yellow indicators on the left side of the front panel indicate the ON status of the limit outputs.
12. Press the **MENU** button, to exit from the menu item, and you see this: **Ŀ.d.oUŀ** .
If you want finish test, continue from part **Exit from menu item**.

Analog output test
Sequence of operations

13. Keep stepping by pressing ▲ button as long as you see this menu item: **Ŀ.A.oUŀ** (**T**est: **A**nalog **Out**put = analog output test).
14. Enter the menu item by pressing the **ENTER** button.

15. You see this: **00 mA** (00 mA).
16. Pressing ▲ button you can increese the value of output current in 1 mA steps in 0 - 20 mA range.
17. Press the **MENU** button, to exit from the menu item, and you see this: **Ŀ.A.oUŀ** .

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Exit from menu item

1. Press the **MENU** button, to exit from the menu item, and you see this: $I8.tES$.
(2. If you want to make further testing, continue the operation from **Point 3 of the Sequence of operations.**)
(3. If you do not want to exit from the menu, as you want to perform further testing, you may press the ▲ button to select the desired menu items.)

Exit from menu

Press the **MENU** button. First the mnemonic $5RuE$ (**Save**), then the mnemonic $EH it$ (**Exit**) are shown on the display. The instrument has exited the menu and goes on with the measurement.

7.20. Changing the user code (19. menu item)

Function

You can define new codes instead of the factory-defined user code. The code is an optional number within the range between 0000 and 9999.
[Default factory setting: 0000]

Sequence of operations

1. Enter the menu by typing either the user code or the supervisor code.
The way the code should be type in is described in Chapter

7.1. Typing the code in. You see this: $0\ 1.br\ \iota$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $19.U5.c$.(**Us**er **C**ode = user code).
3. Enter the menu item by pressing the **ENTER** button.

4. You see on the display: 0000.
The digit on the left side is blinking, signaling that it can be modify.
5. Pressing the ► button you can select the next digit.
6. Pressing the ▲ button you can increase the value of the blinking digit:

$1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9,\ 0$, etc.
7. After setting the new user code press **MENU** button.
8. You have to type the new code in twice. This prevents an error in defining the new code due to typing mistakes. This

is indicated by the mnemonic $r.tyP$ (re-type).
9. Pressing the buttons ▲ and ► type in the new user code again.
10. Press the **MENU** button.
11. When the code you wrote in for the first time is not identical with the code written in for the second time, a

blinking mnemonic $Error$ (**Error** = error) warns you on the error, and the device exits from the menu item. You see

this $19.U5.c$ on the display.
(The user code has not changed, the old one is valid.)
Restart the operation from Point 3.
12. If the codes written in for the first and second time are identical with each other, the device exits from the menu

item. You see this $19.U5.c$ on the display.

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Sequence of operations

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Warning! Do not forget the user code you have defined. If you forget it, defining another one is possible only by using a supervisor code for entering into the menu.

Exit from the menu item

1. As you have already left the menu item there is no need further settings.
(2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)
(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu

Press the **MENU** button. First the mnemonic �SAuE (**Save**), then the mnemonic EH it (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.21. Changing the supervisor code (20. menu item)

Function

You can define new codes instead of the factory-defined supervisor code. The code is an optional number within the range between 0000-9999.
[Default factory setting: 1000]

Sequence of operations

1. Enter the menu by typing the supervisor code.
The way the code should be type in is described in Chapter

7.1. Typing the code in. You see this: $0\,1.br\,\iota$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $20.5U.c$.(**Su**pervisor **C**ode = supervisor code.)
3. Enter the menu item by pressing the **ENTER** button.

4. You see on the display: 1000. The digit on the left side is blinking, signaling that it can be modify.
5. Pressing the ► button you can select the next digit.
6. Pressing the ▲ button you can increase the value of the blinking digit:

1, 2, 3, 4, 5, 6, 7, 8, 9, 0, etc.
7. After setting the new user code press **MENU** button.
8. You have to type the new code in twice. This prevents an error in defining the new code due to typing mistakes. This

is indicated by the mnemonic $r.typ$ (re-type).
9. Pressing the buttons ▲ and ► type in the new user code again.
10. Press the **MENU** button.
11. When the code you wrote in for the first time is not identical with the code written in for the second time, a

blinking mnemonic $Error$ (**Error** = error) warns you on the error, and the device exits from the menu item. You see

this $20.5U.c$ on the display.
(The supervisor code has not changed, the old one is valid.)
Restart the operation from Point 3.
12. If the codes written in for the first and second time are identical with each other, the device exits from the menu

item. You see this $20.5U.c$ on the display.

Sequence of operations   **Warning!** Do not forget the supervisor code you have defined. If you forget it, defining another one is possible in the service only.

Exit from the menu item   1. As you have already left the menu item there is no need further settings.
(2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)
(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu

Press the **MENU** button. First the mnemonic $5Au E$ (**Save**), then the mnemonic EH_it (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.22. Potentiometer parameters (21. menu item)

Function

When potentiometer input is selected here you can calibrate the potentiometer, here you can assign the scale values and the number of decimals of the displayed value.

Assign 0% to the potentiometer wiper start position

Enter the menu by typing a supervisor code. The way the code should be type is described in Chapter

Sequence of operation

7.1. Typing the code in. You see on the display: $0\ 1.br\ i$.
2. Keep stepping by pressing the ▲ button as long as you see this menu item: $2\ 1.Pot$ (**Pot**entiometer = potentiometer).
3. Enter the menu item by pressing the **ENTER** button.

4. You can see: $P.c.000$. Meaning P: potentiometer, meaning c: calibration, meaning 000: here you can assign the position to 0%. The numerical value is blinking.
Enter the menu item by pressing the **ENTER** button.
5. You can see on the display the measured potentiometer resistance in two decimal format. Changing the potentiometer position you can see the resistance change on the display.
6. Set the potentiometer wiper to the desired start position.
7. After stabilizing the displayed resistance value press the **ENTER** button.

8. You can see on the display: no. The message is blinking it signs that it can be modify.
(9. You can exit from this menu item by pressing the **MENU** button.)
10. If you want to assign this position to 0%, press ▲ button. You can see on the display: YES.
11. Press **ENTER** button, the caliblation process is ready.
You can see $rEAdY$ (**Ready** = ready), than $P.c.000$ message on the display.

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Potentiometer display decimal point setting

12. Keep stepping by pressing the ▲ button as long as you see this menu item: *P.c. 100*. Here you can assign the position to 100%. The numerical value is blinking.
Enter the menu item by pressing the **ENTER** button.
13. You can see on the display the measured potentiometer resistance in two decimal format. Changing the potentiometer position you can see the resistance change on the display.
14. Set the potentiometer wiper to the desired end position.
15. After stabilizing the displayed resistance value press the **ENTER** button.

16. You can see on the display: *no*. The message is blinking it signs that it can be modify.
(17. You can exit from this menu item by pressing the **MENU** button.)
18. If you want to assign this position to 100%, press ▲ button. You can see on the display: *YES*.
19. Press **ENTER** button, the caliblation process is ready. You can see *rEAdY* (**Ready** = ready), than *P.c. 100* message on the display.
20. When you are going to display the potentiometer position in 0-100% format, the procedure is ready, you can exit from this menu item by using procedure "**Exit from menu item**".
When you are going to scale the 0-100% display range use the „*Po.ScA* = **Po**tentiometer **Sca**le: potentiometer scale menu item. Here you can scale the above range.
21. Keep stepping by pressing the ▲ button as long as you see this menu item: *P.dEc.P* (**P**otentiometer **Dec**imal **P**oint = potenctiometer decimal point).
Here you can set the decimal point position of the scaled 5 digit displayed value. Enter the menu item by pressing the **ENTER** button.

22. You see this: 543.21. The number is blinking, signaling that it can be modify.
23. Pressing the ▲ button you can set the decimal point position:

• 543.21 = 2 decimal [Factory default]

• 5432.1 = 1 decimal

• 54321 = 0 decimal

• 5.4321 = 4 decimal

• 54.321 = 3 decimal

24. After setting exit from this menu item by pressing **MENU** button. You can see $P.dEc.P$ on the display.

Assign 0% to any physical value (scaling)	You can assign potentiometer 0-100% range to a desired physical range. 25. Keep stepping by pressing the ▲ button as long as you
Sequence of operation	see this menu item: $P.S.000$ (**P**otentiometer **S**cale **000%** = potentiometer scaling 0%). 26. Enter the menu item by pressing the **ENTER** button.

27. You will see: 000.00. on the display. The number on the left is blinking, signaling that it can be modify.
28. Pressing the ► button you can step to the nex digit.
29. Pressing the ▲ button you can increase the value of the blinking digit:

1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, etc.

30. When the digit on the left side is selected pressing the ▲ button the sequence is as follows:

1, 2, 3, 4, 5, 6, 7, 8, 9, $-$, 0, 1, etc. so you can set any number between -9999-99999.
31. After setting exit from this menu item by pressing **MENU** button. You can see $P.S.000$ on the display.

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Assign 100% to any physical value (scaling)

Sequence of operation

32. Keep stepping by pressing the ▲ button as long as you see this menu item: $P.S.\ 100$ (**P**otentiometer **S**cale **100%** = potentiometer scaling 0%).

33. Enter the menu item by pressing the **ENTER** button.

34. You will see: 100.00. on the display. The number on the left is blinking, signaling that it can be modify.

35. Pressing the ► button you can step to the nex digit.

36. Pressing the ▲ button you can increase the value of the blinking digit:

$1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1$, etc.

37. When the digit on the left side is selected pressing the ▲ button the sequence is as follows:

$1, 2, 3, 4, 5, 6, 7, 8, 9, -, 0, 1$, etc. so you can set any number between -9999-99999.

38. After setting exit from this menu item by pressing **MENU** button. You can see $P.S.000$ on the display.

Exit from the menu item

After finishing settings press the **MENU** button to exit from this menu item. You will see $21.Pot$.

(2. If you want to change the setting you have performed just now, or if you just want to check what you have typed in, continue the operation from **Point 3 of the Sequence of operations.**)

(3. If you do not want to exit from the menu, as you want to perform further settings, you may press the ▲ button to select the desired menu items.)

Exit from the menu

Press the **MENU** button. First the mnemonic $SAuE$ (**Save**), then the mnemonic $EH\ it$ (**Exit**) are shown on the display. With this the storing of the settings is completed. The instrument has exited the menu and goes on with the measurement.

7.23. Resetting the default settings (21. menu item)

Function

In this case **all** the settings are deleted, and the default factory setting is restored.
Using this function makes sense in that case, when the settings of the instrument have changed so much, that it is easier to start the setting-up process from the default factory setting.

It is not possible to cancel this operation once the command has been issued.

Sequence of operations

1. Enter the menu by typing the supervisor code.
The way the code should be type in is described in Chapter **7.1. Typing the code in.**

You see this on the display: $0\ 1.br\ 1$.
2. Keep stepping by pressing the ▲ button as long as you see this menu item: $2\ 1.dEF$ (**Def**ault settings = default settings).
3. Enter the menu item by pressing the **ENTER** button.

4. The mnemonic no is shown on the display. The mnemonic is blinking signaling that it can be modify.
5. Now you still have the possibility to exit. If you want to exit, as you do not want to reset the default settings after all, press the **MENU** button. This takes you out from this menu item, and you see this: $2\ 1.dEF$.

6. Press the ▲ button to set YES.

7. Press the **ENTER** button you see this $rEAdY$ (**Ready** = ready) on the display. All of the parameters have been set to factory default settings.
After then it restarts:

dt,

$4\ 120$.

Factory defaults: input mode Pt100 (Pt1000), 4 wire mode, Measured temperature in one decimal format, output current=4-20 mA, limit outputs are in "off" state, MODBUS modul address=0 (disable), etc..

8. Fault rectification

8.1. Fault finding

The instrument has a sophisticated self-test function. It is able to detect and display the majority of the errors.

All the error messages are described in detail in Chapter **6.2**.
In the case of an error that causes total inability of the instrument to function, nothing appears on the display.

8.2. Repairing

In accordance with Point **2.1.**: **For safety and warranty reasons, any internal work on the instrument must be carried out by DATCON personnel.**
In the case of errors, it is recommended to notice of the displayed error message, as well as of the phenomenon seen.
These information please communicate to the Datcon service personnel.

9. Dismounting

9.1. Dismounting procedure

Before dismounting take note the warnings written in Chapter **5.1.**
The following figure shows the dismounting procedures:

Dismounting
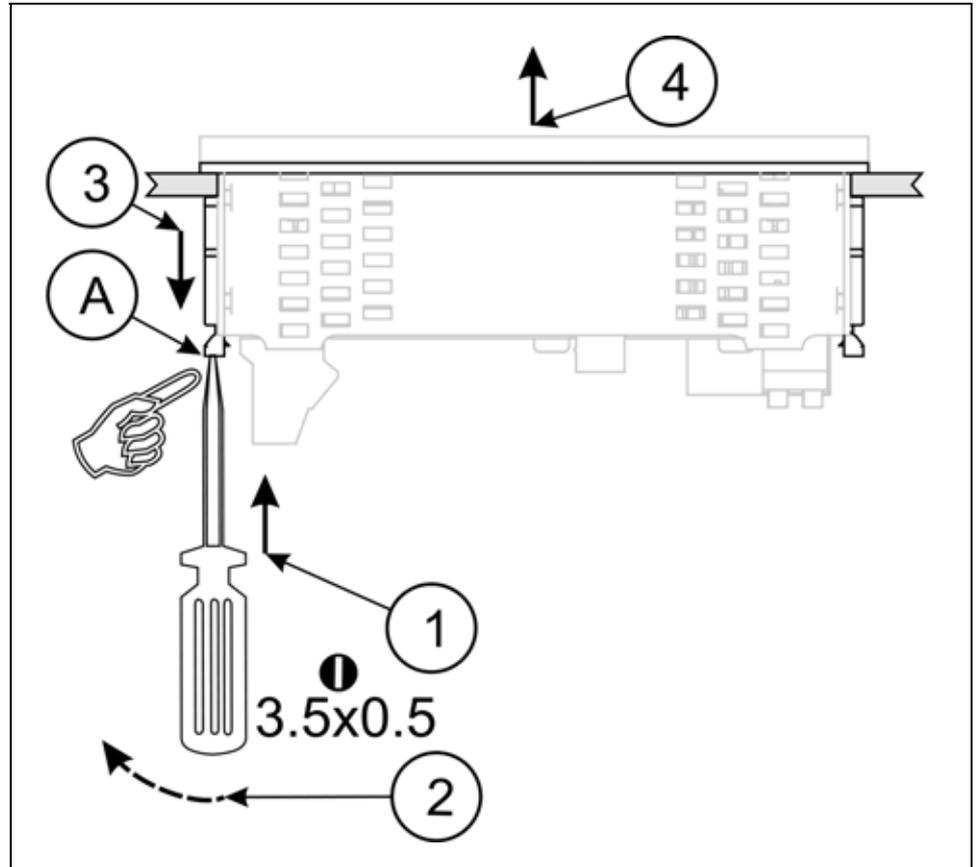
The dismounting procedure needs a screwdriver for slotted screws.
Before put off power supply and disconnect all wires.
1. Slip the tip of the screwdriver into the hole of the mounting clamp (A) (Figure step 1).
2. Move the screwdriver handle to make free the clamp (Figure step 2).
3. Keeping the screwdriver in this position draw back the mounting clamp (Figure step 3).
Please do not exercise forces higher than necessary, as it may cause damages to the clamp.
4. Repeat the 1., 2., 3. steps with the other clamp.
5. You can take out the instrument from the panel cutout.

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9.2. Disposal

According with the concerning EU directive, the Manufacturer undertakes the disposal of the instrument that are manufactured by it and intended to be destroyed. Please deliver it in contamination-free condition to the site of the Manufacturer or to a specialised recycling company.

10. Appendix

10.1. Technical specifications

Safety data:

The connection terminals of the inputs, the outputs and the supply voltages are galvanic isolated from each other. The isolation is in compliance with the standard EN 61010-1, taking into consideration the following:

Pollution level:	2
Measurement category:	II
Overcurrent protection in installation:	4 A

Power supply

Supply voltage:	18-40 V AC/DC (DT4120 xx xx xx)
	180-250 V AC/DC (DT4120 xx xx xx PS)
Power consumption:	3.5 W / 3 VA

Input parameters

Input signal (Pt100 type):	Pt100 / resistance / potentiometer
Input signal (Pt1000 type):	Pt1000 / resistance / potentiometer
Measuring range (Pt100 type):	Pt100: -200 - +800 °C
	resistance / potentiometer: 0-400 Ω
Measuring range (Pt1000 type):	Pt1000: -200 - +800 °C
	resistance / potentiometer: 0-4 kΩ

Display

Display unit:	LED, 5 digit (+ values), 7 segment, decimal point
Display color, brightness	red, the brightness of the display may adjust from10% to 100% in 10% steps. Factory default: 100%
Character height:	14.2 mm
Display range:	-9 999 - 99 999
Indicator LEDs:	2 limit values
	1 status (MODBUS communication)

Measuring parameters

Characteristic:	linear
Display accuracy:	0.2°C @ Ta = 23°C ±2°C, (after 20 min warm up time)
Temperature-dependency:	25 ppm / °C
Measuring frequency:	12 measurements / sec
Number of averaged samples:	1 / 2 / 4 / 8 / **16** / 32 / 64 (adjustable)

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Limit outputs (optional)

Output type:	2 x SPST relays, Normally Off
Contact rating:	240 VAC / 30 VDC, 3 A
Refreshing time:	same as the display's one
Hysteresis:	**0** - ±30000 (adjustable)

Active analog output (optional)

Output type:	galvanic isolated DC current
Output ranges:	4-20 mA / 0-20 mA (scalable)
Characteristic:	linear
Accuracy:	0.03% @ Ta = 23°C ±2°C, (after 20 min warm up time)
Accuracy:	0.4% @ -20°C < Ta < +60°C
Temperature-dependency:	75 ppm / °C
Burden:	max. 500 ohm
Overcurrent protection:	25 mA
Overvoltage protection:	75 V (normal polarity) Reverse polarity: protected by 63 mA fuse
Isolation voltage:	0.5 kV

Passive analog output (optional)

Output type:	galvanic isolated DC current
Output ranges:	4-20 mA / 0-20 mA (scalable)
Characteristic:	linear
Accuracy:	0.03% @ Ta = 23°C ±2°C, (after 20 min warm up time) 0.4% @ -20°C < Ta < +60°C
Temperature-dependency::	75 ppm / °C
External power supply voltage for output:	4 V - 30 V
Overcurrent protection:	25 mA
Overvoltage protection:	75 V
Maximum loop resistance:	R_{max} = (U - 4 V) / 0.02 A [ohm] (U voltage of external power supply)
Minimum loop resistance:	U < 20 V not required U > 20 V R_{min} = (U - 20 V) / 0.02 A [ohm] (U voltage of external power supply)
Isolation voltage:	0.5 kV

Communication interface (optional)

Type:	RS232 or RS485, (isolated)
Isolation voltage:	0.5 kV
RS485 termination resistance:	135 ohm, you can switch on by using a short on the terminals
Baud rate:	300 / 600 / 1200 / 2400 / 4800 / **9600** Baud
Parity:	**even** / odd / none
Protocol:	MODBUS RTU slave
Address:	1-247 (factory setting: **0**)
Possible commands:	read of registers (3)

Ambient conditions

Operating temperature range	0-60 °C (-20 - +60 °C on request)
Storage temperature range	-25 - +70 °C
Climatic conditions:	EN 60654-1, class B2
Relative humidity:	90% (max., non-condensing)
Place of installation:	cabinet

Electromagnetic compatibility (EMC)

In accordance with the standard EN 61326-1:2006

Emission:

Conducted:	EN 55011:1998 Limits for Class A equipments
Radiated:	EN 55011:1998 Limits for Class A equipments

Immunity:

|		
ESD:	4 kV/8 kV contact / air	-B- criteria
BURST:	2 kV/1 kV power / signal	-B- criteria
SURGE:	1 kV	-B- criteria
Conducted RF:	3 Veff	-A- criteria

General data

|	
Housing:	panel instrument
Dimensions [mm]:	96 x 48 x 45 (width x height x depth)
Panel cut off:	91 x 44 (width x height)
Weight:	0.15 kg
Protection:	IP 65 (front)
	IP 30 (rear)
Mounting position:	optional
Connection cable:	
Power supply:	max. 2 mm^2
Signal, option:	0.25-1.5 mm^2
Limit output:	0.25-1.5 mm^2
Connection:	
Power supply:	2 pole screw terminal
Signal, option:	4 pole plug-in screw terminal
Limit outputs:	2x 2 pole push-in direct connection
Manual controls:	3 membrane push-buttons on the front cover

The Manufacturer maintain the right to change the technical data !

10.2. Application example

Analog output option:

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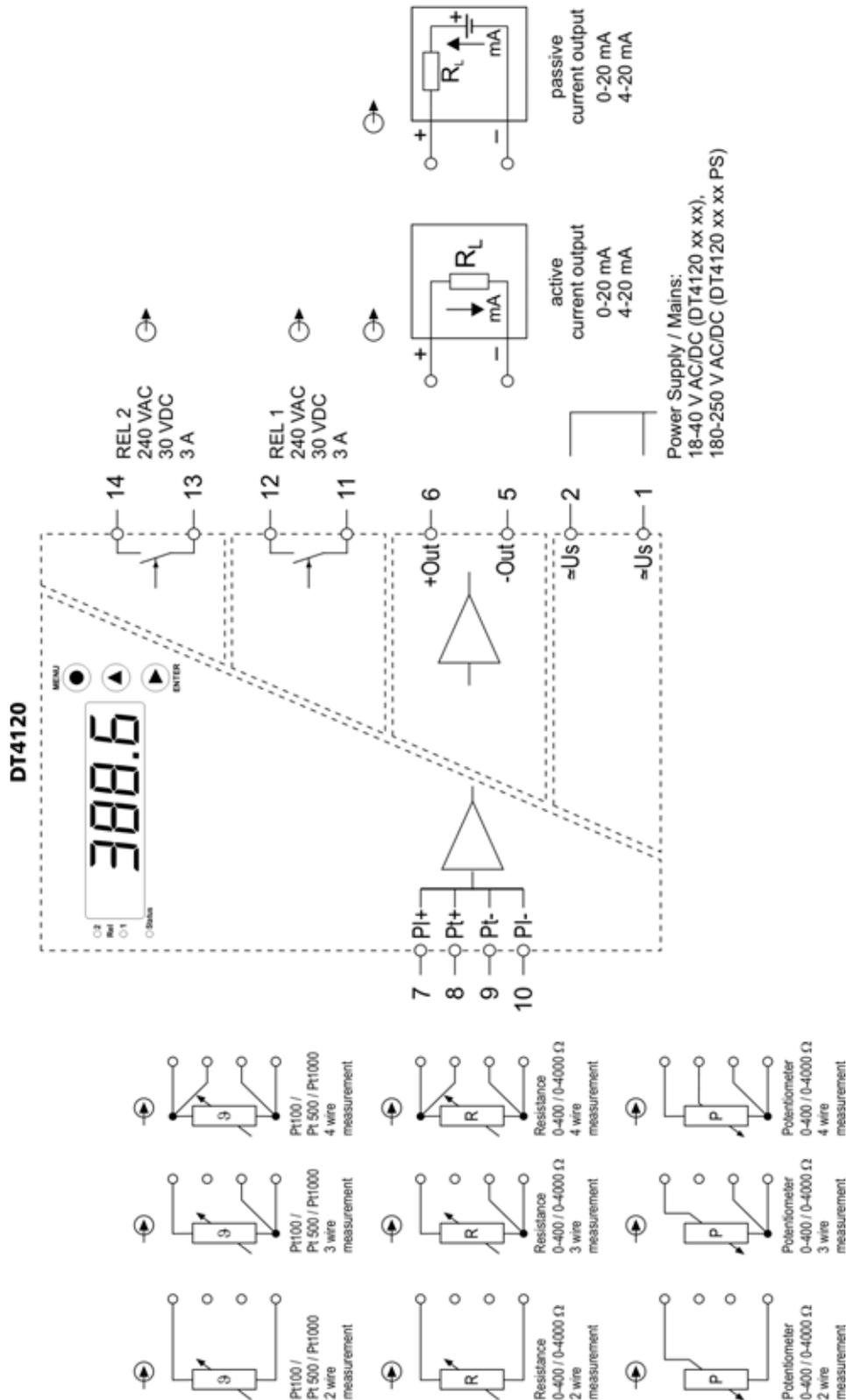
RS232 communication interface option:
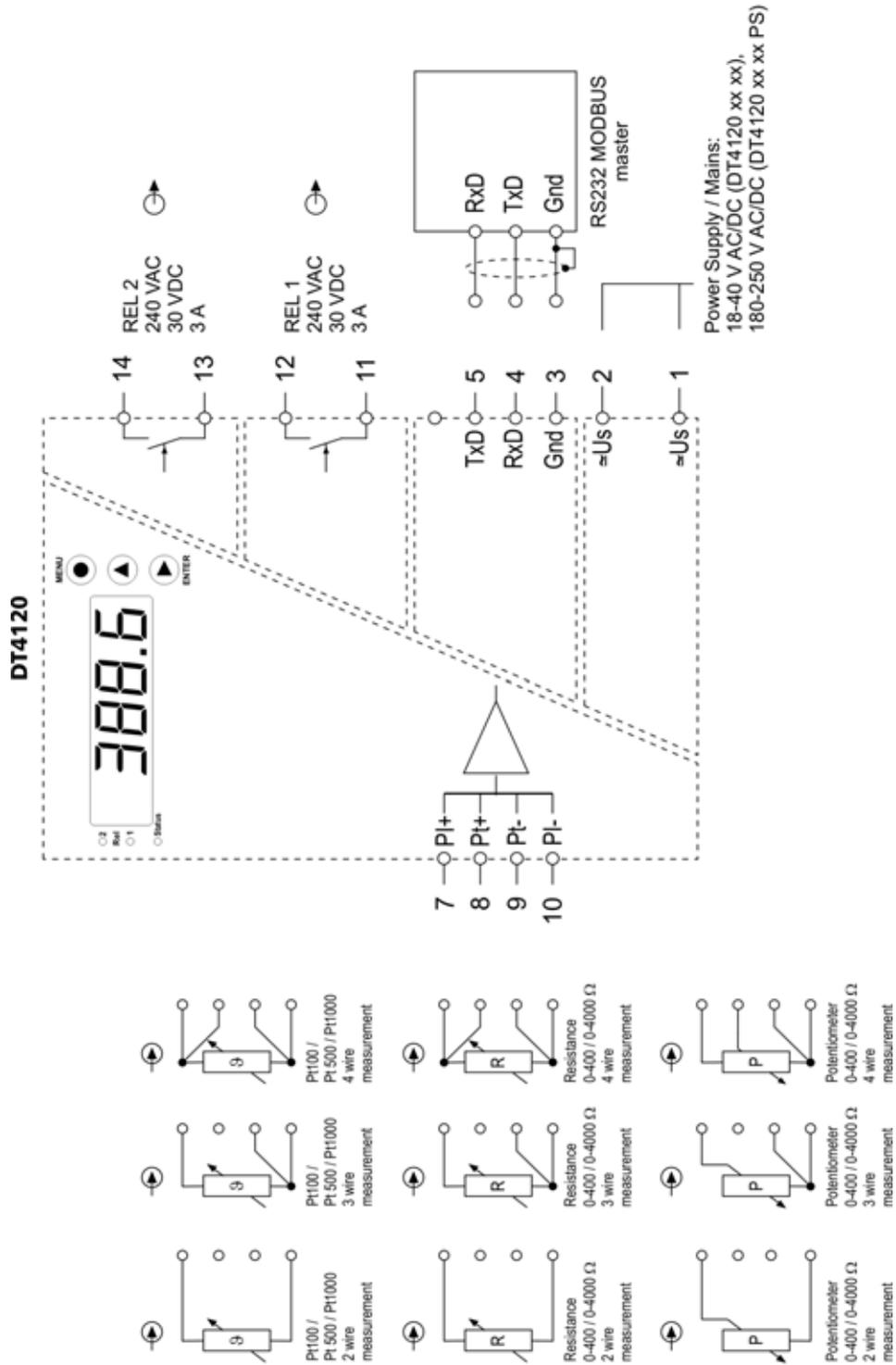
RS485 communication interface option:
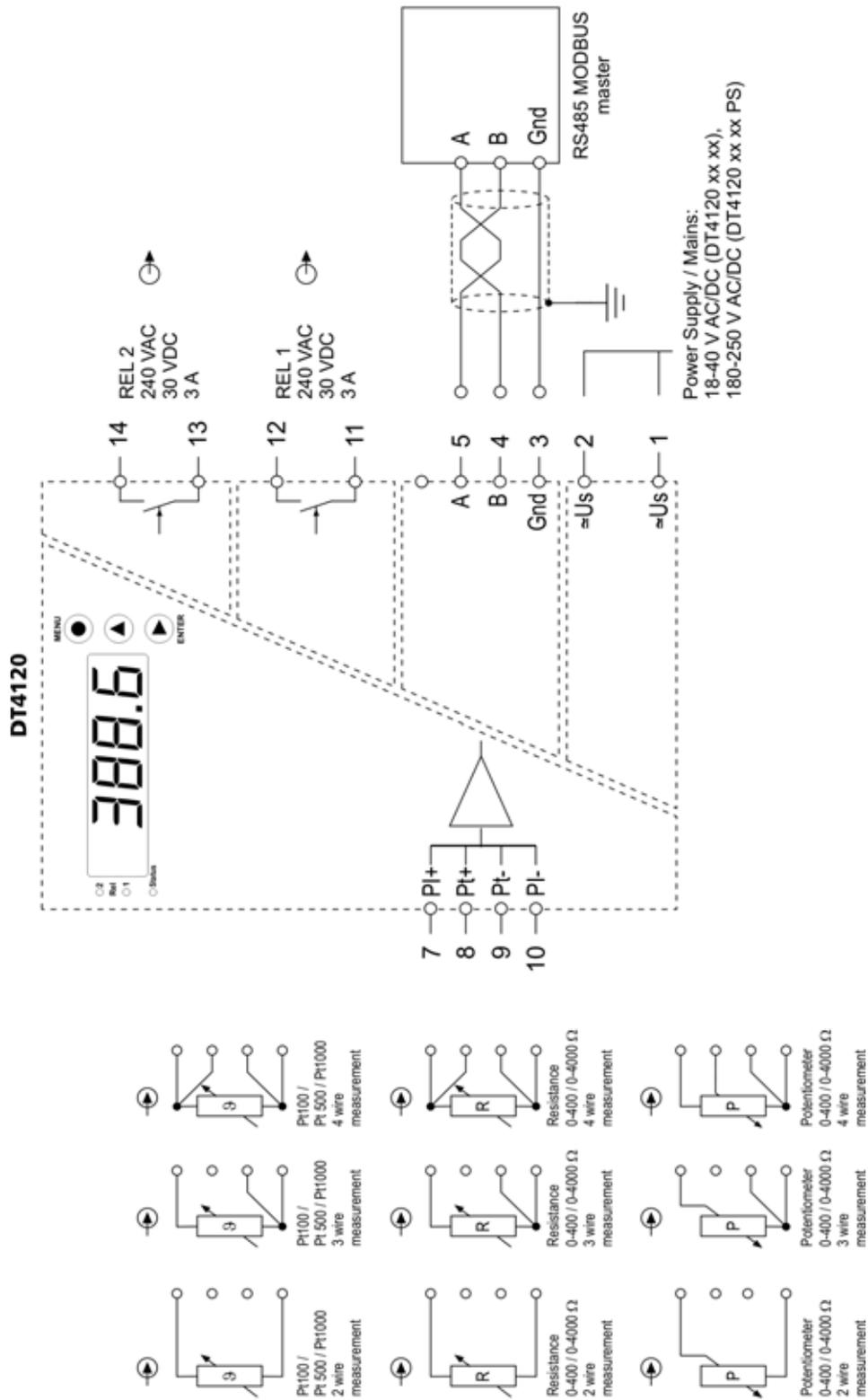
RS485 bus topology:
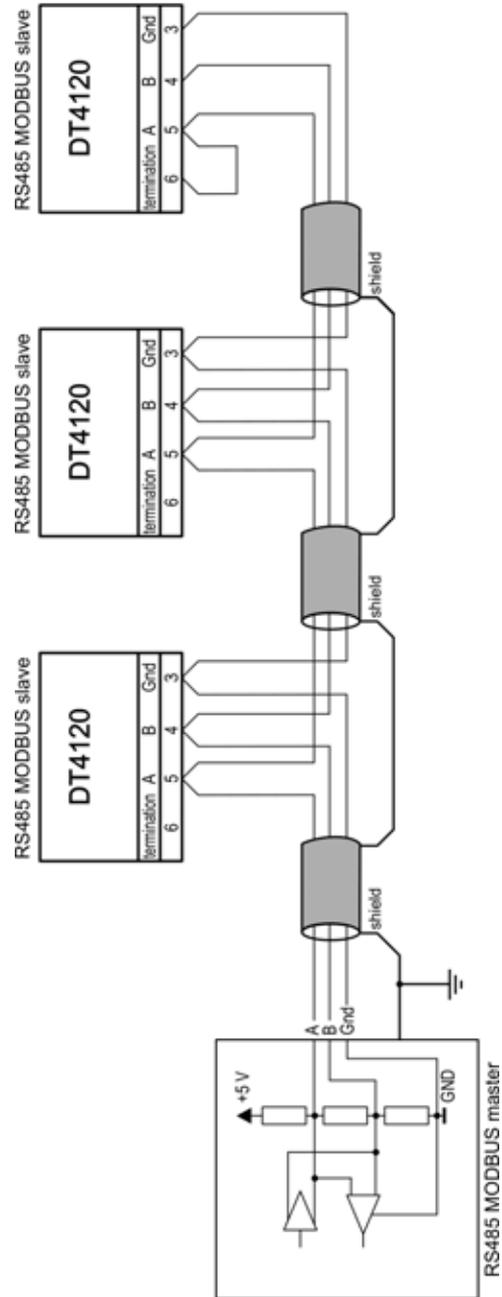
10.3. Setting up the instrument (example)

Remarks

It is an additional example for **Chapter 7. Setting-up.** It helps to understand the setting of values through a practical example. The steps of the whole setting you will find in **Chapter 7.**.

Exercise

The task is: temeperature measurement with Pt100 sensor with 4 wire connection.
A DT4120 xx xx xx xx has an analog output option, output level 4-20 mA, scaleing: 0 °C ÷ 4 mA, 100 °C ÷ 20 mA.
Limit 1 is active when T > 90 °C, hysteresis: ±0.1 °C.
Leading zeroe's are disabled.
The DT4120 xx xx xx xx parameter settings:
Here are listed only those steps what are differ from Factory default:

Setting parameters

• 06.NUL = *SPAcE* (leader zeros are not displayed)

• 10. L1: L1.SET = *h i9h* (limit output is active when displayed value > limit value)

• 10.L1: L1.L:LI = *0090.0* (limit value 90.0 °C)

• 10. L1: L1.HYS = *0000. 1* (hysteresis ±0.1 °C)

• 15. A.S.L = *0000.0* (analog output 4 mA ÷ 0.0 °C)

• 16. A.S.H = *0 100.0* (analog output 20 mA ÷ 100.0 °C)

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10.4. MODBUS settings

Codes before register addresses:
R = Read only
W = Write only
RW = Read and Write

Register addresses are in decimal numerical system.

R1000: Displayed value high 16 bit
R1001: Displayed value low 16 bit
Remark: the displayed value is 32 bit, signed, integer.
This value is without reference to the place of decimal point.
See refer the R1002 register also.

R1002: Number of decimal character (0-4)

Caution !
The displayed value (R1000 and R1001) is valid only when fault (R1003) is 0.

R1003 (Error):
0 = no error
1 = missing calibration (repearing must be carried out in service)
2 = input not connected
3 = potentiometer is not calibrated yet
4 = A/D overflow
5 = A/D underflow
6 = scaling error (e.g.: in case of bad scaling)
7 = displayed value < allowed minimum value
8 = displayed value > allowed maximum value

R1004 (Input mode):
0 = temperature measurement
1 = potentiometer position displayed in %
2 = resistance measurement
3 = potentiometer position displayed in scaled form
R1005: (wire mode):
Pt100 / Pt500 / Pt1000 / resistance / potentiometer connection (2 / 3 / 4 wire)

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