DATCON

INDUSTRIAL MEASUREMENT

DT1400 xx xx

Limit switch

Operating Instructions

CE
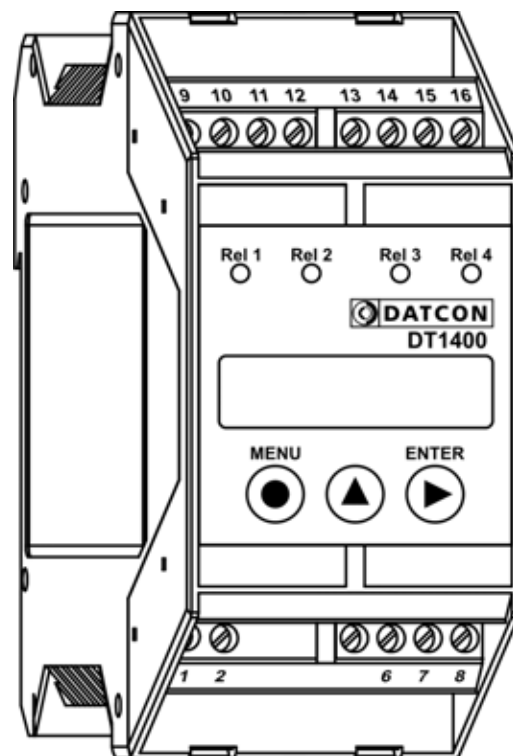
Contents

1. About this document

2. For your safety

3. Product description

4. Mounting

5. Connecting

6. Display and manual controls

7. Setting-up

8. Fault rectification

9. Dismounting

10. Appendix

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 DT1400 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.

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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

The DT1400 xx xx Limit switch enable process variable 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 2-10 V to be displayed in engineering units 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 DT1400 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 DT1400 xx xx is in conformity with the provisions of the following standards:
EN 61326-1:2007 (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:

• DT1400 xx xx

• documentation:
 this operating instructions manual
 warranty

3.2. Type designation

DT1400 ☐☐☐	OPTION* (only one at the same time)		
	IA	**IP**	**TS**
	0-20 mA / 4-20 mA active output	0-20 mA / 4-20 mA passive output	transmitter power supply (15 VDC; 30 mA)
	○ ◐ ●	○ ◐ ●	○ ◐ ●
	RL2	2 limit-relay output (basic configuration)	
	RL4	+ limit-relay output , optio* (in all 4 pc.)	
DT1400 ☐☐☐	18-40 V DC / 14-29 V AC power supply		
	PS	140-250 V AC / 180-250 V DC mains	
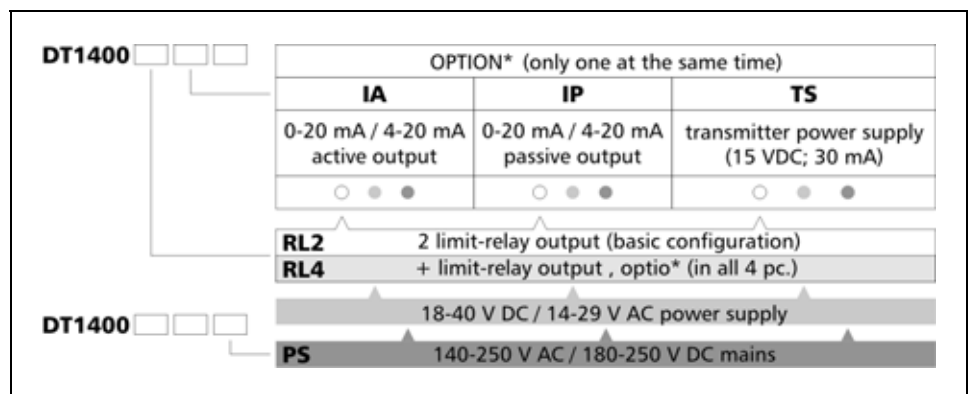
3.3. Operating principle

Area of application

The DT1400 xx xx Limit switch compares the 0-20 mA, 4-20 mA, 0-10 V, 0-5 V, 2-10 V input signal with the set values. When the input signal exceed one of the set values the instrument activates the corresponding SPDT relay contact. The DT1400 xx xx is also a process indicator and enable linear process variable to be displayed in engineering units on its 5 digit LED display.
The instrument is available with the following output options (2 limit-relays are standard, beyond that only one option can be installed at the same time):

• + 2 normally open relay contacts (SPST) for limit switching or for simple control tasks. (In this case 4 limit-relay contacts are in the instrument.)

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

• 15 VDC, 30 mA, galvanic isolated power supply for two wire 4-20 mA transmitter.

Oparating principle

The input current or voltage to be measured is led to the 22 bit A/D converter through a protection and signal condition circuit.
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.
Easy on-site configuration through the front panel membrane keypad is a major advantage of the microcontroller-based technology. The configuration parameters: input signal selection, signal filtering, display scaling, decimal point position, display refresh rate, limit modes, limit values, etc. are stored in EEPROM. The settings are protected by a two-level password against unauthorized manipulation.

Power supply

The instrument has two power supply version:
DT1400 xx xx:
18-40 V DC / 14-29 V AC, 3 VA / 3.5 W
DT1400 xx xx PS:
140-250 V AC / 180-250 V DC, 3 VA / 3.5 W

3.4. Adjustment

The DT1400 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:
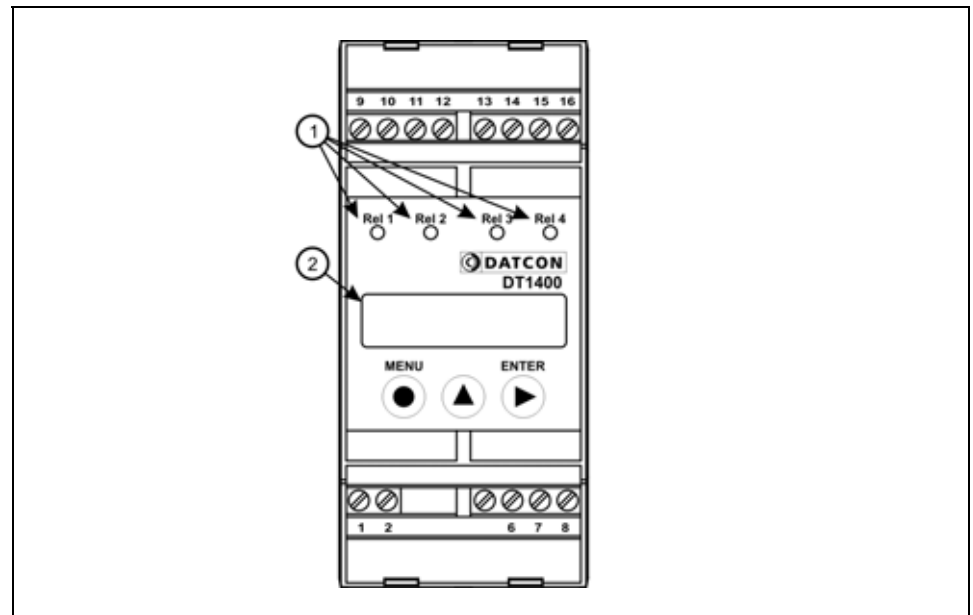
1. „**Rel1**" yellow indicator for indicating that limit output 1 is in "on-state" (LIMIT1).
„**Rel2**" yellow indicator for indicating that limit output 2 is in "on-state" (LIMIT2).
„**Rel3**" yellow indicator for indicating that limit output 3 is in "on-state" (LIMIT3).
„**Rel4**" yellow indicator for indicating that limit output 4 is in "on-state" (LIMIT4).
2. 5 digit 7 segment LED for displaying the measured value and the mnemonic messages.

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 DT1400 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

The instrument should be installed in a cabinet with sufficient IP protection, where the operating conditions are in accordance with chapter **10.1. Technical specification**, as described under the title: Operating conditions.

Mounting position

The instruments are designed in housing for mounting on TS-35 rail.
The instruments should be mounted in vertical position (horizontal rail position).

Horizontal mounting may cause overheating and damage of the instrument.

4.2. Main dimensions of the instrument
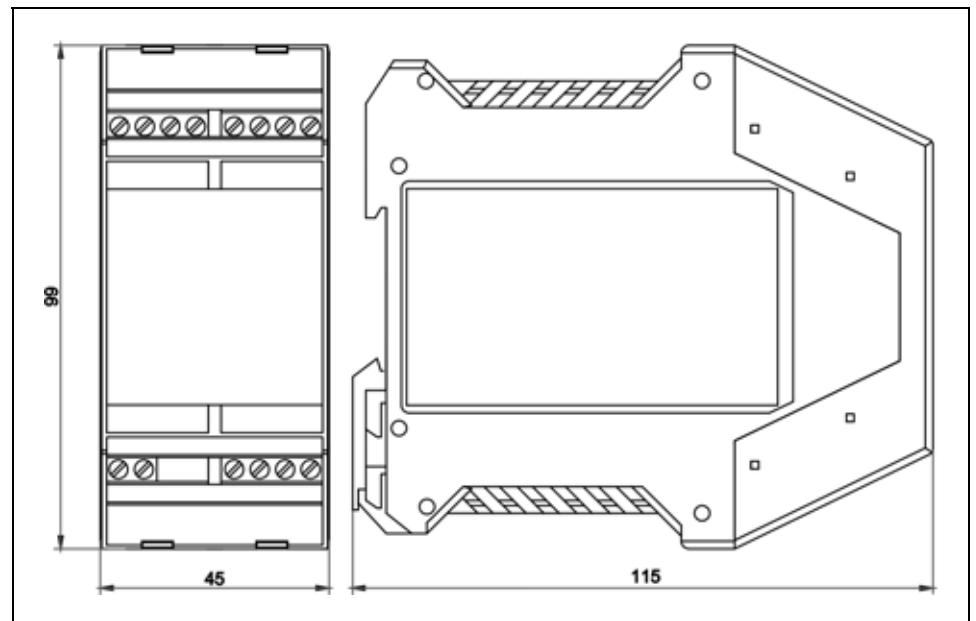
4.3. Mounting

The following figure shows the mounting procedures (fixing on the rail):

Mounting on the rail
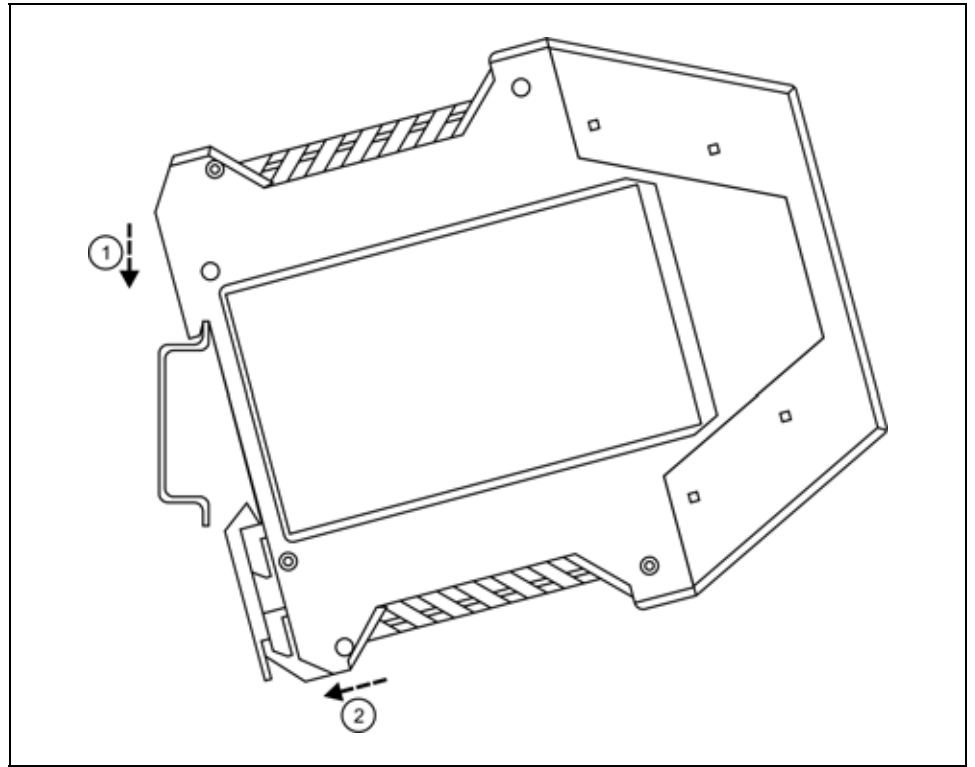
The mounting doesn't need any tool.
1. Tilt the instrument according to the figure; put the instrument's mounting hole onto the upper edge of the rail (figure step 1.).
2. Push the instrument's bottom onto the bottom edge of the rail (figure step 2.), you will hear the fixing assembly closing.
3. Check the hold of the fixing by moving the instrument firmly.

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.).
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.

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5.2. Connecting the power supply and the input signal

The following figure shows the wiring plan, connecting the DT1400 xx xx to the power supply and to the input signal:

Wiring plan, connecting the instrument to the power supply and to the input signal
(see also "Application example")

In case of DC supply the polarity is indifferent

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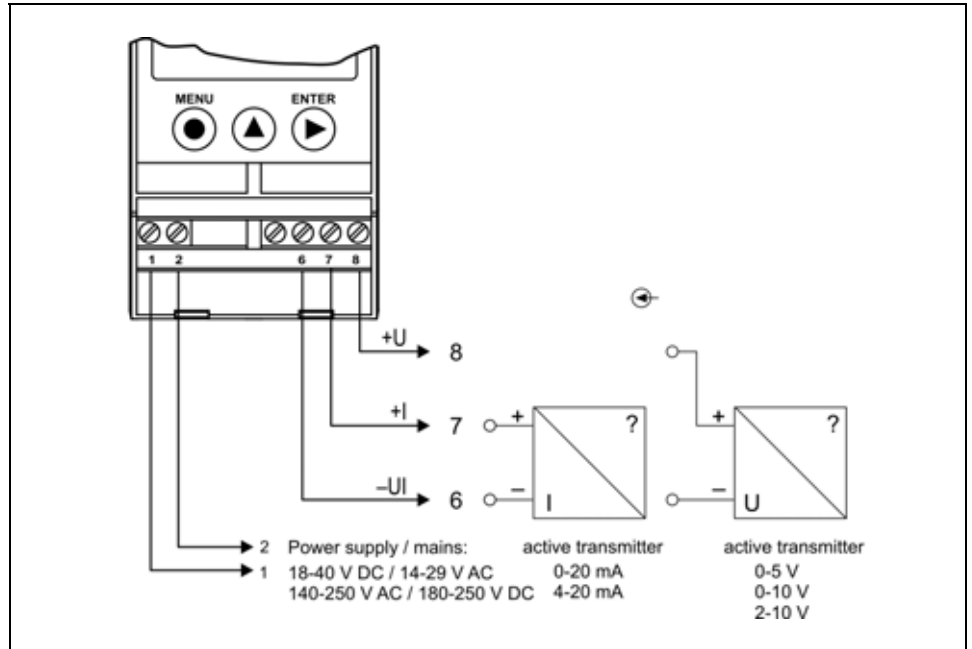
1. Loosen terminal screws.
2. Insert the wire ends into the open terminals according to the wiring plan.
3. Screw the terminal in.
4. Check the hold of the wires in terminals by pulling on them firmly.

5.3. Connecting the Rel 1, 2 limit relay outputs

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

Wiring plan, connecting the Rel 1, 2 limit relay outputs
(see also "Application example")

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 Rel 3, 4 limit relay outputs (option)

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

Wiring plan, connecting the Rel 3, 4 limit relay outputs
(see also "Application example")

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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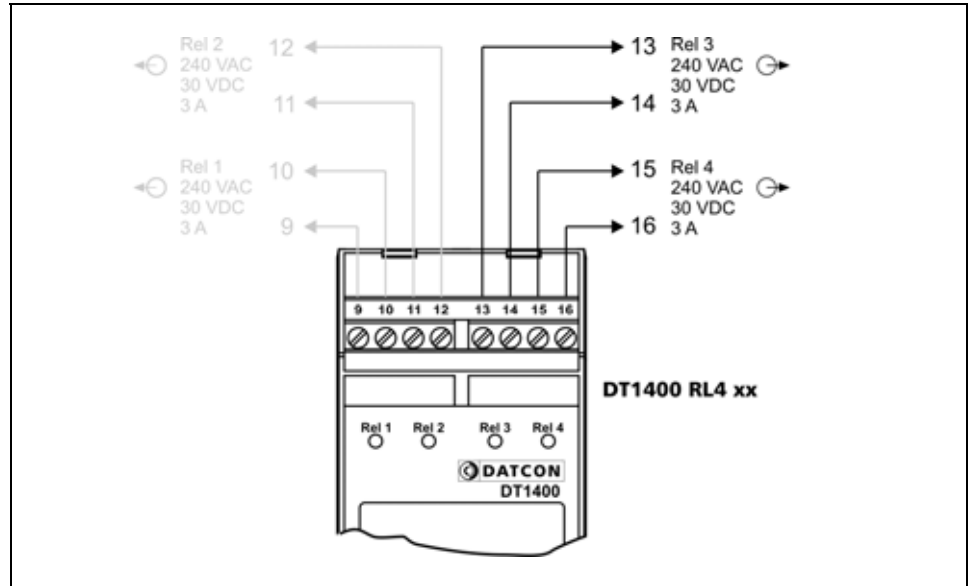
5.5. Connecting the analogue output (option)

The following figure shows the wiring plan, connecting analogue output in case of
active (DT1400 RL2 IA, DT1400 RL2 IA PS) or
passive (DT1400 RL2 IP, DT1400 RL2 IP PS) output:

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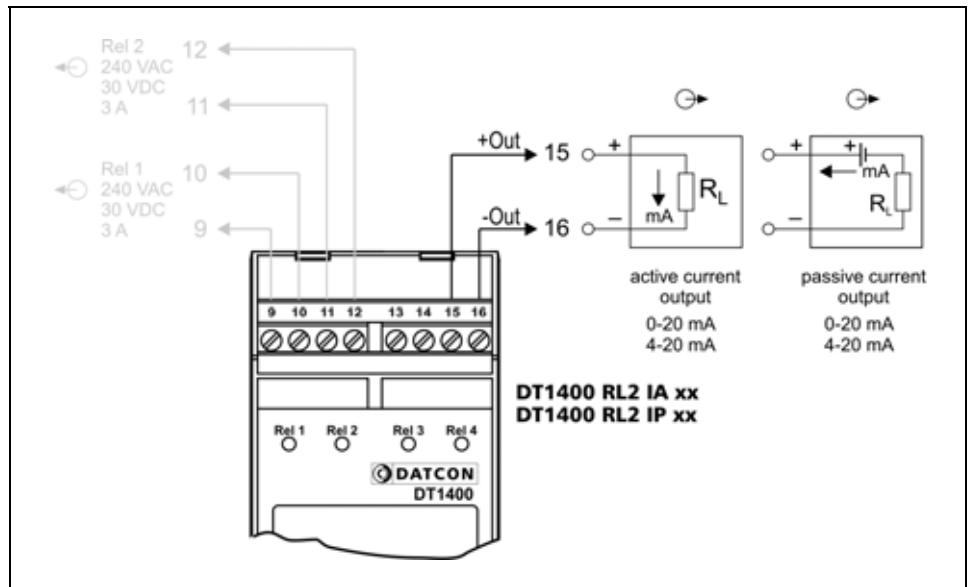
Be careful the polarity of the cables.

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.

5.6. Connecting the transmitter power supply (option)

The following figure shows the wiring plan, connecting transmitter power supply (DT1400 RL2 TS, DT1400 RL2 TS PS):

Wiring plan, connecting the transmitter power supply
(see also "Application example")
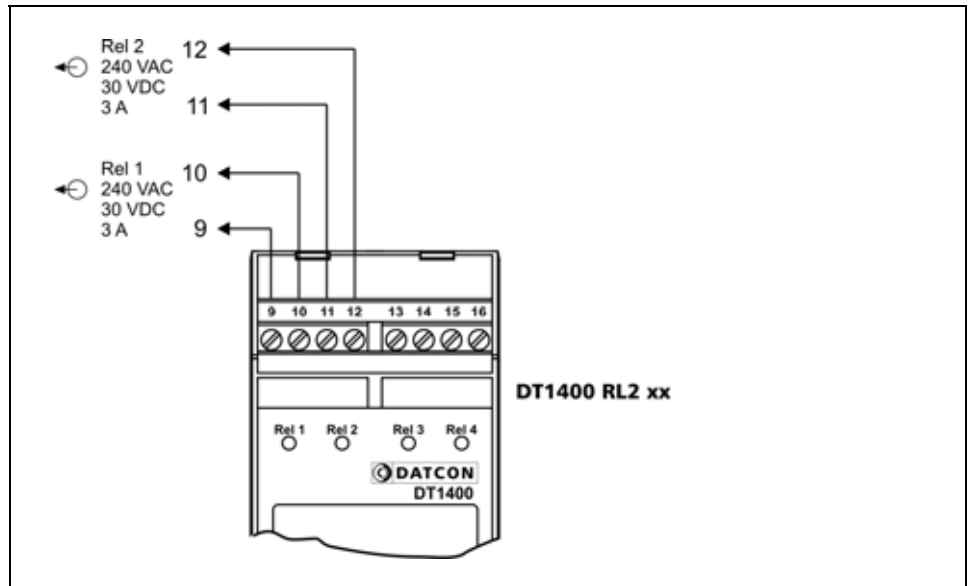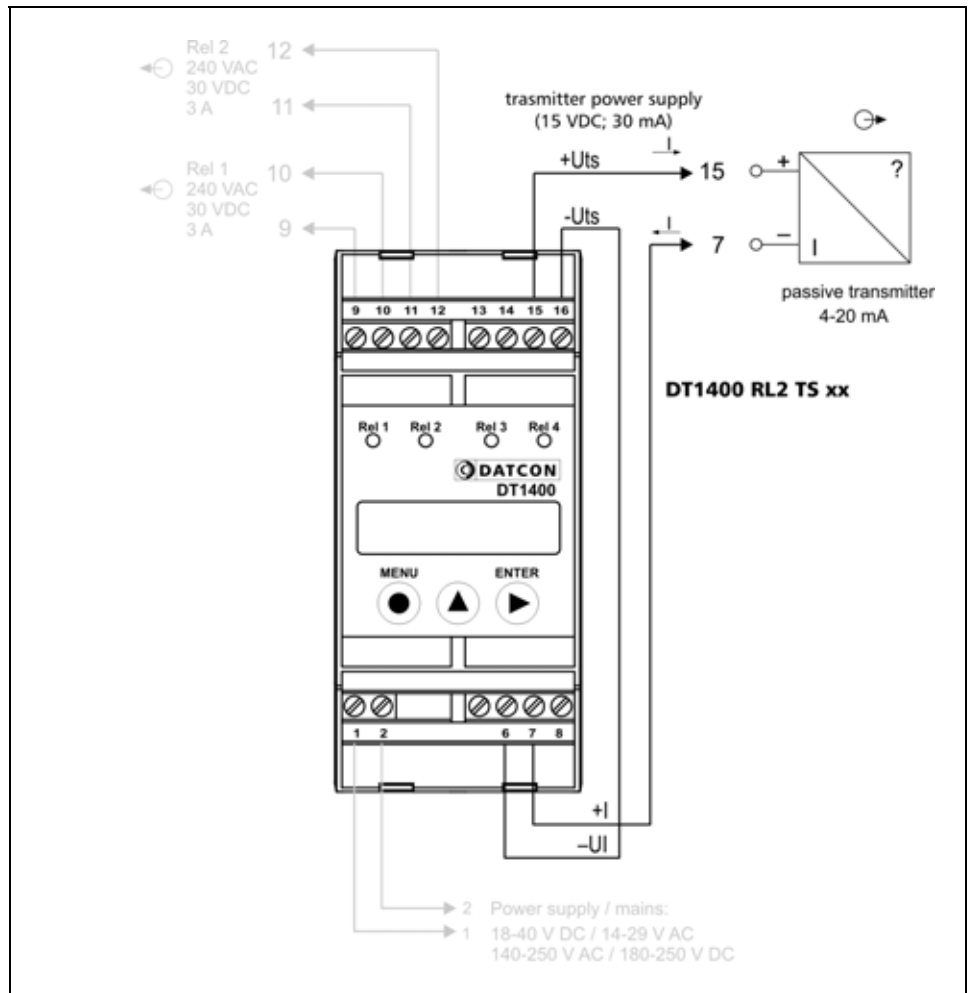
Be careful the polarity of the cables.

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.

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.

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6. Display and manual controls

6.1. The first start-up

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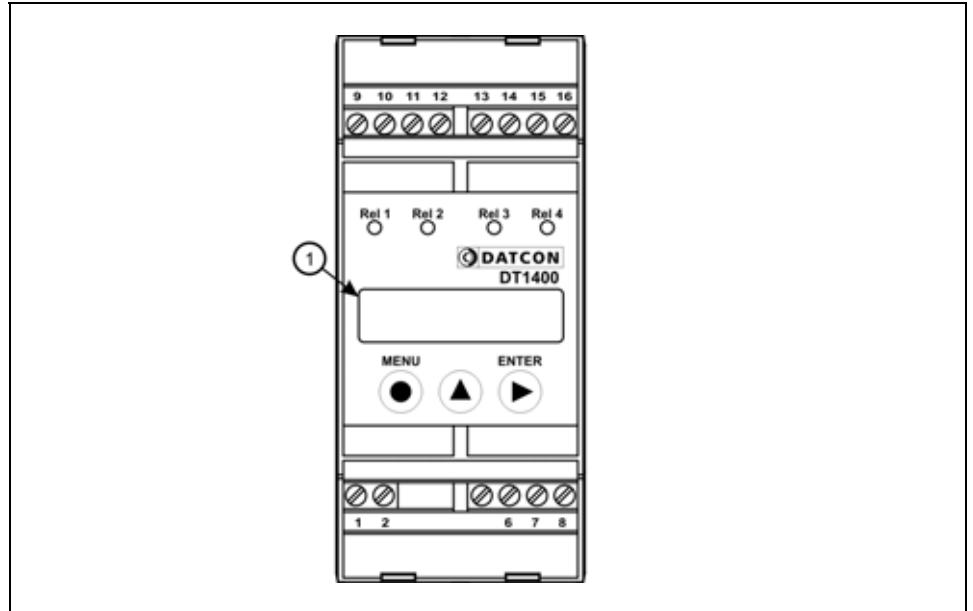
The display is indicated by the arrow (1)

The factory default setting is:
Selected input signal: 4-20 mA
Scaling: 4 mA ÷   0%
            20 mA ÷ 100%

When the input current is 12 mA, you can see 050.00.
on the display.

In the case of an error message

If anything else appears on the display instead of the scaled input signal (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.**.

6.2. Characters and mnemonics appearing on the display

DT1400 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:

1 = 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, *G* = G,

h = H, *i* = I, *J* = J, *H* = K, *L* = L, *m* = M, *n* = N,

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

u = V, *w* = W, *H* = X, *Y* = Y, *Z* = 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
1400	**1400** - Type of the instrument
rL2	Two limit relay output
rL2.iP	Passive analogue option is installed
rL2.iA	Active analogue option is installed
rL2.tS	Transmitter power supply option is installed
rL4	Four limit relay output option is installed

Error messages

E. Lo⁻'

Low (**E**rror: **LOW** Input signal)
Reason of error: the input signal is under of the measuring range. For example: the selected input mode is 4-20 mA and the input signal is 0 mA.

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.⁻ ⁻A

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

E.SAuE

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

ScALE

Scaling 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).

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**visor)

During setting

Lo.L in

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

h i.L in

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

EH it

Exit from the setting (**Exit**)

bUSY

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

rEAdY

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

Error

Error (**Error**)

SAuE

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 (▲ button)

i in in

Minimum value (**Minim**um)

iiAH in

Maximum value (**Maxim**um)

F irii

Firmware version (**Firmw**are)

Limit display

L _ _ _ _

All limit outputs are switched off

L I_3_

The limit output No.1 and No.2 are switched on

L_2_4

The limit output No.2 and No.4 are switched on

L I234

All limit outputs are switched on

6.3. Manual controls, display, indicators

DT1400 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
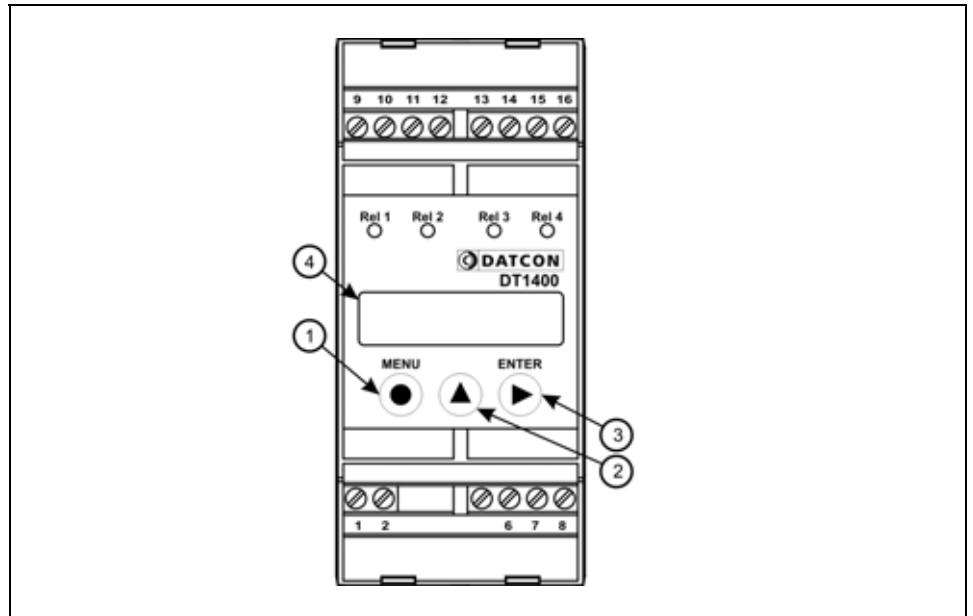
(1) MENU button: Entering the menu
When you push this button, the instrument will ask for a password (code) in accordance with Chapter **7.1. Typing the code (password) in**, when the right code has been given, it enters into the menu. **During this time the measurement is suspended, and the state of 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: $\overline{\textsf{n}}$ $\textsf{in}$ $\overline{\textsf{ni}}$. 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 ırıı. 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 13. 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 **7.13. Limit output state display mode**.

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Indicators

The following figure shows the 4 yellow indicator on the left side of DT1400 xx xx front panel:
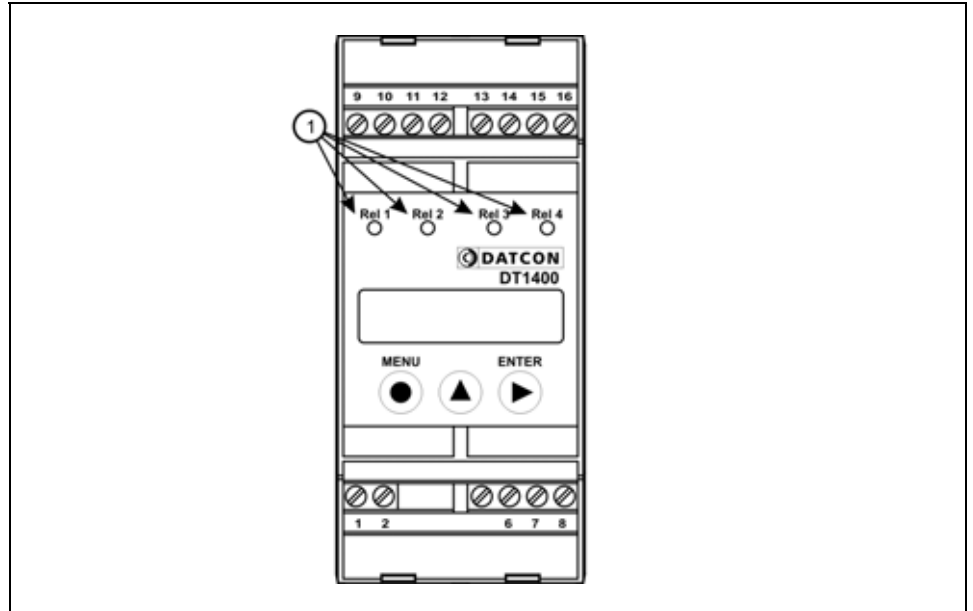
(1) Rel 1: limit output indicator (yellow)
indicates that the limit output 1 is in "on-state" (LIMIT1).

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

(1) Rel 3: limit output indicator (yellow)
indicates that the limit output 3 is in "on-state" (LIMIT3).

(1) Rel 4: limit output indicator (yellow)
indicates that the limit output 4 is in "on-state" (LIMIT4).

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.br1`.
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 $E5cRP$ (**A**uto **Esc**ape) after 4 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
27. page

02: Input selection
28. page

03: Decimal point position
30. page

04: Low value of scale
31. page

05: High value of scale
33. page

06: Leading zeroes enable / disable
35. page

07: Display value rounding
37. page

08: Averaging number
37. page

09: Display refresh time
40. page

10: #1 Limit output
11: #2 Limit output
12: #3 Limit output
13: #4 Limit output
41. page

14: Limit display mode
47. page

15: Clear Min. / max. values
49. page

16: Analogue output select
50. page

17: Assign 4 mA to low value
51. page

18: Assign 20 mA to high value
53. page

19: Tests
58. page

20: User code
58. page

21: Supervisor code
60. page

22: Factory default setting
62. page
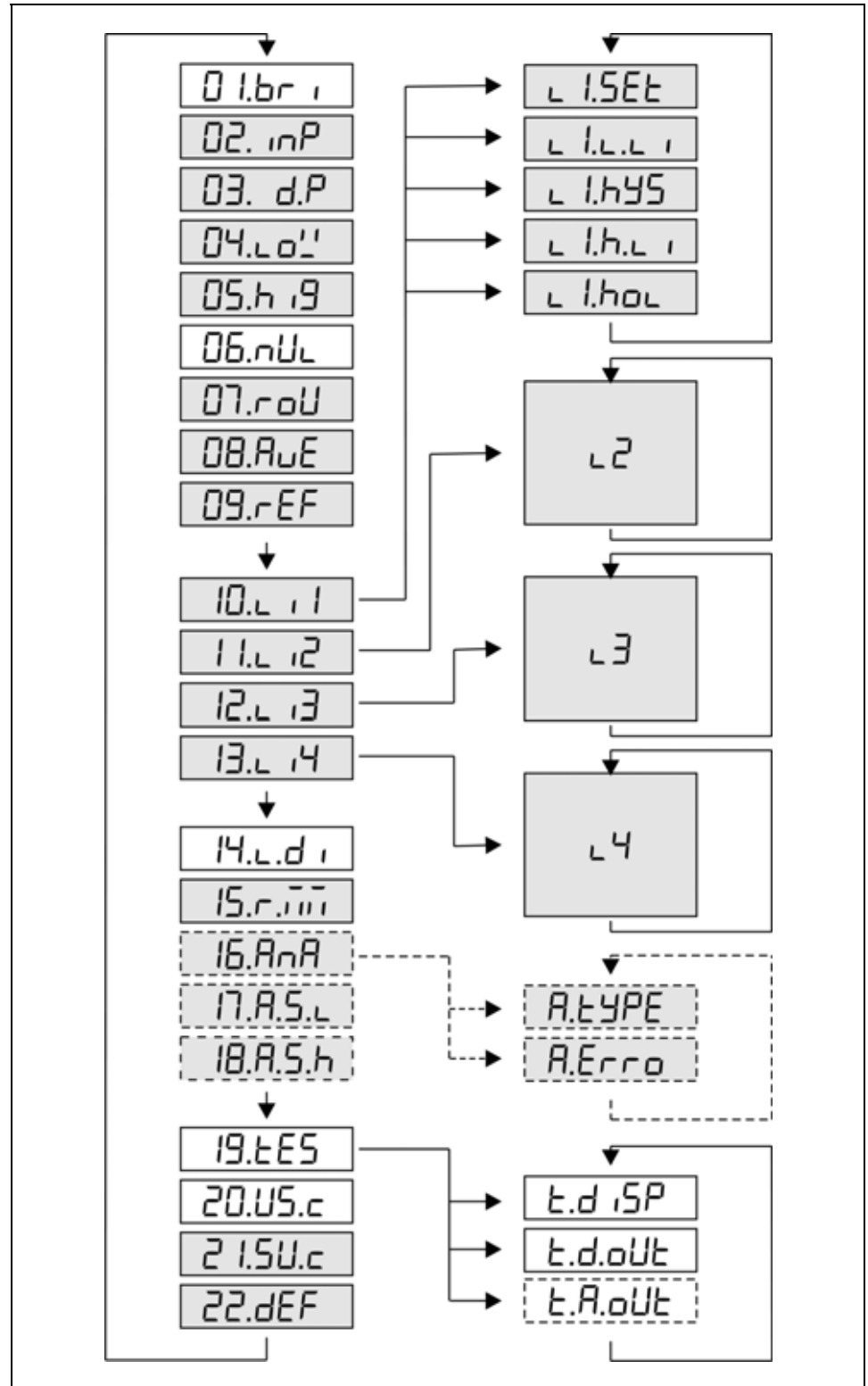
Comment:

The menu items shown in grey appear only in the case of a supervisor-level login.

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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)

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

3. You can read the mnemonic: $br 100$. (**Br**ightness). 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. Input selection (02. menu item)

Function

The instrument has current and voltage inputs. Here you can select the input and the signal level.
[Factory default: 4-20 mA current input]

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: *02. inP*.(**Inp**ut selection).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this *i.4-20* (**I 4-20** mA = current input, 4 mA - 20 mA) on the display. The mnemonic is blinking.
5. You can select from the following inputs:

- *i.4-20* : current input, 4 mA - 20 mA

- *i.0-20* : current input, 0 mA - 20 mA

- *U.0- 10* : voltage input, 0 V - 10 V

- *U.0-5* : voltage input, 0 V - 5 V

- *U.2- 10* : voltage input, 2 V - 10 V

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Exit from the menu item
1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $\mathit{02.\ inP}$.
(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
1. 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.

7.5. Decimal point position (03. menu item)

Function

Setting the position of the decimal point on the display, or switching the decimal point off.
[Default factory setting: 2 decimals]

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: $03. d.P$.(**D**ecimal **P**oint).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this $543.2 1$ on the display. The mnemonic is blinking.
5. You can move the decimal point to the right by pressing the ▲ button.

- $543.2 1$ = 2 decimals [default factory setting]

- $5432. 1$ = 1 decimal

- $5432 1$ = no decimals

- $5.432 1$ = 4 decimals

- $54.32 1$ = 3 decimals

Exit from the menu item

1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $03. dP$.
(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.)
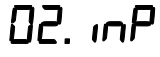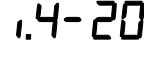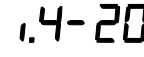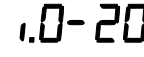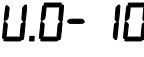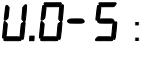
Exit from the menu

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.
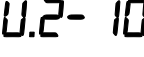
⚙ DATCON

7.6. Low value of scale (04. menu item)

Function

Any optional display range can be assigned to the input signal range (scaling). Here you can set the low value of the desired display range.
[Factory default: 000.00.]

Note! For scaling the DISPLAYED value you should set the high value also. (Next menu item.)

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:

$01.br\ i$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $04.Lo\underline{!}$.(**Low** = low value of scale).

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

4. You will see: 000.00 on the display. The left digit 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.

8. Examle: when the phisical range of the connected transducer is: 30-1000 mbar, you have to set 30.0:

0030.0.

Exit from the menu item	1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $\mathit{04.Lo}$.
	(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	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.

7.7. High value of scale (05. menu item)

Function

Any optional display range can be assigned to the input signal range (scaling). Here you can set the high value of the desired display range.
[Factory default: 100.00.]

Note! For scaling the displayed value you should set the low value also. (Previous menu item.)

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: *05.h 19*.(**Hig**h = high value of scale).
3. Enter the menu item by pressing the **ENTER** button.

4. You will see: *100.00* on the display. The left digit 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.
8. Examle: when the phisical range of the connected transducer is: 30-1000 mbar, you have to set 1000.0:

1000.0.

Exit from the menu item	1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $05.h\ i9$.
	(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	1. Press the **MENU** button. First the mnemonic $5Ru E$ (**Save**), then the mnemonic $EH\ iL$ (**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:

005.20 (default factory setting), or without the leader

zeros: 5.20.

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: $01.br\ i$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $06.nUL$ (**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 the menu item   1. After finishing the settings, press the **MENU** button to exit from the given menu item, and you see: $06.nUL$.

(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 the menu   1. 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.

7.9. 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: $0\,1.br\,\iota$.
2. Keep stepping by pressing the ▲ button as long as you

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

4. You see this $ro\quad1.$ on the display. The text is blinking indicating that it can be modify.
5. Pressing the ▲ button you can select from the following options:

- $ro\quad1$ = no rounding [Factory default]

- $ro\quad2$ = rounding to 2

- $ro\quad5$ = rounding to 5

- $ro\quad10$ = rounding to 10

- $ro\quad20$ = rounding to 20

- $ro\quad50$ = rounding to 50

- $ro\,100$ = 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 $EH\,\iota t$ (**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.

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

Function

The instrument performs cca. 12 measurements in each seconds.
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:

$0 1.br \, i$.

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

4. You see this $RuE \; 16$ 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

Exit from the menu item 1. After finishing the setting, press the **MENU** button, to exit from the menu item, and you see this: $\mathit{08.AuE}$.
(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:

$0 ⒈b r ⒤$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $09.rEF$ (**Ref**resh).
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 $EH ⒤t$ (**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.

⟨○⟩ DATCON

7.12. Setting limit outputs (10., 11., 12., 13. menu item)

Function

The instrument has two (RL2) or four (RL4) 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:

$0 1.br 1$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $10. L 1$ (**L**imit**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 SEt (**Set**tings) 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]

• $h 1.9h$: (**High**). The output gets switched on, when the displayed physical value is higher than or equal with the low limit value (L.LI).

• $L o\underline{''}$: (**Low**) The output gets switched on, when the displayed physical value is lower than the low limit value (L.LI).

• $1n5 1d$: (**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

- ⊔Ŀ5 ⎐: (**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).

- ⎐Hrⁿ̄ (**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 physical value is higher than the upper limit value (H.LI). When the displayed physical 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 physical value is the process value and you can control the process through the limit outputs.

- ⊏⎐⎐L (**Cool**) The output gets switched on, when the displayed physical value is higher than the high limit value (H.LI). When the displayed physical 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 physical value is lower than the lower limit value (L.LI). When the displayed physical 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** = 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: ⎐ I.5Eŀ.

7. If you had selected the ⎐FF or the ⎐⎐ 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.L.L ı* (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:

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

12. Pressing the ► button you can select the next digit.
13. 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 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.L.L ı*.
15. When you don't want to set hysteresis and you had

selected the *h ı9h* or the *Lo'!'* 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.hYS* (Limit**1** **Hys**teresis) 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). [Factory default: hysteresis = 0]

The hysteresis value is in operation for High or Low operation mode only. The hysteresis value is ignored in case of another operation mode.

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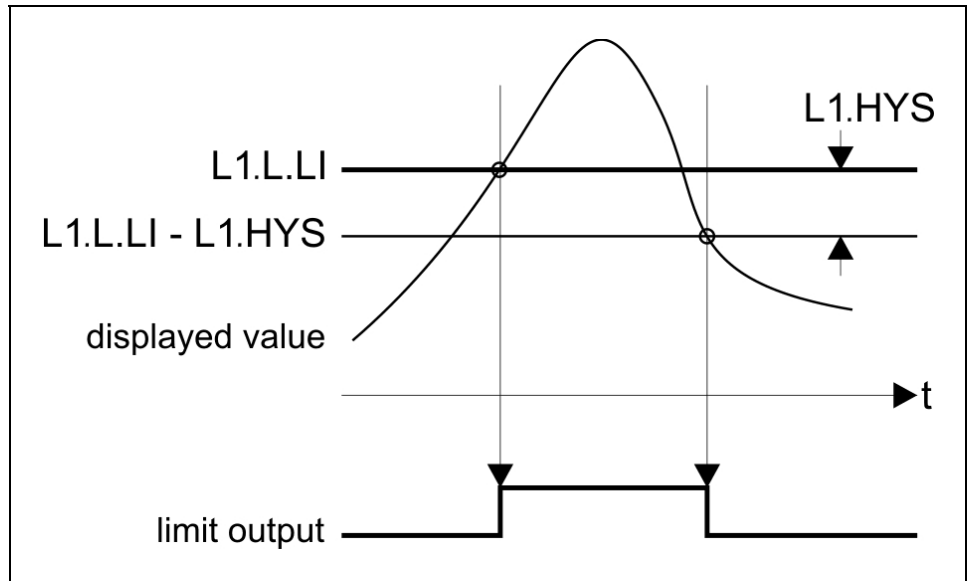
The figure shows the limit output change vs. input signal, where the value of hysteresis is > 0.

Remark: this operation is working in the mode: $high$.

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: $L1.hyS$.

22. If you had selected the $high$ or the $lo\ddot{u}$ 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**.

DATCON

High limit value
Sequence of operation

23. Keep stepping by pressing the ▲ button as long as you see this sub-menu item: ⌐ *l.h.ʟ* ı (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 *ınS ıd* or *oUtS* ı or *l'Arⁿ* or *cooʟ* . 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:

l, *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:

l, *2*, *3*, *4*, *5*, *6*, *7*, *8*, *9*, *-*, *0*, *l*, 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: ⌐ *l.h.ʟ* ı.
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**.

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). 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**). 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.

⬤DATCON

7.13. Limit output state display mode (14. 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: $0\ 1.br\ \iota$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $14.L.d\ \iota$ (**L**imit **Di**splaying).

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

4. You see this on the display: $d\mathcal{Y}nA\bar{\iota}\iota$. The mnemonic is blinking, signaling that it can be modify.

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

• $d\mathcal{Y}nA\bar{\iota}\iota$ (**Dynam**ic)

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

• $t\ \bar{\iota}\bar{\iota}Ed$ (**Timed**)

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

• $5tAt\ \iota$ (**Stati**c)

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

• $chAn9$ (**Chang**ing)

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.

• $PEr\ \iota o$ (**Perio**dical)

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.

Sequence of operations

- $\Box n$ (**On** = switched on)

It displays the limit output state continuously.
Keeping the **ENTER** button pressed it displays the measuring value.

- σFF (**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: $l4.L.d\ l$.
(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. 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 $5RuE$ (**Save**), then the mnemonic $EH\ lL$ (**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

7.14. Clear minimum and maximum values
(15. 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: $15.r.mm$ (**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**) 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: $15.r.mm$.
(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.

DATCON

7.15. Analoge output signal setting (16. 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: $0\ 1.b r\ 1$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $16.AnA$ (**Ana**log).
3. Enter the menu item by pressing the **ENTER** button.

4. You see this: $1.4-20$ on the display The text is blinking, signaling that it can be modify
5. Pressing ▲ button you can choose between the two output signal:

- $1.4-20$: 4-20 mA current output [Factory default]

- $1.0-20$: 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: $16.AnA$.
(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 $5AuE$ (**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

DATCON

7.16. Assignment analog output low (start) value to display value (scaling) (17. menu item)

Function

Here you can assign analog output start value (0 mA or 4 mA) to the measured physical value. This way you can assign any phisical range to any output range. [Factory default: 0.00 so in case of a measured value 0.00 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:

$0 1.br 1$.

2. Keep stepping by pressing the ▲ button as long as you see this menu item: $17.A.5.L$.(**A**nalog **S**cale **L**ow = analog scale low value).
3. Enter the menu item by pressing the **ENTER** button.

4. The number: 000.00. 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: $\mathit{M.A.S.L}$.

(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 SAvE (**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

7.17. Assignment analog output high (end) value to display value (scaling) (18. menu item)

Function

Here you can assign analog output high value (20 mA) to the measured physical value. This way you can assign any phisical range to any output range.
[Factory default: 100.00 so in case of a measured value - 100.00 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: $18.A.5.h$.(**A**nalog **S**cale **H**igh = analog scale high value).

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

4. The number: 100.00 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: $I8.A.5.h$.

(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 $5AuE$ (**Save**),

then the mnemonic $EH\,\imath E$ (**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.

7.18. Tests (19. 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: $19.tE5$ (**Tes**t).
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, $Abcd E$, 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: $t.d.oUt$ (**T**est: **D**igital **Out**put = digital output test).

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

10. You see: $L \_\_\_\_$ 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.:

- $L \_\_\_\_$: all are switched OFF.

- $L\ l\_\_\_$: 1. ON; 2., 3., 4. OFF.

- L_2_4 : 1., 3. OFF; 2., 4. ON.

- $L\ l234$: all are switched ON.

Rel1, Rel2, Rel3, Rel4 yellow indicators on the up 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: $t.d.oUt$.

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: $t.A.oUt$ (**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: $t.A.oUt$.

Exit from menu item

1. Press the **MENU** button, to exit from the menu item, and you see this: $19.tES$.
(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 $5AuE$ (**Save**), then the mnemonic $EH it$ (**Exit**) are shown on the display. The instrument has exited the menu and goes on with the measurement.

7.19. Changing the user code (20. 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: $0 1.br i$.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: $20.US.c$.(**Us**er **C**ode).
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**) warns you on the error, and the device exits from the menu item. You see this

$20.US.c$ 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 $20.US.c$ on the display.

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Sequence of operations

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 $5Ru E$ (**Save**), then the mnemonic $EH \iota E$ (**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.

⚪ DATCON

7.20. Changing the supervisor code (21. 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 ı*.
2. Keep stepping by pressing the ▲ button as long as you

see this menu item: *2 1.SU.c* .(**Su**pervisor **C**ode)
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**) warns you on the error, and the device exits from the menu item. You see this

2 1.SU.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 *2 1.SU.c* on the display.

DATCON

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€ (**Save**), then the mnemonic €H 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. Resetting the default settings (22. 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 $1.br$ i.
2. Keep stepping by pressing the ▲ button as long as you see this menu item: $22.dEF$ (**Def**ault 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: $22.dEF$.

6. Press the ▲ button to set YES.

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

dt,

1400.

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 from the rail
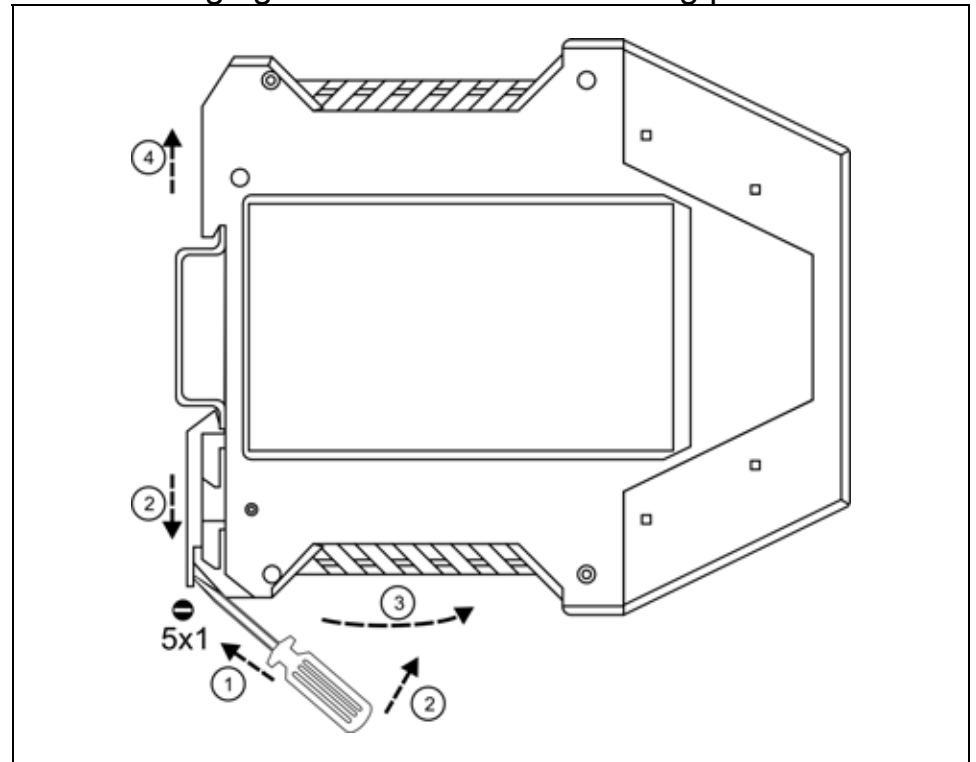
The dismounting procedure needs a screwdriver for slotted screws.
1. Before dismounting disconnect all wires.
2. Put the screwdriver end into the fixing assembly's hole (figure step 1.).
3. Lift the screwdriver handle until it possible to open the fixing assembly (figure step 2.).
4. Keeping the screwdriver in this position lift the instrument bottom from the bottom edge of the rail (figure step 3.).
Lift the whole instrument (you may put out the screwdriver) (figure step 4), the instrument will be free.

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.

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10. Appendix

10.1. Technical specifications

Power supply	
Supply voltage:	DT1400 xx xx: 18-40 V DC / 14-29 V AC DT1400 xx xx PS: 140-250 V AC / 180-250 V DC
Power consumption:	3.5 W / 3 VA

Input parameters	
Input signal:	DC current / DC voltage
Measuring range:	0-20 mA / **4-20 mA** 0-10 V / 2-10 V / 0-5 V
Input resistance:	62 Ω (current input) 1 MΩ (voltage input)
Overrange:	±50 mA (current input) ±200 V (voltage input)

Display	
Display unit:	LED, 5 digit (+ values) / 4 digit (- values), 7 segment, negative sign, setable decimal point
Display color, brightness:	red, the brightness of the display may adjust from10% to 100% in 10% steps. Factory default: 100%
Character height:	7.62 mm
Display range:	-9 999 - 99 999
Relation between the display and the input signal:	Any values to be displayed could be selected (within the display range) to be assigned to the input values.
Display refresh time:	0.1 / 0.3 / **0.5** / 1.0 / 2.0 sec (adjustable)
Indicator LEDs:	4 limit values

Measuring parameters	
Characteristic:	Linear
Display accuracy:	0.02 % @ Ta = 23°C ±2°C, (after 10 min warm up time) 0.2 % @ Ta = 0 °C - +60 °C
Temperature-dependency:	40 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

Output type: 2 NO SPST relays
Contact rating: 30 VDC, 3 ADC / 240 VAC, 3 AAC
Refreshing time: Equal dispaly refreh time

Limit outputs (optional)

Output type: 2 NO SPST relays
Contact rating: 30 VDC, 3 ADC / 240 VAC, 3 AAC
Refreshing time: Equal dispaly refreh time

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 10 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 10 min warm up time)
Accuracy: 0.4 % @ -20°C < Ta < +60°C
Temperature-dependency::   75 ppm / °C
Output supply voltage: 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

DATCON

Ambient conditions

Operating temperature range   0 °C - +60 °C (-20 °C - +60 °C on request)
Storage temperature range   -25 °C - +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

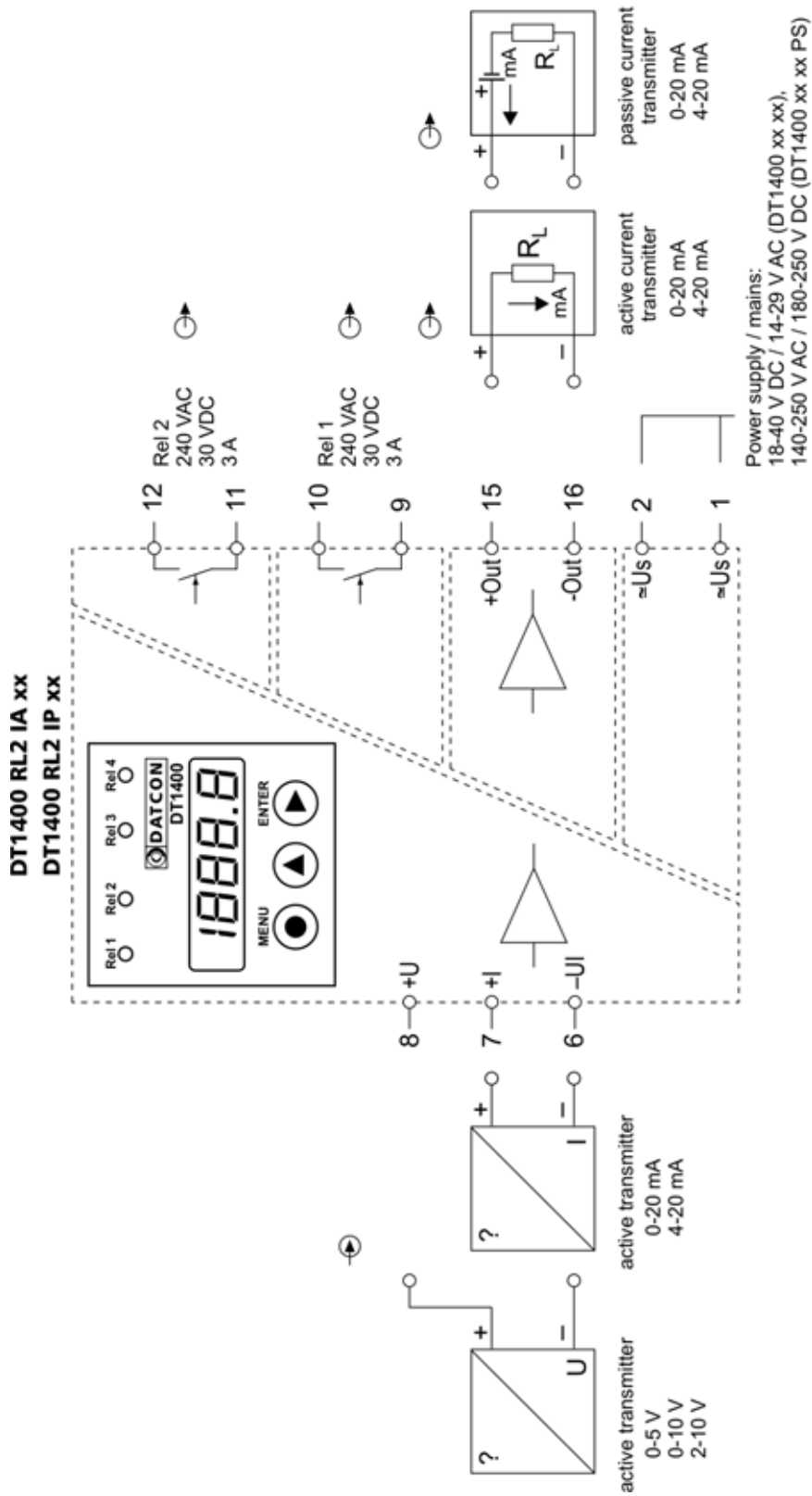Housing: TS-35 rail mounting housing
                                     material: polyamide PA6.6
Dimensions [mm]:   screw-terminal
Panel cut off: 2.5 mm^2 (max.)
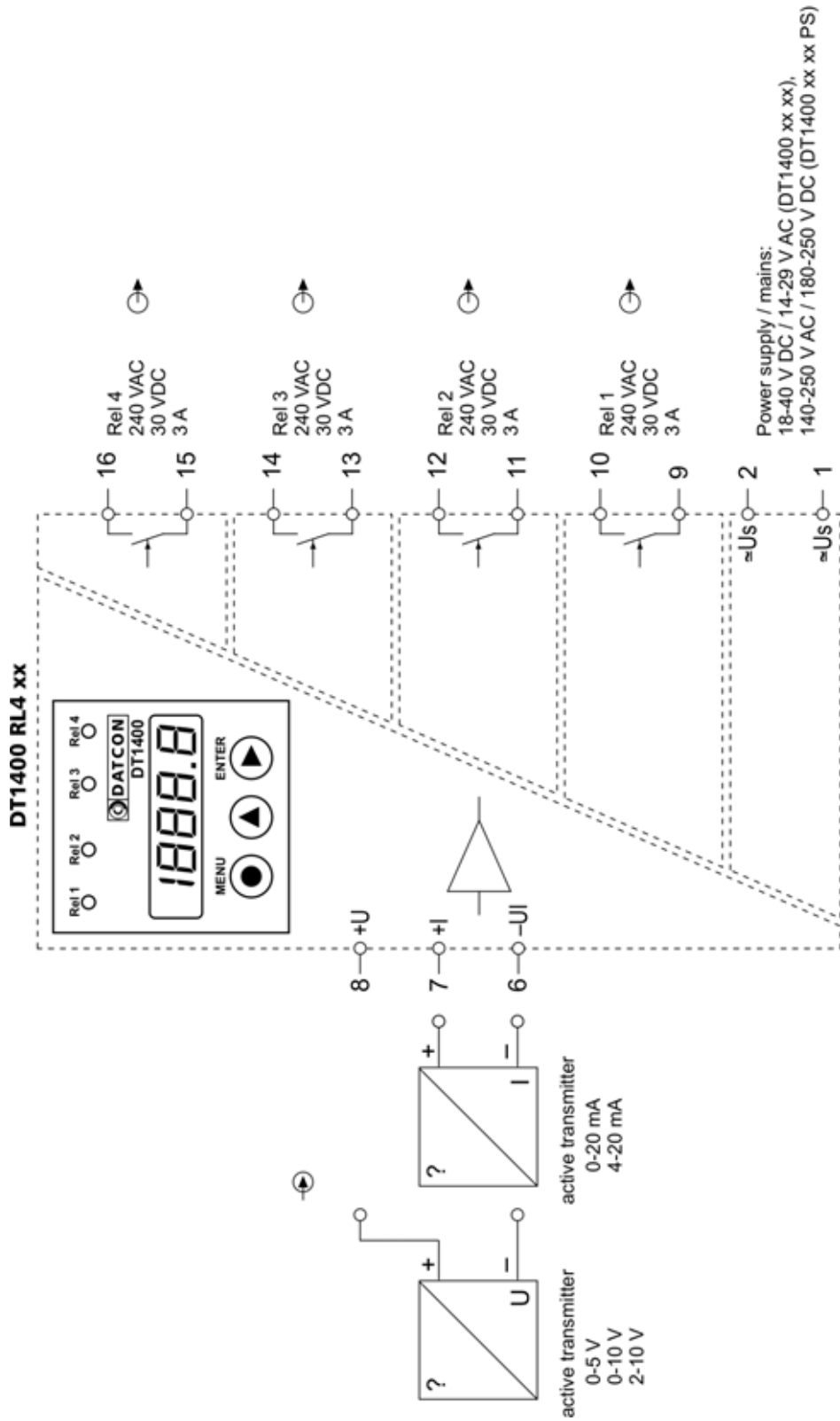Weight: 45 x 99 x 115 mm (width x height x depth)
Protection: IP 20

The Manufacturer maintain the right to change the technical data!

10.2. Application example

Analog output option:

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RL4 option:

TS option:

1148 Budapest, Fogarasi út 5. 27. ép. HUNGARY

Tel.: +(361) 460-1000 Fax: +(361) 460-1001   www.datcon.hu