DATCON
INDUSTRIAL MEASUREMENT

DT1102 V (PS)

Fully Configurable Galvanic Isolator

Operating Instructions

CE
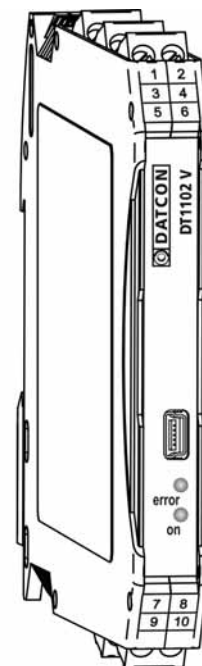
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1. About this document

1.1. Function

This operating instructions manual has all the
information you need for quick set-up and
safe operation of DT1102 V (PS).
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 or it's environ.

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

Action
→   This arrow indicates a single action.

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

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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 DT1102 V (PS) is a Fully Configurable Galvanic Isolator for industrial use. Detailed information on the application range is available in chapter **3. 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 installing or adjustment.

2.4. General safety instructions

Using the DT1102 V (PS) Fully Configurable Galvanic Isolator 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 standards as well as all prevailing safety regulations and accident prevention rules.

2.5. CE conformity

The DT1102 V (PS) is in conformity with the provisions of the following standards:
MSZ EN 61326-1 (EMC)
MSZ EN 61010-1 (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 **3.6. Storage and transport**
• Chapter **9.2. Disposal**

3. Product description

3.1. Delivery configuration

Delivered items   The scope of delivery encompasses:

- DT1102 V (PS)

- documentation:
  this operating instructions manual
  certification
  warranty

3.2. Type designation

DT1102 V ☐ — **PS**	24 VDC POWER SUPPLY
	230 V AC/DC POWER SUPPLY

3.3. Operating principle

Area of application

The DT1102 V (PS) Fully Configurable Galvanic Isolator provide signal transmission and conversion between DC current or DC voltage signal source and signal processing units.

The instruments feature complete 3-way isolation: the input, the output and the power supply are isolated from each other.

The instruments has three inputs:
1./ -25 mA - +25 mA DC current,*
2./ -2.5 - +2.5 V DC voltage,*
3./ -125 - +125 V DC voltage.*

The instruments has two outputs:
1./ 0 - 22 mA DC current,*
2./ 0 – 10.5 V DC voltage.*

* You must use one input and one output at a time.

The PC configurator software is accessory or free downloadable from homepage: www.datcon.hu

The input type and range and the output type and range are configurable (current or voltage). See chapter **10.1. Technical specification**.

The input is bipolar, symmetrical.

The output is unipolar.

The configuration parameters can be download from the PC to the DT1102 V via USB port.

The front panel LED indicators provide information about the operating status of the device.

Principle of operation

The input current flows through the measuring resistor or the input voltage is divide by the attenuator. This voltage is measured by a 24-bit A/D converter. The digital output signal of the A/D converter is processed by a microcontroller.

The microcontroller produces a pulse width modulated output signal which is proportional to the processed, scaled measuring value. The output pulse is galvanic isolated by an opto coupler. After filtering the pulse is converted into analogue current or voltage signal.

Connecting the instrument to the PC through the USB interface the instrument's communication circuitry come into active state and it is ready for communication with the configuration software.

The USB port is galvanic isolated therefore the USB cable can plugged into a grounded PC too.

Power supply

The DT1102 V (PS) is available two different power supply:

**DT1102 V**:
Power Supply: 24 VDC ±10%
DT1102 V PS:
Power Supply: 230 V AC/DC ±10%

3.4. Adjustment

After connecting the DT1102 V is ready to work with the factory default parameters are written in chapter **6.1. The first start-up**. For working with the default parameters there is no need any adjustment. The detailed description of the setup can be found in chapter **7. Setting-up**.

3.5. Indicators, USB connector

The following figure shows the indicators and USB connector on the DT1102 V front panel.
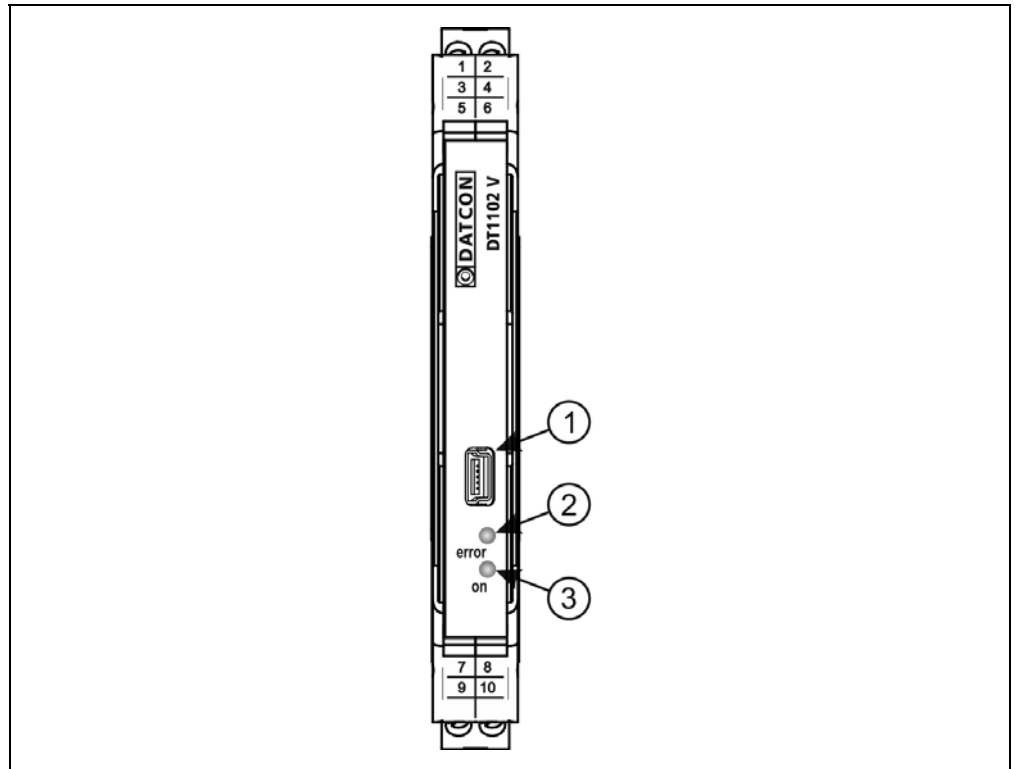
1. USB-B mini, 5 pole connector for connecting to the PC at configuration.
2. The „error" red indicator blinking light indicates different error states.
3. The „on" green indicator continuous light indicates that the instrument is working.

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 specification**, as described under the title: Ambient conditions.

The packaging of DT1102 V consist of environment-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 polyfoam and nylon, which should be disposed of via specialized 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: Ambient conditions.
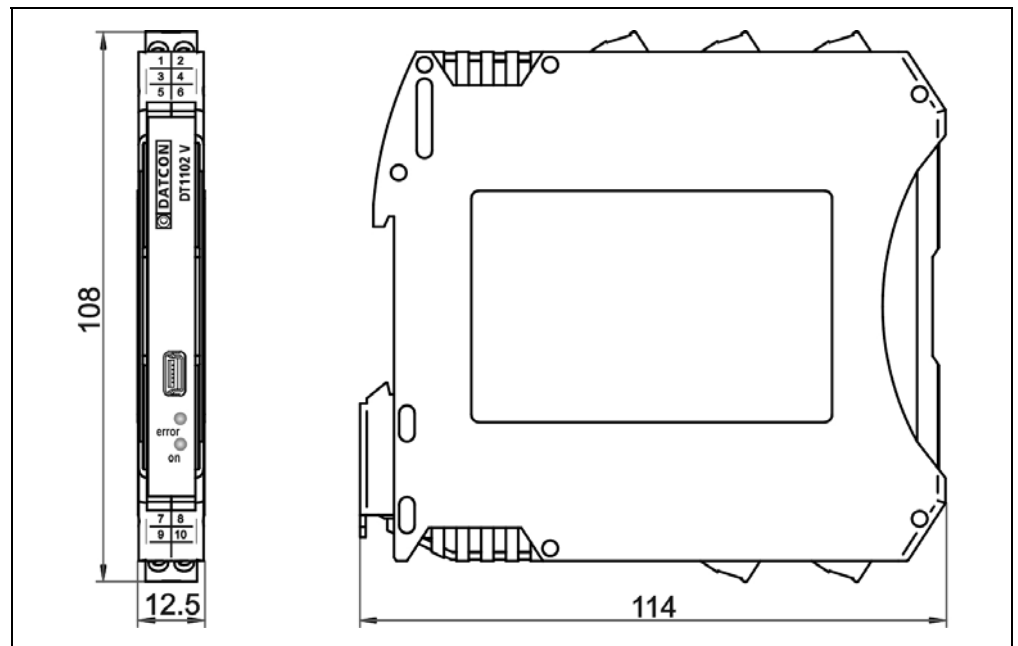
Mounting position

The instruments are designed in a 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

The following figure shows the main dimensions of the instrument.

4.3. Mounting procedure

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

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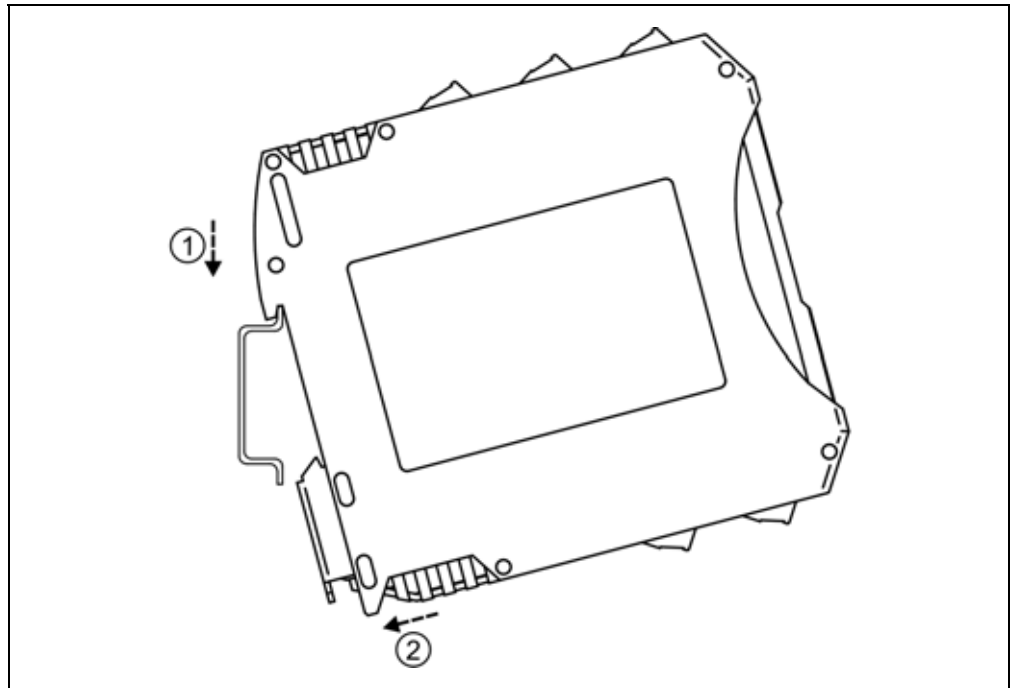
The mounting doesn't need any tool.
1. Tilt the instrument according to the figure; put the instrument's mounting hole onto the upper edge of the rail (figure step 1.).
2. Push the instrument's bottom onto the bottom edge of the rail (figure step 2.), you will hear the fixing assembly closing.
3. Check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

5. Connecting

5.1. Preparing the connection

Always observe the following safety instructions:

• The connection must be carried out by trained and authorized personnel only!

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

• You should take note the data concerning on the overcurrent protection in installation

• Use only a screwdriver with appropriate head.

Select connection cable

Take note the suitability of the connecting cable
(wire cross-section, insulation, etc.).
The wire cross-section should be 0.25-1.5 mm².
You may use either solid conductor or flexible conductor.
In case of using flexible conductor use crimped wire end.

For the input connection we recommended to use screened cable. 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.
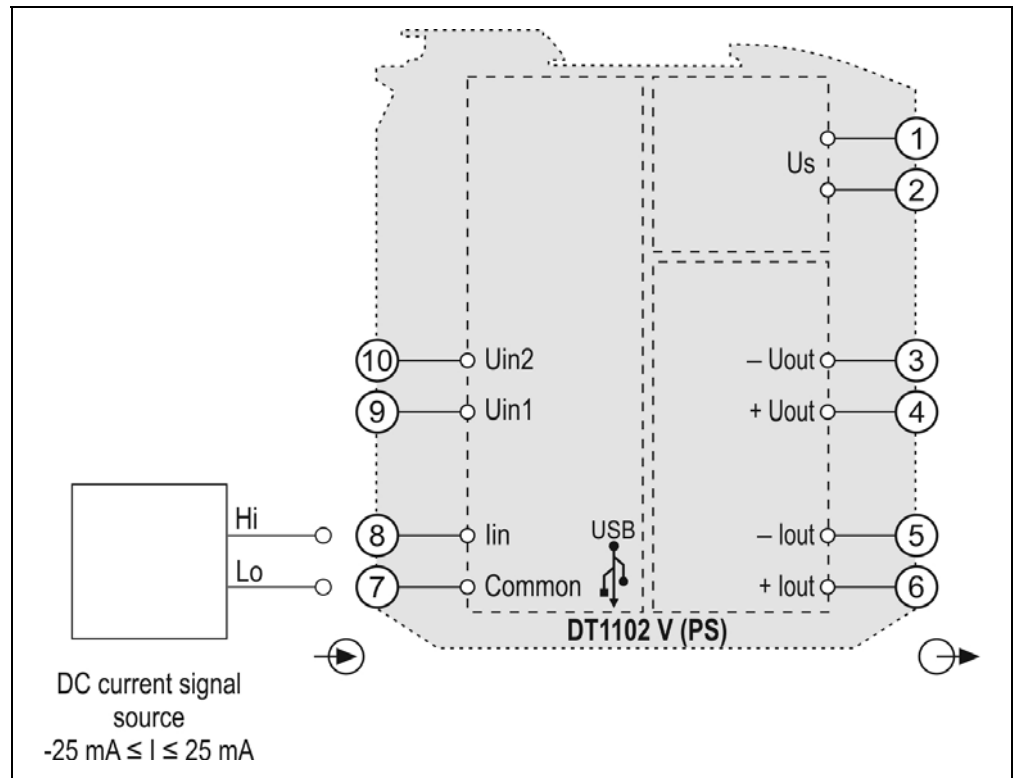Strip approx. 8 mm insulation.

5.2. Connecting the DC current signal source

The following figure shows the wiring plan, connecting the DC current signal source:

Wiring plan, connecting the DC current signal source
(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).

5.3. Connecting a -2.5 - +2.5 VDC voltage signal source

The following figure shows the wiring plan, connecting the DC voltage signal source:

Wiring plan, connecting the DC voltage signal source
(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.
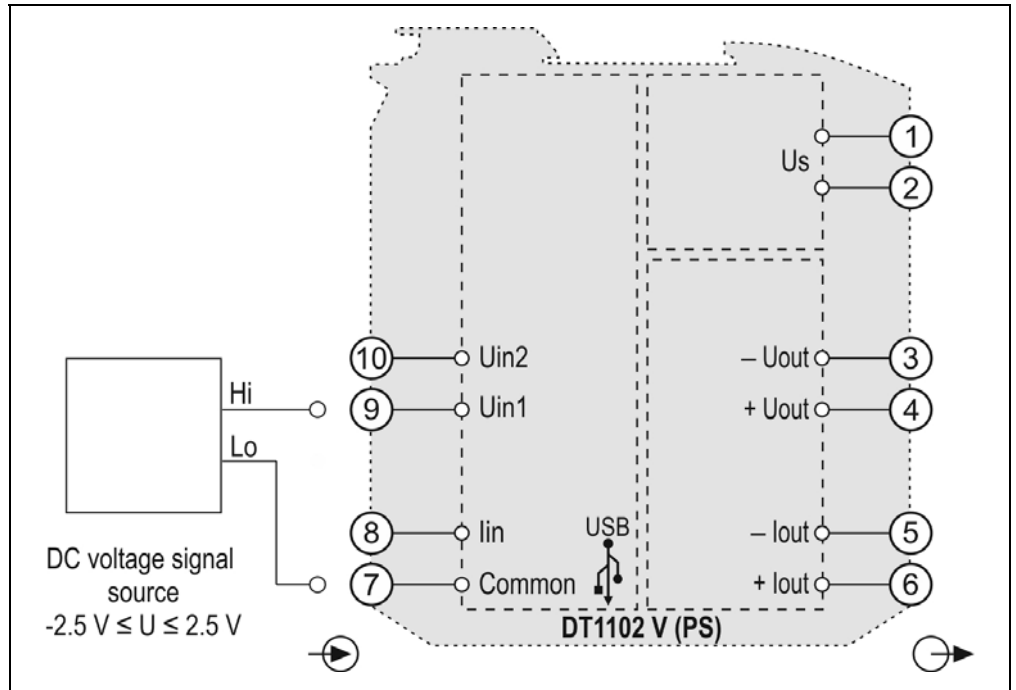
Checking the Connections

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).

5.4. Connecting a -125 - +125 VDC voltage signal source

The following figure shows the wiring plan, connecting the DC voltage signal source:

Wiring plan, connecting the DC voltage signal source
(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.
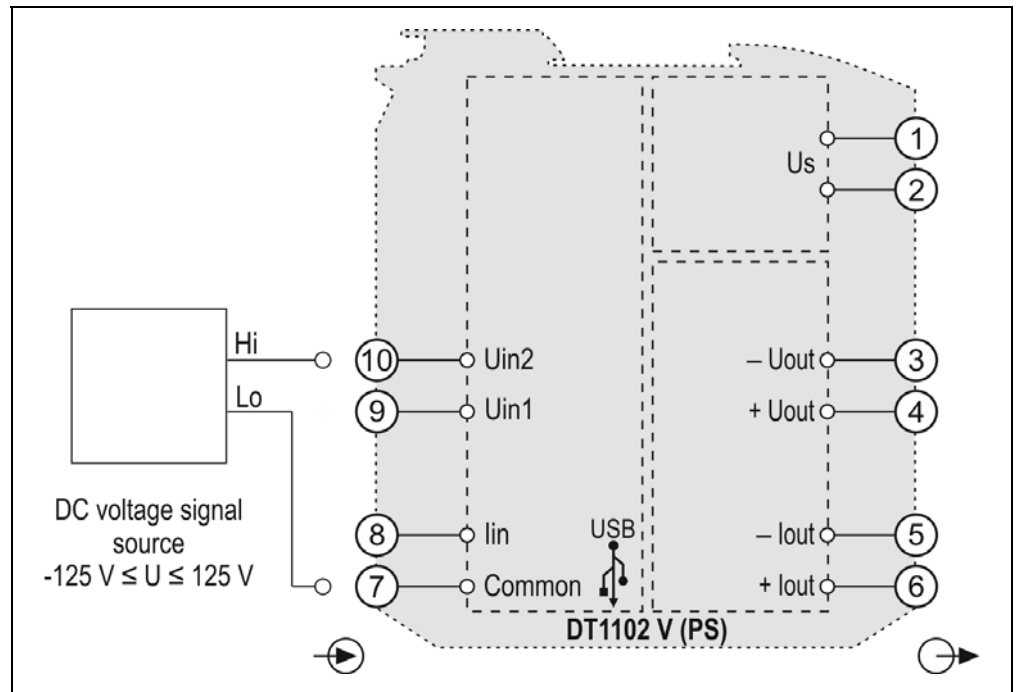
Checking the Connections

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).

5.5. Connecting the signal processing unit and the power supply

The following figure shows the wiring plan, connecting the signal processing unit and the power supply:

Wiring plan, connecting the signal processing unit and the power supply
(see also "Application example")

DC polarity indifferent

Be careful the polarity of the cables

⚠
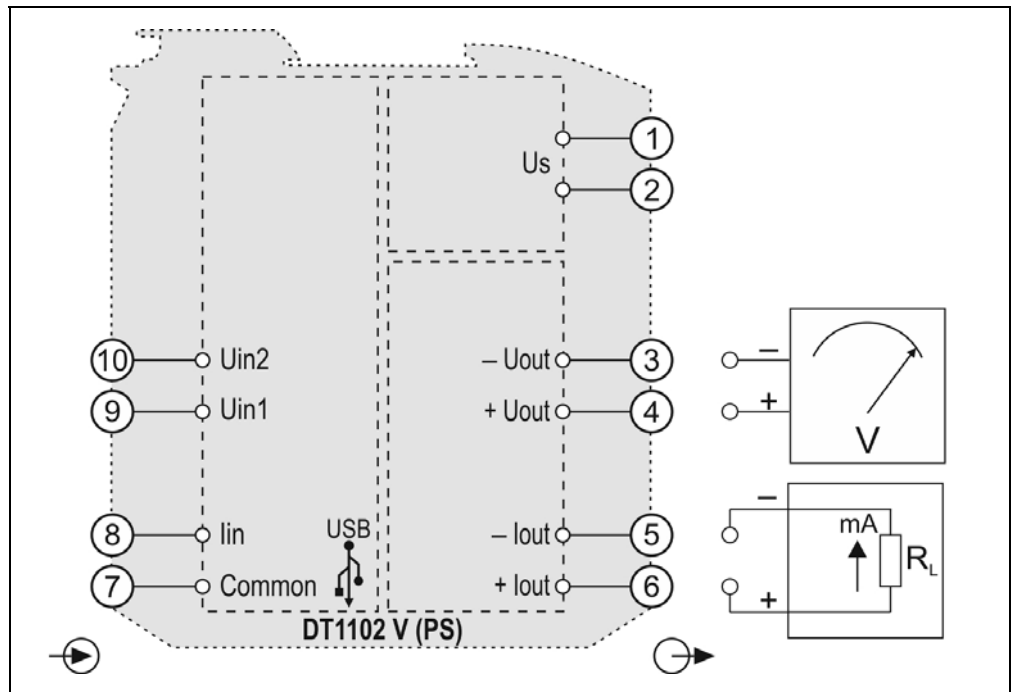
The output must be current only or must be voltage only, can not use both. The unused connector must be unconnected.
Factory default: Current output. When change it to voltage output must be change the settings by the DT1102V_D.exe configuration program.

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).
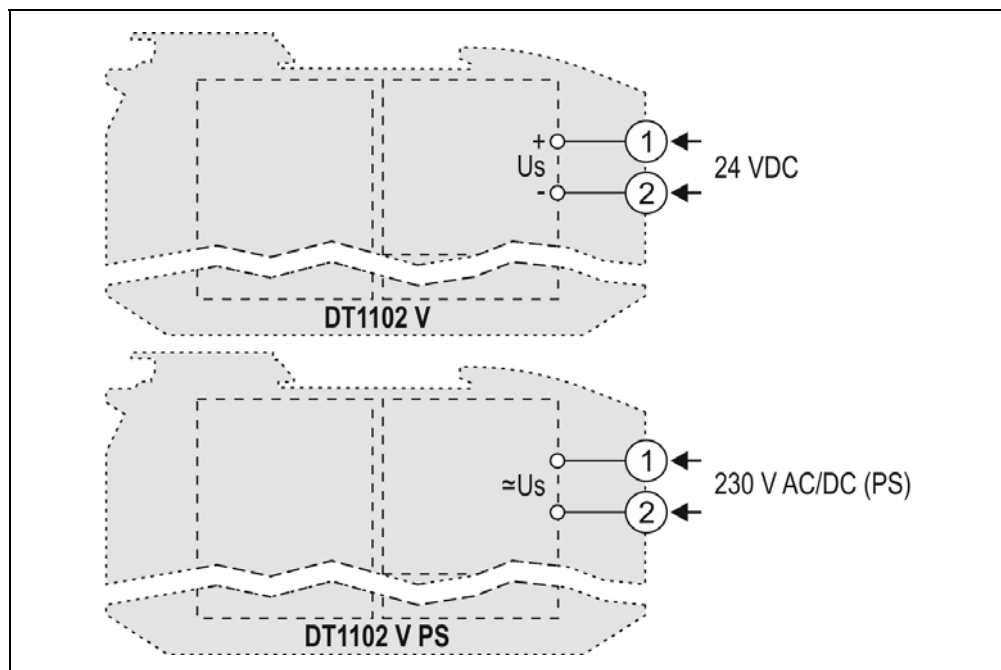
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5.6. A tápellátás csatlakoztatása a készülékhez

Az alábbi ábra mutatja a tápegység bekötését:

Bekötési rajz, tápegység csatlakoztatás
(lásd még "Alkalmazási példa")

DC tápellátás esetén a polaritás tetszőleges.

1. Lazítsa meg a sorkapocs csavarjait.
2. Helyezze az előkészített kábelvégeket a nyitott sorkapcsokba a bekötési rajz szerint.
3. Csavarja be a sorkapocs csavarjait.
4. A vezetékek határozott meghúzásával ellenőrizze a rögzítések megfelelőségét.

Csatlakoztatás ellenőrzése

Ellenőrizze a bekötés megfelelőségét
(megfelelően kötötte-e be a vezetékek, nem érnek-e össze a vezetékvégek egymással).

5.7. A készülék tápfeszültségre kapcsolása.

Put the instrument under supply voltage

After you have completed the connections, put the instrument under supply voltage. If the connection is correct the green indicator gives light and you can measure an output signal according to the measured value on the input.

5.7. Connecting to PC via USB cable

The following figure shows the USB connector on front of the instruments.
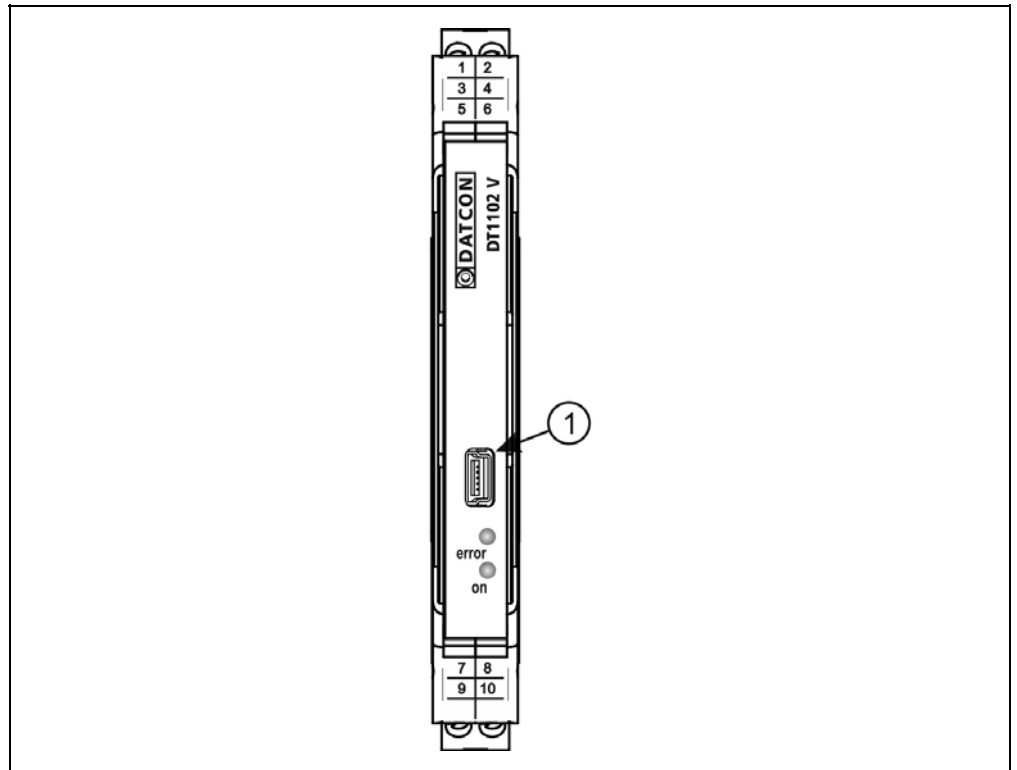
1. For the communication between PC and instruments plug the accessory USB cable (USB-B mini, 5 pins) to USB connector (1).
2. See the chapter Hiba! A hivatkozási forrás nem található. for settings.
3. After the settings unplug the USB cable from instruments.

The USB port is galvanic isolated therefore the USB cable can plugged into a grounded PC too. When USB cable connected or unplugged to instrument need not switch off the power supply.

6. The first start-up, indicators

6.1. The first start-up

After connecting the DT1102 V is ready to work with the factory default parameters.

When you are going to use other parameters you should set-up the instrument according to chapter **7. Setting-up**.

Factory default settings:

- Input signal: Current
- Input initial value: 0 mA
- Input end value: 22 mA
Used input terminals are Common (7) and Iin (8).

- Output signal: Current
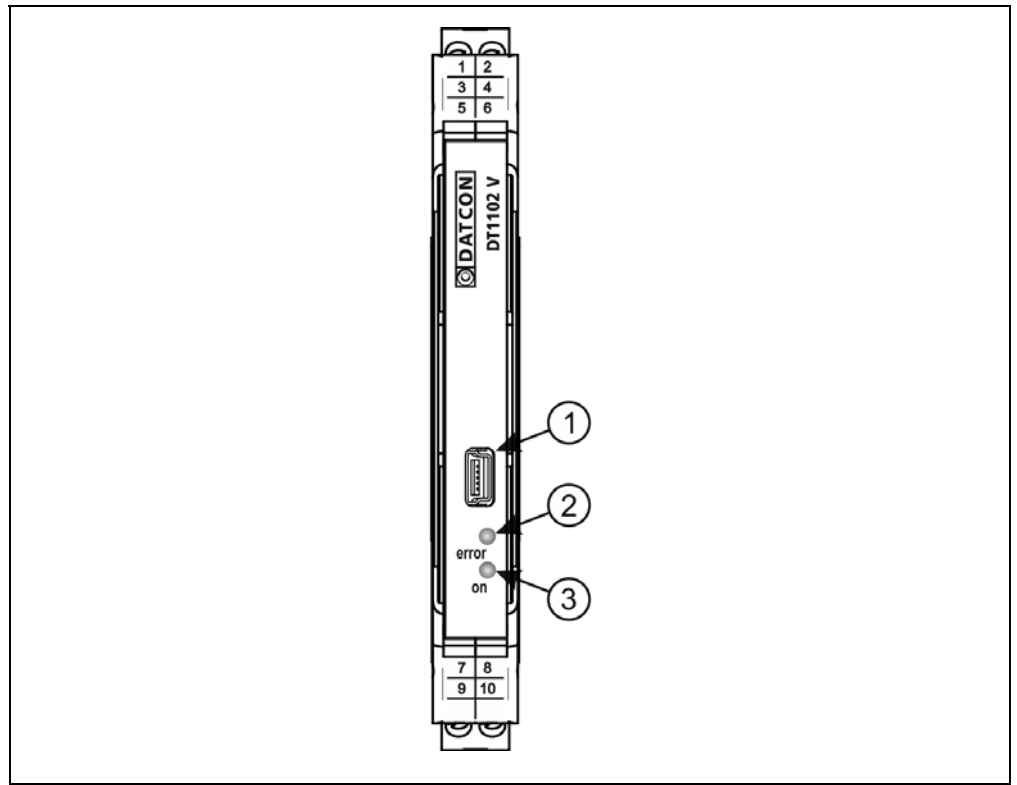- Output initial value: 0 mA
- Output end value: 22 mA
Used output terminals are -Iout (5) and +Iout (6).

The unappropriate settings or the different between settings type and used terminals type makes measurement error happen.

6.2. Indicator LED-s

The following figure shows the indicators and USB connector on the DT1102 V front panel.

(2) The blinking light of „**error**" red indicator indicates different error states.
(3) The continuous light of „**on**" green indicator indicates that the instrument is working.

• **Error state:**
"on" indicator: light, "error" indicator: blinking.
The number of blinks gives the error information:

1 blink: fatal error. (repairing: in factory service only).

4 blinks: input range error. (check the settings parameters and the value of the input signal).

5 blinks: output range error (check the settings parameters).

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7. Setting-up

7.1. First steps

Necessary tools

For setting-up you need:

• mini USB (5 pin) - USB A cable (accessory)

• DT1102V_D.exe configuration software (accessory)

• PC with Windows operation system and one free USB connector

Software

Step 1:

install the USB driver for making the virtual serial port:
- Disconnect the USB cable from instrument.
- Connect the instrument with the USB cable to the PC USB port.
- If the windows runs the device installer application then browse and select the file "DT1102 V\USB Driver\MCP2200_v1.2.inf" and install it. Another method (if the first method failed): run the application"DT1102 V\USB Driver\Driver Installation Tool\xxx\MCP2200DriverInstallationTool.exe".

Step 2:

Easy to use DT1102V_D.exe configuration software (free of charge). Simple copy it into an optional folder, click on the "Start" button and you can configure the instrument.
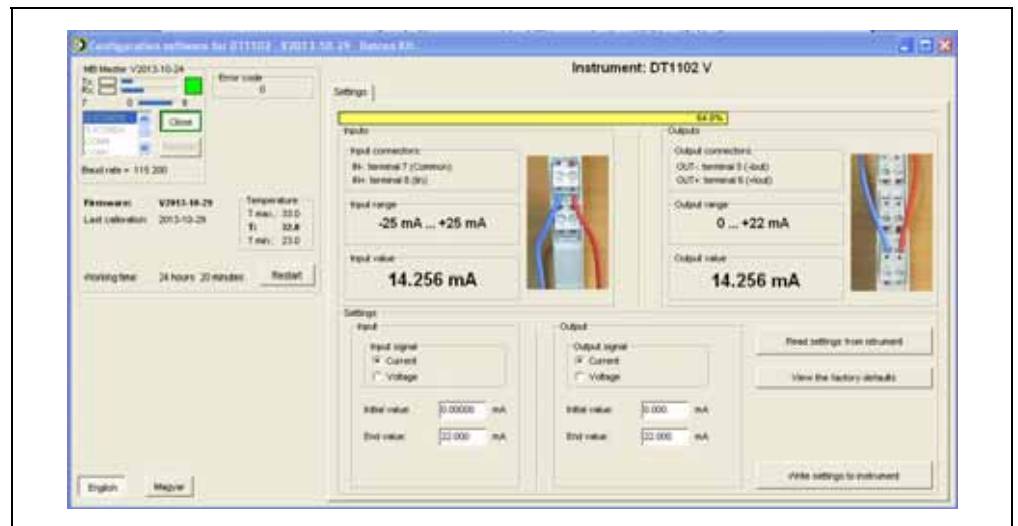
Setting-up

1. Connect the instrument with the USB cable to the PC USB port and put it under supply voltage.
2. Start the DT1102V_D.exe configuration program.
3. Select the appropriate serial port. (Baud rate must be 115200.)
4. Click on the „Open" button.
5. Use the configuration software as is written on the following pages.
6. At the end of the settings click on the
"Write settings to instrument" button, the new settings are written into the instrument.
7. Click on the „Close" button for finishing the configuration procedure and disconnect the USB cable.
8 Close DT1102V_D.exe configuration program.

The virtual serial port setting panel (for USB communication):
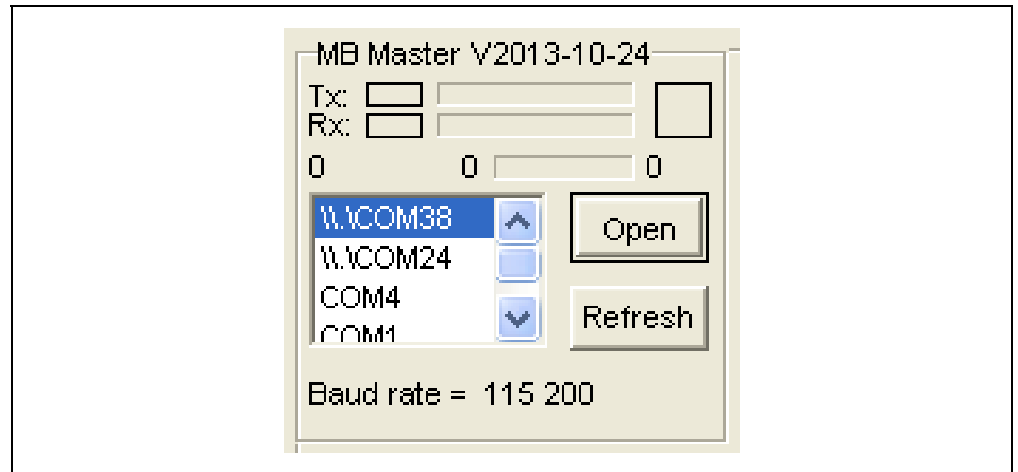
The all perspective of configuration program:

7.2. Analogue input type setting

Function
The instrument has two different inputs. The selectable input signal can be current or voltage.
[Factory default: Current input]

Sequence of operations 1. Select the appropriate input mode by clicking the button.
2. At the end of the settings click on the
"Write settings to instrument" button, the new settings are written into the instrument.

The figure shows the factory default setting.
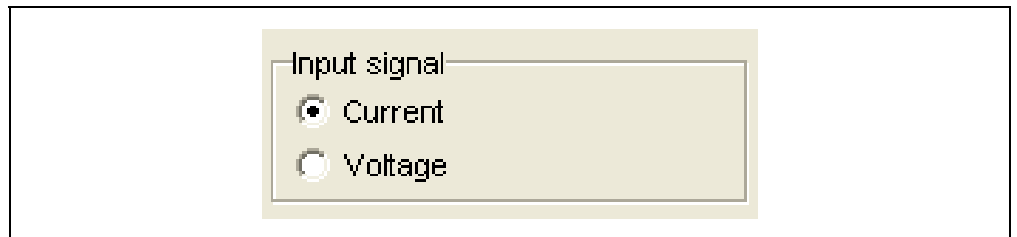
7.3. Analogue input range setting

Function   Selectable input ranges:

-25 - +25 mA @ current input
Terminals: Common (7) and Iin (8).

-2.5 - +2.5 V @ voltage 1 input
Terminals: Common (7) and Uin1 (9).

-125 - +125 V @ voltage 2 input
Terminals Common (7) and Uin2 (10).

The initial value and the end value can be set arbitrary within this range.
[Factory default: 0-22 mA]

Sequence of operations 1. Type the appropriate values into fields.
2. At the end of the settings click on the
"Write settings to instrument" button, the new settings are written into the instrument.

The figure shows the factory default setting.

| Initial value: | 0.00000 | mA |
| End value: | 22.000 | mA |

7.4. Analogue output type setting

Function
The instrument has two output connectors: current output and voltage output. The selected output must be current or voltage, can not use both. The unused connector must be unconnected.
[Factory default: Current output]

Sequence of operations
1. Select the appropriate output mode by clicking the button.
2. At the end of the settings click on the
"Write settings to instrument" button, the new settings are written into the instrument.

The figure shows the factory default setting.

Output signal
⦿ Current
◯ Voltage
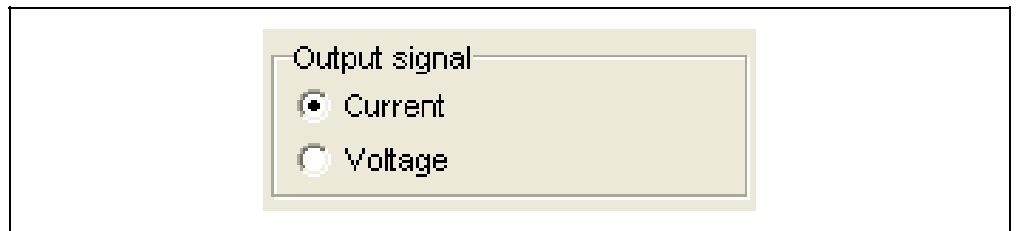
7.5. Analogue output range setting

Function

Selectable output ranges:

0-22 mA @ current output
Terminals: -Iout (5) and +Iout (6).

0-10.5 V @ voltage output
Terminals: -Uout (3) and +Uout (4).

The initial value and the end value can be set arbitrary within this range.
[Factory default: 0-22 mA]

Sequence of operations

1. Type the appropriate values into fields.
2. At the end of the settings click on the
"Write settings to instrument" button, the new settings are written into the instrument.

The figure shows the factory default setting.

| Initial value:	0.000	mA
End value:	22.000	mA

7.6. Resetting default setting

Function   In this case all the settings are deleted, and the default settings are 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.

Sequence of operations   1. Click on the „View the factory defaults" button. The default settings are appeared on fields.
2. If necessary change the settings.
3. At the end of the settings click on the

"Write settings to instrument" button, the new settings are written into the instrument.
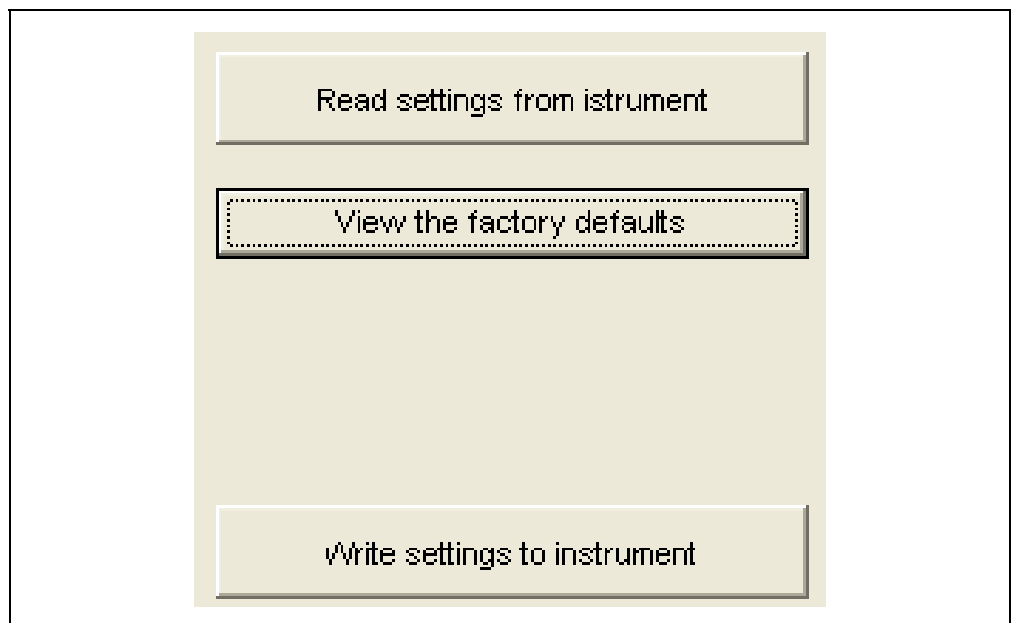
7.7. Display measured data

The program can read out and display the measured input and output values when the serial port is open.
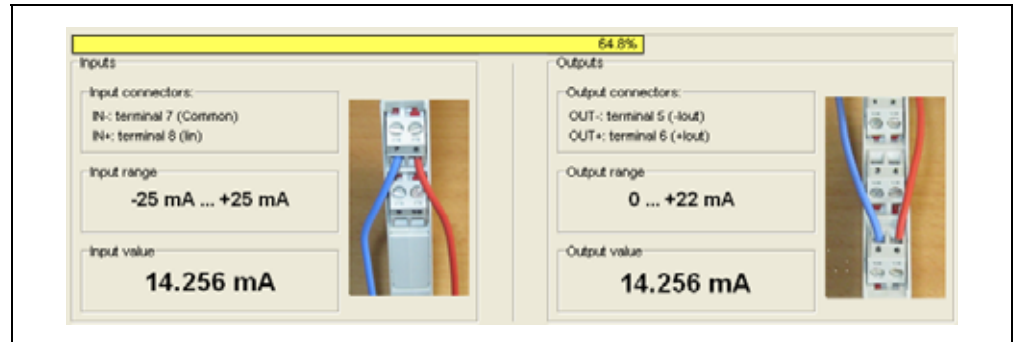
Function

7.8. Display system information

The program can read out and display the system information when the serial port is open.

Function

7.9. Display errors

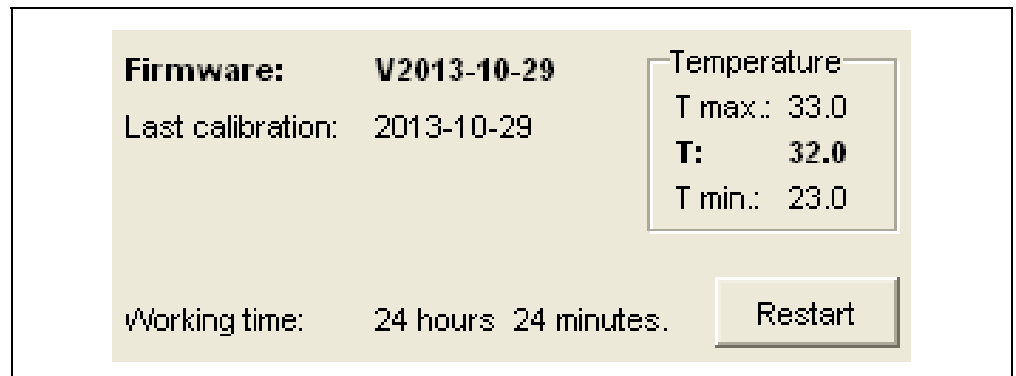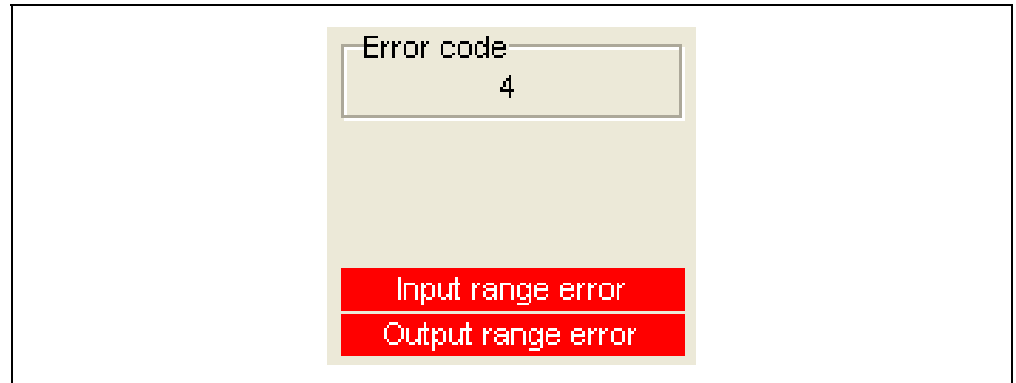The program can read out and display the error messages when the serial port is open. When the error occurs, the error message and the error code are visible.

The figure shows how visible the "Output range error" status.

Function

When the critical errors occur (Error code = 1), must call the manufacturer.

When the next errors occur:

• Input Range Error (Error code = 4): The input signal is too high (input current / voltage). Please check the transmitter which connects to the input and the input ranges.
Please read out the settings from the instruments, and check them. If you find bad setting, please fix it, and download new settings to the instrument.

• Output Range Error (Error code = 5): The output signal is too high (output current / voltage). Please check the transmitter which connects to the input and the input/output ranges.
Please read out the settings from the instruments, and check them. If you find bad setting, please fix it, and download new settings to the instrument.

8. Fault rectification

8.1. Fault finding

The fault finding must be carried out by trained and authorized personnel only!

• The green indicator is dark → check the power supply.
If the supply voltage is OK: the instrument is defective.
• There is no output signal → check the device connected to the input.
When the result of fault finding is that the DT1102 V is defective call the manufacturer service department.

8.2. Repairing

There is no user repairable part inside the instrument.
In accordance with Point **2.1.: For safety and warranty reasons, any internal work on the instrument must be carried out only by DATCON personnel.**
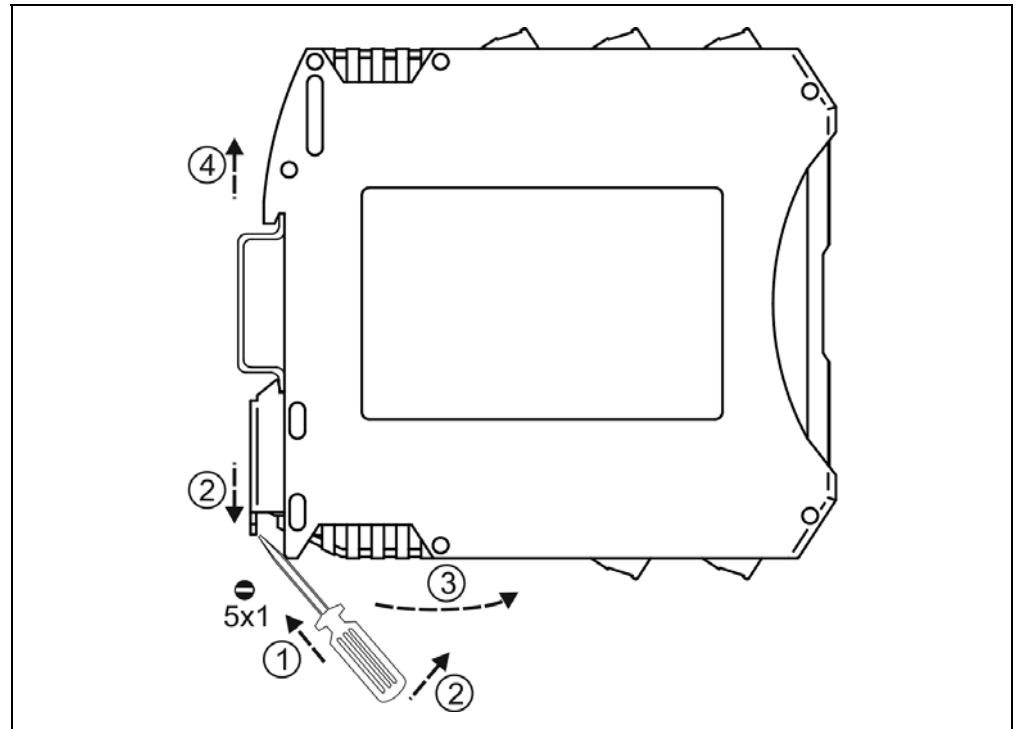
9. Dismounting

9.1. Dismounting procedure

Before dismounting take note the warnings written in chapter **5.1. Preparing the connection**.
The following figure shows the dismounting procedures.

Dismounting from the rail

The dismounting procedure needs a screwdriver for slotted screws.
1. Before dismounting switch off the power then 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 specialized recycling company.

10. Appendix

10.1. Technical specification

Input parameters	
Input signal:	DC current / DC voltage
Maximum of input ranges:	-125 - +125 V @Uin2
	-2.5 - +2.5 V @ Uin1
	-25 - +25 mA @ Iin
Overload:	150 V @ Uin2
	50 V @ Uin1
	±200 mA @ Iin
Scaling:	Linear, the range of the initial value and end value can be set arbitrary within input range.
Input resistance (Voltage inputs):	
Uin1	1.1 Mohm (Range ≤ 500 mV)
	124 kohm (Range > 500 mV)
Uin2	1 Mohm
Input resistance (Current input):	10 ohm
Error of input @ 25 ℃ ±2 ℃:	±0.05%
Temperature coefficient:	typically: 25 ppm / ℃; max.: 50 ppm / ℃
Supply-voltage effect:	practically zero

Configuration		
Input,range of input signal:	The recommended difference between initial and end value of at least (≥)	
Uin1	±200 mV	30 mV
Uin1	±500 mV	50 mV
Uin1	±2.5 V	0.2 V
Uin2	±10 V	0.5 V
Uin2	±50 V	2 V
Uin2	±125 V	6 V
Iin	±25 mA	1 mA

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Output parameters

Output signal:	DC current / DC voltage
Output ranges:	0-10.5 V (voltage output)
	0-22 mA (current output)
Limits:	10.5 V (voltage output)
	22 mA (current output)
Scaling:	Linear, the range of the initial value and end value can be specified arbitrary within output range.
Load resistance:	≥500 ohm (voltage output)
	≤600 ohm (current output)
Output resistance:	<0.2 ohm (voltage output)
	>5 Mohm (current output)
Error @ 25 ºC ±2 ºC:	±0.05%
Temperature coefficient:	tip.: 25 ppm / ºC; max.: 50 ppm / ºC
Supply-voltage effect:	practically zero
Settling time:	300 ms

Galvanic isolation

Test voltage:	2500 VDC (between input-output, input-power supply terminals)
	500 VDC (between output-power supply terminals)

Power supply

Power supply:	
DT1102 V	24 VDC ±10%, 1,2 W
DT1102 V PS	230 V AC/DC ±10%, 1,9 VA (1,3 W)
Overvoltage category:	CAT II.
Overcurrent protection:	4 A (B)

Ambient conditions

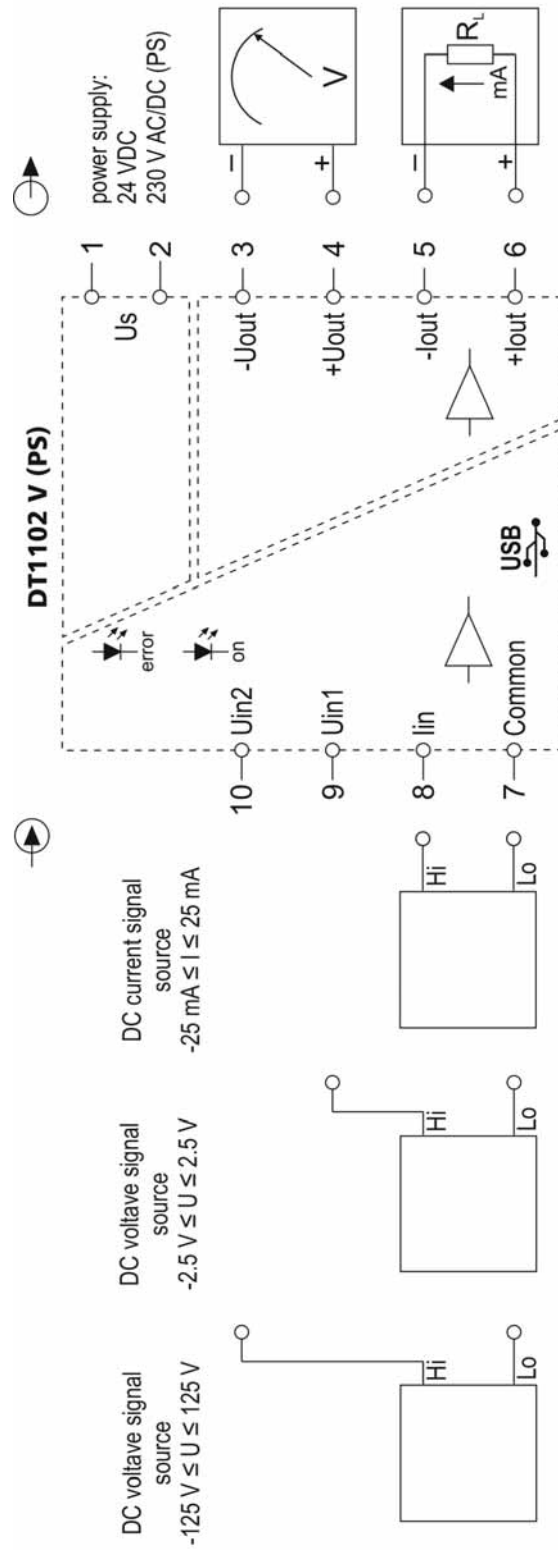|	
Operating temperature range:	0-60 °C
Storage temperature range:	-20 - +70 °C
Relative humidity:	90% (max., non-condensing)
Mounting position:	vertical (horizontal rail position)

Electromagnetic compatibility (EMC)

Accordance with the standard MSZ EN 61326-1

Immunity:	-A- criterion @ U_{in} > 100 mV
	-B- criterion @ U_{in} < 100 mV
Noise emission:	-A- class
Conducted RF Immunity (MSZ EN 61000-6-2)	10 V; 0,15–80 MHz; -A- class

General data

Housing:	TS-35 rail mounting housing material: polyamide PA6.6
Fireproof class:	V2-V0 / UL94
Connection:	Pluggable screw-terminal
Connecting cable:	1.5 mm^2 (max.)
Dimensions:	12.5 x 108 x 114 mm (width x height x depth)
Mass:	0.15 kg
Ingress Protection (MSZ EN 60529):	IP 20

The Manufacturer maintains the right to change technical data.

10.2. Application example

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INDUSTRIAL MEASUREMENT