

LD210



- Touch-screen process indicator for analogue encoders
- Two 16 bit analogue inputs $-10/0 \dots +10V$, $0/4 \dots 20mA$
- Displays input 1, input 2, or a combination of inputs (IN1+IN2, IN1-IN2, IN1xIN2, IN1/IN2)
- Digital, analogue, serial, and relay outputs
- DC / AC power supply: $18 \div 30Vdc$ or $115 \div 230 \pm 10\% Vac$

Suitable for the following models:

- LD210-P8-...
- LD210-PM-...

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The logo for Lika Electronic s.r.l. features the word "lika" in a bold, lowercase, sans-serif typeface. The letters are black and have a modern, clean appearance.

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Typographic and iconographic conventions

In this guide, to make it easier to understand and read the text the following typographic and iconographic conventions are used:

- parameters and objects both of the device and the interface are coloured in **GREEN**;
- alarms are coloured in **RED**;
- states are coloured in **FUCSIA**.

When scrolling through the text some icons can be found on the side of the page: they are expressly designed to highlight the parts of the text which are of great interest and significance for the user. Sometimes they are used to warn against dangers or potential sources of danger arising from the use of the device. You are advised to follow strictly the instructions given in this guide in order to guarantee the safety of the user and ensure the performance of the device. In this guide the following symbols are used:

	This icon, followed by the word WARNING, is meant to highlight the parts of the text where information of great significance for the user can be found: user must pay the greatest attention to them! Instructions must be followed strictly in order to guarantee the safety of the user and a correct use of the device. Failure to heed a warning or comply with instructions could lead to personal injury and/or damage to the unit or other equipment.
	This icon, followed by the word NOTE, is meant to highlight the parts of the text where important notes needful for a correct and reliable use of the device can be found. User must pay attention to them! Failure to comply with instructions could cause the equipment to be set wrongly: hence a faulty and improper working of the device could be the consequence.
	This icon is meant to highlight the parts of the text where suggestions useful for making it easier to set the device and optimize performance and reliability can be found. Sometimes this symbol is followed by the word EXAMPLE when instructions for setting parameters are accompanied by examples to clarify the explanation.

Preliminary information

This guide is designed to provide the most complete information the operator needs to correctly and safely install and operate the **LD210 touch-screen indicator** series.

LD210 touch-screen indicator is designed to interface analogue encoders.

It is equipped with two 16-bit analogue inputs and connects current (0 ... 20 mA, 4 ... 20 mA) and voltage (-10 ... +10 V, 0 ... +10 V) analogue encoders. It can show process values from input 1 or input B and even the result of a variable combination of the inputs (sum, difference, ...). Among the available functions are tare, separate totalization, linearisation over 24 interpolation points, choice of the engineering unit, sampling time setting, etc.

It features a touch screen and 8-digit plus sign graphic display with a complete set of plain text, symbols and units. The LED display is bright and provides high contrast readability and also allows the background light to turn red, green or yellow in the event of the set occurrences such as when the threshold limits are exceeded. The combination of plain text and touch screen functions make the parametrization very user-friendly and intuitive.

In the series the following models are available:

- **LD210-P8** touch-screen indicator standard version;
- **LD210-PM** provides additional 115÷230 ±10% Vac power supply;
- **LD210-...-AVI** provides additional 16-bit analogue output, four control outputs, and RS-232 / RS-485 serial interface;
- **LD210-...-DO** further offers four control outputs and RS-232 / RS-485 serial interface;
- **LD210-...-RO** is equipped with two relay outputs.

All options (-PM-, -AVI-, -DO-, -RO) can be freely combined.

For technical specifications please refer to the product datasheet.

To make it easier to read the text, this guide can be divided into two main sections.

In the first section (from section 1 to section 4) general information concerning the safety, the mechanical installation and the electrical connection.

In the second section (from section 5 to section 8) both general and specific information is given on the operator menu and the setup procedure.

Operational modes

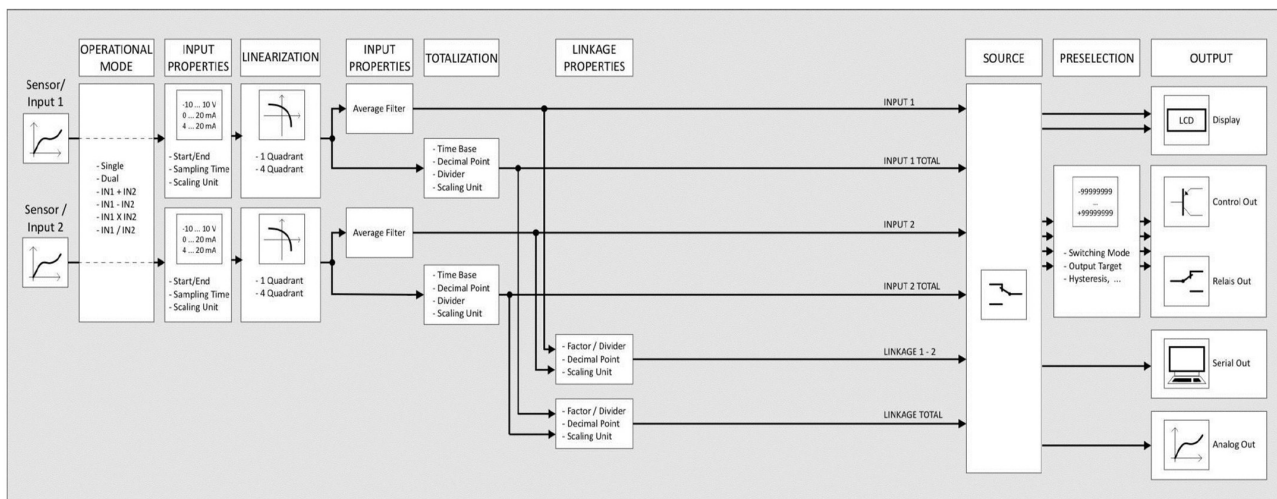
All functions can be configured in the parameter menu.

The device can be set to one of the following operation modes:

- **SINGLE** (only input A is used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Single channel operation of input 1

- DUAL (input A and input B are both used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Two channel operation of input 1 and input 2
- IN 1 + IN 2 (input A and input B are both used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Two channel operation resulting from the addition of input 1 to input 2 (sum)
- IN 1 – IN 2 (input A and input B are both used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Two channel operation resulting from the subtraction of input 2 from input 1 (difference)
- IN 1 x IN 2 (input A and input B are both used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Two channel operation resulting from the multiplication of input 1 by input 2 (multiplication)
- IN 1 / IN 2 (input A and input B are both used), see the **Operational mode** parameter in the "6.2 General menu" section on page 38.
 - Two channel operation resulting from the division of input 1 by input 2 (division)

Functional diagram



1 – Safety summary



1.1 Safety

- Always adhere to the professional safety and accident prevention regulations applicable to your country during device installation and operation;
- installation and maintenance operations have to be carried out by qualified personnel only, with power supply disconnected and stationary mechanical parts;
- device must be used only for the purpose appropriate to its design: use for purposes other than those for which it has been designed could result in serious personal and/or the environment damage;
- high current, voltage and moving mechanical parts can cause serious or fatal injury;
- warning ! Do not use in explosive or flammable areas;
- failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment;
- Lika Electronic assumes no liability for the customer's failure to comply with these requirements.



1.2 Electrical safety

- Turn OFF the power supply before connecting the device;
- connect following to the explanation in the "4 – Electrical connections" section on page 19;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, the following precautions must be taken:
 - before handling and installing the equipment, discharge electrical charge from your body and tools which may come in touch with the device;
 - power supply must be stabilized without noise; install EMC filters on device power supply if needed;
 - always use shielded cables (twisted pair cables whenever possible);
 - avoid cables runs longer than necessary;
 - avoid running the signal cable near high voltage power cables;
 - mount the device as far as possible from any capacitive or inductive noise source; shield the device from noise source if needed;
 - minimize noise by connecting the unit to ground (GND). Make sure that ground (GND) is not affected by noise. The connection point to ground can be situated both on the device side and on user's side. The best solution to minimize the interference must be carried out by the user.



1.3 Mechanical safety

- Install the device following strictly the information in the "3 – Mounting instructions" section on page 16;
- do not disassemble the unit;
- do not tool the unit;

- delicate electronic equipment: handle with care;
- do not subject the device to knocks or shocks;
- respect the environmental characteristics of the device.

1.4 Other safety instructions

This operation manual is a significant component of the unit and includes important rules and hints about the installation, function, and usage. Non-observance can result in damage and/or impairment of the functions to the unit or the machine or even in injury to persons who use the equipment!

Please read the following instructions carefully before operating the device and observe all safety and warning instructions! Keep the manual for later use.

A pertinent qualification of the respective staff is a fundamental requirement in order to use this manual. The unit must be installed, connected, and put into operation by a qualified electrician.

Liability exclusion: The manufacturer is not liable for personal injury and/or damage to property and for consequential damage, due to incorrect handling, installation, and operation. Further claims, due to errors in the operation manual as well as misinterpretations are excluded from liability.

In addition, the manufacturer reserves the right to modify the hardware, software or operation manual at any time and without prior notice. Therefore, there might be minor differences between the unit and the descriptions in the operation manual.

The raiser or positioner is exclusively responsible for the safety of the system and equipment where the unit will be integrated.

During installation or maintenance all general and also all country- and application-specific safety rules and standards must be observed.

If the device is used in processes, where a failure or faulty operation could damage the system or injure persons, appropriate precautions to avoid such consequences must be taken.

1.5 Use according to the intended purpose

The unit is intended exclusively for use in industrial machines, constructions and systems. Non-conforming usage does not correspond to the provisions and lies within the sole responsibility of the user. The manufacturer is not liable for damages which have arisen through unsuitable and improper use.

Please note that the device may only be installed in proper form and used in a technically perfect condition (in accordance to the Technical Specifications). The device is not suitable for operation in explosion-proof areas or areas which are excluded by the EN 61010-1 standard.

2 - Identification

Device can be identified through the **order code** and the **serial number** printed on the label applied to its body. Information is listed in the delivery document too. Please always quote the order code and the serial number when reaching Lika Electronic for purchasing spare parts or needing assistance. For any information on the technical characteristics of the product, refer to the technical catalogue.



Warning: devices having order code ending with "/Sxxx" may have mechanical and electrical characteristics different from standard and be supplied with additional documentation for special connections (Technical info).

3 - Mounting instructions



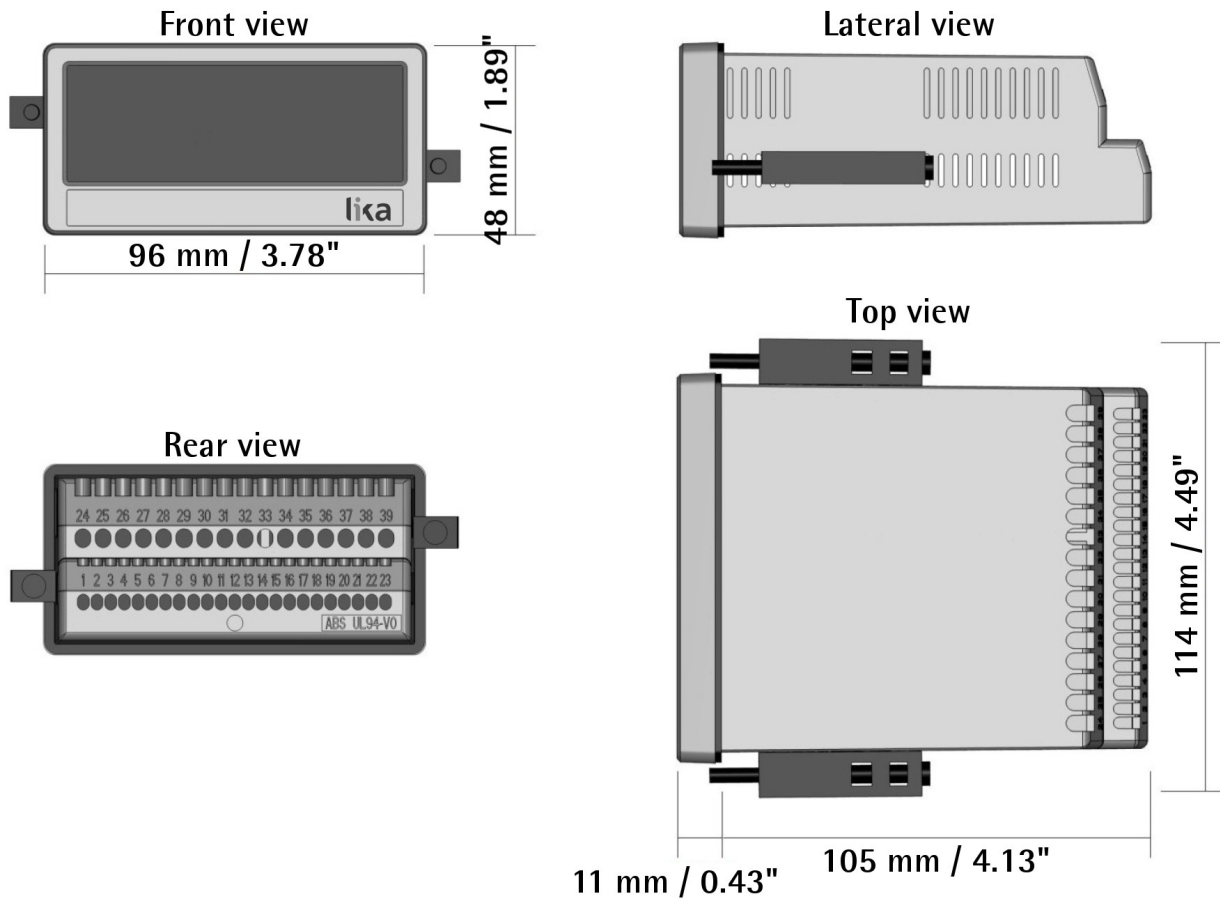
WARNING

Installation and maintenance operations have to be carried out by qualified personnel only, with power supply disconnected and mechanical parts compulsorily in stop.

3.1 Overall dimensions

Mount the display into the provided cut-out (w x h approx. 91 x 43 mm, 3.58" x 1.69") without panel clips.

Install panel clips on the display housing and screw until the unit is fixed.



Panel cut out: 91 x 43 mm (3.58" x 1.69")

3.2 Installation

The device is allowed to be installed and operated only within the permissible operating temperature range (-20°C +60°C / -4°F +140°F), non condensing. Please ensure an adequate ventilation and avoid any direct contact between the device and gases / liquids, in particular hot and aggressive gases / liquids.

Before installation or maintenance, the unit must be disconnected from all voltage sources. Furthermore it must be ensured that no danger can arise in the event of contact with the disconnected voltage sources.

Devices which are supplied by AC voltages must be connected only by means of switches or circuit breakers with low voltage circuit. The switch or circuit breaker must be installed as near as possible to the device and further indicated as separator.

Incoming as well as outgoing wires and wires for extra low voltages (ELV) must be separated from dangerous electrical cables (SELV circuits) by using double or increased insulation.

All selected wires and insulations must comply with the provided voltage and temperature ranges. Furthermore all country and application specific standards which are relevant for structure, form, and quality of the wires must be ensured. Indications about the permissible wire cross sections for wiring are described in the product datasheet.

Before starting the unit for the first time it must be ensured that all connections and wires are firmly plugged in and secured to the screw terminal blocks. All terminal blocks (including unused ones) must be fastened by turning the relevant screws clockwise up to the end position.

Overvoltages at the connections must be limited to values in accordance with the overvoltage category II.

3.3 EMC guidelines

This device is designed to provide high protection against electromagnetic interference. Nevertheless you must minimize the influence of electromagnetic noise to the device and all connected cables.

Therefore the following measures are mandatory for a successful installation and operation.

- **Use shielded cables for all signal and control input and output lines.**
- **Cables for digital controls (digital I/O, relay outputs) must not exceed a length of 30 m / 98.4 ft and are allowed for in building operation only.**
- Use shield connection clamps to connect the cable shields properly to earth.
- The wiring of the common ground lines must be star-shaped and common ground must be connected to earth at only one single point.

- The device should be mounted in a metal enclosure with sufficient distance to sources of electromagnetic noise.
- Run signal and control cables apart from power lines and other cables emitting electromagnetic noise.

3.4 Cleaning, maintenance and service notes

To clean the unit please just use a slightly damp (not wet!), soft cloth. For the rear side no cleaning is necessary. For an unscheduled, individual cleaning of the rear side the maintenance technicians or installation operators are self-responsible.

During normal operation no maintenance is necessary. In case of unexpected problems, failures or malfunctions the device must be shipped back to the manufacturer for any checking, adjustment or repair (if necessary). Unauthorized opening and repair operations can have negative effects or cause failures to the protection measures of the unit.

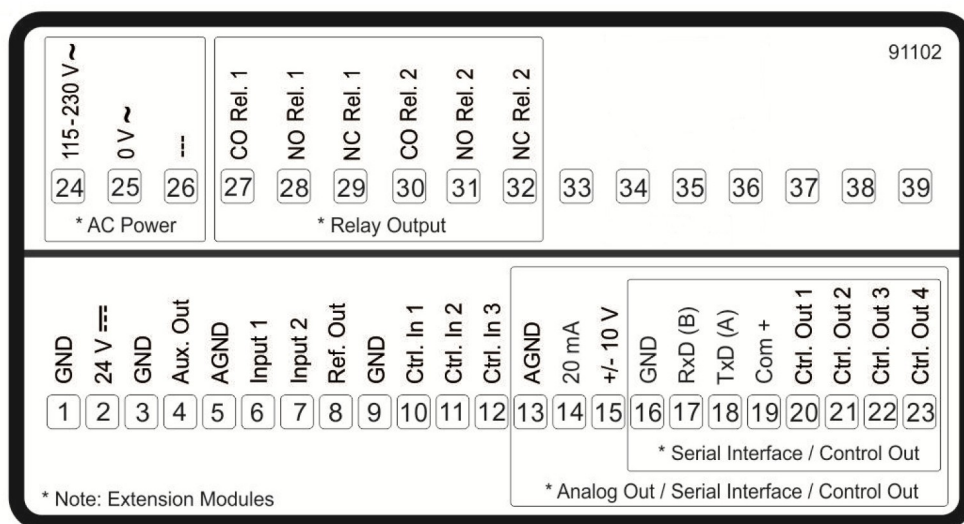
4 - Electrical connections



WARNING

Power supply must be turned off before performing any electrical connection!

The terminal block screws must be tightened using a slotted screwdriver having a 2 mm wide blade.



4.1 DC power supply

DC power supply technical specifications (-P8- order code)

Input voltage:	18Vdc ... 30Vdc
Protection circuit:	reverse polarity protection
Power consumption:	approx. 100 mA (unloaded)
Fuse protection:	external fuse T 0.5 A

The unit accepts DC supply from 18 to 30 V through terminal blocks 1 and 2. The power consumption depends on the level of the supply voltage (approx. 100 mA) and the additional current required by the Auxiliary Voltage output (3 - GND + 4 - Aux. Out, see the "4.3 Auxiliary voltage output" section on page 20).

All GND terminal blocks are internally connected.



NOTE

For AC power supply (-PM- order code) see the following section.

4.2 AC power supply (-PM- order code)

AC power supply technical specifications

Input voltage:	115Vac ... 230 Vac $\pm 10\%$ (50÷60Hz)
Power consumption:	approx. 3 VA (unloaded)
Fuse protection:	external fuse T 0.1 A

The unit with -PM- order code also accepts AC power supply from 115 V to 230 V $\pm 10\%$ through terminal blocks 24 and 25. The power consumption depends on the level of the supply voltage (approx. 3 VA) and the additional current required by the Auxiliary Voltage output (3 – GND + 4 – Aux. Out, see the "4.3 Auxiliary voltage output" section below).



NOTE

Devices with -PM- order code can also be supplied with a DC voltage between 18 V and 30 V through terminals 1 and 2, see the previous "4.1 DC power supply" section.

4.3 Auxiliary voltage output

Auxiliary voltage output technical specifications

DC version:	Approx. 1 V lower than the power supply voltage
Output current:	max. 250 mA
AC version:	Approx. 24Vdc $\pm 15\%$
Output current:	150 mA up to 45°C (+113°F) / 80 mA when more than 45°C (+113°F)

Terminal blocks 3 and 4 provide an auxiliary output useful for supplying sensors and encoders.

The output voltage level depends on the power supply.

DC version	AC version
The encoder voltage is approx. 1 V lower than the power supply voltage at terminal blocks 1 and 2 and should be loaded with max. 250 mA.	The encoder voltage is 24 Vdc ($\pm 15\%$) and should be loaded with max. 150 mA up to 45°C. At higher temperature the maximum output current is reduced to 80 mA.

4.4 Analogue inputs

Analogue inputs technical specifications

Number of inputs:	2
Configuration:	Current or voltage operation
Current input:	0 ... 20 mA / 4 ... 20 mA ($R_i \approx 100 \text{ Ohm}$)
Voltage input:	-10 ... +10 V / 0 ... +10 V ($R_i \approx 33 \text{ kOhm}$)
Resolution:	16 bits
Accuracy:	$\pm 0.1\%$

The unit provides two 16-bit analogue inputs through terminal blocks 6 and 7. The reference potential (AGND) for the analogue inputs is connected at terminal block 5.

The characteristics of the analogue inputs (voltage input or current input) can be set in the **IN 1 Properties** and the **IN 2 Properties** menus, see the "6.3 IN 1 Properties menu" section on page 40 and the "6.6 IN 2 Properties menu" section on page 50 respectively.

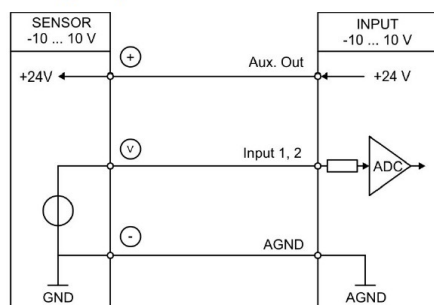


WARNING

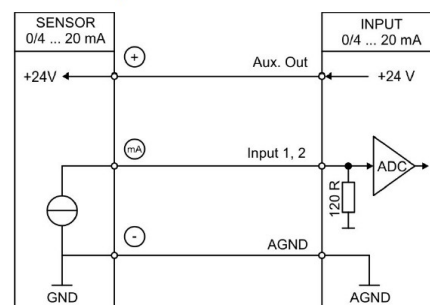
The characteristics of the inputs (voltage level or current level) must be set before connecting the encoder!

4.4.1 Wiring of the analogue inputs

Voltage input



Current input



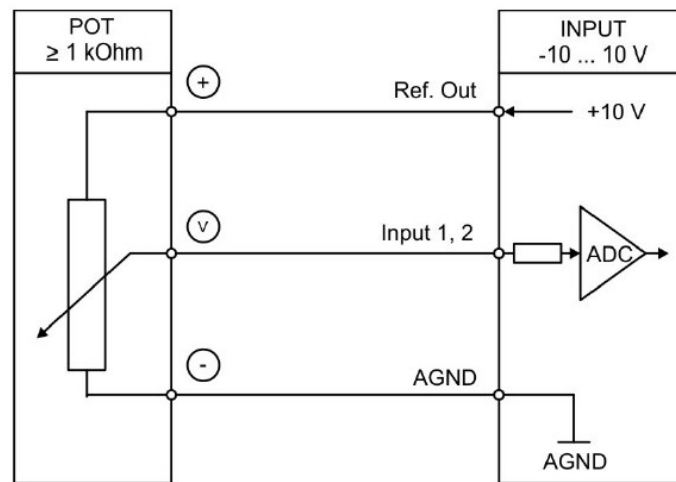
4.5 Reference output

Reference output technical specifications

Output voltage	10 V
Accuracy:	$\pm 0.1\%$
Load:	max. 10 mA

The unit provides a 10 V reference output through terminal block 8. The output should be loaded with max. 10 mA. This reference output can be used to connect a potentiometer.

4.5.1 Wiring of the reference output with potentiometer



4.6 Control inputs

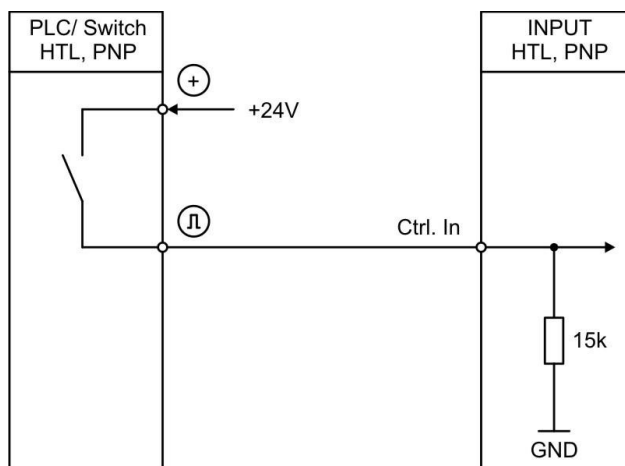
Control inputs technical specifications

Number of inputs:	3
Format:	HTL, PNP (Low = 0 ... 3 V, High = 9 ... 30 V)
Frequency:	max. 1 kHz
Reaction time:	1 ms
Load:	max. 2 mA at 24Vdc

The three control inputs at terminal blocks 10, 11, and 12 have HTL PNP characteristics.

In the **Command** menu (see the "6.17 Command menu" section on page 81) the operation of the control inputs can be set. The available functions are: reset the display value, display switching, locking the touch screen, or release the lock function of the control or relay outputs.

4.6.1 Wiring of the control inputs



Unconnected control inputs are always "LOW".

All inputs are designed to receive impulses from an electronic impulse source.



4.6.2 Note about mechanical switching contacts

When, exceptionally, mechanical contacts are used, please connect an external capacitor between GND (-) and the corresponding input (+). A capacity of 10 μ F will reduce the input frequency to 20 Hz and miscounting due to contact bouncing will be eliminated.

4.7 Analogue output (-AVI- order code)

Analogue output technical specifications

Configuration:	Current or voltage operation
Voltage output (0):	-10 V ... +10 V (max. 2 mA)
Current output (1):	0 ... 20 mA (burden: max. 270 Ohm)
Current output (2):	4 ... 20 mA (burden: max. 270 Ohm)
Resolution:	16 bits
Accuracy:	±0.15% -20°C ... 0°C / -4°F ... +32°F ±0.1% 0°C ... +45°C / +32°F ... +113°F ±0.15% +45°C ... +60°C / +113°F ... +140°F
Reaction time:	< 10 ms

A 16 bit analogue output is available through terminal blocks 13 and 14 / 15. It can be configured and scaled in the **Analog OUT** menu, see the "6.16 Analog OUT menu" section on page 78.

The following configurations are available (see the **Analog format** parameter on page 78):

- 0** Voltage output: -10 V ... +10 V
- 1** Current output: 0 mA ... 20 mA
- 2** Current output: 4 mA ... 20 mA

The analogue output is proportional to the reference source and is referenced to potential AGND.
AGND and GND are internally connected.



WARNING

Voltage and current outputs of the analogue output cannot be operated simultaneously.

4.8 Serial interface (-AVI- and -DO- order codes)

Serial interface technical specifications

Format:	RS-232 (-AVI1- e -DO1-) or RS-485 (-AVI2- e -DO2-)
Baud rate:	9,600, 19,200, and 38,400 baud

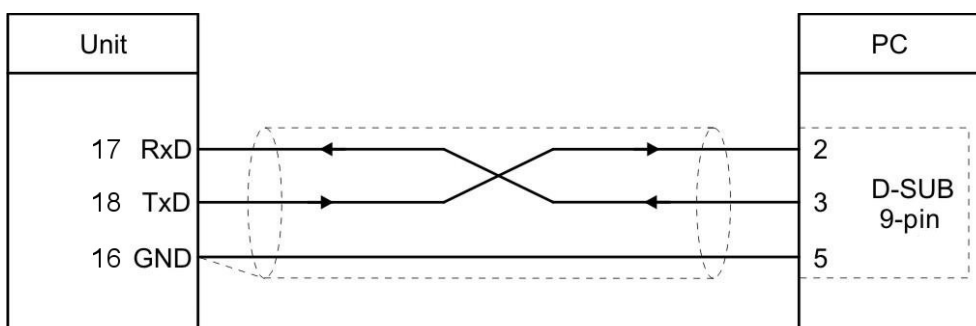
A serial interface (RS-232 / RS-485) is available through terminal blocks 16, 17, and 18.

It can be configured in the **Serial** menu, see the "6.15 Serial menu" section on page 75.

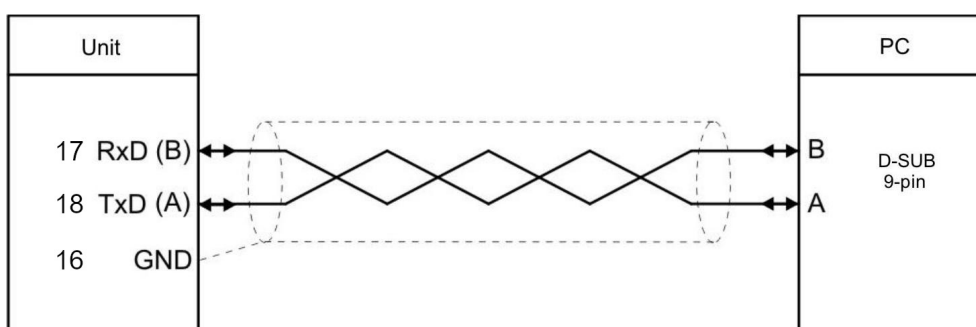
The RS-232 / RS-485 serial interface can be used:

- for easy setup and commissioning of the unit
- to modify settings and parameters during operation
- to read out internal states and current measuring values via PC or PLC

The following drawing shows the RS-232 connection to a PC by using a standard D-Sub 9-pin connector:



The following drawing shows the RS-485 connection to a PC by using a standard D-Sub 9-pin connector:



4.9 Control outputs (-AVI- and -DO- order codes)

Control outputs technical specifications

Number of outputs:	4
Format / level:	5 ... 30 V (depending on the voltage level provided to terminal block 19 - COM+), PNP
Output current:	max. 200 mA
Reaction time:	< 1 ms

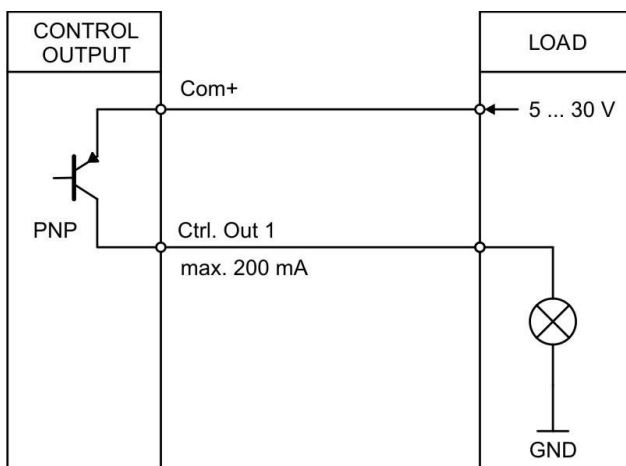
Four control outputs are available at terminal blocks 20, 21, 22, and 23 (+ terminal block 19 for switching voltage).

The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" sections on pages 65, 69, 71 and 73 respectively. The outputs "20 - Ctrl. Out 1", "21 - Ctrl. Out 2", "22 - Ctrl. Out 3" and "23 - Ctrl. Out 4" are fast PNP outputs with a switching capability of 5÷30 V / 200 mA per channel. The switching states are displayed (display with unit and status bar) as **C1** ... **C4**, see the "5 - Display and touch screen" section on page 28.

The switching voltage of the outputs must be applied to input terminal block 19 (COM+).

In case of switching inductive loads it is advisable to use an external filtering of the coils.

4.9.1 Wiring of the control outputs



4.10 Relay outputs (-RO order code)

Relay outputs technical specifications

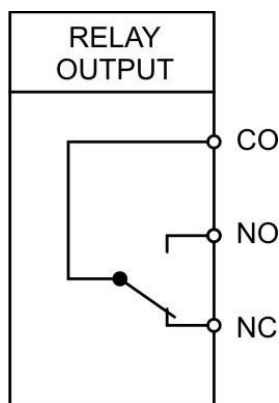
Number of outputs:	2
Configuration:	potential-free changeovers
AC switching capacity:	max. 250 Vac / 3 A / 750 VA
DC switching capacity:	max. 150 Vdc / 2 A / 50 W
Reaction time:	< 20 ms

Two relay outputs with potential-free changeover contacts are available at terminal blocks 27, 28, 29 and 30, 31, 32. The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" sections on pages 65, 69, 71 and 73 respectively. The switching states are displayed (display with unit and status bar) as **K1** and **K2**, see the "5 - Display and touch screen" section on page 28.

AC switching capacity max. 250 Vac / max. 3 A / 750 VA

DC switching capacity max. 150 Vdc / max. 2 A / 50 W

4.10.1 Wiring of the relay outputs



5 – Display and touch screen

5.1 Screen structure for parametrization

Menus and parameters are described in the "6 – Menus and parameters" section on page 32.



Start setup procedure

To enter the menus and edit the parameters, keep the touchscreen pressed for 3 seconds.



Selection of the menu

Select the menu by pressing the arrow keys and confirm the choice by pressing the **ok** key.

You can exit the selection of the menu by pressing the **C** key.



Selection of the parameter

Select the parameter by pressing the arrow keys and confirm the choice by pressing the **ok** key.

You can exit the selection of the parameter by pressing the **C** key.



Parameter setting:

After selection, the parameter (or its last digit) starts blinking. Set the parameter by pressing the **up** and **down** arrow keys, shift the cursor by pressing the **left** and **right** arrow keys and save the value by pressing the **ok** key.

You can exit the editing of the parameter by pressing the **C** key.

Parameter changes become active only after closing the selection of the menu.

5.2 Screen structure during operation

The following screens are available during operation. Depending on the device version and the selected operation mode, not all displays will be shown. The sources (IN 1, IN 2 ...) for the single channel display and the two channel display are defined in the **Display** menu, see the "6.18 Display menu" section on page 84.



Single line display with unit and status bar

To switch to the next display, press the touch screen.



Two line display

To switch to the next display, press the top half of the screen.



Two line display with units

To switch to the next display, press the top half of the screen.




Large display (4 digits)

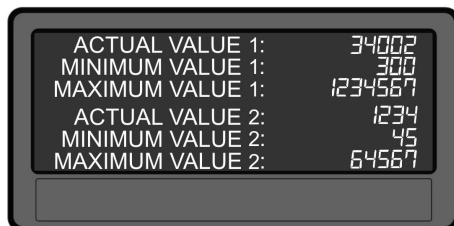
To switch to the next display, press the top half of the screen. It is available only if the **Large display** parameter is activated (see on page 86).



Display for quick start of the preselection values setting process (see the "6.10 Preselection values menu" section on page 63)

To switch to the next display, press the top half of the screen or the  key.

It is available only with AVI, DO, and RO order codes.

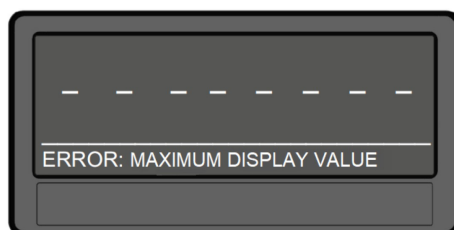


Display with current, minimum, and maximum values of input 1 and input 2.

To switch to the next display, press the touch screen.

5.3 Error messages

The error messages described hereafter are reset automatically as soon as the corresponding display value is within the allowed range.



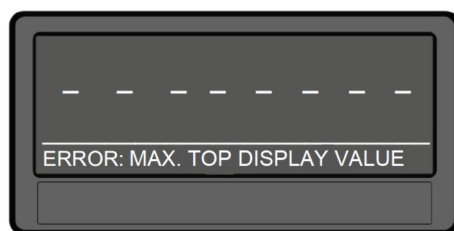
ERROR: MAXIMUM DISPLAY VALUE

The display value of the single line display is greater than +99 999 999



ERROR: MINIMUM DISPLAY VALUE

The display value of the single line display is less than -99 999 999



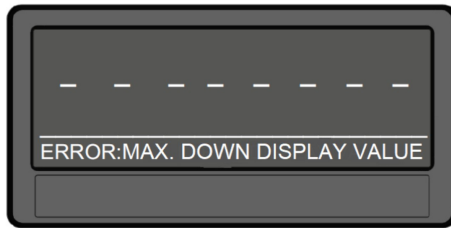
ERROR: MAX. TOP DISPLAY VALUE

Top display value of the two line display is greater than +99 999 999



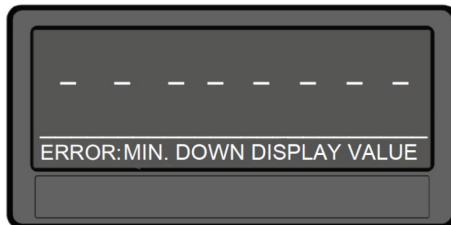
ERROR: MIN. TOP DISPLAY VALUE

Top display value of the two line display is less than -99 999 999



ERROR: MAX. DOWN DISPLAY VALUE

Down display value of the two line display is greater than +99 999 999



ERROR: MIN. DOWN DISPLAY VALUE

Down display value of the two line display is less than -99 999 999



ERROR: MAX. LARGE DISPLAY VALUE

The display value of the large display is greater than +9999



ERROR: MIN. LARGE DISPLAY VALUE

The display value of the large display is less than -999



NOTE

The error messages described above are automatically reset as soon as the corresponding display value is within the representable range.

6 – Menus and parameters

The device can be parametrized either via touch screen or via serial interface through a pc and the OS operating software.

6.1 Overview of the structure

The following tables offer an overview of the menus and their relevant parameters. The menu names are printed in bold and the associated parameters are listed under the menu name. Depending on the device model and the selected operation mode, only the available menus / parameters are shown.



NOTE

In the pages that describe the menus, the default values are highlighted with grey background.

General menu , see the "6.2 General menu" section on page 38
Operational mode , see on page 38
Pin preselection , see on page 38
Pin parameter , see on page 38
Back up memory , see on page 39
Factory settings , see on page 39

IN 1 Properties menu , see the "6.3 IN 1 Properties menu" section on page 40
Configuration , see on page 40
Start value , see on page 40
End value , see on page 40
Decimal point , see on page 40
Scale units , see on page 41
Sampling time (s) , see on page 42
Average filter , see on page 42
Offset , see on page 43
Linearization , see on page 43
Totalization , see on page 43

It is only available if the **Linearization** parameter in the **IN 1 Properties** menu (see on page 43) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

IN 1 Linearization menu , see the "6.4 IN 1 Linearization menu" section on page 44

P1(X), see on page 44
...
P24(X), see on page 44
P1(Y), see on page 44
...
P24(Y), see on page 44

It is only available if the **Totalization** parameter in the **IN 1 Properties** menu (see on page 43) is set to "YES".

IN 1 Totalization menu , see the "6.5 IN 1 Totalization menu" section on page 47
Time base , see on page 47
Divider , see on page 47
Decimal point , see on page 48
Scale units , see on page 48

It is only available if the **Operational mode** parameter in the **General** menu (see on page 38) is set to any dual channel mode.

IN 2 Properties menu , see the "6.6 IN 2 Properties menu" section on page 50
Configuration , see on page 50
Start value , see on page 50
End value , see on page 50
Decimal point , see on page 50
Scale units , see on page 51
Sampling time (s) , see on page 52
Average filter , see on page 52
Offset , see on page 53
Linearization , see on page 53
Totalization , see on page 53

It is only available if the **Operational mode** parameter in the **General** menu (see on page 38) is set to any dual channel mode. Furthermore it is only available if the **Linearization** parameter in the **IN 2 Properties** menu (see on page 53) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

IN 2 Linearization menu , see the "6.7 IN 2 Linearization menu" section on page 54

P1(X), see on page 54
...
P24(X), see on page 54
P1(Y), see on page 54
...
P24(Y), see on page 54

It is only available if the **Operational mode** parameter in the **General** menu (see on page 38) is set to any dual channel mode. Furthermore it is only available if the **Totalization** parameter in the **IN 2 Properties** menu (see on page 53) is set to "YES".

IN 2 Totalization menu , see the "6.8 IN 2 Totalization menu" section on page 57
Time base , see on page 57
Divider , see on page 58
Decimal point , see on page 58
Scale units , see on page 58

It is only available if the **Operational mode** parameter in the **General** menu (see on page 38) is set to any dual channel mode.

Linkage properties menu , see the "6.9 Linkage Properties menu" section on page 60
Factor , see on page 60
Divider , see on page 60
Additive value , see on page 60
Decimal point , see on page 61
Scale units , see on page 61

It is only available for devices with order codes AVI, DO or RO.

Preselection values menu , see the "6.10 Preselection values menu" section on page 63
Preselection 1 , see on page 63
Preselection 2 , see on page 63
Preselection 3 , see on page 63
Preselection 4 , see on page 64

It is only available for devices with order codes AVI, DO or RO.

Preselection 1 menu , see the "6.11 Preselection 1 menu" section on page 65
Source 1 , see on page 65
Mode 1 , see on page 65
Hysteresis 1 , see on page 67
Pulse time 1 (s) , see on page 67
Output target 1 , see on page 67
Output polarity 1 , see on page 67
Output lock 1 , see on page 68
Start up delay 1 (s) , see on page 68
Event color 1 , see on page 68

It is only available for devices with order codes AVI, DO or RO.

Preselection 2 menu , see the "6.12 Preselection 2 menu" section on page 69
Source 2 , see on page 69
Mode 2 , see on page 69
Hysteresis 2 , see on page 69
Pulse time 2 (s) , see on page 69
Output target 2 , see on page 69
Output polarity 2 , see on page 70
Output lock 2 , see on page 70
Start up delay 2 (s) , see on page 70
Event color 2 , see on page 70

It is only available for devices with order codes AVI, DO or RO.

Preselection 3 menu , see the "6.13 Preselection 3 menu" section on page 71
Source 3 , see on page 71
Mode 3 , see on page 71
Hysteresis 3 , see on page 71
Pulse time 3 (s) , see on page 71
Output target 3 , see on page 71
Output polarity 3 , see on page 72
Output lock 3 , see on page 72
Start up delay 3 (s) , see on page 72
Event color 3 , see on page 72

It is only available for devices with order codes AVI, DO or RO.

Preselection 4 menu , see the "6.14 Preselection 4 menu" section on page 73
Source 4 , see on page 73
Mode 4 , see on page 73
Hysteresis 4 , see on page 73
Pulse time 4 (s) , see on page 73
Output target 4 , see on page 73
Output polarity 4 , see on page 74
Output lock 4 , see on page 74
Start up delay 4 (s) , see on page 74
Event color 4 , see on page 74

It is only available for devices with order codes AVI and DO.

Serial menu , see the "6.15 Serial menu" section on page 75
Unit number , see on page 75
Serial baud rate , see on page 75
Serial format , see on page 75
Serial init , see on page 76
Serial protocol , see on page 76
Serial timer (s) , see on page 77
Serial value , see on page 77
MODBUS , see on page 77

It is only available for devices with order code AVI.

Analog OUT menu , see the "6.16 Analog OUT menu" section on page 78
Analog source , see on page 78
Analog format , see on page 78
Analog start , see on page 79
Analog end , see on page 79
Analog gain (%) , see on page 79
Analog offset % , see on page 79

Command menu , see the "6.17 Command menu" section on page 81
Input 1 action , see on page 81
Input 1 config. , see on page 83
Input 2 action , see on page 83
Input 2 config. , see on page 83
Input 3 action , see on page 83
Input 3 config. , see on page 83

Display menu , see the "6.18 Display menu" section on page 84
Start display , see on page 84
Source single , see on page 84
Source dual top , see on page 85
Source dual down , see on page 85
Large display , see on page 86
Source large , see on page 86
Color , see on page 87
Brightness , see on page 87
Contrast , see on page 88
Screen saver , see on page 88
Up-date-time , see on page 88
Font , see on page 88

6.2 General menu

The default values are highlighted with grey background.

Operational mode

This parameter allows to set the desired measuring function.

0	SINGLE	Single channel mode, only input 1 is used
1	DUAL	Dual channel mode, input 1 and input 2 are used in a separate way
2	IN 1 + IN 2	Dual channel mode, input 1 is added to input 2 (sum)
3	IN 1 - IN 2	Dual channel mode, input 2 is subtracted from input 1 (difference)
4	IN 1 x IN 2	Dual channel mode, input 1 is multiplied by input 2 (multiplication)
5	IN 1 / IN 2	Dual channel mode, input 1 is divided by input 2 (division)

Pin preselection

This parameter allows to set the PIN code to lock the quick start of the **Preselection values** menu used to enter the preselection values, see the "5.2 Screen structure during operation" section on page 29. Refer also to the "6.10 Preselection values menu" section on page 63. The Master PIN is 6079.

This lock function is only useful if used along with the lock function set in the **Pin parameter**.

0000	No lock
...	
9999	Access after entering PIN Code 9999

Pin parameter

This parameter sets the PIN code for the lock function of all parameters. The Master PIN is 6079.

0000	No lock
...	
9999	Parametrization of the unit after entering PIN code 9999

Back up memory

0	NO	No memory backup following a power failure
1	YES	Backup memory following a power failure, the current values will be saved, only by totalization

Factory settings

At any time you can return all settings to the factory default values. Default values are highlighted with grey background in this manual.



WARNING

This action will reset all parameters to factory default values and customised settings will be lost. After reset you will have to repeat your individual set-up procedure.

0	NO	No default values are loaded
1	YES	Load default values of all parameters

6.3 IN 1 Properties menu

The **IN 1 Properties** menu is used to configure the characteristics of the input 1.

Configuration

This parameter sets the characteristics of the analogue input 1.

0	-10 ... 10 V	-10 V ... +10 V
1	0 ... 20 mA	0 mA ... 20 mA
2	4 ... 20 mA	4 mA ... 20 mA

Start value

This parameter sets the display value for an analogue input 1 signal of 0 V or 0 mA or 4 mA. Signal values between **Start value** and **End value** behave proportionally.

-99999	Smallest start value
00000	Default value
+99999	Highest start value

End value

This parameter sets the display value for an analogue input 1 signal of +10 V or 20 mA. Signal values between **Start value** and **End value** behave proportionally.

-99999	Smallest end value
+10000	Default value
+99999	Highest end value

Decimal point

It sets the position of the decimal point.

0	NO	No decimal point
1	0000000.0	Decimal point placed in the specified position
2	000000.00	Decimal point placed in the specified position
3	00000.000	Decimal point placed in the specified position
4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position

7	0.0000000	Decimal point placed in the specified position
---	-----------	--

Scale units


This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is to be intended as a label. The number of decimal places must be set in the **Decimal point** parameter.

0	V	
1	mV	
2	A	
3	mA	
4	km/h	
5	mph	
6	feet/min	
7	inch/min	
8	g	
9	kg	
10	oz	
11	W	
12	kW	
13	VA	
14	mm	
15	cm	
16	m	
17	inch	
18	feet	
19	C	
20	F	
21	K	
22	1/sec	
23	1/min	
24	1/h	
25	gal/min	
26	Pa	
27	kPa	
28	%	


29


Edit unit

A customized measuring unit with up to 16 digits can be edited using this parameter.

When you press the  key the **Edit Unit** menu appears.

A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).

Press the  key to save the **Edit Unit** menu.

Press the  key to close the **Edit Unit** menu.

	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	{		}	~	

Sampling time (s)

It allows to set the sampling interval. This time interval sets the time between the single samples of the analogue signals. It directly affects the response time of the unit. The value is expressed in seconds (s).

0.0010	Shortest Sampling time
00.010	Default value
60.000	Longest Sampling time

Average filter

Selectable average filter function to avoid measuring fluctuations.

0	OFF	No average value will be created
1	2 cycle average	Floating average within 2 cycles
2	4 cycle average	Floating average within 4 cycles
3	8 cycle average	Floating average within 8 cycles
4	16 cycle average	Floating average within 16 cycles

Offset

This parameter allows to set the zero offset / tare of input 1.

This parameter does not affect the totalization function, see the "6.5 IN 1 Totalization menu" section on page 47.

-99.999	Smallest offset value
00000	Default value
+99.999	Highest offset value

Linearization

This parameter activates and sets the linearisation function. See the "6.4 IN 1 Linearization menu" section on page 44 and the "6.4.1 Description of the linearisation function" section on page 44.

0	OFF	No linearisation
1	1 QUADRANT	Linearisation using 1 quadrant (see on page 44).
2	4 QUADRANT	Linearisation using 4 quadrants (see on page 44).

Totalization

This parameter activates the totalization function. The totalization function is directly affected by the set operational mode (see the **Operational mode** parameter on page 38). For complete information please refer to the "6.5 IN 1 Totalization menu" section on page 47.

0	OFF	No totalization
1	ON	Totalization is active (see on page 47).

6.4 IN 1 Linearization menu

The linearisation function is configured in this menu. This menu is displayed only if the **Linearization** parameter in the **IN 1 Properties** menu (see on page 43) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT"; if 0 – OFF option is set, the **IN 1 Linearization** menu does not appear.

For a complete description of the linearisation function and some examples refer to the "6.4.1 Description of the linearisation function" section below.

P1(X)

...

P24(X)

X-coordinate of the first P1 ... last P24 linearisation point.

This value represents the display value the unit shows on the display without linearisation.

-99999999	Smallest X-coordinate
00000000	Default value
+99999999	Largest X-coordinate

P1(Y)

...

P24(Y)

Y-coordinate of the first P1 ... last P24 linearisation point.

This is the display value the unit will show on the display after linearisation.



EXAMPLE

P2(X) parameter value will be replaced by **P2(Y)** parameter value.

-99999999	Smallest Y-coordinate
00000000	Default value
+99999999	Largest Y-coordinate

6.4.1 Description of the linearisation function

The linearisation function allows to convert a linear input signal into a non-linear representation (or vice versa). 24 programmable X / Y coordinates (interpolation points) are available for input 1 and input 2, they can be freely arranged over the whole conversion range at any desired distance. The unit uses linear interpolation between two coordinates. Therefore it is advisable to set

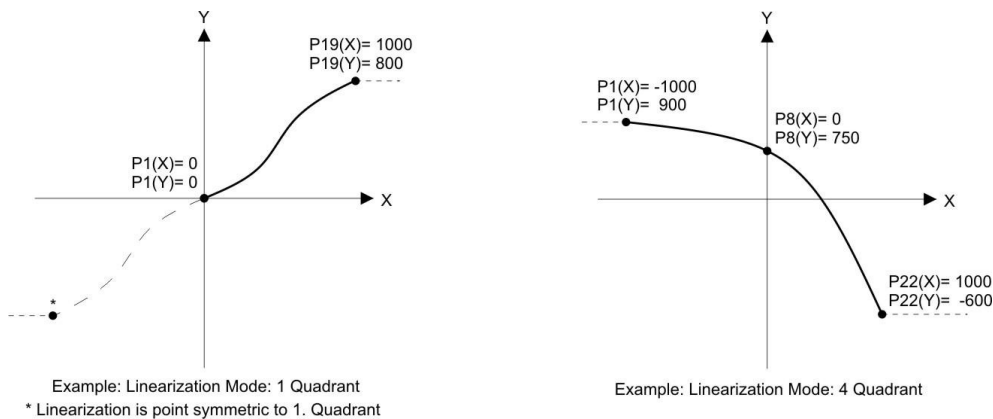
several coordinates where the curvature is greater and only few coordinates where the curvature is lesser.

If you need to set an individual linearisation curve, the **Linearization** parameter in the **IN 1 Properties** menu (see on page 43) must be set to either "1 - 1 QUADRANT" or "2 - 4 QUADRANT" (see the diagrams below).

The parameters **P1(X)** to **P24(X)** are used to specify the coordinates on the x-axis. These are the measuring values that the unit would normally generate according to the actual input signal.

Parameters **P1(Y)** to **P24(Y)** are the values that the unit will generate instead of the X values, i.e. for instance **P5(Y)** replaces **P5(X)** etc.

The X coordinates must use continuously increasing settings, i.e. **P1(X)** must have the lowest setting while **P24(X)** must have the highest setting (**P1(X) < P2(X) < P3(X) ... < P23(X) < P24(X)**). If the measured value is greater than the last defined X value, the corresponding Y value is displayed.



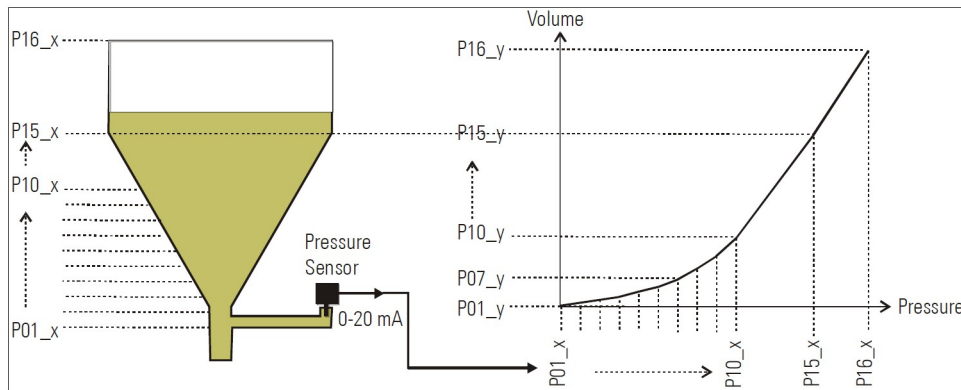
If the **Linearization** parameter in the **IN 1 Properties** menu is set to "1 - 1 QUADRANT", **P1(X)** parameter must be set to zero. Linearisation is only defined in the positive range and the negative range will be mirrored symmetrical with respect to the central point.

If the **Linearization** parameter in the **IN 1 Properties** menu is set to "2 - 4 QUADRANT", **P1(X)** parameter can be set also to a negative value. If the measured value is smaller than **P1(X)**, **P1(Y)** is displayed.



EXAMPLE

We want to display the filling quantity (volume) of a tank (see the Figure below) by using a pressure sensor mounted on the bottom of the tank. In this application, the analogue signal information about pressure is proportional to the filling level, but not to the filling quantity.



To solve the problem, we divide the non linear part of the tank into 14 sections. We set the expected display values of the pressure sensor in the **P1(X)** to **P15(X)** parameters.

For the linear part of the tank it is sufficient to set the final pressure value in the **P16(X)** parameter.

It is now possible to easily calculate the appropriate filling quantities and enter the relevant values in the **P1(Y)** to **P16(Y)** parameters.

6.5 IN 1 Totalization menu

The totalization function is configured in this menu. This menu is displayed only if the **Totalization** parameter in the **IN 1 Properties** menu (see on page 43) is set to "ON"; if "OFF" option is set the **IN 1 Totalization** menu does not appear.



NOTE

Please note that the totalization function is directly affected by the set operational mode (see the **Operational mode** parameter on page 38), according to the following table.

Operational mode	Totalization		
	INPUT 1 TOTAL	INPUT 2 TOTAL	LINKAGE TOTAL
SINGLE	active	→ 0	→ 0
DUAL	active	active	→ 0
IN 1 + IN 2	active	active	Total 1 + Total 2
IN 1 – IN 2	active	active	Total 1 – Total 2
IN 1 x IN 2	active	active	→ 0
IN 1 / IN 2	active	active	→ 0

Time base

This parameter sets the time base of the totalization value. In other words it sets the time interval between two data recordings.

0	SECONDS	The current value is added to INPUT 1 TOTAL every second.
1	MINUTES	The current value is added to INPUT 1 TOTAL every minute.
2	HOURS	The current value is added to INPUT 1 TOTAL every hour.
3	COMMAND	The current value is added to INPUT 1 TOTAL when we use the "25 – ADD TO TOTAL 1" command in order to operate the control input. For further information please refer to the Input 1 action parameter in the "6.17 Command menu" section on page 81.

Divider

This parameter allows to set the divisional factor of the totalization value.

0	1	No division
1	10	The result of the totalization is divided by 10

2	100	The result of the totalization is divided by 100.
3	1,000	The result of the totalization is divided by 1,000.

Decimal point




It sets the position of the decimal point.

0	NO	No decimal point
1	0000000.0	Decimal point placed in the specified position
2	000000.00	Decimal point placed in the specified position
3	00000.000	Decimal point placed in the specified position
4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position
7	0.0000000	Decimal point placed in the specified position

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is to be intended as a label. The number of decimal places must be set in the [Decimal point](#) parameter.

0	V	
1	mV	
2	A	
3	mA	
4	km/h	
5	mph	
6	feet/min	
7	inch/min	
8	g	
9	kg	
10	oz	
11	W	
12	kW	
13	VA	
14	mm	
15	cm	

16	m																																																																																																	
17	inch																																																																																																	
18	feet																																																																																																	
19	C																																																																																																	
20	F																																																																																																	
21	K																																																																																																	
22	1/sec																																																																																																	
23	1/min																																																																																																	
24	1/h																																																																																																	
25	gal/min																																																																																																	
26	Pa																																																																																																	
27	kPa																																																																																																	
28	%																																																																																																	
29	Edit unit	<p>A customized measuring unit with up to 16 digits can be edited using this parameter.</p> <p>When you press the  key the Edit Unit menu appears.</p> <p>A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).</p> <p>Press the  key to save the Edit Unit menu.</p> <p>Press the  key to close the Edit Unit menu.</p> <table><tr><td></td><td>!</td><td>"</td><td>#</td><td>\$</td><td>%</td><td>&</td><td>'</td><td>(</td><td>)</td><td>*</td><td>+</td><td>,</td><td>-</td><td>.</td><td>/</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>:</td><td>;</td><td><</td><td>=</td><td>></td><td>?</td></tr><tr><td>@</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>O</td></tr><tr><td>P</td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td></tr><tr><td>`</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td></tr><tr><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>{</td><td> </td><td>}</td><td>~</td><td></td></tr></table>		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
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6.6 IN 2 Properties menu

The **IN 2 Properties** menu is used to configure the characteristics of the input 2. This menu is displayed only if the **Operational mode** parameter is set to any dual channel mode (DUAL, IN 1 + IN 2, IN 1 – IN 2, IN 1 x IN 2, IN 1 / IN 2). If the SINGLE single channel mode is selected, this menu is hidden. Refer to the "6.2 General menu" section on page 38.

Configuration

This parameter sets the characteristics of the analogue input 2.

0	-10 ... 10 V	-10 V ... +10 V
1	0 ... 20 mA	0 mA ... 20 mA
2	4 ... 20 mA	4 mA ... 20 mA

Start value

This parameter sets the display value for an analogue input 2 signal of 0 V or 0 mA or 4 mA. Signal values between **Start value** and **End value** behave proportionally.

-99999	Smallest start value
00000	Default value
+99999	Highest start value

End value

This parameter sets the display value for an analogue input 2 signal of +10 V or 20 mA. Signal values between **Start value** and **End value** behave proportionally.

-99999	Smallest end value
+10000	Default value
+99999	Highest end value

Decimal point

It sets the position of the decimal point.




0	NO	No decimal point
1	0000000.0	Decimal point placed in the specified position
2	000000.00	Decimal point placed in the specified position
3	00000.000	Decimal point placed in the specified position

4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position
7	0.0000000	Decimal point placed in the specified position

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is to be intended as a label. The number of decimal places must be set in the **Decimal point** parameter.

0	V	
1	mV	
2	A	
3	mA	
4	km/h	
5	mph	
6	feet/min	
7	inch/min	
8	g	
9	kg	
10	oz	
11	W	
12	kW	
13	VA	
14	mm	
15	cm	
16	m	
17	inch	
18	feet	
19	C	
20	F	
21	K	
22	1/sec	
23	1/min	
24	1/h	
25	gal/min	

26	Pa																																																																																																	
27	kPa																																																																																																	
28	%																																																																																																	
29	Edit unit	<p>A customized measuring unit with up to 16 digits can be edited using this parameter.</p> <p>When you press the  key the Edit Unit menu appears.</p> <p>A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).</p> <p>Press the  key to save the Edit Unit menu.</p> <p>Press the  key to close the Edit Unit menu.</p> <table><tr><td></td><td>!</td><td>"</td><td>#</td><td>\$</td><td>%</td><td>&</td><td>'</td><td>(</td><td>)</td><td>*</td><td>+</td><td>,</td><td>-</td><td>.</td><td>/</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>:</td><td>;</td><td><</td><td>=</td><td>></td><td>?</td></tr><tr><td>@</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>O</td></tr><tr><td>P</td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td></tr><tr><td>`</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td></tr><tr><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>{</td><td> </td><td>}</td><td>~</td><td></td></tr></table>		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
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Sampling time (s)

It allows to set the sampling interval. This time interval sets the time between the single samples of the analogue signals. It directly affects the response time of the unit. The value is expressed in seconds (s).

0.0010	Shortest Sampling time
00.010	Default value
60.000	Longest Sampling time

Average filter

Selectable average filter function to avoid measuring fluctuations.

0	OFF	No average value will be created
1	2 cycle average	Floating average within 2 cycles
2	4 cycle average	Floating average within 4 cycles
3	8 cycle average	Floating average within 8 cycles
4	16 cycle average	Floating average within 16 cycles

Offset

This parameter allows to set the zero offset / tare of input 2.

This parameter does not affect the totalization function, see the "6.8 IN 2 Totalization menu" section on page 57.

-99.999	Smallest offset value
00000	Default value
+99.999	Highest offset value

Linearization

This parameter activates and sets the linearisation function. See the "6.7 IN 2 Linearization menu" section on page 54 and the "6.7.1 Description of the linearisation function" section on page 54.

0	OFF	No linearisation
1	1 QUADRANT	Linearisation using 1 quadrant (see on page 54).
2	4 QUADRANT	Linearisation using 4 quadrants (see on page 54).

Totalization

This parameter activates the totalization function. The totalization function is directly affected by the set operational mode (see the **Operational mode** parameter on page 38). For complete information please refer to the "6.8 IN 2 Totalization menu" section on page 57.

0	OFF	No totalization
1	ON	Totalization is active (see on page 57).

6.7 IN 2 Linearization menu

The linearisation function is configured in this menu. This menu is displayed only if the **Operational mode** parameter is set to any dual channel mode (DUAL, IN 1 + IN 2, IN 1 – IN 2, IN 1 x IN 2, IN 1 / IN 2). If the SINGLE single channel mode is selected, this menu is hidden. Refer to the "6.2 General menu" section on page 38. Furthermore it is displayed only if the **Linearization** parameter in the **IN 2 Properties** menu (see on page 53) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT"; if 0 – OFF option is set the **IN 2 Linearization** menu does not appear.

For a complete description of the linearisation function and some examples refer to the "6.7.1 Description of the linearisation function" section below.

P1(X)

...

P24(X)

X-coordinate of the first P1 ... last P24 linearisation point.

This value represents the display value the unit shows on the display without linearisation.

-99999999	Smallest X-coordinate
00000000	Default value
+99999999	Largest X-coordinate

P1(Y)

...

P24(Y)

Y-coordinate of the first P1 ... last P24 linearisation point.

This is the display value the unit will show on the display after linearisation.



EXAMPLE

P2(X) parameter value will be replaced by **P2(Y)** parameter value.

-99999999	Smallest Y-coordinate
00000000	Default value
+99999999	Largest Y-coordinate

6.7.1 Description of the linearisation function

The linearisation function allows to convert a linear input signal into a non-linear representation (or vice versa). 24 programmable X / Y coordinates

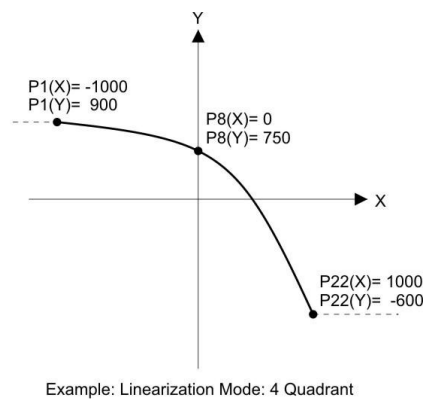
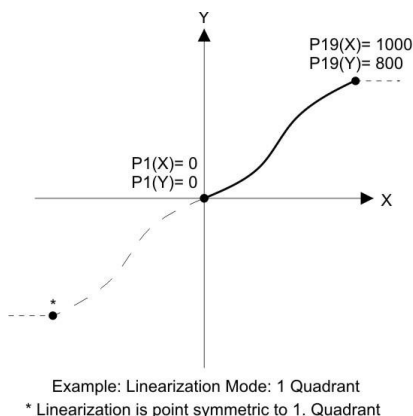
(interpolation points) are available, they can be freely arranged over the whole conversion range at any desired distance. The unit uses linear interpolation between two coordinates. Therefore it is advisable to set several coordinates where the curvature is greater and only few coordinates where the curvature is lesser.

If you need to set an individual linearisation curve, the **Linearization** parameter in the **IN 2 Properties** menu (see on page 53) must be set to either "1 - 1 QUADRANT" or "2 - 4 QUADRANT" (see the diagrams below).

The parameters **P1(X)** to **P24(X)** are used to specify the coordinates on the x-axis. These are the measuring values that the unit would normally generate according to the actual input signal.

Parameters **P1(Y)** to **P24(Y)** are the values that the unit will generate instead of the X values, i.e. for instance **P5(Y)** replaces **P5(X)** etc.

The X coordinates must use continuously increasing settings, i.e. **P1(X)** must have the lowest setting while **P24(X)** must have the highest setting (**P1(X) < P2(X) < P3(X) ... < P23(X) < P24(X)**). If the measured value is greater than the last defined X value, the corresponding Y value is displayed.



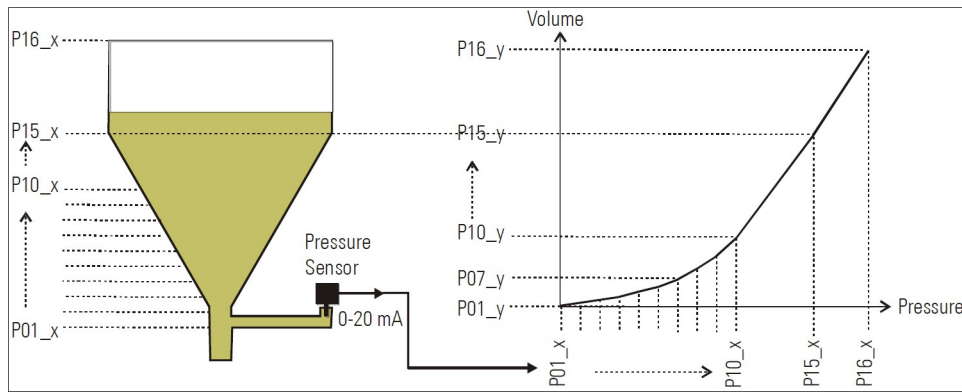
If the **Linearization** parameter in the **IN 2 Properties** menu is set to "1 - 1 QUADRANT", **P1(X)** parameter must be set to zero. Linearisation is only defined in the positive range and the negative range will be mirrored symmetrical with respect to the central point.

If the **Linearization** parameter in the **IN 2 Properties** menu is set to "2 - 4 QUADRANT", **P1(X)** parameter can be set also to a negative value. If the measured value is smaller than **P1(X)**, **P1(Y)** is displayed.



EXAMPLE

We want to display the filling quantity (volume) of a tank (see the Figure below) by using a pressure sensor mounted on the bottom of the tank. In this application, the analogue signal information about pressure is proportional to the filling level, but not to the filling quantity.



To solve the problem, we divide the non linear part of the tank into 14 sections. We set the expected display values of the pressure sensor in the **P1(X)** to **P15(X)** parameters.

For the linear part of the tank it is sufficient to set the final pressure value in the **P16(X)** parameter.

It is now possible to easily calculate the appropriate filling quantities and enter the relevant values in the **P1(Y)** to **P16(Y)** parameters.

6.8 IN 2 Totalization menu

The totalization function is configured in this menu. This menu is displayed only if the **Operational mode** parameter is set to any dual channel mode (DUAL, IN 1 + IN 2, IN 1 – IN 2, IN 1 x IN 2, IN 1 / IN 2). If the SINGLE single channel mode is selected, this menu is hidden. Refer to the "6.2 General menu" section on page 38. Furthermore it is displayed only if the **Totalization** parameter in the **IN 2 Properties** menu (see on page 53) is set to "ON"; if "OFF" option is set the **IN 2 Totalization** menu does not appear.



NOTE

Please note that the totalization function is directly affected by the set operational mode (see the **Operational mode** parameter on page 38), according to the following table.

Operational mode	Totalization		
	INPUT 1 TOTAL	INPUT 2 TOTAL	LINKAGE TOTAL
SINGLE	active	→ 0	→ 0
DUAL	active	active	→ 0
IN 1 + IN 2	active	active	Total 1 + Total 2
IN 1 – IN 2	active	active	Total 1 – Total 2
IN 1 x IN 2	active	active	→ 0
IN 1 / IN 2	active	active	→ 0

Time base

This parameter sets the time base of the totalization value. In other words it sets the time interval between two data recordings.

0	SECONDS	The current value is added to INPUT 2 TOTAL every second.
1	MINUTES	The current value is added to INPUT 2 TOTAL every minute.
2	HOURS	The current value is added to INPUT 2 TOTAL every hour.
3	COMMAND	The current value is added to INPUT 2 TOTAL when we use the "26 – ADD TO TOTAL 2" command in order to operate the control input. For further information please refer to the Input 2 action parameter in the "6.17 Command menu" section on page 81.

Divider

This parameter allows to set the divisional factor of the totalization value.

0	1	No division
1	10	The result of the totalization is divided by 10
2	100	The result of the totalization is divided by 100
3	1000	The result of the totalization is divided by 1,000

Decimal point




It sets the position of the decimal point.

0	NO	No decimal point
1	0000000.0	Decimal point placed in the specified position
2	000000.00	Decimal point placed in the specified position
3	00000.000	Decimal point placed in the specified position
4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position
7	0.0000000	Decimal point placed in the specified position

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is to be intended as a label. The number of decimal places must be set in the **Decimal point** parameter.

0	V	
1	mV	
2	A	
3	mA	
4	km/h	
5	mph	
6	feet/min	
7	inch/min	
8	g	
9	kg	
10	oz	
11	W	

12	kW																																																																																																	
13	VA																																																																																																	
14	mm																																																																																																	
15	cm																																																																																																	
16	m																																																																																																	
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19	C																																																																																																	
20	F																																																																																																	
21	K																																																																																																	
22	1/sec																																																																																																	
23	1/min																																																																																																	
24	1/h																																																																																																	
25	gal/min																																																																																																	
26	Pa																																																																																																	
27	kPa																																																																																																	
28	%																																																																																																	
29	Edit unit	<p>A customized measuring unit with up to 16 digits can be edited using this parameter.</p> <p>When you press the  key the Edit Unit menu appears.</p> <p>A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).</p> <p>Press the  key to save the Edit Unit menu.</p> <p>Press the  key to close the Edit Unit menu.</p> <table><tr><td></td><td>!</td><td>"</td><td>#</td><td>\$</td><td>%</td><td>&</td><td>'</td><td>(</td><td>)</td><td>*</td><td>+</td><td>,</td><td>-</td><td>.</td><td>/</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>:</td><td>;</td><td><</td><td>=</td><td>></td><td>?</td></tr><tr><td>@</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>O</td></tr><tr><td>P</td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td></tr><tr><td>`</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td></tr><tr><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>{</td><td> </td><td>}</td><td>~</td><td></td></tr></table>		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
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6.9 Linkage Properties menu

In this menu the parameters that configure a combined operation work mode can be set. A "combined operation work mode" is any dual channel mode that involves an operation (addition, subtraction, multiplication, division). It is available only if the **Operational mode** parameter in the **General** menu is set to "2 = IN 1 + IN 2", "3 = IN 1 – IN 2", "4 IN 1 x IN 2" or "5 = IN 1 / IN 2" (see on page 38).



NOTE

Parameters in the **IN 1 Properties** and **IN 2 Properties** menus must be set before activating the combined operation work mode.

The result of the combined operations can be scaled using the following parameters.

Factor

This parameter sets the factor by which the result of the combined operation will be multiplied.

-99999999	Smallest value
+00000001	Default value
+99999999	Highest value

Divider

This parameter sets the divider by which the result of the combined operation will be divided.

-99999999	Smallest value
+00000001	Default value
+99999999	Highest value

Additive value

This parameter sets the additive constant that will be added to the result of the combined operation.

-99999999	Smallest value
00000000	Default value
+99999999	Highest value

Decimal point




It sets the position of the decimal point.

0	NO	No decimal point
1	0000000.0	Decimal point placed in the specified position
2	000000.00	Decimal point placed in the specified position
3	00000.000	Decimal point placed in the specified position
4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position
7	0.0000000	Decimal point placed in the specified position

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is to be intended as a label. The number of decimal places must be set in the **Decimal point** parameter.

0	V	
1	mV	
2	A	
3	mA	
4	km/h	
5	mph	
6	feet/min	
7	inch/min	
8	g	
9	kg	
10	oz	
11	W	
12	kW	
13	VA	
14	mm	
15	cm	
16	m	
17	inch	
18	feet	
19	C	

20	F																																																																																																	
21	K																																																																																																	
22	1/sec																																																																																																	
23	1/min																																																																																																	
24	1/h																																																																																																	
25	gal/min																																																																																																	
26	Pa																																																																																																	
27	kPa																																																																																																	
28	%																																																																																																	
29	Edit unit	<p>A customized measuring unit with up to 16 digits can be edited using this parameter.</p> <p>When you press the  key the Edit Unit menu appears.</p> <p>A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).</p> <p>Press the  key to save the Edit Unit menu.</p> <p>Press the  key to close the Edit Unit menu.</p> <table><tr><td></td><td>!</td><td>"</td><td>#</td><td>\$</td><td>%</td><td>&</td><td>'</td><td>(</td><td>)</td><td>*</td><td>+</td><td>,</td><td>-</td><td>.</td><td>/</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>:</td><td>;</td><td><</td><td>=</td><td>></td><td>?</td></tr><tr><td>@</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>O</td></tr><tr><td>P</td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td></tr><tr><td>`</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td></tr><tr><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>{</td><td> </td><td>}</td><td>~</td><td></td></tr></table>		!	"	#	\$	%	&	'	()	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
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6.10 Preselection values menu

The **Preselection values** menu is used to set the preselection values or the switching points.

The preselection values / switching points are always referred to the **Source 1** ... **Source 4** parameters in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" sections respectively.

This menu is available only for devices with AVI, DO, or RO order codes.

Preselection 1

Preselection / switching point 1. The features of **Preselection 1** must be set in the **Preselection 1** menu, see the "6.11 Preselection 1 menu" section on page 65.

-99999999	Smallest value
+00001000	Default value
+99999999	Highest value

Preselection 2

Preselection / switching point 2. The features of **Preselection 2** must be set in the **Preselection 2** menu, see the "6.12 Preselection 2 menu" section on page 69.

-99999999	Smallest value
+00002000	Default value
+99999999	Highest value

Preselection 3

Preselection / switching point 3. The features of **Preselection 3** must be set in the **Preselection 3** menu, see the "6.13 Preselection 3 menu" section on page 71.

-99999999	Smallest value
+00003000	Default value
+99999999	Highest value

Preselection 4

Preselection / switching point 4. The features of **Preselection 1** must be set in the **Preselection 4** menu, see the "6.14 Preselection 4 menu" section on page 73.

-99999999	Smallest value
+00004000	Default value
+99999999	Highest value

6.11 Preselection 1 menu

The **Preselection 1** menu sets the characteristics of **Preselection 1**. It is available only for devices with AVI, DO, or RO order codes.

Source 1

This parameter sets the reference source for **Preselection 1**.

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.
6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Mode 1

Switching conditions for **Preselection 1**. The output / relay / display switches under the following conditions:

0	$ \text{RESULT} \geq \text{PRES} $	The absolute display value is greater than or equal to the absolute value of Preselection 1 . If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value \geq Preselection 1 → ON Display value $<$ Preselection 1 - Hysteresis 1 → OFF
1	$ \text{RESULT} \leq \text{PRES} $	The absolute display value is less than or equal to the absolute value of Preselection 1 (start up delay setting – see the Start up delay 1 (s) parameter on page 68- is advisable).

		<p>If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value \leq Preselection 1 \rightarrow ON Display value $>$ Preselection 1 + Hysteresis 1 \rightarrow OFF</p>
2	 RESULT = PRES 	<p>The absolute display value is equal to the absolute value of Preselection 1. A range (Preselection 1 \pm $\frac{1}{2}$ Hysteresis 1) can be defined and monitored along with a hysteresis value. If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value $>$ Preselection 1 + $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF Display value $<$ Preselection 1 - $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF</p>
3	RESULT \geq PRES	<p>Display value is greater than or equal to Preselection 1, e.g. an overspeed is detected. If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value \geq Preselection 1 \rightarrow ON Display value $<$ Preselection 1 - Hysteresis 1 \rightarrow OFF</p>
4	RESULT \leq PRES	<p>Display value is less than or equal to Preselection 1, e.g. an underspeed is detected (start up delay setting -see the Start up delay 1 (s) parameter on page 68- is advisable). If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value \leq Preselection 1 \rightarrow ON Display value $>$ Preselection 1 + Hysteresis 1 \rightarrow OFF</p>
5	RESULT = PRES	<p>Display value is equal to Preselection 1. A range (Preselection 1 \pm $\frac{1}{2}$ Hysteresis 1) can be defined and monitored along with a hysteresis value. If Hysteresis 1 is greater than 0, the following switching condition is applied: Display value $>$ Preselection 1 + $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF Display value $<$ Preselection 1 - $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF</p>
6	RES\geqPRES-TRAIL	<p>Trailing Preselection 1: Display value is greater than or equal to Preselection 2 - Preselection 1 Preselection 1 is the trailing preselection from Preselection 2.</p>

Hysteresis 1

This parameter sets the switching hysteresis of the switch-off point for **Preselection 1** value.

00000	No switching hysteresis
...	
+99999	Switching hysteresis = +99999

Pulse time 1 (s)

Duration of the output pulse for the switching condition of **Preselection 1** value.

00.000	No output pulse (static signal)
...	
60.000	Pulse duration = 60 seconds

Output target 1

Assignment of an output or relay for the switching condition of **Preselection 1** value.

If more than one switching condition is assigned to the output / relay, the output is set when one switching condition at least is true.

0	NO	No switching condition assigned
1	CTRL OUT 1	Switching condition assigned to "20 - Ctrl. Out 1"
2	CTRL OUT 2	Switching condition assigned to "21 - Ctrl. Out 2"
3	CTRL OUT 3	Switching condition assigned to "22 - Ctrl. Out 3"
4	CTRL OUT 4	Switching condition assigned to "23 - Ctrl. Out 4"
5	RELAY 1	Switching condition assigned to "27-28-29 - Rel. 1"
6	RELAY 2	Switching condition assigned to "30-31-32 - Rel. 2"

Output polarity 1

Polarity for the switching condition of **Preselection 1**.

0	ACTIVE HIGH	Switching condition is true → Active "HIGH"
1	ACTIVE LOW	Switching condition is true → Active "LOW"

Output lock 1

Latch for the switching condition of **Preselection 1**.

0	NO	No latch for Preselection 1
1	YES	Latch for Preselection 1 (command 4 - LOCK RELEASE -see the Input 1 action parameter on page 81- will clear the latch).

Start up delay 1 (s)

Start up delay setting / suppression for the switching condition of **Preselection 1**.

This adjustment only applies to the switching conditions **1 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 1** parameter on page 65).

Start up delay 1 (s) is applied when the display value is ≤ 0 . The timer starts when the display value is > 0 . The monitoring function remains deactivated until the set time has elapsed.

00.000	No start up delay setting
...	
60.000	Start up delay setting expressed in seconds



NOTE

Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 72 and 74 respectively) have an automatic start up delay setting.

Event color 1

Event-depending change of colour of the display for the switching condition of **Preselection 1**. **Event color 1** has the lowest priority. **Event color 2**, **Event color 3**, and **Event color 4** are allowed to overwrite this change of colour.

0	NO CHANGE	No change of colour
1	CHANGE TO RED	Colour of display changes to red
2	CHANGE TO GREEN	Colour of display changes to green
3	CHANGE TO YELLOW	Colour of display changes to yellow

6.12 Preselection 2 menu

The **Preselection 2** menu is only available for devices with order codes AVI, DO, and RO. It allows to set the characteristics for **Preselection 2**.

Source 2

This parameter sets the reference source for **Preselection 2**. For complete information please refer to the **Source 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Mode 2

Switching conditions for **Preselection 2**. The output / relay / display switches under the following conditions:

0 ... 5		For complete information on the switching conditions 0 ... 5, please refer to the Mode 1 parameter in the "6.11 Preselection 1 menu" section on page 65.
6	RES>=PRES-TRAIL	Trailing Preselection 2 : Display value is greater than or equal to Preselection 1 – Preselection 2 Preselection 2 is the trailing preselection from Preselection 1 .

Hysteresis 2

This parameter sets the switching hysteresis of the switch-off point for **Preselection 2** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Pulse time 2 (s)

Duration of the output pulse for the switching condition of **Preselection 2** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output target 2

Assignment of an output or relay for the switching condition of **Preselection 2** value. For complete information please refer to the **Output target 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

0	NO	See "6.11 Preselection 1 menu" section on page 65
1	CTRL OUT 1	
2	CTRL OUT 2	Switching condition assigned to "21 - Ctrl. Out 2"
3	CTRL OUT 3	See "6.11 Preselection 1 menu" section on page 65

4	CTRL OUT 4	
5	RELAY 1	
6	RELAY 2	

Output polarity 2

Polarity for the switching condition of **Preselection 2**. For complete information please refer to the **Output polarity 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output lock 2

Latch for the switching condition of **Preselection 2**. For complete information please refer to the **Output lock 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Start up delay 2 (s)

Start up delay setting / suppression for the switching condition of **Preselection 2**. For complete information please refer to the **Start up delay 1 (s)** parameter in the "6.11 Preselection 1 menu" section on page 65.



NOTE

Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 72 and 74 respectively) have an automatic start up delay setting.

Event color 2

Event-dependent change of colour of the display for the switching condition of **Preselection 2**. **Event color 2**, **Event color 3**, and **Event color 4** have the highest priority and are allowed to overwrite the change of colour set next to the **Event color 1** parameter. For complete information please refer to the **Event color 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

6.13 Preselection 3 menu

The **Preselection 3** menu is only available for devices with order codes AVI, DO, and RO. It allows to set the characteristics for **Preselection 3**.

Source 3

This parameter sets the reference source for **Preselection 3**. For complete information please refer to the **Source 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Mode 3

Switching conditions for **Preselection 3**. The output / relay / display switches under the following conditions:

0 ... 5		For complete information on the switching conditions 0 ... 5, please refer to the Mode 1 parameter in the "6.11 Preselection 1 menu" section on page 65.
6	RES>=PRES-TRAIL	Trailing Preselection 3 : Display value is greater than or equal to Preselection 4 – Preselection 3 Preselection 3 is the trailing preselection from Preselection 4 .

Hysteresis 3

This parameter sets the switching hysteresis of the switch-off point for **Preselection 3** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Pulse time 3 (s)

Duration of the output pulse for the switching condition of **Preselection 3** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output target 3

Assignment of an output or relay for the switching condition of **Preselection 3** value. For complete information please refer to the **Output target 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

0	NO	See "6.11 Preselection 1 menu" section on page 65
1	CTRL OUT 1	
2	CTRL OUT 2	
3	CTRL OUT 3	Switching condition assigned to "22 - Ctrl. Out 3"

4	CTRL OUT 4	See "6.11 Preselection 1 menu" section on page 65
5	RELAY 1	
6	RELAY 2	

Output polarity 3

Polarity for the switching condition of **Preselection 3**. For complete information please refer to the **Output polarity 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output lock 3

Latch for the switching condition of **Preselection 3**. For complete information please refer to the **Output lock 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Start up delay 3 (s)

Start up delay setting / suppression for the switching condition of **Preselection 3**.

This adjustment only applies to the switching conditions **1** - $|\text{RESULT}| \leq |\text{PRES}|$ and **4** - $\text{RESULT} \leq \text{PRES}$ (see the **Mode 3** parameter on page 71).

Automatic start up delay is activated when the parameter is switched on and the display value is ≤ 0 . The monitoring function remains deactivated until the preset value / switching point is exceeded for the first time.

0	OFF	No start up delay setting
1	AUTO	Automatic start up delay setting, until the preselection value / switching point is exceeded for the first time.



NOTE

Start up delay 1 (s) and **Start up delay 2 (s)** (see on pages 68 and 70 respectively) have a time-dependent start up delay setting.

Event color 3

Event-depending change of colour of the display for the switching condition of **Preselection 3**. **Event color 2**, **Event color 3**, and **Event color 4** have the highest priority and are allowed to overwrite the change of colour set next to the **Event color 1** parameter. For complete information please refer to the **Event color 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

6.14 Preselection 4 menu

The **Preselection 4** menu is only available for devices with order codes AVI, DO and RO. It allows to set the characteristics for **Preselection 4**.

Source 4

This parameter sets the reference source for **Preselection 4**. For complete information please refer to the **Source 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Mode 4

Switching conditions for **Preselection 4**. The output / relay / display switches under the following conditions:

0 ... 5		For complete information on the switching conditions 0 ... 5, please refer to the Mode 1 parameter in the "6.11 Preselection 1 menu" section on page 65.
6	RES>=PRES-TRAIL	Trailing Preselection 4 : Display value is greater than or equal to Preselection 3 – Preselection 4 Preselection 4 is the trailing preselection from Preselection 3 .

Hysteresis 4

This parameter sets the switching hysteresis of the switch-off point for **Preselection 4** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Pulse time 4 (s)

Duration of the output pulse for the switching condition of **Preselection 4** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output target 4

Assignment of an output or relay for the switching condition of **Preselection 4** value. For complete information please refer to the **Output target 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

0	NO	See "6.11 Preselection 1 menu" section on page 65
1	CTRL OUT 1	
2	CTRL OUT 2	
3	CTRL OUT 3	

4	CTRL OUT 4	Switching condition assigned to "23 - Ctrl. Out 4"
5	RELAY 1	See "6.11 Preselection 1 menu" section on page 65
6	RELAY 2	

Output polarity 4

Polarity for the switching condition of **Preselection 4**. For complete information please refer to the **Output polarity 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Output lock 4

Latch for the switching condition of **Preselection 4**. For complete information please refer to the **Output lock 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

Start up delay 4 (s)

Start up delay setting for the switching condition of **Preselection 4**.

This adjustment only applies to the switching conditions **1** - $|\text{RESULT}| \leq |\text{PRES}|$ and **4** - $\text{RESULT} \leq \text{PRES}$ (see the **Mode 4** parameter on page 73).

Automatic start up delay is activated when the parameter is switched on and the display value is ≤ 0 . The monitoring function remains deactivated until the preset value / switching point is exceeded for the first time.

0	OFF	No start up delay setting
1	AUTO	Automatic start up delay setting, until the preselection value / switching point is exceeded for the first time.



NOTE

Start up delay 1 (s) and **Start up delay 2 (s)** (see on pages 68 and 70 respectively) have a time-dependent start up delay setting.

Event color 4

Event-depending change of colour of the display for the switching condition of **Preselection 4**. **Event color 2**, **Event color 3**, and **Event color 4** have the highest priority and are allowed to overwrite the change of colour set next to the **Event color 1** parameter. For complete information please refer to the **Event color 1** parameter in the "6.11 Preselection 1 menu" section on page 65.

6.15 Serial menu

The **Serial** menu allows to configure the basic settings of the serial interface (terminal blocks 16, 17, and 18). For complete information on the serial port features, please refer to the "4.8 Serial interface (-AVI- and -DO- order codes)" section on page 25.

This function is only available for devices with order codes AVI and DO.

Unit number

This parameter allows to set the address of the serial device. You can assign to the unit any address number between 11 and 99. The address must not contain any "0" because such numbers (20, 30, ...) are reserved for collective addressing (broadcast address).

11	Smallest address value
...	
99	Highest address value

Serial baud rate

This parameter allows to set the serial transmission speed (baud rate).

Available options are:

0	9600	9,600 baud
1	19200	19,200 baud
2	38400	38,400 baud

Serial format

This parameter allows to set the bit data format.

		Data Bits	Parity Bit	Stop Bits
0	7-EVEN-1	7	even	1
1	7-EVEN-2	7	even	2
2	7-ODD-1	7	odd	1
3	7-ODD-2	7	odd	2
4	7-NONE-1	7	no	1
5	7-NONE-2	7	no	2
6	8-EVEN-1	8	even	1
7	8-ODD-1	8	odd	1
8	8-NONE-1	8	no	1
9	8-NONE-2	8	no	2

Serial init

This parameter allows to set the baud rate for the transmission of the initialization values to the OS software tool. If you set the transmission values higher than 9,600 baud, the duration of the initialization procedure will be shortened.

0	NO	The initialization values will be transmitted at 9,600 baud. After initialization the unit will operate according to the user settings again.
1	YES	The initialization values will be transmitted according to the user defined baud rate (Serial baud rate parameter). After initialization the unit will go on operating according to the user settings again.

Serial protocol

It sets the sequence of characters to be sent when using the serial output for the cyclic data transmission under time control (see the **Serial timer (s)** parameter).

If you set the option "1" the unit address is removed from the string, this results in a slightly faster transmission cycle.

The transmission string will be as follows:

Option 0

UN	UN	+ / -	X	X	X	X	X	X	X	LF	CR
----	----	-------	---	---	---	---	---	---	---	----	----

Option 1

+ / -	X	X	X	X	X	X	X	LF	CR
-------	---	---	---	---	---	---	---	----	----

Where:

UN UN = serial address, e.g. "1 1". See the **Unit number** parameter in the previous page (option **0** only)

+ / - = plus / minus signs, i.e. positive / negative sign of transmitted value

X X X X X X X X = data to be transmitted according to the setting in the **Serial value** parameter

LF = line feed character

CR = carriage return character

0	Transmission string with serial address
1	Transmission string without serial address

Serial timer (s)

This parameter sets the cycle time for the cyclic transmission of data set in the **Serial value** parameter when using the serial output. The value is expressed in seconds. In case of a serial request, the cyclic transmission is stopped for 20 s.

00.000	Cyclic transmission is switched off. The unit will send data following a serial request or a " 7 – Serial print " command (see the Input 1 action , Input 2 action and Input 3 action parameters on pages 81 and 83).
...	
60.000	Cycle time expressed in seconds.

Serial value

This parameter sets the value to be transmitted.

0	:0	Value of input 1
1	:1	Value of input 2
2	:2	Result of the combined operation of input 1 and input 2
3	:3	Result of the totalization 1
4	:4	Result of the totalization 2
5	:5	Result of the combined value of input 1 and input 2 with totalization
6	:6	Minimum value of input 1
7	:7	Maximum value of input 1
8	:8	Minimum value of input 2
9	:9	Maximum value of input 2

MODBUS

This parameter enables the Modbus protocol and allows to set the Modbus address.

For details on the Modbus communication please refer to the "8 - Modbus RTU Interface" section on page 90.

0	Modbus protocol is disabled: the serial interface is using the Lecom protocol.
1 ... 247	Modbus protocol is enabled: the serial interface is using the Modbus RTU protocol. The set value is the Modbus address of the device.

6.16 Analog OUT menu

The **Analog OUT** menu allows to configure the basic settings of the analogue output (terminal blocks 13 and 14 / 15).

For complete information on the analogue output features, please refer to the "4.7 Analogue output (-AVI- order code)" section on page 24.

This function is available only for devices with AVI order code.

Analog source

This parameter sets the reference source for the analogue output.

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.
6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Analog format

This parameter sets the characteristics of the analogue output. The analogue output is proportional to the display value.

If **Analog format** is set to "**0 = -10...10V**", the polarity of the analogue output depends on the polarity of the display value.

0	-10 ... 10 V	-10 V ... +10 V
1	0 ... 20 MA	0 mA ... 20 mA
2	4 ... 20 MA	4 mA ... 20 mA

Analog start

This parameter sets the start value of the analogue conversion. The start value corresponds to the display value for an analogue output of 0 V or 0 mA or 4 mA depending on the set **Analog format**.

-99999999	Smallest start value
00000000	Default value
+99999999	Highest start value

Analog end

This parameter sets the end value of the analogue conversion. The end value corresponds to the display value for an analogue output of (+/-)10 V or 20 mA depending on the set **Analog format**.

-99999999	Smallest end value
+00010000	Default value
+99999999	Highest end value

Analog gain (%)

This parameter sets the maximum conversion of the analogue output expressed in percentage (%).

000.00	Smallest gain
100.00	Default value
110.00	Highest gain



EXAMPLE

If you set "102.00" next to this item the result will be a conversion of 10.2 V or 20.4 mA when the value set next to the **Analog end** parameter is reached.

If you set "95.00" next to this item the result will be a conversion of 9.5 V or 18 mA when the value set next to the **Analog end** parameter is reached.

Analog offset %

This parameter sets the zero offset of the analogue output.

-99.99	Smallest offset
00.00	Default value
+99.99	Highest offset



EXAMPLE

If you set "+00.20" next to this item the result will be an offset of 0.02 V or 0.04 mA as regards the **Analog start** value.

6.17 Command menu

The **Command** menu allows to configure the operation of the inputs "10 - Ctrl. In 1", "11 - Ctrl. In 2", and "12 - Ctrl. In 3".

For complete information on the control inputs features, please refer to the "4.6 Control inputs" section on page 23.

Input 1 action

This parameter sets the function of the input "10 - Ctrl. In 1".

0	NO	No function	
1	TARA INPUT 1	Value of input 1 is stored as an Offset of input 1	(d)
2	TARA INPUT 2	Value of input 2 is stored as an Offset of input 2	(d)
3	TARA INPUT 1+2	Value of input 1 is stored as an Offset of input 1 Value of input 2 is stored as an Offset of input 2	(d)
4	RESET TOTAL 1	Value of totalizator 1 is reset to zero	(d) (s)
5	RESET TOTAL 2	Value of totalizator 2 is reset to zero	(d) (s)
6	RESET TOTAL 1+2	Value of totalizator 1 is reset to zero Value of totalizator 2 is reset to zero	(d) (s)
7	TEACH PRESEL. 1	The value of Source 1 (see on page 65) is stored as Preselection 1 (see the Preselection 1 parameter on page 63).	(d)
8	TEACH PRESEL. 2	The value of Source 2 (see on page 69) is stored as Preselection 2 (see the Preselection 2 parameter on page 63).	(d)
9	TEACH PRESEL. 3	The value of Source 3 (see on page 71) is stored as Preselection 3 (see the Preselection 3 parameter on page 63).	(d)
10	TEACH PRESEL. 4	The value of Source 4 (see on page 73) is stored as Preselection 4 (see the Preselection 4 parameter on page 64).	(d)
11	SCROLL DISPLAY	It scrolls through the available display screens (see the "5.2 Screen structure during operation" section on page 29).	(d)
12	RESET MIN/MAX	It resets the min. / max. values.	(d) (s)
13	CLEAR LOOP TIME	N.A.	
14	ACTIVATE	N.A.	
15	STORE DATA	N.A.	
16	TESTPROGRAM	N.A.	

17	SET RED COLOR	The display lights up red. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1 , Event color 2 , Event color 3 , and Event color 4 in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff).	(d)
18	SET GREEN COLOR	The display lights up green. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1 , Event color 2 , Event color 3 , and Event color 4 in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff).	(d)
19	SET YELLOW COLOR	The display lights up yellow. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1 , Event color 2 , Event color 3 , and Event color 4 in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff).	(d)
20	FREEZE	It freezes the display value.	(s)
21	KEY LOCK	Key locked touch screen.	(s)
22	LOCK RELEASE	No latch for preselection.	(d)
23	SERIAL PRINT	It sends serial data, see the Serial value parameter on page 77.	(d)
24	START PRESELECT	N.A.	
25	ADD TO TOTAL 1	It adds the current value of input 1 to INPUT 1 TOTAL (see the parameters Source 1 , Source 2 , Source 3 , and Source 4 in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff)	(d)
26	ADD TO TOTAL 2	It adds the current value of input 2 to INPUT 2 TOTAL (see the parameters Source 1 , Source 2 , Source 3 , and Source 4 in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff)	(d)
27	INC. BRIGHTNESS	The brightness of the display is increased	(d) (s)
28	DEC. BRIGHTNESS	The brightness of the display is reduced	(d) (s)

- (s) = static switching (level evaluation)
Input 1 config. parameter must be set at LOW / HIGH level to be active (see options 0 – ACTIVE LOW and 1 – ACTIVE HIGH).
- (d) = dynamic switching (edge evaluation)
Input 1 config. parameter must be set at rising / falling edge to activate (see options 2 – RISING EDGE and 3 – FALLING EDGE).
- N.A. = not available

Input 1 config.

This parameter sets the switching characteristics of the input "10 - Ctrl. In 1".

0	ACTIVE LOW	It is active at "LOW" level (static)
1	ACTIVE HIGH	It is active at "HIGH" level (static)
2	RISING EDGE	It activates at rising edge (dynamic)
3	FALLING EDGE	It activates at falling edge (dynamic)

Input 2 action

This parameter sets the function of the input "11 - Ctrl. In 2". For complete information please refer to the **Input 1 action** parameter on page 81.

Input 2 config.

This parameter sets the switching characteristics of the input "11 - Ctrl. In 2". For complete information please refer to the **Input 1 config.** parameter on page 83.

Input 3 action

This parameter sets the function of the input "12 - Ctrl. In 3". For complete information please refer to the **Input 1 action** parameter on page 81.

Input 3 config.

This parameter sets the switching characteristics of the input "12 - Ctrl. In 3". For complete information please refer to the **Input 1 config.** parameter on page 83.

6.18 Display menu

The **Display** menu allows to set the features of the display.

Parameter changes become active only after exiting the menu selection.

Start display

This parameter sets the display visualization after switching the device on.

0	SINGLE	The display shows one value in a single line (single source). The source must be set next to the following Source single parameter.
1	DUAL	The display shows two values in two separate lines (double source). The source must be set next to the Source dual top (first line) and Source dual down (second line) parameters below.
2	DUAL WITH UNIT	The display shows two values with engineering units in two separate lines (double source). The source must be set next to the Source dual top (first line) and Source dual down (second line) parameters below.
3	LARGE	The display shows the value in a large format (4 digits). It is available only if the large display visualization mode is activated (see the Large display parameter on page 86). The source must be set next to the Source large parameter below.
4	QUICKSTART	Display with quick start function. It is available only with AVI1, DO1, RO order codes.
5	MINIMUM/MAXIMUM	Display with current / minimum / maximum values of input 1 and input 2.

Source single

It sets the reference source of the value to be displayed when the "single line" visualization mode is set (see the previous **Start display** parameter).

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.

6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Source dual top

It sets the reference source of the value to be displayed in the first line when the "dual line" visualization mode is set (see the **Start display** parameter in the previous page).

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.
6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Source dual down

It sets the reference source of the value to be displayed in the second line when the "dual line" visualization mode is set (see the **Start display** parameter in the previous page).

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.
6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Large display

This parameter is used to set the "large display" visualization mode. Using the divider ratio, the large display value can also be adjusted.

0	NO	Large display visualization mode is disabled
1	1 : 1	Large display mode with divider ratio 1:1
2	1 : 10	Large display mode with divider ratio 1:10
3	1 : 100	Large display mode with divider ratio 1:100
4	1 : 1000	Large display mode with divider ratio 1:1000
5	1 : 10000	Large display mode with divider ratio 1:10000

Source large

This parameter is available only if the large display visualization mode is activated (see the previous **Large display** parameter). It sets the reference source of the value to be displayed when the "large" visualization mode is set (see the **Start display** parameter on page 84).

0	INPUT 1	The reference source is input 1.
1	INPUT 2	The reference source is input 2.
2	LINKAGE 1-2	The reference source is the result of the combined

		operation of input 1 and input 2.
3	INPUT 1 TOTAL	The reference source is input 1 with totalization.
4	INPUT 2 TOTAL	The reference source is input 2 with totalization.
5	LINKAGE TOTAL	The reference source is the result of the combined operation of input 1 and input 2 with totalization.
6	N.A.	Reserved
7	N.A.	Reserved
8	MINIMUM VALUE 1	Minimum value, the reference source is input 1.
9	MAXIMUM VALUE 1	Maximum value, the reference source is input 1.
10	MINIMUM VALUE 2	Minimum value, the reference source is input 2.
11	MAXIMUM VALUE 2	Maximum value, the reference source is input 2.

Color

This parameter sets the colour of the display.

It is also possible to enable an event-dependent change of the colour of the display by setting a switching condition (see the parameters [Event color 1](#), [Event color 2](#), [Event color 3](#), and [Event color 4](#) in the "6.11 Preselection 1 menu" ... "6.14 Preselection 4 menu" on page 65 ff).

Event-dependent changes are only available for devices with order codes AVI, DO, and RO.

0	RED	The display is coloured in red
1	GREEN	The display is coloured in green
2	YELLOW	The display is coloured in yellow

Brightness

This parameter sets the brightness of the display expressed in percentage (%).

010	Min. brightness
080	Default value
100	Max. brightness

Contrast

This parameter sets the viewing angle.

0	Viewing angle from top
1	Viewing angle from centre
2	Viewing angle from bottom

Screen saver

This parameter sets the time expressed in seconds before the display is switched off, starting from the last touch action.

A new touch action will activate the display again.

0000	Screen saver not active
...	
9999	Longest time before the screen saver is activated

Up-date-time

This parameter sets the update time of the display (refresh of the display), the value is expressed in seconds. It does not affect the refresh of the parameter values.

0.005	Shortest update time
0.100	Default value
9.999	Longest update time

Font

This parameter sets the font style.

0	Standard
1	Font 1

7 - Appendix

7.1 Data readout via serial interface

The OS programming software can be downloaded for free from Lika's web site: enter the page of the display and then press the DOWNLOAD button in the Download\Software section. The MAN download OS.pdf file contains the links for downloading the executable file from Google Drive or BOX.

All codes shown in the **Serial value** parameter (see the "6.15 Serial menu" section on page 75) are available for serial readout by a PC or a PLC. For communication the display uses the Drivecom Protocol according to ISO 1745 or the Modbus RTU protocol. All details about protocols can be found in the user's guide "MAN Serial Protocol IFxx_LD25x_LD30x I_E.pdf" (it is available for download from our web page www.lika.biz); or in the "8 - Modbus RTU Interface" section in the next page of this manual.

To request for a data transmission you must send the following request string to the display:

EOT	AD1	AD2	C1	C2	ENQ
-----	-----	-----	----	----	-----

EOT = control character CTRL D (Hex 04)

AD1 = unit address, High Byte

AD2 = unit address, Low Byte

C1 = register code, High Byte

C2 = register code, Low Byte

ENQ = control character CTRL E (Hex 05)



EXAMPLE

The following example shows the request string for readout of the current input frequency (code = :1) from a unit having address "11":

ASCII code:	EOT	1	1	:	1	ENQ
Hex code:	04	31	31	3A	31	05
Binary code:	0000 0100	0011 0001	0011 0001	0011 1010	0011 0001	0000 0101

Following a correct request, the unit will respond:

STX	C1	C2	xxxxx	ETX	BCC
-----	----	----	-------	-----	-----

STX = control character CTRL B (Hex 02)

C1 = register code, High Byte

C2 = register code, Low Byte

xxxxx = readout data

ETX = control character CTRL C (Hex 03)

BCC = block check character

8 – Modbus RTU Interface

LD210 series displays are standard Modbus RTU Slaves and provide the following Modbus functions:

- Read Coils
- Write Single Coil
- Read Holding Registers
- Write Multiple Registers
- Diagnosis

For the operation of the interface module and the understanding of this manual, basic knowledge in Modbus RTU communication is implied.

8.1 Parameter setting

The following parameters available in the "6.15 Serial menu" section (see on page 75) are required for Modbus protocol:

Unit number

Not used for Modbus communication.

If you need to set the Modbus address refer to the **MODBUS** parameter in the next page.

Serial baud rate

This parameter allows to set the serial transmission speed (baud rate).

Available options are:

0	9600	9,600 baud
1	19200	19,200 baud
2	38400	38,400 baud

Serial format

This parameter allows to set the bit data format.

		Data Bits	Parity Bit	Stop Bits
0	7-EVEN-1	Not used for Modbus communication		
1	7-EVEN-2			
2	7-ODD-1			
3	7-ODD-2			
4	7-NONE-1			
5	7-NONE-2			
6	8-EVEN-1	8	even	1
7	8-ODD-1	8	odd	1

8	8-NONE-1	Not used for Modbus communication		
9	8-NONE-2	8	no	2

Serial init

Not used for Modbus communication.

Serial protocol

Not used for Modbus communication.

Serial timer (s)

Not used for Modbus communication.

Serial value

Not used for Modbus communication.

MODBUS

This parameter enables the Modbus protocol and allows to set the Modbus address.

0	Not used for Modbus communication, Modbus protocol is disabled.
1 ... 247	Modbus protocol is enabled: the serial interface is using the Modbus RTU protocol. The set value is the Modbus address of the device.

8.2 Modbus Communication

The Modbus functions described hereafter are available.

8.2.1 Read Holding Registers and Write Multiple Registers

With the functions "Read Holding Registers" and "Write Multiple Registers" it is possible to access all registers of the device.

All variables (current data) and status registers are mapped into Modbus Holding Registers.

However, as all registers of the device are 32 bit long registers, but Modbus Holding registers are only 16 bit long registers, each register of the device requires two Holding registers (for this reason the use of Modbus function "Write Single Register" is not possible).

It is only possible to access one single register of the device by each read or write operation, therefore the "Quantity (or number) of registers" in the Modbus request must be always "2".

8.2.2 Access to parameters

Holding Register 0x0000 / 0x0001 hex and the followings allow to access the device parameters.

The holding register numbers for a certain parameter can be calculated by means of the parameter # that can be found in the parameter table in this manual (see the "9 - Parameters / serial codes" section on page 94):

Holding Register low = (parameter #) * 2

Holding Register high = (parameter #) * 2 + 1



EXAMPLE

Access the parameter # 167 **Preselection 1** by using the Holding Register 0x014E and 0x014F hex.

8.2.3 Access to current data

Holding Register 0x1000 / 0x1001 hex and the followings allow to access the variables of the device (current data registers):

Holding Register 0x1000 / 0x1001 hex → Current data with serial Code ":0" (Display value)

Holding Register 0x1002 / 0x1003 hex → Current data with serial Code ":1"

Holding Register 0x1004 / 0x1005 hex → Current data with serial Code ":2"

Holding Register 0x1006 / 0x1007 hex → Current data with serial Code ":3"

etc.

8.2.4 Access to status registers

Holding Register 0x2000 / 0x2001 hex and the followings allow to access the status registers of the device:

Holding Register 0x2000 / 0x2001 hex → Output Status (Ctrl. Out status, read only)

Holding Register 0x2002 / 0x2003 hex → Serial Commands

Holding Register 0x2004 / 0x2005 hex → External Command (Ctrl. In status, read only)

Holding Register 0x2006 / 0x2007 hex → All Commands (read only)

8.2.5 Read Coils and Write Single Coil

With the functions "Read Coils" and "Write Single Coil" it is possible to read and set/reset single commands:

Coil number	Serial code of command	Command	
0	54	Reset / Set	Reset/Set Value
1	55	Freeze Display	Freeze current display value
2	56	Touch Disable	Disable touch screen

3	57	Clear Lock	Loosen locking of all outputs / relay
4	58	Clear Min/Max	Reset of the min. / max. values
5	59	Serial Print (do not use with Modbus)	Sending of serial data
6	60	Teach Preset 1	Current display value is stored as Preselection 1
7	61	Teach Preset 2	Current display value is stored as Preselection 2
8	62	Teach Preset 3	Current display value is stored as Preselection 3
9	63	Teach Preset 4	Current display value is stored as Preselection 4
10	64	Scroll Display	Display switching (see display in operation mode, see on page 29)
11	65	Clear Loop Time	Release all latched switching conditions
12	66	Start Preselection	The preselection starts
13	67	Activate Data (not required with Modbus)	Data is activated
14	68	Store to EEPROM	Store to EEPROM
15	69	Test program (do not use with Modbus)	Test program (do not use with Modbus)

8.2.6 Diagnostics

The device supports the diagnostics subfunction 00 "Return Query Data". Other diagnostics functions are not available.

9 - Parameters / serial codes

9.1 General menu

See the "6.2 General menu" section on page 38

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
0	Operational mode	0	0	0	5	0
1	Pin preselection	1	0	0000	9999	0000
2	Pin parameter	2	0	0000	9999	0000
3	Back up memory	3	0	0	1	1
4	Factory settings	4	0	0	1	0
5	-	5	0	0	0	0
6	-	6	0	0	0	0
7	-	7	0	0	0	0
8	-	8	0	0	0	0

9.2 IN 1 Properties menu

See the "6.3 IN 1 Properties menu" section on page 40

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
9	Configuration	9	0	0	2	0
10	Start value	10	0	-99999	+99999	+00000
11	End value	11	0	-99999	+99999	+10000
12	Decimal point	12	0	0	7	3
13	Scale units	13	0	0	29	0
14	Sampling time (s)	14	0	0.0010	60.000	00.010
15	Average filter	15	0	0	4	0
16	Offset	16	0	-99999	+99999	+00000
17	Linearization	17	0	0	2	0
18	Totalization	18	0	0	1	0
19	-	19	0	0	0	0
20	-	20	0	0	0	0
21	-	21	0	0	0	0

9.3 IN 1 Linearization menu

See the "6.4 IN 1 Linearization menu" section on page 44

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
22	P1(X)	A0	0	-99999999	+99999999	+00000000
23	P1(Y)	A1	0	-99999999	+99999999	+00000000
24	P2(X)	A2	0	-99999999	+99999999	+00000000
25	P2(Y)	A3	0	-99999999	+99999999	+00000000
26	P3(X)	A4	0	-99999999	+99999999	+00000000
27	P3(Y)	A5	0	-99999999	+99999999	+00000000
28	P4(X)	A6	0	-99999999	+99999999	+00000000
29	P4(Y)	A7	0	-99999999	+99999999	+00000000
30	P5(X)	A8	0	-99999999	+99999999	+00000000
31	P5(Y)	A9	0	-99999999	+99999999	+00000000
32	P6(X)	B0	0	-99999999	+99999999	+00000000
33	P6(Y)	B1	0	-99999999	+99999999	+00000000
34	P7(X)	B2	0	-99999999	+99999999	+00000000
35	P7(Y)	B3	0	-99999999	+99999999	+00000000
36	P8(X)	B4	0	-99999999	+99999999	+00000000
37	P8(Y)	B5	0	-99999999	+99999999	+00000000
38	P9(X)	B6	0	-99999999	+99999999	+00000000
39	P9(Y)	B7	0	-99999999	+99999999	+00000000
40	P10(X)	B8	0	-99999999	+99999999	+00000000
41	P10(Y)	B9	0	-99999999	+99999999	+00000000
42	P11(X)	C0	0	-99999999	+99999999	+00000000
43	P11(Y)	C1	0	-99999999	+99999999	+00000000
44	P12(X)	C2	0	-99999999	+99999999	+00000000
45	P12(Y)	C3	0	-99999999	+99999999	+00000000
46	P13(X)	C4	0	-99999999	+99999999	+00000000
47	P13(Y)	C5	0	-99999999	+99999999	+00000000
48	P14(X)	C6	0	-99999999	+99999999	+00000000
49	P14(Y)	C7	0	-99999999	+99999999	+00000000
50	P15(X)	C8	0	-99999999	+99999999	+00000000
51	P15(Y)	C9	0	-99999999	+99999999	+00000000
52	P16(X)	D0	0	-99999999	+99999999	+00000000
53	P16(Y)	D1	0	-99999999	+99999999	+00000000
54	P17(X)	D2	0	-99999999	+99999999	+00000000
55	P17(Y)	D3	0	-99999999	+99999999	+00000000
56	P18(X)	D4	0	-99999999	+99999999	+00000000
57	P18(Y)	D5	0	-99999999	+99999999	+00000000

(continue on next page)

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
58	P19(X)	D6	0	-99999999	+99999999	+00000000
59	P19(Y)	D7	0	-99999999	+99999999	+00000000
60	P20(X)	D8	0	-99999999	+99999999	+00000000
61	P20(Y)	D9	0	-99999999	+99999999	+00000000
62	P21(X)	E0	0	-99999999	+99999999	+00000000
63	P21(Y)	E1	0	-99999999	+99999999	+00000000
64	P22(X)	E2	0	-99999999	+99999999	+00000000
65	P22(Y)	E3	0	-99999999	+99999999	+00000000
66	P23(X)	E4	0	-99999999	+99999999	+00000000
67	P23(Y)	E5	0	-99999999	+99999999	+00000000
68	P24(X)	E6	0	-99999999	+99999999	+00000000
69	P24(Y)	E7	0	-99999999	+99999999	+00000000

9.4 IN 1 Totalization menu

See the "6.5 IN 1 Totalization menu" section on page 47

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
70	Time base	E8	0	0	3	0
71	Divider	E9	0	0	3	0
72	Decimal point	F0	0	0	7	0
73	Scale units	F1	0	0	29	0
74	-	F2	0	0	0	0
75	-	F3	0	0	0	0
76	-	F4	0	0	0	0

9.5 IN 2 Properties menu

See the "6.6 IN 2 Properties menu" section on page 50

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
77	Configuration	F5	0	0	2	0
78	Start value	F6	0	-99999	+99999	+00000
79	End value	F7	0	-99999	+99999	+10000
80	Decimal point	F8	0	0	7	3
81	Scale units	F9	0	0	29	0
82	Sampling time (s)	G0	0	0.0010	60.000	00.010
83	Average filter	G1	0	0	4	0
84	Offset	G2	0	-99999	+99999	+00000
85	Linearization	G3	0	0	2	0
86	Totalization	G4	0	0	1	0
87	-	G5	0	0	0	0
88	-	G6	0	0	0	0
89	-	G7	0	0	0	0

9.6 IN 2 Linearization menu

See the "6.7 IN 2 Linearization menu" section on page 54

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
90	P1(X)	G8	0	-99999999	+99999999	+00000000
91	P1(Y)	G9	0	-99999999	+99999999	+00000000
92	P2(X)	H0	0	-99999999	+99999999	+00000000
93	P2(Y)	H1	0	-99999999	+99999999	+00000000
94	P3(X)	H2	0	-99999999	+99999999	+00000000
95	P3(Y)	H3	0	-99999999	+99999999	+00000000
96	P4(X)	H4	0	-99999999	+99999999	+00000000
97	P4(Y)	H5	0	-99999999	+99999999	+00000000
98	P5(X)	H6	0	-99999999	+99999999	+00000000
99	P5(Y)	H7	0	-99999999	+99999999	+00000000
100	P6(X)	H8	0	-99999999	+99999999	+00000000
101	P6(Y)	H9	0	-99999999	+99999999	+00000000
102	P7(X)	I0	0	-99999999	+99999999	+00000000
103	P7(Y)	I1	0	-99999999	+99999999	+00000000
104	P8(X)	I2	0	-99999999	+99999999	+00000000
105	P8(Y)	I3	0	-99999999	+99999999	+00000000

(continue on next page)

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
106	P9(X)	I4	0	-99999999	+99999999	+00000000
107	P9(Y)	I5	0	-99999999	+99999999	+00000000
108	P10(X)	I6	0	-99999999	+99999999	+00000000
109	P10(Y)	I7	0	-99999999	+99999999	+00000000
110	P11(X)	I8	0	-99999999	+99999999	+00000000
111	P11(Y)	I9	0	-99999999	+99999999	+00000000
112	P12(X)	J0	0	-99999999	+99999999	+00000000
113	P12(Y)	J1	0	-99999999	+99999999	+00000000
114	P13(X)	J2	0	-99999999	+99999999	+00000000
115	P13(Y)	J3	0	-99999999	+99999999	+00000000
116	P14(X)	J4	0	-99999999	+99999999	+00000000
117	P14(Y)	J5	0	-99999999	+99999999	+00000000
118	P15(X)	J6	0	-99999999	+99999999	+00000000
119	P15(Y)	J7	0	-99999999	+99999999	+00000000
120	P16(X)	J8	0	-99999999	+99999999	+00000000
121	P16(Y)	J9	0	-99999999	+99999999	+00000000
122	P17(X)	K0	0	-99999999	+99999999	+00000000
123	P17(Y)	K1	0	-99999999	+99999999	+00000000
124	P18(X)	K2	0	-99999999	+99999999	+00000000
125	P18(Y)	K3	0	-99999999	+99999999	+00000000
126	P19(X)	K4	0	-99999999	+99999999	+00000000
127	P19(Y)	K5	0	-99999999	+99999999	+00000000
128	P20(X)	K6	0	-99999999	+99999999	+00000000
129	P20(Y)	K7	0	-99999999	+99999999	+00000000
130	P21(X)	K8	0	-99999999	+99999999	+00000000
131	P21(Y)	K9	0	-99999999	+99999999	+00000000
132	P22(X)	L0	0	-99999999	+99999999	+00000000
133	P22(Y)	L1	0	-99999999	+99999999	+00000000
134	P23(X)	L2	0	-99999999	+99999999	+00000000
135	P23(Y)	L3	0	-99999999	+99999999	+00000000
136	P24(X)	L4	0	-99999999	+99999999	+00000000
137	P24(Y)	L5	0	-99999999	+99999999	+00000000

9.7 IN 2 Totalization menu

See the "6.8 IN 2 Totalization menu" section on page 57

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
138	Time base	L6	0	0	3	0
139	Divider	L7	0	0	3	0
140	Decimal point	L8	0	0	7	0
141	Scale units	L9	0	0	29	0
142	-	M0	0	0	0	0
143	-	M1	0	0	0	0
144	-	M2	0	0	0	0

9.8 Linkage Properties menu

See the "6.9 Linkage Properties menu" section on page 60

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
145	Factor	M3	0	-99999999	+99999999	+00000001
146	Divider	M4	0	-99999999	+99999999	+00000001
147	Additive value	M5	0	-99999999	+99999999	+00000000
148	Decimal point	M6	0	0	7	0
149	Scale units	M7	0	0	29	0
150	-	M8	0	0	0	0
151	-	M9	0	0	0	0
152	-	N0	0	0	0	0

9.9 Preselection values menu

See the "6.10 Preselection values menu" section on page 63

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
167	Preselection 1	05	1000	-99999999	+99999999	+00001000
168	Preselection 2	06	2000	-99999999	+99999999	+00002000
169	Preselection 3	07	3000	-99999999	+99999999	+00003000
170	Preselection 4	08	4000	-99999999	+99999999	+00004000
171	-	09	0	0	0	0
172	-	P0	0	0	0	0

9.10 Preselection 1 menu

See the "6.11 Preselection 1 menu" section on page 65

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
173	Source 1	P1	0	0	11	0
174	Mode 1	P2	0	0	6	0
175	Hysteresis 1	P3	0	00000	99999	00000
176	Pulse time 1 (s)	P4	0	00.000	60.000	00.000
177	Output target 1	P5	0	0	6	1
178	Output polarity 1	P6	0	0	1	0
179	Output lock 1	P7	0	0	1	0
180	Start up delay 1 (s)	P8	0	00.000	60.000	00.000
181	Event color 1	P9	0	0	3	0
182	-	Q0	0	0	0	0
183	-	Q1	0	0	0	0

9.11 Preselection 2 menu

See the "6.12 Preselection 2 menu" section on page 69

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
184	Source 2	Q2	0	0	11	0
185	Mode 2	Q3	0	0	6	0
186	Hysteresis 2	Q4	0	00000	99999	00000
187	Pulse time 2 (s)	Q5	0	00.000	60.000	00.000
188	Output target 2	Q6	0	0	6	1
189	Output polarity 2	Q7	0	0	1	0
190	Output lock 2	Q8	0	0	1	0
191	Start up delay 2 (s)	Q9	0	00.000	60.000	00.000
192	Event color 2	R0	0	0	3	0
193	-	R1	0	0	0	0
194	-	R2	0	0	0	0

9.12 Preselection 3 menu

See the "6.13 Preselection 3 menu" section on page 71

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
195	Source 3	R3	0	0	11	0
196	Mode 3	R4	0	0	6	0
197	Hysteresis 3	R5	0	00000	99999	00000
198	Pulse time 3 (s)	R6	0	00.000	60.000	00.000
199	Output target 3	R7	0	0	6	1
200	Output polarity 3	R8	0	0	1	0
201	Output lock 3	R9	0	0	1	0
202	Start up delay 3 (s)	S0	0	0	1	0
203	Event color 3	90	0	0	3	0
204	-	91	0	0	0	0
205	-	92	0	0	0	0

9.13 Preselection 4 menu

See the "6.14 Preselection 4 menu" section on page 73

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
206	Source 4	9~	0	0	11	0
207	Mode 4	S1	0	0	6	0
208	Hysteresis 4	S2	0	00000	99999	00000
209	Pulse time 4 (s)	S3	0	00.000	60.000	00.000
210	Output target 4	S4	0	0	6	1
211	Output polarity 4	S5	0	0	1	0
212	Output lock 4	S6	0	0	1	0
213	Start up delay 4 (s)	S7	0	0	1	0
214	Event color 4	S8	0	0	3	0
215	-	S9	0	0	0	0
216	-	T0	0	0	0	0

9.14 Serial menu

See the "6.15 Serial menu" section on page 75

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
217	Unit number	T1	0	11	99	11
218	Serial baud rate	T2	0	0	2	0
219	Serial format	T3	0	0	9	0
220	Serial init	T4	0	0	1	0
221	Serial protocol	T5	0	0	1	0
222	Serial timer (s)	T6	0	00.000	60.000	00.000
223	Serial value	T7	0	0	9	0
224	MODBUS	T8	0	0	247	0
225	-	T9	0	0	0	0

9.15 Analog OUT menu

See the "6.16 Analog OUT menu" section on page 78

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
226	Analog source	U0	0	0	11	0
227	Analog format	U1	0	0	2	0
228	Analog start	U2	0	-99999999	99999999	+00000000
229	Analog end	U3	0	-99999999	99999999	+00010000
230	Analog gain (%)	U4	0	000.00	110.00	100.00
231	Analog offset %	U5	0	-99.99	+99.99	+00.00
232	-	U6	0	0	0	0
233	-	U7	0	0	0	0

9.16 Command menu

See the "6.17 Command menu" section on page 81

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
234	Input 1 action	U8	0	0	28	0
235	Input 1 config.	U9	0	0	3	2
236	Input 2 action	V0	0	0	28	0
237	Input 2 config.	V1	0	0	3	2
238	Input 3 action	V2	0	0	28	0
239	Input 3 config.	V3	0	0	3	2
240	-	V4	0	0	0	0
241	-	V5	0	0	0	0
242	-	V6	0	0	0	0
243	-	V7	0	0	0	0

9.17 Display menu

See the "6.18 Display menu" section on page 84

#	Parameter	Serial code	Value	Min. value	Max. value	Default value
244	Start display	V8	0	0	1	0
245	Source single	V9	0	0	11	0
246	Source dual top	W0	0	0	11	0
247	Source dual down	W1	0	0	11	1
248	Large display	W2	0	0	6	0
249	Source large	W3	0	0	11	0
250	Color	W4	0	0	2	0
251	Brightness	W5	0	010	100	080
252	Contrast	W6	0	0	2	1
253	Screen saver	W7	0	0000	9999	0000
254	Up-date-time	W8	0	0.005	9.999	0.100
255	Font	W9	0	0	1	0
256	-	a0	0	0	0	0

9.18 Serial codes of commands

Serial code	Command
54	TARA INPUT 1
55	TARA INPUT 2
56	TARA INPUT 1 + 2
57	RESET TOTAL 1
58	RESET TOTAL 2
59	RESET TOTAL 1 + 2
60	TEACH PRESELECTION 1
61	TEACH PRESELECTION 2
62	TEACH PRESELECTION 3
63	TEACH PRESELECTION 4
64	SCROLL DISPLAY
65	RESET MIN. / MAX. VALUES
66	CLEAR LOOP TIME
67	ACTIVATE
68	STORE DATA
69	TEST PROGRAM

9.19 Unit variables

Serial code	Display
:0	Result[INPUT_1];
:1	Result[INPUT_2];
:2	Result[LINKAGE INPUT_1_2];
:3	Result[TOTAL_1]
:4	Result[TOTAL_2]
:5	Result[TOTAL_LINKAGE];
:6	Minimum_Value_1;
:7	Maximum_Value_1;
:8	Minimum_Value_2;
:9	Maximum_Value_2;
;0	Error_Status;
;1	0;
;2	SDADC_IN1_Voltage;
;3	SDADC_IN1_Current;
;4	SDADC_IN2_Voltage;
;5	SDADC_IN2_Current;

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Document release	Release date	Description
1.0	02.10.2018	First issue
1.1	29.03.2019	RS-485 information added
1.2	07.05.2019	Mode 1 and Start up delay 1 (s) items updated in all Preselection menus
1.3	05.05.2020	Large display function added, Modbus interface, error messages, other minor corrections
1.4	16.03.2023	Technical specifications updated, parameter descriptions updated, minor amendments



Dispose separately

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