

LD350

LD355



- Multifunction touch-screen display for incremental encoders
- Speed and position indicator, frequency counter, process meter, timer, stopwatch, ...
- Input frequencies up to 1MHz
- Digital, analogue, serial and relay outputs
- DC / AC power supply: 18÷30Vdc or 115÷230Vac

Suitable for the following models:

- LD350-P8-...
- LD355-P8-...
- LD350-PM-...
- LD355-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 **LD350 and LD355 touch-screen indicator** series.

LD350 and LD355 touch-screen indicators are designed to interface HTL/TTL encoders or NPN/PNP/NAMUR sensors and offer several operating modes such as position indicator, tachometer and speed indicator, frequency / RPM indicator, process meter, counter, timer, stopwatch, etc. The input frequency can be up to 1 MHz. They also implement the counting direction and the linearisation functions.

They feature a touch screen and 7-segment 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.

LD350 touch-screen indicator provides two incremental AB inputs for PNP/NPN/NAMUR/TRI-STATE type signals.

LD355 touch-screen indicator provides four incremental AB /AB inputs for HTL/RS-422 type signals.

In the series the following models are available:

- **LD350-P8 / LD355-P8** touch-screen indicator standard version;
- **LD350-PM / LD355-PM** provides additional 115-230Vac power supply;
- **LD350-...-AVI / LD355-...-AVI** provides additional 16-bit analogue output, four control outputs and RS-232 / RS-485 serial interface;
- **LD350-...-DO / LD355-...-DO** further offers four control outputs and RS-232 / RS-485 serial interface;
- **LD350-...-RO / LD355-...-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

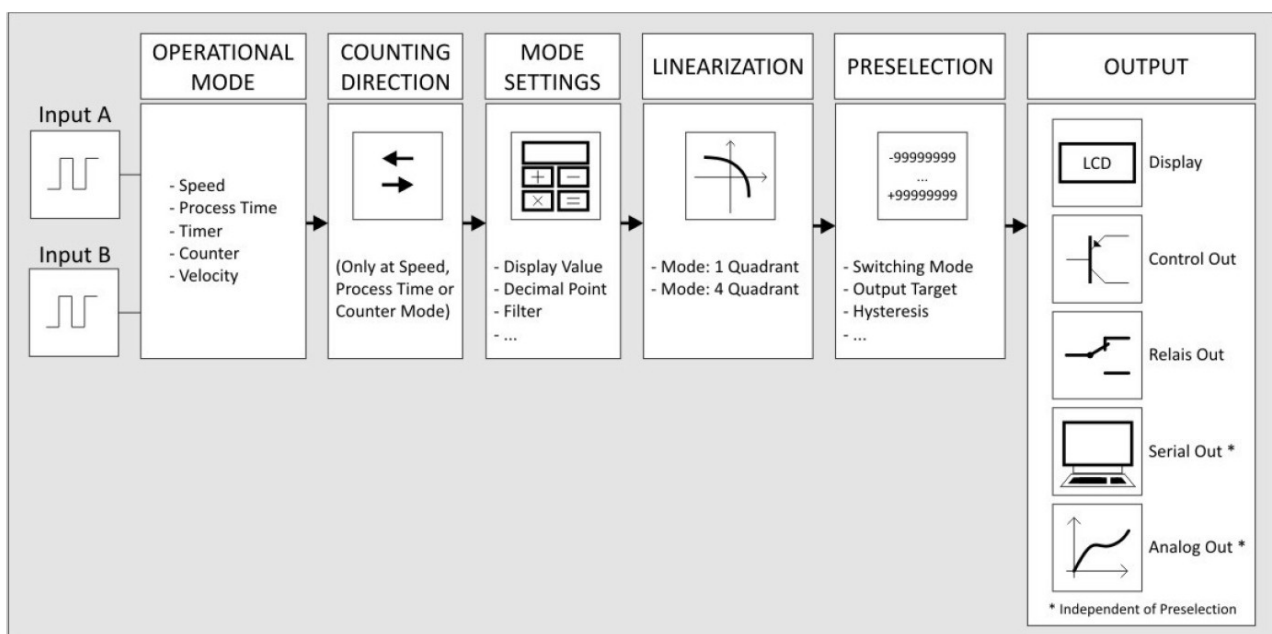
All functions can be configured in the parameter menu.

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

- **SPEED** (only input A or input B are used, depending on the parameter setting), see the "6.3 Speed operation mode menu" section on page 37.

- Tachometer / speed indicator
- Measurement of frequency / RMP indicator
- Monitoring functions for speed and standstill
- PROCESS TIME (only input A is used), see the "6.4 Process Time operation mode menu" section on page 40.
 - Processing time indicator (reciprocal speed)
 - Baking time indicator
 - Flow time indicator
- TIMER (only input A or input B are used, depending on the parameter setting), see the "6.5 Timer operation mode menu" section on page 43
 - Operation as stopwatch (start / stop function can be freely parametrized)
 - Counter for working hours
 - Period measurement
- COUNTER (input A and input B are both used), see the "6.6 Counter operation mode menu" section on page 45
 - Pulse counter / sum or differential counter
 - Up or down counter
 - Position indicator
 - Quadrature counter
 - Batch counter
- VELOCITY (input A operates as a start input and input B operates as a stop input), see the "6.7 Velocity operation mode menu" section on page 48
 - Runtime measurement as speed indicator

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 power supply before connecting the device;
- connect following to explanation in the "4 - Electrical connections" section on page 17;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, 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;
- 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.

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



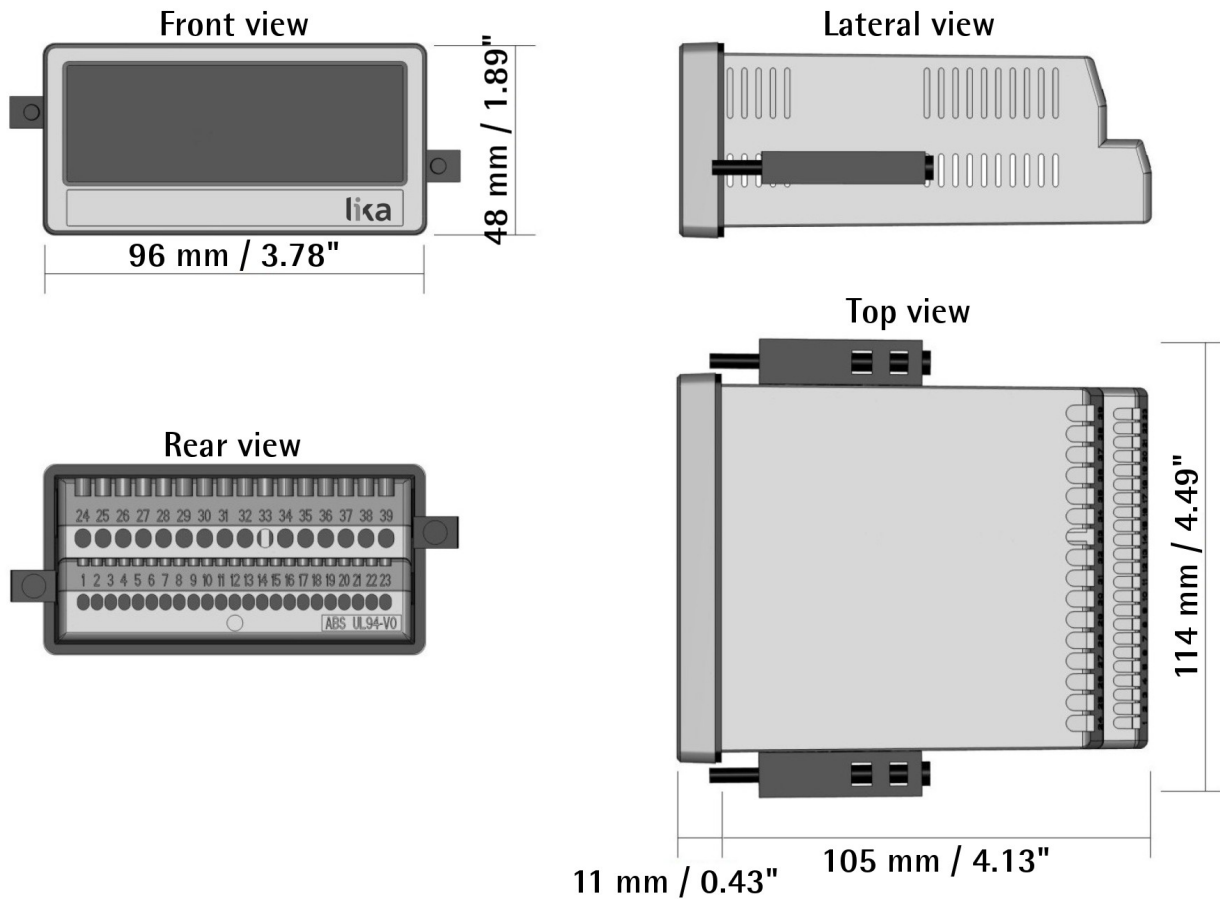
WARNING

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 temperature range (-20°C +60°C / -4°F +140°F). Please ensure an adequate ventilation and avoid any direct contact between the device and 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.

For placement, wiring, environmental conditions as well as shielding and earthing/grounding of the supply lines you must comply with the general standards stated for industrial automation industry and the specific shielding instructions provided by the manufacturer.

3.3 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.

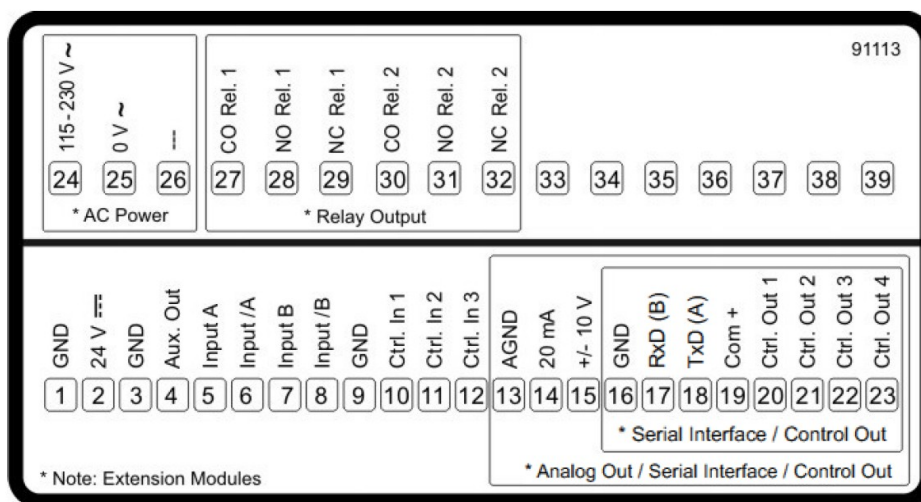
4 – Electrical connections



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 18).

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 ... 230Vac (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 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).

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 (LD350 model)

| | |
|-------------|--|
| DC version: | 24Vdc (approx. 1 V lower than the power supply voltage), max. 250 mA |
| AC version: | 24Vdc ($\pm 15\%$), max. 150 mA up to 45°C / 80 mA when more than 45°C |

Auxiliary voltage output technical specifications (LD355 model)

| | |
|-------------|---|
| DC version: | 24Vdc (approx. 1 V lower than the power supply voltage), max. 250 mA or 5Vdc ($\pm 15\%$), max. 250 mA |
| AC version: | 24Vdc ($\pm 15\%$) (max. 150 mA up to 45°C / 80 mA when more than 45°C) or 5Vdc ($\pm 15\%$), max. 250 mA |

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° Celsius. At higher temperature the maximum output current is reduced to 80 mA. |

LD355 model allows the auxiliary voltage output to be set to either 24 Vdc or 5 Vdc. Refer to the **Encoder supply** parameter in the "6.2 General menu" section on page 33.

4.4 A, B incremental inputs (LD350 model)

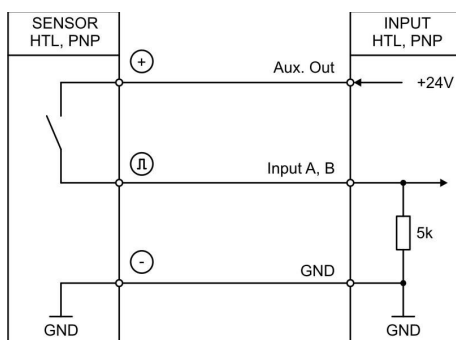
A, B incremental inputs technical specifications

| | |
|------------------------------|--|
| Number of inputs (channels): | 2 (A, B) |
| Configuration: | PNP, NPN, Namur, Tri-State |
| Format: | HTL (Low = 0 ... 3 V, High = 9 ... 30 V) |
| Frequency: | max. 250 kHz |
| Load: | max. 6 mA / $R_i > 5 \text{ k}\Omega$ / 470 pF |

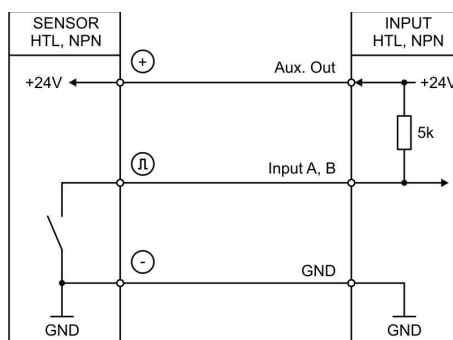
The unit provides two inputs for HTL signals through terminal blocks 5 and 7. The characteristics of the incremental inputs (PNP, NPN, Namur or Tri-State) can be set in the **General** menu, see the **Encoder properties LD350** parameter in the "6.2 General menu" section on page 33.

4.4.1 Wiring of the incremental inputs

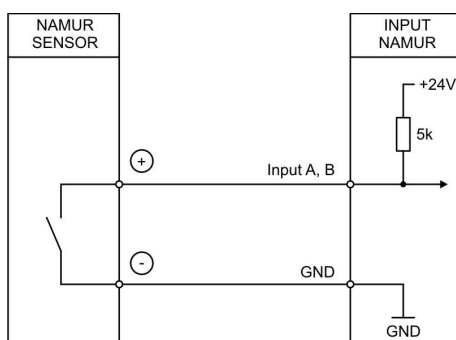
PNP



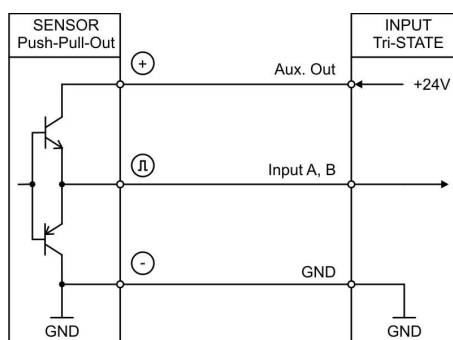
NPN



Namur



Tri-State



Unconnected PNP inputs are always "LOW" and unconnected NPN inputs are always "HIGH".

All inputs are designed to receive impulses from electrical impulse sources.



4.4.2 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 μF will reduce the input frequency to 20 Hz and miscounting due to contact bouncing will be eliminated.

4.5 A, /A, B, /B incremental inputs (LD355 model)

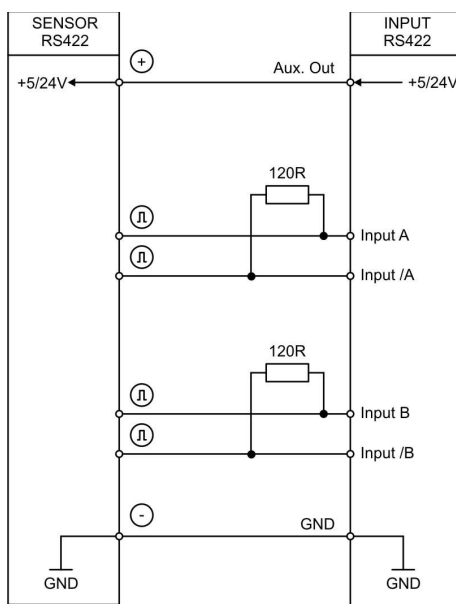
AB, /AB incremental inputs technical specifications

| | |
|------------------------------|--|
| Number of inputs (channels): | 4 (A, /A, B, /B) |
| Configuration: | RS-422, HTL differential, HTL PNP, HTL NPN |
| HTL differential: | HTL (Low = 0 ... 3 V, High = 9 ... 30 V) |
| HTL PNP / NPN: | max. 250 kHz |
| Load: | max. 3 mA / $R_i > 10 \text{ k}\Omega$ / 47 pF |

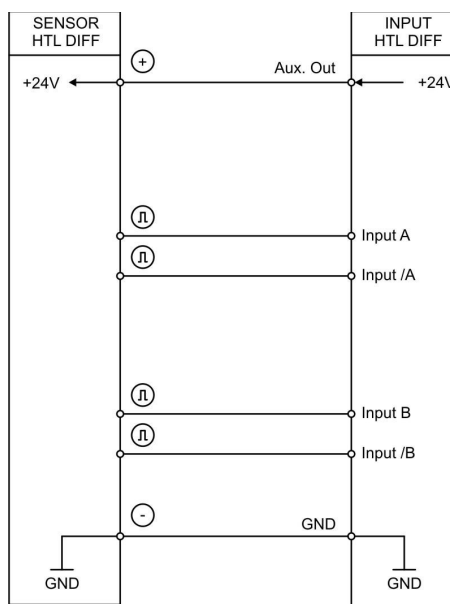
The unit provides four pulse inputs at terminal blocks 5, 6, 7 and 8 for HTL/RS-422 signals. The characteristics of the incremental inputs can be set in the **General** menu, see the [Encoder properties LD355](#) parameter in the "6.2 General menu" section on page 33.

4.5.1 Wiring of the incremental inputs

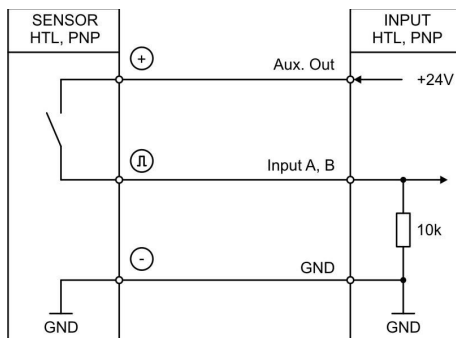
RS-422



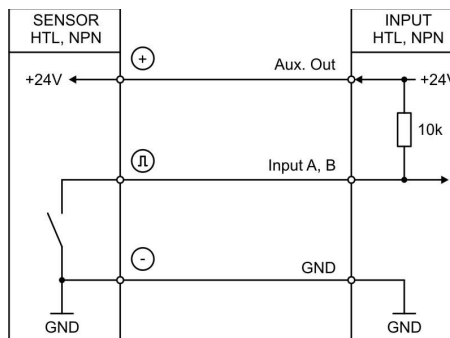
HTL differential



HTL PNP, single ended



HTL NPN, single ended



Unconnected PNP inputs are always "LOW" and unconnected NPN inputs are always "HIGH".

All inputs are designed to receive impulses from electrical impulse sources.

4.6 Control inputs

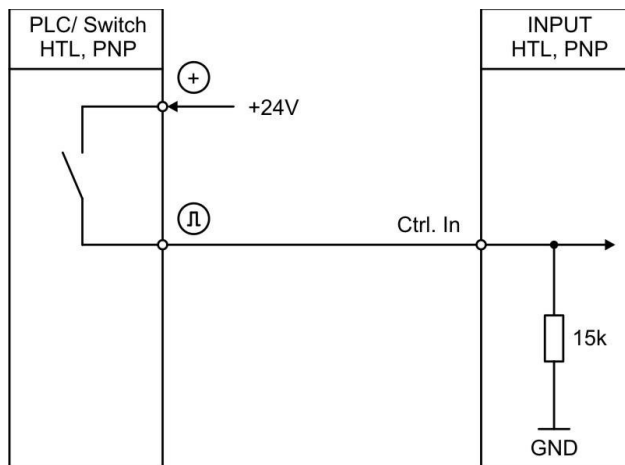
Control inputs technical specifications

| | |
|-------------------|---|
| Number of inputs: | 3 |
| Format: | HTL, PNP (Low = 0 ... 3 V, High = 9 ... 30 V) |
| Frequency: | max. 10 kHz |
| Load: | max. 2 mA / $R_i > 15 \text{ k}\Omega$ / 470 pF |

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

In the **Command** menu (see the "6.15 Command menu" section on page 66) the operation of the control inputs can be set. 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 μF 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: | ±0.1% |
| Reaction time: | < 150 ms |

A 16 bit analogue output is available through terminal blocks 13 and 14 / 15. It can be configured and scaled in the **Analog** menu, see the "6.14 Analog menu" section on page 64.

The following configurations are available (see the **Analog format** parameter on page 64):

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

The analogue output is proportional to the display value 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- and -DO1-) or RS-485 (-AVI2- and -DO2-) |
| Baud rate: | 9600, 19200 and 38400 baud |

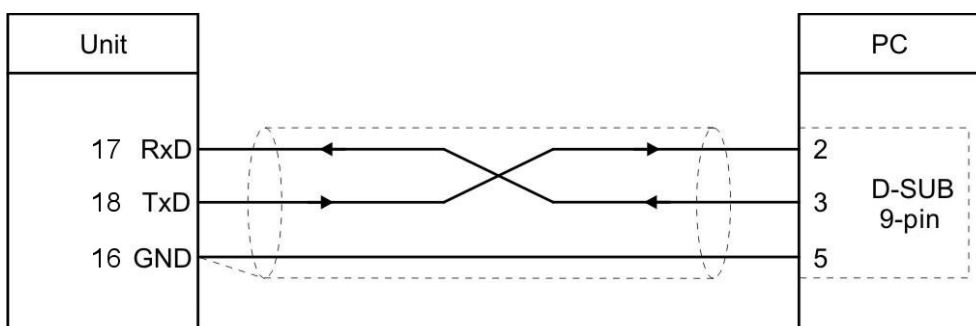
A serial interface (RS-232 / RS-485) is available through terminal blocks 16, 17 and 18.

It can be configured in the **Serial** menu, see the "6.13 Serial menu" section on page 61.

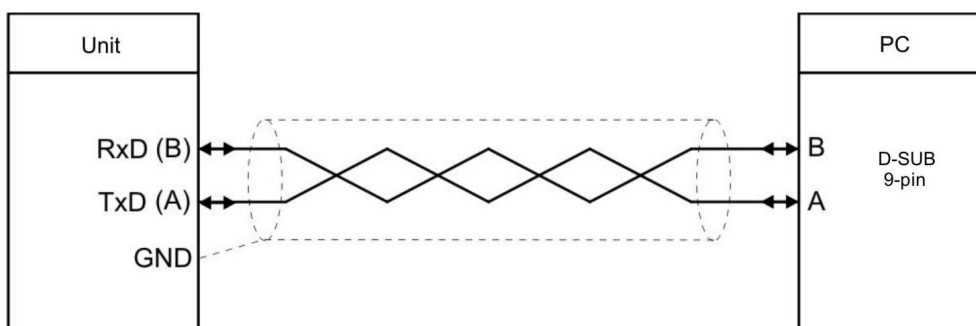
The RS-232 / RS-485 serial interface can be used:

- 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 |

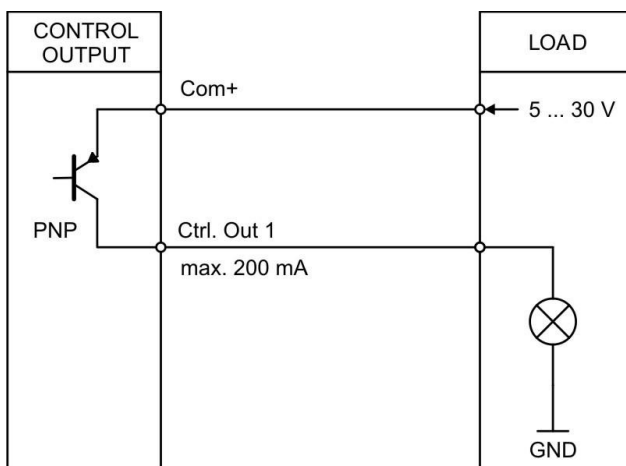
Four control outputs are available at terminal blocks 20, 21, 22 and 23 (+ terminal block 19 for switching voltage).

The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" sections on pages 51, 55, 57 and 59 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 26.

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 |

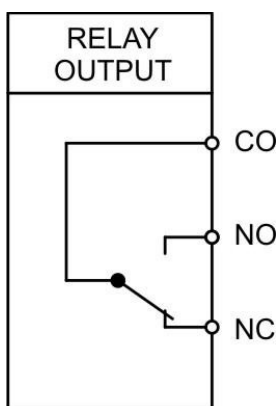
Two relay outputs with potential-free changeover contacts are available at terminal blocks 27, 28, 29, 30, 31 and 32. The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" sections on pages 51, 55, 57 and 59 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 26.

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 28.



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

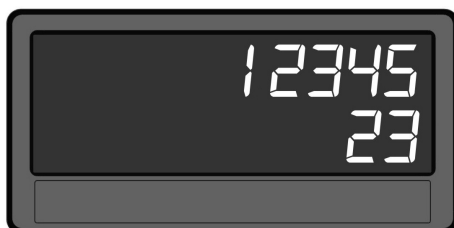
The following screens are available during operation. Depending on the device version and the selected operation mode, not all displays will be shown.



Display with unit and status bar

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

Control output states and relay states are only shown with AVI, DO and RO order codes.



Display batch counter

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

It is available only when the **Batch mode** is active.



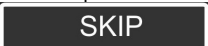
Display with command keys

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

It is available only when the **Timer** or **Counter** operation modes are active.



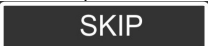
Display for quick start of the preselection values setting process (see the "6.8 Preselection values menu" section on page 50)

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.

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

6 – Menus and parameters

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 33 |
| Operational mode , see on page 33 |
| Encoder properties LD350 , see on page 33 (LD350 model) or Encoder properties LD355 , see on page 33 (LD355 model) |
| Encoder supply , see on page 34 |
| Counting direction , see on page 34 |
| Scale units , see on page 34 |
| Linearization mode , see on page 35 |
| Pin preselection , see on page 36 |
| Pin parameter , see on page 36 |
| Back up memory , see on page 36 |
| Factory settings , see on page 36 |

The following menus depend on the setting of the **Operational mode** parameter, see on page 33.

| |
|--|
| Operational mode = SPEED, Speed operation mode menu , see the "6.3 Speed operation mode menu" section on page 37 |
| Display value , see on page 37 |
| Base frequency (Hz) , see on page 37 |
| Decimal point , see on page 37 |
| Sampling time (s) , see on page 38 |
| Wait time (s) , see on page 38 |
| Standstill time (s) , see on page 39 |
| Average filter , see on page 39 |
| For/Rev detection , see on page 39 |

Operational mode = PROCESS TIME, **Process Time operation mode menu**, see the "6.4 Process Time operation mode menu" section on page 40

Display format, see on page 40

Display value, see on page 40

Base frequency (Hz), see on page 40

Sampling time (s), see on page 41

Wait time (s), see on page 41

Standstill time (s), see on page 42

Average filter, see on page 42

Operational mode = TIMER, **Timer operation mode menu**, see the "6.5 Timer operation mode menu" section on page 43

Time base, see on page 43

Start / Stop, see on page 43

Latch function, see on page 44

Set value, see on page 44

Inc / Dec mode, see on page 44

Operational mode = COUNTER, **Counter operation mode menu**, see the "6.6 Counter operation mode menu" section on page 45

Count mode, see on page 45

Factor, see on page 45

Set value, see on page 46

Decimal point, see on page 46

Batch mode, see on page 46

Batch set value, see on page 47

Operational mode = VELOCITY, **Velocity operation mode menu**, see the "6.7 Velocity operation mode menu" section on page 48

Start / Stop, see on page 48

Display value, see on page 48

Base time (s), see on page 48

Decimal point, see on page 48

Wait time (s), see on page 49

Standstill time (s), see on page 49

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

Preselection values menu, see the "6.8 Preselection values menu" section on page 50

Preselection 1, see on page 50

Preselection 2, see on page 50

Preselection 3, see on page 50

Preselection 4, see on page 50

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

Preselection 1 menu, see the "6.9 Preselection 1 menu" section on page 51

Mode 1, see on page 51

Hysteresis 1, see on page 53

Pulse time 1 (s), see on page 53

Output target 1, see on page 53

Output polarity 1, see on page 53

Output lock 1, see on page 54

Start up delay 1 (s), see on page 54

Event color 1, see on page 54

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

Preselection 2 menu, see the "6.10 Preselection 2 menu" section on page 55

Mode 2, see on page 55

Hysteresis 2, see on page 55

Pulse time 2 (s), see on page 55

Output target 2, see on page 55

Output polarity 2, see on page 55

Output lock 2, see on page 55

Start up delay 2 (s), see on page 56

Event color 2, see on page 56

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

| |
|--|
| Preselection 3 menu , see the "6.11 Preselection 3 menu" section on page 57 |
| Mode 3 , see on page 57 |
| Hysteresis 3 , see on page 57 |
| Pulse time 3 (s) , see on page 57 |
| Output target 3 , see on page 57 |
| Output polarity 3 , see on page 57 |
| Output lock 3 , see on page 57 |
| Start up delay 3 (s) , see on page 58 |
| Event color 3 , see on page 58 |

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

| |
|--|
| Preselection 4 menu , see the "6.12 Preselection 4 menu" section on page 59 |
| Mode 4 , see on page 59 |
| Hysteresis 4 , see on page 59 |
| Pulse time 4 (s) , see on page 59 |
| Output target 4 , see on page 59 |
| Output polarity 4 , see on page 59 |
| Output lock 4 , see on page 60 |
| Start up delay 4 (s) , see on page 60 |
| Event color 4 , see on page 60 |

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

| |
|--|
| Serial menu , see the "6.13 Serial menu" section on page 61 |
| Unit number , see on page 61 |
| Serial baud rate , see on page 61 |
| Serial format , see on page 61 |
| Serial init , see on page 62 |
| Serial protocol , see on page 62 |
| Serial timer (s) , see on page 63 |
| Serial value , see on page 63 |

It is only available for devices with order code AVI.

| |
|--|
| Analog menu , see the "6.14 Analog menu" section on page 64 |
| Analog format , see on page 64 |
| Analog start , see on page 64 |
| Analog end , see on page 64 |
| Analog gain (%) , see on page 65 |
| Analog offset , see on page 65 |

| |
|--|
| Command menu , see the "6.15 Command menu" section on page 66 |
| Input 1 action , see on page 66 |
| Input 1 config. , see on page 68 |
| Input 2 action , see on page 68 |
| Input 2 config. , see on page 68 |
| Input 3 action , see on page 68 |
| Input 3 config. , see on page 68 |

| |
|--|
| Display menu , see the "6.16 Display menu" section on page 69 |
| Color , see on page 69 |
| Brightness (%) , see on page 69 |
| Contrast , see on page 69 |
| Screen saver (s) , see on page 69 |
| Up-date time (s) , see on page 70 |
| Font , see on page 70 |

It is only available if the **Linearization mode** parameter in the **General** menu (see on page 35) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

| |
|--|
| Linearization menu , see the "6.17 Linearization menu" section on page 71 |
| P1(X) , see on page 71 |
| ... |
| P24(X) , see on page 71 |
| P1(Y) , see on page 71 |
| ... |
| P24(Y) , see on page 71 |

6.2 General menu

The default values are highlighted with grey background.

Operational mode

This parameter allows to set the required operational mode, i.e. the desired measuring function.

| | | |
|---|---------------------|--|
| 0 | SPEED | Speed indicator (RPM), tachometer or frequency counter, see the "6.3 Speed operation mode menu" section on page 37. |
| 1 | PROCESS TIME | Operation as baking time or processing time indicator (reciprocal speed), see the "6.4 Process Time operation mode menu" section on page 40. |
| 2 | TIMER | Operation as stopwatch, see the "6.5 Timer operation mode menu" section on page 43. |
| 3 | COUNTER | Operation as position indicator, event, sum, differential or up-down counter, see the "6.6 Counter operation mode menu" section on page 45. |
| 4 | VELOCITY | Runtime measurement as speed indicator, see the "6.7 Velocity operation mode menu" section on page 48. |

Encoder properties LD350

This parameter is only available for LD350 model.

It allows to set the characteristics of the pulse inputs for LD350.

| | | |
|---|------------------|--|
| 0 | PNP | PNP (switch to +) |
| 1 | NPN | NPN (switch to -) |
| 2 | NAMUR | Connect sensor (-) to GND and sensor (+) to input (A or B) |
| 3 | TRI-STATE | Tri-State for Push-Pull encoders / sensors |

Encoder properties LD355

This parameter is only available for LD355 model.

It allows to set the characteristics of the pulse inputs for LD355.

| | | |
|---|-------------------------|------------------------------------|
| 0 | RS422 | RS-422 standard |
| 1 | HTL DIFFERENTIAL | HTL differential |
| 2 | HTL PNP | HTL PNP single ended (switch to +) |
| 3 | HTL NPN | HTL NPN single ended (switch to -) |

Encoder supply

This parameter is only available for LD355 model.

It allows to set the voltage level of the auxiliary voltage output (4 = Aux. Out). For more information refer to the "4.3 Auxiliary voltage output" section on page 18.

| | | |
|---|--------------|-----------------------|
| 0 | 24VDC SUPPLY | 24 Vdc encoder supply |
| 1 | 5VDC SUPPLY | 5 Vdc encoder supply |

Counting direction

This parameter is only available when the **Counter** operation mode is active, see the "6.6 Counter operation mode menu" section on page 45.




It allows to set the counting direction: the display will show the count up information when the encoder rotates clockwise / counter-clockwise (or the axis moves forward / backward).

| | | |
|---|---------|---------------------------------------|
| 0 | FORWARD | Clockwise / Forward direction |
| 1 | REVERSE | Counter-clockwise / Reverse direction |

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value. The number of decimal places must be set in the **Decimal point** parameter that is available in each specific operation mode menu.

| | | |
|----|-------|--|
| 0 | Hz | Default when Speed operation menu is active |
| 1 | kHz | |
| 2 | m/s | |
| 3 | m/min | |
| 4 | km/h | |
| 5 | mph | |
| 6 | 1/min | |
| 7 | RPM | |
| 8 | 1/sec | |
| 9 | RPS | |
| 10 | Stk/h | |
| 11 | pcs/h | |
| 12 | mm | |
| 13 | m | |
| 14 | inch | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 15 | feet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Stueck | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | pcs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | sec | Default when Process time , Timer , Counter and Velocity operation menus are active | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | Min:Sec | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | H:M:S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | l/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | gal/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | ml/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | gr/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | inch/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28 | H:M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | { | | } | ~ | |
| | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | { | | } | ~ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Linearization mode

This parameter activates and sets the linearisation function. See the "6.17 Linearization menu" section on page 71 and the "6.17.1 Description of the linearisation function" section on page 71.

| | | |
|---|------------|---|
| 0 | OFF | No linearisation |
| 1 | 1 QUADRANT | Linearisation using 1 quadrant (see on page 71). |
| 2 | 4 QUADRANT | Linearisation using 4 quadrants (see on page 71). |

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 27. Refer also to the "6.8 Preselection values menu" section on page 50. 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 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 |

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 Speed operation mode menu

When the **Operational mode** parameter in the **General** menu is set to 0 = SPEED (see on page 33), the **Speed operation mode** menu is available. It allows to set the unit operation as speed indicator (RPM), tachometer or frequency meter.

In this operation mode only input A is active or input A and input B with 90° phase offset for detection of forward / reverse motion.

Display value

Desired value that will be displayed according to the setting of the **Base frequency (Hz)** parameter.

| | |
|-----------|----------------|
| 00000001 | Smallest value |
| 0000100.0 | Default value |
| 99999999 | Highest value |

Base frequency (Hz)

Reference frequency for the desired **Display value** expressed in Hz.

| | |
|--------|----------------|
| 000001 | Smallest value |
| 000100 | Default value |
| 500000 | Highest value |

Decimal point

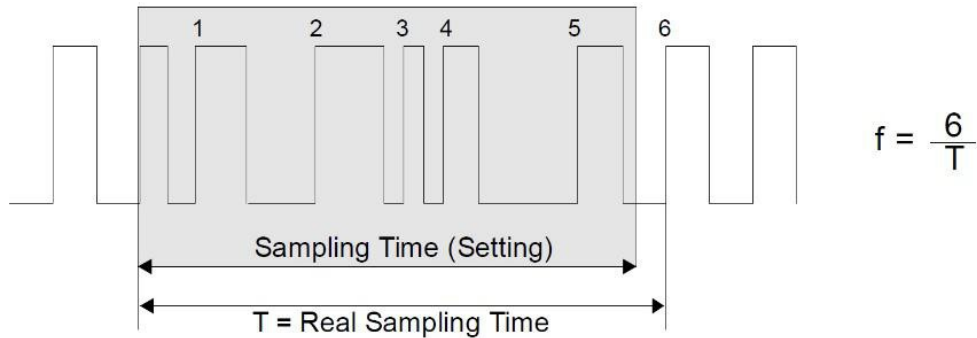
It sets the position of the decimal point.

| | | |
|---|-----------|--|
| 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 |

Sampling time (s)

It allows to set the minimum measurement time. This parameter is used as a filter in case of uneven frequencies. It directly affects the response time of the unit. The value is expressed in seconds (s).

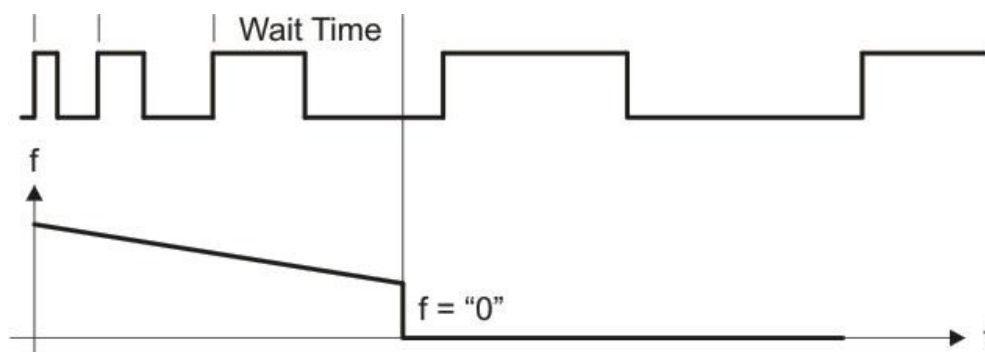
| | |
|--------------|------------------------|
| 0.005 | Shortest Sampling time |
| 0.100 | Default value |
| 9.999 | Longest Sampling time |



Wait time (s)

This parameter sets the span of time of the lowest frequency, i.e. the time between two rising edges when the device detects the frequency 0 Hz. Frequencies whose span of time is longer than the set **Wait time (s)** will be evaluated as frequency = 0 Hz. The value is expressed in seconds (s).

| | |
|--------------|--|
| 0.01 | Frequency = 0 Hz, for frequencies below 100 Hz |
| 01.00 | Default value |
| 99.99 | Frequency = 0 Hz, for frequencies below 0.1 Hz |



Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1 ... Preselection 4** menus on pages 51, 55, 57 and 59 respectively).

Standstill detection can be set in the **Preselection 1 ... Preselection 4** menus, see on pages 51, 55, 57 and 59 respectively.

| | |
|-------|---------------|
| 00.00 | Shortest time |
| ... | |
| 99.99 | Longest time |

Average filter

Selectable average or filter function to avoid measuring fluctuations due to unstable frequencies. With settings 1 to 4 a floating average calculation is performed. With settings 5 to 8, the device uses an exponential filter. The time constant T (63%) corresponds to the number of sampling cycles.



EXAMPLE

If **Sampling time (s)** = 0.1 s and **Average filter** = "Exponential filter, T (63 %) = 2x **Sampling time (s)**", after 0.2 seconds, 63% of the step size is reached.

| | | |
|---|------------------|---|
| 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 |
| 5 | 2 cycle filter | Exponential filter, T (63 %) = 2x Sampling time (s) |
| 6 | 4 cycle filter | Exponential filter, T (63 %) = 4x Sampling time (s) |
| 7 | 8 cycle filter | Exponential filter, T (63 %) = 8x Sampling time (s) |
| 8 | 16 cycle filter | Exponential filter, T (63 %) = 16x Sampling time (s) |

For/Rev detection

This parameter enables the detection of the direction of rotation (input A, input B with 90° phase shift).

| | | |
|---|-----|--|
| 0 | NO | Detection of the direction of rotation OFF |
| 1 | YES | Detection of the direction of rotation ON |

6.4 Process Time operation mode menu

When the **Operational mode** parameter in the **General** menu is set to 1 = PROCESS TIME (see on page 33), the **Process Time operation mode** menu is available. It allows to set the unit operation as baking time or processing time indicator (reciprocal speed).

Only input A is used.

Display format

This parameter sets the display format for the value. The corresponding decimal point will be set automatically.

| | | |
|---|---------|---|
| 0 | SECONDS | Value displayed in seconds |
| 1 | MINUTES | Value displayed in minutes |
| 2 | MIN:SEC | Value displayed in Minutes : Seconds |
| 3 | MIN.00 | Value displayed in Minutes . Hundredths of a minute (1/100) |
| 4 | H:M:S | Value displayed in Hours : Minutes : Seconds |

Display value

Desired value that will be displayed according to the setting of the **Base frequency (Hz)** parameter.

| | |
|----------|----------------|
| 00000001 | Smallest value |
| 00001000 | Default value |
| 99999999 | Highest value |

Base frequency (Hz)

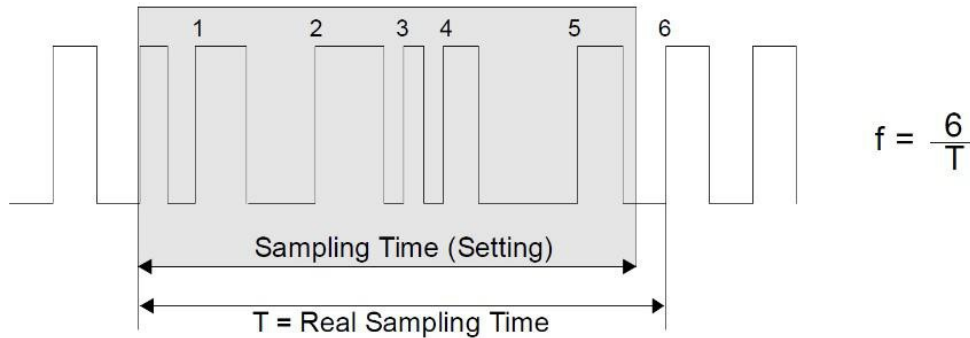
Reference frequency for the desired **Display value** expressed in Hz.

| | |
|--------|----------------|
| 000001 | Smallest value |
| 000100 | Default value |
| 500000 | Highest value |

Sampling time (s)

It allows to set the minimum measurement time. This parameter is used as a filter in case of uneven frequencies. It directly affects the response time of the unit. The value is expressed in seconds (s).

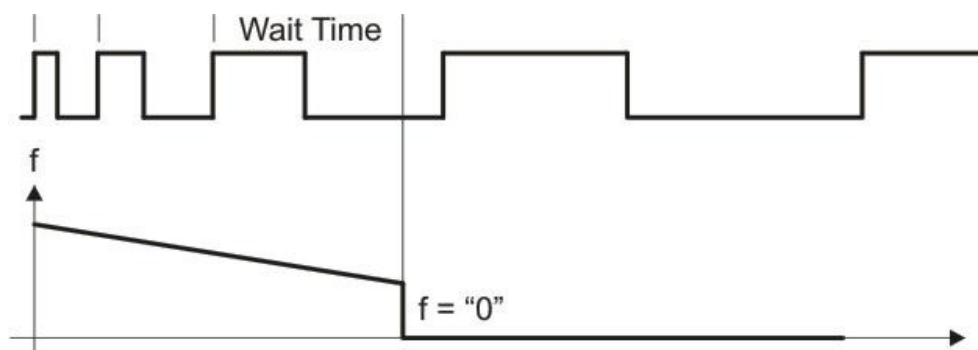
| | |
|--------------|------------------------|
| 0.005 | Shortest Sampling time |
| 0.100 | Default value |
| 9.999 | Longest Sampling time |



Wait time (s)

This parameter sets the span of time of the lowest frequency, i.e. the time between two rising edges when the device detects the frequency 0 Hz. Frequencies whose span of time is longer than the set **Wait time (s)** will be evaluated as frequency = 0 Hz. The value is expressed in seconds (s).

| | |
|--------------|--|
| 00.01 | Frequency = 0 Hz, for frequencies below 100 Hz |
| 01.00 | Default value |
| 99.99 | Frequency = 0 Hz, for frequencies below 0.1 Hz |



Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1 ... Preselection 4** menus on pages 51, 55, 57 and 59 respectively).

Standstill detection can be set in the **Preselection 1 ... Preselection 4** menus, see on pages 51, 55, 57 and 59 respectively.

| | |
|-------|---------------|
| 00.00 | Shortest time |
| ... | |
| 99.99 | Longest time |

Average filter

Selectable average or filter function to avoid measuring fluctuations due to unstable frequencies. With settings 1 to 4 a floating average calculation is performed. With settings 5 to 8, the device uses an exponential filter. The time constant T (63%) corresponds to the number of sampling cycles.



EXAMPLE

If **Sampling time (s)** = 0.1 s and **Average filter** = "Exponential filter, T (63 %) = 2x **Sampling time (s)**", after 0.2 seconds, 63% of the step size is reached.

| | | |
|---|------------------|---|
| 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 |
| 5 | 2 cycle filter | Exponential filter, T (63 %) = 2x Sampling time (s) |
| 6 | 4 cycle filter | Exponential filter, T (63 %) = 4x Sampling time (s) |
| 7 | 8 cycle filter | Exponential filter, T (63 %) = 8x Sampling time (s) |
| 8 | 16 cycle filter | Exponential filter, T (63 %) = 16x Sampling time (s) |

6.5 Timer operation mode menu

When the **Operational mode** parameter in the **General** menu is set to 2 = TIMER (see on page 33), the **Timer operation mode** menu is available. It allows to set the unit operation as timer or stopwatch.

Depending on the parametrization only input A or both inputs A and B are used.

Time base

This parameter sets the time base or resolution of the measurement.

| | | |
|---|------------|--|
| 0 | 1/1000 SEC | Milliseconds |
| 1 | 1/100 SEC | Hundredths of a second (1/100) |
| 2 | 1/10 SEC | Tenths of a second (1/10) |
| 3 | SECONDS | Full seconds |
| 4 | MIN.00 | Minutes and hundredths of a minute (1/100) |
| 5 | MIN.0 | Minutes and tenths of a minute (1/10) |
| 6 | H:M:S | Hours : Minutes : Seconds (9999:59:59) |
| 7 | H:M | Hours : Minutes (999999:59) |

Start / Stop

This parameter sets the start/stop condition of the time measurement.

| | | |
|---|------------------|---|
| 0 | COUNT AT A HIGH | Time measurement is active as long as input A signal is "HIGH" |
| 1 | COUNT AT A LOW | Time measurement is active as long as input A signal is "LOW" |
| 2 | START A / STOP B | A rising edge of input A signal starts the time measurement; a rising edge of input B signal stops the time measurement |
| 3 | PERIODE AT A | Time period measurement: the span of time between two rising edges of input A signal is displayed |

Auto set / reset

| | | |
|---|----|--|
| 0 | NO | Time measurement operates by adding up or subtracting measured values (see the Inc / Dec mode parameter in the next page), no automatic set / reset operation is carried out at next start. Start setting must be done via set / reset (see "6.15 Command menu" section on page 66) |
|---|----|--|

| | | |
|---|-----|--|
| 1 | YES | At each start, the new time measurement automatically starts from the value set next to the Set value parameter (see the next page) |
|---|-----|--|

Latch function

| | | |
|---|-----|--|
| 0 | NO | Real time display, the counting value appears on the display |
| 1 | YES | The display shows the result of the last measurement; the current measurement is shown in the background |

Set value

In case of a set / reset command (via keyboard shortcut, control input or PC user interface), the timer is preset to the value entered next to this item. See also the **Auto set / reset** parameter in the previous page.

| | |
|-----------|------------------------|
| 00000.000 | Smallest value (Reset) |
| ... | |
| 99999999 | Highest value |

Inc / Dec mode

It sets the time measurement operation by adding or subtracting measured values. When the **Start / Stop** parameter is set to 3 = PERIODE AT A (period time measurement), the time measurement always operates by adding measured values.

| | | |
|---|----------------|--|
| 0 | INCREMENT MODE | Time measurement operates by adding measured values |
| 1 | DECREMENT MODE | Time measurement operates by subtracting measured values |

6.6 Counter operation mode menu

When the **Operational mode** parameter in the **General** menu is set to 3 = COUNTER (see on page 33), the **Counter operation mode** menu is available. It allows to set the unit operation as position indicator, impulse counter, 2 inputs sum counter, 2 inputs differential counter or up-down counter. Input A and input B are both used.

Count mode

This parameter allows to set the counter operational mode.

| | | |
|---|-----------|---|
| 0 | A SINGLE | Input A is used as counting input. Input B is used to set the counting direction: "LOW" = Clockwise / Forward direction; "HIGH" = Counter-clockwise / Reverse direction |
| 1 | A + B | Sum counter: A channel pulses + B channel pulses |
| 2 | A - B | Differential counter: A channel pulses - B channel pulses |
| 3 | A/B 90 x1 | Quadrature counter: Pulses A, B with edge counting x1 |
| 4 | A/B 90 x2 | Quadrature counter: Pulses A, B with edge counting x2 |
| 5 | A/B 90 x4 | Quadrature counter: Pulses A, B with edge counting x4 |

Factor

It sets the scaling factor. When the sum counter mode (**Count mode** = 1 = A + B) or the differential counter mode (**Count mode** = 2 = A - B) are set, please note that the pulse scaling factor will only affect input A.



EXAMPLE

If **Factor** is set to 1.23456, 100,000 input pulses will result in a value of 123456.

| | |
|----------|----------------|
| 00.00001 | Smallest value |
| 01.00000 | Default value |
| 99.99999 | Highest value |

Set value

In case of a reset command (via keyboard shortcut, control input, or PC user interface), the counter is set to the value entered next to this item.

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

Decimal point

This parameter 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 |

Batch mode

It allows to set the batch counter.

The function of batch counting according to a preset value (**Preselection 1 ... Preselection 3**) is only possible if the switch conditions "automatic reset to zero" ($7 = \text{RESULT} \geq \text{PRES} \rightarrow 0$) or "set the counter value" ($8 = \text{RESULT} \leq 0 \rightarrow \text{SET}$) are enabled.

Preselection 4 value is the preset value of the batch counter, when the **Batch mode** is active.



EXAMPLE

We need the batch counter to increment by 1 at each 1,000 pulses.

Preselection 1 parameter has to be set to "1000"; the corresponding switch condition **Mode 1** has to be set to " $7 = \text{RESULT} \geq \text{PRES} \rightarrow 0$ "; **Batch mode** has to be set to "**1 = INCREMENT BATCH**". Should an output be turned on after a batch amount of 33, **Preselection 4** has to be set to "33" and the switching condition of **Mode 4** has to be set to "display value greater than or equal to" ($3 = \text{RESULT} \geq \text{PRES}$).

| | | |
|---|-----|------------------|
| 0 | OFF | No batch counter |
|---|-----|------------------|

| | | |
|---|--------------------|---|
| 1 | INCREMENT BATCH | Batch counter operates by incrementing |
| 2 | DECREMENT BATCH | Batch counter operates by decrementing |
| 3 | USE INPUTS ONLY | The batch counter is operated only via external commands (see the Command menu, refer to the "6.15 Command menu" section on page 66) |

Batch set value

In case of a reset / set command (via keyboard, control input or PC user interface) the batch counter is set to the value entered next to this item. The parameter is available only when the **Batch mode** is active.

| | |
|----------|----------------|
| 00000000 | Smallest value |
| ... | |
| 99999999 | Highest value |

6.7 Velocity operation mode menu

When the **Operational mode** parameter in the **General** menu is set to 4 = VELOCITY (see on page 33), the **Velocity operation mode** menu is available. It allows to set the unit operation as runtime measurement for speed. Channel A is the start input while channel B is the stop input.

Start / Stop

This parameter sets the start and stop condition.

| | | |
|---|--------------|---|
| 0 | RISE TO RISE | Start = rising edge of input A signal Stop = rising edge of input B signal |
| 1 | FALL TO FALL | Start = falling edge of input A signal Stop = falling edge of input B signal |
| 2 | RISE TO FALL | Start = rising edge of input A signal Stop = falling edge of input B signal |
| 3 | FALL TO RISE | Start = falling edge of input A signal Stop = rising edge of input B signal |

Display value

Desired value that will be displayed according to the setting of the **Base time (s)** parameter.

| | |
|----------|----------------|
| 00000001 | Smallest value |
| 00001000 | Default value |
| 99999999 | Highest value |

Base time (s)

Reference time for the desired **Display value** expressed in seconds.

| | |
|---------|----------------|
| 000.001 | Smallest value |
| 001.000 | Default value |
| 999.999 | Highest value |

Decimal point

This parameter sets the position of the decimal point.

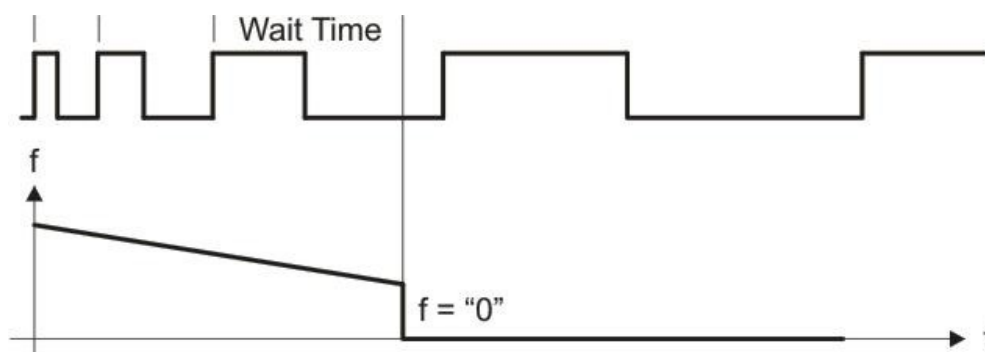
| | | |
|---|-----------|--|
| 0 | NO | No decimal point |
| 1 | 0000000.0 | Decimal point placed in the specified position |
| 2 | 000000.00 | Decimal point placed in the specified position |
| 3 | 00000.000 | Decimal point placed in the specified position |

| | | |
|---|-----------|--|
| 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 |

Wait time (s)

This parameter sets the span of time of the lowest frequency, i.e. the time between two rising edges when the device detects the frequency 0 Hz. Frequencies whose span of time is longer than the set **Wait time (s)** will be evaluated as frequency = 0 Hz. The value is expressed in seconds (s).

| | |
|-------|--|
| 00.00 | The display value is retained until a new value is available |
| 00.01 | Frequency = 0 Hz, for frequencies below 100 Hz |
| ... | |
| 99.99 | Frequency = 0 Hz, for frequencies below 0.1 Hz |



Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1 ... Preselection 4** menus on pages 51, 55, 57 and 59 respectively).

Standstill detection can be set in the **Preselection 1 ... Preselection 4** menus, see on pages 51, 55, 57 and 59 respectively.

Standstill time (s) makes sense only if **Wait time (s)** parameter is different from 00.00.

| | |
|-------|---------------|
| 00.00 | Shortest time |
| ... | |
| 99.99 | Longest time |

6.8 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 display value.

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

Preselection 1

Preselection / switching point 1. The features of **Preselection 1** must be set in the **Preselection 1** menu, see "6.9 Preselection 1 menu" section on page 51.

| | |
|------------|----------------|
| -9999999.9 | Smallest value |
| +0000100.0 | Default value |
| +9999999.9 | Highest value |

Preselection 2

Preselection / switching point 2. The features of **Preselection 2** must be set in the **Preselection 2** menu, see "6.10 Preselection 2 menu" section on page 55.

| | |
|------------|----------------|
| -9999999.9 | Smallest value |
| +0000200.0 | Default value |
| +9999999.9 | Highest value |

Preselection 3

Preselection / switching point 3. The features of **Preselection 3** must be set in the **Preselection 3** menu, see "6.11 Preselection 3 menu" section on page 57.

| | |
|------------|----------------|
| -9999999.9 | Smallest value |
| +0000300.0 | Default value |
| +9999999.9 | Highest value |

Preselection 4

Preselection / switching point 4. The features of **Preselection 4** must be set in the **Preselection 4** menu, see "6.12 Preselection 4 menu" section on page 59.

When the **Batch mode** is active (see on page 46), **Preselection 4** value is the preset value of the batch counter.

| | |
|------------|----------------|
| -9999999.9 | Smallest value |
| +0000400.0 | Default value |
| +9999999.9 | Highest value |

6.9 Preselection 1 menu

The **Preselection 1** menu is only available for devices with order codes AVI, DO and RO. It allows to set the characteristics of **Preselection 1**.

Mode 1

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

| | | |
|---|--------------------------------------|--|
| 0 | $ \text{RESULT} \geq \text{PRES} $ | <p>The absolute display value is greater than or equal to the absolute value of Preselection 1.</p> <p>If Hysteresis 1 is greater than 0, the following switching condition is applied:</p> <p>Display value \geq Preselection 1 \rightarrow ON</p> <p>Display value $<$ Preselection 1 - Hysteresis 1 \rightarrow OFF</p> |
| 1 | $ \text{RESULT} \leq \text{PRES} $ | <p>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 54– is advisable).</p> <p>If Hysteresis 1 is greater than 0, the following switching condition is applied:</p> <p>Display value \leq Preselection 1 \rightarrow ON</p> <p>Display value $>$ Preselection 1 + Hysteresis 1 \rightarrow OFF</p> |
| 2 | $ \text{RESULT} = \text{PRES} $ | <p>The absolute display value is equal to the absolute value of Preselection 1.</p> <p>A range (Preselection 1 \pm $\frac{1}{2}$ Hysteresis 1) can be defined and monitored along with a hysteresis value.</p> <p>If Hysteresis 1 is greater than 0, the following switching condition is applied:</p> <p>Display value $>$ Preselection 1 + $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF</p> <p>Display value $<$ Preselection 1 - $\frac{1}{2}$ Hysteresis 1 \rightarrow OFF</p> |
| 3 | $\text{RESULT} \geq \text{PRES}$ | <p>Display value is greater than or equal to Preselection 1, e.g. an overspeed is detected.</p> <p>If Hysteresis 1 is greater than 0, the following switching condition is applied:</p> <p>Display value \geq Preselection 1 \rightarrow ON</p> <p>Display value $<$ Preselection 1 - Hysteresis 1 \rightarrow OFF</p> |
| 4 | $\text{RESULT} \leq \text{PRES}$ | <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 54– is advisable).</p> <p>If Hysteresis 1 is greater than 0, the following</p> |

| | | |
|---|------------------------------------|--|
| | | switching condition is applied: Display value \leq Preselection 1 \rightarrow ON Display value $>$ Preselection 1 + Hysteresis 1 \rightarrow OFF |
| 5 | RESULT = PRES | 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 |
| 6 | RESULT = 0 | Display value is zero (standstill condition detected after the Standstill time (s) delay has expired), e. g. standstill monitoring. It is only available when Speed or Process Time operation modes are selected (see on pages 37 and 40 respectively). |
| 7 | RESULT \geq PRES \rightarrow 0 | Auto reset at Preselection 1 . It is only available when Timer or Counter operation modes are selected (see on pages 43 and 45 respectively). Display value is greater than or equal to Preselection 1 , the display value is set to 0. If Batch mode is active (see on page 46), the batch counter increments or decrements when the display value is set to 0. |
| 8 | RESULT \leq 0 \rightarrow SET | Auto set to Preselection 1 . It is only available when Timer or Counter operation modes are selected (see on pages 43 and 45 respectively). Display value is less than or equal to 0, the display value is set to Preselection 1 . If Batch mode is active (see on page 46), the batch counter increments or decrements when the display value is set to Preselection 1 . |
| 9 | RES \geq PRES-TRAIL | Trailing Preselection 1 : Display value is greater than or equal to Preselection 2 - Preselection 1 \rightarrow ON Preselection 1 is the trailing preselection from Preselection 2 . |

Hysteresis 1

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

| | |
|--------------|------------------------------|
| 000.0 | 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 66- will clear the latch). |

Start up delay 1 (s)

Start up delay setting 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 51) and when **Speed** or **Process Time** operation modes are selected (see on pages 37 and 40 respectively).

| | |
|--------|---|
| 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 58 and 60 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 |

6.10 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**.

Mode 2

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

| | |
|-------------------|---|
| 0 ... 8 | For complete information on the switching conditions 0 ... 8, please refer to the Mode 1 parameter in the "6.9 Preselection 1 menu" section on page 51. |
| 9 RES>=PRES-TRAIL | Trailing Preselection 2 : Display value is greater than or equal to Preselection 1 – Preselection 2 → ON 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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

Output polarity 2

Polarity for the switching condition of **Preselection 2**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

Output lock 2

Latch for the switching condition of **Preselection 2**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

Start up delay 2 (s)

Start up delay setting for the switching condition of **Preselection 2**. For complete information please refer to the **Start up delay 1 (s)** parameter in the "6.9 Preselection 1 menu" section on page 51.



NOTE

Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 58 and 60 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 "6.9 Preselection 1 menu" section on page 51.

6.11 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**.

Mode 3

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

| | |
|-------------------|---|
| 0 ... 8 | For complete information on the switching conditions 0 ... 8, please refer to the Mode 1 parameter in the "6.9 Preselection 1 menu" section on page 51. |
| 9 RES>=PRES-TRAIL | Trailing Preselection 3 : Display value is greater than or equal to Preselection 4 – Preselection 3 → ON 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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

Output polarity 3

Polarity for the switching condition of **Preselection 3**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

Output lock 3

Latch for the switching condition of **Preselection 3**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

Start up delay 3 (s)

Start up delay setting 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 57) and when **Speed** or **Process Time** operation modes are selected (see on pages 37 and 40 respectively).

| | | |
|----------|-------------|--|
| 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 54 and 56 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 "6.9 Preselection 1 menu" section on page 51.

6.12 Preselection 4 menu

The **Preselection 4** menu is only available for devices with order codes AVI, DO and RO. If **Batch mode** is active (see the "6.6 Counter operation mode menu" section on page 45), the batch counter is compared with the **Preselection 4** value.

Mode 4

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

| | | |
|---------|-----------------|---|
| 0 ... 8 | | For complete information on the switching conditions 0 ... 8, please refer to the Mode 1 parameter in the "6.9 Preselection 1 menu" section on page 51. |
| 9 | RES>=PRES-TRAIL | Trailing Preselection 4 : Display value is greater than or equal to Preselection 3 – Preselection 4 → ON 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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

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 "6.9 Preselection 1 menu" section on page 51.

Output polarity 4

Polarity for the switching condition of **Preselection 4**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

Output lock 4

Latch for the switching condition of **Preselection 4**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 51.

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 59) and when **Speed** or **Process Time** operation modes are selected (see on pages 37 and 40 respectively).

| | | |
|---|------|--|
| 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 54 and 56 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 "6.9 Preselection 1 menu" section on page 51.

6.13 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 23.

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 | 9600 baud |
| 1 | 19200 | 19200 baud |
| 2 | 38400 | 38400 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 OS6.0 software tool. If you set transmission values higher than 9600 baud, the duration of the initialization procedure will be shortened.

| | | |
|----------|------------|--|
| 0 | NO | The initialization values will be transmitted at 9600 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 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 66 and 68). |
| ... | |
| 60.000 | Cycle time expressed in seconds. |

Serial value

This parameter sets the value to be transmitted.

| | | |
|---|---|--------------------|
| 0 | 0 | Measurement_Result |
| 1 | 1 | Speed_Value |
| 2 | 2 | Time_Result |
| 3 | 3 | Counter |
| 4 | 4 | Velocity_Speed |
| 5 | 5 | Batch_Counter |
| 6 | 6 | Minimal_Value |
| 7 | 7 | Maximal_Value |
| 8 | 8 | N.A. |
| 9 | 9 | N.A. |

N.A. = not available

6.14 Analog menu

The **Analog** 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 22.

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

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**", when the **Counter** operation mode is active (see the "6.6 Counter operation mode menu" section on page 45) the polarity of the analogue output depends on the polarity of the display value.

| | | |
|----------|------------------|---------------|
| 0 | -10...10V | -10 ... +10 V |
| 1 | 0...20mA | 0 ... 20 mA |
| 2 | 4...20mA | 4 ... 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 |
| +0000000.0 | 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 start value |
| +0001000.0 | Default value |
| +99999999 | Highest start 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.

6.15 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 21.

Input 1 action

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

| | | | |
|----|-----------------|---|---------|
| 0 | NO | No function | |
| 1 | RESET/SET VALUE | When the Timer operation mode is active (see the "6.5 Timer operation mode menu" section on page 43): it resets the value to 0. When the Counter operation mode is active (see the "6.6 Counter operation mode menu" section on page 45): it resets / sets the value to the one set next to the Set value parameter (see on page 46). When the Velocity operation mode is active (see the "6.7 Velocity operation mode menu" section on page 48): it resets the value to 0. | (d) (s) |
| 2 | FREEZE | It freezes the current display value. | (s) |
| 3 | KEY LOCK | It disables the touch screen. | (s) |
| 4 | LOCK RELEASE | It releases the lock in all outputs / relay. | (d) |
| 5 | RESET MIN/MAX | It resets the minimum / maximum values. | (d) (s) |
| 6 | SERIAL PRINT | It allows serial data to be transmitted, see the Serial value parameter on page 63. | (d) |
| 7 | TEACH PRESEL. 1 | The current display value is stored as Preselection 1 (see the Preselection 1 parameter on page 50). | (d) |
| 8 | TEACH PRESEL. 2 | The current display value is stored as Preselection 2 (see the Preselection 2 parameter on page 50). | (d) |
| 9 | TEACH PRESEL. 3 | The current display value is stored as Preselection 3 (see the Preselection 3 parameter on page 50). | (d) |
| 10 | TEACH PRESEL. 4 | The current display value is stored as Preselection 4 (see the Preselection 4 parameter on page 50). | (d) |
| 11 | SCROLL DISPLAY | It scrolls through the available display | (d) |

| | | | |
|----|------------------|---|-----|
| | | screens (see the "5.2 Screen structure during operation" section on page 27). | |
| 12 | CLEAR LOOP TIME | It clears all latched switching conditions. | |
| 13 | START PRESELECT | N.A. | |
| 14 | ACTIVATE DATA | 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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 51 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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 51 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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 51 ff). | (d) |
| 20 | INCREMENT BATCH | It increases the batch counter (see the Counter operation mode, "6.6 Counter operation mode menu" section on page 45). | (d) |
| 21 | DECREMENT BATCH | It decreases the batch counter (see the Counter operation mode, "6.6 Counter operation mode menu" section on page 45). | (d) |
| 22 | RESET/SET BATCH | It resets the batch counter (see the Counter operation mode, "6.6 Counter operation mode menu" section on page 45). | (d) |

(s) = static switching (level evaluation)
Input 1 config. parameter must be set to be active at LOW / HIGH level
 (see options 0 – ACTIVE LOW and 1 – ACTIVE HIGH).

(d) = dynamic switching (edge evaluation)

Input 1 config. parameter must be set to activate at rising / falling edge (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 |
| 3 | FALLING EDGE | It activates at falling edge |

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 66.

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 68.

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 66.

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 68.

6.16 Display menu

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

Parameter changes become active only after exiting the menu selection.

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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 51 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 in percent (%).

| | |
|------------|-----------------|
| 010 | Min. brightness |
| 090 | 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 (s)

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 (s)

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

6.17 Linearization menu

The linearisation function is configured in this menu. The linearisation points are available only when the **Speed**, **Process Time** or **Counter** operation modes are enabled (see on pages 37, 40 and 45 respectively). Furthermore this menu is displayed only if the **Linearization mode** parameter in the **General** menu (see on page 35) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT"; if 0 – OFF option is set the **Linearization** menu does not appear.

For a complete description of the linearisation function and some examples refer to the "6.17.1 Description of the linearisation function" section below.

P1(X)

...

P24(X)

X-coordinate of the linearisation point.

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

| | |
|------------|-----------------------|
| -99999999 | Smallest X-coordinate |
| +0000000.0 | Default value |
| +99999999 | Largest X-coordinate |

P1(Y)

...

P24(Y)

Y-coordinate of the 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 |
| +0000000.0 | Default value |
| +99999999 | Largest Y-coordinate |

6.17.1 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

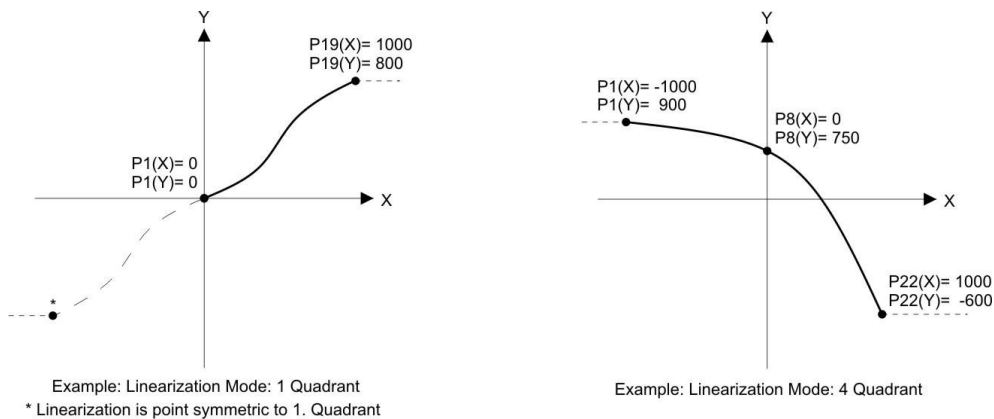
where the curvature is greater and only few coordinates where the curvature is lesser.

If you need to set an individual linearisation curve, the **Linearization mode** parameter in the **General** menu (see on page 35) 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.



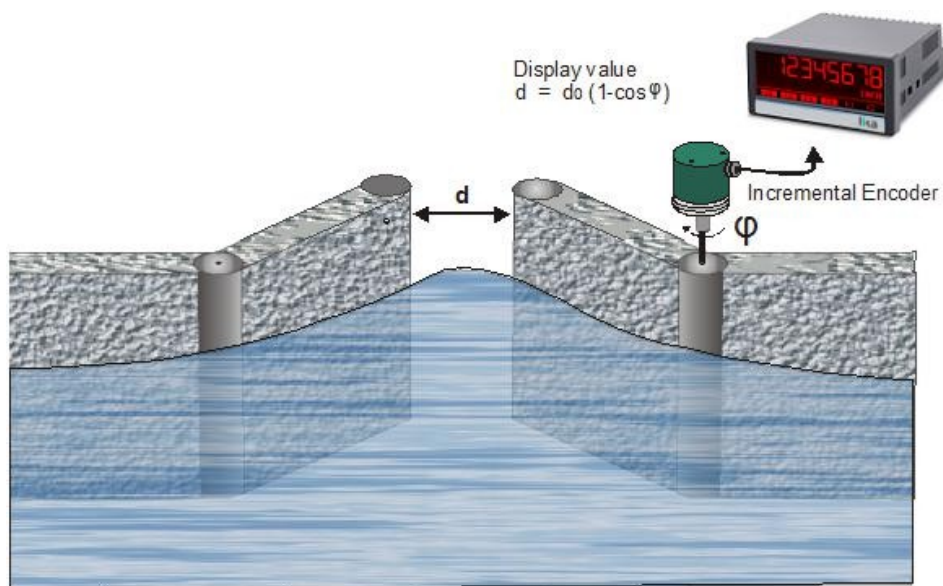
If the **Linearization mode** parameter in the **General** menu is set to "1 - 1 QUADRANT", **P1(X)** parameter must be set to zero. Linearisation is only defined in the positive range and the negative range will be mirrored symmetrical with respect to the central point.

If the **Linearization mode** parameter in the **General** 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.

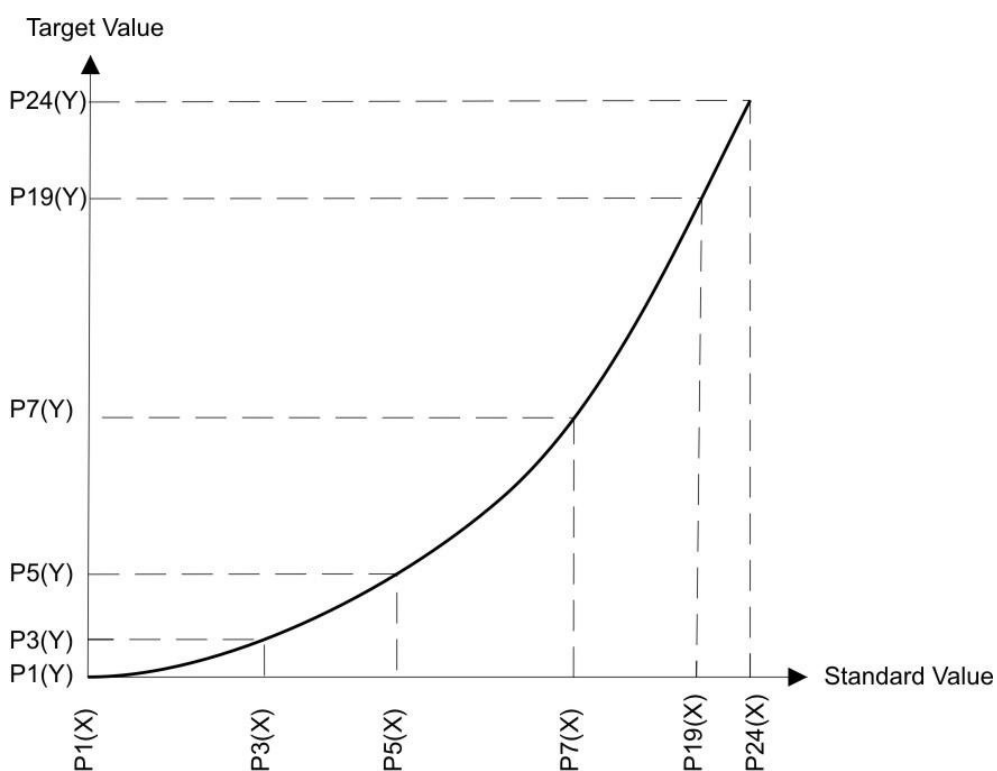


EXAMPLE

The picture below shows a sluiceway where the gate is controlled by means of an incremental encoder. We want to display the opening of the gate "d", the existing encoder information is proportional to the angular information φ .



In this case we need to convert a non-linear input signal (incremental encoder signals φ) into a linear representation (opening of the gate "d"). In the x-axis we must set the actual values detected by the encoder while in the y-axis we will set the opening values of the gate.



7 - Appendix

7.1 Data readout via serial interface

All codes shown in the **Serial value** parameter (see the "6.13 Serial menu" section on page 61) are available for serial readout by a PC or a PLC. For communication the monitors use the Drivecom Protocol according to ISO 1745. All protocol details 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.

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

| | | | | | |
|-----|-----|-----|----|----|-----|
| 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 serial 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 - Parameters / serial codes

8.1 General menu

See the "6.2 General menu" section on page 33

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|--|-------------|-------|------------|------------|---------------|-----------|------------|
| Operational mode | 0 | 3 | 0 | 4 | 0 | 1 | 0 |
| Encoder properties LD350 Encoder properties LD355 | 1 | 0 | 0 | 3 | 0 | 1 | 0 |
| Encoder supply | 2 | 0 | 0 | 1 | 0 | 1 | 0 |
| Counting direction | 3 | 0 | 0 | 1 | 0 | 1 | 0 |
| Scale units | 4 | 29 | 0 | 29 | 0 | 2 | 0 |
| Linearization mode | 5 | 0 | 0 | 2 | 0 | 1 | 0 |
| Pin preselection | 6 | 0 | 0000 | 9999 | 0000 | 4 | 0 |
| Pin parameter | 7 | 0 | 0000 | 9999 | 0000 | 4 | 0 |
| Back up memoryY | 8 | 1 | 0 | 1 | 1 | 1 | 0 |
| Factory settings | 9 | 0 | 0 | 1 | 0 | 1 | 0 |
| - | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| - | 11 | 0 | 0 | 0 | 0 | 0 | 0 |

8.2 Speed operation mode menu

See the "6.3 Speed operation mode menu" section on page 37

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|---------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Display value | 12 | 1000 | 00000001 | 99999999 | 100.0 | 8 | 0 |
| Base frequency (Hz) | 13 | 100 | 000001 | 500000 | 100 | 6 | 0 |
| Decimal point | 14 | 1 | 0 | 7 | 1 | 1 | 0 |
| Sampling time (s) | 15 | 100 | 0.005 | 9.999 | 0.100 | 4 | 3 |
| Wait time (s) | 16 | 100 | 0.01 | 99.99 | 01.00 | 4 | 2 |
| Standstill time (s) | 17 | 0 | 00.00 | 99.99 | 00.00 | 4 | 2 |
| Average filter | 18 | 0 | 0 | 8 | 0 | 1 | 0 |
| For/Rev detection | 19 | 0 | 0 | 1 | 0 | 1 | 0 |
| - | 20 | 0 | 0 | 0 | 0 | 0 | 0 |

8.3 Process Time operation mode menu

See the "6.4 Process Time operation mode menu" section on page 40

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|---------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Display format | 21 | 0 | 0 | 4 | 0 | 1 | 0 |
| Display value | 22 | 1000 | 00000001 | 99999999 | 1000 | 8 | 0 |
| Base frequency (Hz) | 23 | 100 | 000001 | 500000 | 100 | 6 | 0 |
| Sampling time (s) | 24 | 100 | 0.005 | 9.999 | 0.100 | 4 | 3 |
| Wait time (s) | 25 | 100 | 00.01 | 99.99 | 01.00 | 4 | 2 |
| Standstill time (s) | 26 | 0 | 00.00 | 99.99 | 00.00 | 4 | 2 |
| Average filter | 27 | 0 | 0 | 8 | 0 | 1 | 0 |
| - | 28 | 0 | 0 | 0 | 0 | 0 | 0 |
| - | 29 | 0 | 0 | 0 | 0 | 0 | 0 |

8.4 Timer operation mode menu

See the "6.5 Timer operation mode menu" section on page 43

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Time base | 30 | 7 | 0 | 7 | 0 | 1 | 0 |
| Start / Stop | 31 | 2 | 0 | 3 | 2 | 1 | 0 |
| Auto set / reset | 32 | 0 | 0 | 1 | 0 | 1 | 0 |
| Latch function | 33 | 0 | 0 | 1 | 0 | 1 | 0 |
| Set value | 34 | 0 | 00000.000 | 99999999 | 0 | 8 | 0 |
| Inc / Dec mode | 35 | 0 | 0 | 1 | 0 | 1 | 0 |

8.5 Counter operation mode menu

See the "6.6 Counter operation mode menu" section on page 45

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|-----------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Count mode | 36 | 3 | 0 | 5 | 3 | 1 | 0 |
| Factor | 37 | 1000 | 00.00001 | 99.99999 | 1.00000 | 7 | 5 |
| Set value | 38 | 0 | -99999999 | 99999999 | +0 | +/- 8 | 0 |
| Decimal point | 39 | 0 | 0 | 7 | 0 | 1 | 0 |
| Batch mode | 40 | 1 | 0 | 3 | 0 | 1 | 0 |
| Batch set value | 41 | 0 | 00000000 | 99999999 | 0 | 8 | 0 |
| - | 42 | 0 | 0 | 0 | 0 | 1 | 0 |

8.6 Velocity operation mode menu

See the "6.7 Velocity operation mode menu" section on page 48

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|---------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Start / Stop | A0 | 0 | 0 | 3 | 0 | 1 | 0 |
| Display value | A1 | 1000 | 00000001 | 99999999 | 1000 | 8 | 0 |
| Base time (s) | A2 | 1000 | 000.001 | 999.999 | 1.000 | 6 | 3 |
| Decimal point | A3 | 0 | 0 | 7 | 0 | 1 | 0 |
| Wait time (s) | A4 | 0 | 00.00 | 99.99 | 0 | 4 | 2 |
| Standstill time (s) | A5 | 0 | 00.00 | 99.99 | 0 | 4 | 2 |
| - | A6 | 0 | 0 | 0 | 0 | 0 | 0 |
| - | A7 | 0 | 0 | 0 | 0 | 0 | 0 |

8.7 Preselection values menu

See the "6.8 Preselection values menu" section on page 50

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|----------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Preselection 1 | A8 | 1000 | -9999999.9 | 9999999.9 | 100.0 | +/- 8 | 0 |
| Preselection 2 | A9 | 2000 | -9999999.9 | 9999999.9 | 200.0 | +/- 8 | 0 |
| Preselection 3 | B0 | 3000 | -9999999.9 | 9999999.9 | 300.0 | +/- 8 | 0 |
| Preselection 4 | B1 | 4000 | -9999999.9 | 9999999.9 | 400.0 | +/- 8 | 0 |

8.8 Preselection 1 menu

See the "6.9 Preselection 1 menu" section on page 51

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|----------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Mode 1 | B2 | 7 | 0 | 9 | 0 | 1 | 0 |
| Hysteresis 1 | B3 | 0 | 000.0 | 99999 | 0 | 5 | 0 |
| Pulse time 1 (s) | B4 | 500 | 00.000 | 60.000 | 0 | 5 | 3 |
| Output target 1 | B5 | 1 | 0 | 6 | 1 | 1 | 0 |
| Output polarity 1 | B6 | 0 | 0 | 1 | 0 | 1 | 0 |
| Output lock 1 | B7 | 0 | 0 | 1 | 0 | 1 | 0 |
| Start up delay 1 (s) | B8 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Event color 1 | B9 | 0 | 0 | 3 | 0 | 1 | 0 |

8.9 Preselection 2 menu

See the "6.10 Preselection 2 menu" section on page 55

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|----------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Mode 2 | C0 | 0 | 0 | 9 | 0 | 1 | 0 |
| Hysteresis 2 | C1 | 0 | 000.0 | 99999 | 0 | 5 | 0 |
| Pulse time 2 (s) | C2 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Output target 2 | C3 | 2 | 0 | 6 | 1 | 1 | 0 |
| Output polarity 2 | C4 | 0 | 0 | 1 | 0 | 1 | 0 |
| Output lock 2 | C5 | 0 | 0 | 1 | 0 | 1 | 0 |
| Start up delay 2 (s) | C6 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Event color 2 | C7 | 0 | 0 | 3 | 0 | 1 | 0 |

8.10 Preselection 3 menu

See the "6.11 Preselection 3 menu" section on page 57

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|----------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Mode 3 | C8 | 0 | 0 | 9 | 0 | 1 | 0 |
| Hysteresis 3 | C9 | 0 | 000.0 | 99999 | 0 | 5 | 0 |
| Pulse time 3 (s) | D0 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Output target 3 | D1 | 3 | 0 | 6 | 1 | 1 | 0 |
| Output polarity 3 | D2 | 0 | 0 | 1 | 0 | 1 | 0 |
| Output lock 3 | D3 | 0 | 0 | 1 | 0 | 1 | 0 |
| Start up delay 3 (s) | D4 | 0 | 0 | 1 | 0 | 1 | 0 |
| Event color 3 | D5 | 0 | 0 | 3 | 0 | 1 | 0 |

8.11 Preselection 4 menu

See the "6.12 Preselection 4 menu" section on page 59

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|----------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Mode 4 | D6 | 0 | 0 | 9 | 0 | 1 | 0 |
| Hysteresis 4 | D7 | 0 | 000.0 | 99999 | 0 | 5 | 0 |
| Pulse time 4 (s) | D8 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Output target 4 | D9 | 4 | 0 | 6 | 1 | 1 | 0 |
| Output polarity 4 | E0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Output lock 4 | E1 | 0 | 0 | 1 | 0 | 1 | 0 |
| Start up delay 4 (s) | E2 | 0 | 0 | 1 | 0 | 1 | 0 |
| Event color 4 | E3 | 0 | 0 | 3 | 0 | 1 | 0 |

8.12 Serial menu

See the "6.13 Serial menu" section on page 61

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Unit number | 90 | 11 | 11 | 99 | 11 | 2 | 0 |
| Serial baud rate | 91 | 0 | 0 | 2 | 0 | 1 | 0 |
| Serial format | 92 | 0 | 0 | 9 | 0 | 1 | 0 |
| Serial init | 9~ | 0 | 0 | 1 | 0 | 1 | 0 |
| Serial protocol | E4 | 0 | 0 | 1 | 0 | 1 | 0 |
| Serial timer (s) | E5 | 0 | 00.000 | 60.000 | 0 | 5 | 3 |
| Serial value | E6 | 0 | 0 | 9 | 0 | 1 | 0 |
| - | E7 | 0 | 0 | 0 | 0 | 0 | 0 |

8.13 Analog menu

See the "6.14 Analog menu" section on page 64

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|-----------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Analog format | E8 | 0 | 0 | 2 | 0 | 1 | 0 |
| Analog start | E9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| Analog end | F0 | 10000 | -99999999 | 99999999 | 1000.0 | +/- 8 | 0 |
| Analog gain (%) | F1 | 10000 | 000.00 | 110.00 | 100.00 | 5 | 2 |
| Analog offset | F2 | 0 | -99.99 | 99.99 | 0.00 | 84 | 2 |
| - | F3 | 0 | 0 | 0 | 0 | 0 | 0 |
| - | F4 | 0 | 0 | 0 | 0 | 0 | 0 |

8.14 Command menu

See the "6.15 Command menu" section on page 66

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|-----------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Input 1 action | F5 | 20 | 0 | 22 | 0 | 2 | 0 |
| Input 1 config. | F6 | 2 | 0 | 3 | 2 | 1 | 0 |
| Input 2 action | F7 | 21 | 0 | 22 | 0 | 2 | 0 |
| Input 2 config. | F8 | 2 | 0 | 3 | 2 | 1 | 0 |
| Input 3 action | F9 | 22 | 0 | 22 | 0 | 2 | 0 |
| Input 3 config. | G0 | 2 | 0 | 3 | 2 | 1 | 0 |
| - | G1 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | G2 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | G3 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | G4 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | G5 | 0 | 0 | 0 | 0 | 1 | 0 |

8.15 Display menu

See the "6.16 Display menu" section on page 69

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|------------------|-------------|-------|------------|------------|---------------|-----------|------------|
| Color | G6 | 0 | 0 | 2 | 0 | 1 | 0 |
| Brightness (%) | G7 | 90 | 010 | 100 | 090 | 3 | 0 |
| Contrast | G8 | 1 | 0 | 2 | 1 | 1 | 0 |
| Screen saver (s) | G9 | 0 | 0000 | 9999 | 0 | 4 | 0 |
| Up-date time (s) | H0 | 100 | 0.005 | 9.999 | 0.100 | 4 | 3 |
| Font | H1 | 0 | 0 | 1 | 0 | 1 | 0 |
| - | H2 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | H3 | 0 | 0 | 0 | 0 | 1 | 0 |
| - | H4 | 0 | 0 | 0 | 0 | 1 | 0 |

8.16 Linearization menu

See the "6.17 Linearization menu" section on page 71

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|-----------|-------------|-------|------------|------------|---------------|-----------|------------|
| P1(X) | H5 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P1(Y) | H6 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P2(X) | H7 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P2(Y) | H8 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P3(X) | H9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P3(Y) | I0 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P4(X) | I1 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P4(Y) | I2 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P5(X) | I3 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P5(Y) | I4 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P6(X) | I5 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P6(Y) | I6 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P7(X) | I7 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P7(Y) | I8 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P8(X) | I9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P8(Y) | J0 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P9(X) | J1 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P9(Y) | J2 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P10(X) | J3 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P10(Y) | J4 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P11(X) | J5 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P11(Y) | J6 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |

(continue on next page)

(continued)

| Parameter | Serial code | Value | Min. value | Max. value | Default value | Positions | Characters |
|-----------|-------------|-------|------------|------------|---------------|-----------|------------|
| P12(X) | J7 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P12(Y) | J8 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P13(X) | J9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P13(Y) | K0 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P14(X) | K1 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P14(Y) | K2 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P15(X) | K3 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P15(Y) | K4 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P16(X) | K5 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P16(Y) | K6 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P17(X) | K7 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P17(Y) | K8 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P18(X) | K9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P18(Y) | L0 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P19(X) | L1 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P19(Y) | L2 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P20(X) | L3 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P20(Y) | L4 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P21(X) | L5 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P21(Y) | L6 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P22(X) | L7 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P22(Y) | L8 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P23(X) | L9 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P23(Y) | M0 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P24(X) | M1 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |
| P24(Y) | M2 | 0 | -99999999 | 99999999 | 0.0 | +/- 8 | 0 |

8.17 Serial codes of commands

| Serial code | Command |
|-------------|--------------------|
| 54 | RESET/SET |
| 55 | FREEZE DISPLAY |
| 56 | TOUCH DISABLE |
| 57 | CLR LOCK |
| 58 | CLR MIN MAX |
| 59 | SERIAL PRINT |
| 60 | TEACH PRES 1 |
| 61 | TEACH PRES 2 |
| 62 | TEACH PRES 3 |
| 63 | TEACH PRES 4 |
| 64 | SCROLL_DISPLAY |
| 65 | CLEAR LOOP TIME |
| 66 | START PRESELECTION |
| 67 | ACTIVATE DATA |
| 68 | STORE EEPROM |
| 69 | TESTPROGRAM |

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| Document release | Release date | Description |
|------------------|--------------|---|
| 1.0 | 27.09.2018 | 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 |



Dispose separately

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