Smart encoders & actuators

User's guide

LD360
LD365

- Multifunction touch-screen display for incremental encoders
- Tachometer, pulse counter, position indicator
- Position and speed values available simultaneously on display
- 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:

- LD360-P8-...
- LD365-P8-...
- LD360-PM-...
- LD365-PM-...

General Contents

General contents

Subject index

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 **LD360 and LD365 touch-screen indicator** series.

LD360 and LD365 touch-screen indicators are designed to interface HTL/TTL encoders or NPN/PNP/NAMUR sensors and offer several operating modes such as position indicator, pulse counter, batch counter, tachometer, speed indicator, frequency meter, RPM indicator, etc.
Both position and speed values can be shown simultaneously on the display.

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.
LD360 touch-screen indicators provide two incremental AB inputs for PNP/NPN/NAMUR/TRI-STATE type signals.
LD365 touch-screen indicators provide four incremental AB /AB inputs for HTL/RS-422 type signals.

In the series the following models are available:

- **LD360-P8 / LD365-P8** touch-screen indicator standard version;
- **LD360-PM / LD365-PM** provides additional 115-230Vac power supply;
- **LD360-...-AVI / LD365-...-AVI** provides additional 16-bit analogue output, four control outputs and RS-232 / RS-485 serial interface;
- **LD360-...-DO / LD365-...-DO** further offers four control outputs and RS-232 / RS-485 serial interface;
- **LD360-...-RO / LD365-...-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.

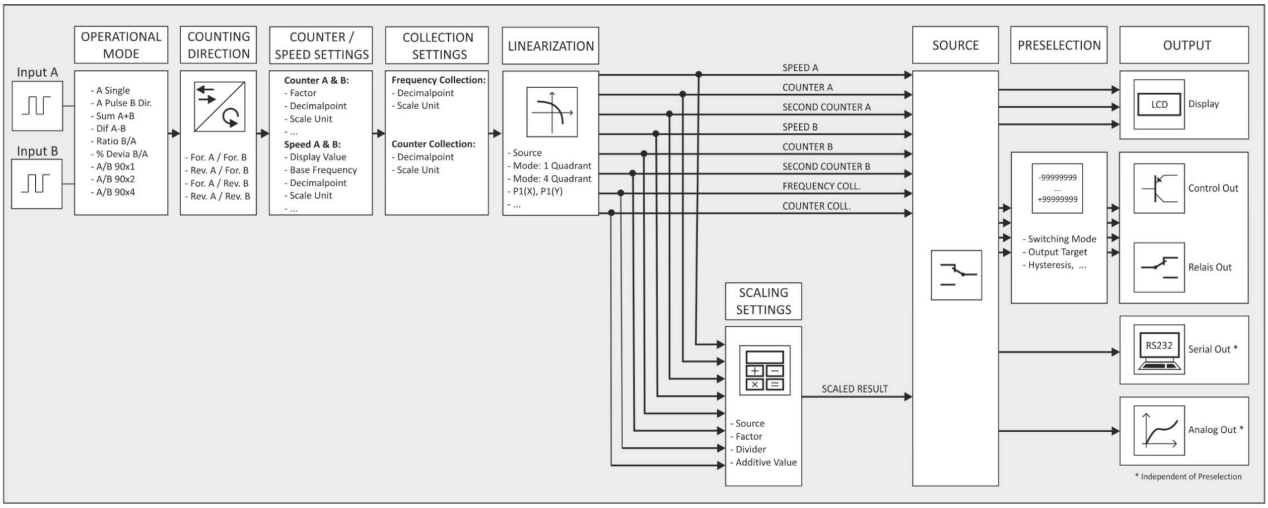
The device can be set to one of the following operation modes:

- Operation as frequency display for incremental input signals, see the "6.3 Speed A Settings menu" section on page 41 and the "6.4 Speed B Settings menu" section on page 47.
  - Measurement of frequency / RPM indicator
  - Tachometer / speed indicator
  - Monitoring functions for speed and standstill
  - Possibility of linking (A+B, B/A, ...) of both channels (e.g. ratio or percentage deviation)

- Operation as position indicator / counter for incremental input signals, see the "6.5 Counter A Settings menu" section on page 53 and the "6.6 Counter B Settings menu" section on page 59.
  - Pulse counter
  - Up or down counter
  - Position indicator
  - Protractor
  - Quadrature counter
  - Batch counter / Total counter
  - Possibility of linking (A+B, B/A, ...) of both channels (e.g. ratio or percentage deviation)

- Operation as speed and position indicator for incremental input signals

Functional diagram



1 - Safety summary

1.1 Safety

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

1.2 Electrical safety

- Turn OFF the power supply before connecting the device;
- connect the unit following the explanation in the "4 - Electrical connections" section on page 18;
- 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 on page 16;
- do not disassemble the unit;
- do not tool the unit;

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

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.

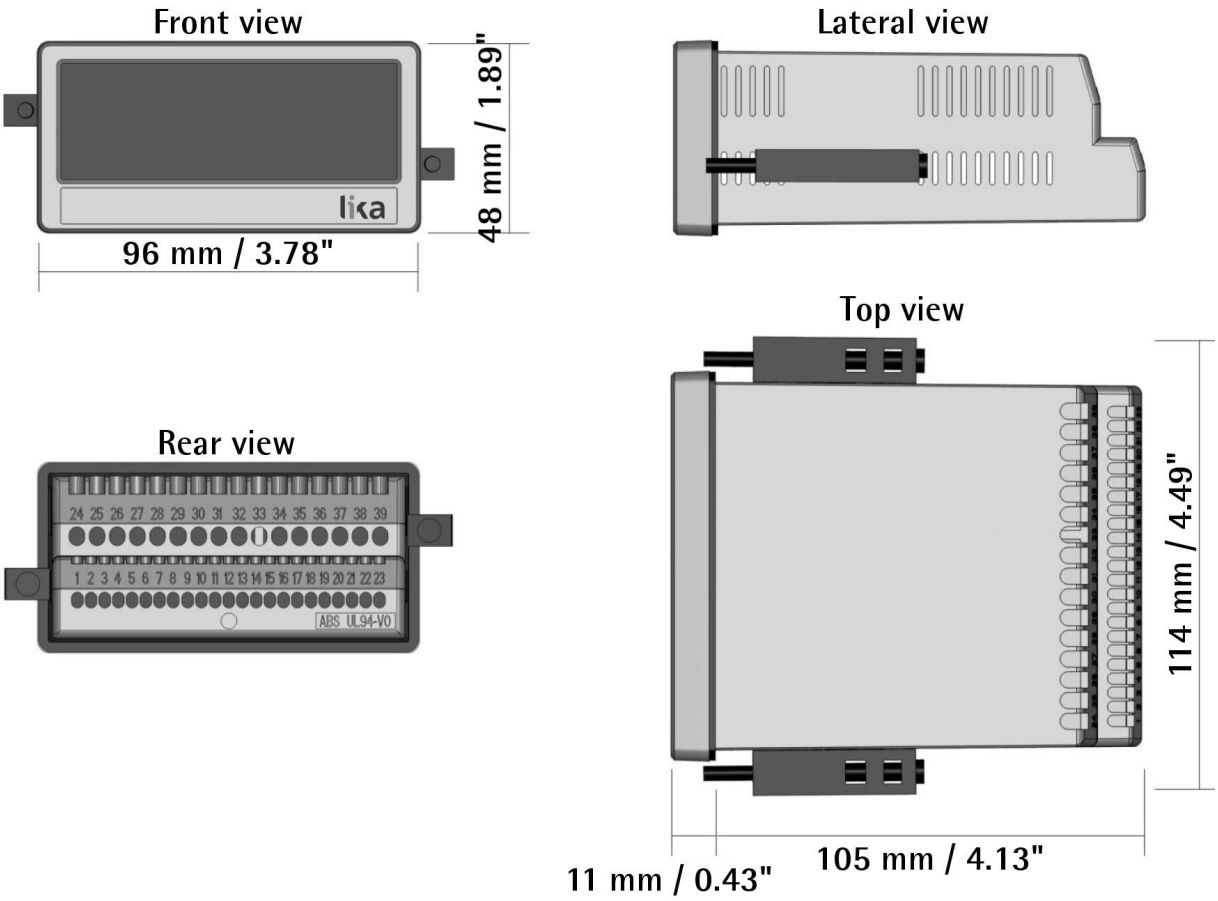
Warning: devices having order code ending with "/Sxxx" may have mechanical and electrical characteristics different from standard and be supplied with additional documentation for special connections (Technical info).

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

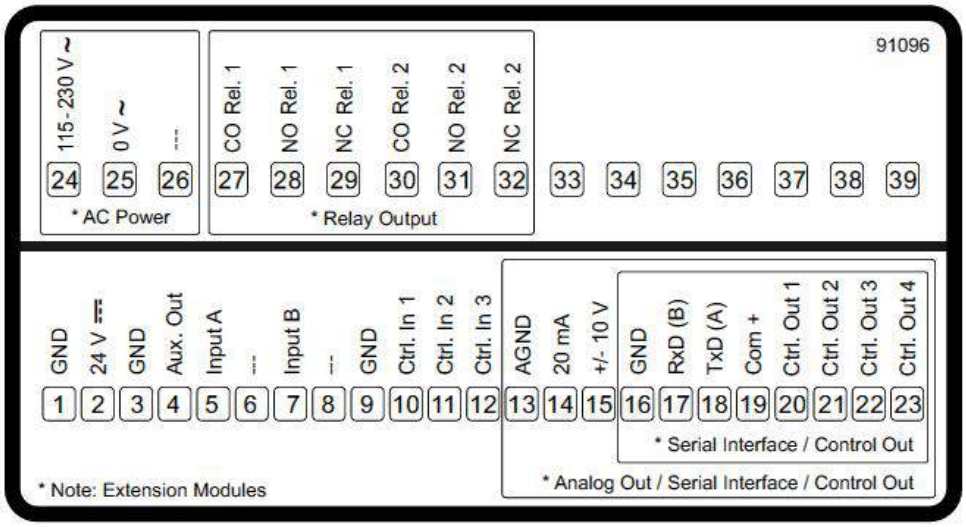
To clean the unit please just use a slightly damp (not wet!), soft cloth. For the rear side no cleaning is necessary. For an unscheduled, individual cleaning of the rear side the maintenance technicians or installation operators are self-responsible.

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.

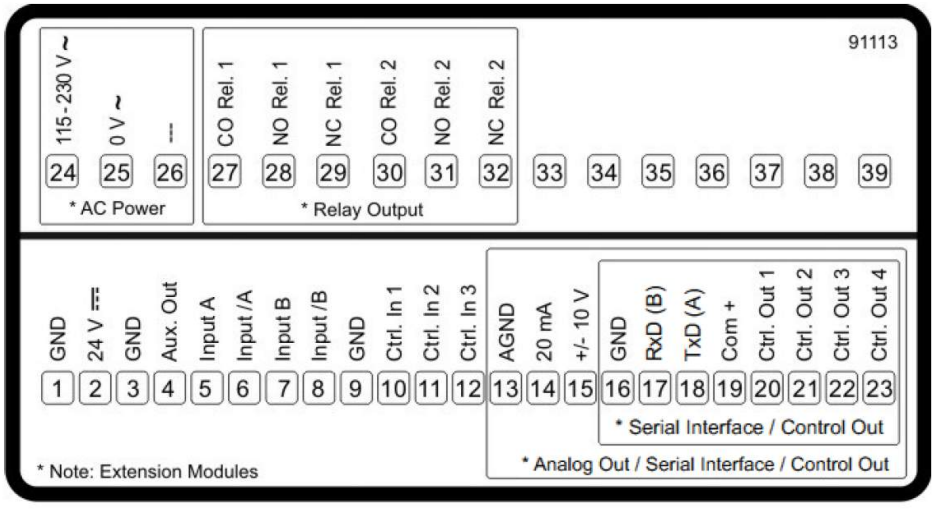
4 - Electrical connections

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.



LD360 terminal scheme



LD365 terminal scheme

4.1 DC power supply

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

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

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

All GND terminal blocks are internally connected.

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

4.2 AC power supply (-PM- order code)

AC power supply technical specifications

Input voltage:	115Vac ... 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 (LD360 model)

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

Auxiliary voltage output technical specifications (LD365 model)

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

DC version	AC version
The encoder voltage is approx. 1 V lower than the main power supply voltage at terminal blocks 1 and 2 and should be loaded with max. 250 mA.	The encoder voltage is 24 Vdc (± 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.

LD365 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 38.

4.4 A, B incremental inputs (LD360 model)

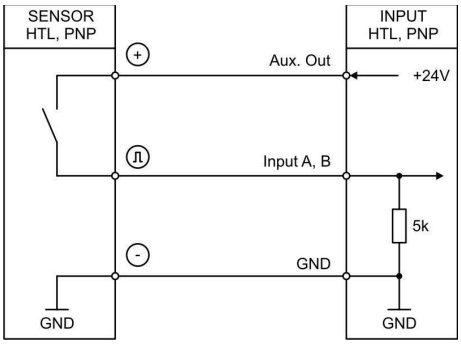
A, B incremental inputs technical specifications

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 / Ri > 5 kOhm / 470 pF

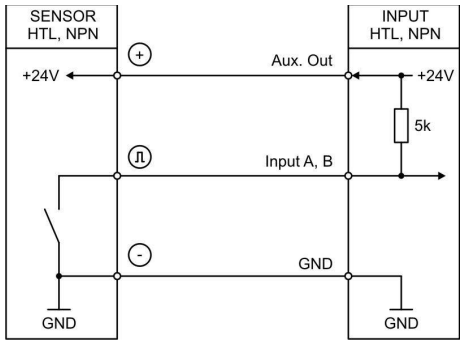
The unit provides two inputs for HTL signals through terminal blocks 5 and 7.
The characteristics of the incremental inputs (PNP, NPN, Namur, or Tri-State) can be set in the **General** menu, see the Encoder properties LD360 parameter in the "6.2 General menu" section on page 38.

4.4.1 Wiring of the incremental inputs

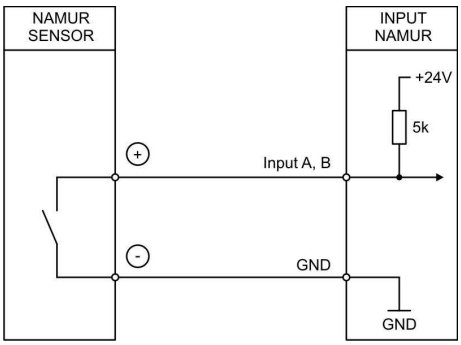
PNP



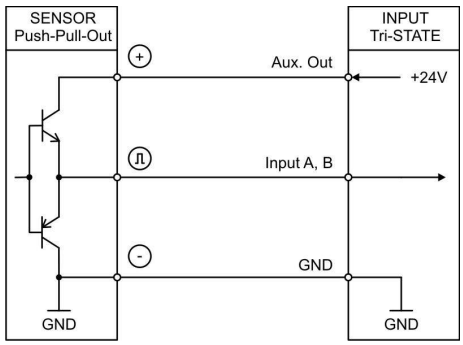
NPN



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 (LD365 model)

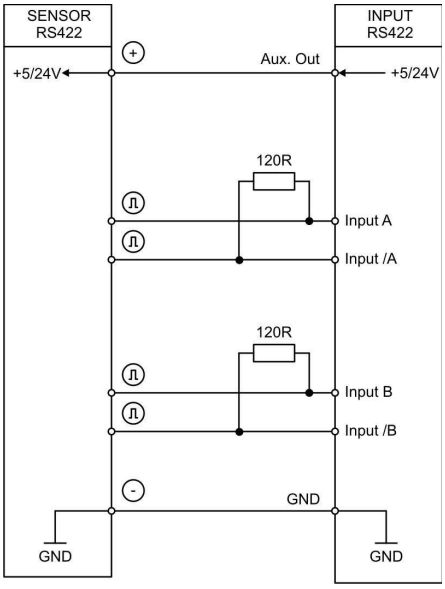
AB, /AB incremental inputs technical specifications

Number of inputs (channels):	2 with inverted signals (A, /A, B, /B)
Configuration:	RS-422, HTL differential, HTL PNP, HTL NPN
RS-422:	max. 1 MHz (RS-422 differential signal > 0.5 V
HTL differential:	max. 500 kHz (HTL differential signal > 2 V)
HTL PNP / NPN:	max. 250 kHz (Low = 0 ... 3 V, High = 9 ... 30 V)
Load:	max. 3 mA / Ri > 10 kOhm / 47 pF

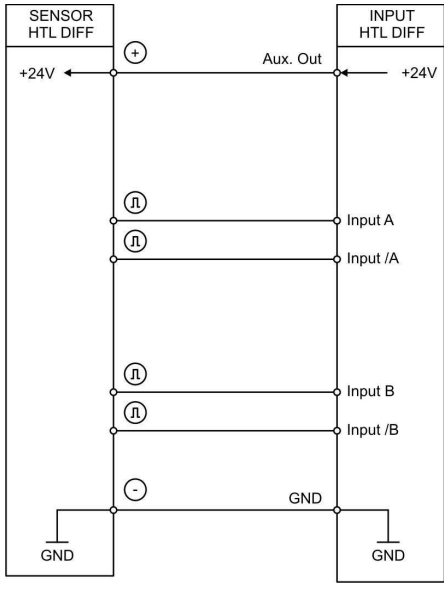
The unit provides two pulse inputs at terminal blocks 5, 6, 7, and 8 for HTL/RS-422 signals. The characteristics of the incremental inputs can be set in the **General** menu, see the **Encoder properties LD365** parameter in the "6.2 General menu" section on page 38.

4.5.1 Wiring of the incremental inputs

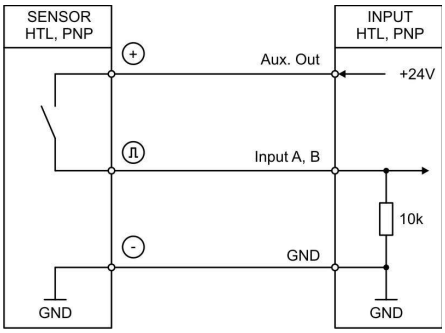
RS-422



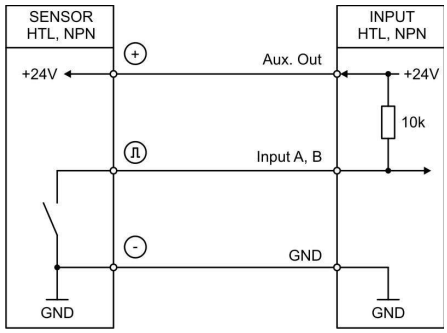
HTL differential



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

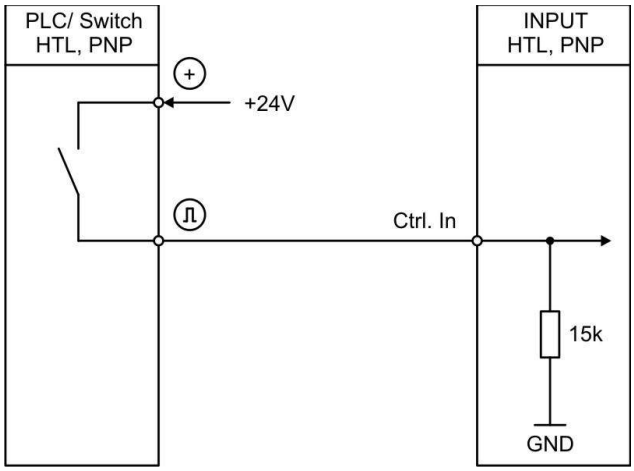
Control inputs technical specifications

Number of inputs:	3
Format:	HTL, PNP (Low = 0 ... 3 V, High = 9 ... 30 V)
Frequency:	max. 10 kHz
Load:	max. 2 mA / Ri > 15 kOhm / 470 pF

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

In the **Command** menu (see the "6.16 Command menu" section on page 90) 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 "6.15 Analog menu" section on page 87.

The following configurations are available (see the **Analog format** parameter on page 88):

- **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

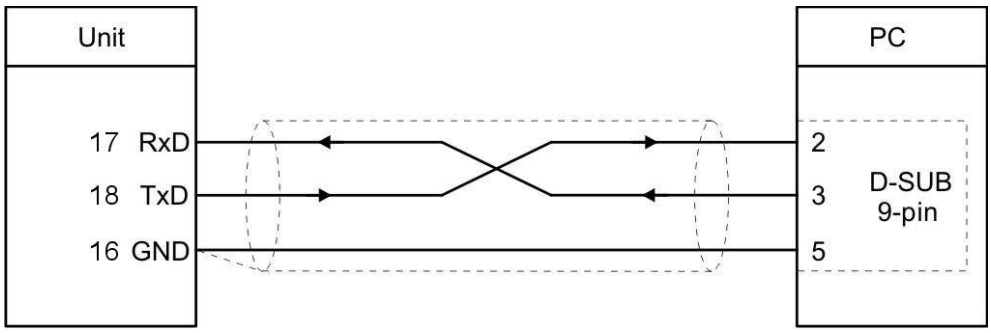
Format:	RS-232 (-AVI1- and -DO1-) or RS-485 (-AVI2- and -DO2-)
Baud rate:	9600, 19200 and 38400 baud

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 "6.14 Serial menu" section on page 84.

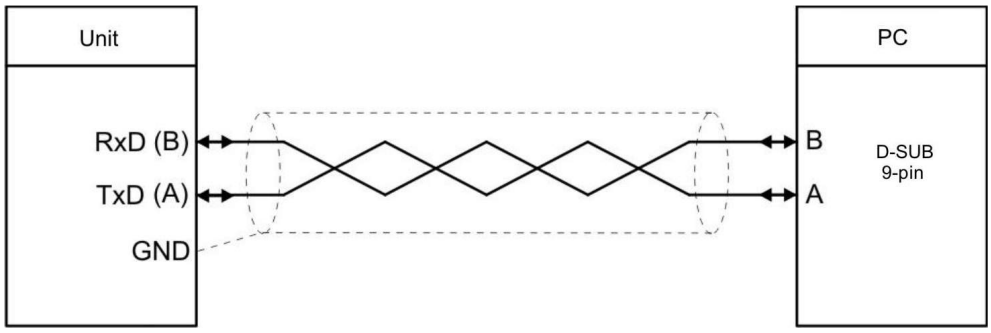
The RS-232 / RS-485 serial interface can be used:

- 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)

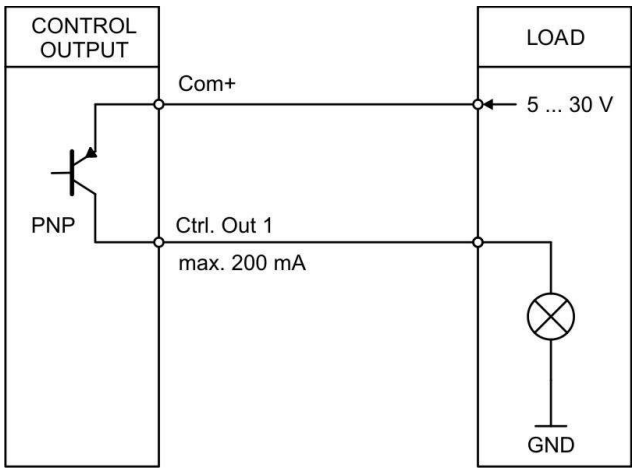
Control outputs technical specifications

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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" sections on pages 72, 78, 80 and 82 respectively. The outputs "20 - Ctrl. Out 1", "21 - Ctrl. Out 2", "22 - Ctrl. Out 3", and "23 - Ctrl. Out 4" are fast PNP outputs with a switching capability of 5÷30 V / 200 mA per channel. The switching states are displayed (display with unit and status bar) as C1 ... C4, see the "5 - Display and touch screen" section on page 28.

As stated, 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)

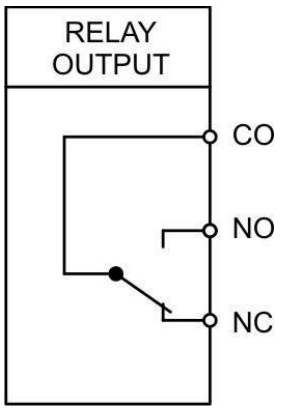
Relay outputs technical specifications

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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" sections on pages 72, 78, 80 and 82 respectively. The switching states are displayed (display with unit and status bar) as K1 and K2, see the "5 - Display and touch screen" section on page 28.

AC switching capacity max. 250 Vac / max. 3 A / 750 VA
DC switching capacity max. 150 Vdc / max. 2 A / 50 W

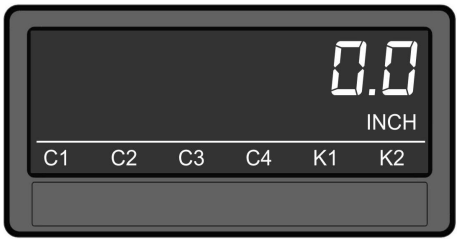
4.10.1 Wiring of the relay outputs



5 - Display and touch screen

5.1 Screen structure for parametrization

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



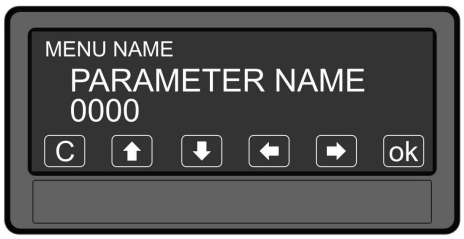
Start setup procedure

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

Selection of the menu

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

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

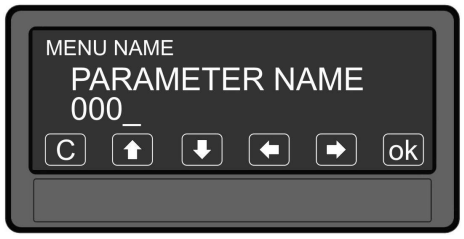


Selection of the parameter

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

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

Parameter setting:



After selection the parameter (or its last digit) starts blinking. Set the parameter by pressing the and arrow keys, shift the cursor by pressing the and 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. Refer also to the **Start display** parameter on page 94.

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.

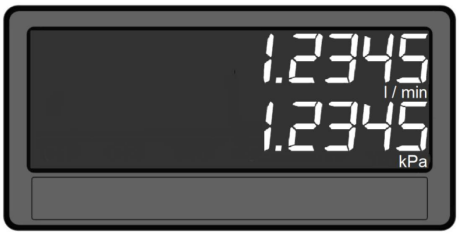
Large display (4 digits)

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

It is available only when **Large display** is active.

Two-line display without units

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



Two-line display with units

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

Display with command keys

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

Display for quick start of the preselection values setting process (see the "6.9 Preselection values menu" section on page 71)

The desired command key ("EDIT PRESEL." or "SHOW PRESEL.") can be chosen by setting the **Quickstart key** parameter in the "6.17 Display menu" section on page 100.

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

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

Display with current, minimum, and maximum values.

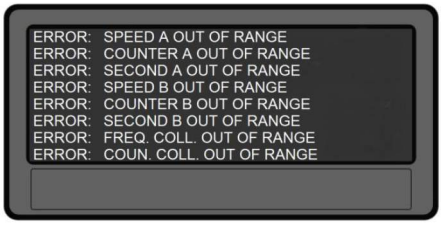
To switch to the next display, press the top half of the screen or the SKIP key.

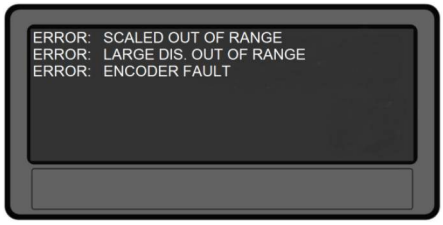
The minimum and maximum evaluation values refer to the reference source set in the **Source single** parameter in the "6.17 Display menu" section on page 95.

5.3 Error messages

If a measurement result, which is shown on the display, is outside the allowed display range, an error message is briefly displayed every 2 seconds. The message explains the value that is out-of-range.

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





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 38
Operational mode, see on page 38
Encoder properties LD360, see on page 38 (LD360 model) or Encoder properties LD365, see on page 39 (LD365 model)
Encoder supply, see on page 39
Counting direction, see on page 39
Linearization mode, see on page 39
Pin preselection, see on page 40
Pin parameter, see on page 40
Back up memory, see on page 40
Factory settings, see on page 40

Speed A Settings menu, see the "6.3 Speed A Settings menu" section on page 41
Display value SA, see on page 41
Base frequency (Hz) SA, see on page 41
Decimal point SA, see on page 43
Sampling time (s) SA, see on page 43
Wait time (s) SA, see on page 43
Standstill time (s) SA, see on page 44
Average filter SA, see on page 44
Scale units SA, see on page 45

This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.

Speed B Settings menu, see the "6.4 Speed B Settings menu" section on page 47
Display value SB, see on page 47
Base frequency (Hz) SB, see on page 47
Decimal point SB, see on page 49
Sampling time (s) SB, see on page 49
Wait time (s) SB, see on page 49
Standstill time (s) SB, see on page 50
Average filter SB, see on page 50
Scale units SB, see on page 51

Counter A Settings menu, see the "6.5 Counter A Settings menu" section on page 53
Factor CA, see on page 53
Set value CA, see on page 53
Decimal point CA, see on page 53
Scale units CA, see on page 54
Second mode CA, see on page 55
Second set value CA, see on page 56
Second decimal point CA, see on page 56
Second scale units CA, see on page 57

This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.

Counter B Settings menu, see the "6.6 Counter B Settings menu" section on page 59
Factor CB, see on page 59
Set value CB, see on page 59
Decimal point CB, see on page 59
Scale units CB, see on page 60
Second mode CB, see on page 61
Second set value CB, see on page 62

Second decimal point CB, see on page 62
Second scale units CB, see on page 63

This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.

Collection Settings menu, see the "6.7 Collection Settings menu" section on page 65
Decimal point frequency, see on page 65
Scale units frequency, see on page 65
Decimal point counter, see on page 67
Scale units counter, see on page 67

Scaling Settings menu, see the "6.8 Scaling settings menu" section on page 69
Source, see on page 69
Factor, see on page 70
Divider, see on page 70
Additive value, see on page 70

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

Preselection values menu, see the "6.9 Preselection values menu" section on page 71
Preselection 1, see on page 71
Preselection 2, see on page 71
Preselection 3, see on page 71
Preselection 4, see on page 71

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

Preselection 1 menu, see the "6.10 Preselection 1 menu" section on page 72
Source 1, see on page 72
Mode 1, see on page 73
Hysteresis 1, see on page 75
Pulse time 1 (s), see on page 76
Output target 1, see on page 76

Output polarity 1, see on page 76
Output lock 1, see on page 76
Start up delay 1 (s), see on page 77
Event color 1, see on page 77

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

Preselection 2 menu, see the "6.11 Preselection 2 menu" section on page 78
Source 2, see on page 78
Mode 2, see on page 78
Hysteresis 2, see on page 78
Pulse time 2 (s), see on page 78
Output target 2, see on page 78
Output polarity 2, see on page 79
Output lock 2, see on page 79
Start up delay 2 (s), see on page 79
Event color 2, see on page 79

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

Preselection 3 menu, see the "6.12 Preselection 3 menu" section on page 80
Source 3, see on page 80
Mode 3, see on page 80
Hysteresis 3, see on page 80
Pulse time 3 (s), see on page 80
Output target 3, see on page 80
Output polarity 3, see on page 81
Output lock 3, see on page 81
Start up delay 3 (s), see on page 81
Event color 3, see on page 81

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

Preselection 4 menu, see the "6.13 Preselection 4 menu" section on page 82
Source 4, see on page 82
Mode 4, see on page 82
Hysteresis 4, see on page 82

Pulse time 4 (s), see on page 82
Output target 4, see on page 82
Output polarity 4, see on page 83
Output lock 4, see on page 83
Start up delay 4 (s), see on page 83
Event color 4, see on page 83

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

Serial menu, see the "6.14 Serial menu" section on page 84
Unit number, see on page 84
Serial baud rate, see on page 84
Serial format, see on page 84
Serial init, see on page 85
Serial protocol, see on page 85
Serial timer (s), see on page 86
Serial value, see on page 86
MODBUS, see on page 86

It is only available for devices with order code AVI.

Analog menu, see the "6.15 Analog menu" section on page 87
Analog source, see on page 87
Analog format, see on page 88
Analog start, see on page 88
Analog end, see on page 88
Analog gain (%), see on page 89
Analog offset, see on page 89

Command menu, see the "6.16 Command menu" section on page 90
Input 1 action, see on page 90
Input 1 config., see on page 92
Input 2 action, see on page 92
Input 2 config., see on page 93
Input 3 action, see on page 93
Input 3 config., see on page 93

Display menu, see the "6.17 Display menu" section on page 94
Start display, see on page 94
Source single, see on page 95
Source dual top, see on page 96
Source dual down, see on page 97
Large display, see on page 98
Color, see on page 98
Brightness (%), see on page 99
Contrast, see on page 99
Screen saver (s), see on page 99
Up-date time (s), see on page 99
Font, see on page 99
Quickstart key, see on page 100

It is only available if the **Linearization mode** parameter in the **General** menu (see on page 39) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

Linearization menu, see the "6.18 Linearization menu" section on page 101
Source, see on page 101
P1(X), see on page 102
...
P24(X), see on page 102
P1(Y), see on page 102
...
P24(Y), see on page 102

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	**A SINGLE**	Input A is used as pulse input (single channel measurement).
1	**A PULSE B DIR**	Input A is used as pulse input. Input B is used to detect the counting direction: e.g. "LOW" = Clockwise / Forward direction; "HIGH" = Counter-clockwise / Reverse direction.
2	**SUM A+B**	Sum counter: A channel pulses + B channel pulses and A channel frequency + B channel frequency.
3	**DIF A-B**	Differential counter: A channel pulses – B channel pulses and A channel frequency - B channel frequency.
4	**RATIO B/A**	Ratio: frequency and counter ratio of both channels (channel B / channel A). NOTE: the result with 4 decimal places must be interpreted in the format ±x.xxxx.
5	**% DEVIA B/A**	Deviation: percentage deviation from channel B to channel A. NOTE: the result with 2 decimal places must be interpreted in the format ±xxx.xx%.
6	**A/B 90 x1**	Up / Down counter for pulses with 1 x 90° offset (simple edge evaluation x1).
7	**A/B 90 x2**	Up / Down counter for pulses with 2 x 90° offset (double edge evaluation x2).
8	**A/B 90 x4**	Up / Down counter for pulses with 4 x 90° offset (fourfold edge evaluation x4).

Encoder properties LD360

This parameter is only available for LD360 model.
It allows to set the characteristics of the pulse inputs for LD360.

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 LD365

This parameter is only available for LD365 model.
It allows to set the characteristics of the pulse inputs for LD365.

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 LD365 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 20.

0	**24VDC SUPPLY**	24 Vdc encoder supply
1	**5VDC SUPPLY**	5 Vdc encoder supply

Counting direction

It allows to set the direction of rotation / direction of counting of the pulse inputs (inputs A and B can be reversed).

0	**FOR. A / FOR. B**	Direction of rotation / direction of counting of both pulse inputs (A and B): forward.
1	**REV. A / REV. B**	Direction of rotation / direction of counting of both pulse inputs (A and B): reversed.
2	**FOR. A / REV. B**	Direction of rotation / direction of counting of pulse input A: forward; of pulse input B: reversed.
3	**REV. A / FOR. B**	Direction of rotation / direction of counting of pulse input A: reversed; of pulse input B: forward.

Linearization mode

This parameter activates and sets the linearisation function. See the "6.18 Linearization menu" section on page 101 and the "6.18.1 Description of the linearisation function" section on page 102.

0	**OFF**	No linearisation
1	**1 QUADRANT**	Linearisation using 1 quadrant (see on page 102).
2	**4 QUADRANT**	Linearisation using 4 quadrants (see on page 102).

Pin preselection

This parameter allows to set the PIN code to lock the quick start of the **Preselection values** menu used to enter the preselection values, see the "5.2 Screen structure during operation" section on page 29. Refer also to the "6.9 Preselection values menu" section on page 71.
The Master PIN is 6079.
This lock function is only useful if used along with the lock function set in the Pin parameter.

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

Pin parameter

This parameter sets the PIN code for 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 A Settings menu

The **Speed A Settings** menu allows to set the parameters for channel A operation as tachometer or frequency meter.
Depending on the operation mode selected (see the **Operational mode** parameter in the "6.2 General menu" section on page 38), only input A is active or both input A and input B with 90° phase offset are active for detection of the forward / reverse motion.

Display value SA

Desired value that will be displayed according to the setting of the **Base frequency (Hz) SA** parameter. For further information on setting the **Display value SA** parameter, see the "Programming Display value SA and Base frequency (Hz) SA parameters" section here below.

00000001	Smallest value
00001000	Default value
99999999	Highest value

Base frequency (Hz) SA

Reference frequency for the desired **Display value SA** expressed in Hz. For further information on programming the **Base frequency (Hz) SA** parameter, see the "Programming Display value SA and Base frequency (Hz) SA parameters" section hereafter.

000001	Smallest value
000100	Default value
500000	Highest value

Programming Display value SA and Base frequency (Hz) SA parameters

When you need to set the display's **Speed A operation mode** and the **Display value SA** and **Base frequency (Hz) SA** parameters as well as to show the RPM / rotations per minute, please consider the following formula (note that it can be used in a general way to display the value in other engineering units):

n = (f * 60) / N in [1/min] → RPM (see the **Scale units SA** parameter)

where:
n: DISPLAY VALUE: it is the value you want to display, i.e. the value to be set next to the **Display value SA** parameter, it results from the calculation of the above formula.
f: BASE FREQUENCY: it is the reference frequency, it must be set next to the **Base frequency (Hz) SA** parameter; you can freely choose any desired frequency value, however it should be comprised in the working range of your application.
60: conversion factor (in our example, for conversion into RPM = 60).

N: number of increments (pulses) per turn (for instance 1024, if the connected encoder has 1024 PPR resolution).

EXAMPLE 1

You need the **SPEED A** operation mode and want to display the values expressed in RPM.
Let's say the number of increments per turn of the encoder is 1024.
The **Base frequency (Hz) SA** parameter can be set, for instance, to 100 Hz.
The decimal point (**Decimal point SA** parameter) should be placed in the second decimal position.

n = (f * 60) / N = (100 * 60) / 1024 = 5.86

Following our calculation the parameters need to be set as follows:

Display value SA: 586
Base frequency (Hz) SA: 100
Decimal point SA: 2 = 000000.00

EXAMPLE 2

You need the **SPEED A** operation mode and want to display the values expressed in metres per minute (m/min).
Let's say the number of increments per turn of the encoder is 3600.
First of all, we need to choose a reference speed of the encoder, for example 1 rpm. When the encoder rotates at a speed of 1 rpm, it provides a pulse frequency of 3600 / 60 s = 60 Hz. So let's set the **Base frequency (Hz) SA** parameter to 60 Hz.
Now let's check the stroke of the machine per each revolution of the encoder (how many metres / centimetres / millimetres does the axis run per each revolution of the encoder?). For instance it could be 1.23 m per each revolution of the encoder.
So let's set the unit as follows:

Display value SA: 123
Base frequency (Hz) SA: 60
Decimal point SA: 2 = 000000.00
Scale units SA: 3 = m/min

Decimal point SA

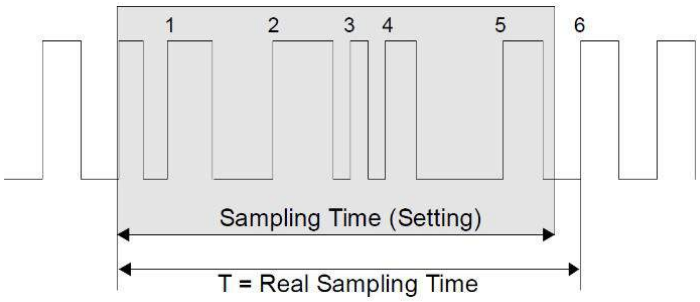
It sets the position of the decimal point.

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) SA

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

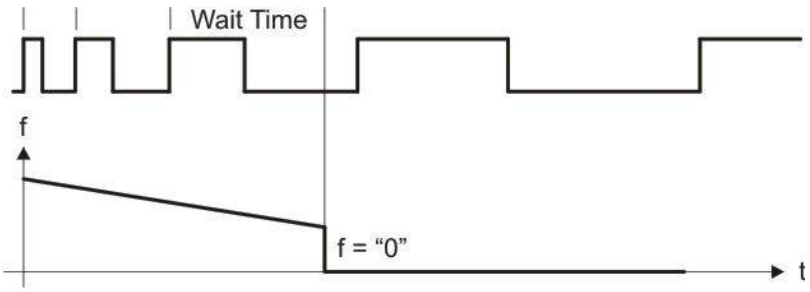


$$f = \frac{6}{T}$$

Wait time (s) SA

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) SA** 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
80.00	Frequency = 0 Hz, for frequencies below 0.01 Hz



Standstill time (s) SA

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 72, 78, 80 and 82 respectively).
Standstill detection can be set in the **Preselection 1** ... **Preselection 4** menus, see on pages 72, 78, 80 and 82 respectively.

00.00	Shortest time
...	
99.99	Longest time

Average filter SA

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

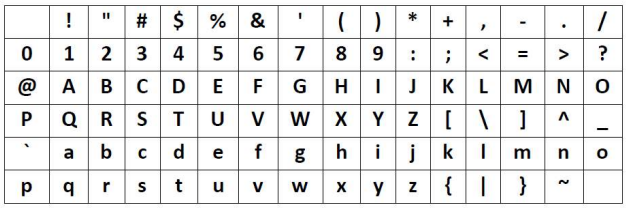
0	**OFF**	No average value will be created
1	**2 cycle average**	Floating average within 2 cycles
2	**4 cycle average**	Floating average within 4 cycles
3	**8 cycle average**	Floating average within 8 cycles
4	**16 cycle average**	Floating average within 16 cycles
5	**2 cycle filter**	Exponential filter, T (63 %) = 2x **Sampling time (s) SA**
6	**4 cycle filter**	Exponential filter, T (63 %) = 4x **Sampling time (s)**

7	8 cycle filter	Exponential filter, T (63 %) = 8x Sampling time (s) SA
8	16 cycle filter	Exponential filter, T (63 %) = 16x Sampling time (s) SA

Scale units SA

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the Decimal point SA parameter, see on page 43.

0	Hz	Default
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	
15	feet	
16	Stueck	
17	pcs	
18	sec	
19	min	
20	Min:Sec	
21	H:M:S	
22	Min:Sec:00	
23	l/min	
24	gal/min	

25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu. 

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

6.4 Speed B Settings menu

The **Speed B Settings** menu allows to set the parameters for channel B operation as tachometer or frequency meter.
This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

Display value SB

Desired value that will be displayed according to the setting of the **Base frequency (Hz) SB** parameter. For further information on setting the **Display value SB** parameter, see the "Programming Display value SB and Base frequency (Hz) SB parameters" section here below.

00000001	Smallest value
00001000	Default value
99999999	Highest value

Base frequency (Hz) SB

Reference frequency for the desired **Display value SB** expressed in Hz. For further information on programming the **Base frequency (Hz) SB** parameter, see the "Programming Display value SB and Base frequency (Hz) SB parameters" section hereafter.

000001	Smallest value
000100	Default value
500000	Highest value

Programming Display value SB and Base frequency (Hz) SB parameters

When you need to set the display's **Speed B operation mode** and the **Display value SB** and **Base frequency (Hz) SB** parameters as well as to show the RPM / rotations per minute, please consider the following formula (note that it can be used in a general way to display the value in other engineering units):

n = (f * 60) / N in [1/min] → RPM (see the **Scale units SB** parameter)

where:
n: DISPLAY VALUE: it is the value you want to display, i.e. the value to be set next to the **Display value SB** parameter, it results from the calculation of the above formula.
f: BASE FREQUENCY: it is the reference frequency, it must be set next to the **Base frequency (Hz) SB** parameter; you can freely choose any desired frequency value, however it should be comprised in the working range of your application.
60: conversion factor (in our example, for conversion into RPM = 60).

N: number of increments (pulses) per turn (for instance 1024, if the connected encoder has 1024 PPR resolution).

EXAMPLE 1

You need the **SPEED B** operation mode and want to display the values expressed in RPM.
Let's say the number of increments per turn of the encoder is 1024.
The **Base frequency (Hz) SB** parameter can be set, for instance, to 100 Hz.
The decimal point (**Decimal point SB** parameter) should be placed in the second decimal position.

n = (f * 60) / N = (100 * 60) / 1024 = 5.86

Following our calculation the parameters need to be set as follows:

Display value SB: 586
Base frequency (Hz) SB: 100
Decimal point SB: 2 = 000000.00

EXAMPLE 2

You need the **SPEED B** operation mode and want to display the values expressed in metres per minute (m/min).
Let's say the number of increments per turn of the encoder is 3600.
First of all, we need to choose a reference speed of the encoder, for example 1 rpm. When the encoder rotates at a speed of 1 rpm, it provides a pulse frequency of 3600 / 60 s = 60 Hz. So let's set the **Base frequency (Hz) SB** parameter to 60 Hz.
Now let's check the stroke of the machine per each revolution of the encoder (how many metres does the axis run per each revolution of the encoder?). For instance it could be 1.23 m per each revolution of the encoder.
So let's set the unit as follows:

Display value SB: 123
Base frequency (Hz) SB: 60
Decimal point SB: 2 = 000000.00
Scale units SB: 3 = m/min

Decimal point SB

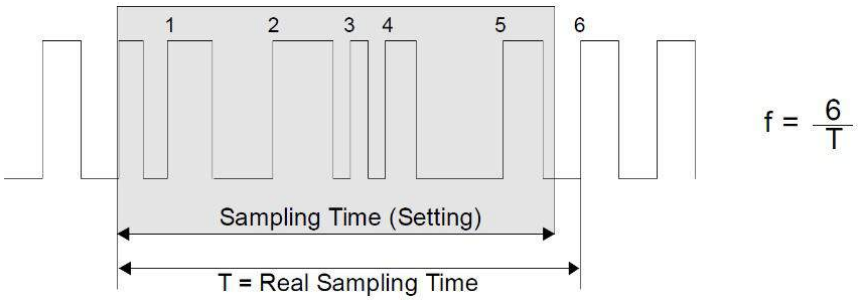
It sets the position of the decimal point.

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) SB

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).

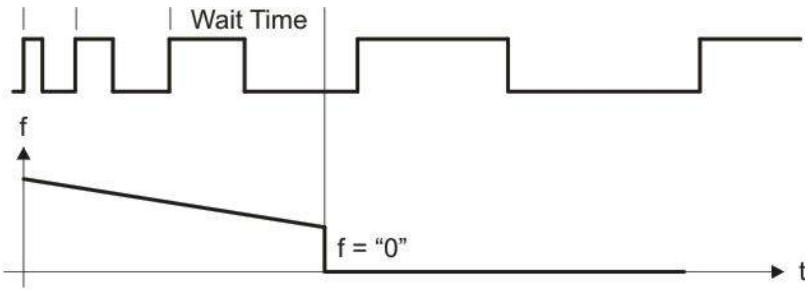
0.005	Shortest Sampling time
0.100	Default value
9.999	Longest Sampling time



Wait time (s) SB

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) SB** 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
80.00	Frequency = 0 Hz, for frequencies below 0.01 Hz



Standstill time (s) SB

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 72, 78, 80 and 82 respectively).
Standstill detection can be set in the **Preselection 1** ... **Preselection 4** menus, see on pages 72, 78, 80 and 82 respectively.

00.00	Shortest time
...	
99.99	Longest time

Average filter SB

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

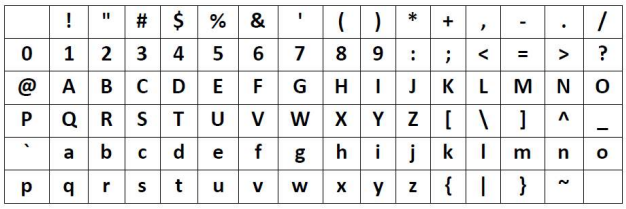
0	**OFF**	No average value will be created
1	**2 cycle average**	Floating average within 2 cycles
2	**4 cycle average**	Floating average within 4 cycles
3	**8 cycle average**	Floating average within 8 cycles
4	**16 cycle average**	Floating average within 16 cycles
5	**2 cycle filter**	Exponential filter, T (63 %) = 2x **Sampling time (s) SB**
6	**4 cycle filter**	Exponential filter, T (63 %) = 4x **Sampling time (s)**

7	8 cycle filter	Exponential filter, T (63 %) = 8x Sampling time (s) SB
8	16 cycle filter	Exponential filter, T (63 %) = 16x Sampling time (s) SB

Scale units SB

This parameter sets the required engineering unit. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the Decimal point SB parameter, see on page 49.

0	Hz	Default
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	
15	feet	
16	Stueck	
17	pcs	
18	sec	
19	min	
20	Min:Sec	
21	H:M:S	
22	Min:Sec:00	
23	l/min	
24	gal/min	

25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu. 

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

6.5 Counter A Settings menu

The **Counter A Settings** menu allows to set the parameters for channel A operation as pulse counter or position indicator.

Factor CA

It sets the scaling factor for channel A.

EXAMPLE

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

00.00001	Smallest value
1	Default value
99.99999	Highest value

Set value CA

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

-99999999	Smallest value
00000000	Default value
+99999999	Highest value

Decimal point CA

This parameter sets the position of the decimal point for the main counter A.

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

Scale units CA

This parameter sets the required engineering unit for the main counter A. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the **Decimal point CA** parameter, see on page 53.

0	**Hz**	
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**	Default
13	**m**	
14	**inch**	
15	**feet**	
16	**Stueck**	
17	**pcs**	
18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter.

When you press the ok key the **Edit Unit** menu appears.
A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).
Press the ok key to save the **Edit Unit** menu.
Press the C key to close the **Edit Unit** menu.

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

Second mode CA

It allows to set the batch counter / total counter.
The function of batch counting according to a preset value (Preselection 1 ... Preselection 3) is only possible if one of the following switch conditions is enabled: "automatic reset to zero" (**7 = RESULT >= PRES->0**) or "automatic reset to Preselection 1" (**8 = RESULT<=0->SET**) or "automatic reset to the value set next to Set value CA" (**10 = RESULT>=PRES->VALUE**).

When Second mode CA is active, Source 1 to Source 4 in the "Preselection" menus are used as current value for the SECOND COUNTER A.

EXAMPLE FOR BATCH COUNTER
We need the batch counter to increment by 1 at each 1,000 pulses.
Preselection 1 parameter has to be set to "1000"; the related reference source Source 1 to "**1 = COUNTER A**"; the corresponding switch condition Mode 1 has to be set to "**7 = RESULT>=PRES->0**"; Second mode CA has to be set to "**1 = INCREMENT BATCH**". Should an output be turned on after a batch amount of 33, Preselection 2 has to be set to "33", the related reference source Source 2 has to be set to "**2 = SECOND COUNTER A**" and the switching condition of Mode 2 has to be set to "display value greater than or equal to" (**3 = RESULT>=PRES**).

EXAMPLE FOR TOTAL COUNTER
To activate the total counter, Second mode CA must be set to "**4 = TOTAL COUNTER**". The total counter operates in parallel to the main counter. If we want the total counter to reset to 0 when 4000 value is reached, the preset value (e.g. Preselection 3 item) must be set to "4000", the reference source Source 3 must be set to "**2 = SECOND COUNTER A**" and the related switching condition of Mode 3 has to be set to "automatic reset to zero" (**7 = RESULT>=PRES->0**).

0	**OFF**	No batch counter & no total 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 "6.16 Command menu" section on page 90)
4	**TOTAL COUNTER**	Total counter is activated

Second set value CA

In case of a reset / set command via control input (see the option "**22 = SET SECOND A**" in the "6.16 Command menu" section on page 90), the second counter A (batch counter / total counter) is set to the value entered next to this item. This parameter is available only when the **Second mode CA** is active.

-99999999	Smallest value
0	Default value
+99999999	Highest value

Second decimal point CA

This parameter sets the position of the decimal point for the second counter A. This parameter is available only when the **Second mode CA** is active.

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

Second scale units CA

This parameter sets the required engineering unit for the second counter A. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the **Second decimal point CA** parameter, see on page 56.
This parameter is available only when the **Second mode CA** is active.

0	**Hz**	
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**	Default
13	**m**	
14	**inch**	
15	**feet**	
16	**Stueck**	
17	**pcs**	
18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits

		can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu.

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

6.6 Counter B Settings menu

The **Counter B Settings** menu allows to set the parameters for channel B operation as pulse counter or position indicator.
This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

Factor CB

It sets the scaling factor for channel B.

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

00.00001	Smallest value
1	Default value
99.99999	Highest value

Set value CB

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

-99999999	Smallest value
00000000	Default value
+99999999	Highest value

Decimal point CB

This parameter sets the position of the decimal point for the main counter B.

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

Scale units CB

This parameter sets the required engineering unit for the main counter B. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the **Decimal point CB** parameter, see on page 59.

0	**Hz**	
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**	Default
13	**m**	
14	**inch**	
15	**feet**	
16	**Stueck**	
17	**pcs**	
18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter.

When you press the ok key the **Edit Unit** menu appears.
A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).
Press the ok key to save the **Edit Unit** menu.
Press the C key to close the **Edit Unit** menu.

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

Second mode CB

It allows to set the batch counter / total counter.
The function of batch counting according to a preset value (Preselection 1 ... Preselection 3) is only possible if one of the following switch conditions is enabled: "automatic reset to zero" (**7 = RESULT >= PRES->0**) or "automatic reset to Preselection 1" (**8 = RESULT<=0->SET**) or "automatic reset to the value set next to Set value CB" (**10 = RESULT>=PRES->VALUE**).

When Second mode CB is active, Source 1 to Source 4 in the "Preselection" menus are used as current value for the SECOND COUNTER B.

EXAMPLE FOR BATCH COUNTER
We need the batch counter to increment by 1 at each 1,000 pulses.
Preselection 1 parameter has to be set to "1000"; the related reference source Source 1 to "**4 = COUNTER B**"; the corresponding switch condition Mode 1 has to be set to "**7 = RESULT>=PRES->0**"; Second mode CB has to be set to "**1 = INCREMENT BATCH**". Should an output be turned on after a batch amount of 33, Preselection 2 has to be set to "33", the related reference source Source 2 has to be set to "**5 = SECOND COUNTER B**" and the switching condition of Mode 2 has to be set to "display value greater than or equal to" (**3 = RESULT>=PRES**).

EXAMPLE FOR TOTAL COUNTER
To activate the total counter, Second mode CB must be set to "**4 = TOTAL COUNTER**". The total counter operates in parallel to the main counter. If we want the total counter to reset to 0 when 4000 value is reached, the preset value (e.g. Preselection 3 item) must be set to "4000", the reference source Source 3 must be set to "**5 = SECOND COUNTER B**" and the related switching condition of Mode 3 has to be set to "automatic reset to zero" (**7 = RESULT>=PRES->0**).

0	**OFF**	No batch counter & no total 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 "6.16 Command menu" section on page 90)
4	**TOTAL COUNTER**	Total counter is activated

Second set value CB

In case of a reset / set command via control input (see the option "**23 = SET SECOND B**" in the "6.16 Command menu" section on page 90), the second counter B (batch counter / total counter) is set to the value entered next to this item.
The parameter is available only when the **Second mode CB** is active.

-99999999	Smallest value
0	Default value
+99999999	Highest value

Second decimal point CB

This parameter sets the position of the decimal point for the second counter B.
The parameter is available only when the **Second mode CB** is active.

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

Second scale units CB

This parameter sets the required engineering unit for the second counter B. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the **Second decimal point CB** parameter, see on page 62.
The parameter is available only when the **Second mode CB** is active.

0	**Hz**	
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**	Default
13	**m**	
14	**inch**	
15	**feet**	
16	**Stueck**	
17	**pcs**	
18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits

		can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu.

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

6.7 Collection Settings menu

This menu allows to set the decimal point as well as the corresponding engineering unit for the linked results ("Frequency collection" and "Counter collection").

This menu is displayed only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

Decimal point frequency

This parameter sets the position of the decimal point for the frequency linked result.

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

Scale units frequency

This parameter sets the required engineering unit for the frequency linked result. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the previous **Decimal point frequency** parameter.

0	**Hz**	Default
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**	
15	**feet**	
16	**Stueck**	
17	**pcs**	
18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu.

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

Decimal point counter

This parameter sets the position of the decimal point for the counter linked result.

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

Scale units counter

This parameter sets the required engineering unit for the counter linked result. It does not affect the calculation of the display value, it is just a label to be shown next to the display value. The number of decimal places must be set in the previous **Decimal point counter** parameter.

0	**Hz**	
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**	Default
13	**m**	
14	**inch**	
15	**feet**	
16	**Stueck**	
17	**pcs**	

18	**sec**	
19	**min**	
20	**Min:Sec**	
21	**H:M:S**	
22	**Min:Sec:00**	
23	**l/min**	
24	**gal/min**	
25	**ml/min**	
26	**gr/min**	
27	**inch/min**	
28	**H:M**	
29	**Edit unit**	A customized measuring unit with up to 16 digits can be edited using this parameter. When you press the ok key the **Edit Unit** menu appears. A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast). Press the ok key to save the **Edit Unit** menu. Press the C key to close the **Edit Unit** menu.

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

6.8 Scaling settings menu

The **Scaling settings** menu allows to set additional scaling factors by means of which the desired process value can be calculated further. The scaled result value is stored and available in the **8 – SCALED RESULT** of the SOURCE parameters. It can be selected accordingly for further processing needs by means of an adjustable reference source (e.g. see the SOURCE parameter available in the menus that describe the analogue output, the switching outputs, the display, ...).

Source

This parameter sets the reference source which is additionally calculated by using the scaling operations below.

0	**SPEED A**	The reference source is the main result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from the combination of both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.

7	**COUNTER COLL.**	The reference source is the value resulting from the combination of both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

Factor

It sets the factor by which the measured value (see the **Source** parameter) will be multiplied for the display value.

-99999999	Smallest value
+1	Default value
+99999999	Highest value

Divider

It sets the divider by which the measured value (see the **Source** parameter) will be divided for the display value.

-99999999	Smallest value
+1	Default value
+99999999	Highest value

Additive value

It sets the additive constant that will be added to the measured value (see the **Source** parameter).

-99999999	Smallest value
0	Default value
+99999999	Highest value

6.9 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 selected SOURCE of the "Preselection" menu.
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 "6.10 Preselection 1 menu" section on page 72.

-99999999	Smallest value
+1000	Default value
+99999999	Highest value

Preselection 2

Preselection / switching point 2. The features of **Preselection 2** must be set in the **Preselection 2** menu, see "6.11 Preselection 2 menu" section on page 78.

-99999999	Smallest value
+2000	Default value
+99999999	Highest value

Preselection 3

Preselection / switching point 3. The features of **Preselection 3** must be set in the **Preselection 3** menu, see "6.12 Preselection 3 menu" section on page 80.

-99999999	Smallest value
+3000	Default value
+99999999	Highest value

Preselection 4

Preselection / switching point 4. The features of **Preselection 4** must be set in the **Preselection 4** menu, see "6.13 Preselection 4 menu" section on page 82.

-99999999	Smallest value
+4000	Default value
+99999999	Highest value

6.10 Preselection 1 menu

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

Source 1

It sets the reference source for **Preselection 1**. It is further calculated by using the scaling factors.

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General

		menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8 Scaling settings menu" section on page 69.

Mode 1

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

0	**|RESULT|>=|PRES|**	The absolute display value is greater than or equal to the absolute value of **Preselection 1**. If **Hysteresis 1** is greater than 0, the following switching condition is applied: Display value ≥ **Preselection 1** → ON Display value < **Preselection 1** - **Hysteresis 1** → OFF
1	**|RESULT|<=|PRES|**	The absolute display value is less than or equal to the absolute value of **Preselection 1** (start up delay setting – see the **Start up delay 1 (s)** parameter on page 77- is advisable). If **Hysteresis 1** is greater than 0, the following switching condition is applied: Display value ≤ **Preselection 1** → ON Display value > **Preselection 1** + **Hysteresis 1** → OFF
2	**|RESULT|=|PRES|**	The absolute display value is equal to the absolute value of **Preselection 1**. A range (**Preselection 1** +/- ½ **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** + ½ **Hysteresis 1** → OFF Display value < **Preselection 1** - ½ **Hysteresis 1** → OFF
3	**RESULT >= PRES**	Display value is greater than or equal to **Preselection 1**, e.g. an overspeed is detected. If **Hysteresis 1** is greater than 0, the following switching condition is applied: Display value ≥ **Preselection 1** → ON Display value < **Preselection 1** - **Hysteresis 1** → OFF

4	**RESULT <= PRES**	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 77- is advisable). If **Hysteresis 1** is greater than 0, the following switching condition is applied: Display value ≤ **Preselection 1** → ON Display value > **Preselection 1** + **Hysteresis 1** → OFF
5	**RESULT = PRES**	Display value is equal to **Preselection 1**. A range (**Preselection 1** +/- ½ **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** + ½ **Hysteresis 1** → OFF Display value < **Preselection 1** - ½ **Hysteresis 1** → 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 **0= SPEED A** or **3 = SPEED B** reference sources are selected (see the **Source 1** parameter on page 72).
7	**RESULT>= PRES->0**	Automatic reset to zero. It is only available when **1 = COUNTER A**, **2 = SECOND COUNTER A**, **4 = COUNTER B** or **5 = SECOND COUNTER B** reference sources are selected (see the **Source 1** parameter on page 72). Display value is greater than or equal to **Preselection 1**, the display value is set to 0. If **Second mode CA** (see on page 55) or **Second mode CB** (see on page 61) are set to either **1 = INCREMENT BATCH** or **2 = DECREMENT BATCH** so activating the batch mode, the corresponding batch counter increments or decrements when the display value is set to 0 and when the corresponding reference source (**Source 1** = "**1 = COUNTER A**" or "**4 = COUNTER B**") is selected.
8	**RESULT<= 0->SET**	Automatic set to **Preselection 1**. It is only available when **1 = COUNTER A**, **2 = SECOND COUNTER A**, **4 = COUNTER B** or **5 = SECOND COUNTER B** reference sources are selected (see the **Source 1** parameter on page 72). Display value is less than or equal to 0, the display value is set to **Preselection 1**. If **Second mode CA** (see on page 55) or **Second mode CB** (see on page 61) are set to either **1 =**

		INCREMENT BATCH or **2 = DECREMENT BATCH** so activating the batch mode, the corresponding batch counter increments or decrements when the display value is set to **Preselection 1** and when the corresponding reference source (**Source 1** = "**1 = COUNTER A**" or "**4 = COUNTER B**") is selected.
9	**RES>=PRES-TRAIL**	Trailing **Preselection 1**: Display value is greater than or equal to **Preselection 2** – **Preselection 1** → ON **Preselection 1** is the trailing preselection from **Preselection 2**.
10	**RESULT>=PRES ->VALUE**	Automatic reset to the value set next to **Set value CA** (see on page 53) or **Set value CB** (see on page 59). It is only available when **1 = COUNTER A**, **2 = SECOND COUNTER A**, **4 = COUNTER B** or **5 = SECOND COUNTER B** reference sources are selected (see the **Source 1** parameter on page 72). The display value is greater than or equal to **Preselection 1**, the display value is set to the corresponding **SET VALUE**. If **Second mode CA** (see on page 55) or **Second mode CB** (see on page 61) are set to either **1 = INCREMENT BATCH** or **2 = DECREMENT BATCH** so activating the batch mode, the corresponding batch counter increments or decrements when the display value is set to the corresponding **SET VALUE** and when the corresponding reference source (**Source 1** = "**1 = COUNTER A**" or "**4 = COUNTER B**") is selected.
11	**ERROR SET**	Error message to show device errors.

Hysteresis 1

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

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.

0.000	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 90- 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 73) and for **0 = SPEED A** and **3 = SPEED B** reference sources (see the **Source 1** parameter on page 72).

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 81 and 83 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

6.11 Preselection 2 menu

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

Source 2

This parameter sets the reference source for **Preselection 2**. For complete information please refer to the **Source 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Mode 2

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

0 ... 8, 10 and 11		For complete information on the switching conditions 0 ... 8, 10 and 11, please refer to the **Mode 1** parameter in the "6.10 Preselection 1 menu" section on page 72.
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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72. The default value is **2 = CTRL OUT 2**.

Output polarity 2

Polarity for the switching condition of **Preselection 2**. For complete information please refer to the **Output polarity 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Output lock 2

Latch for the switching condition of **Preselection 2**. For complete information please refer to the **Output lock 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72.

NOTE

Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 81 and 83 respectively) have an automatic start up delay setting.

Event color 2

Event-depending 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 "6.10 Preselection 1 menu" section on page 72.

6.12 Preselection 3 menu

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

Source 3

This parameter sets the reference source for **Preselection 3**. For complete information please refer to the **Source 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Mode 3

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

0 ... 8, 10 and 11		For complete information on the switching conditions 0 ... 8, 10 and 11, please refer to the **Mode 1** parameter in the "6.10 Preselection 1 menu" section on page 72.
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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72. The default value is **3 = CTRL OUT 3**.

Output polarity 3

Polarity for the switching condition of **Preselection 3**. For complete information please refer to the **Output polarity 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Output lock 3

Latch for the switching condition of **Preselection 3**. For complete information please refer to the **Output lock 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

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 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 3** parameter on page 80) and for **0 = SPEED A** and **3 = SPEED B** reference sources (see the **Source 3** parameter on page 80).

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 77 and 79 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 "6.10 Preselection 1 menu" section on page 72.

6.13 Preselection 4 menu

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

Source 4

This parameter sets the reference source for **Preselection 4**. For complete information please refer to the **Source 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Mode 4

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

0 ... 8, 10 and 11		For complete information on the switching conditions 0 ... 8, 10 and 11, please refer to the **Mode 1** parameter in the "6.10 Preselection 1 menu" section on page 72.
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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72.

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 "6.10 Preselection 1 menu" section on page 72. The default value is **4 = CTRL OUT 4**.

Output polarity 4

Polarity for the switching condition of **Preselection 4**. For complete information please refer to the **Output polarity 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

Output lock 4

Latch for the switching condition of **Preselection 4**. For complete information please refer to the **Output lock 1** parameter in the "6.10 Preselection 1 menu" section on page 72.

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 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 4** parameter on page 82) and for **0 = SPEED A** and **3 = SPEED B** reference sources (see the **Source 4** parameter on page 82).

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 77 and 79 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 "6.10 Preselection 1 menu" section on page 72.

6.14 Serial menu

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

Unit number

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

11	Smallest address value
...	
99	Highest address value

Serial baud rate

This parameter allows to set the serial transmission speed (baud rate).
Available options are:

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

Serial format

This parameter allows to set the bit data format.

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

Serial init

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

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

Serial protocol

It sets the sequence of characters to be sent when using the serial output for 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	= 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 "**6 – Serial print**" command (see the **Input 1 action**, **Input 2 action** and **Input 3 action** parameters on pages 90 and 93).
...	
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	Counter_Total
9	9	Time_Result_Total

MODBUS

This parameter enables the Modbus protocol and allows to set the Modbus address.
For details on the Modbus communication please refer to the "8 - Modbus RTU Interface" section on page 106.

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

6.15 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 24.
This function is only available for devices with order code AVI.

Analog source

This parameter sets the reference source for the analog output.

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the

		Operational mode parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8 Scaling settings menu" section on page 69.

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 a counter operation mode is active (see "6.5 Counter A Settings menu" section on page 53; and "6.6 Counter B Settings menu" section on page 59), 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
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 end value
+10000	Default value
+99999999	Highest end value

Analog gain (%)

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

000.00	Smallest gain
100.00	Default value
110.00	Highest gain

EXAMPLE
If you set "102.00" next to this item the result will be a conversion of 10.2 V or 20.4 mA when the value set next to the **Analog end** parameter is reached.
If you set "95.00" next to this item the result will be a conversion of 9.5 V or 18 mA when the value set next to the **Analog end** parameter is reached.

Analog offset

This parameter sets the zero offset of the analogue output.

-99.99	Smallest offset
00.00	Default value
+99.99	Highest offset

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

6.16 Command menu

The **Command** menu allows to configure the operation of the inputs "10 - Ctrl. In 1", "11 - Ctrl. In 2" and "12 - Ctrl. In 3".
For complete information on the control inputs features, please refer to the "4.6 Control inputs" section on page 23.

Input 1 action

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

0	**NO**	No function	
1	**RESET/SET A + B**	It resets / sets the counter of channel A to the value set next to the **Set value CA** parameter (see on page 53); and it resets / sets the counter of channel B to the value set next to the **Set value CB** parameter (see on page 59).	(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 86.	(d)
7	**TEACH PRESEL. 1**	The current display value is stored as Preselection 1 (see the **Preselection 1** parameter on page 71). The reference source is the one line display.	(d)
8	**TEACH PRESEL. 2**	The current display value is stored as Preselection 2 (see the **Preselection 2** parameter on page 71). The reference source is the one line display.	(d)
9	**TEACH PRESEL. 3**	The current display value is stored as Preselection 3 (see the **Preselection 3** parameter on page 71). The reference source is the one line display.	(d)
10	**TEACH PRESEL. 4**	The current display value is stored as Preselection 4 (see the **Preselection 4** parameter on page 71). The reference source is the one line display.	(d)
11	**SCROLL DISPLAY**	It scrolls through the available display screens (see the "5.2 Screen structure during operation" section on page 29).	(d)
12	**CLEAR LOOP TIME**	N.A.	

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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" on page 72 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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" on page 72 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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" on page 72 ff).	(d)
20	RESET/SET A	It resets / sets the counter of channel A to the value set next to the **Set value CA** parameter (see on page 53).	(d) (s)
21	RESET/SET B	It resets / sets the counter of channel B to the value set next to the **Set value CB** parameter (see on page 59).	(d) (s)
22	SET SECOND A	It resets / sets the batch counter / total counter of channel A to the value set next to the **Second set value CA** parameter (see on page 56).	(d) (s)
23	SET SECOND B	It resets / sets the batch counter / total counter of channel B to the value set next to the **Second set value CB** parameter (see on page 62).	(d) (s)
24	INC. BATCH A	It increases the batch counter of channel A (see the "6.5 Counter A Settings menu" section on page 53).	(d)
25	DEC. BATCH A	It decreases the batch counter of channel A (see the "6.5 Counter A	(d)

		Settings menu" section on page 53).	
26	**INC. BATCH B**	It increases the batch counter of channel B (see the "6.6 Counter B Settings menu" section on page 59).	(d)
27	**DEC. BATCH B**	It decreases the batch counter of channel B (see the "6.6 Counter B Settings menu" section on page 59).	(d)
28	**INC. BRIGHTNESS**	The brightness of the display is increased.	(d) (s)
29	**DEC. BRIGHTNESS**	The brightness of the display is reduced.	(d) (s)
30	**LOCK COUNTER A**	The counter of channel A is disabled and stops counting any further pulses as long as this command is active.	(s)
31	**LOCK COUNTER B**	The counter of channel B is disabled and stops counting any further pulses as long as this command is active.	(s)

(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 (dynamic)
3	**FALLING EDGE**	It activates at falling edge (dynamic)

Input 2 action

This parameter sets the function of the input "11 - Ctrl. In 2". For complete information please refer to the **Input 1 action** parameter on page 90.

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 92.

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 90.

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 92.

6.17 Display menu

The **Display** menu allows to set the features of the display.
Parameter changes become active only after exiting the menu selection.

Start display

This parameter sets the display visualization after switching the device on. Refer also to the "5.2 Screen structure during operation" section on page 29.

0	**STANDARD**	The display shows one value in a single line (single source) with engineering unit and status bar. The source must be set next to the following **Source single** parameter.
1	**LARGE**	The display shows the value in a large format (4 digits). It is available only if the large display visualization mode is activated (see the **Large display** parameter on page 98). The source must be set next to the following **Source single** parameter.
2	**DOUBLE**	The display shows two values in two separate lines (double source) without engineering units. The source must be set next to the **Source dual top** (first line) and **Source dual down** (second line) parameters below.
3	**DOUBLE WITH UNITS**	The display shows two values with engineering units in two separate lines (double source). The source must be set next to the **Source dual top** (first line) and **Source dual down** (second line) parameters below.
4	**COMMAND**	The display shows one value in a single line (single source) with commands. The source must be set next to the following **Source single** parameter.
5	**QUICKSTART**	Display with quick start keys for entering / displaying the preselection values. It is available only with AVI1, DO1, RO order codes. The source must be set next to the following **Source single** parameter. The desired command key ("EDIT PRESEL." or "SHOW PRESEL.") can be chosen by setting the **Quickstart key** parameter on page 100 in this section.
6	**MINIMUM/MAXIMUM**	Display with current / minimum / maximum values of input 1 and input 2. The source must be set next to the following **Source single** parameter.

Source single

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

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B, 3 = DIF A-B, 4 = RATIO B/A, 5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8

		Scaling settings menu" section on page 69.

Source dual top

It sets the reference source of the value to be displayed in the first line when the "two line" visualization mode is set (see the **Start display** parameter on page 94).

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the

		following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8 Scaling settings menu" section on page 69.

Source dual down

It sets the reference source of the value to be displayed in the second line when the "two line" visualization mode is set (see the **Start display** parameter on page 94).

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8 Scaling settings menu" section on page 69.

Large display

This parameter is used to activate and set the "large display" visualization mode. Using the splitting ratio, the large display value can be divided. The source of the **Large display** visualization mode must be set next to the **Source single** parameter on page 95.

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

Color

This parameter sets the colour of the display.
It is also possible to enable an event-depending 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 "6.10 Preselection 1 menu" ... "6.13 Preselection 4 menu" on page 72 ff).
Event-depending 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 percentage (%).

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.

00.00	Screen saver not active
...	
99.99	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

Quickstart key

This parameter sets the command that is displayed when the **5 - QUICKSTART** visualization mode option is set, see the **Start display** parameter on page 94. It is only available for devices with order codes AVI, DO, and RO.

0	**EDIT PRESEL.**	The **EDIT PRESEL.** key is available on the display. When you press the key you open the editing menu and can set the preselection values, see the "6.9 Preselection values menu" section on page 71. **NOTE** The monitoring of the switching outputs, the correction of the analogue output, etc. are deactivated as long as the editing menu is open.
1	**SHOW PRESEL.**	The **SHOW PRESEL.** key is available on the display. When you press the key the set preselection values are displayed on the screen. The editing menu is not opened. **NOTE** The monitoring of the switching outputs, the correction of the analogue output, etc. are still activated.

6.18 Linearization menu

The linearisation function is configured in this menu. This menu is displayed only if the **Linearization mode** parameter in the **General** menu (see on page 39) 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 "6.18.1 Description of the linearisation function" section below.

Source

It sets the reference source of the value to be displayed when the "single line" and "large" visualization modes are set.

0	**SPEED A**	The reference source is the main display result value of the frequency measured on channel A (or A/B 90).
1	**COUNTER A**	The reference source is the result value of the main counter of channel A (or A/B 90).
2	**SECOND COUNTER A**	The reference source is the result value of the second counter (total counter / batch counter) of channel A (or A/B 90). The option is available only when the **Second mode CA** is active.
3	**SPEED B**	The reference source is the main display result value of the frequency measured on channel B. This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
4	**COUNTER B**	The reference source is the result value of the main counter of channel B.This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
5	**SECOND COUNTER B**	The reference source is the result value of the second counter (total counter / batch counter) of channel B. The option is available only when the **Second mode CB** is active.
6	**FREQUENCY COLL.**	The reference source is the value resulting from both frequency values of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.

7	**COUNTER COLL.**	The reference source is the value resulting from both counters of channel A and channel B (A+B, A-B, B/A, ...). This option is available only if the **Operational mode** parameter in the "6.2 General menu" section on page 38 is set to one of the following options: **2 = SUM A+B**, **3 = DIF A-B**, **4 = RATIO B/A**, **5 = % DEVIA B/A**.
8	**SCALED RESULT**	The reference source is the value resulting from the additionally scaled process value, see the "6.8 Scaling settings menu" section on page 69.

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
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
0	Default value
+99999999	Largest Y-coordinate

6.18.1 Description of the linearisation function

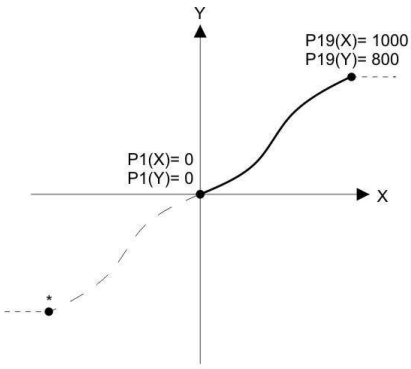
The linearisation function allows to convert a linear input signal into a non-linear representation (or vice versa). 24 programmable X / Y coordinates (interpolation points) are available, they can be freely arranged over the whole

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 39) must be set to either "1 - 1 QUADRANT" or "2 - 4 QUADRANT" (see the diagrams below).

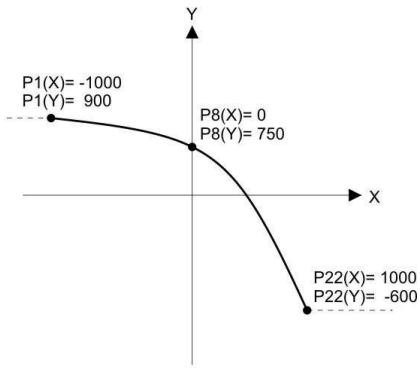
The parameters **P1(X)** to **P24(X)** are used to specify the coordinates on the x-axis. These are the measuring values that the unit would normally generate according to the actual input signal.

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.



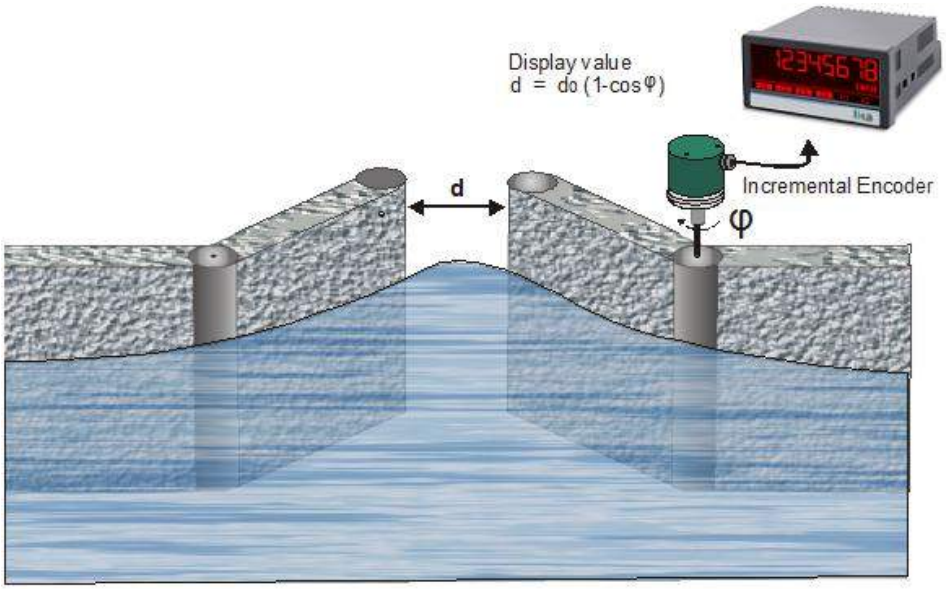
Example: Linearization Mode: 1 Quadrant
* Linearization is point symmetric to 1. Quadrant



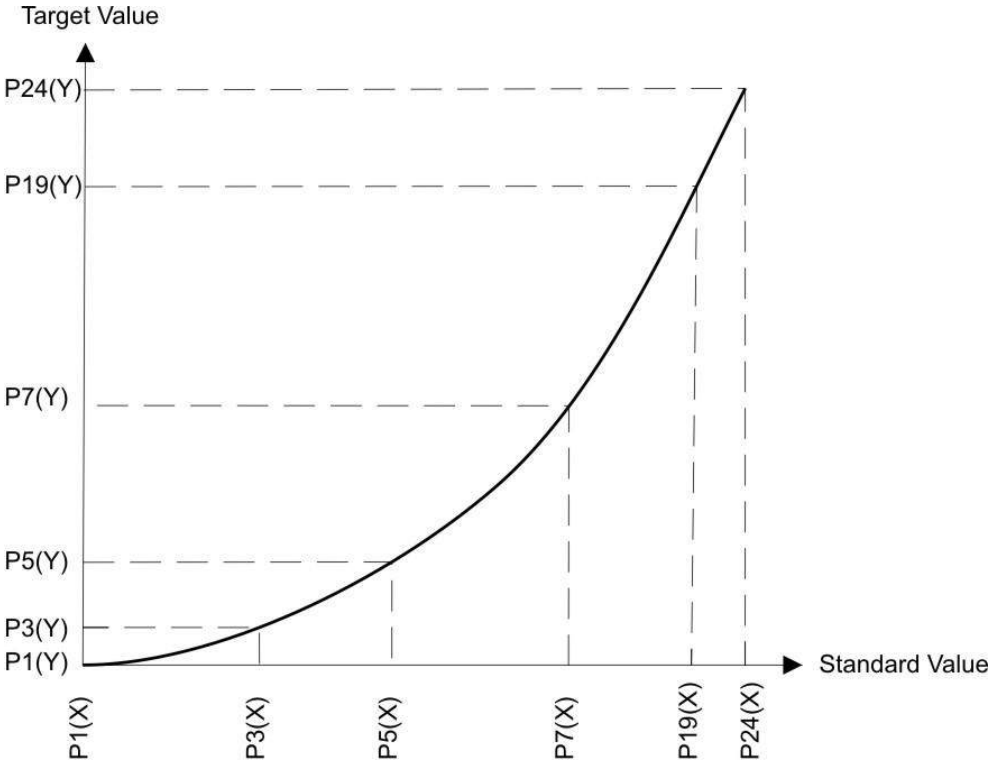
Example: Linearization Mode: 4 Quadrant

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 "6.14 Serial menu" section on page 84) 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 "MAN Serial Protocol IFxx_LD2xx_LD3xx I_E.pdf" user's guide. 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 - Modbus RTU Interface

LD360 / LD365 series displays are standard Modbus RTU Slaves and provide the following Modbus functions:

- Read Coils
- Write Single Coil
- Read Holding Registers
- Write Multiple Registers
- Diagnostic information

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

8.1 Parameter setting

The following parameters available in the "6.14 Serial menu" section (see on page 84) are required for Modbus protocol:

Unit number

Not used for Modbus communication.
If you need to set the Modbus address refer to the **MODBUS** parameter on page 86.

Serial baud rate

This parameter allows to set the serial transmission speed (baud rate).
Available options are:

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

Serial format

This parameter allows to set the bit data format.

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

7	**8-ODD-1**	8	odd	1
8	8-NONE-1	Not to be used for Modbus communication		
9	**8-NONE-2**	8	no	2

Serial init
Not used for Modbus communication.

Serial protocol
Not used for Modbus communication.

Serial timer (s)
Not used for Modbus communication.

Serial value
Not used for Modbus communication.

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

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

8.2 Modbus Communication
The Modbus functions described hereafter are available.

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

All variables (current data) and status registers are mapped into Modbus Holding Registers.
However, as all registers of the device are 32 bit registers, but Modbus Holding registers are only 16 bit registers, each register of the device requires two Holding registers (for this reason the use of the Modbus function "Write Single Register" is not possible).

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

8.2.2 Access to parameters

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

The holding register numbers for a certain parameter can be calculated by means of the parameter # that can be found in the parameter table in this manual (see the "9 - Parameters / serial codes" section on page 110):
Holding Register low = (parameter #) x 2
Holding Register high = (parameter #) x 2 + 1

EXAMPLE
Access the parameter # 58 **Divider** by using the Holding Register 0x0074 and 0x0075 hex.

8.2.3 Access to current data

Holding Register 0x1000 / 0x1001 hex and the followings allow to access the variables of the device (current data registers):
Holding Register 0x1000 / 0x1001 hex → Current data with serial Code ":0" (Display value)
Holding Register 0x1002 / 0x1003 hex → Current data with serial Code ":1"
Holding Register 0x1004 / 0x1005 hex → Current data with serial Code ":2"
Holding Register 0x1006 / 0x1007 hex → Current data with serial Code ":3"
etc.

8.2.4 Access to status registers

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

Holding Register 0x2000 / 0x2001 hex → Output Status (Ctrl. Out status, read only)
Holding Register 0x2002 / 0x2003 hex → Serial Commands
Holding Register 0x2004 / 0x2005 hex → External Command (Ctrl. In status, read only)
Holding Register 0x2006 / 0x2007 hex → All Commands (read only)

8.2.5 Read Coils and Write Single Coil

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

Coil number	Serial code of command	Command	
0	54	Reset / Set	Reset/Set Value of channels A and B
1	55	Freeze Display	Freeze the current display value

2	56	Touch Disable	Disable touch screen
3	57	Clear Lock	Loosen locking of all outputs / relay
4	58	Clear Min/Max	Reset of the min. / max. values
5	59	Serial Print	Sending of serial data (do not use with Modbus)
6	60	Teach Preset 1	Current display value (the reference source is the one-line display) is stored as **Preselection 1**
7	61	Teach Preset 2	Current display value (the reference source is the one-line display) is stored as **Preselection 2**
8	62	Teach Preset 3	Current display value (the reference source is the one-line display) is stored as **Preselection 3**
9	63	Teach Preset 4	Current display value (the reference source is the one-line display) is stored as **Preselection 4**
10	64	Scroll Display	Display switching (see display in operation mode, see on page 29)
11	65	Clear Loop Time	Release all latched switching conditions
12	66	Start Preselection	The preselection starts
13	67	Activate Data	Data is activated (not required with Modbus)
14	68	Store to EEPROM	Store to EEPROM
15	69	Testprogram	Test program (do not use with Modbus)

8.2.6 Diagnostics

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

9 - Parameters / serial codes

9.1 General menu

See the "6.2 General menu" section on page 38

Parameter	#	Serial code	Min. value	Max. value	Default value
Operational mode	0	00	0	8	0
Encoder properties LD360 Encoder properties LD365	1	01	0	3	0
Encoder supply	2	02	0	1	0
Counting direction	3	03	0	3	0
Linearization mode	4	04	0	2	0
Pin preselection	5	05	0000	9999	0000
Pin parameter	6	06	0000	9999	0000
Back up memory	7	07	0	1	1
Factory settings	8	08	0	1	0
-	9	09	0	0	0

9.2 Speed A Settings menu

See the "6.3 Speed A Settings menu" section on page 41

Parameter	#	Serial code	Min. value	Max. value	Default value
Display value SA	10	10	00000001	99999999	1000
Base frequency (Hz) SA	11	11	000001	500000	100
Decimal point SA	12	12	0	7	1
Sampling time (s) SA	13	13	0.005	9.999	0.100
Wait time (s) SA	14	14	0.01	80.00	01.00
Standstill time (s) SA	15	15	00.00	99.99	00.00
Average filter SA	16	16	0	8	0
Scale units SA	17	17	0	29	0
-	18	18	0	0	0
-	19	19	0	0	0
-	20	20	0	0	0

9.3 Speed B Settings menu

See the "6.4 Speed B Settings menu" section on page 47

Parameter	#	Serial code	Min. value	Max. value	Default value
Display value SB	21	21	00000001	99999999	1000
Base frequency (Hz) SB	22	22	000001	500000	100
Decimal point SB	23	23	0	7	1
Sampling time (s) SB	24	24	0.005	9.999	0.100
Wait time (s) SB	25	25	0.01	80.00	01.00
Standstill time (s) SB	26	26	00.00	99.99	00.00
Average filter SB	27	27	0	8	0
Scale units SB	28	28	0	29	0
-	29	29	0	0	0
-	30	30	0	0	0
-	31	31	0	0	0

9.4 Counter A Settings menu

See the "6.5 Counter A Settings menu" section on page 53

Parameter	#	Serial code	Min. value	Max. value	Default value
Factor CA	32	32	00.00001	99.99999	1.00000
Set value CA	33	33	-99999999	+99999999	0
Decimal point CA	34	34	0	7	0
Scale units CA	35	35	0	29	12
Second mode CA	36	36	0	4	0
Second set value CA	37	37	-99999999	+99999999	0
Second decimal point CA	38	38	0	7	0
Second scale units CA	39	39	0	29	12
-	40	40	0	0	0
-	41	41	0	0	0

9.5 Counter B Settings menu

See the "6.6 Counter B Settings menu" section on page 59

Parameter	#	Serial code	Min. value	Max. value	Default value
Factor CB	42	42	00.00001	99.99999	1.00000
Set value CB	43	43	-99999999	+99999999	0
Decimal point CB	44	44	0	7	0
Scale units CB	45	45	0	29	12
Second mode CB	46	46	0	4	0
Second set value CB	47	47	-99999999	+99999999	0
Second decimal point CB	48	48	0	7	0
Second scale units CB	49	A0	0	29	12
-	50	A1	0	0	0
-	51	A2	0	0	0

9.6 Collection Settings menu

See the "6.7 Collection Settings menu" section on page 65

Parameter	#	Serial code	Min. value	Max. value	Default value
Decimal point frequency	52	A3	0	7	0
Scale units frequency	53	A4	0	29	0
Decimal point counter	54	A5	0	7	0
Scale units counter	55	A6	0	29	12

9.7 Scaling Settings menu

See the "6.8 Scaling settings menu" section on page 69

Parameter	#	Serial code	Min. value	Max. value	Default value
Source	56	A7	0	7	0
Factor	57	A8	-99999999	+99999999	+1
Divider	58	A9	-99999999	+99999999	+1
Additive value	59	B0	-99999999	+99999999	0

9.8 Preselection values menu

See the "6.9 Preselection values menu" section on page 71

Parameter	#	Serial code	Min. value	Max. value	Default value
Preselection 1	60	B1	-99999999	+99999999	+1000
Preselection 2	61	B2	-99999999	+99999999	+2000
Preselection 3	62	B3	-99999999	+99999999	+3000
Preselection 4	63	B4	-99999999	+99999999	+4000

9.9 Preselection 1 menu

See the "6.10 Preselection 1 menu" section on page 72

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 1	64	B5	0	8	0
Mode 1	65	B6	0	11	0
Hysteresis 1	66	B7	00000	99999	0
Pulse time 1 (s)	67	B8	00.000	60.000	0
Output target 1	68	B9	0	6	1
Output polarity 1	69	C0	0	1	0
Output lock 1	70	C1	0	1	0
Start up delay 1 (s)	71	C2	00.000	60.000	0
Event color 1	72	C3	0	3	0
-	73	C4	0	0	0

9.10 Preselection 2 menu

See the "6.11 Preselection 2 menu" section on page 78

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 2	74	C5	0	8	0
Mode 2	75	C6	0	11	0
Hysteresis 2	76	C7	00000	99999	0
Pulse time 2 (s)	77	C8	00.000	60.000	0
Output target 2	78	C9	0	6	2
Output polarity 2	79	D0	0	1	0
Output lock 2	80	D1	0	1	0
Start up delay 2 (s)	81	D2	00.000	60.000	0
Event color 2	82	D3	0	3	0
-	83	D4	0	0	0

9.11 Preselection 3 menu

See the "6.12 Preselection 3 menu" section on page 80

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 3	84	D5	0	8	0
Mode 3	85	D6	0	11	0
Hysteresis 3	86	D7	00000	99999	0
Pulse time 3 (s)	87	D8	00.000	60.000	0
Output target 3	88	D9	0	6	3
Output polarity 3	89	E0	0	1	0
Output lock 3	90	E1	0	1	0
Start up delay 3 (s)	91	E2	0	1	0
Event color 3	92	E3	0	3	0
-	93	E4	0	0	0

9.12 Preselection 4 menu

See the "6.13 Preselection 4 menu" section on page 82

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 4	94	E5	0	8	0
Mode 4	95	E6	0	11	0
Hysteresis 4	96	E7	00000	99999	0
Pulse time 4 (s)	97	E8	00.000	60.000	0
Output target 4	98	E9	0	6	4
Output polarity 4	99	F0	0	1	0
Output lock 4	100	F1	0	1	0
Start up delay 4 (s)	101	F2	0	1	0
Event color 4	102	F3	0	3	0
-	103	F4	0	0	0

9.13 Serial menu

See the "6.14 Serial menu" section on page 84

Parameter	#	Serial code	Min. value	Max. value	Default value
Unit number	104	90	11	99	11
Serial baud rate	105	91	0	2	0
Serial format	106	92	0	9	0
Serial init	107	9~	0	1	0
Serial protocol	108	F5	0	1	0
Serial timer (s)	109	F6	00.000	60.000	0
Serial value	110	F7	0	9	0
MODBUS	111	F8	0	247	0
-	112	F9	0	0	0
-	113	G0	0	0	0

9.14 Analog menu

See the "6.15 Analog menu" section on page 87

Parameter	#	Serial code	Min. value	Max. value	Default value
Analog source	114	G1	0	8	0
Analog format	115	G2	0	2	0
Analog start	116	G3	-99999999	+99999999	0
Analog end	117	G4	-99999999	+99999999	+10000
Analog gain (%)	118	G5	000	110	100
Analog offset	119	G6	-99.99	+99.99	0
-	120	G7	0	0	0

9.15 Command menu

See the "6.16 Command menu" section on page 90

Parameter	#	Serial code	Min. value	Max. value	Default value
Input 1 action	121	G8	0	31	0
Input 1 config.	122	G9	0	3	2
Input 2 action	123	H0	0	31	0
Input 2 config.	124	H1	0	3	2
Input 3 action	125	H2	0	31	0
Input 3 config.	126	H3	0	3	2
-	127	H4	0	0	0
-	128	H5	0	0	0
-	129	H6	0	0	0
-	130	H7	0	0	0

9.16 Display menu

See the "6.17 Display menu" section on page 94

Parameter	#	Serial code	Min. value	Max. value	Default value
Start display	131	H8	0	6	0
Source single	132	H9	0	8	0
Source dual top	133	I0	0	8	0
Source dual down	134	I1	0	8	1
Large display	135	I2	0	5	0
Color	136	I3	0	2	0
Brightness (%)	137	I4	010	100	090
Contrast	138	I5	0	2	1
Screen saver (s)	139	I6	00.00	99.99	0
Up-date time (s)	140	I7	0.005	9.999	0.100
Font	141	I8	0	1	0
Quickstart key	142	I9	0	1	0

9.17 Linearization menu

See the "6.18 Linearization menu" section on page 101

Parameter	#	Serial code	Min. value	Max. value	Default value
Source	143	J0	0	8	0
P1(X)	144	J1	-99999999	+99999999	0
P1(Y)	145	J2	-99999999	+99999999	0
P2(X)	146	J3	-99999999	+99999999	0
P2(Y)	147	J4	-99999999	+99999999	0
P3(X)	148	J5	-99999999	+99999999	0
P3(Y)	149	J6	-99999999	+99999999	0
P4(X)	150	J7	-99999999	+99999999	0
P4(Y)	151	J8	-99999999	+99999999	0
P5(X)	152	J9	-99999999	+99999999	0
P5(Y)	153	K0	-99999999	+99999999	0
P6(X)	154	K1	-99999999	+99999999	0
P6(Y)	155	K2	-99999999	+99999999	0
P7(X)	156	K3	-99999999	+99999999	0
P7(Y)	157	K4	-99999999	+99999999	0
P8(X)	158	K5	-99999999	+99999999	0
P8(Y)	159	K6	-99999999	+99999999	0
P9(X)	160	K7	-99999999	+99999999	0
P9(Y)	161	K8	-99999999	+99999999	0

(continue on next page)

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Parameter	#	Serial code	Min. value	Max. value	Default value
P10(X)	162	K9	-99999999	+99999999	0
P10(Y)	163	L0	-99999999	+99999999	0
P11(X)	164	L1	-99999999	+99999999	0
P11(Y)	165	L2	-99999999	+99999999	0
P12(X)	166	L3	-99999999	+99999999	0
P12(Y)	167	L4	-99999999	+99999999	0
P13(X)	168	L5	-99999999	+99999999	0
P13(Y)	169	L6	-99999999	+99999999	0
P14(X)	170	L7	-99999999	+99999999	0
P14(Y)	171	L8	-99999999	+99999999	0
P15(X)	172	L9	-99999999	+99999999	0
P15(Y)	173	M0	-99999999	+99999999	0
P16(X)	174	M1	-99999999	+99999999	0
P16(Y)	175	M2	-99999999	+99999999	0
P17(X)	176	M3	-99999999	+99999999	0
P17(Y)	177	M4	-99999999	+99999999	0
P18(X)	178	M5	-99999999	+99999999	0
P18(Y)	179	M6	-99999999	+99999999	0
P19(X)	180	M7	-99999999	+99999999	0
P19(Y)	181	M8	-99999999	+99999999	0
P20(X)	182	M9	-99999999	+99999999	0
P20(Y)	183	N0	-99999999	+99999999	0
P21(X)	184	N1	-99999999	+99999999	0
P21(Y)	185	N2	-99999999	+99999999	0
P22(X)	186	N3	-99999999	+99999999	0
P22(Y)	187	N4	-99999999	+99999999	0
P23(X)	188	N5	-99999999	+99999999	0
P23(Y)	189	N6	-99999999	+99999999	0
P24(X)	190	N7	-99999999	+99999999	0
P24(Y)	191	N8	-99999999	+99999999	0

9.18 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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