lika
Smart encoders & actuators

User's guide

LD350
LD355

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

Suitable for the following models:
- LD350-P8-...
- LD355-P8-...
- LD350-PM-...
- LD355-PM-...

General Contents

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

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

They feature a touch screen and 7-segment graphic display with a complete set of plain text, symbols and units. The LED display is bright and provides high contrast readability and also allows the background light to turn red, green or yellow in the event of the set occurrences such as when the threshold limits are exceeded. The combination of plain text and touch screen functions make the parametrization very user-friendly and intuitive.

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

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

In the series the following models are available:

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

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

For technical specifications please <u>refer to the product datasheet</u>.

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:

- <u>SPEED</u> (only input A or input B is used, depending on the parameter setting), see the "6.3 Speed operation mode menu" section on page 43.

- ○ Tachometer / speed indicator
- ○ Measurement of frequency / RMP indicator
- ○ Monitoring functions for speed and standstill

- PROCESS TIME (only input A is used), see the "6.4 Process Time operation mode menu" section on page 47.
  - ○ Processing time indicator (reciprocal speed)
  - ○ Baking time indicator
  - ○ Flow time indicator

- TIMER (only input A or input B is used, depending on the parameter setting), see the "6.5 Timer operation mode menu" section on page 50
  - ○ Operation as stopwatch (start / stop function can be freely parametrized)
  - ○ Counter for working hours
  - ○ Period measurement
  - ○ Total time measurement

- COUNTER (input A and input B are both used), see the "6.6 Counter operation mode menu" section on page 53
  - ○ Pulse counter / sum or differential counter
  - ○ Up or down counter
  - ○ Position indicator
  - ○ Quadrature counter
  - ○ Batch counter / Total counter

- VELOCITY (input A operates as a start input and input B operates as a stop input), see the "6.7 Velocity operation mode menu" section on page 56
  - ○ Runtime measurement as speed indicator

Functional diagram
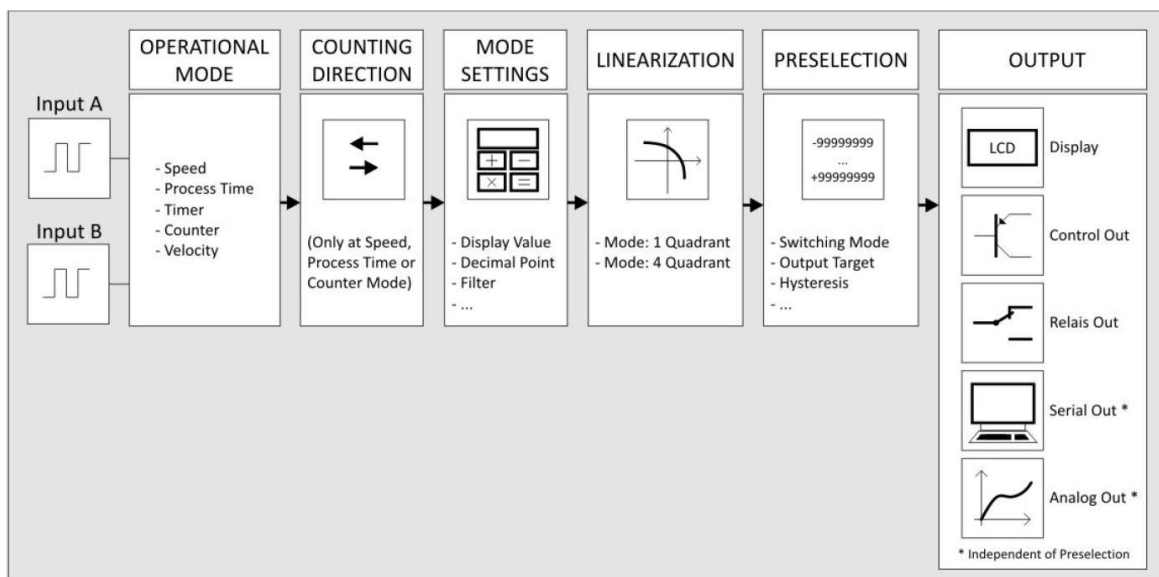
1 – Safety summary

1.1 Safety

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

1.2 Electrical safety

- Turn OFF 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.

Front view

48 mm / 1.89"

96 mm / 3.78"

Lateral view

Rear view

24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

ABS UL94-V0

Top view

114 mm / 4.49"

11 mm / 0.43"   105 mm / 4.13"
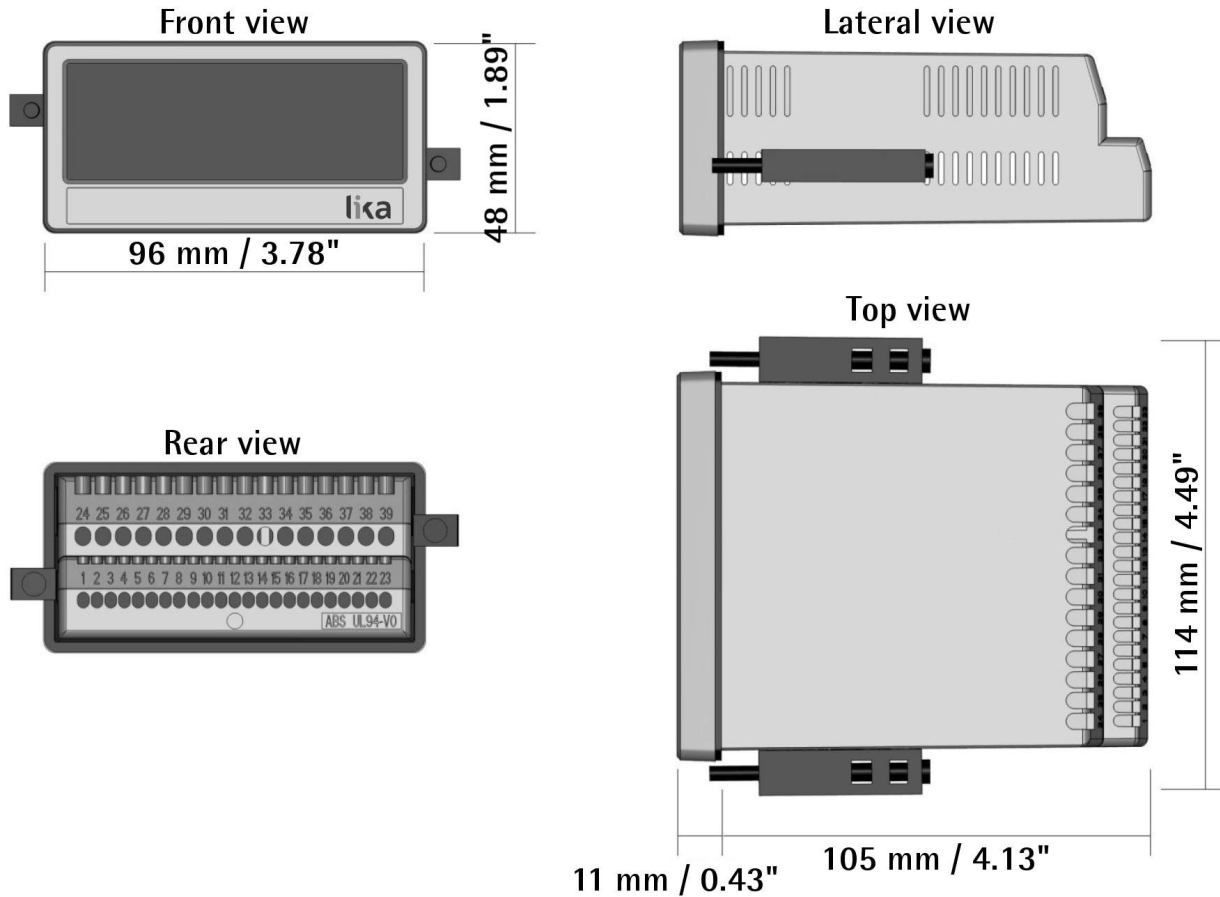
Panel cut out: 91 x 43 mm (3.58" x 1.69'')

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.
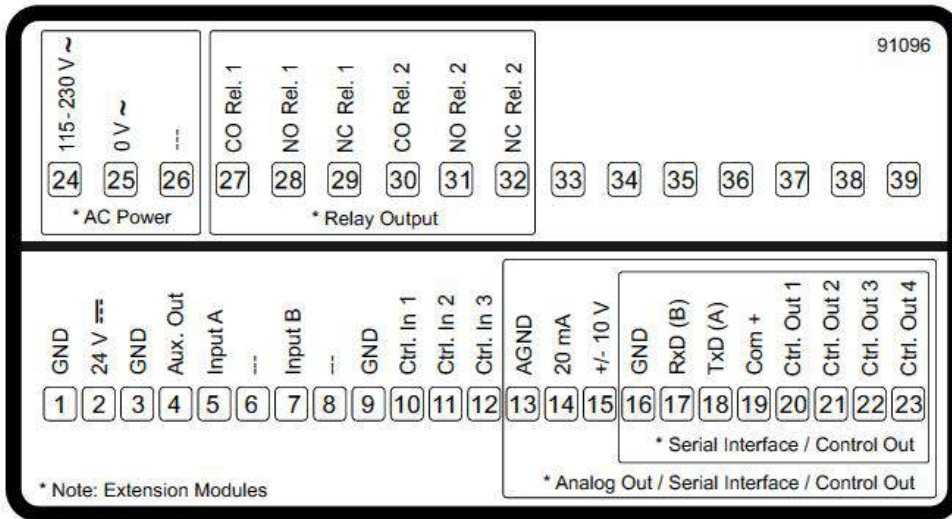
LD350 terminals scheme
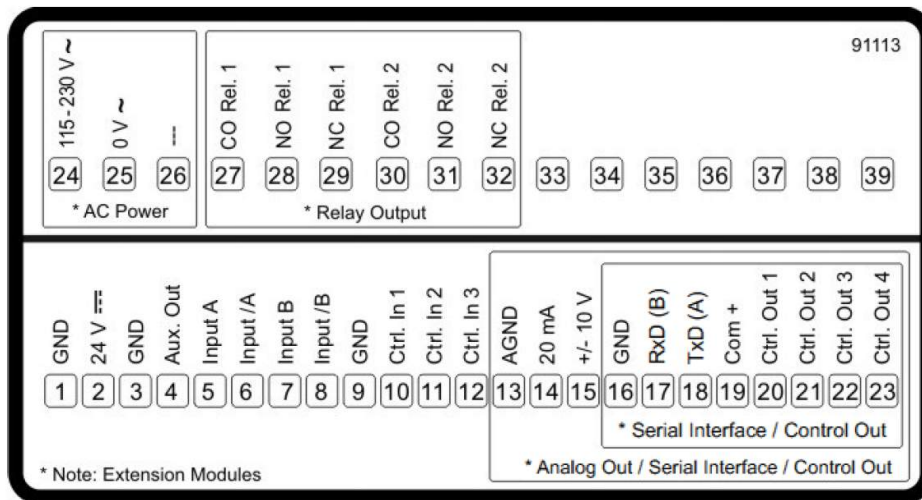
LD355 terminals scheme

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 (LD350 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 (LD355 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.

LD355 model allows the auxiliary voltage output to be set to either 24 Vdc or 5 Vdc. Refer to the **Encoder supply** parameter in the "6.2 General menu" section on page 38.

4.4 A, B incremental inputs (LD350 model)

A, B incremental inputs technical specifications

Number of inputs (channels):	2 (A, B)
Configuration:	PNP, NPN, Namur, Tri-State
Format:	HTL (Low = 0 ... 3 V, High = 9 ... 30 V)
Frequency:	max. 250 kHz
Load:	max. 6 mA / 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 LD350 parameter in the "6.2 General menu" section on page 38.

4.4.1 Wiring of the incremental inputs
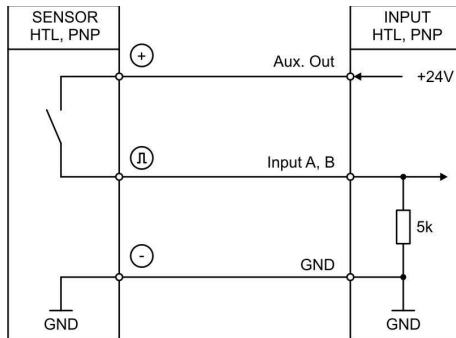
PNP   **NPN**
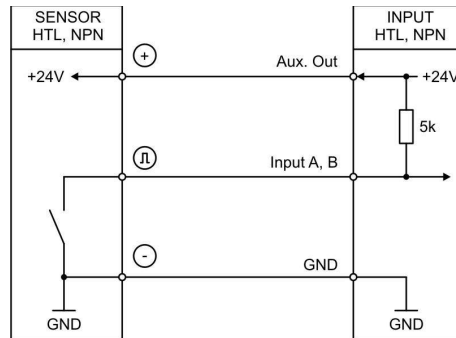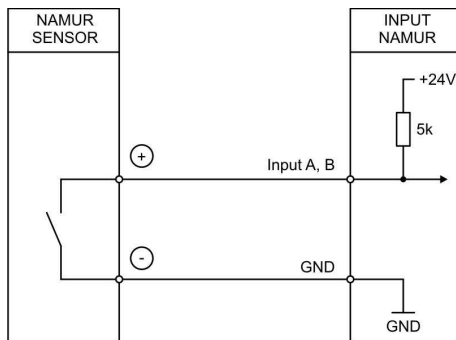
Namur   **Tri-State**
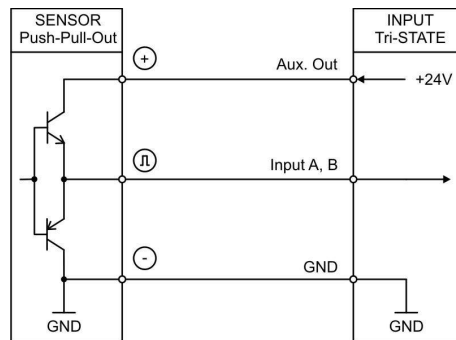
Unconnected PNP inputs are always "LOW" and unconnected NPN inputs are always "HIGH".
All inputs are designed to receive impulses from electrical impulse sources.

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 (LD355 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 LD355 parameter in the "6.2 General menu" section on page 38.

4.5.1 Wiring of the incremental inputs
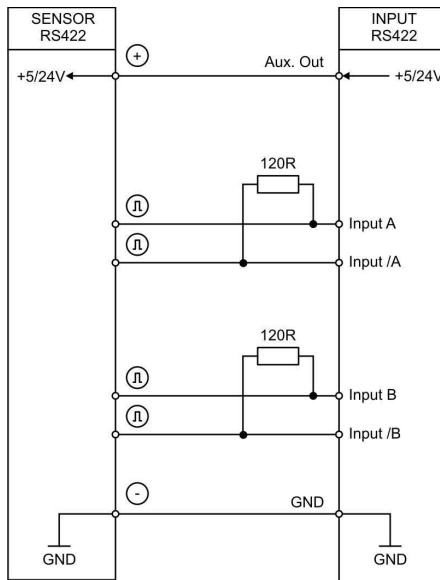
RS-422   **HTL differential**
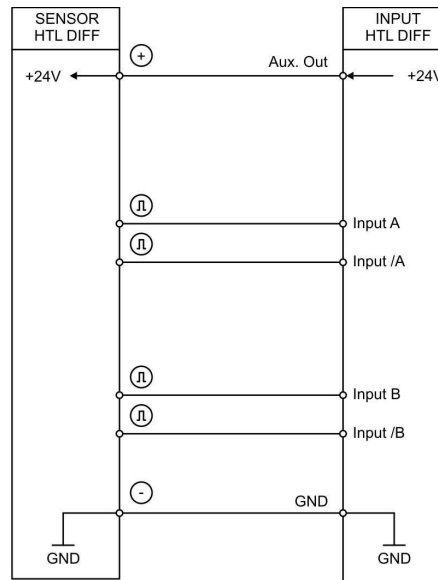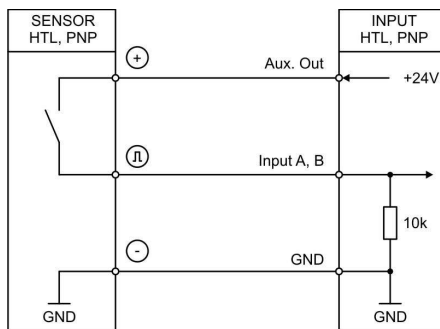
HTL PNP, single ended   **HTL NPN, single ended**
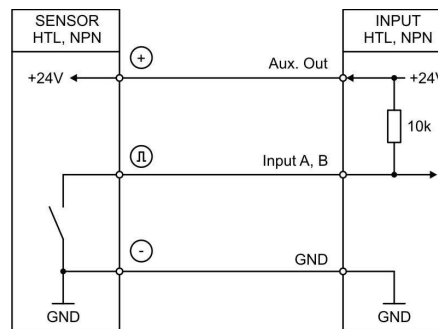
Unconnected PNP inputs are always "LOW" and unconnected NPN inputs are always "HIGH".
All inputs are designed to receive impulses from electrical impulse sources.

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 "6.15 Command menu" section on page 76) the operation of the control inputs can be set. Available functions are: reset the display value, display switching, locking the touch screen or release the lock function of the control or relay outputs.

4.6.1 Wiring of the control inputs
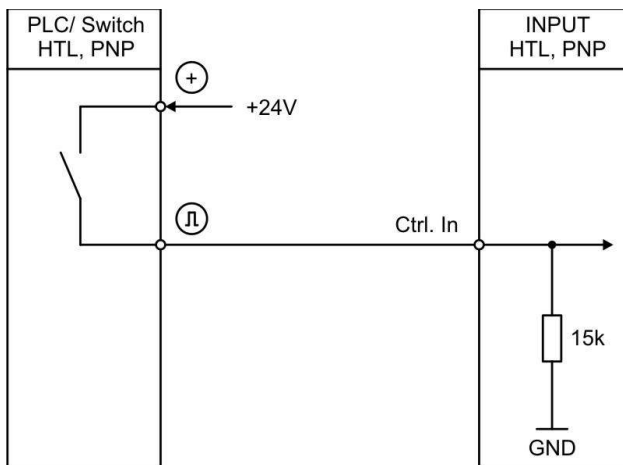
Unconnected control inputs are always "LOW".
All inputs are designed to receive impulses from an electronic impulse source.

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

4.7 Analogue output (-AVI- order code)

Analogue output technical specifications

Configuration:	Current or voltage operation
Voltage output (0):	-10 V ... +10 V (max. 2 mA)
Current output (1):	0 ... 20 mA (burden: max. 270 Ohm)
Current output (2):	4 ... 20 mA (burden: max. 270 Ohm)
Resolution:	16 bits
Accuracy:	±0.1%
Reaction time:	< 150 ms

A 16 bit analogue output is available through terminal blocks 13 and 14 / 15.
It can be configured and scaled in the **Analog** menu, see the "6.14 Analog menu" section on page 73.

The following configurations are available (see the **Analog format** parameter on page 73):

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

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

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

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

Serial interface technical specifications

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

A serial interface (RS-232 / RS-485) is available through terminal blocks 16, 17 and 18.
It can be configured in the **Serial** menu, see the "6.13 Serial menu" section on page 70.

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

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

The following drawing shows the RS-232 connection to a PC by using a standard D-Sub 9-pin connector:
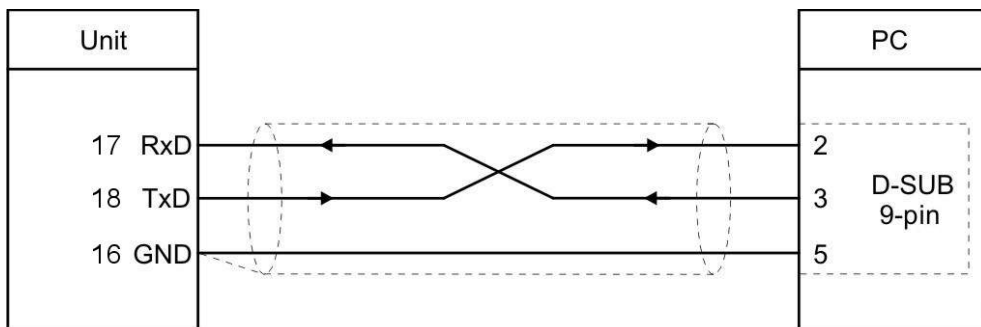
The following drawing shows the RS-485 connection to a PC by using a standard D-Sub 9-pin connector:
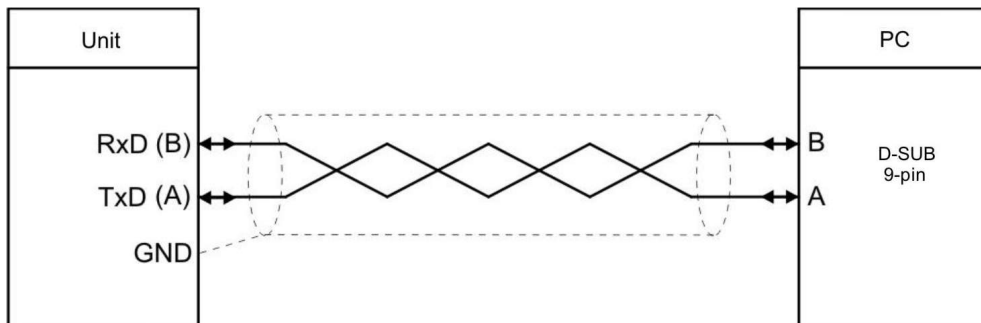
4.9 Control outputs (-AVI- and -DO- order codes)

Control outputs technical specifications

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

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

The switching conditions can be set in the **Preselection 1 … Preselection 4** menus, see the "6.9 Preselection 1 menu" … "6.12 Preselection 4 menu" sections on pages 59, 64, 66 and 68 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
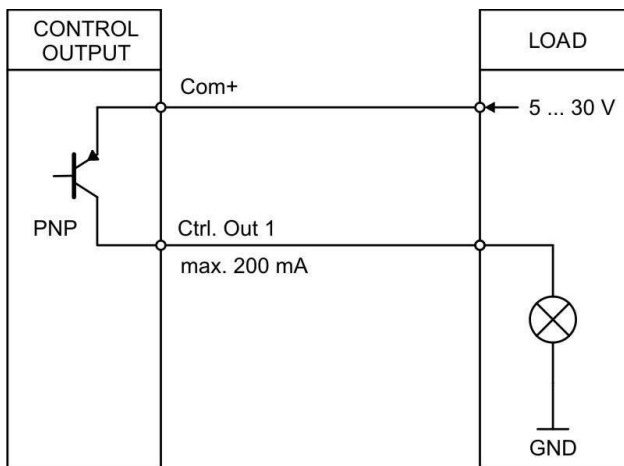
4.10 Relay outputs (-RO order code)

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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" sections on pages 59, 64, 66 and 68 respectively.

The switching states are displayed (display with unit and status bar) as `K1` and `K2`, see the "5 - Display and touch screen" section on page 28.

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

4.10.1 Wiring of the relay outputs
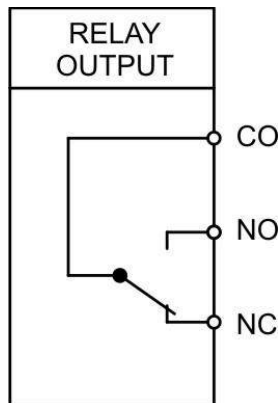
5 – Display and touch screen

5.1 Screen structure for parametrization

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

Start setup procedure

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

Selection of the menu

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

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

Selection of the parameter

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

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

Parameter setting:

After selection the parameter (or its last digit) starts blinking. Set the parameter by pressing the ⬆ 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.

1.2345
INCH
C1   C2   C3   C4   K1   K2

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.

12345
23

Display counter and batch/total counter or timer/total timer

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

It is available only if **Count mode** is set to A+B or A-B; or **Batch / Total mode** is active; or **Total time mode** is active

1.2345
l / min
1.2345
kPa

Two-line display with units

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

It is available only if **Count mode** is set to A+B or A-B; or **Batch / Total mode** is active; or **Total time mode** is active

1.234

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.

1.2345
RESET/SET   FREEZE

Display with command keys

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

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

Display for quick start of the preselection values setting process (see the "6.8 Preselection values menu" section on page 58)

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 minimum and maximum values.

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

| SKIP |

key.

5.3 Error messages

The error messages described hereafter are reset automatically as soon as the corresponding display value is within the allowed range.
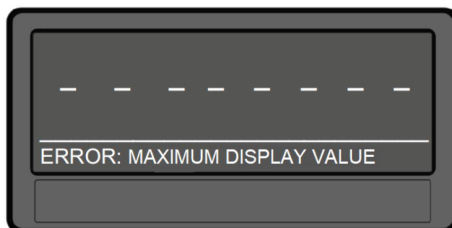
ERROR: MAXIMUM DISPLAY VALUE

The display value of the single line display is greater than +99 999 999
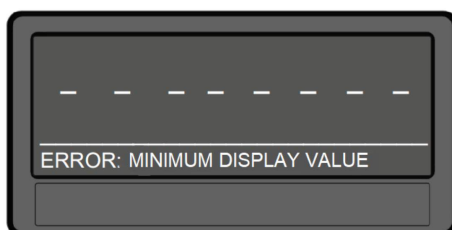
ERROR: MINIMUM DISPLAY VALUE

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

ERROR: MAX. TOP DISPLAY VALUE

Top display value of the two line display is greater than +99 999 999
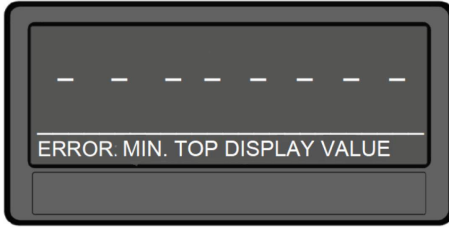
ERROR: MIN. TOP DISPLAY VALUE

Top display value of the two line display is less than -99 999 999
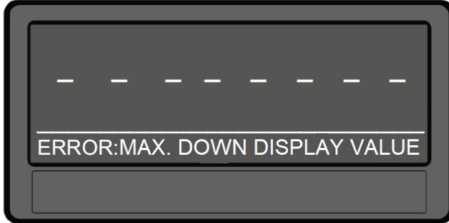
ERROR: MAX. DOWN DISPLAY VALUE

Down display value of the two line display is greater than +99 999 999
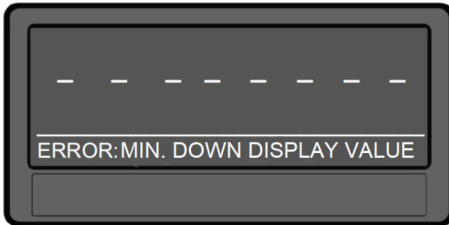
ERROR: MIN. DOWN DISPLAY VALUE

Down display value of the two line display is less than -99 999 999
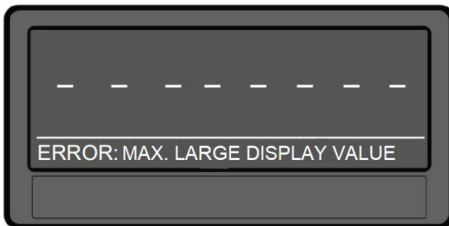
ERROR: MAX. LARGE DISPLAY VALUE

The display value of the large display is greater than +9999
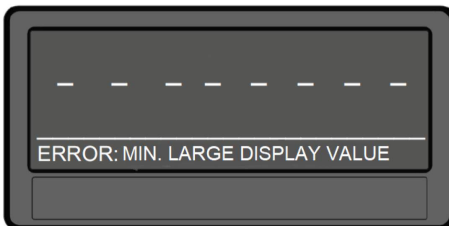
ERROR: MIN. LARGE DISPLAY VALUE

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

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 LD350, see on page 38 (LD350 model) or Encoder properties LD355, see on page 38 (LD355 model)
Encoder supply, see on page 39
Counting direction, see on page 39
Scale units, see on page 39
Scale units (batch), see on page 41
Linearization mode, see on page 41
Pin preselection, see on page 41
Pin parameter, see on page 41
Back up memory, see on page 41
Factory settings, see on page 42

The following menus depend on the setting of the Operational mode parameter, see on page 38.

Operational mode = SPEED, **Speed operation mode menu**, see the "6.3 Speed operation mode menu" section on page 43
Display value, see on page 43
Base frequency (Hz), see on page 43
Decimal point, see on page 44
Sampling time (s), see on page 45
Wait time (s), see on page 45
Standstill time (s), see on page 46
Average filter, see on page 46

For/Rev detection, see on page 46

Operational mode = PROCESS TIME, **Process Time operation mode menu**, see the "6.4 Process Time operation mode menu" section on page 47
Display format, see on page 47
Display value, see on page 47
Base frequency (Hz), see on page 47
Sampling time (s), see on page 48
Wait time (s), see on page 48
Standstill time (s), see on page 49
Average filter, see on page 49

Operational mode = TIMER, **Timer operation mode menu**, see the "6.5 Timer operation mode menu" section on page 50
Time base, see on page 50
Start / Stop, see on page 50
Auto set / reset, see on page 51
Latch function, see on page 51
Set value, see on page 51
Inc / Dec mode, see on page 51
Total time mode, see on page 52
Total time set value, see on page 52

Operational mode = COUNTER, **Counter operation mode menu**, see the "6.6 Counter operation mode menu" section on page 53
Count mode, see on page 53
Factor, see on page 53
Set value, see on page 54
Decimal point, see on page 54
Batch / Total mode, see on page 54
Batch / total set value, see on page 55
Round-loop value, see on page 55

Operational mode = VELOCITY, **Velocity operation mode menu**, see the "6.7 Velocity operation mode menu" section on page 56
Start / Stop, see on page 56
Display value, see on page 56
Base time (s), see on page 56
Decimal point, see on page 56
Wait time (s), see on page 57
Standstill time (s), see on page 57

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

Preselection values menu, see the "6.8 Preselection values menu" section on page 58
Preselection 1, see on page 58
Preselection 2, see on page 58
Preselection 3, see on page 58
Preselection 4, see on page 58

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

Preselection 1 menu, see the "6.9 Preselection 1 menu" section on page 59
Source 1, see on page 59
Mode 1, see on page 59
Hysteresis 1, see on page 62
Pulse time 1 (s), see on page 62
Output target 1, see on page 62
Output polarity 1, see on page 62
Output lock 1, see on page 63
Start up delay 1 (s), see on page 63
Event color 1, see on page 63

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

Preselection 2 menu, see the "6.10 Preselection 2 menu" section on page 64
Source 2, see on page 64
Mode 2, see on page 64
Hysteresis 2, see on page 64
Pulse time 2 (s), see on page 64

Output target 2, see on page 64
Output polarity 2, see on page 64
Output lock 2, see on page 65
Start up delay 2 (s), see on page 65
Event color 2, see on page 65

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

Preselection 3 menu, see the "6.11 Preselection 3 menu" section on page 66
Source 3, see on page 66
Mode 3, see on page 66
Hysteresis 3, see on page 66
Pulse time 3 (s), see on page 66
Output target 3, see on page 66
Output polarity 3, see on page 66
Output lock 3, see on page 67
Start up delay 3 (s), see on page 67
Event color 3, see on page 67

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

Preselection 4 menu, see the "6.12 Preselection 4 menu" section on page 68
Source 4, see on page 68
Mode 4, see on page 68
Hysteresis 4, see on page 68
Pulse time 4 (s), see on page 68
Output target 4, see on page 68
Output polarity 4, see on page 68
Output lock 4, see on page 69
Start up delay 4 (s), see on page 69
Event color 4, see on page 69

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

Serial menu, see the "6.13 Serial menu" section on page 70
Unit number, see on page 70
Serial baud rate, see on page 70

Serial format, see on page 70
Serial init, see on page 71
Serial protocol, see on page 71
Serial timer (s), see on page 72
Serial value, see on page 72
MODBUS, see on page 72

It is only available for devices with order code AVI.

Analog menu, see the "6.14 Analog menu" section on page 73
Analog source, see on page 73
Analog format, see on page 73
Analog start, see on page 74
Analog end, see on page 74
Analog gain (%), see on page 74
Analog offset, see on page 74

Command menu, see the "6.15 Command menu" section on page 76
Input 1 action, see on page 76
Input 1 config., see on page 78
Input 2 action, see on page 79
Input 2 config., see on page 79
Input 3 action, see on page 79
Input 3 config., see on page 79

Display menu, see the "6.16 Display menu" section on page 80
Source dual top, see on page 80
Source dual down, see on page 80
Color, see on page 81
Brightness (%), see on page 81
Contrast, see on page 82
Screen saver (s), see on page 82
Up-date time (s), see on page 82
Font, see on page 82
Start display, see on page 82

Large display, see on page 83

It is only available if the **Linearization mode** parameter in the **General** menu (see on page 41) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

Linearization menu, see the "6.17 Linearization menu" section on page 84
P1(X), see on page 84
...
P24(X), see on page 84
P1(Y), see on page 84
...
P24(Y), see on page 84

6.2 General menu

The default values are highlighted with grey background.

Operational mode

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

0	SPEED	Speed indicator (RPM), tachometer or frequency counter, see the "6.3 Speed operation mode menu" section on page 43.
1	PROCESS TIME	Operation as baking time or processing time indicator (reciprocal speed), see the "6.4 Process Time operation mode menu" section on page 47.
2	TIMER	Operation as stopwatch, see the "6.5 Timer operation mode menu" section on page 50.
3	COUNTER	Operation as position indicator, event, sum, differential or up-down counter, see the "6.6 Counter operation mode menu" section on page 53.
4	VELOCITY	Runtime measurement as speed indicator, see the "6.7 Velocity operation mode menu" section on page 56.

Encoder properties LD350

This parameter is only available for LD350 model.
It allows to set the characteristics of the pulse inputs for LD350.

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

Encoder properties LD355

This parameter is only available for LD355 model.
It allows to set the characteristics of the pulse inputs for LD355.

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

Encoder supply

This parameter is only available for LD355 model.

It allows to set the voltage level of the auxiliary voltage output (4 = Aux. Out). For more information refer to the "4.3 Auxiliary voltage output" section on page 20.

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

Counting direction

This parameter is only available when the **Counter** operation mode is active, see the "6.6 Counter operation mode menu" section on page 53.

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

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

Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value, 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** parameter that is available in each specific operation mode menu.

(i) NOTE

When the two-line display is selected (refer to the **Start display** parameter on page 82), the set engineering unit as well as the decimal point of the display value are automatically used for the **Total counter** or **Total timer**. The engineering unit for the batch counter can be selected separately by means of the following **Scale units (batch)** 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	{	|	}	~	

Scale units (batch)

This parameter sets the engineering unit that has to be shown in the two-line display for the batch counter. For a list of the available engineering units, see the previous **Scale units** item. Refer also to the **Start display** parameter on page 82.

Linearization mode

This parameter activates and sets the linearisation function. See the "6.17 Linearization menu" section on page 84 and the "6.17.1 Description of the linearisation function" section on page 84.

0	OFF	No linearisation
1	1 QUADRANT	Linearisation using 1 quadrant (see on page 84).
2	4 QUADRANT	Linearisation using 4 quadrants (see on page 84).

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 "6.8 Preselection values menu" section on page 58. Master PIN is 6079.
This lock function is only useful if used along with the lock function set in the **Pin parameter**.

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

Pin parameter

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

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

Back up memory

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

Factory settings

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

WARNING

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

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

6.3 Speed operation mode menu

When the Operational mode parameter in the **General** menu is set to 0 = SPEED (see on page 38), the **Speed operation mode** menu is available. It allows to set the unit operation as speed indicator (RPM), tachometer or frequency meter.

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

Display value

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

00000001	Smallest value
00001000	Default value
99999999	Highest value

Base frequency (Hz)

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

000001	Smallest value
000100	Default value
500000	Highest value

Programming Display value and Base frequency (Hz) parameters

When you need to set the display's **Speed operation mode** and the Display value and Base frequency (Hz) 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 (Scale units parameter in the **General** menu, see on page 39)

where:

n: DISPLAY VALUE: it is the value you want to display, i.e. the value to be set next to the Display value 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) 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** 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)** parameter can be set, for instance, to 100 Hz.
The decimal point (**Decimal point** 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: 586
Base frequency (Hz): 100
Decimal point: 2 = 000000.00

EXAMPLE 2
You need the **SPEED** 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)** 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: 123
Base frequency (Hz): 60
Decimal point: 2 = 000000.00
Scale units: 3 = m/min

Decimal point
It sets the position of the decimal point.

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

3	00000.000	Decimal point placed in the specified position
4	0000.0000	Decimal point placed in the specified position
5	000.00000	Decimal point placed in the specified position
6	00.000000	Decimal point placed in the specified position
7	0.0000000	Decimal point placed in the specified position

Sampling time (s)

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

0.005	Shortest Sampling time
0.100	Default value
9.999	Longest Sampling time

$$f = \frac{6}{T}$$
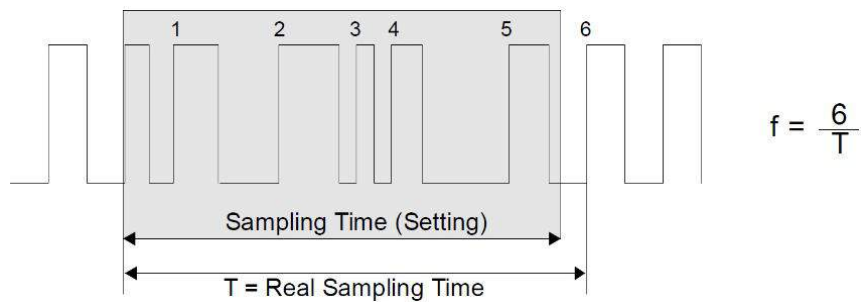
Wait time (s)

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

0.01	Frequency = 0 Hz, for frequencies below 100 Hz
01.00	Default value
80.00	Frequency = 0 Hz, for frequencies below 0.01 Hz

Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1** ... **Preselection 4** menus on pages 59, 64, 66 and 68 respectively).

Standstill detection can be set in the **Preselection 1** ... **Preselection 4** menus, see on pages 59, 64, 66 and 68 respectively.

00.00	Shortest time
...	
99.99	Longest time

Average filter

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

EXAMPLE

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

0	OFF	No average value will be created
1	**2 cycle average**	Floating average within 2 cycles
2	**4 cycle average**	Floating average within 4 cycles
3	**8 cycle average**	Floating average within 8 cycles
4	**16 cycle average**	Floating average within 16 cycles
5	**2 cycle filter**	Exponential filter, T (63 %) = 2x **Sampling time (s)**
6	**4 cycle filter**	Exponential filter, T (63 %) = 4x **Sampling time (s)**
7	**8 cycle filter**	Exponential filter, T (63 %) = 8x **Sampling time (s)**
8	**16 cycle filter**	Exponential filter, T (63 %) = 16x **Sampling time (s)**

For/Rev detection

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

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

6.4 Process Time operation mode menu

When the Operational mode parameter in the **General** menu is set to 1 = PROCESS TIME (see on page 38), the **Process Time operation mode** menu is available. It allows to set the unit operation as baking time or processing time indicator (reciprocal speed).
Only input A is used.

Display format

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

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

Display value

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

00000001	Smallest value
00001000	Default value
99999999	Highest value

Base frequency (Hz)

Reference frequency for the desired Display value expressed in Hz.

000001	Smallest value
000100	Default value
500000	Highest value

Sampling time (s)

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

0.005	Shortest Sampling time
0.100	Default value
9.999	Longest Sampling time

$$f = \frac{6}{T}$$
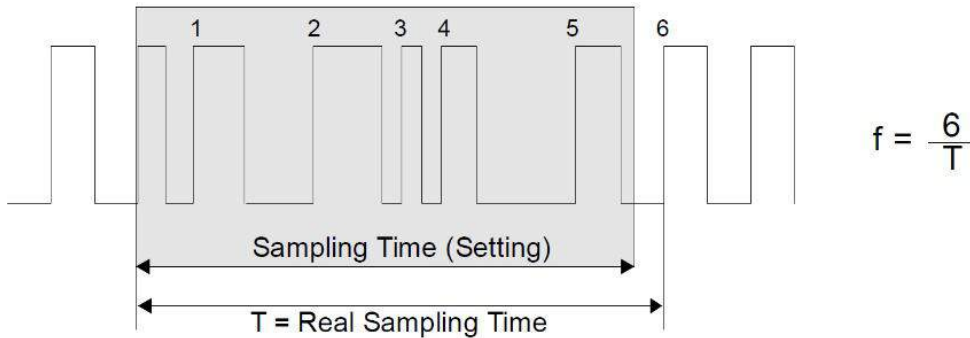
Wait time (s)

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

00.01	Frequency = 0 Hz, for frequencies below 100 Hz
01.00	Default value
80.00	Frequency = 0 Hz, for frequencies below 0.01 Hz

Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1** ... **Preselection 4** menus on pages 59, 64, 66 and 68 respectively).

Standstill detection can be set in the **Preselection 1** ... **Preselection 4** menus, see on pages 59, 64, 66 and 68 respectively.

00.00	Shortest time
...	
99.99	Longest time

Average filter

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

EXAMPLE

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

0	OFF	No average value will be created
1	2 cycle average	Floating average within 2 cycles
2	4 cycle average	Floating average within 4 cycles
3	8 cycle average	Floating average within 8 cycles
4	16 cycle average	Floating average within 16 cycles
5	2 cycle filter	Exponential filter, T (63 %) = 2x **Sampling time (s)**
6	4 cycle filter	Exponential filter, T (63 %) = 4x **Sampling time (s)**
7	8 cycle filter	Exponential filter, T (63 %) = 8x **Sampling time (s)**
8	16 cycle filter	Exponential filter, T (63 %) = 16x **Sampling time (s)**

6.5 Timer operation mode menu

When the Operational mode parameter in the **General** menu is set to 2 = TIMER (see on page 38), the **Timer operation mode** menu is available. It allows to set the unit operation as timer or stopwatch.

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

Time base

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

0	1/1000 SEC	Milliseconds
1	1/100 SEC	Hundredths of a second (1/100)
2	1/10 SEC	Tenths of a second (1/10)
3	SECONDS	Full seconds
4	MIN.00	Minutes and hundredths of a minute (1/100)
5	MIN.0	Minutes and tenths of a minute (1/10)
6	MIN:SEC	Minutes : Seconds (999999:59)
7	MIN:SEC:00	Minutes : Seconds : 1/100 seconds (9999:59:99)
8	H:M:S	Hours : Minutes : Seconds (9999:59:59)
9	H:M	Hours : Minutes (999999:59)

Start / Stop

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

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

Auto set / reset

0	NO	Time measurement operates by adding up or subtracting measured values (see the **Inc / Dec mode** parameter in the next page), no automatic set / reset operation is carried out at next start. Start setting must be done via set / reset (see "6.15 Command menu" section on page 76)
1	YES	At each start, the new time measurement automatically starts from the value set next to the **Set value** parameter (see below in the page)

Latch function

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

Set value

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

0	Smallest value (Reset)
...	
99999999	Highest value

Inc / Dec mode

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

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

Total time mode

It sets the total timer (total time measurement).

When **Total time mode** is active (= 1 = YES), **Preselection 1** to **Preselection 3** values are used to set the preset value for the total timer.

0	NO	Total time measurement deactivated
1	YES	Total time measurement activated

EXAMPLE

When you need the total time measurement, **Total time mode** must be set to 1 = YES. The total time measurement is achieved in parallel to the normal time measurement. If, for example, you need to reset to 0 automatically the total time measurement when 1:30 (H:M) is reached, then the reference source (for instance **Source 1** item) must be set to "**5 = TOTAL TIMER**"; while the corresponding preset value (e.g. **Preselection 1** item) must be set to "1:30"; finally the relevant switching condition must be set to "**7 = RESULT>=PRES->0**" next to the **Mode 1** item.

Total time set value

As soon as the SET TOTAL TIME command is sent (see "6.15 Command menu" section on page 76), the total time (total time measurement) is set to the value set next to this item. The parameter is available only if **Total time mode** is set to 1 = YES.

0	Smallest value (Reset)
...	
99999999	Highest value

6.6 Counter operation mode menu

When the Operational mode parameter in the **General** menu is set to 3 = COUNTER (see on page 38), the **Counter operation mode** menu is available. It allows to set the unit operation as position indicator, impulse counter, 2 inputs sum counter, 2 inputs differential counter or up-down counter.
Input A and input B are both used.

Count mode

This parameter allows to set the counter operational mode.

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

Factor

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

EXAMPLE

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

00.00001	Smallest value
1	Default value
99.99999	Highest value

Set value

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

–99999999	Smallest value
+00000000	Default value
+99999999	Highest value

Decimal point

This parameter sets the position of the decimal point.

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

Batch / Total mode

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 the switch conditions "automatic reset to zero" (**7 = RESULT >= PRES->0**) or "automatic reset to **Preselection 1**" (**8 = RESULT<=0->SET**) are enabled.

When **Batch / Total mode** is active, **Source 1** to **Source 4** in the "Preselection" menus are used as current value for the BATCH COUNTER or the TOTAL COUNTER.

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 "**0 = MEASUREM. RESULT**"; the corresponding switch condition **Mode 1** has to be set to "**7 = RESULT>=PRES->0**"; **Batch / Total mode** 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 "**3 = BATCH COUNTER**" 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, Batch / Total mode 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 "**4 = TOTAL COUNTER**" 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
1	INCREMENT BATCH	Batch counter operates by incrementing
2	DECREMENT BATCH	Batch counter operates by decrementing
3	USE INPUTS ONLY	The batch counter is operated only via external commands (see the **Command** menu, refer to the "6.15 Command menu" section on page 76)
4	TOTAL COUNTER	Total counter is activated

Batch / total set value
In case of a reset / set command via control input (see the option "**22 = SET BATCH / TOTAL**" in the "6.15 Command menu" section on page 76), the batch counter / total counter is set to the value entered next to this item. The parameter is available only when the Batch / Total mode is active.

00000000	Smallest value
...	
99999999	Highest value

Round-loop value
It sets the number of steps when a round-loop function is desired. The round-loop function is available only when Count mode is set to "**0 = A SINGLE**" or "**3 = A/B 90 x1**" or "**4 = A/B 90 x2**" or "**5 = A/B 90 x4**", see above in this section.

00000000	Normal display without round-loop function
...	
99999999	Number of steps for the round-loop function

6.7 Velocity operation mode menu

When the Operational mode parameter in the **General** menu is set to 4 = VELOCITY (see on page 38), the **Velocity operation mode** menu is available. It allows to set the unit operation as runtime measurement for speed.
Channel A is the start input while channel B is the stop input.

Start / Stop

This parameter sets the start and stop condition.

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

Display value

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

00000001	Smallest value
00001000	Default value
99999999	Highest value

Base time (s)

Reference time for the desired Display value expressed in seconds.

000.001	Smallest value
001.000	Default value
999.999	Highest value

Decimal point

This parameter sets the position of the decimal point.

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

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

Wait time (s)

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

00.00	The display value is retained until a new value is available
00.01	Frequency = 0 Hz, for frequencies below 100 Hz
...	
99.99	Frequency = 0 Hz, for frequencies below 0.01 Hz
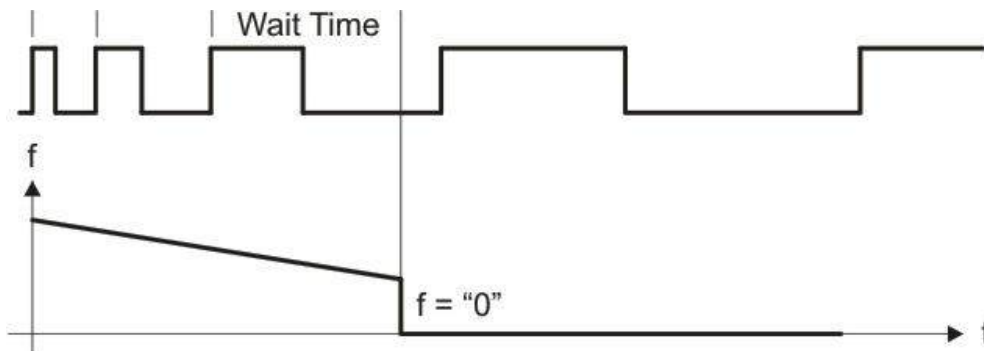
Standstill time (s)

This parameter sets the time after which a standstill condition is acknowledged. When the "frequency = 0 Hz" condition is detected, after the delay set next to this parameter the unit warns of the standstill condition and reactivates the start up delays (see the **Start up delay x (s)** parameter in the **Preselection 1** ... **Preselection 4** menus on pages 59, 64, 66 and 68 respectively).

Standstill detection can be set in the **Preselection 1** ... **Preselection 4** menus, see on pages 59, 64, 66 and 68 respectively.

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

00.00	Shortest time
...	
99.99	Longest time

6.8 Preselection values menu

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

The preselection values / switching points are always referred to the 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 "6.9 Preselection 1 menu" section on page 59.

–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 "6.10 Preselection 2 menu" section on page 64.

–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 "6.11 Preselection 3 menu" section on page 66.

–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 "6.12 Preselection 4 menu" section on page 68.

When the Total time mode or the Batch / Total mode are active (see on page 52 and on page 54 respectively), the batch counter / total counter or total timer is compared with the Preselection 4 value.

–99999999	Smallest value
+4000	Default value
+99999999	Highest value

6.9 Preselection 1 menu

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

Source 1

It sets the reference source for **Preselection 1**.

0	MEASUREM. RESULT	The reference source is the measurement result of the selected operating mode.
1	COUNTER A	The reference source is the current value of the counter of channel A. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
2	COUNTER B	The reference source is the current value of the counter of channel B. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
3	BATCH COUNTER	The reference source is the batch counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**1 = INCREMENT BATCH**" or "**2 = DECREMENT BATCH**" or "**3 = USE INPUTS ONLY**".
4	TOTAL COUNTER	The reference source is the total counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**4 = TOTAL COUNTER**".
5	TOTAL TIMER	The reference source is the total timer. It is available only when **Total time mode** in the "Timer" menu (see on page 52) is set to "**1 = YES**".

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 63- 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 63- 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 **Speed** or **Process Time** operation modes are selected (see on pages 43 and 47 respectively).

7	RESULT>= PRES->0	Automatic reset to zero. It is only available when **Timer** or **Counter** operation modes are selected (see on pages 50 and 53 respectively). Display value is greater than or equal to Preselection 1, the display value is set to 0. If Batch / Total mode is active (see on page 54), the batch counter increments or decrements when the display value is set to 0 and when the corresponding source (Source 1 = "**0 = MEASUREM. RESULT**" or "**1 = COUNTER A**" or "**2 = COUNTER B**") is selected.
8	RESULT<= 0->SET	Automatic set to Preselection 1. It is only available when **Timer** or **Counter** operation modes are selected (see on pages 50 and 53 respectively). Display value is less than or equal to 0, the display value is set to Preselection 1. If Batch / Total mode is active (see on page 54), the batch counter increments or decrements when the display value is set to Preselection 1 and when the corresponding source (Source 1 = "**0 = MEASUREM. RESULT**" or "**1 = COUNTER A**" or "**2 = 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 when the Operational mode parameter in the **General** menu is set to 2 = TIMER or to 3 = COUNTER (see on page 38). The display value is greater than or equal to Preselection 1, the display value is set to SET VALUE. If Batch / Total mode is active (see on page 54), the batch counter increments or decrements when the display value is set to SET VALUE and when the corresponding source (Source 1 = "**0 = MEASUREM. RESULT**" or "**1 = COUNTER A**" or "**2 = 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.

000.0	No switching hysteresis
...	
99999	Switching hysteresis = 99999

Pulse time 1 (s)

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

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

Output target 1

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

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

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

Output polarity 1

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

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

Output lock 1

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

0	NO	No latch for **Preselection 1**
1	YES	Latch for **Preselection 1** (command **4 – LOCK RELEASE** -see the **Input 1 action** parameter on page 76- 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 59) and when **Speed** or **Process Time** operation modes are selected (see on pages 43 and 47 respectively).

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

NOTE
Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 67 and 69 respectively) have an automatic start up delay setting.

Event color 1

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

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

6.10 Preselection 2 menu

The **Preselection 2** menu is only available for devices with order codes AVI, DO and RO. It allows to set the 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 "6.9 Preselection 1 menu" section on page 59.

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 "6.9 Preselection 1 menu" section on page 59.
9	**RES>=PRES-TRAIL**	Trailing **Preselection 2**: Display value is greater than or equal to **Preselection 1** – **Preselection 2** → ON **Preselection 2** is the trailing preselection from **Preselection 1**.

Hysteresis 2

This parameter sets the switching hysteresis of the switch-off point for **Preselection 2** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Pulse time 2 (s)

Duration of the output pulse for the switching condition of **Preselection 2** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output target 2

Assignment of an output or relay for the switching condition of **Preselection 2** value. For complete information please refer to the **Output target 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output polarity 2

Polarity for the switching condition of **Preselection 2**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output lock 2

Latch for the switching condition of **Preselection 2**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Start up delay 2 (s)

Start up delay setting for the switching condition of **Preselection 2**. For complete information please refer to the **Start up delay 1 (s)** parameter in the "6.9 Preselection 1 menu" section on page 59.

NOTE
Start up delay 3 (s) and **Start up delay 4 (s)** (see on pages 67 and 69 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 "6.9 Preselection 1 menu" section on page 59.

6.11 Preselection 3 menu

The **Preselection 3** menu is only available for devices with order codes AVI, DO and RO. It allows to set the 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 "6.9 Preselection 1 menu" section on page 59.

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 "6.9 Preselection 1 menu" section on page 59.
9	**RES>=PRES-TRAIL**	Trailing **Preselection 3**: Display value is greater than or equal to **Preselection 4** – **Preselection 3** → ON **Preselection 3** is the trailing preselection from **Preselection 4**.

Hysteresis 3

This parameter sets the switching hysteresis of the switch-off point for **Preselection 3** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Pulse time 3 (s)

Duration of the output pulse for the switching condition of **Preselection 3** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output target 3

Assignment of an output or relay for the switching condition of **Preselection 3** value. For complete information please refer to the **Output target 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output polarity 3

Polarity for the switching condition of **Preselection 3**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output lock 3

Latch for the switching condition of **Preselection 3**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

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 66) and when **Speed** or **Process Time** operation modes are selected (see on pages 43 and 47 respectively).

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

NOTE
Start up delay 1 (s) and **Start up delay 2 (s)** (see on pages 63 and 65 respectively) have a time-dependent start up delay setting.

Event color 3

Event-depending change of colour of the display for the switching condition of **Preselection 3**. **Event color 2**, **Event color 3** and **Event color 4** have the highest priority and are allowed to overwrite the change of colour set next to the **Event color 1** parameter. For complete information please refer to the **Event color 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

6.12 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 "6.9 Preselection 1 menu" section on page 59.

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 "6.9 Preselection 1 menu" section on page 59.
9	**RES>=PRES-TRAIL**	Trailing **Preselection 4**: Display value is greater than or equal to **Preselection 3** – **Preselection 4** → ON **Preselection 4** is the trailing preselection from **Preselection 3**.

Hysteresis 4

This parameter sets the switching hysteresis of the switch-off point for **Preselection 4** value. For complete information please refer to the **Hysteresis 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Pulse time 4 (s)

Duration of the output pulse for the switching condition of **Preselection 4** value. For complete information please refer to the **Pulse time 1 (s)** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output target 4

Assignment of an output or relay for the switching condition of **Preselection 4** value. For complete information please refer to the **Output target 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output polarity 4

Polarity for the switching condition of **Preselection 4**. For complete information please refer to the **Output polarity 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

Output lock 4

Latch for the switching condition of **Preselection 4**. For complete information please refer to the **Output lock 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

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 68) and when **Speed** or **Process Time** operation modes are selected (see on pages 43 and 47 respectively).

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

NOTE

Start up delay 1 (s) and **Start up delay 2 (s)** (see on pages 63 and 65 respectively) have a time-dependent start up delay setting.

Event color 4

Event-depending change of colour of the display for the switching condition of **Preselection 4**. **Event color 2**, **Event color 3** and **Event color 4** have the highest priority and are allowed to overwrite the change of colour set next to the **Event color 1** parameter. For complete information please refer to the **Event color 1** parameter in the "6.9 Preselection 1 menu" section on page 59.

6.13 Serial menu

The **Serial** menu allows to configure the basic settings of the serial interface (terminal blocks 16, 17 and 18). For complete information on the serial port features, please refer to the "4.8 Serial interface (-AVI- and -DO- order codes)" section on page 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 <u>not</u> contain any "0" because such numbers (20, 30, ...) are reserved for collective addressing (broadcast address).

11	Smallest address value
...	
99	Highest address value

Serial baud rate

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

0	**9600**	9600 baud
1	**19200**	19200 baud
2	**38400**	38400 baud

Serial format

This parameter allows to set the bit data format.

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

Serial init

This parameter allows to set the baud rate for the transmission of the initialization values to the OS6.0 software tool. If you set transmission values higher than 9600 baud, the duration of the initialization procedure will be shortened.

0	NO	The initialization values will be transmitted at 9600 baud. After initialization the unit will operate according to the user settings again.
1	YES	The initialization values will be transmitted according to the user defined baud rate (**Serial baud rate** parameter). After initialization the unit will go on operating according to the user settings again.

Serial protocol

It sets the sequence of characters to be sent when using the serial output for cyclic data transmission under time control (see the **Serial timer (s)** parameter). If you set the option "1" the unit address is removed from the string, this results in a slightly faster transmission cycle.

The transmission string will be as follows:
Option 0

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

Option 1

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

Where:

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

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

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

LF = line feed character

CR = carriage return character

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

Serial timer (s)

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

00.000	Cyclic transmission is switched off. The unit will send data following a serial request or a "**7 – Serial print**" command (see the Input 1 action, Input 2 action and Input 3 action parameters on pages 76 and 79).
...	
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 88.

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.

6.14 Analog menu

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

For complete information on the analogue output features, please refer to the "4.7 Analogue output (-AVI- order code)" section on page 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	MEASUREM. RESULT	The reference source is the measurement result of the selected operating mode.
1	COUNTER A	The reference source is the current value of the counter of channel A. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
2	COUNTER B	The reference source is the current value of the counter of channel B. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
3	BATCH COUNTER	The reference source is the batch counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**1 = INCREMENT BATCH**" or "**2 = DECREMENT BATCH**" or "**3 = USE INPUTS ONLY**".
4	TOTAL COUNTER	The reference source is the total counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**4 = TOTAL COUNTER**".
5	TOTAL TIMER	The reference source is the total timer. It is available only when **Total time mode** in the "Timer" menu (see on page 52) is set to "**1 = YES**".

Analog format

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

If **Analog format** is set to "**0 = –10...10V**", when the **Counter** operation mode is active (see the "6.6 Counter operation mode menu" section on page 53) 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.

6.15 Command menu

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

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

Input 1 action

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

0	NO	No function	
1	RESET/SET VALUE	When the **Timer** operation mode is active (see the "6.5 Timer operation mode menu" section on page 50): it resets the value to 0. When the **Counter** operation mode is active (see the "6.6 Counter operation mode menu" section on page 53): it resets / sets the value to the one set next to the Set value parameter (see on page 54). When the **Velocity** operation mode is active (see the "6.7 Velocity operation mode menu" section on page 56): it resets the value to 0.	(d) (s)
2	FREEZE	It freezes the current display value.	(s)
3	KEY LOCK	It disables the touch screen.	(s)
4	LOCK RELEASE	It releases the lock in all outputs / relay.	(d)
5	RESET MIN/MAX	It resets the minimum / maximum values.	(d) (s)
6	SERIAL PRINT	It allows serial data to be transmitted, see the Serial value parameter on page 72.	(d)
7	TEACH PRESEL. 1	The current display value is stored as Preselection 1 (see the Preselection 1 parameter on page 58).	(d)
8	TEACH PRESEL. 2	The current display value is stored as Preselection 2 (see the Preselection 2 parameter on page 58).	(d)
9	TEACH PRESEL. 3	The current display value is stored as Preselection 3 (see the Preselection 3 parameter on page 58).	(d)
10	TEACH PRESEL. 4	The current display value is stored as Preselection 4 (see the Preselection 4 parameter on page 58).	(d)
11	SCROLL DISPLAY	It scrolls through the available display	(d)

		screens (see the "5.2 Screen structure during operation" section on page 29).	
12	CLEAR LOOP TIME	It clears all latched switching conditions.	
13	START PRESELECT	N.A.	
14	ACTIVATE DATA	N.A.	
15	STORE DATA	N.A.	
16	TESTPROGRAM	N.A.	
17	SET RED COLOR	The display lights up red. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1, Event color 2, Event color 3 and Event color 4 in the "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 59 ff).	(d)
18	SET GREEN COLOR	The display lights up green. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1, Event color 2, Event color 3 and Event color 4 in the "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 59 ff).	(d)
19	SET YELLOW COLOR	The display lights up yellow. The colour can be changed by setting an event-dependent switching condition (see the parameters Event color 1, Event color 2, Event color 3 and Event color 4 in the "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 59 ff).	(d)
20	INCREMENT BATCH	It increases the batch counter (see the **Counter** operation mode, "6.6 Counter operation mode menu" section on page 53).	(d)
21	DECREMENT BATCH	It decreases the batch counter (see the **Counter** operation mode, "6.6 Counter operation mode menu" section on page 53).	(d)
22	SET BATCH / TOTAL	It resets / sets the value of the batch counter / total counter (see the **Counter** operation mode, "6.6 Counter operation mode menu" section on page 53).	(d) (s)
23	INC. BRIGHTNESS	The brightness of the display is increased.	(d) (s)

24	DEC. BRIGHTNESS	The brightness of the display is reduced.	(d) (s)
25	SET TOTAL TIME	It resets / sets the total time measurement value to the value set next to the Set value item. It is available only when the **Timer** operation mode is active (see the "6.5 Timer operation mode menu" section on page 50).	(d) (s)
26	SET COUNTER A	It resets / sets the value from port A to the value set next to the Set value item. It is available only when the **Counter** operation mode is active (see the "6.6 Counter operation mode menu" section on page 53).	(d) (s)
27	SET COUNTER B	It resets / sets the value from port B to the value set next to the Set value item. It is available only when the **Counter** operation mode is active (see the "6.6 Counter operation mode menu" section on page 53).	(d) (s)
28	LOCK COUNTER A	The counter of channel A is disabled and stops counting any further pulses as long as this command is active.	(s)
29	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
3	FALLING EDGE	It activates at falling edge

Input 2 action

This parameter sets the function of the input "11 - Ctrl. In 2". For complete information please refer to the **Input 1 action** parameter on page 76.

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 78.

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 76.

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 78.

6.16 Display menu

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

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 82).

0	MEASUREM. RESULT	The reference source is the measurement result of the selected operating mode.
1	COUNTER A	The reference source is the current value of the counter of channel A. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
2	COUNTER B	The reference source is the current value of the counter of channel B. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
3	BATCH COUNTER	The reference source is the batch counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**1 = INCREMENT BATCH**" or "**2 = DECREMENT BATCH**" or "**3 = USE INPUTS ONLY**".
4	TOTAL COUNTER	The reference source is the total counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**4 = TOTAL COUNTER**".
5	TOTAL TIMER	The reference source is the total timer. It is available only when **Total time mode** in the "Timer" menu (see on page 52) is set to "**1 = YES**".

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 82).

0	MEASUREM. RESULT	The reference source is the measurement result of the selected operating mode.
1	COUNTER A	The reference source is the current value of the counter of channel A. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A–B**", see on page 53.
2	COUNTER B	The reference source is the current value of the

		counter of channel B. It is available only when **Count mode** is set to "**1 = A+B**" or "**2 = A-B**", see on page 53.
3	BATCH COUNTER	The reference source is the batch counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**1 = INCREMENT BATCH**" or "**2 = DECREMENT BATCH**" or "**3 = USE INPUTS ONLY**".
4	TOTAL COUNTER	The reference source is the total counter. It is available only when **Batch / Total mode** in the "Counter" menu (see on page 54) is set to "**4 = TOTAL COUNTER**".
5	TOTAL TIMER	The reference source is the total timer. It is available only when **Total time mode** in the "Timer" menu (see on page 52) is set to "**1 = YES**".

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 "6.9 Preselection 1 menu" ... "6.12 Preselection 4 menu" on page 59 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

Start display

This parameter sets the visualization mode of the display after the device is switched on.

0	STANDARD	The display shows engineering units and status bar. See also on page 29.
1	DOUBLE	The display shows two lines without engineering units. It is only available if **Total time mode** or **Batch / Total mode** are active; or **Count mode** is set to "**1 = A+B**" or "**2 = A–B**". See also on page 29.

2	DOUBLE WITH UNITS	The display shows two lines with additional engineering units. It is only available if **Total time mode** or **Batch / Total mode** are active; or **Count mode** is set to "**1 = A+B**" or "**2 = A−B**". See also on page 29.
3	LARGE	The display starts in the "large display" visualization mode. The **Large display** option must be active, see the next item. See also on page 29.
4	COMMAND	The display shows the command keys. It is available only when the **Timer** or **Counter** operation modes are active (see the "6.5 Timer operation mode menu" section on page 50 and the "6.6 Counter operation mode menu" section on page 53 respectively). See also on page 29.
5	QUICKSTART	The display starts in "quick start" visualization mode and allows to enter the preselection values. It is only available for devices with order codes AVI, DO and RO. See also on page 29.
6	MINIMUM/ MAXIMUM	The display shows maximum and minimum values. See also on page 29.

Large display

This parameter is used to activate and set the "large display" visualization mode. Using the divider ratio, the large display value can also be adjusted. It only applies to all 99999999 number formats!

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

6.17 Linearization menu

The linearisation function is configured in this menu. The linearisation points are available only when the **Speed**, **Process Time** or **Counter** operation modes are enabled (see on pages 43, 47 and 53 respectively). Furthermore this menu is displayed only if the **Linearization mode** parameter in the **General** menu (see on page 41) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT"; if 0 – OFF option is set the **Linearization** menu does not appear.

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

P1(X)

...

P24(X)

X-coordinate of the linearisation point.
This value represents the display value the unit shows on the display without linearisation.

–99999999	Smallest X-coordinate
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

6.17.1 Description of the linearisation function

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

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

If you need to set an individual linearisation curve, the **Linearization mode** parameter in the **General** menu (see on page 41) 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 <u>instead</u> 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.
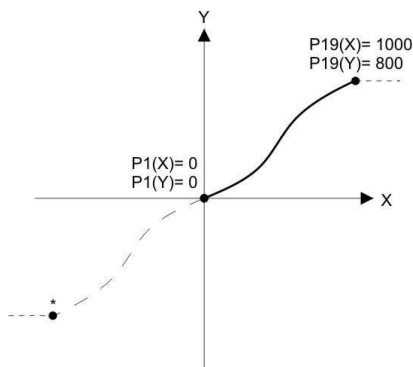
Example: Linearization Mode: 1 Quadrant
* Linearization is point symmetric to 1. Quadrant
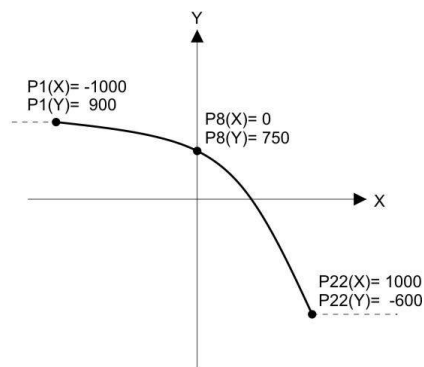
Example: Linearization Mode: 4 Quadrant

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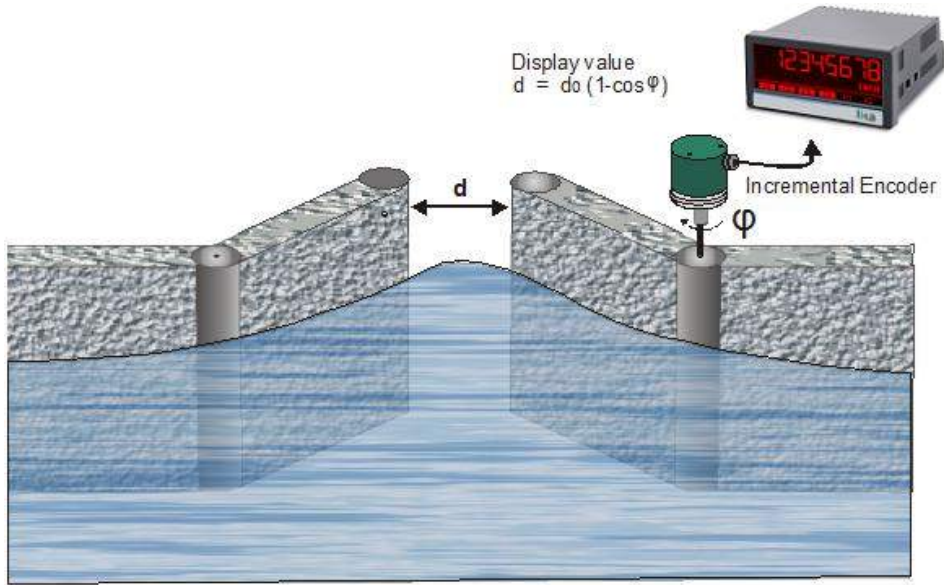
In this case we need to convert a non-linear input signal (incremental encoder signals **φ**) into a linear representation (opening of the gate "d"). In the x-axis we must set the actual values detected by the encoder while in the y-axis we will set the opening values of the gate.
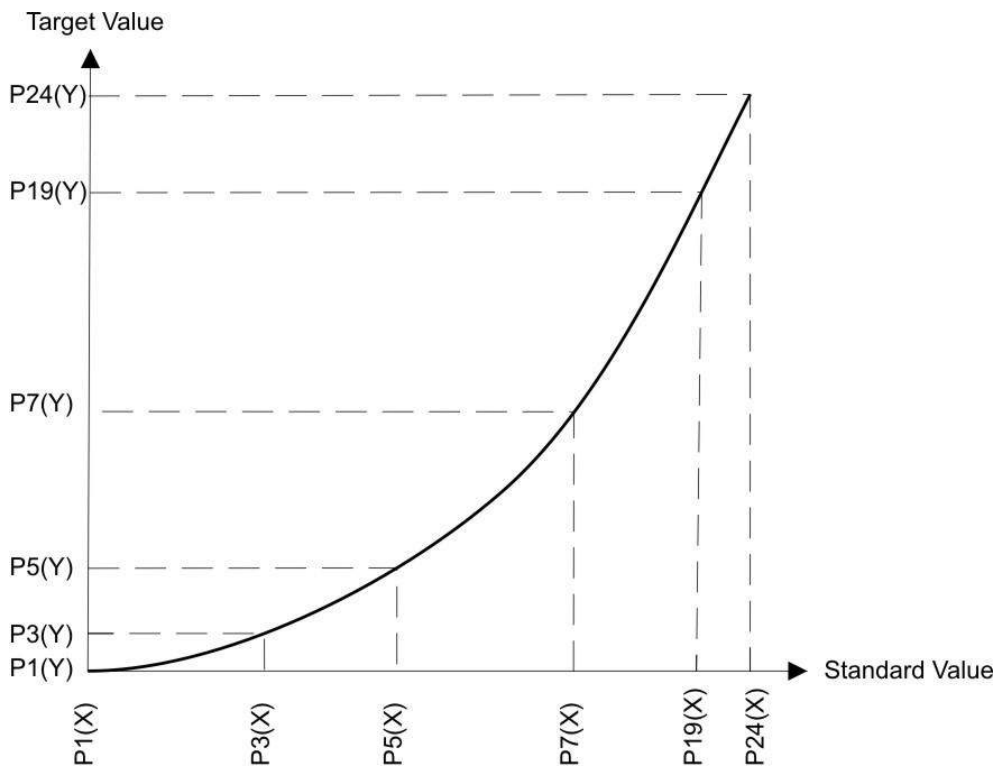
7 – Appendix

7.1 Data readout via serial interface

All codes shown in the **Serial value** parameter (see the "6.13 Serial menu" section on page 70) are available for serial readout by a PC or a PLC. For communication the monitors use the Drivecom Protocol according to ISO 1745. All protocol details can be found in the user's guide "MAN Serial Protocol IFxx_LD25x_LD30x I_E.pdf". It is available for download from our web page www.lika.biz.

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

EOT	AD1	AD2	C1	C2	ENQ

EOT = control character CTRL D (Hex 04)
AD1 = unit address, High Byte
AD2 = unit address, Low Byte
C1 = register code, High Byte
C2 = register code, Low Byte
ENQ = control character CTRL E (Hex 05)

EXAMPLE
The following example shows the request string for readout of the serial code = 1 from a unit having address "11":

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

Following a correct request, the unit will respond:

STX	C1	C2	xxxxx	ETX	BCC

STX = control character CTRL B (Hex 02)
C1 = register code, High Byte
C2 = register code, Low Byte
xxxxx = readout data
ETX = control character CTRL C (Hex 03)
BCC = block check character

8 – Modbus RTU Interface

LD350 / LD355 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 "6.13 Serial menu" section (see on page 70) 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 72.

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			
1	7-EVEN-2			
2	7-ODD-1			
3	7-ODD-2	Not to be used for Modbus communication		
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 92):
Holding Register low = (parameter #) x 2
Holding Register high = (parameter #) x 2 + 1

EXAMPLE

Access the parameter # 58 Preselection 1 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
1	55	Freeze Display	Freeze current display value
2	56	Touch Disable	Disable touch screen

3	57	Clear Lock	Loosen locking of all outputs / relay
4	58	Clear Min/Max	Reset of the min. / max. values
5	59	Serial Print	Sending of serial data (do not use with Modbus)
6	60	Teach Preset 1	Current display value is stored as **Preselection 1**
7	61	Teach Preset 2	Current display value is stored as **Preselection 2**
8	62	Teach Preset 3	Current display value is stored as **Preselection 3**
9	63	Teach Preset 4	Current display value is stored as **Preselection 4**
10	64	Scroll Display	Display switching (see display in operation mode, see on page 29)
11	65	Clear Loop Time	Release all latched switching conditions
12	66	Start Preselection	The preselection starts
13	67	Activate Data	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	0	0	4	0
Encoder properties LD350 Encoder properties LD355	1	1	0	3	0
Encoder supply	2	2	0	1	0
Counting direction	3	3	0	1	0
Scale units	4	4	0	29	0
Scale units (batch)	5	5	0	28	16
Linearization mode	6	6	0	2	0
Pin preselection	7	7	0000	9999	0000
Pin parameter	8	8	0000	9999	0000
Back up memoryY	9	9	0	1	1
Factory settings	10	10	0	1	0
-	11	11	0	0	0

9.2 Speed operation mode menu

See the "6.3 Speed operation mode menu" section on page 43

Parameter	#	Serial code	Min. value	Max. value	Default value
Display value	12	12	00000001	99999999	1000
Base frequency (Hz)	13	13	000001	500000	100
Decimal point	14	14	0	7	1
Sampling time (s)	15	15	0.005	9.999	0.100
Wait time (s)	16	16	0.01	80.00	01.00
Standstill time (s)	17	17	00.00	99.99	00.00
Average filter	18	18	0	8	0
For/Rev detection	19	19	0	1	0
-	20	20	0	0	0
-	21	21	0	0	0

9.3 Process Time operation mode menu

See the "6.4 Process Time operation mode menu" section on page 47

Parameter	#	Serial code	Min. value	Max. value	Default value
Display format	22	22	0	4	0
Display value	23	23	00000001	99999999	1000
Base frequency (Hz)	24	24	000001	500000	100
Sampling time (s)	25	25	0.005	9.999	0.100
Wait time (s)	26	26	00.01	80.00	01.00
Standstill time (s)	27	27	00.00	99.99	00.00
Average filter	28	28	0	8	0
-	29	29	0	0	0
-	30	30	0	0	0

9.4 Timer operation mode menu

See the "6.5 Timer operation mode menu" section on page 50

Parameter	#	Serial code	Min. value	Max. value	Default value
Time base	31	31	0	9	0
Start / Stop	32	32	0	3	2
Auto set / reset	33	33	0	1	0
Latch function	34	34	0	1	0
Set value	35	35	00000000	99999999	0
Inc / Dec mode	36	36	0	1	0
Total time mode	37	37	0	1	0
Total time set value	38	38	00000000	99999999	0
-	39	39	0	0	0

9.5 Counter operation mode menu

See the "6.6 Counter operation mode menu" section on page 53

Parameter	#	Serial code	Min. value	Max. value	Default value
Count mode	40	40	0	5	3
Factor	41	41	00.00001	99.99999	1.00000
Set value	42	42	-99999999	99999999	0
Decimal point	43	43	0	7	0
Batch / Total mode	44	44	0	4	0
Batch / total set value	45	45	00000000	99999999	0
Round–loop value	46	46	00000000	99999999	0
-	47	47	0	0	0
-	48	48	0	0	0

9.6 Velocity operation mode menu

See the "6.7 Velocity operation mode menu" section on page 56

Parameter	#	Serial code	Min. value	Max. value	Default value
Start / Stop	49	A0	0	3	0
Display value	50	A1	00001	99999	1000
Base time (s)	51	A2	000.001	999.999	1.000
Decimal point	52	A3	0	7	0
Wait time (s)	53	A4	00.00	99.99	0
Standstill time (s)	54	A5	00.00	99.99	0
-	55	A6	0	0	0
-	56	A7	0	0	0
-	57	A8	0	0	0

9.7 Preselection values menu

See the "6.8 Preselection values menu" section on page 58

Parameter	#	Serial code	Min. value	Max. value	Default value
Preselection 1	58	A9	–99999999	+99999999	+1000
Preselection 2	59	B0	–99999999	+99999999	+2000
Preselection 3	60	B1	–99999999	+99999999	+3000
Preselection 4	61	B2	–99999999	+99999999	+4000

9.8 Preselection 1 menu

See the "6.9 Preselection 1 menu" section on page 59

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 1	62	B3	0	5	0
Mode 1	63	B4	0	11	0
Hysteresis 1	64	B5	00000	99999	0
Pulse time 1 (s)	65	B6	00.000	60.000	0
Output target 1	66	B7	0	6	1
Output polarity 1	67	B8	0	1	0
Output lock 1	68	B9	0	1	0
Start up delay 1 (s)	69	C0	00.000	60.000	0
Event color 1	70	C1	0	3	0
-	71	C2	0	0	0

9.9 Preselection 2 menu

See the "6.10 Preselection 2 menu" section on page 64

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 2	72	C3	0	5	0
Mode 2	73	C4	0	11	0
Hysteresis 2	74	C5	00000	99999	0
Pulse time 2 (s)	75	C6	00.000	60.000	0
Output target 2	76	C7	0	6	2
Output polarity 2	77	C8	0	1	0
Output lock 2	78	C9	0	1	0
Start up delay 2 (s)	79	D0	00.000	60.000	0
Event color 2	80	D1	0	3	0
-	81	D2	0	0	0

9.10 Preselection 3 menu

See the "6.11 Preselection 3 menu" section on page 66

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 3	82	D3	0	5	0
Mode 3	83	D4	0	11	0
Hysteresis 3	84	D5	00000	99999	0
Pulse time 3 (s)	85	D6	00.000	60.000	0
Output target 3	86	D7	0	6	3
Output polarity 3	87	D8	0	1	0
Output lock 3	88	D9	0	1	0
Start up delay 3 (s)	89	E0	0	1	0
Event color 3	90	E1	0	3	0
-	91	E2	0	0	0

9.11 Preselection 4 menu

See the "6.12 Preselection 4 menu" section on page 68

Parameter	#	Serial code	Min. value	Max. value	Default value
Source 4	92	E3	0	5	0
Mode 4	93	E4	0	11	0
Hysteresis 4	94	E5	00000	99999	0
Pulse time 4 (s)	95	E6	00.000	60.000	0
Output target 4	96	E7	0	6	4
Output polarity 4	97	E8	0	1	0
Output lock 4	98	E9	0	1	0
Start up delay 4 (s)	99	F0	0	1	0
Event color 4	100	F1	0	3	0
-	101	F2	0	0	0

9.12 Serial menu

See the "6.13 Serial menu" section on page 70

Parameter	#	Serial code	Min. value	Max. value	Default value
Unit number	102	90	11	99	11
Serial baud rate	103	91	0	2	0
Serial format	104	92	0	9	0
Serial init	105	9~	0	1	0
Serial protocol	106	F3	0	1	0
Serial timer (s)	107	F4	00.000	60.000	0
Serial value	108	F5	0	9	0
MODBUS	109	F6	0	247	0
-	110	F7	0	0	0
-	111	F8	0	0	0

9.13 Analog menu

See the "6.14 Analog menu" section on page 73

Parameter	#	Serial code	Min. value	Max. value	Default value
Analog source	112	F9	0	5	0
Analog format	113	G0	0	2	0
Analog start	114	G1	−99999999	+99999999	0
Analog end	115	G2	−99999999	+99999999	10000
Analog gain (%)	116	G3	000	110	100
Analog offset	117	G4	−99.99	+99.99	0
-	118	G5	0	0	0

9.14 Command menu

See the "6.15 Command menu" section on page 76

Parameter	#	Serial code	Min. value	Max. value	Default value
Input 1 action	119	G6	0	29	0
Input 1 config.	120	G7	0	3	2
Input 2 action	121	G8	0	29	0
Input 2 config.	122	G9	0	3	2
Input 3 action	123	H0	0	29	0
Input 3 config.	124	H1	0	3	2
-	125	H2	0	0	0
-	126	H3	0	0	0
-	127	H4	0	0	0
-	128	H5	0	0	0
-	129	H6	0	0	0

9.15 Display menu

See the "6.16 Display menu" section on page 80

Parameter	#	Serial code	Min. value	Max. value	Default value
Source dual top	130	H7	0	5	1
Source dual down	131	H8	0	5	2
Color	132	H9	0	2	0
Brightness (%)	133	I0	010	100	090
Contrast	134	I1	0	2	1
Screen saver (s)	135	I2	00.00	99.99	0
Up-date time (s)	136	I3	0.005	9.999	0.100
Font	137	I4	0	1	0
Start display	138	I5	0	6	0
Large display	139	I6	0	5	0

9.16 Linearization menu

See the "6.17 Linearization menu" section on page 84

Parameter	#	Serial code	Min. value	Max. value	Default value
P1(X)	140	I7	-99999999	+99999999	0
P1(Y)	141	I8	-99999999	+99999999	0
P2(X)	142	I9	-99999999	+99999999	0
P2(Y)	143	J0	-99999999	+99999999	0

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Parameter	#	Serial code	Min. value	Max. value	Default value
P3(X)	144	J1	-99999999	+99999999	0
P3(Y)	145	J2	-99999999	+99999999	0
P4(X)	146	J3	-99999999	+99999999	0
P4(Y)	147	J4	-99999999	+99999999	0
P5(X)	148	J5	-99999999	+99999999	0
P5(Y)	149	J6	-99999999	+99999999	0
P6(X)	150	J7	-99999999	+99999999	0
P6(Y)	151	J8	-99999999	+99999999	0
P7(X)	152	J9	-99999999	+99999999	0
P7(Y)	153	K0	-99999999	+99999999	0
P8(X)	154	K1	-99999999	+99999999	0
P8(Y)	155	K2	-99999999	+99999999	0
P9(X)	156	K3	-99999999	+99999999	0
P9(Y)	157	K4	-99999999	+99999999	0
P10(X)	158	K5	-99999999	+99999999	0
P10(Y)	159	K6	-99999999	+99999999	0
P11(X)	160	K7	-99999999	+99999999	0
P11(Y)	161	K8	-99999999	+99999999	0
P12(X)	162	K9	-99999999	+99999999	0
P12(Y)	163	L0	-99999999	+99999999	0
P13(X)	164	L1	-99999999	+99999999	0
P13(Y)	165	L2	-99999999	+99999999	0
P14(X)	166	L3	-99999999	+99999999	0
P14(Y)	167	L4	-99999999	+99999999	0
P15(X)	168	L5	-99999999	+99999999	0
P15(Y)	169	L6	-99999999	+99999999	0
P16(X)	170	L7	-99999999	+99999999	0
P16(Y)	171	L8	-99999999	+99999999	0
P17(X)	172	L9	-99999999	+99999999	0
P17(Y)	173	M0	-99999999	+99999999	0
P18(X)	174	M1	-99999999	+99999999	0
P18(Y)	175	M2	-99999999	+99999999	0
P19(X)	176	M3	-99999999	+99999999	0
P19(Y)	177	M4	-99999999	+99999999	0
P20(X)	178	M5	-99999999	+99999999	0
P20(Y)	179	M6	-99999999	+99999999	0
P21(X)	180	M7	-99999999	+99999999	0
P21(Y)	181	M8	-99999999	+99999999	0

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Parameter	#	Serial code	Min. value	Max. value	Default value
P22(X)	182	M9	-99999999	+99999999	0
P22(Y)	183	N0	-99999999	+99999999	0
P23(X)	184	N1	-99999999	+99999999	0
P23(Y)	185	N2	-99999999	+99999999	0
P24(X)	186	N3	-99999999	+99999999	0
P24(Y)	187	N4	-99999999	+99999999	0

9.17 Serial codes of commands

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

Document release	Release date	Description
1.0	27.09.2018	First issue
1.1	29.03.2019	RS-485 information added
1.2	07.05.2019	**Mode 1** and **Start up delay 1 (s)** items updated in all Preselection menus
1.3	23.09.2020	Firmware updated, new parameters added, Modbus interface, general review
1.4	04.05.2021	Information about **Display value** and **Base frequency (Hz)** parameters updated, **Speed** menu
1.5	02.09.2021	New example added to the **Speed** menu

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