

## LD220



- Touch-screen indicator for SSI encoders
- For 10 to 32 bit singleturn and multiturn encoders with SSI interface
- Operation as Master or Slave
- Digital, analogue, serial and relay outputs
- DC / AC power supply: 18÷30Vdc or 115÷230Vac

### Suitable for the following models:

- LD220-P8-...
- LD220-PM-...

### General Contents

Preliminary information	10
1 - Safety summary	12
2 - Identification	14
3 - Mounting instructions	15
4 - Electrical connections	17
5 - Display and touch screen	26
6 - Menus and parameters	29
7 - Appendix	65
8 - Parameters / serial codes	74

This publication was produced by Lika Electronic s.r.l. 2019. All rights reserved. Tutti i diritti riservati. Alle Rechte vorbehalten. Todos los derechos reservados. Tous droits réservés.

This document and information contained herein are the property of Lika Electronic s.r.l. and shall not be reproduced in whole or in part without prior written approval of Lika Electronic s.r.l. Translation, reproduction and total or partial modification (photostat copies, film and microfilm included and any other means) are forbidden without written authorisation of Lika Electronic s.r.l.

The information herein is subject to change without notice and should not be construed as a commitment by Lika Electronic s.r.l. Lika Electronic s.r.l. reserves the right to make all modifications at any moments and without forewarning.

This manual is periodically reviewed and revised. As required we suggest checking if a new or updated edition of this document is available at Lika Electronic s.r.l.'s website. Lika Electronic s.r.l. assumes no responsibility for any errors or omissions in this document. Critical evaluation of this manual by the user is welcomed. Your comments assist us in preparation of future documentation, in order to make it as clear and complete as possible. Please send an e-mail to the following address [info@lika.it](mailto:info@lika.it) for submitting your comments, suggestions and criticisms.

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

# General contents

General contents.....	3
Subject index.....	7
Typographic and iconographic conventions.....	9
Preliminary information.....	10
Operational modes.....	10
Functional diagram.....	11
<b>1 – Safety summary.....</b>	<b>12</b>
1.1 Safety.....	12
1.2 Electrical safety.....	12
1.3 Mechanical safety.....	12
<b>2 – Identification.....</b>	<b>14</b>
<b>3 – Mounting instructions.....</b>	<b>15</b>
3.1 Overall dimensions.....	15
3.2 Installation.....	16
3.3 Cleaning, maintenance and service notes.....	16
<b>4 – Electrical connections.....</b>	<b>17</b>
4.1 DC power supply.....	17
4.2 AC power supply (-PM- order code).....	18
4.3 Auxiliary voltage output.....	18
4.4 SSI inputs.....	19
4.4.1 Wiring of Master operational mode.....	19
4.4.2 Wiring of Slave operational mode.....	20
4.5 Control inputs.....	21
4.5.1 Wiring of the control inputs.....	21
4.5.2 Note about mechanical switching contacts.....	21
4.6 Analogue output (-AVI- order code).....	22
4.7 Serial interface (-AVI- and -DO- order codes).....	23
4.8 Control outputs (-AVI- and -DO- order codes).....	24
4.8.1 Wiring of the control outputs.....	24
4.9 Relay outputs (-RO order code).....	25
4.9.1 Wiring of the relay outputs.....	25
<b>5 – Display and touch screen.....</b>	<b>26</b>
5.1 Screen structure for parametrization.....	26
5.2 Screen structure during operation.....	27
5.2.1 Operational screens.....	27
5.2.2 Error messages.....	28
<b>6 – Menus and parameters.....</b>	<b>29</b>
6.1 Overview of the structure.....	29
6.2 General menu.....	33
Display format.....	33
Factor.....	33
Divider.....	33
Additive value.....	34
Decimal point.....	34
Scale units.....	34
Linearization mode.....	36

Pin preselection.....	36
Pin parameter.....	36
Factory settings.....	36
6.3 SSI properties menu.....	37
Mode.....	37
Encoder resolution.....	37
Bit per revolution.....	37
Data format.....	37
Baud rate.....	38
High bit.....	38
Low bit.....	38
SSI offset.....	39
Direction.....	39
Round loop value.....	39
Sampling time (s).....	39
Error bit.....	40
Error polarity.....	40
Encoder supply.....	40
6.4 Preselection values menu.....	41
Preselection 1.....	41
Preselection 2.....	41
Preselection 3.....	41
Preselection 4.....	41
6.5 Preselection 1 menu.....	42
Mode 1.....	42
Hysteresis 1.....	43
Pulse time 1 (s).....	43
Output target 1.....	44
Output polarity 1.....	44
Output lock 1.....	44
Start up delay 1 (s).....	45
Event color 1.....	45
6.6 Preselection 2 menu.....	46
Mode 2.....	46
Hysteresis 2.....	46
Pulse time 2 (s).....	46
Output target 2.....	46
Output polarity 2.....	46
Output lock 2.....	46
Start up delay 2 (s).....	47
Event color 2.....	47
6.7 Preselection 3 menu.....	48
Mode 3.....	48
Hysteresis 3.....	48
Pulse time 3 (s).....	48
Output target 3.....	48
Output polarity 3.....	48
Output lock 3.....	48
Start up delay 3 (s).....	49

Event color 3.....	49
6.8 Preselection 4 menu.....	50
Mode 4.....	50
Hysteresis 4.....	50
Pulse time 4 (s).....	50
Output target 4.....	50
Output polarity 4.....	50
Output lock 4.....	50
Start up delay 4 (s).....	51
Event color 4.....	51
6.9 Serial menu.....	52
Unit number.....	52
Serial baud rate.....	52
Serial format.....	52
Serial init.....	53
Serial protocol.....	53
Serial timer (s).....	54
Serial value.....	54
6.10 Analog menu.....	55
Analog format.....	55
Analog start.....	55
Analog end.....	55
Analog gain (%).....	56
Analog offset.....	56
6.11 Command menu.....	57
Input 1 action.....	57
Input 1 config.....	58
Input 2 action.....	58
Input 2 config.....	59
Input 3 action.....	59
Input 3 config.....	59
6.12 Display menu.....	60
Color.....	60
Brightness (%).....	60
Contrast.....	60
Screen saver (s).....	60
Up-date-time (s).....	61
Font.....	61
Skip commands.....	61
6.13 Linearization menu.....	62
P1(X).....	62
P24(X).....	62
P1(Y).....	62
P24(Y).....	62
6.13.1 Description of the linearisation function.....	62
<b>7 - Appendix.....</b>	<b>65</b>
7.1 Data readout via serial interface.....	65
7.2 Reading the SSI data.....	66
7.3 Internal processing and calculation of SSI data.....	67

7.3.1 Checking the error bit.....	67
7.3.2 Data conversion.....	68
7.3.3 Data splitting.....	69
7.3.4 Checking the direction of rotation.....	70
7.3.5 Evaluation of the bit blanking.....	71
7.3.6 Considering the SSI offset.....	72
7.3.7 Calculation of the display value.....	73
<b>8 - Parameters / serial codes.....</b>	<b>74</b>
8.1 General menu.....	74
8.2 SSI properties menu.....	74
8.3 Preselection values menu.....	75
8.4 Preselection 1 menu.....	75
8.5 Preselection 2 menu.....	75
8.6 Preselection 3 menu.....	76
8.7 Preselection 4 menu.....	76
8.8 Serial menu.....	77
8.9 Analog menu.....	77
8.10 Command menu.....	77
8.11 Display menu.....	78
8.12 Linearization menu.....	78
8.13 Serial codes of commands.....	80

# Subject index

## A

Additive value.....	34
Analog end.....	55
Analog format.....	55
Analog gain (%).....	56
Analog offset.....	56
Analog start.....	55

## B

Baud rate.....	38
Bit per revolution.....	37
Brightness (%).....	60

## C

Color.....	60
Contrast.....	60

## D

Data format.....	37
Decimal point.....	34
Direction.....	39
Display format.....	33
Divider.....	33

## E

Encoder resolution.....	37
Encoder supply.....	40
Error bit.....	40
Error polarity.....	40
Event color 1.....	45
Event color 2.....	47
Event color 3.....	49
Event color 4.....	51

## F

Factor.....	33
Factory settings.....	36
Font.....	61

## H

High bit.....	38
Hysteresis 1.....	43
Hysteresis 2.....	46
Hysteresis 3.....	48
Hysteresis 4.....	50

## I

Input 1 action.....	57
Input 1 config.....	58
Input 2 action.....	58
Input 2 config.....	59
Input 3 action.....	59
Input 3 config.....	59

## L

Linearization mode.....	36
Low bit.....	38

## M

Mode.....	37
Mode 1.....	42
Mode 2.....	46
Mode 3.....	48
Mode 4.....	50

## O

Output lock 1.....	44
Output lock 2.....	46
Output lock 3.....	48
Output lock 4.....	50
Output polarity 1.....	44
Output polarity 2.....	46
Output polarity 3.....	48
Output polarity 4.....	50
Output target 1.....	44
Output target 2.....	46
Output target 3.....	48
Output target 4.....	50

## P

P1(X).....	62
P1(Y).....	62
P24(X).....	62
P24(Y).....	62
Pin parameter.....	36
Pin preselection.....	36
Preselection 1.....	41
Preselection 2.....	41
Preselection 3.....	41
Preselection 4.....	41
Pulse time 1 (s).....	43
Pulse time 2 (s).....	46
Pulse time 3 (s).....	48
Pulse time 4 (s).....	50

## R

Round loop value.....	39
-----------------------	----

## S

Sampling time (s).....	39
Scale units.....	34
Screen saver (s).....	60
Serial baud rate.....	52
Serial format.....	52
Serial init.....	53

Serial protocol.....53

Serial timer (s).....54

Serial value.....54

Skip commands.....61

SSI offset.....39

Start up delay 1 (s).....45

Start up delay 2 (s).....47

Start up delay 3 (s).....49

Start up delay 4 (s).....51

**U**

Unit number.....52




Up-date-time (s).....61

# 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 **LD220 touch-screen indicator** series.

LD220 touch-screen indicators are designed to interface SSI encoders.

It accepts signals from single- and multiturn encoders with SSI interface, resolution in the range 10 to 32 bits and clock frequency up to 1 MHz. Operation can be as either Master or Slave. The features include scaling, bit blanking, linearization over 24 interpolation points, choice of the engineering unit, sampling time setting, three HTL PNP control inputs (for example for resetting the display value), etc.

It features 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.

In the series the following models are available:

- **LD220-P8** touch-screen indicator standard version;
- **LD220-PM** provides additional 115-230Vac power supply;
- **LD220-...-AVI** provides additional 16-bit analogue output, four control outputs and RS-232/RS-485 serial interface;
- **LD220-...-DO** further offers four control outputs and RS-232/RS-485 serial interface;
- **LD220-...-RO** is equipped with two relay outputs.

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

For technical specifications please refer to the product datasheet.

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

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

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

## Operational modes

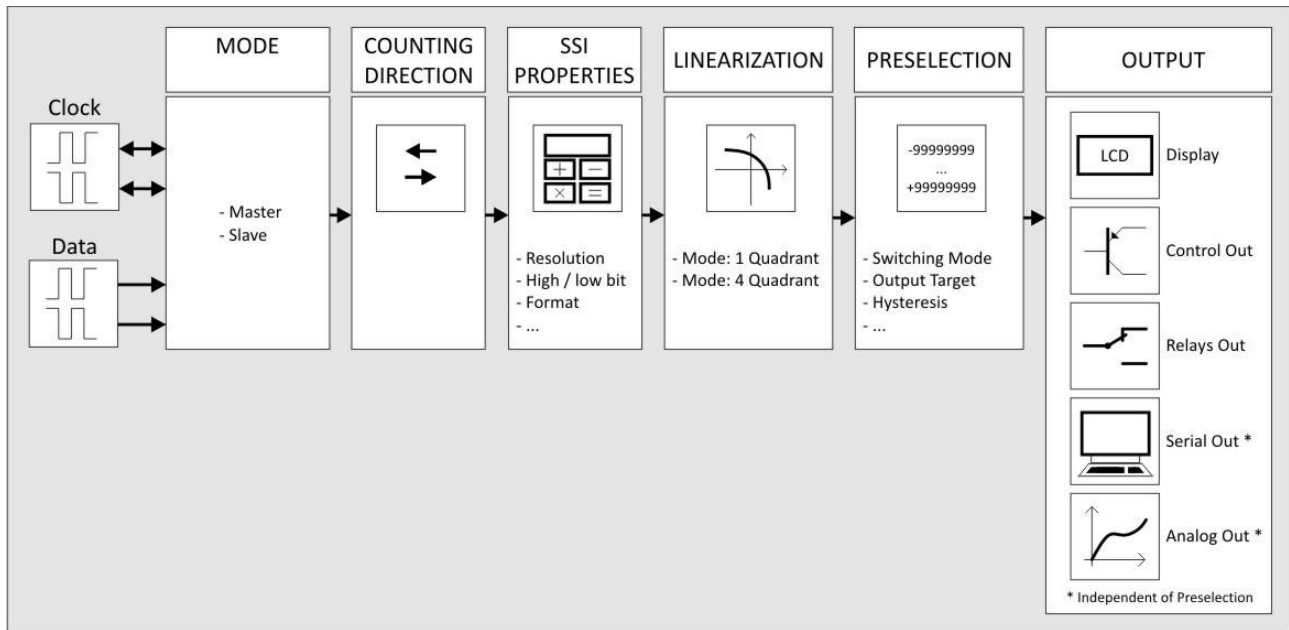
All functions can be configured in the parameter menu.

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

- MASTER, see the **Mode** parameter in the "6.3 SSI properties menu" section on page 37.
  - The unit provides the clock signal for the connected device.
  - Both clock terminal blocks "5 - CLK" and "6 - /CLK" are configured as outputs.

- SLAVE, see the **Mode** parameter in the "6.3 SSI properties menu" section on page 37.
  - An external device (i.e. the SSI Master) must provide the clock signal for the connected encoder / sensor.
  - Both clock terminal blocks "5 – CLK" and "6 – /CLK" are configured as inputs.

## Functional diagram



## 1 – Safety summary



### 1.1 Safety

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



### 1.2 Electrical safety

- Turn OFF power supply before connecting the device;
- connect following to explanation in the "4 – Electrical connections" section on page 17;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, following precautions must be taken:
  - before handling and installing the equipment, discharge electrical charge from your body and tools which may come in touch with the device;
  - power supply must be stabilized without noise; install EMC filters on device power supply if needed;
  - always use shielded cables (twisted pair cables whenever possible);
  - avoid cables runs longer than necessary;
  - avoid running the signal cable near high voltage power cables;
  - mount the device as far as possible from any capacitive or inductive noise source; shield the device from noise source if needed;
  - minimize noise by connecting the unit to ground (GND). Make sure that ground (GND) is not affected by noise. The connection point to ground can be situated both on the device side and on user's side. The best solution to minimize the interference must be carried out by the user.



### 1.3 Mechanical safety

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

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

## 2 - Identification

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



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

## 3 - Mounting instructions



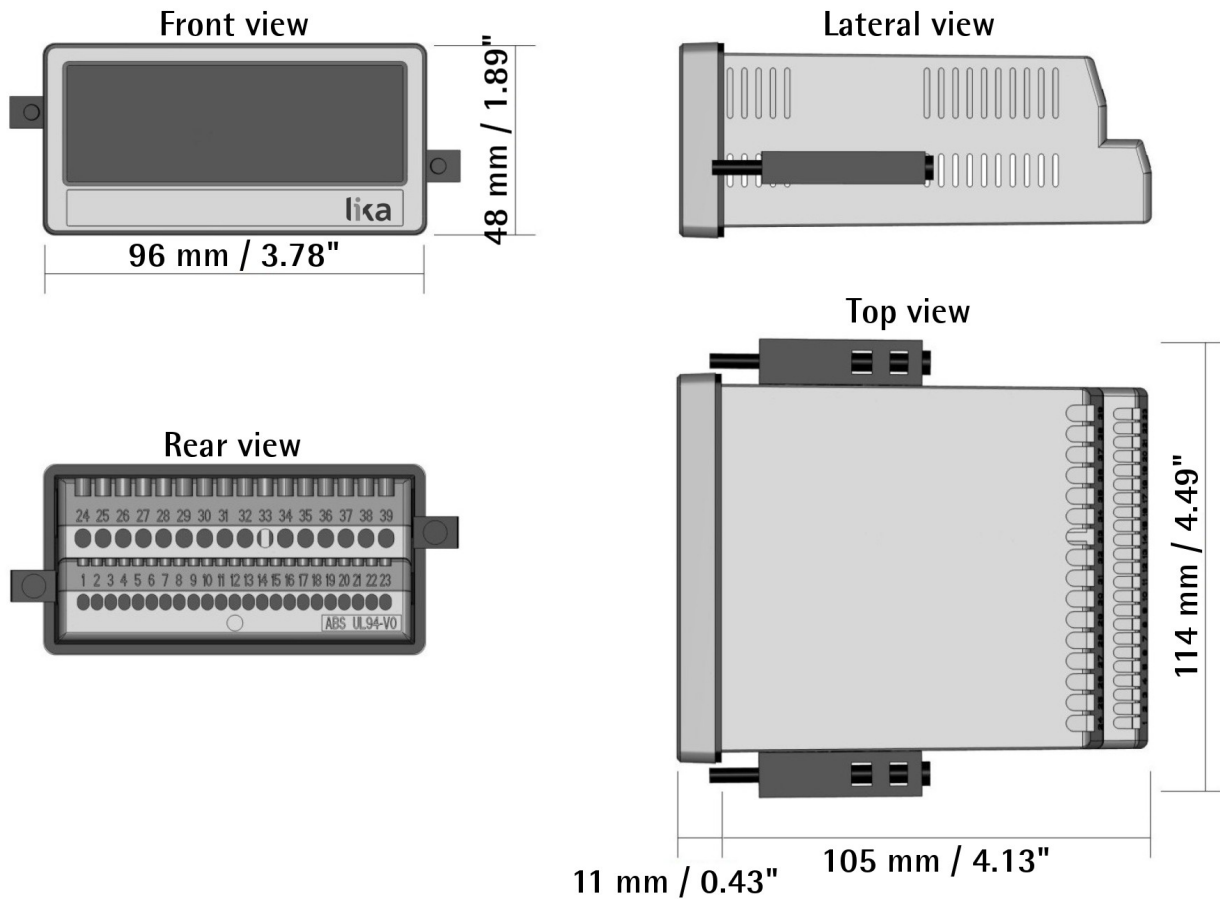
### WARNING

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

### 3.1 Overall dimensions

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

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



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

### 3.2 Installation

The device is allowed to be installed and operated only within the permissible temperature range (-20°C +60°C / -4°F +140°F). Please ensure an adequate ventilation and avoid any direct contact between the device and gases / liquids. Before installation or maintenance, the unit must be disconnected from all voltage sources. Furthermore it must be ensured that no danger can arise in the event of contact with the disconnected voltage sources.

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

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

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

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

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

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

### 3.3 Cleaning, maintenance and service notes

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

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

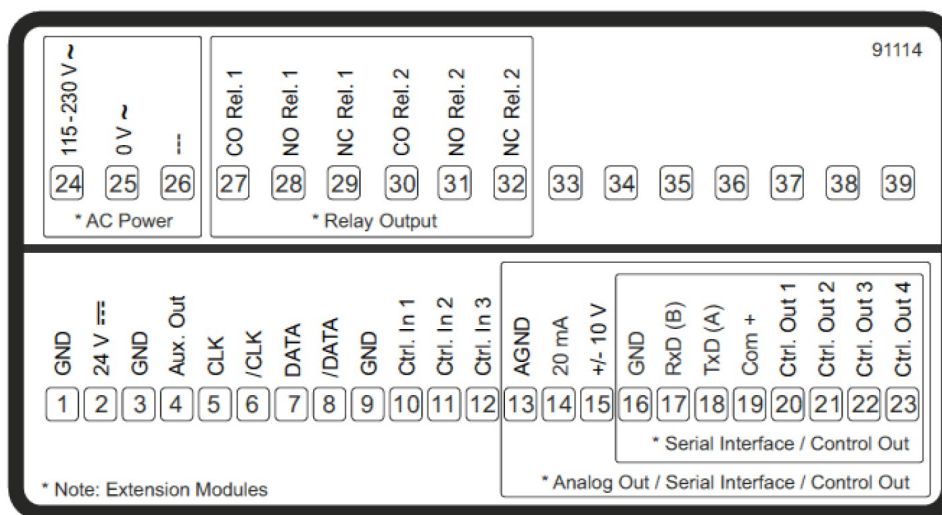
## 4 – Electrical connections



### WARNING

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

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



### 4.1 DC power supply

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

Input voltage:	18Vdc ... 30Vdc
Protection circuit:	reverse polarity protection
Power consumption:	approx. 150 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. 150 mA) and the additional current required by the Auxiliary Voltage output (3 – GND + 4 – Aux. Out, see the "4.3 Auxiliary voltage output" section on page 18).

All GND terminal blocks are internally connected.



### NOTE

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

## 4.2 AC power supply (-PM- order code)

### AC power supply technical specifications

Input voltage:	115Vac ... 230Vac (60/50Hz)
Power consumption:	approx. 5 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. 5 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

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

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

The 24Vdc output voltage depends on the power supply, see the table above.

The unit allows the auxiliary voltage output to be set to either 24 Vdc or 5 Vdc. Refer to the **Encoder supply** parameter in the "6.3 SSI properties menu" section on page 37.

## 4.4 SSI inputs

### SSI inputs technical specifications

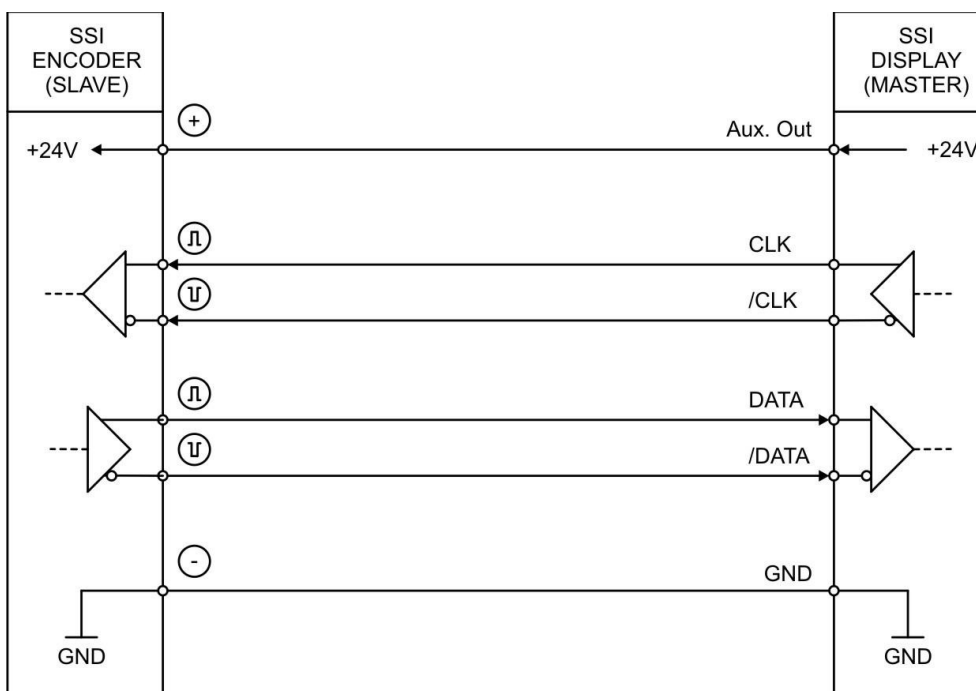
Number of inputs (channels):	1 (Clock, /Clock, Data, /Data)
Configuration:	Master or Slave
Format:	Binary or Gray code
Frequency:	max. 1 MHz
Resolution:	10 ... 32 bits
Load:	max. 2 mA / $R_i > 10 \text{ k}\Omega$ / 47 pF

The unit provides the connection for SSI signals through terminal blocks 5, 6, 7 and 8.

The characteristics of the SSI inputs can be set in the "6.3 SSI properties menu" section on page 37.

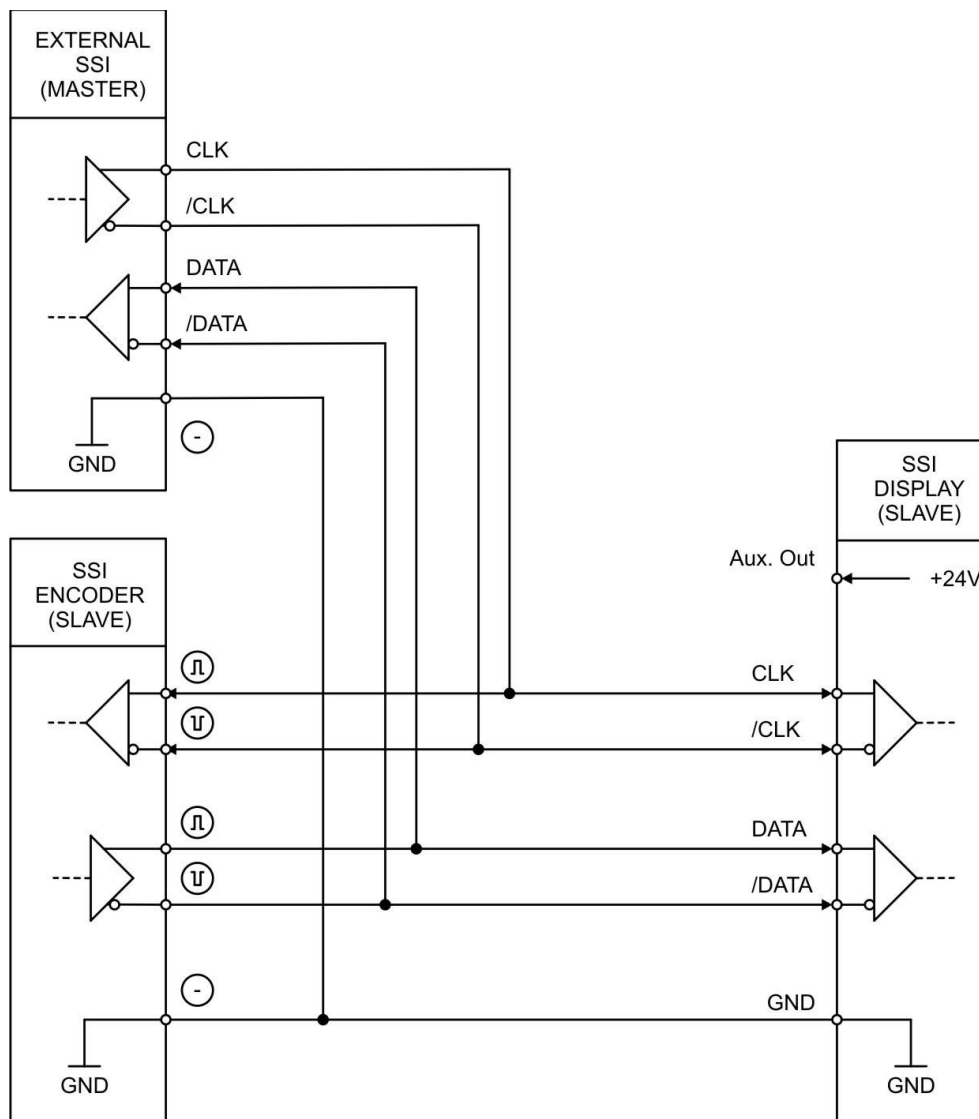
#### 4.4.1 Wiring of Master operational mode

For more information refer to the [Mode](#) parameter on page 37.



#### 4.4.2 Wiring of Slave operational mode

For more information refer to the [Mode](#) parameter on page 37.



## 4.5 Control inputs

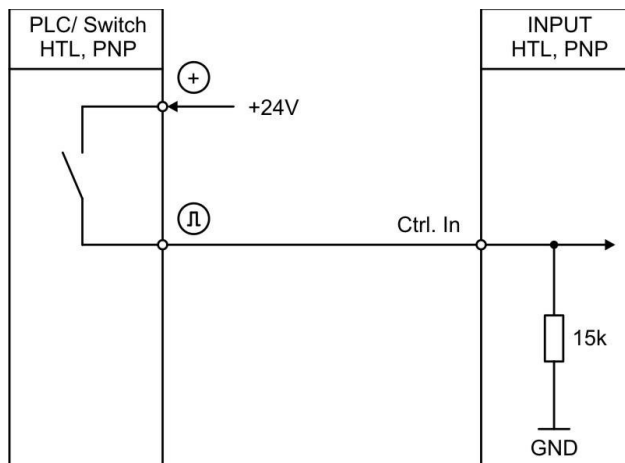
### Control inputs technical specifications

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

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

In the **Command** menu (see the "6.11 Command menu" section on page 57) 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.

### 4.5.1 Wiring of the control inputs



Unconnected control inputs are always "LOW".

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



### 4.5.2 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.

## 4.6 Analogue output (-AVI- order code)

### Analogue output technical specifications

Configuration:	Current or voltage operation
Voltage output (0):	-10 V ... +10 V (Low: 0 ... 3 V, High 9 ... 30 V)
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 "6.10 Analog menu" section on page 55.

The following configurations are available (see the **Analog format** parameter on page 55):

- 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.

## 4.7 Serial interface (-AVI- and -DO- order codes)

### Serial interface technical specifications

Format:	RS-232 (-AVI1- and -DO1-) or RS-485 (-AV2- and DO2-)
Baud rate:	9600, 19200 and 38400 baud

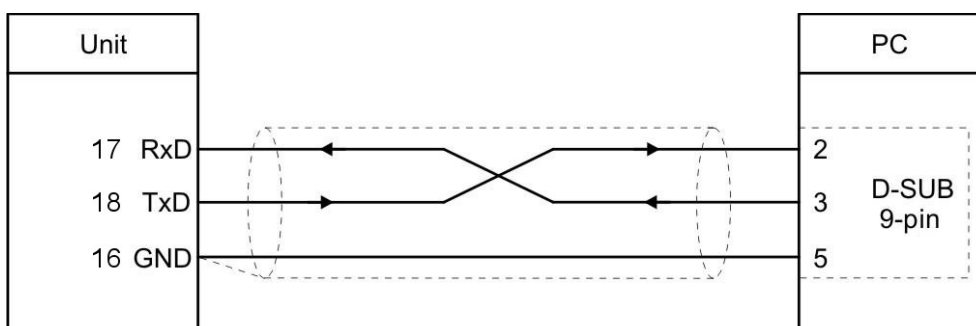
A serial interface (RS-232 or RS-485) is available through terminal blocks 16, 17 and 18.

It can be configured in the **Serial** menu, see the "6.9 Serial menu" section on page 52.

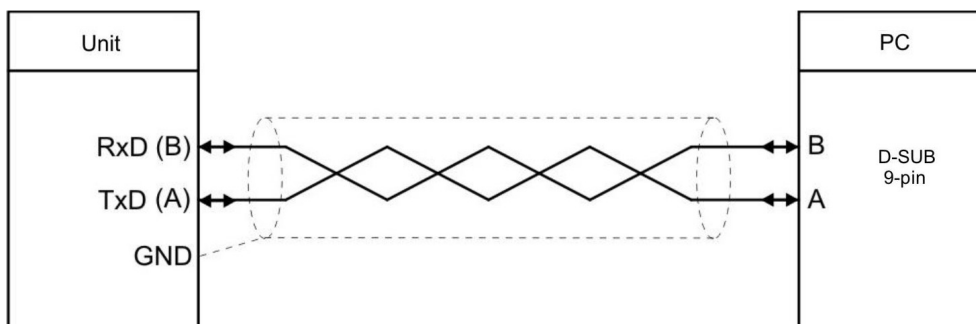
The RS-232 / RS-485 serial interface can be used:

- 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:



## 4.8 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

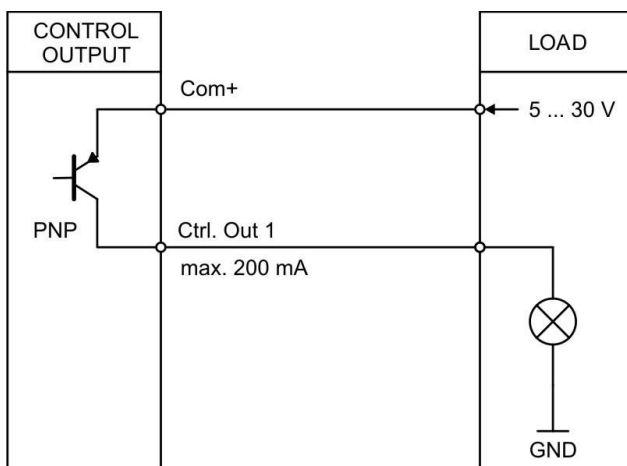
Four control outputs are available at terminal blocks 20, 21, 22 and 23 (+ terminal block 19 for switching voltage).

The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" sections on pages 42, 46, 48 and 50 respectively. The outputs "20 - Ctrl. Out 1", "21 - Ctrl. Out 2", "22 - Ctrl. Out 3" and "23 - Ctrl. Out 4" are fast PNP outputs with a switching capability of 5÷30 V / 200 mA per channel. The switching states are displayed (display with unit and status bar) as **C1** ... **C4**, see the "5 - Display and touch screen" section on page 26.

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

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

### 4.8.1 Wiring of the control outputs



## 4.9 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

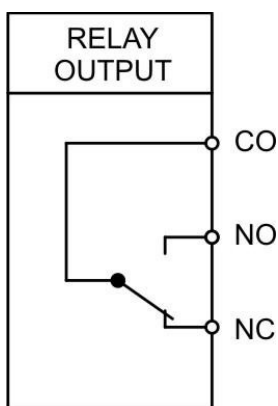
Two relay outputs with potential-free changeover contacts are available at terminal blocks 27, 28, 29, 30, 31 and 32. The switching conditions can be set in the **Preselection 1 ... Preselection 4** menus, see the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" sections on pages 42, 46, 48 and 50 respectively.

The switching states are displayed (display with unit and status bar) as **K1** and **K2**, see the "5 - Display and touch screen" section on page 26.

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

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

### 4.9.1 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 29.



#### Start setup procedure

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



#### Selection of the menu

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

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



#### Selection of the parameter

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

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



#### Parameter setting:

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

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

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

## 5.2 Screen structure during operation

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

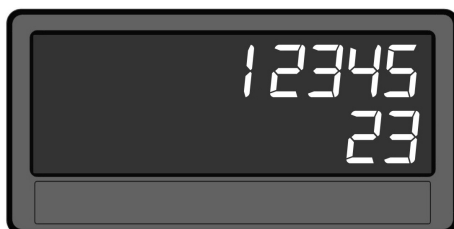
### 5.2.1 Operational screens



#### Display with unit and status bar

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

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



#### Display of single and multiturn value

Display value for diagnostic purposes -raw data, no influence on/from device functions.

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




#### Display with command keys

For function refer to the **Command** menu on page 57 and to the **Skip commands** parameter in the **Display** menu, see on page 61.

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




#### Display for quick start of the preselection values setting process (see the "6.4 Preselection values menu" section on page 41)

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

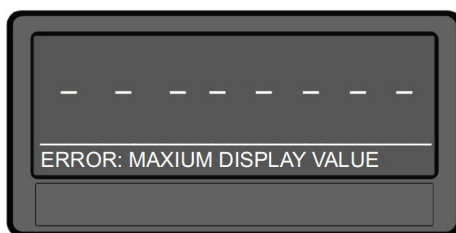
It is available only with AVI, DO and RO order codes.



Display with current, minimum and maximum values.

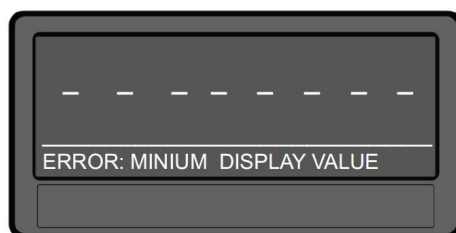
To switch to the next display, press the top half of the screen or the  key.

## 5.2.2 Error messages



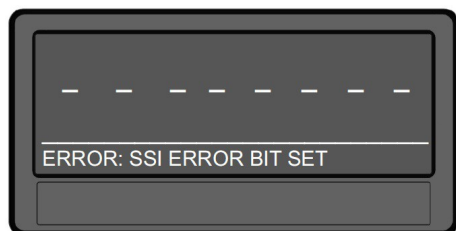
ERROR: MAXIMUM DISPLAY VALUE

The display value is greater than +99,999,999



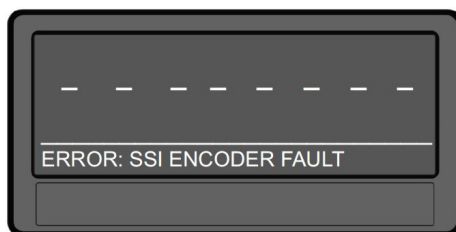
ERROR: MINIMUM DISPLAY VALUE

The display value is less than -99,999,999



ERROR: SSI ERROR BIT SET

The error bit of the SSI encoder is set



ERROR: SSI ENCODER FAULT

An error is active (if available)



### NOTE

In case of error, the result of the measurement will be 0.  
 With order code AVI, the analogue output will supply 0 V or 0 mA.  
 With order codes DO and AVI the monitoring of the limit value is performed having the reference value to "0".

## 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.

<b>General menu</b> , see the "6.2 General menu" section on page 33
<b>Display format</b> , see on page 33
<b>Factor</b> , see on page 33
<b>Divider</b> , see on page 33
<b>Additive value</b> , see on page 34
<b>Decimal point</b> , see on page 34
<b>Scale units</b> , see on page 34
<b>Linearization mode</b> , see on page 36
<b>Pin preselection</b> , see on page 36
<b>Pin parameter</b> , see on page 36
<b>Factory settings</b> , see on page 36

<b>SSI properties menu</b> , see the "6.3 SSI properties menu" section on page 37
<b>Mode</b> , see on page 37
<b>Encoder resolution</b> , see on page 37
<b>Bit per revolution</b> , see on page 37
<b>Data format</b> , see on page 37
<b>Baud rate</b> , see on page 38
<b>High bit</b> , see on page 38
<b>Low bit</b> , see on page 38
<b>SSI offset</b> , see on page 39
<b>Direction</b> , see on page 39
<b>Round loop value</b> , see on page 39
<b>Sampling time (s)</b> , see on page 39

<b>Error bit</b> , see on page 40
<b>Error polarity</b> , see on page 40
<b>Encoder supply</b> , see on page 40

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

<b>Preselection values menu</b> , see the "6.4 Preselection values menu" section on page 41
<b>Preselection 1</b> , see on page 41
<b>Preselection 2</b> , see on page 41
<b>Preselection 3</b> , see on page 41
<b>Preselection 4</b> , see on page 41

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

<b>Preselection 1 menu</b> , see the "6.5 Preselection 1 menu" section on page 42
<b>Mode 1</b> , see on page 42
<b>Hysteresis 1</b> , see on page 43
<b>Pulse time 1 (s)</b> , see on page 43
<b>Output target 1</b> , see on page 44
<b>Output polarity 1</b> , see on page 44
<b>Output lock 1</b> , see on page 44
<b>Start up delay 1 (s)</b> , see on page 45
<b>Event color 1</b> , see on page 45

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

<b>Preselection 2 menu</b> , see the "6.6 Preselection 2 menu" section on page 46
<b>Mode 2</b> , see on page 46
<b>Hysteresis 2</b> , see on page 46
<b>Pulse time 2 (s)</b> , see on page 46
<b>Output target 2</b> , see on page 46
<b>Output polarity 2</b> , see on page 46
<b>Output lock 2</b> , see on page 46
<b>Start up delay 2 (s)</b> , see on page 47
<b>Event color 2</b> , see on page 47

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

<b>Preselection 3 menu</b> , see the "6.7 Preselection 3 menu" section on page 48
<b>Mode 3</b> , see on page 48
<b>Hysteresis 3</b> , see on page 48
<b>Pulse time 3 (s)</b> , see on page 48
<b>Output target 3</b> , see on page 48
<b>Output polarity 3</b> , see on page 48
<b>Output lock 3</b> , see on page 48
<b>Start up delay 3 (s)</b> , see on page 49
<b>Event color 3</b> , see on page 49

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

<b>Preselection 4 menu</b> , see the "6.8 Preselection 4 menu" section on page 50
<b>Mode 4</b> , see on page 50
<b>Hysteresis 4</b> , see on page 50
<b>Pulse time 4 (s)</b> , see on page 50
<b>Output target 4</b> , see on page 50
<b>Output polarity 4</b> , see on page 50
<b>Output lock 4</b> , see on page 50
<b>Start up delay 4 (s)</b> , see on page 51
<b>Event color 4</b> , see on page 51

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

<b>Serial menu</b> , see the "6.9 Serial menu" section on page 52
<b>Unit number</b> , see on page 52
<b>Serial baud rate</b> , see on page 52
<b>Serial format</b> , see on page 52
<b>Serial init</b> , see on page 53
<b>Serial protocol</b> , see on page 53
<b>Serial timer (s)</b> , see on page 54
<b>Serial value</b> , see on page 54

It is only available for devices with order code AVI.

<b>Analog menu</b> , see the "6.10 Analog menu" section on page 55
<b>Analog format</b> , see on page 55
<b>Analog start</b> , see on page 55
<b>Analog end</b> , see on page 55
<b>Analog gain (%)</b> , see on page 56
<b>Analog offset</b> , see on page 56

<b>Command menu</b> , see the "6.11 Command menu" section on page 57
<b>Input 1 action</b> , see on page 57
<b>Input 1 config.</b> , see on page 58
<b>Input 2 action</b> , see on page 58
<b>Input 2 config.</b> , see on page 59
<b>Input 3 action</b> , see on page 59
<b>Input 3 config.</b> , see on page 59

<b>Display menu</b> , see the "6.12 Display menu" section on page 60
<b>Color</b> , see on page 60
<b>Brightness (%)</b> , see on page 60
<b>Contrast</b> , see on page 60
<b>Screen saver (s)</b> , see on page 60
<b>Up-date-time (s)</b> , see on page 61
<b>Font</b> , see on page 61
<b>Skip commands</b> , see on page 61

It is only available if the **Linearization mode** parameter in the **General** menu (see on page 36) is set to either "1 – 1 QUADRANT" or "2 – 4 QUADRANT".

<b>Linearization menu</b> , see the "6.13 Linearization menu" section on page 62
<b>P1(X)</b> , see on page 62
...
<b>P24(X)</b> , see on page 62
<b>P1(Y)</b> , see on page 62
...
<b>P24(Y)</b> , see on page 62

## 6.2 General menu

The default values are highlighted with grey background.

### Display format

This parameter sets the display format. The decimal point will be set automatically according to 999999:59 or 9999:59:59. The display value depends on the scale (see the parameters **Factor**, **Divider** and **Additive value**). For more information please refer to the "7.3.7 Calculation of the display value" section on page 73.

<b>0</b>	<b>99999999</b>	Without format customization
<b>1</b>	<b>999999:59</b>	Value displayed in "degrees : minutes of arc" or "minutes of arc : seconds of arc"
<b>2</b>	<b>9999:59:59</b>	Value displayed in "degrees : minutes of arc : seconds of arc"

### Factor

It sets the factor by which the measured value will be multiplied. For more information please refer to the "7.3.7 Calculation of the display value" section on page 73.

<b>-99999999</b>	Smallest value
<b>1</b>	Default value
<b>99999999</b>	Highest value

### Divider

It sets the divider by which the measured value will be divided. For more information please refer to the "7.3.7 Calculation of the display value" section on page 73.

<b>-99999999</b>	Smallest value
<b>1</b>	Default value
<b>99999999</b>	Highest value

### Additive value

It sets the additive constant that will be added to the measured value. For more information please refer to the "7.3.7 Calculation of the display value" section on page 73.

<b>-99999999</b>	Smallest value
<b>0</b>	Default value
<b>99999999</b>	Highest value

### Decimal point




It sets the position of the decimal point.

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

### Scale units

This parameter sets the required engineering unit. It does not affect the calculation of the display value. The number of decimal places must be set in the **Decimal point** parameter.

<b>0</b>	<b>inch</b>	Default
<b>1</b>	<b>feet</b>	
<b>2</b>	<b>mm</b>	
<b>3</b>	<b>cm</b>	
<b>4</b>	<b>m</b>	
<b>5</b>	<b>Stueck</b>	
<b>6</b>	<b>pcs</b>	
<b>7</b>	<b>Grad</b>	
<b>8</b>	<b>degree</b>	
<b>9</b>	<b>Min:Sec</b>	
<b>10</b>	<b>H:M:S</b>	
<b>11</b>	<b>%</b>	

12	mbar																																																																																																	
13	bar																																																																																																	
14	psi																																																																																																	
15	Pa																																																																																																	
16	kPa																																																																																																	
17	g																																																																																																	
18	kg																																																																																																	
19	t																																																																																																	
20	lb																																																																																																	
21	oz																																																																																																	
22	ml																																																																																																	
23	l																																																																																																	
24	cm3																																																																																																	
25	m3																																																																																																	
26	gal																																																																																																	
27	Edit unit	<p>A customized measuring unit with up to 16 digits can be edited using this parameter.</p> <p>When you press the  key the <b>Edit Unit</b> menu appears.</p> <p>A measuring unit can be created using the arrow keys (by pressing and holding the arrow key down the characters scroll fast).</p> <p>Press the  key to save the <b>Edit Unit</b> menu.</p> <p>Press the  key to close the <b>Edit Unit</b> menu.</p> <table><tr><td></td><td>!</td><td>"</td><td>#</td><td>\$</td><td>%</td><td>&amp;</td><td>'</td><td>(</td><td>)</td><td>*</td><td>+</td><td>,</td><td>-</td><td>.</td><td>/</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>:</td><td>;</td><td>&lt;</td><td>=</td><td>&gt;</td><td>?</td></tr><tr><td>@</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>O</td></tr><tr><td>P</td><td>Q</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td>Y</td><td>Z</td><td>[</td><td>\</td><td>]</td><td>^</td><td>_</td></tr><tr><td>`</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td></tr><tr><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>{</td><td> </td><td>}</td><td>~</td><td></td></tr></table>		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
	!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/																																																																																			
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?																																																																																			
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O																																																																																			
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_																																																																																			
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o																																																																																			
p	q	r	s	t	u	v	w	x	y	z	{		}	~																																																																																				

### Linearization mode

This parameter activates and sets the linearisation function. See the "6.13 Linearization menu" section on page 62 and the "6.13.1 Description of the linearisation function" section on page 62.

0	OFF	No linearisation
1	1 QUADRANT	Linearisation using 1 quadrant (see on page 62).
2	4 QUADRANT	Linearisation using 4 quadrants (see on page 62).

### Pin preselection

This parameter allows to set the PIN code to lock the quick start of the **Preselection values** menu used to enter the preselection values, see the "5.2 Screen structure during operation" section on page 27. Refer also to the "6.4 Preselection values menu" section on page 41. The Master PIN is 6079.

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

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

### Pin parameter

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

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

### 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 SSI properties menu

The **SSI properties** menu allows to configure the unit according to the technical features of the connected SSI encoder.

#### Mode

This parameter configures the unit for operation as a Master or a Slave. For more information please refer to the "7.2 Reading the SSI data" section on page 66.

<b>0</b>	<b>MASTER</b>	Master mode: the unit is set to operate as a Master, it provides the clock signals to the SSI encoder.
<b>1</b>	<b>SLAVE</b>	Slave mode: the unit is set to operate as a Slave, an external Master device provides the clock signals to the SSI encoder.

#### Encoder resolution

It sets the resolution (singleturn + multiturn) of the connected SSI encoder expressed in number of bits. For more information please refer to the "7.2 Reading the SSI data" section on page 66.

<b>10</b>	Minimum value
<b>25</b>	Default value
<b>32</b>	Maximum value

#### Bit per revolution

It sets the singleturn resolution of the connected SSI encoder expressed in number of bits. It is only used for display and diagnostic purposes, and has no influence on device functions. If the singleturn resolution is higher than 16 bits, set the maximum value. See the "5.2.1 Operational screens" section on page 27.

<b>10</b>	Minimum value
<b>13</b>	Default value
<b>16</b>	Maximum value

#### Data format

It sets the output code used by the SSI encoder to output the absolute position information. The output code can be Binary or Gray. For more information please refer to the "7.3.2 Data conversion" section on page 68.

<b>0</b>	<b>GRAY CODE</b>	Gray code
<b>1</b>	<b>BINARY CODE</b>	Binary code

### Baud rate

It sets the clock frequency of the SSI telegrams. For more information please refer to the "7.2 Reading the SSI data" section on page 66.

0	2 MHZ	N.A.
1	1.5 MHZ	N.A.
2	1 MHZ	1 MHz clock frequency
3	500 KHZ	500 kHz clock frequency
4	250 KHZ	250 kHz clock frequency
5	100 KHZ	100 kHz clock frequency

N.A. = not available

### High bit

This parameter sets the highest bit (MSB) that must be evaluated when the bit blanking function is used. For more information please refer to the "7.3.5 Evaluation of the bit blanking" section on page 71.

If you want the full encoder range to be evaluated, it must be set to the total number of encoder bits.

01	Minimum value
25	Default value
32	Maximum value

### Low bit

This parameter sets the lowest bit (LSB) that must be evaluated when the bit blanking function is used. For more information please refer to the "7.3.5 Evaluation of the bit blanking" section on page 71.

If you want the full encoder range to be evaluated, it must be set to "01".

01	Minimum value
...	
32	Maximum value

### SSI offset

Using the RESET / SET VALUE command (via keyboard command, control input or PC user interface; see the "6.11 Command menu" section on page 57) causes the current SSI position value of the encoder to be transferred to the **SSI offset** parameter. For more information please refer to the "7.3.6 Considering the SSI offset" section on page 72.

<b>-99999999</b>	Minimum value
<b>0</b>	Default value
<b>99999999</b>	Maximum value

### Direction

It allows to set the direction of the motion of the connected SSI encoder: clockwise / counter-clockwise (or forward / backward). For more information please refer to the "7.3.4 Checking the direction of rotation" section on page 70.

<b>0</b>	<b>FORWARD</b>	Clockwise / Forward direction
<b>1</b>	<b>REVERSE</b>	Counter-clockwise / Reverse direction

### Round loop value

This parameter sets the number of encoder counts when a round-loop function is desired.

<b>0</b>	The round loop function is disabled, encoder data is displayed as it is
<b>...</b>	
<b>99999999</b>	Number of counts for the round loop function

### Sampling time (s)

It allows to set the reading cycle of the SSI signal when the **Mode** parameter is set to MASTER. The value is expressed in seconds (s).

<b>0.001</b>	Shortest measurement time
<b>0.010</b>	Default value
<b>9.999</b>	Longest measurement time

### Error bit

It enables the error bit diagnostics and the position of the error bit. For more information please refer to the "7.3.1 Checking the error bit" section on page 67.

<b>0</b>	No error bit available. Diagnostics on the connected encoder is disabled.
...	
<b>32</b>	Position of the error bit to be evaluated. Diagnostics on the connected encoder is enabled.

### Error polarity

This parameter sets the polarity of the error bit in case of error. For more information please refer to the "7.3.1 Checking the error bit" section on page 67.

<b>0</b>	In case of error the bit has LOW logic level.
<b>1</b>	In case of error the bit has HIGH logic level.

### Encoder supply

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

<b>0</b>	<b>24VDC SUPPLY</b>	24 Vdc encoder supply
<b>1</b>	<b>5VDC SUPPLY</b>	5 Vdc encoder supply

## 6.4 Preselection values menu

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

The preselection values / switching points are always referred to the display value.

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

### Preselection 1

Preselection / switching point 1. The features of **Preselection 1** must be set in the **Preselection 1** menu, see "6.5 Preselection 1 menu" section on page 42.

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

### Preselection 2

Preselection / switching point 2. The features of **Preselection 2** must be set in the **Preselection 2** menu, see "6.6 Preselection 2 menu" section on page 46.

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

### Preselection 3

Preselection / switching point 3. The features of **Preselection 3** must be set in the **Preselection 3** menu, see "6.7 Preselection 3 menu" section on page 48.

-99999999	Smallest value
+00003000	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 "6.8 Preselection 4 menu" section on page 50.

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

## 6.5 Preselection 1 menu

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

### Mode 1

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

0	$ \text{RESULT}  \geq  \text{PRES} $	<p>The absolute display value is greater than or equal to the absolute value of <b>Preselection 1</b>.</p> <p>If <b>Hysteresis 1</b> is greater than 0, the following switching condition is applied:</p> <p>Display value <math>\geq</math> <b>Preselection 1</b> <math>\rightarrow</math> ON</p> <p>Display value <math>&lt;</math> <b>Preselection 1</b> - <b>Hysteresis 1</b> <math>\rightarrow</math> OFF</p>
1	$ \text{RESULT}  \leq  \text{PRES} $	<p>The absolute display value is less than or equal to the absolute value of <b>Preselection 1</b> (start up delay setting – see the <b>Start up delay 1 (s)</b> parameter on page 45– is advisable).</p> <p>If <b>Hysteresis 1</b> is greater than 0, the following switching condition is applied:</p> <p>Display value <math>\leq</math> <b>Preselection 1</b> <math>\rightarrow</math> ON</p> <p>Display value <math>&gt;</math> <b>Preselection 1</b> + <b>Hysteresis 1</b> <math>\rightarrow</math> OFF</p>
2	$ \text{RESULT}  =  \text{PRES} $	<p>The absolute display value is equal to the absolute value of <b>Preselection 1</b>.</p> <p>A range (<b>Preselection 1</b> <math>\pm</math> <math>\frac{1}{2}</math> <b>Hysteresis 1</b>) can be defined and monitored along with a hysteresis value.</p> <p>If <b>Hysteresis 1</b> is greater than 0, the following switching condition is applied:</p> <p>Display value <math>&gt;</math> <b>Preselection 1</b> + <math>\frac{1}{2}</math> <b>Hysteresis 1</b> <math>\rightarrow</math> OFF</p> <p>Display value <math>&lt;</math> <b>Preselection 1</b> - <math>\frac{1}{2}</math> <b>Hysteresis 1</b> <math>\rightarrow</math> OFF</p>
3	$\text{RESULT} \geq \text{PRES}$	<p>Display value is greater than or equal to <b>Preselection 1</b>, e.g. an overspeed is detected.</p> <p>If <b>Hysteresis 1</b> is greater than 0, the following switching condition is applied:</p> <p>Display value <math>\geq</math> <b>Preselection 1</b> <math>\rightarrow</math> ON</p> <p>Display value <math>&lt;</math> <b>Preselection 1</b> - <b>Hysteresis 1</b> <math>\rightarrow</math> OFF</p>
4	$\text{RESULT} \leq \text{PRES}$	<p>Display value is less than or equal to <b>Preselection 1</b>, e.g. an underspeed is detected (start up delay setting –see the <b>Start up delay 1 (s)</b> parameter on page 45– is advisable).</p> <p>If <b>Hysteresis 1</b> is greater than 0, the following</p>

		switching condition is applied: Display value $\leq$ <b>Preselection 1</b> $\rightarrow$ ON Display value $>$ <b>Preselection 1</b> + <b>Hysteresis 1</b> $\rightarrow$ OFF
5	RESULT = PRES	Display value is equal to <b>Preselection 1</b> . A range ( <b>Preselection 1</b> $\pm$ $\frac{1}{2}$ <b>Hysteresis 1</b> ) can be defined and monitored along with a hysteresis value. If <b>Hysteresis 1</b> is greater than 0, the following switching condition is applied: Display value $>$ <b>Preselection 1</b> + $\frac{1}{2}$ <b>Hysteresis 1</b> $\rightarrow$ OFF Display value $<$ <b>Preselection 1</b> - $\frac{1}{2}$ <b>Hysteresis 1</b> $\rightarrow$ OFF
6	RES $\geq$ PRES-TRAIL	Trailing <b>Preselection 1</b> : Display value is greater than or equal to <b>Preselection 2</b> - <b>Preselection 1</b> $\rightarrow$ ON <b>Preselection 1</b> is the trailing preselection from <b>Preselection 2</b> .
7	ERROR SET	Error messages for 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 <b>Preselection 1</b>
1	YES	Latch for <b>Preselection 1</b> (command <b>4 - LOCK RELEASE</b> -see the <b>Input 1 action</b> parameter on page 57- will clear the latch).

## Start up delay 1 (s)

Start up delay setting for the switching condition of **Preselection 1**. It is the delay before starting the monitoring function.

This adjustment only applies to the switching conditions **1 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 1** parameter on page 42).

<b>00.000</b>	No start up delay setting
...	
<b>60.000</b>	Start up delay setting expressed in seconds



### NOTE

**Start up delay 3 (s)** and **Start up delay 4 (s)** (see on pages 49 and 51 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.

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

## 6.6 Preselection 2 menu

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

### Mode 2

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

0 ... 5 and 7	For complete information on the switching conditions 0 ... 5 and 7, please refer to the <b>Mode 1</b> parameter in the "6.5 Preselection 1 menu" section on page 42.
6 RES>=PRES-TRAIL	Trailing <b>Preselection 2</b> : Display value is greater than or equal to <b>Preselection 1</b> – <b>Preselection 2</b> → ON <b>Preselection 2</b> is the trailing preselection from <b>Preselection 1</b> .

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### Output polarity 2

Polarity for the switching condition of **Preselection 2**. For complete information please refer to the **Output polarity 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

### Output lock 2

Latch for the switching condition of **Preselection 2**. For complete information please refer to the **Output lock 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

**Start up delay 2 (s)**

Start up delay setting for the switching condition of **Preselection 2**. It is the delay before starting the monitoring function.

For complete information please refer to the **Start up delay 1 (s)** parameter in the "6.5 Preselection 1 menu" section on page 42.

**NOTE**

**Start up delay 3 (s)** and **Start up delay 4 (s)** (see on pages 49 and 51 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 "6.5 Preselection 1 menu" section on page 42.

## 6.7 Preselection 3 menu

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

### Mode 3

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

0 ... 5 and 7		For complete information on the switching conditions 0 ... 5 and 7, please refer to the <b>Mode 1</b> parameter in the "6.5 Preselection 1 menu" section on page 42.
6	RES>=PRES-TRAIL	Trailing <b>Preselection 3</b> : Display value is greater than or equal to <b>Preselection 4</b> – <b>Preselection 3</b> → ON <b>Preselection 3</b> is the trailing preselection from <b>Preselection 4</b> .

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### Output polarity 3

Polarity for the switching condition of **Preselection 3**. For complete information please refer to the **Output polarity 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

### Output lock 3

Latch for the switching condition of **Preselection 3**. For complete information please refer to the **Output lock 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

## Start up delay 3 (s)

Start up delay setting for the switching condition of **Preselection 3**. It is the delay before starting the monitoring function.

This adjustment only applies to the switching conditions **1 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 3** parameter on page 48).

<b>0</b>	<b>OFF</b>	No start up delay setting
<b>1</b>	<b>AUTO</b>	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 45 and 47 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 "6.5 Preselection 1 menu" section on page 42.

## 6.8 Preselection 4 menu

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

### Mode 4

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

0 ... 5 and 7		For complete information on the switching conditions 0 ... 5 and 7, please refer to the <b>Mode 1</b> parameter in the "6.5 Preselection 1 menu" section on page 42.
6	RES>=PRES-TRAIL	Trailing <b>Preselection 4</b> : Display value is greater than or equal to <b>Preselection 3</b> – <b>Preselection 4</b> → ON <b>Preselection 4</b> is the trailing preselection from <b>Preselection 3</b> .

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### 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 "6.5 Preselection 1 menu" section on page 42.

### Output polarity 4

Polarity for the switching condition of **Preselection 4**. For complete information please refer to the **Output polarity 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

### Output lock 4

Latch for the switching condition of **Preselection 4**. For complete information please refer to the **Output lock 1** parameter in the "6.5 Preselection 1 menu" section on page 42.

## Start up delay 4 (s)

Start up delay setting for the switching condition of **Preselection 4**. It is the delay before starting the monitoring function.

This adjustment only applies to the switching conditions **1 - |RESULT|<=|PRES|** and **4 - RESULT<=PRES** (see the **Mode 4** parameter on page 50).

<b>0</b>	<b>OFF</b>	No start up delay setting
<b>1</b>	<b>AUTO</b>	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 45 and 47 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 "6.5 Preselection 1 menu" section on page 42.

## 6.9 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 "4.7 Serial interface (-AVI- and -DO- order codes)" section on page 23.

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

### Unit number

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

<b>11</b>	Smallest address value
...	
<b>99</b>	Highest address value

### Serial baud rate

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

Available options are:

<b>0</b>	<b>9600</b>	9600 baud
<b>1</b>	<b>19200</b>	19200 baud
<b>2</b>	<b>38400</b>	38400 baud

### Serial format

This parameter allows to set the bit data format.

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

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

### Serial protocol

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

The transmission string will be as follows:

Option 0

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

Option 1

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

Where:

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

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

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

LF = line feed character

CR = carriage return character

<b>0</b>	Transmission string with serial address
<b>1</b>	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 <b>Input 1 action</b> , <b>Input 2 action</b> and <b>Input 3 action</b> parameters on pages 57 and 59).
...	
60.000	Cycle time expressed in seconds.

### Serial value

This parameter sets the value to be transmitted.

0	:0	Measurement Result
1	:1	SSI Data
2	:2	SSI Single
3	:3	SSI Rev
4	:4	SSI Dir Result
5	::5	SSI Mask Result
6	:6	Minimal Value
7	:7	Maximal Value
8	:8	SSI Set Result
9	:9	SSI Data

## 6.10 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 "4.6 Analogue output (-AVI- order code)" section on page 22.

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

### Analog format

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

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

<b>0</b>	<b>-10...10V</b>	-10 ... +10 V
<b>1</b>	<b>0...20MA</b>	0 ... 20 mA
<b>2</b>	<b>4...20MA</b>	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**.

<b>-99999999</b>	Smallest start value
<b>+00000000</b>	Default value
<b>+99999999</b>	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**.

<b>-99999999</b>	Smallest start value
<b>+00010000</b>	Default value
<b>+99999999</b>	Highest start value

### Analog gain (%)

This parameter sets the the maximum output value of the analogue output expressed in percentage (%) of (+/-)10 V or 20 mA.

<b>000.00</b>	Smallest gain
<b>100.00</b>	Default value
<b>110.00</b>	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.

<b>-99.99</b>	Smallest offset
<b>+00.00</b>	Default value
<b>+99.99</b>	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.

### 6.11 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 "4.5 Control inputs" section on page 21.

#### Input 1 action

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

0	NO	No function	
1	RESET/SET VALUE	The current SSI value is transferred to the <b>SSI offset</b> parameter, see on page 39.	(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 <b>Serial value</b> parameter on page 54.	(d)
7	TEACH PRESEL. 1	The current display value is stored as Preselection 1 (see the <b>Preselection 1</b> parameter on page 41).	(d)
8	TEACH PRESEL. 2	The current display value is stored as Preselection 2 (see the <b>Preselection 2</b> parameter on page 41).	(d)
9	TEACH PRESEL. 3	The current display value is stored as Preselection 3 (see the <b>Preselection 3</b> parameter on page 41).	(d)
10	TEACH PRESEL. 4	The current display value is stored as Preselection 4 (see the <b>Preselection 4</b> parameter on page 41).	(d)
11	SCROLL DISPLAY	It scrolls through the available display screens (see the "5.2 Screen structure during operation" section on page 27).	(d)
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 <b>Event color 1</b> , <b>Event color 2</b> , <b>Event color 3</b> and <b>Event color 4</b> in the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" on page 42 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 <b>Event color 1</b> , <b>Event color 2</b> , <b>Event color 3</b> and <b>Event color 4</b> in the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" on page 42 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 <b>Event color 1</b> , <b>Event color 2</b> , <b>Event color 3</b> and <b>Event color 4</b> in the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" on page 42 ff).	(d)

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

#### Input 1 config.

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

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

#### Input 2 action

This parameter sets the function of the input "11 - Ctrl. In 2". For complete information please refer to the **Input 1 action** parameter on page 57.

## 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 58.

## 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 57.

## 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 58.

## 6.12 Display menu

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

Parameter changes become active only after exiting the menu selection.

### Color

This parameter sets the colour of the display.

It is also possible to enable an event-dependent change of the colour of the display by setting a switching condition (see the parameters **Event color 1**, **Event color 2**, **Event color 3** and **Event color 4** in the "6.5 Preselection 1 menu" ... "6.8 Preselection 4 menu" on page 42 ff).

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

<b>0</b>	<b>RED</b>	The display is coloured in red
<b>1</b>	<b>GREEN</b>	The display is coloured in green
<b>2</b>	<b>YELLOW</b>	The display is coloured in yellow

### Brightness (%)

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

<b>010</b>	Minimum brightness
<b>090</b>	Default value
<b>100</b>	Maximum brightness

### Contrast

This parameter sets the viewing angle.

<b>0</b>	Viewing angle from top
<b>1</b>	Viewing angle from centre
<b>2</b>	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.

<b>0000</b>	Screen saver not active
<b>...</b>	
<b>9999</b>	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.

<b>0.005</b>	Shortest update time
<b>0.100</b>	Default value
<b>9.999</b>	Longest update time

### Font

This parameter sets the font style.

<b>0</b>	Standard
<b>1</b>	Font 1

### Skip commands

This parameter allows to enable / disable the visualization of the keyboard commands.

<b>Show Command Key</b>	Visualization and operation of the keyboard commands is enabled.
<b>Skip Command Key</b>	Visualization and operation of the keyboard commands is disabled.

## 6.13 Linearization menu

The linearisation function is configured in this menu. This menu is displayed only if the **Linearization mode** parameter in the **General** menu (see on page 36) 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 "6.13.1 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
+00000000	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
+00000000	Default value
+99999999	Largest Y-coordinate

### 6.13.1 Description of the linearisation function

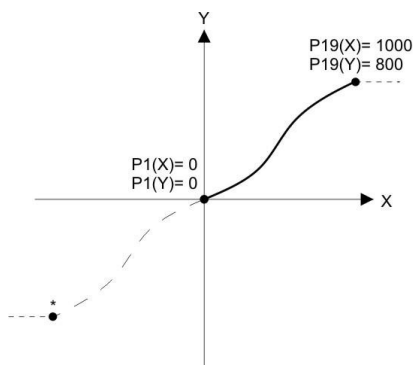
The linearisation function allows to convert a linear input signal into a non-linear representation (or vice versa). 24 programmable X / Y coordinates (interpolation points) are available, they can be freely arranged over the whole conversion range at any desired distance. The unit uses linear interpolation 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 36) must be set to either "1 - 1 QUADRANT" or "2 - 4 QUADRANT" (see the diagrams below).

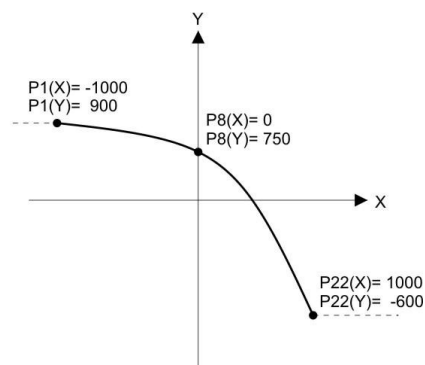
The parameters **P1(X)** to **P24(X)** are used to specify the coordinates on the x-axis. These are the measuring values that the unit would normally generate according to the actual input signal.

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

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



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



Example: Linearization Mode: 4 Quadrant

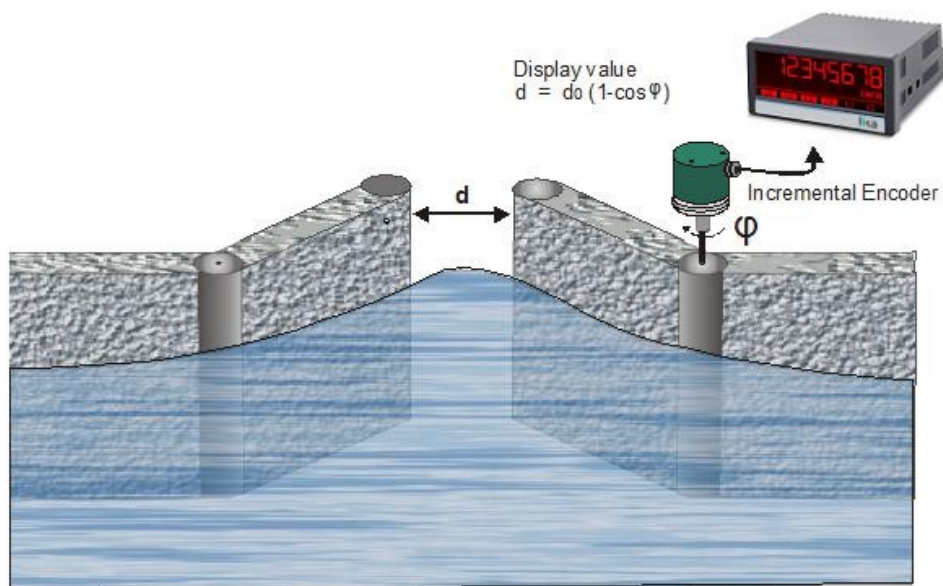
If the **Linearization mode** parameter in the **General** menu is set to "1 - 1 QUADRANT", **P1(X)** parameter must be set to zero. Linearisation is only defined in the positive range and the negative range will be mirrored symmetrical with respect to the central point.

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

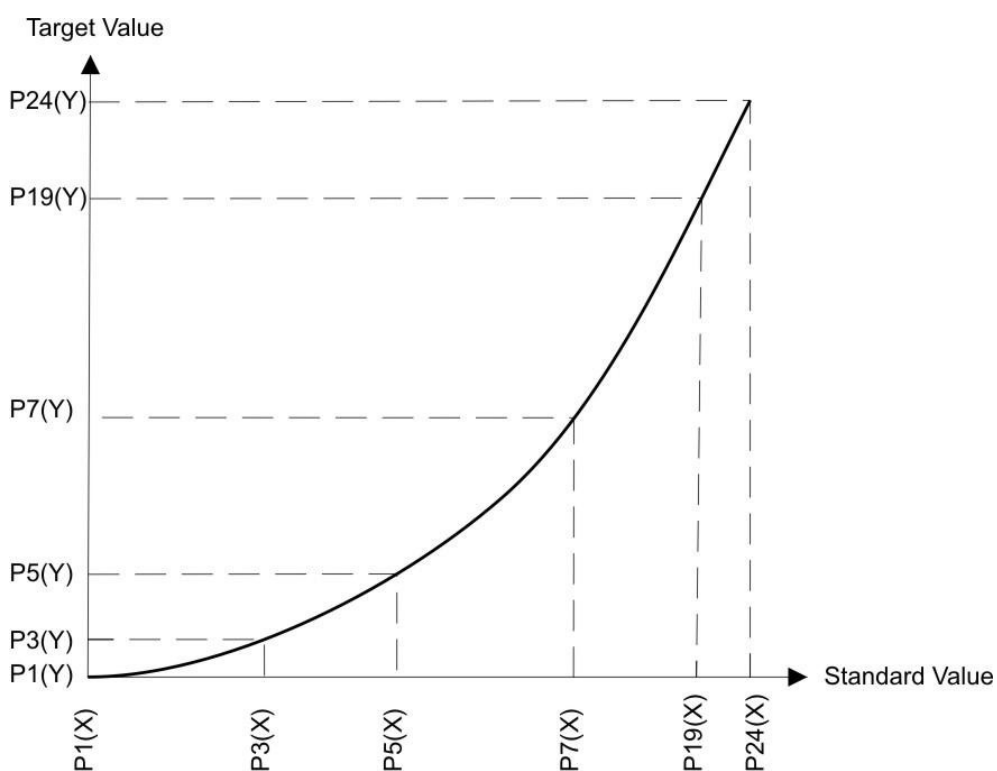


## EXAMPLE

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



In this case we need to convert a non-linear input signal (incremental encoder signals  $\varphi$ ) 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 "6.9 Serial menu" section on page 52) 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](http://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

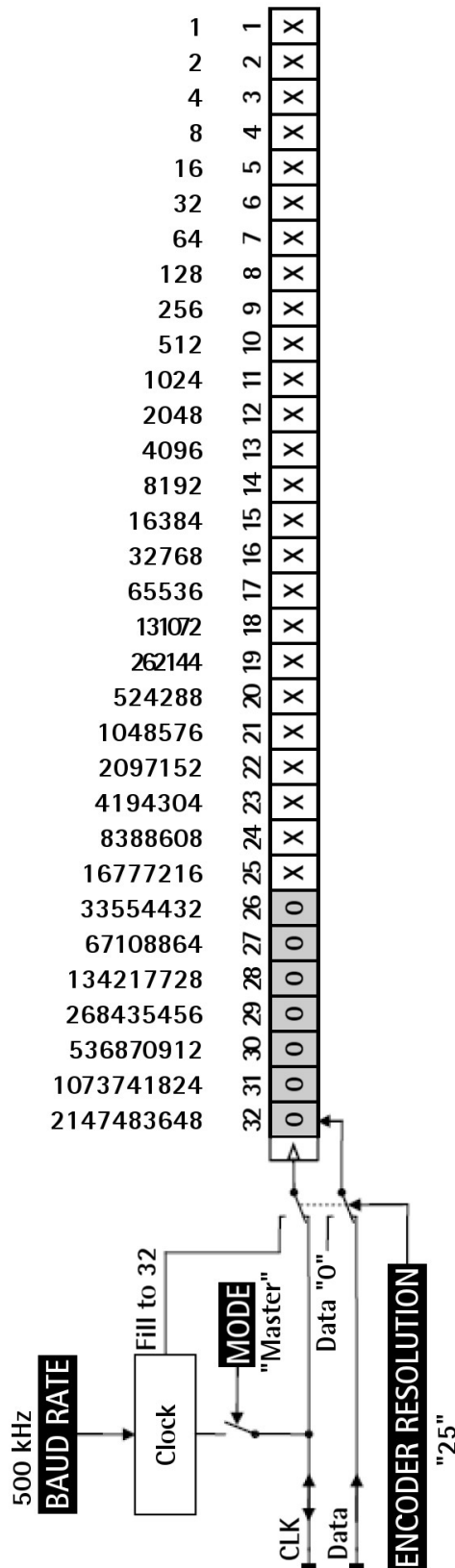
ETX = control character CTRL C (Hex 03)

BCC = block check character

## 7.2 Reading the SSI data

Received data has always a length of 32 bits.

See the parameters **Mode**, **Encoder resolution** and **Baud rate**, refer to the "6.3 SSI properties menu" section on page 37.

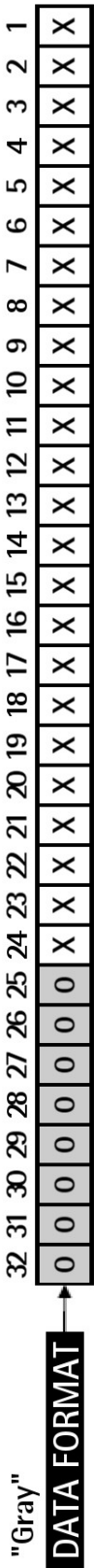


See the parameters **Error bit** and **Error polarity**, refer to the "6.3 SSI properties menu" section on page 37.



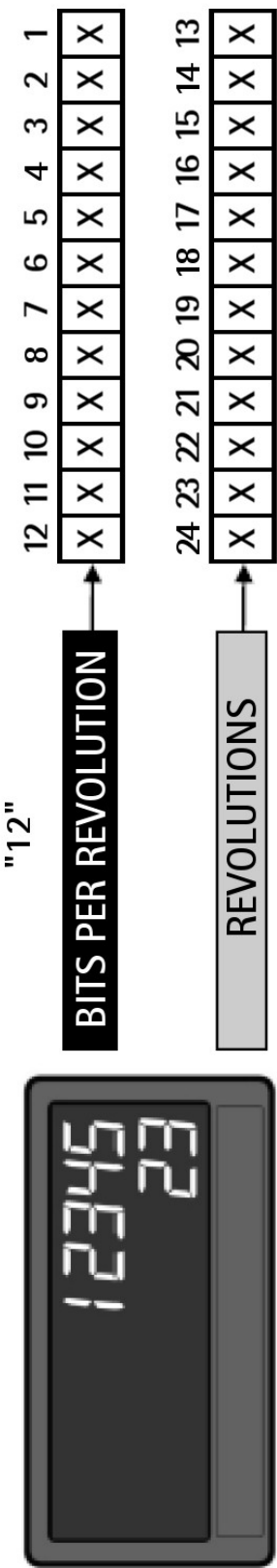
7.3.2 Data conversion

See the parameter **Data format**, refer to the "6.3 SSI properties menu" section on page 37. Gray code → Binary code.



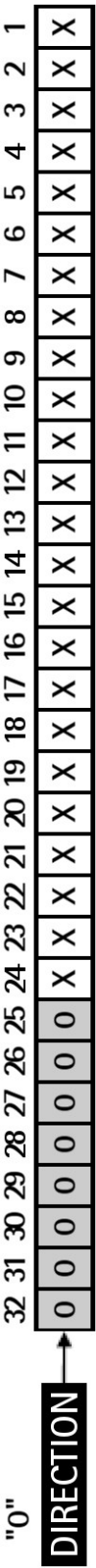
7.3.3 Data splitting

See the parameters **Encoder resolution** and **Bit per revolution**, refer to the "6.3 SSI properties menu" section on page 37.



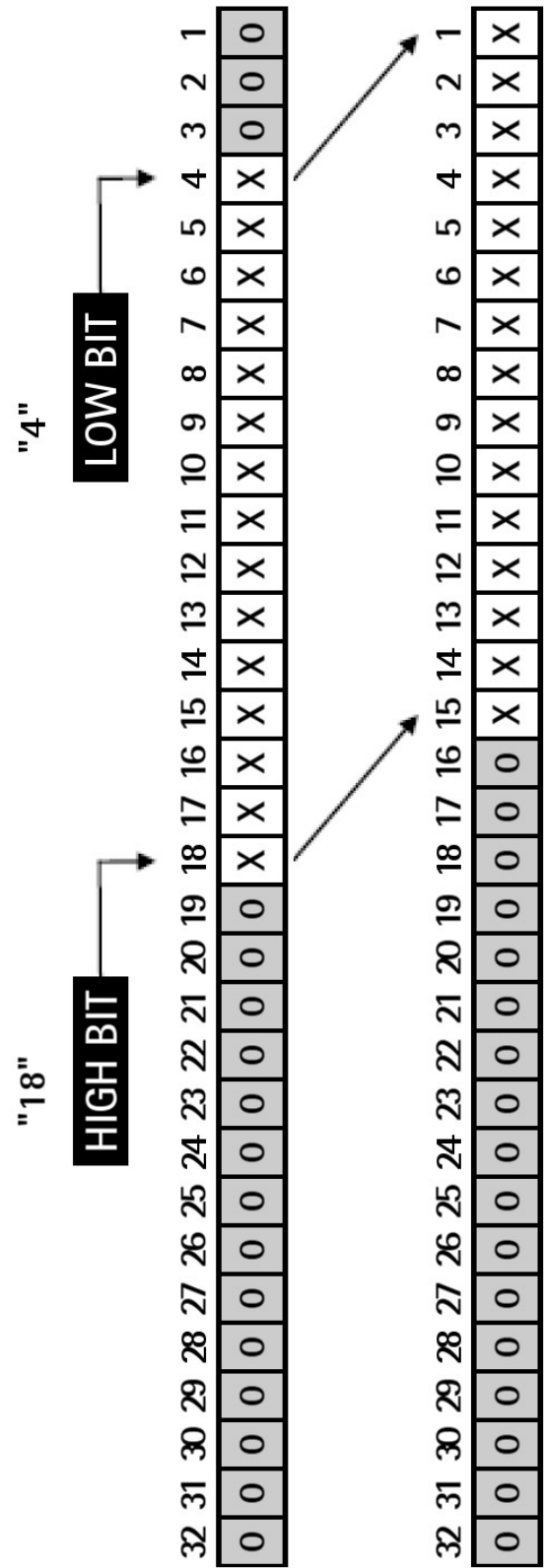
7.3.4 Checking the direction of rotation

See the parameter **Direction**, refer to the "6.3 SSI properties menu" section on page 37.



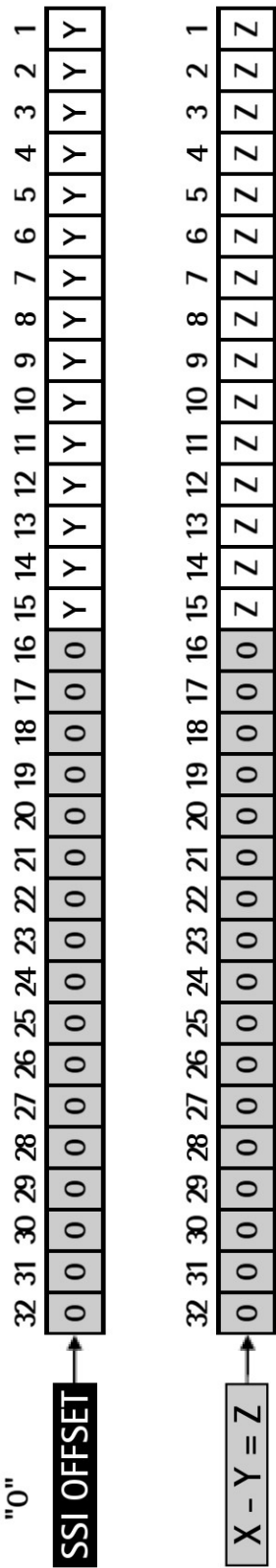
7.3.5 Evaluation of the bit blanking

See the parameters **High bit** and **Low bit**, refer to the "6.3 SSI properties menu" section on page 37.




7.3.6 Considering the SSI offset

See the parameter **SSI offset**, refer to the "6.3 SSI properties menu" section on page 37.



### 7.3.7 Calculation of the display value

See the parameters **Factor**, **Divider** and **Additive value**, refer to the "6.2 General menu" section on page 33.

$$\begin{array}{c}
 \text{"1"} \\
 \boxed{Z} \times \frac{\text{FACTOR}}{\text{DIVIDER}} + \text{"0"} \\
 \text{ADDITIVE VALUE} \\
 = \\
 \text{Display Value}
 \end{array}$$


The diagram illustrates the calculation of the display value. It shows a formula where a value 'Z' is multiplied by the 'FACTOR' and then divided by the 'DIVIDER'. This result is then added to the 'ADDITIVE VALUE' (labeled as '0'). The final result is shown on the display as 1.2345 INCH. The display also shows various menu parameters: C1, C2, C3, C4, K1, and K2.

## 8 - Parameters / serial codes

### 8.1 General menu

See the "6.2 General menu" section on page 33

Parameter	Serial code	Min. value	Max. value	Default value
Display format	0	0	2	0
Factor	1	-999999999	999999999	1
Divider	2	-999999999	999999999	1
Additive value	3	-999999999	999999999	0
Decimal point	4	0	7	0
Scale units	5	0	28	0
Linearization mode	6	0	2	0
Pin preselection	7	0000	9999	0000
Pin parameter	8	0000	9999	0000
Factory settings	9	0	1	0
-	10	0	0	0
-	11	0	0	0
-	12	0	0	0
-	13	0	0	0

### 8.2 SSI properties menu

See the "6.3 SSI properties menu" section on page 37

Parameter	Serial code	Min. value	Max. value	Default value
Mode	14	0	1	0
Encoder resolution	15	10	32	25
Bit per revolution	16	10	16	13
Data format	17	0	1	0
Baud rate	18	0	5	3
High bit	19	1	32	25
Low bit	20	1	32	1
SSI offset	21	-99999999	99999999	0
Direction	22	0	1	0
Round loop value	23	0	99999999	0
Sampling time (s)	24	1	9999	10
Error bit	25	0	32	0
Error polarity	26	0	1	0
Encoder supply	27	0	1	0
-	28	0	0	0
-	29	0	0	0

### 8.3 Preselection values menu

See the "6.4 Preselection values menu" section on page 41

Parameter	Serial code	Min. value	Max. value	Default value
Preselection 1	A0	-99999999	99999999	1000
Preselection 2	A1	-99999999	99999999	2000
Preselection 3	A2	-99999999	99999999	3000
Preselection 4	A3	-99999999	99999999	4000

### 8.4 Preselection 1 menu

See the "6.5 Preselection 1 menu" section on page 42

Parameter	Serial code	Min. value	Max. value	Default value
Mode 1	A4	0	7	0
Hysteresis 1	A5	000.0	99999	0
Pulse time 1 (s)	A6	00.000	60.000	0
Output target 1	A7	0	6	1
Output polarity 1	A8	0	1	0
Output lock 1	A9	0	1	0
Start up delay 1 (s)	B0	00.000	60.000	0
Event color 1	B1	0	3	0
-	B2	0	0	0
-	B3	0	0	0

### 8.5 Preselection 2 menu

See the "6.6 Preselection 2 menu" section on page 46

Parameter	Serial code	Min. value	Max. value	Default value
Mode 2	B4	0	7	0
Hysteresis 2	B5	000.0	99999	0
Pulse time 2 (s)	B6	00.000	60.000	0
Output target 2	B7	0	6	1
Output polarity 2	B8	0	1	0
Output lock 2	B9	0	1	0
Start up delay 2 (s)	C0	00.000	60.000	0
Event color 2	C1	0	3	0
-	C2	0	0	0
-	C3	0	0	0

## 8.6 Preselection 3 menu

See the "6.7 Preselection 3 menu" section on page 48

Parameter	Serial code	Min. value	Max. value	Default value
Mode 3	C4	0	7	0
Hysteresis 3	C5	000.0	99999	0
Pulse time 3 (s)	C6	00.000	60.000	0
Output target 3	C7	0	6	1
Output polarity 3	C8	0	1	0
Output lock 3	C9	0	1	0
Start up delay 3 (s)	D0	0	1	0
Event color 3	D1	0	3	0
-	D2	0	0	0
-	D3	0	0	0

## 8.7 Preselection 4 menu

See the "6.8 Preselection 4 menu" section on page 50

Parameter	Serial code	Min. value	Max. value	Default value
Mode 4	D4	0	7	0
Hysteresis 4	D5	000.0	99999	0
Pulse time 4 (s)	D6	00.000	60.000	0
Output target 4	D7	0	6	1
Output polarity 4	D8	0	1	0
Output lock 4	D9	0	1	0
Start up delay 4 (s)	E0	0	1	0
Event color 4	E1	0	3	0
-	E2	0	0	0
-	E3	0	0	0

### 8.8 Serial menu

See the "6.9 Serial menu" section on page 52

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

### 8.9 Analog menu

See the "6.10 Analog menu" section on page 55

Parameter	Serial code	Min. value	Max. value	Default value
Analog format	E8	0	2	0
Analog start	E9	-99999999	99999999	0.0
Analog end	F0	-99999999	99999999	1000.0
Analog gain (%)	F1	000.00	110.00	100.00
Analog offset	F2	-99.99	99.99	0.00
-	F3	0	0	0
-	F4	0	0	0

### 8.10 Command menu

See the "6.11 Command menu" section on page 57

Parameter	Serial code	Min. value	Max. value	Default value
Input 1 action	F5	0	19	0
Input 1 config.	F6	0	3	2
Input 2 action	F7	0	19	0
Input 2 config.	F8	0	3	2
Input 3 action	F9	0	19	0
Input 3 config.	G0	0	3	2
-	G1	0	0	0
-	G2	0	0	0
-	G3	0	0	0
-	G4	0	0	0
-	G5	0	0	0

### 8.11 Display menu

See the "6.12 Display menu" section on page 60

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

### 8.12 Linearization menu

See the "6.13 Linearization menu" section on page 62

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

(continue on next page)

(continued)

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

### 8.13 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

This page intentionally left blank

This page intentionally left blank

This page intentionally left blank

Document release	Release date	Description
1.0	12.10.2018	First issue
1.1	08.01.2019	<b>Bit per revolution</b> information updated
1.2	29.03.2019	RS-485 information added
1.3	07.05.2019	<b>Mode 1</b> and <b>Start up delay 1 (s)</b> items updated in all Preselection menus



Dispose separately

**lika**

**Lika Electronic**

Via S. Lorenzo, 25 • 36010 Carrè (VI) • Italy

Tel. +39 0445 806600

Fax +39 0445 806699



info@lika.biz • www.lika.biz