Smart encoders & actuators

User's guide

LD200

- Position display, counter, event transmitter, converter
- For HTL/Push-Pull, TTL/Line Driver, Sine/Cosine 1Vpp incremental encoders/sensors and SSI absolute encoders/sensors
- Linear (mm, inches,...) and angular (degrees) display function
- 1 input and 3 dedicated digital outputs
- RS-232 interface and software tool for easy configuration

Suitable for the following models:

- LD200 universal display

General Contents

lika

General contents

Subject index

Typographic and iconographic conventions

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

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

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

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

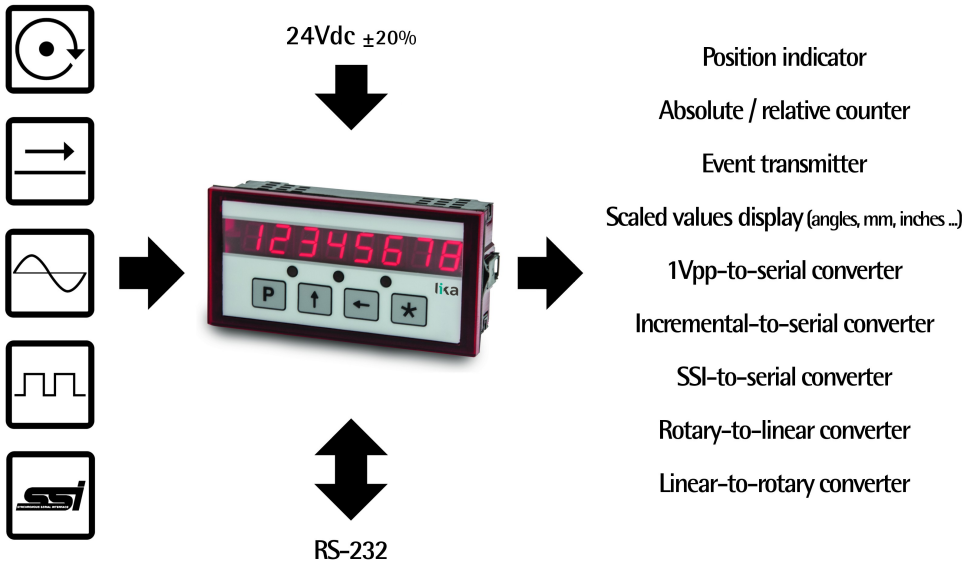
Preliminary information

This guide is designed to provide the most complete information the operator needs to correctly and safely install and operate the **LD200 universal display**.

LD200 is a position display which allows to connect a variety of encoders / sensors, they can be incremental (HTL/Push-Pull, TTL/Line Driver, Sine/Cosine 1Vpp) and absolute (SSI) as well as rotary and linear.
User's interface is a scratch resistant polycarbonate keyboard fitted with 4 multifunction keys and a 7 segment 8 digit high brightness LED display. The device is also equipped with 3 status LEDs, 1 input and 3 digital outputs designed to operate dedicated functions.
The display provides an RS-232 interface for connection to a PC and configuration via free software tool.
Among the available functions:

- position indicators;
- absolute / relative counter;
- event transmitter.

It allows to display and scale both linear (millimeters, inches, fractional inches) and angular (degreses) measurement values.



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's menu, the use of the keys, the setup procedure and the serial interface.

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 16;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, the following precautions must be taken:

  - before handling and installing the equipment, discharge electrical charge from your body and tools which may come in touch with the device;
  - power supply must be stabilized without noise; install EMC filters on device power supply if needed;
  - always use shielded cables (twisted pair cables whenever possible);
  - avoid cables runs longer than necessary;
  - avoid running the signal cable near high voltage power cables;
  - mount the device as far as possible from any capacitive or inductive noise source; shield the device from noise source if needed;
  - minimize noise by connecting the unit to ground (GND). Make sure that ground (GND) is not affected by noise. The connection point to ground can be situated both on the device side and on user's side. The best solution to minimize the interference must be carried out by the user.

1.3 Mechanical safety

- Install the device following strictly the information in the "3 - Mounting instructions" section on page 14;
- 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.

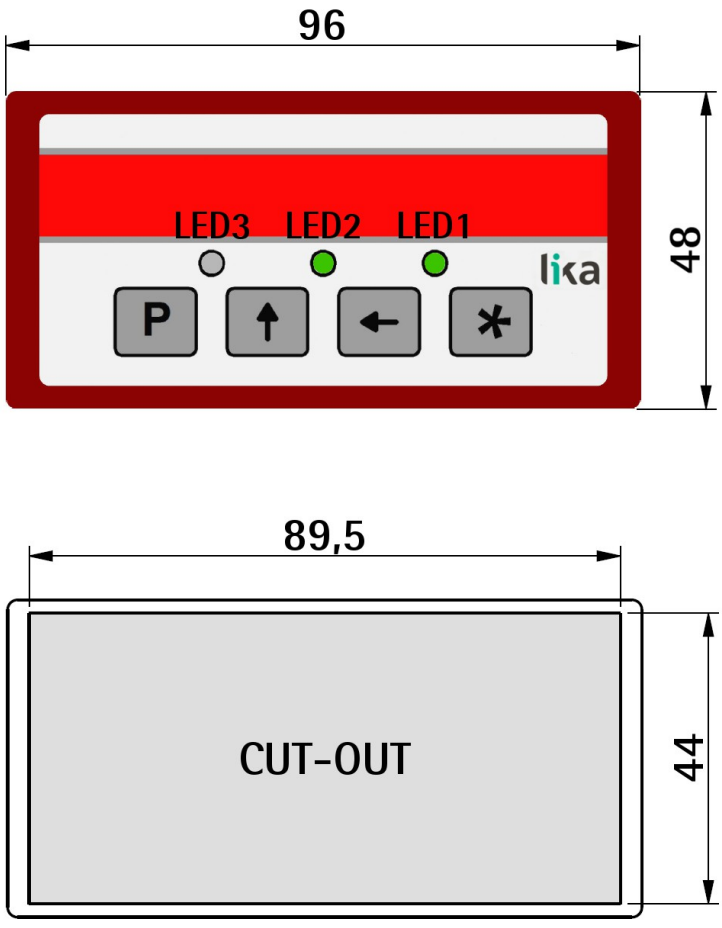
Warning: devices having order code ending with "/Sxxx" may have mechanical and electrical characteristics different from standard and be supplied with additional documentation for special connections (Technical info).

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

Insert the display without panel clips through the cut-out (approx. 89.5 W x 44 H mm / 3.523" W x 1.732" H) made in the panel.
Mount the panel clips on the sides of the display housing and tighten the screws until fixed.



Values are expressed in millimeters

3.2 Installation

The device is allowed to be installed and operated only within the permissible temperature range (0°C +70°C / +32°F +158°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.
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.

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.

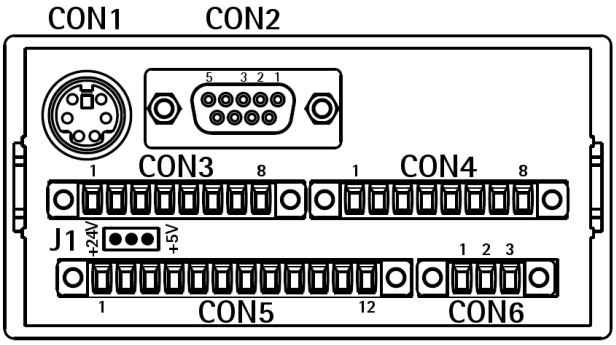
3.3 Cleaning and maintenance

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!



4.1 CON6 connections (Power supply to the display)

Pin	Vdc	Vac
1	+ 24Vdc ±20%	18Vac
2	0Vdc	18Vac
3	P.E. (GND)	P.E. (GND)

4.2 CON1 connections (Mini-DIN connector)

Plug the Mini-DIN circular connector of Lika's SM2, SM25 or SM5 sensors on the backside of the display. For more information refer to the technical documentation of the magnetic sensors.

4.3 CON2 connections (RS-232 serial interface)

Pin	Description
1	not connected
2	RxD
3	TxD
4	not connected
5	0Vdc
6, 7, 8, 9	not connected

For parameter setup via RS-232 interface and software tool please refer to sections "7 - RS-232 serial interface" on page 53 and "8 - Application software for PC" on page 65.

4.4 CON3 connections (Sine/Cosine 1Vpp)

It allows to connect a Sine/Cosine 1Vpp encoder.

Pin	Description
1	0Vdc
2	+5Vdc
3	SIN + (B)
4	SIN - (/B)
5	COS + (A)
6	COS - (/A)
7	REF + (0) [1]
8	REF - (/0) [1]

1. Zero signal provided by the encoder can be used to activate the Preset function. See the "5.9 Zero setting (or Preset setting)" section on page 21. To enable it set the **EnAbLE 0** parameter in the specific menu to "ON", the counting is zero set at the rising edge of the Zero signal.

4.5 CON5 connections (Push-Pull, Line Driver, SSI)

It allows to connect an HTL/Push-Pull or a TTL/Line Driver incremental encoder / sensor or an SSI interface absolute encoder / sensor.

Pin	Description
1	0Vdc
2	+Vdc [1]
3	A
4	/A
5	B
6	/B
7	0 [2]
8	/0 [2]
9	Data OUT + (SSI)
10	Data OUT - (SSI)
11	Clock IN + (SSI)
12	Clock IN - (SSI)

1. The voltage level of the power supply provided to the connected encoder can be selected by means of jumper J1. Refer to the "4.6 Jumper J1 (Power supply to the encoder / sensor)" section in the following page.
2. Zero signal provided by the encoder can be used to activate the Preset function. See the "5.9 Zero setting (or Preset setting)" section on page 21. To enable it set the **EnAbLE 0** parameter in the specific menu to "ON", the counting is zero set at the rising edge of the Zero signal.

4.6 Jumper J1 (Power supply to the encoder / sensor)

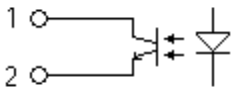
It allows to select the voltage level of the power supply provided to the connected incremental or SSI encoder / sensor.

Position	Description
Left (1-2)	+Vdc = +24Vdc @ 1A
Right (2-3)	+Vdc = +5Vdc @ 150mA

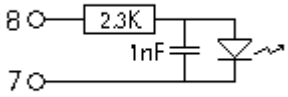
4.7 CON4 connections (Outputs and Input)

Pin	Description
1	OUT1 +
2	OUT1 -
3	OUT2 +
4	OUT2 -
5	OUT3 +
6	OUT3 -
7	Preset Input -
8	Preset Input +

Digital outputs scheme



Digital input scheme



Outputs are open collector with optocouplers, Imax = 25 mA.
Input with optocoupler, Vin max = +30Vdc.

NOTE
Some examples of use of the input and the outputs are available in the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22 and in the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

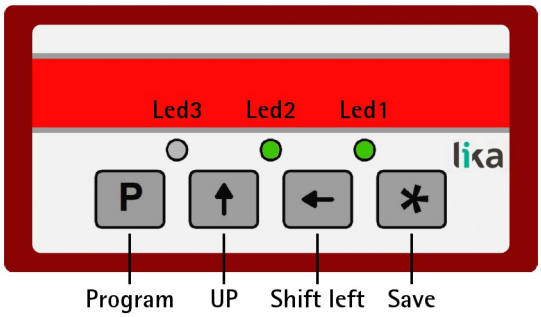
5 - Functions

5.1 Start up

At switching on the unit shows the hardware/software version followed by the device address and the current position.

	Hardware version	Software version
Version:	H xx	S yy

Device address (0 ... 31): Ad zz (see on page 26)
(used for RS-232 interface connection)



5.2 Function of the LEDs

The display is equipped with three LEDs, their function is described in the following table.

LED 1 GREEN	Description
OFF	measurement in millimetres or degrees
ON	measurement in inches or fractional inches

See the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21

LED 2 GREEN	Description
OFF	absolute display mode
ON	relative display mode

See the "5.5 Absolute / relative counting mode" section on page 20

LED 3	Description
no function	

NOTE
During initialisation, system checks the diagnostic LEDs for proper operation; therefore they light up for a while.

5.3 Function of the keys

Key	Function
P	Program: it allows to scroll the items in the menu
↑	UP: it allows to change the value of the selected digit
←	Shift left: it allows to select the digit and sometimes also to change it
*	Save: it allows to save data

Sometimes the keys are used in combination to execute specific functions. Refer to the following sections.

5.4 Default parameters (factory settings)

Default parameter values are set at the factory by Lika Electronic engineers to allow the operator to run the device for standard operation in a safe mode. They are highlighted in **BOLD** characters in the description of the menus.

The unit can be reset to default values following the steps below:

- hold down **P** and ↑ keys while switching the device on ("**dEFPAr**" must appear);
- zero set the unit (see the "5.9 Zero setting (or Preset setting)" section on page 21).

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.

NOTE
When you need to connect a new device to LD200 please upload the default parameters of the display before configuring it.

5.5 Absolute / relative counting mode

Press **P** and * keys to switch from absolute (LED2 = OFF) to relative display mode (LED2 = ON) and vice versa. Default display mode is "absolute". Absolute / relative display mode function is not active with SSI encoders / sensors.

5.6 Memory on power down (for incremental and 1Vpp encoders / sensors)

On power down the device automatically stores the last position value on internal memory.

WARNING
If the position of the connected encoder changes while the power of the display is off, at the next start up the device will display the last position stored before switching off, not the new position.

5.7 Offset

The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool.
When the current position value is displayed, press ↑ key to add the OFFSEt value to it ("**OFFSEt**" will be displayed); press ↑ key again to confirm.
If the OFFSEt value is already used, press ↑ key to subtract it from the current value ("**nO OFS**" will be displayed); press ↑ key again to confirm.
Display value = current position + PrESEt value + OFFSEt value
For more information on the offset value refer to the OFFSEt parameter in the specific menus.

5.8 Displaying values in millimetres / degrees / inches / fractional inches

When you press ← key for 3 s. the display switches the engineering unit from millimeters/degrees (LED1 = OFF) to inches and further to fractional inches (LED1 = ON). Default display mode is millimetres.
Refer to the Unit parameter in the specific menus.

5.9 Zero setting (or Preset setting)

The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to the PrESEt parameter (see the specific menus) and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed.
Reset/preset function can be activated in the following ways:

- via keyboard: press * key for 3 seconds to access the Preset function ("**rESEt**" will be displayed). Press **P** key to exit function (no reset operation is carried out). Press * key twice to confirm the preset execution ("**donE**" will be displayed);
- via Preset digital input: see the "5.10 Preset Input function (CON4, pins 7 and 8)" section in the following page;

- via Encoder Zero signal: refer to the **EnAbLE 0** parameter in the specific menus;
- by transmitting the zero setting command via serial port; please refer to the "7 - RS-232 serial interface" section on page 53;
- using the software tool via serial port; please refer to the "8 - Application software for PC" section on page 65.

For more information on the preset / zero setting function please refer to the description of the **PrESEt** parameter in the specific menus.

NOTE
In the absolute counting mode setting the preset/reset affects also the relative counting mode (see the "5.5 Absolute / relative counting mode" section on page 20).
In the relative counting mode setting the preset/reset does not affect the absolute counting mode (see the "5.5 Absolute / relative counting mode" section on page 20).
Display value = 0 + **PrESEt** value

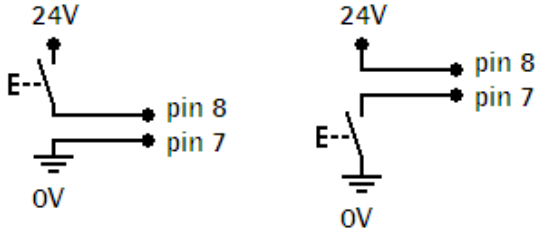
NOTE
See also OUT 3 output in the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on the next page to zero set the connected encoder.

5.10 Preset Input function (CON4, pins 7 and 8)

The Preset input function is used to execute the Set Preset function (see the previous "5.9 Zero setting (or Preset setting)" section). The Preset signal has to be at logic level HIGH (Vin between +5Vdc and +30Vdc) for 100 msec. minimum.
Refer to the **EnAb. In** parameter in the specific menus to enable this function.
Display value = 0 + **PrESEt** value

WARNING
Input with optocoupler, Vin max = +30Vdc.

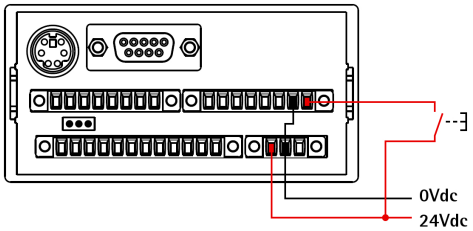
Recommended wiring diagrams:



5.10.1 Examples of using the input

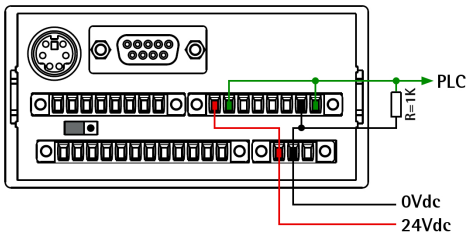
In both examples the "Enable Preset Input" function has to be enabled: **EnAb. In** parameter = ON.

1 Using a remote button to perform the Preset function of the displayed value (any encoder / sensor connected):



WARNING: pins 7 and 8 of CON4 require direct current (Vdc); if the display is supplied with alternate current (Vac), connect to pins 7 and 8 of CON4 pins 1 and 2 of CON5 (both +5Vdc and +24Vdc), instead of pins 1 and 2 of CON6.

2 Using OUT 1 (positive limit switch) to send a digital output to the PLC and simultaneously perform a Preset function of the displayed value:



WARNING: pins 1 and 7 of CON4 require direct current (Vdc); if the display is supplied with alternate current (Vac), connect to pins 1 and 7 of CON4 pins 1 and 2 of CON5 (both +5Vdc and +24Vdc) instead of pins 1 and 2 of CON6.

In this case, the high-level signal sent to the PLC has a duration of 160 ms.

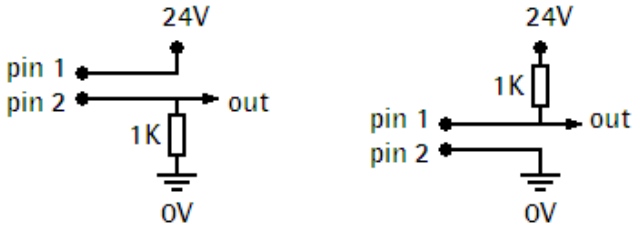
5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)

OUT 1 and OUT 2 digital outputs can be used to set upper and lower software limit switches. See the **LIMIt P** and **LIMIt N** parameters in the specific menus.
OUT 3 output can be used for zero setting an SSI absolute encoder / sensor equipped with zero setting input. When you press the zero setting key or send the zero setting serial command (see on page 21), OUT 3 is at high logic level for a duration of 100 ms.

Output	Function
OUT 1	**HIGH LEVEL** if the current position is > **LIMIt P** **LOW LEVEL** if the current position is < **LIMIt P**
OUT 2	**HIGH LEVEL** if the current position is < **LIMIt N** **LOW LEVEL** if the current position is > **LIMIt N**
OUT 3	**HIGH LEVEL** while the reset command is active **LOW LEVEL** during normal operation

WARNING
Outputs are open collector with optocouplers, Imax = 25 mA.

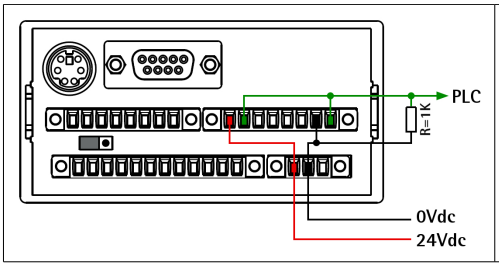
Recommended wiring diagrams:



5.11.1 Examples of using the outputs

In the first two examples the "Enable Preset Input" function has to be enabled: **EnAb. In** = ON.

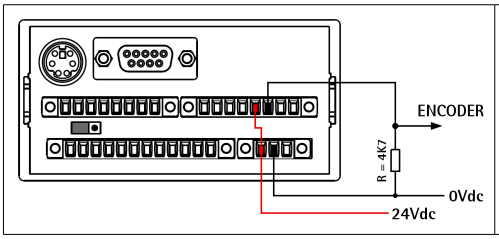
1 Using OUT 1 (positive limit switch) to send a digital output to the PLC and simultaneously perform a Preset function of the displayed value, the "Enable Preset Input" function has to be enabled: **EnAb. In** parameter = ON:



WARNING: pins 1 and 7 of CON4 require direct current (Vdc); if the display is supplied with alternate current (Vac), connect to pins 1 and 7 of CON4 pins 1 and 2 of CON5 (both +5Vdc and +24Vdc) instead of pins 1 and 2 of CON6.

In this case, the high-level signal sent to the PLC has a duration of 160 ms.

2 Using OUT 3 (encoder zero setting output) to send a **24V** signal to an SSI encoder in order to zero set the position by means of the Zero setting input:



WARNING: pins 5 and 6 of CON4 require direct current (Vdc); if the display is supplied with alternate current (Vac), connect to pins 5 and 6 of CON4 pins 1 and 2 of CON5 (both +5Vdc and +24Vdc) instead of pins 1 and 2 of CON6.

When we use the display zero setting function by means of the zero setting key or by sending the zero setting serial command (see on page 21), we contemporaneously transmit to the SSI encoder a 24V signal having a duration of 100 ms.

6 - Setup

6.1 Access to setup menus

Press **P** key for 3 second to enter the **Setup** procedure ("**SEtUP**" will be displayed):
Then:

- press * key to enter the **"Basic settings"** menu (see the "6.2 Basic settings" section on page 26);
- press ↑ key to enter the **"Parameter settings"** menu (see the "6.3 Parameter settings" section on page 26).

In the **"Basic settings"** menu both the name of the parameter and the value appear simultaneously; the value blinks; in the **"Parameter settings"** menu the name of the parameter appears first, pressing **P** key once again the set value also appears. Press **P** key to scroll the menu.

Change the value by pressing ↑ and/or ← keys.

Press * to store parameters and values. Displayed value stops blinking if stored correctly.

Admissible value range for each parameter is listed as follows in the next pages:
[minimum value, maximum value] (**default value**)
To exit the **SETUP** procedure scroll the whole list of parameters by pressing **P** key.

NOTE
In the LD200 page of Lika's web site **www.lika.biz** an application software **LD200_Serial_Communication_x_x.exe** is available for parameter setup via RS-232 interface (CON2 connections). Please refer to the "7 - RS-232 serial interface" section on page 53 and to the "8 - Application software for PC" section on page 65.

6.2 Basic settings

Ad

Device address [0, 31] (def: **0**)
It sets the address of the device needed for RS-232 communication. Please refer to the "7 - RS-232 serial interface" section on page 53 and to the "8 - Application software for PC" section on page 65.

L_int

Light intensity of the display [0, 15] (def: **10**)
It sets the light intensity of 7 segment LED display. Use ↑ and ← keys to change the parameter value.
0 = minimum intensity
...
10 = normal intensity
...
15 = maximum intensity

6.3 Parameter settings

d_tyPE

Device type
[E_Incr, E_1VPP, E_SSI_, M_SEnS, M_Incr, M_1VPP, M_SSI_] (def: **E_Incr**)

It sets the type of encoder/sensor connected to the display.

d_tyPE	Type of transducer
E_Incr	AB0 incremental rotary encoder Refer to "6.4 AB0 incremental rotary encoder" section on page 27
E_1VPP	1Vpp Sine/Cosine rotary encoder Refer to "6.5 1Vpp Sine/Cosine rotary encoder" section on page 30
E_SSI_	SSI interface absolute rotary encoder Refer to "6.6 Absolute rotary encoder with SSI interface" section on on page 33
M_SEnS	SM2, SM25, SM5 magnetic linear sensors Refer to "6.7 Lika's SM2, SM25, SM5 magnetic sensors" section on on page 40
M_Incr	AB0 incremental linear encoder/sensor Refer to "6.8 AB0 incremental linear encoder/sensor" section on on page 43
M_1VPP	1Vpp Sine/Cosine linear encoder/sensor Refer to "6.9 1Vpp Sine/Cosine linear encoder/sensor" section on on page 46
M_SSI_	SSI interface absolute linear encoder/sensor Refer to "6.10 Absolute linear encoder/sensor with SSI interface" section on on page 49

NOTE
Each device type has appropriate parameters only relevant to the specific type of encoder/sensor. The choice of the connected device also changes the list of the available parameters.

6.4 AB0 incremental rotary encoder

d_tyPE = **E_Incr**. List of parameters of incremental rotary encoders with HTL/Push-Pull or TTL/Line Driver circuit (with or without complementary signals). For connection refer to the "4.5 CON5 connections (Push-Pull, Line Driver, SSI)" section on page 17.

PPr

Pulses per revolution [1, 99999999] (def: **4096**)
Number of pulses per revolution (PPR) provided by the encoder.

diSt_r

Display value per turn [1, 99999999] (def: **4096**)
Value to be displayed after 1 revolution of the encoder.
If **diSt_r** is > **PPr** * 4, a "jump" in the display value will occur.

MOd 360

360° display mode [OFF, On] (def: **OFF**)
It sets the angular display mode (expressed in degrees: ...0.0°...359.9°...0.0°...).
If **MOd 360** = ON, the display value per turn (see **diSt_r** parameter) has to be set to 360, 3600 or 36000 depending on the required decimal separator position. Set **Unit** parameter = U_dEc.
OFF = angular display mode not active
On = angular display mode active

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters/degrees, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm/degrees ("degrees" only if **MOd 360** = On)
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

EnAbLE 0

Enable Zero signal [OFF, On] (def: **OFF**)
It is used to activate the Preset function of the display by means of the zero signal of the encoder (pins 7 and 8 of CON5, see on page 17). See the "5.9 Zero setting (or Preset setting)" section on page 21.
If **EnAbLE 0** is set to "On", the display value is zero set at the rising edge of the Zero signal.
OFF = Zero signal not enabled
On = Zero signal enabled

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the encoder shaft turns clockwise (viewed from the shaft side)
dn = inverted counting direction

dEciMALS

Decimal separator [0, 3] (def: **0**)
It changes the position of the decimal separator. This setting does not affect other parameters.
0 = 00000000
...
3 = 00000.000 (0000.0000 if **Unit** = Inch)

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + OFFSEt value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE
An I58-H-500ZCU46L2 encoder (500 PPR) has to display 10,00 mm at each complete turn, activate the positive limit switch at 30,00 mm and enable the input function.

d_tyPE = E_Incr
PPr = 500 (encoder feature)
diSt_r = 1000
MOd 360 = OFF
Unit = U_dec
EnAbLE 0 = OFF
dir = Up
dECiMALS = 2
PrESEt = 0
LIMIt P = 2999
LIMIt N = 0
OFFSEt = 0
EnAb. In = ON

EXAMPLE
We need to connect the following incremental rotary encoder: I28-Y-100BNF25Lx (100 PPR) and display 100 mm at each complete turn.

d_tyPE = E_Incr
PPr = 100 (encoder feature)
diSt_r = 100
MOd 360 = OFF
Unit = U_dec
EnAbLE 0 = OFF
dir = Up
dECiMALS = 0
PrESEt = 0
LIMIt P = 0
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

6.5 1Vpp Sine/Cosine rotary encoder

d_tyPE = **E_1VPP**. List of parameters of rotary encoders with 1Vpp Sine/Cosine output circuit. For connection refer to the "4.4 CON3 connections (Sine/Cosine 1Vpp)" section on page 17.

PPr

Pulses per revolution [1, 99999999] (def: **4096**)
Number of pulses per revolution (Sine/Cosine signals) provided by the encoder.

diSt_r

Display value per turn [1, 99999999] (def: **4096**)
Value to be displayed after 1 revolution of the encoder.
If diSt_r is > PPr * 1024, a "jump" in the display value will occur. The max. interpolation factor is 5,000.

MOd 360

360° display mode [OFF, On] (def: **OFF**)
It sets the angular display mode (expressed in degrees: ...0.0°...359.9°...0.0°...).
If MOd 360 = ON, the display value per turn (see diSt_r parameter) has to be set to 360, 3600 or 36000 depending on the required decimal separator position. Set Unit parameter = U_dec.
OFF = angular display mode not active
On = angular display mode active

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters/degrees, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm/degrees ("degrees" only if MOd 360 = On)
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

EnAbLE 0

Enable Zero signal [OFF, On] (def: **OFF**)
It is used to activate the Preset function of the display by means of the zero signal of the encoder (pins 7 and 8 of CON3, see on page 17). See the "5.9 Zero setting (or Preset setting)" section on page 21.
If EnAbLE 0 is set to "On", the display value is zero set at the rising edge of the Zero signal.
OFF = Zero signal not enabled
On = Zero signal enabled

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the encoder shaft turns clockwise (viewed from the shaft side)
dn = inverted counting direction

dEciMALS

Decimal separator [0, 3] (def: **0**)
It changes the position of the decimal separator. This setting does not affect other parameters.
0 = 00000000
...
3 = 00000.000 (0000.0000 if **Unit** = Inch)

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + OFFSEt value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE
An I58-V-1024ZCU16 encoder (1024 sinusoids each turn) has to display 360.00° each turn and activate the positive limit switch at 359.99°.

d_tyPE = E_1Vpp
PPr = 1024 (encoder feature)
diSt_r = 36000
MOd 360 = ON
Unit = U_dec
EnAbLE 0 = OFF
dir = Up
dECiMALS = 2
PrESEt = 0
LIMIt P = 35998
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

6.6 Absolute rotary encoder with SSI interface

d_tyPE = **E_SSI_**. List of parameters of singleturn/multiturn absolute rotary encoders with SSI interface and "Tree" or LSB Right Aligned" protocol. For connection refer to the "4.5 CON5 connections (Push-Pull, Line Driver, SSI)" section on page 17.

NOTE
If you need to connect a rotary encoder with "MSB Left Aligned" protocol and 25-bit max. resolution, refer to the "6.6.1 Connecting an SSI encoder with "MSB Left Aligned" protocol" section on page 36.

NOTE
Absolute/relative display mode function is not active in this device type.

ForMAt

Number of clocks for SSI [13-25, 25-32] (def: **13-25**)
It sets the number of clocks required by the SSI protocol.
13-25 = 13 or 25 clocks (singleturn/multiturn encoders)
25-32 = 25 or 32 clocks (extended protocol up to 32 bits)

WARNING
Extended format only with "LSB Right Aligned protocol" (see Prtcl parameter).

PPr

Resolution per turn [1, 33554432] (def: **4096**)
Number of counts per revolution (cpr) provided by the absolute encoder.

n_turnS

Number of turns [1, 4096] (def: **4096**)
Number of turns of the absolute encoder. For singleturn encoders set 1. With programmable encoders set the number of hardware revolutions, not the programmed value.

diSt_r

Display value per turn [1, 99999999] (def: **4096**)
Value to be displayed after 1 revolution of the encoder.
If diSt_r is > PPr, a "jump" in the display value will occur.

Prtcl

SSI protocol [SHIFt, trEE] (def: **trEE**)
Type of SSI protocol used by the connected encoder.
SHIFt = LSB Right Aligned protocol
trEE = Tree format protocol

NOTE
If you need to configure an SSI encoder with "MSB Left Aligned" protocol and 25-bit max. resolution, refer to the "6.6.1 Connecting an SSI encoder with "MSB Left Aligned" protocol" section on page 36.

codE

Encoder output code [GrAy, bin] (def: **GrAy**)
Output code of the encoder.
GrAy = Gray code (eg. Lika order code "GS" or "GR")
bin = Binary code (eg. Lika order code "BS" or "BR")

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the encoder shaft turns clockwise (viewed from the shaft side)
dn = inverted counting direction

dEciMALS

Decimal separator [0, 3] (def: **0**)
It changes the position of the decimal separator. This setting does not affect other parameters.
0 = 00000000
...
3 = 00000.000 (0000.0000 if **Unit** = Inch)

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

NOTE
Refer also to the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23 for contemporaneously resetting the encoder via OUT 3 output (if the encoder is equipped with the Zero setting input).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + **OFFSEt** value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE
The absolute position of an AM5812/4096GS-10 encoder (4096 cpr, 4096 turns, Gray code and "Tree" protocol) has to display 20,00 mm at each complete turn, activate the positive limit switch at 50,00 mm and enable the input function.

d_tyPE = E_SSI_
ForMAt = 13-25
PPr = 4096 (encoder feature)
n_turnS = 4096 (encoder feature)
diSt_r = 2000
Prtcl = Tree (encoder feature)
codE = Gray (encoder feature)
Unit = U_dec
dir = Up
dECiMALS = 2
PrESEt = 0
LIMIt P = 4999
LIMIt N = 0
OFFSEt = 0
EnAb. In = ON

EXAMPLE
We need to connect the following absolute rotary encoder: MM3612/8192GB-6 (4096 cpr, 8192 turns, Gray code and "LSB Right Aligned" protocol).

d_tyPE = E_SSI_
ForMAt = 13-25
PPr = 4096 (encoder feature)
n_turnS = 8192 (encoder feature)
diSt_r = 4096
Prtcl = Shift (encoder feature)
codE = Gray (encoder feature)
Unit = U_dec
dir = Up
dECiMALS = 0
PrESEt = 0
LIMIt P = 0
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

6.6.1 Connecting an SSI encoder with "MSB Left Aligned" protocol

You can set the LD200 display for connection to a rotary or linear encoder equipped with **"MSB Left Aligned" SSI serial protocol** having a **max. resolution of 25 bits**.

If the **total hardware resolution** of the connected encoder is **between 12 and 25 bits** (transmission of 25 clocks) please set the parameters as follows:

d_tyPE = E_SSI_
ForMAt = 13-25
PPr = see the table below
n_turnS = 4096, see the table below
diSt_r = the same as PPr, see the table below
Prtcl = Tree

Number of bits	PPr	n_turnS	diSt_r
25	8192	4096	8192
24	4096	4096	4096
23	2048	4096	2048
22	1024	4096	1024
21	512	4096	512
20	256	4096	256
19	128	4096	128
18	64	4096	64
17	32	4096	32
16	16	4096	16
15	8	4096	8
14	4	4096	4
13	2	4096	2

If the **total hardware resolution** of the connected encoder is **between 2 and 12 bits** (transmission of 13 clocks) please set the parameters as follows:

d_tyPE = E_SSI_
ForMAt = 13-25
PPr = see the table below
n_turnS = 1, see the table below
diSt_r = the same as PPr, see the table below
Prtcl = Tree

Number of bits	PPr	n_turnS	diSt_r
12	4096	1	4096
11	2048	1	2048
10	1024	1	1024
9	512	1	512
8	256	1	256
7	128	1	128
6	64	1	64
5	32	1	32
4	16	1	16
3	8	1	8
2	4	1	4

The **total hardware resolution** of the connected encoder is: **cpr** + **number of turns**.
In a rotary encoder the cpr is expressed in bits in the order code while the number of turns must be translated into bits.

For example: AM58**12/4096**...: "12" is the number of bits of the counts per revolution (i.e. 2^{12} = 4096 cpr); "4096" is the number of turns, that is: 2^{12}. So the number of turns expressed in bits is "12".
In the example the total hardware resolution will be 12 + 12 = 24 bits.

In a linear encoder the number of bits is calculated considering the maximum number of information the encoder can provide to output and cannot be directly gathered from the order code. WARNING: please do not add to sum any additional bit (such as an error bit). The maximum number of information depends on the measuring length of the application and the resolution of the encoder and is calculated as follows:

$$\text{Maximum number of information} = \frac{\text{measuring length}}{\text{resolution}}$$

EXAMPLE
Let's say we need to connect the following linear encoder: SMAX-BG-100. Its resolution is 0.1 mm (see the order code). The maximum measuring length of the SMAX linear encoder over the MTAX tape is 600 mm (see the order code of the tape).
So the encoder will provide the following maximum number of information:

$$\text{Maximum number of information} = \frac{600}{0.1} = 6{,}000$$

It is clear that if you mount only half the tape (i.e. 300 mm), then the maximum number of information that the encoder can provide will be down to half (3,000 information).
To translate the number of information into bits, you must "round up" the value to the next highest power of 2, that is: 6,000 = 2^{13} (8,192). The number of bits to consider will be "13".
For further information please refer to the specific technical documentation of the connected encoder.

EXAMPLE
Using the parameters dedicated to the absolute rotary encoders with SSI interface, we are able to configure the display for connection to an SMA2 linear encoder (resolution from 1 µm to 50 µm, Gray or binary code and "MSB Left Aligned" protocol). Please consider that the maximum measuring length of the SMA2 encoder over the MTA2 tape is 8,160 mm.

d_tyPE = E_SSI_
ForMAt = 13-25
PPr = 2048 if resolution = 1 µm
PPr = 1024 if resolution = 2 µm
PPr = 512 if resolution = 5 µm
PPr = 256 if resolution = 10 µm
PPr = 64 if resolution = 50 µm

n_turnS = 4096
diSt_r = the same as **PPr**
Prtcl = Tree
codE = Gray or Bin
dir = Up or Dn

For example if we connect an SMA2-GG1-1-...:

$$\text{Maximum number of information} = \frac{8{,}160}{0.001} = 8{,}160{,}000$$

$8{,}160{,}000 = 2^{23}$

Thus:
n_turnS = $4{,}096 = 2^{12}$
PPr = $2^{23} - 2^{12} = 2^{11} = 2{,}048$, as you can see in the table above.

6.7 Lika's SM2, SM25, SM5 magnetic sensors

d_tyPE = **M_SEnS**. List of parameters of Lika's SM2, SM25 or SM5 series magnetic sensors with Mini-DIN connector. For connection refer to the "4.2 CON1 connections (Mini-DIN connector)" section on page 16.

Pitch

Type of sensor/tape [10, 20, 25, 32, 40, 50] (def: **50**)
It sets the type of SM sensor + MT tape used. The number to be set indicates the pole pitch of the sensor and tape expressed in tenths of a millimeter.
20 = SM2 sensor + MT20 tape (2 mm pole pitch)
25 = SM25 sensor + MT25 tape (2.5 mm pole pitch)
50 = SM5 sensor + MT50 tape (5 mm pole pitch)

rES

Resolution [0.001, 0.005, 0.01, 0.05, 0.1, 0.5, 1] (def: **0.001**)
It sets the linear resolution expressed in millimeters to be used to display the position value.
1 = 1 mm
...
0.001 = 0.001 mm

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the sensor moves over the tape in the standard direction as explained in the manual
dn = inverted counting direction

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this PrESEt parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the

zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + OFFSEt value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE

An SM5-R-2 sensor is connected to an LD200 display and has to display positions with a resolution of 0.01 mm, a tool correction factor of 5 mm and software limit switches at 0 and 1.5 meter.

d_tyPE = M_Sens
Pitch = 50 (sensor feature)
rES = 0.01 mm
Unit = U_dec
dir = Up
PrESEt = 0
LIMIt P = 149999
LIMIt N = 0
OFFSEt = 500
EnAb. In = OFF

6.8 AB0 incremental linear encoder/sensor

d_tyPE = **M_Incr**. List of parameters of incremental linear encoders and sensors with HTL/Push-Pull or TTL/Line Driver output (with or without complementary signals). For connection refer to the "4.5 CON5 connections (Push-Pull, Line Driver, SSI)" section on page 17.

rES

Resolution [0.001, 0.002, 0.005, 0.01, 0.02, 0.025, 0.04, 0.05, 0.1, 0.25, 0.5] (def: **0.001**)
It sets the linear resolution expressed in millimeters to be used to display the position value.
0.5 = 0.5 mm
...
0.001 = 0.001 mm

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

EnAbLE 0

Enable Zero signal [OFF, On] (def: **OFF**)
It is used to activate the Preset function of the display by means of the zero signal of the sensor (pins 7 and 8 of CON5, see on page 17). See the "5.9 Zero setting (or Preset setting)" section on page 21.
If EnAbLE 0 is set to "On", the display value is zero set at the rising edge of the Zero signal.
We recommend sensors with "R" Reference order code to be used.
OFF = Zero signal not enabled
On = Zero signal enabled

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the sensor moves over the tape in the standard direction as explained in the manual
dn = inverted counting direction

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + **OFFSEt** value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE

The measurement values of an SME51-Y-2-10-I-L2-B magnetic sensor paired with an MT50 tape have to be displayed.

d_tyPE = M_Incr
rES = 0.01 mm
Unit = U_dec
EnAbLE 0 = OFF
dir = Up
PrESEt = 0
LIMIt P = 0
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

6.9 1Vpp Sine/Cosine linear encoder/sensor

d_tyPE = **M_1VPP**. List of parameters of incremental linear encoders and sensors with 1Vpp Sine/Cosine output. For connection refer to the "4.4 CON3 connections (Sine/Cosine 1Vpp)" section on page 17.

Pitch

Pitch of the sensor/tape [10, 20, 25, 32, 40, 50] (def: **50**)
It sets the type of sensor and tape used. Value indicates the pole pitch of the sensor and tape expressed in tenths of a millimeter.
10 = MT10 tape (1 mm pole pitch)
...
50 = MT50 tape (5 mm pole pitch)

rES

Resolution [0.005, 0.01, 0.02, 0.025, 0.04, 0.05, 0.1, 0.25, 0.5] (def: **0.005**)
It sets the linear resolution expressed in millimeters to be used to display the position value.
0.5 = 0.5 mm
...
0.005 = 0.005 mm

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

EnAbLE 0

Enable Zero signal [OFF, On] (def: **OFF**)
It is used to activate the Preset function of the display by means of the zero signal of the sensor (pins 7 and 8 of CON3, see on page 17). See the "5.9 Zero setting (or Preset setting)" section on page 21.
If EnAbLE 0 is set to "On", the display value is zero set at the rising edge of the Zero signal.
We recommend sensors with "R" Reference order code to be used.
OFF = Zero signal not enabled
On = Zero signal enabled

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of the display value.
uP = standard counting direction = count up when the sensor moves over the tape in the standard direction as explained in the manual
dn = inverted counting direction

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + **OFFSEt** value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE
The measurement values of an SMS1x-V-1-R-L2 magnetic sensor with a resolution of 10 µm paired with an MT10 tape have to be displayed.

d_tyPE = M_1VPP
Pitch = 10 (1 mm, sensor feature)
rES = 0.01 mm
Unit = U_dec
EnAbLE 0 = OFF
dir = Up
PrESEt = 0
LIMIt P =0
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

6.10 Absolute linear encoder/sensor with SSI interface

d_tyPE = **M_SSI_**. List of parameters of absolute linear encoders and sensors with SSI interface and "LSB Right Aligned" protocol. For connection refer to the "4.5 CON5 connections (Push-Pull, Line Driver, SSI)" section on page 17.

NOTE
If you need to connect a linear encoder with "MSB Left Aligned" protocol (such as an SMA2 linear encoder: "MSB Left Aligned" protocol, resolution from 1 µm to 50 µm), refer to the "6.6.1 Connecting an SSI encoder with "MSB Left Aligned" protocol" section on page 36.

NOTE
Absolute/relative display mode function is not active in this device type.

ForMAt

Number of clocks for SSI [25, 32] (def: **25**)
It sets the number of clocks required by the SSI protocol.
25 = 25 clocks (standard protocol)
32 = 32 clocks (extended protocol up to 32 bits)

StEPS

Number of steps [0, 99999999] (def: **4096**)
Maximum number of information provided by the absolute encoder/sensor (total resolution) expressed in the higher power of 2 value.
StEPS = 524,288 for SMA5-GA-10 (2^{19})
StEPS = 1,048,576 for SMA5-GA-5 (2^{20})

NOTE
The maximum number of information depends on the measuring length of the application and the resolution of the encoder and is calculated as follows:

$$\text{Maximum number of information} = \frac{\text{measuring length}}{\text{resolution}}$$

EXAMPLE
Let's say we need to connect the following linear encoder: SMA1-GA2-5. Its resolution is 0.005 mm (see the order code). The maximum measuring length of the SMA1 linear encoder over the MTA1 tape is 5,015 mm (see the technical sheet of the tape).
So the encoder will provide the following maximum number of information:

$$\text{Maximum number of information} = \frac{5{,}015}{0.005} = 1{,}003{,}000$$

The higher power of 2 to be set will be 1,048,576 (2^{20}).
It is clear that if you mount only half the tape (i.e. ~2,507 mm), then the maximum number of information that the encoder can provide will be down to half (501,400 information, value to be set: 524,288 = 2^{19}).

rES

Resolution [0.005, 0.01, 0.05, 0.1] (def: **0.005**)
It sets the linear resolution of the sensor connected to the display expressed in millimeters.
0.1 = 0.1 mm
0.05 = 0.05 mm
0.01 = 0.01 mm
0.005 = 0.005 mm

codE

Encoder/sensor output code [GrAy, bin] (def: **GrAy**)
Output code of the encoder/sensor.
GrAy = Gray code
bin = Binary code

Unit

Unit of measurement [U_dEc, Inch, Inch_F] (def: **U_dEc**)
It sets the unit of measurement of the display mode to millimeters, inches or fractional inches. See also the "5.8 Displaying values in millimetres / degrees / inches / fractional inches" section on page 21.
U_dEc = mm
Inch = inches
Inch_F = fractional inches (eg. 12.31.64 = 12" $^{31}/_{64}$)

dir

Counting direction [uP, dn] (def: **uP**)
It sets the counting direction of displayed value.
uP = standard counting direction = count up when the sensor moves over the tape in the standard direction as explained in the manual
dn = inverted counting direction

PrESEt

Preset value [-99999999, 99999999] (def: **0**)
The Preset function of the display is meant to show a desired value according to the position value provided by the connected encoder. The chosen position will get the value set next to this **PrESEt** parameter and all the previous and the following positions will get a value according to it. This function is useful, for example, when we want to pair the zero position of the application with the zero value that is displayed. To execute the preset see the "5.9 Zero setting (or

Preset setting)" section on page 21. This parameter is always expressed and calculated in metric measurement unit (millimeters).

NOTE
Refer also to the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23 for contemporaneously resetting the encoder via OUT 3 output (if the encoder is equipped with the Zero setting input).

LIMIt P

Positive limit switch [-99999999, 99999999] (def: **0**)
Value of positive limit switch.
Output OUT 1 (see on page 18) is active (HIGH LEVEL) when the current position is greater than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

LIMIt N

Negative limit switch [-99999999, 99999999] (def: **0**)
Value of negative limit switch.
Output OUT 2 (see on page 18) is active (HIGH LEVEL) when the current position is less than the set value. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" section on page 23.

OFFSEt

Offset value [-99999999, 99999999] (def: **0**)
The offset value is the difference between the value displayed and the value that is actually measured. It is added to the current position value to indicate, for example, the thickness of a tool. This value is added to the current position by pressing ↑ key. This parameter is always expressed and calculated in metric measurement unit (millimeters). See also the "5.7 Offset" section on page 21.
Position = current position + OFFSEt value

EnAb. In

Enable Preset Input [OFF, On] (def: **OFF**)
If it is set to "On", the Preset digital input can be used to activate the Preset function (see the "5.10 Preset Input function (CON4, pins 7 and 8)" section on page 22).
OFF = Input not enabled
On = Input enabled

EXAMPLE

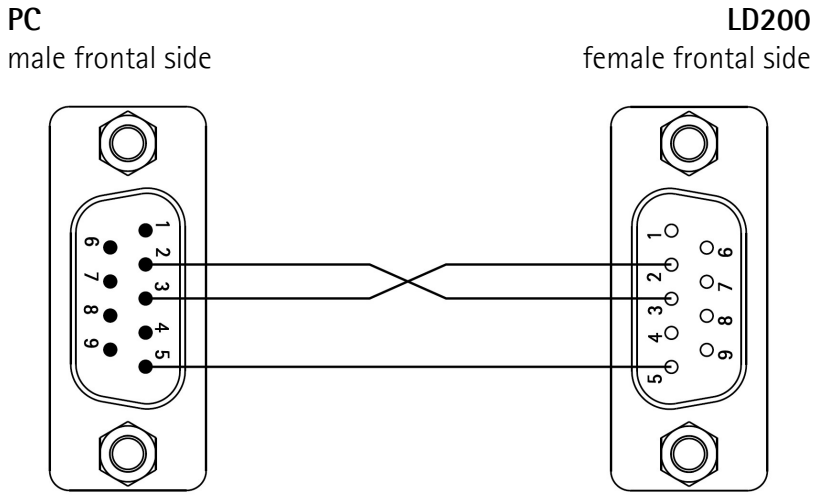
Display of the value measured by a Lika's absolute magnetic sensor, type SMA5-GA-10-L2.

d_tyPE = M_SSI_
ForMAt = 13-25
StEPS = 524288 (2^{19})
rES = 0.01 mm
codE = Gray (sensor feature)
Unit = U_dec
dir = Up
PrESEt = 0
LIMIt P = 0
LIMIt N = 0
OFFSEt = 0
EnAb. In = OFF

7 - RS-232 serial interface

In the LD200 page of Lika's web site **www.lika.biz** an application software **LD200_Serial_Communication_x_x.exe** is available for parameter setup via RS-232 interface (CON2 connections, see the "4.3 CON2 connections (RS-232 serial interface)" section on page 16). Refer also to "8 - Application software for PC" section on page 65.

7.1 Connection to a PC



WARNING
Please make sure that RxD on PC side is connected to TxD on LD200 side and TxD on PC side is connected to RxD on LD200 side.

7.2 Setting the serial port

Configure the serial port of the PC as shown in the following table:

Function	Data
Baud rate	9600
Data bits	8
Parity bit	No
Stop bit	1
Flow control	No

7.3 Communication protocol

The communication protocol consists of messages having a fixed length of 14 bytes. In every transmission a **Command** message is sent by the PC, while the LD200 answers sending back an **Acknowledge** message (except when the cyclic transmission of the position value is set).

7.3.1 Protocol structure

Byte	Field	Function
0	**SOF**	Start of Frame
1	**ADD**	Device address
2, 3, 4, 5	**CMD**	Command
6	**ACK**	Acknowledge
7, 8, 9, 10	**DATA**	Process data
11,12	**CHK**	Checksum
13	**EOF**	End of Frame

SOF

Start of Frame
Start of message byte.
SOF = " | " (ASCII) = 7C (hex)

ADD

Device address
Byte used to specify the address of device the message is sent to. The value of **ADD** is hexadecimal.

EXAMPLE
Address 12: **ADD** = 0C (hex)

CMD

Command
Byte used to specify the command (sent or received). **CMD** byte is ASCII coded (see the "7.3.2 Commands" section on page 55 for available values).

ACK

Acknowledge
The acknowledge character confirms the correct transmission of data.
PC → LD200: **ACK** =**"Null"** (00 Hex)
LD200 → PC: **ACK** =**":"** (3A Hex)
Other values mean incorrect transmission.

DATA

Current position and Process data
4 **DATA** bytes are used to transmit the current position or parameter data/values to be set.
DATA bytes content must be hexadecimal.

Bytes 7 to 10 are **"signed integer 32 bit"** and have the following structure:

byte 7			...	byte 10		
MSBit			...			LSBit
2^{31}	...	2^{24}	...	2^{7}	...	2^{0}

CHK

Checksum

2 **CHK** bytes are used to control the correct transmission of the message. Value of **CHK** is the sum of bytes 0-10.

Bytes 11 and 12 are **"unsigned integer 16 bit"** and have the following structure:

byte 11			byte 12		
MSBit					LSBit
2^{15}	...	2^{8}	2^{7}	...	2^{0}

As **CHK** is 16 bit unsigned, a checksum overflow is ignored.

EOF

End of Frame

End of message byte.

EOF = " ♦ " (ASCII) = 04 (hex)

7.3.2 Commands

Transmitted commands have the following meaning:

- "**T...**" (transmit): it means a command sent from the PC to the LD200 to read a parameter value. **DATA** content has no meaning in this case
  LD200 replies sending back the same **CMD**, **ACK** = "**:**" and required value in the DATA field.

- "**R...**" (receive): it means a command sent from the PC to the LD200 to write a parameter value that must be entered in the **DATA** field.
  LD200 acquires the value and confirms sending back the same **CMD**, **ACK** = "**:**" and the same **DATA** values.

Possible values of Command (**CMD**) are the following:

TPOS

Transmission of the current position [signed int 32 bit]

- If the device type is set to **M_SEnS** or **M_1VPP** the current position value must be multiplied by the resolution of the sensor (see the **rES** parameter in the specific menus).

EXAMPLE

Received position = 1589, **rES** = 0.05 mm
Real position = 1589 * 0.05 = 79.45 mm

- If the device type is set to **M_Incr** or **M_SSI_** the position is transmitted according to the resolution of the device.

EXAMPLE

Received position = 13362, **rES** = 0.002 mm, Real position = 13.362 mm
Received position = 2345, **rES** = 0.05 mm, Real position = 23.45 mm
Received position = 1921, **rES** = 0.1 mm, Real position = 192.1 mm

- If the device type is set to **E_incr**, **E_1VPP** or **E_SSI_** the position is transmitted without decimal separator.

EXAMPLE

Received position = 15879, **dEciMALS** = 2, Real position = 158.79

See an example of reading the current position in the "Reading the current position" section on page 63.

TDEV
RDEV

Device type [unsigned char 8 bit]. See the **d_tyPE** parameter in the specific menus.

These commands are used to read or set the device type connected to the display. **DATA** bytes must be as in the following table:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Device type**
00	M_SEnS (see on page 40)
01	M_Incr (see on page 43)
02	M_1VPP (see on page 46)
03	M_SSI_ (see on page 49)
04	E_Incr (see on page 27)
05	E_1VPP (see on page 30)
06	E_SSI_ (see on page 33)

See an example of setting the device type in the "Setting the Device type" section on page 63.

TFOR
RFOR

Number of SSI clocks [unsigned char 8 bit]. See the **ForMAt** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)		
DATA byte 10 (Hex)	**E_SSI_**	**M_SSI_**
00	13-25	25
01	25-32	32

TPPR
RPPR

Pulses per revolution [signed int 32 bit]. See the **PPr** parameter in the specific menus.
See an example of setting the pulses per revolution in the "Setting the Pulses per revolution" section on page 63.

TREV
RREV

Number of turns [signed int 32 bit]. See the **n_turnS** parameter on page 33.

TDST
RDST

Display value per turn [signed int 32 bit]. See the **diSt_r** parameter in the specific menus.

T360
R360

360° display mode [bool]. See the **MOd 360** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**MOd 360**
00	OFF
01	ON

TSTE
RSTE

Number of steps [signed int 32 bit]. See the **StEPS** parameter on page 49.

TPIT
RPIT

Pitch of the sensor / tape [unsigned char 8 bit]. See the Pitch parameter in the specific menus.
Value is expressed in tenths of a millimeter. Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)		
DATA byte 10 (Hex)	**Pitch**	**Tape**
00	10	MT10
01	20	MT20
02	25	MT25
03	32	MT32
04	40	MT40
05	50	MT50

TRES
RRES

Linear resolution [unsigned char 8 bit]. See the **rES** parameter in the specific menus.
Resolution is expressed in millimeters. Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)				
DATA byte 10 (Hex)	**M_SEnS**	**M_Incr**	**M_1VPP**	**M_SSI_**
00	0.001	0.001	0.005	0.005
01	0.005	0.002	0.01	0.01
02	0.01	0.005	0.02	0.05
03	0.05	0.01	0.025	0.1
04	0.1	0.02	0.04	-
05	0.5	0.025	0.05	-
06	1	0.04	0.1	-
07	-	0.05	0.25	-
08	-	0.1	0.5	-
09	-	0.25	-	-
0A	-	0.5	-	-

TPRO
RPRO

SSI protocol [bool]. See the **Prtcl** parameter on page 34.

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Prtcl**
00	Tree
01	Shift

TCOD
RCOD

Output code of SSI protocol [bool]. See the **codE** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**codE**
00	Gray
01	Binary

TUNI
RUNI

Unit of measurement [unsigned char 8 bit]. See the **Unit** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Unit**
00	Decimal (mm)
01	Inches
02	Fractional Inches

TETZ
RETZ

Enabling of Zero signal [bool]. See the **EnAbLE 0** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**EnAbLE 0**
00	OFF
01	ON

TDIR
RDIR

Counting direction [bool]. See the **dir** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Dir**
00	standard
01	inverted

TDEC
RDEC

Decimal separator [unsigned char 8 bit]. See the **dEciMALS** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**dEciMALS**
00	0 decimals
...	...
03	3 decimals

See an example of reading the position of the decimal separator in the "Reading the position of the decimal separator" section on page 63.

TREF
RREF

Preset value [signed int 32 bit]. See the **PrESEt** parameter in the specific menus.

TLIP
RLIP

Positive limit switch [signed int 32 bit]. See the **LIMIt P** parameter in the specific menus.

TLIM
RLIM

Negative limit switch [signed int 32 bit]. See the **LIMIt N** parameter in the specific menus.

TOFF
ROFF

Offset value [signed int 32 bit]. See the **OFFSEt** parameter in the specific menus.

TEIN
REIN

Enabling the Preset input [bool]. See the **EnAB. In** parameter in the specific menus.
Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**EnAb. In**
00	OFF
01	ON

TADR
RADR

Serial address of the device [unsigned char 8 bit]. See the **Ad** parameter on page 26.

Enter the new address of the device in the **DATA** bytes according to the following table. When you send the command, enter the current address in the **ADD** field, not the new one. The new address will be valid after **ACK** message.

Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Ad**
00	address 0
...	...
1F	address 31

TRLA
RRLA

Absolute / relative counting mode [bool]. See the "5.5 Absolute / relative counting mode" section on page 20.

Possible values of **DATA** bytes are:

DATA bytes 7-9 = 00 (Hex)	
DATA byte 10 (Hex)	**Counting mode**
00	absolute
01	relative

TVER

Hardware and software versions of the device.

The structure of **DATA** bytes is as follows:

Byte	**7**	**8**	**9**	**10**
Meaning	-	-	HW version	SW version

ZERO

Zero setting the display position. See the "5.9 Zero setting (or Preset setting)" section on page 21.

DATA bytes are negligible.

See an example of zero setting the display position in the "Zero setting the position value" section on page 64.

STAR

Starting the cyclic mode [unsigned int 32 bit]
It sets the cyclic transmission of the position value. Enter in the **DATA** bytes the cyclic time expressed in milliseconds.
Cyclic time can be set to any value between 100 and 10000 ms, values must be a multiple of 4.
See an example of starting the cyclic transmission of the position value in the "Starting the cyclic transmission" section on page 64.
See an example of cyclic transmission of the position value from LD200 in the "Reading the current position cyclically" section on page 64.

STOP

Stopping the cyclic mode.
DATA bytes are negligible.
See an example of stopping the cyclic transmission of the position value in the "Stopping the cyclic transmission" section on page 64.

"Null"

Used by LD200 for cyclic transmission [unsigned int 32 bit]
This command is used only by LD200 for cyclic transmission of the position.
See an example of cyclic transmission of the position value from LD200 in the "Reading the current position cyclically" section on page 64.

NOTE

- While sending a "**T...**" transmission **CMD** command from the PC to LD200 the contents of **DATA** bytes are negligible.
- While sending an "**R...**" receive **CMD** command from the PC to LD200 the parameter value to transmit has to be set in the **DATA** field.
- The **RUNI** command (see on page 59) allows to set the unit of measurement used for displaying the value, but the following parameters are transmitted always in millimeters (mm): diSt_r, PrESEt, LIMIt P, LIMIt N, OFFSEt and the current position value.

7.3.3 Examples of using the protocol and the commands

In all examples the address of the device is 0 (**ADD** of LD200 = 0).

Setting the Device type
E_Incr = 04 h

PC → LD200 **CMD** = RDEV

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	52444556	00	0004	01B1	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	52444556	3A	0004	01EB	04

Setting the Pulses per revolution
PPR = 500 = 01F4 h

PC → LD200 **CMD** = RPPR

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	52505052	00	001F4	02B5	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	52505052	3A	001F4	02EF	04

Reading the position of the decimal separator

PC → LD200 **CMD** = TDEC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	54444543	00	0000	019C	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	54444543	3A	0002	01D8	04

DATA = 00 00 00 02 h => dEciMALS = 2

Reading the current position

PC → LD200 **CMD** = TPOS

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	54504F53	00	0000	01C2	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	54504F53	3A	0000	01FC	04

DATA = 0 => Position = 0

Zero setting the position value

PC → LD200 **CMD** = ZERO

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	5A45524F	00	0000	01BC	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	5A45524F	3A	0000	01F6	04

Starting the cyclic transmission

Cyclic time = 100 ms = 64h

PC → LD200 **CMD** = STAR

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	53544152	00	00064	021A	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	53544152	3A	00064	0254	04

Reading the current position cyclically

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	00000000	3A	003E8	01A1	04

DATA = 00 00 03 E8 h => Position = 1000

Stopping the cyclic transmission

PC → LD200 **CMD** = STOP

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	53544F50	00	0000	01C2	04

LD200 → PC

	SOF	ADD	CMD	ACK	DATA	CHK	EOF
Hex	7C	00	53544F50	3A	0000	01FC	04

8 - Application software for PC

LD200 display is supplied with a software expressly developed and released by Lika Electronic in order to easily programme and configure the device. It allows the operator to set the working parameters of the device and monitor whether the device is running properly. The program is supplied for free and can be installed in any PC fitted with a Windows operating system (Windows XP or later). The name of the program executable file is **LD200_Serial_Communication_x_x.exe** where _x_x is the release version of the file. The program is available for download at the page dedicated to LD200 in Lika's web site **www.lika.biz**.
The program is designed to be installed simply by copying the executable file (*.exe file) to the desired location and there is **no installation** process. To launch the program just double-click the file icon. To close the program press the **EXIT** button at the top right of the page.

NOTE
Before starting the program and establishing a communication with the device, it is necessary to connect it to the personal computer. The interface is an RS-232 serial interface. To communicate with the encoder, you must connect the device to the personal computer through a serial port. Should the personal computer not be equipped with a serial port, you must install a USB / RS-232 converter, easily available in the market.
On the DISPLAY side, the serial cable must be connected as explained in the "4.3 CON2 connections (RS-232 serial interface)" section on page 16.

8.1 Serial communication settings

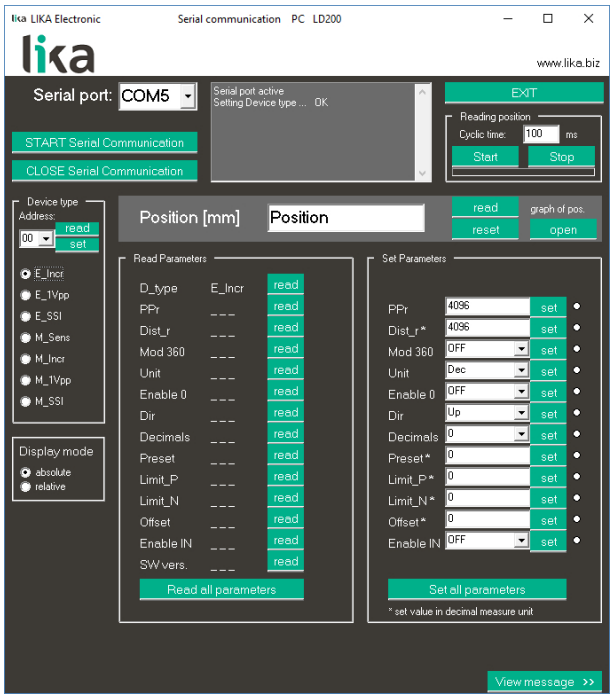
When you start the program by double clicking on the **LD200_Serial_Communication_x_x.exe** executable file icon, first of all you must select the serial port. If the COM port is not listed (see the **Serial port** drop-down box), enter the correct number directly in the field (e.g. COM5, COM11, ...).

Then start the serial communication by pressing the **START Serial communication** button.

If the serial parameters are set properly and the communication with the COM port is established correctly, some information will appear in the **Note** field (see the message **Serial port active**).

8.2 Selecting the encoder type

In the **Device type** box select the address and type of the encoder connected to the LD200.
Press the **READ** button next to the **Address** drop-down box to read the address that is set currently.
Select a different address in the drop-down box and press the **SET** button to confirm a new address.

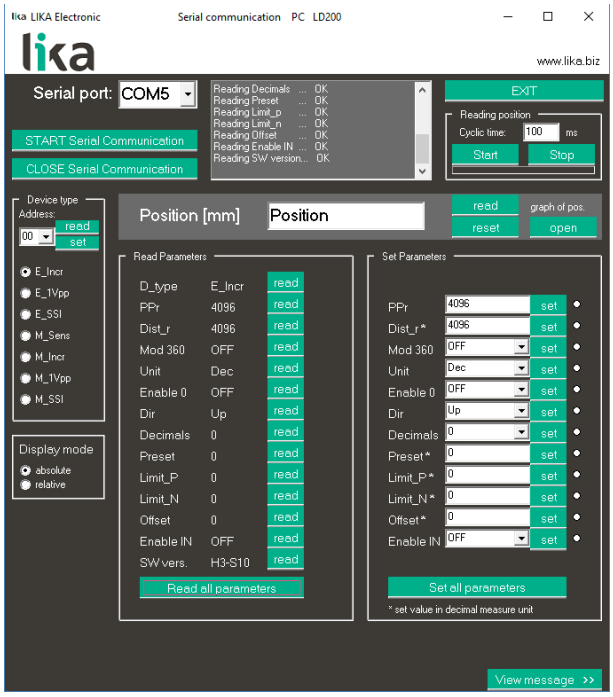


If the PC communicates properly with LD200 the complete list of parameters for the the selected type of encoder is displayed.
In case of wrong communication an error messages is displayed. The number of the COM port and the address of the encoder must be checked.

All messages that are exchanged between the PC and the device via RS-232 serial interface can be viewed. Press the **VIEW MESSAGE** button on the bottom right.

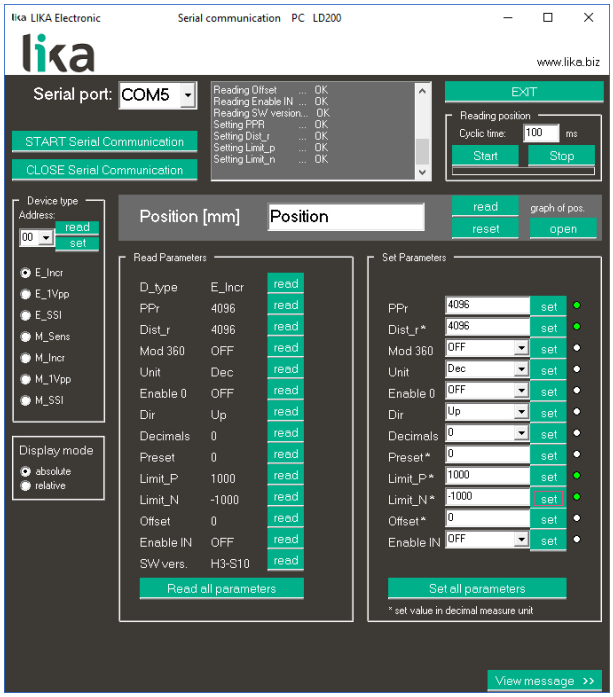
8.3 Reading the encoder parameters

In the **Read parameters** box press the **READ** button next to each parameter to read only the value of the specific parameter selected.
Press the **READ ALL PARAMETERS** to display the complete list of values of all parameters.



8.4 Setting the encoder parameters

In the **Set Parameters** box the complete list of the parameters to be set is available.
Enter the new value in the field or select it by means of the drop-down box. Then press the **SET** button next to each parameter to confirm only the value of the specific parameter selected; or press the **SET ALL PARAMETERS** button to confirm the complete list of values of all parameters.
A green mark next to each **SET** button confirms that the parameter has been accepted, a red mark means an incorrect value.
Negative values can be set entering the "minus" ("-") sign.



All parameters that are set properly are saved automatically and displayed in the **Read Parameters** box.

8.5 Reading the position

As soon as you press the **READ** button in the **Position [mm]** box you read the position that is currently displayed on the device including preset and offset values if set.
Press the **RESET** button to reset the position to the value set next to the **Preset** parameter.

8.6 Setting the absolute / relative counting mode

Press the **ABSOLUTE** or **RELATIVE** buttons in the **Display mode** box to select the absolute or the relative counting mode respectively.

8.7 Reading the position cyclically

The program allows to set the cyclic transmission of the position value. To enable the setting use the functions in the **Reading position** box on the top right.
In the **Cyclic time** field enter the delay between two consecutive readings expressed in milliseconds. Press the **START** button to start the reading cycle. A blue bar under the buttons shows that the cycle is active (also a message appears in the **Note** field at the top of the page). Press the **STOP** button to stop the reading cycle.

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Document version	Release date	Description	HW	SW
1.0	17.11.2005	First issue	1	1
1.1	07.12.2005	HW-SW update, general review	1	3
1.2	12.12.2005	OUT3 corrected	1	3
1.3	19.12.2005	LIMIt P corrected	1	3
1.4	21.02.2006	RS-232 communication update, parameters Unit and MOd 360, LED1 function, preset function changed	1	4
1.5	14.03.2007	Preset Input function, EnAbLE 0 for **E_INCR** and **M_INCR**, diSt_r for **E_SSI_** updated	1	6
1.6	07.06.2007	Preset input corrected ("5.10 Preset Input function (CON4, pins 7 and 8)")	1	6
2.0	07.11.2007	HW update: last position memorization, Enable Zero signal added to **E_1VPP** e **M_1VPP**	2	8
2.1	25.11.2009	"5.11 OUT 1, OUT 2, OUT 3 output function (CON4, pins 1 ... 6)" updated	2	8
2.2	14.10.2010	SW update, general review	2	10
2.3	10.12.2018	General review, Italian and English versions separated	3	10
2.4	06.03.2020	Sections "5.10.1 Examples of using the input" and "5.11.1 Examples of using the outputs" updated	3	10

Dispose separately

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