Smart encoders & actuators

User's guide

ASB62

- Singleturn rotary encoder with optical scanning
- Ø 10-mm (0.39") 1:10 tapered solid shaft
- Many mounting options (expansion flange and fixing plates)
- Resolution up to 25 bits
- SSI and BiSS C-mode interfaces
- 2,048 Sine-Cosine 1Vpp additional track
- For feedback operations on servo and gearless motors

Suitable for the following models:

- ASB62-xx-00-BGx-...
- ASB62-xx-00-GGx-...
- ASB62-xx-00-SCx-...

Table of Contents

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 for submitting your comments, suggestions and criticisms.

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 Lika device and 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 and exhaustive information the operator needs to correctly and safely install and operate the **ASB62 absolute encoder with SSI / BiSS C-mode interface**.

ASB62 is the absolute singleturn encoder for position and speed feedback on gearless motors and servomotors.
It is designed to be perfectly integrated into motor housings. It has a space-saving low profile and is equipped with a 9.25-mm diameter 1:10 tapered solid shaft. It is ideal for high-precision direct coupling in constricted spaces and guarantees an absolutely backlash-free and torsionally rigid mating for increased mechanical and electrical performances. Many mounting options allow to fit specific applications. Furthermore the expansion flange option makes installation and fastening very easy and functional.
ASB62 offers 13 bit (8,192 cpr), 17 bit (131,072 cpr), 21 bit (2,097,152 cpr), and 25 bit (33,554,432) singleturn resolution and implements SSI and BISS C-mode interfaces. It also provides an additional incremental track (2,048 1Vpp Sine-Cosine signals per turn) for accurate rotor speed control.

For technical specifications please refer to the product datasheet.

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

In the first section some general information concerning the safety, the mechanical installation and the electrical connection as well as tips for setting up and running properly and efficiently the unit are provided.
In the second section, entitled **SSI interface**, both general and specific information is given on the SSI interface.
In the third section, entitled **BiSS C-mode interface**, both general and specific information is given on the BiSS C-mode interface. In this section the parameters implemented in the unit are fully described.

1 - Safety summary

1.1 Safety

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

1.2 Electrical safety

- Turn off the power supply before connecting the device;
- connect according to the explanation in the "4 - Electrical connections" section on page 16;
- if not used, connect Zero setting / Preset and Counting direction inputs to 0Vdc;
  - to set the zero, connect Zero setting / Preset input to +Vdc for 100 µs at least, then disconnect +Vdc; normally voltage must be at 0Vdc; zero must be set after Counting direction; we suggest setting the zero when the encoder shaft is not running;
  - Counting direction: CW increasing count (viewed from shaft side): connect to 0Vdc; CCW increasing count: connect to +Vdc;
- in compliance with the 2014/30/EU norm on electromagnetic compatibility, the following precautions must be taken:

  - before handling and installing, 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;
  - we suggest using the connection cable order code **EC-ASB/CB62-xxx** (on request; to be ordered separately);
  - 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;
  - to guarantee a correct working of the device, avoid using strong magnets on or near by the unit;
  - minimize noise by connecting the shield and/or the frame to ground. Make sure that ground 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 11;
- mechanical installation has to be carried out with stationary mechanical parts;
- do not disassemble the encoder;
- do not tool the encoder or its shaft;
- delicate electronic equipment: handle with care;
- do not subject the device and the shaft to knocks or shocks;
- respect the environmental characteristics declared by manufacturer.

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 any information on the technical characteristics of the product refer to the technical catalogue.

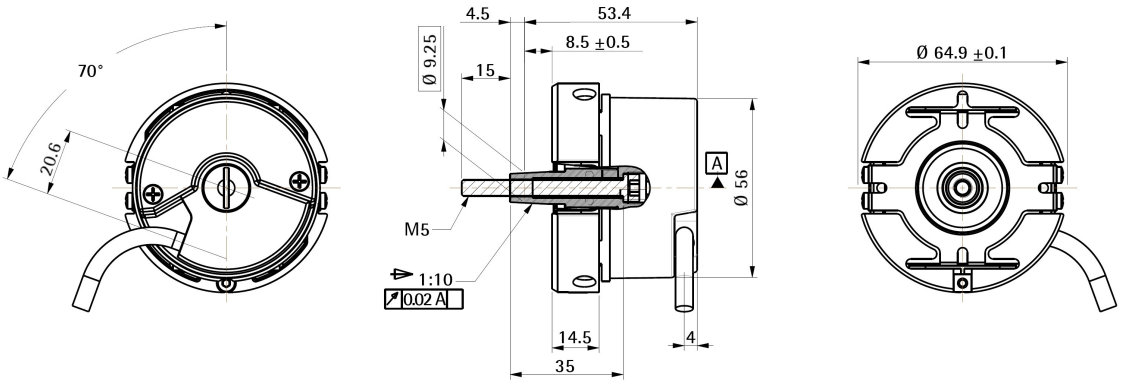
Warning: encoders having order code ending with "/Sxxx" may have mechanical and electrical characteristics different from standard and be supplied with additional documentation for special connections (Technical Info).

3 - Mounting instructions

WARNING
Installation must be carried out by qualified personnel only, with power supply disconnected and mechanical parts compulsorily in stop.

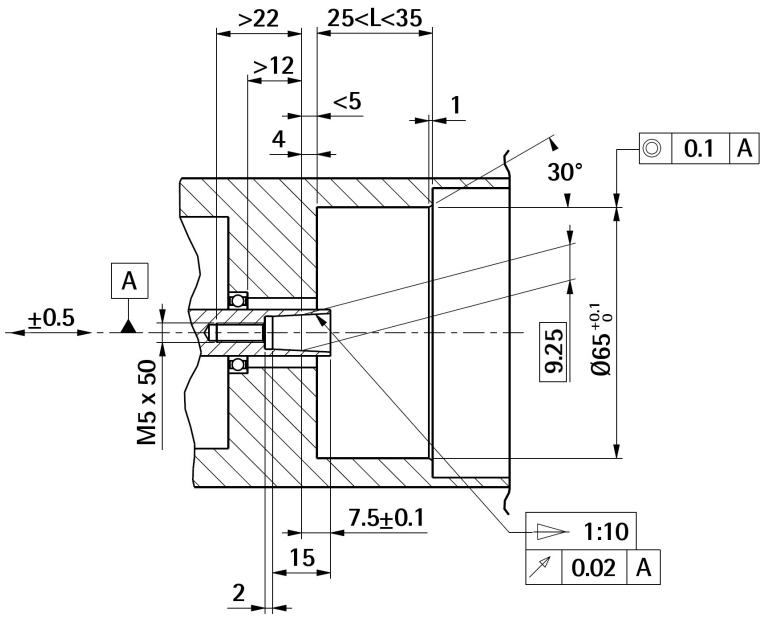
3.1 Encumbrance sizes (standard version)

(values are expressed in mm)



3.1.1 Mechanical characteristics of the mounting support

(values are expressed in mm)

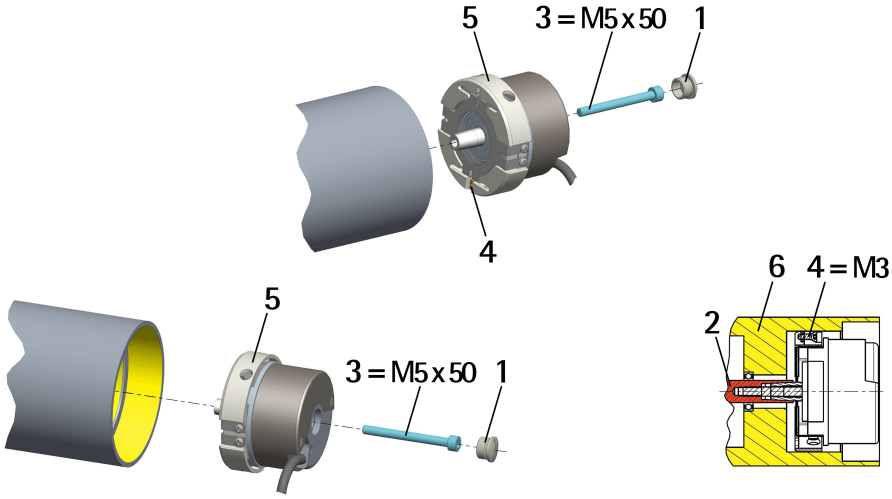


3.1.2 Mounting the encoder (standard version)

For correct installation the motor shaft must be fitted with an M5-threaded bore (see Figures below).

To install the encoder please follow carefully the next steps:

- remove the PG cap **1** from the back of the encoder;
- fit the encoder into the rotor shaft **2** and fix it using the provided M5 x 50 UNI 5931 screw **3**; the recommended tightening torque is **5 Nm**;
- replace the PG cap **1** properly and tighten it;
- tighten the M3 screw **4** to cause the flange **5** to expand so clamping the encoder onto the stator **6**; the recommended tightening torque is **1.2 Nm**.



3.1.3 Removing the encoder (standard version)

To remove the encoder please follow carefully the steps described hereinafter:

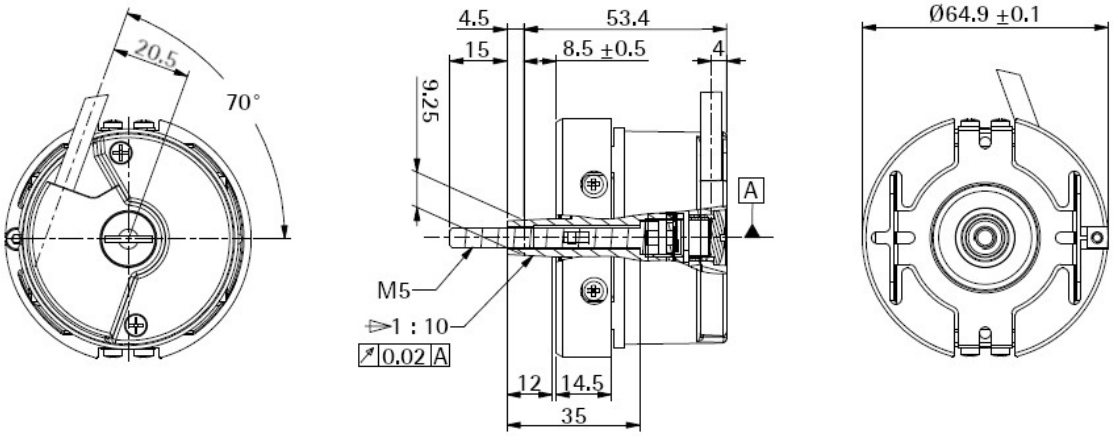
- unscrew the M3 screw **4** to release the expansion flange **5**;
- remove the PG cap **1** from the back of the encoder;
- hold the rotor shaft **2** and screw off the M5 screw **3** which fixes the encoder shaft to the rotor shaft **2**.

WARNING: do not force the encoder manually to pull it out!

- ensure that the rotor shaft **2** does not move and carefully tighten an M6 screw instead of the M5 screw in the encoder shaft: tightening the M6 screw will cause the encoder shaft to be drawn out slowly. To prevent the thread of the rotor shaft **2** from being damaged we suggest tightening an M5 grub screw before screwing in the M6 screw.

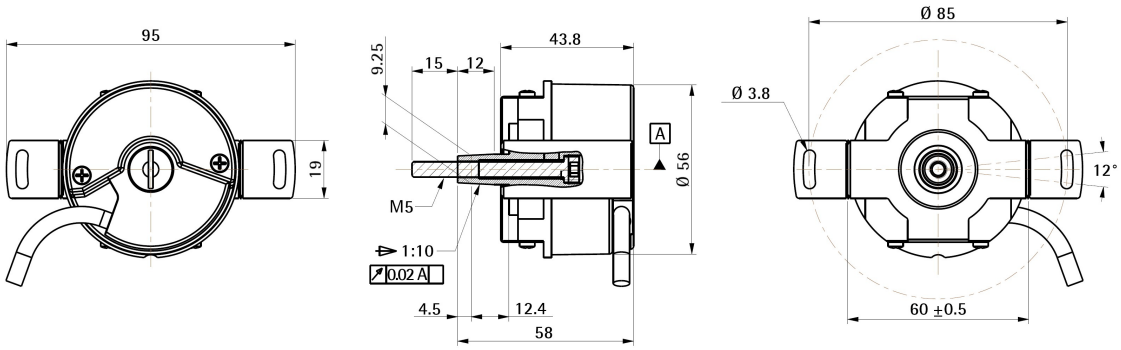
3.2 Encumbrance sizes (A order code)

(values are expressed in mm)



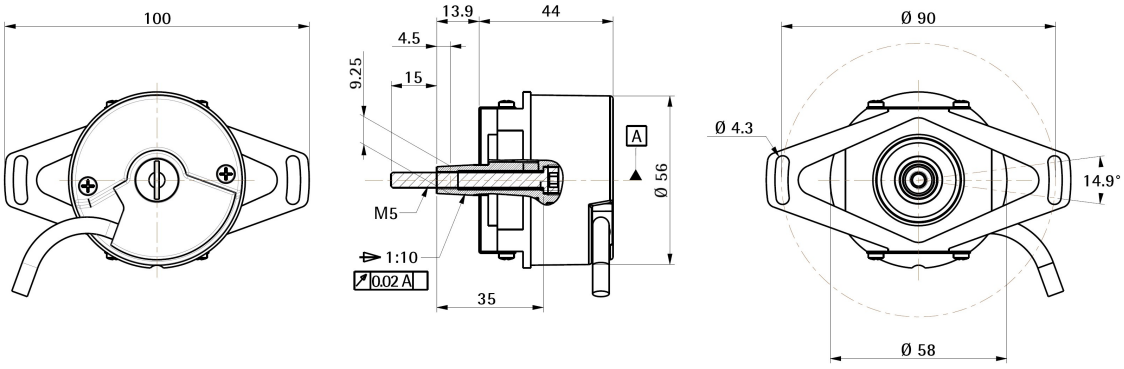
3.3 Encumbrance sizes (B order code) – KIT MOL3255

(values are expressed in mm)



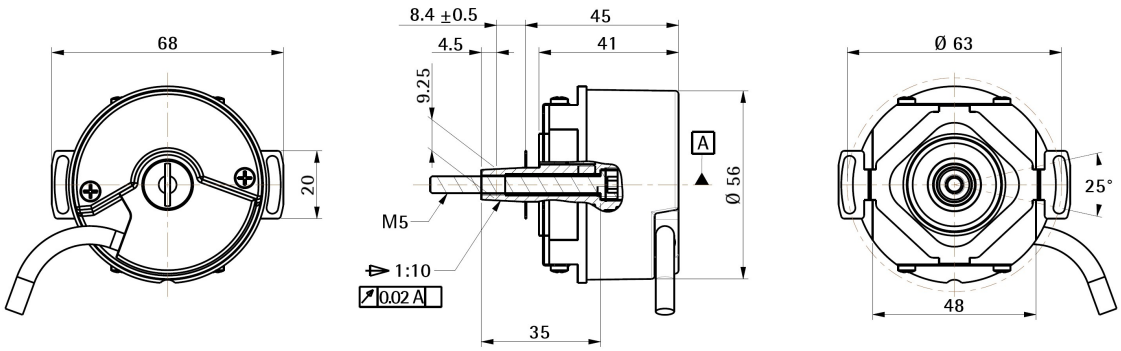
3.4 Encumbrance sizes (D order code) – KIT MOL2311

(values are expressed in mm)



3.5 Encumbrance sizes (E order code) – KIT MOL3035

(values are expressed in mm)



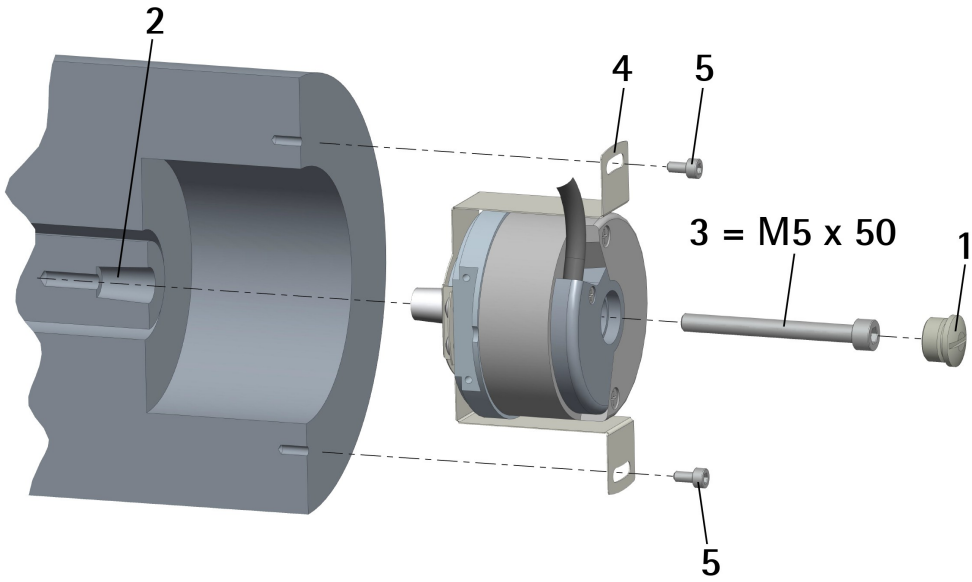
3.5.1 Mounting the encoder (A, B, D, and E order codes)

For correct installation the motor shaft must be fitted with an M5-threaded bore (see Figures above).

To install the encoder please follow carefully the next steps:

- remove the PG cap **1** from the back of the encoder;
- fit the encoder into the rotor shaft **2** and fix it using the provided M5 x 50 UNI 5931 screw **3**; the recommended tightening torque is **5 Nm**;
- replace the PG cap **1** properly and tighten it;

- B, D and E order codes only: fasten the fixing plate **4** to the motor frame using two appropriate screws **5**: M3 x 5 min. for B and E order codes, recommended tightening torque = **1.2 Nm**; M4 x 5 min. for D order code, recommended tightening torque = **2.8 Nm**.



Example with B type fixing plate

3.5.2 Dismounting the encoder (A, B, D, and E order codes)

To dismount the encoder please follow carefully the steps described hereinafter:

- B, D and E order codes only: unscrew the fixing plate **4** from the motor frame;
- remove the PG cap **1** from the back of the encoder;
- hold the rotor shaft **2** and screw off the M5 screw **3** which fixes the encoder shaft to the rotor shaft **2**.

WARNING: do not force the encoder manually to pull it out!

- ensure that the rotor shaft **2** does not move and carefully tighten an M6 screw instead of the M5 screw in the encoder shaft: tightening the M6 screw will cause the encoder shaft to be drawn out slowly. To prevent the thread of the rotor shaft **2** from being damaged we suggest tightening an M5 grub screw before screwing in the M6 screw.

4 - Electrical connections

WARNING
Power supply must be turned off before performing any electrical connection!
If wires of unused signals come in contact, irreparable damage could be caused to the device. Thus they must be cut at different lengths and insulated singularly.

Function	14-pin connector	EC-ASB/CB62-xxx
Zero setting / Preset	1	Violet
Counting direction	2	-
DATA OUT + / SLO +	3	Red
+Vdc [1]	4	Pink
/A (COS -)	5	White_Green
CLOCK IN - / MA -	6	Brown
0Vdc	7	White
B (SIN +)	8	Blue
/B (SIN -)	9	Green
0Vdc [2]	10	-
CLOCK IN + / MA +	11	Grey
A (COS +)	12	Black
+Vdc [3 / 4]	13	Brown_Green
DATA OUT - / SLO -	14	Yellow
Shield	Case	Shield

1 Pin 4 is internally connected to pin 13

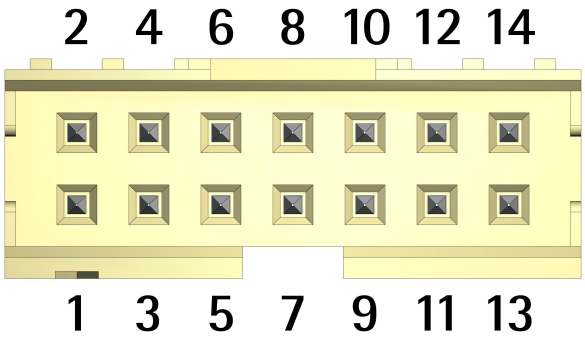
2 Pin 10 is internally connected to pin 7

3 See the order code for power supply voltage level

EXAMPLE
ASB62-21-00-SC**1**-... +Vdc = +5Vdc ± 5%
ASB62-21-00-SC**2**-... +Vdc = +10Vdc +30Vdc

4 **WARNING** When the power is switched on, above 3V supply voltage +Vdc must be applied with a slew rate larger than 50V/s

4.1 98414-G05-14-LF 14-pin connector



14-pin male connector

Female mating connector: **SQW-107-01-F-D-VS**

4.2 EC-ASB/CB62-xxx connection cable

The encoder can be supplied with a connection cable order code **EC-ASB/CB62-xxx** where xxx is the length of the cable expressed in decimetres. Refer to the order code for the available lengths of the cable. The connection cable must be ordered separately.

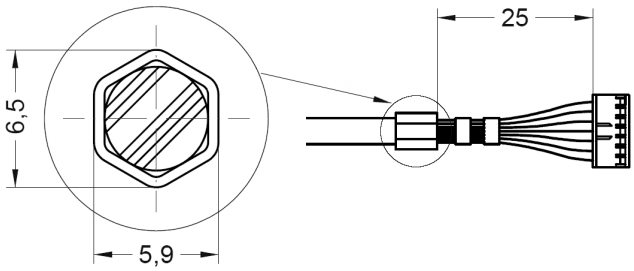
4.3 TF12 cable specifications

Model	: LIKA TF12 encoder cable
Cross section	: 6 x 2 x 28AWG
Jacket	: Special flame retardant PVC compound, RZ-TM2 quality
Shield	: Tinned copper braid, coverage > 80% with tinned copper drain wire
Outer diameter	: 5.4 mm ±0.1 mm (0.213" ±0.004")
Min. bending radius	: outer diameter x 10
Work temperature	: -15°C +80°C (+5°F +176°F)
Conductor resistance	: < 242.02 Ω/Km (+20°C / +68°F) (UL 758 table 5.2.1)

The total length of the cable that connects the encoder and the receiving device should not exceed the values stated in the "Cable lengths" section of the rotary encoders' catalogue or indicated in this manual; they are specific for each type of output circuit. If you need to reach greater distances please contact Lika Electronic Technical Dept.

4.4 Cable shield connection to ground

To connect the cable shield we suggest gathering the shielding wires together and fixing them by means of a hexagonal metal gland crimped 25 mm / 0.984" away from the connector. Be sure that the gland is in tight contact with the encoder's enclosure. Prevent the shielding wires from coming in contact with the internal electronics.



4.5 1Vpp sinusoidal output signals

For any further information on the 1Vpp sinusoidal signals please refer to the "7 - 1Vpp sine/cosine output signals" section on page 33.

4.6 Zero setting / Preset input

The output position information at a point in the shaft rotation can be set either to 0 (SSI interface) or to a desired value called "preset" (BiSS C-mode interface; the preset value must be set next to the **Preset** registers, see on page 27). The Zero setting / Preset input allows the operator to activate the zero / preset value by using an input signal sent by a PLC or other controller. To activate the zero setting / preset function, connect the Zero setting / Preset input to +Vdc for 100 µs at least, then disconnect +Vdc; normally voltage must be at 0Vdc. Zero setting / Preset must be set after Counting direction. We suggest setting the zero setting / preset function when the encoder shaft is not running. If not used, connect the Zero setting / Preset input to 0Vdc.

WARNING

In the BiSS C-mode interface model, the Zero setting / Preset input is active only when the **Preset setting enable** register is set to "01", see on page 29; otherwise the hardware function is disabled.

NOTE

In the BiSS interface the preset can be activated also by using the **Save parameters and activate Preset** function of the **Command** register. For

detailed information please refer to the Preset registers on page 27 and to the Command register on page 30.

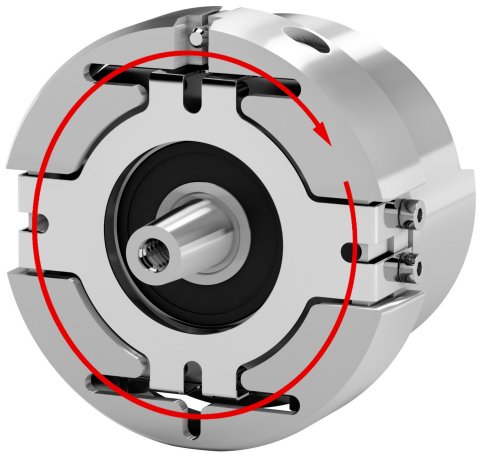
4.7 Counting direction input

NOTE
The counting direction input is available through the pin 2 of the 14-pin connector. **EC-ASB/CB62-xxx** cable does not provide a dedicated wire, so the function is not available through this cable. Anyway the user can make its own cable and connect also the pin 2 to have the counting direction function available.

The Counting direction input allows to set whether the position value output by the encoder increases when the encoder shaft rotates clockwise (CW) or counter-clockwise (CCW). The clockwise rotation is intended as shown in the Figure. If the Counting direction input is connected to 0Vdc, the position value increases when the encoder shaft rotates clockwise; on the contrary, if the Counting direction input is connected to +Vdc, the position value increases when the encoder shaft rotates counter-clockwise. If not used, connect the Counting direction input to 0Vdc (standard counting direction, see the Figure).

WARNING
After changing the counting direction you are required to set a new zero.

NOTE
The counting direction function affects the absolute position information, not the sine/cosine signals.



5 - SSI interface

Order code: ASB62-xx-00-BGx-...
ASB62-xx-00-GGx-...

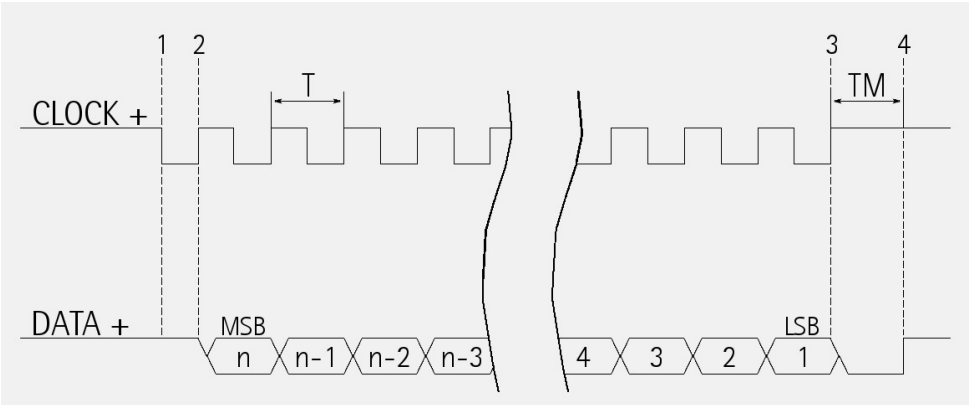
5.1 SSI (Synchronous Serial Interface)

SSI (the acronym for **Synchronous Serial Interface**) is a synchronous point-to-point serial interface engineered for unidirectional data transmission between one Master and one Slave. Developed in the first eighties, it is based on the RS-422 serial standard. Its most peculiar feature is that data transmission is achieved by synchronizing both the Master and the Slave devices to a common clock signal generated by the controller; in this way the output information is clocked out at each controller's request. Furthermore only two pairs of twisted wires are used for data and clock signals, thus a six-wire cable is required.
The main advantages in comparison with parallel or asynchronous data transmissions are:

- less conductors are required for transmission;
- less electronic components;
- possibility of insulting the circuits galvanically by means of optocouplers;
- high data transmission frequency;
- hardware interface independent from the resolution of the absolute encoder.

Furthermore the differential transmission increases the noise immunity and decreases the noise emissions. It allows multiplexing from several encoders, thus process controls are more reliable with simplified line design and easier data management.

Data transmission is carried out as follows.
At the first falling edge of the clock signal (**1**, the logic level changes from high to low) the absolute position value is stored while at the following rising edge (**2**) the transmission of data information begins starting from the MSB.



At each change of the clock signal and at each subsequent rising edge (**2**) one bit is clocked out at a time, up to LSB, so completing the data word transmission. The cycle ends at the last rising edge of the clock signal (**3**). This means that up to n + 1 rising edges of the clock signals are required for each data word transmission (where n is the bit resolution); for instance, a 13-bit encoder needs 14 clock edges. If the number of clocks is greater than the number of bits of the data word, then the system will send a zero (low logic level signal) at each additional clock, zeros will either lead (LSB ALIGNED protocol) or follow (MSB ALIGNED protocol) or lead and/or follow (TREE FORMAT protocol) the data word. After the period Tm monoflop time, having a typical duration of 12 µsec, calculated from the end of the clock signal transmission, the encoder is then ready for the next transmission and therefore the data signal is switched high.
The clock signal has a typical logic level of 5V, the same as the output signal which has customarily a logic level of 5V in compliance with RS-422 standard.
The output code can be binary or Gray (see the order code).

5.2 "MSB left aligned" protocol

"MSB left aligned" protocol allows to left align the bits, beginning from MSB (most significant bit) to LSB (least significant bit); MSB is then sent at the first clock cycle. If the number of clock signals is higher than the data bits, then unused bits are forced to logic level low (0) and follow the data word. This protocol can be used in encoders having any resolution.
The number of clocks to be sent to the encoder must equal the number of data bits at least, anyway it can be higher, as stated previously. The great advantage of this protocol over the TREE format or the LSB RIGHT ALIGNED format is that data can be transmitted with a minimum time loss and Tm monoflop time can immediately follow the data bits without any additional clock signal.
The length of the word is variable according to the resolution, as shown in the following table.

Model	Length of the word	Max. number of information
ASB62-13-00-...	13 bits	8,192 cpr
ASB62-17-00-...	17 bits	131,072 cpr
ASB62-21-00-...	21 bits	2,097,152 cpr
ASB62-25-00-...	25 bits	33,554,432 cpr

The output code can be BINARY or GRAY (see the order code).

Structure of the position information

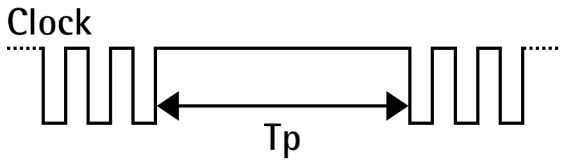
ASB62-25-00-...	**bit**	**24**	**...**	**0**
ASB62-21-00-...	**bit**	**20**	**...**	**0**
ASB62-17-00-...	**bit**	**16**	**...**	**0**
ASB62-13-00-...	**bit**	**12**	**...**	**0**
	value	MSB	...	LSB

5.3 Recommended transmission rates

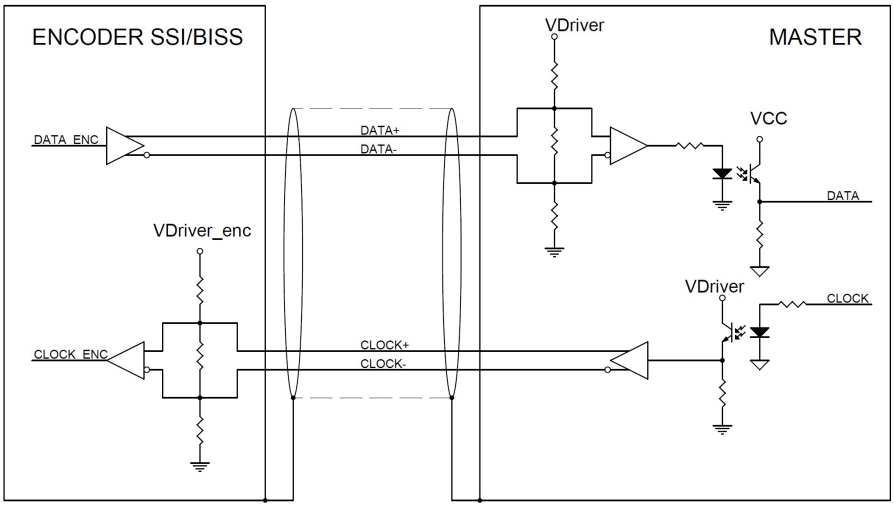
The SSI interface has a frequency of data transmission ranging between 100 kHz and 4 MHz.
CLOCK IN and DATA OUT signals comply with the "EIA standard RS-422".
The SSI clock frequency (baud rate) depends on the length of the cable and must comply with the technical information reported in the following table:

Cable length	Baud rate
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

The time interval between two Clock sequence transmissions must be at least 20 µs (Tp > 20 µs).



5.4 Recommended SSI input circuit



6 - BiSS C-mode interface

Order code: ASB62-xx-00-SCx-...

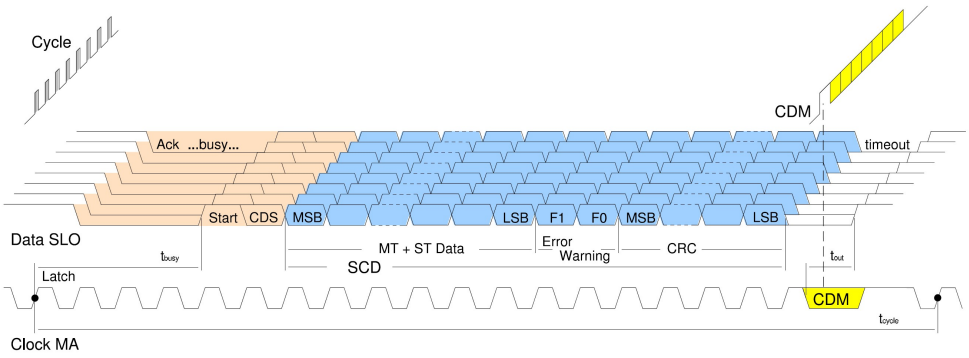
Lika encoders are always Slave devices and comply with the "BiSS C-mode interface" and the "Standard encoder profile".
Refer to the official BiSS website for all information not listed in this manual (www.biss-interface.com).
The device is designed to work in a point-to-point configuration and has to be installed in a "single Master, single Slave" network.
CLOCK IN (MA) and DATA OUT (SLO) signal levels are according to the "EIA standard RS-422".

WARNING
Do not install the encoder in a "single Master, multi Slave" network.

6.1 Communication

The BiSS C-mode protocol uses two types of data transmission protocols:

- **Single Cycle Data (SCD):** it is the main data transmission protocol. It is used to send process data from the Slave to the Master. For any information refer to the "6.2 Single Cycle Data SCD" section on page 24.
- **Control Data (CD):** transmission of a single bit following the SCD data. It is used to read or write data into the registers of the Slave. For any information refer to the "6.3 Control Data CD" section on page 25.



6.2 Single Cycle Data SCD

6.2.1 SCD structure

SCD data has a variable length according to the resolution of the encoder. It is nbitres+7 bit long where "nbitres" is the resolution of the encoder expressed in bits. It consists of the following elements: position value (**Position**), 1 error bit nE (**Error**), 1 warning bit nW (**Warning**) and a 6-bit CRC Cyclic Redundancy Check (**CRC**).

bit	nbitres+7 ... 8	7	6	5 ... 0
function	Position	Error	Warning	CRC

Position
(Nbitres)
It is the process data transmitted from the Slave to the Master. It has a variable length, it is as long as the resolution of the encoder expressed in bits.
It provides information about the current position of the encoder.
The transmission starts with msb (most significant bit) and ends with lsb (least significant bit). "Nbitres" is the resolution of the encoder expressed in bits.

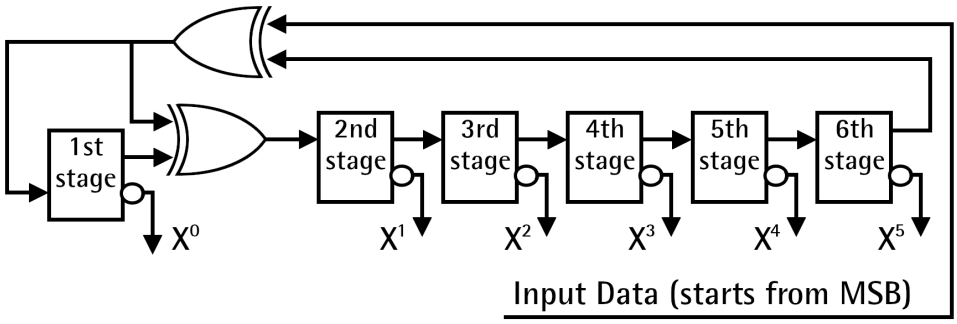
bit	Nbitres+7	...	...	8
value	msb	...	...	lsb

Error
(1 bit)
Not used (nE = "1"). It is 1-bit long.

Warning
(1 bit)
Not used (nW = "1"). It is 1-bit long.

CRC
(6 bits)
Control of correct transmission (inverted output). Cyclic Redundancy Check is an error checking which is the result of a "Redundancy Check" calculation performed on the message contents. This is intended to check whether transmission has been performed properly. It is 6-bit long.
Polynomial: X^6+X^1+1 (binary: 1000011)

Logic circuit



6.3 Control Data CD

Main control data is described in this section. Please refer to the official BiSS documents for complete CD structure: "BiSS C Protocol Description" in the BiSS homepage.

Register address
It sets the number of the register you need either to read or to write. It is 7-bit long.

RW
RW = "01": when you need to write in the register.
RW = "10": when you need to read in the register.
It is 2-bit long.

DATA
When you need to write in a register (**RW** = "01"), it allows to enter the value to be written in the register (transmitted from the Master to the Slave).
When you need to read in a register (**RW** = "10"), it shows the value read in the register (transmitted from the Slave to the Master).
It is 8-bit long.

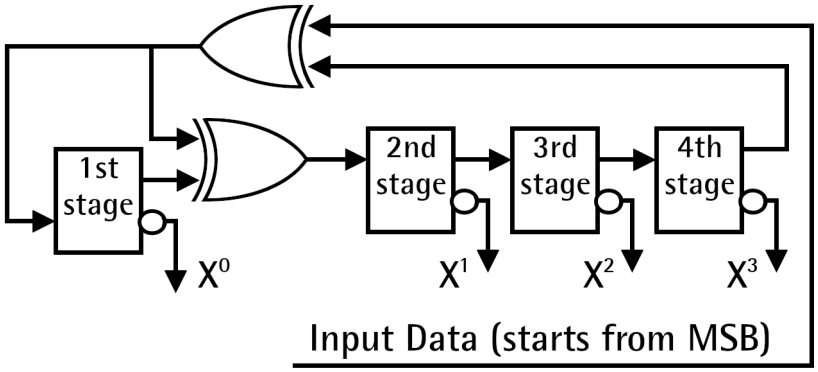
Data bit structure:

bit	7	...	...	0
	msb	...	...	lsb

CRC

Control of correct transmission (inverted output). Cyclic Redundancy Check is an error checking which is the result of a "Redundancy Check" calculation performed on the message contents. This is intended to check whether transmission has been performed properly. It is 4-bit long.
Polynomial: X^4+X^1+1 (binary: 10011)

Logic circuit:



6.4 Implemented registers

Register (hex)	Function
11 ... 15	Preset
40	Preset setting enable
44 ... 47	Serial number
77	Command
78 ... 7B	Device ID
7C	7C
7D	Release
7E - 7F	Manufacturer ID

All registers described in this section are listed as follows:

Function name
[Address, Attribute]
Description of the function and specification of the default value.

- Address: the register address is expressed in hexadecimal notation.
- Attribute: ro = read only
  rw = read and write
  wo = write only
- Default parameter value is written in **bold**.

Preset

[11 ... 15, rw]

WARNING

You are allowed to enter a value next to the **Preset** registers only after having set the value "01" next to the **Preset setting enable** register. As soon as you have entered the desired preset value, you must set the value "00" next to the **Preset setting enable** register and then save data.

These registers allow the operator to set the Preset value. The preset function is meant to assign a desired value to a physical position of the encoder. The chosen physical position (i.e. the transmitted position value) will get the value set next to these registers and all the previous and following positions will get a value according to it. For instance, this can be useful for getting the zero point of the encoder and the zero point of the application to match. The preset value will be set for the position of the encoder in the moment when the command is sent through the **Save parameters and activate Preset** function of the **Command** register (or through the Preset input signal, see the "4.6 Zero setting / Preset input" section on page 18).

After having entered a value next to the **Preset** registers you can either save it without activating the preset function or both save and activate it at the same time. Use the **Save parameters** function (set "01" in the **Command** register) to save the new Preset value without activating it.

Use the **Save parameters and activate Preset** function (set "02" in the **Command** register) to both save and activate the new Preset value.

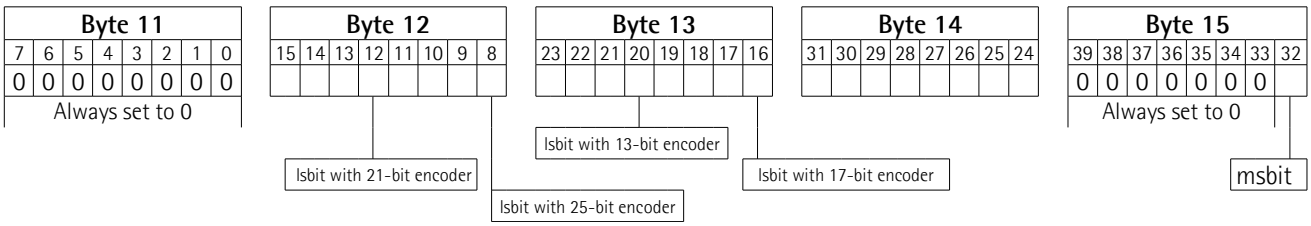
The Preset value must be lower than the "total hardware resolution".
Default = **00 00 00h**.

NOTE

We suggest setting the preset when the encoder shaft is not running.

NOTE

Please note that the bit structure of the **Preset** registers is as follows:



NOTE

Please note that:

- msbit is always bit 32 of byte 15;
- lsbit changes according to the resolution of the encoder; it is:
  - bit 20 of byte 13 for 13-bit encoder;
  - bit 16 of byte 13 for 17-bit encoder;
  - bit 12 of byte 12 for 21-bit encoder;
  - bit 8 of byte 12 for 25-bit encoder;
- binary values must be entered:
  - in bit 32 of byte 15;
  - from bit 31 to bit 24 in byte 14;
  - from bit 23 to bit 16 in byte 13;
  - from bit 15 to bit 8 in byte 12;
- bits from 39 to 33 in byte 15 are always set to 0;
- all bits in byte 11 are always set to 0.

To properly set the **Preset** value see the following example.

PRESET SETTING EXAMPLE

ASB62-21-00-... encoder has a resolution of 21 bits (2^{21} = 2,097,152 information), you want to set the following **Preset** value = $50{,}000_{10}$ = C350h = $1100\ 0011\ 0101\ 0000_2$.

1. As previously stated, first of all you must enable the setting of the **Preset** registers by entering the value "01" next to the **Preset setting enable** register.

2. Then enter the **Preset** value (50.000_{10} = $1100\ 0011\ 0101\ 0000_2$) according to the structure explained above. Please note that you must enter the value in the 21-bit long format (according to the encoder resolution), so it is: 000001100001101010000 in binary notation. See the following table:

Byte 11							
7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0

Byte 12							
15	14	13	12	11	10	9	8
0	**0**	**0**	**0**	0	0	0	0

lsbit

Byte 13							
23	22	21	20	19	18	17	16
0	**0**	**1**	**1**	**0**	**1**	**0**	**1**

Byte 14							
31	30	29	28	27	26	25	24
0	**0**	**0**	**0**	**1**	**1**	**0**	**0**

Byte 15							
39	38	37	36	35	34	33	32
0	0	0	0	0	0	0	**0**

msbit

3. It results that you must enter the following hexadecimal value:

Byte 11							
0	0	0	0	0	0	0	0
0						0	

Byte 12							
0	0	0	0	0	0	0	0
0						0	

Byte 13							
0	0	1	1	0	1	0	1
3						5	

Byte 14							
0	0	0	0	1	1	0	0
0						C	

Byte 15							
0	0	0	0	0	0	0	0
0						0	

4. Then, before saving the entered data, set the value "00" next to the **Preset setting enable** register.
5. To save the new Preset value, you must use the **Save parameters** function in the **Command** register (set "01" in the **Command** register).

6. Otherwise, to both save and activate the new Preset value at the same time, you must use the **Save parameters and activate Preset** function in the **Command** register (set "02" in the **Command** register).

Function	ADDR	DATA Tx
Preset setting enable	40	01

Writing in the Preset registers	11	00
	12	00
	13	35
	14	0C
	15	00

Preset setting enable	40	00

Save parameters function in the **Command** register	77	01
or		
Save parameters and activate Preset function in the **Command** register	77	02

Preset setting enable

[40, wo]

It allows the operator to enable both the setting of the **Preset** registers (see on page 27) and the preset setting hardware function (see on page 18). You are allowed to set a new preset value only after having entered the value "01" next to this **Preset setting enable** register. As soon as you have entered the desired preset value, you must set the value "00" next to this **Preset setting enable** register and then save data.

Serial number

[44 ... 47, ro]

These registers contain the serial number of the device in ascending order expressed in hexadecimal notation.

Serial number registers structure:

Register	44	45	46	47
	Serial number			
	MSB	...	...	LSB
	2^{31} ... 2^{24}	2^{23} ... 2^{16}	2^{15} ... 2^{8}	2^{7} ... 2^{0}

EXAMPLE

Serial number 194503067 dec (where "19" is the year of production; "45" is the week of production; "03067" is a number in ascending order) is expressed as shown in the table:

Register	44	45	46	47
	0B	97	E1	9B

Command

[77, wo]

Value	Function
01	**Save parameters**
02	**Save parameters and activate Preset**

After having set a new value in any register use the **Save parameters** function in the **Command** register to save the new value. Set "01" in the **Command** register.

After having set a new value in any register use the **Save parameters and activate Preset** function in the **Command** register to both save the new value and activate the preset function at the same time. Set "02" in the **Command** register.

After having sent the command the register is set back to "00" automatically.

Wait 30 ms at least (EPROM writing time) before activating a new function.

Device ID

[78 ... 7B, ro]

These registers contain the Device ID. Identification name is expressed hexadecimal ASCII code.

Register	78	79	7A	7B
Hex	53	42	36	32
ASCII	S	B	6	2

7C

[7C, ro]
Reserved.

Release

[7D, ro]
It shows the release version of the encoder. It is expressed in hexadecimal ASCII code. "30" hex = "0" identifies a prototype.

EXAMPLE
If the value in the register 7D is "31" hex, then the release version is "1".

Manufacturer ID

[7E – 7F, ro]
These registers contain the Manufacturer ID. Identification name is expressed in hexadecimal ASCII code.

Register	7E	7F
Hex	4C	69
ASCII	L	i

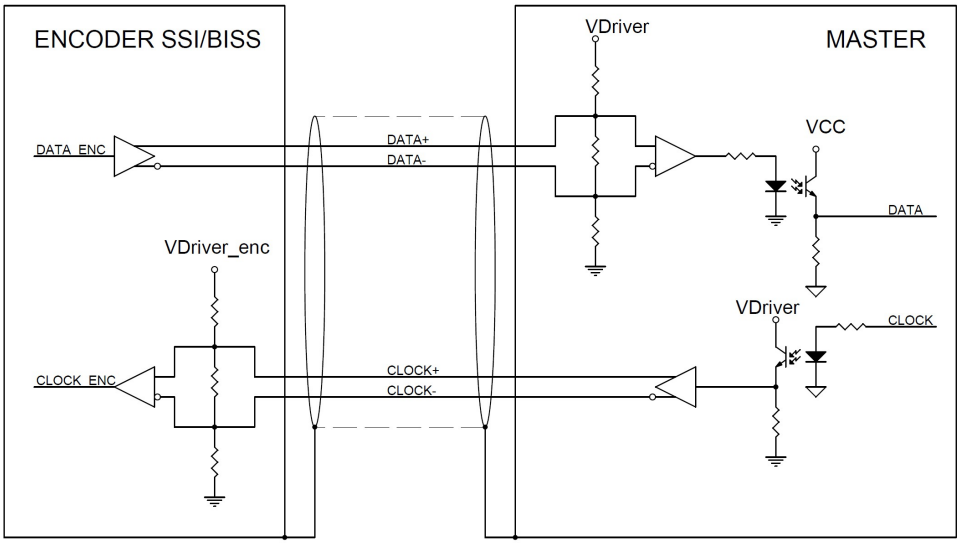
Li = Lika Electronic

6.5 Application notes

Data transmission:

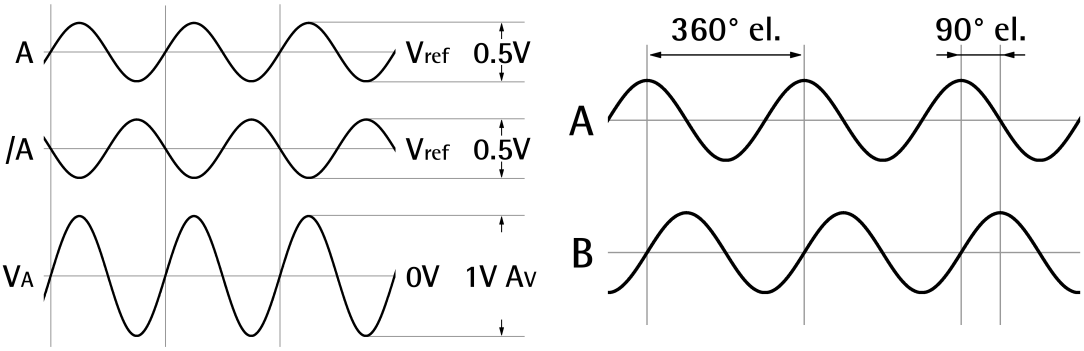
Parameter	Value
Clock Frequency	Min 200 KHz, max 10 MHz
BiSS time-out	Self-adaptable to the clock, 0.5 µs min., 8 µs max.

6.6 Recommended BiSS input circuit



7 - 1Vpp sine/cosine output signals

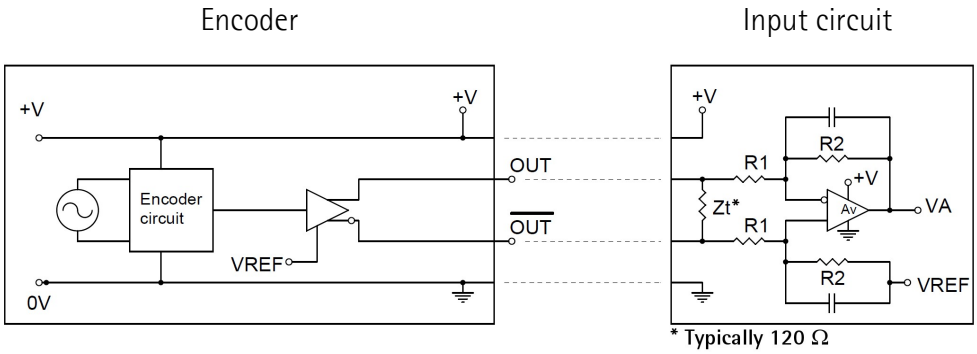
A (COSINE) and B (SINE) signals are to be intended with CW rotation as viewed in the Figure in the "4.7 Counting direction input" section on page 19. They provide 2,048 sinusoidal waves per mechanical revolution with amplitude 1Vpp. 1Vpp output level results from differential signals detection. The frequency of output signals is proportional to the rotational speed of the encoder.



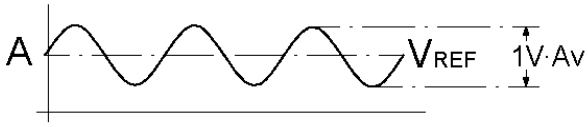
7.1 Output signals voltage level

The voltage level refers to the differential value between normal and inverted signal (differential).

Recommended input circuit



V_{REF} = 2.5V ± 0.5V V_A = 1Vpp * Av Av = R2 / R1



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Document release	Release date	Description	HW	SW	Interface
1.0	10.12.2019	First issue	0	1	-
1.1	10.02.2020	Electrical connections information updated, SSI information updated	0	1	-
1.2	13.05.2022	Sine/cosine signals error corrected, information about new mounting options added (order codes A, B, D, E), information about new 25-bit resolution added	0	1	-
1.3	05.02.2024	New order codes, new standard model drawing, minor amendments	0	1	-

This device is to be supplied by a Class 2 Circuit or Low-Voltage Limited Energy or Energy Source not exceeding 30 Vdc. Refer to the order code for supply voltage rate.
Ce dispositif doit être alimenté par un circuit de Classe 2 ou à très basse tension ou bien en appliquant une tension maxi de 30Vcc. Voir le code de commande pour la tension d'alimentation.

Dispose separately

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