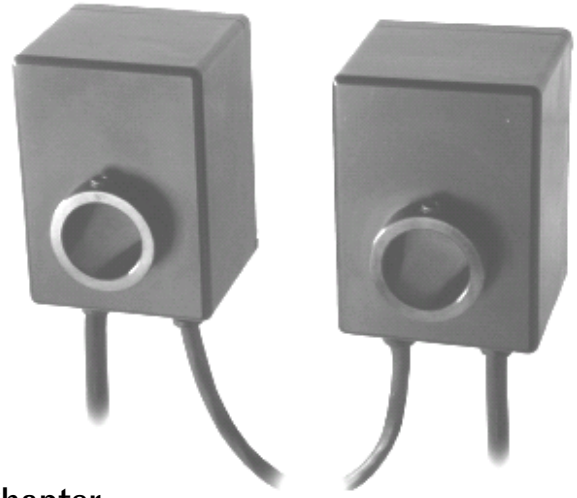
User manual

SC1

Description

SC1 is an absolute multi turn encoder. It can be programmed by PC through RS485 interface. SC1 is an idea solution for the control of manual axis and ball-screws.
The internal battery works up to 10 years.



Chapter

1 - Safety summary

For the electrical connections, we recommend to closely follow these electrical instructions. In particular, according to the 89/336/EEC norm on electromagnetic compatibility, following precautions must be taken:

- Install the encoder as close as possible to the electronic control unit.
- Always use shielded and twisted cables if possible.
- Avoid running the signal cables near high voltage power cables (e.g. drive cables).
- Install EMC filters on sensor power supply if needed.
- Avoid mounting sensor near capacitive or inductive noise sources and switching power supplies.

Connect according to the chapter 5: "Electrical connections".

2 - Identification

The device can be identified by the label's data (ordering code, serial number). This information is listed in the delivery document. For technical features of the product, refer to the technical catalogue.

3 - Installation

Install the device according to the provided protection level. Protect the system against knocks, friction, solvents and respect the environmental characteristics of the unit.

4 - Mounting recommendations

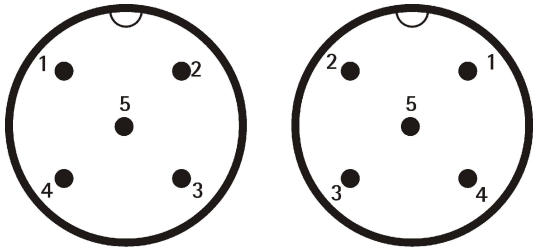
IMPORTANT:

You are strongly advised not to carry out any mechanical operations (drilling, milling, etc.) on the encoder's shaft. This could cause serious damages to the internal parts and the immediate warranty loss.

5 - Electrical connections

Pin	Cable	Function
1	Red	+10 Vdc +30 Vdc
2	Black	0 Vdc GND
3	Shield	Shield
4	White	Data + (RS485)
5	Blue	Data - (RS485)

female frontal side	male frontal side



NOTES:

- while connecting, power must be switched OFF;
- check correct connections before switching ON;
- we recommend that the sensor head be mounted as far as possible from any capacitive or inductive noise source and switching devices;
- avoid routing the sensor cable near high voltage power cables in order to reduce

influences of electric noise;
- minimize noise by connecting shield or connector housing to ground (GND). Make sure that ground (GND) is not affected by noise;
- electric noise sources should be linked with noise suppression filters.

6 - Setup

6.1 System Reset

In absence of external power supply, the system is supplied by the internal battery.
In case of system halt, a Reset of the device can be done pushing the button on the rear side.
This function restarts the microprocessor; the position value is lost, but address device, preset and counting direction are saved on the internal memory. During Reset function power must be switched ON.

6.2 RS485 Communication

Please write carefully the commands' structure to obtain a correct configuration of the serial communication.

Syntax of the communication message:

S O T	n_char	Adr	Com	Sub	d0[1]	d1[4]	E O T	C R C

This syntax is used both for TX and RX messages.

SOT Start of transmission [1 byte]
Beginning of message.
SOT = 01h.

n_char Number of characters [1 byte]
Total number of bytes which compose the message.

Adr 20h + Device address [1 byte]
Device address plus 20h (HEX).
Adr = 20h + device address (HEX)

Examples:
if address=01h, then Adr=21h;
except for the "Init address" command (see chapter 6.4), where Adr=83h for all devices (broadcast type address).

Com Command [1 byte]
Command to be sent to the device, its value is taken from the ASCII coding tables (see chapter 6.3).

Sub Sub-Command [1 byte]
Sub-command to be sent to the device, its value is taken from the ASCII coding tables (see chapter 6.3).

d0[1] d0 data byte [1 byte]
1-byte length parameter; it's used only in few commands.

d1[4] d1 data bytes [4 bytes]
4-bytes field, to be filled with TX/RX data
d1[1]= LSB less significant Byte
d1[2]= intermediate Byte
d1[3]= intermediate Byte
d1[4]= MSB most significant Byte

EOT End of transmission [1 byte]
Command for end-of-transmission indication.
EOT = 04h.

CRC Checksum [1 byte]
Byte used for the message's correct transmission check. Follow the example in the chapter 6.9 to see how to calculate it.

6.3 Command description

List of commands and sub-commands:

Com	Sub	Description	Remarks
I (49h)	**a** (61h)	Init address	Device address assignment
R (52h)	**q** (71h)	Read position	Reads current position
	a (61h)	Read alarm	Reads low-battery alarm
W (57h)	**r** (72h)	Write reference	Writes the position reference (Preset)
	d (64h)	Write direction	Sets the counting direction

All values indicated are in HEX (Hexadecimal).

6.4 Device address assignment

This function is used to set an address into the device. To assign the address, please send the following message and than rotate the shaft of the device to be set. The device replies with the address received and accepted. Device address can be set from 1 to 98.

User → Encoder

SOT	n_char	Adr	Com	Sub	d0	EOT	CRC
01	08	83	49	61	xx	04	Ck

xx = address to be assigned to the encoder (HEX)
Ck = checksum (HEX)

Rotate the shaft of the encoder to be set.

Encoder → User

SOT	n_char	Adr	Com	Sub	d0	EOT	CRC
01	08	83	49	61	xx	04	Ck

xx = address assigned to the encoder (HEX)
Ck = checksum (HEX)

6.5 Current position

Syntax for both TX and RX messages:

User → Encoder

SOT	n_char	Adr	Com	Sub	EOT	CRC
01	07	20 + xx	52	71	04	Ck

xx = device address (HEX)
Ck = checksum (HEX)

Encoder → User

SOT	n_char	Adr	Com	Sub	d0
01	0C	20 + xx	52	71	00

d1[1]	d1[2]	d1[3]	d1[4]	EOT	CRC
LSB	...	...	MSB	04	Ck

xx = device address (HEX)
Ck = checksum (HEX)

The position indication is intended as follows:

d1[4]	d1[3]	d1[2]	d1[1]
2^{31}-2^{24}	2^{23}-2^{16}	2^{15}-2^{8}	2^{7}-2^{0}
MSByte	...	...	LSByte

6.6 Low-battery alarm message

This command is used to get a low-battery message.
00 = alarm OFF: battery OK
01 = alarm ON: low battery

User → Encoder

SOT	n_char	Adr	Com	Sub	EOT	CRC
01	07	20 + xx	52	61	04	Ck

xx = device address (HEX)
Ck = checksum (HEX)

Encoder → User

SOT	n_ch.	Adr	Com	Sub	d0	EOT	CRC
01	08	20+xx	52	61	aa	04	Ck

xx = device address (HEX)
aa = battery alarm:
00=OFF: battery OK
01=ON: low battery
Ck = checksum (HEX)

6.7 Preset

Setting of preset's value (i.e. measure start-up).
Default value: **0**

Preset's value must be handled as follows:

d1[4]	d1[3]	d1[2]	d1[1]
2^{31}-2^{24}	2^{23}-2^{16}	2^{15}-2^{8}	2^{7}-2^{0}
MSByte	...	...	LSByte

Syntax of writing and confirmation message:

User → Encoder

SOT	n_char	Adr	Com	Sub	d0
01	0C	20 + xx	57	72	00

d1[1]	d1[2]	d1[3]	d1[4]	EOT	CRC
LSB	...	...	MSB	04	Ck

xx = device address (HEX)
Ck = checksum (HEX)

Encoder → User

SOT	n_char	Adr	Com	Sub	d0
01	0C	20 + xx	57	72	00

d1[1]	d1[2]	d1[3]	d1[4]	EOT	CRC
LSB	...	...	MSB	04	Ck

xx = device address (HEX)
Ck = checksum (HEX)

6.8 Counting direction

Setting of the counting direction
00 = standard counting direction
01 = inverted counting direction

User → Encoder

SOT	n_ch.	Adr	Com	Sub	d0	EOT	CRC
01	08	20+xx	57	64	dd	04	Ck

xx = device address (HEX)
dd = counting direction to be set
00= standard direction
01= inverted direction
Ck = checksum (HEX)

Encoder → User

SOT	n_ch.	Adr	Com	Sub	d0	EOT	CRC
01	08	20+xx	57	64	dd	04	Ck

xx = device address (HEX)
dd = counting direction setting
00= standard direction
01= inverted direction
Ck = checksum (HEX)

After the counting direction setting or modification, a "Preset" command must be executed (see chapter 6.7).

6.9 Checksum Computing (CRC)

1-byte-lenght word which is necessary to execute a check on the correct message's transmission.
The computing must include all bytes which compose the message.

Example: computing of the CRC byte in the message "position reading request" of one encoder which is set with device address "01h".
The message is composed as follows:

User → Encoder

SOT	n_char	Adr	Com	Sub	EOT	CRC
01	07	21	52	71	04	Ck

Compute CRC:

clear Ck	00000000
Ck= Ck<<1 (1 bit left shifting)	00000000
SOT=01h	00000001
Ck= Ck xor SOT	00000001
Ck= Ck<<1 (1 bit left shifting)	00000010
n_char=07h	00000111
Ck= Ck xor n_char	00000101
Ck= Ck<<1 (1 bit left shifting)	00001010
Adr=21h	00100001
Ck= Ck xor Adr	00101011
Ck= Ck<<1 (1 bit left shifting)	01010110
Com=52h	01010010
Ck= Ck xor Com	00000100
Ck= Ck<<1 (1 bit left shifting)	00001000
Sub=71h	01110001
Ck= Ck xor Sub	01111001
Ck= Ck<<1 (1 bit left shifting)	11110010
EOT=04h	00000100
Ck= Ck xor EOT	11110110
Ck=11110110=F6h	

The complete message is:

SOT	n_char	Adr	Com	Sub	EOT	CRC
01	07	21	52	71	04	F6

lika

Lika Electronic
Via S. Lorenzo, 25 - 36010 Carrè (VI) - Italy

Tel. +39 0445 382814
Fax +39 0445 382797

Italy: eMail info@lika.it - www.lika.it
World: eMail info@lika.biz - www.lika.biz