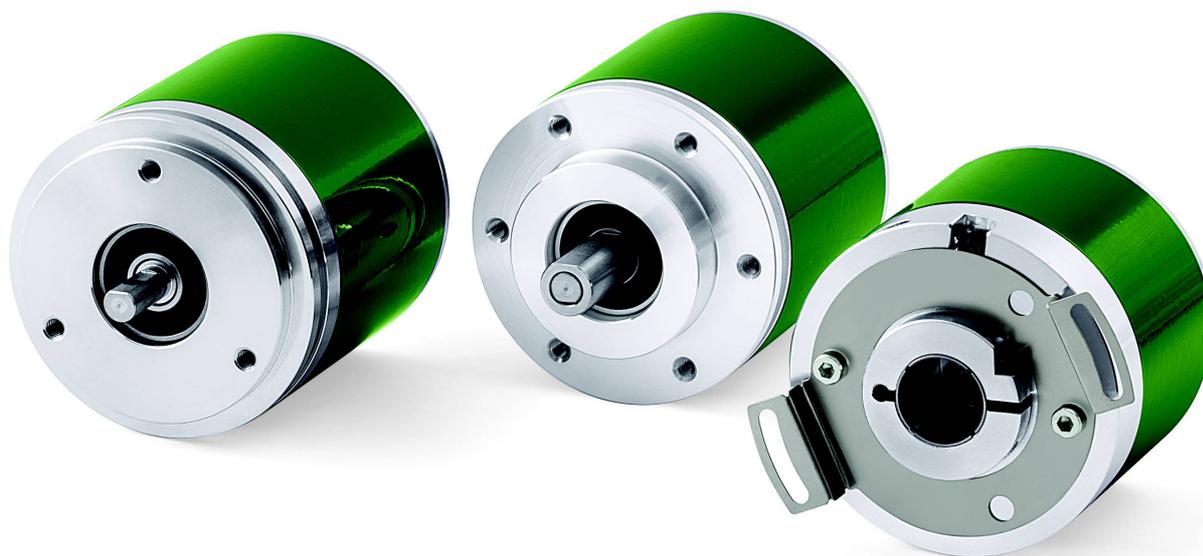


User's guide

EM58 PA

Programmable encoder

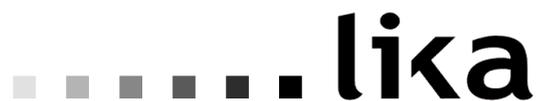


This publication was produced by Lika Electronic s.r.l. 2014. All rights reserved. Tutti i diritti riservati. Alle Rechte vorbehalten. Todos los derechos reservados. Tous droits réservés.

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

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

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



General contents

User's guide.....	1
General contents.....	3
Subject index.....	6
Typographic and iconographic conventions.....	7
Preliminary information.....	8
1 Safety summary.....	9
1.1 Safety.....	9
1.2 Electrical safety.....	9
1.3 Mechanical safety.....	10
2 Identification.....	11
3 Mechanical installation.....	12
3.1 Encoder with solid shaft.....	12
3.1.1 Customary installation.....	12
3.1.2 Installation using fixing clamps (optional kit code LKM-386).....	13
3.1.3 Installation using a mounting bell (optional kit code PF4256).....	13
3.2 Encoder with hollow shaft.....	14
3.2.1 EMC58 PA installation using the antirotation pin.....	14
3.2.2 EMC59 PA installation using the fixing plate.....	15
3.2.3 EMC60 PA installation using the antirotation pin and the fixing plate.....	16
4 Electrical connection.....	17
4.1 Cable and connectors connections.....	17
4.2 T12 cable specifications.....	17
4.3 M23H 12-pin (counter-clockwise) connector specifications.....	18
4.4 M12 12-pin connector specifications.....	18
4.5 Connection of the shield.....	18
4.6 Ground connection.....	19
4.7 RS-232 serial connection.....	19
4.8 0VDC.....	20
4.9 Fault output.....	20
4.9.1 Fault output connected to a PLC input.....	21
4.9.2 Fault output connected to a relay.....	22
4.10 Current analogue output.....	23
4.11 Voltage analogue output.....	24
4.12 Counting direction.....	25
4.13 Preset.....	26
4.14 Recommended current analogue output circuit.....	27
4.15 Recommended voltage analogue output circuit.....	27
5 Software and configuration parameters.....	28
5.1 Configuring the device using the Lika Electronic software tool.....	28
5.1.1 Available pages and commands.....	29
5.2 IDENTIFICATION page.....	32
5.2.1 COM PORT box.....	34
Device search.....	34
Port.....	34
5.2.2 ENCODER box.....	35

Device type.....	35
Serial number.....	35
Output type.....	35
Version.....	35
Read parameters.....	35
Load default parameters.....	36
5.3 CONFIGURATION page.....	37
5.3.1 POSITION box.....	37
Position.....	37
Turns.....	37
Counts/rev.....	38
5.3.2 PRESET box.....	38
Preset.....	38
Activate preset.....	39
5.3.3 DIAGNOSTICS box.....	40
Encoder travel not valid: counts to be displayed greater than physical resolution between start and stop.....	40
Encoder travel not valid: unable to reach the minimum stroke.....	40
No error.....	40
5.3.4 ENCODER CONFIGURATION box.....	41
Enable analog output.....	41
Enable preset.....	41
Positive counting direction.....	41
Output type.....	42
Output range.....	42
5.3.5 RESOLUTION SETTING box.....	43
Programming mode: Start / Stop (single ramp).....	44
1 - Start teaching.....	45
2 - Stop teaching.....	45
Programming mode: Start / Stop (cyclic ramp).....	47
1 - Start teaching.....	48
2 - Stop teaching.....	48
Programming mode: Prog (single ramp).....	50
Encoder HW counts.....	51
Programming mode: Prog (cyclic ramp).....	52
Encoder HW counts.....	53
5.3.6 ENCODER SPECIFICATIONS box.....	54
Counts per revolution.....	54
Max number of revolutions.....	54
Max total counts.....	54
5.4 LOAD / SAVE CONFIGURATION page.....	55
5.4.1 Saving the encoder configuration to a file.....	55
5.4.2 Loading the encoder configuration from a file.....	56
5.5 Error messages.....	57
Carattere non valido.....	57
Disconnected cable.....	57
Encoder HW counts to be converted into the selected output range must be lower than the maximum total counts.....	57
Error creating the file.....	57
Error reading the file.....	57
Value not valid: preset greater than the maximum position.....	57

Subject index

1		
1 - Start teaching.....	45, 48	
2		
2 - Stop teaching.....	45, 48	
A		
Activate preset.....	39	
C		
Carattere non valido.....	57	
Counts per revolution.....	54	
Counts/rev.....	38	
D		
Device search.....	34	
Device type.....	35	
Disconnected cable.....	57	
E		
Enable analog output.....	41	
Enable preset.....	41	
Encoder HW counts.....	51, 53	
Encoder HW counts to be converted.....	57	
Encoder travel not valid: counts to be displayed greater than physical resolution between start and stop.....	40	
Encoder travel not valid: unable to reach the minimum stroke.....	40	
Error creating the file.....	57	
Error reading the file.....	57	
L		
Load default parameters.....	36	
M		
Max number of revolutions.....	54	
Max total counts.....	54	
N		
No error.....	40	
O		
Output range.....	42	
Output type.....	35, 42	
P		
Port.....	34	
Position.....	37	
Positive counting direction.....	41	
Preset.....	38	
Programming mode: Prog (cyclic ramp).....	52	
Programming mode: Prog (single ramp).....	50	
Programming mode: Start / Stop (cyclic ramp).....	47	
Programming mode: Start / Stop (single ramp).....	44	
R		
Read parameters.....	35	
S		
Serial number.....	35	
T		
Turns.....	37	
V		
Value not valid: preset.....	57	
Version.....	35	

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 **ORANGE**;
- 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 **EM58 PA absolute multiturn programmable encoder fitted with current and voltage analogue output**.

EM58 PA programmable encoder from Lika Electronic is designed to maximize customization and versatility and really allows the operator to get, along with the absolute position information, a complete parametrization and the better configuration that perfectly suit specific needs in a good many applications and machines. The operator in fact can not only choose the type of analogue output required by the controller and application and the range of output; but also to set the desired resolution in the range of max. 12 bits singleturn (4096 information per revolution) and 14 bits multiturn (16384 revolutions).

EM58 PA programmable encoder is available in both hollow and solid shaft versions.

The parametrization and set up of the EM58 PA programmable encoder is achieved through a software expressly developed and released by Lika Electronic. The program is supplied for free and can be installed in any PC fitted with a Windows operating system (Windows XP or later). It allows the operator to set the working parameters of the device and monitor whether the device is running properly. Communication is established using **RS-232 serial cable and port**. The software tool is compatible with the whole series of HM- and EM- programmable encoders: programmable encoder with SSI serial output (PS code), programmable encoder with parallel output (PN and PY codes), programmable encoder with analogue output (PA code).

To make it easier to read and understand the text, this guide is divided into two 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 **Software and configuration parameters**, 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 s.r.l. 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 according to explanation in section "Electrical connection";
- the wires of unused output signals must be cut at different lengths and insulated singularly;
- in compliance with 2004/108/EC norm on electromagnetic compatibility, following precautions must be taken:
 - before handling and installing the equipment, discharge electrical charge from your body and tools which may come in touch with the device;
 - power supply must be stabilized without noise; install EMC filters on device power supply if needed;
 - always use shielded cables (twisted pair cables whenever possible);
 - avoid cables runs longer than necessary;
 - avoid running the signal cable near high voltage power cables;
 - mount the device as far as possible from any capacitive or inductive noise source; shield the device from noise source if needed;
 - 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 connector housing 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 section "Mechanical installation";
- mechanical installation has to be carried out with stationary mechanical parts;
- do not disassemble the unit;
- do not tool the unit 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 of the product;
- unit with solid shaft: in order to guarantee the maximum reliability over time of the mechanical parts, we recommend a flexible coupling to be installed to connect the encoder and the installation shaft; make sure the misalignment tolerances of the flexible coupling are respected;
- unit with hollow shaft: the encoder can be mounted directly on a shaft whose diameter has to respect the technical characteristics specified in the purchase order and clamped by means of the collar and the fixing plate into which an anti-rotation pin has to be inserted.

2 Identification

Device can be identified through the **ordering 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 ordering code and the serial number when reaching Lika Electronic s.r.l. for purchasing spare parts or needing assistance. For any information on the technical characteristics of the product refer to the technical catalogue.



Warning: encoders having ordering 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 Mechanical installation



WARNING

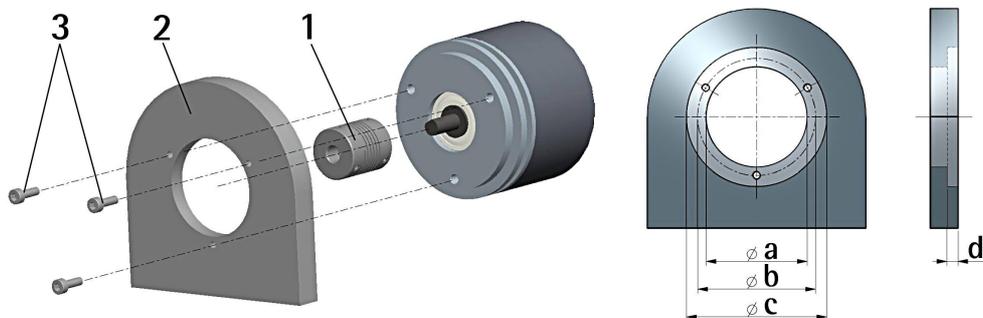
Installation has to be carried out by qualified personnel only, with power supply disconnected and mechanical parts compulsorily in stop.

Never force the rotation of the shaft manually, it could cause irreparable damage!

3.1 Encoder with solid shaft

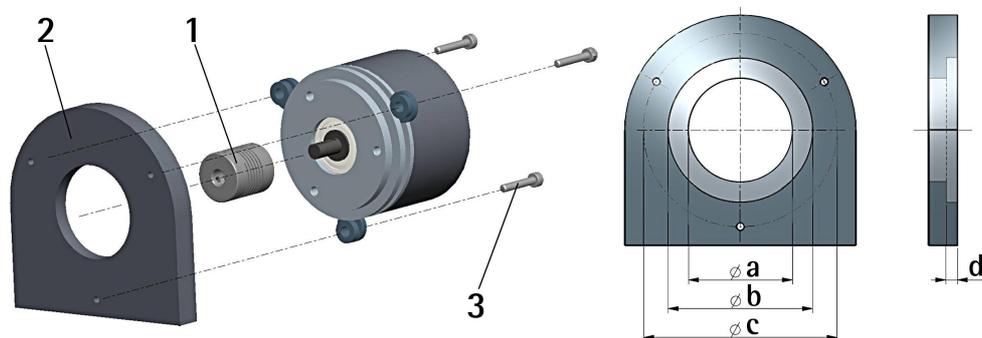
- Mount the flexible coupling **1** on the encoder shaft;
- fix the encoder to the flange **2** (or to the mounting bell) by means of screws **3**;
- secure the flange **2** to the support (or the mounting bell to the motor);
- mount the flexible coupling **1** on the motor shaft;
- make sure the misalignment tolerances of the flexible coupling **1** are respected.

3.1.1 Customary installation



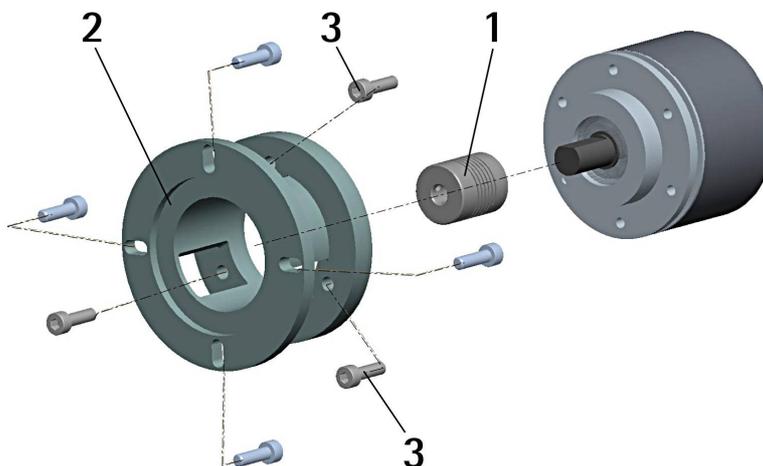
	a [mm]	b [mm]	c [mm]	d [mm]
EM58 PA	-	42	50 F7	4
EM58S PA	36 H7	48	-	-

3.1.2 Installation using fixing clamps (optional kit code LKM-386)



	a [mm]	b [mm]	c [mm]	d [mm]
EM58 PA	-	50 F7	67	4
EM58S PA	36 H7	-	67	-

3.1.3 Installation using a mounting bell (optional kit code PF4256)



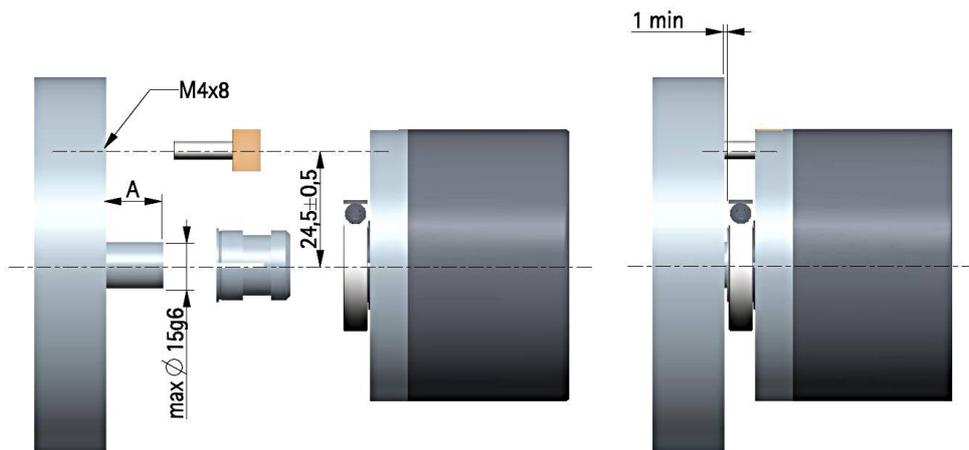
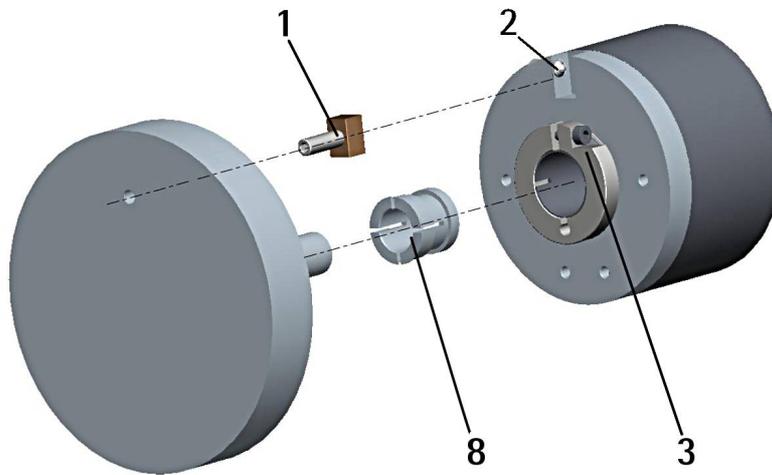
NOTE

In order to guarantee reliability over time of the encoder mechanical parts, we recommend a flexible coupling to be installed between the encoder and the motor shaft. Make sure the misalignment tolerances of the flexible coupling are respected.

3.2 Encoder with hollow shaft

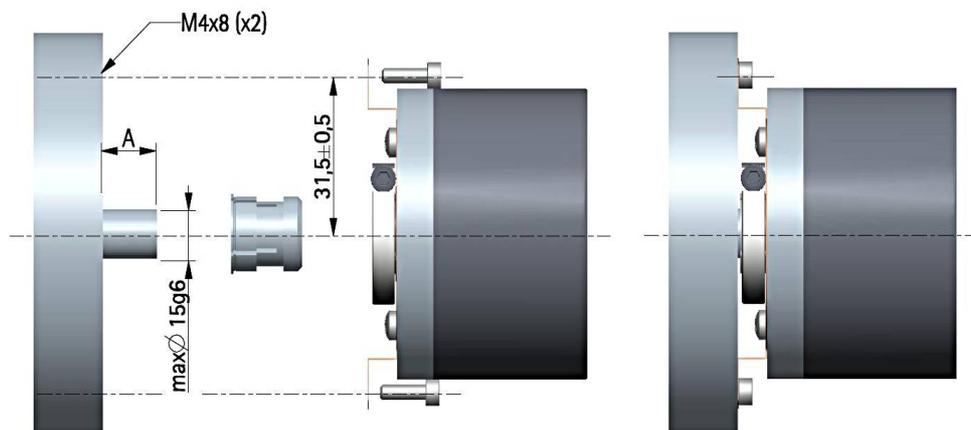
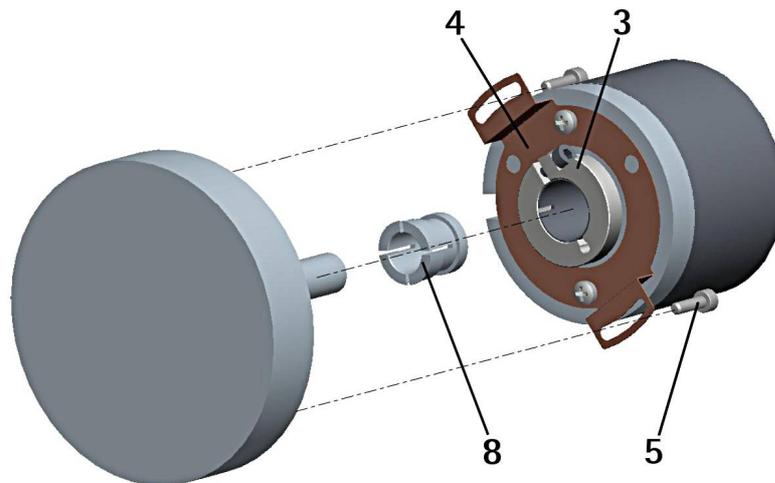
3.2.1 EMC58 PA installation using the antirotation pin

- Fasten the anti-rotation pin **1** to the rear of the motor (secure it using a locknut);
- mount the encoder on the motor shaft using the reducing sleeve **8** (if supplied). Avoid forcing the encoder shaft;
- insert the anti-rotation pin **1** into the slot on the flange of the encoder; this secures it in place by grub screw **2**, preset at Lika;
- fix the collar **3** to the encoder shaft.



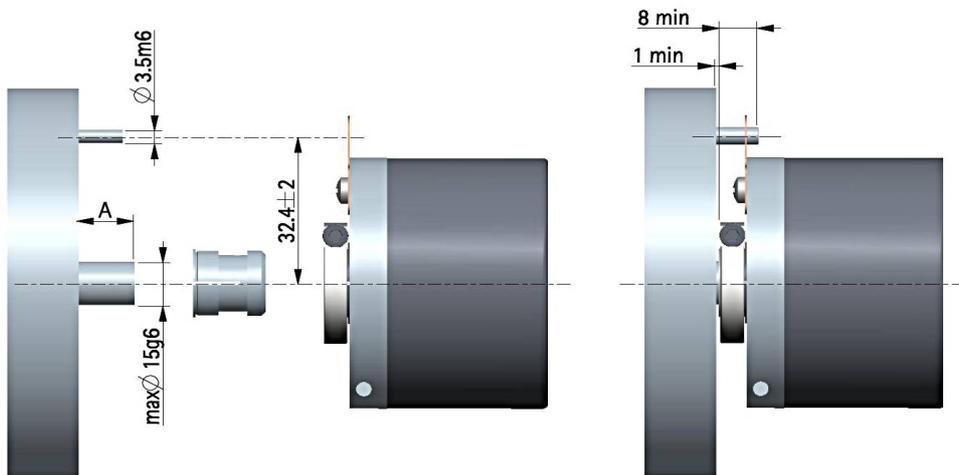
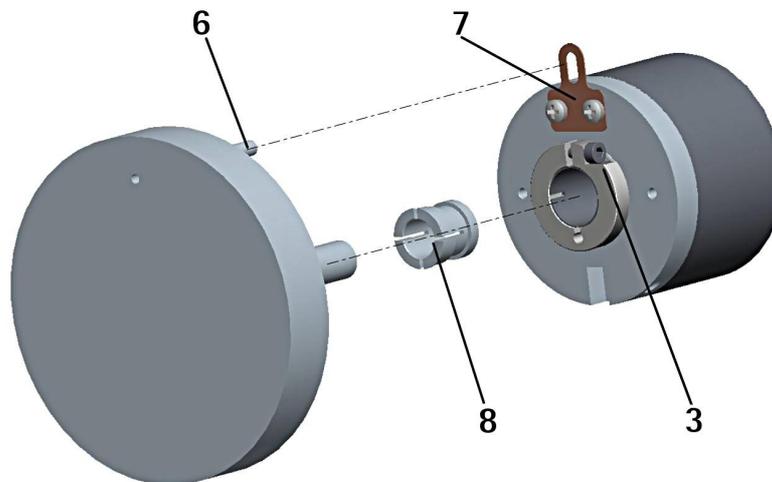
3.2.2 EMC59 PA installation using the fixing plate

- Remove the antirotation pin **1** (see the Figure in the previous page);
- mount the encoder on the motor shaft using the reducing sleeve **8** (if supplied). Avoid forcing the encoder shaft;
- fasten the fixing plate **4** to the rear of the motor using two M3 cylindrical head screws **5**;
- fix the collar **3** to the encoder shaft.



3.2.3 EMC60 PA installation using the antirotation pin and the fixing plate

- Remove the antirotation pin **1** (see Figure on page 14);
- fix the tempered pin **6** to the rear of the motor;
- mount the encoder on the motor shaft using the reducing sleeve **8** (if supplied). Avoid forcing the encoder shaft;
- make sure the anti-rotation pin **6** is inserted properly into the fixing plate **7**;
- fix the collar **3** to the encoder shaft.



NOTE

You are strongly advised not to carry out any mechanical operations (drilling, milling, etc.) on the encoder shaft. This could cause serious damages to the internal parts and an immediate warranty loss. Please contact our technical personnel for the complete availability of "custom made" shafts.

4 Electrical connection



WARNING

Electrical connection has to be carried out by qualified personnel only, with power supply disconnected and mechanical parts compulsorily in stop. Never force the rotation of the shaft manually, it could cause irreparable damage!



WARNING

If wires of unused signals come in contact, irreparable damage could be caused to the device. Please insulate them singularly.

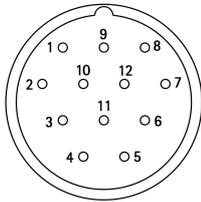
4.1 Cable and connectors connections

Function	T12 cable	M23H 12-pin	M12 12-pin
TD RS-232	Red	1	11
RD RS-232	Green	2	9
Fault	Yellow	3	4
OVDC RS-232	Brown	4	10
+Iout	Grey	5	5
OVDC analogue	Violet	6	3
+Vout	Pink	7	6
Counting direction	Blue	8	8
Preset	White	9	7
Not connected	Black	10	12
+13VDC +30VDC	Brown/Green	11	2
OVDC Power Supply	White/Green	12	1
Shield	Shield	Case	Case

4.2 T12 cable specifications

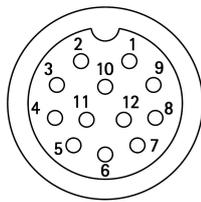
Model : LIKA T12 cable
 Cross section : 4 x 0,25 mm² + 4 x 2 x 0,14 mm² twisted pairs (24/26 AWG)
 Jacket : TPU, extra flexible
 Shield : tinned copper braid, coverage > 85%
 Outer diameter : Ø 6.1 mm ±0.1 mm (Ø 0.24" ±0.004")
 Min. bending radius : fix min. 25 mm (0.98") / dynamic min. 45 mm (1.77")
 Work temperature : fix -40 +90°C (-40 +194°F) / dyn -50 +90°C (-58 +194°F)
 Conductor resistance : < 148 Ω/km - < 90 Ω/km

4.3 M23H 12-pin (counter-clockwise) connector specifications



M23H 12-pin connector
Male
Counter-clockwise

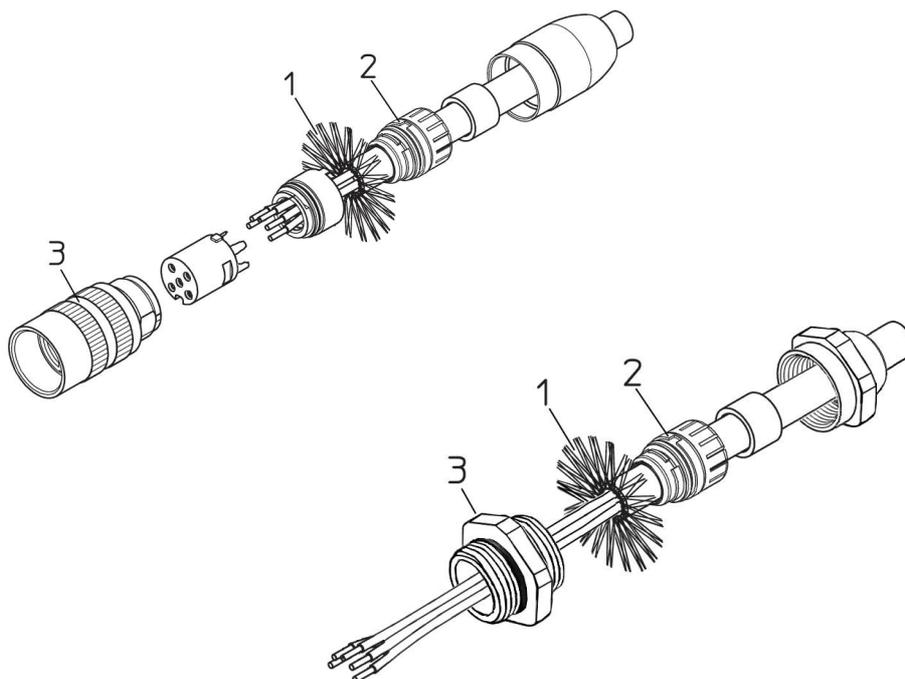
4.4 M12 12-pin connector specifications



Male
Frontal side
A coding

4.5 Connection of the shield

For signals transmission always use shielded cables. The cable shielding must be connected properly to the metal ring nut **3** of the connector in order to ensure a good earthing through the frame of the device. To do this disentangle and shorten the shielding **1** and then bend it over the part **2**; finally place the ring nut **3** of the connector. Be sure that the shielding **1** is in tight contact with the ring nut **3**.



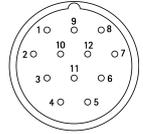
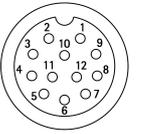
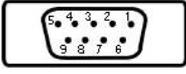
4.6 Ground connection

Minimize noise by connecting the shield and/or the connector housing 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. You are advised to provide the ground connection as close as possible to the encoder.

4.7 RS-232 serial connection

This EM58 PA programmable encoder is equipped with a serial interface for the parametrization and set up of the device. A software tool designed to program the encoder via RS-232 interface is available at the address www.lika.biz > **PRODUCTS** > **ROTACOD** > **EM58 PA**. Before starting the program, 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.

The serial cable must be connected as shown in the table hereafter. See also the section "Electrical connection" on page 17.

Function	T12 cable				Function
		M23 12-pin	M12 12-pin	Sub-D 9-pin female	
TD	Red	1	11	2	RD
RD	Green	2	9	3	TD
OVDC	Brown	4	10	5	OVDC

Please always make sure that the RD of the ENCODER is cross-wired to the TD of the PC while the TD is cross-wired to the RD.

An optional kit fitted with RS-232/USB adapter for the communication between the encoder and the PC is available for both M23H and M12 outputs.

The ordering codes are as follows:

- **KIT EM58PA M23** M23H / USB adapter cable;
- **KIT EM58PA M12** M12 / USB adapter cable.

Please note that the configuration parameters of the serial port have fixed values so the user cannot change them.

They are:

RS-232 serial port settings	Value
Baud rate	9600
Byte size	8
Parity	None
Stop bits	1
Flow control	None

4.8 0VDC

0VDC RS-232, 0VDC analogue and 0VDC Power Supply are internally connected.

4.9 Fault output

This output is only available if the current output is enabled (**Output type = CURRENT**). It is intended to signal an error such as a circuit break. As soon as the Fault signal is activated, a message is also invoked to appear in the **DIAGNOSTICS** box of the **CONFIGURATION** page (see the error message **Disconnected cable**).

To connect the Fault signal please refer to the examples hereafter: "4.9.1 Fault output connected to a PLC input" and "4.9.2 Fault output connected to a relay".

Please pay attention to the value of the R2 resistor (Figure 2 and Figure 3).

$I_{max} = 50 \text{ mA}$

$R1 = 47 \ \Omega$

$$R2 = \left(\frac{V_{dc}}{I} \right) - R1$$

No encoder error = transistor ON (conducting)

Encoder error = transistor OFF (open)

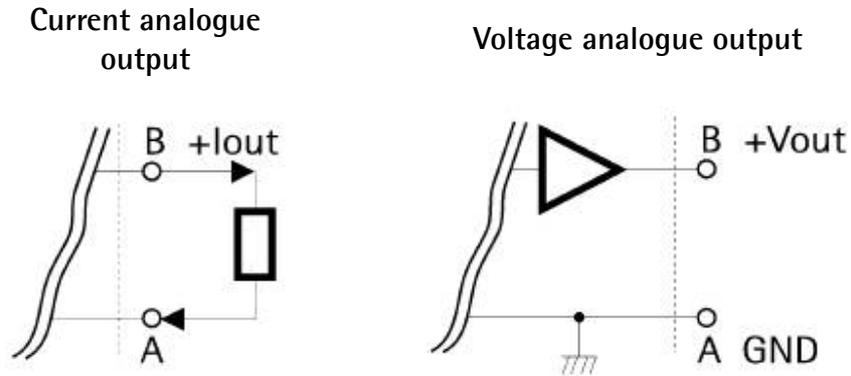


Figure 1

4.9.1 Fault output connected to a PLC input

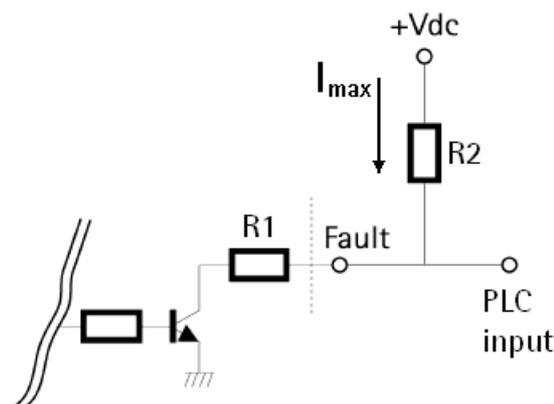


Figure 2

No encoder error = PLC input Low (0 VDC)
Encoder error = PLC input High (+VDC)



EXAMPLE

VDC = +24 V

R1 = 47 Ω

$$R2 = \left(\frac{V_{dc}}{I} \right) - R1$$

I = 4.7 mA

R2 = 5 kΩ

4.9.2 Fault output connected to a relay

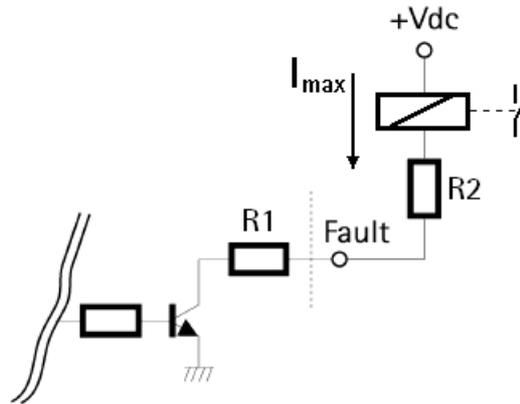


Figure 3

No encoder error = coil energized
Encoder error = coil de-energized



EXAMPLE

VDC = +24 V

R1 = 47 Ω

$$R2 = \left(\frac{V_{dc}}{I} \right) - R1$$

I = 30 mA (current needed to energize a small relay coil)

R2 = 750 Ω

4.10 Current analogue output

+Iout delivers the current analogue signal.

After having enabled the analogue output by setting the parameter **Enable analog output** in the **ENCODER CONFIGURATION** box of the **CONFIGURATION** page, the user is allowed to choose the type of output (either current or voltage) by setting the desired value (CURRENT or VOLTAGE) next to the parameter **Output type** in the same box; then he has to set the output range by means of the drop-down list in the following parameter **Output range**.

This encoder allows to choose between the following current output range options (**Output type** = CURRENT):

Output range	Application range	
	minimum position	maximum position
4 mA ... 20 mA	4 mA	20 mA
0 mA ... 20 mA	0 mA	20 mA
0 mA ... 24 mA	0 mA	24 mA

When the default parameters are set (EM58 PA 12/16384), increments per each step are as follows:

- 0,244 μ A** if **Output range** = 4 mA ... 20 mA
- 0,305 μ A** if **Output range** = 0 mA ... 20 mA
- 0,366 μ A** if **Output range** = 0 mA ... 24 mA

4.11 Voltage analogue output

+Vout delivers the voltage analogue signal.

After having enabled the analogue output by setting the parameter **Enable analog output** in the **ENCODER CONFIGURATION** box of the **CONFIGURATION** page, the user is allowed to choose the type of output (either current or voltage) by setting the desired value (CURRENT or VOLTAGE) next to the parameter **Output type** in the same box; then he has to set the output range by means of the drop-down list in the following parameter **Output range**.

This encoder allows to choose between the following voltage output range options (**Output type** = VOLTAGE):

Output range	Application range	
	minimum position	maximum position
0 V ... +5 V	0 V	+5 V
0 V ... +10 V	0 V	+10 V
- 5 V ... +5 V	-5 V	+5 V
-10 V ... +10 V	-10 V	+10 V

When the default parameters are set (EM58 PA 12/16384), increments per each step are as follows:

0,076 mV if **Output range** = 0 V ... +5 V
0,153 mV if **Output range** = 0 V ... +10 V
0,153 mV if **Output range** = -5 V ... +5 V
0,305 mV if **Output range** = -10 V ... +10 V

4.12 Counting direction

This input is also known as Complementary.

The counting direction circuit is designed to reverse the counting direction. In other words it allows the count up also when the shaft is rotating counterclockwise. Connect the Counting direction input to 0VDC if not used. Connect the counting direction input to 0VDC to have an increasing count when the encoder is turning clockwise (CW, viewed from the shaft side); connect the counting direction input to +VDC to have an increasing count when the encoder is turning counterclockwise (CCW).



WARNING

The counting direction can be set also through the programming tool. The parameter **Positive counting direction** in the **CONFIGURATION** page allows the operator to choose the options CW (STANDARD) and CCW (INVERTED). When the counting direction is set to CW (STANDARD) -**Positive counting direction** = CW (STANDARD)-, if the Complementary input has LOW logic level (0VDC) the encoder will provide the increasing count when the shaft is turning clockwise (and the decreasing count when the shaft is turning counterclockwise); on the contrary if the Complementary input has HIGH logic level (+VDC) the encoder will provide the increasing count when the shaft is turning counterclockwise (and the decreasing count when the shaft is turning clockwise). When the option CCW (INVERTED) is set -**Positive counting direction** = CCW (INVERTED)-, if the Complementary input has LOW logic level (0VDC) the encoder will provide the increasing count when the shaft is turning counterclockwise (and the decreasing count when the shaft is turning clockwise); on the contrary if the Complementary input has HIGH logic level (+VDC) the encoder will provide the increasing count when the shaft is turning clockwise (and the decreasing count when the shaft is turning counterclockwise).



WARNING

After having set the new counting direction it is necessary to set also the preset function.

4.13 Preset

Preset input is active only when the software function **Enable preset** in the **ENCODER CONFIGURATION** box is enabled (see on page 41); otherwise the hardware function is disabled. It is the same as the **Activate preset** button (see on page 39). This input is intended to set the preset value (the preset value is set next to the parameter **Preset** in the **PRESET** box, see on page 38) for the current position of the encoder. For detailed information on the preset function refer to the section "5.3.2 PRESET box" on page 38.

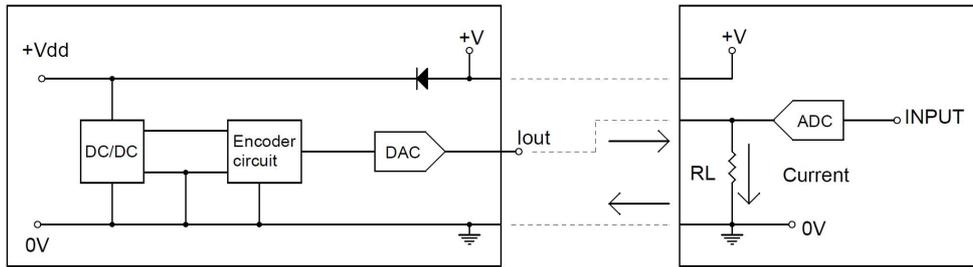
The output information can be forced through a command sent to the PRESET input by a PLC or via a button. After this, the position output by the encoder in that point will be the one set (and then loaded to the encoder) next to the parameter **Preset** in the **PRESET** box, see on page 38. By default the preset value is 0. Connect Preset input to 0VDC if not used. To set the preset, connect Preset input to +VDC for 100 μ s at least, then disconnect +VDC. Normally voltage must be at 0VDC or floating. We suggest performing the preset setting when the encoder is in stop.



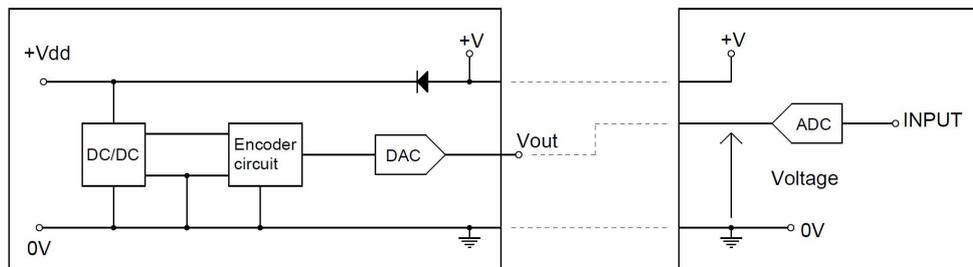
WARNING

Check the parameter **Preset** and execute the preset function (either by means of the **Preset** input or by pressing the **Activate preset** button) every time you change the value next to the parameter **Encoder HW counts** available when the options **Programming mode: Prog (single ramp)** or **Programming mode: Prog (cyclic ramp)** are set; or after having changed the counting direction (through the **Counting direction** input or by setting the parameter **Positive counting direction**).

4.14 Recommended current analogue output circuit



4.15 Recommended voltage analogue output circuit



5 Software and configuration parameters

5.1 Configuring the device using the Lika Electronic software tool

EM58 PA encoder with analogue interface is supplied with a software expressly developed and released by Lika Electronic in order to easily programme and configure the device. The software tool is compatible with the whole series of HM- and EM- programmable encoders from Lika Electronic: programmable encoder with SSI serial output (PS code); programmable encoder with parallel output (PN and PY codes); programmable encoder with analogue output (PA code). 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). Communication is established using **RS-232 serial cable and port** (see on page 19). The executable file **LIKA_PROGRAMMABLE_ENCODER_Vx.EXE** is available in the enclosed documentation or at the address www.lika.biz > **PRODUCTS** > **ROTACOD** > **EM58 PA**). The program is designed to be installed simply by copying the executable file to the desired location and there is **no installation** process. To launch it just double-click the file icon. To close the program press the **EXIT** button in the **File** menu of the **CONFIGURATION** page.



WARNING

Please be aware that the following compatibilities between the hardware-software version of the device and the software version of the executable file have to be respected compulsorily.

Compatibility	HW-SW	EXE FILE
	1-1	Up to ...



NOTE

Before starting the program, connect the device to the personal computer through a serial port. The serial interface of the analogue programmable encoder is a RS-232 type connector. Should the personal computer not be equipped with a serial port, you must install a USB / RS-232 converter, easily available in the market.

The serial cable must be connected as shown in the section "4.7 RS-232 serial connection" on page 19.

5.1.1 Available pages and commands

In each page of the Lika Electronic configuration tool software there are the **left navigation bar** and the usual **menu bar** on the top.

In the left navigation bar the following buttons are available:

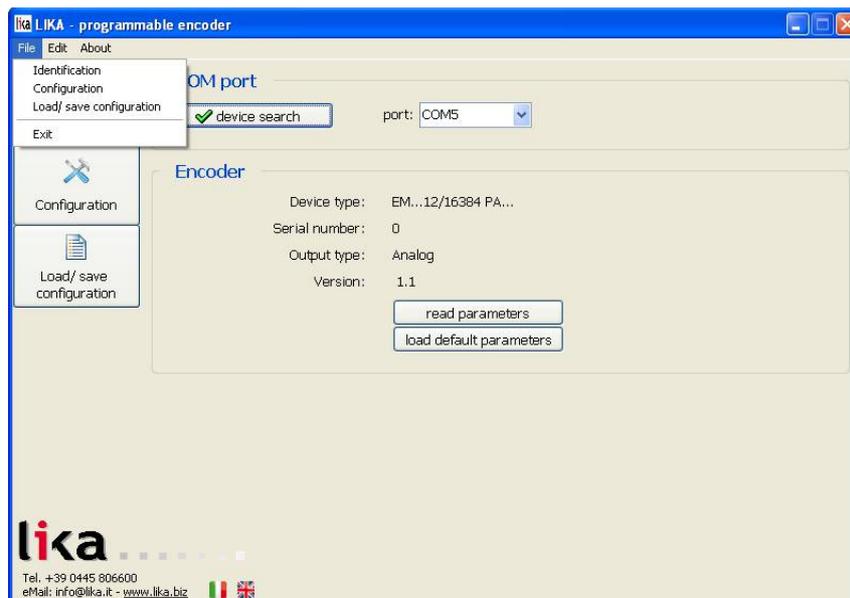
- **Identification** button: it allows to enter the **IDENTIFICATION** page in order to search and activate the communication with the device connected through the serial port; see on page 32;
- **Configuration** button: it allows to enter the page where the configuration parameters are available; see on page 37;
- **Load / save configuration** button: it enters the page where the current configuration of the encoder can be saved; or a previously saved configuration can be loaded; see on page 55.

In the menu bar the **File**, **Edit** and **About** menus are available; they contain the following commands.

File menu

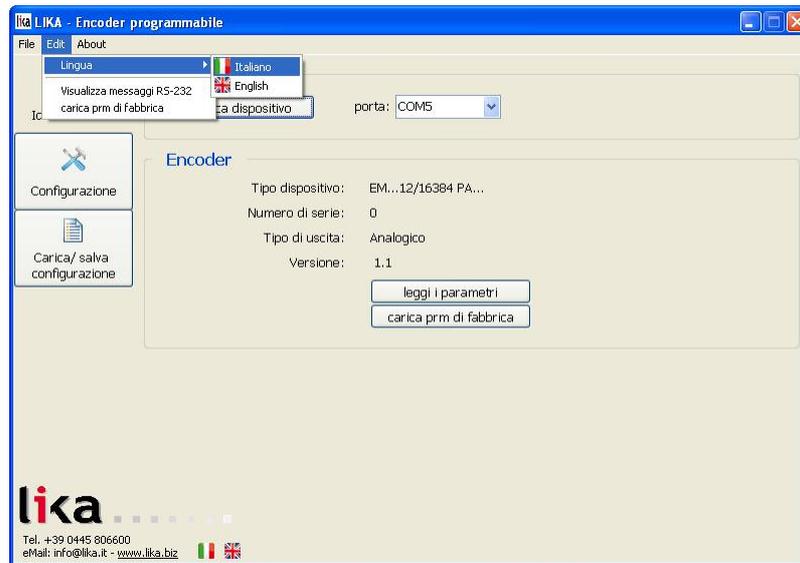
The commands in the **File** menu are exactly the same as the ones located in the left navigation bar, that is:

- **Identification** command;
- **Configuration** command;
- **Load / save configuration**;
- the **Exit** command causes the program to terminate.



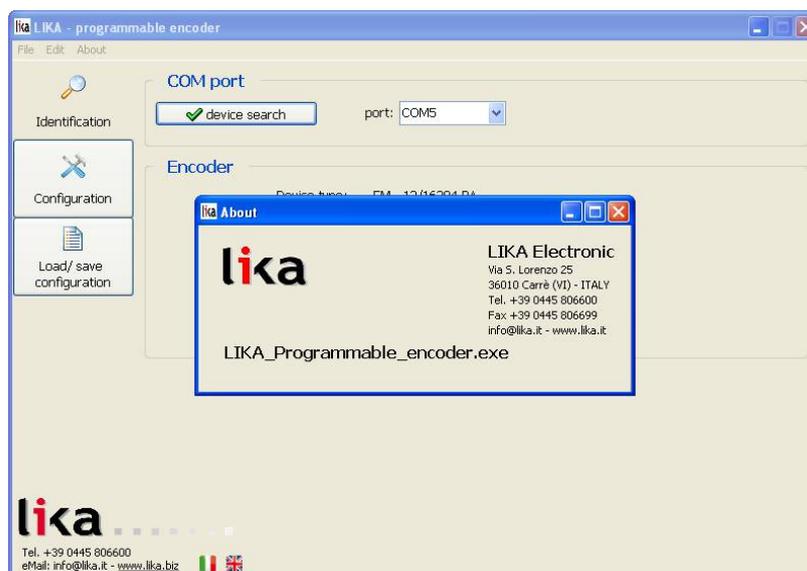
Edit menu

- **Language** command: the same as the English / Italian flags below in the page. It allows the operator to choose the language used to display the menu bar, the buttons and the diagnostic messages;
- **View RS-232 messages** command: it allows to enter the page where the transmission / reception messages exchanged between the program and the encoder are shown;
- **Load default parameters** command: the same as the **Load default parameters** button in the **IDENTIFICATION** page, see on page 36.

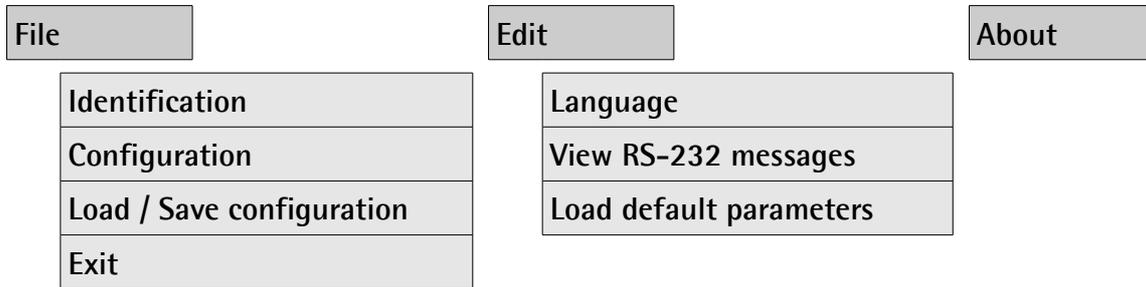


About menu

It shows some information on the application software and the contact details to reach Lika Electronic.

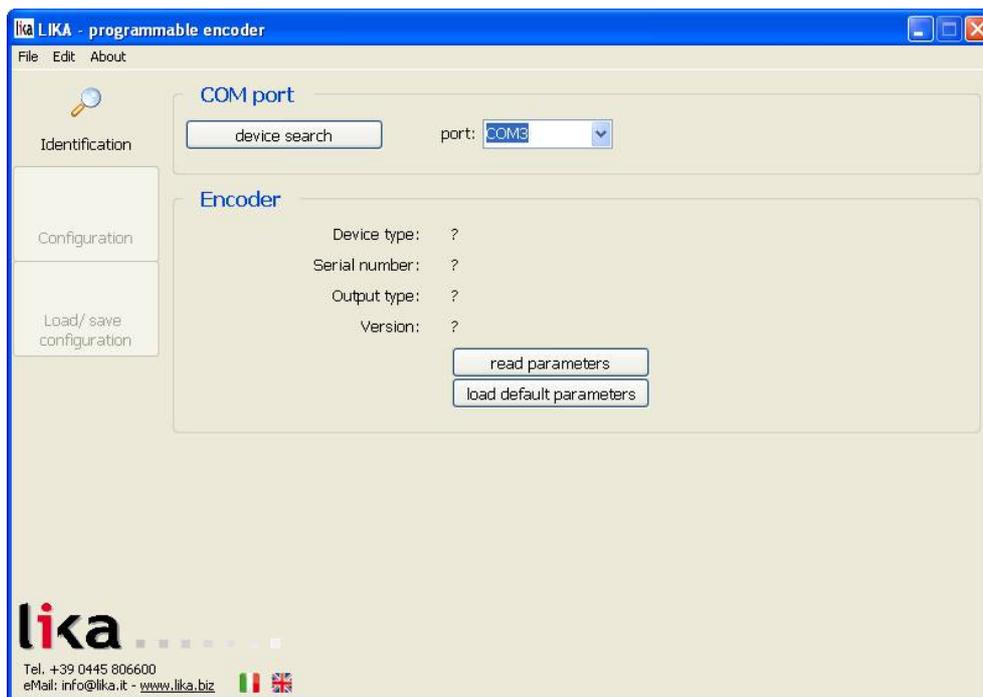


The structure and contents of the menu is shown in the following scheme:



5.2 IDENTIFICATION page

When you start the program by double-clicking the **LIKA_PROGRAMMABLE_ENCODER_Vx.EXE** executable file, the **IDENTIFICATION** page is first displayed.



First of all this page allows the operator to choose the language used to display texts and items in the user interface. Click the **Italian flag**  icon to choose the Italian language; click the **UK flag**  icon to choose the English language.

If you click the www.lika.biz link below in the page, you enter the Lika Electronic web site page where the technical documentation and information on the device as well as the downloadable files for installing the software tool are available.

At this stage the buttons in the left navigation bar as well as the commands in the menu bar are not available; furthermore the fields in the **ENCODER** box show a question mark ("?") as the connected device has not been identified yet.

Before starting the identification process please make sure the unit is connected properly to the personal computer and the power is switched on. The software will force the settings of the personal computer serial port to the values required by the serial port of the connected device, thus it is not necessary to previously set the parameters of the pc serial port in the Windows **Device Manager** menu.

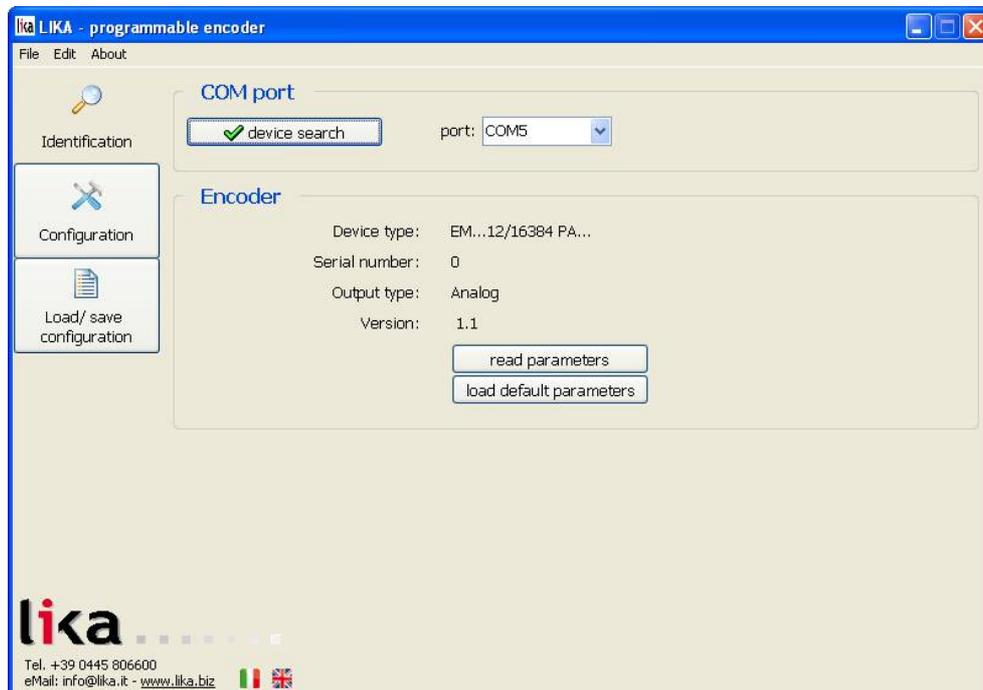
For any information on the characteristics of the serial connection please refer to the section "4.7 RS-232 serial connection" on page 19.



WARNING

Make sure one only device is connected to the personal computer and switched on when you start a device searching process!

Now you are ready to establish the connection to the encoder: press the **DEVICE SEARCH** button in the **COM PORT** box. During the connection attempt a blue arrow appears next to the **DEVICE SEARCH** button.



As soon as the connection is established properly, a green tick (✓) appears next to the **DEVICE SEARCH** button and the fields in the **ENCODER** box are filled with information relating to the connected device. Furthermore the buttons in the left navigation bar and the commands in the menu bar become active.

On the contrary, if the program is not able to establish a connection to the encoder, a red X (X) appears next to the **DEVICE SEARCH** button.

Should this happen, please check that the unit is connected properly and the power is on. Make sure that the power supply voltage is correct. Also check that the serial cable characteristics meet the requirements described in the section "4.7 RS-232 serial connection" on page 19.



WARNING

Make sure one only device is connected to the personal computer and switched on when you start a device searching process!

5.2.1 COM PORT box

In the **COM PORT** box the following functions are available:

Device search

After having connected a device to the serial port of your personal computer and turned it on, press this button to start establishing a communication and allow the program to detect it. During the connection attempt a blue arrow appears next to the button. As soon as the connection is established properly, a green tick (✓) appears next to the **DEVICE SEARCH** button and the fields in the **ENCODER** box are filled with information relating to the connected device. Furthermore the buttons in the left navigation bar and the commands in the menu bar become active.

On the contrary, if the program is not able to establish a connection to the encoder, a red X (X) appears next to the **DEVICE SEARCH** button.

Should this happen, please check the unit is connected properly and the power is on. Make sure that the power supply voltage is correct. Also check that the serial cable characteristics meet the requirements described in the section "4.7 RS-232 serial connection" on page 19.



WARNING

Make sure one only device is connected to the personal computer and switched on when you start a device searching process!

Port

It shows the list of the serial ports available in the personal computer. It is not necessary either to choose the serial port the unit is connected to or to set the parameters of the pc serial port in the Windows **Device Manager** menu first as

the program automatically scroll through the available ports and search in each one for a device which is connected and on. Furthermore it forces the settings of the personal computer serial port to the values required by the serial port of the connected device. For any information on the characteristics of the serial connection please refer to the section "4.7 RS-232 serial connection" on page 19.

5.2.2 ENCODER box

In the **ENCODER** box the following functions are available:

Device type

As soon as the connection is established properly and the device is detected, the main characteristics of the unit are shown respecting the structure of the ordering code. They are: device series (HM or EM series); singleturn resolution (expressed in bits) / multiturn resolution (expressed in number of revolutions; for example: 18/16384), output type (PN: programmable encoder with parallel output and NPN driver; PY: programmable encoder with parallel output and Push-Pull driver; PS: programmable encoder with SSI serial output; PA: programmable encoder with analogue output).

Serial number

As soon as the connection is established properly and the device is detected, the univocal serial number of the device is shown next to this item.

Output type

As soon as the connection is established properly and the device is detected, the type of output of the device is shown next to this item: PARALLEL, SSI or ANALOGUE.

Version

As soon as the connection is established properly and the device is detected, the **software** and **hardware versions** of the device are shown next to this item.

Read parameters

After the connection has been established properly and the device detected, this button allows the operator to force a new read of the device parameters. During the connection attempt a blue arrow appears next to the button. If the program

is not able to establish a connection to the encoder, the fields in the **ENCODER** box and listed above show a question mark ("?").

Load default parameters

Default parameters are set at the factory by Lika Electronic engineers to allow the operator to run the device for standard operation in a safe mode. As soon as you press this button the default parameters are uploaded and activated. All parameters which have been set previously are overwritten, thus previously set values are lost. The complete list of machine data and relevant default parameters preset by Lika Electronic engineers is available on page 59.

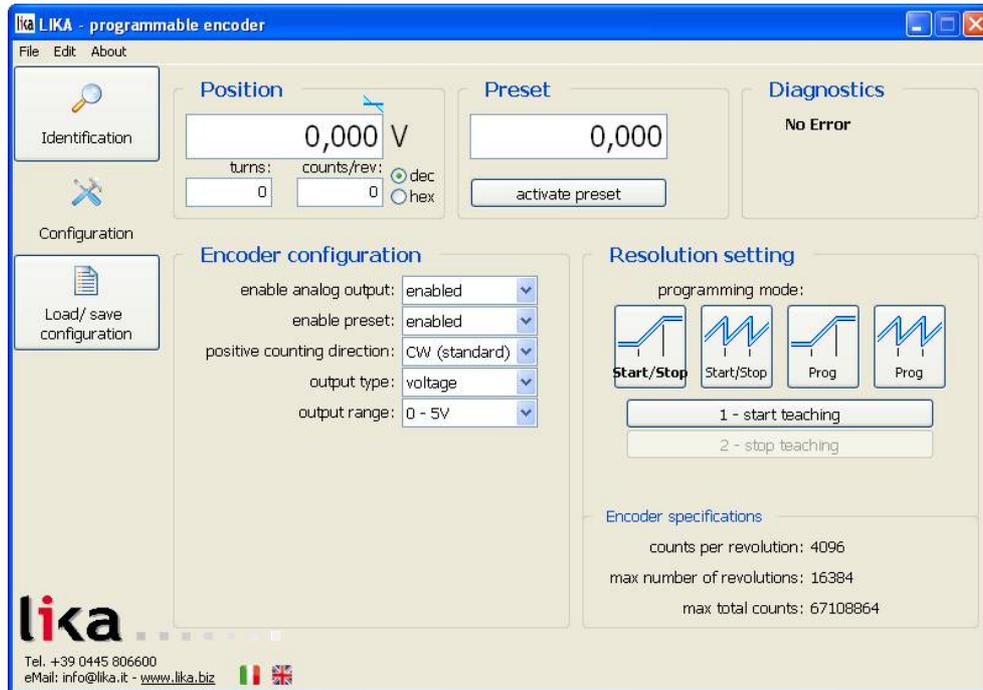


WARNING

As soon as you press this button, all parameters which have been set previously are overwritten, thus previously set values are lost!

5.3 CONFIGURATION page

When you press the **CONFIGURATION** button in the left navigation bar you enter the **CONFIGURATION** page. This page allows the operator to start programming and monitoring the unit. The following window will appear:



5.3.1 POSITION box

In the **POSITION** box at the top left of the page the following functions are available. The cyclical movement of the blue arrow located at the top right of the **Position** field is intended to show the proper communication with the device.

Position

It shows the current position information of the connected device. If **Output type** = VOLTAGE, then the current encoder position is expressed in Volts (V); otherwise if **Output type** = CURRENT, then the current encoder position is expressed in milliamperes (mA).

Turns

It shows the number of revolutions performed by the encoder. The value can be represented in either decimal or hexadecimal format, click the DEC or HEX option buttons in this box to choose the desired display format.

Counts/rev

It shows the current position information in the revolution. As soon as the hardware number of information per revolution (namely, counts per revolution, cpr: singleturn resolution) is achieved, the counter restarts again the increasing count. The value is expressed in pulses. The value can be represented in either decimal or hexadecimal format, click the DEC or HEX option buttons in this box to choose the desired display format.

5.3.2 PRESET box

The functions in this box are activated and thus available only if the parameter **Enable preset** in the **ENCODER CONFIGURATION** box is set to ENABLED; on the contrary, if DISABLED is set, they are not available. The functions in this box are used to set and activate the preset.

Preset

This function is available only if the parameter **Enable preset** in the **ENCODER CONFIGURATION** box is set to ENABLED.

This parameter allows the operator to enter the preset value.

The Preset function is meant to assign a value to a desired physical position of the encoder. The chosen physical position will get the value set next to this item and all the previous and following positions will get a value according to it. This function is useful, for example, when the zero position of the encoder and the zero position of the axis need to match. The preset value will be set for the position of the encoder (the current position is displayed next to the item **Position** in the **POSITION** box) in the moment when the preset value is activated. To activate the preset, stop the encoder in the desired position and then press the **Activate preset** button in this box (otherwise connect the Preset input as explained on page 26).

This parameter allows to enter decimal numbers with up to three digits (thousandths); further digits in the fractional part are subject to round-off. Separate the integer part from the fractional part using the decimal point (.); decimal comma is converted into decimal point.

Default = 0 (min. / max. = see the limit values of the selected output range)



EXAMPLE

Here follows an example useful to better understand the preset function and the meaning of the related parameters and commands: **Preset** and **Activate preset**. Let's say **Output type** = CURRENT and **Output range** = 0 – 5V.

In our example the minimum value you can set next to the parameter **Preset** is 0; the maximum value is 5.

If a **Preset** value has been never set previously and anyway the **Activate preset** command has been never sent, the transmitted position information and the current position information necessarily match.

When you enter a **Preset** value and then execute the **Activate preset** command, the system saves the set preset value and use it to calculate the position value to be transmitted.

For instance, let's suppose that we set the value "4" (V) next to the item **Preset** and then we execute the **Activate preset** command after having stopped the encoder at position "0,195" (V) (**Position** = 0,195; after having sent the command by pressing the button **Activate preset**, **Position** = 4V; **Turns** = 13107; **Counts/rev** = 819). So we need the encoder to output the value "4" (V) when it reaches the real position "0,195" (V).

Thus the transmitted position values will result as follows:

If **current encoder position** = "0,195" → **transmitted position** = 4,000 V.

If **current encoder position** = "0,196" → **transmitted position** = 4,001 V.

...

If **current encoder position** = "0,193" → **transmitted position** = 3,998 V.

If **current encoder position** = "0,194" → **transmitted position** = 3,999 V.



NOTE

The settable preset values are comprised between the limits of the selected output range.



WARNING

Check the parameter **Preset** and execute the preset function (either by means of the **Preset** input or by pressing the **Activate preset** button) every time you change the value next to the parameter **Encoder HW counts** available when the options **Programming mode: Prog (single ramp)** or **Programming mode: Prog (cyclic ramp)** are set; or after having changed the counting direction (through the **Counting direction** input or by setting the parameter **Positive counting direction**).

Activate preset

This function is active only if the parameter **Enable preset** in the **ENCODER CONFIGURATION** box is set to ENABLED.

Press this button to activate the preset function. The preset value (it is set next to the **Preset** item above) will be set for the position of the encoder in the moment when the preset value is activated. To activate the preset, stop the encoder in the desired position and then press this **Activate preset** button. The

chosen physical position will get the value set next to the **Preset** item and all the previous and following positions will get a value according to it. For any further information on the preset function and the meaning of the related parameters and commands **Preset** and **Activate preset** refer to page 38.



WARNING

The Preset hardware input works in parallel with the **Activate preset** command. For any information on using the Preset input refer to the section "4.13 Preset" on page 26.

5.3.3 DIAGNOSTICS box

This box is designed to show the error messages which could be triggered while programming the encoder. Hereafter are the available error messages.

Encoder travel not valid: counts to be displayed greater than physical resolution between start and stop

When programming the encoder using the START / STOP mode (see **Programming mode: Start / Stop (single ramp)** on page 44; or **Programming mode: Start / Stop (cyclic ramp)** on page 47), if the travel exceeds the maximum encoder resolution as set by the operator, then this error message is displayed.

Encoder travel not valid: unable to reach the minimum stroke

When programming the encoder using the START / STOP mode (see **Programming mode: Start / Stop (single ramp)** on page 44; or **Programming mode: Start / Stop (cyclic ramp)** on page 47), if the start position (**1 – Start teaching**) and final position (**2 – Stop teaching**) match (i.e., you do not change the axis position during programming process and press the buttons when the axis is in the same exact position), then this error message is displayed.

No error

There are not active errors.

5.3.4 ENCODER CONFIGURATION box

Enable analog output

It enables / disables the analogue output. If **Enable analog output** = disabled, then the voltage signal or the current signal are not provided through the relevant outputs +Vout or +Iout.

Default = enabled

Enable preset

It enables / disables the preset function. When this parameter is set to ENABLED, the functions available in the **PRESET** box and the Preset input are active and can be set; otherwise they are disabled. For any information on the preset function refer to the section "5.3.2 PRESET box" on page 38.

Default = enabled

Positive counting direction

It allows to set whether the position information output by the encoder increases when the shaft rotates clockwise or counter-clockwise. Clockwise and counter-clockwise rotations are viewed from the shaft. It is possible to choose the following options: CW (STANDARD) and CCW (INVERTED). When the counting direction is set to CW (STANDARD) -**Positive counting direction** = CW (STANDARD)-, if the Complementary input (see on page 25) has LOW logic level (OVDC) the encoder will provide the increasing count when the shaft is turning clockwise (and the decreasing count when the shaft is turning counter-clockwise); on the contrary if the Complementary input has HIGH logic level (+VDC) the encoder will provide the increasing count when the shaft is turning counter-clockwise (and the decreasing count when the shaft is turning clockwise). When the option CCW (INVERTED) is set -**Positive counting direction** = CCW (INVERTED)-, if the Complementary input has LOW logic level (OVDC) the encoder will provide the increasing count when the shaft is turning counter-clockwise (and the decreasing count when the shaft is turning clockwise); on the contrary if the Complementary input has HIGH logic level (+VDC) the encoder will provide the increasing count when the shaft is turning clockwise (and the decreasing count when the shaft is turning counter-clockwise). For any information on the Complementary input refer to the section "Electrical connection" on page 17 and in particular to the section "4.12 Counting direction" on page 25.

Default = CW (standard)



WARNING

After having set the new counting direction it is necessary to set also the preset function.

Output type

It sets the analogue output type. Two options are available: VOLTAGE or CURRENT. If **Output type** = VOLTAGE, the position information will be provided through the +Vout output and expressed in Volts (V); otherwise if **Output type** = CURRENT, the position information will be provided through the +Iout output and expressed in milliamperes (mA). The output range options for either voltage type or current type can be set next to the following parameter **Output range**. Please note that the analogue output can be enabled / disabled by setting the parameter **Enable analog output** in the same **ENCODER CONFIGURATION** box.

Default = voltage

Output range

After having enabled the analogue output by setting the parameter **Enable analog output** and selected the type of output (voltage output or current output) by setting the desired option (VOLTAGE or CURRENT) next to the previous parameter **Output type**, scroll the drop-down list to choose between the available output range options.

Default = 0 – 5 V

The following output range options are available for the current output (**Output type** = CURRENT):

- 4 ... 20 mA;
- 0 ... 20 mA;
- 0 ... 24 mA.

For any information refer to the section "4.10 Current analogue output" on page 23.

The following output range options are available for the voltage output (**Output type** = VOLTAGE):

- 0 ... 5 V;
- 0 ... 10 V;
- -5 ... +5 V;
- -10 ... +10 V.

For any information refer to the section "4.11 Voltage analogue output" on page 24.

5.3.5 RESOLUTION SETTING box

The four graphic buttons available in the **RESOLUTION SETTING** box allow to programme the encoder work mode that best suits the requirements of the specific application. The functions available in the box are different for each programming mode.

The available programming modes are:



Programming mode: Start / Stop (single ramp): TEACH IN, it allows to programme the encoder by considering directly the physical travel of the application you need to measure and control; the travel is defined in a single ramp, the initial position of the travel is the minimum value of the output range, the final position is the maximum value of the output range; beyond the travel limits the current / voltage signal level is kept at the minimum / maximum value of the selected range (**Output range**), see on page 44.



Programming mode: Start / Stop (cyclic ramp): TEACH IN, it allows to programme the encoder by considering directly the physical travel of the application you need to measure and control; the travel is defined in a ramp which is then repeated cyclically: as soon as the the final position of the travel is reached, then the minimum signal level of the selected range is output to start a new ramp, see on page 47.



Programming mode: Prog (single ramp): it allows to programme the encoder provided that you know exactly the number of encoder information (counts) for the physical travel of the application you need to measure and control; the travel is defined in a single ramp, the initial position of the travel is the minimum value of the output range, the final position is the maximum value of the output range; beyond the travel limits the current / voltage signal level is kept at the minimum / maximum value of the selected range (**Output range**), see on page 50.

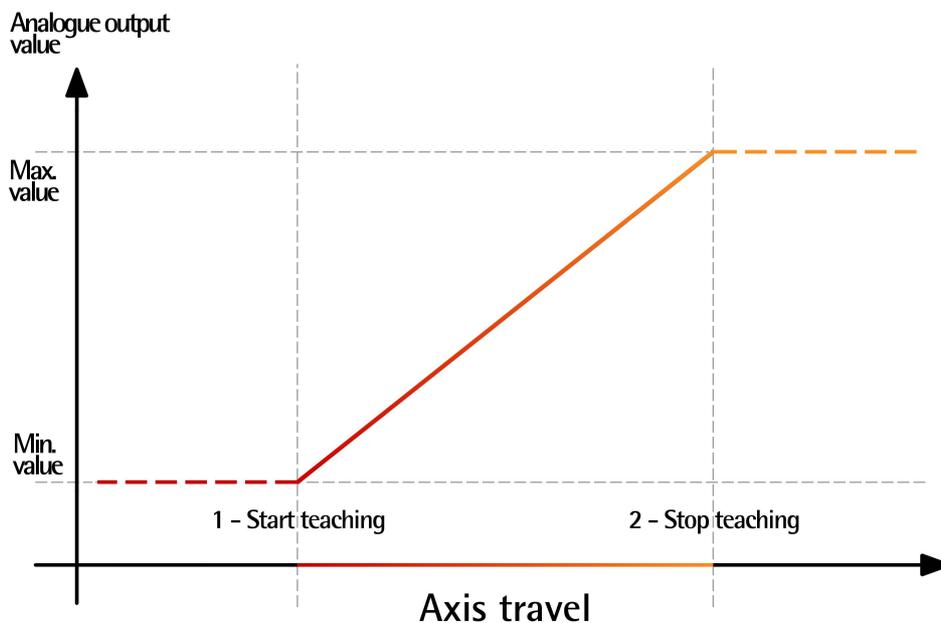


Programming mode: Prog (cyclic ramp): it allows to programme the encoder provided that you know exactly the number of encoder information (counts) for the physical travel of the application you need to measure and control; the travel is defined in a ramp which is then repeated cyclically: as soon as the the final position of the travel is reached, then the minimum signal level of the selected range is output to start a new ramp, see on page 52.

Programming mode: Start / Stop (single ramp)

Press this button to enter the START / STOP (single ramp) programming mode and activate the relevant functions. In this mode **the travel will be defined in a single ramp.**

The START / STOP (single ramp) programming mode allows to programme the encoder by considering directly the physical travel of the application you need to measure and control; the travel is defined in a single ramp, the initial position of the travel is the minimum value of the output range, the final position is the maximum value of the output range; beyond the travel limits the current / voltage signal level is kept at the minimum / maximum value of the selected range. The set output range (the overall information to be output which is set next to the item **Output range**) is defined over the travel of the specific application and is comprised between the ends of the axis: the origin of the axis, i.e. the point where you press the **1 - Start teaching** button, and the end of the axis, i.e. the point where you press the **2 - Stop teaching** button. For the positions beyond the travel limits the current / voltage signal level will be kept at the minimum / maximum value of the selected range. Before the initial position of the travel the encoder will provide the minimum current / voltage signal level of the output range selected in the parameter **Output range**; after the last position of the travel the encoder will provide the maximum current / voltage signal level of the output range selected in the parameter **Output range**.





For instance, if **Output type** = VOLTAGE; **Output range** = 0 – 5V; the length of the travel between the **1 – Start teaching** point and the **2 – Stop teaching** point = 4096, then the encoder will provide a fixed voltage level of 0 V for the 33552384 positions before the origin of the travel (i.e. the point where you press the **1 – Start teaching** button); a voltage level between 0 V (origin of the travel, position 0) and 5 V (end of the travel, position 4095) for the positions of the axis; a fixed voltage level of 5 V for the 33552384 positions after the last point of the travel (i.e. the point where you press the **2 – Stop teaching** button).

To programme the encoder using the START / STOP (single ramp) programming mode proceed as follows:

- move the axis to the origin of the physical travel of the application you want to measure and control; in other words, move it to the point where the travel starts;
- press the **1 – Start teaching** button; in this point the encoder will provide the minimum current / voltage signal level available in the output range selected in the parameter **Output range**;
- now move the axis to the end of the physical travel of the application you want to measure and control; in other words, move it to the point where the travel stops;
- press the **2 – Stop teaching** button; in this point the encoder will provide the maximum current / voltage signal level available in the output range selected in the parameter **Output range**.

1 – Start teaching

This button is available only when the **Programming mode: Start / Stop (single ramp)** is enabled.

After having moved the axis to the start position (0 position), i.e. the point where the travel we need to measure starts, press this button in order to bind the first value of the selected output range to the physical position you have moved the axis to (axis origin).

2 – Stop teaching

This button is available only when the **Programming mode: Start / Stop (single ramp)** is enabled.

After having moved the axis to the end position, i.e. the point where the travel we need to measure stops, press this button in order to bind the last value of the selected output range to the physical position you have moved the axis to (axis end).



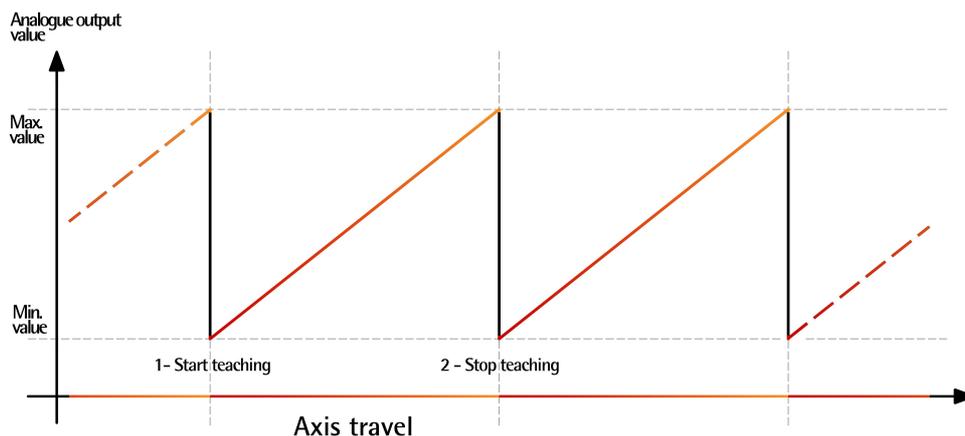
WARNING

- If the start position (**1 – Start teaching**) and the final position (**2 – Stop teaching**) match (i.e., you do not change the axis position during programming process and press the buttons when the axis is in the same exact position), then the error message **Encoder travel not valid: unable to reach the minimum stroke** is displayed.
- If the travel is over the maximum encoder limits, then the error message **Encoder travel not valid: counts to be displayed greater than physical resolution between start and stop** is displayed.
- If you set the start position, move the axis in a direction and then reverse the movement of the axis so going back over the start position, then the error message is displayed.

Programming mode: Start / Stop (cyclic ramp)

Press this button to enter the START / STOP (cyclic ramp) programming mode and activate the relevant functions. In this mode **the travel will be defined in cyclic ramps**.

The START / STOP (cyclic ramp) programming mode allows to programme the encoder by considering directly the physical travel of the application you need to measure and control; the travel is defined in a ramp which is then repeated cyclically: as soon as the the final position of the travel is reached, then the minimum signal level of the selected range is output to start a new ramp; and so on. The set output range (the overall information to be output which is set next to the item **Output range**) is defined over the travel of the specific application and is comprised between the ends of the axis: the origin of the axis, i.e. the point where you press the **1 – Start teaching** button, and the end of the axis, i.e. the point where you press the **2 – Stop teaching** button. It is then repeated cyclically.



Ramps follow each other. If you move the axis beyond the limits of the travel you enter either the previous or the following ramp.



For instance, if **Output type** = VOLTAGE; **Output range** = 0 – 5V; the length of the travel between the **1 – Start teaching** point and the **2 – Stop teaching** point = 4096, then the encoder will provide a voltage level between 0 V at the origin of the travel (i.e. the point where you press the **1 – Start teaching** button, position 0) and 5 V at the end of the travel (i.e. the point where you press the **2 – Stop teaching** button, position 4095). Then the sequence will be repeated cyclically and a 0-5V ramp will follow a 0-5V ramp; and so on.

To programme the encoder using the START / STOP (cyclic ramp) programming mode proceed as follows:

- move the axis to the origin of the physical travel of the application you want to measure and control; in other words, move it to the point where the travel starts;
- press the **1 – Start teaching** button; in this point the encoder will provide the minimum current / voltage signal level available in the output range selected in the parameter **Output range**;
- now move the axis to the end of the physical travel of the application you want to measure and control; in other words, move it to the point where the travel stops;
- press the **2 – Stop teaching** button; in this point the encoder will provide the maximum current / voltage signal level available in the output range selected in the parameter **Output range**.

1 – Start teaching

This button is available only when the **Programming mode: Start / Stop (cyclic ramp)** is enabled.

After having moved the axis to the start position (0 position), i.e. the point where the travel we need to measure starts, press this button in order to bind the first value of the selected output range to the physical position you have moved the axis to (axis origin).

2 – Stop teaching

This button is available only when the **Programming mode: Start / Stop (cyclic ramp)** is enabled.

After having moved the axis to the end position, i.e. the point where the travel we need to measure stops, press this button in order to bind the last value of the selected output range to the physical position you have moved the axis to (axis end).



WARNING

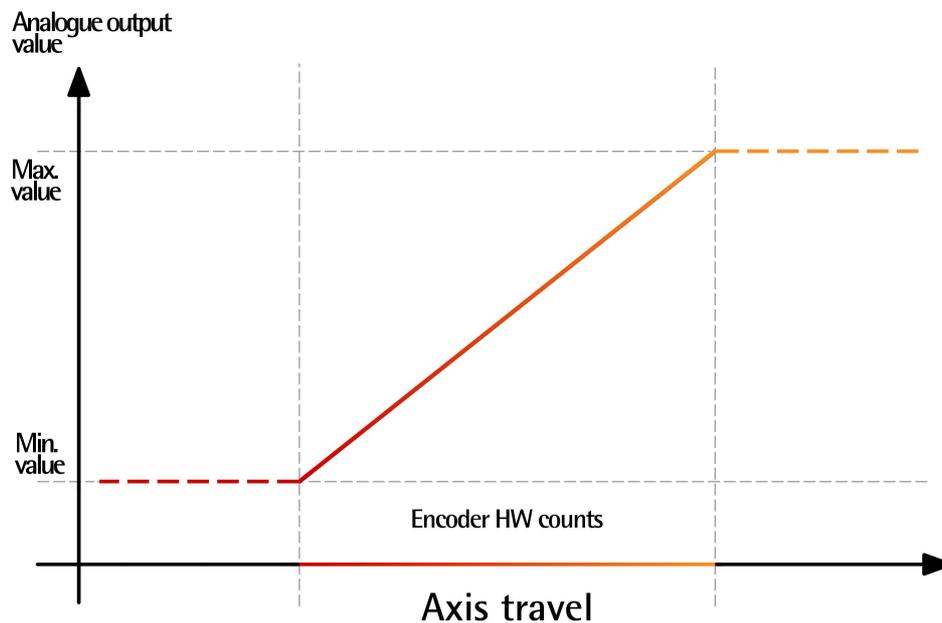
- If the start position (**1 – Start teaching**) and the final position (**2 – Stop teaching**) match (i.e., you do not change the axis position during programming process and press the buttons when the axis is in the same exact position), then the error message **Encoder travel not valid: unable to reach the minimum stroke** is displayed.
- If the travel is over the maximum encoder limits, then the error message **Encoder travel not valid: counts to be displayed greater than physical resolution between start and stop** is displayed.

- If you set the start position, move the axis in a direction and then reverse the movement of the axis so going back over the start position, then the error message is displayed.

Programming mode: Prog (single ramp)

Press this button to enter the PROG programming mode and activate the relevant functions. In this mode **the travel will be defined in a single ramp**.

The PROG (single ramp) programming mode allows to programme the encoder provided that you know exactly the number of encoder information (counts) for the physical travel of the application you need to measure and control; the travel is defined in a single ramp, the initial position of the travel is the minimum value of the output range, the final position is the maximum value of the output range; beyond the travel limits the current / voltage signal level is kept at the minimum / maximum value of the selected range (**Output range**). The length of the travel you need to measure and control must be set next to the item **Encoder HW counts** and is expressed in counts. The set output range (the overall information to be output which is set next to the item **Output range**) is defined over the travel of the application and is comprised between the ends of the axis. For the positions beyond the travel limits the current / voltage signal level will be kept at the minimum / maximum value of the selected range. Before the initial position of the travel the encoder will provide the minimum current / voltage signal level of the output range selected in the parameter **Output range**; after the last position of the travel the encoder will provide the maximum current / voltage signal level of the output range selected in the parameter **Output range**.



For instance, if **Output type** = VOLTAGE; **Output range** = 0 – 5V; **Encoder HW counts** = 4096, then the encoder will provide a fixed voltage level of 0 V for the 33552384 positions before the origin of the travel; a voltage level between 0 V (origin of the travel, position 0) and 5 V (end of the travel, position 4095) for the

positions of the axis; a fixed voltage level of 5 V for the 33552384 positions after the last point of the travel.



NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC has a 16-bit (65536 information) resolution. So you are allowed to arrange the number of counts per turn and the number of revolutions as you prefer; yet the overall analogue resolution will be limited to 16 bits.

Encoder HW counts

This parameter is available only when the **Programming mode: Prog (single ramp)** is enabled.

It sets the length of the displacement you need to measure and control expressed in encoder information (counts). When needed, calculate the portions of a turn by considering the physical **Counts per revolution**. For instance: if the axis travel is 1.5 turn long, enter: $4096 * 1.5 = 6144$ counts.

Default = 67108864 (min. = 1, max. = 67108864)



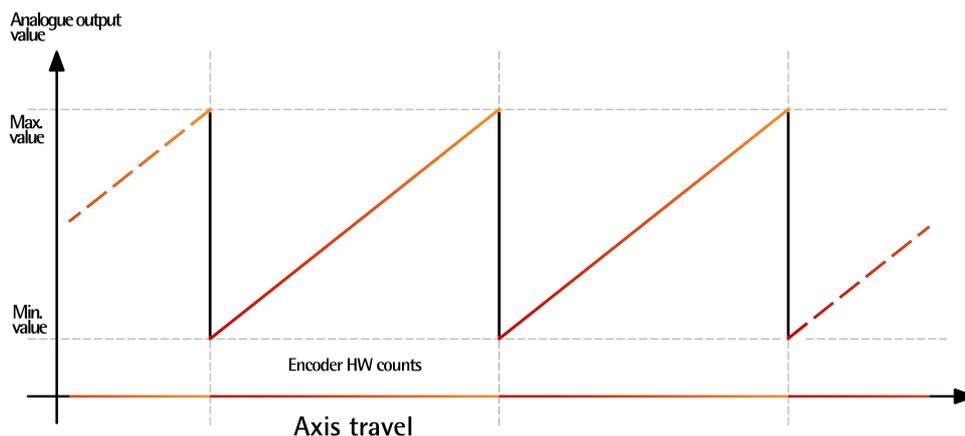
NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC has a 16-bit (65536 information) resolution, so the overall analogue resolution will be limited to 16 bits.

Programming mode: Prog (cyclic ramp)

Press this button to enter the PROG programming mode and activate the relevant functions. In this mode **the travel will be defined in cyclic ramps**.

The PROG (cyclic ramp) programming mode allows to programme the encoder provided that you know exactly the number of encoder information (counts) for the physical travel of the application you need to measure and control; the travel is defined in a ramp which is then repeated cyclically: as soon as the the final position of the travel is reached, then the minimum signal level of the selected range is output to start a new ramp; and so on. The initial position of the travel is the minimum value of the selected output range (**Output range**), the final position is the maximum value of the output range. The length of the travel you need to measure and control must be set next to the item **Encoder HW counts** and is expressed in counts. The set output range (the overall information to be output which is set next to the item **Output range**) is defined over the travel of the application and is comprised between the ends of the axis.



Ramps follow each other, i.e. they are repeated cyclically. If you move the axis beyond the limits of the travel you enter either the previous or the following ramp.



For instance, if **Output type** = VOLTAGE; **Output range** = 0 – 5V; **Encoder HW counts** = 4096, the encoder will provide a voltage level between 0 V (origin of the travel, position 0) and 5 V (end of the travel, position 4095). Then the sequence will be repeated cyclically and a 0-5V ramp will follow a 0-5V ramp; and so on.



NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC

has a 16-bit (65536 information) resolution, so the overall analogue resolution will be limited to 16 bits.

Encoder HW counts

This parameter is available only when the **Programming mode: Prog (cyclic ramp)** is enabled.

It sets the length of the displacement you need to measure and control expressed in encoder information (counts). When needed, calculate the portions of a turn by considering the physical **Counts per revolution**. For instance: if the axis travel is 1.5 turn long, enter: $4096 * 1.5 = 6144$ counts.

Default = 67108864 (min. = 1, max. = 67108864)

5.3.6 ENCODER SPECIFICATIONS box

Counts per revolution

It displays the number of physical information per revolution the device is able to output (namely, the singleturn resolution: 4096 cpr -counts per revolution-, i.e. 2^{12}).



NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC has a 16-bit (65536 information) resolution, so the overall analogue resolution will be limited to 16 bits.

Max number of revolutions

It displays the number of physical revolutions the device is able to output (namely, the multiturn resolution: 16384 turns, i.e. 2^{14}).



NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC has a 16-bit (65536 information) resolution, so the overall analogue resolution will be limited to 16 bits.

Max total counts

It displays the overall physical resolution of the device (67108864, i.e. 2^{26}).

The overall physical resolution results from the following calculation:

Max total counts = Counts per revolution * Max number of revolutions.

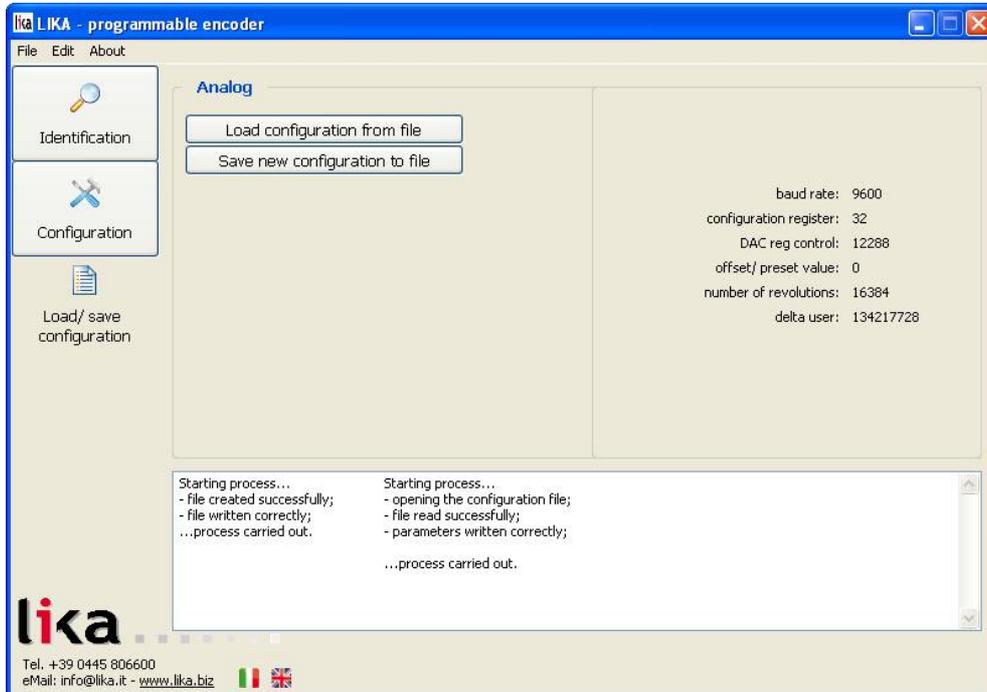


NOTE

Please note that in this encoder the maximum number of physical counts per turn is 4096 (2^{12}), while the maximum number of physical revolutions is 16384 (2^{14}); thus the overall number of information is 67108864 (2^{26}). However the DAC has a 16-bit (65536 information) resolution, so the overall analogue resolution will be limited to 16 bits.

5.4 LOAD / SAVE CONFIGURATION page

When you press the **LOAD / SAVE CONFIGURATION** button in the left navigation bar you enter the **LOAD / SAVE CONFIGURATION** page.



This page allows the operator to save the current encoder configuration to a .dat file; or to load a previously saved configuration. The current encoder configuration is listed in the box on the right.

5.4.1 Saving the encoder configuration to a file

To save the current encoder configuration just press the **SAVE NEW CONFIGURATION TO FILE** button. As soon as you press the button the **Save as** dialogue box appears on the screen and the "Starting process..." message appears on the display box below in the page. The operator must type the .dat file name and specify the path where the file has to be located. When you press the **SAVE** button to confirm, the dialogue box closes. If the process is carried out properly, then the "- file created successfully; - file written correctly; ...process carried out" message appears on the display box. Otherwise the **Error creating the file** warning message appears on the display box.

5.4.2 Loading the encoder configuration from a file

When you need to load an encoder configuration you have previously saved to a file, press the **LOAD CONFIGURATION FROM FILE** button. As soon as you press the button, the **Open** dialogue box appears on the screen and the "Starting process..." message appears on the display box below in the page. The operator must select the folder and then the file where the configuration has been saved. When you press the **OPEN** button to confirm, the dialogue box closes. If the process is carried out properly, then the "- opening the configuration file; - file read successfully; - parameters written correctly; ...process carried out" message appears on the display box. Otherwise the **Error reading the file** warning message appears on the display box.

5.5 Error messages

(in alphabetical order)

Carattere non valido

You entered an invalid character or comma (such as , \ / : * ? " < > |). All the fields only allow integer values (except **Preset** which accepts also decimal numbers separated by dot or comma -decimal mark-).

Disconnected cable

This message is allowed to appear only when the current output is selected (**Output type** = CURRENT). +lout cable is not connected or connected incorrectly or broken. Check the connection. The error is further signalled though the FAULT output. For more information refer to the section "4.9 Fault output" on page 20.

Encoder HW counts to be converted into the selected output range must be lower than the maximum total counts

While programming the encoder using the PROG mode (see on pages 50 and 52), the operator has confirmed in the parameter **Encoder HW counts** in **Programming mode: Prog (single ramp)** or **Programming mode: Prog (cyclic ramp)** a number of information for the travel greater than the maximum number of HW information available for the encoder. The maximum number of information (**Max total counts**) which can be set is 67108864 (2^{26}). If you confirm a value greater than 2^{26} this alarm is invoked.

Error creating the file

If an error occurs while saving the encoder configuration to file (see the section "5.4.1 Saving the encoder configuration to a file" on page 55), then this error message is displayed.

Error reading the file

If an error occurs while uploading an encoder configuration file (see the section "5.4.2 Loading the encoder configuration from a file" on page 56), then this error message is displayed.

Value not valid: preset greater than the maximum position

The operator has entered next to the parameter **Preset** in the **PRESET** box a value which is beyond the limits of the selected analogue range (see the parameter **Output range** on page 42).

The parameter **Preset** allows to enter decimal numbers with up to three digits (thousandths); further digits in the fractional part are subject to round-off. Separate the integer part from the fractional part using the decimal point (.); decimal comma is converted into decimal point.

6 Default parameters list

Parameters list	Default value		
Preset	0		
Enable analog output	enabled		
Enable preset	enabled		
Positive counting direction	CW (standard)		
Output type	voltage		
Output range	0 - 5V		
Programming mode	Start / Stop single ramp		
Encoder HW counts in Programming mode: Prog (single ramp)	67108864		
Encoder HW counts in Programming mode: Prog (cyclic ramp)	67108864		



HW-SW version	Document release	Description
1-1	1.0	1 st issue



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 ordering code for supply voltage rate.

Please check the supply voltage specification in the product datasheet.

LIKA Electronic

Via S. Lorenzo, 25

36010 Carré (VI) • Italy

Tel. +39 0445 806600

Fax +39 0445 806699



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

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