ΦDATALOGIC

Programmable Incremental Encoder

ENC58/IEP58 PROG

Instruction Manual

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Typographic and iconographic conventions

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

- parameters and objects both of the Lika device and the 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.

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 ENC58 and IEP58 series programmable incremental encoders.

ENC/IEP58 programmable encoders from Datalogic Automation is designed to maximize customization and versatility and really allows the operator to get, along with the 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 configure the desired resolution or set the point in the revolution at which the 0 signal is output, but also choose for instance the voltage level of A, B and 0 output channels.

ENC58 / IEP58 programmable encoders are available in both solid (ENC/IEP58-S) and hollow (ENC/IEP58-H) shaft versions. The parametrization and set up of the ENC58 / IEP58 programmable encoders is achieved through a software expressly developed and released by Datalogic Automation.

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.

The connection between the encoder and the PC is established by using the USB connection kit order code KIT ENC58 provided by Datalogic Automation; ZCZ connection devices need the kit to be matched with ECIP/ IQ-M23 order code cordset; ZCM connection devices need the kit to be matched with EC-IP/IQ-M12 order code cordset.

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 safety standards, mechanical installation and electrical connections as well as further information about correct functioning and set up of the unit are provided.

In the second section, entitled Programming Interface, both general and specific information is given on the programming interface.

In this section the interface features and the parameters implemented in the unit are fully described.

1 - Safety summary

Safety

- Always adhere to the safety at work 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 damage;
- high current, voltage and moving mechanical parts can cause serious or fatal injury;
- do not use in flammable or explosive environment;
- 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;
- Datalogic Automation S.r.l. assumes no liability for the customer's failure to comply with these requirements.

Electrical safety

- Turn off power supply before connecting the device;
- connect according to explanation in section "4 – *Electrical connections*".
- Cables of unused output signals must be cut at different lengths and insulated singularly.
- in compliance with the 2004/108/EC norm on electromagnetic compatibility, 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 interference, install EMC filters on device power supply if needed;
  - always use shielded cables (twisted pair cables whenever possible);
  - avoid cables running longer than necessary;
  - avoid running the signal cable near high voltage power cables;
  - mount the device as far as possible from any interference source, shield the device from interference source if needed;
  - to guarantee a correct working of the device, avoid using strong magnets nearby the unit;
  - minimize interference by connecting the cable shield and/or the connector housing and/or the frame to ground. Make sure that ground is not affected by interference.
  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.

Mechanical safety

- Install the device following strictly the information in the section "*Mounting instructions*".
- mechanical installation has to be carried out only with stationary mechanical parts;
- do not disassemble the encoder;
- do not tool the encoder;
- 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;
- unit with solid shaft: in order to guarantee maximum reliability over time of mechanical parts, we recommend a flexible coupling to be installed to connect the encoder and user's 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 slot for anti-rotation pin insertion.

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 Datalogic Automation s.r.l. for purchasing spare parts or needing technical assistance.

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

3 - Mounting instructions

WARNING
Installation and maintenance operations have to be carried out by qualified personnel only, with power supply disconnected and motor aand shaft compulsorily in stop.
Never force the rotation of the shaft manually, it could cause irreparable damage!

3.1 Solid shaft encoders

- 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;
- make sure the misalignment tolerances of the flexible coupling 1 are respected.

3.1.1 Customary installation
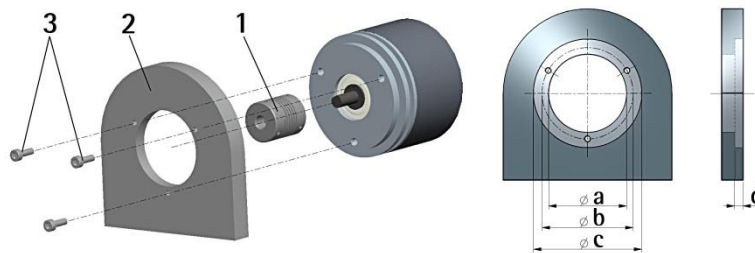
	a [mm]	b [mm]	c [mm]	d [mm]
ENC/IEP58 S06 SERVO FLANGE	-	42	50 F7	4
ENC/IEP58 S10 MOUNT FLANGE	36 H7	48	-	-

3.1.2 Installation using fixing clamps (code ST-58-KIT)
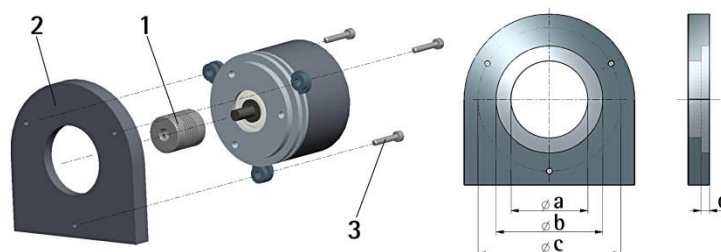
	a [mm]	b [mm]	c [mm]	d [mm]
ENC/IEP58 S06 SERVO FLANGE	-	50 F7	67	4
ENC/IEP58 S10 MOUNT FLANGE	36 H7	-	67	-

3.1.3 Installation using a bell (code ST-58-FLNG)
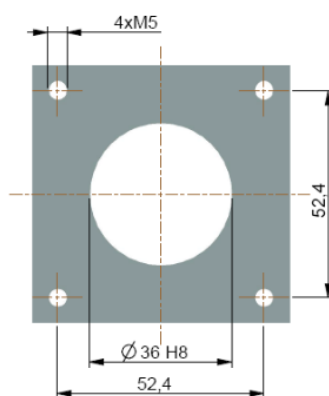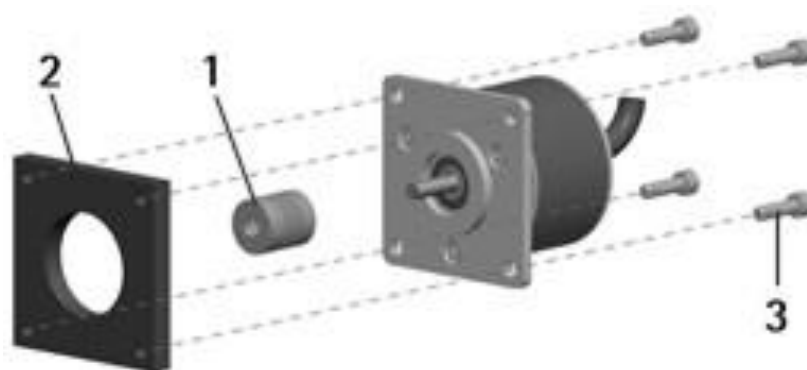
3.2 Hollow shaft encoders

3.2.1 ENC/IEP58-Hxx

- 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 (apply threadlocker to screw 3).
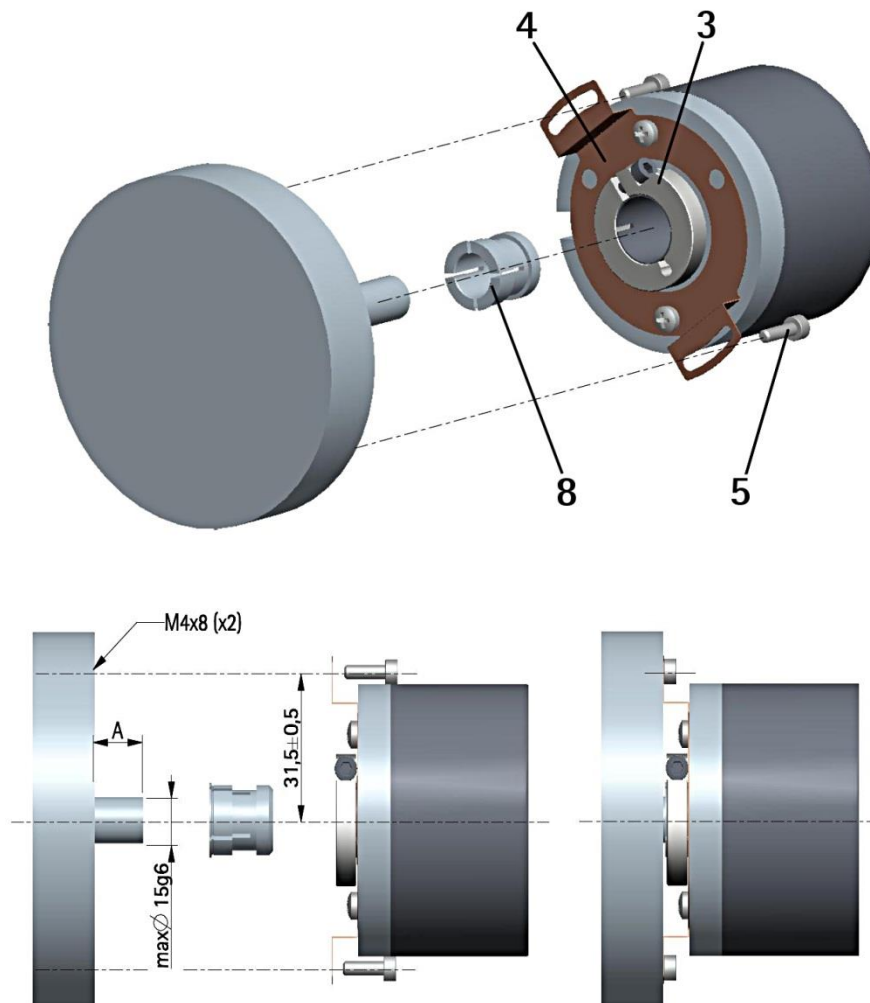
4 - Electrical connections

WARNING

Electrical connection has to be carried out with power supply disconnected.
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. Thus they must be cut at different lengths and insulated singularly.

4.1 Cable and connectors connections + I^{2}C serial interface

| Function	L12 cable	M23 12-pin	M12 12-pin
0VDC	White	1	1
+5VDC +30VDC	Brown	2	2
A	Green	3	3
/A	Yellow	4	4
B	Grey	5	5
/B	Pink	6	6
o	Blue	7	7
/0	Red	8	8
Index pulse setting*	Black	9	9
Counting direction*	Violet	10	10
SDA	Grey/Pink	11	11
SCL	Red/Blue	12	12
Shield	Shield	Case	Case

* Available only on ENC58 models.

4.2 L12 cable specifications
Conductors :4 x 0,25 mm2 + 4 x 2 x 0,14 mm^2 twisted pairs
(24/26 AWG)

Jacket   :Flame retardant PVC
Shield   : tinned copper wire braid
Outer diameter   : Ø 5.7 mm (Ø 0.23")
Min. bending radius   : 10 x outer Ø
Work temperature   : -20° +75°C (-4° +167°F)
Electric resistance   : < 79 Ω/km (0,25 mm^2) - < 148 Ω/km
(0,14 mm^2)

4.3 M23 12-pin connector specifications

M23 12-pin connector
Male
Clockwise Contacts

4.4 M12 12-pin connector specifications

Male
Contacts Side
A coding
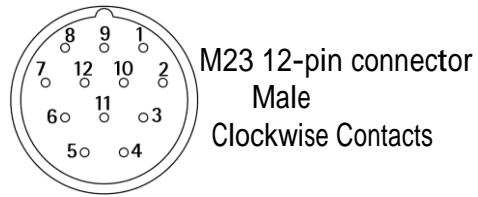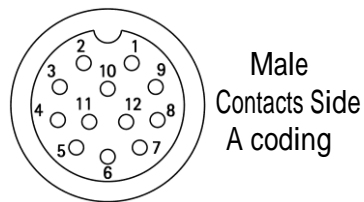
4.5 Connection of the shield

For signals transmission always use shielded cables.
The cable shielding must be connected properly to the metal ring nut 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 being sure that the shielding 1 is in tight contact with the ring nut 3.
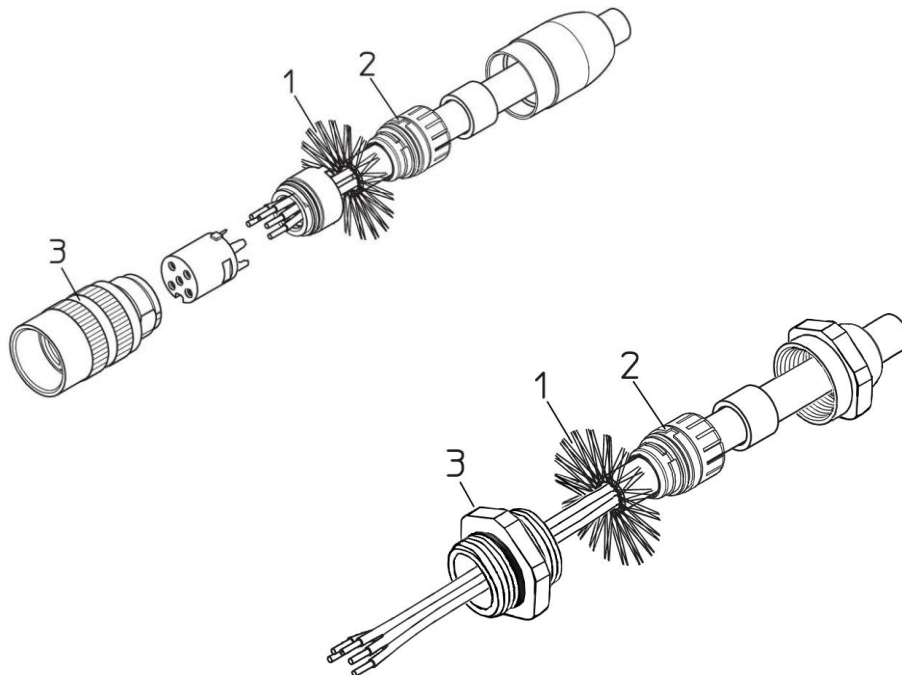
4.6 Ground connection

Connect the cable shield and/or the connector housing and/or the frame to ground.

Make sure that ground is not affected by interferences.

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 A, B, 0 output channels

4.8 Index pulse setting input (ENC58 models only)

NOTE
The Index pulse setting input is available only on ENC58 models.

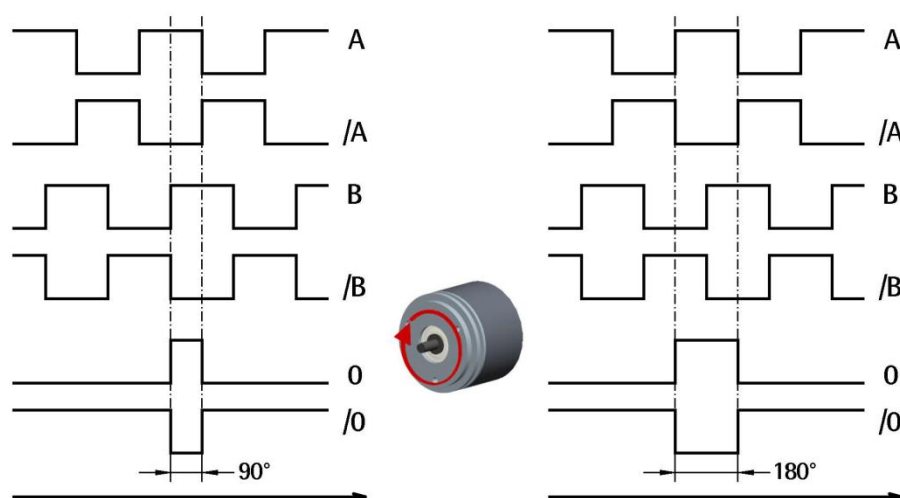This encoder provides the zero signal (Index pulse) once per revolution as relative positioning reference (home position, see the Figure here above). In this way a unique position can be identified at a well-known point in the 360° revolution of the encoder shaft.

This input allows to set the point in the revolution at which the 0 pulse will be output. This function is useful, for example, when you want the zero position of the encoder and the zero mechanical position of the axis to match.

When you want to set the position of the 0 signal you must send a command via PLC or other controller to the encoder through the dedicated input: this signal is used by the microprocessor internal circuit to activate the index pulse setting.Connect the Index pulse setting input to 0VDC if not used. To set the zero position, connect the Index pulse setting input to +VDC for 100 µs at least, then disconnect +VDC.

Normally input must be at 0VDC.

We suggest moving the mechanical axis to the desired position, then activate the function while the encoder and the mechanical assembly are in stop.

WARNING
Please check the position of the 0 pulse and set it if necessary whenever you set a new resolution next to the **Resolution** parameter or reverse the counting direction.

NOTE
The width of the 0 pulse can be set next to the **Index length** parameter. Two options are available: "90° el (gated A, B)" and "180° el (gated A)". Please note that the 0 pulse having a width of 90 electrical degrees is synchronised with A and B pulses, while the 0 pulse having a width of 180 electrical degrees is synchronised with A pulse. For further information please refer to page 22.

NOTE
It is possible to set the 0 pulse position also by either pressing the external button located in the rear side of the encoder enclosure -see the section "4.11 *Index pulse setting external button (Figure 1) (ENC58 models only)*" - this option is available only on ENC58 models; or by means of the programming interface -see the **Index position** parameter on page 23.

4.9 Counting direction input (ENC58 models only)

NOTE
The Counting direction input is available only on ENC58 models.

By default the phase relationship between A and B channels is so that the rising edge of A channel leads the rising edge of B channel when the encoder is rotating in a clockwise direction (see paragraph "4.7 A, B, 0 output channels).
Thus the counter in the subsequent electronics will get a count up.
This input allows to have a count up also when the encoder is rotating in acounter-clockwise direction. 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; connect the Counting direction input to +VDC to have an increasing count when the encoder is turning counter-clockwise. Clockwise and counter-clockwise directions are viewed from the shaft side.

WARNING
The **Counting direction** can be set also through the programming tool. The **Counting direction** parameter implies that the Counting direction input is set to 0VDC. If the Counting direction input has HIGH logic level (+VDC) the setting of the **Counting direction** parameter will be contrary to what is expected. The **Counting direction** parameter allows the operator to choose between the options CW and CCW. When the counting direction is set to CW - **Counting direction** = CW-, if the Counting direction 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 Counting direction 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 is set -**Counting direction** = CCW-, if the Counting direction input has LOW logic level (0VDC) 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 Counting direction 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).

WARNING
After having set the new counting direction it is necessary to set also the Index pulse.

4.10 Diagnostic LEDs (Figure 1) (ENC58 models only)

NOTE

The Diagnostic LEDs are available only on ENC58 models.

Two LEDs located in the rear side of the encoder enclosure are intended to show visually the work status of the device as explained in the following table.

GREEN LED (status)	Description
ON	The encoder is supplied and running properly
OFF	The encoder is OFF; an error occurred in the ASIC while reading the disk

RED LED (microcontroller error)	Description
ON	It warns of the presence of an error: 1 SPI communication error between the microcontroller and the ASIC designed to read the disk 2 An error occurred at power on while uploading the configuration data from the EEPROM 3 An error occurred while reading the encoder position immediately after starting the encoder or after setting either the resolution or the counting direction 4 Communication error between the encoder and the PC

4.11 Index pulse setting external button (Figure 1) (ENC58 models only)

NOTE
The Index pulse setting external button is available only on ENC58 models.

This encoder provides the zero signal (Index pulse) once per revolution as relative positioning reference (home position, see the Figure on page 9).
In this way a unique position can be identified at a well-known point in the 360° revolution of the encoder shaft. The external button located in the rear side of the encoder enclosure allows to set the point in the revolution at which the 0 pulse will be output.
This function is useful, for example, when you want the zero position of the encoder and the zero mechanical position of the application to match. When you want to set the position of the 0 signal in the revolution you must move the axis to the desired position, then press the Index pulse setting button while the encoder and the mechanical assembly are in stop.
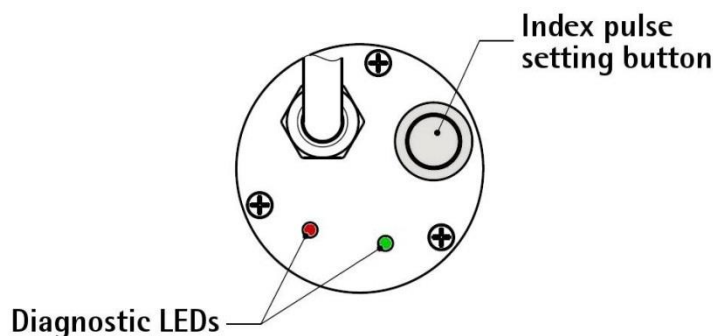
Figure 1 - Diagnostic LEDs and Index pulse setting button

WARNING
Please do not press the Index pulse setting button when the encoder configuration interface program is running.

Please check the position of the 0 pulse and set it if necessary whenever you set a new resolution next to the **Resolution** parameter or reverse the counting direction.

NOTE

The width of the 0 pulse can be set next to the **Index length** parameter. Two options are available: "90° el (gated A, B)" and "180° el (gated A)". Please note that the 0 pulse having a width of 90 electrical degrees is synchronised with A and B pulses, while the 0 pulse having a width of 180 electrical degrees is synchronised with A pulse.
For further information please refer to page 23.

NOTE

It is possible to set the 0 pulse position also by either sending a signal via PLC or other controller through the dedicated input -see the section "*4.8 Index pulse setting input (ENC58 models only)*" - option available only on ENC58 models; or by means of the programming interface -see the **Index position** parameter on page 23- option available on both ENC58 series.

4.12 I^{2}C (Inter Integrated Circuit) serial connection

The ENC/IEP58 programmable encoder is equipped with a serial interface for the parametrization and set-up of the device. The serial interface is an I^{2}C(Inter Integrated Circuit) type.

To communicate with the encoder, you must connect the device to the personal computer through a USB port using the specific connection kit code **KIT ENC/IEP58- PROG-TOOL ENCODER-PC USB INTERFACE** supplied by Datalogic.

The connection kit is **KIT ENC/IEP58**. It is provided with a terminal for connecting the cable of the devices having ZCU output circuit code.

ZCZ connection devices need the kit to be matched with a cable - M23 12-pin female connector cordset, **CN-M23-PROG (order code**: 95B081990); ZCM connection devices need the kit to be matched with a cable - M12 12-pin female connector cordset, **CN-M12-PROG (**order code: 95B082000).

To connect the encoder to the connection kit, please refer to the following table and the label applied to the connection kit terminal:

Function	Encoder / Cordset cable	Terminal
+5VDC power supply *	Brown	**PWR +**
0VDC	White	**PWR -**
SDA Serial Data Line	Grey / Pink	**SDA**
SCL Serial Clock Line	Blue / Red	**SCL**

* WARNING
+5VDC power supply from the USB connection.
Do not connect any external power supply sources!

WARNING
Please make sure that only one encoder is connected to the **KIT ENC/IEP58** when you activate the USB connection !

NOTE
Before configuring the encoder by means of the programming interface, you must connect it to the personal computer through the **KIT ENC/IEP58** connection cable. You are required to install the drivers of the USB Serial Converter and the USB Serial Port first.
The drivers are available for download at the following address www.datalogic.com.

4.12.1 Installing the KIT ENC/IEP58 USB drivers

Please follow the steps in the documents listed below to install the drivers of both the USB Serial Converter and the USB Serial Port of the **KIT ENC/IEP58**.
The drivers package and the relevant documents are found inside the DRIVER USB folder. As stated, the drivers are available for download at the following address www.datalogic.com.

If you need to install the drivers under the Microsoft Windows XP operating system, please refer to the following document: Installation_Guide_for_WindowsXP.pdf.
If you need to install the drivers under the Microsoft Windows Vista operating system, please refer to the following document: Installation_Guide_for_VISTA.pdf.
If you need to install the drivers under the Microsoft Windows 7 or 8 operating system, please refer to the following document:
Installation_Guide_for_Windows7.pdf.

As a preliminary operation please:
1. connect the encoder to the **KIT ENC/IEP58** terminal through the encoder cable or using either the M23 12-pin connector cordset or the M12 12- pin connector cordset (for the connection scheme refer to the table in the previous page); you do not need to power the encoder by means of an external power pack as the device gets the power from USB;

2. connect the cable fitted with the USB connector to a USB port of your PC; after a few seconds a message will appear in the notification area of the Windows taskbar and the USB Serial Converter drivers installation wizard will start. Then follow the instructions in the above mentioned pdf documents.

After installation you can launch the executable file and open the encoder programming interface; to know more refer to the section "*Programming interface*".

5 - Programming interface

5.1 Configuring the encoder using the software tool

ENC/IEP58 programmable incremental encoder is supplied with a software expressly developed and released by Datalogic Automation in order to easily programme and configure the device. It allows the operator to set the working parameters of the device and monitor whether the device is running properly.

The program is supplied for free and can be installed in any PC fitted with a Windows operating system(Windows XP or later).

The name of the program executable file is **ENC58_PROG_TOOL_vx.x.exe** where vx.x is the release version of the file.

The program is available for download at the following address www.datalogic.com.

The program is designed to be installed simply by copying the executable file (*.exe file) to the desired location and there is **no installation** process. To launch the program just double-click the file icon. To close the program press the **EXIT** button in the title bar.

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.

HW-SW	Connection kit	EXE FILE
1-1	ENC58-...-PROG-...	R1, R1_1
1-1	ENC58-...-PROG-..., KIT ENC/IEP58 - PROG-TOOL	From v2.0 up to …

The new programming interface (from v2.0 release on) allows the connection to both the ENC58 series and the IEP58 series using either the KIT ENC58-...-PROG-... (if you already have one) or the KIT ENC58/IEP58 PROG TOOL. The old programming interface (R1, R1_1 releases) allows the connection to the ENC58 series only, using the KIT ENC58.

In all cases you must comply with the hardware and software compatibility indicated in the table.

NOTE
Before starting the program and establishing a communication with the device, it is necessary to connect it to the personal computer.
The interface is a I^2C (Inter Integrated Circuit) serial interface.
To communicate with the encoder, you must connect the device to the personal computer through a USB port using the specific connection cable order code **KIT ENC/IEP58** supplied by Lika Electronic.

For any further information please refer to the section 4.12 "I^2C (Inter Integrated Circuit) serial connection".

WARNING
Please make sure that only one encoder is connected to the **KIT ENC/IEP58** when you activate the USB connection !

WARNING
Please always close the programming interface before disconnecting the encoder !

5.2 Starting the program

To launch the program just double-click the **ENC58_PROG_TOOL_vx.x.exe** executable file.

The main page of the configuration interface will appear on the screen. A further page is dedicated to the diagnostic information; it can be accessed by pressing the **ADVANCED DIAGNOSTICS** button below in the page (see on page 26).
First of all the main page allows the operator to choose the language used to display texts and items in the user interface. Click the **Italian flag** icon in the top right to choose the Italian language; click the **UK flag** icon to choose the English language.

Two sections can be found in the main page of the configuration interface:
1. a top section groups the items needful to establish the connection between the encoder and the interface, the connection buttons as well as the drop-down boxes designed to select the interface type and the series of the encoder to connect;
2. the section where the parameters to program the encoder can be found; also the buttons to check the work status of the encoder and enter the diagnostic information page can be found below in this section.

5.3 Connection with the encoder

When you start the program, the system automatically recognizes the type of interface you plugged into (**INTERFACE TYPE**: "ENC58-...-PROG-..." or "ENC58/IEP58 PROG TOOL").

Users are required instead to select the series of the encoder they are connected to. To do this open the **ENCODER** drop-down box and select from the options in the list: "ENC58-...-PROG-..." or "IEP58-...-PROG-...". The encoder model can be found in the label applied to the device enclosure.

If the connection is established properly, a green tick (✓) appears next to both buttons; on the contrary, if the program is not able to

establish a connection to the encoder, a red X (✗) appears next to either button. After positive connection the fields in the page are filled with information acquired from the connected device.

5.4 Setting the parameters

WARNING
To save the data on the EEPROM permanently, after having entered the new value you must press the ENTER button in the keyboard.
The parameter is saved instantly.

Internal pos. register
It is used to show the value in the internal position register, that is: the current position of the encoder. When you start the program, 0 appears next to this item. Press the **START** button to start the routine which allows to continuously read and display the current position: the encoder current position appears on the field. Press the **PAUSE** button to stop the routine; the last position value is kept "frozen" in the display field. After having set a new resolution value, a zero setting operation is carried out by the system. If the routine is running, the 0 value is shown in the internal position register; otherwise the last "frozen" position is shown.

Resolution
This parameter allows the operator to set a custom number of pulses the encoder will output per each revolution (PPR, Pulses Per Reduction).
Please enter the desired value and then press the **ENTER** button to confirm. If you set a value that is out of range (lower or greater than allowed), the system automatically sets either the minimum or the maximum value in the range.
After having set the resolution, set also the encoder maximum rotational speed, see the parameter **Max rpm**.
Please always consider the pulse multiplication factor (x 1, x 2 or x 4) of your subsequent electronics before entering a new resolution value.
Default = 1024 (min. value = 1; max. value = 65536) - ENC58 series
Default = 1024 (min. value = 1; max. value = 16384) - IEP58 series

EXAMPLES

Here are some examples useful to better understand the application field of the programmable resolution. We assume that the pulse multiplication factor in the following electronics is x 1.
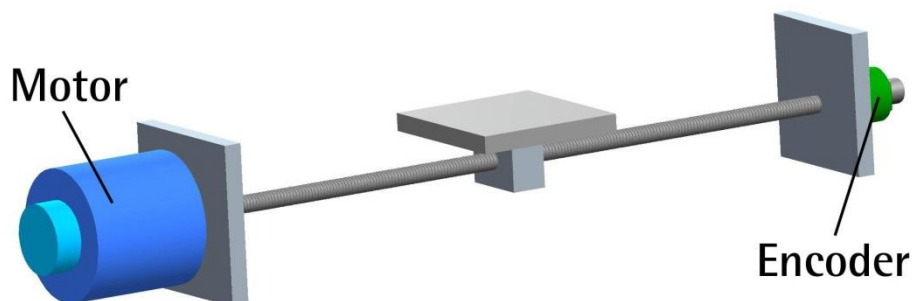
Example 1

Let's assume that the encoder is mounted on the driven draw roller of a slitter and the circumference of the roller is 753 mm.
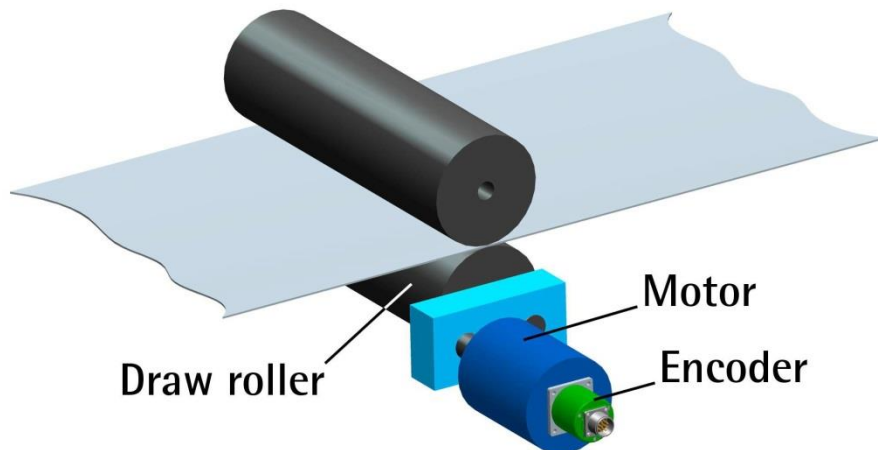
We can set a resolution of 7530 PPR (**Resolution** = 7530) to control the movement of the roller with a tenth of a millimetre resolution.

In this way we convert a rotary measurement value (for example: 10000 PPR) into a linear measurement value, thus we are able to control the unwinding of the sheet from the reel and activate the blades to cut 1-m long sheets with a tenth of a millimetre resolution.

Example 2

Let's assume that an axis is guided by a ball screw; a motor fitted with a reduction gearbox having 1:50 reduction ratio is installed at an end of the system, while the encoder is installed at the opposite end of the system.

As we know the reduction ratio of the reduction motor, we can set a suitable resolution in order to control the motion of the motor precisely and calculate the inputs peed starting from the known output speed.

Example 3

Let's assume that the encoder is mounted on the SFI draw wire unit and the application has a 5500-mm long linear travel.

We can set a resolution of 55000PPR (**Resolution**= 55000) to control the movement of the cable and thus of the axis with a tenth of a millimetre resolution.

In this way we convert a rotary measurement value (55000PPR) into a linear measurement value, therefore we are able to control the 5.5-m long linear travel with a tenth of a millimetre resolution.

Example 4

Let's assume that the encoder is used to control the movement of a chain conveyor. The chain conveyor is equipped with multiple stations and has an overall length of 14.847 m. If we set a resolution of 14847 PPR (**Resolution** =14847) we have precise control over the movement of the chain conveyor and its positioning at the stations with a millimetre resolution.

Counting direction

By default the phase relationship between A and B channels is so that the rising edge of A channel leads the rising edge of B channel when the encoder is rotating in a clockwise direction (see the Figure on page 33).

Thus the counter in the subsequent electronics will get a count up. This parameter allows to have a count up also when the encoder is rotating in a counter-clockwise direction

Set **Counting direction** = **CW** to have the increasing count when the shaft is turning clockwise; set **Counting direction** = **CCW** to have the increasing count when the shaft is turning counter-clockwise.

Clockwise and counter-clockwise directions are viewed from the shaft side (see the Figure below).

Default = CW (min. value = CCW; max. value = CW)

WARNING

The counting direction can be set both via hardware (see the Counting direction input, section "4.9 Counting direction input (ENC58 models only)" this option is available only on ENC58-models) and via software by programming the **Counting direction** parameter. If not used, the Counting direction input must be connected to 0VDC. The **Counting direction** parameter implies that the Counting direction input is set to 0VDC. If the Counting direction input has HIGH logic level (+VDC) the setting of the **Counting direction** parameter will be contrary to what is expected.

When the counting direction is set to CW -**Counting direction** = CW-, if the Counting direction 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 counter-clockwise); on the contrary if the Counting direction 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 is set -**Counting direction** = CCW-, if the Counting direction input has LOW logic level (0VDC) 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 Counting direction 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).

For any information on the connection of the Counting direction input refer to the section "4.9 *Counting direction input (ENC58 models only)"*.

WARNING

After having set the new counting direction it is necessary to set also the Index pulse.

Index length

This parameter allows to set the width of the Index pulse (0 pulse) expressed in electrical degrees. Two options are available and selectable in the drop-down box: **90° el (gated A, B)** and **180° el (gated A)**. Please note that the 0 pulse having a width of 90 electrical degrees is synchronised with A and B pulses, while the 0 pulse having a width of 180 electrical degrees is synchronised with A pulse. See the Figure below.

Default = 90° el (gated A, B)
Min. value = 90° el (gated A, B);
Max. value = 180° el (gated A)
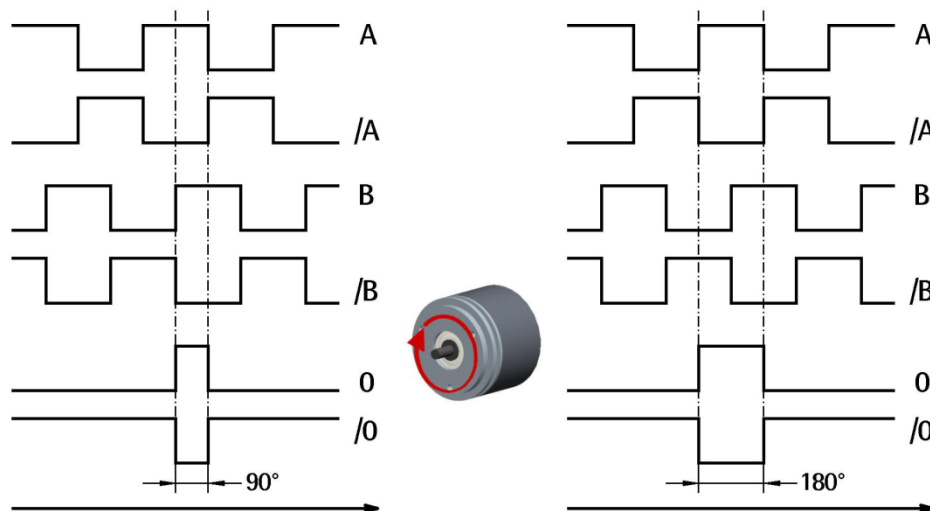
Index position

This encoder provides the zero signal (Index pulse) once per revolution as relative positioning reference (home position, see the Figure above). In this way a unique position can be identified at a well-known point in the 360° revolution of the encoder shaft.

This function allows to set the point in the revolution at which the 0 pulse will be output. It is useful, for example, when you want the zero position of the encoder and the zero mechanical position of the axis to match. When you want to set the position of the 0 signal in the revolution you must move the axis to the desired position, then press the **SET** button next to this Index position item while the encoder and the mechanical assembly are in stop.

WARNING
Please check the position of the 0 pulse and set it if necessary whenever you set a new resolution next to the **Resolution** parameter or reverse the counting direction.

NOTE
The width of the 0 pulse can be set next to the **Index length** parameter. Two options are available: 90° el (gated A, B) and 180° el (gated A). Please note that the 0 pulse having a width of 90 electrical degrees is synchronised with A and B pulses, while the 0 pulse having a width of 180 electrical degrees is synchronised with A pulse. For further information please refer to page 13.

NOTE
It is possible to set the 0 pulse position also by either sending a signal via PLC or other controller through the dedicated index pulse input -see the section "*4.8 Index pulse setting input (ENC58 models only)*"; or by pressing the external button located in the rear side of the encoder enclosure -see the section "4.11 *Index pulse setting external button (Figure 1) ENC58 models only*".
Both these options are available only on ENC58 models.

Output circuit

NOTE
This parameter is available only on ENC58 models.

NOTE
This parameter allows to set the voltage level of AB0, /AB0 output channels. You can choose between 5V and the encoder power supply voltage level (+VDC). In the drop-down box select the **5V (line driver/TTL)** option to have a voltage level of 5V at output channels; select the **5-30V (PP/LD universal)** option to have a voltage level at output channels according to the encoder power supply voltage level (5V to 30V).
Default = 5-30V (PP/LD universal)
Min. value = 5V (Line driver/TTL); max. value = 5-30V (PP/LD universal)

Example
Let's assume that the encoder power supply voltage level is 12V; in this case you can have the output channels at either 5V voltage level -by setting the **5V (Line driver/TTL)** option- or 12V -by setting the **5-30V (PP/LD universal)** option-.

Max rpm

It allows to optimize the encoder performance (by keeping the most efficient ratio between either the rotational speed and the precision in the case of the ENC58 encoder; or the rotational speed and the edge distance in the case of the IEP58 encoder), depending on the maximum speed the application is able to reach. Since the maximum speed and the resolution are strictly correlated, some options may be disabled or limited as you enter increasing resolutions. If more options are available -**2250**; **4500**; **9000** for ENC58 encoder; **xxxrpm (100 kHz)**; **xxxrpm (300 kHz)**; **xxxrpm (500 kHz)** for IEP58 encoder- the operator has to select the speed value option that is immediately higher than the maximum speed of the application. If you do not know the maximum speed the application is able to reach, please enter the maximum rotational speed option available.

Example

Let's assume the resolution of an ENC58 encoder to be 1024 PPR; in this case three options are available for you to choose from: **2250**, **4500** and **9000** rpm.
If the maximum speed of the application is 4000 rpm, you have to select the 4500 rpm option; if the maximum speed of the application is 4500 rpm, you have to select the 9000 rpm option; if you do not know the maximum speed of the application, you have to select the 9000 rpm option.

NOTE

Please note that the maximum counting frequency of an encoder, expressed in kHz, results from the number of revolutions per minute (RPM) -i.e. its rotational speed- and the number of pulses per revolution (PPR) -i.e. its resolution. It can be calculated by using the following algorithm:

Maximum counting frequency (kHz) = $\dfrac{RPM * PPR}{60 * 1000}$

It follows that the higher the maximum rotational speed of the encoder and its resolution, the higher the counting frequency.
This has to be considered carefully when you program the encoder, in particular referring to the maximum counting frequency of the encoder as stated in the technical specifications, to the following electronic equipment and to the length of the cables.
If you reverse the formula you can easily calculate the maximum number of revolutions starting from the value of the counting frequency (as allowed by the encoder, permitted by the subsequent electronics and accepted by the cable run) and the desired number of pulses per revolution:

$$RPM = \frac{Maximum\ counting\ frequency\ (kHz) * 60 * 1000}{PPR}$$

The reversed formula can be very useful -for instance- when you know the maximum counting frequency that is applicable to the system (because of the encoder, the following electronics and the cable length) and you need to calculate the maximum rotational speed the encoder is allowed to reach at the desired resolution.

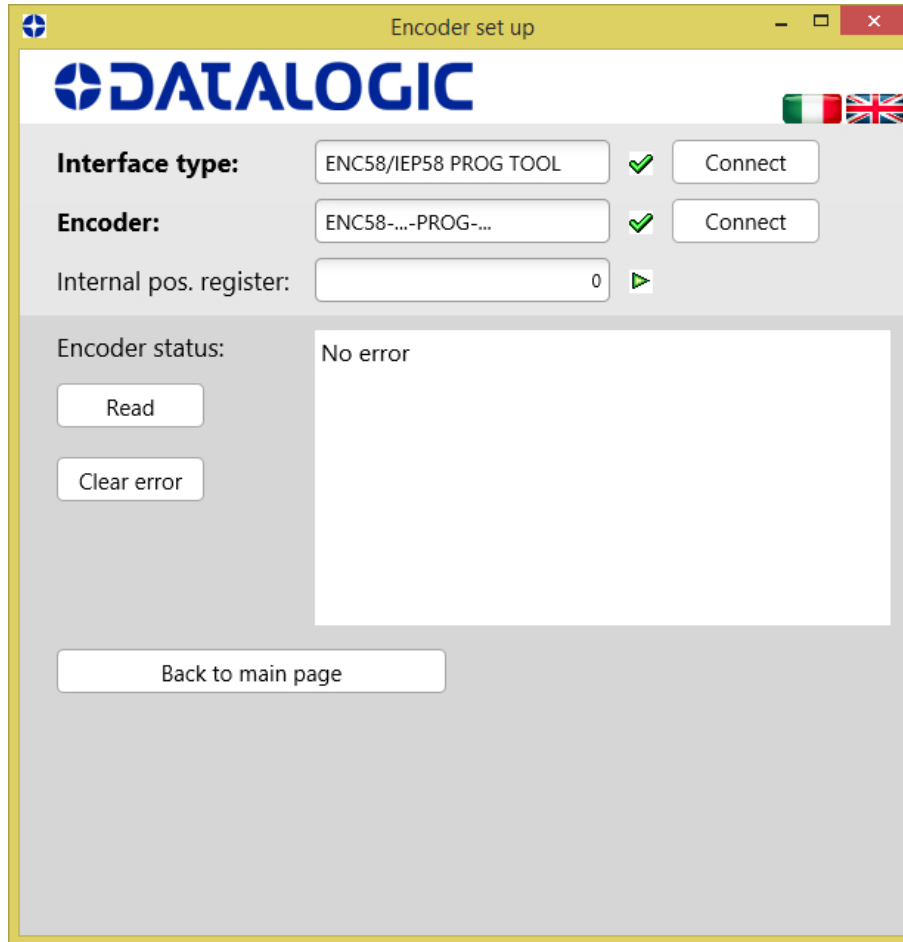### Encoder status

It displays the work status of the encoder.

Press the **READ** button to update the status visualization.

If the encoder is working properly, the **NO ERROR** message appears on the right of the **READ** button. If a fault condition arises, the **WARNING** message is invoked to appear. By pressing the **CLEAR ERROR** button the system tries to solve the problem. If this is not possible, please press the **ADVANCED DIAGNOSTICS** button to learn more about the occurred fault.

5.5 Diagnostics page

When you press the **ADVANCED DIAGNOSTICS** button in the main page, you enter the Diagnostics page.

In this page you can find detailed information on the work status of the encoder. The current status is described in the window in the bottom right.

If an error occurs the system is not able to solve by pressing the **CLEAR ERROR** button, please take note of the error code that appears in the window and reach Datalogic Automation After Sales and Technical Service.

Press the **BACK TO MAIN PAGE** button to display back the main page.

6 - Default parameters list

Parameters list	Default value
Resolution	1024 *
Counting direction	CW
Index length	90° el(gated A,B)
Index position	0
Output circuit	5-30V (PP/LD universal)
Maxrpm	9000

* 1024 PPR is the default resolution of the PROG order code version only.
Versions with factory preset resolution may provide different PPR information, see your specific order code in the label applied to the encoder enclosure.