USER'S GUIDE

www.italsensor.com

TISP58

from 1 to 65536 ppr

Programmable incremental encoder

ITALSENSOR TEKEL

Summary

Terms and conditions of license to use the software

Italsensor SRL provides the software for free, this may not be resold or modified by third parties, also does not provide any type of explicit or implicit guarantee on the software. The use of the same by the user involves implicit and unconditional acceptance of what specified above.

Warnings (instructions), symbols and notations used in this manual

It emphasizes that the information provided in the paragraph can be of help for an efficient us of the software and provides details on parameters that can affect in a not dangerous way on the use of the device itself.

It emphasized that the information provided in the paragraph are important from the point of view of the proper use of the product and for prevent eventual damages or injuries to things and/or people. Please read always, with great attention, as specified, in case of doubt or necessity contact Italsensor Srl.

Software installation

This manual is intended to provide the information needed to use of the software configuration of **programmable incremental encoder TISP58.**

The software is provided free of charge to support the product and can be downloaded by accessing to the following link on **Italsensor web site.**

Once the download is completed, proceed with the installation of the same by double clicking on executable **file TISP58-Manager.exe**, the installation process takes place automatically and at the end of that will start the program.

Pick up the programming cable and connect one end to a free **USB port** on PC, and the other end, with a 12-pin connector, must be connected to the encoder connector.

TISP58

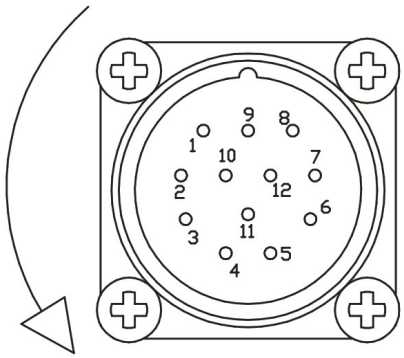
Programming interface

Programming software on PC

In the event that the USB device is not recognized by your system you should proceed to manually install the necessary drivers, downloadable from the following link on **Italsensor web site.**

Programming interface

The encoder TISP58, from an operational point of view, does not require specific hardware as already equipped with a standard programming port RS232 accessible from the connector of the encoder itself.



Pin connector	Function	Notes
1	CHBN	Channel B complemented
2	DIR	Counting direction
3	CHZ	Zero impulse
4	CHZN	Zero impulse complemented
5	CHA	Channel A
6	CHAN	Channel A complemented
7	RX	RX (port RS232)
8	CHB	Channel B
9	SET	Setting position zero
10	0V	Reference potential 0V
11	TX	TX (porta RS232)
12	+Vcc	Voltage supply

Figure 1: Connector TISP58 and details of standard connections ("R2")

To help the user, is possible supply a programming cable that operates as an interface between the PC USB port and RS232 port of the encoder.

The code for the programming cable is **TISP581PRGCBL.20**. On a end of the cable is soldered a type A (plug) USB connector and on the other end a 12-pin female connector suitable to be used directly with the TISP58 "R2" standard connection (see Figure 1 for more details). The total length of the cable is 2 mt.

Figure 2: USB programming cable for TISP58.

The use of the cable allows the direct supply of the encoder via the USB port of the computer avoiding need for a external power supply source.

The cable performs a **VCP (Virtual Com Port)** connection by means of a virtual COM port that is compliant to the RS232 standard even in systems that do not have these ports in native format.

The use of the cable, depending on your operating system, may or not require the installation of drivers that can be downloaded from the Italsensor website at the TISP58 product page (link).

The operating systems currently supported are:

- Windows 98, 98SE, ME, 2000, Server 2003, XP and Server 2008
- Windows XP and XP 64-bit
- Windows Vista and Vista 64-bit
- Windows XP Embedded
- Windows CE 4.2, 5.0 and 6.0
- Mac OS 8.9, OS-X
- Linux 2.4 and greater

The supplied cable is RoHS compliant.

Operating temperature range: -40 ° C up to + 85 ° C.

Direct configuration and application examples

The TISP58 programmable encoder can also be configured directly without using the TISP58 Manager utility.

The device configuration can be done by means of a native or emulated RS232 interface by sending the appropriate configuration strings in ASCII code. The serial communication parameters shall be set according to the standard 9600, N, 8,1, no handshake.

To communicate with the encoder you need to implement a simple (proprietary) ASCII based communication protocol ("command-response" structure). With few simple commands you can set all the functionality of the encoder (resolution, counting direction, synchronous zero, level of the output voltage and reading status internal transducer).

This allows the direct configuration of the transducer in the plant without the need of having to configure it before installation.

A typical scenario might be the one that provides downloading of the configuration parameters in the encoder in igniting the plant by a PLC equipped with a serial connection.

This feature allows to avoid possible problems related to the traceability of the configurations for the various nodes of the machine (the configuration is downloaded locally by the PLC of government which maintains the inside memory of the necessary parameters for the transducer) thus allowing a reduction of maintenance time and machine downtime. Even non-specialized personnel can install encoder; as in fact, dedicated equipment to the configuration is no longer necessary, and this operation is performed directly by the control system encoder is connected to.

Other applications may be of the format change, adapting dynamically the encoder resolution to the type of machining to be carried, thus making the system more versatile in respect to working of different type. For example, you can perform low precision high-speed encoder setting the resolution of the encoder at medium-low and then make more accurate working by increasing the resolution of the encoder, without having necessity to have more encoders with different resolutions, but simply by changing parameterization of the same encoder.

Program Start

Running the program from the install the system presents the main screen:

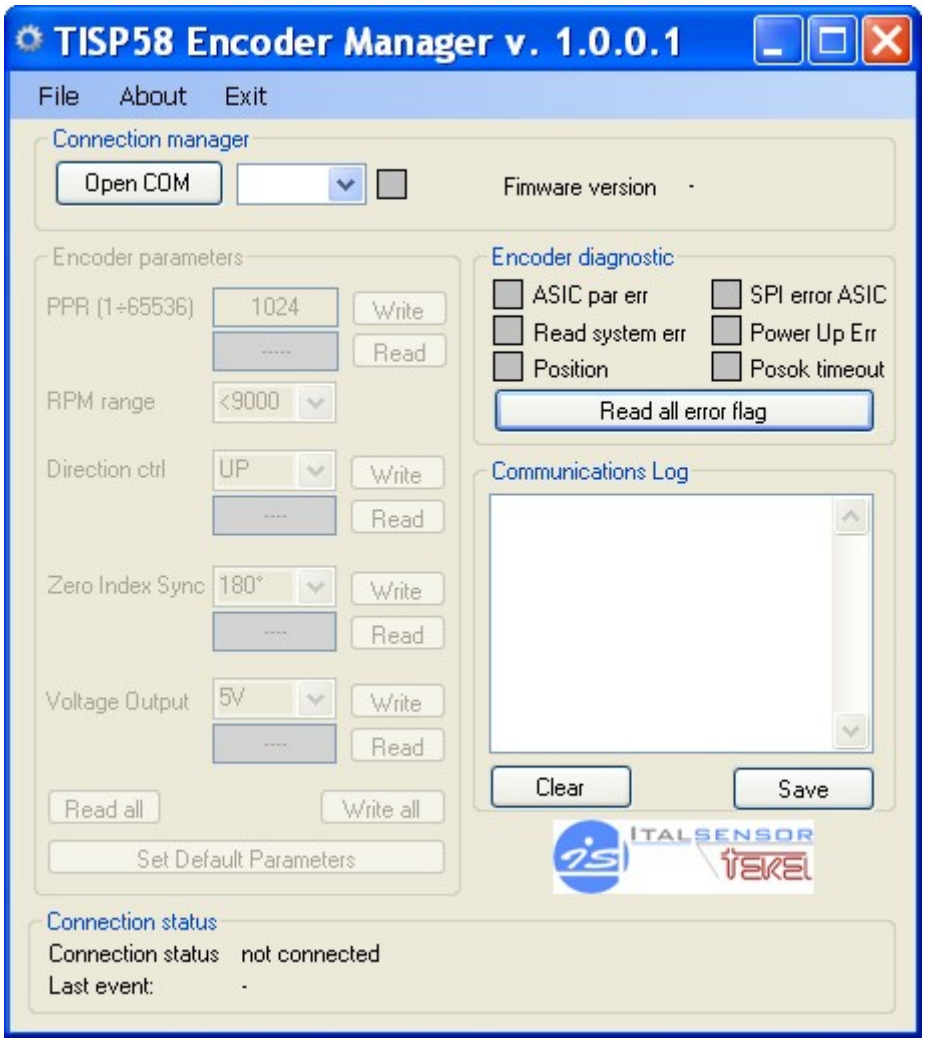


Figure 3: start window.

Once connected the USB cable to the PC and the connector to the encoder, it is possible to activate the connection to the encoder by selecting the COM port and subsequently pressing the Open COM button.

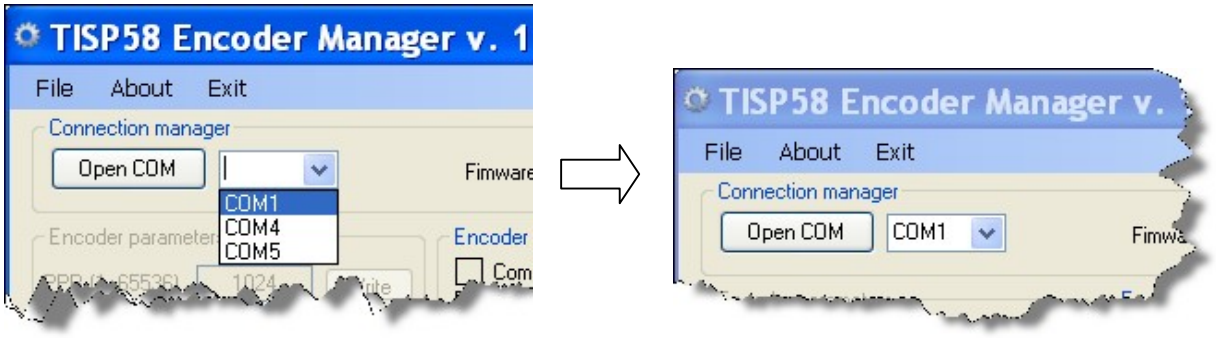


Figura 4: communication port selection.

If the operation complete successfully the software proceeds to read the firmware release and enables the encoder configuration panel (***Encoder parameters***).

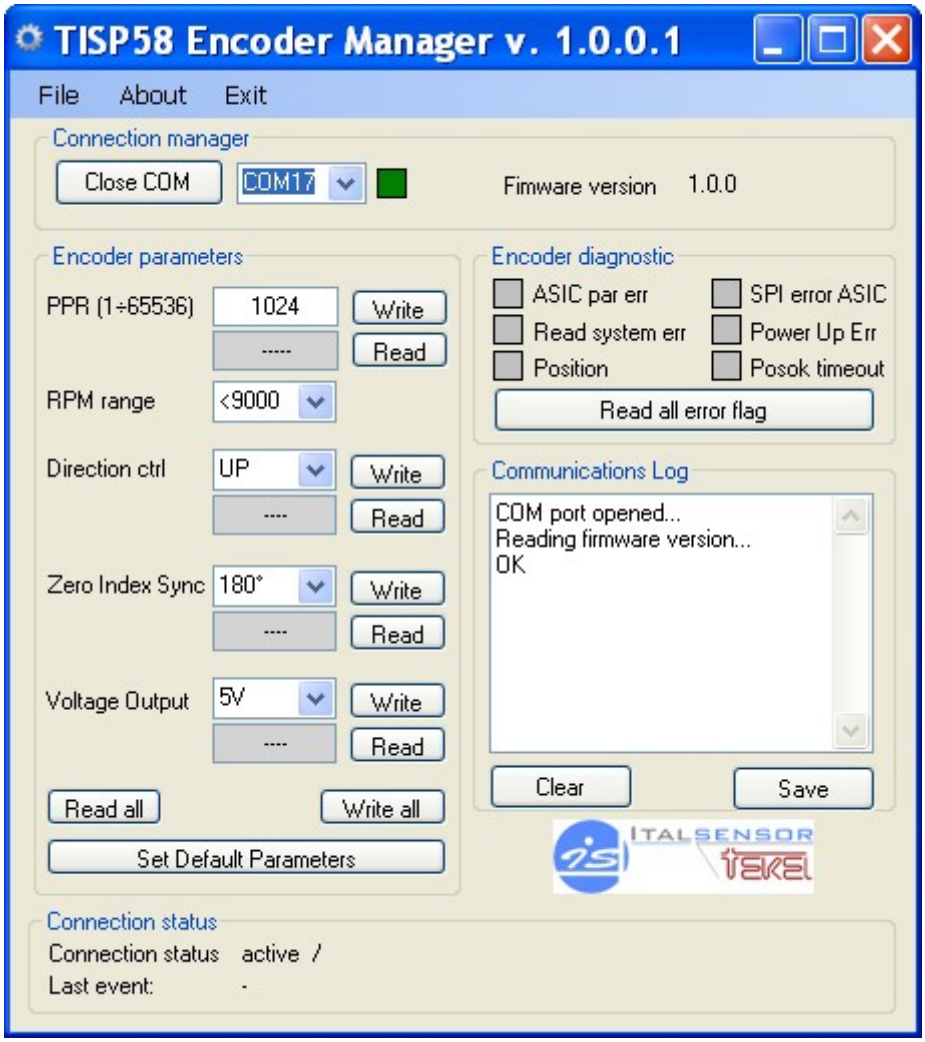


Figura 5: main window with the communication section enabled (encoder connected)

The activity of the connection is visible through a bar, placed in continuous rotation, present in the lower part of the window (***Connection status panel***) and by a status led indicator behind the COM port selection with green color.

Encoder Setting Resolution

Through section:

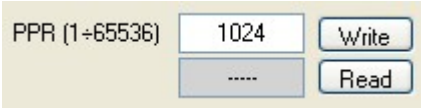


Figure 6: section for setting/reading of the resolution

It is possible to define desired resolution for the encoder or read the value of the resolution, which is currently set in the encoder.

Setting of the resolution

To set a new value it is sufficient write the desired resolution in the highlighted box, valid values range from 1 to 65536, and then press the button Write to write the resolution value into the encoder memory.

The result of the operation is notified in the summary window (Communications Log).

Reading of the resolution currently set

To read the value of the resolution currently set it is sufficient press Read, if the operation is successful the read resolution will be reported into the text box on the left of the reading button.

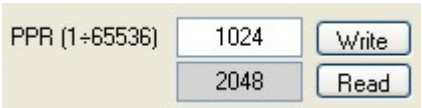


Figure 7: reading of the current resolution

In the example shown on figure 7 the read value is equal to 2048 PPR.

The result of the operation is notified in the summary window (***Communications Log***).

If after setting the zero pulse position (by means of the pushbutton on the encoder cover) the resolution or the counting direction are changed is important to re-check again the zero position because may be necessary set it again. Remember also that the zero pulse position shall be set only when the encoder shaft is not moving.

RPM speed setting

The TISP58 Encoder is able to optimise the structure of the output signal in terms of jitter and phase relationship basing on the current selected resolution and speed. As bigger is the resolution than lower should be the maximum speed. For resolution below 16384 PPR the user can choose between 2250 RPM, 4500 RPM and 9000 RPM. For resolution below 32768 PPR the speed selection can be only from 4500 PPR and 2250 RPM. Finally for the last resolution range up to 65536 PPR the only permissible choice is 2250 PPR.

The three mentioned speed level can be set by means of the combo box ***RPM Range***.

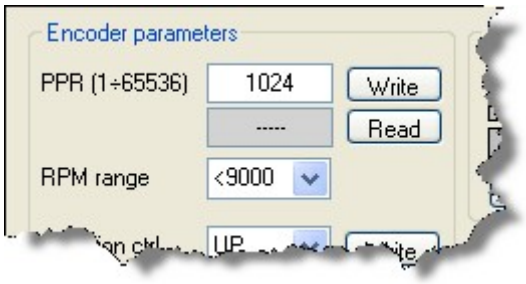


Figure 8: speed selection.

The permissible speed level are splitted into three range, <9000 RPM, <4500 RPM and <2250 RPM (the theoretical levels are bigger than the listed values, these are for safety reason).

If some resolution/speed combination are not allowed, the system will signal it to the user by means of a message and the appropriate speed level will be set into the selection box for the current selected resolution.

Working at a speed (RPM) greater than the limit, the green led begin blinking (position error), the frequency of the output signals remain at the maximum permitted value also if the speed is increased. The normal behavior is restablished when the speed goes below to the predefined limit.

Setting of the counting direction of the encoder

Through section:

Figure 9: section for setting/reading the counting direction parameter

It is possible to define counting direction of the encoder, that is, or the phase relationship between Channel A and Channel B (it refers only to straight/linear signals, similar consideration are valid also for relative complementary signals).

By default incremental signals generated by the encoder are such that, observing the encoder frontally, for clockwise rotation (CW) of the shaft, the rising edge of the channel A is in advance of the rising edge of the channel B; in case of counter clockwise rotation (CCW) it will be the rising edge of Channel B to be in advanced of the rising edge of Channel A

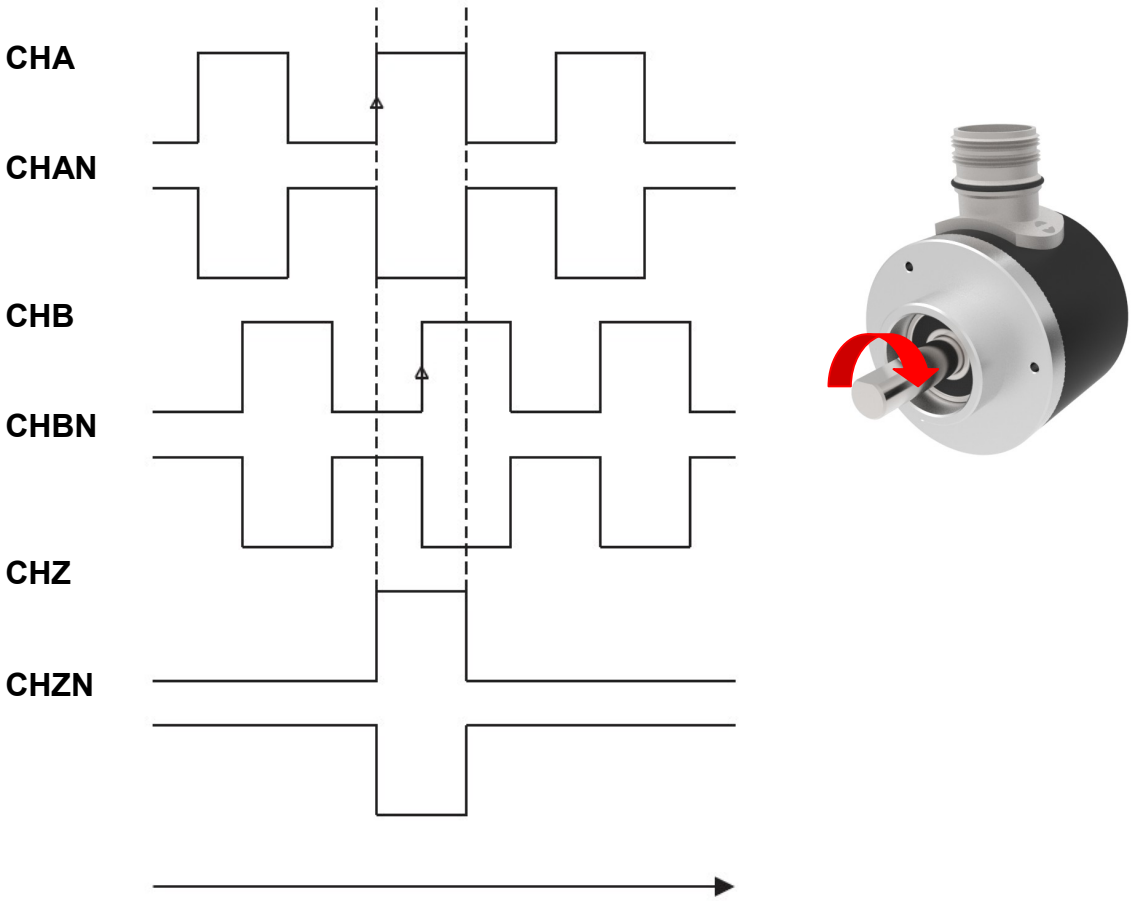


Figure 10: structure of incremental signals (default)

In the case of programmable encoder TISP58, you can define the counting direction through some hardware and software combination (pin 2 of the connector) that can be combined with each other as shown in the following table:

PIN 2 state	Software setting	Shaft rotation	Counting direction
Floating or 0V	UP	Clockwise (CW)	UP
+Vin	UP	Counterclockwise (CCW).	DOWN
Floating or 0V	DOWN	Clockwise (CW)	DOWN
+Vin	DOWN	Counterclockwise (CCW).	UP

Table 1: possible settings of counting direction

Setting of counting direction (software)

To set the count direction through configuration software it is sufficient selecting desired model (UP or DOWN) using right box of label ***Direction ctrl*** and subsequently pressing Write to write the selected option into the encoder memory.

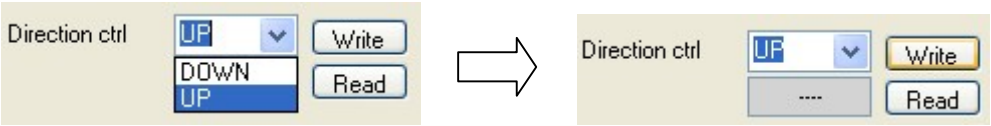


Figure 11: sequence of operation for setting sense of direction (software).

The result of the operation is notified in the summary window (***Communications Log***).

Reading of the counting direction (software)

For reading the counting direction value currently written into the encoder it is sufficient pressing the Read button, if the operation is successful the current setting (software) will be reported on the text box close to the reading button.

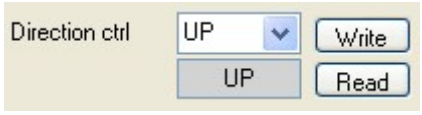


Figure 12: reading the counting direction parameter setting.

In the example reported on figure 12, current setting (software) of the encoder is of type UP.

The result of the operation is notified in the summary window (***Communications Log***).

If after setting the zero pulse position (by means of the pushbutton on the encoder cover) the resolution or the counting direction are changed is important to re-check again the zero position because may be necessary set it again. Remember also that the zero pulse position shall be set only when the encoder shaft is not moving.

Setting of zero synchronysm

Through the ***Zero Index Sync*** section:

Figure 13: setting/read the zero synchronism parameter

In addition to the incremental signals A and B (and their complementary copies), encoder allows to set the synchronism of zero between two different options: synchronism on channel A (180° by default) or A&B (90°).

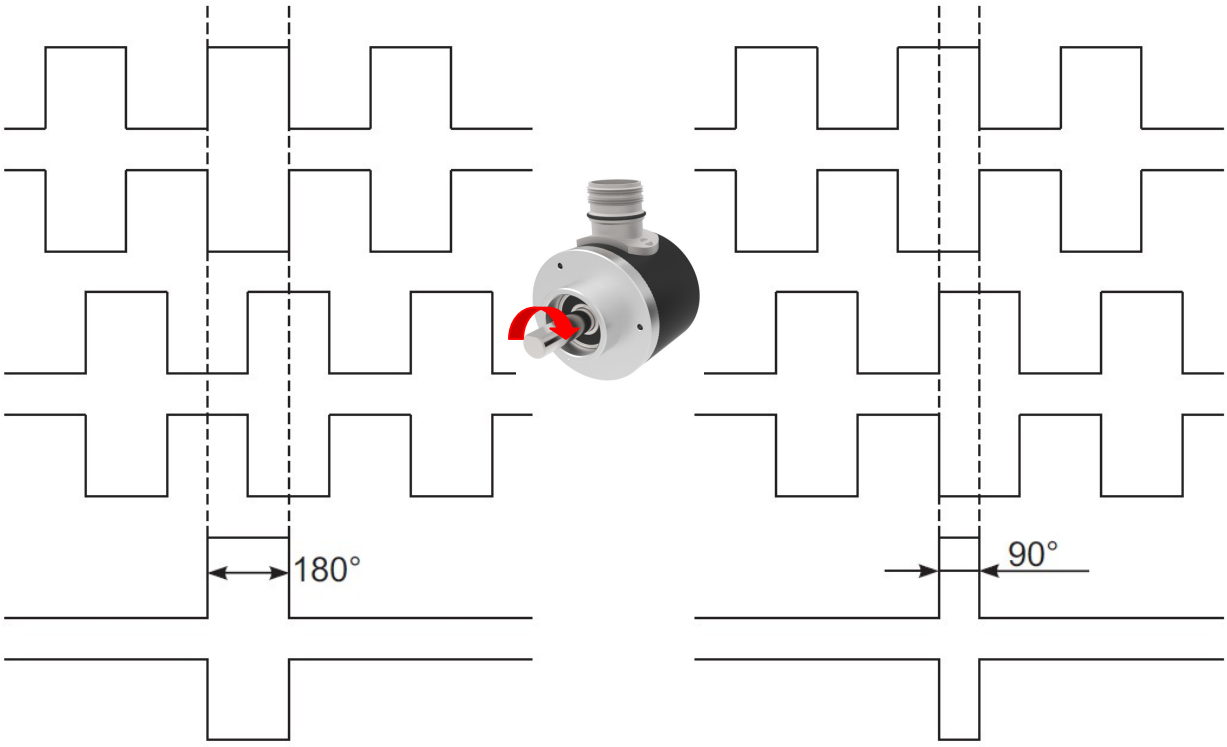


Figure 14: definition of the synchronism of zero (clockwise rotation, shaft encoder)

Setting the zero synchronism to 180° (standard) or 90°

To set the standard synchronism, that provides for a pulse width equal to 180° electrical and synchronization with the channel A, is sufficient to select the option 180° from the box on the right of the ***Zero Index Sync label*** and then press the button Write to write the selected option into the encoder memory.

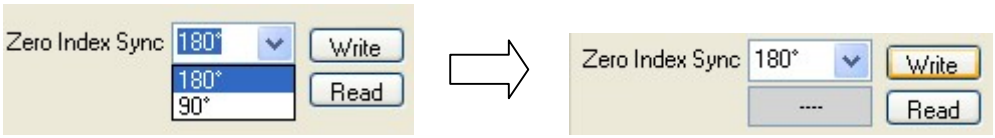


Figure 15: Setting the synchronism of 180 ° (channel A, by default)

In a similar way, we proceed to the selection of the 90° synchronism type.

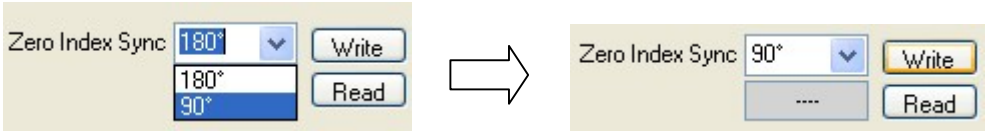


Figure 16: Setting the synchronism 90 ° (A & B)

The outcome of the operation is notified in the summary window ***(Communications Log).***

Reading the zero setting

To read the value of the resolution currently set in the encoder pressing the button Read. If the operation is successful, the current setting on the synchronism of zero will be transmitted immediately in the text box on the left of the reading button.

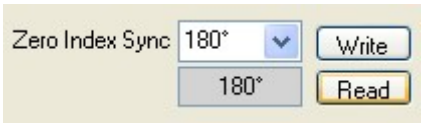


Figure 17: reading setting of zero synchronism

In the example shown in Figure 17, the encoder is configured to have a zero synchronism equal to 180 °.

The outcome of the operation is notified in the summary window (***Communications Log).***

Setting output voltage level

Through the ***Voltage Output*** section:

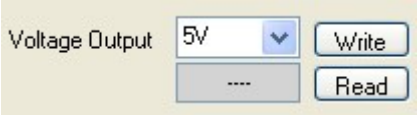


Figure 18: section setting output voltage level

User can set the maximum level assumed by the encoder's output signals between two possible options, 5V or Vin.

Selecting 5V, irrespective of the value assumed by the encoder's supply voltage, for all the signals generated in the encoder output the maximum voltage will be equal to 5V, the maximum range of the signals will therefore always comprised between 0V (reference potential) and + 5V.

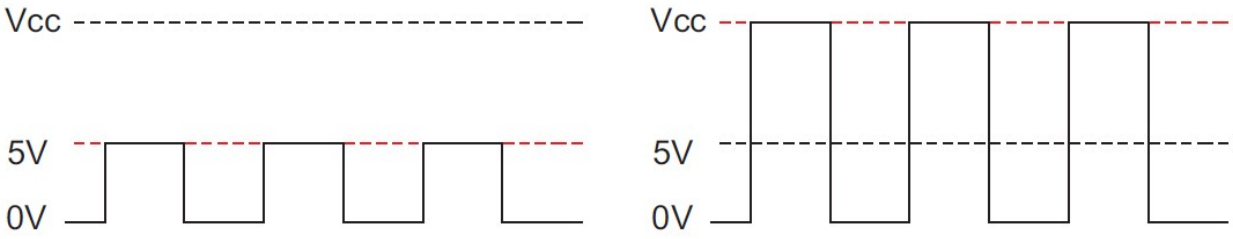


Figure 19: setting the level of the output voltage to + 5V (left) and Vin (right)

Selecting Vin, for all the signals generated in the encoder output, the maximum voltage will be equal to the value assumed by the encoder voltage supply, the maximum range of the signals will then be between 0V (reference potential) and + Vcc (voltage supply of encoder). Means that if you feeds encoder of 24 V, the output signals will assume a maximum level equal to 24V as well!

When you set the selected output voltage Vin, the amplitude of the output channels is to be changed immediately. Before activating this option, always check if the logic, encoder connected is, will be able to handle the voltage level chosen to avoid damage to the encoder and the devices connected to it directly.

Setting of output voltage level

To set the output voltage level to + 5V, select the option 5 V from the box to the right of the label ***Voltage Output*** and then press the button Write to write the selected option into the encoder memory

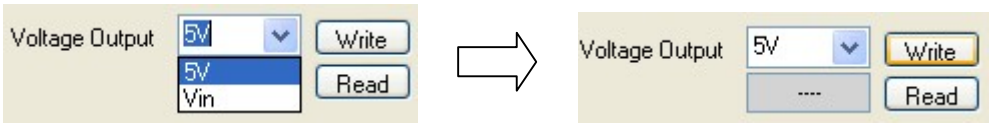


Figure 20: setting of output voltage level at 5V

The outcome of the operation is notified in the summary window ***(Communications Log).***

To set the maximum output voltage to the level of the supply voltage of the encoder we proceed in a similar manner by selecting the option Vin and pressing the button Write

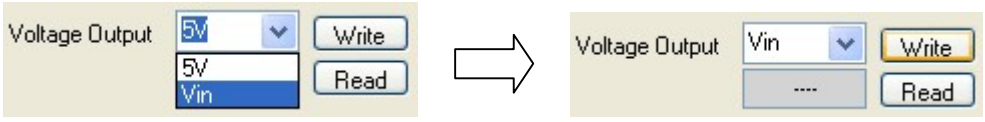


Figure 21: setting level output voltage at 5V

The outcome of the operation is notified in the summary window ***(Communications Log).***

Reading of the output voltage level setting

To read the current setting of the level of maximum output voltage that is currently set, press the button Read. If the operation is successful, the current setting will be shown immediately in the text box to the left of the button reading.

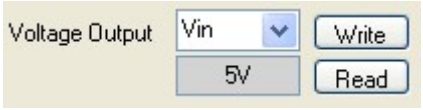


Figure 22: reading setting of zero synchronism

In the example shown in figure 22, the current setting for the maximum level of the output voltage is equal to 5V.

The outcome of the operation is notified in the summary window ***(Communications Log***).

Useful features and shortcuts

The tool allows you to read and write in one operation all the parameters of the encoder, using the button Read all and the button Write all.

To fill all the fields with the default parameters you can use the button Set Default Parameters to prepare the selections panel parameters as follows.

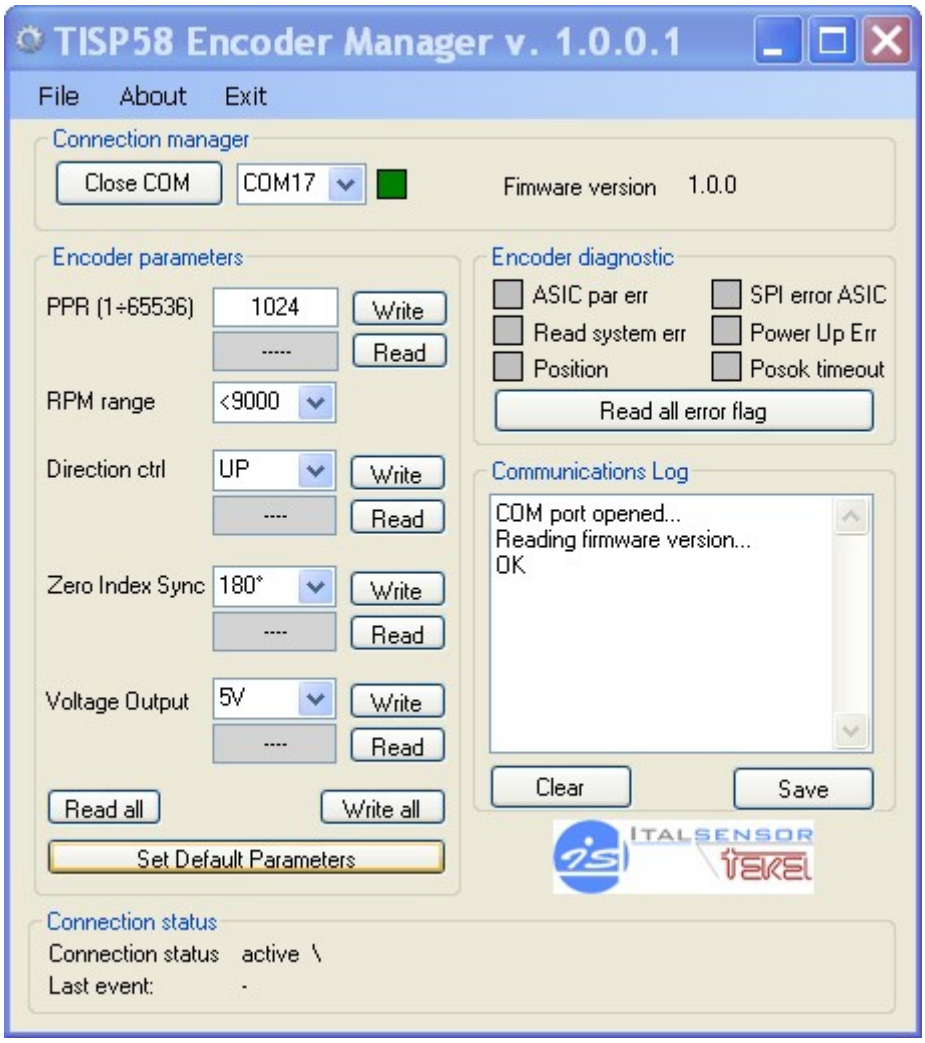


Figure 23: default settings after pressing the button *Set Default Parameters.*

Pressing the button Set Default Parameters you modify the settings only in the application window but not in the permanent memory of the encoder. To write the configuration in the encoder you can use the button Write all or write individually the options of interest using the buttons Write in the various sections of configuration.

Saving and loading of configurations

The application allows you to save files in special configuration all the options defined on the main panel, in the same way it allows to recall a previously saved configuration.

Saving the current configuration

To save the current configuration, enter to the menu ***File*** by selecting ***Save configuration.***

Figure 24: Saving the current configuration to file.

It will proceed with the insertion of a valid file name that will be used to save the file on.

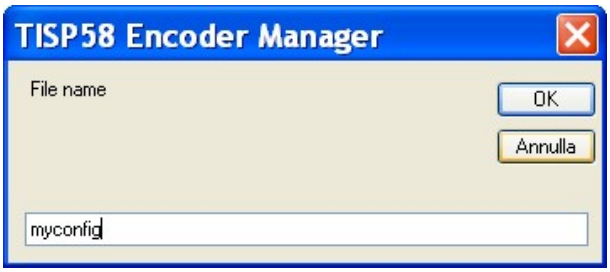


Figure 25: Saving the current configuration to file.

After pressing **OK button,** if everything goes smoothly, the following notification will appear the *File saved* window**.**

Figure 26: The file was saved successfully.

Loading a configuration file

To load a previously saved configuration enter to the ***File*** menu by selecting ***Open configuration.***

Figure 27: loading an existing configuration file

You can then search for and select the configuration file that will be used to set all the parameters in the **main window.**

Loading a configuration file only sets the parameters in the main window, but does not act directly on the encoder settings. To apply the settings you can use the button Write all or write individually the options of interest using the buttons Write in the various sections of configuration.

The file ***default.cfg*** contains the default settings shown in figure 23.

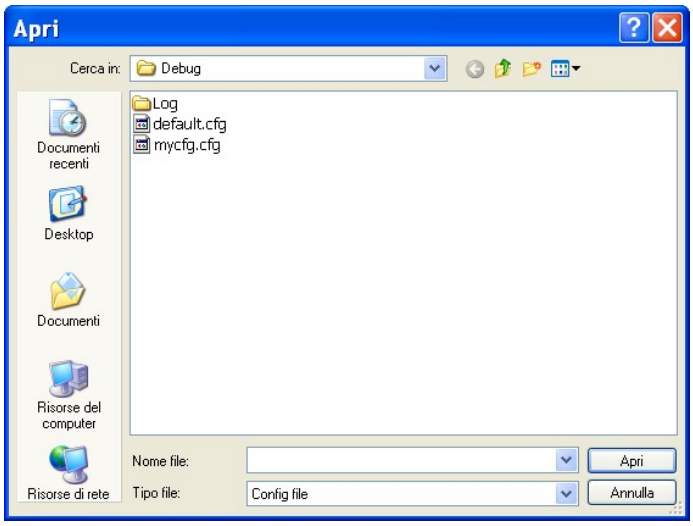
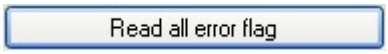


Figure 28: Window for selecting and loading the configuration file.

Diagnostics and errors

The encoder has an on-board diagnostic system that controls the correct operation of the system, the internal state can be controlled by activating the button 

inside the section ***Encoder Diagnostic***.

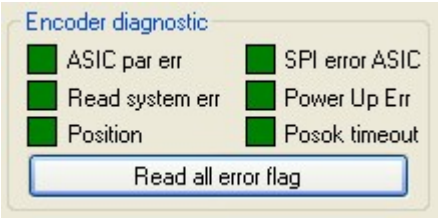


Figura 29: encoder status

Without error the related indicator take the green color, if there are some errors the color will be changed to red.

The internal status is read every time you perform a read or write operation.

The presence of errors can be identified through the state of two leds on the encoder cover.

Status	Green Led	Red Led
Correct operation	ON	OFF
Communication error	ON	ON
Reading unit error	ON	BLINK
Position not valid error	BLINK	OFF

Table 2**:** LED's diagnostic

Warranty conditions and operating manual

We invite the user to read the warranty conditions and the operating manual available on the Italsensor web site at the section ***Manuals*** subsection ***Operating Manual / Warranty conditions***.

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