

# User's guide

## IF31



- Signal converter (1Vpp Sine/Cosine to incremental)
- Signal interpolator (multiplier / divider)
- Line Driver RS-422 / Push-Pull HTL outputs (AB0 /AB0)
- Input frequency up to 400 kHz / Output frequency up to 4 MHz
- Slim and space-saving housing for DIN rail mounting

### Suitable for the following models:

- IF31

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The logo for Lika Electronic s.r.l. consists of the word "lika" in a bold, lowercase, sans-serif font. The letter "i" has a dot above it. The logo is positioned in the bottom right corner of the page.

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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 device and the interface are coloured in **GREEN**;
- alarms are coloured in **RED**;
- states are coloured in **FUCSIA**.

When scrolling through the text some icons can be found on the side of the page: they are expressly designed to highlight the parts of the text which are of great interest and significance for the user. Sometimes they are used to warn against dangers or potential sources of danger arising from the use of the device. You are advised to follow strictly the instructions given in this guide in order to guarantee the safety of the user and ensure the performance of the device. In this guide the following symbols are used:

	This icon, followed by the word <b>WARNING</b> , 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 <b>NOTE</b> , 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 <b>EXAMPLE</b> when instructions for setting parameters are accompanied by examples to clarify the explanation.

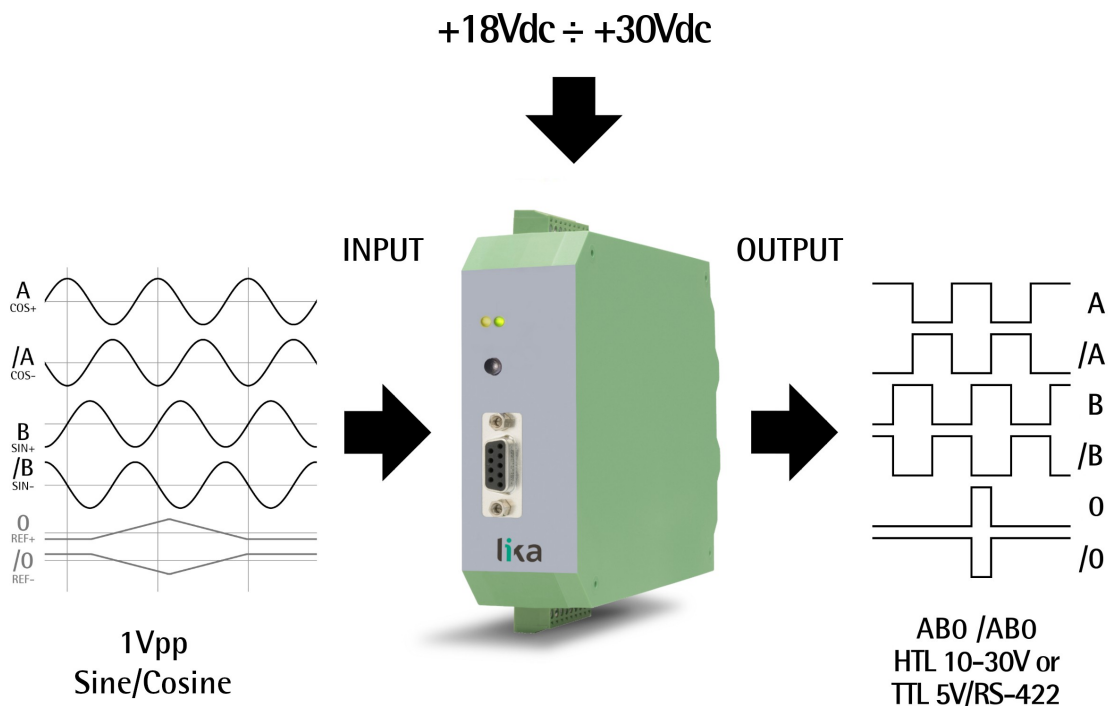
# Preliminary information

This guide is designed to provide the most complete information the operator needs to correctly and safely install and operate the **IF31 converter and interpolator for 1Vpp Sine/Cosine encoders**.

IF31 is an encoder interface designed to convert the signals provided by 1Vpp Sine/Cosine encoders into incremental quadrature signals (A/B /A/B digital signals).

The unit is also able to interpolate a corresponding number of pulses from every sine wave by means of an adjustable multiplier. If required, an additional programmable divider allows the division of the pulses before they are provided to output.

Output pulses can be set to either TTL RS-422 level or Push-Pull HTL level.



The maximum sine input frequency is 400 kHz.

The interpolation rate can be set in the range from 5 to 50, i.e. the unit can generate up to 50 pulses per one single sine period.

The maximum output frequency is 4 MHz. If required, the output frequency can be reduced by a selectable divider 1 : 1 ... 1 : 255. Independently from the selected interpolation rate, an interpolation time can be set in order to limit the output frequency to a desired maximum value.

The unit provides auxiliary output voltages 5.2 volts and  $V_{IN}$  to supply the Sine/Cosine encoder, all they are short-circuit proof.

A LED and a digital control output are both designed to warn about errors. Errors can be reset by means of the push-button available in the front of the unit, or by a remote reset signal.

All settings are made by means of two 12 pin DIL switches that are mounted on the top and on the bottom of the housing respectively.

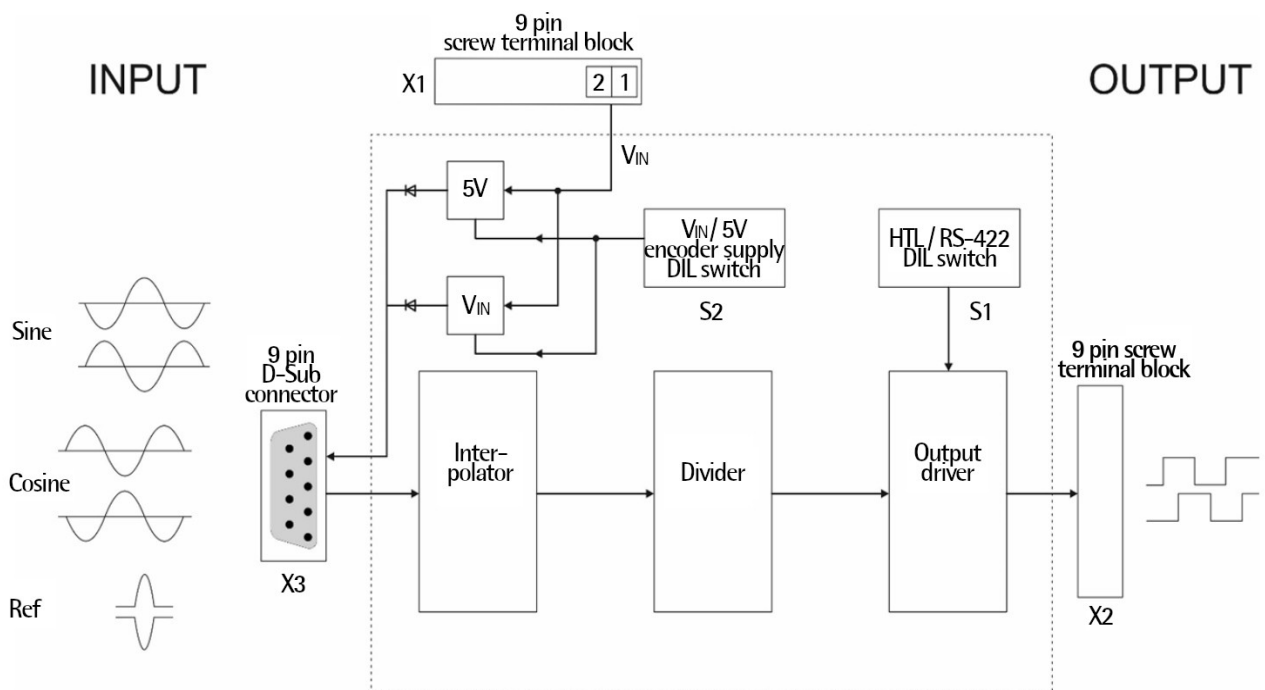


**WARNING**

The power supply must be switched off before setting the DIL switches. Changes in the DIL switch positions will become active only after the unit is switched OFF and then ON again.

The mechanical construction provides a compact housing for 35 mm top hat DIN rail mounting (according to EN 60715) with two terminal blocks and one D-Sub connector.

The following block diagram shows all the main functions.



For complete technical specifications please [refer to the product datasheet](#).

## Compatibility

This product is designed to be as much as possible compatible with the previous IF30 converter. It is able to replace the functionality of the previous model and also adds some other new options; however some minor differences need to be noted with regard to the parameter settings.

The main differences between this product and the respective previous model are listed below.

	IF31	IF30 (outdated model)
<b>Housing</b>	Dimensions (w x h x d): 34 x 118 x 135 mm (1.34 x 4.65 x 5.31 inches), including connections weight: approx. 160 g	Dimensions (w x h x d): 40 x 79 x 91 mm (1.57 x 3.11 x 3.58 inches), including connections weight: approx. 200 g
<b>Incremental output Push-Pull HTL / Line Driver TTL RS-422</b>	1 9-terminal terminal block Push-Pull HTL or Line Driver TTL RS-422 selectable via DIL switch	Terminal block (Push-Pull HTL) 9-pin D-Sub connector (Line Driver TTL RS-422)
<b>Power supply connection</b>	9-terminal terminal block	Terminal blocks
<b>Control output connection</b>	9-terminal terminal block	Terminal blocks
<b>Control input connection</b>	9-terminal terminal block	Terminal blocks
<b>Encoder power supply</b>	Selectable via DIL switch	Via external bridge
<b>Single track SINE/COSINE signals (SIN / COS / REF)</b>	Currently not supported	Supported

Specific features of the IF31 converter are:

- automatic generation of one Z pulse (REF) per each input period (selectable)
- separate Z divider
- extension of the A/B divider
- input to stop the output signals

## 1 - Safety summary



### 1.1 Safety

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



### 1.2 Electrical safety

- Turn OFF the power supply before connecting the device;
- connect following to the explanation in the "4 - Electrical connections" section on page 13;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, the 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;
  - minimize noise by connecting the unit to ground (GND). Make sure that ground (GND) is not affected by noise. For more information please refer also to the "4.9 EMC guidelines" section on page 20.



### 1.3 Mechanical safety

- Install the device following strictly the information in the "3 - Mounting instructions" section on page 11;
- do not disassemble the unit;
- do not tool the unit;
- delicate electronic equipment: handle with care;



- do not subject the device to knocks or shocks;
- respect the environmental characteristics of the device.

## 2 - Identification

Device can be identified through the **order code** and the **serial number** printed on the label applied to its body. Information is listed in the delivery document too. Please always quote the order code and the serial number when reaching Lika Electronic for purchasing spare parts or needing assistance. For any information on the technical characteristics of the product, refer to the technical catalogue.



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

### 3 - Mounting instructions

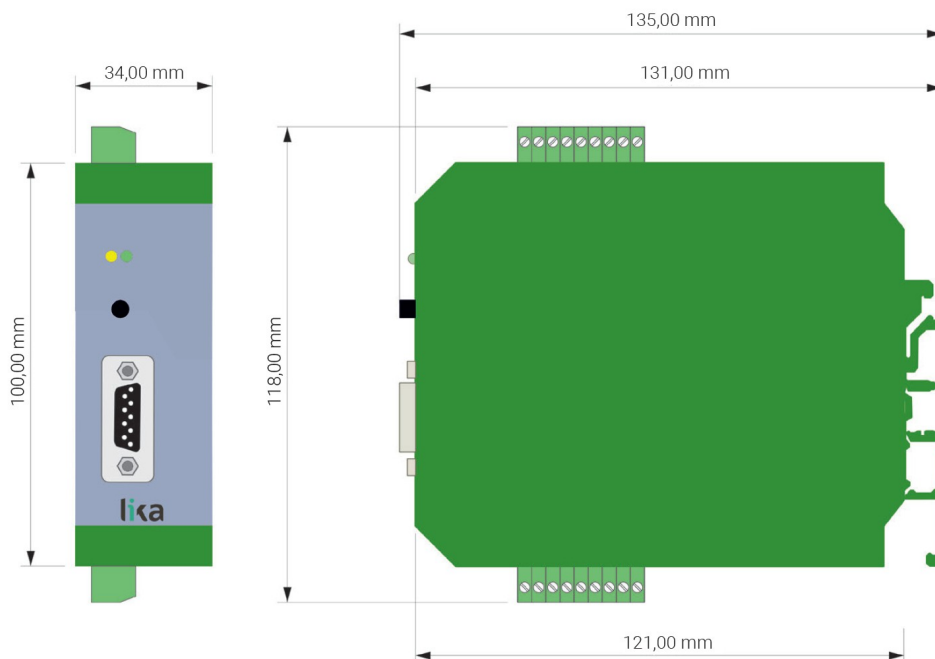


#### WARNING

Installation and maintenance operations must be carried out by qualified personnel only, with power supply disconnected and mechanical parts compulsorily in stop. Never tool the device.

#### 3.1 Overall dimensions

IF31 converter must be installed and protected inside the electric cabinet. It provides 35 mm top hat DIN rail mounting and can quickly snap onto a DIN rail with built-in DIN rail clips that require no additional brackets or supports.



#### 3.2 Installation notes

The device is only allowed to be installed and operated within the permissible temperature range (0°C +45°C / +32°F +113°F). Please ensure an adequate ventilation and avoid all direct contact between the device and hot or aggressive gases and liquids.

Before installation or maintenance, the unit must be disconnected from all voltage sources. Furthermore it must be ensured that no danger can arise by touching the disconnected voltage sources.

Devices which are supplied by AC voltages must be connected only by means of switches or circuit breakers with low voltage circuit. The switch or circuit breaker must be installed as near as possible to the device and further indicated as separator.

Incoming as well as outgoing wires and wires for extra low voltages (ELV) must be separated from dangerous electrical cables (SELV circuits) by using double or increased insulation.

All selected wires and insulations must comply with the provided voltage and temperature ranges. In addition all country and application-specific standards, which are relevant for structure, form and quality of the wires, must be ensured. Before first start-up it must be ensured that all connections and wires are firmly in place and secured to the screw terminals. All (including unused) terminals must be fastened by turning the relevant screws clockwise up to the stop. Overvoltages at the connections must be limited to values in accordance with the overvoltage category II.

### **3.3 Cleaning, maintenance and service notes**

To clean the front of the unit please use only a slightly damp (not wet!), soft cloth. For the rear no cleaning is necessary. For an unscheduled, individual cleaning of the rear the maintenance staff or assembler is self-responsible.

During normal operation no maintenance is necessary. In case of unexpected problems, failures or malfunctions the device must be shipped back to the manufacturer for maintenance check, adjustment and repair (if necessary). Unauthorized opening and repair can have negative effects or failures to the measures of protection of the unit.

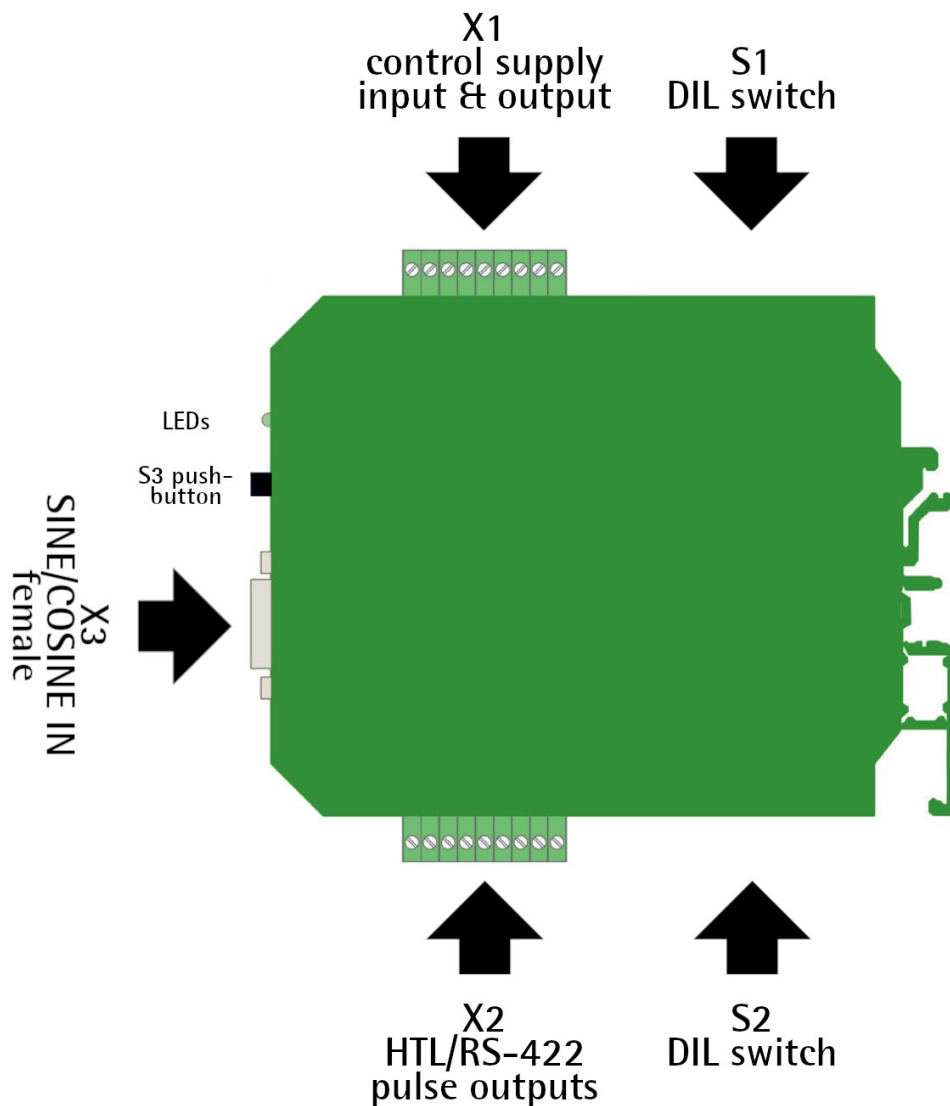
## 4 - Electrical connections

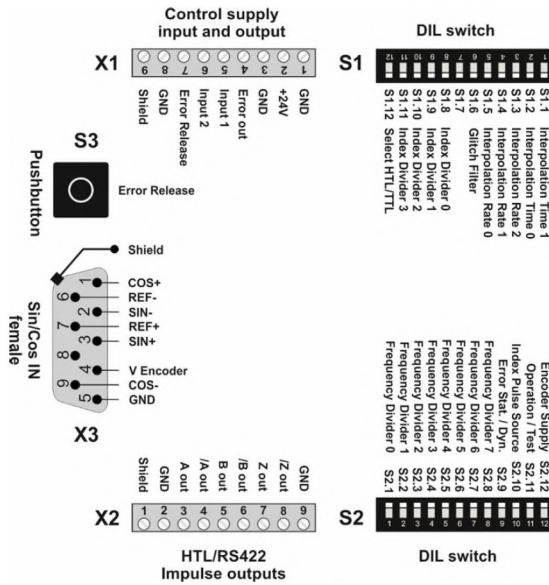


### WARNING

Power supply must be turned off before performing any electrical connection!

For the wiring of the unit one X3 D-Sub 9-pin female connector and two X1 and X2 terminal blocks are available as shown in the drawing below. Terminal blocks have screw terminal connectors. Terminal block screws must be tightened using a slotted screwdriver having a 2 mm wide blade.





#### 4.1 Power supply to the converter (X1 terminal block)

##### DC power supply technical specifications

Input voltage:	18Vdc ... 30Vdc
Protection circuit:	reverse polarity protection
Ripple:	≤ 10% at 24 Vdc
Power consumption:	approx. 150 mA at 18 V / approx. 60 mA at 30 V (unloaded)
Connections:	X1 screw terminal block, 1.5 mm <sup>2</sup> / AWG16

The unit requires a **supply voltage from 18Vdc to 30Vdc**, it must be applied to the terminals 1 (GND) and 2 (+24V) of the X1 terminal block.



##### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

#### 4.2 Power supply to the encoder (X3 connector)

##### Auxiliary voltage for encoder supply technical specifications

Number of auxiliary voltages:	2, selectable via S2 DIL switch
Encoder supply 1:	+5.2 Vdc
Encoder supply 2:	Input voltage (V <sub>IN</sub> ) minus approx. 2 V
Output current:	max. 150 mA each
Connections:	X3 D-Sub 9 pin female connector

The encoder is supplied through the pins 4 (V Encoder) and 5 (GND) of the X3 D-Sub 9-pin female connector.

The power supply to the encoder can be:

1. according to the power supply voltage supplied to the converter minus approx. 2 V (DIL switch S2.12 = ON);
2. +5.2 Vdc (DIL switch S2.12 = OFF).

For complete information on setting the option through the S2 DIL switch, refer to the "5.1 Generic settings of both S1 and S2 DIL switches" section on page 22.



### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

## 4.3 D-Sub 9-pin female connector (X3 connector) – Input signals

### Sine/Cosine encoder input technical specifications

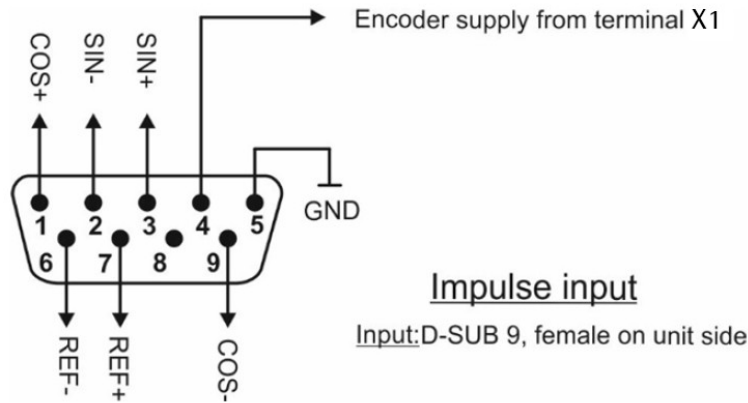
Amplitude:	Min. 0.8 Vpp ... max. 1.2 Vpp
DC offset:	Min. 1.8 V ... max. 3.1 V
Channels:	SIN+, SIN-, COS+, COS-, REF+, REF-
Frequency:	Max. 400 kHz
Differential REF input signal:	High 130 mV, Low 40 mV
Connections:	X3 D-Sub 9 pin female connector

The unit is equipped with a D-Sub 9 pin female connector for the connection of the Sine/Cosine encoder. To easily supply the encoder, an auxiliary voltage of either 5.2 Vdc or 24 Vdc can be provided to the D-Sub connector, see the previous "4.2 Power supply to the encoder (X3 connector)" section.

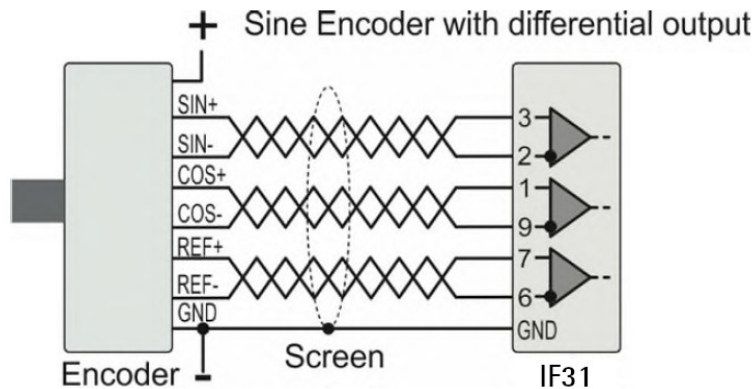
### 4.3.1 Pin assignment of the D-Sub connector

Standard Sine/Cosine encoders with differential outputs can be connected directly to the corresponding pins SIN+, SIN-, COS+, COS-, REF+, and REF-.

When long cables must be used, terminating resistors between the non-inverted and the inverted signal of each channel may be useful.



The maximum Sine input frequency is 400 kHz. The interpolation rate can be set in the range from 5 to 50 through the S1 DIL switch, i.e. the unit can generate up to 50 pulses per each Sine period. See the "5.2 S1 DIL switch: interpolation and filtering" section on page 23.



By means of the S2 DIL switch it is possible to either use and provide the 0 pulse as supplied by the encoder or automatically generate the Index pulse per each sine period. Refer to the "5.1 Generic settings of both S1 and S2 DIL switches" section on page 22.



### WARNING

Sine/Cosine signals that are provided at input are highly sensitive analogue signals! Therefore it is mandatory to adopt proper screening methods. The use of cables with twisted pair leads is highly recommended. The length of the cable should not exceed 5 metres.



### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

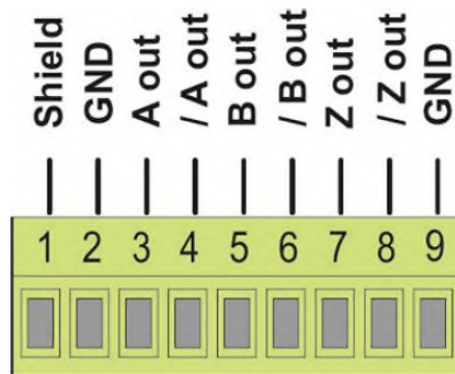


## 4.4 HTL/RS-422 pulse outputs (X2 terminal block) – Output signals

### Incremental output signals technical specifications

Signal levels:	Supply voltage ( $V_{IN}$ ) minus 2 V, 5 V, selectable via S1 DIL switch
Number of channels:	A, /A, B, /B, Z, /Z
Configuration:	RS-422 TTL, HTL
Frequency:	Up to 4 MHz
Connections:	X2 screw terminal block, 1.5 mm <sup>2</sup> / AWG16

Signals at output are provided through the X2 terminal block.



They are available in either Line Driver RS-422 or Push-Pull HTL format. The output level must be set through the S1 DIL switch, see the "5.1 Generic settings of both S1 and S2 DIL switches" section on page 22.

The level of the Push-Pull HTL output signals corresponds to the input voltage supplied to the terminals 1 (GND) and 2 (+24V) of the X1 terminal block.

The maximum output frequency is 4 MHz. When required, the output frequency can be reduced by a divider 1 : 1 ... 1 : 255, selectable through the S1 and S2 DIL switches, see the "5.3 S1 and S2 DIL switches: frequency dividers" section on page 25.



### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

## 4.5 Control inputs (X1 terminal block)

### Control inputs technical specifications

Signal level:	10 ... 30 V, HTL / PNP, Low: 0 ... 4 V, High: 10 ... 30 V
Internal resistance:	$R_i \approx 7 \text{ k}\Omega$
Connections:	X1 screw terminal block, 1.5 mm <sup>2</sup> / AWG16

Terminal 5 INPUT 1 control input can be used to stop all the output signals independently from the input signals. When INPUT 1 has high level (10 ... 30 V), no incremental pulses are provided to output.

Terminal 6 INPUT 2 control input can be used to stop the Z output signal. When INPUT 2 has high level (10 ... 30 V), no Z pulse is provided to output.

Terminal 7 ERROR RELEASE control input is used to acknowledge an error when active. When ERROR RELEASE has high level (10 ... 30 V), the error is acknowledged. For complete information refer to the next section.



### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

## 4.6 Control output (X1 terminal block) – Error out

### Control output technical specifications

Signal level:	HTL, supply voltage ( $V_{IN}$ ) minus 2 V
Output current:	Max. 30 mA
Connections:	X1 screw terminal block, 1.5 mm <sup>2</sup> / AWG16



### WARNING

The Error out function is available only if the switch 11 of the S2 DIL switch is set to OFF. In this case the output has the normal function and the test function is not active. If the switch 11 of the S2 DIL switch is set to ON, the test function is active.

In case of error, the Error out output (terminal 4 of the X1 terminal block) switches to high level. The yellow LED installed in the front of the unit comes on solidly at the same time, see the "4.8 Diagnostic LEDs" section on page 19. An error is acknowledged by means of either the Error release input (terminal 7 of the X1 terminal block) or the S3 ERROR RELEASE push-button installed in the front of the unit (see also the following "4.7 S3 ERROR RELEASE push-button" section). If the input frequencies are too high, the reset of the error may fail.

The following errors are detected and signalled by the Error output signal as well as by the yellow LED.

- The breaking of the wire in one of the following signals: SIN+, SIN-, COS+, COS- (the REF+ and REF- signals are not monitored for errors).
- The too low amplitude of one of the following signals: SIN+, SIN-, COS+, COS- (the REF+ and REF- signals are not monitored for errors).
- The input frequency exceeds the maximum level, the output frequency is unable to follow.

Depending on the settings of the S2 DIL switch (see the switch 9, refer to the "5.1 Generic settings of both S1 and S2 DIL switches" section on page 22), the error signals remain active until remote acknowledgement, or are reset automatically when the error is no more active.

In case of error the proper function of the unit is not ensured and a loss of encoder pulses may occur.



### WARNING

All inputs and outputs as well as the power supply refer to the same reference potential (GND)!

### 4.7 S3 ERROR RELEASE push-button

In case of error, the Error out output (terminal 4 of the X1 terminal block) switches to high level. The yellow LED installed in the front of the unit comes on solidly at the same time. An error is acknowledged by means of either the S3 ERROR RELEASE push-button installed in the front of the unit or the Error release input (terminal 7 of the X1 terminal block). For complete information please refer to the previous "4.6 Control output (X1 terminal block) – Error out" section.

### 4.8 Diagnostic LEDs

Two LEDs are available in the front of the unit and used for diagnostic information.

LED	Meaning
<b>Green</b> LED	It shows the current state of power supply
OFF	The unit power supply is switched OFF
ON (lit <b>green</b> )	The unit power supply is switched ON
<b>Yellow</b> LED	It warns about errors. For complete information refer to the "4.6 Control output (X1 terminal block) – Error out" section on page 18
OFF	No error is active
ON (lit <b>yellow</b> )	An error is active

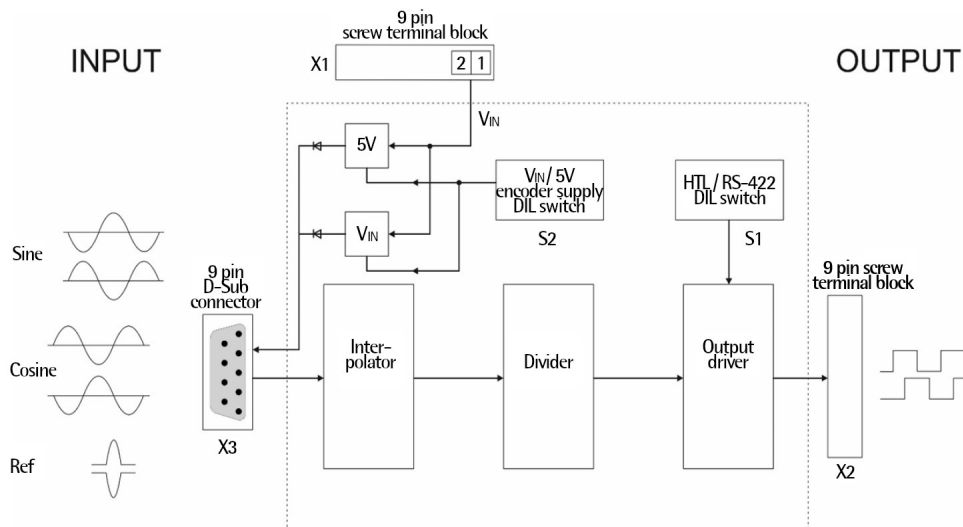
## 4.9 EMC guidelines

This unit is designed to provide high protection against electromagnetic interference. Nevertheless you must minimize the power of electromagnetic noise to the unit and all connected cables.

The following measures are mandatory for a proper installation and operation.

- **Shielded cable must always be used for all signals as well as for control input and output lines.**
- **Cables for digital controls (digital I/Os, relay outputs) must not exceed 30 m in length and are allowed for in building operation only.**
- Use shield clamps to properly connect the cable shields to earth.
- The wiring of the common ground lines (GND or 0V) must be star-shaped and common ground must be connected to earth at one single point only.
- The device should be installed in a metal housing and as far away as possible from sources of interference.
- Run signal and control cables apart from power lines and other cables that emit electromagnetic noise.

## 4.10 Functional diagram

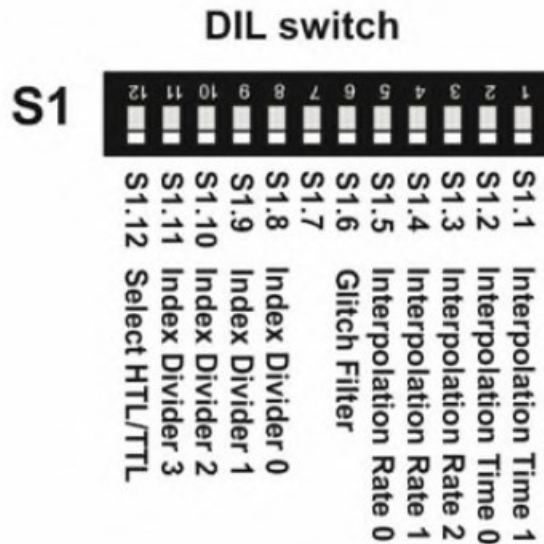


## 5 – Setting the DIL switches

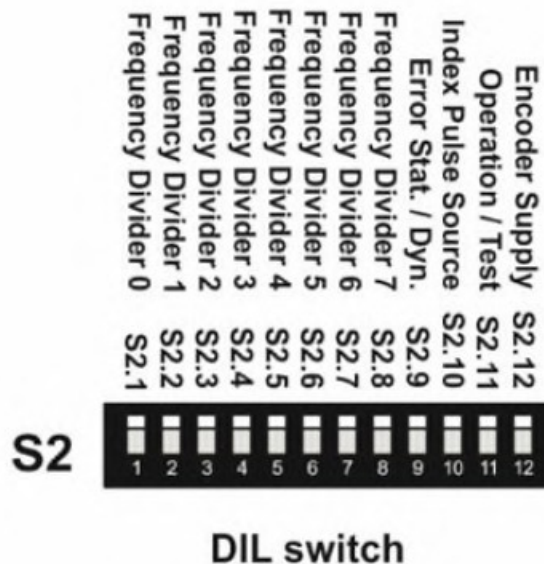
Two DIL switches named S1 and S2 are installed in the top and in the bottom of the unit's housing respectively.

The S1 DIL switch is used to set the interpolation time, the interpolation factor, the glitch filter, the programmable Z divider, and the level of the incremental output signals.

The switch 7 of the S1 DIL switch is not used.



The S2 DIL switch allows the activation of a programmable A/B divider and the selection of the test modes.



### WARNING

Changes in the DIL switch positions will become active only after the unit is switched OFF and then ON again.

5.1 Generic settings of both S1 and S2 DIL switches

DIL switch . Terminal	Status	Description
S1.12	ON	Output signals at X2 terminal block have $V_{IN}$ level (+24 V)
	OFF	Output signals at X2 terminal block have +5 V level
S2.12	ON	Power supply to the encoder at pin 4 V Encoder of the X3 D-Sub connector has $V_{IN}$ voltage level (+24 Vdc)
	OFF	Power supply to the encoder at pin 4 V Encoder of the X3 D-Sub connector has +5.2 Vdc voltage level
S2.11	ON	Test function active, Error out at terminal 4 of the X1 terminal block is reserved for test
	OFF	Test function not active, Error out at terminal 4 of the X1 terminal block has normal function
S2.10	ON	The REF pulses are generated automatically
	OFF	The REF pulses that are provided through the pins 6 and 7 of the X3 D-Sub connector are used
S2.09	ON	Error is not static and is always deleted
	OFF	Error is static and saved

5.2 S1 DIL switch: interpolation and filtering

S1 DIL switch						Interpolation and Filtering	
6	5	4	3	2	1		
ON						Filter ON	Glitch filter
	OFF	OFF	OFF			40	Interpolation factor
	ON	OFF	OFF			20	
	OFF	ON	OFF			10	
	ON	ON	OFF			5	
	OFF	OFF	ON			50	
	ON	OFF	ON			25	
	OFF	ON	ON			12.5	
	ON	ON	ON			6.25	
				OFF	OFF	25 ns	Interpolation time
				OFF	ON	100 ns	
				ON	OFF	400 ns	
				ON	ON	1600 ns	



**WARNING**

Distortions of the input signal result in the fluctuation of the output frequency.



**WARNING**

The interpolation factor cannot be disabled. If you do not need any interpolation, you must set any of the interpolation factors (e.g. 5) and then set the suitable divider (1 : 5 in the example).

**Glitch filter**

The use of the glitch filter results in increased interpolation times at standstill or in case of low input frequencies, therefore it reduces noise and jitter of the output signal by a few increments up and down in a standstill condition. However, when the glitch filter is switched ON, fast changes of speed can result in temporary proportional errors between the input frequency and the output frequency during acceleration. See the table in the following page.

The following table shows the limits of input and output frequencies with respect to the S1 DIL switch settings.

Interpolation rate	Interpolation time	Maximum output frequency	Maximum input frequency
<b>x5</b>	25 ns	2 MHz	400 kHz
	100 ns	2 MHz	400 kHz
	400 ns	625 kHz	125 kHz
	1600 ns	156.25 kHz	31.25 kHz
<b>x6.25</b>	25 ns	2.5 MHz	400 kHz
	100 ns	2.5 MHz	400 kHz
	400 ns	625 kHz	100 kHz
	1600 ns	156.25 kHz	25 kHz
<b>x10</b>	25 ns	4 MHz	400 kHz
	100 ns	2.5 MHz	250 kHz
	400 ns	625 kHz	62.5 kHz
	1600 ns	156.25 kHz	15.625 kHz
<b>x12.5</b>	25 ns	4 MHz	320 kHz
	100 ns	2.5 MHz	200 kHz
	400 ns	625 kHz	50 kHz
	1600 ns	156.25 kHz	12.5 kHz
<b>x20</b>	25 ns	4 MHz	200 kHz
	100 ns	2.5 MHz	125 kHz
	400 ns	625 kHz	31.25 kHz
	1600 ns	156.25 kHz	17.8125 kHz
<b>x25</b>	25 ns	4 MHz	160 kHz
	100 ns	2.5 MHz	100 kHz
	400 ns	625 kHz	25 kHz
	1600 ns	156.25 kHz	6.25 kHz
<b>x40</b>	25 ns	4 MHz	100 kHz
	100 ns	2.5 MHz	62.5 kHz
	400 ns	625 kHz	15.625 kHz
	1600 ns	156.25 kHz	3.90625 kHz
<b>x50</b>	25 ns	4 MHz	80 kHz
	100 ns	2.5 MHz	50 kHz
	400 ns	625 kHz	12.5 kHz
	1600 ns	156.25 kHz	3.125 kHz



### 5.3 S1 and S2 DIL switches: frequency dividers

The programmable frequency divider provides decrease of the output frequency by an adjustable division rate between 1 : 1 and 1 : 255.

S2 DIL switch								A/B divider
8	7	6	5	4	3	2	1	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1 : 1
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	1 : 2
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	1 : 3
OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	1 : 4
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	1 : 5
OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	1 : 6
OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	1 : 7
OFF	OFF	OFF	OFF	OFF	ON	ON	ON	1 : 8
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	1 : 9
OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	1 : 10
OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	1 : 11
OFF	OFF	OFF	OFF	ON	OFF	ON	ON	1 : 12
...								...
ON	ON	ON	ON	ON	ON	ON	ON	1 : 255

A/B division rate

S1 DIL switch				Index (Z) divider
11	10	9	8	
OFF	OFF	OFF	OFF	1 : 1
OFF	OFF	OFF	ON	1 : 2
OFF	OFF	ON	OFF	1 : 3
OFF	OFF	ON	ON	1 : 4
OFF	ON	OFF	OFF	1 : 5
OFF	ON	OFF	ON	1 : 6
OFF	ON	ON	OFF	1 : 7
OFF	ON	ON	ON	1 : 8
ON	OFF	OFF	OFF	1 : 9
ON	OFF	OFF	ON	1 : 10
ON	OFF	ON	OFF	1 : 11
ON	OFF	ON	ON	1 : 12
ON	ON	OFF	OFF	1 : 13
ON	ON	OFF	ON	1 : 14
ON	ON	ON	OFF	1 : 15
ON	ON	ON	ON	1 : 16

Index (Z) division rate

### 5.4 DIL switches setting example



**EXAMPLE**

You need to connect a 1Vpp sinusoidal encoder that has to be supplied with +5Vdc and provides 2,048 Sine/Cosine signals per revolution without Z index signals. You need these Sine/Cosine signals to be converted into quadrature signals with Z index signals. And you also need the signals to be interpolated as you need 4,096 TTL signals (you must double the signals).

In this case you have to set the S1 and S2 DIL switches as follows:

**S1 DIL switch**

12	11	10	9	8	7	6	5	4	3	2	1
OFF	OFF	ON	OFF	OFF	n.u.	ON	OFF	ON	OFF	a.t.n.	a.t.n.

a.t.n. = according to needs      n.u. = not used

**S2 DIL switch**

12	11	10	9	8	7	6	5	4	3	2	1
OFF	n.s.	ON	n.s.	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF

n.s. = not significant

### 5.5 Delays

There is a delay time between the analogue input signals and the incremental output signals, it is 3 µsec. typically when the divider is switched off. The use of the divider function will lengthen the delay time correspondingly. The delay time is constant and causes a frequency dependent phase shift between the input and the output signals.

## 6 - Miscellaneous hints

- The unit will reach the full accuracy only after a transient period necessary for the internal signal controller to stabilize, i.e. after approximately 20 full sine cycles at the input. Before that, the input frequency should not exceed about 50% of the normal maximum frequency.
- The application of digital interpolation procedures requires the use of quantization steps, which can cause some dither in the output signal.
- The quality of the output signals depends mainly on the quality of the input signals. Therefore, please pay the utmost attention and take the greatest care in arranging the shielding and running the cables and their length.
- IF31 converter does not provide potential separation, i.e. the GND of the unit is also the GND of the sensor at the same time. Therefore, it is important to ensure safe conditions of the earthing installation and to prevent earth loops and balance currents flowing through the unit. When difficult manageable potential situations may occur, we recommend using a fully separate power supply to supply the IF31 converter.

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1.0	17.06.2024	First issue



Dispose separately

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