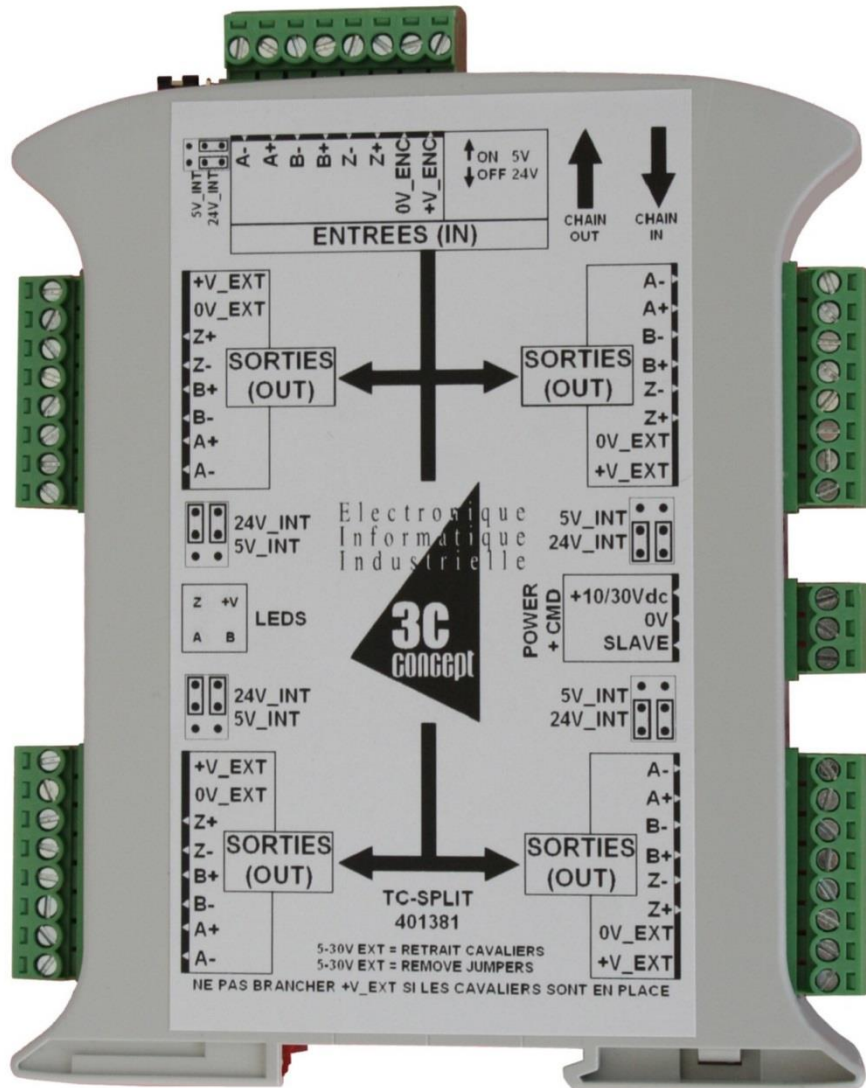


# TC-SPLIT



One product, multiple features:

- Signal converter: adapt encoder output voltage levels to devices inputs (PLC, variable frequency drive ...)
- Unipolar / differential converter
- Splitter: send encoder signals to multiples devices (4 outputs per module, unlimited numbers of chained devices)
- Insulator: galvanic isolation between encoder and module outputs, and between module outputs themselves.
- Multiplexer: Choice of the source encoder signal (using two chained modules at least)

PDF Manual PDF available at: [www.3cconcept.fr/tcusb](http://www.3cconcept.fr/tcusb)

## 1 – Overview

TC-SPLIT Module allows connection of 4 devices on the same incremental encoder (or similar devices). It can be chained in order to obtain 8,12,16 outputs.

3 independent channels (A,B,Z) are available on each device output

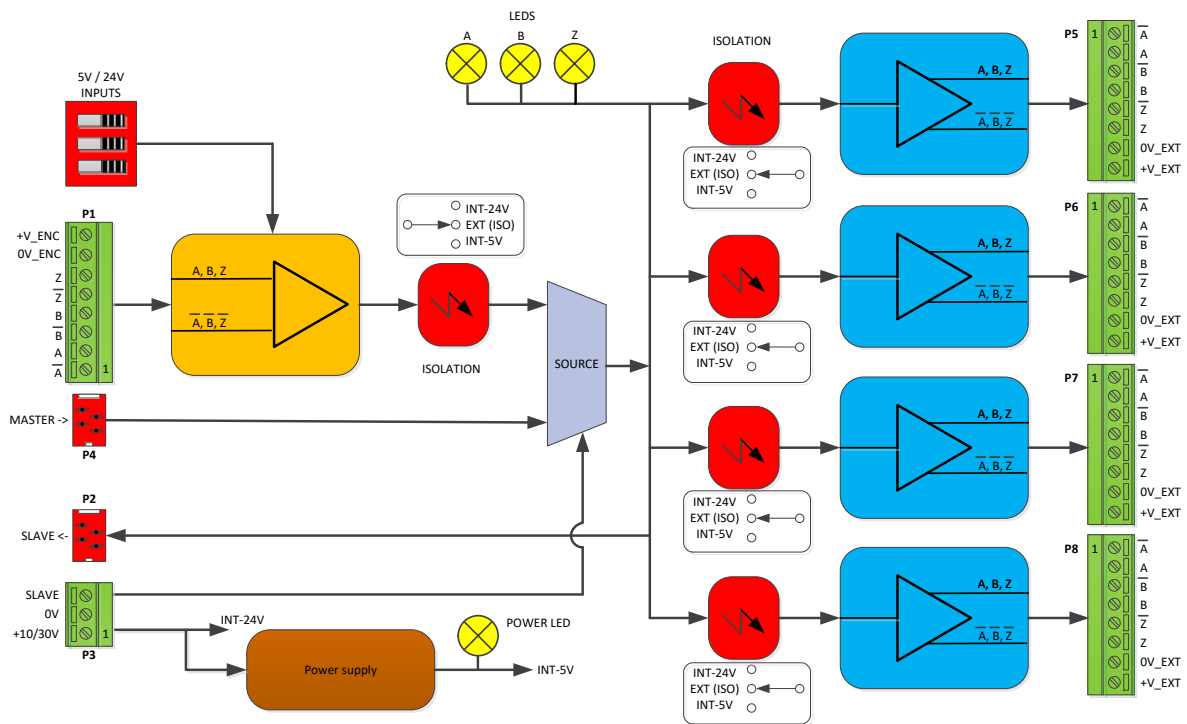
Encoder input signals can be configured as RS422/TTL/HTL unipolar or differential.

Each group of (input or output) module can be galvanic isolated, if an external power is provided

High working frequency (greater than usual encoder working frequency)

TC-SPLIT Module can be mounted on DIN Rail

Module is powered by a DC source voltage, between 10 to 30V. Typical power is less than 0.5W (without encoder or loads)



## 2 – Technical Characteristics

Parameter	Type	Pinout	Value	Unit
Power	Module	P3.1	10 à 30	VDC
	V_EXT	Pn.8	4.5 à 30	VDC
	Max supply current	P3.1	250	mA
	Supply current @24V (1)	P3.1	50	mA
	Max supply current, 5V (+V_ENC)	P1.8	200	mA
	supply current V_EXT (1)	Pn.8	25	mA
Counting	Max Frequency (differential)	A/B/Z	1000	KHz
	Max Frequency (unipolar)	A/B/Z	250	KHz
	Max propagation time	A/B/Z	1	µs
Inputs (5V) (input switch ON)	Input impedance	P1 (1-6)	700	Ohms
	Nominal input current	P1 (1-6)	5	mA
	Min. voltage for NL1 (2)	P1 (1-6)	2.6	V
	Max voltage for NLO (2)	P1 (1-6)	1.5	V
	Max allowed voltage	P1 (1-6)	8.0	V
Inputs (24V) (Input switch OFF)	Input impedance	P1 (1-6)	4000	Ohms
	Nominal input current	P1 (1-6)	5	mA
	Min. voltage for NL1 (2)	P1 (1-6)	10	V
	Max voltage for NLO (2)	P1 (1-6)	5	V
	Max allowed voltage	P1 (1-6)	30	V
Output (5V) (INT or EXT Power)	Max output current	Pn (1-6)	25	mA
	Min. voltage for NL1 (3)	Pn (1-6)	3.0	V
	Max voltage for NLO (3)	Pn (1-6)	0.8	V
Output (24V) (INT or EXT Power)	Max output current	Pn (1-6)	25	mA
	Min. voltage for NL1 (4)	Pn (1-6)	21	V
	Max voltage for NLO (4)	Pn (1-6)	0.8	V
Others	Size		130x101x18	mm
	Protection rating		IP20	
	Operating temperature (5)		-20/+60	°C

### Notes:

- (1) No load on A/B/Z outputs, no encoder powered
- (2) NL1: Logic level 1 (active), NLO: Logic level 0 (inactive)
- (3) On 5mA load
- (4) On 10mA load, supposing 24Vdc power, if not  $V_o = V_{power} - 3V$
- (5) No condensing

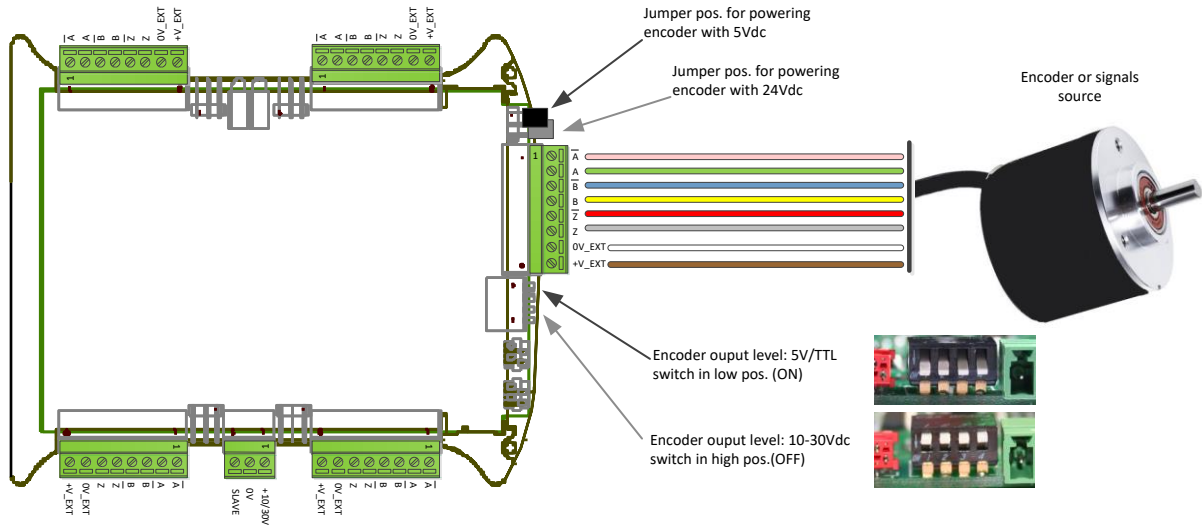


Use shielded multipair cables.

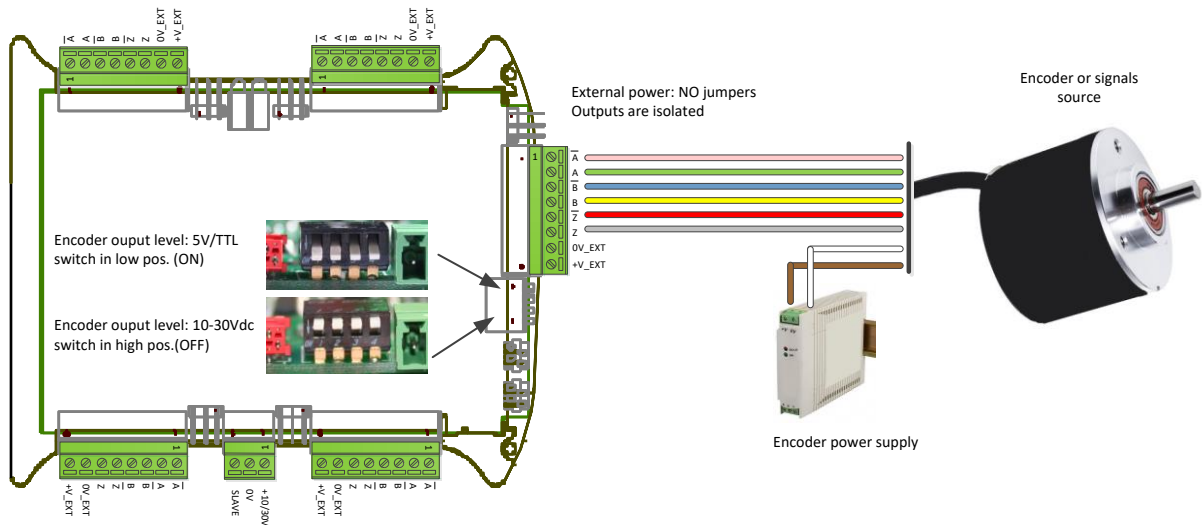
Each pair must be affected to a signal and its complement (example: A+, A-). Cable shielding should be tied to earth on the electric box. As a good practice, you should separate power cable from instrumentation signals. Power cable cross-section should be of sufficient size if module is powered by 5Vdc (avoid this if distance is superior greater than 5 meters)

### 3 - Configuration and encoder cabling (P1)

#### 3.1 – Differential encoder (RS422 or HTL differential outputs), not isolated

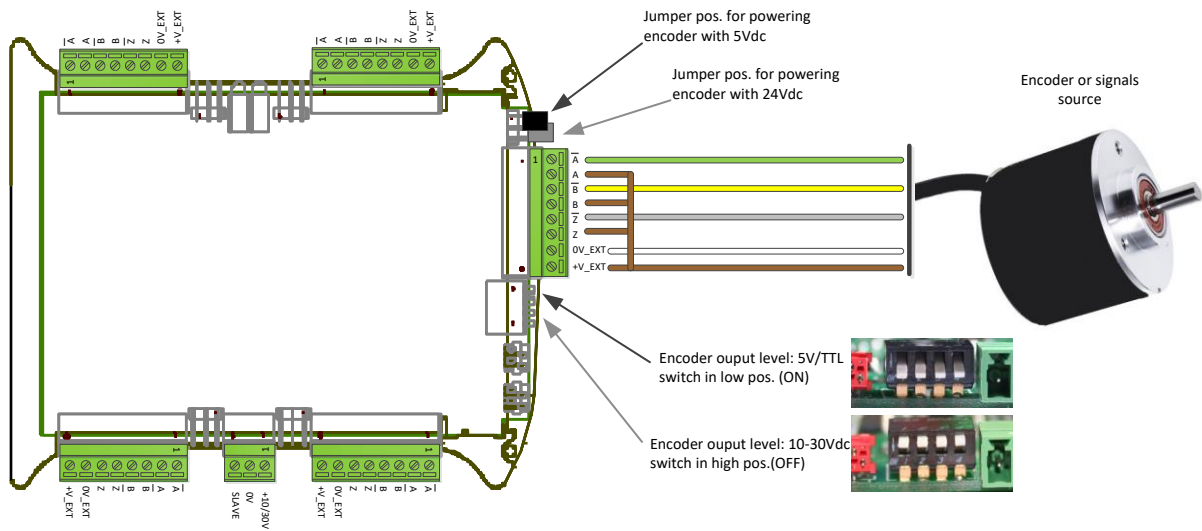


#### 3.2 - Differential encoder (RS422 or HTL differential outputs), isolated

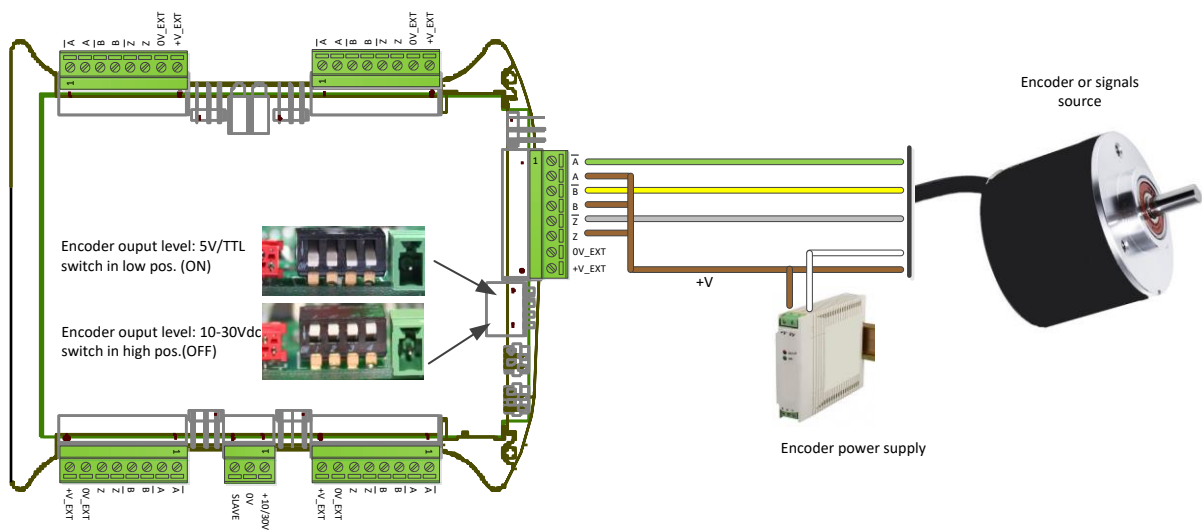


See notes and usage precaution on next page.

3.3 – Unipolar encoder (open collector or unipolar TTL/HTL outputs), not isolated



3.4 – Unipolar encoder (open collector or unipolar TTL/HTL outputs), isolated



Unipolar wiring must not be used with long cabling distance or within high electromagnetic environments.



Input voltage must not be greater than 8V if switches are in low position  
 Never set jumpers vertically  
 Never set external power on [P1.7; P1.8] if jumpers are populated



Wiring colours used above are not standardized, double check datasheet of the encoder for correct wiring

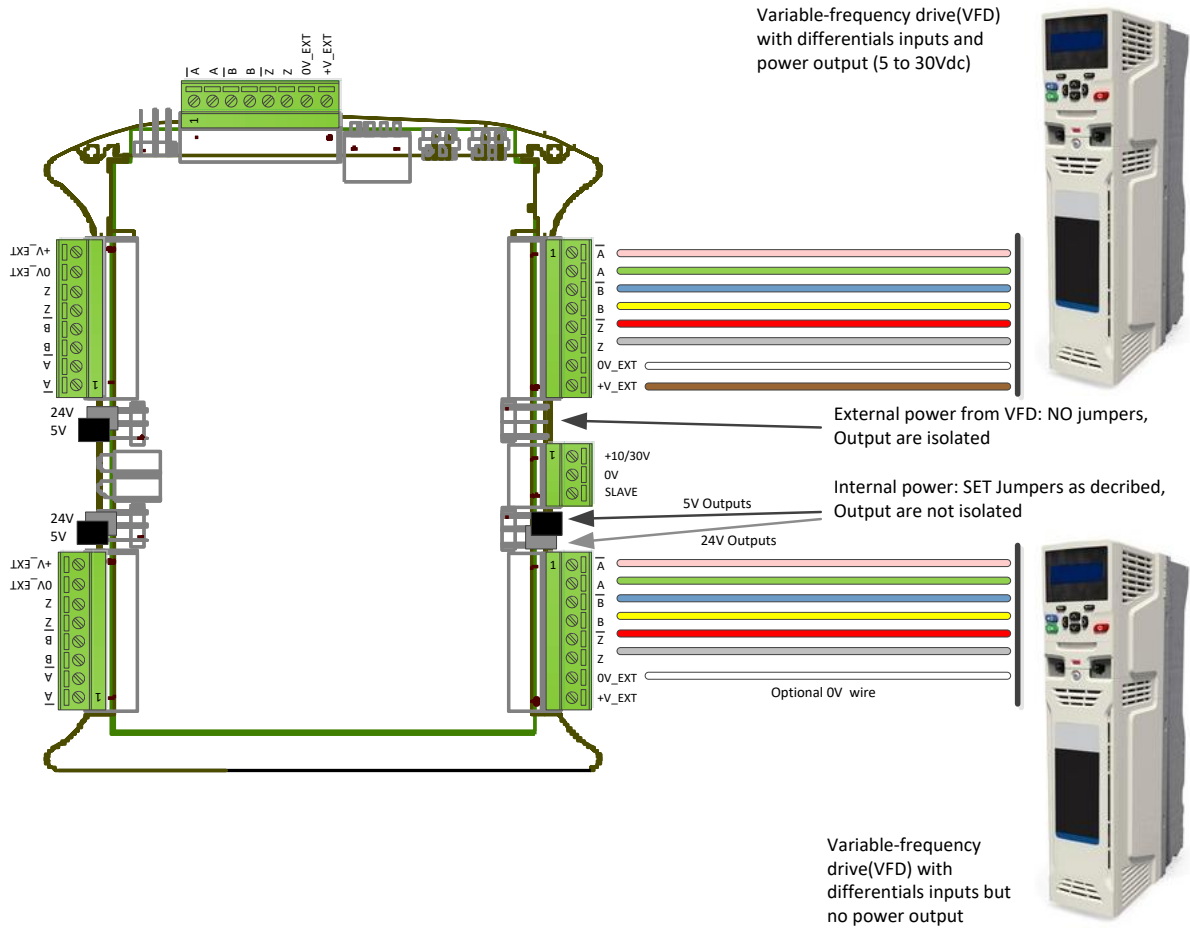


After module power up, it is possible to check the operation by slowly moving the encoder axis, the 3 leds on the side of the TC-SPLIT should blink.

## 4 - Configuration and module outputs cabling (P5 P6 P7 P8)

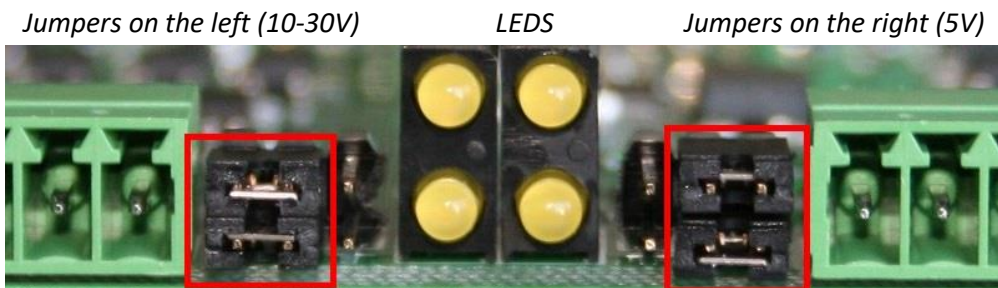
### 4.1 – Differentials outputs (RS422 or HTL differential)

Examples with and without power supply from external device

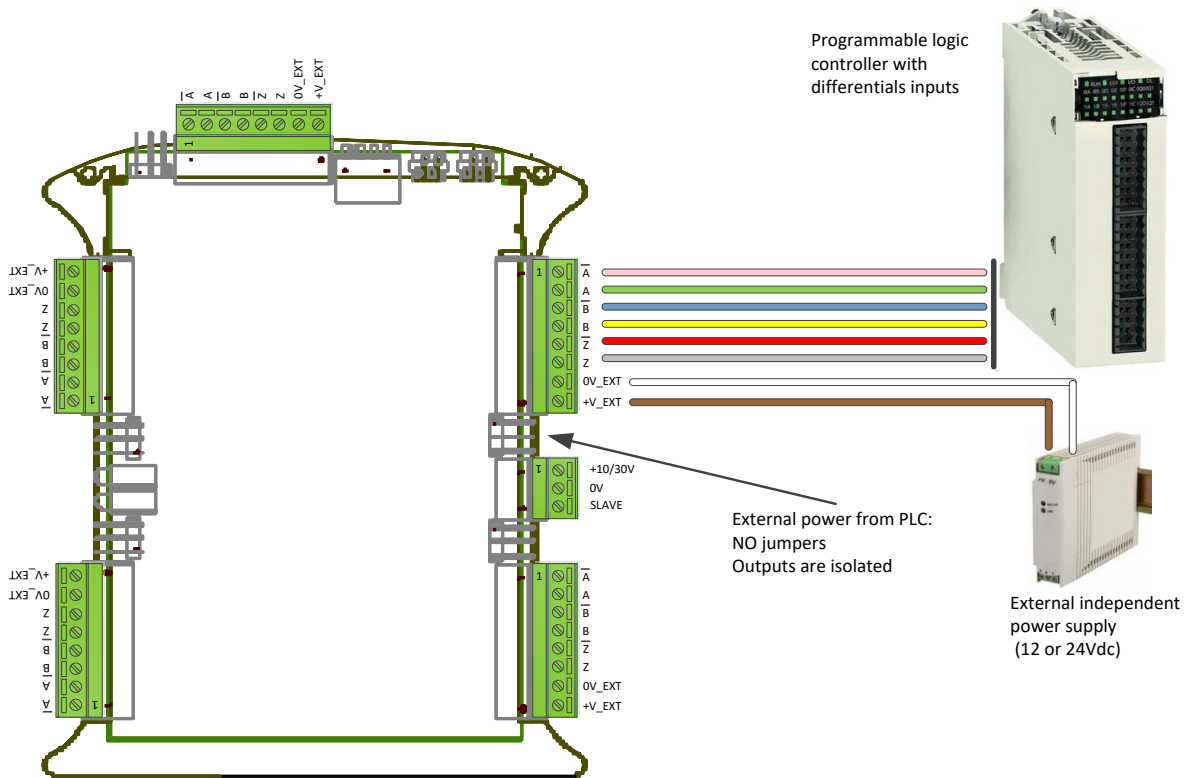


Outputs isolation	Kind of power supply	1-2	2-3
		(right)	(left)
Not isolated	5Vdc Internal power supply	YES	-
	10-30Vdc Internal power supply	-	YES
Isolated	5-30Vdc External power supply	-	-

« YES »: mean that 2 Jumpers must be set superimposed horizontally  
 Pin 1 of the jumpers is at the right of the connector (assuming terminal screw on the top)



Example with power supply separated from the main device (isolated output)



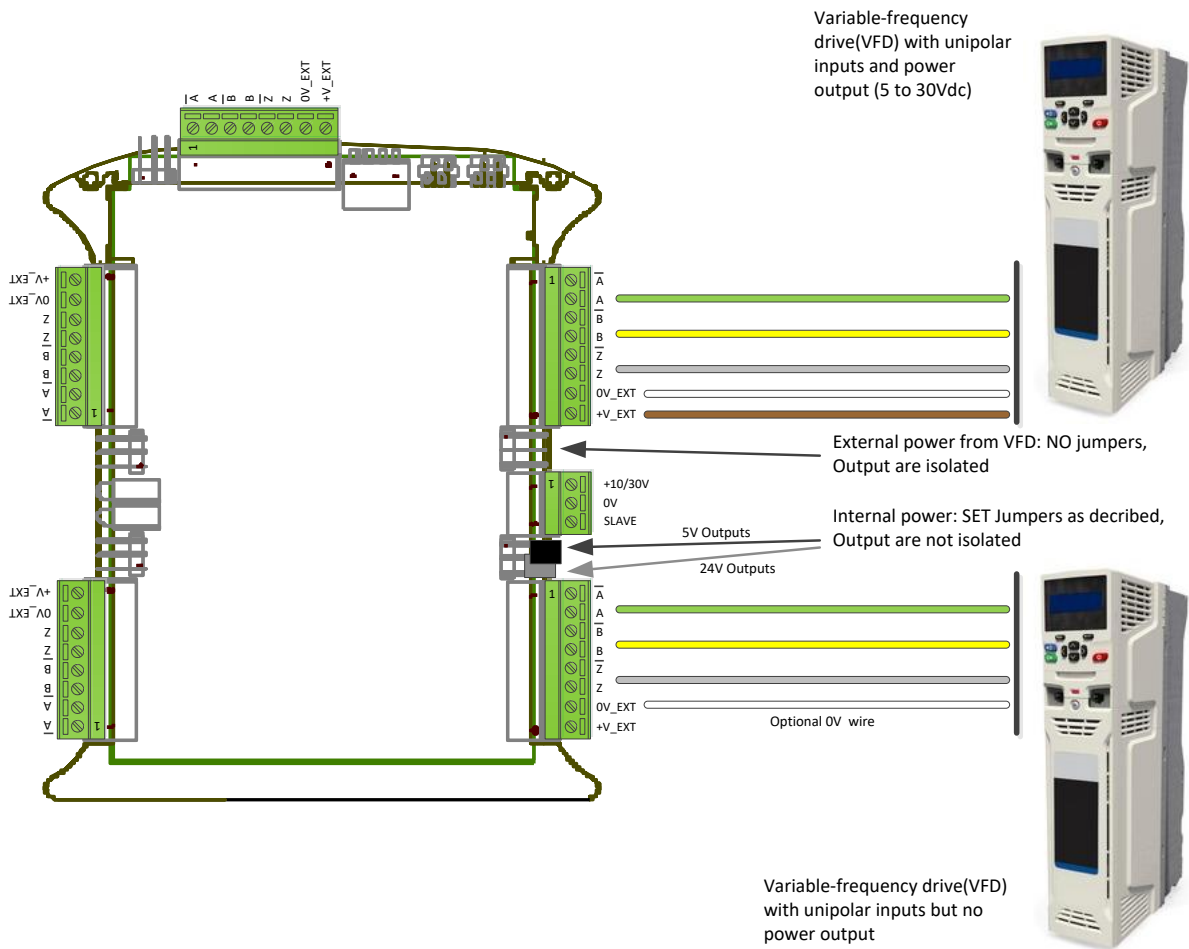
Never set Jumpers vertically (risk of destruction)



On RS422 devices (5v max), you have to match impedance line by adding 120 Ohms resistors at each line termination:



4.2 – Unipolar outputs (TTL 5V or HTL 10-30V outputs)

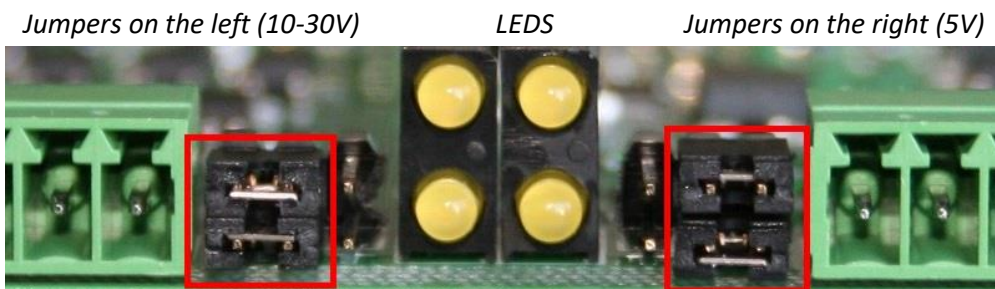


Outputs isolation	Kind of power supply	1-2 (right)	2-3 (left)
Not isolated	5Vdc Internal power supply	YES	-
	10-30Vdc Internal power supply	-	YES
Isolated	5-30 Vdc External power supply	-	-

« « YES »»: mean that 2 Jumpers must be set superimposed horizontally

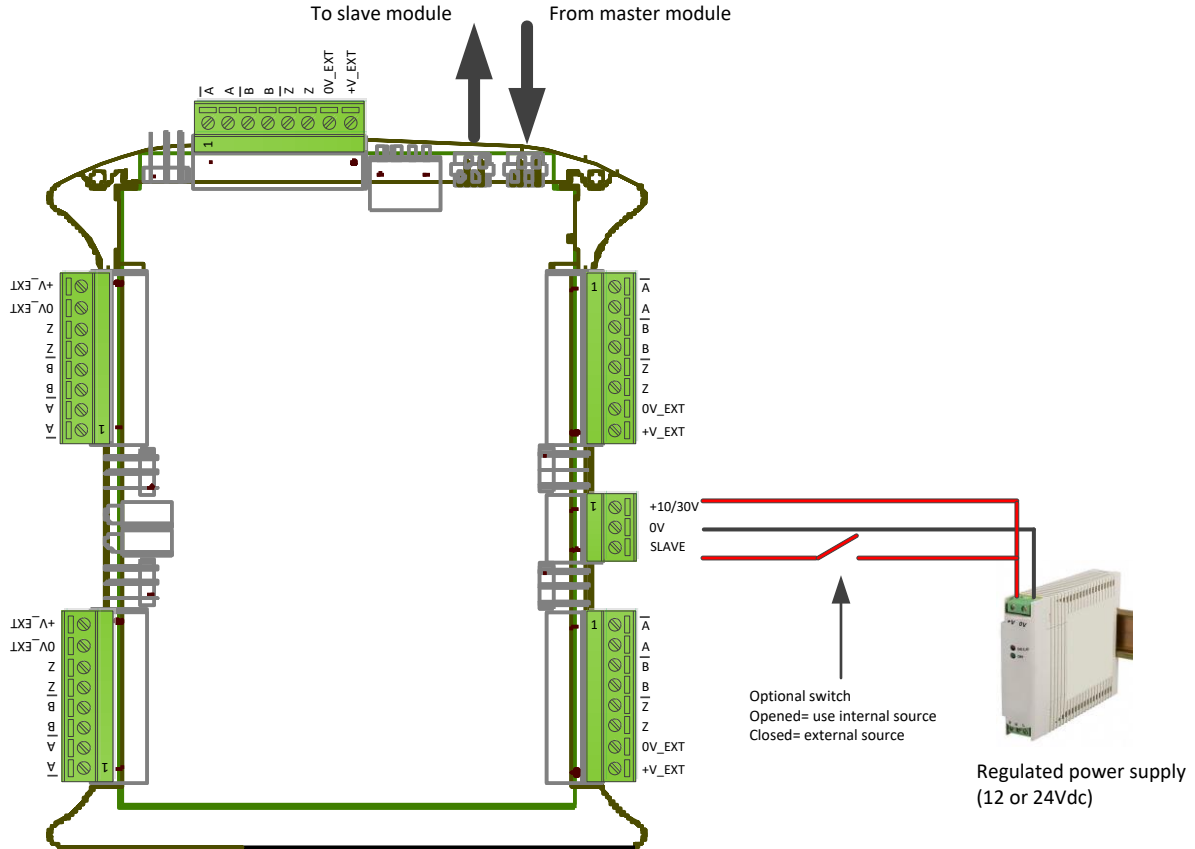
Pin 1 of the jumpers is at the right of the connector (assuming terminal screw on the top)

In isolated mode, output voltage level on A/B/Z is almost identical of the power supply voltage level (see characteristics, page 3)



## 5 – Module power supply and multiplexer input (P3)

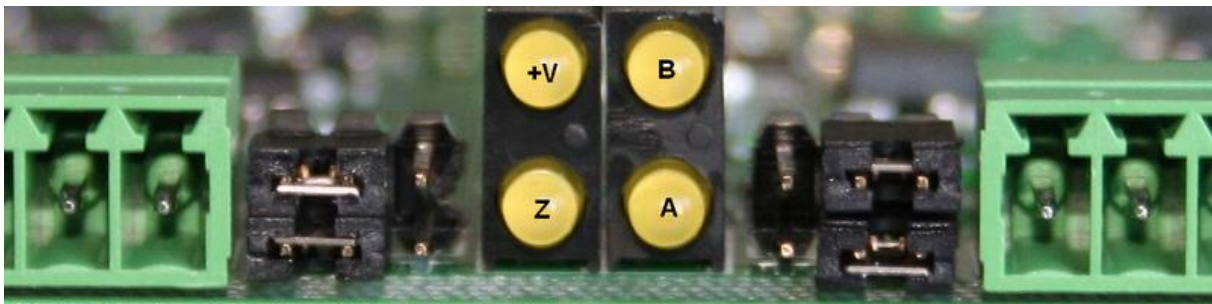
### 5.1 - Wiring



Mode	Outputs	Slave Input
Standalone (Master)	TC-SPLIT outputs are sourced from TC-SPLIT main input (P1)	-
Chained (Slave)	TC-SPLIT outputs are sourced from Chain IN input (which comes from a master module, Chain OUT)	> 10V

SLAVE input must be left floating if TC-SPLIT is used in the standalone mode

### 5.2 –LEDS identification



## 6 – TC-SPLIT Chaining:

### 6.1 Extending encoder outputs:

Example for a chaining with 3 TC-SPLITS in order to get 12 duplicated outputs.

#### Master and 1st module :

Encoder #1 provides signals to TC-SPLIT#1, set as a master (SLAVE input left floating) and to the next module.

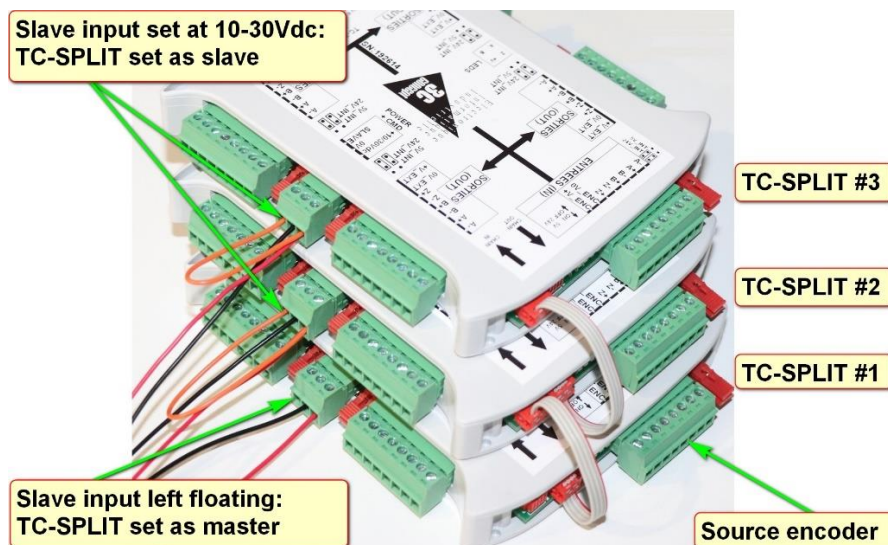
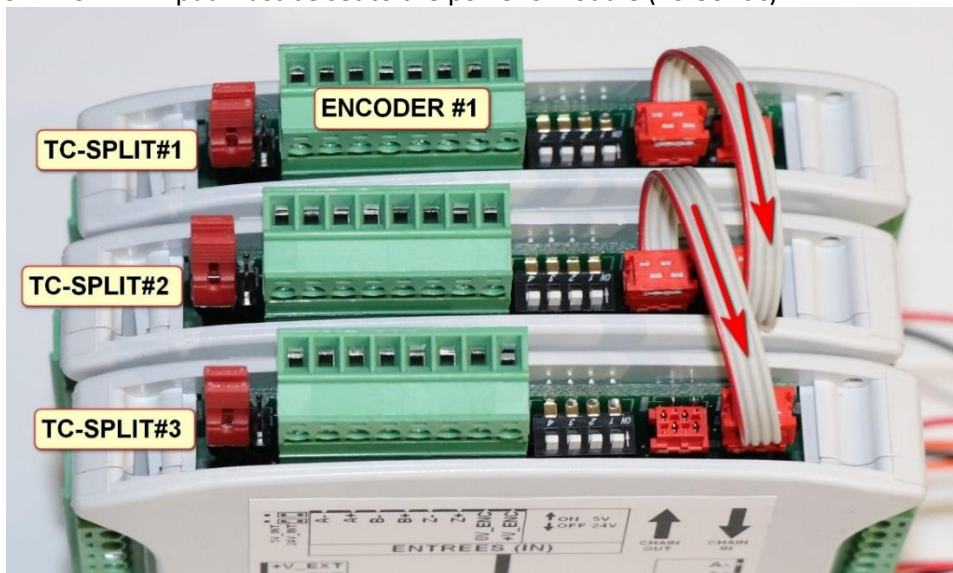
Set up the ribbon cable of the TC-SPLIT#1, ChainOUT output to TC-SPLIT #2, ChainIN input.

TC-SPLIT#2 SLAVE input must be set to the power's module (10-30Vdc)

#### Next module(s) :

Set up the ribbon cable of the additional TC-SPLIT (preceding ChainOUT output) to the ChainIN Input of the added module.

Added TC-SPLIT SLAVE input must be set to the power's module (10-30Vdc)



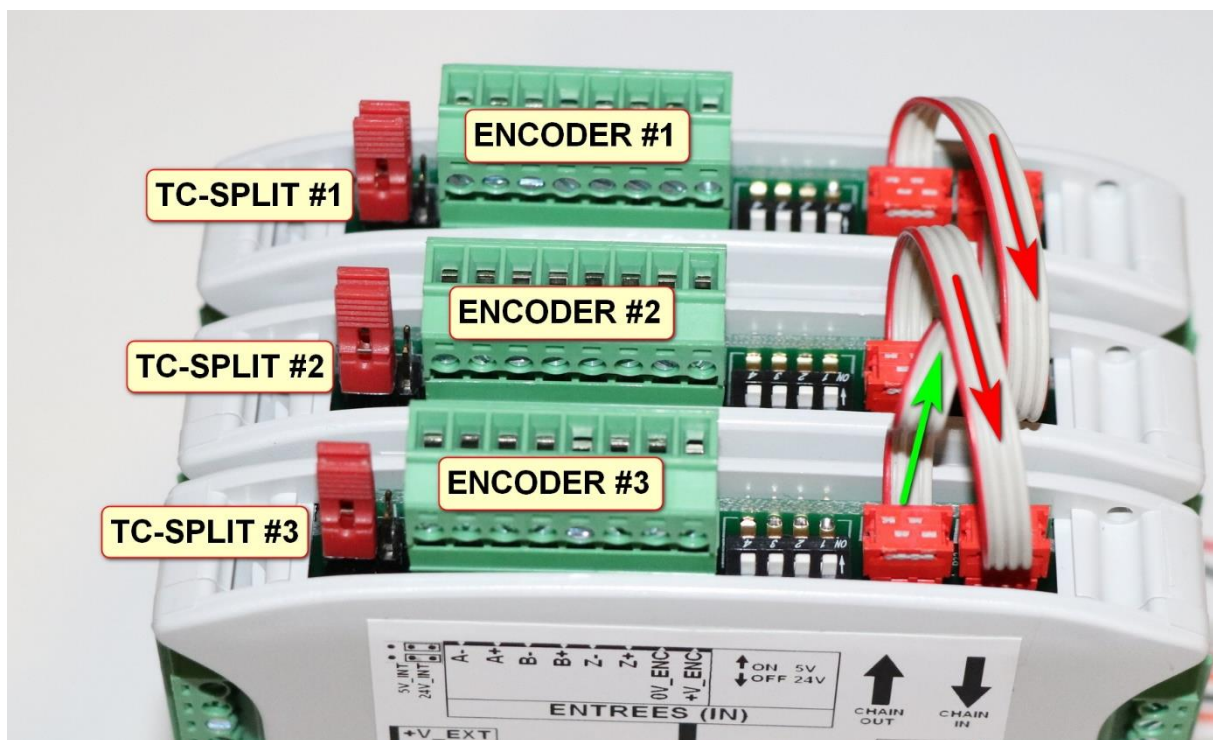
### 6.2 Source encoder multiplexing :

Set up modules like explained before, and add a ribbon cable of the last module ChainOUT output to the first module ChainIN input.

From a PLC (or another supervising device), set all the SLAVE inputs to power supply except one:

The module which has no SLAVE input set becomes Master source for all of the others modules. Signals from this master are all duplicated to the others modules.

As an example, you can easily switch from one source to another in case of encoder malfunction.



*Notes:*