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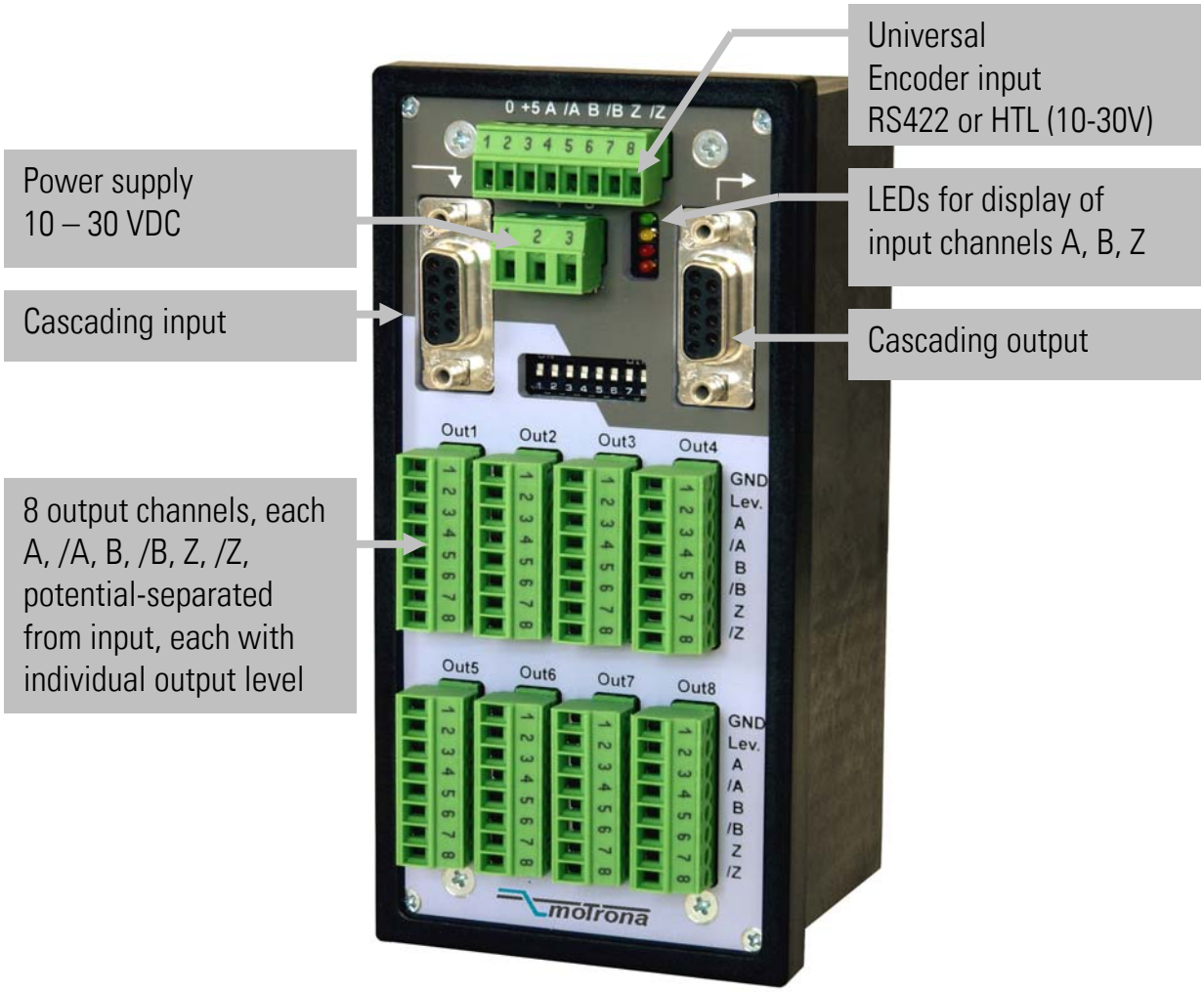
control – motion – interface

GV 470

Universal 8-Channel Splitter for Incremental Encoder Signals



Operating Instructions

Safety Instructions

- This manual is an essential part of the unit and contains important hints about function, correct handling and commissioning. Non-observance can result in damage to the unit or the machine, or even in injury to persons using the equipment !
- The unit must only be installed, connected and activated by a qualified electrician
- It is a must to observe all general and also all country-specific and application-specific safety standards
- When this unit is used with applications where failure or maloperation could cause damage to a machine or hazard to the operating staff, it is indispensable to meet effective precautions in order to avoid such consequences
- Regarding installation, wiring, environmental conditions, screening of cables and earthing, you must follow the general standards of industrial automation industry
- - Errors and omissions excepted –

Version:	Description:
GV47001a/Jan05/HK	First edition
GV47001a/Jul07/HK	Improved block diagrams, dimensions in inch and °F

Table of Contents

1. Introduction and Block Diagram

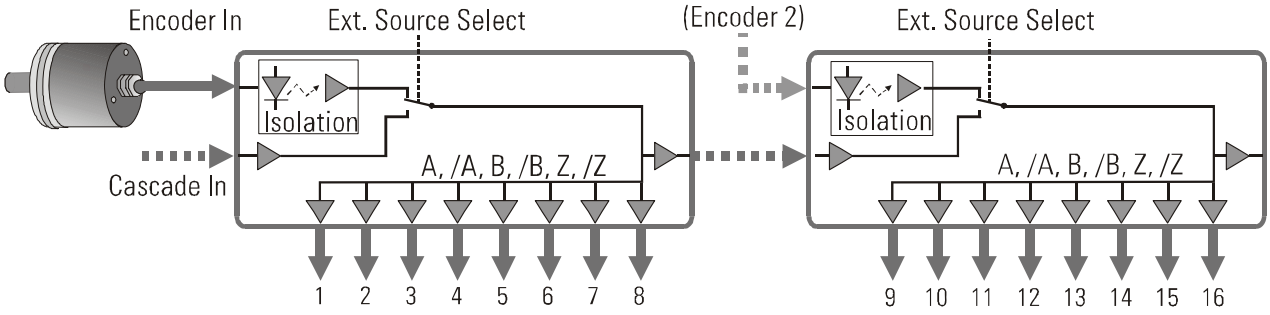
GV 470 has been designed to distribute the impulse signals of an incremental encoder or measuring system to up to eight target units.

The encoder input is switch-selectable for operation with either standard RS422 signals or with HTL (24 V) signals, with differential (symmetric) or single-ended (asymmetric) characteristics.

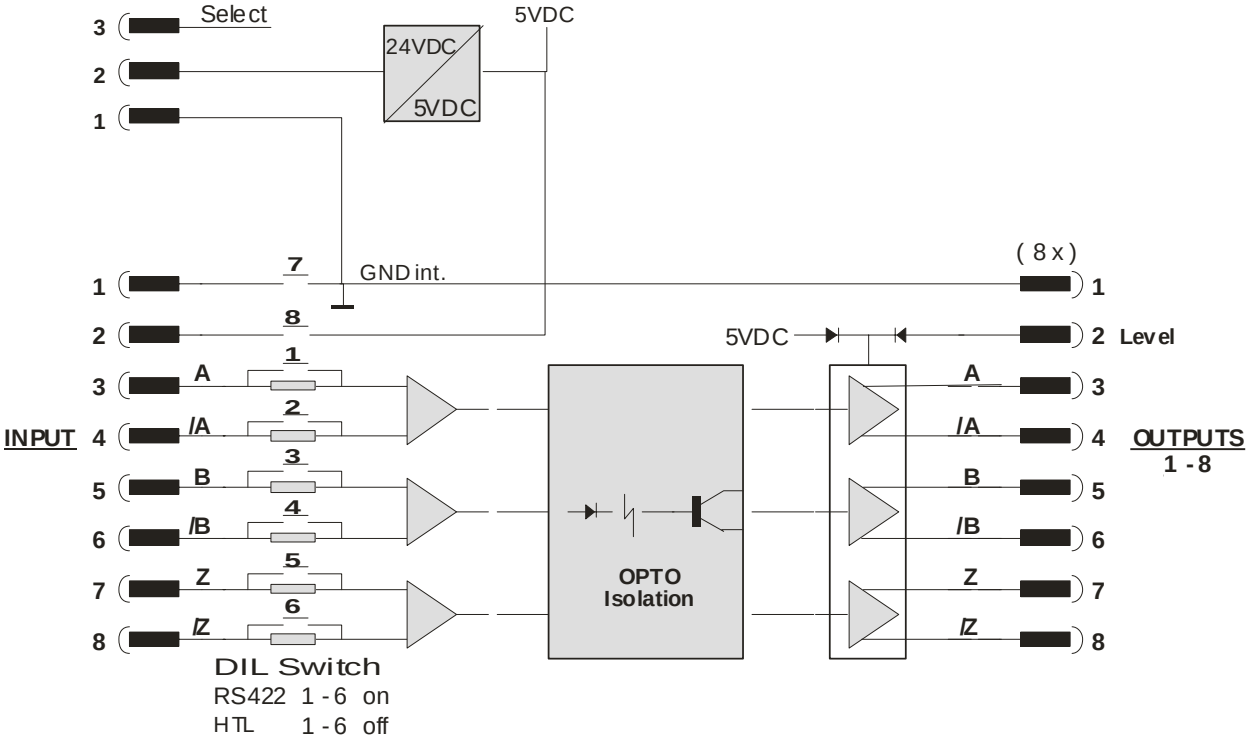
All eight output channels provide push-pull characteristics with individually adjustable output levels, and with potential separation to the input signals.

Separate cascading inputs and outputs provide cascading of several units to totally n x 8 output channels without loss of regular output terminals. Furthermore, cascaded configurations allow remote selection and switch-over between several input encoders.

GV 470 is built into a most compact and space-saving housing for mounting on DIN rails.



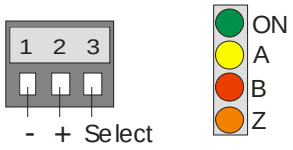
The following drawing explains the principle of function with one of the eight output channels:



2. Electrical Connections and LEDs

2.1. Power Supply and LED Assignment

The unit provides a 3-position screw terminal strip for supply from a 10 – 30 volts DC power unit. The current consumption is approx. 100 mA (no-load operation).
The "Select" input terminal provides selection of the desired source encoder. Details will be described later.



The upper LED (green) signals that power is applied to the unit.

The lower LEDs (yellow, red, orange) signal the actual logical states of the input channels A, B and Z. With very low input frequencies it is possible to visually check the input pulses, the phase displacement A/B and the index pulse function of an encoder.

2.2. Encoder Input

The signal to be distributed to the outputs must be applied to the 8-position input terminal. The appropriate input level (RS422 or HTL 10-30 V) must be set to the DIL switches correspondingly.

With RS422 setting, and also with HTL setting and impulse levels lower than 15 volts, the unit needs at any time the non-inverted and the inverted input signals (differential input).

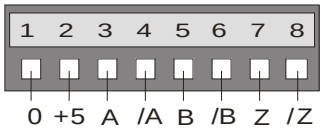
With HTL levels higher than 15 volts you are free to either use the inverted inputs or to just leave them unconnected (the unit will accept differential and single-ended operation as well with input levels >15 volts).

Other input characteristics like TTL-single-ended inputs or Namur signals are possible as well, but may need additional remote circuit at the input terminals.

Where the potential-separation between input and outputs is required, the input encoder must be supplied from a remote power source.

The DIL switch allows to connect the unit's internal power supply (approx. 5.3 volts) to the terminals „0" und „+5" for use as an auxiliary encoder supply. However, this will switch off the potential separation and tie the encoder potential to the general GND.

Input terminal strip:



A codification of the input connector avoids accidentally mix-up with other connectors.

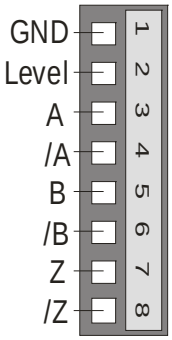
2.3. Outputs

All outputs always provide the non-inverted and the inverted signals, even when on the input side the inverted signals are not available. All common GND lines of the outputs are connected among each other, and also to the minus pole of the unit's power supply.

When the terminal marked „Level" is unconnected, the output level on the corresponding terminal strip is always approx. 5 volts. When you apply any remote DC voltage higher than 5.5 volts to the "Level" terminal, this voltage will determine the output swing of the impulses.

Each of the 8 outputs can be connected to any individual voltage from 5.5 to 30 volts, allowing individual level assignment to any of the 8 outputs.

Output terminal strip:

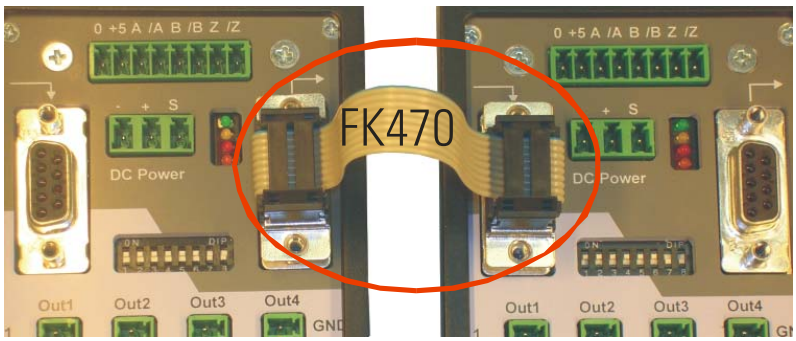


All output connectors use the same connector codification and may be interchanged among each other, since the electrical circuit of all 8 channels is the same and only the voltage applied to the "Level" terminal of the mating connector determines the output level.

2.4. Cascading of Several Units and Encoder Select Function

The unit can be cascaded very easily to n x 8 output channels, without loss of outputs. To do this, pins 1, 3, 5 and 7 of the cascading output must be connected to the corresponding pins of the cascading input of the follower unit.

An appropriate ribbon cable connection is available under motrona part # FK470



Cascaded units allow selection of the active source encoder via the encoder select input on the 3-position power connector (see also block diagram):

LOW (or open): outputs refer to the encoder input of the same unit
HIGH (10 – 30 volts): outputs refer to the encoder input of the preceding unit

It is possible at any time to switch over from one to the other source encoder during operation, therefore cascaded units can also operate as a cross-switch.

Where only one common encoder is used, the select input of the first unit remains unconnected, and the select inputs of all follower units are advantageously connected to the +pole of the power supply next to the select input

3. Input Settings by DIL Switch

Positions 1 – 6 of the DIL switch serve to set the desired input levels. This setting can be done for each of the input terminals individually.

Switch #	1	2	3	4	5	6	7	8
Input line	A	/A	B	/B	Z	/Z	GND	VCC

OFF: Associated input line requires HTL level (10 – 30 volts)
ON: Associated input line requires RS422 characteristics (2 – 7 volts)

Positions 7 and 8 allow to switch the potential separation off, when the internal auxiliary voltage of 5,3 volts should be used to supply the input encoder from terminals 1 and 2 of the input connector.

OFF: potential separation is active, no aux. output voltage is available on the terminals
ON: potential separation is switched off, aux output voltage for encoder supply is available

- When switch positions 1 – 6 are ON (RS422 setting), the corresponding input must not receive levels >7 volts. At the same time it is necessary to apply also the inverted signal, since the input will only accept differential signals.
- When a switch is set to OFF, the dedicated input will accept differential signals at a level from 10 to 30 volts (inverted and non-inverted inputs), but also single-ended signals at a level from 15 to 30 volts (inputs A, B, Z only, inverted inputs remain unconnected)
- You should set the switch positions to ON or to OFF pair wise (i.e. 1 with 2, 3 with 4, 5 with 6)

4. Technical Specifications and Dimensions

Power supply:	10 – 30 Vdc
Power consumption: (without aux. encoder supply)	approx. 100 mA, plus currents taken from the output lines
Maximum frequency:	RS422: 500 kHz, HTL: 200 kHz
Input level with RS422 operation:	2,0 – 7 volts (min. difference 150 mV)
Input level with symmetric HTL operation:	10 – 30 volts (difference approx. 10 volts)
Input level with asymmetric HTL operation: (single-ended without inverted signal)	High > 15 volts Low < 10 volts
Outputs:	Push-Pull 3,5 – 30 volts / 30 mA each
Signal propagation delay:	approx. 600 nsec (+ 100 nsec with cascade)
Mounting:	Standard DIN rail
Weight:	approx. 400 g
Temperature range:	Operation 0 – 50 °C (32 - 113 °F) Storage -25 - +75° (-13 - 158 °F)
Conformity and standards:	
EMC 89/336/EEC:	EN 61000-6-2 EN 61000-6-3
LV73/23/EEC:	EN 61010-1