



GV150 / GV151

Impulse amplifier and splitter for incremental encoder signals

Product features:

- Impulse input (A, /A, B, /B, Z, /Z, TTL level or HTL level)
- Potential separation by high speed optocouplers
- 6 output channels, each (A, /A, B, /B, Z, /Z)
- Frequency range from 0 up to 400 kHz
- Front LED's for indication of input pulses A, B and Z
- Elimination of noise and cross talking on transmission lines
- Closed aluminum cassette for mounting in 19" racks or snap fitting with top hat rails (option SM)
- 18 to 30 VDC power supply

Available devices:

- **GV150:** All 6 output channels with TTL / RS422 level
- **GV151:** All 6 output channels individually programmable to either TTL or HTL level

Version:	Description:
GV15002B/hk_03/2008	First motrona edition with A5 brochure format
Gv150_02c_oi/Nov-15/ag	Manual-template, "Safety Instructions" & "Technical Specifications" updated and "Legal notices" added.

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Table of Contents

1. Safety Instructions and Responsibility	3
1.1 General Safety Instructions.....	3
1.2 Use according to the intended purpose	3
1.3 Installation.....	4
1.4 Cleaning, Maintenance and Service Notes.....	4
2. Application and Construction	5
3. Connections and Switch Settings	6
4. Block Diagram	7
5. Input Pin Assignment.....	8
6. Output pin assignment.....	8
7. Technical Specifications	9

1. Safety Instructions and Responsibility

1.1 General Safety Instructions

This operation manual is a significant component of the unit and includes important rules and hints about the installation, function and usage. Non-observance can result in damage and/or impairment of the functions to the unit or the machine or even in injury to persons using the equipment!

Please read the following instructions carefully before operating the device and observe all safety and warning instructions! Keep the manual for later use.

A pertinent qualification of the respective staff is a fundamental requirement in order to use these manual. The unit must be installed, connected and put into operation by a qualified electrician.

Liability exclusion: The manufacturer is not liable for personal injury and/or damage to property and for consequential damage, due to incorrect handling, installation and operation. Further claims, due to errors in the operation manual as well as misinterpretations are excluded from liability.

In addition the manufacturer reserve the right to modify the hardware, software or operation manual at any time and without prior notice. Therefore, there might be minor differences between the unit and the descriptions in operation manual.

The raiser respectively positioner is exclusively responsible for the safety of the system and equipment where the unit will be integrated.

During installation or maintenance all general and also all country- and application-specific safety rules and standards must be observed.

If the device is used in processes, where a failure or faulty operation could damage the system or injure persons, appropriate precautions to avoid such consequences must be taken.

1.2 Use according to the intended purpose

The unit is intended exclusively for use in industrial machines, constructions and systems. Non-conforming usage does not correspond to the provisions and lies within the sole responsibility of the user. The manufacturer is not liable for damages which has arisen through unsuitable and improper use.

Please note that device may only be installed in proper form and used in a technically perfect condition (in accordance to the Technical Specifications, see chapter [7](#)). The device is not suitable for operation in explosion-proof areas or areas which are excluded by the EN 61010-1 standard.

1.3 Installation

The device is only allowed to be installed and operated within the permissible temperature range. 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. Further 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 exclusively by switches, respectively circuit-breakers with the low voltage network. The switch or circuit-breaker must be placed 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 a double resp. increased isolation.

All selected wires and isolations must be conform to the provided voltage- and temperature-ranges. Further all country- and application-specific standards, which are relevant for structure, form and quality of the wires, must be ensured. Indications about the permissible wire cross-sections for wiring are described in the Technical Specifications (see chapter [7](#)).

Before first start-up it must be ensured that all connections and wires are firmly seated and secured in the screw terminals. All (inclusively 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 to the overvoltage category II.

For placement, wiring, environmental conditions as well as shielding and earthing/grounding of the supply lines the general standards of industrial automation industry and the specific shielding instructions of the manufacturer are valid. Please find all respective hints and rules on www.motrona.com/download.html --> "[General EMC Rules for Wiring, Screening and Earthing]".

1.4 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 for back to the manufacturer for checking, adjustment and reparation (if necessary). Unauthorized opening and repairing can have negative effects or failures to the protection-measures of the unit.

2. Application and Construction

The unit is used to increase the drive capability of existing encoder signals and to distribute the signals to several channels. At the same time it provides potential separation between source and target lines as well as level conversion.

In general, an incremental encoder output is limited to drive currents of 20 mA only on its impulse lines. The GV150 amplifiers increase the Fan-Out to 6 channels, each loadable with 20 respectively. 30 mA per line. The units can be used for encoder pulse transmission and for data transmission applications as well.

- Standardly GV150 and GV151 provide TTL (RS422) inputs (A, /A, B, /B, Z, /Z)
- With option **HTLIN1**, the input is set to HTL level (12 ... 30 V), and only the signals A, B and Z are necessary (no inverted signals).
- With option **HTLIN2**, the input is also set to HTL level (12 ... 30 V), but all signals must be applied (A, /A, B, /B, Z, /Z).

Each of the 6 output channels generates the signals (A, /A, B, /B, Z, /Z).

- **GV150** provides **always** **TTL/ RS422** standard and
- **GV151** has individually programmable output levels **TTL or HTL**

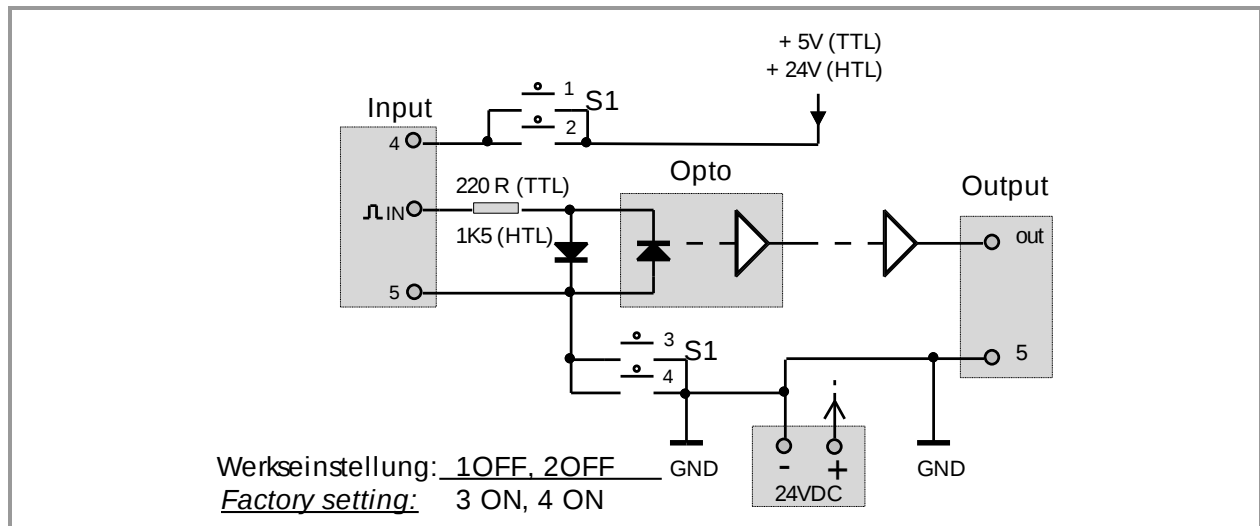
3. Connections and Switch Settings

- The unit is supplied by a power connector on the front side.
The power supply range is 18 ... 30 VDC.
- For operation without potential separation, positions 3 and 4 of the internal DIL switch S1 can be set to "ON". This will connect the input GND to the output GND and to the Minus potential of the power supply
- Pin 4 of the input connector provides an auxiliary voltage output, when the DIL-switch positions 1 and 2 are set to "ON".

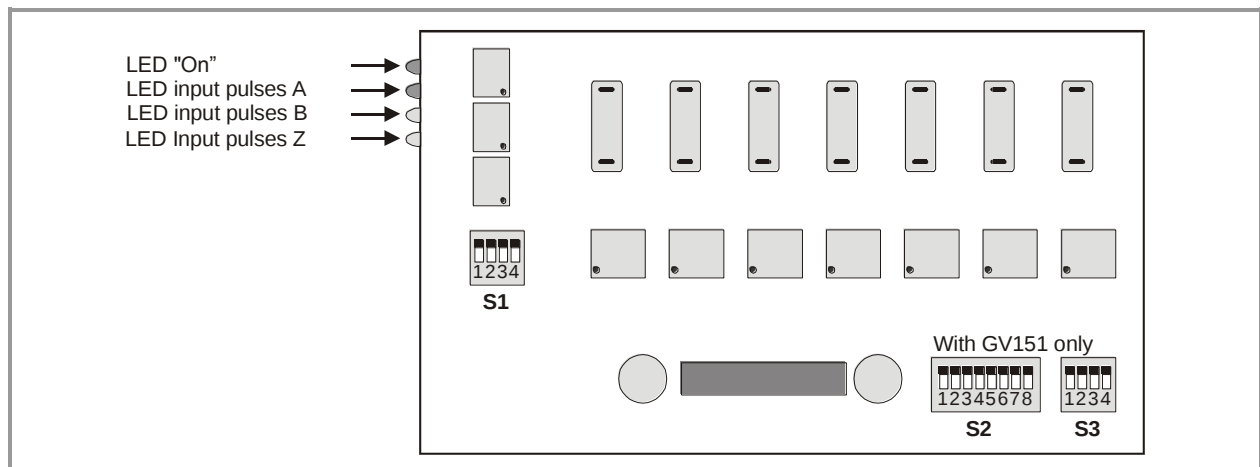


When DIL-switch positions 1 and 2 are set to "ON", never any external voltage must be applied to pin 4!

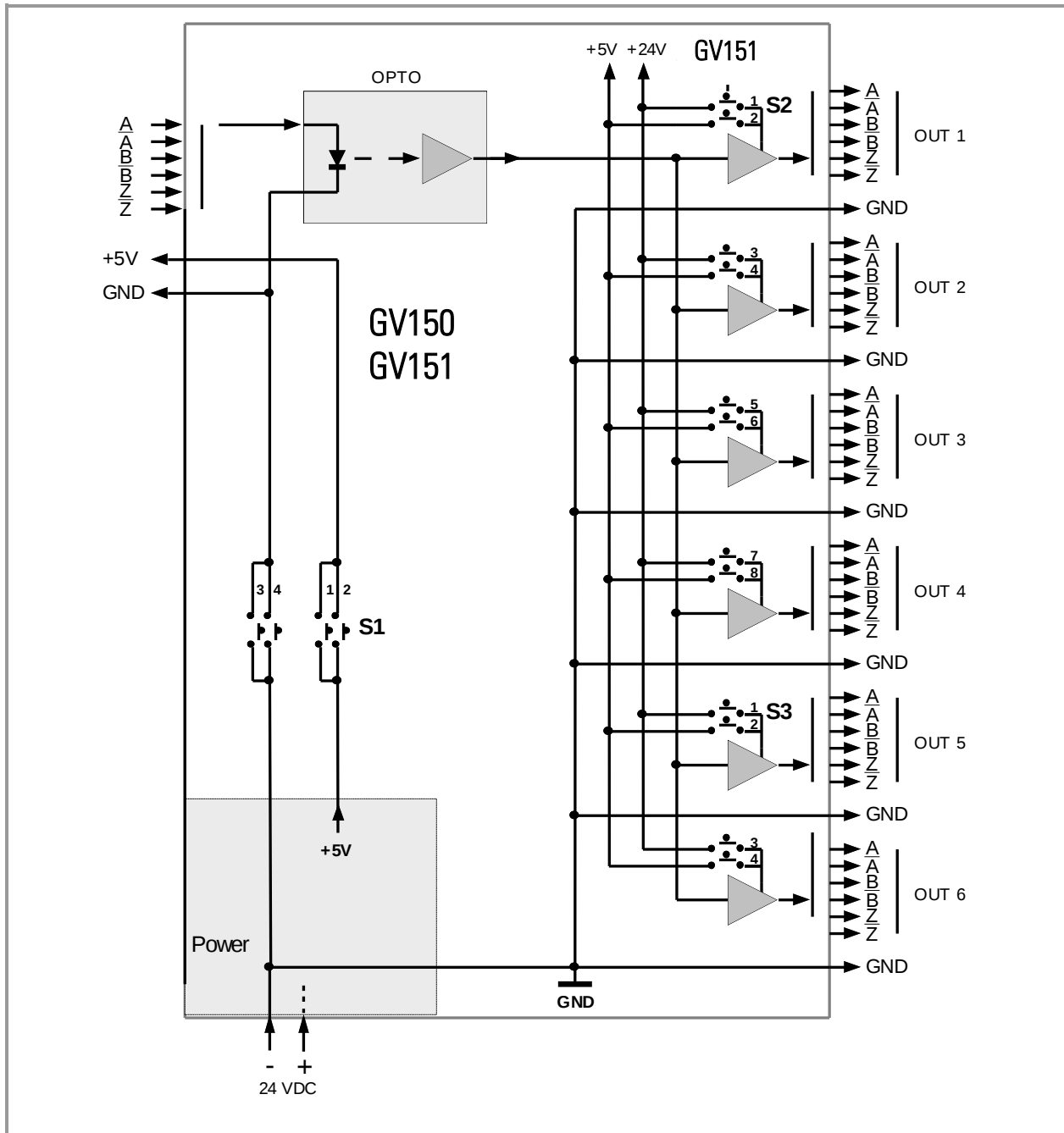
The aux. output voltage is 5.5 V / 300 mA with TTL inputs and 24 V / 300 mA with options HTLIN1 and HTLIN2.



All DIL switches become accessible when you remove the right hand side plate.

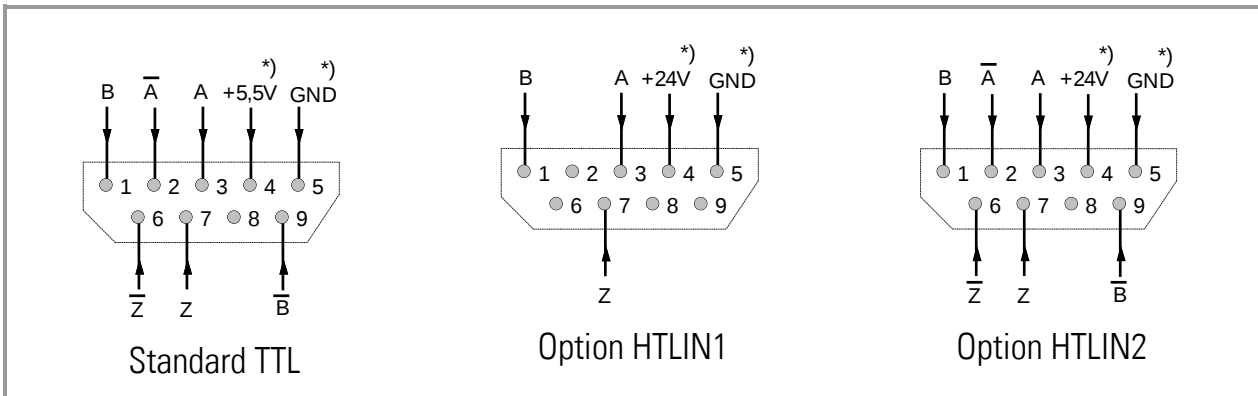


4. Block Diagram



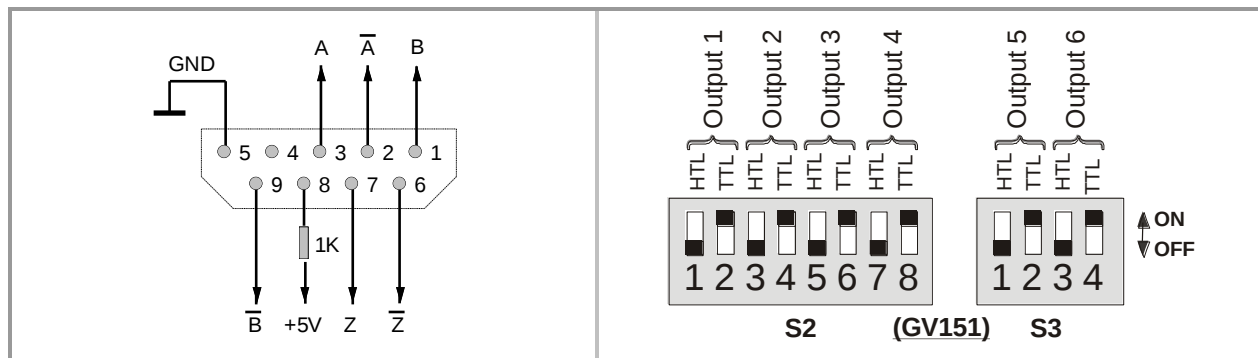
5. Input Pin Assignment

(SUB-D-9 male on the unit) * See DIL switch S1



6. Output pin assignment

(SUB-D-9 female on the unit)



With GV151, the desired output level (TTL/HTL) can be selected by setting the associated position of the DIL switch to „ON“ (with the other position OFF).

Setting both TTL and HTL to ON at a time would result in HTL output.

For safety reasons, the default factory setting is always TTL like shown above.

7. Technical Specifications

Power supply:	Input voltage: 18 ... 30 VDC Protection circuit: reverse polarity protection and potential separation (switchable) Ripple: $\leq 10\%$ at 24 VDC Consumption: approx. 200 mA (unloaded) Connections: 1.5 m supply-cable-set (2 lines) with coded plug connector
Encoder supply:	Output voltages: TTL: 5.5 VDC (standard) or HTL: 18 ... 30 VDC (optional) Output current: max. 300 mA Availability: switchable by DIL-switch Connections: SUB-D connector (male), 9-pin
Incremental input:	Input levels: TTL / RS422 (standard): LOW = 0 ... 1.5 V, HIGH = 3 ... 5.5 V HTL1IN / HTL2IN (option): LOW = 0 ... 4 V, HIGH = 11 ... 30 V Channels: TTL / RS422 (standard): A, /A, B, /B, Z, /Z HTL1IN (option): A, B, Z HTL2IN (option): A, /A, B, /B, Z, /Z Frequency: TTL output: 400 kHz HTL output: 250 kHz Internal resistance: TTL / RS422 (standard): $R_i \approx 220\ \Omega$ HTL1IN / HTL2IN (option): $R_i \approx 1.5\ \text{k}\Omega$ Connections: SUB-D connector (male), 9-pin
Incremental outputs:	Number of outputs: 6 Signal levels: GV150: TTL / RS422 GV151: HTL (18 ... 30 V) Channels: A, /A, B, /B, Z, /Z Output current: GV150: max. 20 mA (per output) GV151: max. 30 mA (per output) HTL output driver: push-pull Signal delay time: GV150: approx. 200 ns GV151: approx. 700 ns Protection circuit: durable short circuit proof Connections: SUB-D connector (female), 9-pin
Display components:	Number/type: 4 LED, 2 x green and 2 x red Functions: each 1 x operation and input pulses A, B, Z
Housing:	Material: galvanized sheet steel housing with aluminum front-plate Mounting: Standard: 19" rack Option SM: snap fitting on 35 mm top hat rail (EN 60715) Dimensions (w x h x d): 4TE x 3HE resp. 70 x 129 x 175 mm / 2.756 x 5.079 x 6.890 inch Protection class: IP20 Weight: approx. 650 g
Temperature range:	Operation: 0 °C ... +45 °C / +32 ... +113 °F (not condensing) Storage: -25 °C ... +70 °C / -13 ... +158 °F (not condensing)
Conformity & standards:	EMC 2004/108/EC: EN 61000-6-2, EN 61000-6-3, EN 61000-6-4 Guideline 2011/65/EU: RoHs-conform