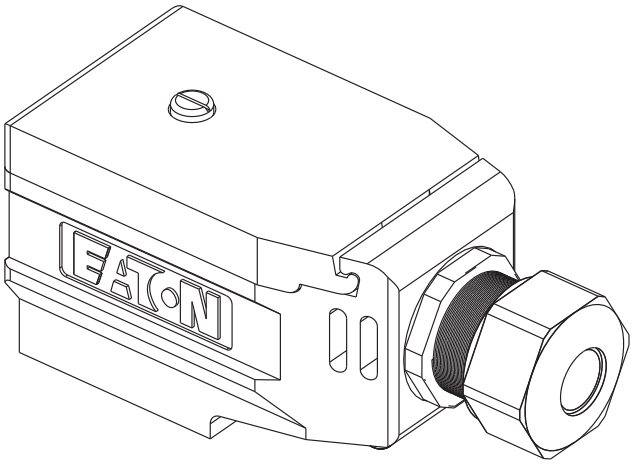
Digital Power Plugs for Proportional Valves



General description

Digital Proportional Power plugs, conforming to ISO 4400/ DIN 43650 interface, are designed for compact, electronic control of non-feedback hydraulic proportional and switching valves. This plug/valve combination offers an easy to use, cost-effective alternative to traditional rack mounted machine controls. Digital Proportional Power Plugs are available in the following configurations:

Type C plugs offer "soft switch" control. Using built in ramps for discrete "on/off" signals, soft switch power plugs with proportional valves help to reduce hydraulic system transients, improving machine usability and extending life

Type D, K, and G plugs are controlled with a standard analog command signals, (0-10V, 4-20mA, and 0-5V respectively.)

Type N plugs are controlled with standard, CANOpen commands or SmartWire-DT commands. These power plugs help to eliminate cost point to point wiring set-ups which are difficult to install, and expensive to maintain.

Type P plugs offer "Peak and Hold" functionality by providing high initial current to switching valve coils and subsequently lowering the current to hold them in place. Using Peak and Hold power plugs saves energy, reduces heat, and extends coil life.

Type S plugs are controlled with SmartWire-DT® commands. These power plugs allow proportional control to be added to a SmartWire-DT® system, eliminating point-to-point wiring and allowing faster commissioning.

For each of the listed configurations, Control parameter adjustments can be made manually or electronically via a PCBased software tool. Furthermore, this software tool allows reconfiguration of input power (12/24V) and analog command type (for types C,D,K plugs only)

EHH-AMP-702/12 – C/D/K/G/N/P Series

For use with valve types:

- KDG4V-3(S)-H*-6*
- KTG4V-3(S)-H*-6*
- KDG4V-5-H*-3*
- KTG4V-5-H*-3*
- KCG-3/6/8-H1-1*
- KX(C)G-6/8-H1-1*
- KDG5V-5/7/8-H1-1*
- CMX***-E-G
- EPV*
- ERV*
- EPRV*
- ESV*
- EFV*
- IRV*
- PFR21*
- PFR24*
- PDR21*
- PPD22*

Model code description

EHH-AMP-7aa-b-c-d-e-30

aa – Supply voltage
- 12 – 12V version (8 to 16V)
- 02 – 24V version (18 to 32V)

b – Analog command input
- C – Soft switch (12V – ON, 5V – OFF)
- D – 0 to 10V
- K – 4 to 20mA
- G – 0 to 5V or Joystick
- N – No command input (software/CAN/SWD-DT command)
- P – Peak and Hold

c – Digital communication
- C – CAN Open
- R – RS232
- S – SmartWire-DT

d – Manual adjustment option
- P – Potentiometer
- N – No potentiometer

e – Cable connection option
- 1 – PG9 cable clamp
- 2 – M16 cable clamp
- 3 – M12 5 pin connector
- 4 – SmartWire-DT connectors

Powering Business Worldwide

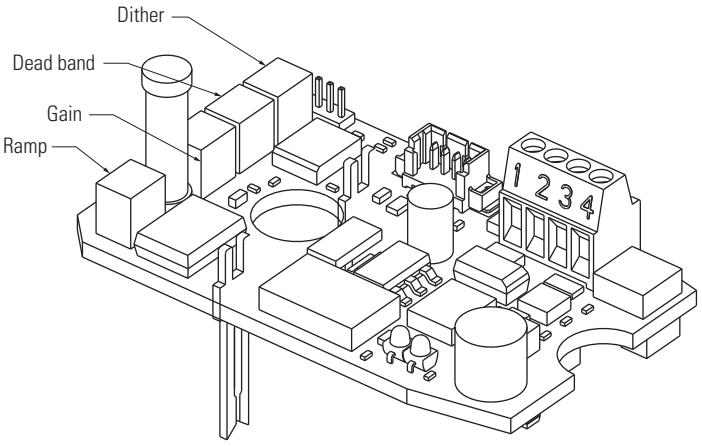
This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 89/336/EEC, amended by 91/263/EEC, 92/31/ EEC and 93/68/EEC, article 5, and 2014/30/EU. For instructions on installation requirements to achieve effective protection levels, see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by Electromagnetic Compatibility (EMC).

Features and benefits

- Integral amplifier provides essential functions for control of proportional valves.
- Adjustable ramp time, gain, dead band compensation through potentiometer or RS232/CAN/SmartWire-DT communication (via software).
- Ease of installation, with reduced cost.
- Fully short-circuit and reverse-polarity protected.
- Differential voltage command signal.
- Options with RS232, CAN and SmartWire-DT® communication.
- Peak and Hold Functionality.
- PG9, M16 cable clamp and M12 connector options.
- Adjustable dither.
- EMC to latest European standards.
- Protection to IP67
- Available with CANOpen or SmartWire-DT® communications

Application

- Designed for the control of direct-operated, non-feedback, proportional valves where the cost of more complex electronic controls can be avoided.



Set-up procedure

This procedure describes the adjustments on the Power Plug for setting the dead-band, gain and ramp rate on a non-feedback proportional valve. Proportional valves with over-lapped spools have a range of spool travel where there is no flow from the valve. This range of spool motion is called deadband. Adjusting the power plug allows the dead-band to be electronically eliminated (dead-band Compensation) by making the spool jump across the dead-band when a small input signal is applied to the power plug.

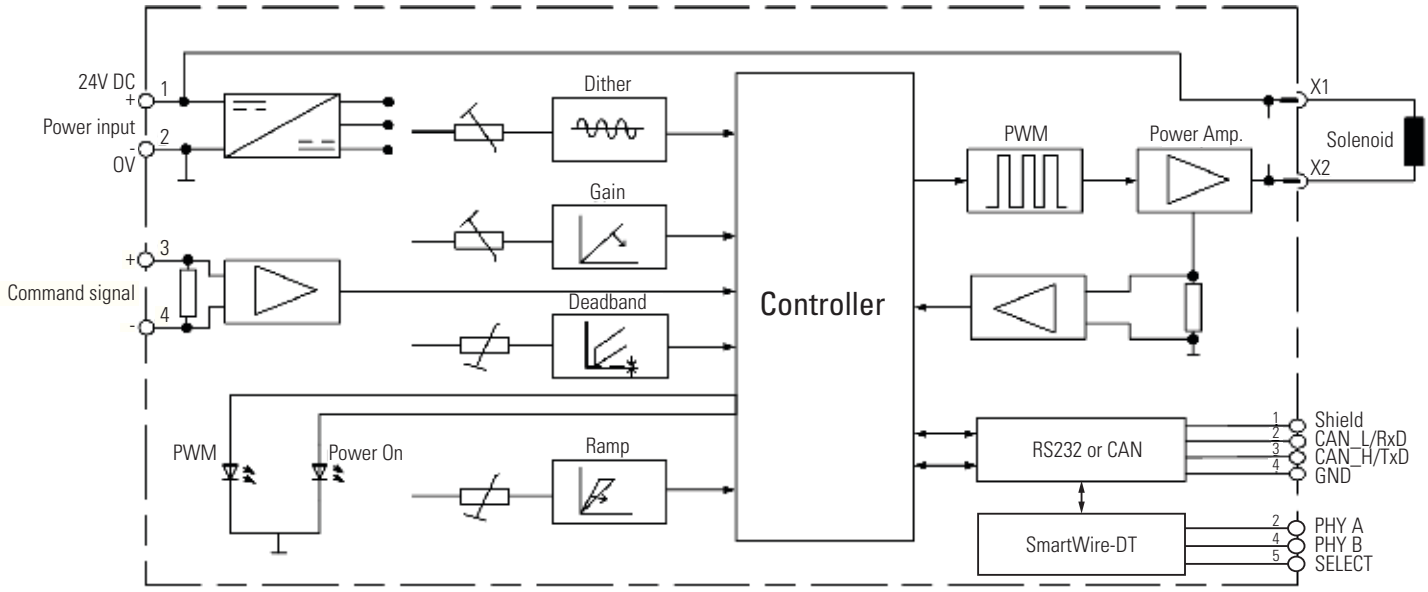
$$\text{Gain} = \frac{\text{Output Current (solenoid current) in AMP}}{\text{Command Input (Voltage, Current, CAN command)}}$$

The gain of the valve is the ratio of the opening of the valve or flow rate from it) to the applied voltage input to the power plug. The ramp rate is the rate at which the power plug allows the valve to open (or close) when a step voltage input is applied to the power plug. In many applications this ramp would be used to gradually accelerate or decelerate an actuator.

Installation precautions to eliminate leaks into the power plug:

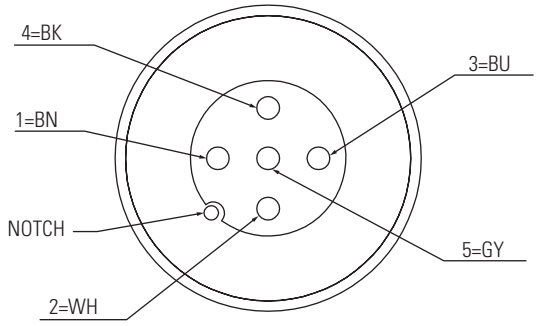
- Use only cables with circular cross-sections and diameter between 5–10 mm (.2" - .4")
- Ensure that sealing grommet is present and installed correctly. It must be forced over the outer jacket of the cable.
- Ensure that all the gaskets are present and properlyseated.
- Ensure that the plastic cover seats firmly and correctly on the center body post.

Electrical block diagram



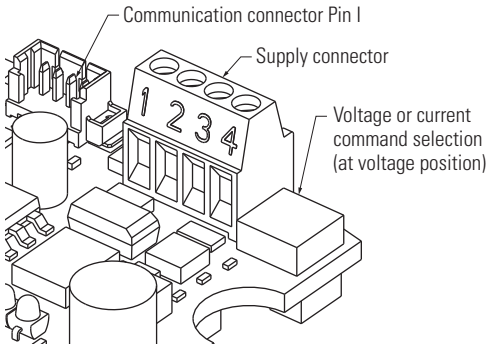
Connection diagram

Connection diagram for CAN version (EHH-AMP-702-N-C-N-3-30)



Pin Number	Description
1	CAN Shield
2	Supply Positive
3	Supply GND
4	CAN H
5	CAN L

Connection diagram for RS232 Versions (EHH-AMP-7XX-X-R-P-X-30)

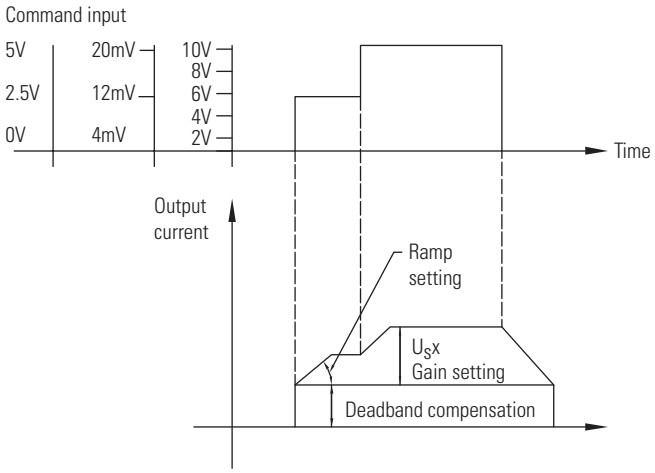


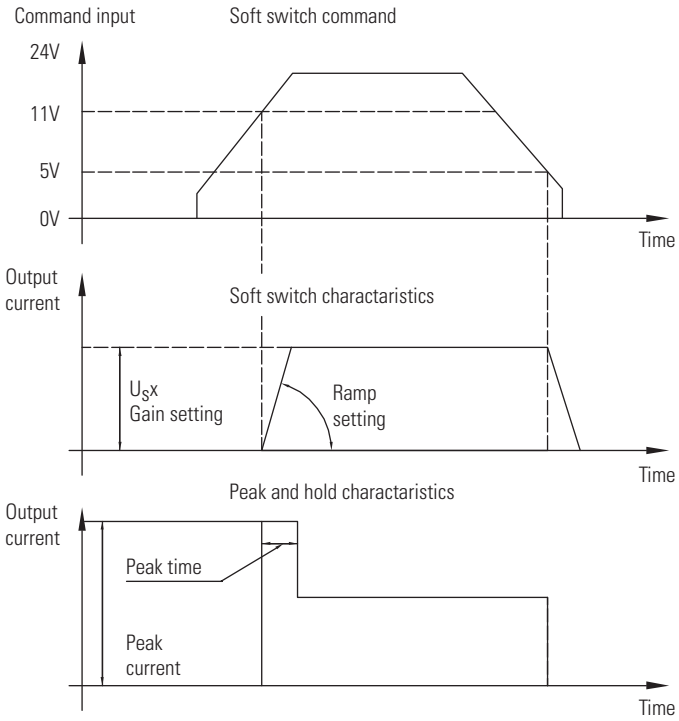
Connector	Pin number	Description
Supply Connector	1	Supply Positive
	2	Supply GND
	3	Command + (For G type - Joystick I/P)
	4	Command – (For G type - +5V reference)
Communication Connector	1	NC
	2	RXD
	3	TXD
	4	GND

Note: When the selection switch position is changed, the input impedance for the command input also changed. It is 249 Ohm for current command input and 10K Ohm for voltage command input. The PTC (positive temperature coefficient) in series with the command signal and the transzorb across the input impedance of command signal will protect if the switch is at current command and the voltage command is applied externally.For the correct solenoid valve operation, it is necessary to check the command switch position before applying the command input as per shown above. Switch position is also identified by communication. When changing from Voltage to current command (or vice versa) the switch has to be moved in the correct position and the unit has to be configured via software (GUI) for the voltage or current input. Changing the switch does not change indicated device model code in the software (GUI).

Input output characteristics

Joystick, current and voltage command





Operating data

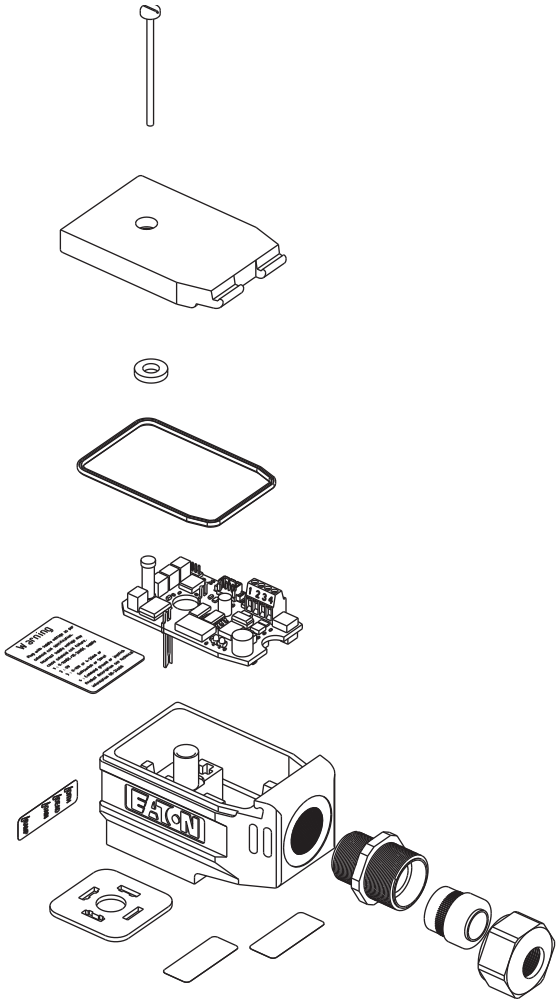
Electrical

Description	Limits		
Connections	See the connection diagrams above		
Power (input) Supply	9 to 16Vdc for 12V nominal	18 to 36Vdc for 24V nominal	20.4V-28.8Vdc for SmartWire-DT
Max. Power Consumption including solenoid	35W		
Reverse polarity protected	Yes		
Short circuit protected	Yes		
Maximum output current	3.5A for 12V Supply	1.6A for 24V Supply	
Max. output voltage typical (3.5A output current)	Typically 1.5V below supply voltage		
Command signal	Voltage command (0 – 10V, 0 – 5V, Soft switch 10KOhm) Current Command (4 – 20mA 249Ohm) CAN command (Digital command) Smartwire-DT command		
Dead band triggering For output For no output	200 mV 200 mV to 10V 0 mV to 100 mV	4 mA 4-20 mA 0-4 mA	
Dead band adjustment range	100 to 1000 mA		
Gain adjustment range	0.02 A/V to 0.16 A/V – For EHH-AMP-702-D-R-P-X-30 0.01 A/mA to 0.08 A/mA – For EHH-AMP-702-K-R-P-X-30 0.02 A/V to 0.32 A/V – For EHH-AMP-712-X-R-P-X-30		
Pick and Hold	Pick time 50 mS to 5 S - For EHH-AMP-7X2-P-R-P-1-30 Pick / Hold current 0 mA to 1.6A For 24V supply and 0mA to 3.2A for 12V supply Settable through POT or RS232 - For EHH-AMP-7X2-P-R-P-1-30		
Dither adjustment range	0 to 500 mA		
Ramp time	50 mS to 5 S		
PWM frequency	1200 Hz 10%		
Dither frequency	120 Hz 10%		
Protection	IEC 529: IP67 (when correctly installed with interface seal in place) Fully short-circuit and reverse-polarity protected		
Communication	RS232 – 125Kbps for 50 meters SWD-DT – 250Kbps up to 600 meters SWD-DT – 2Mbps up to 60 meters	CAN – 500 Kbps (Selectable 125Kbps – 1Mbps) for 100 meters	

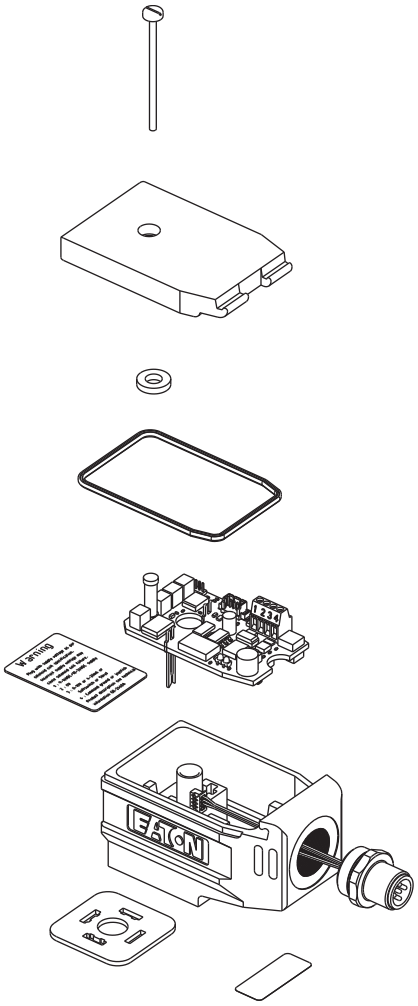
Mechanical

Description	Limits	
Housing	PA6 glass-reinforced plastic (conforming to UL-94HB) Connector pins: 16 Color: gray	
Cable clamp and connector	PG9, M16 and M12	
Temperature, ambient range	-20 to +70°C (-4 to +158°F)	-20 to +60°C for SmartWire-DT
Mass	0,07 kg (0.154 lb)	

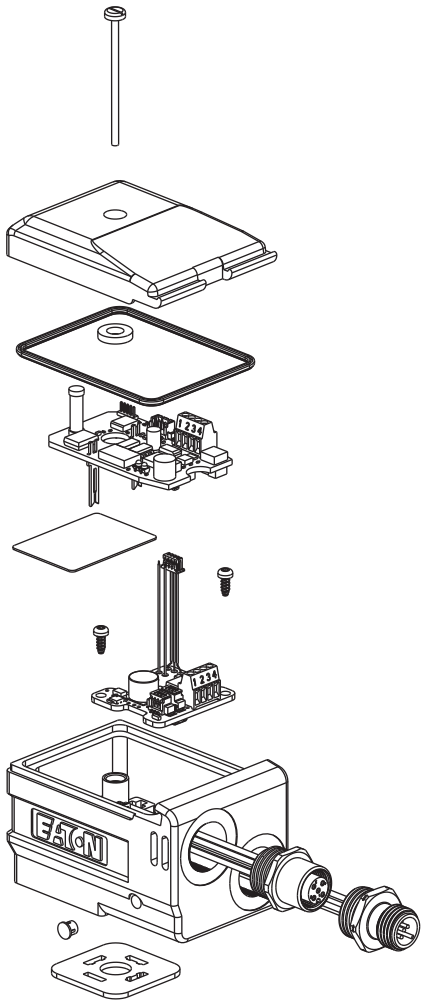
Assemblies



PG9 cable clamp



M12 5-pin male connector

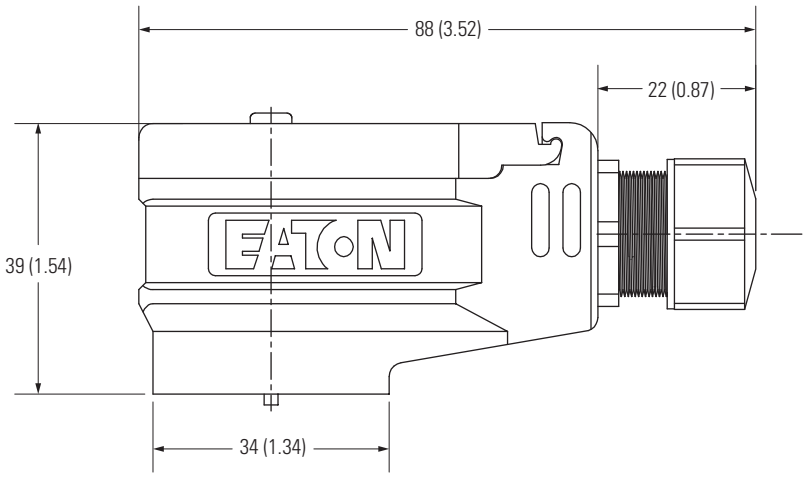


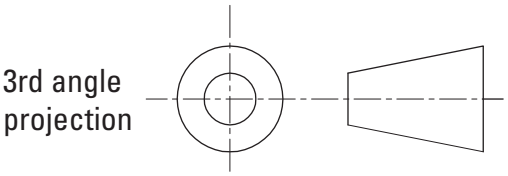
Smartwire DT connectors (M12 5-pin male and female connectors)

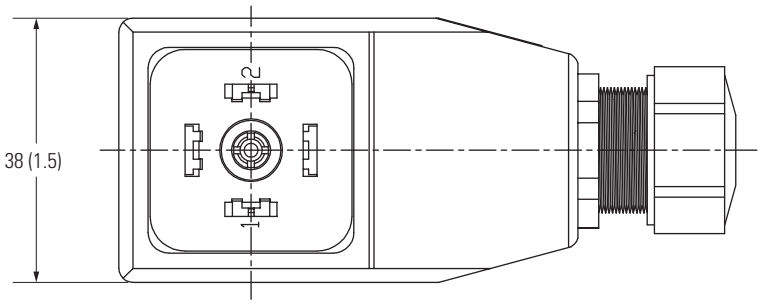
Warning:

- Ensure cable clamp nut is adequately tightened to secure the cable.
- Do not connect, or disconnect, the plug while power is on.
- Do not mount, or dismount, the plug while power is on.

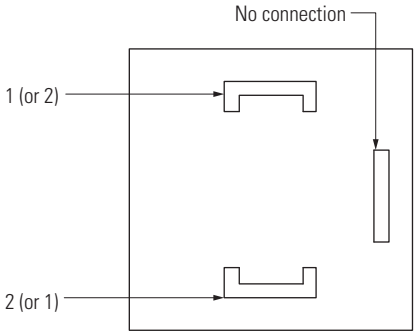
Installation dimensions D3P in mm (inches)







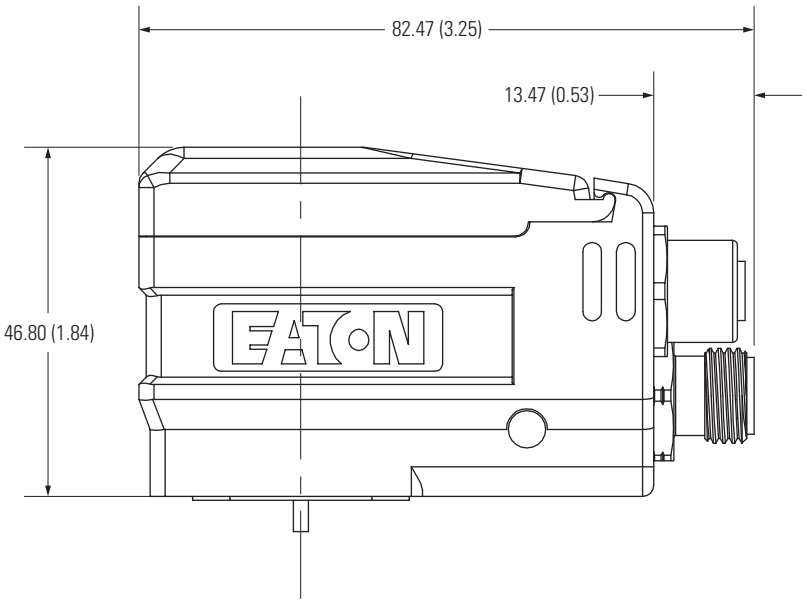
Solenoid connections



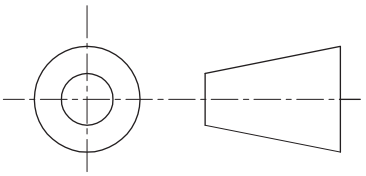
Standard options available:

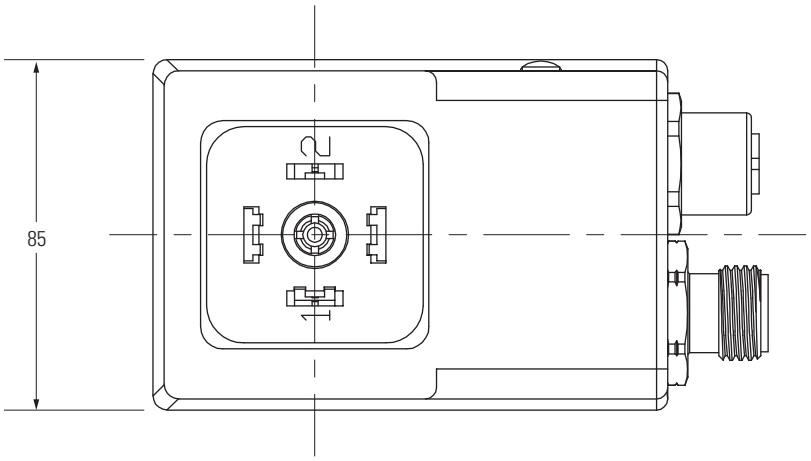
Model code	Assembly numbers
EHH-AMP-702-D-R-P-1-30	6024153-001
EHH-AMP-702-C-R-P-1-30	6024153-002
EHH-AMP-702-K-R-P-1-30	6024153-003
EHH-AMP-712-G-R-P-1-30	6024153-004
EHH-AMP-712-D-R-P-1-30	6024153-005
EHH-AMP-702-N-C-N-3-30	6024153-006
EHH-AMP-702-D-R-P-2-30	6024153-007
EHH-AMP-712-N-C-N-3-30	6024153-008
EHH-AMP-702-P-R-P-1-30	6024153-009
EHH-AMP-712-P-R-P-1-30	6024153-010
EHH-AMP-702-N-S-N-4-30	6035904-001

Installation dimensions SmartWire - DT in mm (inches)

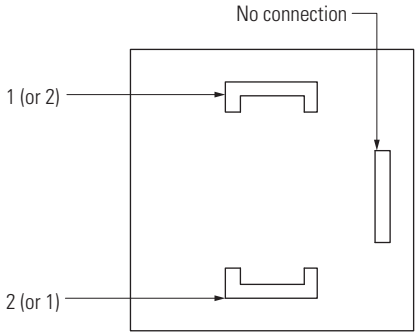


3rd angle projection



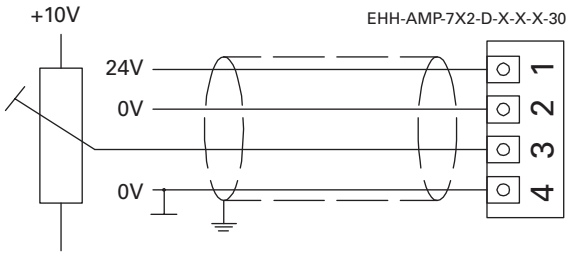


Solenoid connections

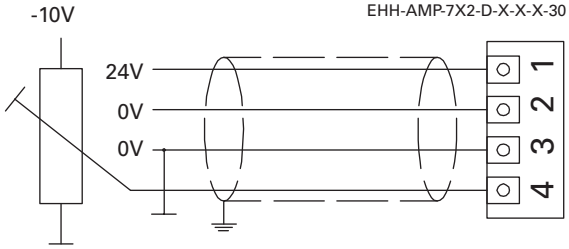


Wiring diagrams

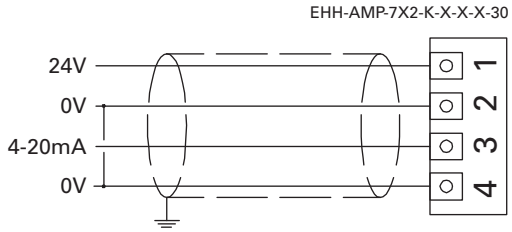
Installation wiring options
Positive command voltage



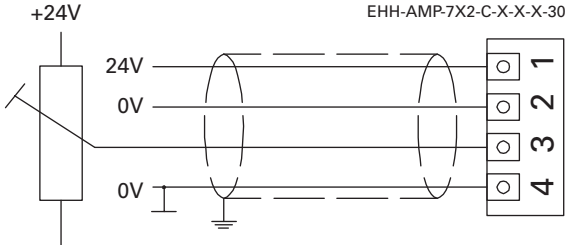
Negative command voltage



4-20mA command signal



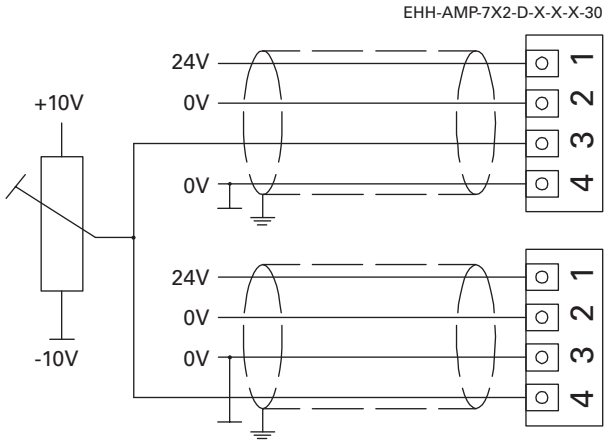
Softswitch command voltage



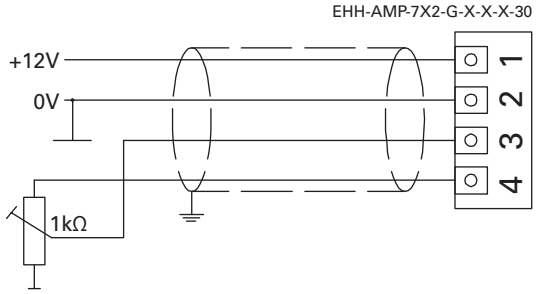
⏚ Customer's protective ground connection.

Warning: Electromagnetic Compatibility (EMC) Screened cables should be used and particular attention paid to the grounding of the screens as shown in the above diagrams.

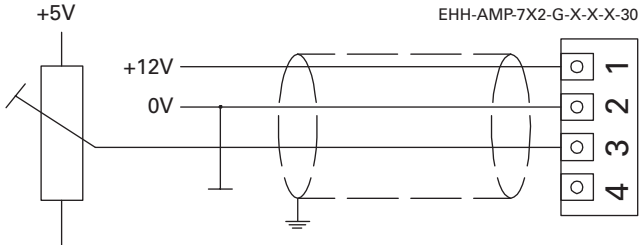
Bi-polar command voltage for operating
Two solenoids from one signal



Internal 5V command signal



External 5V command signal



Note: For EHH-AMP-7X2-N-C-N-3-30 wiring diagram please refer the connection diagram for the same

Wiring diagrams

Start-up procedure

- Correctly wire the plug and, before mounting it on the valve solenoid, apply supply voltage to the “power input” terminals.
- Check for correct plug function by illumination/ non-illumination of the LED. The Power on LED (Red) should illuminate when the correct supply is given. And the PWM LED (Yellow) should illuminate when demand applied to the “signal input” terminal is correct and within limit If there is a malfunction a new plug must be fitted.
- Switch off power supply and command/input signal and then install plug on solenoid. Ensure that all seals are fitted correctly and clamped as the retaining screw is tightened: this is essential in providing IP67 protection.
- Ensure that the hydraulic system will not cause any erratic movement of actuators, then:
- Switch on power supply again. Repeat LED/function check. An LED malfunction now indicates a short circuit at the load.
- Successful completion of these checks means that the plug and load are ready for use.

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Printed in USA
Document No. E-VLPO-CC002-E
September 2016