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# “Soft Switch” Power Plugs

## EHH-AMP-702-C-2\*; 10 Series

For use with valve types:

KDG4V-3(S)-H7-6\*  
 KTG4V-3(S)-H7-6\*  
 KDG4V-5-H\*-3\*  
 KTG4V-5-H7-3\*  
 KCG-3/6/8-H1-1\*  
 KX(C)G-6/8-H1-1\*  
 KDG5V-5/7/8-H1-1\*  
 CMX\*\*\*-E-G  
 EPV\*\*-12D-1\*  
 ERV1/2\*\*-12D-1\*  
 EPFR1\*\*-12D-1\*

### General Description

These plugs, conforming to ISO 4400/ DIN 43650 interface, offer adjustable, ramped on/off switching times through the use of an integral amplifier.

The switching time range is 50 ms to 5 seconds.

The soft switch plug is rated for 24V DC nominal and controlled by a 24V logic signal. Applying an “on” signal causes the output current to ramp up to, and stay at, an adjustable maximum while the “on” signal is maintained. At “switch-off” the output current is ramped down to zero and will remain at zero until the next “on” signal.

Ramp times (switching times) can be adjusted by an in-built potentiometer.

An adjustment also allows for compensation of any deadband in the valve.

### Features and Benefits

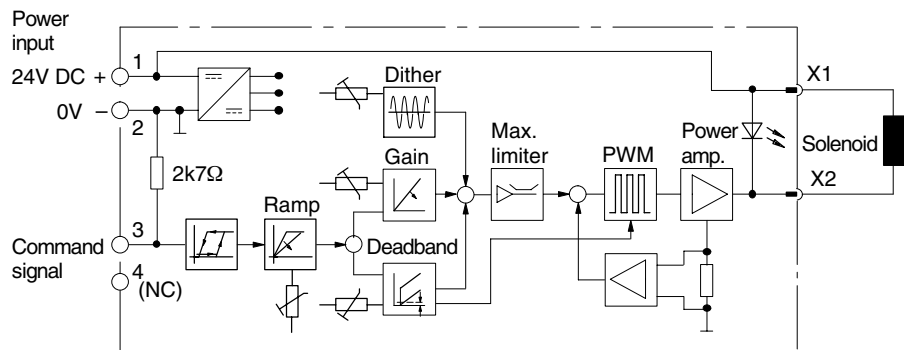
- Integral amplifier provides control from on/off logic command signal
- Adjustable ramp time
- Deadband compensation
- Adjustable output level
- Adjustable dither
- EMC to latest European standards
- Improved switching time repeatability
- Fully short-circuit and reverse-polarity protected
- Protection to IP67

### Application

Focus applications for this plug are in the control of hydraulic solenoid-operated directional and pressure control valves where control of valve response time can significantly reduce shocks in the hydraulic system.

Best results in reducing hydraulic shocks will only be obtained by using valves with the right “low shock”, or “proportional” features.

### Electrical Block Diagram



### Model Code

**EHH-AMP-702- C - 2\***



## Operating Data

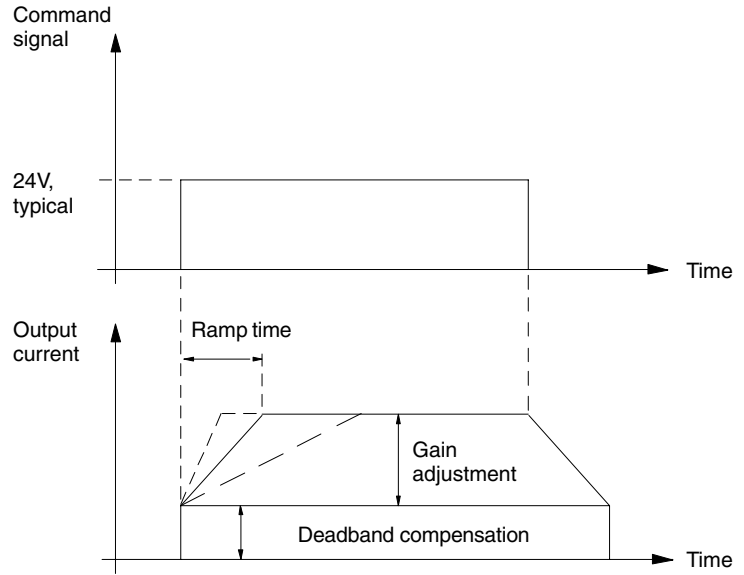
<b>Electrical</b>	
Connections:	
1	24V DC
2	0V (power and signal)
3	Positive command signal
4	Negative command signal
Power (input) supply	20-30V DC including $\pm 10\%$ maximum ripple (peak-to-peak) 24V DC nominal
Absolute maximum voltage	40V
Max. power consumption incl. solenoid	35W
Reverse polarity protected	Yes
Short circuit protected	Yes
Maximum output current	1,6A
Max. output voltage typical (1,6A output current)	Typically 1,5V below supply voltage
Command signal:	
For output (LED ON)	15V to 24V
For no output (LED OFF)	0V to 5V
Input impedance	2700 ohms
Deadband adjustment range	<100 - 1000 mA
Gain adjustment range	0,2A to 1,6A (maximum)
Dither adjustment range	0 to 500 mA
Ramp time	50 ms to 5s
PWM frequency	1200 Hz $\pm 10\%$
Dither frequency	120 Hz $\pm 10\%$
Protection	IEC 529: IP67 (when correctly installed with interface seal in place) Fully short-circuit and reverse-polarity protected
Isolation to VDE 0110	Group "B"
Electromagnetic compatibility (EMC):	
Emission	EN 50081-2
Immunity	EN 50082-2
<b>Mechanical</b>	
Housing	PA6 glass reinforced plastic (conforms to UL-94HB). Color: gray
Mounting interface	ISO 4400 (DIN 43650)
Cable clamp	Pg 9 screw type
Cable diameter	$\varnothing$ 5 to 10 mm (0.197 to 0.394" dia)
Wire section	0,5-1,0 mm <sup>2</sup> (20-17 AWG)
Temperature, ambient range	-20 to +70°C (-4 to +158°F)
Mass	0,07 kg (0.154 lb)

# Operating Data

## Functions

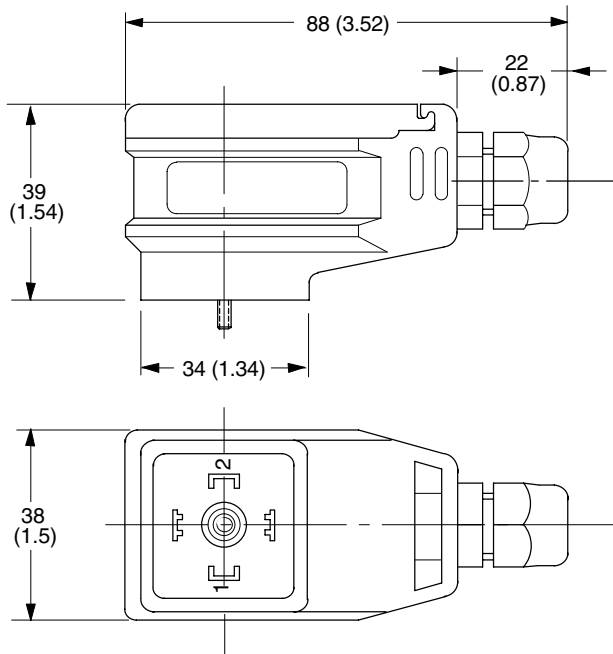
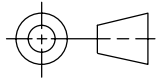
- Switch-on/off: after switching on with a 15V signal the amplifier will remain in the "on" condition with a command signal above 6V. The command signal must be reduced to below 5V to achieve switch-off of the amplifier.

## Input/Output Characteristic

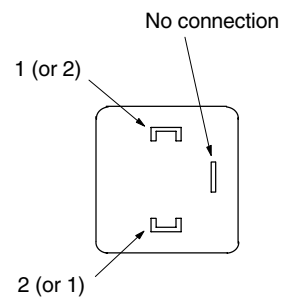


## Installation Dimensions in mm (inches)

3rd angle projection

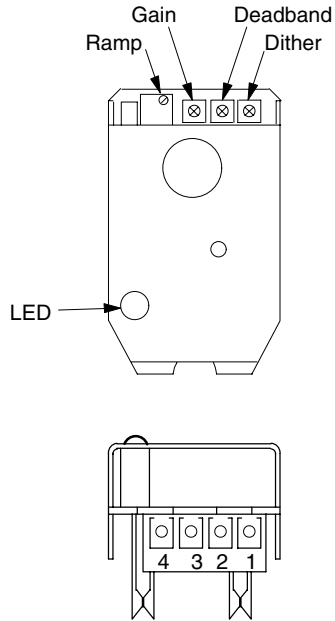


## Solenoid Connections



# Installation Data

## Adjustments



Ramp time:  
Turn clockwise to increase ramp time.

Gain:  
Turn clockwise to increase gain.

Deadband compensation:  
Turn clockwise to increase deadband compensation current.

Dither:  
Turn clockwise to increase the dither current.

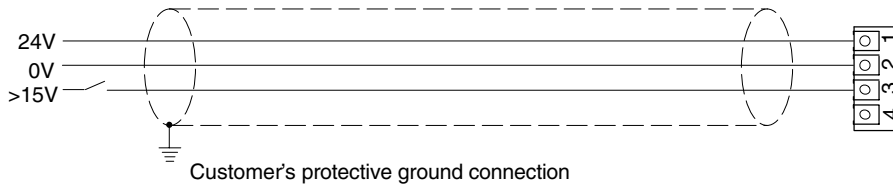
Terminal 1:  
Power supply 20V - 30V DC, positive.

Terminal 2:  
Power supply 0V.

Terminal 3:  
Switch command signal positive.

Terminal 4:  
Not connected.

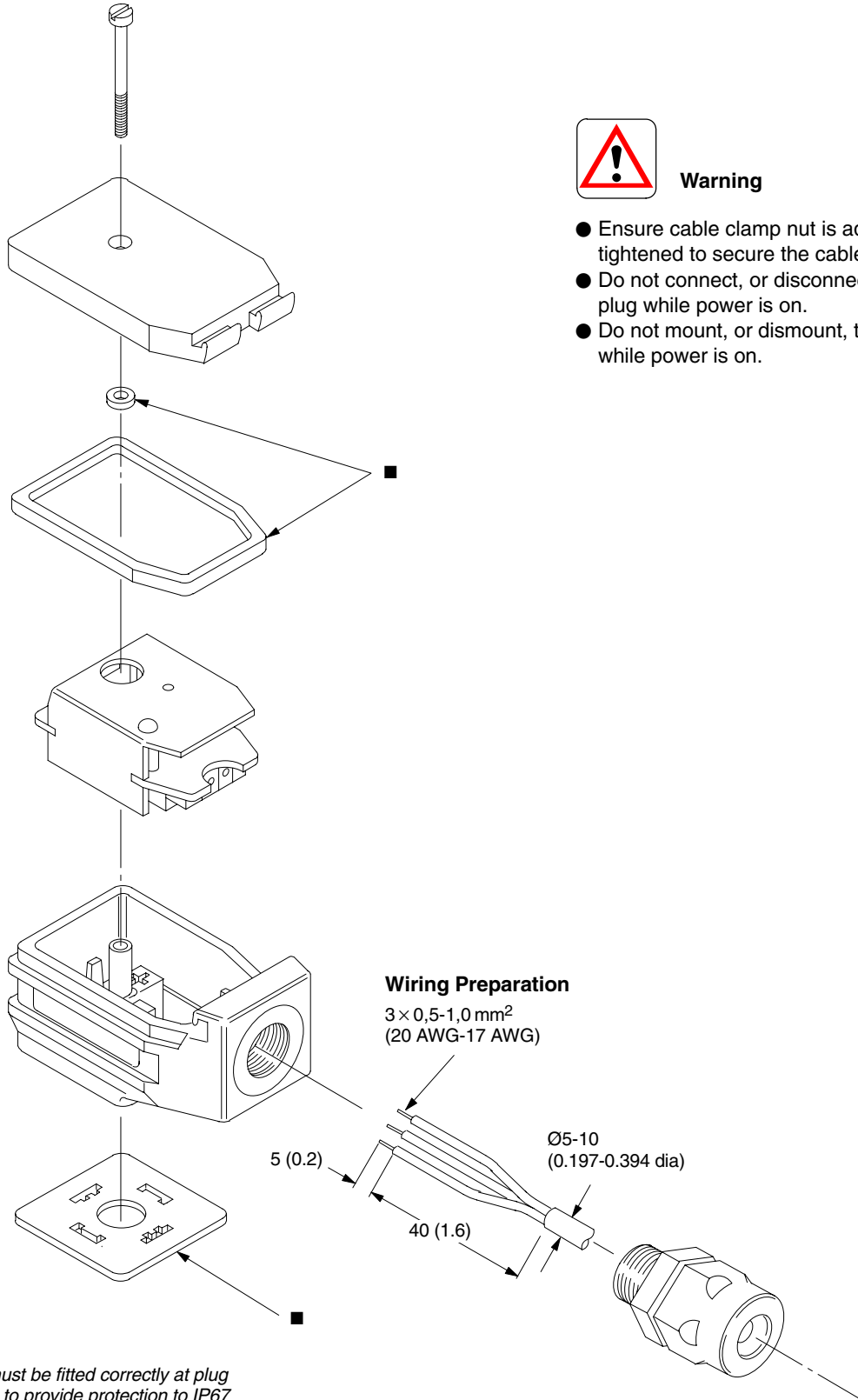
## Installation Wiring



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

# Installation Data

## Assembly Showing Wiring Connection Points



# Installation Data

## Start-Up Procedure

1. Correctly wire the plug and, before mounting it on the valve solenoid, apply 24V DC (20 to 30V limits) to the “power input” terminals.
2. Check for correct plug function by illumination/non-illumination of the LED:
  - a. Apply less than 2 to 3 volts to the input terminal: the LED should not be illuminated.
  - b. Increase voltage: the LED should illuminate when the voltage reaches 15V. *Do not exceed 30V command signal.*
  - c. Decrease voltage: the LED should go off when the voltage is less than 5V.

If there is a malfunction a new plug must be fitted.

3. 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.*
4. *Ensure that the hydraulic system will not cause any erratic movement of actuators, then:*
  - Switch on power supply again.
  - Repeat LED/function check as in 2.An LED malfunction now indicates a short circuit at the load.
5. Successful completion of these checks means that the plug and load are ready for use.

## Spare Parts

The only spare part available is the interface seal, part number 732100.

## Ordering Procedure

Order plug by full model code, and spare interface seals by part number 732100.

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