# Mini DDV Amplifier
# G123-821

## Application Notes

## 1. Scope

These application notes are a guide to applying the G123-821 Mini DDV Amplifier. They cover the following process:

- Determine which input signal to use.
- Provide an enable signal.
- Determine required frequency response.
- Draw your wiring diagram.
- Install and commission your system.

Aspects such as hydraulic design, actuator selection and closed loop design are not covered by these application notes.

## 2. Description

The G123-821 Mini DDV Amplifier is a ±1 Amp output amplifier suitable for driving a Moog Mini DDV. Its bipolar output enables the DDV to produce flow to both ports A and B, an essential feature in a closed loop servo system.

Its intended application is to accept a command from a servo amplifier output and produce a proportional ±1A output for the coil of a Mini DDV. Three permanently connected input signals are summed to produce the ±1A output. This feature simplifies initial set up, the user needing only to connect to the required terminals and set the 4-20mA switch on the circuit board to the appropriate position.

When 4-20mA is selected, a wire break output is enabled and will indicate if the input connection has been lost. The output is normally on and turns off if a wire break is detected.

An enable input turns the output current amplifier on and off.

A user accessible plug-in capacitor sets the frequency response.

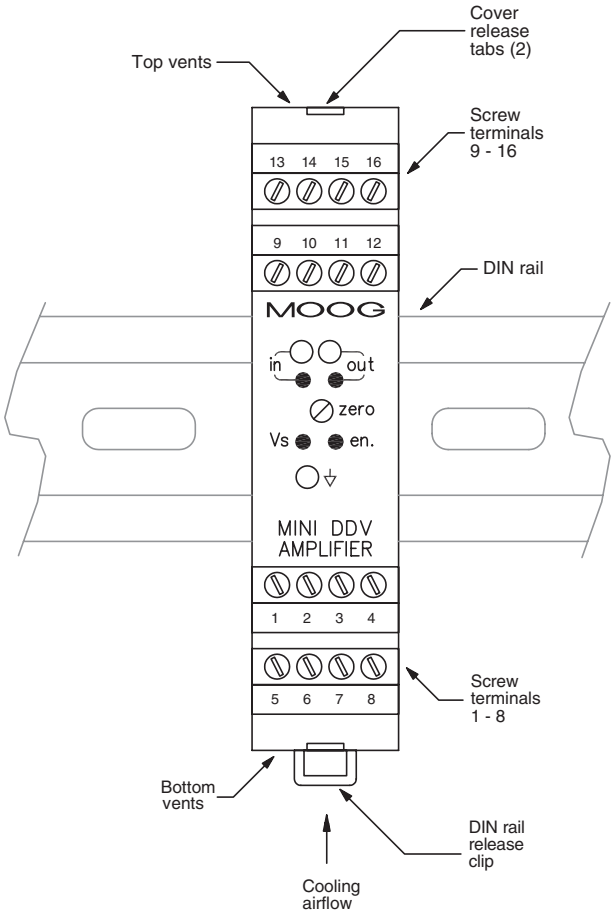
Front panel indicators and test points provide ease of set-up and trouble shooting. The Mini DDV Amplifier is housed in a compact DIN rail mounting enclosure and requires a 24V DC power supply.

Refer also to data sheet G123-821.

## 3. Installation

### 3.1 Placement

A horizontal DIN rail, mounted on the vertical rear surface of an industrial steel enclosure, is the intended method of mounting. The rail release clip of the G123-821 should face down, so the front panel and terminal identifications are readable and so the internal electronics receive a cooling airflow. An important consideration for the placement of the module is electro-magnetic interference (EMI) from other equipment in the enclosure. For instance, VF and AC servo drives can produce high levels of EMI. Always check the electro-magnetic compatibility (EMC) compliance of other equipment before placing the G123-821 close by.



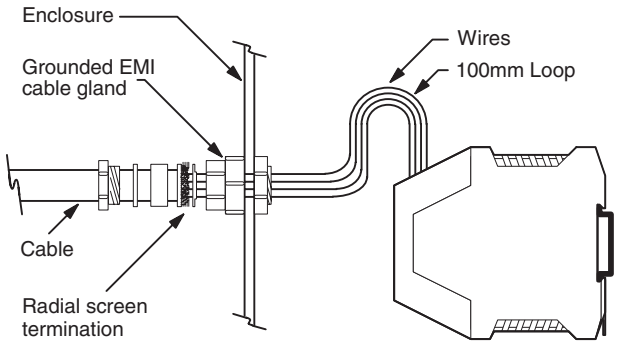

### 3.2 Cooling

Vents in the top and bottom sides of the G123-821 case provide cooling for the electronics inside. These vents should be left clear. It is important to ensure that equipment below does not produce hot exhaust air that heats up the G123-821.

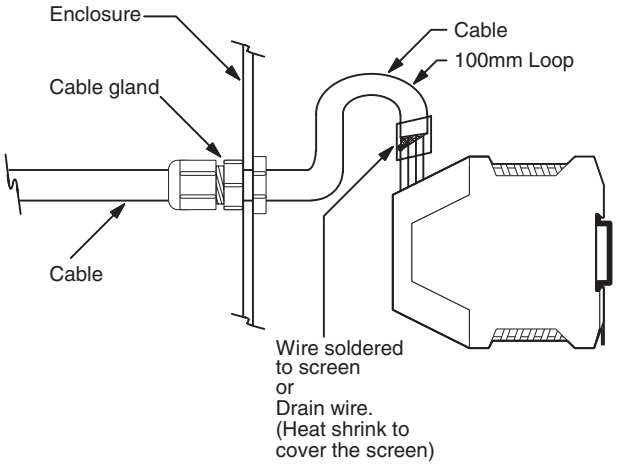
### 3.3 Wiring

The use of crimp "boot lace ferrules" is recommended for the screw terminals. Allow sufficient cable length so the circuit card can be withdrawn from its case with the wires still connected. This enables switch and capacitor changes on the circuit card to be made while the card is still connected and operating. An extra 100mm for cables going outside the enclosure, as well as for wires connecting to adjacent DIN rail units, is adequate. See section 6 for instruction on withdrawing the circuit card from its case.

Terminal identification is on the block-wiring diagram on page 3.




**Preferred wiring**




**Alternative wiring**

### 3.4 EMC

Use high quality shielded cable to ensure emissions are below the level needed for EMC compliance. Shield coverage of 96% or greater is recommended. Immunity from external interfering radiation is dependent on careful wiring techniques. The accepted method is to radially terminate the cable screens, in an appropriate grounded cable gland, at the point of entry into the industrial steel enclosure. If this is not possible, chassis ground screw terminals are provided on the G123-821. Exposed wires should be kept to a minimum length. Connect the screens at both ends of the cable to chassis ground.

## 4. Power Supply

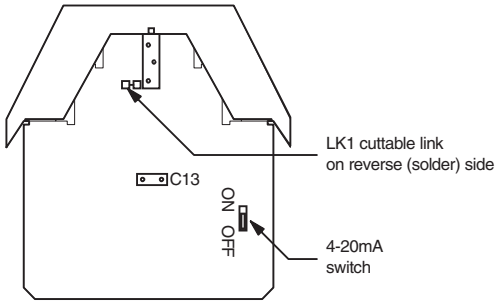
24V nominal, 22 to 28V.

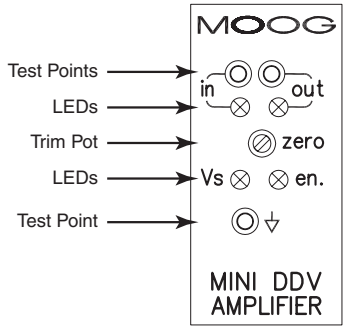
100mA @ 24V with all LEDs illuminated and no output load.

500mA @ 24V and ±1.0A Mini DDV load.

If an unregulated supply is used, the bottom of the ripple waveform is not to fall below 22V.

## 5. Set-up




### 5.1 4-20mA switch

This switch is located on the circuit card. See section 6 for instructions on withdrawing the circuit card. Set the switch to on, if a 4-20mA input signal is connected. If not, set it to off. If this switch is incorrectly set, the amplifier will not function correctly.

### 5.2 Frequency response capacitor

This capacitor is mounted in plug-in sockets on the circuit card. See section 6 for instructions on withdrawing the circuit card. The value loaded at shipping is 2.2nF, which gives a –3dB point of 482Hz. The capacitor can be changed to adjust the –3dB point. $C = \frac{1061}{f}$, C is in nano Farad (nF) and f is in Hertz (Hz).

The plug-in spacing is 0.2 inches (5mm) and a metallised polyester film type with a tolerance of ±10% is suitable. Roderstein MKT1826, Arctronic MKT185 or Wima FKS2 are suitable types.

### 5.3 ±10V input resistance link LK1

The voltage input terminals 9 and 10 have a 10kOhm resistor between them. This ensures that if an input wire breaks, the G123-821 output drops to approximately zero. Without this resistor, a wire break could result in just a minor degradation in performance that may not be detectable to a person observing the process being controlled by the G123-821. This 10k resistor can be disconnected by cutting LK1 on the rear (solder) side of the card. When disconnected, the input resistance goes to 150k. Cut the fine trace between the two square pads with a sharp packing knife.

### 5.4 ±10mA and ±10V unused input

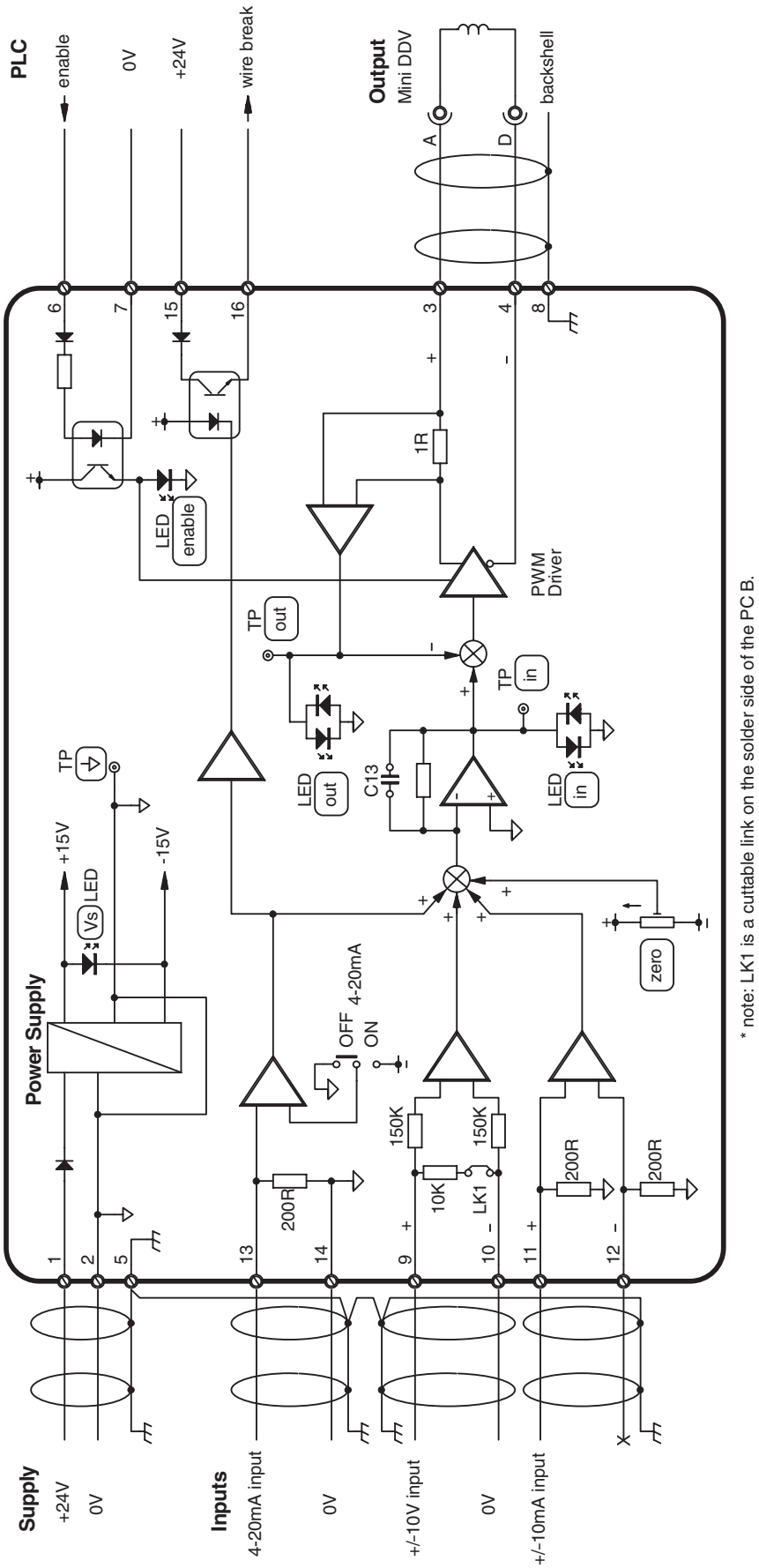
An unused mA input can be connected to 0V or left floating. To ensure best gain accuracy, leave it floating.

An unused V input must be connected to 0V.

## 6. Withdrawing the circuit card from its case

To select 4-20mA input signal and to change the frequency response setting capacitor, the circuit card needs to be withdrawn from its case. To do this, push one tab in with a pen or screwdriver while gently pulling on the top cover on that side. The cover will release approximately 1 mm. Repeat on the other side and withdraw the cover and circuit card until the required adjustment points are exposed. The rigidity of the connecting wires will hold the circuit card in position while adjustments are made.

## 7. Block-wiring diagram




* note: LK1 is a cuttable link on the solder side of the PC B.

## 8. Specifications

Amplifier frequency response figures quoted using an unpressurised Mini DDV D633-7205 as a load.

**Command:** All 3 inputs constantly summed to produce output
Each 100% input produces the maximum 1.0A output

**Input 1:** 0 to ±10V for 0 to ±100% output
Differential
Input resistance, 10kOhm between the two input terminals
Cuttable link to remove the 10kOhm to give 150kOhm

**Input 2:** 0 to ±10mA for 0 to ±100% output
Differential
Input resistance, 200 Ohm connected to 0V on each input
Leave unused input un-terminated

**Input 3:** 4-20mA for ±100% output
12mA = zero current output
Single ended
Input resistance, 200 Ohm connected to 0V
Switch selectable on/off
Switch must be turned off if 4-20mA is not connected

**Output:** 0 to ±1.0A (–0%/+10%)
Maximum into Mini DDV, ±1.2A
PWM @ 24kHz ±10%

**Frequency response:** Flat to 100Hz @ ± 1A
Flat to 600Hz @ ± 0.4A
Flat to 2.0kHz @ ± 0.1A
Output distorts beyond these limits due to 24V limiting max current drive into the inductive load
Plug-in capacitor to limit –3dB point,
$C = \frac{1061}{f}$, f in Hz, C in nano Farad
Default C = 2.2nF for –3dB = 480Hz

**Maximum load:** 20 Ohm @ 24V

**Minimum load:** 4mH, 5 Ohm

**Zero adjustment:** 0 to ±0.2A

**Enable input:** Opto-isolated
On, 10 to 24V
Off, less than 1.5V or open circuit.
Input current, 25mA @ 24V

**Wire break output:** Opto-isolated, normally on
For 4-20mA input only
Off at <2mA input current (wire break)
On if "4-20mA" not selected
Output rating,+40V @ 20mA max

**Supply:** 24V DC nominal, 22 to 28V
100mA @ 24V, no load
500mA @ 24V , ±1A Mini DDV load

**Front panel indicators:** Vs, internal supply – green
in, input command, positive – red
negative – green
out, output current, positive – red
negative – green
en, enable – yellow

**Front panel test points:** in, input command,
0 to ± 10V, –3db = 480Hz
out, output current,
0 to ± 10V, –3db = 480Hz
⏚, signal 0V reference

**Front panel trimpot:** zero

**Mounting:** DIN rail, IP20

**Temperature:** 0 to +40°C

**Dimensions:** 100W x 108H x 22.5D

**Weight:** 130g

## Internet Data

For a detailed Data Sheet and the latest version of these Application Notes, please refer to the Moog website www.moog.com/industrial

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