MOOG

Buffer Amplifier
G123-815

Application Notes

1 Scope

These application notes are a guide to applying the G123-815 Buffer Amplifier. They tell you how to install, connect and adjust the Buffer Amplifier. They do not tell you how to design the closed loop system in which it is used.

2 Description

The G123-815 Buffer Amplifier interfaces between standard PLC analogue input and output modules, on one side, and a position transducer and a Moog valve, on the other. It simplifies the use of a PLC in closing position loops.

The Buffer Amplifier solves the common problem of the ±10V PLC output being incompatible with the valve drive requirements. It also provides digital noise filtering for the valve signal and noise filtering for the position transducer signal. For a more detailed description, see Moog brochure G123-815E01.01.

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 G123-815 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 EMC compliance of other equipment before placing the G123-815 close by.

3.2 Cooling

Vents in the top and bottom sides of the G123-815 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 G123-815.
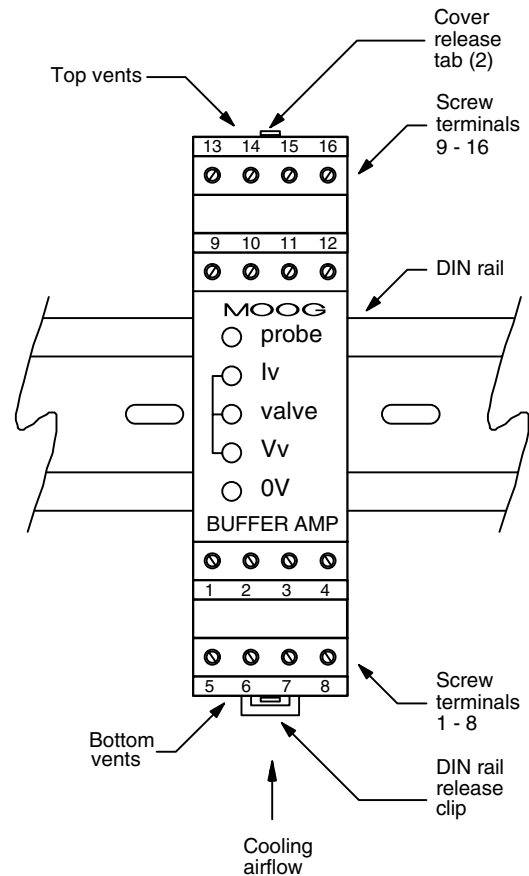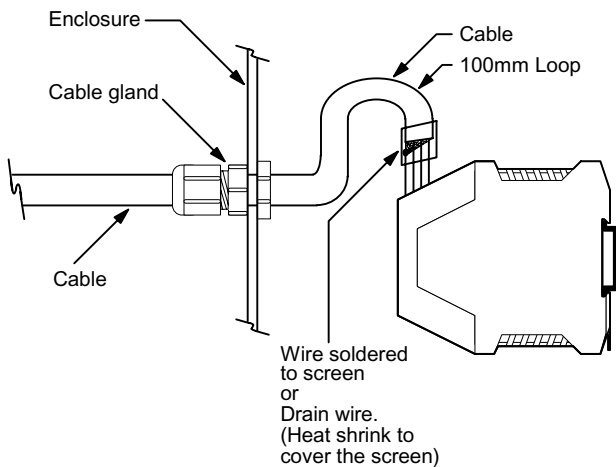

3.3 Wiring

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 Allow sufficient cable length so the circuit card can be withdrawn from its case with the wires still connected.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 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 wires connecting to adjacent DIN rail units, is adequate.
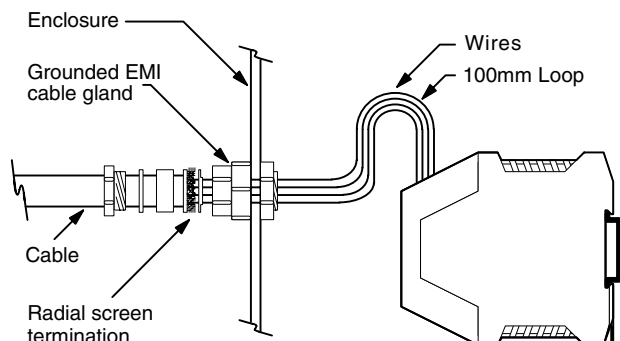
Preferred Wiring

Alternative Wiring

3.4 EMC

The G123-815 emits radiation well below the level called for in its CE mark test. Therefore, no special precautions are required for suppression of emissions. However, immunity from external interfering radiation is dependent on careful wiring techniques. The accepted method is to use screened cables for all connections and 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 G123-815. 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
20mA @ 24V without a load, 145mA @ 100mA load.

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

It is recommended that the M205, 250mA T (slow blow) fuse, supplied with the unit, be placed in series with the +24V input to protect the electronic circuit. There is a spare fuse in the cover of the fuse holder. Replacement fuses should be compliant with IEC 127-2 sheet 3.

5 Set-up adjustments
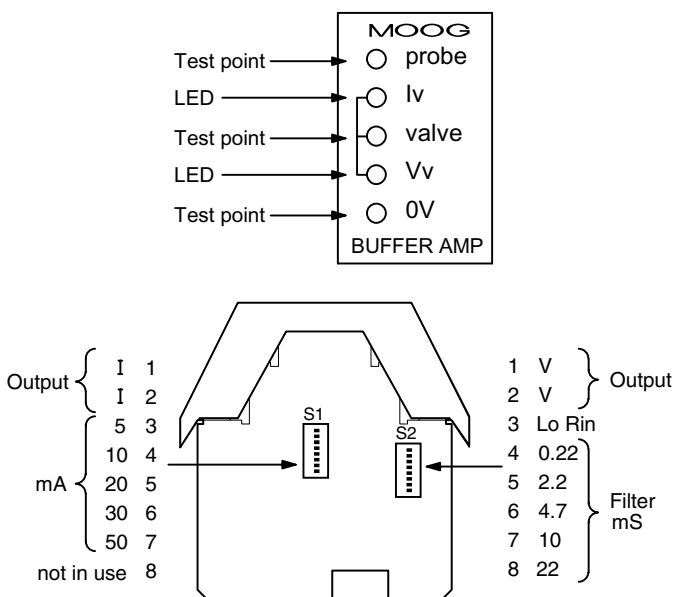
5.1 Digital noise filter

This filter removes the digital quantization noise, due to the PLC update period, in the PLC output signal. Because PLC's can have low frequency period noise that the valve can respond to, it is important to remove this update rate noise so the valve does not buzz and the load does not follow. The update period of the PLC needs to be known so the correct filter time constant can be selected. Initially set the filter period to be equal to the update rate. Switch values sum, so if you need 15mS, select 10 and 4.7.

When the system is operating, a final check of the time constant can be made. If the valve buzzes, a greater time constant is required. If the valve does not buzz, reduce the time constant until buzzing is detected, then increase it until the buzzing just stops.

To calculate the 3dB frequency roll off point, use the formula:
$f = \dfrac{159}{T}$ Hz, where T = the sum of mS period switches selected

5.2 Low Rin

The "low Rin" switch drops the input resistance for the PLC signal from 100k Ohm to 1k Ohm. This can improve the noise immunity of the signal. Be sure the PLC output can deliver ±10mA that is needed when low Rin is selected.

5.3 Valve drive signal

Select the output signal to match the valve requirement. If voltage is selected, the ± 10V output can drive up to ± 10mA. If current is selected, the full scale current output will then need to be selected on the valve current switches. The switches sum, so if 45mA is required, select 30, 10 and 5mA. Maximum output current, in current mode, is ± 100mA.

6 Test points and indicators

The Iv and Vv LEDs show the polarization and level of the selected output signal.

The valve test point gives the actual voltage on the valve output terminal. When the output signal is selected as current, a knowledge of the valve's input resistance is needed to interpret the test point signal. For instance, if 10mA is selected and a valve with 200 Ohm input resistance is connected, the signal on the valve test point will vary between ± 2V.

The probe test point enables a check of the filtered position transducer signal.

7 Withdrawing the circuit card from its case

The circuit card needs to be withdrawn from its case to set the digital noise filter switches, to select the output signal type, to select the current and to select low Rin.
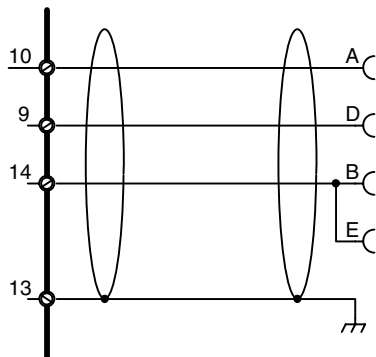
To do this, push one tab in with a pen or screwdriver, while gently pulling on the top cover on that side. The cover will release approximately one mm. Repeat on the other side and then withdraw the cover and circuit card until the required switches are exposed. The rigidity of the connecting wires will hold the circuit card in position while the switches are set.
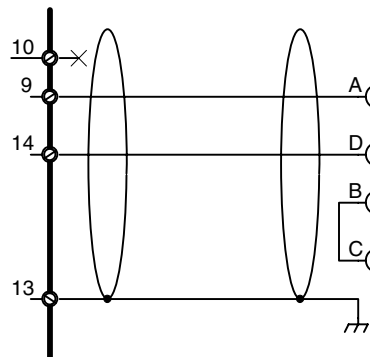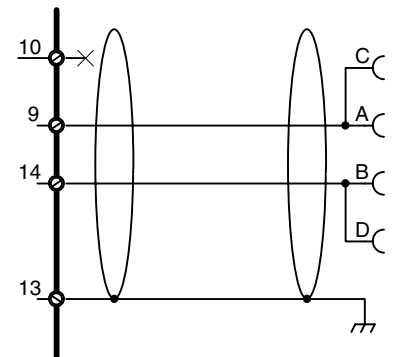
8 Block-wiring diagram

Note 1: Connect cable screen to enclosure cable gland.
Note 2: Terminal 10 cannot power a DDV
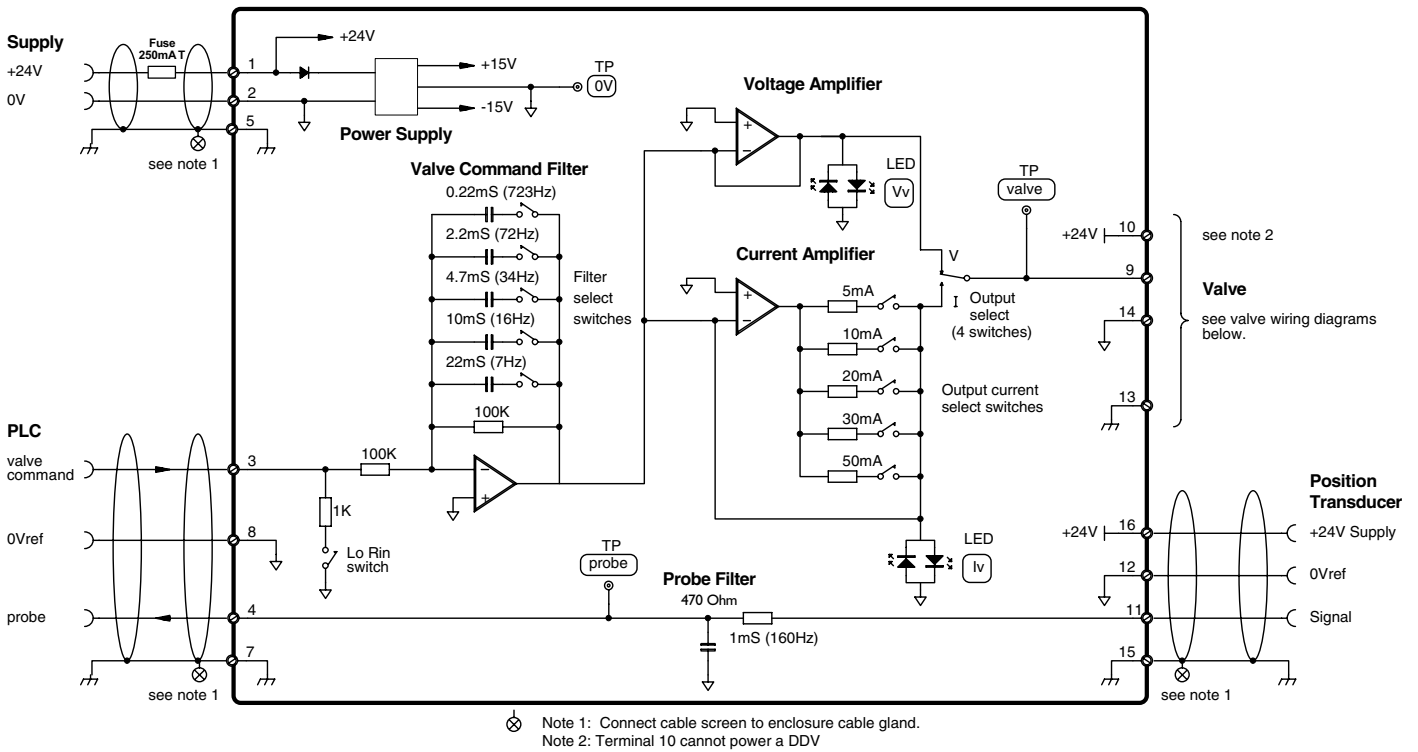
Valve wiring diagrams

8.1 Proportional valve (efb)

8.2 Servovalve (mfb) series coils

8.3 Servovalve (mfb) parallel coils

9 Specifications

Valve drive input:	0 to ± 10V
Valve drive outputs:	0 to ± 10V @ 1K Ohm min
	0 to ± 100mA max
	$\text{max load} = \left(\dfrac{11V}{I\,(Amp)} - 39 \right) \text{Ohm}$
Valve drive current selections:	±5, 10, 20, 30 & 50 mA
Valve drive test point:	Zo = 10K Ohm
Probe test point:	Zo = 10K Ohm
Vv LED:	Maximum illumination at ± 10V
	+ = red
	− = green
Iv LED:	Maximum illumination at ±5 mA \ ±100mA
	+ = red
	− = green
Valve filter type:	Active, single pole

Valve filter corner frequency selections:	7, 16, 34, 72 & 723 Hz ±10%
Probe filter corner frequency:	154Hz ±10%
Class of protection:	IP 20
Supply:	24 V nominal, 22 to 28 V
	20 mA @ 24 V, no load,
	145 mA @ 100 mA load
Recommended supply protection:	M205, 250mA T (slow blow) fuse compliant with IEC 127-2 sheet 3
Terminal 10 max current:	500 mA
Mounting:	DIN rail
Temperature:	0 to 40°C
Dimensions:	100W x 108H x 22.5D
Weight:	120g
CE mark:	EN50081.1 emission
	EN50082.2 immunity
C tick:	AS4251.1 emission

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