

G040-124-001 DDV Tester



DESCRIPTION

The Moog G040-124-001 Direct Drive Valve (DDV) Tester tests a DDV, without the need for electrical power or hydraulic supply. Internal rechargeable batteries eliminate the need for external electrical power by powering the Tester as well as the valve.

Testing is simple and straightforward. Plug the Tester's connector into the valve, rotate the command potentiometer and observe the spool LED display following the command. A hydraulic supply is not necessary because the force to position the spool is generated electrically by the valve's linear force motor.

A measurement of the valve's operation can be made with a digital multimeter on the command and spool test points.

More test points, connected directly to the valve's connector pins, aid in trouble-shooting. A test point that gives an output proportional to the valve's supply current is also very useful in trouble-shooting.

FEATURES

- Fully tests a Direct Drive Valve (DDV)
- All command signals catered for
- LED display of spool position
- Normalised $\pm 10V$ command and spool test points
- Valve pin test points
- Valve supply current test point
- Internal rechargeable batteries power the valve and Tester

OPERATING INSTRUCTIONS

The numbers in **bold** refer to the corresponding area in figure 1.

1. Supply and battery charging

Turn on the Tester with the on/off switch in **1**. The Vs LED indicates correct internal supplies.

If the Lo.V LED is illuminated, do not use the Tester; charge its batteries. Plug the charger into the charge socket in **1** and charge until the charger LED is green.

The Hi.I LED illuminates if the supply current to the valve is greater than $\pm 250\text{mA}$. This current will occur during normal operation. The warning is provided to maximise battery life by alerting the user to occasions when high current may not be necessary.

2. Valve connector

Plug the valve connector, **2**, into the valve.

3. Command

Select the type of command with the command selector in **3**. The command type is stamped on the valve name plate. If this is not present, or cannot be read, determine the signal type from the model or box-car number.

Vary the command with the command potentiometer and observe the spool LED display in **4** following the command.

4. Spool

For precise confirmation of correct valve operation, measure at the $\pm 10\text{V}$ command and $\pm 10\text{V}$ spool test points. Measure with respect to the 0V test point in **1**. Without flow, the spool test point signal will follow the command, unless the spool movement is restricted.

5. Test points

The test points of **5** enable direct measurement of signals on the valve connector pins and an indirect measurement of the supply current to the valve. The I_A valve current test point scaling is $1\text{V} = 1\text{A}$. High current draw can indicate a sticking spool, due to contamination or physical damage to the spool or bushing.

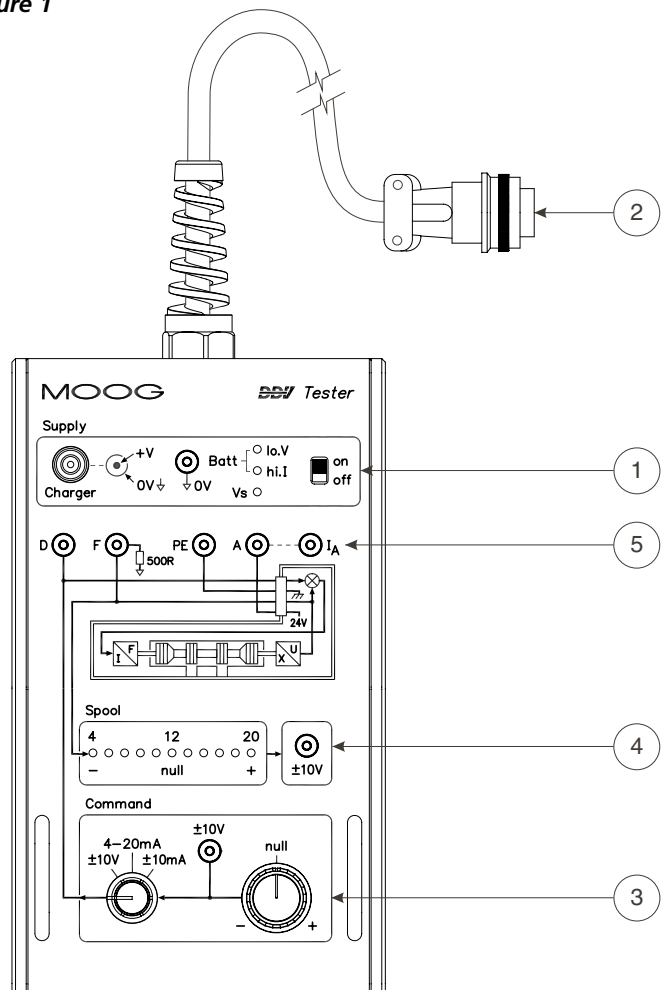
6. Other valves

The Tester can also be used to test +24V, 6+PE proportional valves. Pin C on the valve connector is wired to 24V to provide the enable signal required by proportional valves.

7. Battery replacement

- Remove the six screws on the side panels and unclip the front panel from the base. The side panels will need to be levered apart with a screwdriver to do this.
- Disconnect the battery leads from the circuit card and unclip the battery cover.
- Note the battery orientation and place the new batteries in the same way.
- When reassembling, be careful not to pinch any internal wires.
- Ensure the new batteries receive a full charge before using.

Figure 1



G040-124-001

SPECIFICATIONS

Command outputs:	0 to $\pm 10V$ @ $\pm 10mA$ max 0 to $\pm 10mA$ @ 1k load min 4-20mA @ 0 to 500 Ohm load
Spool input:	4-20mA, 500 Ohm load
Supply to valve:	24V nominal @ 2.1A max
Test points:	Command, 0 to $\pm 10V$ Spool, 0 to $\pm 10V$ A, valve supply pin, 22 to 26V IA, valve supply current, 1V = 1A PE, protective earth F, spool signal, 2 to 10V D, command signal 0V, zero volts (ground) reference
LEDs:	Lo.V, threshold = 22V Hi.I, threshold = $\pm 250mA$ Vs, $\pm 15V$ internal supply > $\pm 12V$
Battery:	Sealed lead acid, 2 x 12V, 0.8Ahr
Charge time:	4.5 hours typical from 22V
Operate time:	40 minutes @ 500mA supply to valve 2 hours for typical use
Operating temp:	0 to 40°C
Dimensions:	80H x 105W x 180D Depth to end of cable gland is 240
Cable length:	2 m
Weight:	1.5 kg
EMC:	CE marked EN61000-6-3 emission En61000-6-2 immunity
Battery charger:	240mA @ 29.4V (red LED) 27.4V float (green LED) 90-264VAC, 47-63Hz AC connector, 2 pin IEC320-C7 -25 to 40°C CE marked EN50081.1 emission EN50082.1 immunity

ORDERING INFORMATION

G040-120-001	DDV Tester with batteries installed and a battery charger (AC power lead not included)
C70591	Charger only (AC power lead not included)
C70589	Replacement battery (2 required)

INTERNET DATA

For the latest version of this Data Sheet, please refer to the Moog website www.moog.com/valvetesters

VALVE ELECTRONICS WITH SUPPLY VOLTAGE 24 VOLT AND 6+PE POLE CONNECTOR

**Command signal 0 to ±10 mA floating,
Valves with current command input**

The spool stroke of the valve is proportional to the current flowing between pins D and E.

100% valve opening P → A and B → T is achieved at $I_D = +10$ mA. At 0 mA command the spool is in centred position. The input pins D and E are inverting. Either pin D or E is used according to the required operating direction. It is necessary to connect the unused pin to signal ground in the cabinet.

**Command signal 0 to ±10 mA,
Valves with current command input**

The spool stroke of the valve is proportional to $(I_D - I_E)$. 100% valve opening P → A and B → T with $(I_D - I_E) = +10$ mA. Either pin D or E is used according to the desired flow phasing. The unused pin is left unconnected. R_{in} (D to B) = 200Ω. R_{in} (E to B) = 200Ω.

**Command signal 0 to ±10 V,
Valves with voltage command input**

The spool stroke of the valve is proportional to $(U_D - U_E)$. 100% valve opening P → A and B → T is achieved at $(U_D - U_E) = +10$ V.

At 0 V command the spool is in centred position. The input stage is a differential amplifier. When only one command signal is connected to the valve it is necessary to connect the unused pin to signal ground in the cabinet, according to the required operating direction.

**Command signal 4 to -20 mA,
Valves with current command input**

The spool stroke of the valve is proportional to I_D minus the centre null current of 12 mA. 100% valve opening P → A and B → T with $I_D = +20$ mA. 100% valve opening P → B and A → T with $I_D = +4$ mA. Use pin D as signal input. Pin E is left unconnected. R_{in} (D to B) = 200Ω.

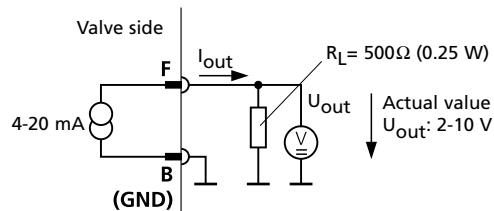
Actual value 4 to 20 mA

The actual spool position value can be measured at pin F (see diagram below). This signal can be used for monitoring and fault detection purposes.

The spool stroke range corresponds to 4 to 20 mA.

The centred position is at 12 mA. 20 mA corresponds to 100% valve opening P → A and B → T.

**Circuit diagram for measurement of actual value I_F
(position of spool) for valves with 6+PE pole connector**

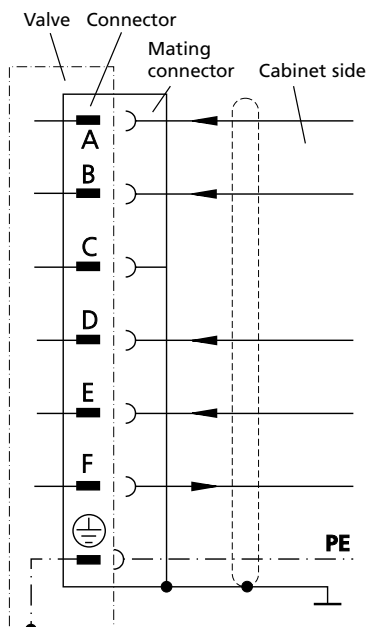


The position signal output 4 to 20 mA allows the detection of a cable break when $I_F = 0$ mA.

For failure detection purposes it is necessary to connect pin F of the mating connector and route this signal to the control cabinet.

WIRING FOR VALVES WITH 6+PE POLE CONNECTOR

(to EN 175201 Part 804¹⁾, and mating connector (type R and S, metal shell) with leading protective earth connection (⊥). See also Application Note AM 426 E.



Function	Current command 0 to ± 10 mA floating	Voltage command 0 to ± 10 VDC
Supply	24 VDC (19 to 32 VDC)	
Supply / Signal ground	⊥ (0 V)	
not used		
Input rated command (differential)	Input command $I_D = - I_E$: 0 to ± 10 mA Input command (inv.) $I_E = - I_D$: 0 to ± 10 mA R_{in} (D to E) = 200Ω	$U_{D-E} = 0$ to ± 10 V R_{in} (D to E) = 10 KΩ
Output actual valve spool position	Input voltage U_{D-B} and U_{E-B} for both signal types is limited to min. -15 V, max. +24 V.	
Protective earth	$I_{F-B} = 4$ to 20 mA. At 12 mA spool is in centred position. $R_L = 300$ to 500Ω	

¹⁾ formerly DIN 43563