G122-828B017
Velocity and Pressure (VP) Controller

DESCRIPTION
The Moog G122-828B017 VP Controller, combined with a Moog servo valve, a position or velocity transducer and a pressure transducer, will provide closed loop control of the injection cycle of a plastic injection molding machine.

The functions controlled during the cycle are:
- Injection speed
- Injection pressure limiting
- Hold pressure during setting
- Back pressure during plasticising

Retract speed during decompression is controlled open loop.

Closed loop control of the critical injection speed and pressures ensures precise repeatability of mold fill and so consistent and high quality machine output. Variations in material characteristics, machine hydraulic pressure, mold temperature, screw clearances, etc, do not result in the normally observed variations is part quality. Consistent and repeatable inject speed, hold pressure and back pressure dramatically reduce the influence of these variables.

The VP Controller is housed in a compact DIN rail mounting enclosure and requires a 24V DC supply.

FEATURES
- Improved yield
- Higher quality parts
- Set once, no further adjustments needed
- Low cost
- Moog quality and reliability
- Compact DIN rail housing
- Convenient front panel controls, test points and indicators

Rev C of this data sheet changes the model number to B017 and adds a power supply fuse. The B017 is functionally identical to the A017.

The A017 and B017 models differ from the -017 model in that the valve drive during back pressure is limited to +5 V maximum in the A017 and B017 models. The -017 model allowed full +10 V valve drive.
SPECIFICATIONS

Logic inputs: Inject, hold pressure, back pressure and retract
- On at 10 V
- Off at 5 V
- Max 28 V
- 5.1 mA @ 24 V

Valve output: 0 to ± 10 V @ ± 2 mA max
- Short circuit and over voltage protected

Monitor signal outputs:
- S-act+ 0 to +10 V
- S-act – 0 to −10 V
- P-act 0 to +10 V
- V-act 0 to +10 V
- 2mA max, short circuit and over-voltage protected

Front panel test points:
- Wipers of R2, 4,12 & 13 and 0 V reference

Front panel indicators:
- inj (inject) – green
- HP (hold pressure) – green
- BP (back pressure) – green
- ret (retract) – green
- sat (valve saturated) – yellow

Front panel trimpots:
- R1 velocity sensitivity
- R2 actual pressure zero
- R3 actual pressure sensitivity
- R4 hold pressure zero
- R5 hold pressure balance
- R6 voltage distributor P gain
- R7 voltage distributor I gain
- R8 hold pressure P gain
- R9 hold pressure I gain
- R10 back pressure P gain
- R11 back pressure I gain
- R12 back pressure zero
- R13 retract adjust
- R14 integral delay time
- R15 pressure limiter P gain
- R16 pressure limiter I gain

P-set signal input:
- Rin = 100 kOhm
- Pin 13
- Vin = 0 to +10 V

V-set signal input:
- Rin = 10 kOhm
- Pin 11
- Vin = 0 to +10 V

P-act signal input:
- Rin = 15 kOhm
- Pin 4
- Vin = 0 to +100 mV

S-act signal input:
- J404 made
- Pin 8, voltage
- Rin = 100 kOhm
- Vin = +10 to 0 V

V-act signal input:
- J421 made
- Pin 8, frequency
- full scale = 1.8 kHz
- mark space ratio = 50%
- Rin = 2 kOhm pull up to +15 V

S-act signal input:
- Pin 9
- Rin = 100 kOhm
- Vin = −10 to 0 V

Pressure transducer:
- +5 V ± 0.25 V @ 50 mA max
- supply, Pin 3

Valve supply:
- Internally supplied from pin 1

Supply:
- 24V nominal, 22 to 28 V
- 300 mA max output

Fuse:
- 250 mA T, slow blow, compliant to IEC127-2 sheet 3

Mounting:
- DIN rail to EN50002
- Housing IP40
- Terminal block IP20

Temperature:
- 0 to +40°C

Dimensions:
- 90 L x 85 W x 108 H

Weight:
- 316 gm

CYCLE DESCRIPTION

Refer to the timing diagram below and the Operating detail drawings on page 4.

Inject: At the start of the cycle the machine PLC sets the INJECT logic input true and outputs an analog voltage V-set, to set the inject speed. It also outputs an analog voltage P-set, which sets the upper limit of the inject pressure. As soon as the actual inject pressure reaches the P-set value, the speed control is suppressed by the pressure control and the rest of the inject part of the cycle is at constant pressure. The pressure will normally rise to this limit when the mold is full and the inject actuator can no longer move forward.

Hold Pressure: This part of the cycle maintains a constant pressure on the part, setting in the mold. The machine PLC now removes the INJECT logic input and sets HOLD PRESSURE true. At the same time it adjusts the P-set analog value to the required hold pressure.

Back Pressure: This part of the cycle maintains a constant pressure in the rear of the injection actuator to ensure even plasticising.

The machine PLC removes the HOLD PRESSURE logic signal and sets the BACK PRESSURE logic signal true. It adjusts the P-set analog signal to the required pressure and the closed loop holds the oil pressure at that value as the screw rotates and forces the inject actuator back.

Retract: After plasticising, the screw is pulled back to stop inject nozzle drool.

The machine PLC removes the BACK PRESSURE logic signal and sets the RETRACT logic signal true. The machine also pressurises the front of the inject actuator to pull back the screw. Oil flow out of the back of the actuator is controlled open loop by the servo valve. The command to the servo valve can come from V-set, or R13 on the VP Controller, or both.

CYCLE TIMING DIAGRAM
**LINK ACCESS**

Access to the internal circuit boards, so the links can be set, is achieved by the following:

- Remove both electrical connectors.
- Using a medium sized, flat blade screw driver, push in one side tab while pulling the cover away from the base. The cover will click over the tab.
- Repeat for the other tab on that side.
- After the two tabs on one side are released, release the two tabs on the other side.
- Withdraw the electronics assembly and identify the circuit boards by their part numbers C70349 and C70365.

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**MAIN PCB 3 TOP**

<table>
<thead>
<tr>
<th>Link</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>J406</td>
<td>✔️</td>
<td>Hold pressure controller integrating capacitor 220F</td>
</tr>
<tr>
<td>J409</td>
<td>✔️</td>
<td>Park for J410</td>
</tr>
<tr>
<td>J410</td>
<td>✔️</td>
<td>Hold pressure controller integrating capacitor 100F</td>
</tr>
<tr>
<td>J411</td>
<td>✔️</td>
<td>Park for J412</td>
</tr>
<tr>
<td>J412</td>
<td>✔️</td>
<td>Hold pressure controller integrating capacitor 220F</td>
</tr>
<tr>
<td>J414</td>
<td>✔️</td>
<td>Hold pressure controller integrator disable</td>
</tr>
</tbody>
</table>

**MAIN PCB 4 BOTTOM**

<table>
<thead>
<tr>
<th>Link</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>J415</td>
<td>✔️</td>
<td>Pressure measuring amp 10V transducer</td>
</tr>
<tr>
<td>J416</td>
<td>✔️</td>
<td>Pressure measuring amp 10V transducer</td>
</tr>
<tr>
<td>J417</td>
<td>✔️</td>
<td>Pressure measuring amp low gain Vx1</td>
</tr>
<tr>
<td>J418</td>
<td>✔️</td>
<td>Pressure measuring amp high gain Vx2</td>
</tr>
<tr>
<td>J419</td>
<td>✔️</td>
<td>Velocity signal offset</td>
</tr>
<tr>
<td>J420</td>
<td>✔️</td>
<td>Velocity signal from linear pot</td>
</tr>
<tr>
<td>J421</td>
<td>✔️</td>
<td>Velocity signal from pulse pick-up</td>
</tr>
</tbody>
</table>

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**MAIN PCB 4 BOTTOM**

- Fuse 250 mA T
- +24V 0V
- 15V power supply
- pressure transducer
- R14: J415 gain select
- R47: J408, J409 10V transducer select
- R2: zero (TP R2)
- R3: sensitivity
- sensitivity
- +24V
- 0V
- Inject
- Hold Pressure
- Back Pressure
- Retract
- H.P.
- B.P.
- RET
- +24V
- 0V
- Inject
- Hold Pressure
- Back Pressure
- Retract
- H.P.
- B.P.
- RET
- INJ
- H.P.
- B.P.
- RET
- differential amplifier
- voltage distributor
- terminal R6: P-portion
- terminal R7: I-portion
- bumpless transfer
- passive mixer
- proportional amplifier
- integrator
- output amplifier
- speed transducer
- linear potentiometer or pulse generator
- differential amplifier
- voltage distributor
- R6: P-portion
- R7: I-portion
- pressure limiter
- valve saturation detector
- integrator
- buffer
- inverter
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**Digital ground**

- J208
- J209 J210
- J211 J212
- J402 J403 J404
- J405 J406
- J407 J408
- J412
- J413
- J414 J415
- J417 J418 J419
- J420
- J421
- J422

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**Fuse 250 mA T**

1. Default link loaded.
**INTERCONNECT DIAGRAM**

**G122-828B017**

**FRONT PANEL TEST POINTS**

<table>
<thead>
<tr>
<th>Location</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2</td>
<td>–</td>
<td>Actual pressure zero</td>
</tr>
<tr>
<td>R4</td>
<td>–</td>
<td>Hold pressure command zero</td>
</tr>
<tr>
<td>R12</td>
<td>–</td>
<td>Back pressure command zero</td>
</tr>
<tr>
<td>R14</td>
<td>–</td>
<td>Retract speed trim</td>
</tr>
<tr>
<td>Terminal 6</td>
<td>Pact</td>
<td>Actual inject pressure. 0 to +10V</td>
</tr>
<tr>
<td>Terminal 7</td>
<td>Vact</td>
<td>Actual inject velocity. 0 to +10V</td>
</tr>
<tr>
<td>Terminal 10</td>
<td>Sact+</td>
<td>Actual inject position. 0 to +10V</td>
</tr>
<tr>
<td>Terminal 11</td>
<td>Vset</td>
<td>Command (set) inject velocity</td>
</tr>
<tr>
<td>Terminal 13</td>
<td>Pset</td>
<td>Command (set) inject pressure</td>
</tr>
<tr>
<td>Terminal 16</td>
<td>Vlv E</td>
<td>Servo valve drive signal. 0 to ±10V</td>
</tr>
<tr>
<td>Terminal 21</td>
<td>Vlv F</td>
<td>Servo valve spool signal. Varies with valve model.</td>
</tr>
<tr>
<td>Terminal 25</td>
<td>Sact-</td>
<td>Actual inject position. 0 to -10V</td>
</tr>
<tr>
<td>Various</td>
<td>–</td>
<td>Signal 0V reference (ground)</td>
</tr>
</tbody>
</table>

**INTERNET DATA**

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

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