

Flowtronic^D

2-Port Flow Control Valve with Digital Electronics

Installation Manual



numatics™

BCAE
Automation Solutions

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CAUTION

OBSERVE PRECAUTIONS
FOR HANDLING

ELECTROSTATIC SENSITIVE DEVICES

This product contains electronic components sensitive to electrostatic discharge. An electrostatic discharge generated by a person or object coming in contact with the electrical components can damage or destroy the product. To avoid the risk of electrostatic discharge, please observe the handling precautions and recommendations contained in standard EN 100015-1. Do not connect or disconnect the device while it is energised.



CAUTION! Dangerous operating conditions may occur when using the programming interface on the valve as the valve may possibly not react to the analog setpoint any more. Provide for protection against uncontrolled movement of equipment when putting the valve into operation and before making any modifications to the valve settings.

DECLARATION OF INCORPORATION

according to Machinery Directive 89/392/EEC, Annex II B

We herewith declare that the version of the product described in this installation manual is intended to be incorporated into or assembled with other machinery and that it must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Council Directive 89/392/EEC, Annex IIB.

Handling, assembly and putting into service and all settings and adjustments must be done by qualified, authorised personnel only.



This product complies with the essential requirements of the EMC Directive 89/336/EEC and its amendments. It is **CE**-approved. A separate Declaration of Conformity is available on request. A separate Declaration of Incorporation relating to the EU Directive 89/392/EEC Annex II B is available on request. Please provide ordering code and serial numbers of products concerned.

NOTICE

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1. Description

The **FLOWTRONIC^D** flow controller is especially designed for applications placing extreme dynamic demands on flow control. It consists of a fast, direct-acting 2-port proportional valve and a control unit that contains all the electronics and sensors. The FLOWTRONIC^D offers precise flow adjustment and quickly responds to outside influences. High accuracy is achieved by measuring the flow with two sensors. The Flowtronic^D directly regulates the actual rate of flow and adjusts it quickly to changing conditions.

The use of digital control electronics and a USB interface allow the FLOWTRONIC^D to be adapted to different applications. An auto-tune function and the Numatics FlowCom PC software provide easy start-up. Diagnosis of the FLOWTRONIC^D is made possible over the integrated LEDs and the Numatics FlowCom PC software. The FLOWTRONIC^D is available with or without LED display and operating buttons.

1.1 How to Order

8 3 3 - 3 8 0 1 0 1 1 5 0

Version (ports), body / Display

- 0 = (GTap) without display*
- 1 = (GTap) with display*
- 2 = 1/2 (GTap) without display
- 3 = 1/2 (GTap) with display
- 6 = (NPT) without display*
- 7 = (NPT) with display*
- 8 = 1/2 (NPT) without display
- 9 = 1/2 (NPT) with display
- * Port size depends on flow range (1/4 or 3/8)

Command signal

- 0 = 0 ... 10 Volt
- 1 = 0 ... 20 mA
- 2 = 4 ... 20 mA

Feedback

- 1 = Feedback output 00 ... 10 Volt
- 2 = Feedback output 00 ... 20 mA
- 3 = Feedback output 04 ... 20 mA
- 4 = Feedback input 0 - 10 Volt¹⁾
- 5 = Feedback input 0 - 20 mA¹⁾
- 6 = Feedback input 4 - 20 mA¹⁾

Notes:

¹⁾ Feedback input is needed for dual loop units.

Options

A00 = Dual loop control

Flow regulation range

- 10 = 0.4 - 3.5 SCFM (10 - 100 NI/min)
(1/4 - Versions 0, 1, 6 or 7 only)
- 20 = 0.4 - 7.1 SCFM (10 - 200 NI/min)
(1/4 - Versions 0, 1, 6 or 7 only)
- 30 = 0.4 - 10.6 SCFM (12 - 300 NI/min)
(1/4 - Versions 0, 1, 6 or 7 only)
- 50 = 0.7 - 17.7 SCFM (20 - 500 NI/min)
(1/4 - Versions 0, 1, 6 or 7 only)
- 60 = 0.8 - 21.2 SCFM (22 - 600 NI/min)
(1/4 - Versions 0, 1, 6 or 7 only)
- 99 = 1.8 - 35.3 SCFM (50 - 1000 NI/min)
(3/8 - Versions 0, 1, 6 or 7 only)
- 20 = 3.5 - 70.6 SCFM (100 - 2000 NI/min)
(1/2 - Versions 2,3,8 or 9 only)

Digital I/O

- 1 = Pressure switch output
PNP ± 5 %

1.2 Operating Elements



- 1 Proportional solenoid cover
- 2 Power supply, M12 connector
- 3 USB port, M12B connector
- 4 Operator buttons
- 5 3-digit display of flow
- 6.1 Green LED
 - OFF: Setpoint \neq feedback
 - ON: Setpoint = feedback
 - Flashing: Overtemperature
- 6.2 Yellow LED
 - OFF: Normal
 - ON: Manual operation
 - Flashing: AUTOSAFE enabled
- 6.3 Red LED
 - OFF: Normal
 - ON: Low voltage
 - Flashing: Overvoltage

1.3 Manual Setpoint Adjustment (Hand)

After an interruption in the power supply, press both arrow buttons located beneath the display during power up to switch to the manual mode. The operating mode is indicated by the letters "H n d" in the display.

The "H n d" display disappears when the arrow buttons are released.

Press the left arrow button or DOWN arrow to reduce the flow, press the right arrow button or UP arrow to increase the flow. The yellow LED is on permanently during manual mode.

Exit this operating mode by pressing both arrow buttons simultaneously or by turning off the power supply for a short time.

1.4 Operating Modes

Shut-off:

If the command signal falls below 0.5 %, the control valve is switched off and the flow is interrupted.

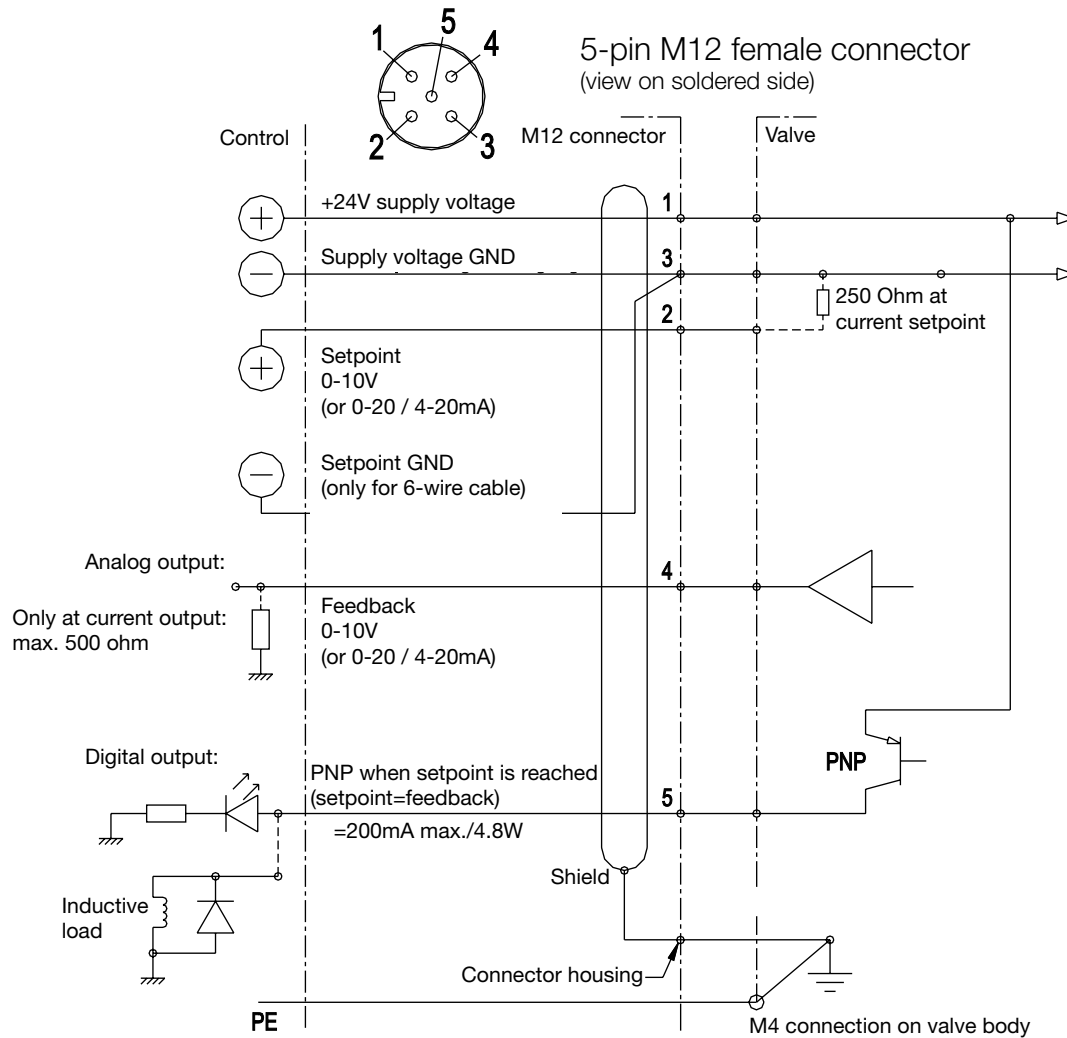
Overtemperature:

If the temperature of the internal control electronics exceeds 100°C the green LED starts to flash.

Undervoltage / overvoltage:

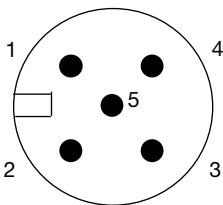
If the supply voltage is less than 19 V or more than 30 V, the control valve is switched off and the valve is locked. The red LED lights up constantly to indicate undervoltage or flashes to indicate overvoltage.

2. Electrical Connection



- 1) The valve must only be supplied with 24V DC at a tolerance of +15%/-10% and a max. ripple of 10% (no supply via diode bridge). Overvoltage or a ripple rate exceeding these tolerances can damage the electronics.
- 2) The max. current at the digital output is 200 mA/4.8W (PNP output). The output is protected against short circuit and overload.
- 3) If a relay (inductive load) is connected to the digital output, a freewheel diode or a varistor must be used.
- 4) A shielded cable must be used for protection against interference and EMC.
- 5) The valve body must be grounded with the earthing terminal PE (dia. M4)

Connector Pin Out

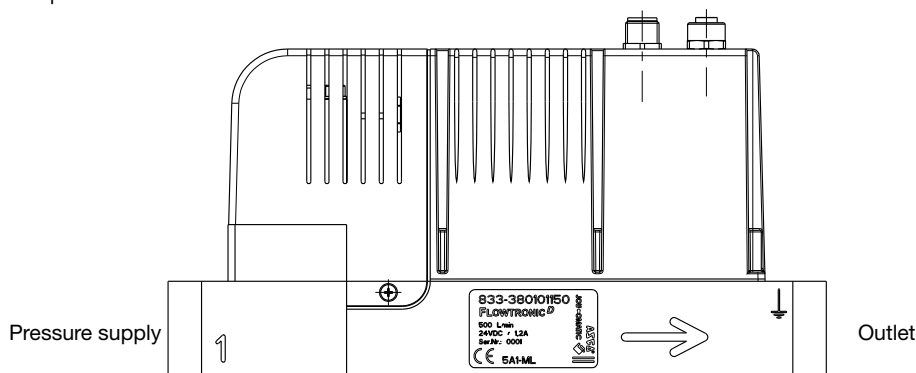


PIN	Description
1	+24 VDC Supply
2	Command Signal
3	+0 VDC Common (Supply)
	+0 VDC Common (Command Signal)*
4	Analog output (feedback)
5	Digital output (pressure switch)
Body	EMC shield

*A 6-wire cable with separate common for the command signal is used for cable lengths over 2 m to minimize the voltage drop for the command signal.

3. Pneumatic Connection

The air flow is from port 1 in the direction of the arrow.



Inch screw connections (pipe threads) must be used.

Each screw connections must be lined with a fitting synthetic sealing disc.

Do not use Teflon sealing tape or hemp as they may get inside the valve and damage it.

The diameter of the pneumatic lines must be adjusted to the nominal diameter of the valve. The diameter of outlet line (2) must be larger or equal to that of inlet line (1).

The supply pressure must not exceed 8 bar (116 psi).

4. Factory Settings

- Setpoint offset: 0 l/min flow rate at a command signal of 0 Volt or 0/4 mA.
- Span: Max. specified flow at a command signal of 10 V / 20 mA.
- Minimum hysteresis.
- The control parameters, setpoint offset, setpoint span and window size of the digital output are factory-programmed.

Parameter set: factory settings

Setpoint offset: 0%

Setpoint span: 100%

Setpoint ramp: no ramp

Shut-off: ON; the flow rate is 0 at a command signal below 0.5%

Controller structure: PID

Proportional gain: 0.1

Integration time: 0.2 sec

Derivation time: 0 msec

Window size: 5 %

5. Field-Programmable Settings

Display

The actual flow rate is displayed in NI/min during normal operation.

Hnd indicates that the Manual mode has been selected.

Push Buttons

To enter the Manual mode, press and hold both pushbuttons simultaneously and power off and power up again.

"Hnd" appears in the display.

Use the UP button to increase the flow rate and the DOWN button to decrease it. The actual flow rate is displayed.

Quick presses on the buttons allow you to make slight changes in the flow rate.

5. Field-Programmable Settings (Cont'd)

Push Buttons (Cont'd)

Longer presses allow you to make larger changes in the flow rate.

Press both pushbuttons simultaneously to exit the "Manual mode" and return to the "Regular mode". Pressing the UP or DOWN button in "Regular mode" causes the display to blink and show the setpoint in %. Press the UP or DOWN button again to display the actual flow rate.

Autotune

AUTOTUNE determines the forward current the proportional valve needs to open. This control parameter, called forward offset, is permanently stored.

AUTOTUNE can be activated in the three following ways:

1. Press and hold the AUTOTUNE button, switch the supply voltage off and on again, and release the AUTOTUNE button.
2. Over the Numatics FlowCom operating software.
3. If the appropriate option has been selected over the operating software, AUTOTUNE can be activated over the digital input (M12, Pin 5).

After having determined the forward offset, the device will automatically go into Regular mode.

6. Technical Characteristics

Construction

Directly operated valve

Body: Aluminium

Internal parts: Aluminum, brass, stainless steel

Seals: NBR

Installation

Assembly position: any (solenoid upright preferred)

6.1 Fluid Characteristics

Fluids:	Air or nitrogen (N ₂), filtered at 50 µm, without condensate, lubricated or not
Max. Air Pressure (MAP):	8 bar (116 psi)
Temperature Fluid:	32°F to 122°F (0°C to +50°C)
Ambient:	32°F to 104°F (0°C to 40°C)
Setpoint - Analog:	0 - 10 V (100 kW), 0/4 to 20mA (resistance 250 W)
Feedback - Analog:	0 - 10 V, 0/4 to 20 mA (max. load 500 W)
Flow accuracy	
Hysteresis:	± 3%
Linearity:	± 3%
Repeatability:	± 1.5%
Calibration Conditions	
Ambient Temperature:	72.5°F±4.5°F (22.5°C± 2.5°C)
Fluid:	Air
Dynamic Performance	
Response Time:	<200 ms
Other Features:	Auto-tune, error display by 3 LEDs

6.2 Electrical Characteristics

Flow Regulation Range	Voltage *	Max. Power (W)	Max. Current (mA)	Insulation Class	Degree of Protection	Electrical Connection
Up to 1000 NI/min	24 VDC = ± 10%	30	1250	H	IP 65	- 5-pin M12 connector - USB connection with 4 pin M12 connector
2000 NI/min	24 VDC = ± 10%	34	1400	H	IP 65	- 5-pin M12 connector - USB connection with 4 pin M12 connector

* Max. ripple: 10 %

7. Accessories



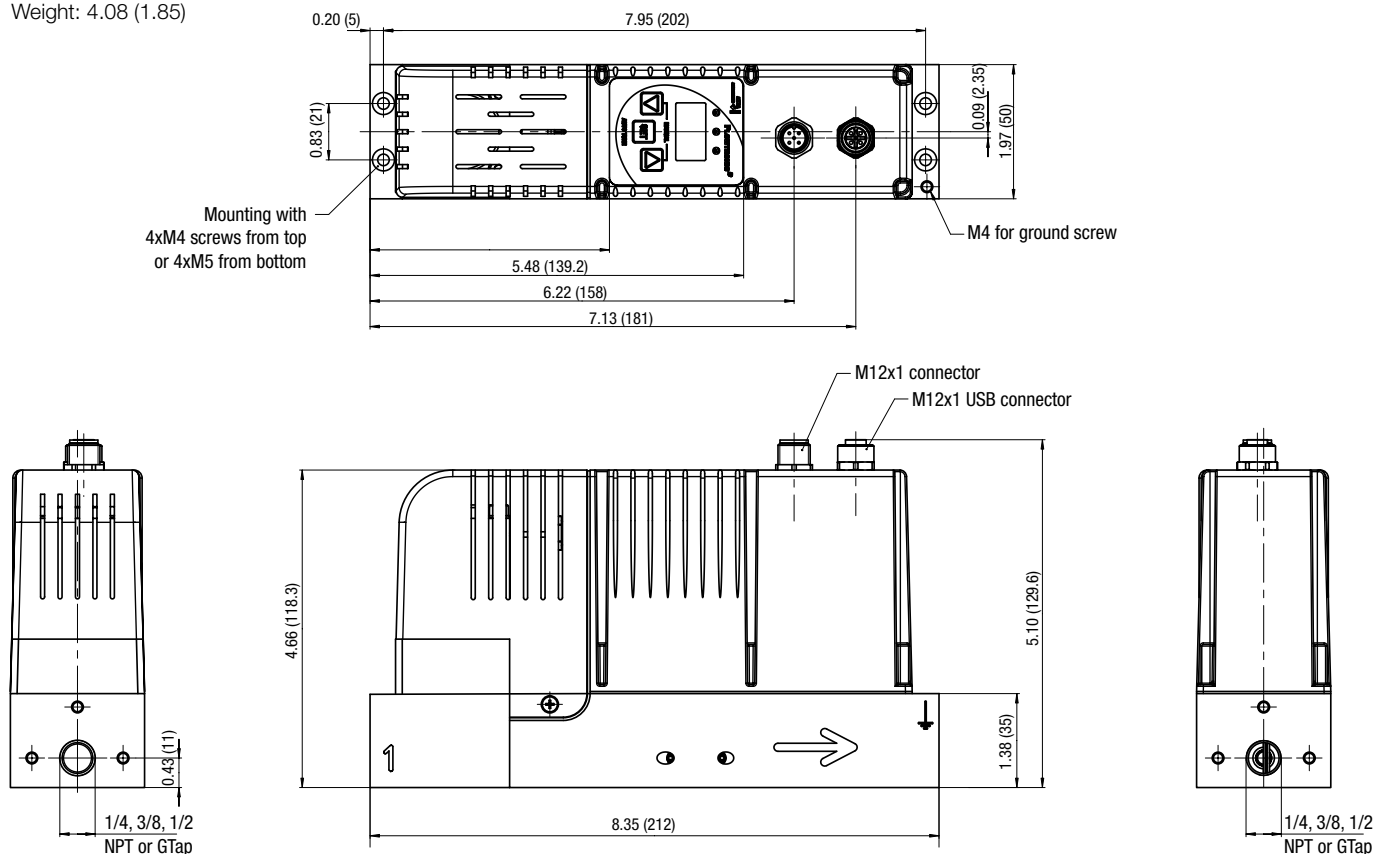
5 Pin 12mm FEMALE Straight Field Attachable Connectors		Model number
PG 9 Cable Gland		TC05F20000000000
5 Pin 12mm FEMALE 90 DEGREE Field Attachable Connectors		
PG 9 Cable Gland		TD05F20000000000
Micro Female 5 Pole Straight 6 Wire 22 AWG, Shielded		
3 Meter		TC0503MMS000671Y
5 Meter		TC0505MMS000671Y
Micro Female 5 Pole 90 Degree 6 Wire 22 AWG Euro Color Code, Shielded		
3 Meter		TD0503MMS000671Y
5 Meter		TD0505MMS000671Y
PC Software & Cable Connector		Model number
FLOWTRONIC ^D software "Numatics-FlowCom-Light" - free download at Numatics.com		88100895
FLOWTRONIC ^D software "Numatics-FlowCom-Expert" - CD-ROM		88100896
USB cable for connection of FLOWTRONIC ^D to PC		88100897

8. Maintenance and Care

No special maintenance or care required.

9. Dimensions and Weight

Weight: 4.08 (1.85)





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