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

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.

NOTICE
The information in this manual is subject to change without notice.
In no event shall Numatics be liable for technical or editorial errors or omissions. Neither is any liability assumed for accidental or consequential
damages arising out of or in connection with the supply or use of the information contained herein.
THIS MANUAL CONTAINS INFORMATION PROTECTED BY COPYRIGHT. NO PART OF THIS DOCUMENT MAY BE PHOTOCOPIED OR REPRODUCED IN ANY FORM OR MANNER WHATSOEVER WITHOUT PRIOR WRITTEN PERMISSION FROM NUMATICS.
1. Description

The Flowtronic 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 offers precise flow adjustment and quickly responds to outside influences. High accuracy is achieved by measuring the flow with two sensors. The Flowtronic 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 to be adapted to different applications. An auto-tune function and the Numatics FlowCom PC software provide easy start-up. Diagnosis of the Flowtronic is made possible over the integrated LEDs and the Numatics FlowCom PC software. The Flowtronic is available with or without LED display and operating buttons.

1.1 How to Order

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 Volt
5 = Feedback input 0 - 20 mA
6 = Feedback input 4 - 20 mA

Notes:
1) Feedback input is needed for dual loop units.
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 ≠ 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

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24 VDC Supply</td>
</tr>
<tr>
<td>2</td>
<td>Command Signal</td>
</tr>
<tr>
<td>3</td>
<td>+0 VDC Common (Supply)</td>
</tr>
<tr>
<td></td>
<td>+0 VDC Common (Command Signal)*</td>
</tr>
<tr>
<td>4</td>
<td>Analog output (feedback)</td>
</tr>
<tr>
<td>5</td>
<td>Digital output (pressure switch)</td>
</tr>
</tbody>
</table>

* 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 connection 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 Nl/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 (N₂), 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 20 mA (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

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

* Max. ripple: 10 %
7. Accessories

<table>
<thead>
<tr>
<th>5 Pin 12mm FEMALE Straight Field Attachable Connectors</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 9 Cable Gland</td>
<td>TC05F20000000000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 Pin 12mm FEMALE 90 DEGREE Field Attachable Connectors</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG 9 Cable Gland</td>
<td>TD05F20000000000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Micro Female 5 Pole Straight 6 Wire 22 AWG, Shielded</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Meter</td>
<td>TC0503MMS000671Y</td>
</tr>
<tr>
<td>5 Meter</td>
<td>TC0505MMS000671Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Micro Female 5 Pole 90 Degree 6 Wire 22 AWG Euro Color Code, Shielded</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Meter</td>
<td>TD0503MMS000671Y</td>
</tr>
<tr>
<td>5 Meter</td>
<td>TD0505MMS000671Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Software &amp; Cable Connector</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOWTRONIC® software &quot;Numatics-FlowCom-Light&quot; - free download at Numatics.com</td>
<td>88100895</td>
</tr>
<tr>
<td>FLOWTRONIC® software &quot;Numatics-FlowCom-Expert&quot; - CD-ROM</td>
<td>88100896</td>
</tr>
<tr>
<td>USB cable for connection of FLOWTRONIC® to PC</td>
<td>88100897</td>
</tr>
</tbody>
</table>

8. Maintenance and Care

No special maintenance or care required.

9. Dimensions and Weight

Weight: 4.08 (1.85)

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Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.