



# Griswold Controls Energy FIT System

*Energy-Saving Pressure Independent Temperature Control System  
DN15-40 / 1/2"-1 1/2"*



## FEATURES AND BENEFITS

The Griswold Energy FIT System is the world's first pressure independent temperature controlling regulation valve. With the FIT System you will get monitoring, measuring, connectivity and control in one package including PICV valve, sensor kit and the Intelligent Interface.

The FIT System measures energy usage while monitoring performance and adjusts the PICV valve to optimize coil performance. The PICV valve maintains the correct flow, despite pressure changes, and guarantees that flow and actuator position will only change when demand requirements change or  $\Delta T$  is outside specification. The FIT System is suitable for any sub-metering application.

With FIT's SMART control logic, room temperature (i.e. human comfort) will be prioritized as long as temperature is outside user specifications. Once within,  $\Delta T$  control will be prioritized and flow rates may be reduced, providing significant energy savings.

- **State-of-the-art** - Pressure independent temperature control.
- **All-in-one** including PICV, temperature and pressure sensors, flow meter and energy meter for sub-metering applications.
- **User friendly** with **easy** setting.
- **Cost savings** due to optimized energy consumption and improved efficiency.
- **Complete overview** of energy and flow.
- **Simple monitoring** via Bluetooth® or BACnet to BMS.
- **Clear information** regarding  $\Delta T$ ,  $\Delta P$ , flow rate and energy heat transfer.
- **Flexible solution** - also allowing upside-down installation.
- **No piping restriction** and most **compact** system on the market.

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## SPECIFICATIONS

### **PICV valve**

Static pressure:	2500 kPa / 360 psi
Ambient temperature:	-10°C to +50°C / +14°F to +122°F
Media temperature:	-20°C to +120°C / -4°F to +248°F
Material:	
• Housing and covers:	Brass ASTM CuZn40Pb2
• Union end connections:	Brass alloy
• Composite components (internal):	FIT.1, 1/2"-1": POM / PC FIT.2, 1"-1 1/2": POM / PPS (glass-reinforced) / PC
• Metal components (internal):	FIT.1, 1/2"-1": Brass and stainless steel FIT.2, 1"-1 1/2": Stainless steel
• Stem seal and O-rings:	EPDM
• Diaphragm:	HNBR
• Bracket:	PA
• Snap ring:	PE
Stroke:	2160°
Maximum close off pressure:	600 kPa / 87 psi
Maximum operational ΔP:	320 kPaD / 46 psid
Control characteristic:	Linear flow
Rangeability:	>100:1
Turn down ratio:	>100:1
Shut-off leakage:	ANSI / FCI 70-2 2006 / IEC 60534-4 - Class IV
Flow rate range:	0.00685-2.34 l/sec / 0.109-37.1 GPM
End connection <sup>1</sup> :	Union end connections ISO or NPT
Housing taps:	1/4" ISO

Note 1: NPT only available ex. US-factory.



## SPECIFICATIONS

### FlowCon PICV actuator<sup>2</sup>

#### FlowCon SM.0.0.1.3 (standard)

#### FlowCon SM.0.0.1.4 (standard failsafe)

#### FlowCon SM.0.0.0.6 (BACnet failsafe)

#### Supply voltage:

- SM.0.0.1.3/4: 24V AC  $\pm 20\%$ , 50/60 Hz or 24V DC  $\pm 20\%$
- SM.0.0.0.6: 22-26V AC, 50/60Hz or 22-26V DC

#### Type:

Electrical, Bi-directional synchronous motor

#### Power consumption:

- SM.0.0.1.3: 24V AC: 2.2VA standby / 3.8VA operating / 15VA max  
24V DC: 1.0W standby / 1.7W operating / 8.0W max
- SM.0.0.1.4: 24V AC: 3.3VA standby / 4.5VA operating / 15VA max  
24V DC: 2.0W standby / 3.0W operating / 8.0W max
- SM.0.0.0.6: 22-26V AC: 3.5VA standby / 5.0VA operating / 12VA max

#### Control signal:

Analog 2-10V DC

#### Resolution:

1:800 (2-10V analog)

#### Feedback:

Linear flow

Auto (equal to analog control signal) or 2-10V DC

#### Control mode:

Linear flow

#### Supply voltage failsafe:

- SM.0.0.1.3: Fail in place
- SM.0.0.1.4: Fail in place or settable 0-100% open
- SM.0.0.0.6: Optional open or close

#### Control signal failsafe:

- SM.0.0.1.3/4: Fail in place or settable 0-100% open

#### Manuel override:

Yes

#### Position indicator:

No

#### Operation time:

- FlowCon valve SM.3-5: 190 sec (from closed to fully open valve)
- FlowCon valve SM.6: 317 sec (from closed to fully open valve)

#### Actuating force:

- SM.0.0.1.3/4: 9 Nm opening / 7.5 Nm closing
- SM.0.0.0.6: 8 Nm opening / 7.0 Nm closing

#### Stroke:

- FlowCon valve SM.3-5: 2160°
- FlowCon valve SM.6: 3600°

#### Ambient temperature:

-10°C to +50°C / +14°F to +122°F

#### Humidity rating:

5..95% rH, no condensation

#### Protection:

IP54 including upside-down mounting

#### CE conformity:

EN 60730, class II

#### Calibration:

Automatic at startup

#### Cable:

- SM.0.0.1.3/4: Fixed, 5 wires x 0.75 mm<sup>2</sup> / AWG18, halogen free, 1 meter / 3 ft
- SM.0.0.0.6: Fixed, 5 wires x 0.75 mm<sup>2</sup> / AWG18, halogen free, 1 meter / 3 ft  
Fixed, 3 wires x 0.75 mm<sup>2</sup> / AWG18, halogen free, 1 meter / 3 ft (BACnet)

#### Material:

- Cover, top: PA (glass-reinforced), UL94, V0 rated
- Cover, bottom: PC (glass-reinforced), UL94, V0 rated
- Spindle adaptor: Brass and EPDM

#### Valve-actuator coupling:

Easy snap coupling

#### Programming:

- SM.0.0.1.3/4: Programming of all settings on interface with buttons and display
- SM.0.0.0.6: Programming of all settings on interface with buttons and display or via BACnet

Note 2: FlowCon warranty is voided using other actuators than supplied or recommended by FlowCon International.



## SPECIFICATIONS

### **BACnet (SM.0.0.0.6)**

Protocol:	BACnet MS/TP
Interface:	EIA-485 / RS-485
Device profile:	BACnet Application Specific Controller (B-ASC) type server
Baud rates supported:	9600, 19200, 38400, 76800 and 115200
Services (BIBBS) supported:	DS-RP-B, DS-WP-B, DM-DDB-B, DM-DOB-B and DM-DCC-B
BACnet fallback action:	Yes
Participants:	Up to 32 recommended, max. 127 participants
Load:	1/8

### **Intelligent Interface**

Supply voltage:	24V AC -0%/+20%, 50-60Hz or 24V DC -0%/+20%
Power consumption:	4W
Control signal:	2-10V DC
Output:	2-10V DC
Humidity rating:	5..95% rH, no condensation
Protection:	IP54 including upside-down mounting
CE conformity:	Yes
Cable, 3 groups:	
• Group 1:	fixed, 1 wire with quick-connector, 3 meter / 9 ft (T1) fixed, 1 wire with quick-connector, 1 meter / 3 ft (T2) fixed, 3 wires, 0.6 meter / 2 ft (analog actuator communication)
• Group 2:	fixed, 2 wires 0.6 meter / 2 ft (power and ground) fixed, 3 wires 0.6 meter / 2 ft (BACnet BMS Communication)
• Group 3:	fixed, 1 wire with quick-connector, 1 meter / 3 ft (P1) fixed, 1 wire with quick-connector, 1 meter / 3 ft (P2) fixed, 3 wires, 0.6 meter / 2 ft (BACnet actuator communication)
Material:	
• Cover, top:	PA (glass-reinforced), UL94, V0 rated
• Cover, bottom:	PC (glass-reinforced), UL94, V0 rated
• Bracket:	St 37-2, powder coated
Protocol:	BACnet MS/TP
Interface:	EIA-485 / RS-485
Device profile:	BACnet Application Specific Controller (B-ASC) type server
Baud rates supported:	9600, 19200, 38400, 57600, 76800 and 115200
Services (BIBBS) supported	DS-RP-B, DS-WP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, DS-RPM-B and DM-RD-B
Participants:	Up to 32 recommended, max. 127 participants
Load:	1/8



## SPECIFICATIONS

### Temperature sensors (T1 and T2)

Supply voltage:	NA
Cable:	No cable, but with quick-connector
Output:	Resistive
Media temperature:	-20°C to +120°C / -4° to +248°F
Working pressure:	40 bar / 580 psi
Housing material:	AISI 304
Protection:	IP65
Probe length:	12.7 mm / 0.5 in (use of sensor pocket is recommended)
Probe diameter:	6 mm / 0.236 in
CE conformity:	Yes
Connection:	1/4" ISO

#### Performance data:

- Sensor type: PT1000
- Accuracy: 0.5% FS (Full Scale)
- Linearity:  $\pm 0.5\%$  FS (Full Scale)
- Long time stability: 0.1% FS (Full Scale)
- Response time: at 50°C (122°F): 2.3 sec / at 90°C (194°F): 5.4 sec.

### Pressure sensors (P1 and P2)

Supply voltage:	2V DC
Cable:	No cable, but with quick-connector
Output:	4-20mA
Media temperature:	-10°C to +85°C / +14°F to +185°F
Pressure range <sup>3</sup> :	0-25 bar / 0-360 psi
Housing material:	AISI 304
Protection:	IP65
CE conformity:	Yes
Connection:	1/4" ISO

#### Performance data:

- Accuracy:  $\pm 1.5\%$  FS (Full Scale)  
(tolerances can be software compensated in the Griswold Controls Intelligent Interface)
- Stability: 0.5% FS (Full Scale)  $\pm 0.05\%$
- Thermal effect on zero:  $\pm 0.1\%$  FS (Full Scale)
- Thermal effect on span:  $\pm 0.05\%$  FS (Full Scale)
- Electronic proof: Short circuit protection
- Response time: <20 msec (20 sec mean value calculated in the Griswold Controls Intelligent Interface)

Note 3: Calibrated at factory at 24V DC.

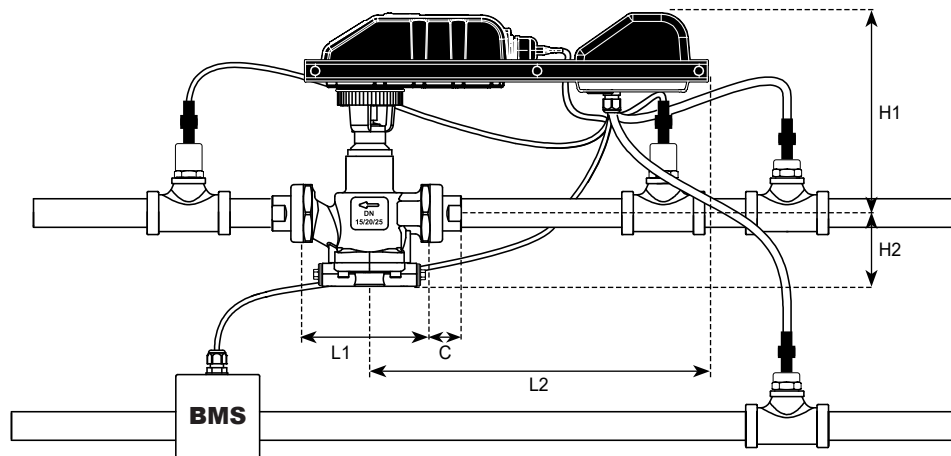


## DIMENSIONS AND WEIGHT

Model no.	Valve size	PICV Valve				End connections C <sup>4</sup>			Weight <sup>5</sup>
		L1	L2	H1	H2	Female	Male	Sweat	
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm	kg (lb)	
FIT.1.1	15 (1/2)	108 (4.25)	338 (13.3)	185 (7.28)	59 (2.32)	22 (0.87)	24 (0.95)	20	3.31 (7.30)
	20 (3/4)					22 (0.87)	25 (0.99)	20	
	25 (1)					-	39 (1.54)	22	
FIT.2.1	25 (1)	149 (5.87)	338 (13.3)	235 (9.25)	63 (2.48)	35 (1.38)	40 (1.57)	34	5.24 (11.6)
	32 (1 1/4)					33 (1.30)	40 (1.57)	34	
	40 (1 1/2)					33 (1.30)	42 (1.65)	-	

Note 4: Add end connection length to body length.

Note 5: Weight includes PICV valve, PICV actuator (standard), Intelligent Interface and sensor kit, but no end connections.





## MODEL NUMBER SELECTION

	FIT	1	2
Housing size:			
<b>1</b> = DN15-25 / 1/2"-1"			
<b>2</b> = DN25-40 / 1"-1 1/2"			
Control range:			
<b>1</b> = 32-320 kPaD / 4.6-46 psid (FIT.1) or 40-320 kPaD / 5.8-46 psid (FIT.2)			
P/t plug requirements:			
<b>B</b> = p/t plugs			
<b>P</b> = taps plugged (standard)			
Type of actuator:			
<b>3</b> = standard (SM.0.0.1.3)			
<b>4</b> = standard and failsafem (SM.0.0.1.4)			
<b>6</b> = BACnet and failsafe (SM.0.0.0.6)			
Union end connections (inlet x outlet):			
Model and size	Female threaded	Male threaded	Sweat
FIT.1.1 DN15-25 / 1/2"-1"	<b>E</b> = 15 mm / 1/2" <b>F</b> = 20 mm / 3/4"	<b>H</b> = 15 mm / 1/2" <b>I</b> = 20 mm / 3/4" <b>J</b> = 25 mm / 1"	<b>K</b> = 15 mm <b>L</b> = 18 mm <b>M</b> = 22 mm
FIT.2.1 DN25-40 / 1"-1 1/2"	<b>G</b> = 25 mm / 1" <b>P</b> = 32 mm / 1 1/4" <b>Q</b> = 40 mm / 1 1/2"	<b>J</b> = 25 mm / 1" <b>S</b> = 32 mm / 1 1/4" <b>T</b> = 40 mm / 1 1/2"	<b>N</b> = 28 mm <b>W</b> = 35 mm
Sensor kit:			
<b>2</b> = PICV valve, pressure/temperature sensor kit, Bluetooth® and ΔT control			

### 1 actuator bracket included (standard)

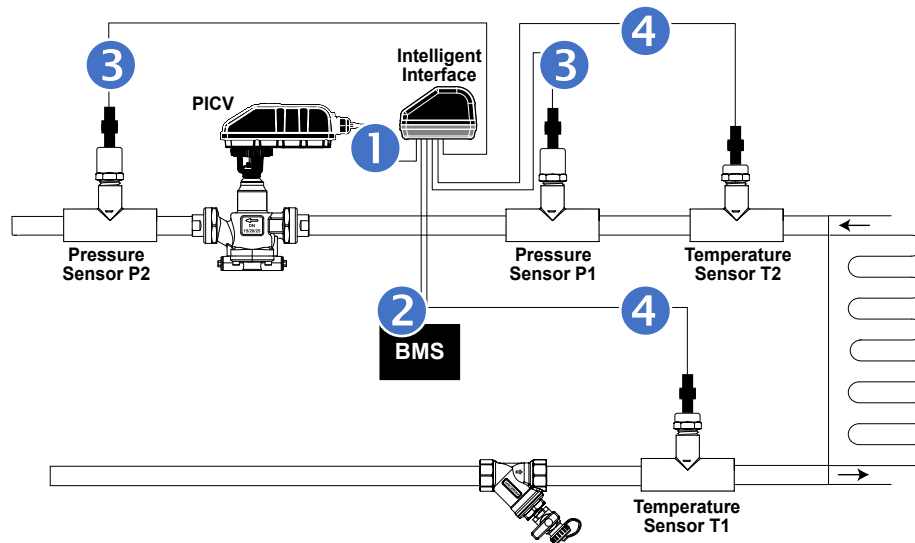
Example:

**FIT.2.1.B.3.Q.Q.2** = Griswold Controls Energy FIT System DN25-40 (1"-1 1/2"), 40-320 kPaD (5.8-46 psid) with p/t plugs, standard actuator and DN40 (1 1/2") ISO female threaded end connections as well as pressure/temperature sensor kit, Bluetooth® and ΔT control incl. actuator bracket.

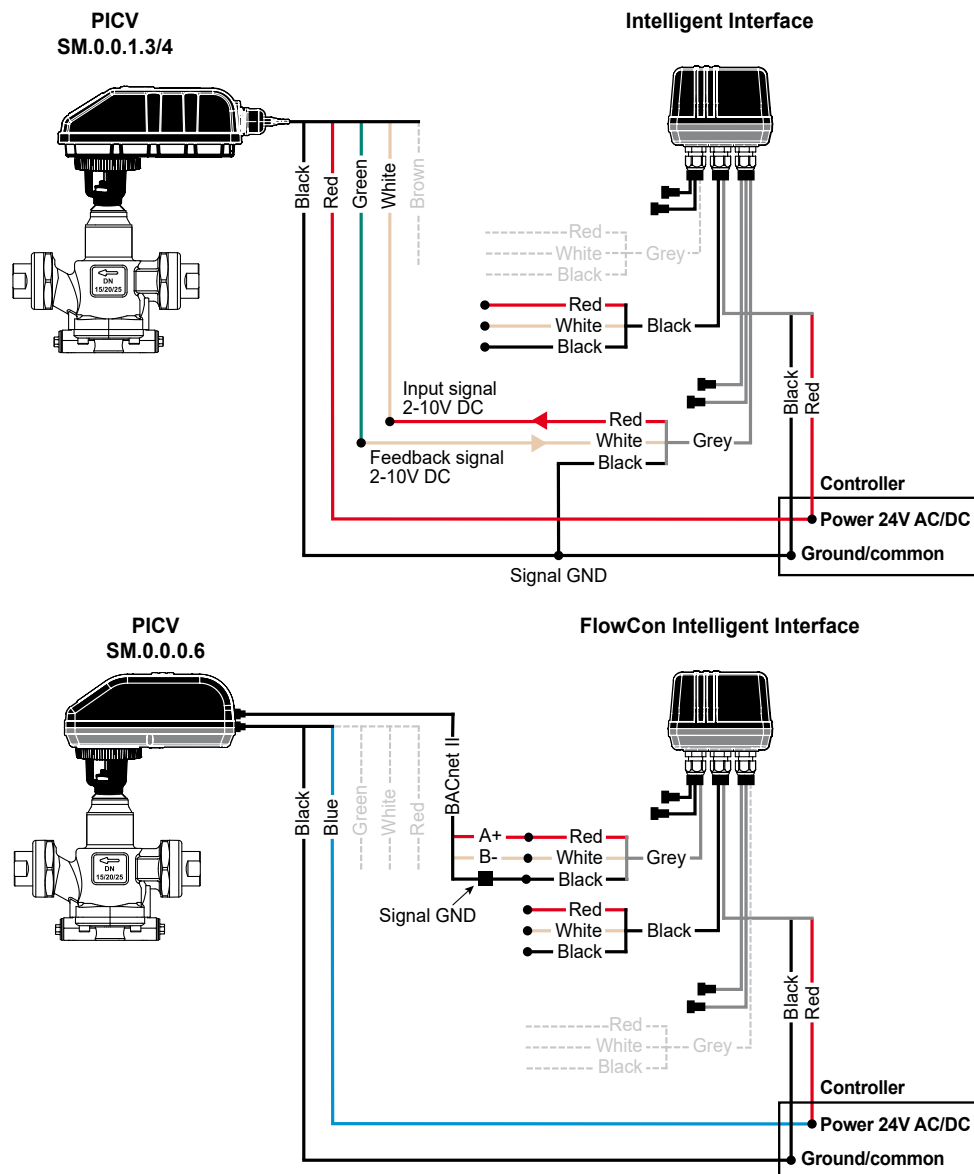
For **NPT threaded solution**, please add "**N**" at the end of the model number.



# WIRING INSTRUCTION



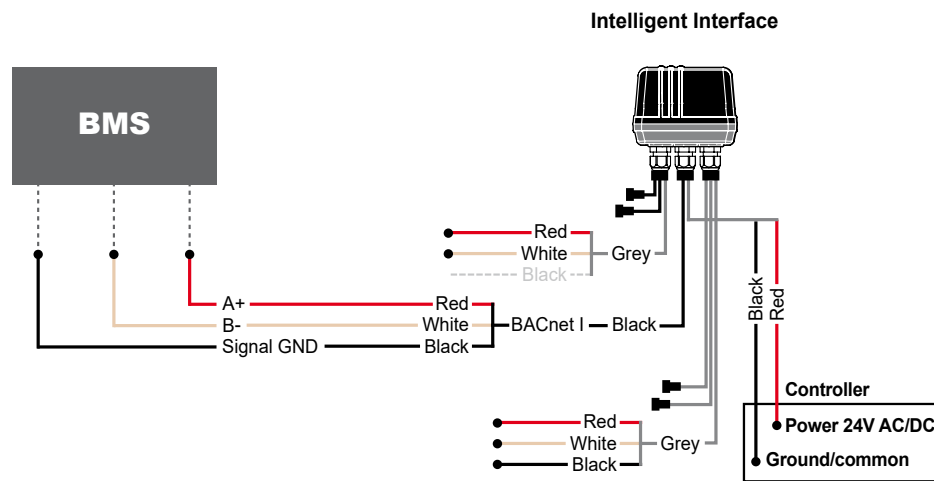
1



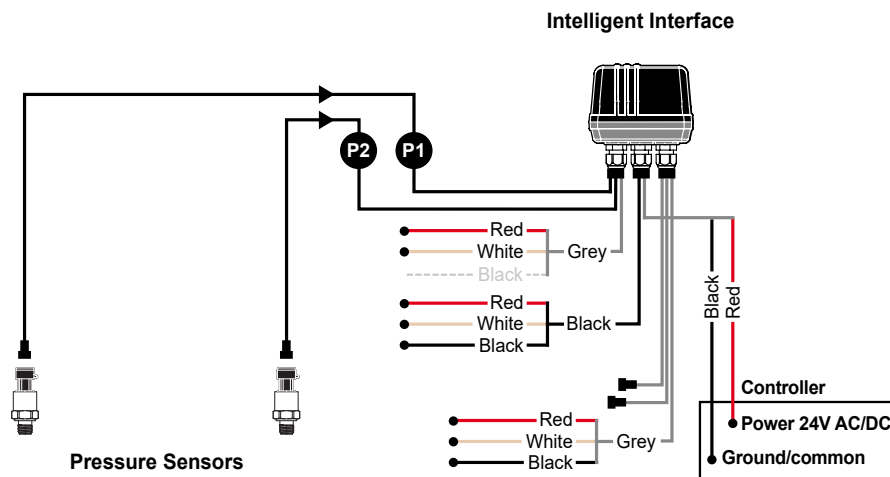


## WIRING INSTRUCTION

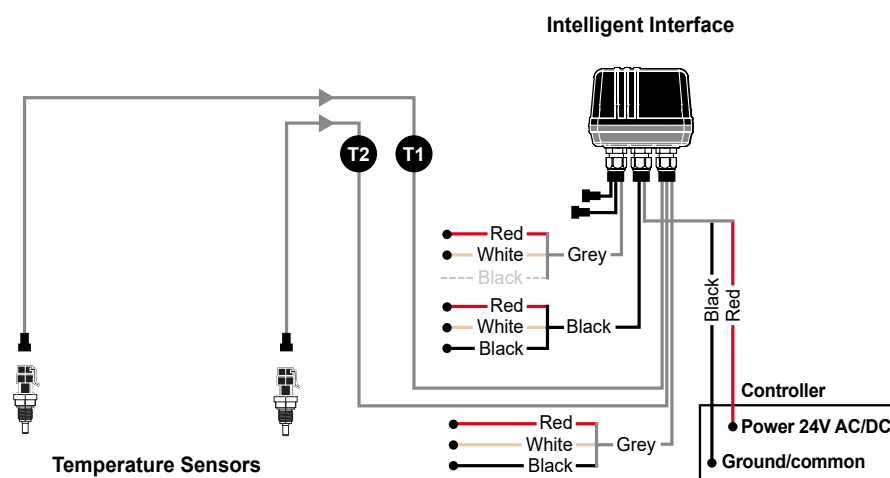
2



3



4





## DESCRIPTION

The Griswold Controls Energy FIT System measures energy usage while monitoring performance to adjust the PICV to optimize chiller performance. The PICV maintains the correct flow despite pressure changes and guarantees that flow and actuator position only change when demand requirements change or water  $\Delta T$  is outside of specification.

The Griswold Controls FIT is fully customizable and allows selection of components that work best to optimize the application's unique energy goals. It consists of a FIT Intelligent Interface and a SM actuator. The FIT Interface has control logics based on sensor inputs and feedback from the actuator. The sensors used for the FIT System are two PT1000 temperature sensors and two 25 bar pressure sensors measuring relative to atmospheric pressure. The temperature sensors provide the Griswold Controls FIT with measurements of up- and downstream temperature, and the pressure sensors measure the  $\Delta P$  across the PICV allowing the BMS to reduce system pressure to save pump energy when pressure drop is higher than the PICV's requirements.

When the FIT System is set up with pressure and temperature sensors, inlet- and outlet temperatures, static and differential pressures, flow rate and BTU/kWh will be readable in the Building Management System through the BACnet objects. Also, the control objects can be controlled through the BACnet interface. For full detailed information, please see Griswold Controls FIT BACnet PICS.

If combined, a BACnet compatible SM actuator and the FIT Intelligent Interface will give you access to remote programming of the SM actuator via BACnet. Furthermore, notifications from the SM actuator are routed through the FIT to the BMS system for remote monitoring. In addition, the BACnet compatible SM actuator will show a variety of information incl. sensor data in its display for local access.

There are 3 main control modes for the FIT module: direct  $\Delta T$  Control, direct Comfort Control, and Smart Control.  $\Delta T$  Control adjusts the flow through the valve with the aim of maintaining a set design  $\Delta T$  in the hydraulic system. Comfort Control allows you to adjust the control signal of the actuator directly and thereby control water flow rate like a standard control valve. And Smart Control uses a dual layer control characteristic. The main control is changing the flow to optimize the room temperature relative to the room temperature target. When the room temperature is within the accepted range, the  $\Delta T$  control is activated to optimize the water  $\Delta T$ .

Finally, the Griswold Controls Energy FIT System has local Bluetooth® access in immediate vicinity of the FIT Interface that can be used through the Griswold Controls App. The Griswold Controls Intelligent Interface calculates the BTU and displays the data via Bluetooth® on an Android or iPhone mobile device. In the Griswold Controls App you may connect to the FIT System by tapping "Connection" and "Search" for Griswold Controls systems around. Follow the steps in the App menu and press "Add". This way, you can monitor T1, T2,  $\Delta T$ , P1, P2,  $\Delta P$ , Flow, BTU/kWh and  $\Delta T$  target.





## FLOW RATE SETTING<sup>6</sup>

### FlowCon SM.0.0.1.3 / SM.0.0.1.4 Actuators

Griswold FIT.1.1	Flow Rate Setting Table - FlowCon SM.0.0.1.3/4 Actuators		
	Valve size: DN15-25 / 1/2"-1"		
Pressure range, ΔP:	32-320 kPaD / 4.6-46 psid		
FIT.1.1			
	l/sec	l/hr	GPM
Lowest settable max flow	0.00685	24.7	0.109
Increments	0.00685	24.7	0.109
Highest settable max flow	0.685	2470	10.9

Griswold FIT.2.1	Flow Rate Setting Table - FlowCon SM.0.0.1.3/4 Actuators		
	Valve size: DN25-40 / 1"-1 1/2"		
Pressure range, ΔP:	40-320 kPaD / 5.8-46 psid		
FIT.2.1			
	l/sec	l/hr	GPM
Lowest settable max flow	0.0234	84.2	0.371
Increments	0.0234	84.2	0.371
Highest settable max flow	2.34	8420	37.1

### FlowCon SM.0.0.0.6 Actuator

Griswold FIT.1.1	Flow Rate Setting Table - FlowCon SM.0.0.0.6 Actuators		
	Valve size: DN15-25 / 1/2"-1"		
Pressure range, ΔP:	32-320 kPaD / 4.6-46 psid		
FIT.1.1			
	l/sec	l/hr	GPM
Lowest settable max flow	0.176	633	2.78
Estimated increments	0.0102	36.7	0.162
Highest settable max flow	0.685	2470	10.9

Griswold FIT.2.1	Flow Rate Setting Table - FlowCon SM.0.0.0.6 Actuators		
	Valve size: DN25-40 / 1"-1 1/2"		
Pressure range, ΔP:	40-320 kPaD / 5.8-46 psid		
FIT.2.1			
	l/sec	l/hr	GPM
Lowest settable max flow	0.513	1850	8.13
Estimated increments	0.0365	131	0.579
Highest settable max flow	2.34	8420	37.1

Note 6:

Accuracy: Greatest of either ±5% of the controlled flow or ±2% of the maximum flow applies at flow rates between 35% and 100% of rated valve capacity. Griswold recommends valve's max flow to minimum 50% of rated valve capacity.

Above table indicates settable max flow defining the flow through the valve at maximum control signal, normally 10V.



## GENERAL SPECIFICATIONS

### **1. Pressure independent temperature control system - Griswold FIT**

- 1.1. Contractor shall install where indicated in drawings.
- 1.2. System shall include a pressure independent dynamic control valve, a sensor kit and an electronic unit.
  - 1.2.1. The PICV valve shall accurately control flow independent of system pressure fluctuations.
  - 1.2.2. The sensor kit shall include 2 temperature sensors and 2 pressure sensors. Temperature sensors shall measure the  $\Delta T$  across the coil and pressure sensors shall measure the  $\Delta P$  across the PICV.
  - 1.2.3. The intelligence interface shall accurately change PICV flow to maintain target  $\Delta T$ . In addition, the electronic unit shall calculate BTU or kWh heat transfer and supply continuous information on  $\Delta T$ ,  $\Delta P$  and flow.
- 1.3. Housing shall be permanently marked to show direction of flow.

### **2. Valve actuator**

#### 2.a FlowCon SM.0.0.1.3 / SM.0.0.1.4 Actuators

- 2.a.1. Valve-actuator coupling shall be snap coupling for fast mounting and de-mounting.
- 2.a.2. Actuator housing shall be rated to IP54 including upside-down mounting.
- 2.a.3. Actuator shall be driven by a 24V AC/DC motor and shall accept 2-10V control signal.
- 2.a.4. Actuator control mode shall be selectable to linear flow.
- 2.a.5. Actuator shall be capable of providing linear flow feedback signal to the control system. Feedback signal shall be selectable to Auto (equal to input signal) or 2-10V DC.
- 2.a.6. In case of lost control signal, actuator shall be capable of operating valve to any set 0-100% open position or remain in place.
- 2.a.7. Automatic calibration of valve position shall be standard.
- 2.a.8. Actuator shall include buttons for external programming of all settings with the valve in-line and system in operation.
- 2.a.9. Actuator display showing current valve flow, maximum valve flow, input signal, feedback signal, operational direction and control mode shall be standard.
- 2.a.10. Optional failsafe versions shall be available. In case of power failure, failsafe versions shall be capable of operating valve to any set 0-100% open position or remain in place.

OR

#### 2.b FlowCon SM.0.0.0.6 Actuator

- 2.b.1. Valve-actuator coupling shall be snap coupling for fast mounting and de-mounting.
- 2.b.2. Actuator housing shall be rated to IP54 including upside-down mounting.
- 2.b.3. Actuator shall be driven by a 24V AC/DC motor and shall accept 2-10V DC electric input signal.
- 2.b.4. Actuator shall be capable of providing linear feedback signal to the control system. Feedback signal shall be equal to input signal, 2-10V DC.
- 2.b.5. Automatic calibration of valve position shall be standard.
- 2.b.6. Actuator shall include buttons for external programming of all settings with the valve in-line and system in operation.
- 2.b.7. Actuator display showing current valve flow, maximum valve flow, input signal, feedback signal and operational direction shall be standard.
- 2.b.8. Failsafe version to power valve to either open (max. setting) or closed position from any position in case of power failure shall be standard.
- 2.b.9. BACnet version shall be standard. BACnet versions shall provide remote setting and control of actuator.

### **3. Valve housing**

- 3.1. Housing shall consist of brass ASTM CuZn40Pb2 rated at no less than 2500 kPa (360 psi) static pressure and +120°C (+248°F).
- 3.2. Housing shall be double union end construction with a range of pipe connections available for appropriate pipe size.
- 3.3. Pressure/temperature test plugs for verifying accuracy of flow performance shall be available on all valve sizes.



## GENERAL SPECIFICATIONS

### **4. Flow regulation unit**

- 4.1. Flow regulation unit shall consist of brass / POM / PC or POM / PPS (glass-reinforced) / PC depending on valve size and be with EPDM sealings and a HNBR diaphragm.
- 4.2. Flow regulation unit shall be accessible for change-out or maintenance.
- 4.3. Flow regulation unit shall, via the actuator, be externally adjustable to 100 different settings; minimum pressure range shall be capable of being activated by 32 kPaD (4.6 psid) or 40 kPaD (5.8 psid) depending on valve size. Further, the flow regulation unit shall be capable of controlling the flow within  $\pm 5\%$  of controlled flow or  $\pm 2\%$  of maximum flow in a specified range of rated valve capacity.

### **5. Intelligent interface / electronic unit**

- 5.1. Intelligent interface shall consist of UL94 V0-rated plastic.
- 5.2. Intelligent interface shall be rated to IP54 including upside-down mounting.
- 5.3. Intelligent interface shall be driven by 24V AC/DC.
- 5.4. Intelligent interface shall be Bluetooth<sup>®</sup> enabled.
- 5.5. Intelligent interface shall be capable of communicating via BACnet with the control system and wire-less feedback signal to handheld devices. Shall communicate with both Android and iPhone devices and display via App.

### **6. Temperature sensor**

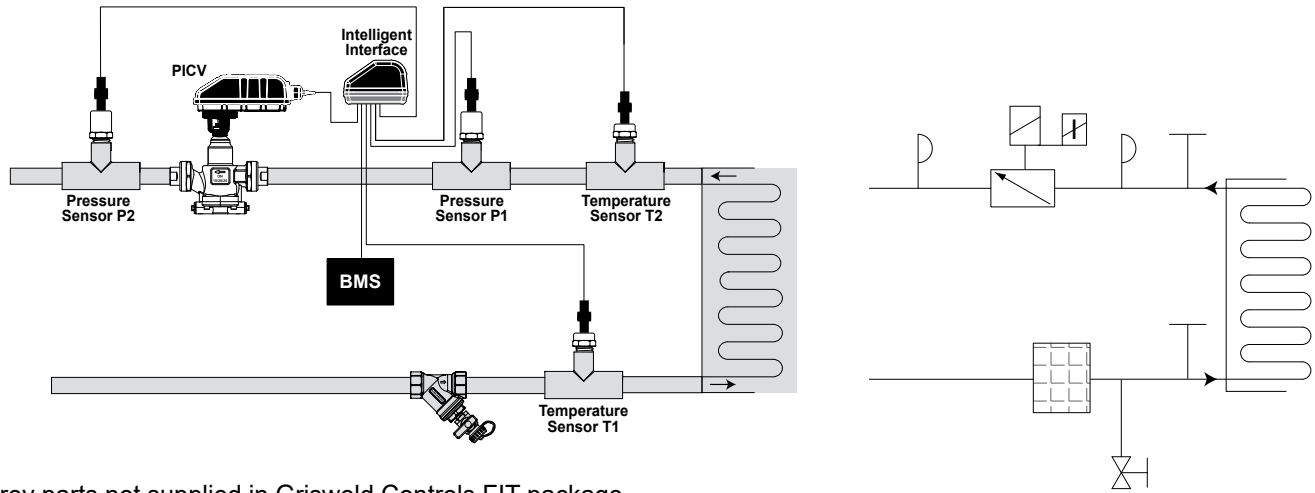
- 6.1. Temperature sensors shall consist of AISI 304.
- 6.2. Temperature sensors shall be IP65.
- 6.3. Temperature sensors shall provide a resistive output signal corresponding to water temperature.

### **7. Pressure sensor**

- 7.1. Pressure sensors shall consist of AISI 304.
- 7.2. Pressure sensors shall IP65.
- 7.3. Pressure sensors shall be driven by 12V DC.
- 7.4. Pressure sensors shall provide a 4-20mA output signal corresponding to water pressure.



## APPLICATION AND SCHEMATIC EXAMPLE



Grey parts not supplied in Griswold Controls FIT package

## UPDATES

For latest updates please see [www.griswoldcontrols.com](http://www.griswoldcontrols.com)

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