IMI Hydronic Engineering

Harmony

Engineering GREAT Solutions

FINDING TRUE BALANCE IN YOUR HYDRONIC SYSTEM

The Balancing Valve

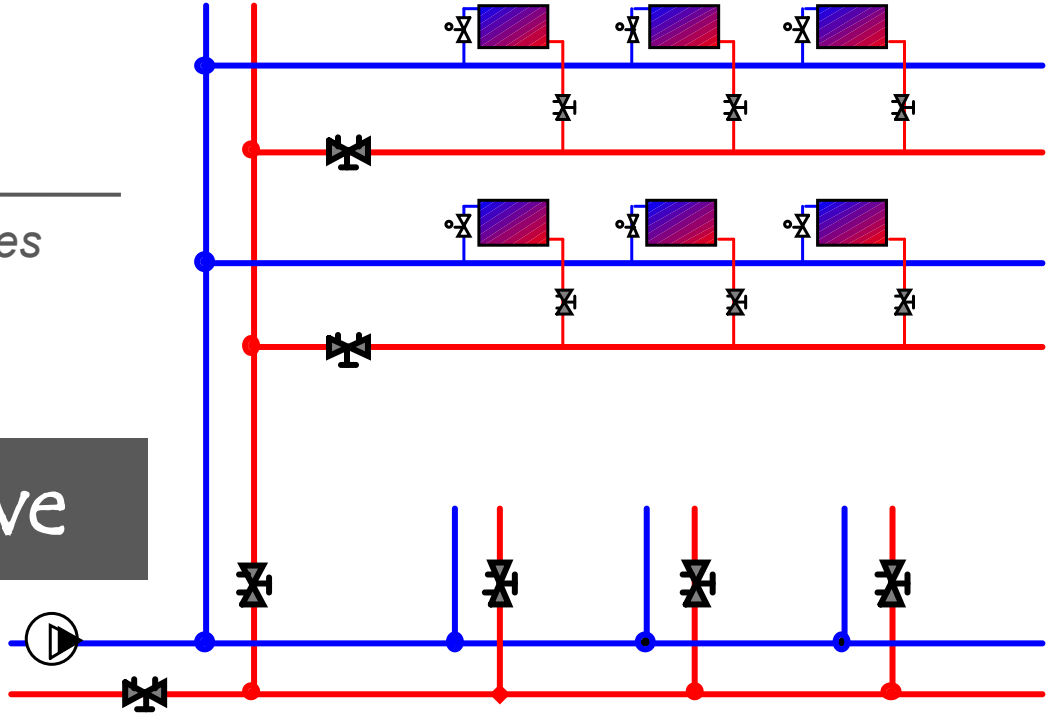
Engineering GREAT Solutions

IMI Hydronic Engineering

Idea:

Adjust the local hydraulic resistances (create local Dp) so as to obtain the required flows

The Balancing Valve



Manual Balancing Venturi Type

Engineering GREAT Solutions

IMI Hydronic Engineering

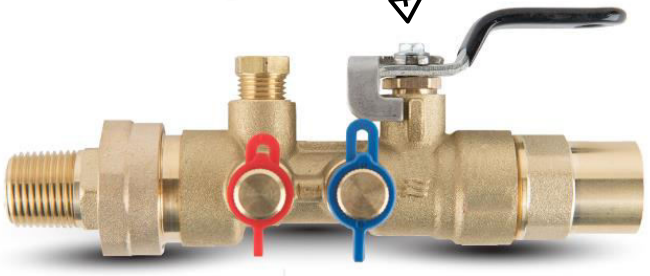
Pros

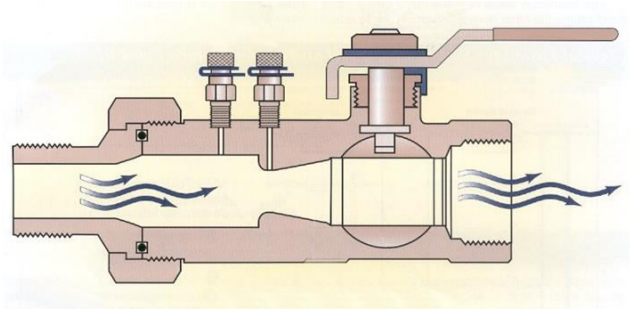
- Very Accurate
  - *Fixed Cv*
- Flow Measurement
  - *Integral P/T Ports*
- Field Adjustable
  - *With Memory Stop*
- No Wheel Required
  - *Direct relationship*

Cons

- Interactivity
  - *Not only during commissioning!*

Ball Valve for Throttling Purposes



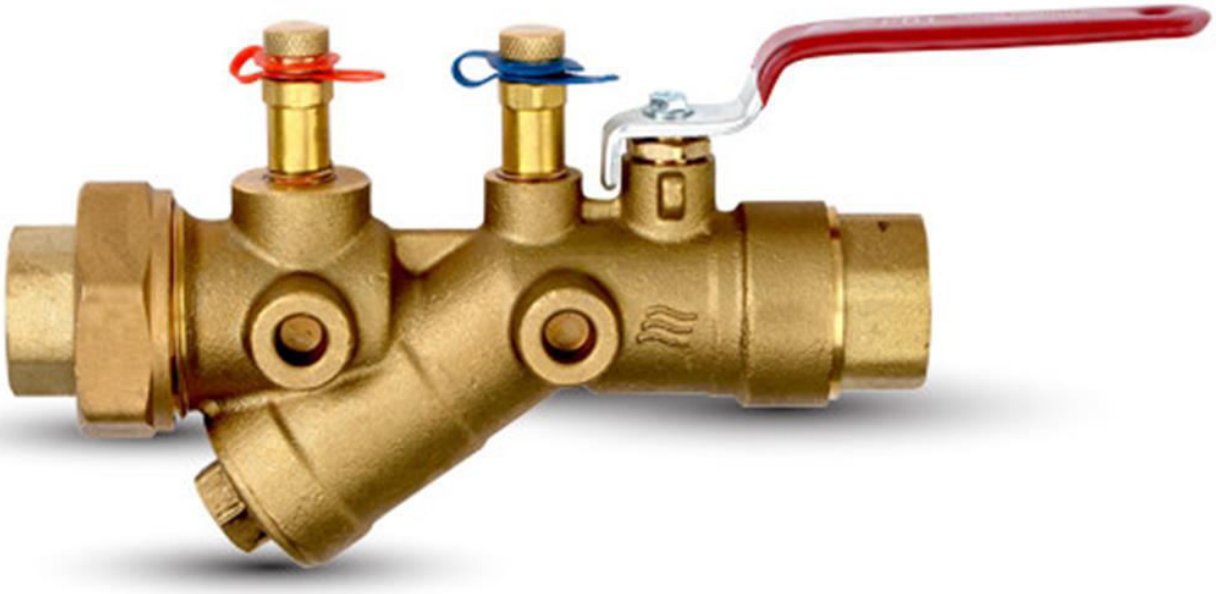


Another Option

Engineering GREAT Solutions

IMI Hydronic Engineering

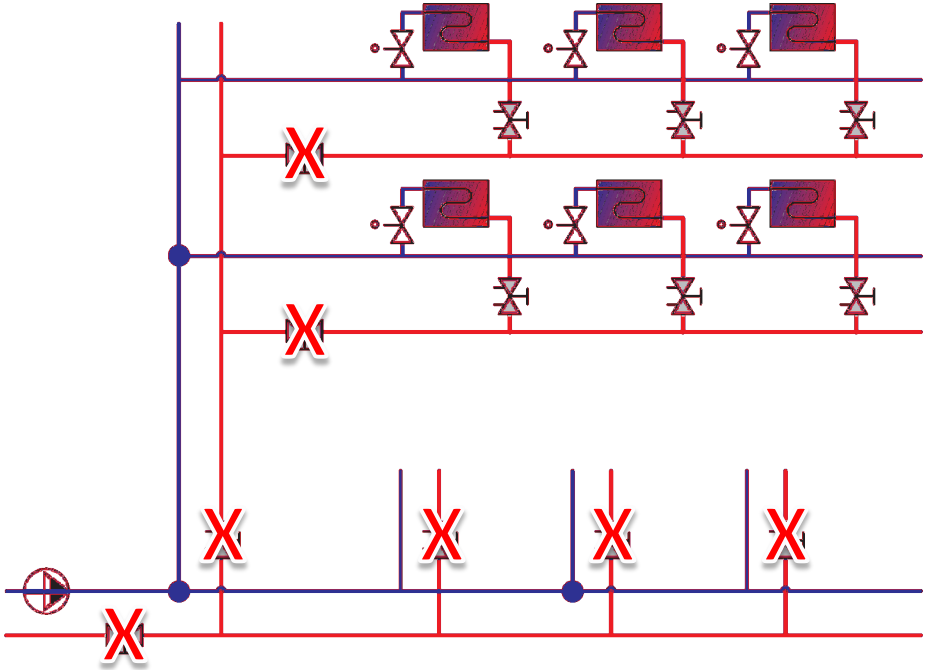
The Automatic Balancing Valve



The Automatic Valve Idea

Engineering GREAT Solutions

IMI Hydronic Engineering



Pros

- Less Valves
  - *Only needed at terminal units*
- Less Work
  - *Flow preset at factory*
  - *No "balancing" on site*
- Continual Balance
  - *Automatically adjusts under all operating conditions*

Cons

- *No True Flow Measurement*

What if…

Engineering GREAT Solutions

IMI Hydronic Engineering

We took the positive attributes of the manual balancing valve…

- Very Accurate
  - *Fixed Cv*
- Flow Measurement
  - *Integral P/T Ports*
- Field Adjustable
  - *With Memory Stop*
- No Wheel Required
- Direct Relationship

What if…

Engineering GREAT Solutions

IMI Hydronic Engineering

And we added the positive attributes of the automatic balancing valve…

- Less Valves
  - *Only needed at terminal units*
- Less Work
  - *Flow preset at factory*
  - *No “balancing” on site*
- Continual Balance
  - *Automatically adjusts under all operating conditions*

What if…

Engineering GREAT Solutions

IMI Hydronic Engineering

We took all of those positive characteristics...

- And added a control valve...

What is Harmony?

What is Harmony?

Engineering GREAT Solutions

IMI Hydronic Engineering

Pressure Independent Balancing and Control Valve *(PIBCV)*

- Complete hydronic balancing and control solution for optimum performance over the life of your customers' HVAC systems
- Innovations engineered to give your customers unparalleled control at minimal energy consumption
- Advances in PI valve technology with first-in-the-industry built-in flushing feature, breakaway isolation valve and Harmony Actuator that give your customers new capabilities for advanced measuring and diagnostics, system maintenance and faster commissioning

IMI Hydronic Engineering

Welcome to the World of Controls

Control Modes

Engineering GREAT Solutions

IMI Hydronic Engineering

On/Off Control (2 Point)

- Signal can only assume one of two different discrete values
  - *On or off*
  - *Least expensive option available*

3 Point Control

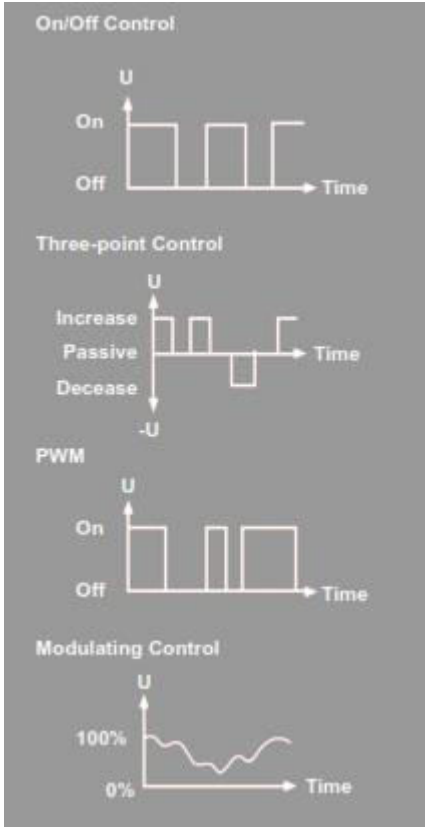
- Signal assumes three different discrete values
  - *Increase lift, decrease lift, or stay passive*
- Commonly used for control of supply water temperature
  - *not recommended for room temperature control*

Pulse Width Modulation

- Signal is pulsed out with a duration proportional to the difference between the set point and actual value

Modulating Control

- Utilizes indiscrete steps which make the control continuous and more accurate
- Tougher demands and higher degree of control difficulty requires modulating control



Functions

Engineering GREAT Solutions

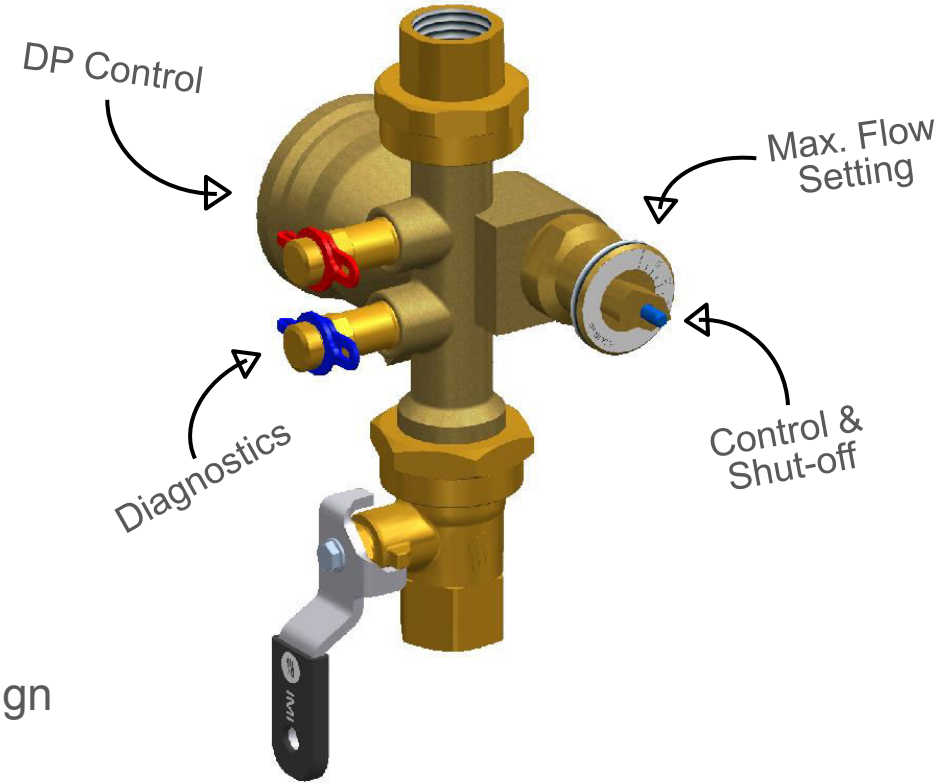
IMI Hydronic Engineering

Control
- Pressure independent
- Modulating

Balancing
- Without lift limitation
- Direct presetting in GPM

Diagnostics
- Available pressure
- Temperature

Shut-off
- True isolation with breakaway valve design



A Unique DP Controller

Engineering GREAT Solutions

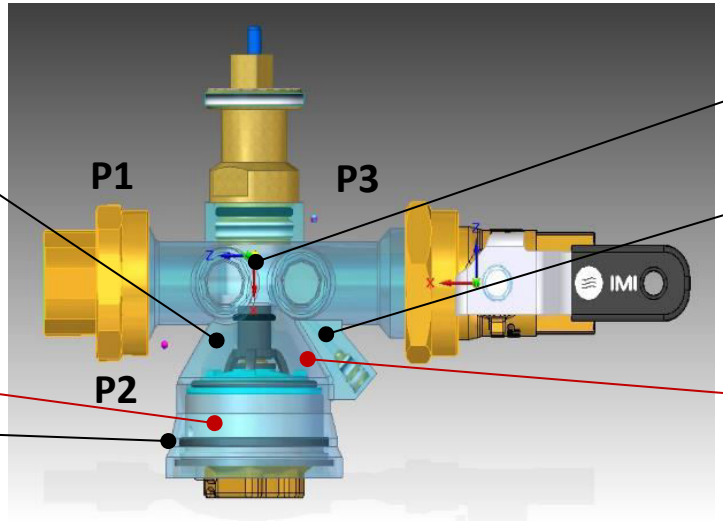
IMI Hydronic Engineering

Flow Direction

Plug and fixture are <u>not</u> moving parts

Diaphragm

Reference Spring



Seat adjusts as needed

P3 is transmitted through this channel to the “backside” of the diaphragm

P2 is acting on the “front side” of the diaphragm

P1–P2 *= pressure drop in the DP Controller*

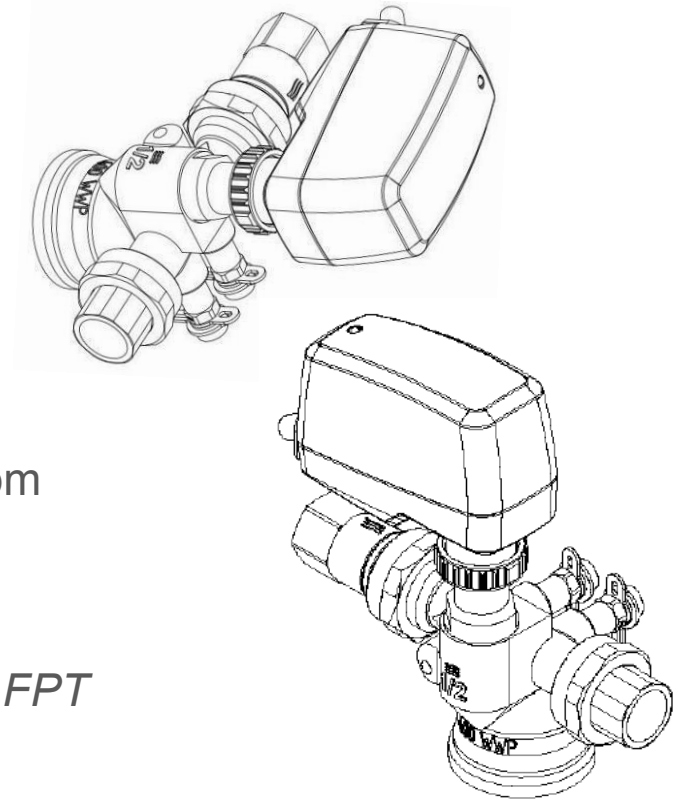
P2–P3 *= stabilized pressure across the control part*

Technical Data

Engineering GREAT Solutions

IMI Hydronic Engineering

- **Dimensions:** Currently available ½” and ¾”
- **Pressure Class:** 400 psig
- **EQM Characteristic**
- **Lift:** 4 mm – ½”; 6 mm – ¾”
- **Actuator Connection:** M30x1.5
- **Differential Pressure:** ΔpV = 2-80 psi
- **Flow Range:** ½” = 0.2 – 2.0 gpm; ¾: = 0.5 – 5.0 gpm
- **True Shut-off via Breakaway Isolation Valve**
- **Temperature Range**: -20 – 250°F
- **Connections:** Inlet: *SWT, FPT, MPT*; Outlet: *SWT, FPT*



IMI Hydronic Engineering

Giving You MORE

By Giving You LESS

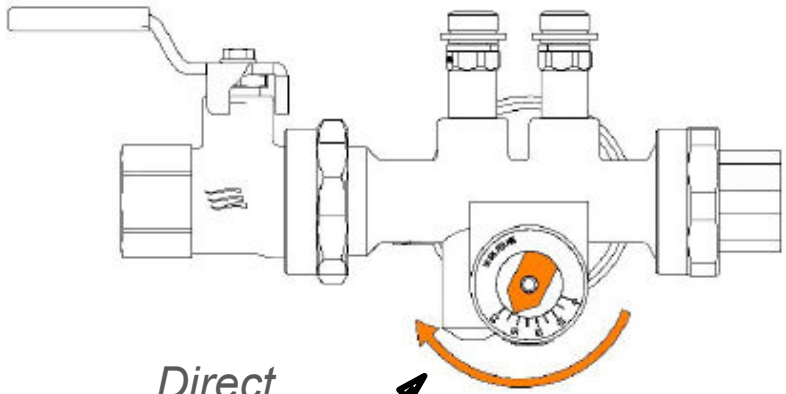
LESS Hassle

Engineering GREAT Solutions

IMI Hydronic Engineering

Setting

- Remove actuator by rotating coupling ring counterclockwise
- Turn pointer to the desired flow (label is in GPM)
  - *If there is no pressure in the system, the pointer can be turned by hand.*
  - *If there is pressure, a wrench might be needed.*
- Re-Install actuator



LESS Pieces

Engineering GREAT Solutions

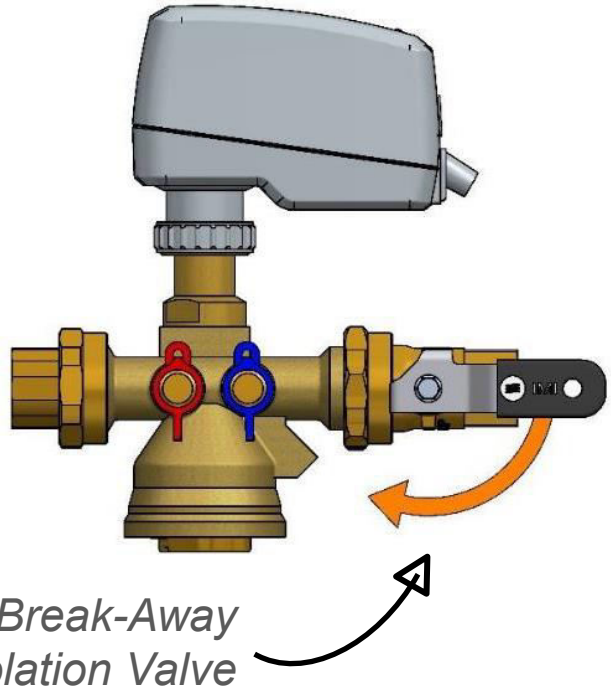
IMI Hydronic Engineering

Shut-off

- Close the ball valve

Maintenance to the Control Portion of the Valve

- Unscrew nut connected to ball valve
  - *Ball valve and control device can be installed at separately as well via this feature*



LESS Energy Use

Engineering GREAT Solutions

IMI Hydronic Engineering

Max Flow Limited Through Fully Open Valve

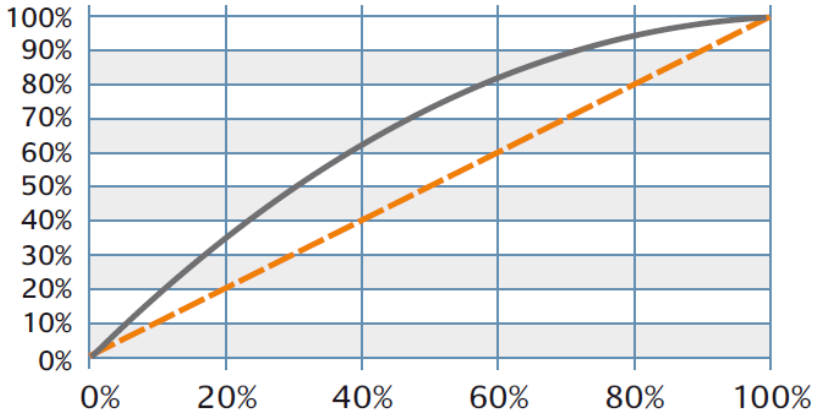
- Eliminates overflows
- Allows for full range of lift to still be available for modulating under low flow conditions

Low Startup Pressure

- Only 2 psi
- The lowest in the industry to date

Power Consumption

- **Operation:** < 1VA (VAC); 0.6 W (VDC)
- **Standby:** < 0.5VA (VAC); 0.25W (VDC)



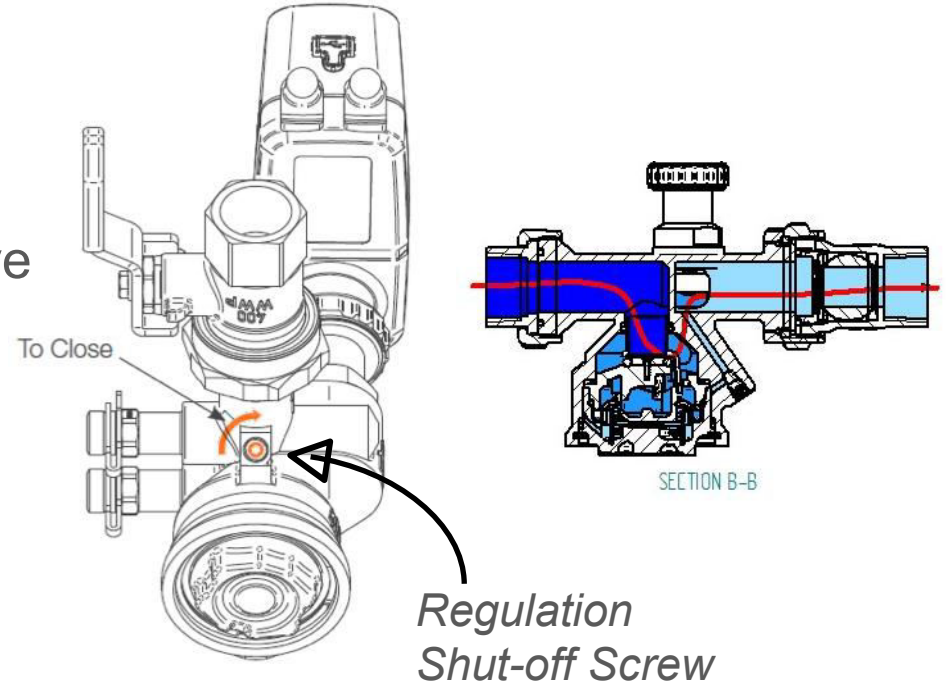
LESS Debris

Engineering GREAT Solutions

IMI Hydronic Engineering

Flushing

- Step 1: Shut the isolation valve
- Step 2: Tighten the screw
- Step 3: Re-open the isolation valve
- Step 4: Loosen the screw back to original position

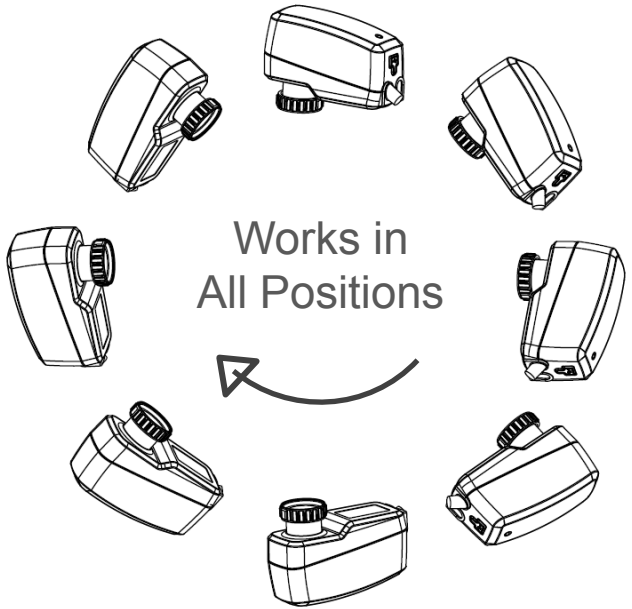


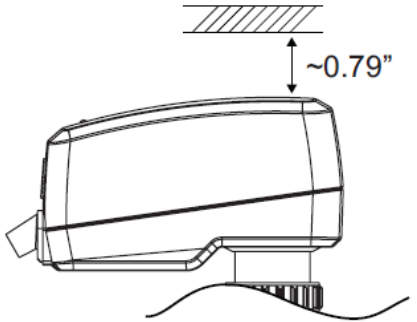
LESS Limitations

Engineering GREAT Solutions

IMI Hydronic Engineering

Space on a job site is TIGHT, but not a problem for Harmony users!





Actuator is sealed against water intrusion enabling it to be mounted in any direction

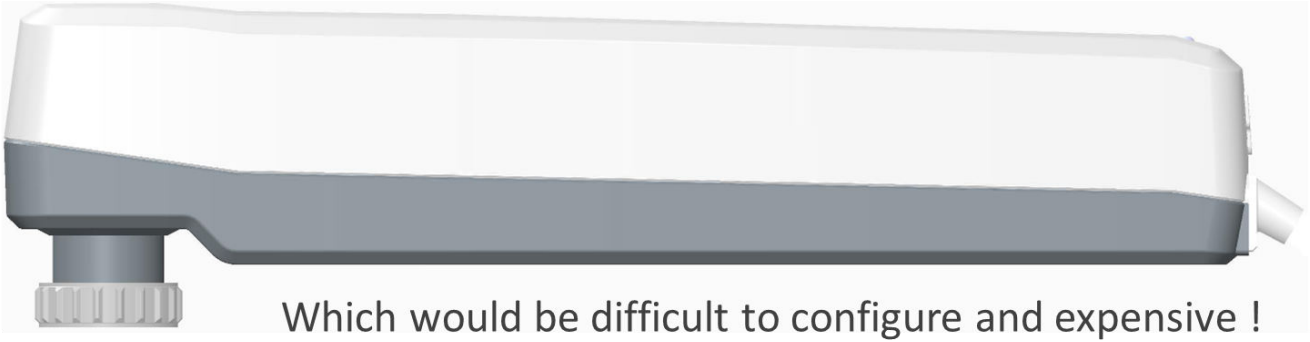
LESS Restrictions

Engineering GREAT Solutions

IMI Hydronic Engineering

For adjusting as many settings with dipswitches as the Harmony provides you would need a long… long… long dipswitch block…

That would mean a long… long… long actuator…



Which would be difficult to configure and expensive !

LESS Installation and Set Up Time

Engineering GREAT Solutions

IMI Hydronic Engineering

1 Program or drive actuator open/closed without even having an electrical connection

2 Copy and paste setting from one actuator to another saving HOURS on a jobsite

4 Totally customizable by micro-USB with Dongle and App on smartphone

3 Compatible with all types of control valves (M30x1.5)

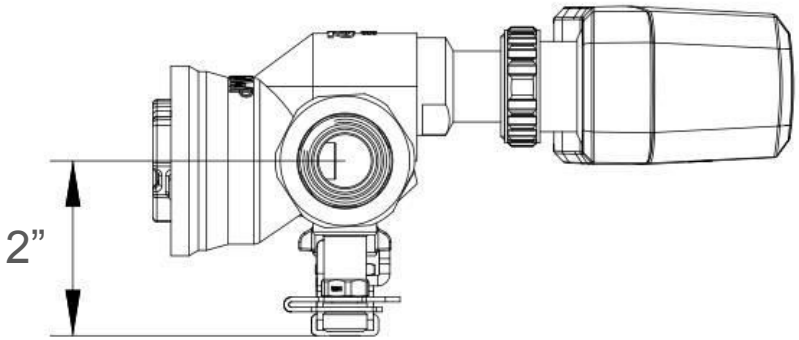
5 Statistics of operation and list of last errors for diagnostic purposes

LESS Space Required

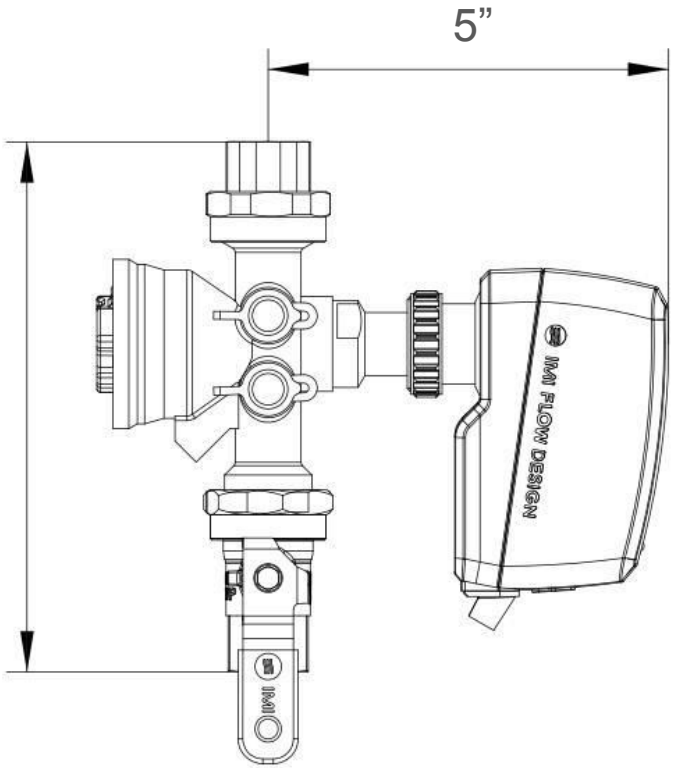
Engineering GREAT Solutions

IMI Hydronic Engineering

- Designed for use in small fan-coil cabinets
- Slim body enables parallel installation
- Still great access to all functions



½” = 6.6”
¾” = 7.2”



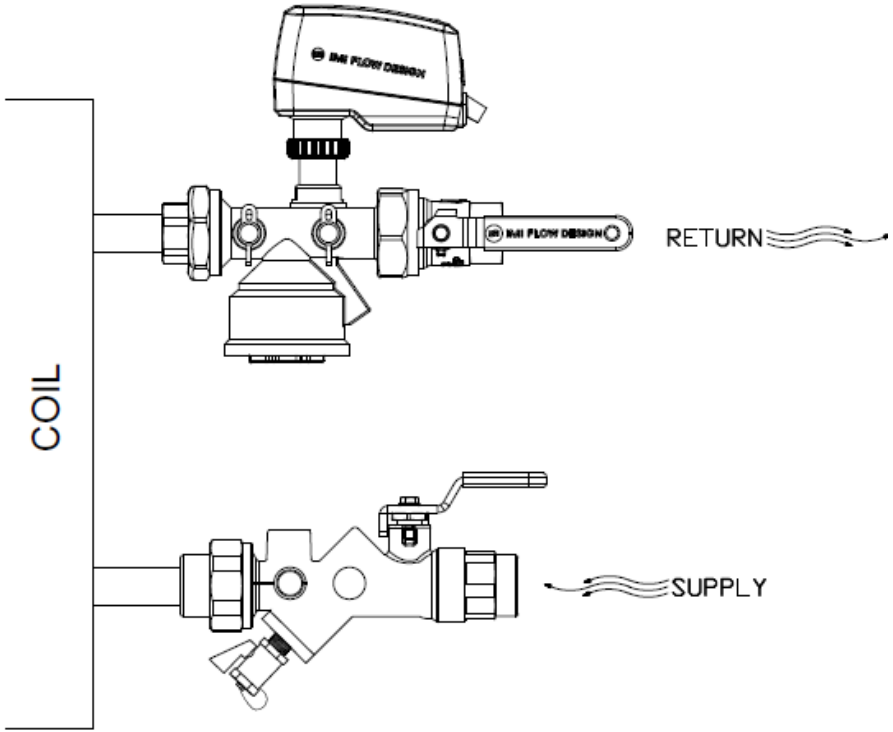
LESS Field Connections

Engineering GREAT Solutions

IMI Hydronic Engineering

1 Hookup – 2 Valves

- Eliminating the need for a union, outside ATC valve and additional isolation device with our **ALL IN ONE HARMONY**



LESS Unknowns

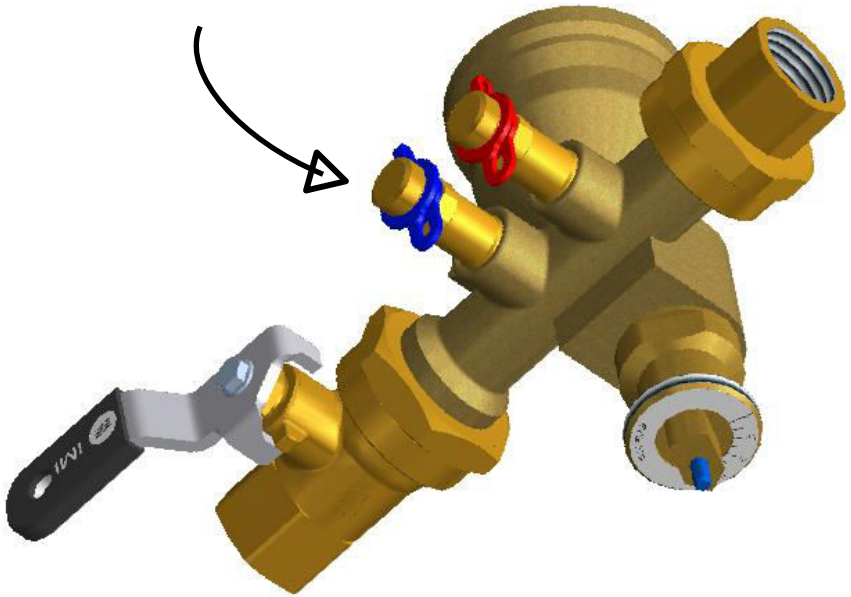
Engineering GREAT Solutions

IMI Hydronic Engineering

Measuring ΔH

- The two P/T ports provided show the total pressure drop across the valve.
- If it is more than the required minimum pressure at the desired flow, then the pump head in the system could be reduced by the difference without affecting the terminal where the measured unit is attached.
- Find the terminal with the least excess pressure, and reduce the pump pressure by the difference at that terminal.

Ability to measure total pressure drop across valve



In Summary…

Engineering GREAT Solutions

IMI Hydronic Engineering

LESS is MORE…

- MORE Controllability
- MORE Flexibility
- MORE Accuracy
- MORE Energy Savings

This is

HARMONY