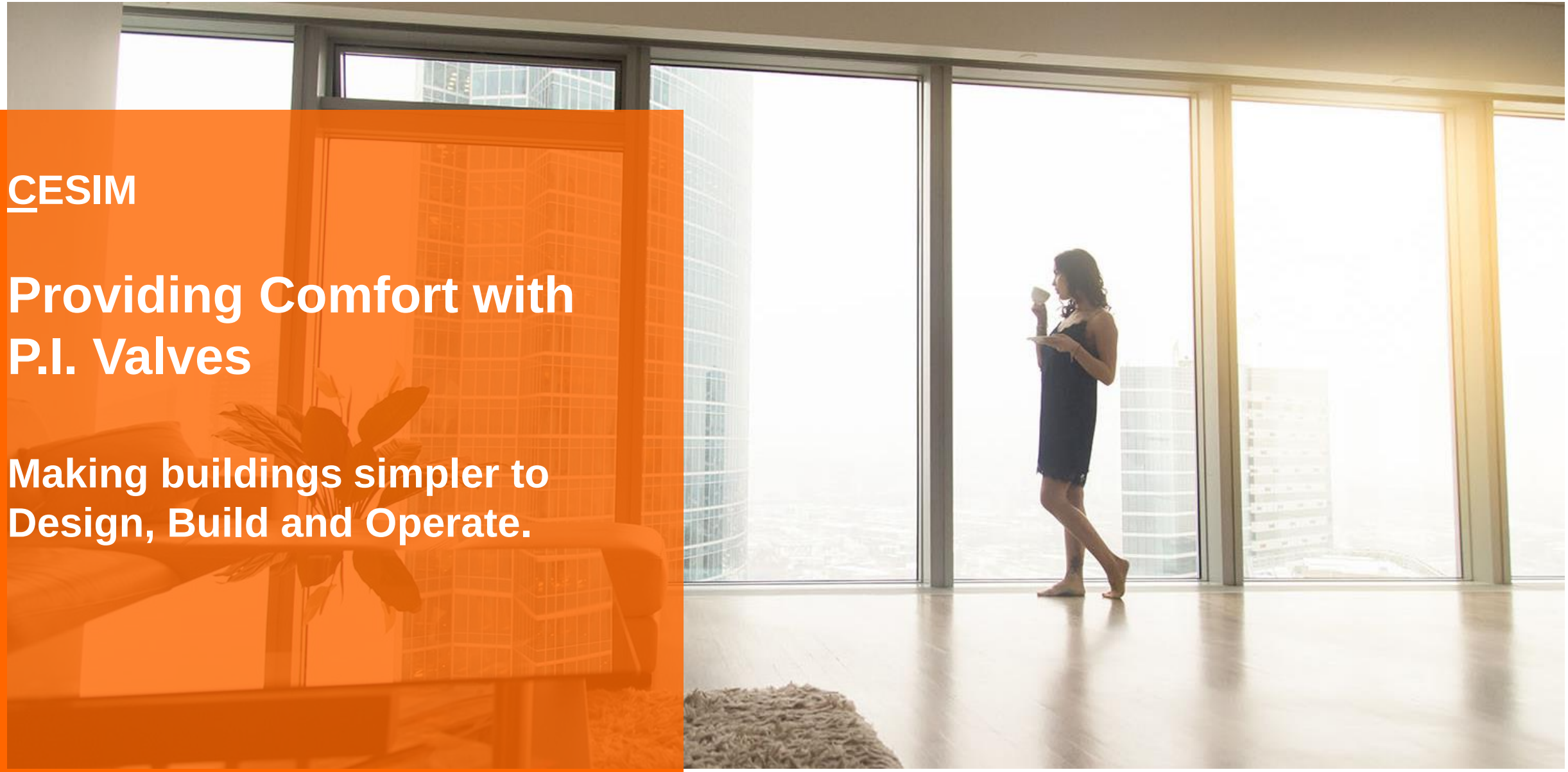


CESIM

Providing Comfort with P.I. Valves

Making buildings simpler to Design, Build and Operate.

BELIMO


COMFORT
Indoor Air Quality
ENERGY
Savings Estimator
System Transparency
LEED GOLD BUILDING
ENERGY EFFICIENCY
Energy A+
SAFETY
SAFETY FIRST
Protect Lives and Assets
FIRE & SMOKE
INSTALLATION
Quick, Easy, & Flexible
MAINTENANCE
Peace of Mind
5 YEAR WARRANTY

Comfort from Peace of Mind

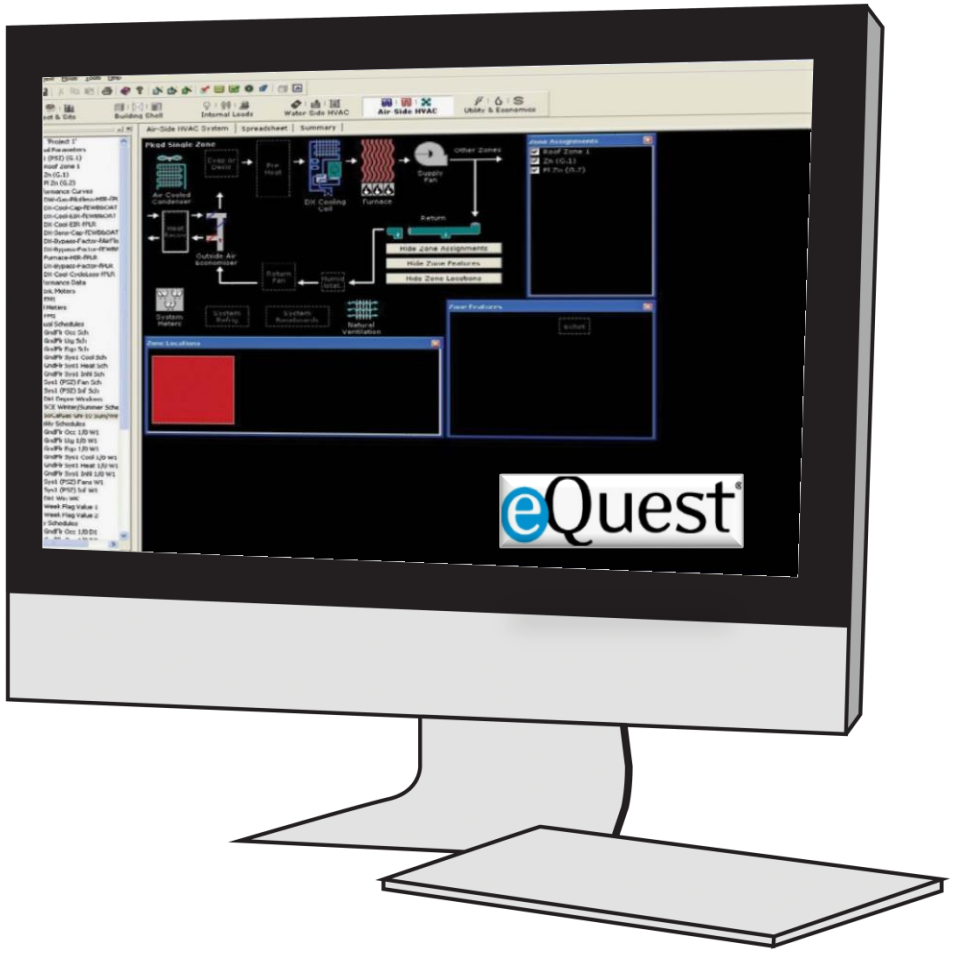
Ensure that the building performance matches the design
Size the valves perfectly, every time

Build like the Model

Design / Modeling Assumptions

1. Proper Valve Sizing
2. Stable System Pressures
3. Perfect Valve Authority

Only P.I. valves will match the performance of the model



Hydronic Valve Sizing
Pressure Dependent Valves

2-Way

Model #	Cv	Size [mm]
G665C	65	2.5” [65]
G680C	90	3” [80]
G6100C	170	4” [100]
G6125C	263	5” [125]
G6150C	344	6” [150]

$$Cv = \frac{GPM}{\sqrt{\Delta P}}$$

- Coil Requires 250 GPM
- ΔP = 4psi

$$Cv = \frac{250\ GPM}{\sqrt{4}} = 125$$

Hydronic Valve Sizing
Pressure Independent Valves

Model #	GPM	Size [mm]
P6400S-225	225	4” [100]
P6400S-240	240	
P6400S-255	255	
P6400S-270	270	
P6400S-285	285	

$$Cv = \frac{GPM}{\sqrt{\Delta P}}$$

- Coil Requires 250 GPM
- ~~ΔP = 4psi~~

$$Flow = 250gpm$$

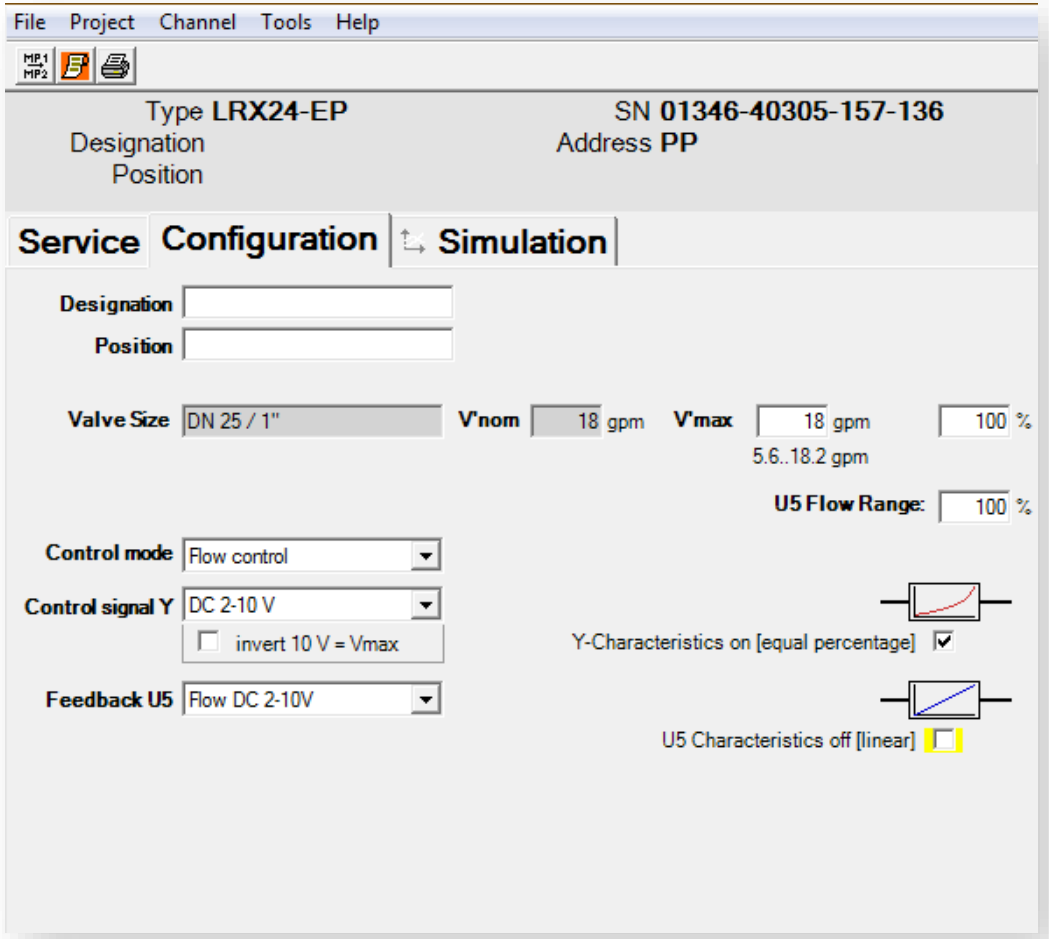
Adjusting to Specific Pressure Drop

BELIMO

FLOW REDUCTION CHART

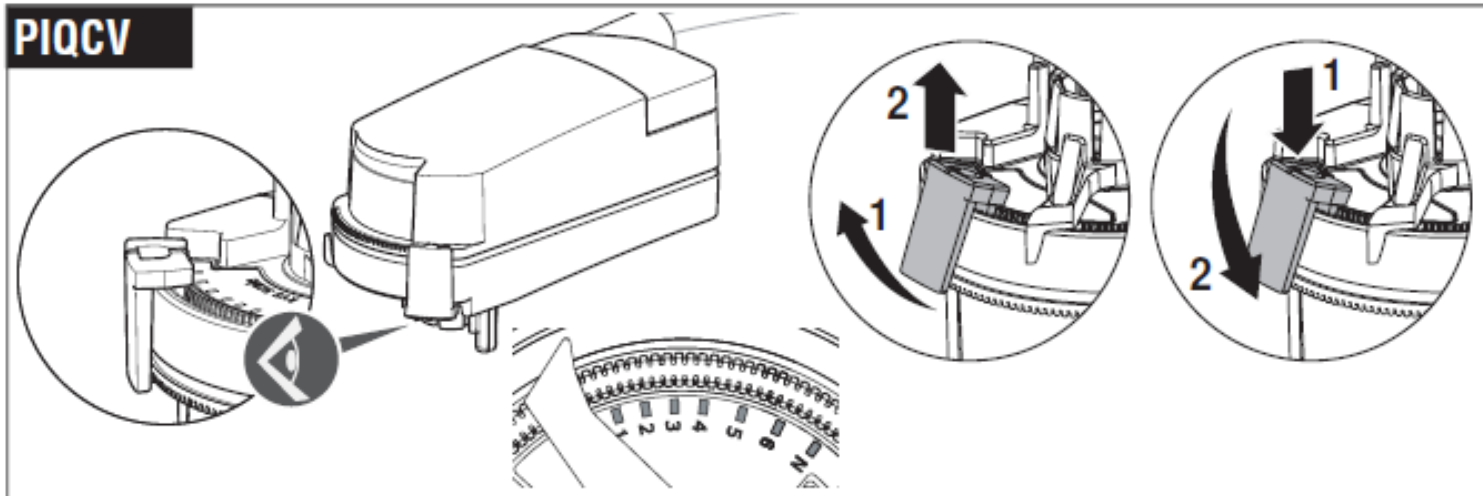
Size		5 psi*	4 psi	3 psi	2 psi	1 psi
Inches	DN [mm]					
3	80	180 GPM	138 GPM	120 GPM	97 GPM	69 GPM
4	100	317 GPM	235 GPM	203 GPM	166 GPM	117 GPM
5	125	495 GPM	367 GPM	318 GPM	260 GPM	183 GPM
6	150	713 GPM	550 GPM	476 GPM	389 GPM	275 GPM

Adjusting to Specific Flow Rates



Adjusting to Specific Flow Rates

PIQCV

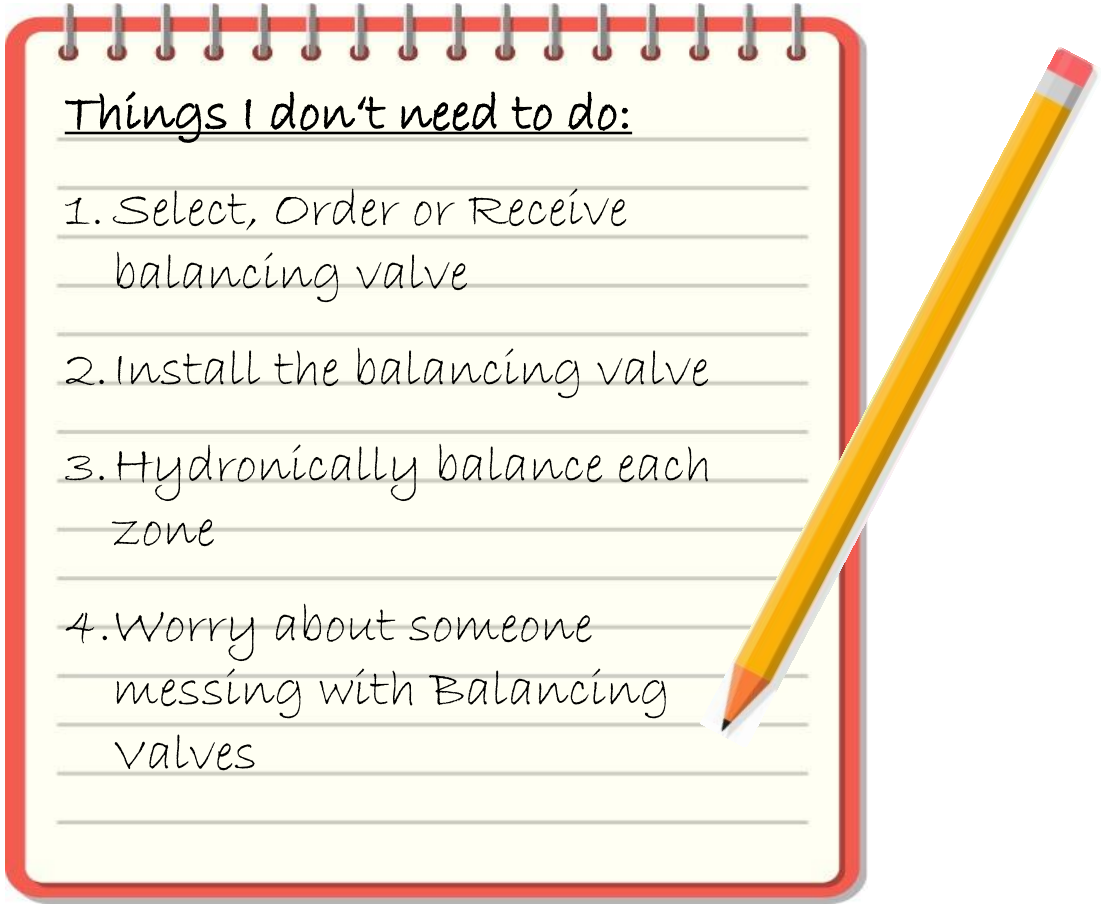


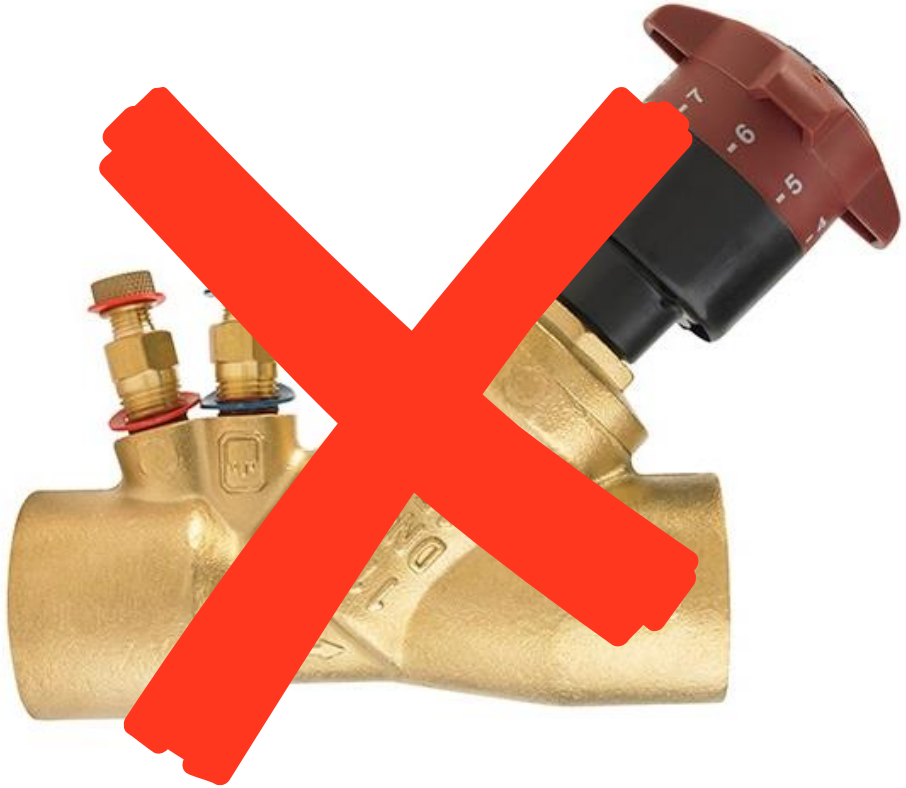
Valve Model (1/2")	Clip Position for Flow Adjustment (GPM)							
	1	2	3	4	5	6	N	No Clip
Z2050QPT-B			0.1	0.2	0.4	0.6	0.8	0.9
Z2050QPT-D	0.2	0.3	0.4	0.5	0.7	1	1.4	1.9
Z2050QPT-F	0.5	0.6	0.8	1.2	1.8	2.7	3.5	4
Actuator Runtime	30 sec	37 sec	43 sec	49 sec	55 sec	62 sec	68 sec	75 sec

Labor cost avoidance and quick, simple commissioning

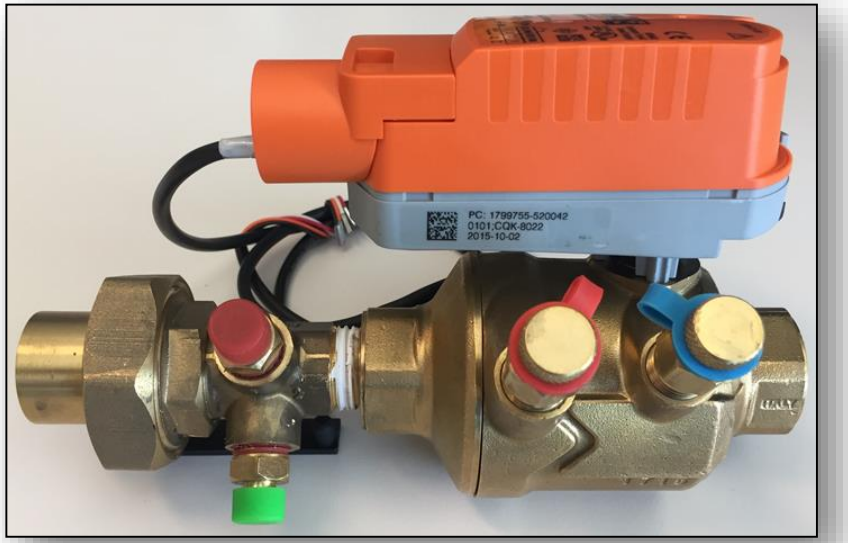
Material & Labor Cost Avoidance

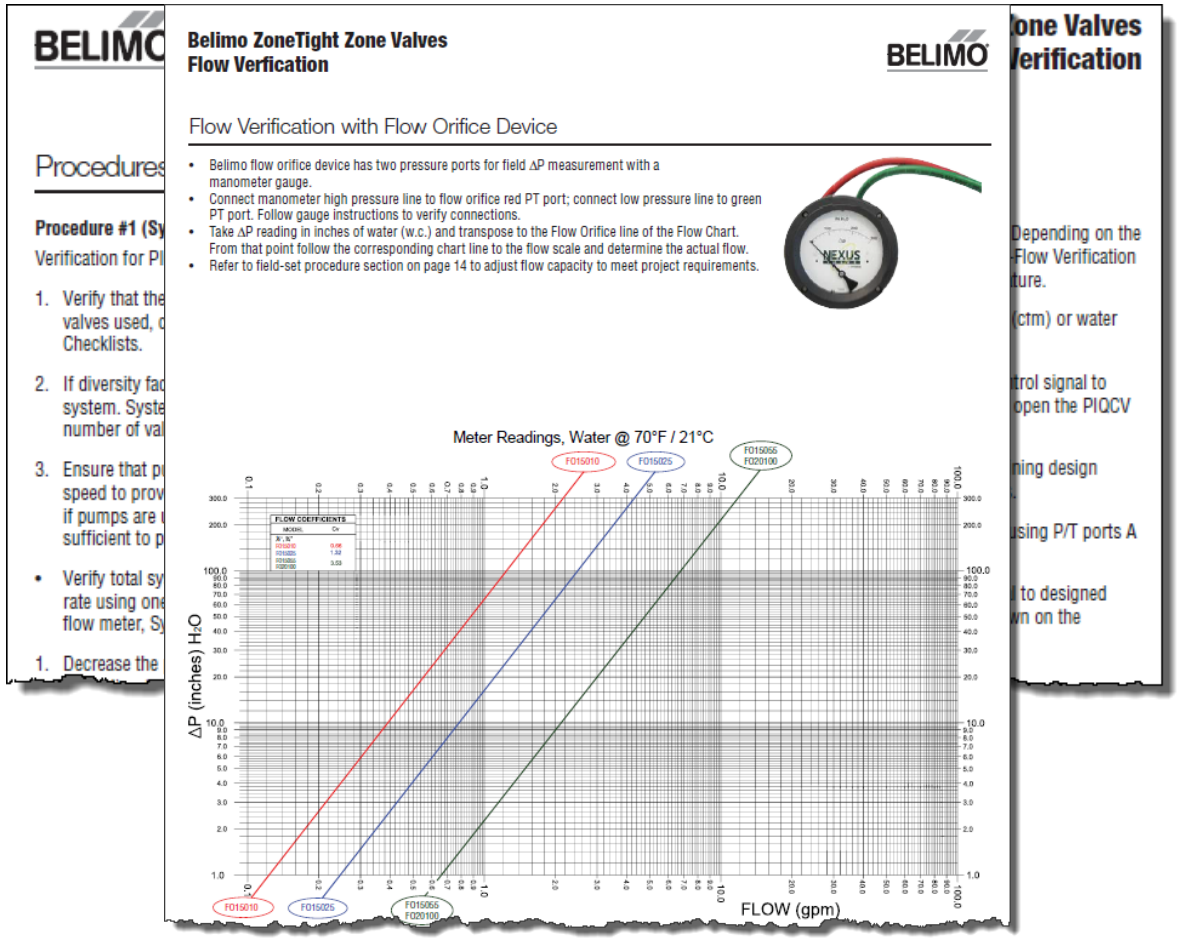
P.I. Valves do not require balancing devices





Commissioning and Flow Verification





Dynamically balanced systems provide superior comfort and simplified building management

Static Balancing

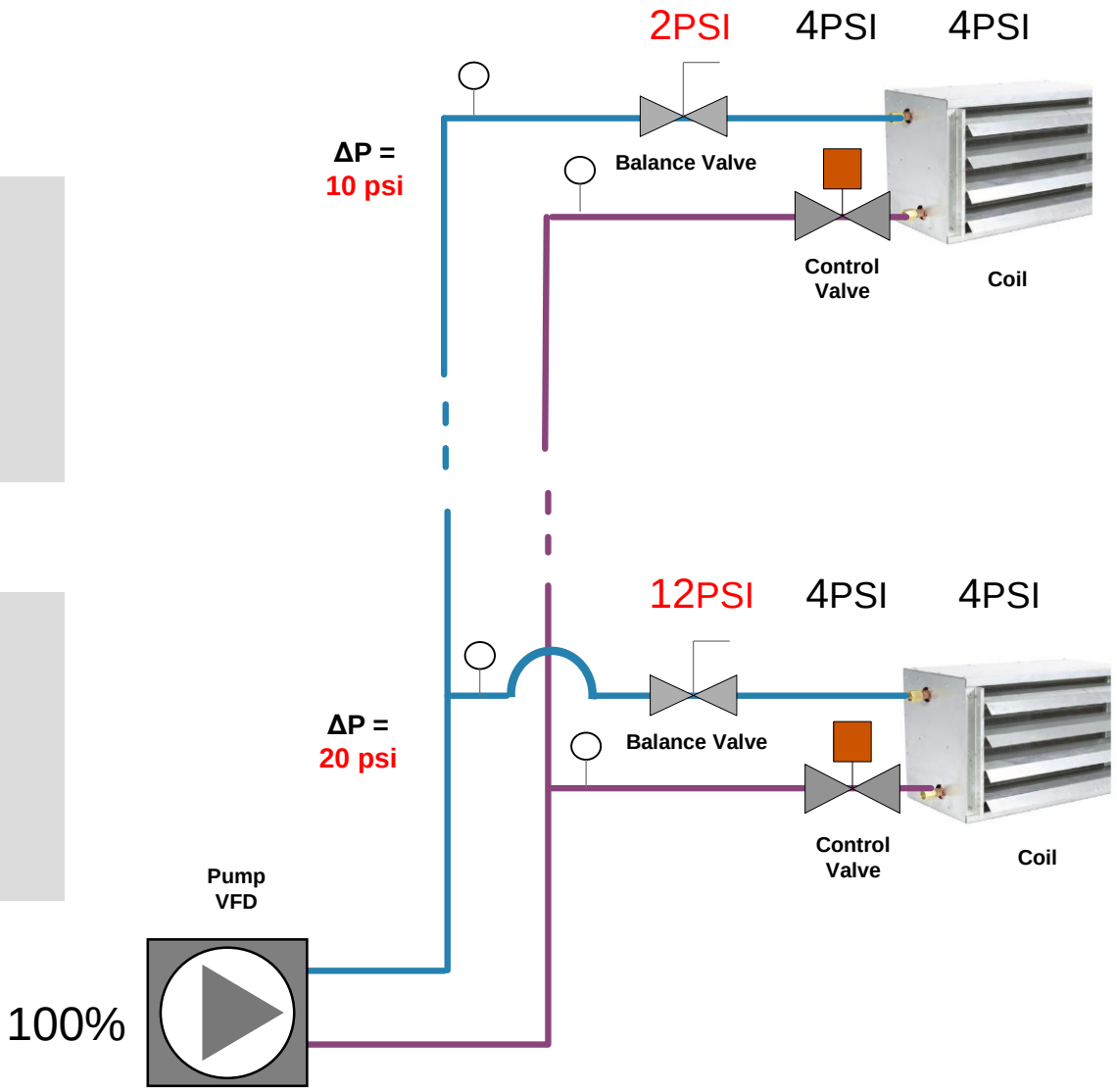
Static Balancing
Full Flow

Far From Pump:

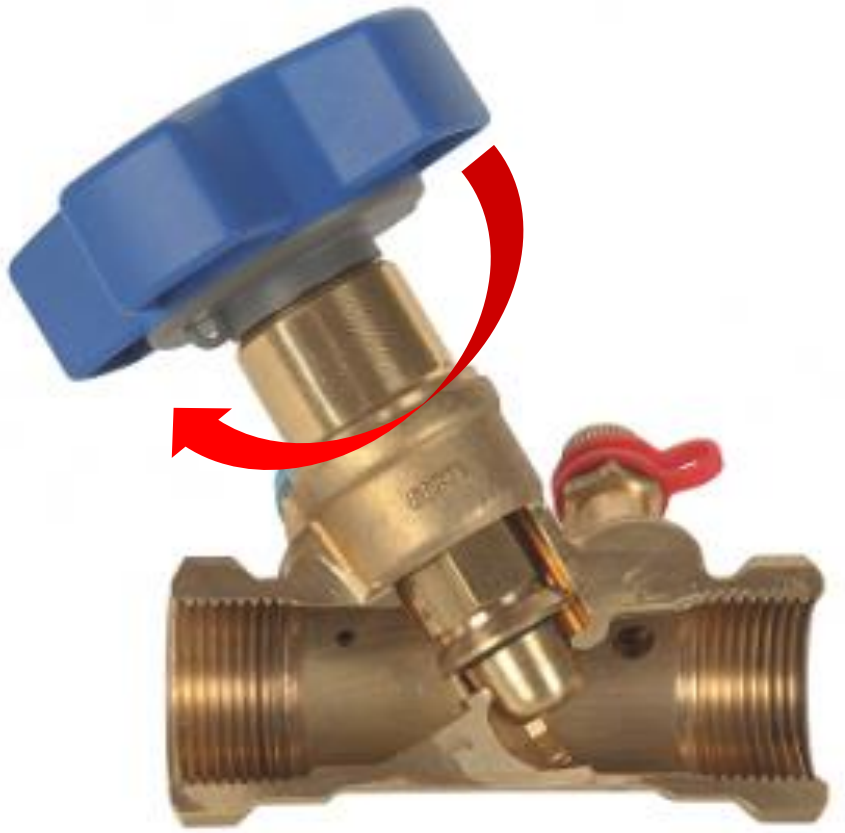
- Low Branch Differential
- Low Pressure Drop on Balancing Valve

Near Pump:

- High Branch Differential
- High Pressure Drop on Balancing Valve

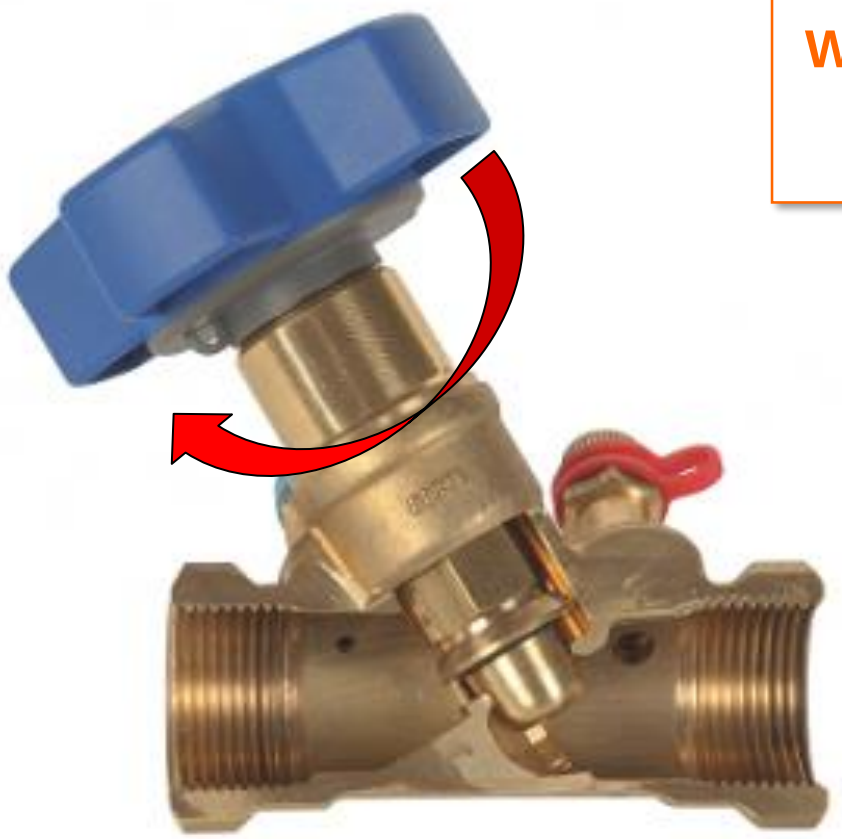


Static Balancing
Manual Balancing Valves



100% flow
12 psi pressure drop

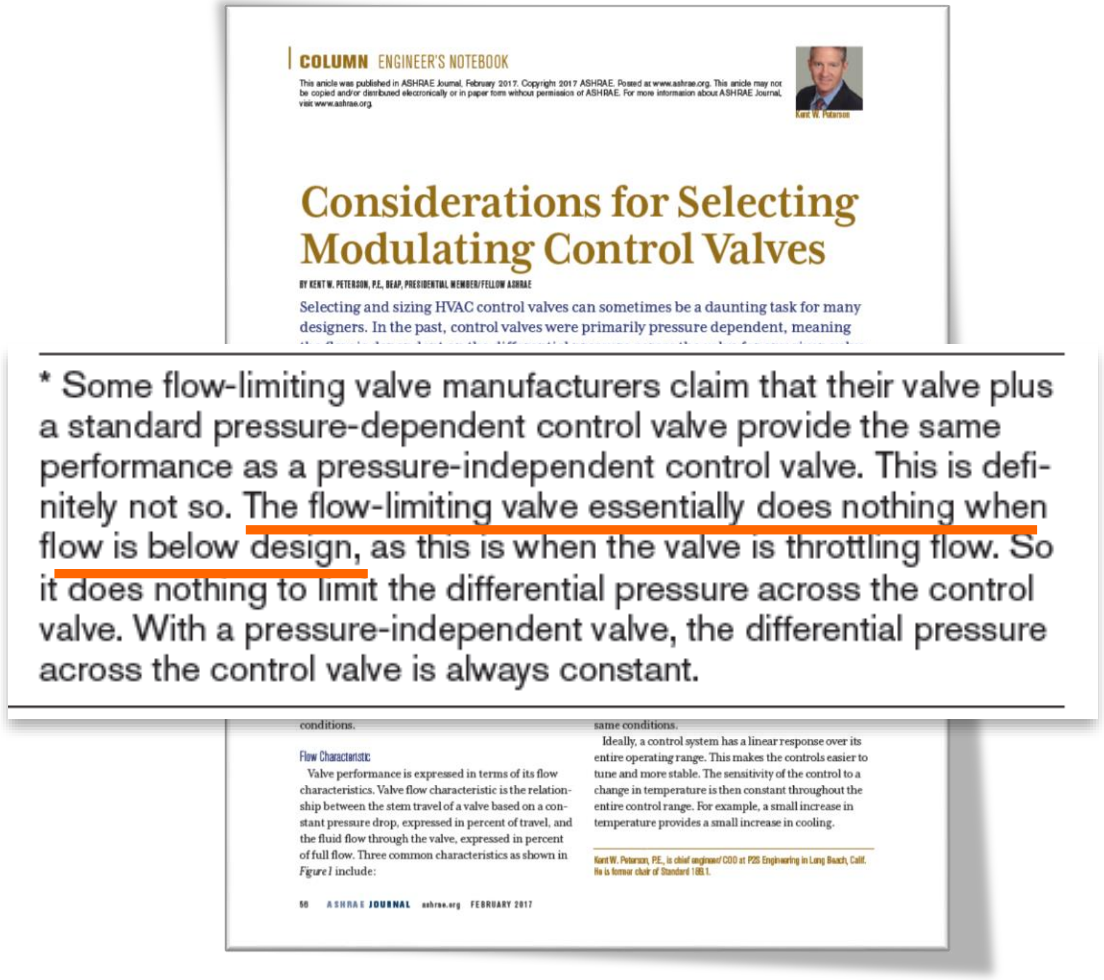
Static Balancing
Manual Balancing Valves



What happens at 20% flow?

Static Balancing
Automatic Balancing Valves

- Limit the maximum coil flow…
- What happens below max flow?



COLUMN ENGINEER'S NOTEBOOK

Kent W. Peterson

Considerations for Selecting Modulating Control Valves

BY KENT W. PETERSON, P.E., BEAP, PRESIDENTIAL MEMBER/FELLOW ASHRAE

Selecting and sizing HVAC control valves can sometimes be a daunting task for many designers. In the past, control valves were primarily pressure dependent, meaning

* Some flow-limiting valve manufacturers claim that their valve plus a standard pressure-dependent control valve provide the same performance as a pressure-independent control valve. This is definitely not so. The flow-limiting valve essentially does nothing when flow is below design, as this is when the valve is throttling flow. So it does nothing to limit the differential pressure across the control valve. With a pressure-independent valve, the differential pressure across the control valve is always constant.

conditions.

Flow Characteristic

Valve performance is expressed in terms of its flow characteristics. Valve flow characteristic is the relationship between the stem travel of a valve based on a constant pressure drop, expressed in percent of travel, and the fluid flow through the valve, expressed in percent of full flow. Three common characteristics as shown in *Figure 1* include:

same conditions.

Ideally, a control system has a linear response over its entire operating range. This makes the controls easier to tune and more stable. The sensitivity of the control to a change in temperature is then constant throughout the entire control range. For example, a small increase in temperature provides a small increase in cooling.

Kent W. Peterson, P.E., is chief engineer/COO at PSS Engineering in Long Beach, Calif. He is former chair of Standard 180.1.

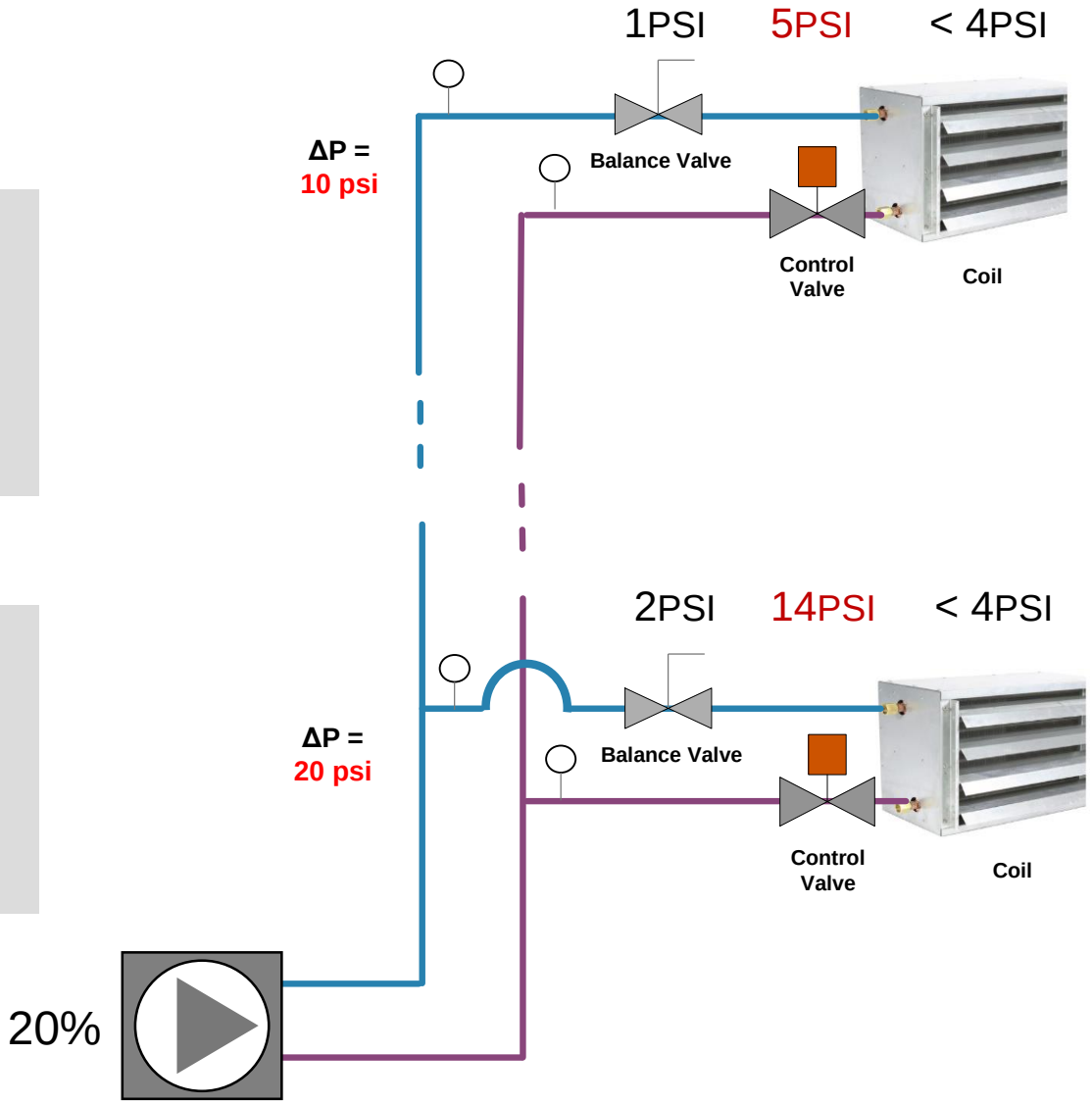
Static Balancing
Less than Full Flow

Far From Pump:

- Small Overflow

Near Pump:

- Massive Overflow



Dynamic Balancing

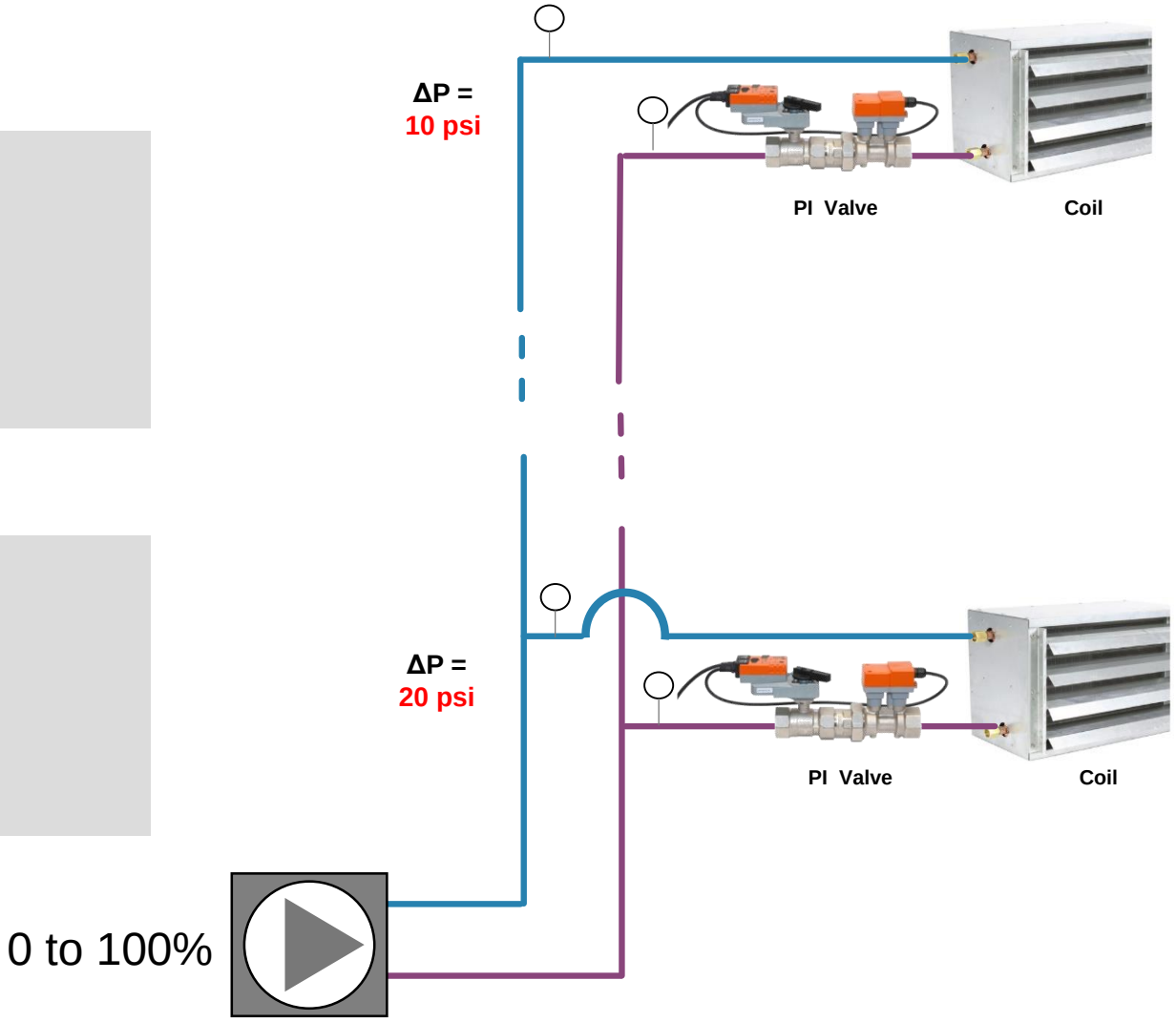
Dynamic Balancing
All Flows

Far From Pump:

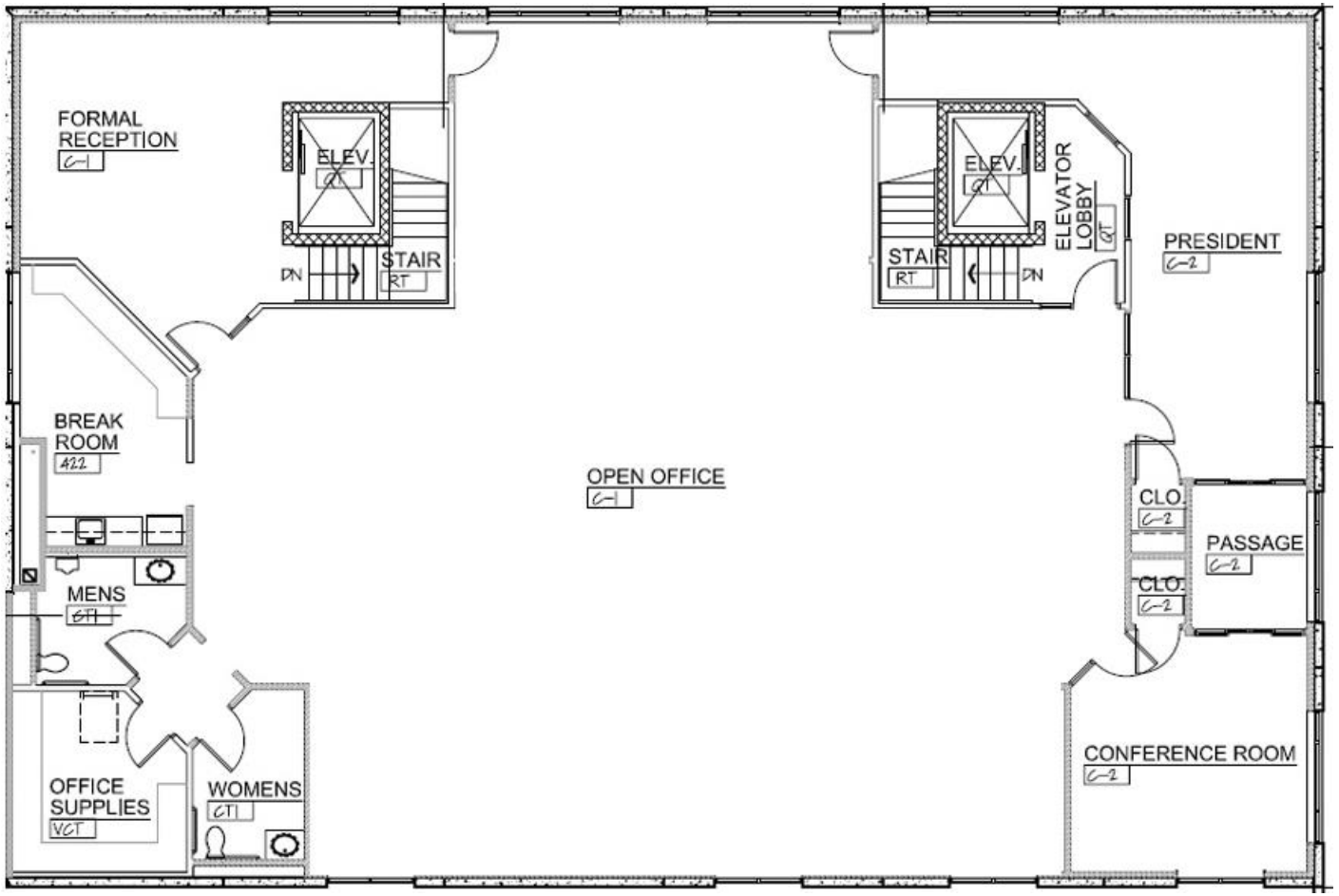
- Exact GPM

Near Pump:

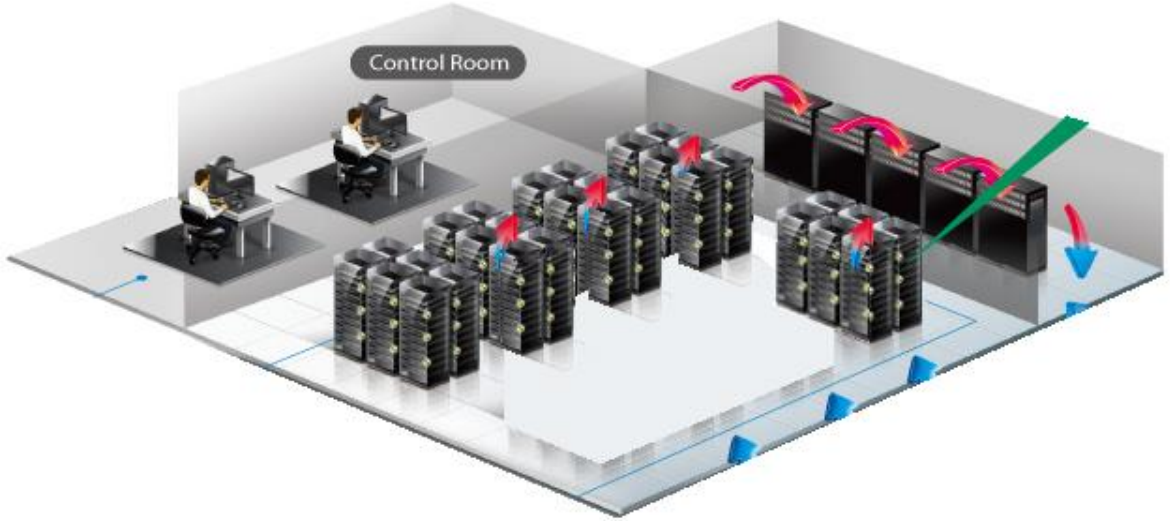
- Exact GPM

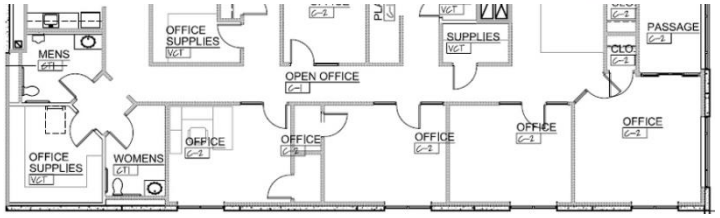



Rebalancing
after T.I. work?
LOL ;-)


FORMAL RECEPTION
C-1
ELEV.
CT
STAIR
RT
DN
ELEV.
CT
STAIR
RT
DN
ELEVATOR LOBBY
CT
PRESIDENT
C-2
BREAK ROOM
422
OPEN OFFICE
C-1
CLO.
C-2
PASSAGE
C-2
CLO.
C-2
MENS
CT
OFFICE SUPPLIES
VCT
WOMENS
CT
CONFERENCE ROOM
C-2

Renovation and Use Change Benefits of Dynamic Balancing



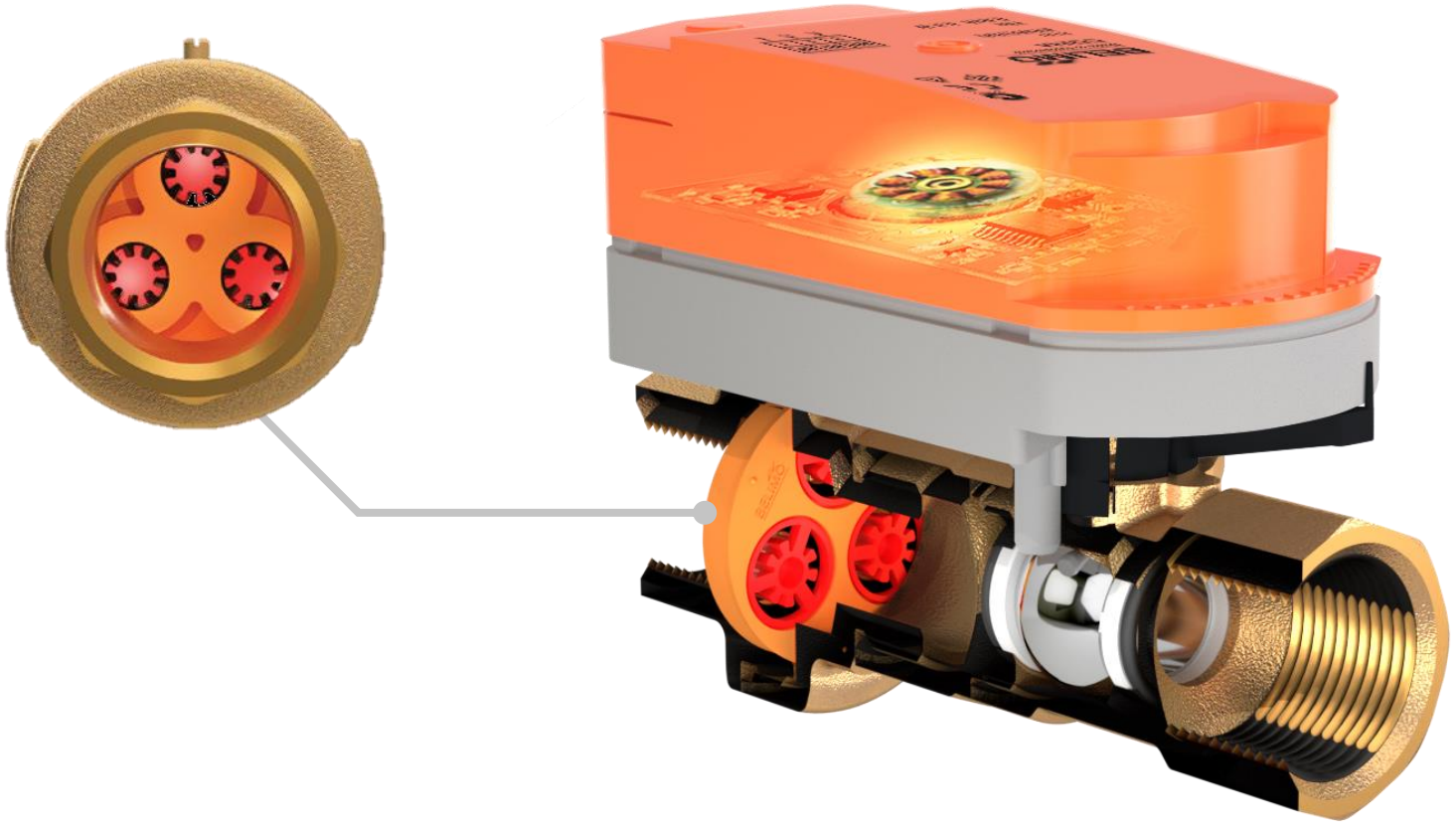


- Dynamically balanced zones don’t need to be balanced, or re-balanced.
- Preplanned expansions, can be addressed during initial construction
- Changes in tenant usage are easily overcome

Pressure Independent Technologies

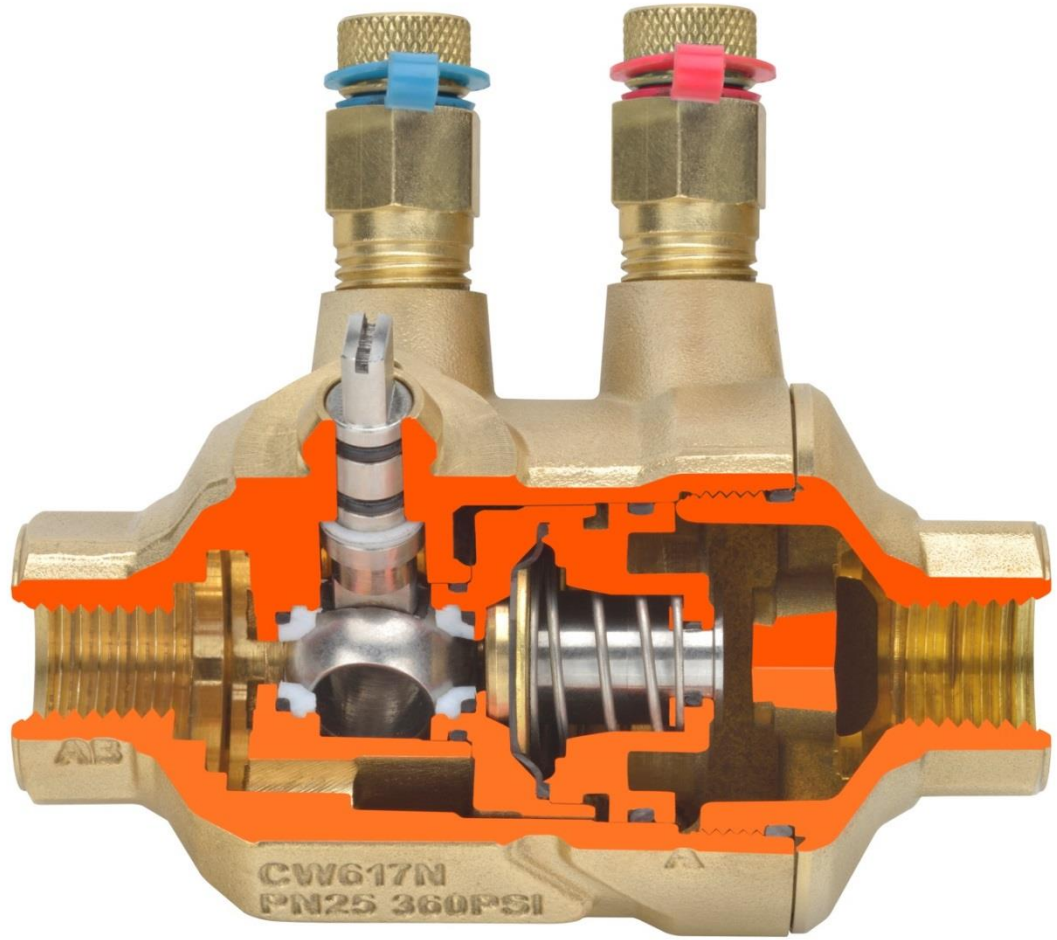

PRESSURE INDEPENDENT
FLOW LIMITER VALVE, PIFLV™
Designed for on/off cooling
zone applications.

PIFLV Operation

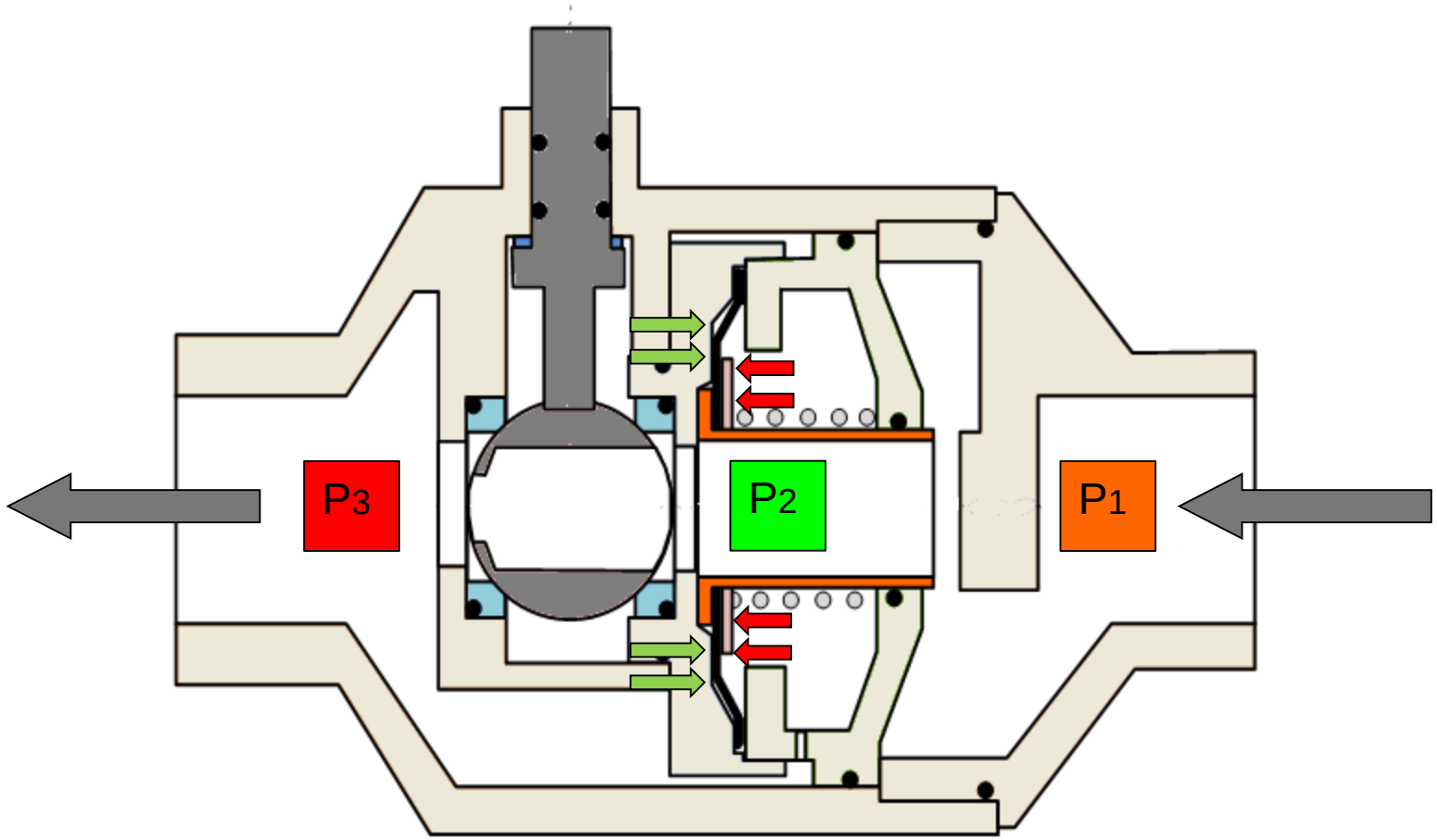


Belimo ZoneTight™

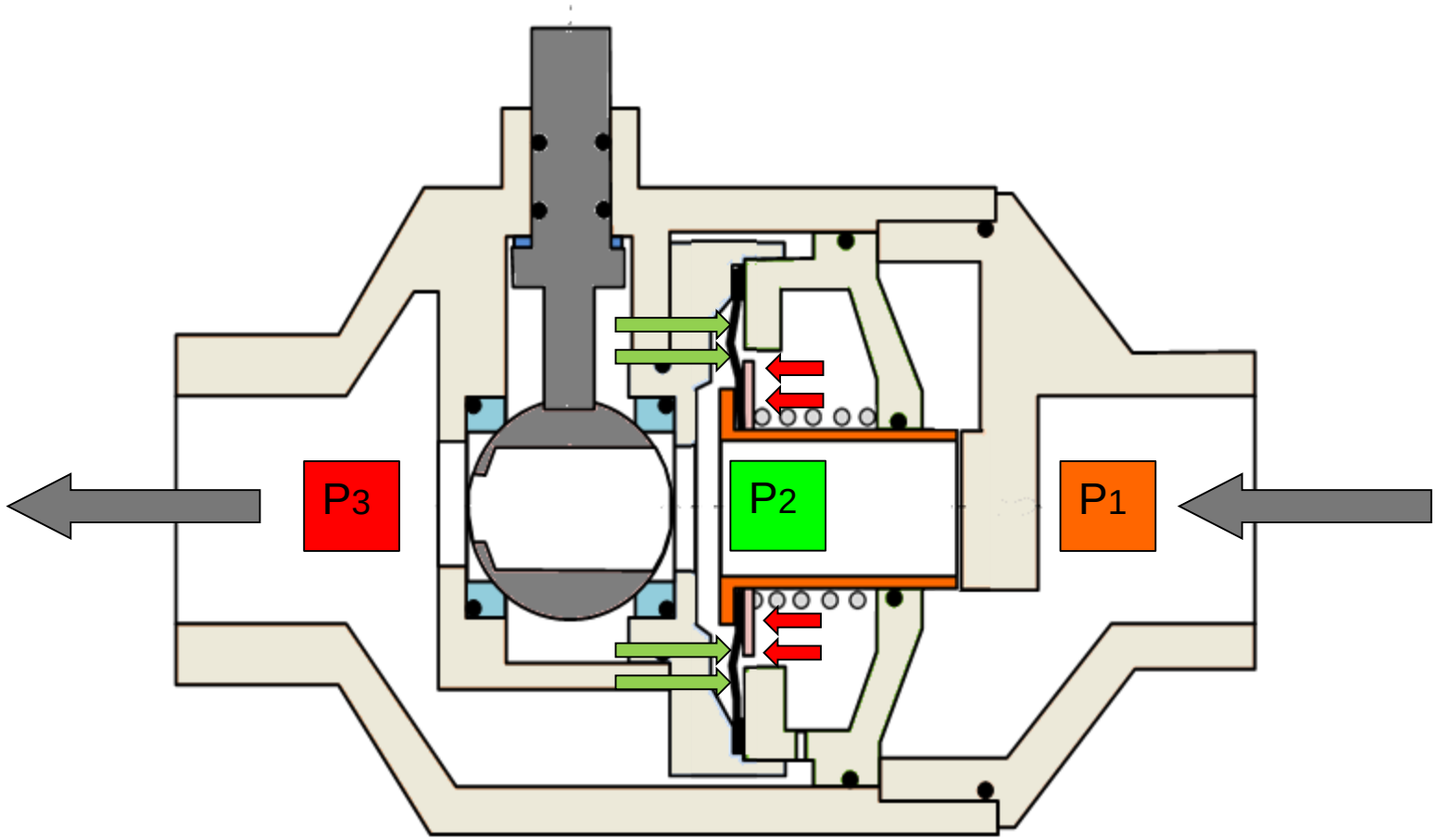
PIQCV – Pressure Independent Quick Compact Valve


AB
A
CW617N
PN25 360PSI

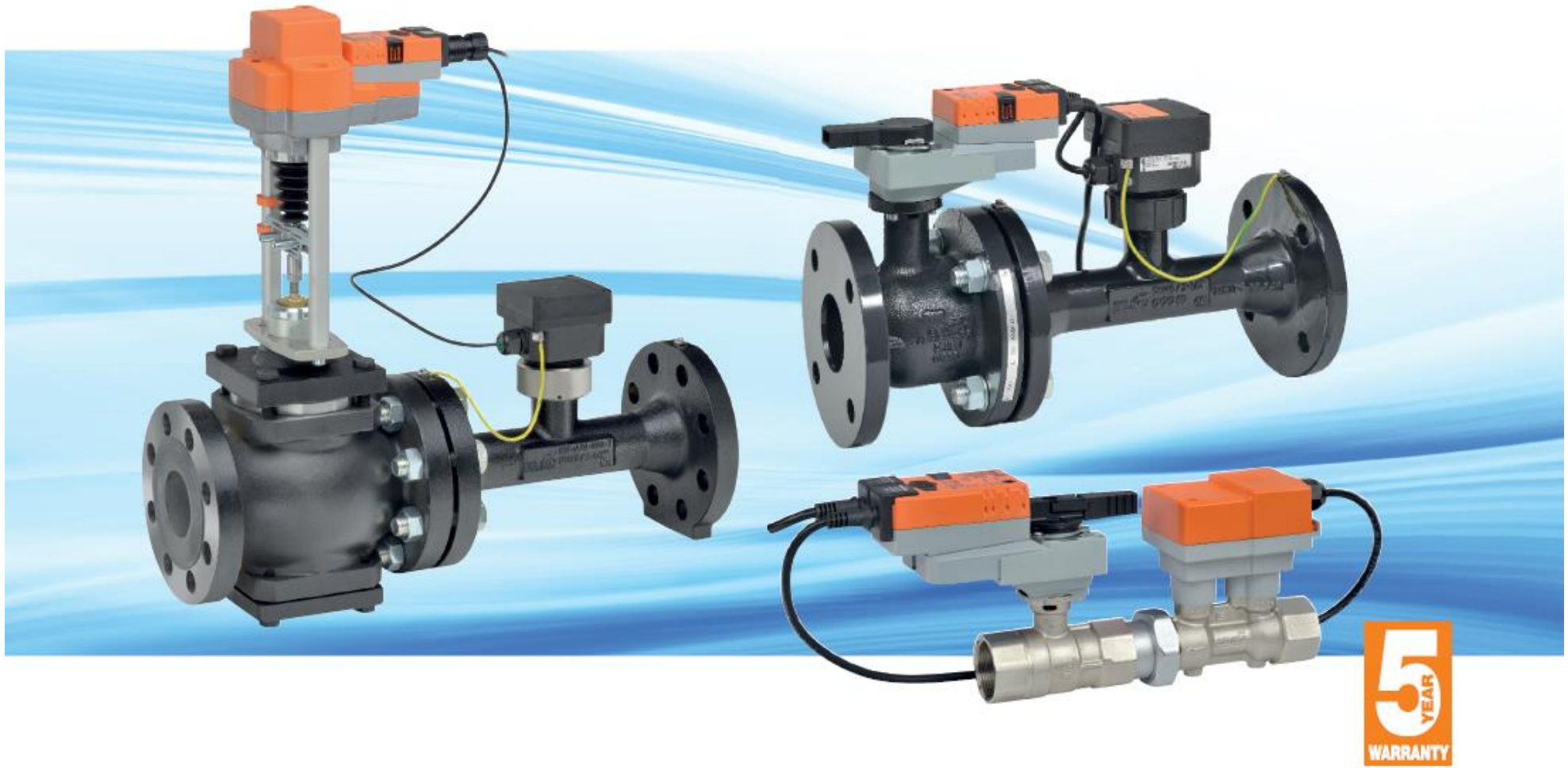
Zone Tight: PIQCV



Zone Tight: PIQCV



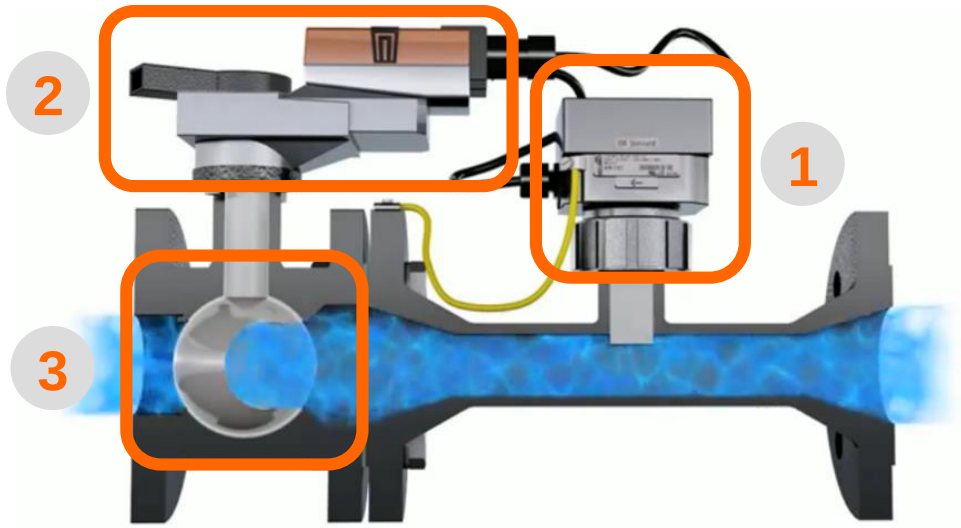
Electronic Pressure Independent Valve (ePIV)

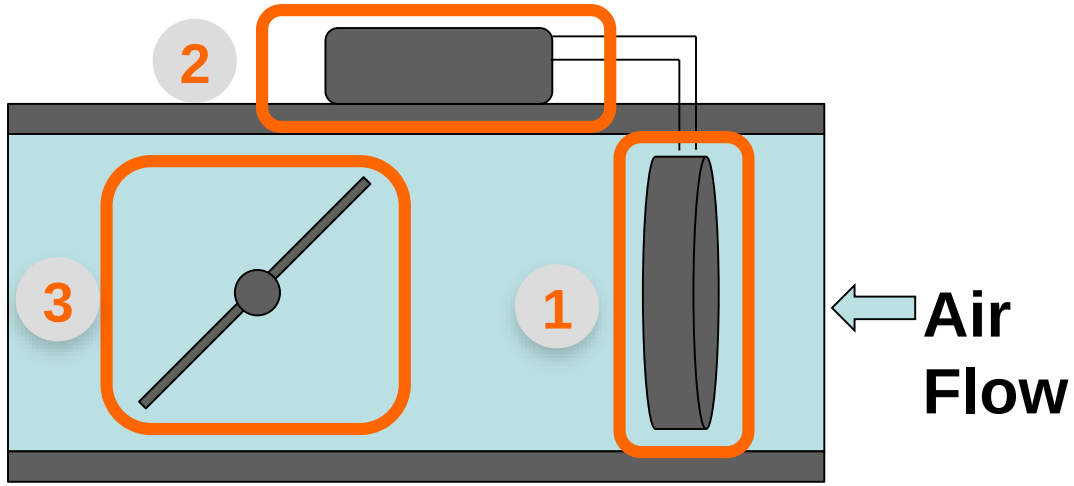


Electronic Pressure Independent Valve

Same Logic as Pressure Independent VAV

1. Flow Measurement Device
2. Controller
3. Flow Regulating Device






BELIMO®