Frese Application Guide

Valves & Controls for HVAC Applications

www.frese.eu/hvac

Efficient indoor climate control for buildings

Over 25 years' experience producing dynamic balancing solutions has positioned Frese as the leading manufacturer of energy saving valves and through our commitment to innovation, we continue to be at the forefront of technological advancements in our areas of expertise.

Our innovative solutions balance global HVAC systems accurately and efficiently. From cooling systems in the Middle East to heating systems in Scandinavia, our products transform state of the art technology into everyday solutions.

To support our products, the knowledge, experience and dedication of our employees and partners ensure our solutions are applied correctly to maximise savings and position Frese as the authoritative voice for energy efficient, pressure independent valve solutions.

Key Icons

DYNAMIC valves

DYNAMIC valves from Frese offer the maximum savings in terms of energy consumption and are **strongly recommended solutions** for HVAC heating and cooling applications.

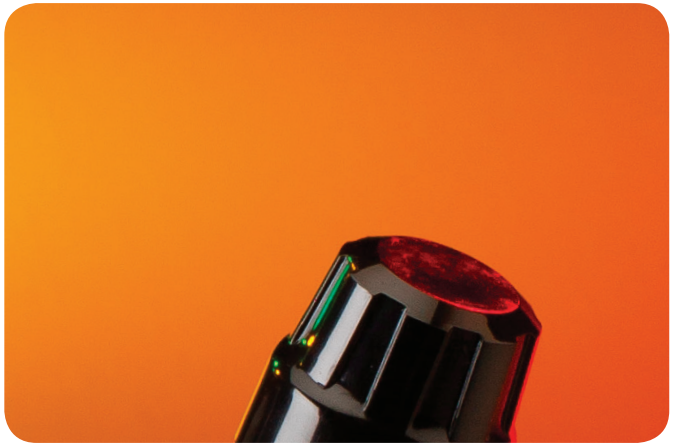
STATIC valves

STATIC valves from Frese offer effective and reliable flow regulation and verification.

KNOWLEDGE | QUALITY | INNOVATION | MANUFACTURING EXCELLENCE | CUSTOMER FOCUS

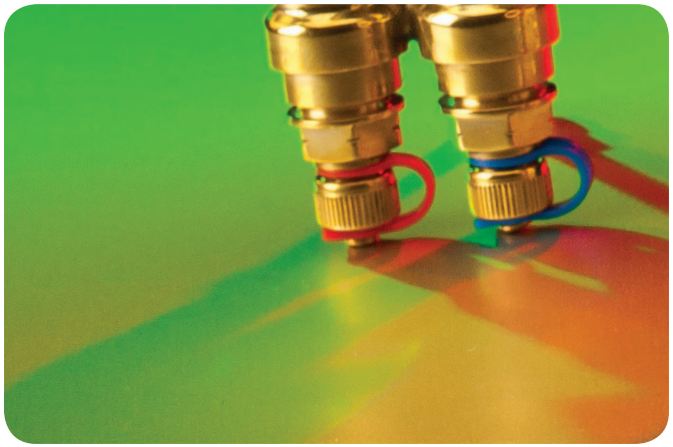
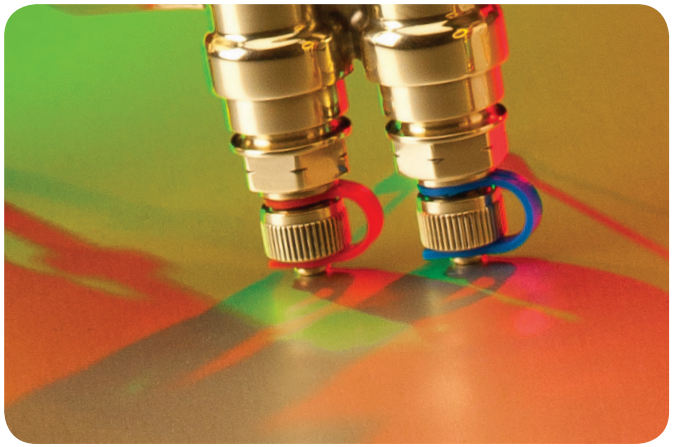
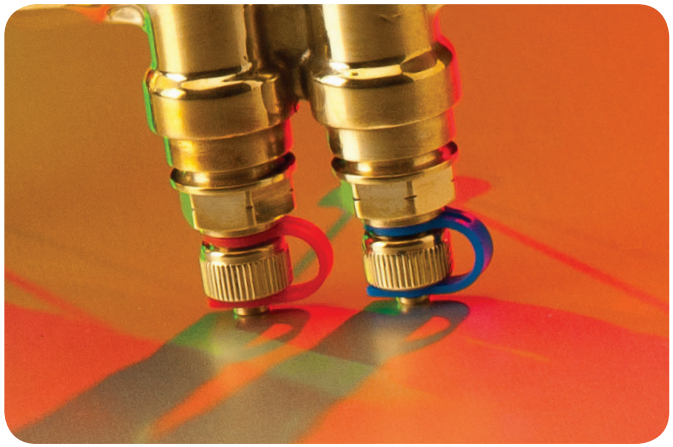
Typical Application Schematics for Frese DYNAMIC valves



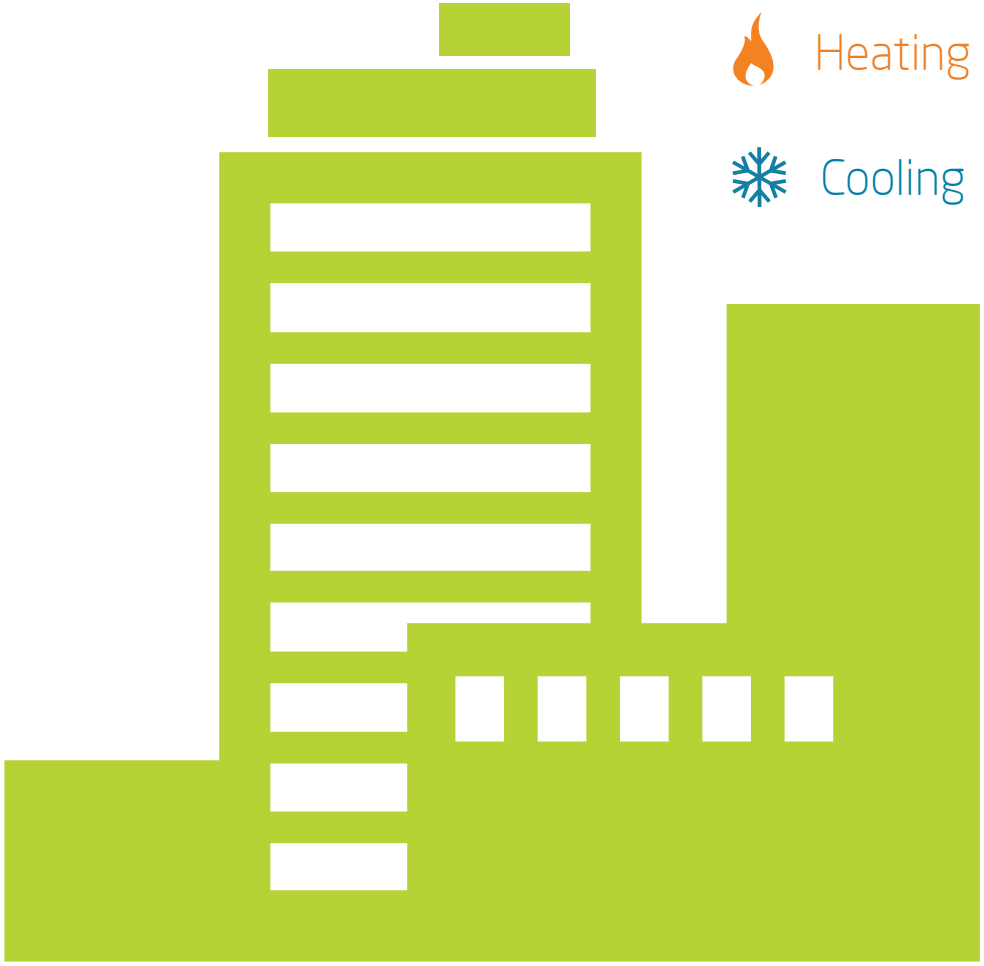


DN20PN25

DN20PN25

DN15PN25




AHU ..... Air Handling Unit
DPCV ..... Differential Pressure Control Valve
DRV ..... Double regulating valve
EQ% ..... Equal percentage
FCU ..... Fan Coil Unit
FODRV ..... Fixed orifice double regulating valve
PICV ..... Pressure Independent Control Valve
PV-STBV ..... PV Compact - Static Balancing Valve
TRV ..... Thermostatic Radiator Valve
VODRV ..... Variable orifice double regulating valve



Heating Systems

DYNAMIC and STATIC valve finder

Heating

ONE PIPE SYSTEM

→ with TRVs OR without TRVs

→ Dynamic or Automatic Balancing → DYNAMIC valves

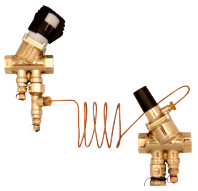
SIGMA Compact
DN15 to DN300
Dynamic Flow Limiting Valve

→ Static or Manual Balancing → STATIC valves

STBV Range
DN15 to DN500
DRV & VODRV
DN15 to DN300 FODRV

TWO PIPE SYSTEM

→ No presetting on TRVs → Differential Pressure & Flow Control → DYNAMIC valves



PV-SIGMA Compact
DN15 to DN50
DPCV & Dynamic Flow Limiting Valve

PV-STBV
DN15 to DN50
DPCV & FODRV

→ Presetting on TRVs → Differential Pressure Control → DYNAMIC valves

PV Compact
DN15 to DN200
DPCV

FOUR PIPE SYSTEM

→ Pressure Independent Control → DYNAMIC valves

COMBIFLOW 6-Way
DN15 to DN20
Pressure Independent Control Valve

Cooling

CONSTANT FLOW

- Dynamic or Automatic Balancing
  - DYNAMIC valves
    - Cartridge Solution
    - Externally Adjustable
- Static or Manual Balancing
  - STATIC valves

VARIABLE FLOW

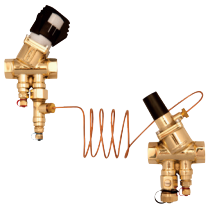
- Differential Pressure & Flow Control
  - DYNAMIC valves
- Differential Pressure Control
  - DYNAMIC valves
- Pressure Independent Control
  - DYNAMIC valves

ALPHA
DN15 to DN800
Dynamic Flow Limiting Valve

SIGMA Compact
DN15 to DN300
Dynamic Flow Limiting Valve

STBV Range
DN15 to DN500
DRV & VODRV
DN15 to DN300 FODRV

PV-STBV
DN15 to DN50
DPCV & FODRV



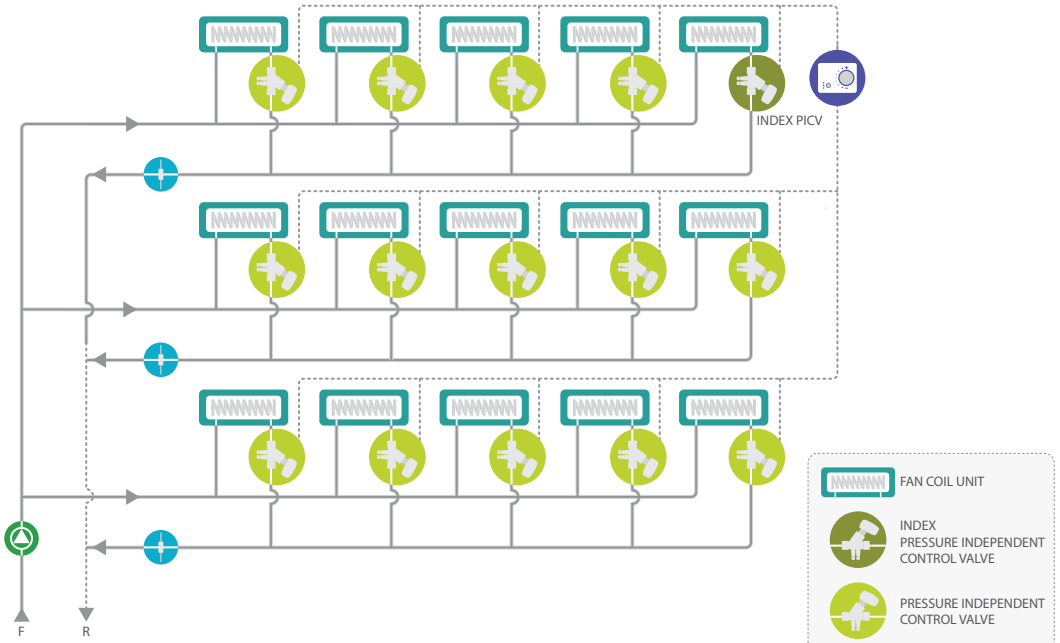
PV-SIGMA Compact
DN15 to DN50
DPCV & Dynamic Flow Limiting Valve

PV Compact
DN15 to DN200
DPCV

OPTIMA Compact
DN10 to DN300
Pressure Independent Control Valve

Fan Coil Unit Application

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a controller connected to the PICV actuator.

The control can either be modulating or On/Off depending on the system layout.

Benefits

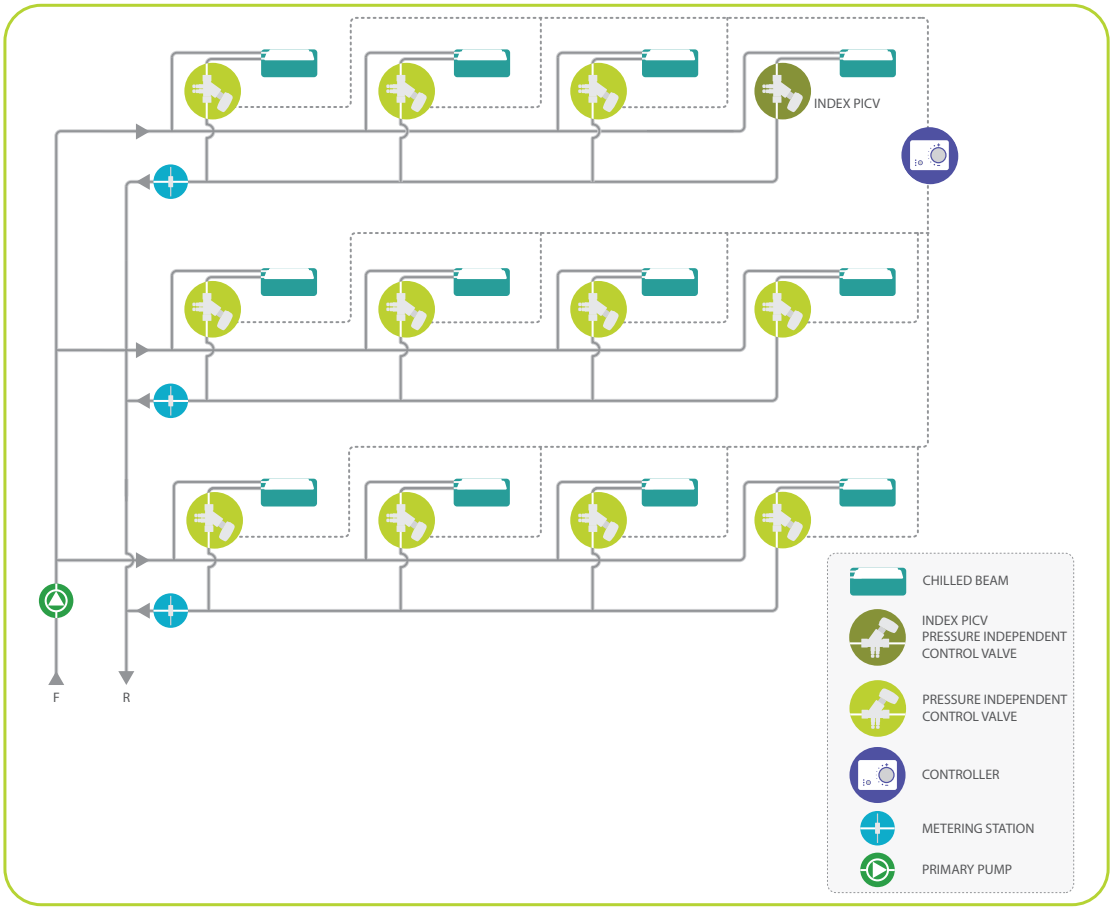
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- A metering station can be placed on the branch if additional flow verification is required by the witnessing authority.
- The index valve will, in applications such as this with identical design and coil performance, be the one furthest from the pump, but it can be elsewhere in other layouts.
- In theory, PT-plugs are only needed on the index PICV, but for commissioning and diagnostic purposes, it can be useful to have PT-plugs on every valve.

Chilled Beams

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a controller connected to the PICV actuator. The control can either be modulating or On/Off depending on the system layout. On/Off control is often selected on passive chilled beams to avoid laminar flow, which lowers the cooling transfer from the water to the coil.

Benefits

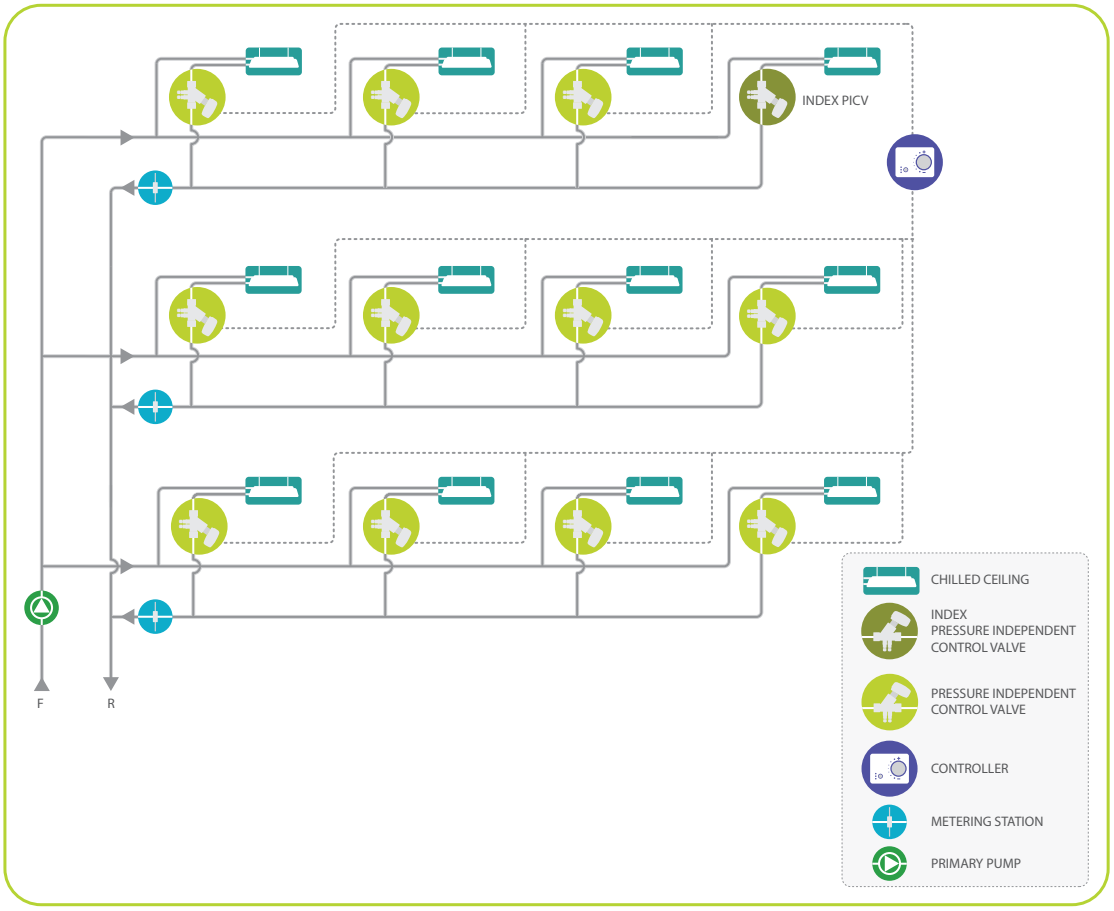
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need of additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- A metering station can be placed on the branch if additional flow verification is required by the witness authority.
- The index valve will, in applications such as this with identical design and coil performance, be the one furthest from the pump, but it can be elsewhere in other layouts.
- In theory, PT-plugs are only needed on the index PICV, but for commissioning and diagnostic purposes, it can be useful to have PT-plugs on every valve.

Chilled Ceilings

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a controller connected to the PICV actuator. The control can either be modulating or On/Off depending on the system layout. On/Off control is often selected on passive chilled ceiling to avoid laminar flow which lowers the cool transfer from the water to the coil.

Benefits

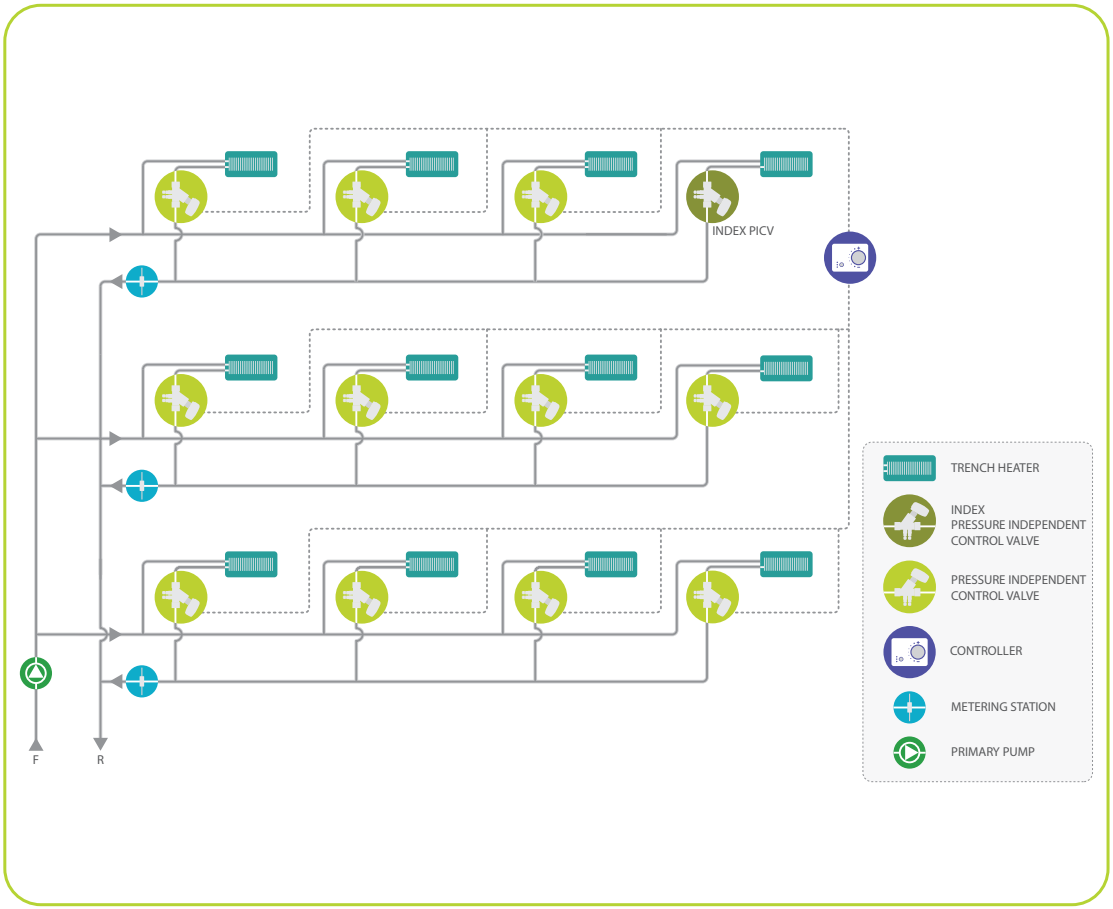
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- A metering station can be placed on the branch if additional flow verification is required by the witness authority
- The index valve will, in applications such as this with identical design and coil performance, be the one furthest from the pump, but it can be elsewhere in other layouts
- In theory, PT-plugs are only needed on the index PICV, but for commissioning and diagnostic purposes, it can be useful to have PT-plugs on every valve.

Trench Heater

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a controller connected to the PICV actuator.

The control can either be modulating or on/off depending on the system layout.

Benefits

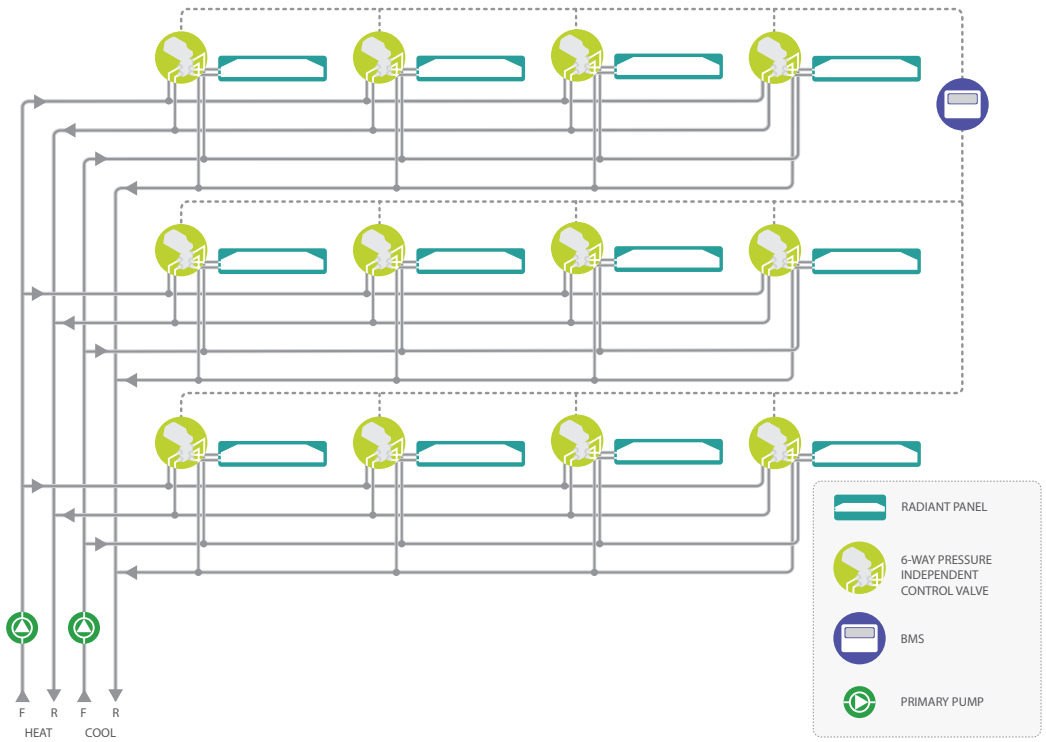
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- A metering station can be placed on the branch if additional flow verification is required by the witnessing authority.
- The index valve will, in applications such as this with identical design and coil performance, be the one furthest from the pump, but it can be elsewhere in other layouts.
- In theory, PT-plugs are only needed on the index PICV, but for commissioning and diagnostic purposes, it can be useful to have PT-plugs on each valve.

Radiant panels

4-pipe heating and cooling



COMBIFLOW 6-WAY
Pressure Independent Control Valve

Function

The 6-Way Pressure Independent Control Valve (PICV) is used in 4-pipe water distribution systems with one single terminal unit for both cooling and heating. The room temperature is controlled by the BMS connected to the 6-Way PICV actuator. The switch over from cooling to heating and modulating control, can either be digital by Modbus and BACnet or analogue by 0-10 V or 4-20 mA.

Benefits

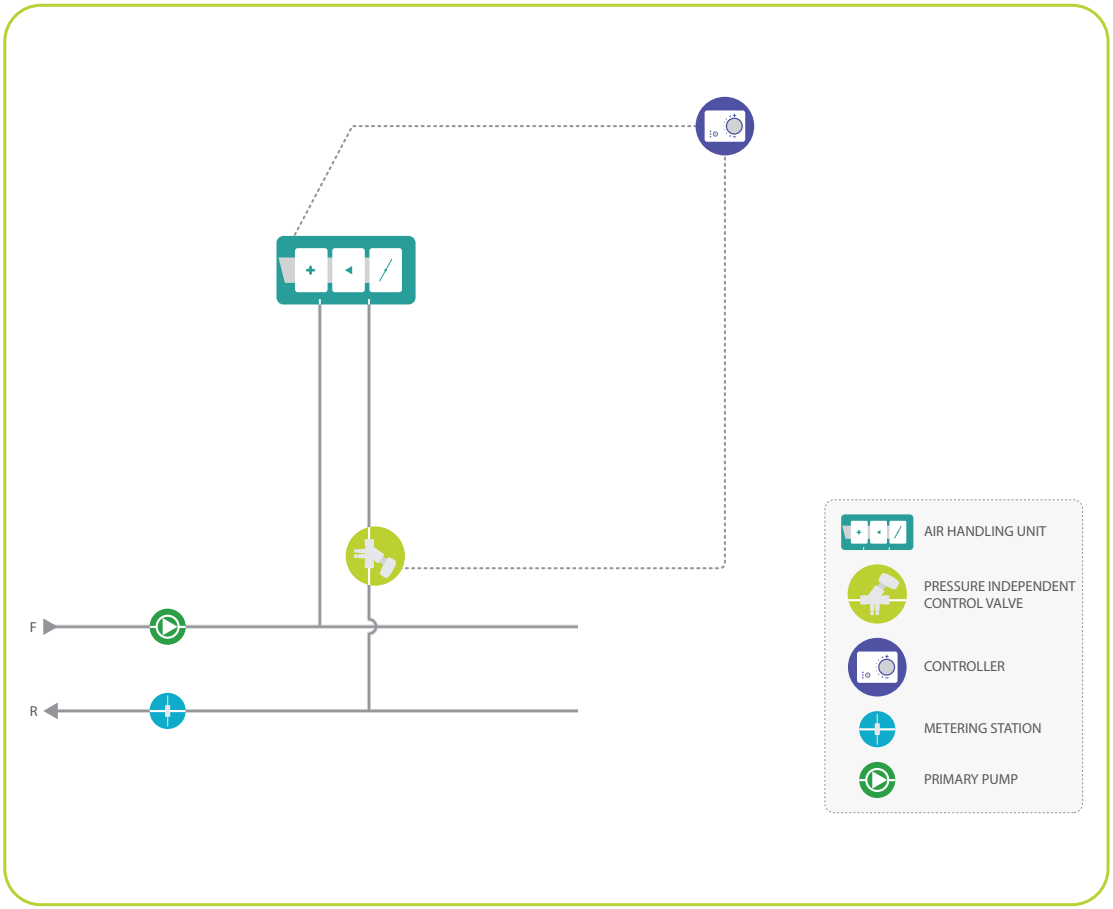
- The 6-Way PICV controls both cooling and heating in one single valve and ensures balancing of the flow and eliminates the use of static balancing valves and differential pressure control valves.
- Simple installation with only one 6-Way PICV valve and one actuator.
- Low total pressure loss in the system due to one single valve with high KV.
- The flow for both heating and cooling is set independently of each other, by the actuator, without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the 6-Way PICV placed at the index point, or at the end of every branch.

Considerations

- The index valve will, in applications such as this with identical design and coil performance, be the one furthest from the pump, but it can be elsewhere in other layouts.
- In theory, PT-plugs are only needed on the index 6-Way PICV, but for commissioning and diagnostic purposes, it can be useful to have PT-plugs on every valve.

Air Handling Unit

with PICV direct control



OPTIMA Compact
Pressure Independent Control Valve

Function

The air temperature of the Air Handling Unit is controlled by a sensor in the outlet. When the control system calls for higher or lower temperature on the air outlet, the PICV opens or closes to increase or decrease the flow through the coil. The power output from the coil follows a parabolic curve where often an EQ% valve/actuator characteristic is chosen to have a direct relation between the input control signal and power output.

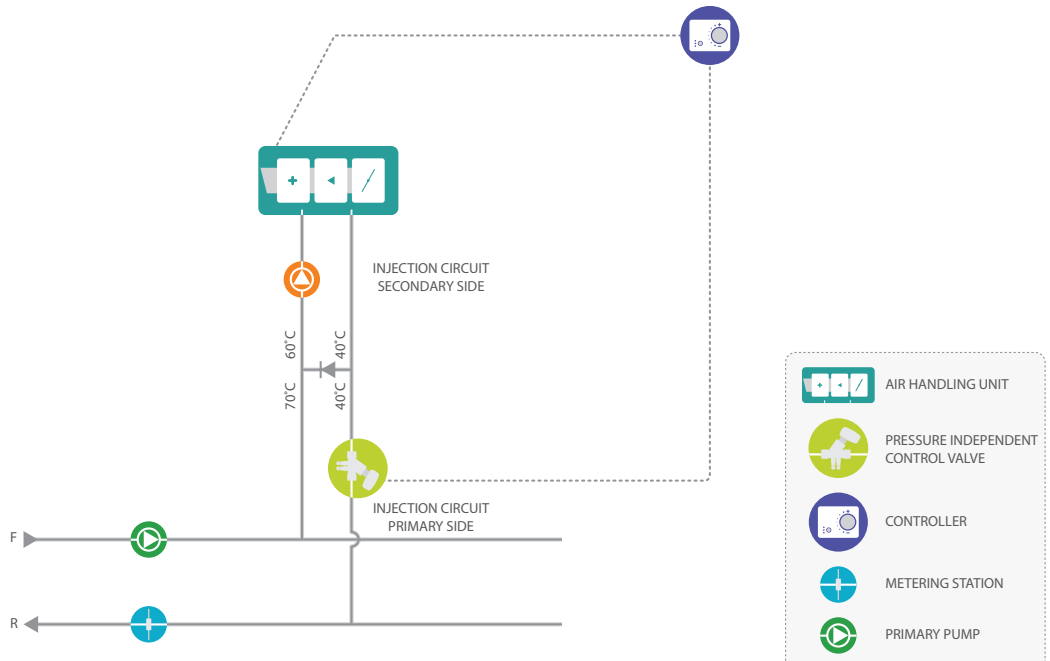
Benefits

- The PICV ensures balancing of the primary flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple application as only a PICV is required to control flow, temperature and differential pressure.

Considerations

- At part load, the flow through the coil can be low leading to laminar flow and reducing the power output.
- Larger coils can have different temperatures in different areas of the coil making precise temperature control difficult.
- A metering station can be installed if additional flow verification is required.

Air Handling Unit
with PICV injection circuit



OPTIMA Compact
Pressure Independent Control Valve

Function

The air temperature of the Air Handling Unit is controlled by a sensor in the outlet. The secondary side of the injection circuit circulates a constant flow through the coil maintaining a uniform temperature throughout the entire coil.

When the control system calls for higher or lower temperature on the air outlet, the PICV valve opens or closes to allow heating or cooling water from the primary side of the injection circuit to enter the secondary side. The temperature in the coil then changes giving an almost direct relation between the temperature in the coil and the power output from the coil.

Benefits

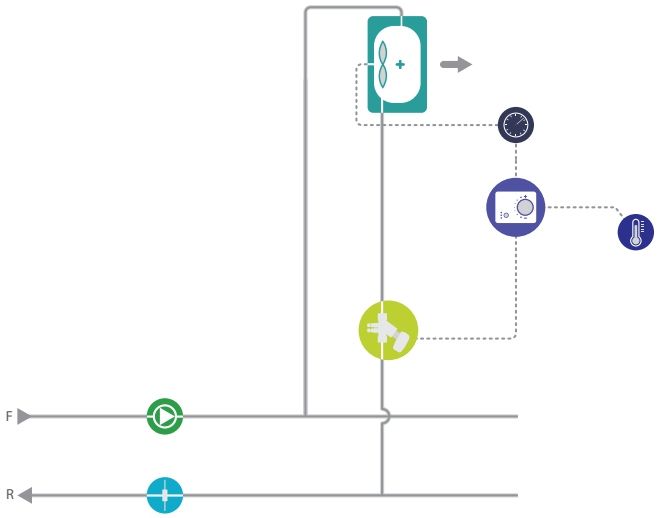
- The PICV ensures balancing of the primary flow and eliminates the use of both static balancing valves and differential pressure control valves.
- AHU with a large coil area have a uniform temperature in all parts of the coil, providing a precise temperature control.
- Direct relation between coil temperature and power output.

Considerations

- Requires a small circulation pump on the secondary side of the injection circuit.
- A metering station can be installed if additional flow verification is required.

Calorifier

with PICV control



CALORIFIER

CONTROLLER

PRESSURE INDEPENDENT CONTROL VALVE

METERING STATION

PRIMARY PUMP

TEMPERATURE SENSOR (INDOOR)

TIMER

OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a room controller connected to the PICV actuator. To avoid cold air being blown into the room, when fresh air is taken from outside, a timer can be inserted to delay the startup of the fan. The control can either be modulating or On/ Off depending on the system layout.

Benefits

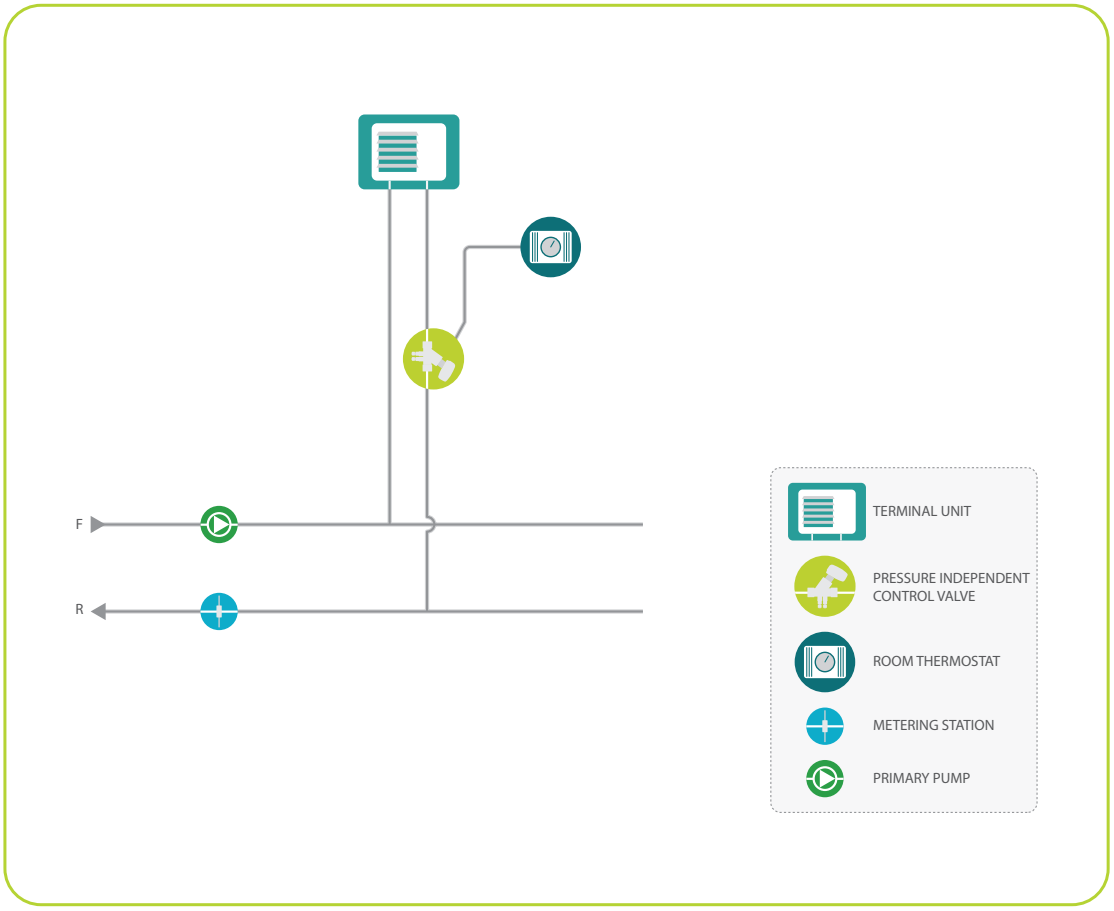
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- The minimum differential pressure required for the PICV must be available at design flow.
- A metering station can be installed if additional flow verification is required.

Stand-alone Terminal Unit

with PICV control and Self Acting Thermostat



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature in different applications, such as Fan Coil Units, Radiators and Trench Heaters, is controlled by a self-acting room thermostat.

The room thermostat has a remote sensor and can be directly connected to the PICV.

Benefits

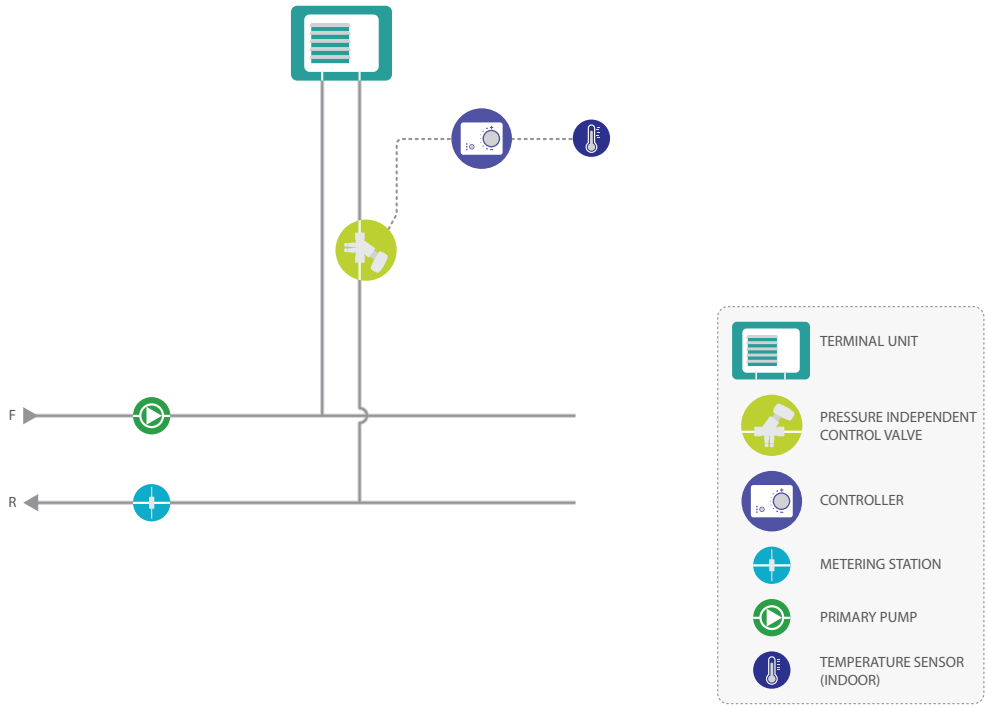
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- Minimum differential pressure required for the PICV must be available at design flow.
- A metering station can be placed on the branch if additional flow verification is required by the witnessing authority.

Stand-alone Terminal Unit

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature in different applications, such as Fan Coil Units, Chilled Beams, Chilled Ceilings, Trench Heaters, is controlled by a room controller.

The room controller has a built in temperature sensor and delivers an output signal to the PICV actuator.

The control signal can either be modulating or on/off depending on the system layout.

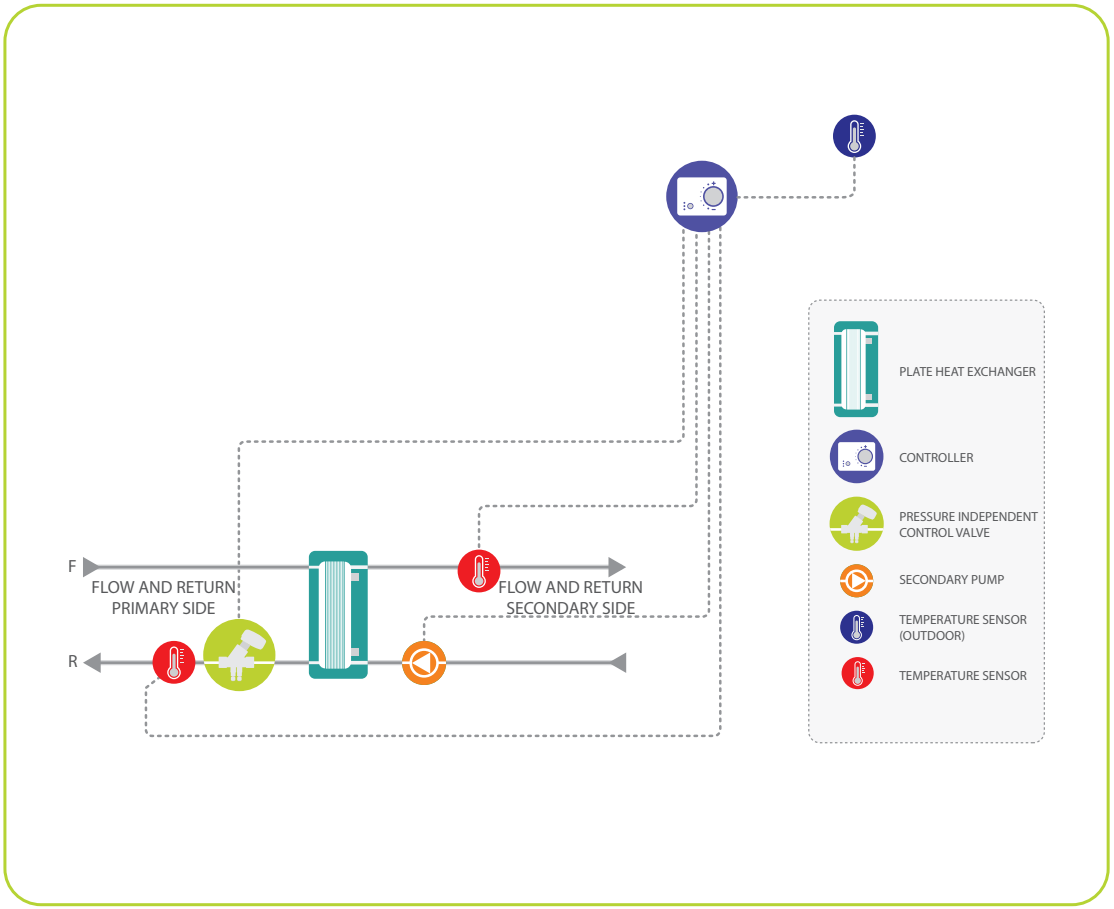
Benefits

- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV placed at the index point, or at the end of every branch.

Considerations

- Minimum differential pressure required for the PICV must be available at design flow.
- A metering station can be placed on the branch if additional flow verification is required by the witnessing authority.

Plate Heat Exchanger
with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The primary function of the PICV is to control the water inlet temperature on the secondary side.

To secure the water outlet temperature on the primary side a sensor is placed here.

The balance and the full modulating control on the primary side is made by the PICV with a modulating actuator.

When the controller calls for higher or lower temperature on the water inlet on the secondary side, the PICV valve opens or closes to allow heating or cooling water from the primary side to enter the plate heat exchanger. The temperature on the secondary side then changes to the desired temperature.

Benefits

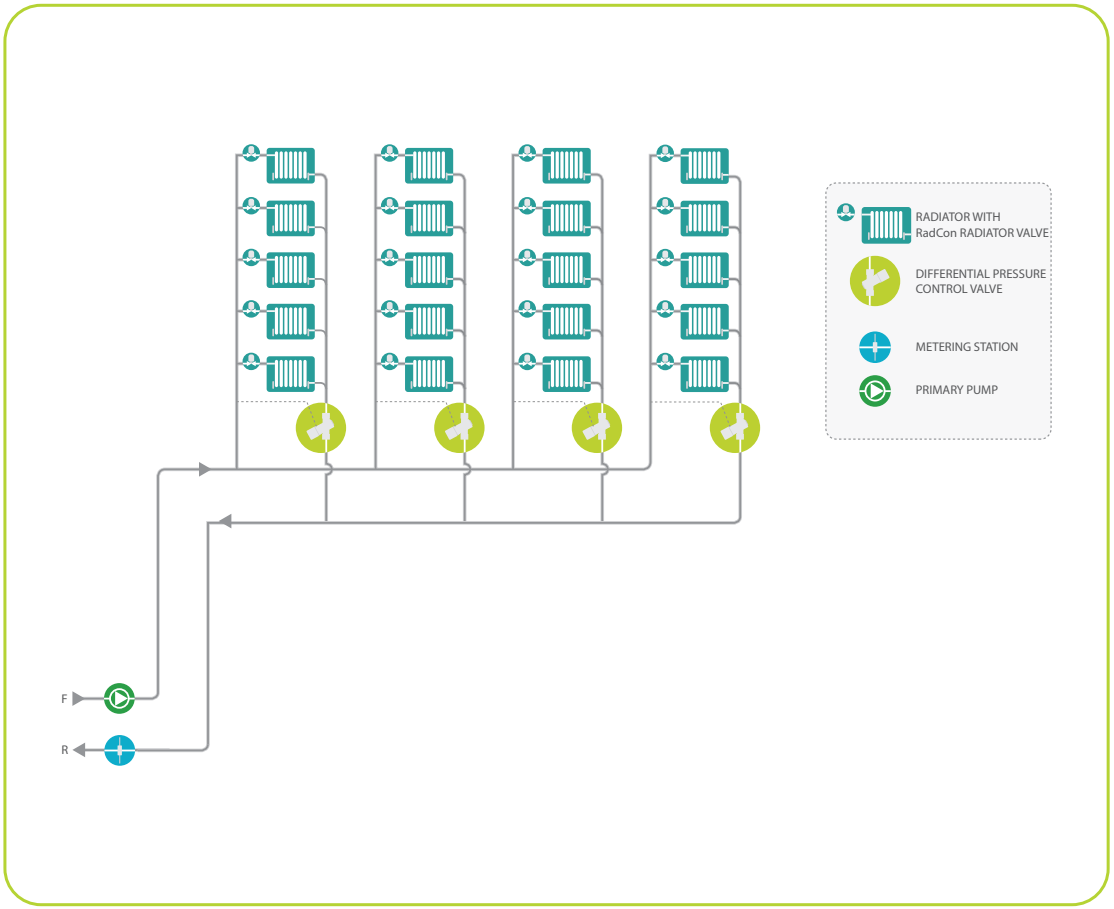
- The PICV ensures balancing of the primary flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Full modulation with an authority of 1 for the plate heat exchanger control.
- Return temperature on the primary side is secured.
- Secondary pump is switched off when no demand.

Considerations

- Minimum differential pressure required for the PICV must be available at design flow.

Radiator System - Dynamic

2-pipe DP above 70 kPa with DPCV



RadCon
Pressure Independent
Radiator Valve

PV Compact
Differential Pressure
Control Valve

Function

The room temperature is controlled by the radiator valve on each radiator. The balance of the system is handled by the flow setting of the dynamic radiator valves.

The flow at the individual risers is automatically limited and balanced by the dynamic radiator valves regardless of pressure fluctuations. The primary differential pressure is limited by the differential pressure control valve (DPCV).

Benefits

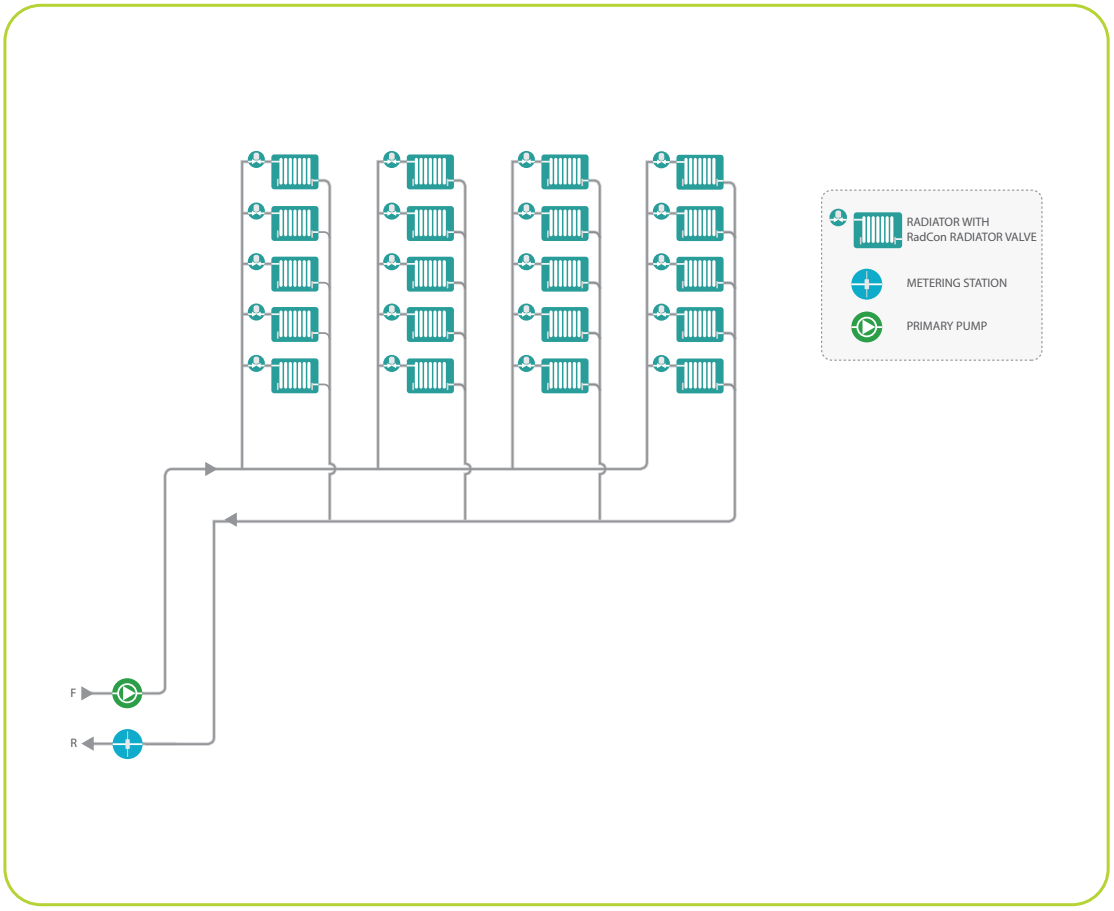
- Direct flow setting on each radiator.
- Ensures full balance and flow limitation in the system.
- Provides optimal modulation for the radiator valves.
- All sections will have a defined DP available.
- With the correct dynamic radiator valve flow-setting, the flow will be controlled in every part of the system.

Considerations

- The DP available at the dynamic radiator valves must be within 15-70 kPa.

Radiator System - Dynamic

2-pipe DP below 70 kPa



RadCon
Pressure Independent Radiator Valve

Function

The room temperature is controlled by the radiator valve on each radiator. The balance of the system is handled by the flow setting of the dynamic radiator valves.

The flow at the individual risers is automatically limited and balanced by the dynamic radiator valves regardless of outside pressure fluctuations.

Benefits

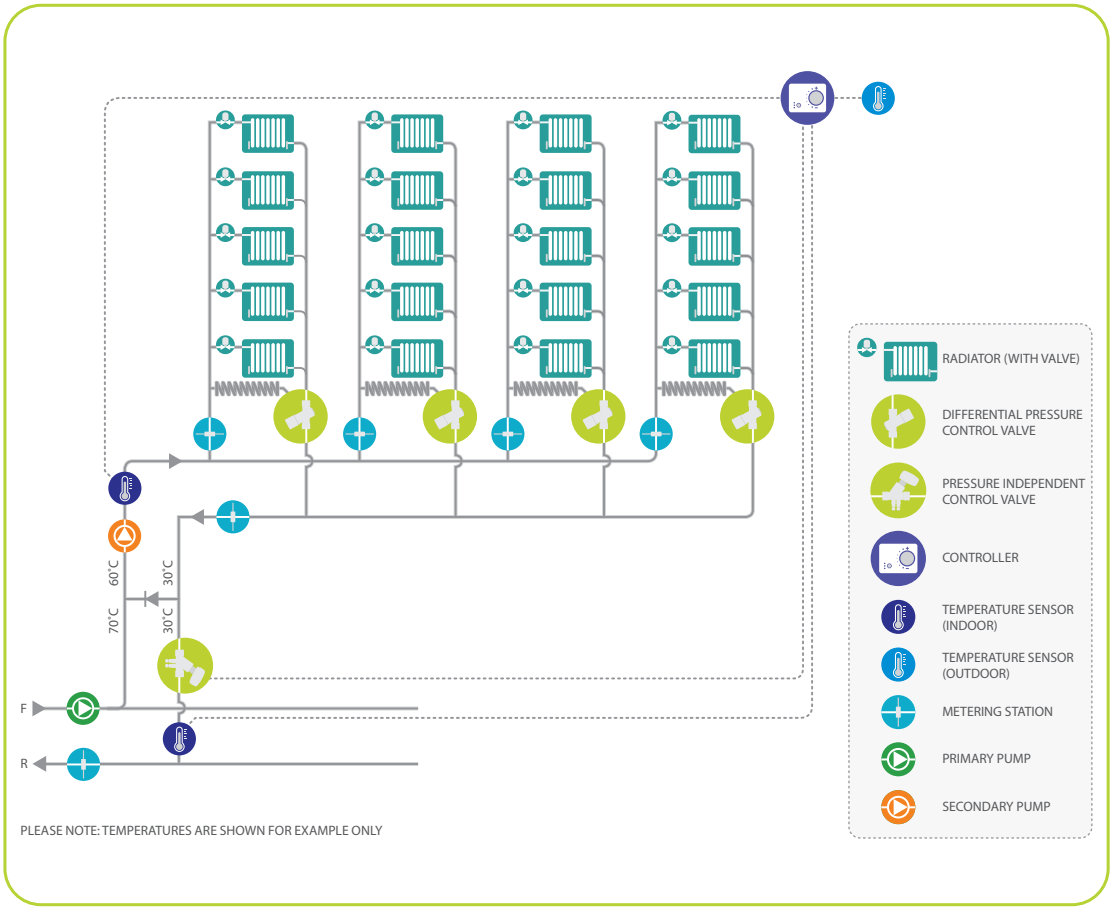
- Direct flow setting on each radiator.
- Ensures full balance and flow limitation in the system.
- Provides optimal modulation for the radiator valves.
- With the correct dynamic radiator valve flow-setting, the flow will be controlled in every part of the system.
- Low-cost solution.

Considerations

- The DP available at the dynamic radiator valves must be above 15 kPa.

Radiator System - Static

with differential pressure control



PV Compact
Differential Pressure Control Valve

OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by the radiator valve on each radiator. The balance of the system is handled by the pre-setting of the radiator valves in conjunction with the pre-set differential pressure, controlled by the DPCV.

A DPCV controlling the differential pressure at every riser prevents noise in the system and allow the radiator valves to regulate and close when required.

The temperature from the primary circuit is lowered to an optimal inlet temperature at the secondary side, with a heat PICV injection circuit connected to a controller.

The flow at the individual risers can be adjusted by the DPCV and verified on the metering station on each riser.

Benefits

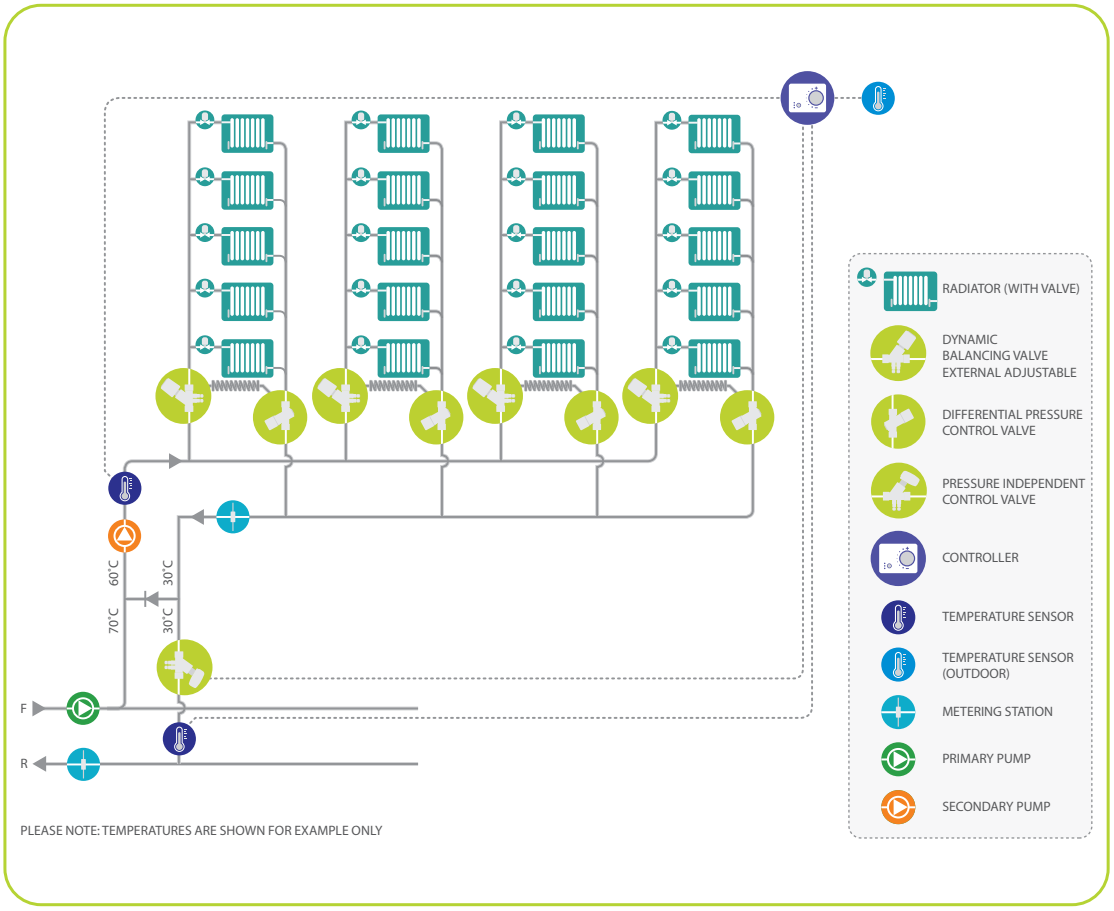
- Prevents noise in the system.
- Provides good modulation for the radiator valves.
- All sections will have a defined DP available.
- With the correct radiator valve pre-setting, the flow will be controlled in every part of the system.
- Low cost solution.

Considerations

- If the radiator valves are without pre-setting or they are not set correctly, the flow in the system will not be in balance.

Radiator System - Static

with DPCV and dynamic balancing



PV-SIGMA Compact
DPCV & Dynamic Flow Limiting Valve

OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by the radiator valve on each radiator.

The balance of the system is handled by the installation of a dynamic balancing valve on each riser/branch, controlling the flow rate through this section of the system. The dynamic balancing valve is a flow limiter that prevents overflow in the part of the system controlled by the valve. This will ensure that the design flow is always available in all parts of the system.

A DPCV controlling the differential pressure at each riser prevents noise in the system and allows the radiator valves to regulate and close when required.

The temperature from the primary circuit is lowered to an optimal inlet temperature at the secondary side, with a heat PICV injection circuit connected to a controller.

Benefits

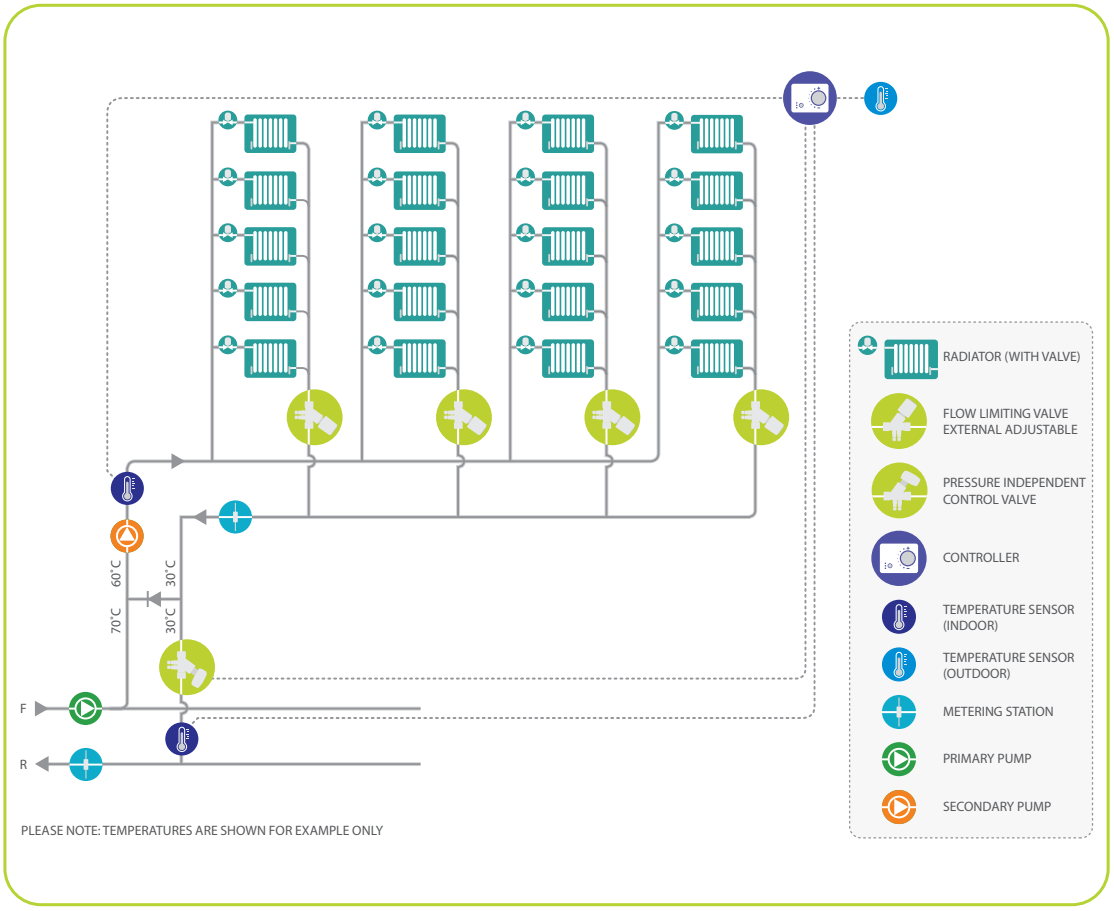
- The flow rate through the dynamic balancing valve is independent of the differential pressure across it.
- The flow can be set without the use of a manometer/commissioning device.
- Only 1 dynamic balancing valve in series.
- If the system is expanded, it will not need to be rebalanced.
- No straight lengths of pipe before or after the dynamic balancing valve are required.
- Prevents noise in the system and provides good modulation to the radiator valves.
- All sections will have a defined DP available.

Considerations

- Higher cost from both DP control valve and dynamic balancing valve
- A metering station can be installed if additional flow verification is required by the witnessing authority.

Radiator System - Static

with dynamic balancing



SIGMA Compact
Dynamic Flow Limiting Valve

OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by the radiator valve on each radiator.

The balance of the system is handled by a dynamic balancing valve on each riser/branch controlling the flow rate through this section of the system. The dynamic balancing valve can also be installed at each apartment for a more localised balancing

The dynamic balancing valve is a flow limiter that prevents overflow in the part of the system controlled by the valve. This will ensure that the design flow is always available in every part of the system.

The temperature from the primary circuit is lowered to an optimal inlet temperature at the secondary side, with a PICV injection circuit connected to a controller.

Benefits

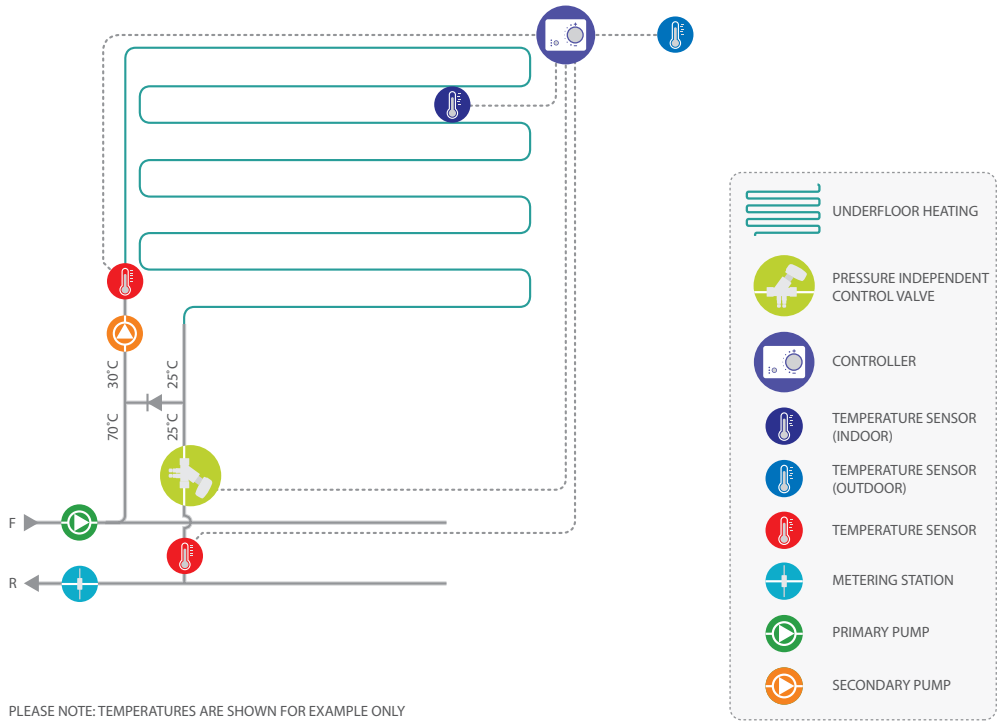
- The flow rate through the dynamic balancing valve is independent of the differential pressure across it.
- The flow can be set without the use of a manometer/commissioning device.
- Only 1 dynamic balancing valve in series.
- If the system is expanded, it will not need to be rebalanced.
- No straight lengths of pipe before or after the dynamic balancing valve are required.

Considerations

- Minimum differential pressure required for the dynamic balancing valve must be available at design flow.
- The differential pressure in the different sections of the system cannot be controlled.

Underfloor Heating

with PICV control - single circuit



OPTIMA Compact
Pressure Independent Control Valve

Function

The room temperature is controlled by a room thermostat connected to the PICV actuator. The temperature from the primary circuit is lowered by a heat injection circuit down to a maximum of 30°C.

Due to the slow response time of an underfloor heating system, it is normally controlled by a weather compensated room controller with an outside sensor.

The control characteristic will normally be linear.

Benefits

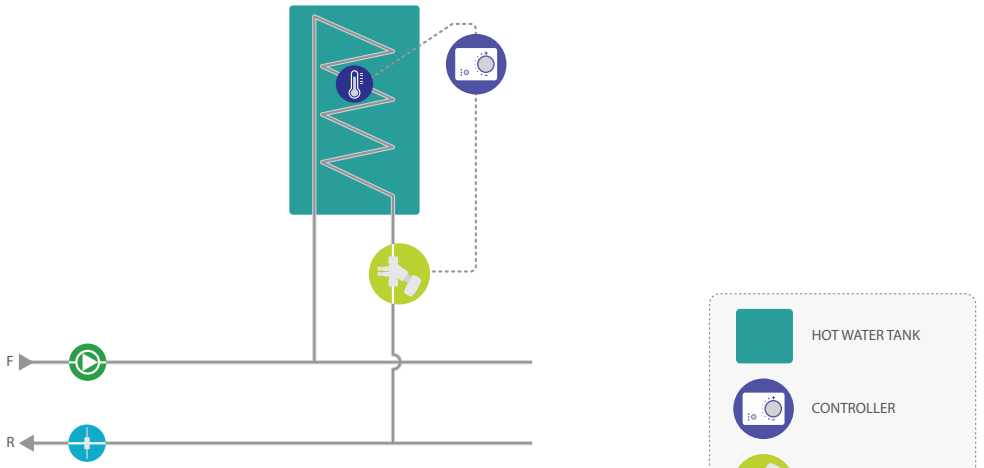
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.

Considerations

- Minimum differential pressure required for the PICV must be available at design flow.
- A metering station can be installed if additional flow verification is required by the witnessing authority.

Hot Water Tank

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The hot water temperature in the tank is controlled by a controller with a temperature sensor placed in the tank. The valve is controlled by a modulating actuator mounted directly on the PICV.

Benefits

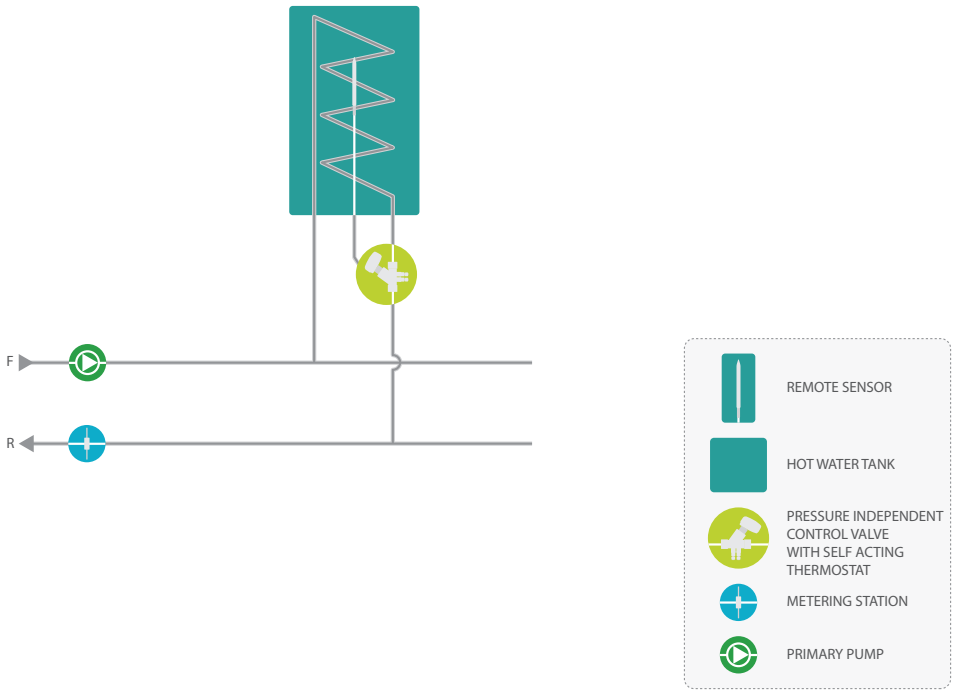
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The flow limiting feature of the PICV ensures a minimum Delta T for the water heating up the tank.
- Legionella heating up cycles can be performed automatically.

Considerations

- A metering station can be installed if additional flow verification is required by the witnessing authority.

Hot Water Tank

with PICV control and Self Acting Thermostat



OPTIMA Compact
Pressure Independent Control Valve

Function

The hot water temperature in the tank is controlled by a self-acting thermostat with a remote sensor placed in a sensor pocket located in the tank.

The self-acting thermostat is mounted directly on the PICV.

Benefits

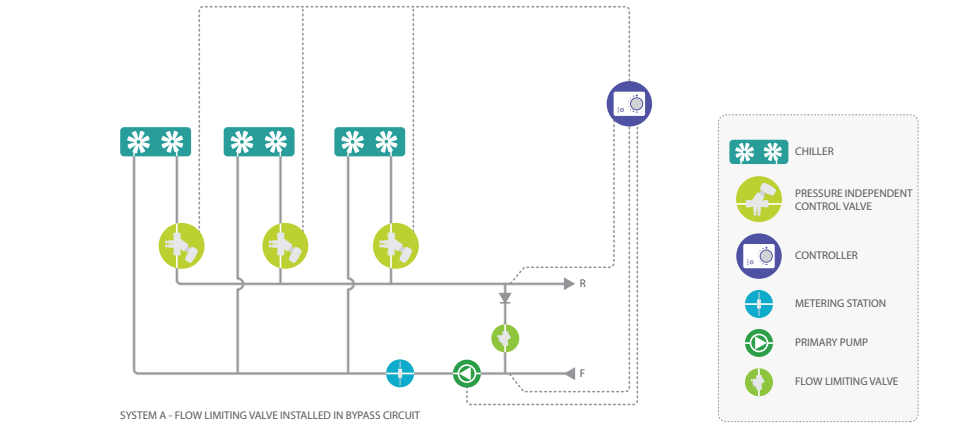
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation with no need of any control system.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The flow limiting feature of the PICV ensures a minimum Delta T for the water heating up the tank.

Considerations

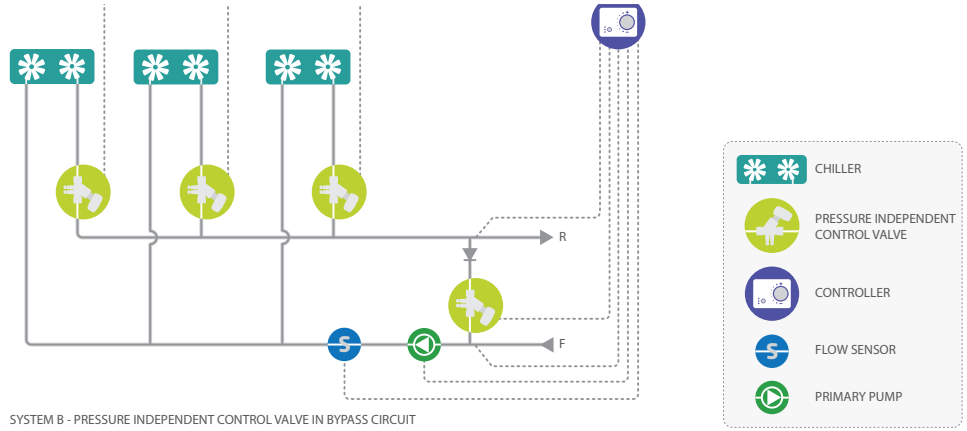
- Legionella heating up cycles cannot be performed automatically.
- A metering station can be installed if additional flow verification is required by the witnessing authority.

Circulation of Minimum Flow - Plant Room

with PICVs and flow limiters



SYSTEM A - FLOW LIMITING VALVE INSTALLED IN BYPASS CIRCUIT



SYSTEM B - PRESSURE INDEPENDENT CONTROL VALVE IN BYPASS CIRCUIT

OPTIMA Compact
Pressure Independent Control Valve

ALPHA
Dynamic Flow Limiting Valve

Function

The dynamic flow limiter (Automatic Balancing Valve) ensures a minimum flow for the cooling or heating devices to prevent from freezing or overheating. The selected flow rate for the flow limiter is based on the minimum required flow rate for the heating/cooling device.

Benefits

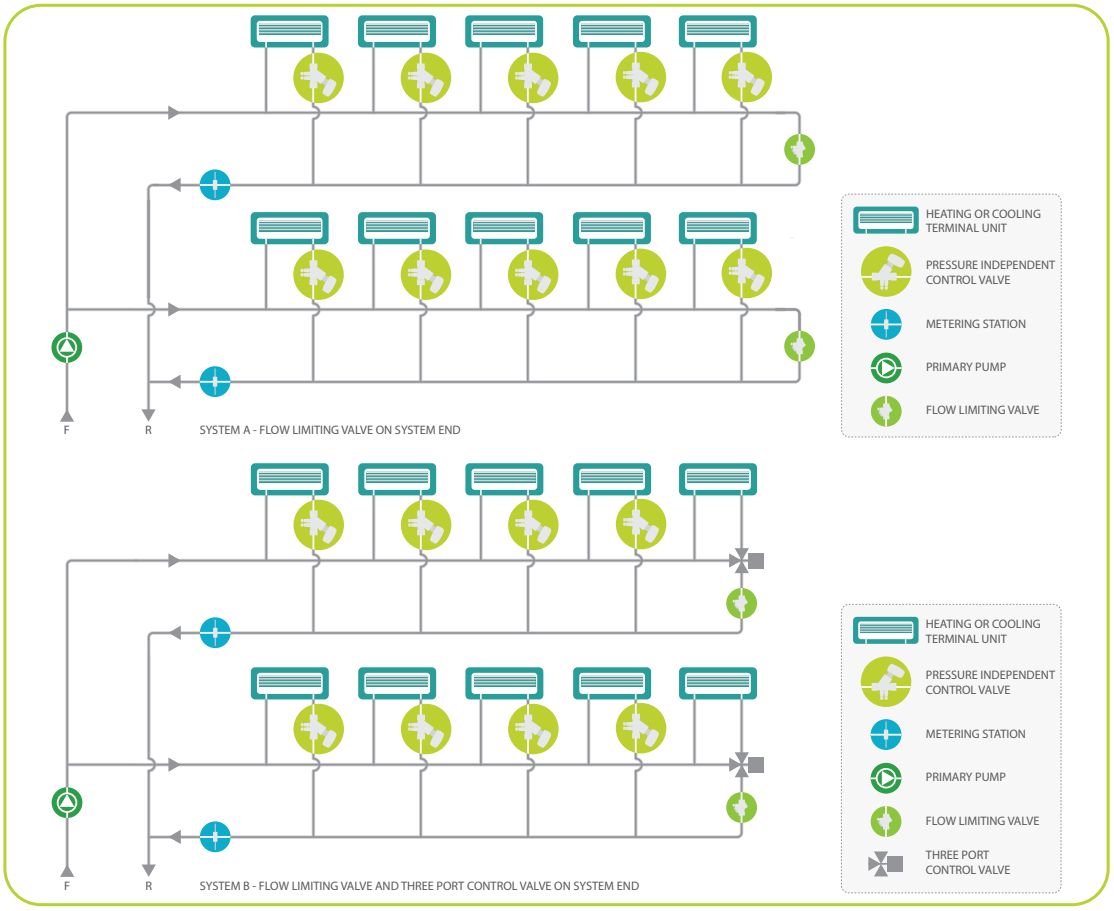
- The dynamic flow limiter ensures that only the required flow passes through the bypass and it is not influenced by an increasing pump pressure across the valve.
- The dynamic flow limiter can either be a fixed cartridge solution or a PICV where the minimum flow can be regulated by the controller.
- With a PICV controlling the bypass flow, the bypass can be closed when the flow to the system exceeds the minimum required flow. The controller must be connected to a flowmeter to control the bypass PICV.

Considerations

- A metering station can be placed on the main line if additional flow verification is required by the witnessing authority.
- The minimum bypass flow shall be added to the design flow if a PICV with a flow controlled bypass solution is not chosen.

Circulation of Minimum Flow - System End

with PICVs and flow limiters



OPTIMA Compact
Pressure Independent Control Valve

ALPHA
Dynamic Flow Limiting Valve

Function

The dynamic flow limiter (Automatic Balancing Valve) ensures a minimum flow for the cooling or heating devises to prevent from freezing or overheating. The total flow rate for the flow limiters is based on the minimum required flow rate for the heating/cooling device. The control of the minimum bypass flow can be made with either a PICV system where a dynamic flow limiter is placed at the end of the branch, or in a system where the PICV at the end of the branch is replaced with a 3-way valve with dynamic flow limiter on the outlet port.

Benefits

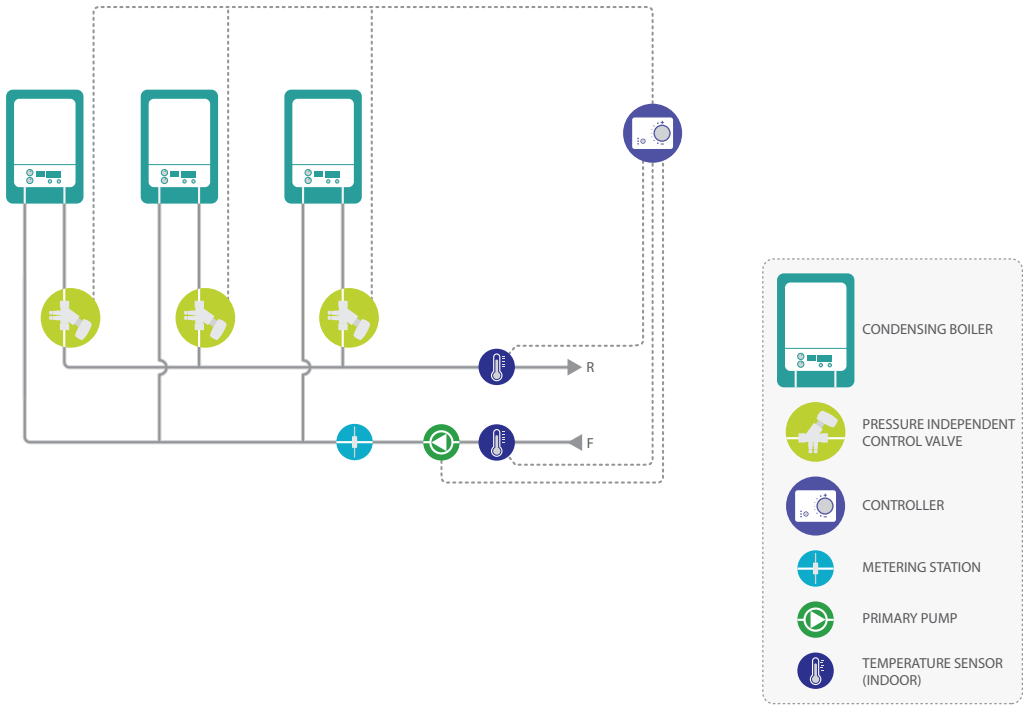
- The dynamic flow limiter ensures that only the required flow passes through the bypass and it is not influenced by an increasing pump pressure across the valve.
- With the bypass placed at the end of the line, instant cooling or heating is ensured at all times, and the circulation of chemicals throughout the whole system is undertaken.

Considerations

- A metering station can be placed on the main line if additional flow verification is required by the witness authority.
- With the PICV system, the minimum bypass flow shall be added to the design flow.
- With the 3-way valve replacing the PICV at the end of the branch, pressure independent modulation is not possible.

Condensing Boiler - Plant room

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The fully modulating boilers are connected to the controller which controls the flow through each boiler by the PICV.

The controller measures the inlet and outlet temperature to maximize Delta T and regulates the variable speed pump to maintain the required pump pressure.

For optimal boiler efficiency, the use of either cascade or unison control is recommended.

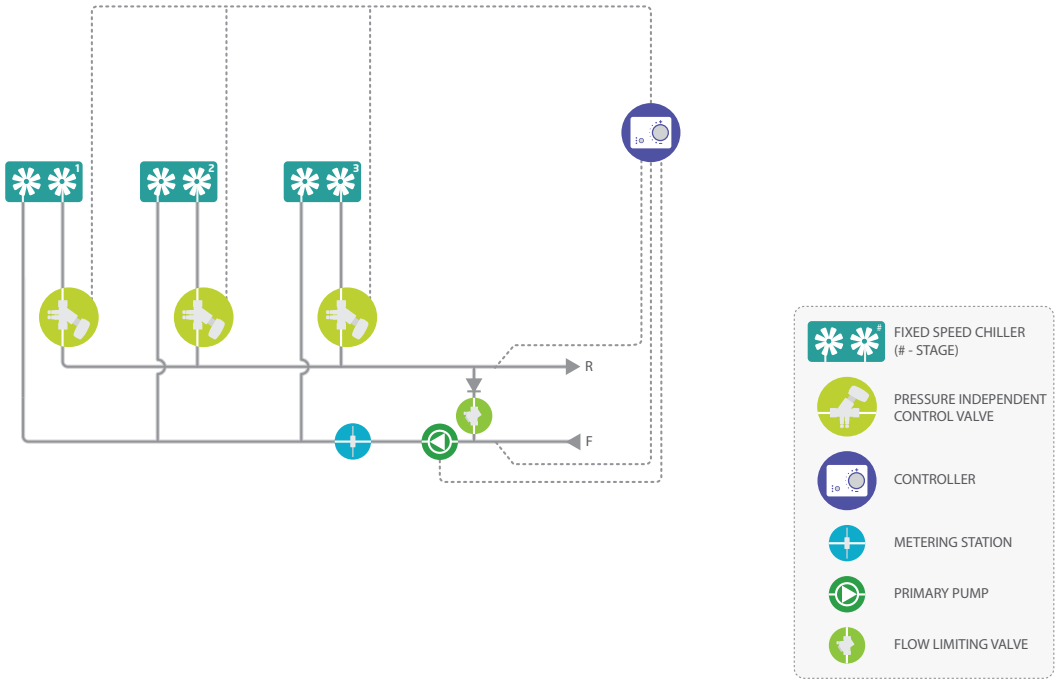
Benefits

- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV to set the required flow.

Considerations

- A metering station can be placed on the main line if additional flow verification is required by the witnessing authority.

Fixed Speed Chiller - Plant Room
with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The fixed speed chillers are connected to the controller which opens and closes the flow through each chiller by turning the PICV on and off.

The controller measures the inlet and outlet temperature to maximize Delta T and regulates the variable speed pump to maintain the required pump pressure.

For optimal chiller efficiency, the use of cascade control is recommended.

Benefits

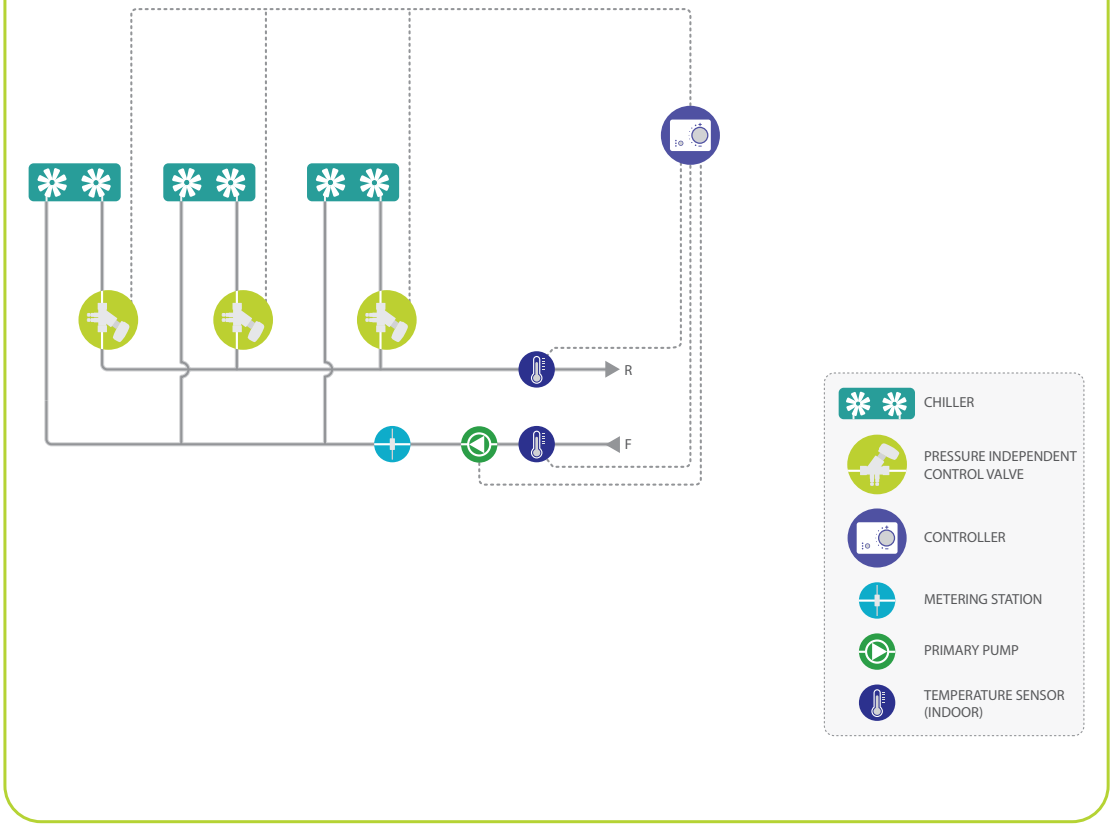
- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV to set the required flow.

Considerations

- A metering station can be placed on the main line if additional flow verification is required by the witnessing authority.
- A minimum bypass flow controlled by a dynamic flow limiter is required by the chiller to avoid freezing as they are running at full capacity when switched on.

Variable Speed Chiller - Plant Room

with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The variable speed chillers are connected to the controller, which controls the flow through each chiller by the PICV.

The controller measures the inlet and outlet temperatures to maximize Delta T and regulate the variable speed pump to maintain the required pump pressure.

For optimal chiller efficiency, the use of multiple chillers at lower capacity or cascade control at part load shall be selected, depending on the chiller design and control philosophy.

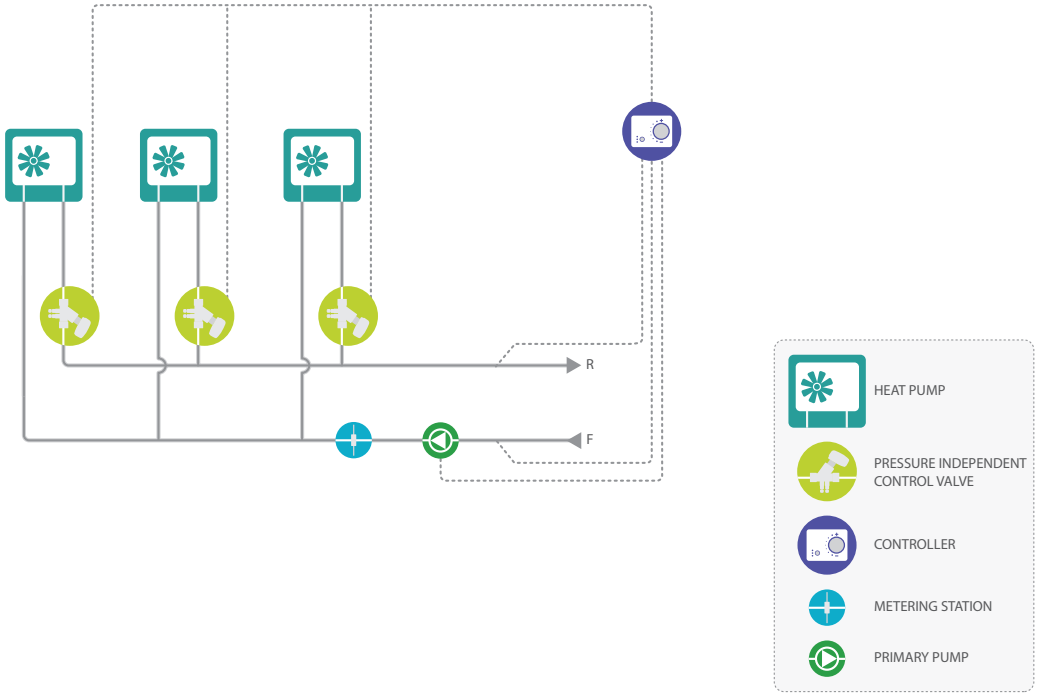
Benefits

- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV to set the required flow.

Considerations

- A metering station can be placed on main line if additional flow verification is required by the witnessing authority.
- A minimum bypass flow can be required by the chiller to secure instant cooling or circulation of chemicals in the system. This should be placed at the most appropriate place in the system.

Heat Pump - Plant Room
with PICV control



OPTIMA Compact
Pressure Independent Control Valve

Function

The heat pumps are connected to the controller through the valve actuator which controls the flow through each heat pump using the PICV.

The controller measures the inlet and outlet temperature to maximize Delta T and regulates the variable speed pump to maintain the required pump pressure.

For optimal heat pump efficiency, the use of either cascade or unison control is recommended.

Benefits

- The PICV ensures balancing of the flow and eliminates the use of both static balancing valves and differential pressure control valves.
- Simple installation as only the PICV is required with no need for additional pressure or flow balancing valves.
- Low total pressure loss in the system due to simple design.
- The flow can be set directly on the PICV without the need of a manometer or a commissioning unit.
- The differential pressure only needs to be checked at the PICV to set the required flow.

Considerations

- A metering station can be placed on the main line if additional flow verification is required by the witnessing authority.
- A minimum bypass flow can be required by the heat pump to secure instant heating or circulation of chemicals in the system. This should be placed at the most appropriate place in the system.

Types of Projects

For Frese DYNAMIC valves

Shopping Malls

Sports

Education

Hotels

Residential

Please visit
www.frese.eu/
HVAC
for more details

Commercial Buildings

Case Study

PICV energy savings - Canary Wharf, London

Overview

We installed a DN65 pressure independent control valve on an air handling unit together with a variety of sensors and data collection equipment to monitor the performance of the valve and the associated air handling unit.

We were also able to compare the performance of the air handling unit with a pressure independent control valve fitted to the same air handling unit with a conventional 2-port modulating control valve fitted.

Findings

a The off coil air temperature is controlled much more tightly by the pressure independent control valve compared to the conventional 2-port modulating valve

b With the relative flow control through the air handling unit when fitted with pressure independent control valve or fitted with a conventional 2-port control valve. Again, the amplitude and frequency of the oscillations are higher when the air handling unit is fitted with a conventional 2-port modulating valve

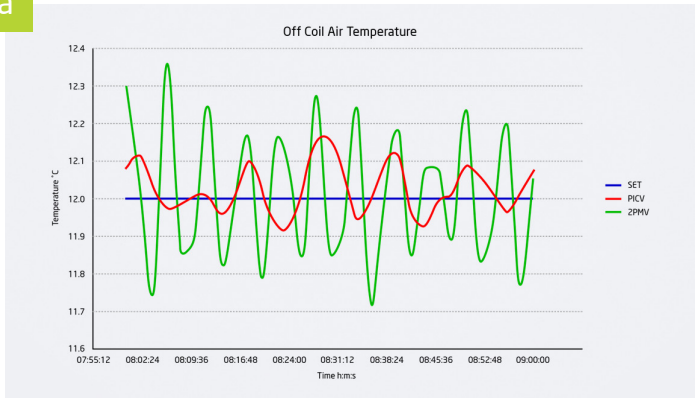
c Compare the relative cooling output of the air handling unit when fitted with a pressure independent control valve and 2-port modulating valve, we can see once again the power output from the coil is much more stable when fitted with a pressure independent control valve

Conclusion

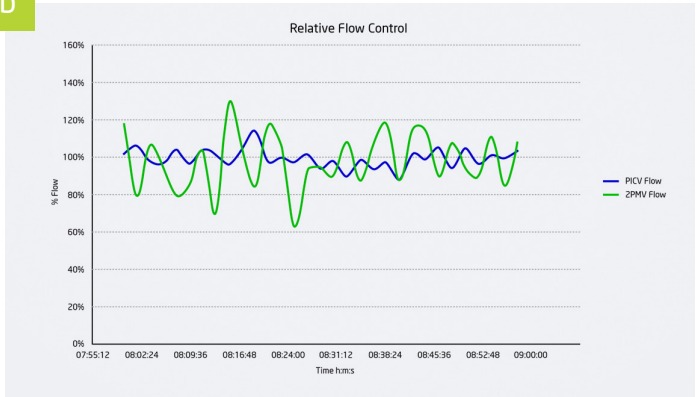
The actual energy saving was calculated using the pump affinity laws and the coil power output equation to compare the energy performance of the air handling unit when fitted with a pressure independent control valve and a conventional two port modulating valve.

The results showed that when the system was fitted with a PICV, the same AHU can satisfy the same cooling load with 35% less pump energy consumption and in increased ΔT.

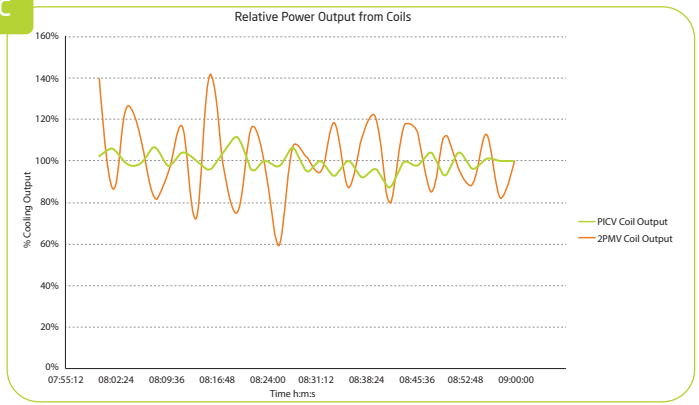
a



b



c



35%
ENERGY
SAVING

OPTIMA Compact
Dynamisk motorventil
DN50 til DN300

KNOWLEDGE

QUALITY

INNOVATION

MANUFACTURING EXCELLENCE

CUSTOMER FOCUS

www.frese.eu/hvac

Denmark - Main Office
Frese A/S
Tel: +45 58 56 00 00

Germany
Frese Armaturen GmbH
Tel: +49 (0)241 475 82 333

United Kingdom
Frese Ltd
Tel: +44 (0) 1704 896 012

Turkey
Frese Eurasia DIS TIC. LTD. STI.
Tel: +90 216 580 93 60

China
Frese Valves (Ningbo) Co., Ltd.
Tel: +86 (21) 5110 3212

Saudi Arabia
Frese Saudi Arabia
Tel: +966 5410 25 405

Australia & New Zealand
Frese Asia Pacific
Tel: +61431 794 414

South Africa
Frese Asia Pacific
Tel: +61431 794 414