Series 149 - 80mm centres
fan coil connection kit

altecnic
Caleffi group

Series 149 - 80mm centres fan coil connection kit

Introduction

The Altecnic Series 149 with 80mm centres fan coil connection kit is a pre-assembled group of components for terminal units.

It is compact in size and able to isolate, adjust and filter the secondary circuit of the terminal unit.

It allows the connection of fan coils, cold beams or ceiling conditioning systems with the main distribution network.

It controls the operation of the system and allows maintenance to be carried out should it be required.

Complete with insulation suitable for both heating and cooling.

Available with Venturi device for flow rate measurement

Materials

Component	Material	Grade	
Body	DZR	BS EN 12165 CW602N	
Strainer mesh	Stainless steel	AISI 304	
Isolating valve knob	Nylon reinforced	PA6G30	
PICV			
Headwork	DZR	BS EN 12165 CW602N	
Control stem	Stainless steel	BS EN 10088-3 AISI 304	
Piston	Stainless steel	BS EN 10088-3 AISI 304	
Obturator seat			
0.02 to 1.2 m³/h	PTFE		
1.8 to 3 m³/h	Satinless steel	BS EN 10088-3 AISI 303	
Obturator	EPDM		
Pressure regulating membrane	EPDM		
Springs	Stainless steel	BS EN 10270-3 AISI 302	
Seals	Non asbestos fibre		
Pre-adjustment indicator	Nylon reinforced	PA6G30	PA6G30
Knobs	Nylon	PA6	

Connections

System side:	DN15	½"F
	DN20	¾"F
	DN25	1"F
Terminal unit side:	DN15	¾"M
	DN20	1"M
	DN25	1¼"M

Technical Specification

Medium: Potable water
Max. percentage of glycol: 50%
Max. working pressure: 25 bar
Max. differential pressure with actuator: 1 bar
Working temperature range: -10 to 120°C
Ambient temperature range: 0 to 50°C
Nominal Δp control range: 25 to 400 kPa
Flow rate regulation range: 0.2 to 3 m³/h
(see hydraulic characteristics)
Max. flow rate with 656 thermo-electric actuator fitted
0.02 to 1.2 m³/h reduce by: 20%
1.8 to 3 m³/h reduce by: 25%
Strainer mesh size: 800µm

Insulation

Material: PPE
Density: 30 kg/m³
Thermal conductivity: 0.037 W/(m-K) at 10°C
Reaction to fire: class HBF

Technical Specification for Actuator - code 145014

Proportional linear actuator
Electrical supply: 24 V (ac/dc)
Power consumption: 2.5 VA (ac) - 1.5 W (dc)
Control signal: 0 to 10 V
Protection class: IP43
Ambient temperature range: 0 to 50°C
Supply cable length: 1.5 m
Connection: M30 p. 1.5

Technical Specification for Thermo Electric Actuator - code 6502

Normally closed
Electrical supply: 230 V(ac), 24 V (ac), 24 V (dc)
Starting current: ≤ 1 A
Running current: 230 V (ac) = 13 mA
24 V (ac) - 24 V (dc) = 140 mA
Running power consumption: 3 W
Auxillary microswitch contact rating:
(code 656112/114:0.8 A (230 V)
Protection class: IP 54 (on vertical position)
Double insulation construction: ⧈CE
Ambient temperature range: 0 to 50°C
Operating time: opening and closing from 120 to 180 sec.
Electricity supply cable length: 80 cm

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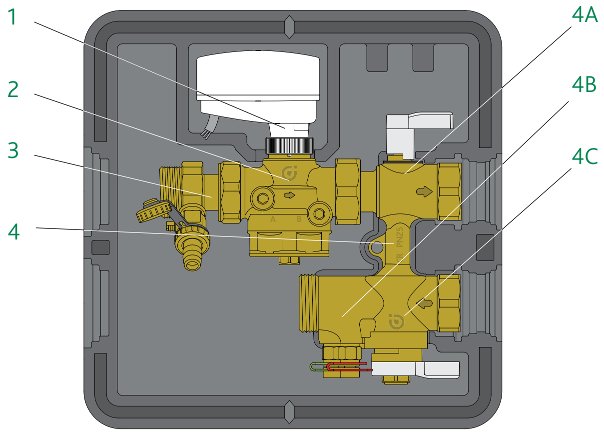
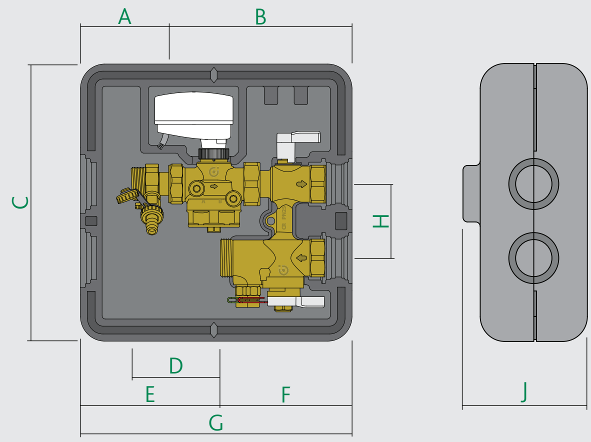
Components



Item	Component
1	Actuator - optional
2	Pressure independent control valve - PICV
3	Fill/drain cock - optional
4	Bypass kit comprising:
	4A Three-way shut-off valve
	4B Venturi device for flow measurement with connections for pressure test points - present only in 149.000 code
	4C Three-way shut off valve with integral strainer

Dimensions

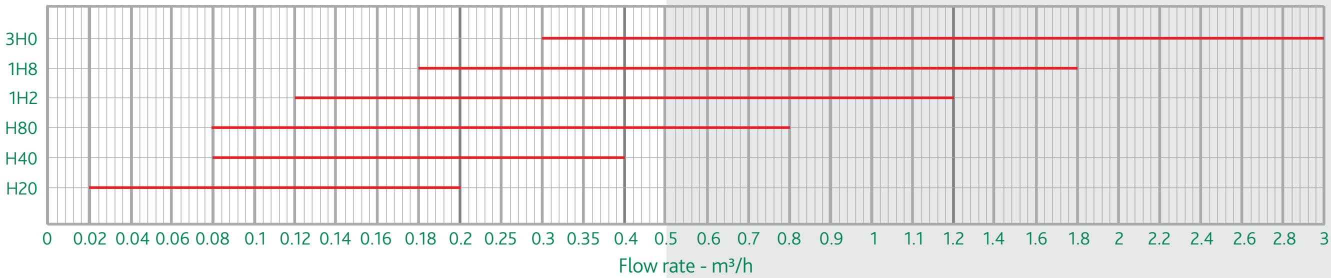


Code	A	B	C	D	E	F
DN15	109	191	300	83	150	150
DN20	109	191	300	04	154	146
DN25	100	200	300	109	154	146

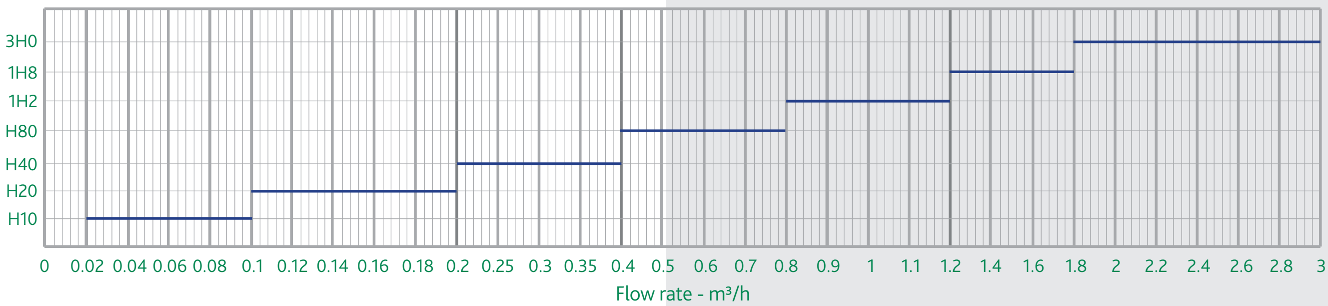
Code	G	H	J	kg
DN15	300	80	137	2.4
DN20	300	80	137	2.5
DN25	300	80	137	3.0

Flow Rate Range Selection Chart

Unit without venturi device



Unit with venturi device



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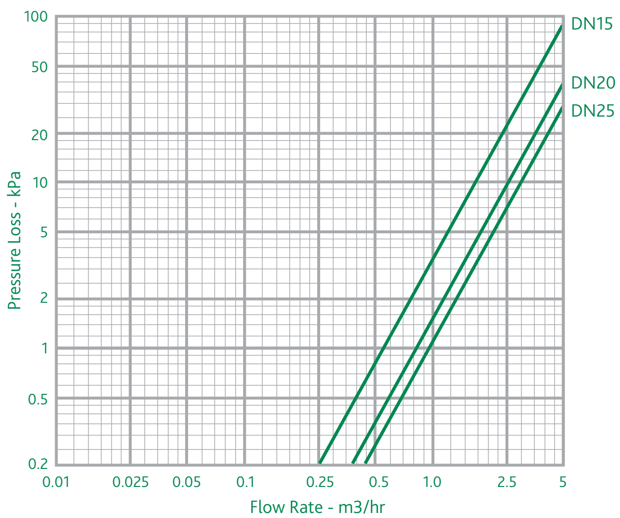
Hydraulic Characteristics of the Unit Without Venturi Device

Code Flow rate range	DN		Adjustment position									
			1	2	3	4	5	6	7	8	9	10
149410 H20 0.02 to 0.2 m³/h	15	Flow rate (m3/h)	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2
		Δp min PICV (kPa)	25	25	25	25	25	25	25.5	25.5	26	26
		Δp by-pass kit (kPa)	*	*	*	*	*	*	*	*	*	*
149410 H40 0.08 to 0.4 m³/h	15	Flow rate (m3/h)	-	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4
		Δp min PICV (kPa)	-	25	25.5	26	26	26.5	26.5	27	27	27
		Δp by-pass kit (kPa)	-	*	*	*	*	*	*	*	*	0.5
149410 H80 0.08 to 0.8 m³/h	15	Flow rate (m3/h)	0.08	0.16	0.24	0.32	0.4	0.48	0.56	0.64	0.72	0.8
		Δp min PICV (kPa)	25	25	25.5	26	26	27	27.5	28	28.5	29
		Δp by-pass kit (kPa)	*	*	*	*	0.5	0.8	1	1.4	1.7	2.1
149510 H20 0.02 to 0.2 m³/h	20	Flow rate (m3/h)	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18	0.2
		Δp min PICV (kPa)	25	25	25	25	25	25	25.5	25.5	26	26
		Δp by-pass kit (kPa)	*	*	*	*	*	*	*	*	*	*
149510 H40 0.08to 0.4 m³/h	20	Flow rate (m3/h)	-	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4
		Δp min PICV (kPa)	-	25	25.5	26	26	26.5	26.5	27	27	27
		Δp by-pass kit (kPa)	-	*	*	*	*	*	*	*	*	*
149510 H80 0.08 to 0.8 m³/h	20	Flow rate (m3/h)	0.08	0.16	0.24	0.32	0.4	0.48	0.56	0.64	0.72	0.8
		Δp min PICV (kPa)	25	25	25.5	26	26	27	27.5	28	28.5	19
		Δp by-pass kit (kPa)	*	*	*	*	*	*	0.5	0.6	0.8	1
149510 1H2 0.12 to 1.2 m³/h	20	Flow rate (m3/h)	0.12	0.24	0.36	0.48	0.6	0.72	0.84	0.96	1.08	1.2
		Δp min PICV (kPa)	25	25	25.5	26	26	26.5	26.5	27	27.5	28
		Δp by-pass kit (kPa)	*	*	*	*	0.5	0.8	1.1	1.4	1.8	2.2
149610 1H8 0.18 to 1.8 m³/h	25	Flow rate (m3/h)	0.18	0.36	0.54	0.72	0.9	1.08	1.26	1.44	1.62	1.8
		Δp min PICV (kPa)	35	35	35	35	35	28	25	25	25	25
		Δp by-pass kit (kPa)	*	*	*	0.6	0.9	1.3	1.7	2.3	2.8	3.5
149610 3H0 0.3 to 3 m³/h	25	Flow rate (m3/h)	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3
		Δp min PICV (kPa)	35	35	35	35	35	35	35	35	35	35
		Δp by-pass kit (kPa)	*	*	*	1.6	2.4	3.5	4.8	6.3	7.9	9.8

* Values not indicated as Δp negligible - Δp by-pass kit < 0.5 kPa

By-pass kit - without Venturi



	DN15	DN20	DN25
Kv - kit by-pass m³/hr	5.5	8.1	9.6

Minimum Differential Pressure Required

To choose the pump you need to add the minimum pressure difference required by the unit to the fixed head losses of the most disadvantaged circuit.

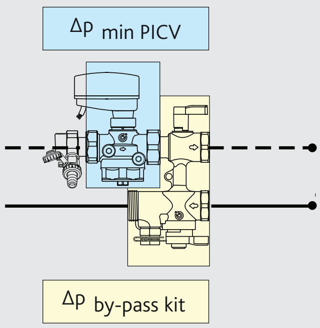
The minimum Δp of the connected unit and adjustment is obtained:

$$\Delta p_{\text{min total}} = \Delta p_{\text{bypass kit}} + \Delta p_{\text{min PICV}}$$

where:

$\Delta p_{\text{bypass kit}}$ = bypass kit headloss

$\Delta p_{\text{min PICV}}$ = minimum PICV load loss



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Hydraulic Characteristics of the Unit With Venturi Device

Code Flow rate range	DN	Venturi Kv		Adjustment position									
				1	2	3	4	5	6	7	8	9	10
149400 H10 0.02 to 0.2 m^3/h	15	0.25	Flow rate (m3/h)	0.02	0.04	0.06	0.08	0.1	-	-	-	-	-
			Δp min PICV (kPa)	25	25	25	25	25	-	-	-	-	-
			Δp by-pass kit (kPa)	0.5	1.8	4.0	7.1	11.1	-	-	-	-	-
149400 H20 0.1 to 0.2 m^3/h	15	0.5	Flow rate (m3/h)	-	-	-	-	0.1	0.12	0.14	0.16	0.18	0.2
			Δp min PICV (kPa)	-	-	-	-	25	25	25.5	25.5	26	26
			Δp by-pass kit (kPa)	-	-	-	-	2.8	4	5.4	7.1	9.0	11.1
149400 H40 0.2 to 0.4 m^3/h	15	1.1	Flow rate (m3/h)	-	-	-	-	0.2	0.24	0.28	0.32	0.36	0.4
			Δp min PICV (kPa)	-	-	-	-	26	26.5	26.5	27	27	27
			Δp by-pass kit (kPa)	-	-	-	-	2.4	3.4	4.6	6.1	7.7	9.5
149400 H80 0.4 to 0.8 m^3/h	15	2.35	Flow rate (m3/h)	-	-	-	-	0.4	0.48	0.56	0.64	0.72	0.8
			Δp min PICV (kPa)	-	-	-	-	26	27	27.5	28	28.5	29
			Δp by-pass kit (kPa)	-	-	-	-	1.9	2.7	3.7	4.9	6.2	7.6
149500 H10 0.02 to 0.1 m^3/h	20	0.25	Flow rate (m3/h)	0.02	0.04	0.06	0.08	0.1	-	-	-	-	-
			Δp min PICV (kPa)	25	25	25	25	25	-	-	-	-	-
			Δp by-pass kit (kPa)	0.5	1.8	4.0	7.1	11.1	-	-	-	-	-
149500 H20 0.1 to 0.2 m^3/h	20	0.5	Flow rate (m3/h)	-	-	-	-	0.1	0.12	0.14	0.16	0.18	0.2
			Δp min PICV (kPa)	-	-	-	-	25	25	25.5	25.5	26	26
			Δp by-pass kit (kPa)	-	-	-	-	2.8	4	5.4	7.1	9.0	11.1
149500 H40 0.2 to 0.4 m^3/h	20	1.1	Flow rate (m3/h)	-	-	-	-	0.2	0.24	0.28	0.32	0.36	0.4
			Δp min PICV (kPa)	-	-	-	-	26	26.5	26.5	27	27	27
			Δp by-pass kit (kPa)	-	-	-	-	2.4	3.4	4.6	6.1	7.7	9.5
149500 H80 0.4 to 0.8 m^3/h	20	2.35	Flow rate (m3/h)	-	-	-	-	0.4	0.48	0.56	0.64	0.72	0.8
			Δp min PICV (kPa)	-	-	-	-	26	27	27.5	28	28.5	29
			Δp by-pass kit (kPa)	-	-	-	-	1.9	2.7	3.7	4.9	6.2	7.6
149500 1H2 0.8 to 1.2 m^3/h	20	5.0	Flow rate (m3/h)	-	-	-	-	-	-	0.84	0.96	1.08	1.2
			Δp min PICV (kPa)	-	-	-	-	-	-	26.5	27	27.5	28
			Δp by-pass kit (kPa)	-	-	-	-	-	-	2.3	2.9	3.7	4.6
149600 1H8 1.2 to 1.8 m^3/h	25	5.0	Flow rate (m3/h)	-	-	-	-	-	-	1.26	1.44	1.62	1.8
			Δp min PICV (kPa)	-	-	-	-	-	-	25	25	25	25
			Δp by-pass kit (kPa)	-	-	-	-	-	-	51.	6.6	8.4	10.3
149800 3H0 1.8 to 3.0 m^3/h	25	9.6	Flow rate (m3/h)	-	-	-	-	-	1.8	2.1	2.4	2.7	3.0
			Δp min PICV (kPa)	-	-	-	-	-	35	35	35	35	35
			Δp by-pass kit (kPa)	-	-	-	-	-	3.5	4.8	6.3	7.9	9.8

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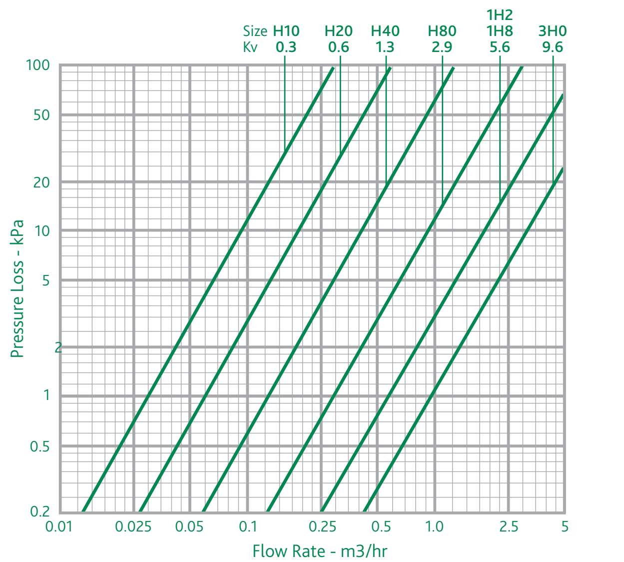
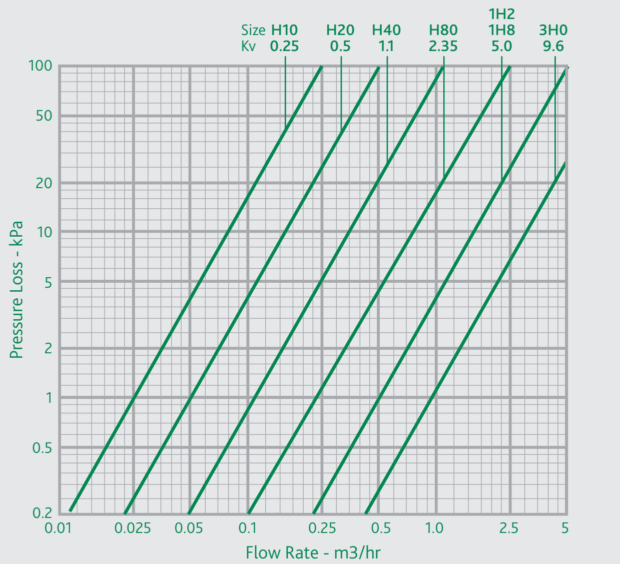
By-pass kit - with Venturi



	H10	H20	H40	H80	1H2-1H8	3H0
Kv - kit by-pass m³/hr	0.3	0.6	1.3	2.9	5.6	9.6

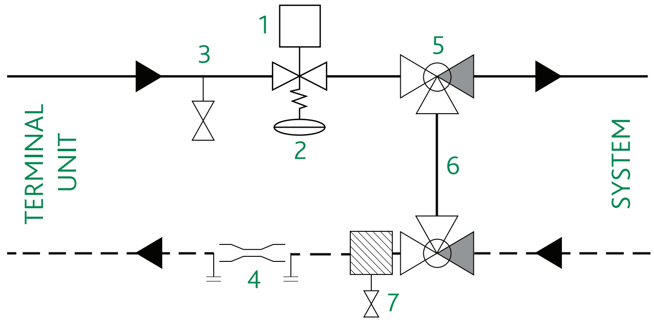
Venturi



	H10	H20	H40	H80	1H2-1H8	3H0
Kv - venturi m³/hr	0.25	0.5	1.1	2.35	5.0	9.6

Operating Principles

The unit is shown in the schematic diagram:



1 Actuator (optional)
2 Pressure independent control valve (PICV)
3 Fill/drain cock (optional)
4 Venturi device with connections for pressure test points (present only in 149.00 codes)
5 3-way shut-off valve
6 By-pass
7 Shut-off valve with integrated strainer

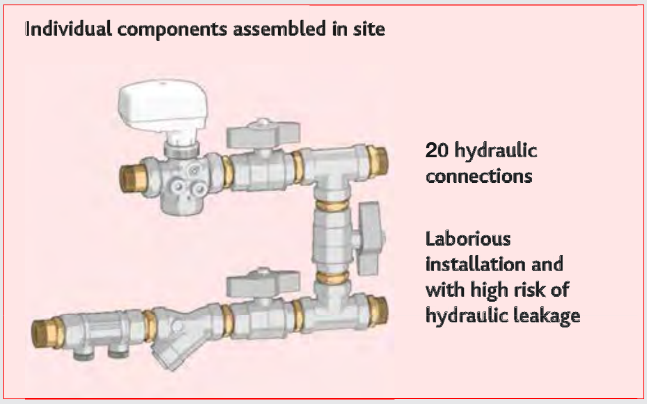
The unit allow;

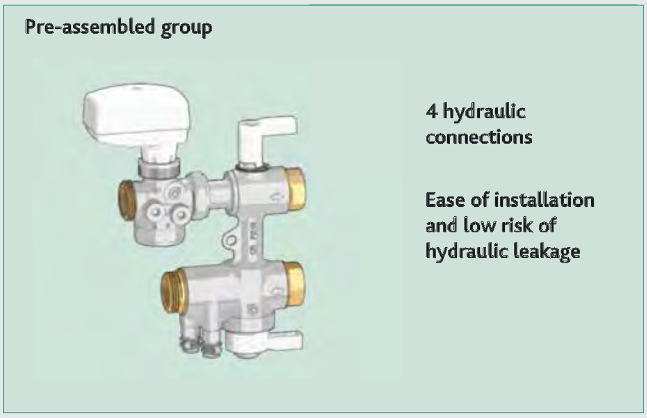
- adjust and maintain the flow rate of the terminal unit constant as the differential pressure conditions of the main circuit changes due to the pressure independent control valve PICV (2).
- isolate the terminal unit using the 3-way shut-off valves (5 & 7).
- bypass the flow through the 3-way shut-off valves (5 and 7) and the integrated by-pass (6).
- filter the inlet water to the terminal unit through the strainer located inside the shut-off valve (7).
- measure the flow rate passing through the terminal unit using the Venturi device with pressure test ports (4) (present only in codes 149.00).
- water to be drained through the drain cock (optional) (3)

Construction Details

Compact body

The unit is of compact design specifically for small spaces and is easy to install to connect the terminal unit to the main circuit.





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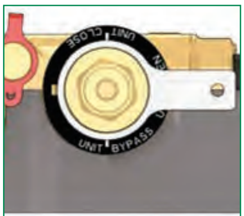
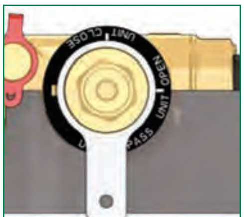
Three way ball valve

The three-way ball valves have been designed to isolate the flow and are of compact design.

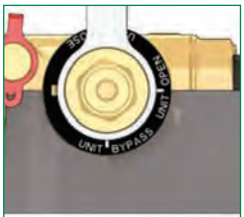
The internal ball is designed to open the straight path (A) (for normal operation), the by-pass path (B) (for passage through the by-pass) or to completely close the passage and isolate the circuit of the terminal unit (C).



A - UNIT OPEN



B - UNIT BY-PASS



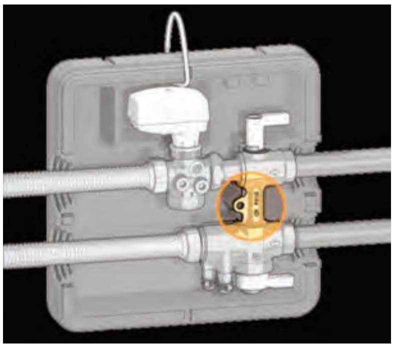
C - UNIT CLOSE

Construction Details Continued

Integral by-pass

The unit is complete with by-pass, which is an indispensable element for each terminal circuit. The by-pass allows:

- flushing and cleaning of the main circuit without fluid passing through the terminal unit
- shut-off and maintenance operations of the terminal unit.

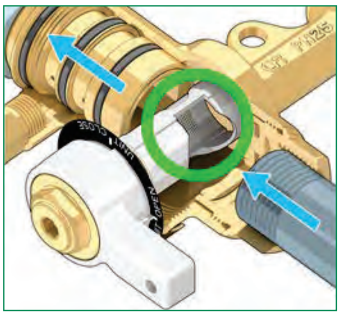


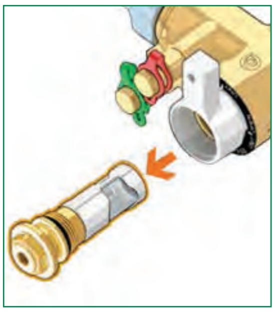
Integral strainer

The components of a heating or air conditioning system are exposed to degradation caused by the debris contained in the system.

If the debris is not removed, it can impair operation of the units or components, such as boilers, heat exchangers or terminal appliances in the circuits, especially during commissioning.

The cartridge filter contained inside the 3-Way valve collects the debris (before arriving to the terminal unit) and retains it by mechanical selection through a mesh wire filter.



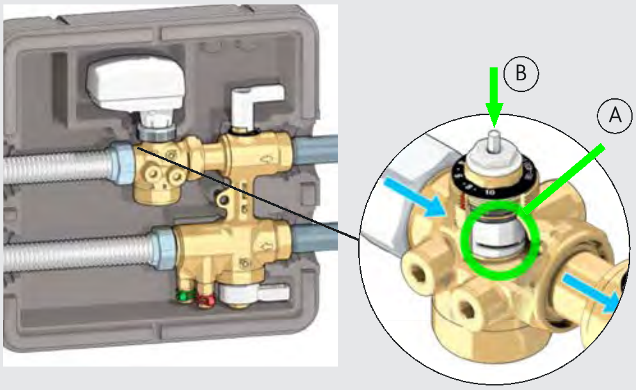


Integral PICV

The unit is equipped with a pressure independent control valve (PICV) capable of adjusting and maintaining a constant the flow rate even when the differential pressure within the system changes.

The flow rate is adjusted:

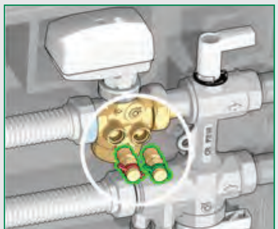
- manually on the automatic flow rate regulator, to restrict the maximum value. The adjustment is made by turning the locking nut and positioning it on the relative adjustment number: this causes the flow passage to open or closing (A)
- automatically by the control valve in combination with a proportional (0–10 V) or ON/OFF actuator, in accordance with the thermal load requirements of the circuit to be controlled. The actuator adjusts the flow rate from the maximum to the minimum value acting on the vertical displacement of the control stem (B).



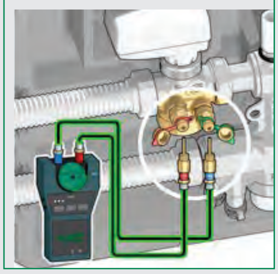
Pressure test ports

The pressure independent control valve is supplied with upstream and downstream pressure test points (Caleffi code 100000).

The test probes must only be connected to the test points with the system cold.



During the operation it is possible to measure the Δp of the valve (using the differential pressure measuring station Caleffi code 130005/6) and check if the valve is working in the correct Δp range.



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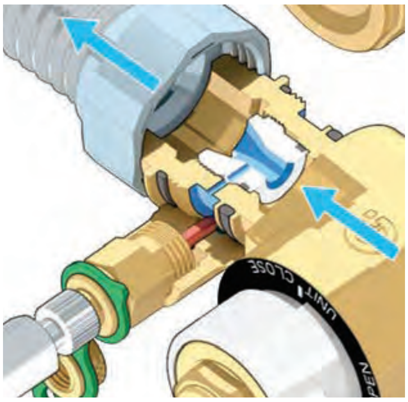
Venturi

The unit contains a flow rate metering device based on a Venturi.

Being able to measure the flow rate during commissioning makes setting the valve easier.

By restricting the cross-section of the flow path through the venturi, the flow velocity increases which create a larger Δp (as measured) guaranteeing a precise flow measurement.

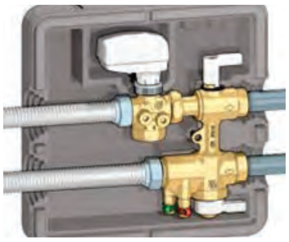
Each Δp value (measured through the pressure test ports) has a corresponding accurate flow rate value, known as the Kv value.



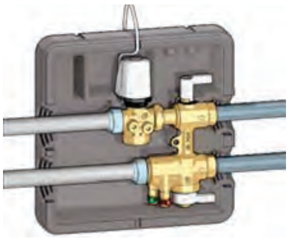
Fitted with an actuator

The unit can be fitted with a proportional linear actuator (code 145014).

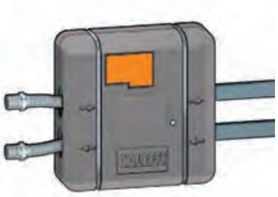
When controlled by an actuator, the valve can modulate the flow rate in accordance with the system thermal load.



As an alternative the valve can also be controlled with an ON/OFF type thermo-electric actuator 656 series, for simpler temperature control logic.



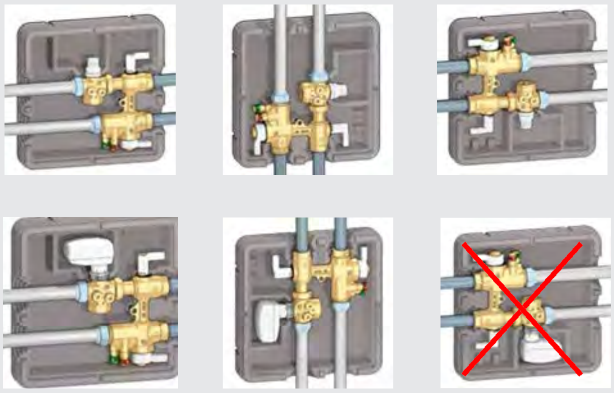
In order to use the unit with actuator in a heating system, it is necessary to remove part of the insulation (pre-cut) that covers the actuator, to avoid overheating.



Versatile installation

The unit, without an actuator, can be installed in any position.

With an actuator fitted the valve can be installed in any position except upside down.



Design Data

A system is designed to serve up to 80 fan coils divided into 8 secondary circuits, as shown in the diagram below.

In each secondary branch (see box) the system must serve 3 types of fan coil.

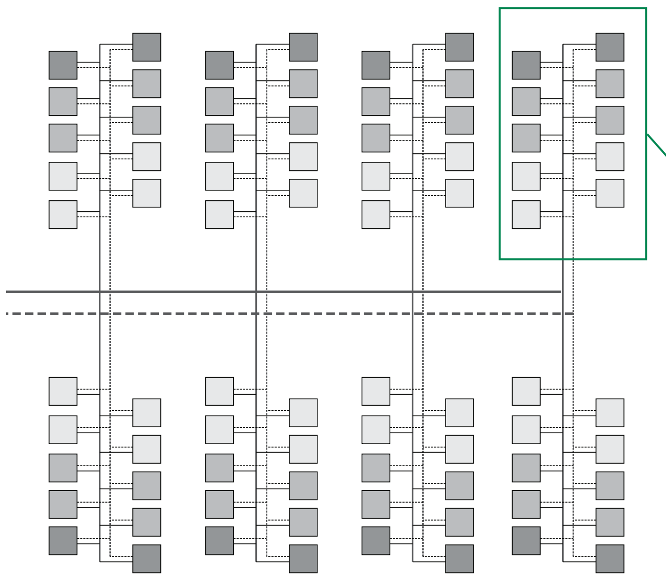
The following design data are adopted:

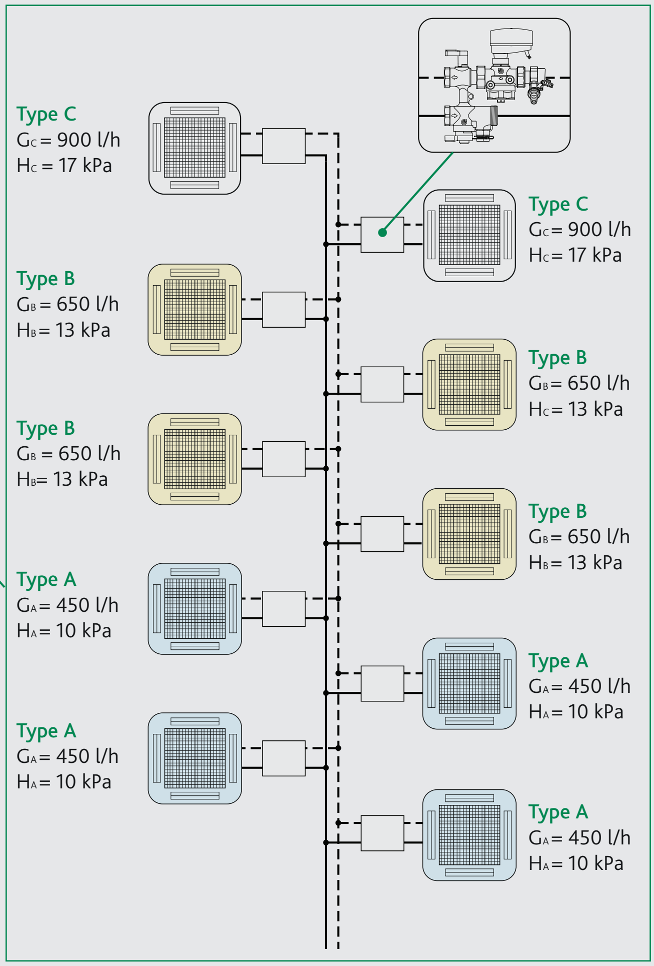
- Type A - Ga = 450 l/h - Ha = 10 kPa
- Type B - Gb = 650 l/h - Hb = 13 kPa
- Type C - Gc = 900 l/h - Hc = 17 kPa

where:

G = design flow rate

H = fan coil design pressure loss





Size selection

Each fan coil is served by a group of which it is necessary to choose:

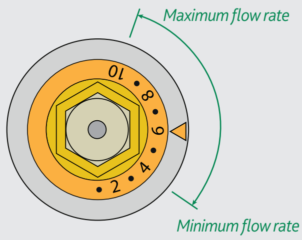
1. the body size.
2. the flow range and related flow rate pre-setting.

1 Unit without Venturi

If the choice is directed to a unit without a Venturi proceed as follows:

1. The selection of the size is made according to the required flow rate and, if possible, with the diameter equal to the fancoil connections.
2. When , as in this case, the pressure independent control valves also work as modulating valves, it is preferable to use the highest possible pre-adjustment positions.

For example, it is preferable to use adjustment positions of the locking nut from 10 to 4 to make the adjustment more stable.



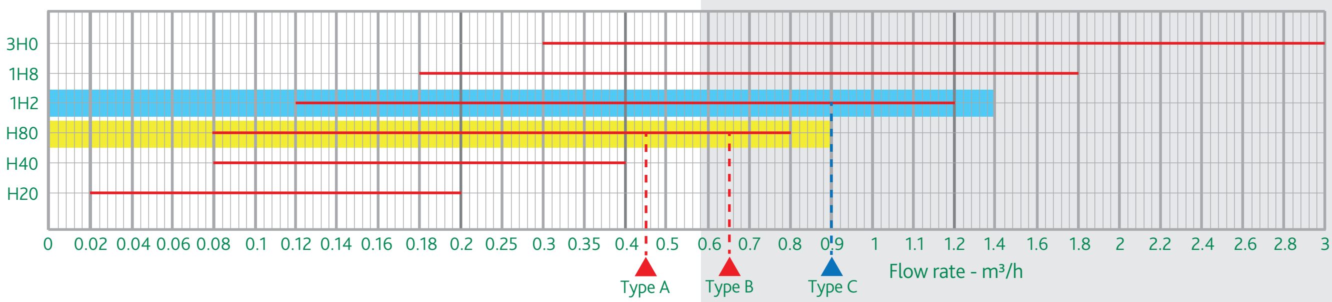
For this reason, for type A and B the flow rate range H80 is chosen, available in sizes DN 15 or DN20.

For type C, the next size 1H2 is chosen, available exclusive in DN20.

The following sizes can be chosen:

Type A and B	flow rate range H80 - size DN20
Type C	Flow rate range 1H2 - size DN20

Unit without venturi device



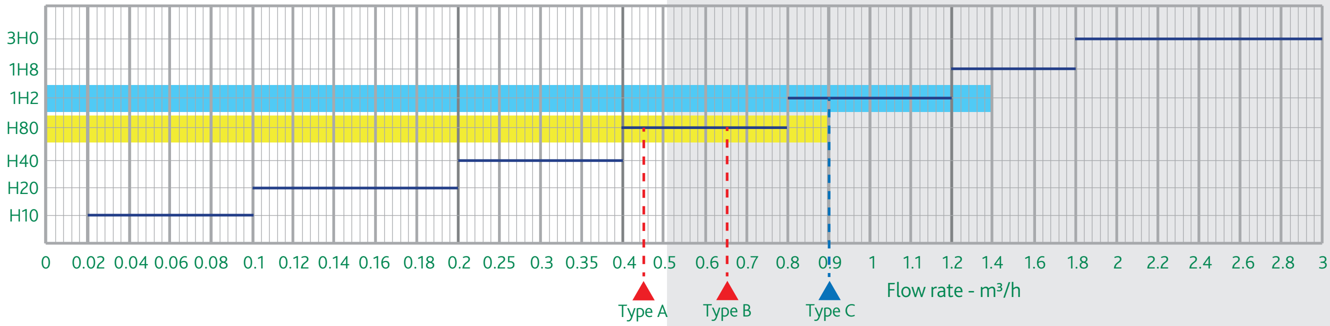
2 Unit with Venturi

If the choice is directed to a unit with a Venturi proceed it is sufficient to identify the correct flow rate range.

The following sizes can be chosen:

Type A and B	flow rate range H80 - size DN20
Type C	Flow rate range 1H2 - size DN20

Unit with venturi device



Determination of the ΔP requested at the detachment towards the terminals

Their value is determined with the formula:

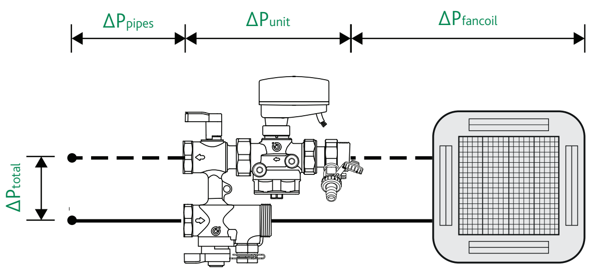
$\Delta P_{total} = \Delta P_{pipes} + \Delta P_{unit} + \Delta P_{fan\ coil}$

where

ΔP_{pipes} = pdc mainline-fan coil connection section (for the sake of simplicity we assume 2 kPa)

ΔP_{unit} = minimum ΔP of the unit

$\Delta P_{fan\ coils}$ = Type A = 10 kPA
= Type 6 = 13 kPA
= Type C = 17 kPA



1 Unit without Venturi

The load loss of the group is obtained from the corresponding table knowing the flow rate and size of the unit chosen.

$\Delta P_{unit} = \Delta P_{by\text{-}pass} + \Delta P_{min\ PICV}$

Type A

Ga = 450 l/h — flow rate range H80 - Size DN20
$\Delta P_{min\ PICV}$ = 27 kPa
$\Delta P_{by\text{-}pass}$ = 0 kPa

Type B

Gb = 650 l/h — flow rate range H80 - Size DN20
$\Delta P_{min\ PICV}$ = 28 kPa
$\Delta P_{by\text{-}pass}$ = 0.6 kPa

Type C

Gc = 900 l/h — flow rate range 1H2 - Size DN20
$\Delta P_{min\ PICV}$ = 27 kPa
$\Delta P_{by\text{-}pass}$ = 1.4 kPa

Based on these values the ΔP_{total} are:

Type A ΔP_{unit} = 27 + 0 = 27 kPa
Type B ΔP_{unit} = 28 + 0.6 = 28.6 kPa
Type C ΔP_{unit} = 27 + 1.4 = 28.4 kPa

The pressure losses at the connection to the system are:

Type A ΔP_{total} = 2 + 27 +10 = 39 kPa
Type B ΔP_{total} = 2 + 28.6 +13 = 43.6 kPa
Type C ΔP_{total} = 2 + 28.4 +17 = 47.4 kPa

1 Unit with Venturi

The load loss of the group is obtained from the corresponding table knowing the flow rate and size of the unit chosen.

$\Delta P_{unit} = \Delta P_{by\text{-}pass} + \Delta P_{min\ PICV}$

Type A

Ga = 450 l/h — flow rate range H80 - Size DN20
$\Delta P_{min\ PICV}$ = 27 kPa
$\Delta P_{by\text{-}pass}$ = 2.7 kPa

Type B

Gb = 650 l/h — flow rate range H80 - Size DN20
$\Delta P_{min\ PICV}$ = 28 kPa
$\Delta P_{by\text{-}pass}$ = 4.9 kPa

Type C

Gc = 900 l/h — flow rate range 1H2 - Size DN20
$\Delta P_{min\ PICV}$ = 27 kPa
$\Delta P_{by\text{-}pass}$ = 2.9 kPa

Based on these values the ΔP_{total} are:

Type A ΔP_{unit}= 27 + 2.7 = 29.7 kPa
Type B ΔP_{unit} = 28 + 4.9 = 32.9 kPa
Type C ΔP_{unit} = 27 + 2.9 = 29.9 kPa

The pressure losses at the connection to the system are:

Type A ΔP_{total} = 2 + 29.7 +10 = 41.7 kPa
Type B ΔP_{total} = 2 + 32.9 +10 = 47.9 kPa
Type C ΔP_{total} = 2 + 29.9 +17 = 49.9 kPa

Determination of the system flow rate and head

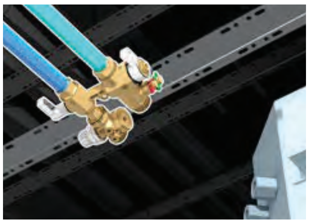
Considering that the unit stabilizes the flow rate on all the branches and makes it independent from the various actions, the flow rates that cross the network are exactly the design ones.

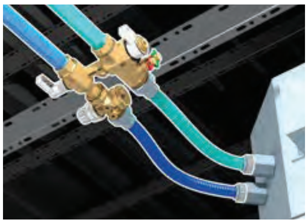
Once the flow rates in the various sections have been determined, the load losses of the pipes are calculated with the usual formulas.

Series 149 - 80mm centres fan coil connection kit

Installation

Connect the unit to the system pipes and then to the terminal unit using flexible pipes.

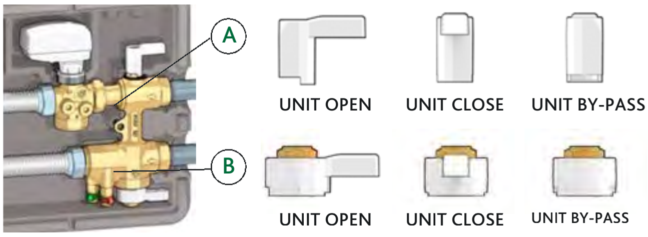




The insulation can be closed with cable ties housed in the appropriate spaces.

Flushing

Using different positions of the three-way ball valves (hereinafter referred to as valve A and valve B), different operation configurations can be obtained.

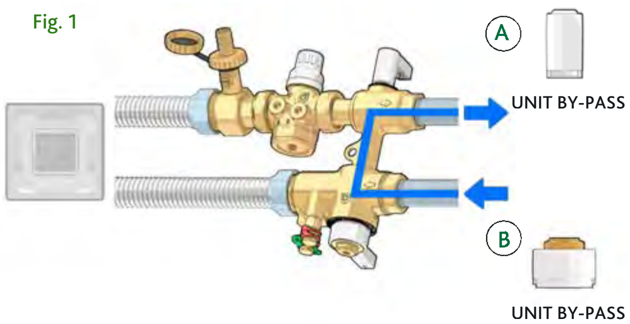


1 Flushing Bypass

Clean the main circuit using the integral flushing bypass.

Place both lever A and lever B on "UNIT BY-PASS".

Fig. 1



2 Flushing the Terminal Unit

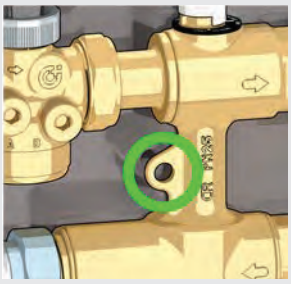
Position both levers on “UNIT OPEN”, close the PICV using the knob and open the optional drain cock: in this way it is possible to flush the terminal unit using water coming from the main circuit without passing through the PICV (Fig. 2A).

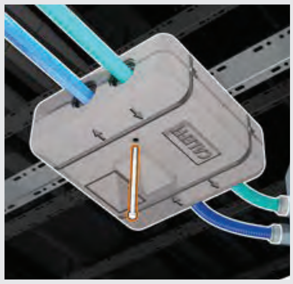
It is also possible to flush the terminal unit with the configuration shown in fig.2B.

In this case, set lever A to "UNIT BY-PASS" and lever B to "UNIT CLOSE".

Bracketing

The unit is supplied with a hole for use with threaded rod.





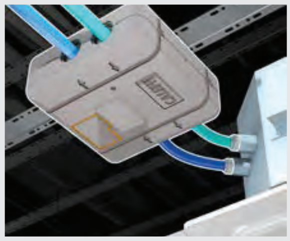


Fig. 2A

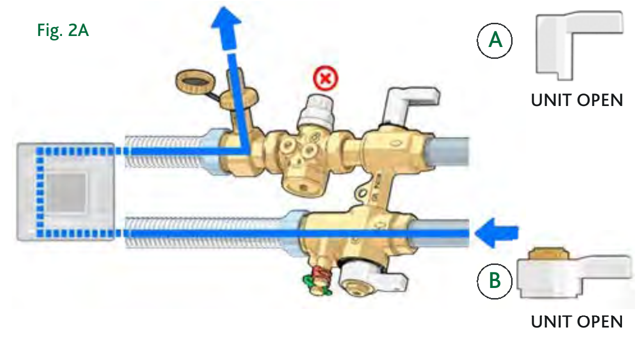
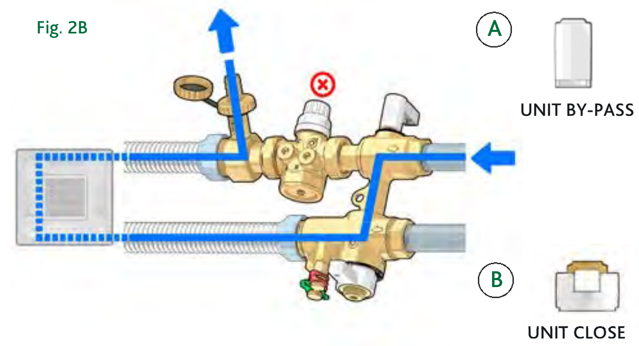


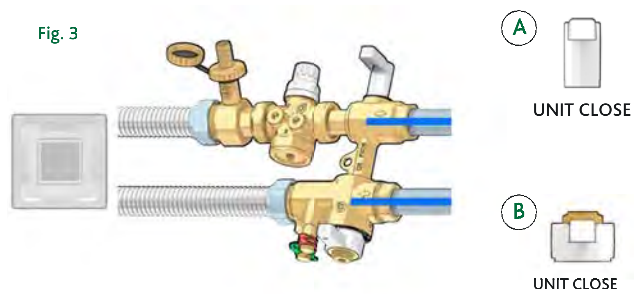
Fig. 2B



3 Cleaning the Strainer

To clean the strainer, position both levers to “UNIT CLOSE”

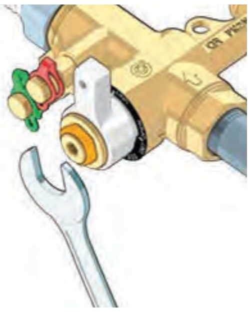
Fig. 3



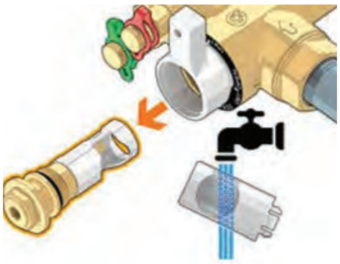
3 Cleaning the Strainer Cont.

Unscrew the strainer holder cartridge by means of a 20mm A/F spanner.

Caution: the by-pass contains water which will escape during cartridge removal.



Remove the strainer holder cartridge and clean the strainer under running water.

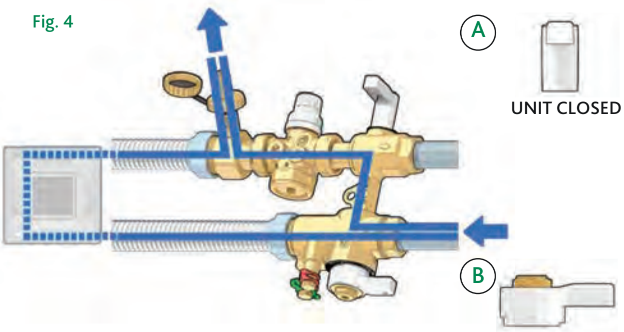


4 Filling

Turn lever A to "UNIT CLOSE" and lever B to "UNIT OPEN", open the PICV using the appropriate knob.

Close the drain cock (optional) as soon as the air is completely eliminated.

Fig. 4

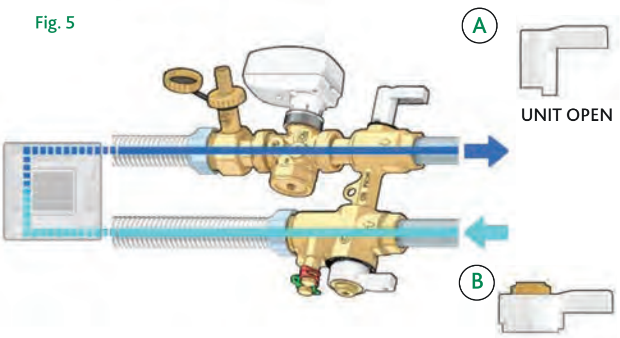


5 Normal Operation

Normal operation involves turning both valves to "OPEN".

Water passes through the strainer before entering in the terminal unit, protecting the unit against any debris or impurities present in the main circuit water.

Fig. 5



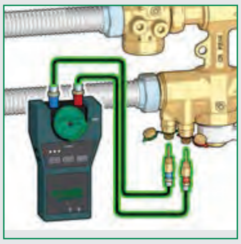
Maximum Flow Rate Adjustment

Adjust the maximum flow rate through the PICV by adjusting the nut.

See section "Maximum flow rate adjustment".

Check the PICV setting by measuring the flow rate passing through the terminal unit using the integral Venturi. See section "Flow rate measurement".

Install the actuator and make the electrical connections.



Additional Use Configurations

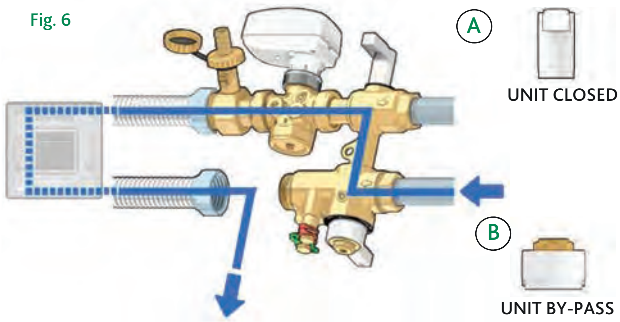
Terminal unit back wash

Where it is required it is possible to back flush the terminal unit.

Turn lever A to "UNIT CLOSE" and lever B to "UNIT BY-PASS" and flush through the open flexible pipe.

This configuration can be performed with the PICV actuator installed.

Fig. 6



Isolating the PICV and terminal unit

It is possible to isolate the PICV and the secondary circuit including the terminal unit.

This configuration is generally used to perform maintenance on the terminal unit.

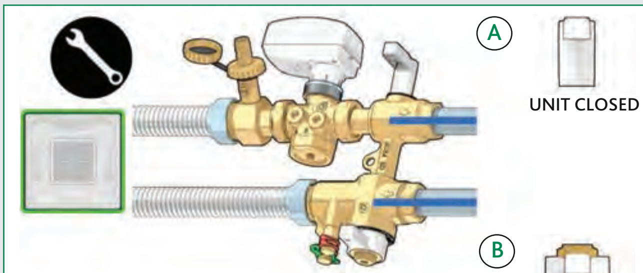


Fig. 7

Flow Rate Adjustment

Maximum flow rate adjustment

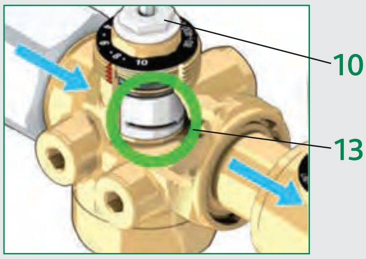
Unscrew the protective cap by hand to gain access to the maximum flow rate adjustment nut (10), which can be turned with a spanner.

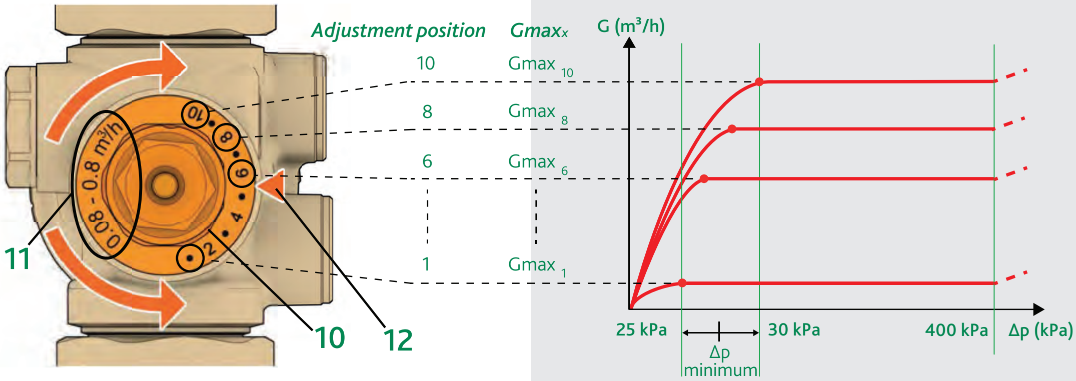
The locking nut is fixed to a 10-position graduated scale, divided into steps corresponding to 1/10 of the maximum available flow rate, which is also shown on the scale (11).

Turn the locking nut to the numerical position corresponding to the required flow rate (design flow rate), referring to the "Flow rate adjustment table". The notch (12) on the valve body is the physical positioning reference.

Turning the locking nut (10), determines the number associated with the "Adjustment position", results in opening/closing of the flow path cross section in the external obturator (13).

Hence, each flow path cross section set on the locking nut corresponds to a specific Gmaxx value.





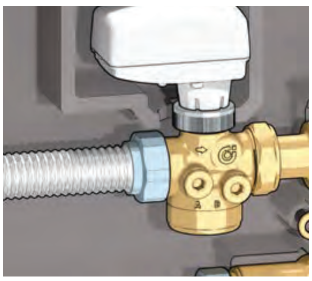
Automatic flow rate adjustment with actuator and external sensor

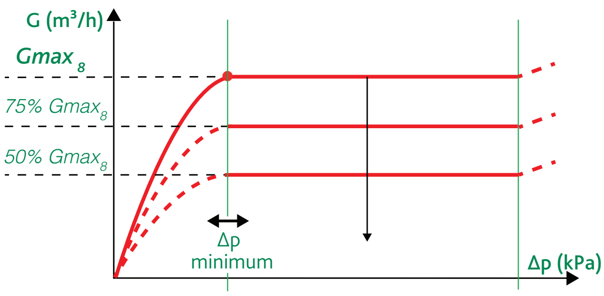
After adjusting the maximum flow rate, it is possible to fit the actuator (0–10 V) code 145014 to the valve.

Under the control of an external regulator the actuator can change the flow rate from the maximum value set (E.g.: $Gmax_8$) up to the minimum value, depending on the thermal load to be controlled, always maintaining the automatic balancing of the systems.

The actuator acts on the vertical displacement of control stem (4). This results in additional opening/closing, on the maximum flow path cross section, by the internal obturator.

For example, if the maximum flow rate has been set to position 8, the flow rate can be adjusted automatically by the actuator from $Gmax_8$ to completely closed (zero flow rate).



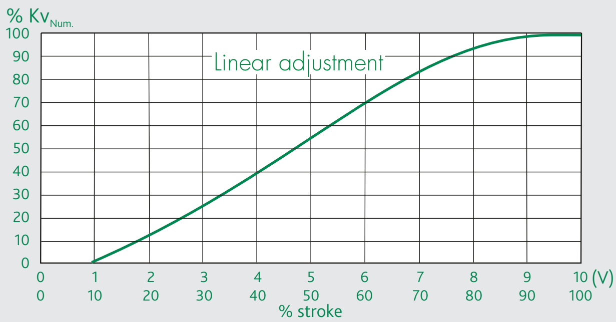


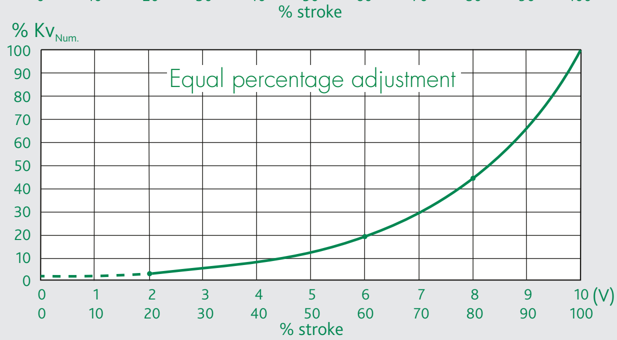
Flow rate adjustment charts

The valve adjustment curve is of the linear type. An increase or decrease in the valve opening cross section corresponds to a directly proportional increase or decrease of the valve's hydraulic coefficient Kv.

The motor is factory configured with linear adjustment.

It is possible to obtain an equal-percentage adjustment (see diagram below) setting the actuator (code 145014) for this operation by means of the dedicated switch inside it. (see specific instruction sheet). In this way the control signal is managed to obtain an equal percentage adjustment





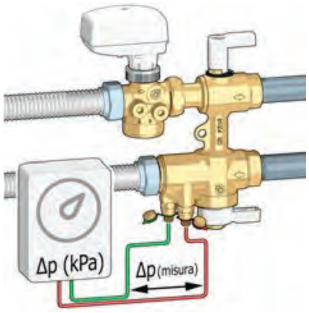
Flow Rate Measurement

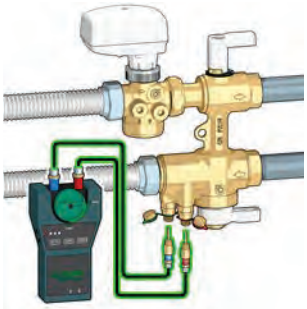
Connect a differential pressure measuring device to the Venturi pressure test ports on the unit.

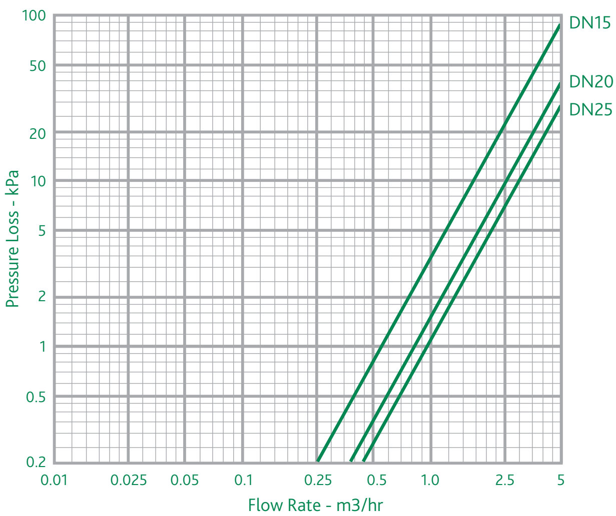
Reading the Δp on the measuring device, to obtain the flow rate G you can refer to the characteristic Venturi diagram for the size being used or the flow rate can be calculated by applying the equation:

$$G = Kv * \sqrt{\Delta p(\text{Signal})} \qquad (1.1)$$

	H10	H20	H40	H80	1H2-1H8	3H0
Kv - kit by-pass m^3/hr	0.25	0.5	1.1	2.35	5.0	9.6





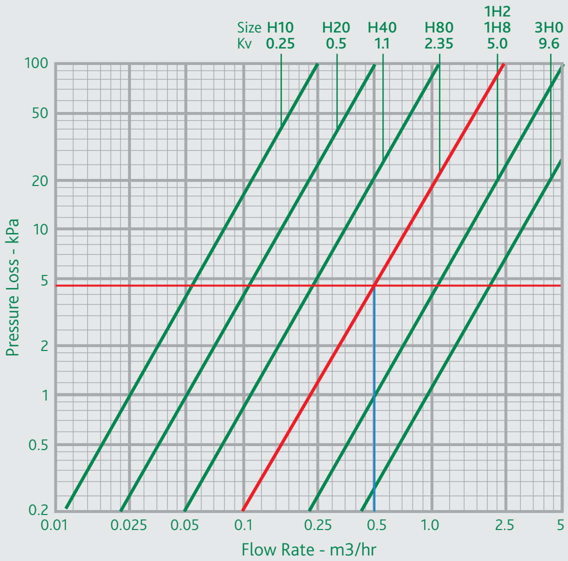


Example of flow rate measurement

Reading a Δp Venturi of 4.5 kPa = 0.045 bar (red line) on a H80 valve, using the characteristic Venturi chart of the valve in question, in the x-axis there is a flow rate equal to 0.5 m3/h (blue line).

Alternatively calculate the flow rate using the Kv value of 2.35 measured Δp of 4.5 kPa

$$G = 2.35 * \sqrt{0.045} = 0.5\ m^3/h$$



Example of correction for liquid with different density

Liquid density: $\ell = 1.1\ kg/dm^3$

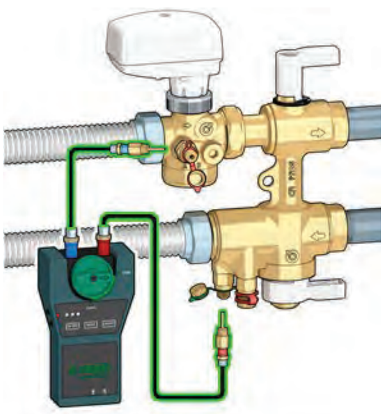
Measured head loss: $\Delta p_{venturi} = 4.5$ kPa

Reference head loss: $\Delta p = 4.5 / 1.1 = 4.1$ kPa

With this value you use the Venturi diagram for the dimension used or the formula (1.1) and obtain the corresponding flow rate G equal to 0.47 m^3/h.

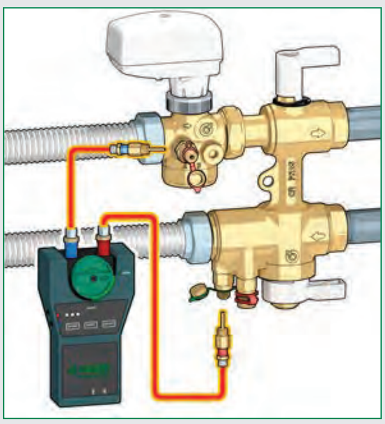
Δp Measurement

Connecting the measuring instrument to the low pressure connection of the Venturi and to the high pressure connection of the PICV it is possible to measure the working Δp of the terminal unit circuit.



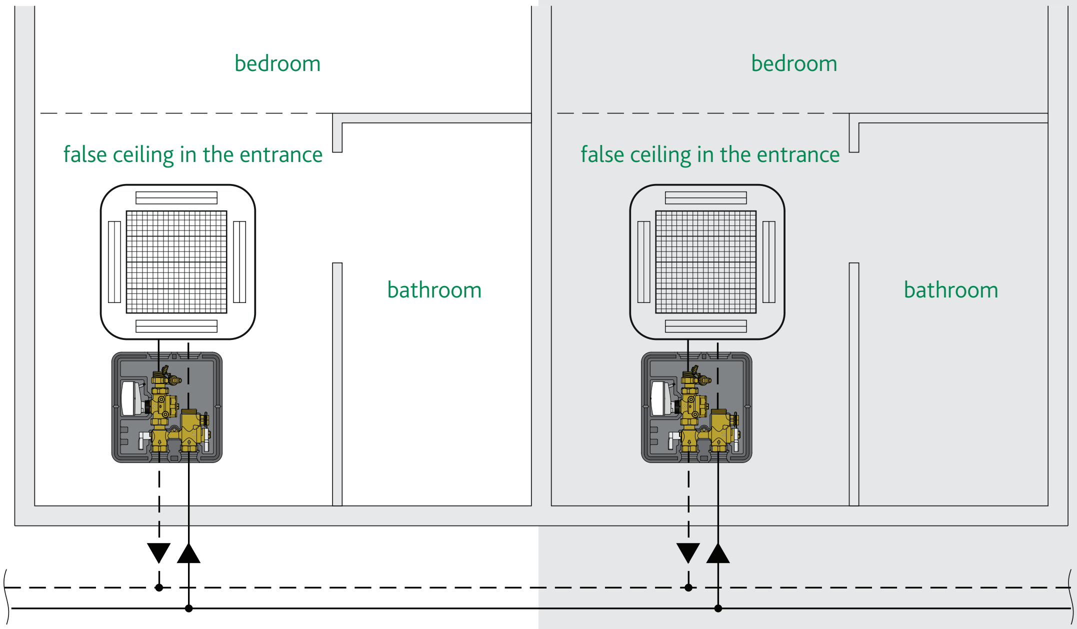
ΔT Measurement

Connecting the measuring instrument by means of appropriate probes (optional) to any low pressure test port connection on the Venturi and to one of the PICV it is possible to measure the working ΔT of the terminal unit circuit.

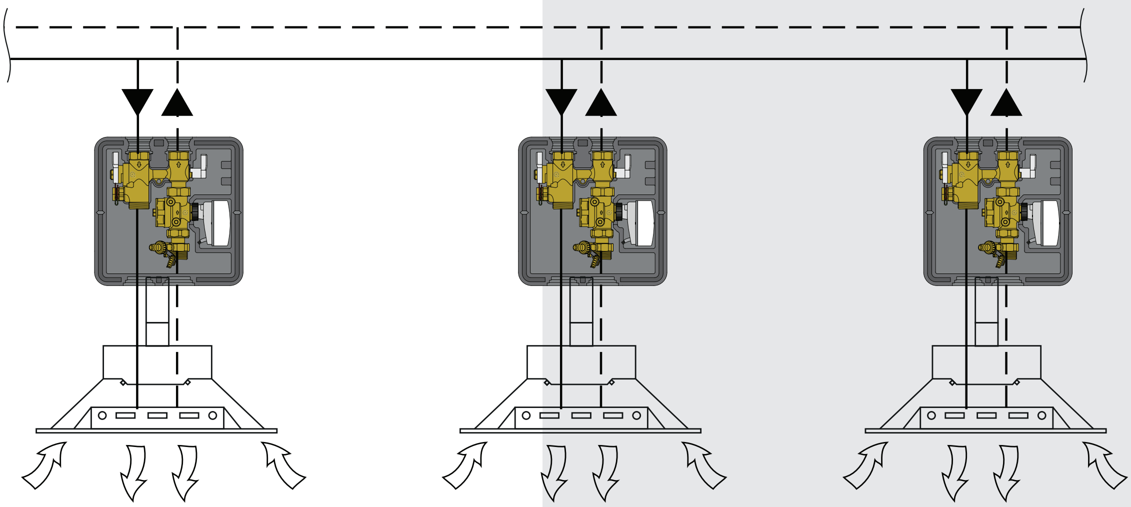


Typical Applications

Installation in false ceiling for fancoil service



Installation for cold beams service



Series 149 - 80mm centres fan coil connection kit

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