## FUNCTION

 The pre-assembled ICMA collector kits have the function of optimizing the distribution of heat transfer fluid to floor heating systems in order to improve the control of the thermal emission in every single area of the plant.

They are supplied complete with all the accessories required for the installation, filling and handling of low temperature underfloor heating systems; They also guarantee a simple and precise regulation of the flow rates of the heat transfer fluid in each individual circuit ring, as well as the possibility of individual interceptions.

Their particular shape, due to the shape of the fixing brackets, facilitates connection operations with the pipes in the installation phase, ensuring compact dimensions especially deep and allowing installation even in very small spaces.
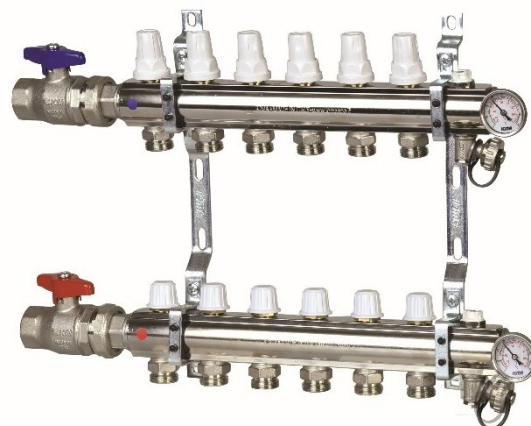
PRODUCT RANGE

Kit di collettori con regolazione ed intercettazione manuale/termostatizzabile con detentori di regolazione in mandata.

K005-K006 -   Delivery and return kit

K009-K010 -   Delivery and return kit with extra outlet for air vent valves and water discharge

K021-K022 -   Delivery and return kit complete with ball valves, manual air vent valves, drain cocks and Thermometers.

TECHNICAL FEATURES

METERIALS

Delivery manifold

Manifold:	Brass CW617N - UNI EN 12165

Lockshield:

Adjustable nut:	Brass CW617N - UNI EN 12165
Bottom connection:	Brass CW617N - UNI EN 12165
Inner tube:	Noryl Black
Spring:	Stainless Steel
Hydraulical seal:	EPDM Perox

Return manifold

Manifold:	Brass CW617N - UNI EN 12165

Thermostat valve:

Adjustable nut:	Brass CW617N - UNI EN 12165
Bottom connection:	Brass CW617N - UNI EN 12165
Inner rod and spring:	Stainless steel
Knob:	ABS White
Hydraulical seal:	EPDM Perox

Interception sphere valves

Body:	Brass CW617N - UNI EN 12165
Cap and pipe union:	Brass CW617N - UNI EN 12165
Sphere and coupling:	Brass CW617N - UNI EN 12165
Knob:	Nylon PA6 C.V.30%
Sphere gasket:	PTFE
Hydraulical seal:	EPDM Perox

See related technical data sheet for items below:

Automatic valves for air vent G3/8"	Art. 700-707
Manual valves for air vent G1/2"	Art. 705
Charge/discharge system tap G1/2"	Art. 172
Turnable junction M-F G1"	Art. 204
Thermometer cap G1"	Art. 185
Thermometer 0÷60 °C	Art. 206
Support	Art. 208

PERFORMANCES

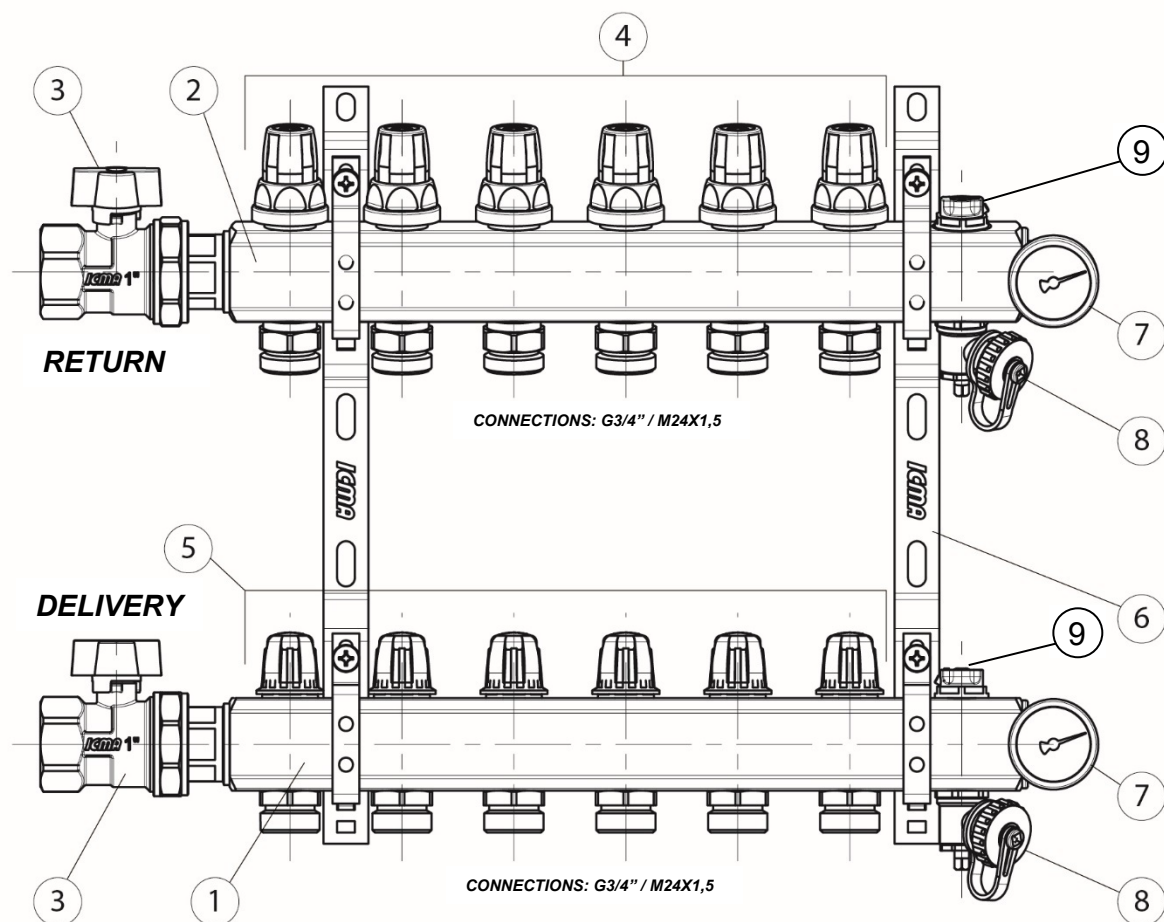|	
Working fluids:	water and glycol solutions
Glycol max percentage:	30 %
Max working pressure:	10 bar
Working temperature:	5÷80 °C
Thermometer range:	0÷60 °C
Manifold dimensions:	G 1" / G 1"¼

Connections

Main connections:	G1" F / G1¼" F (ISO 228-1)
Main connection hub spacing:	207 mm
Derivations – connections:	G3/4" F / M24x1,5 F
Derivations – hub spacing:	50 mm

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COMPONENTS

RETURN

CONNECTIONS: G3/4" / M24X1,5

DELIVERY

CONNECTIONS: G3/4" / M24X1,5

PART LIST:

1) Delivery manifold
2) Return manifold
3) Interception sphere valves with O-ring seal pipe union on manifold
4) Interception thermostat valves arranged for electrothermic control devices
5) Delivery adjustment lockshield
6) Supports with anti-vibration gasket
7) Thermometer holder caps with gasket on manifold (thermometer 0-60° included)
8) Water charge/vent taps
9) Manual air vent valves.

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PART DESCRIPTION

DELIVERY MANIFOLD

The delivery manifold consists of a perforated nickel plated brass bar (1) and a variable number of flow meters with built-in flow rate control valve (2).

The calibration of the flow rate for each individual holder is shown in the diagram on pag. 9.

If necessary, the same valve allows intercepting each circuit, excluding it from the system.
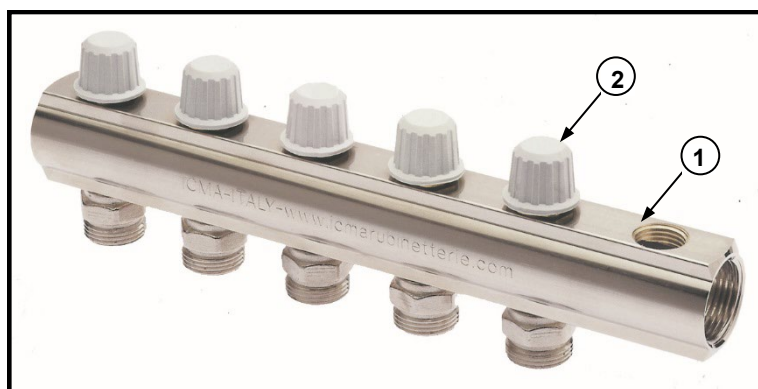
RETURN MANIFOLD

The return manifold is also made up of a nickel-plated brass drill bit (1) and a variable number of thermostatable shut-off valves (2).
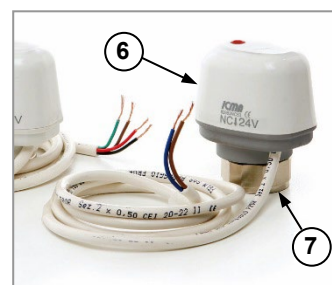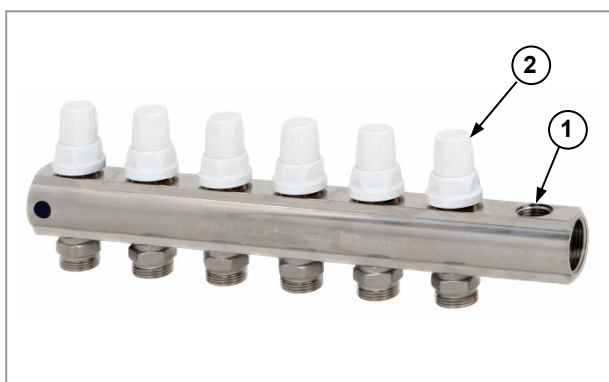
Thermostatable valves give you the ability to manually open or close each branch ring according to your needs. By fully screwing (clockwise), the top of the white cap (3) above the valve can close the fluid passage to the respective loop ring (5), excluding the entire circuit.

The shut-off valves are also predisposed for the installation of electrothermal actuators (6) which are appropriately connected to the room thermostats, allowing to maintain the temperature in the various rooms at the set values.

To do this, simply unscrew both parts of the white knob (3 and 4) from the valve body and fasten the fastening ring (7) first and then the actuator.

However, you will still be able to remove the installed actuator and reassemble the white dial for manual control at any time by returning the shut-off valve to the initial condition.

For actuator installation operations, see the specific instruction sheet contained in each package.

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INTERCEPTION SPHERE VALVE

Ball-tap valves with o-ring seal for mounting on the manifold bar. Installed on manifold kits is used to exclude the system from connecting to the boiler or centralized supply, facilitating any maintenance or repair operations.

AIR VENT VALVES

The air vent valves have the function of ejecting the air that accumulates inside the circuit.
Depending on the product chosen, automatic or manual vent valves are installed. Valves are installed in K025-K026 and K031-K032, while manual valves are installed in K023-K024 articles.

The automatic air vent valves are equipped with an internal float that, connected via a shutter lever system, automatically adjusts the expulsion of the air that accumulates inside it.
They are also equipped with a hygroscopic safety cap which, once closed manually, prevents water spills in the event of a valve malfunction. The use of these valves avoids the occurrence of negative phenomena for the plant such as corrosion, localized air pockets and cavitation in circulation pumps.

The manual air vent valves have a micrometric opening, they are rotatable and are equipped with a special sealing gasket for mounting on the manifold.
They are mounted on collector kits to facilitate the loading and unloading of the plant.

THERMOMETER HOLDER CAPS

They are specially designed for a simple and safe installation at the head of the manifold bars, they are equipped with a sealing gasket and have a hole for the housing of the thermometers.
The supplied thermometers have a reading range of $0 \div 60$ ° C.

CHARGE/VENT TAPS

Micrometric opening orientable taps are equipped with sealing gasket for mounting on the manifold and a seal with seal for a safety closure.
They are mounted on collector kits to facilitate the loading and unloading of the plant.

SUPPORTS

Along with the collector kits, galvanized steel fixing brackets are provided with their anti-vibration gaskets.
These are brackets designed to facilitate the installation of the manifolds and to limit the dimensions, can be fixed directly to the wall or in the appropriate floor heating systems.

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ACCESSORIES

ELECTROTHERMICAL ACTUATORS

Normally closed electrothermal commands with M28x1.5 connection
Article 982 - with micro-switch for normally closed closed-end signal
Article 983 - simple command on / off
The electrothermal actuators installed on the thermostatable return manifold shut-off valves have the function of automatically intercepting the thermovoltaic fluid on the control of the room thermostat and other electrical circuit breaker.
It is possible to install an electrothermal actuation of each of the shut-off valves so as to best control and regulate each single branch of the floor system.
The installation is simple and fast and is done via a quick coupling and a threaded nut.
The ICMA electrothermal actuators are in compliance with Directives 73/23 / EEC - 89/336 / EEC.

FITTINGS FOR MULTILAYER PIPE

Fittings for simple or multilayer plastic tubes
Article 100 - connection thread on manifold M24x1.5
Article 101 - Connection thread on the G3 / 4 "Euroconus manifold
They ensure a simple and secure connection of the multilayer pipe to the outlet and return manifolds.
The seals on the pipe and the manifold are made of peroxide EPDM O-Ring rings.
Thanks to their reduced internal surface roughness, low load losses are guaranteed.

INSULATION SHIELDS

Article 177 - Insulation shields for manifolds G1 "and G1" ¼

They are made up of a pair of thermoformed shells made of closed cellular polyethylene foam, particularly suitable for thermal insulation and condensation formation.
Drilled on both sides with a distance between holes of 50 mm.
For G1 manifolds "are provided with a length suitable for manifolds with max. 12 outputs, while for manifolds G1" ¼ the length is suitable for collectors with max 15 outputs.
It is possible to cut the cups to fit them with manifolds with a lower number of outputs.

MANIFOLD BOXES

Article 196 - Boxes for underfloor heating systems

Containers with depth and height adjustable, made of white painted sheet metal RAL 9010 complete with lock and supports for floor installation. The thickness of the sheet of 1 mm, with which the frame and the door are made, guarantees a remarkable build-up.
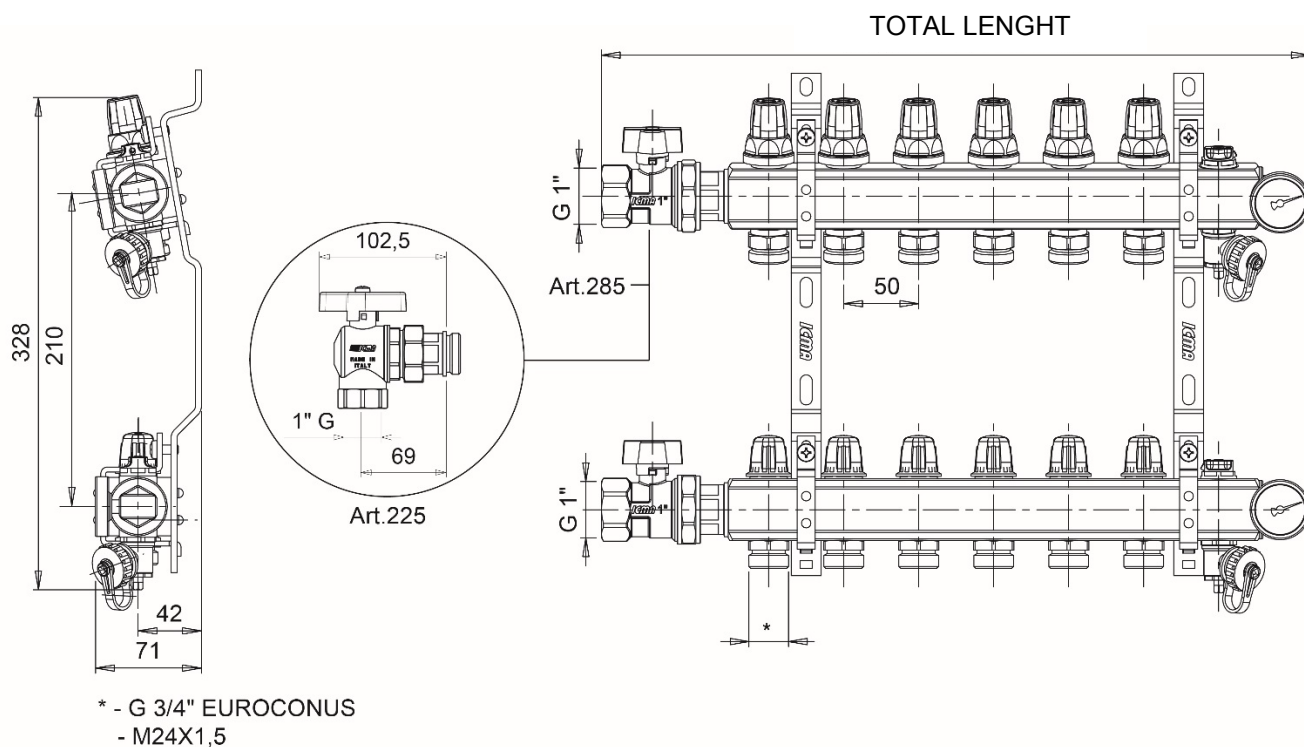- Adjustable height from 630 to 930 mm.
- Adjustable depth from 90 to 110 mm.
It is also possible to adjust the inside position of the manifold both in height and sideways. Suitable for collectors without circulation pump.
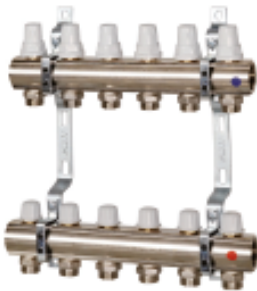For the choice of cassettes, refer to the total lengths of the manifolds and the recommended cassettes indicated in the "codes and dimensions" tables of the respective collector kits.

DIMENSIONS

TOTAL LENGHT

G 1"

Art.285

50

G 1"

Art.225

102,5

1" G

69

328

210

42

71

*

* - G 3/4" EUROCONUS
  - M24X1,5

ATTENTION: For total length and collector codes, refer to the "codes and dimensions" tables
listed on the following pages.

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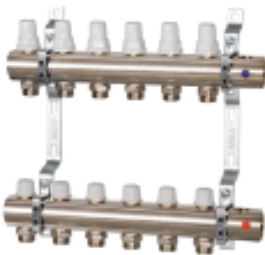pag. 6

MANIFOLD K005-K006

Manifolds unit with adjustment lockshields and valves with thermostatic option. Brackets with anti-vibration supports (art.208).
Suitable for 3/4" Euroconus or M24x1,5 fittings.
Choose electrothermic actuators with 28x1,5 connection thread.

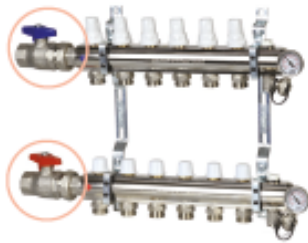| ART.	HEAD CONNECT.	OUTLETS	CODE EUROCONUS	CODE M24X1,5	PACKAGING	LENGTH TOTAL COLLECTOR
K005/K006	1"	2	87K005PG06	87K006PG06	1	104 mm
K005/K006	1"	3	87K005PH06	87K006PH06	1	154 mm
K005/K006	1"	4	87K005PJ06	87K006PJ06	1	204 mm
K005/K006	1"	5	87K005PQ06	87K006PQ06	1	254 mm
K005/K006	1"	6	87K005PK06	87K006PK06	1	304 mm
K005/K006	1"	7	87K005PR06	87K006PR06	1	354 mm
K005/K006	1"	8	87K005PL06	87K006PL06	1	404 mm
K005/K006	1"	9	87K005PS06	87K006PS06	1	454 mm
K005/K006	1"	10	87K005PM06	87K006PM06	1	504 mm
K005/K006	1"	11	87K005PT06	87K006PT06	1	554 mm
K005/K006	1"	12	87K005PU06	87K006PU06	1	604 mm
K005/K006	1"	13	87K005PV06	87K006PV06	1	654 mm
K005/K006	1"	14	87K005PW06	87K006PW06	1	704 mm
K005/K006	1"	15	87K005PY06	87K006PY06	1	754 mm

MANIFOLD K009-K010

Manifolds unit with adjustment lockshields and valves with thermostatic option. Outlets for 1/2" air vent (art.707) and 1/2" drain cock (art.172). Brackets with anti-vibration supports (art.208).
Suitable for 3/4" Euroconus or M24x1,5 fittings.
Choose electrothermic actuators with 28x1,5 connection thread.

ART.	HEAD CONNECT.	OUTLETS	CODE EUROCONUS	CODE M24X1,5	PACKAGING	LENGTH TOTAL COLLECTOR
K009/K010	1"	2	87K009PG06	87K010PG06	1	154 mm
K009/K010	1"	3	87K009PH06	87K010PH06	1	204 mm
K009/K010	1"	4	87K009PJ06	87K010PJ06	1	254 mm
K009/K010	1"	5	87K009PQ06	87K010PQ06	1	304 mm
K009/K010	1"	6	87K009PK06	87K010PK06	1	354 mm
K009/K010	1"	7	87K009PR06	87K010PR06	1	404 mm
K009/K010	1"	8	87K009PL06	87K010PL06	1	454 mm
K009/K010	1"	9	87K009PS06	87K010PS06	1	504 mm
K009/K010	1"	10	87K009PM06	87K010PM06	1	554 mm
K009/K010	1"	11	87K009PT06	87K010PT06	1	604 mm
K009/K010	1"	12	87K009PU06	87K010PU06	1	654 mm
K009/K010	1"	13	87K009PV06	87K010PV06	1	704 mm
K009/K010	1"	14	87K009PW06	87K010PW06	1	754 mm

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MANIFOLD K021-K022

Manifolds unit with adjustment lockshields and valves with thermostatic option.
It includes:
- 2 ball valves (art.215)
- Connection to the ball valve with gasket with plane seat and o-ring
- 2 brackets (art.208) with anti-vibration supports
- 2 built-in manual air vents with o-ring (ns.art.705)
- 2 1/2" drain cocks (Ns.art.172)
- 2 1" thermometer caps with o-ring (art.185)
- 2 0-60° thermometers (art.206).

Suitable for 3/4" Euroconus or M24x1,5 fittings.
Choose thermostatic and electrothermic actuators with 28x1,5 connection thread.

WITH STRAIGHT BALL VALVE

ART.	HEAD CONNECT.	OUTLETS	CODE EUROCONUS	CODE M24X1,5	PACKAGING	LENGTH TOTAL COLLECTOR	BOX RECOMMENDED ART. 196
K021/K022	1"	2	87K021PG06	87K022PG06	1	295 mm	500 mm
K021/K022	1"	3	87K021PH06	87K022PH06	1	345 mm	500 mm
K021/K022	1"	4	87K021PJ06	87K022PJ06	1	395 mm	500 mm
K021/K022	1"	5	87K021PQ06	87K022PQ06	1	445 mm	700 mm
K021/K022	1"	6	87K021PK06	87K022PK06	1	495 mm	700 mm
K021/K022	1"	7	87K021PR06	87K022PR06	1	545 mm	700 mm
K021/K022	1"	8	87K021PL06	87K022PL06	1	595 mm	700 mm
K021/K022	1"	9	87K021PS06	87K022PS06	1	645 mm	850 mm
K021/K022	1"	10	87K021PM06	87K022PM06	1	695 mm	850 mm
K021/K022	1"	11	87K021PT06	87K022PT06	1	745 mm	850 mm
K021/K022	1"	12	87K021PU06	87K022PU06	1	795 mm	1000 mm
K021/K022	1"	13	87K021PV06	87K021PV06	1	845 mm	1000 mm
K021/K022	1"	14	87K021PW06	87K021PW06	1	895 mm	1200 mm

WITH ANGLE BALL VALVE

ART.	HEAD CONNECT.	OUTLETS	CODE EUROCONUS	CODE M24X1,5	PACKAGING	LENGTH TOTAL COLLECTOR	BOX RECOMMENDED ART. 196
K021/K022	1"	2	87K021PG06 226	87K022PG06 226	1	295 mm	500 mm
K021/K022	1"	3	87K021PH06 226	87K022PH06 226	1	345 mm	500 mm
K021/K022	1"	4	87K021PJ06 226	87K022PJ06 226	1	395 mm	500 mm
K021/K022	1"	5	87K021PQ06 226	87K022PQ06 226	1	445 mm	700 mm
K021/K022	1"	6	87K021PK06 226	87K022PK06 226	1	495 mm	700 mm
K021/K022	1"	7	87K021PR06 226	87K022PR06 226	1	545 mm	700 mm
K021/K022	1"	8	87K021PL06 226	87K022PL06 226	1	595 mm	700 mm
K021/K022	1"	9	87K021PS06 226	87K022PS06 226	1	645 mm	850 mm
K021/K022	1"	10	87K021PM06 226	87K022PM06 226	1	695 mm	850 mm
K021/K022	1"	11	87K021PT06 226	87K022PT06 226	1	745 mm	850 mm
K021/K022	1"	12	87K021PU06 226	87K022PU06 226	1	795 mm	1000 mm
K021/K022	1"	13	87K021PV06 226	87K022PV06 226	1	845 mm	1000 mm
K021/K022	1"	14	87K021PW06 226	87K022PW06 226	1	895 mm	1200 mm

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HYDRAULICAL FEATURES

The hydraulic characteristics of a radiant panel circuit, served by a collector kit such as those described in this data sheet, are substantially represented by the load losses of the circuit itself.

The loss of load by its definition is the pressure loss due to all the passive forces (curves, branches, bottlenecks and shrubs of materials) that oppose water resistance in a pipe or circuit.

Knowing the value of the overall load loss of a circuit is critical at the time of designing a plant to determine the flow rate and consequently the prevalence that the circulation pump will provide.

In order to determine the overall loss of a circuit, it is necessary to know and add up all the load losses of the individual devices that compose it.

Collettore/Manifold Art. 1005-1006-1011-1012 – G 1"
DIAGRAMMA DELLE PERDITE DI CARICO
PRESSURE DROP DIAGRAM
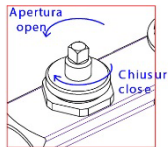
n° giri/ turns	Kv1* [m³/ h]
1	0,85
2	1,75
3	2,25
All open tutto aperto	2,3

* Valori riferiti ad una singola uscita
values in reference to a single exit

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Collettore/Manifold Art. 1001-1002-1007-1008 – G 1"
DIAGRAMMA DELLE PERDITE DI CARICO
PRESSURE DROP DIAGRAM

n° giri/turns	Kv1* [m³/h]
Tutto aperto All open	2,05

Valori riferiti ad una singola uscita
values in reference to a single exit
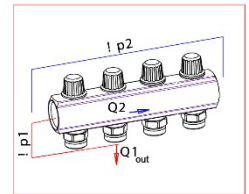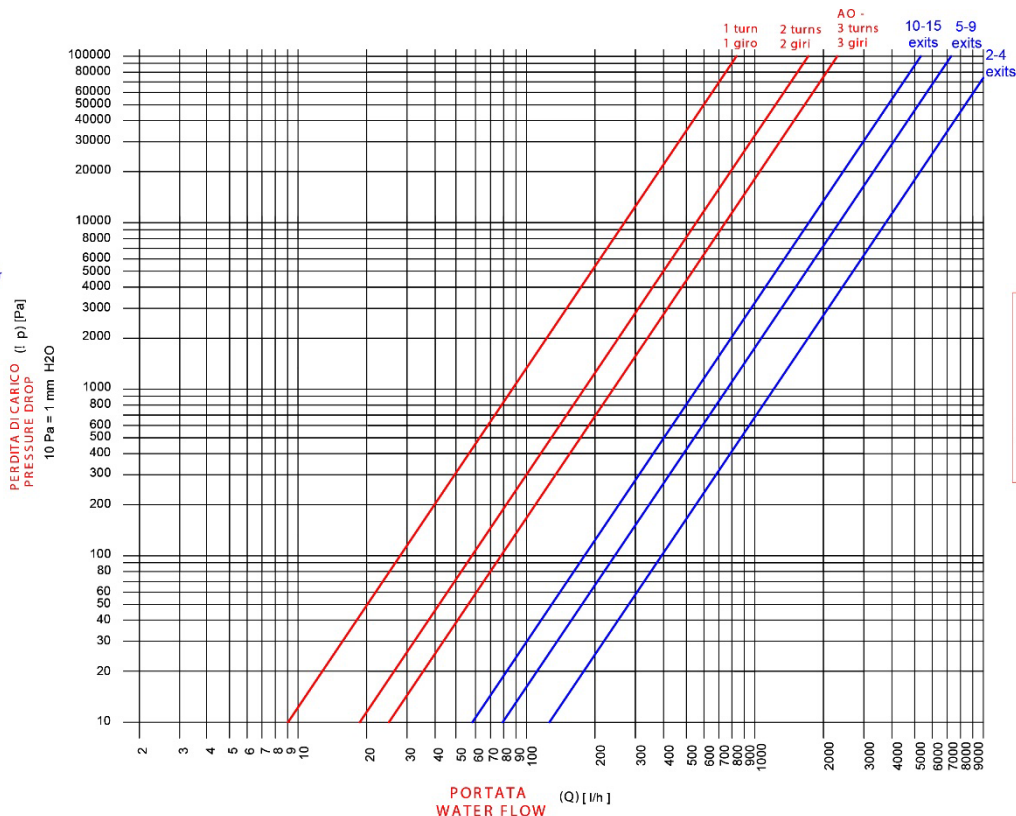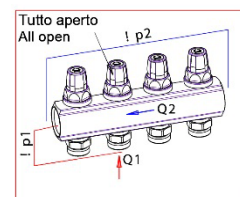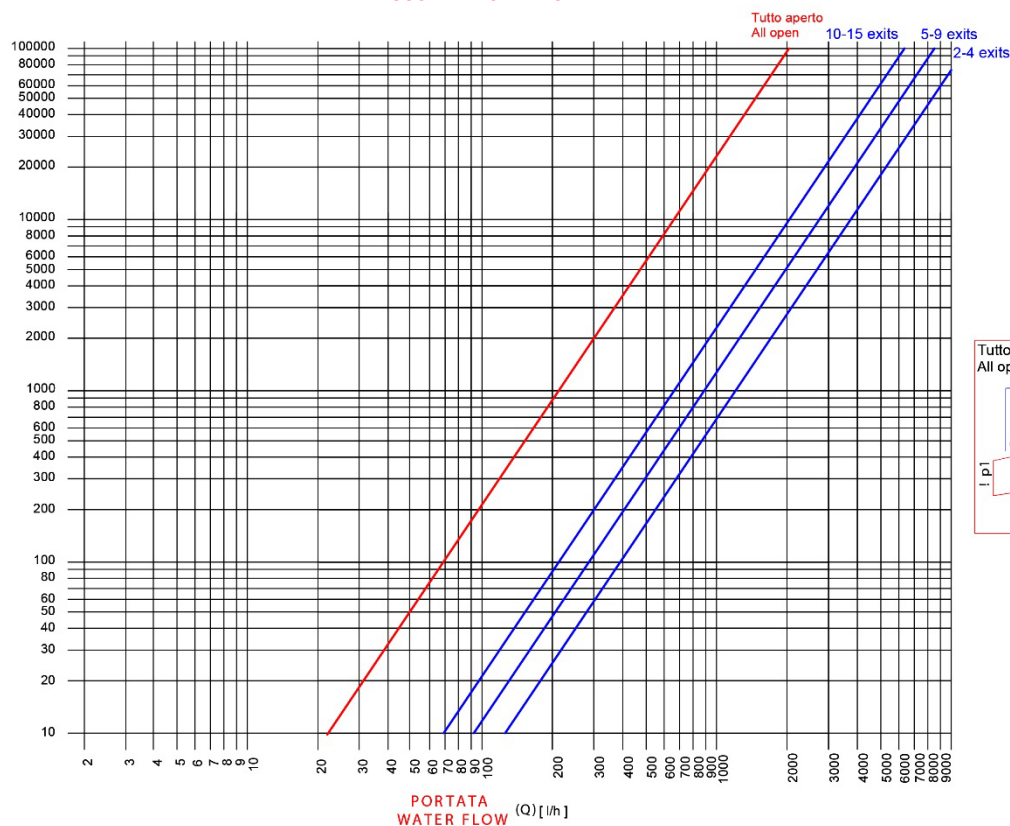
	Kv2 collettore Kv2 manifold [m³/h]
2-4 exits	12,6
5-9 exits	8,7
10-15 exits	6,45

— Vitone/spindle
— Collettore/manifold

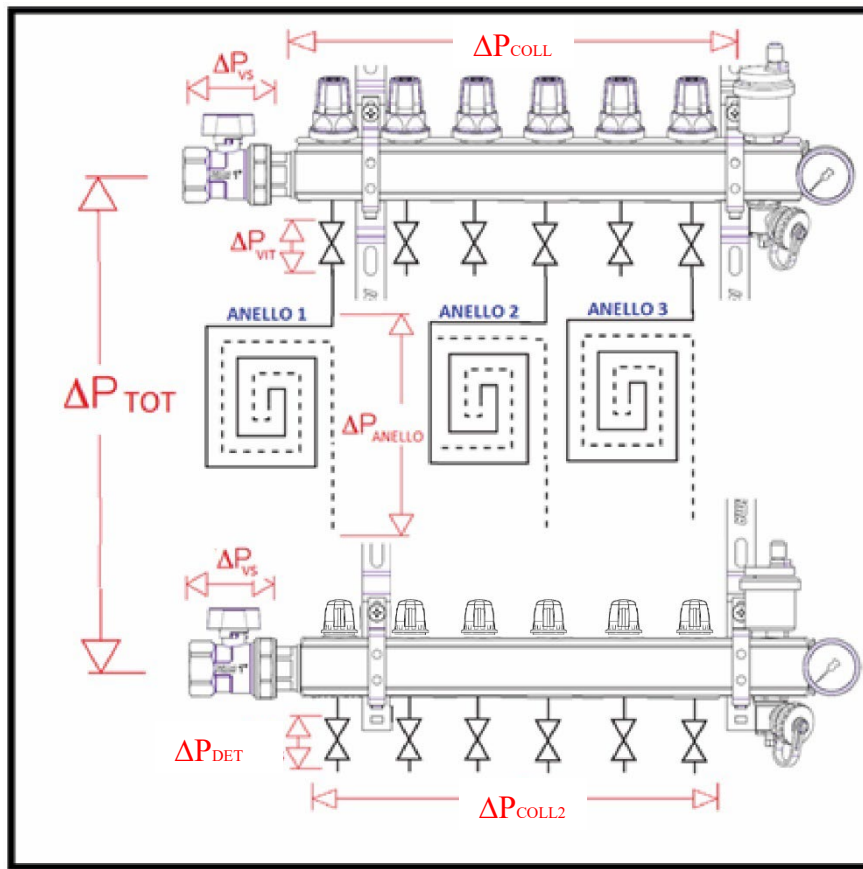$$K v1 = \frac{Q1}{\sqrt{\Delta P1}}$$

$$K v2 = \frac{Q2}{\sqrt{\Delta P2}}$$

Collettore/Manifold Art. 284 – G 1"
DIAGRAMMA DELLE PERDITE DI CARICO
PRESSURE DROP DIAGRAM
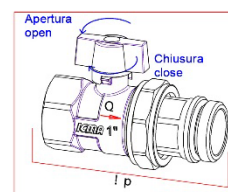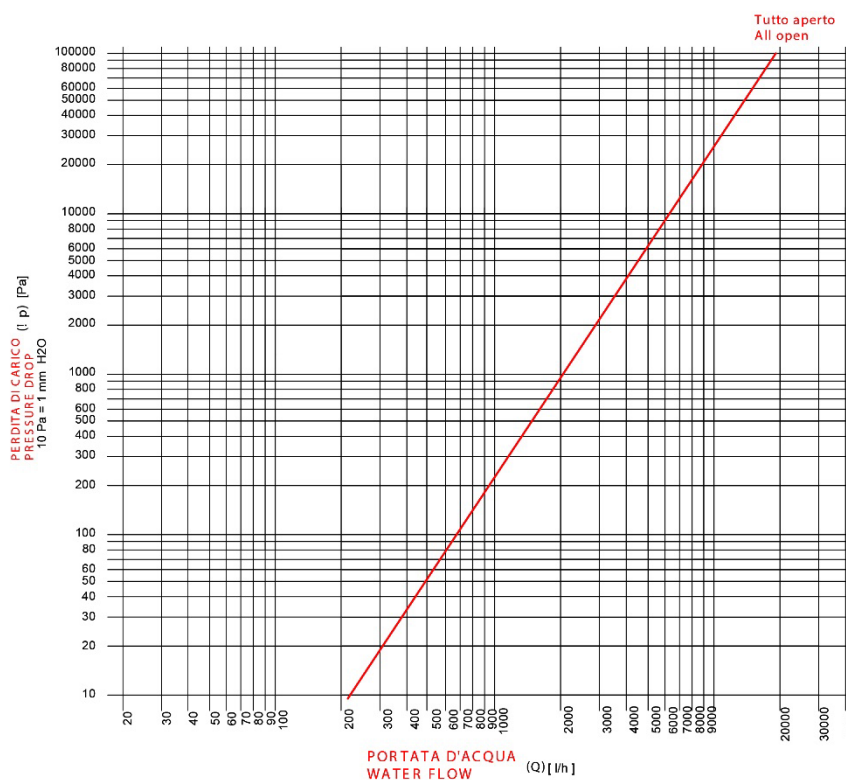
Kv [m³/h]
19,1

Practical example of calculating the total load loss of collector K021.

ΔP_{COLL1} = distributed manifold discharge loss of Art.1001 collector
ΔP_{COLL2} = distributed manifold discharge loss of Art.1013
ΔP_{VS} = load loss generated by the ball valve Art.284
ΔP_{DET} = load loss generated by the flowmeter of delivery
ΔP_{VIT} = load loss generated by the return vein
ΔP_{ring} = load loss generated by the radiant tube
ΔP_{TOT} = total load loss

It is permissible to have the following planting requirements in a floor heating system, including a 3-outlet K021 manifold group:

1. $Ring\ Capacity\ 1: Q1 = 120\frac{l}{h}$
2. $Ring\ Capacity\ 2: Q2 = 150\frac{l}{h}$
3. $Ring\ Capacity\ 3: Q3 = 190\frac{l}{h}$

The hydraulic characteristics of the circuit components (to be obtained from the diagrams above) are:

1. Sphere valve Art.284: $Kv_{VS} = 19,1\frac{m^3}{h}$
2. Manifold Art. 1001: $Kv_{COLL1} = 12,6\frac{m^3}{h}$
3. Manifold Art. 1013: $Kv_{COLL2} = 11,1\frac{m^3}{h}$
4. Adjustment Nut 1001: $Kv_{VIT} = 2,05\frac{m^3}{h}$
5. Flowmeter 1013: $Kv_{DET} = 1,21\frac{m^3}{h}$
6. Rings: $r_{RING} = 14\frac{mm\ c.a.}{m}$ (caratteristica dei tubi dell'impianto)
7. Ring Lenght: $l_{RING} = 100m$

The most disadvantaged circuit is always the circuit with multiple load losses. The latter corresponds, at the same length as the individual pipes, to the circuit in which it has to flow more flow. In this case it is ring 3.

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Calculation of differential ΔP required for ring 3 to ensure $190 \frac{l}{h}$:

$$\Delta P_{anello3} = r_{RING} * l_{RING} = 14 \frac{mm\, c.a.}{m} * 100m = 1400\, mm\, c.a = 14 Kpa$$

$$\Delta P_{VIT} = \frac{Q_3{}^2}{Kv_{VIT}{}^2} = \left(\frac{190}{1000}\right)^2 \frac{m^3}{h} * \frac{1}{2,05^2} \frac{bar * h}{m^3} = 8,5 * 10^{-3} bar = 0,85 Kpa$$

$$\Delta P_{DET} = \frac{Q_3{}^2}{Kv_{VIT}{}^2} = \left(\frac{190}{1000}\right)^2 \frac{m^3}{h} * \frac{1}{1,21^2} \frac{bar * h}{m^3} = 0,0246 bar = 2,45 Kpa$$

La pressione differenziale totale da garantire agli imbocchi dell'anello 3 è quindi:

$$\Delta P_{g3} = \Delta P_{ring3} + \Delta P_{ring3} + \Delta P_{ring3} = 14 Kpa + 0,85 Kpa + 2,45 Kpa = 17,3 Kpa$$

This loss of load must be added to the distributed manifold loss and the ball valve loss, the latter multiplied by 2 (being 2 ball valves). The scope to consider for calculation is this time the total flow rate of collectors. Then:

$$Q_{TOT} = Q_1 + Q_2 + Q_3 = 120 \frac{l}{h} + 150 \frac{l}{h} + 190 \frac{l}{h} = 460 \frac{l}{h}$$

$$\Delta P_{COLL1} = \frac{Q_{TOT}{}^2}{Kv_{COLL1}{}^2} = \left(\frac{460}{1000}\right)^2 \frac{m^3}{h} * \frac{1}{12,6^2} \frac{bar * h}{m^3} = 1,33 * 10^{-3} bar = 0,13 Kpa$$
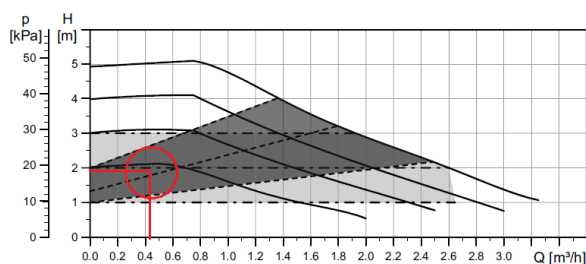
$$\Delta P_{COLL2} = \frac{Q_{TOT}{}^2}{Kv_{COLL2}{}^2} = \left(\frac{460}{1000}\right)^2 \frac{m^3}{h} * \frac{1}{11,1^2} \frac{bar * h}{m^3} = 1,71 * 10^{-3} bar = 0,17 Kpa$$

$$\Delta P_{VS} = \frac{Q_{TOT}{}^2}{Kv_{COLL}{}^2} = \left(\frac{460}{1000}\right)^2 \frac{m^3}{h} * \frac{1}{19,1^2} \frac{bar * h}{m^3} = 5,8 * 10^{-4} bar = 0,058 Kpa$$

For the correct sizing of the pump, it is important to obtain the ΔPTOT. It is therefore:

$$\Delta P_{TOT} = \Delta P_{g3} + \Delta P_{COLL1} + \Delta P_{COLL2} + 2 * \Delta P_{VS} = 17,3 Kpa + 0,13 Kpa + 0,17 Kpa + 2 * 0,058 Kpa = 17,71 Kpa$$

PUMP DIMENSION

A properly dimensioned pump will have to guarantee at least 460 l / h with a prevalence of 17.71Kpa, or about 1.8m. Considering, for example, the curves characteristic of a UPM3 HYBRID 25-50 130:
The image shows the working point of the pump, obtained by intersecting the two flow data and loss of load. The pump in question is more than enough to ensure the desired flow rate. The workstation also falls within the Constant Pressure area; the pump can then operate by ensuring a constant ΔP.

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