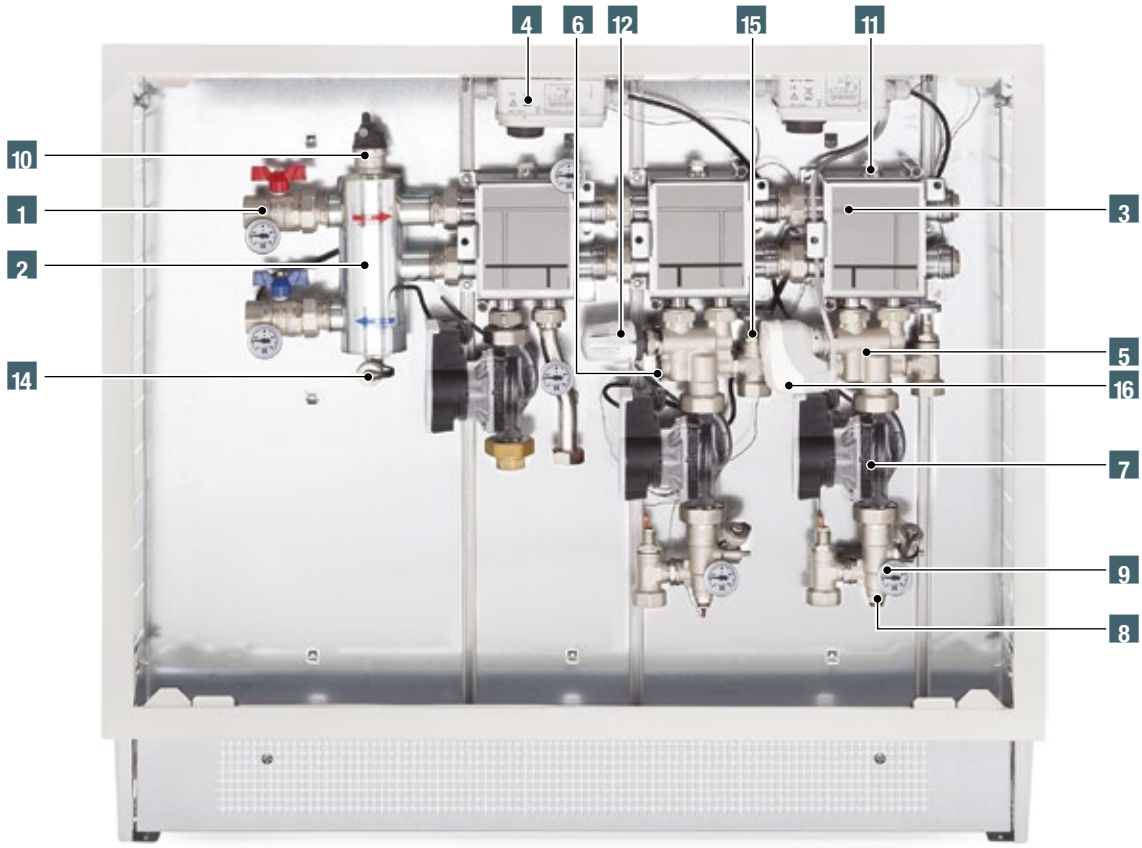
Modular Firstbox

Modular Firstbox is a modular system for the management of heating systems in zones that require large water flow rates, with homogeneous supply temperature or with mixed temperatures (high and low temperature for radiator/fan coil and radiant panel systems).
The main feature is the "modular" construction which allows to assemble one or more modules as required.
The mixing system with thermostatic head for fixed-point control (heating only), or with an electric servomotor for temperature control (heating and/or cooling), reacts to any change in flow or heat emission and keeps the temperature of the fluid of the radiant panel system constant.
The unit, which comes with the Wilo Para RS 25/7 electronic circulator, should be completed with the installation of a thermostatic head with a remote sensor (for fixed-point operation in heating mode only), or an electric servomotor (3-point floating, or 0-10 Vdc modulating) combined with a climatic regulator for heating and/or cooling.
The open Manifold module (hydraulic separator), allows the modules to be fed with heat sources equipped with a circulator, avoiding any mutual interference between the primary and secondary circuits.
As well as the standard offer of pre-assembled modules in a recessed metalbox, with the individual modules it is possible to build the distribution system that best suits your needs.



Construction

1. Ball valve kit (not supplied)
2. Manifold open (where envisaged)
3. Distribution manifold
4. Electrical box with safety thermostat for low temperature circulator wiring (optional)
5. Mixing valve with thread M30x1.5 for the installation of a thermostatic head with immersion probe from 20 to 65 °C or an electric servomotor (not supplied as standard)
6. Calibration and by-pass valve
7. Wilo Para RS 25/7 wired electronic circulator with three-core cable L=1000 mm
8. Flow temperature probe housing
9. Control thermometer from 0 to 80°C
10. Automatic air relief valve ½"
11. Manual air relief valve ½"
12. Thermostatic head with immersion probe from 20 to 65 °C (fixed point adjustment)
13. Non-return valve (not shown)
14. Loading/unloadingtap with swivel connection and safety cap (where envisaged)
15. Shut-off lockshield with housing for thermometer or return probe (climate control)
16. 3-point electric servomotor or 0-10 V DC

Operation

Open manifold operation

The open manifold allows to avoid actions of mutual interference between the circulators that operate for different circuits. As well as changing the differential pressures of the system, it may also change the temperatures because there may be significant mixing phenomena.

The following cases can occur:
- primary flow rate (G1) equal to secondary flow rate (G2) Fig. A;
- primary flow rate (G1) higher than secondary flow rate (G2) Fig. B;
- primary flow rate (G1) lower than secondary flow rate (G2) Fig. C.

In all cases, the temperature of the original project according to which the terminals of the system are dimensioned is the flow temperature of the secondary circuit.

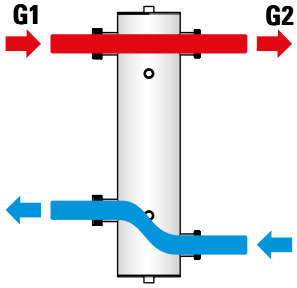


Fig. A **G1 = G2**

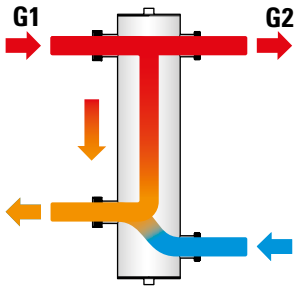


Fig. B **G1 > G2**

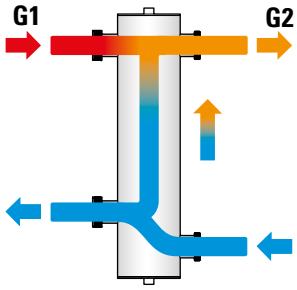


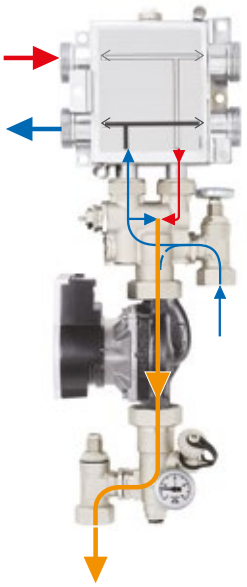
Fig. C **G1 < G2**

Low temperature module operation (mixed)

The mixing system with fixed-point regulation and thermostatic control head (for heating only) or with temperature control and electric servomotor (for heating and/or cooling) reacts to any change in flow or heat emission and keeps the temperature of the fluid of the underfloor system constant. Using the mixing system, the temperature of the supply water of the underfloor heating system (low temperature mixed water) is regulated at a fixed point, by means of the application on the mixing valve of a thermostatic head with a remote temperature sensor, or by means of a temperature control unit, through the application on the mixing valve of an electric servomotor.

In the case of fixed-point control, the temperature sensor with capillary tubing 9 inserted in the valve box detects the temperature of the fluid downstream of the circulator, keeping it at the value set on the knob of the head (from 20 to 65 °C).

In the case of temperature control, the temperature probe inserted in the valve box detects the temperature of the fluid upstream of the circulator, keeping it constant at the value calculated by the temperature control unit, by means of the activation of the electric servomotor. By acting on the calibration and by-pass valve, it is possible to adjust the by-pass flow of the underfloor heating system, thus ensuring that the ΔT of the original design is reached.



Use

The high and low temperature distribution modules with open Manifold module require a circulator upstream (normally that of the heat generator).

The high and low temperature distribution modules without open Manifold module can be connected to generators without a circulator or a tank (puffer).

Warning

In accordance with UNI EN 1264-4, there must be a safety device (thermostat) that blocks the supply of the low temperature zone over certain limits.

This function is integrated in the accessories of the Electrical box with safety thermostat and 6T base unit.

Advantages

The Modular Firstbox system optimizes and simplifies the realization of heating systems in zones with circulators, exploiting a series of components that assemble in a simple and accurate manner, with an O-ring seal.
Safe: each unit is tested under pressure, and then mounted inside the Metalbox and packed in a cardboard box with a suitable wooden structure for transportation to the site.
Rational: using the special connection fittings, the assembly of the modules is simple and safe.
Durable: the materials and components used create a heat generating unit that qualifies the plant over time.
Complete: all components, accessories and technical solutions adopted contribute to create a system that facilitates the testing, regulation, balancing and maintenance phases of the plant.
Minimum space: the pre-assembled modules inside the Metalboxes can be placed within partitions 12 cm thick.

Technical data

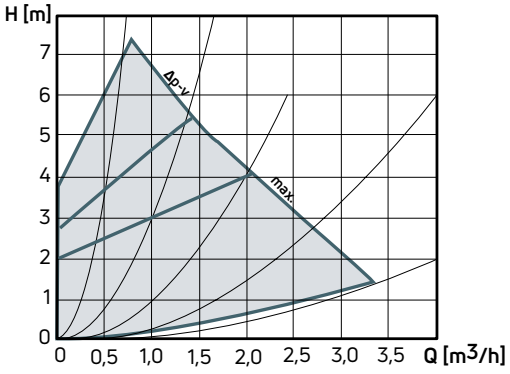
Operating conditions and performance data
Max temperature on primary circuit: 90 °C
Maximum operating pressure: 10 bar
Δp max on primary circuit: 1 bar
Thermometer scale: 0÷80°C
Temperature interval on secondary circuit: 20÷65 °C
Thermal power exchangeable with ΔT=7°C and Δp=0.25 bar on the secondary circuit:
- 10 kW with by-pass in position 0 (fully closed by-pass)
- 12.5 kW with by-pass in position 5 (fully open by-pass)

Wilo Para RS 25/7 electronic circulator
Thread UNI EN ISO 228-1 (G 1"1/2)
Centre distance: 130 mm
Speed of rotation: 2580÷4700 rpm
Maximum head: 7 m
Maximum capacity: 3.5 m^3/h
Usable fluids:
- cooling and heating water.
- water and glycol: max 1:1
Electrical connection 1~230V +10% / -15%, 50/60Hz
Protection class: IPX 4D
Insulation class: F
Rated power of motor: 37 W
Absorbed power from 1-230 V: 8.2÷50 W
Current absorbed from 1-230 V: 0.07÷0.44 A
EEI ≤ 0.2

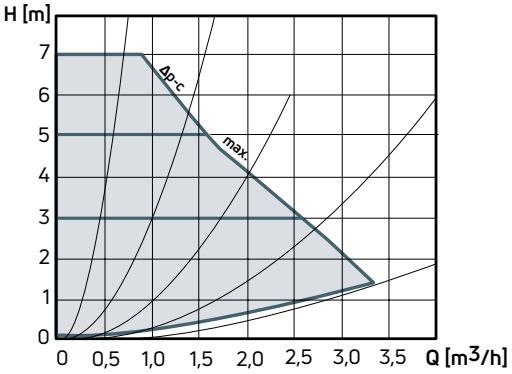
Circulator conformity
Directive ErP
EN 61800-3
EN 61000-6-3 / EN 61000-6-4
EN 61000-6-2 / EN 61000-6-1
2014/35/EU (low voltage)
2014/30/EU (Electromagnetic compatibility)

Wilo Para 25/7 circulator hydraulic performance diagrams

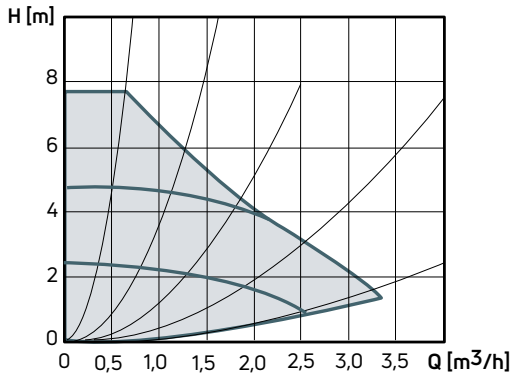
Δp-v Variable



Δp-c Constant



Constant speed



High temperature module connections
Primary circuit connections: G 1"1/4 male (G 1" female), centre distance 65 mm
Secondary circuit connections: G 1" female and G 1" female swivel nut, variable centre distance (about 70 mm)

Low temperature module connections
Primary circuit connections: 1"1/4 male (1" female), centre distance 65 mm
Secondary circuit connections: 1" female, variable centre distance

Open manifold connections
Lateral connections: G 1" female
Auxiliary connections: G 1/2" female

Manifolds for high temperature
Auxiliary connections
Size: 1"
End thread: G 1" female
Takeoffs: 24x19 male, centre distance 50 mm

Materials

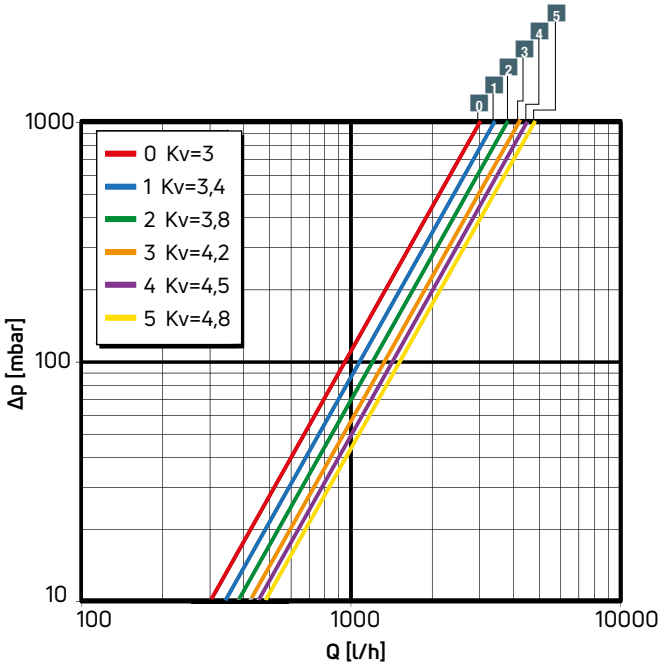
Mixing kit materials
Brass UNI EN 12165 CW617N
Brass UNI EN 12164 CW614N
Annealed copper
O-ring seals EPDM 70 Sh

Materials of distribution modules and open manifold
Brazed galvanized steel UNI EN 13134

Materials of manifolds for high temperature auxiliary connections
Drawn bar brass UNI EN 12168 CW614N
O-ring seals EPDM 70 Sh

Diagram for Modular Firstbox adjustment

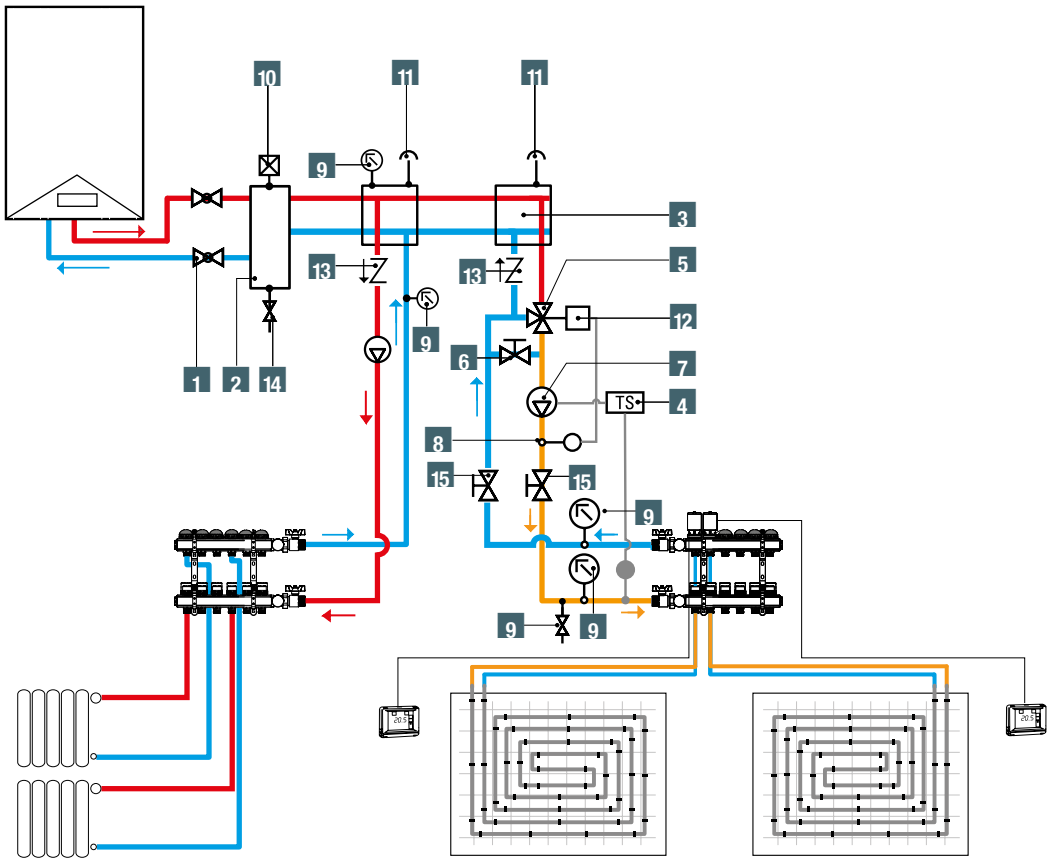
Pressure drops of mixing unit



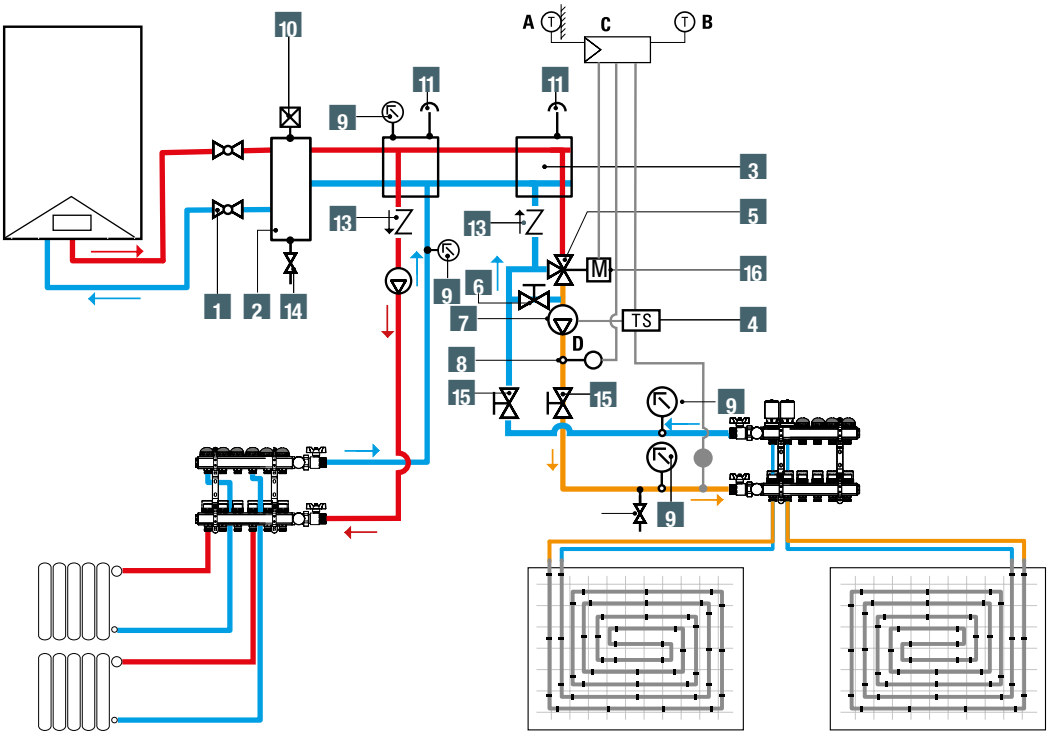
0 ··· 5 Position of calibration and by-pass valve
Performance detected at -2K

Hydraulic diagrams

Hydraulic diagram - Modules with open manifold - Fixed-point control



Hydraulic diagram - Modules with open manifold - Temperature control



A external probe **B** room sensor **C** climatic regulator **D** flow probe

Description of components: see introduction photos

The Range

Each module includes the following components: distribution modules, Wilo Para RS 25/7 circulator (except for models without circulator), thermometers on the high temperature flow and on the return pipe, non-return valve on the flow to prevent unwanted circulations in the opposite direction when the circulator is off (but with other circulators on).
The low temperature modules, for fixed-point control via the thermostatic head with immersion probe (heating only) o temperature control via the servomotor driven by a suitable climatic regulator (for heating and/or cooling) also include a mixing valve, calibration and balancing by-pass, lockshields to shut-off the flow on the flow and return, thermometer on the mixed flow, load/unload tap, valve box for the installation of the safety thermostat, valve boxes for the installation of the flow probe (or of the remote bulb of the thermostat head) and return probe if required.
The manifolds with high temperature auxiliary connections come complete with micrometric lockshields (flow) and valves for electrothermic heads (return).

Versions pre-assembled in box

The modules, complete with a circulator, are pre-assembled in a Metalbox with a thickness of 110 mm, complete with a frame flush with the wall, painted doors, screwdriver lock.

Modular Firstbox H
Distribution modules for high temperature areas (1/2/3 zones), complete with open manifold module



Modular Firstbox H+L
Distribution modules for mixed high and low temperature zones, complete with open manifold module.
Models: 1H+1L, 1H+2L, 2H+1L.



Modular Firstbox L
Distribution module for mixed Low temperature zones (1/2/3 zones), complete with open manifold module.



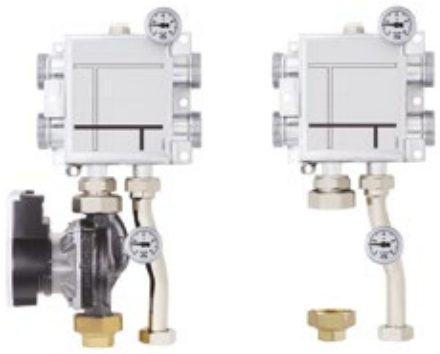
Modular Firstbox L + High temperature auxiliary connections
Distribution modules for 1 or 2 mixed Low temperature zones, with High temperature auxiliary connections (2/3 connections). They do not include the open manifold module.



Single distribution modules

Single modules to be assembled by means of the connections F 1"1/4 swivel – M 1".
They can be attached inside a metal box or directly to the wall.
By performing some simple operations it is possible to use the same modules both with the circulator facing downwards and with the circulator facing upwards, without changing the hydraulic connections of the primary circuit (heat generator).
This characteristic also allows to create modular plants, with circulators facing upwards and/or downwards (e.g. circulator of zone 1 facing upwards and circulator of zone 2 facing downwards).
The individual modules for 1 or 2 Low temperature zones, with High temperature auxiliary connections (2/3 connections) are sold divided into 2 parts, to be assembled by the installer: the distribution module and the mixing unit complete with the circulator. These modules are also suitable for installations with the circulator facing upwards or downwards.

Single High temperature module (with or without circulator)



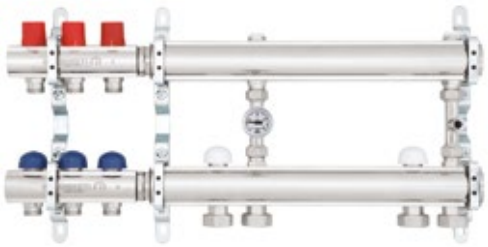
Can be facing upwards or downwards.
Delivered pre-assembled and facing downwards.

Single Low temperature module (with or without circulator)



To be completed with:
- thermostatic head
or
- 3-point servomotor
or
- 0-10 Vdc electric servomotor
Combine an RCE or PCOC climatic regulator for heating and/or cooling. Can be facing upwards or downwards. Delivered pre-assembled and facing downwards.

Single Low temperature modules (1 or 2 zone) with high temperature auxiliary connections (2 or 3 connections)



Combine a mixing unit for individual low temperature modules with high temperature auxiliary connections.

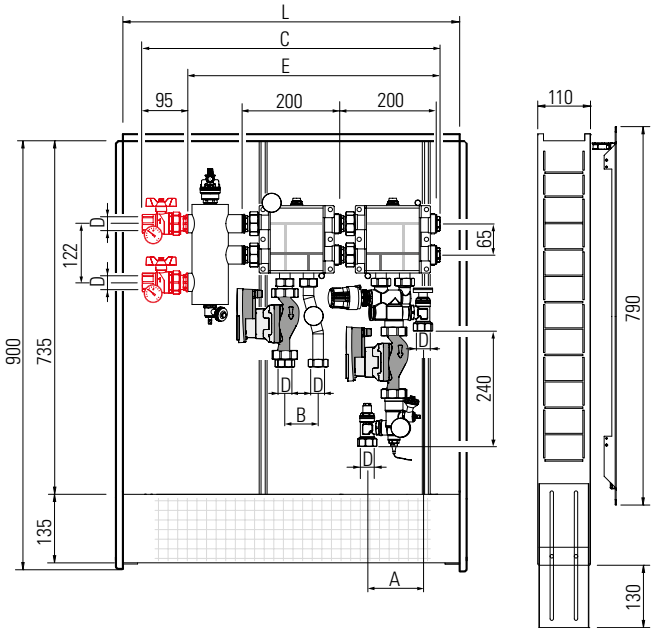
Mixing unit for individual low temperature modules with high temperature auxiliary connections.



To be completed with:
- thermostatic head
or
- 3-point servomotor
or
- 0-10 Vdc electric servomotor
Combine an RCE or PCOC climatic regulator for heating and/or cooling.

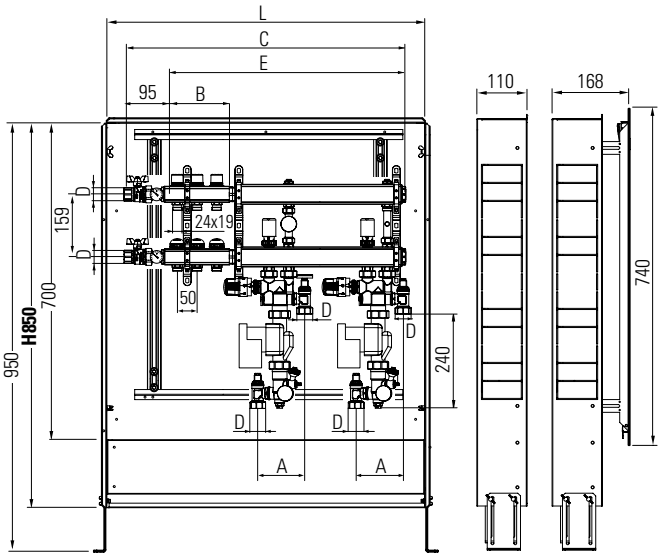
Dimensions of Modular Firstbox

Recessed distribution modules for High/Low temperature systems



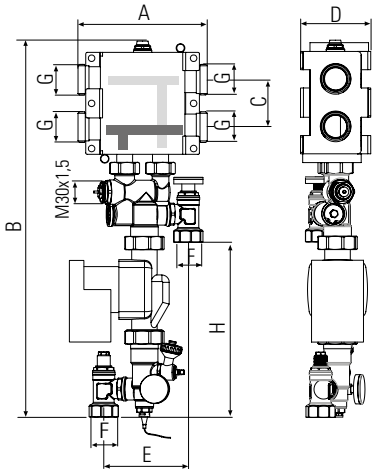
Model	A [mm]	B [mm]	C [mm]	D	E [mm]	L [mm]
1H	min 110 max 120	min 60 max 70	420	G 1" F	325	500
2H	min 110 max 120	min 60 max 70	620	G 1" F	525	700
3H	min 110 max 120	min 60 max 70	820	G 1" F	725	1000
1L	min 110 max 120	min 60 max 70	420	G 1" F	325	500
2L	min 110 max 120	min 60 max 70	620	G 1" F	525	700
3L	min 110 max 120	min 60 max 70	820	G 1" F	725	1000
1H + 1L	min 110 max 120	min 60 max 70	620	G 1" F	525	700
1H + 2L	min 110 max 120	min 60 max 70	820	G 1" F	725	1000
2H + 1L	min 110 max 120	min 60 max 70	820	G 1" F	725	1000

Recessed distribution system for Low temperature systems with connections for High temperature terminals



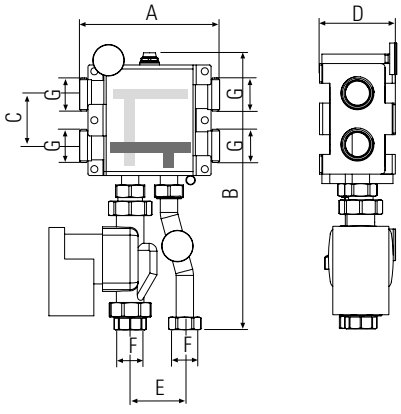
Model	A [mm]	B [mm]	C [mm]	D	E [mm]	L [mm]
2H + 1L	min 110 max 120	114	420	G 1" F	325	500
3H + 1L	min 110 max 120	164	470	G 1" F	375	700
2H + 2L	min 110 max 120	114	670	G 1" F	565	850
3H + 2L	min 110 max 120	164	720	G 1" F	625	850

Single distribution modules for Low temperature systems



Model	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G	H [mm]
1L	178	516	65	96	min 110 max 120	G 1" F	G 1"¼ M G 1" F	240

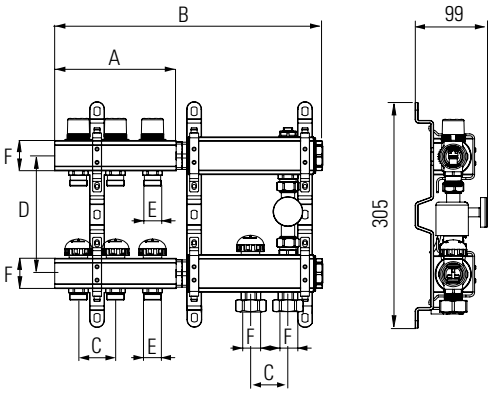
Single distribution modules for High temperature systems



Model	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	G
1H	178	351	65	96	min 60 max 70	G 1" F	G 1"¼ M G 1" F

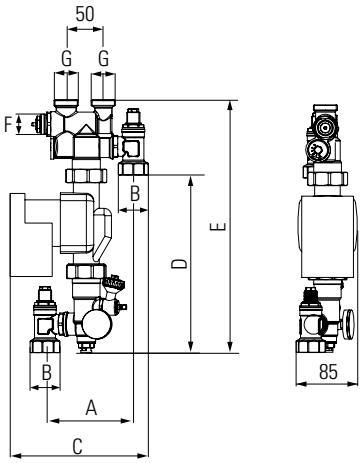
Distribution system Single module

Distribution module for Low temperature systems with auxiliary connections for High temperature terminals.



Model	A [mm]	B [mm]	C [mm]	D [mm]	E	F
2H+1L	114	325	50	159	24x19 male	G 1" F
3H+1L	164	375	50	159	24x19 male	G 1" F

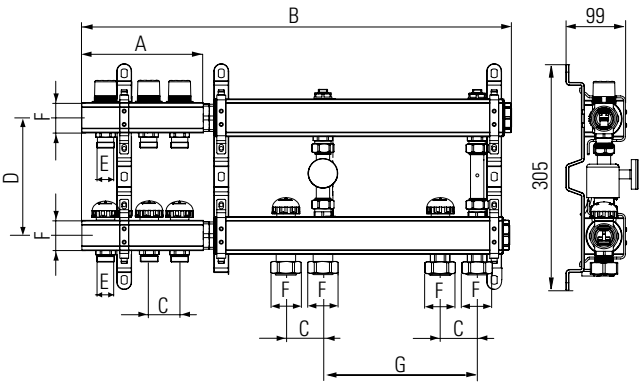
Adjustment units with electronic circulator.



Model	A [mm]	B	C [mm]	D [mm]	E [mm]	F	G
1L	min 110 max 120	G 1" F	190	240	340	M30x1.5	G 1" M

Distribution system Double module

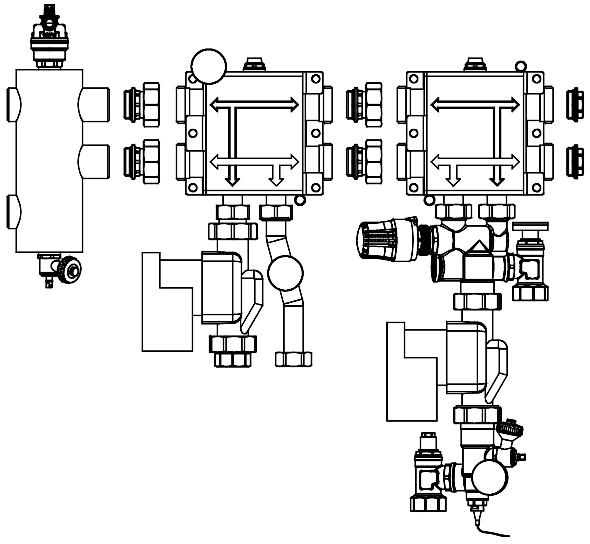
Double distribution module for Low temperature systems with auxiliary connections for High temperature terminals.



Model	A [mm]	B [mm]	C [mm]	D [mm]	E	F	G [mm]
2H+2L	114	565	50	159	24x19 male	G 1" F	250
3H+2L	164	625	50	159	24x19 male	G 1" F	250

Assembly of single modules

The assembly of the individual modules Modular Firstbox according to the requirements of the particular type of system to be made, should be carried out by means of the special female connections 1"1/4 flat face swivel nut - M 1", which allows to connect two modules



Accessories

Thermostatic head with immersion probe for fixed-point control

Adjustment range: 20÷65 °C - Threaded connection size: M30x1.5



3 point floating electric servomotor



Type of operation: 3-position control
Nominal voltage: 230 Vac (± 15%)
Nominal frequency: 50/60 Hz - Maximum consumption: 6 VA
Permissible room temperature: 0÷55°C
Maximum permissible fluid temperature: 110 °C
Nominal stroke: 2.5 mm - Maximum stroke: 5.5 mm
Stroke time (at 50/60 Hz, regarding a stroke of 2.5 mm): 150 s
Nominal force: 100 N
Degree of protection: IP40 according to EN 60529
Insulation class: II according to EN 60730
Threaded fitting size: M30x1.5

Modulating electric servomotor 0-10 Vdc



Type of operation: control 0÷10 Vdc
Nominal voltage: AC/DC 24 V (±20% / ±25%)
Nominal frequency: 50/60 Hz - Maximum consumption: 6 VA
Permissible room temperature: 0÷55°C
Maximum permissible fluid temperature: 110 °C
Nominal stroke: 2.5 mm - Maximum stroke: 5.5 mm
Stroke time (at 50/60 Hz, regarding a stroke of 2.5 mm): 150 s
Nominal force: 100 N
Degree of protection: IP40 according to EN 60529
Insulation class: II according to EN 60730
Threaded fitting size: M30x1.5

Straight Progress valve Kit M-F 1" or 1"1/4 with thermometers and unions



Right-angle Progress kit M-F 1"



To be installed exclusively upstream of the connections of the open manifold, on the side of the primary circuit.

Open manifold

2"1/2 - int 65 mm - 2+2 way / 2"1/2 - int 65 mm - 4+2 way



Complete with n°2 female connections 1"1/4 flat face swivel nut - male 1", n° 1 exhaust valve, n° 1 exhaust tap.

Pair of 1" male - 1"1/4 female module coupling unions with swivel nut, flat seal



Nickel-plated 1" male blind stopper with O-Ring



Terminal kit with 1"1/4 by-pass for Modular Firstbox with auxiliary connections for high temperature terminals



Overpressure valve settable from 0.2 to 0.5 bar.

Insulating shell for Modular Firstbox distribution modules 1 high zone



In cross-linked, closed-cell polyethylene foam.
For the installation of the insulating shell, first of all it is necessary to remove the hydraulic unit from the box (there fore do not make the hydraulic and electrical connections before installing the insulating shell). If the insulating shell is to be installed on a unit inside a Metalbox, it is recommended to install the unit keeping a distance between the back of the box and the wall equal to 135 mm. Not combinable with distribution modules with auxiliary connections for elements heated at a high temperature.

Insulating shell for Modular Firstbox distribution modules 1 low zone



In cross-linked, closed-cell polyethylene foam.
For the installation of the insulating shell, first of all it is necessary to remove the hydraulic unit from the box (there fore do not make the hydraulic and electrical connections before installing the insulating shell). If the insulating shell is to be installed on a unit inside a Metalbox, it is recommended to install the unit keeping a distance between the back of the box and the wall equal to 135 mm. Not combinable with distribution modules with auxiliary connections for elements heated at a high temperature.

Insulating shell for Modular Firstbox open manifold



In cross-linked, closed-cell polyethylene foam. For the installation of the insulating shell, first of all it is necessary to remove the hydraulic unit from the box (there fore do not make the hydraulic and electrical connections before installing the insulating shell). If the insulating shell is to be installed on a unit inside a Metalbox, it is recommended to install the unit keeping a distance between the back of the box and the wall equal to 135 mm.

Electrothermic head with auxiliary micro switch



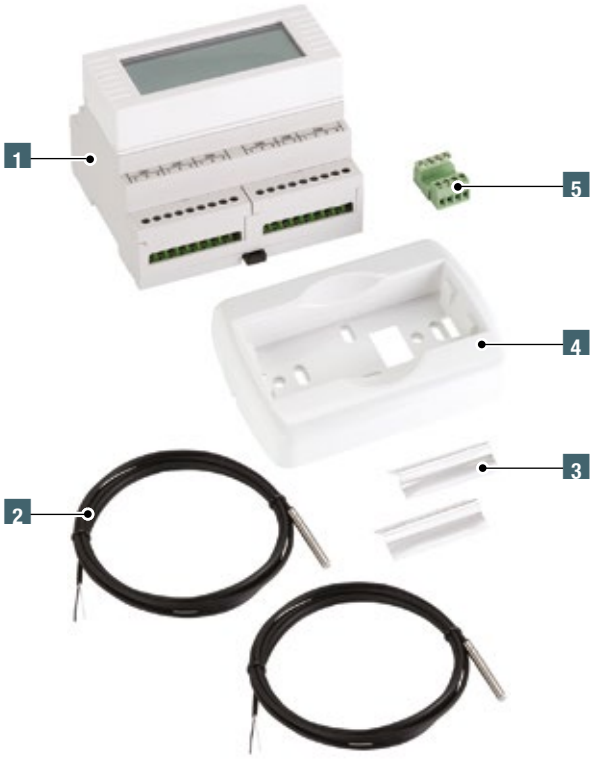
Electrical box with safety thermostat



Base unit 6T



RCE Climatic Regulator Kit



The Emmeti Climatic Regulator Kit for mixing units includes the following components:

1. n° 1 Emmeti Climatic Regulator (RCE)
2. n° 2 NTC temperature probes
3. n° 1 Probe holder kit
4. n° 1 Wall plate for display
5. n° 1 Male/female connector kit for display extension (connectors for circuits marked MSTB with 4 poles)

PCOC climatic thermoregulation system



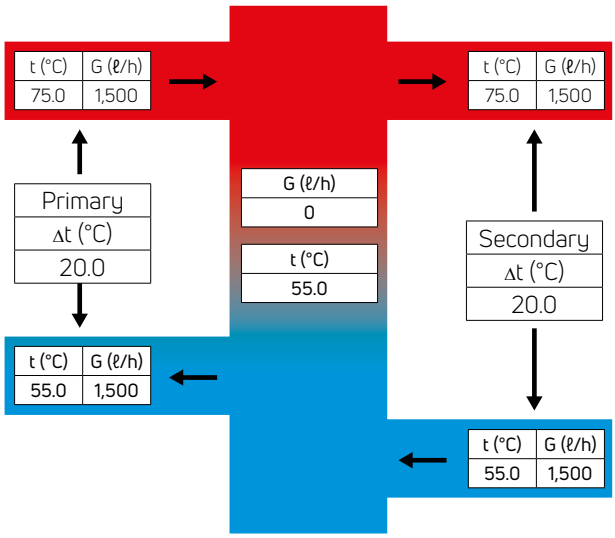
The system (suitable for operation in heating/cooling mode) consists of the following components:

1. PCOC regulator
2. Remote terminal
3. Temperature/humidity probes and temperature probes
4. Flow probe
5. External probe

Example of calculation of open manifold

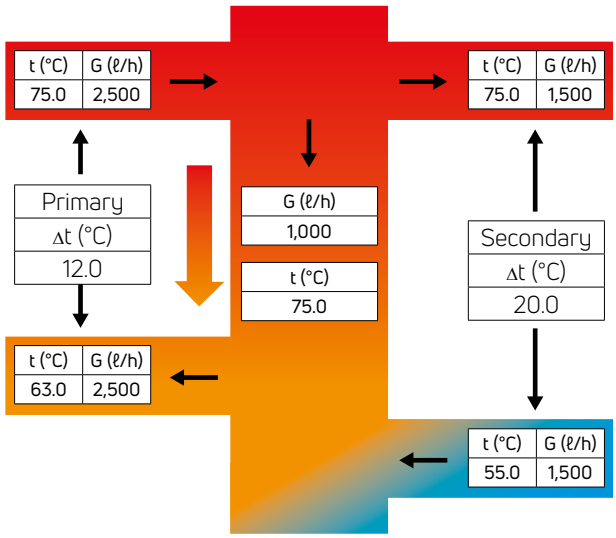
G1 = G2

Power of secondary/primary circuit (Kcal/h)	30,000
Flow rate of the secondary circuit (l/h)	1,500
Flow temperature of the primary circuit (°C)	75.0
Flow rate of the primary circuit (l/h)	1,500
Δt primary circuit (°C)	20.0
Return temperature of the primary circuit (°C)	55.0
Flow temperature of the secondary circuit (°C)	75.0
Return temperature of the secondary circuit (°C)	55.0
Δt secondary circuit (°C)	20.0
Flow rate through the open manifold (l/h)	0
Temperature in the open manifold (°C)	55.0



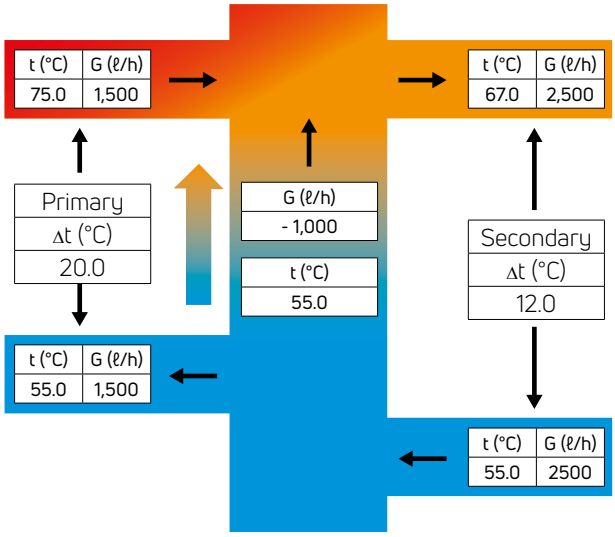
G1 > G2

Power of secondary/primary circuit (Kcal/h)	30,000
Secondary circuit flow rate (l/h)	1,500
Flow temperature of the primary circuit (°C)	75.0
Primary circuit flow rate (l/h)	2,500
Δt primary circuit (°C)	12.0
Return temperature of the primary circuit (°C)	63.0
Flow temperature of the secondary circuit (°C)	75.0
Return temperature of the secondary circuit (°C)	55.0
Δt secondary circuit (°C)	20.0
Flow rate through open manifold (l/h)	1,000
Temperature in the open manifold (°C)	75.0



G1 < G2

Power of secondary/primary circuit (Kcal/h)	30,000
Secondary circuit flow rate (l/h)	2,500
Flow temperature of the primary circuit (°C)	75.0
Primary circuit flow rate (l/h)	1,500
Δt primary circuit (°C)	20.0
Return temperature of the primary circuit (°C)	55.0
Flow temperature of the secondary circuit (°C)	67.0
Return temperature of the secondary circuit (°C)	55.0
Δt secondary circuit (°C)	12.0
Flow rate through open manifold (l/h)	- 1,000
Temperature in the open manifold (°C)	55.0



Application diagram

Example

System with wall-hung boiler, Modular Firstbox 1H+2L.

TA1 Chronothermostats of the rooms belonging to zone 1 (underfloor).

TA2 Chronothermostats of the rooms belonging to zone 2 (underfloor).

TA3 Chronothermostats of the rooms belonging to zone 3 (underfloor).

The thermostats and relative electrothermic heads are connected to the base units **6T**.

The base units 6T activate the circulators of the zone. The boiler ignition contact is activated by at least one of the dedicated contacts of the 6T base units.

