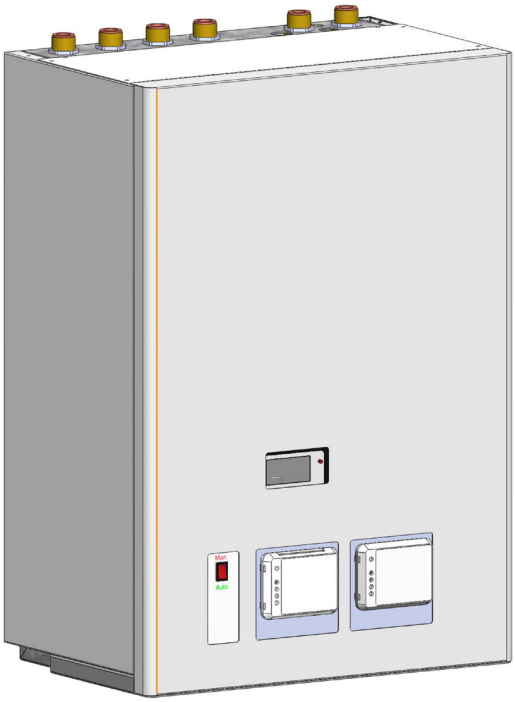

ModuSat TP Twin Plate Satellite Heating Unit

Installation, Commissioning and Servicing Instructions

Evinox Ltd T. +44 (0)1372 722277 E. technical@evinox.co.uk W. www.evinox.co.uk

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CONTENTS

1 GENERAL INFORMATION

The Evinox ModuSat TP Twin Plate is a wall mounting satellite heating system that has been designed to provide independent and instantaneous domestic hot water with electronic thermostatic control and high efficiency heating. The system suits a variety of applications such as:

- Small flats
- Communal housing developments
- Sheltered accommodation

The ModuSat TP is the complete solution for hot water and space heating in satellite heating systems where DHW is provided instantaneously. Heating is provided via a plate heat exchanger, which separates primary and apartment circuits, and circulation pump. The unit is suitable for radiator or underfloor heating with thermostatic or climatic control of the water supply temperature.

The heating circuit side consists of a plate heat exchanger, safety valve, manometer, thermometers, ball valves, drain valve, air valve, expansion vessel and circulation pump. The temperature of the heating is controlled by an electronic controller with an outdoor temperature sensor via the Bus. Depending on the application, different heat exchangers for central or underfloor heating can be used.

The domestic hot water is prepared in the heat exchanger and the temperature is regulated by means of a blending valve.The control of the DHW temperature ensures a fast production of hot water and maintains a constant supply temperature. A special reducer prevents lime scale formation.

All pipes are constructed from copper and both plate heat exchangers are made of stainless steel. The connections are made by nuts and gaskets. The ModuSat TP unit is fitted with a white steel casing for wall mounting.

The required flow rate is set into the ModuSat TP and the flow meter continually monitors it and adjusts the energy shut off valve by modulation to ensure the unit always has the required flow rate. This process makes the system self balancing and removes the requirement for any mechanical intervention. The flow rate can be read on the room unit and on the software remotely from site to see that the system is balanced. This enables us to provide a screen shot to show the system is balanced and this can be used for commissioning documentation.

The design of the ModuSat TP provides the end user with the same autonomy as if they had their own boiler. This includes a meter for billing of energy usage and cold water consumption for each apartment or house.

The ModuSat TP draws energy from the main heating primary circuit delivered from a centralised plant room. This is in line with latest legislation encouraging centralised plant rather than the use of individual heating and hot water systems.

The in-built energy meter can be tailored to meet the requirements of the building operator and residents, ranging from simple read-only meters, to a complete remote billing solution using BUS communication to provide the end user with a fully itemised energy bill.

1.1 Benefits

- Completely independent heating and hot water for each residence
- Simple to install due to factory assembled pipe work, internal wiring and integrated heat meter
- Integrates readily with renewable energy sources
- Reduced installation costs
- No flue or gas requirement in each apartment
- Read only meters or complete remote surveillance and billing solution

- Easy access for servicing
- Minimal maintenance requirements
- No additional room ventilation required
- Remote monitoring, alarms and diagnostics
- Can be controlled by homeowner sending SMS (text) message
- No annual gas appliance inspections required

1.2 Integrating renewable energy

We are all conscious of the effect that man is having on the planet and aware also of the spiralling cost of energy and the legislation covering this.
Over a third of all UK carbon emissions are generated in the home so any use of renewable energy or energy saving can have a large impact on our contribution to global warming.
The Evinox ModuSat TP satellite heating system can be integrated with renewable technology very effectively. The main plant can include a combination of renewable energy sources such as solar, ground source heat pumps or CHP, with top up boiler plant, to further improve energy savings.

1.3 ModuSat TP central plant

The use of a central boiler plant is more energy efficient than employing multiple boilers, in each individual dwelling, no matter how efficient they are.
Not only is the carbon footprint reduced but it also makes energy use much easier to measure with individual metering for each end user.
Evinox provide central plant which can include

- Gas, LPG or oil fired boilers
- Wood chip or pellet boilers
- Combined heat and power
- Ground source heat pumps
- Air source heat pumps
- Solar thermal

Importantly we offer a total system solution, which includes the centralised plant, with all elements of the system chosen to work together to create a totally integrated system that operates at optimum performance and efficiency. The client therefore has just one place to go for product support.

1.4 Regulation and monitoring system

Each ModuSat TP is provided with a regulation system that allows the user to set the desired room comfort, the DHW supply temperature and to read heating and water consumptions. The regulation system is suitable for both, radiators or floor heating, and has been developed to permit the remote consumption download and monitoring, alarms and diagnostic.

1.5 Warnings

Please read this manual carefully before installing, commissioning and using the ModuSat TP. This document must be kept with care by the user.
ModuSat TP is intrinsically safe for the end user because there is no combustion inside the unit, nor it employs any sort of gas. It also does not require a chimney connection.

The only connections required are to the electric power line for the control panel, pump and valves and to the primary hot/cold water supply coming from the central heating system.
A pre-installation rig is available to the installer, to help position and space the pipes to be connected to the unit.

Installation and start up maintenance and service must be carried out by a registered engineer according to the current governing regulations.
The non observance of the instructions and procedures concerning the verification of the system correct operation may cause injuries to people.
Therefore it's requested to the user to report any wrong operation or defect to authorised personnel.
Any work or alteration done on the system without EVINOX official authorisation invalidates the warranty and relieves the manufacturer from any liability.
The manufacturer has the right to make any change to the products without preventive notice.

CE Compliance

EVINOX declares that all ModuSat TP units comply with European Standards 73/23/CE and 93/68/CE for low voltage electric safety, it also declares that they meet the European Standards 89/336/CE for electromagnetic compatibility.

INSTRUCTIONS FOR PROPER DISPOSAL OF THE PRODUCT IN COMPLIANCE WITH THE EUROPEAN STANDARD 2002/96/CE

At the end of its useful life this product cannot be disposed together with urban waste.
It must be taken to authorised sites equipped to dispose such products.
The icon shown on the left indicates the obligation to follow the rules above.

1.6 Symbols

Below is a list of symbols used in this manual:

IMPORTANT NOTE REGARDING THE CORRECT DESIGN AND PRODUCT INSTALLATION

CAUTION !

IMPORTANT NOTE REGARDING PEOPLE SAFETY AND ENVIRONMENT CARE

CAUTION !

DANGER OF ELECTRIC SHOCK!

1.7 Safety Instructions

All installation and maintenance operations must be carried out by registered engineers according to the current governing regulations

In case of water leaks:

- Remove the electric power supply
- Close the main water supply valve
- Inform the authorised maintenance personnel

In case the pump is directly connected to an ambient thermostat, make sure that this is provided with an ON/OFF switch.

We recommend the unit to be checked at least once a year by authorised maintenance personnel. If the unit is on heavy duty, we recommend to have it checked more than once per year.

Disconnect the electric supply before starting any work on a ModuSat TP.

1.8 Legislation

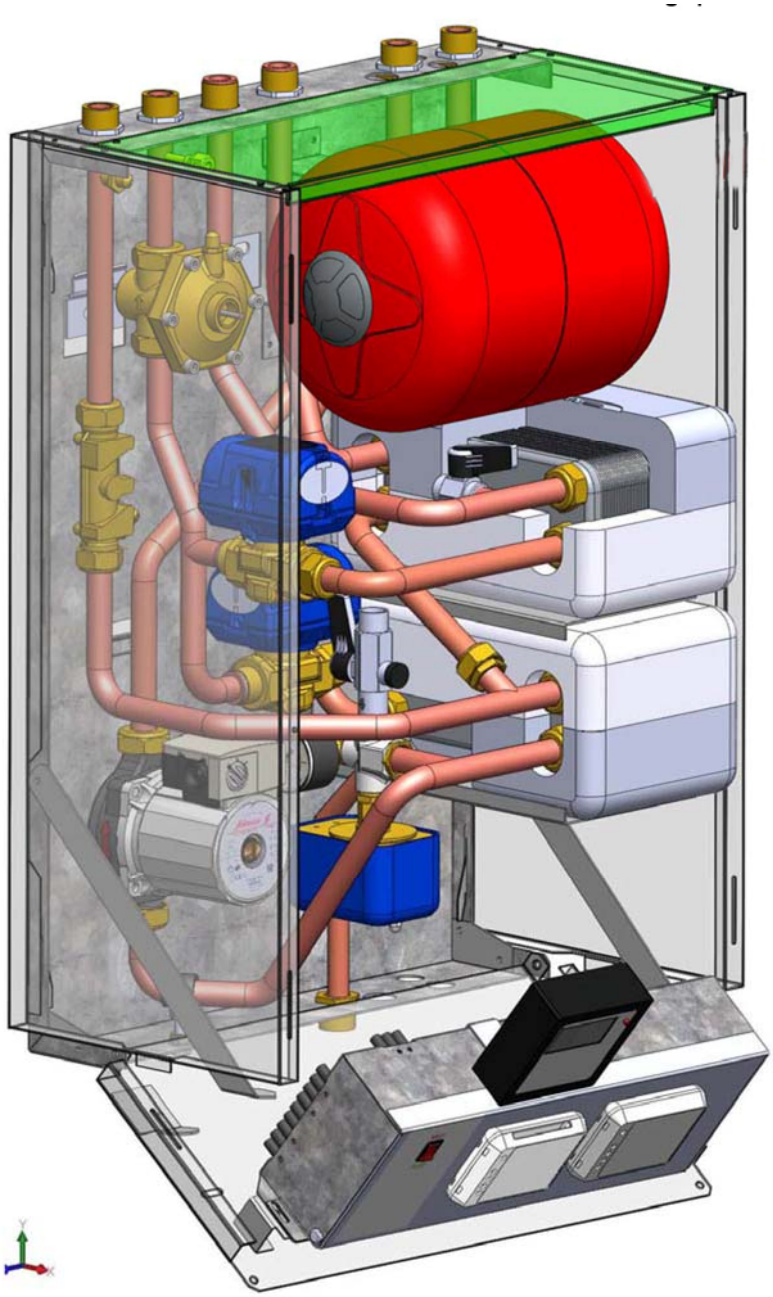
All ModuSat TP models intrinsically comply with the current legislation governing the use of these products including heat control and energy metering.

Each user has no obligations to maintain the units.

Of course the user is not allowed to tamper with metering devices, which are regularly checked by a supervisor/controller.

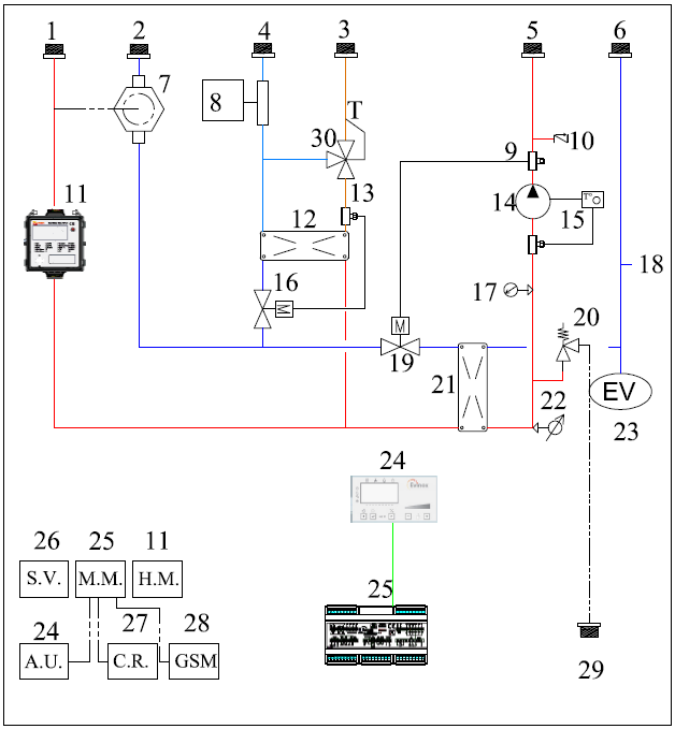
The building manager is in charge of all the user's books as well as that of the main system. Safety devices like expansion vessels, safety valves, etc. must be installed in the main boiler room as in any central heating system.

2 TECHNICAL FEATURES

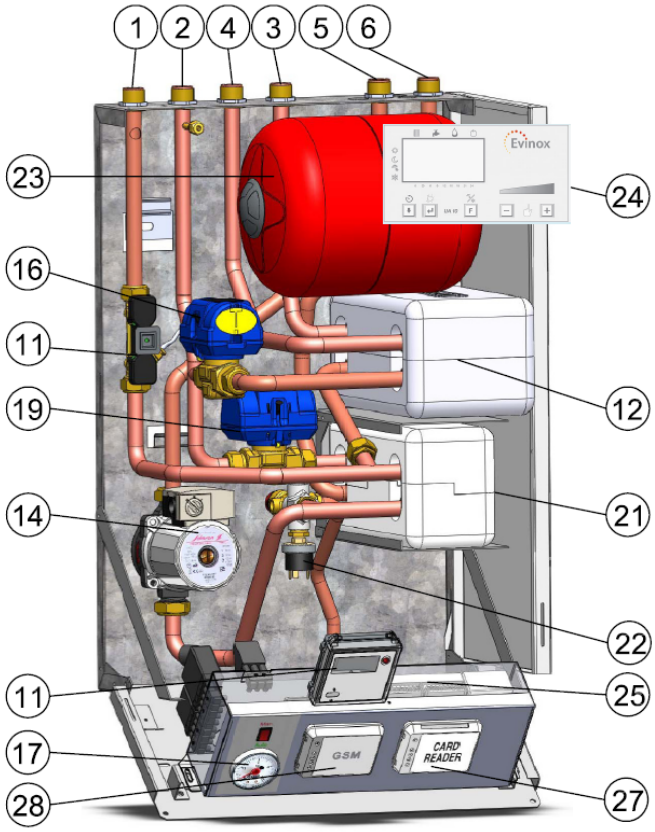


ModuSat TP is a terminal for district heating plants for heating and domestic hot water production by means of a plate heat exchanger. The primary hot fluid is provided by a central boiler that supplies all units through a main pump. A plate heat exchanger is placed between the primary and secondary heating circuits in order to separate them and allow an independent regulation in each apartment, thus simplifying the design and installation. A variable pump is used on each secondary circuit to ensure proper operation and water flow: the system allows to set the temperature gradient of the apartment circuit for a better comfort control together with electric energy saving. A blending valve controls the DHW output temperature. Both plate heat exchangers are provided with insulation jackets to minimize temperature losses. The ModuSat TP is provided with an electronic controller that can be either an ON-OFF type or a climatic type according to the model. A class 2 Ultrasonic MID heat meter with nominal flow **rate of 1.5 m3/h provides consumption measurement for both heating and domestic hot water. The unit can be fitted with an additional meter (external installation) for water consumption monitoring and h**as been developed to permit the remote consumption download and monitoring, alarms and diagnostic. Pipes are constructed from copper and both the plate heat exchanger from stainless steel. The ModuSat TP does not require any balancing device as the required flow rate is set into the ModuSat TP that modulates the shut-off valves to control the set primary water flow rate. However, as an option, the unit can be provided with a DPC. All hydraulic connections are ¾" male and are placed in different configurations.

2.1 Schematic principle



Note: different connection arrangements are available on request

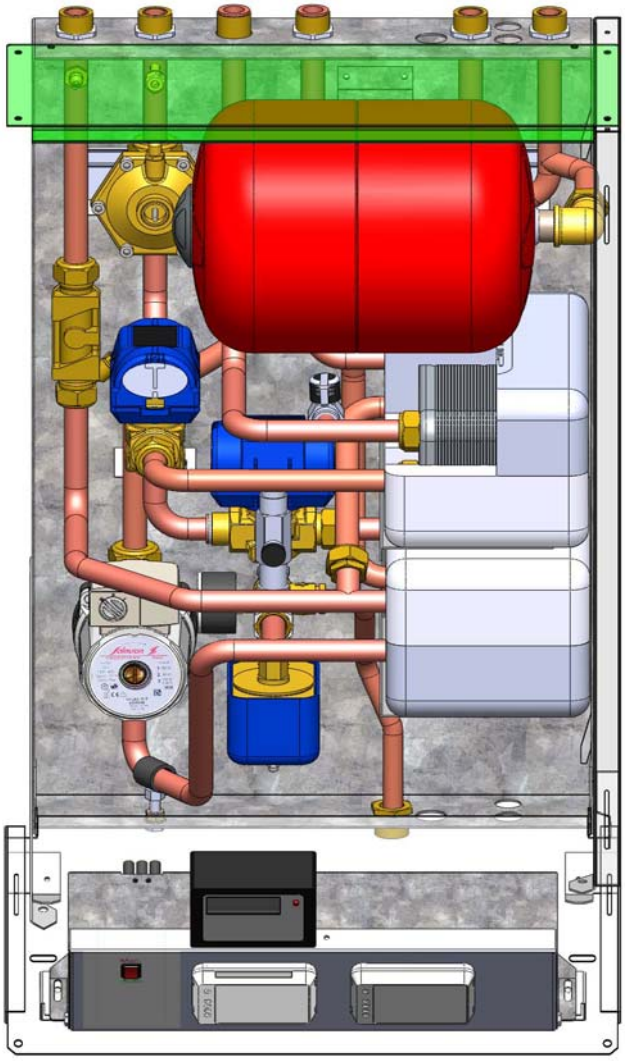


1 DH supply
2 DH return
3 DHW outlet
4 DCW inlet
5 HE supply
6 HE return
7 DPC (option)
8 Lime scale reducer (option)
9 Supply probe (S4)
10 Drain point
11 Heat meter
12 Plate heat exchanger DHW (Insulated)
13 DHW probe (S3)
14 Circulation pump
15 Safety thermostat (option)
16 DHW control valve
17 Pressure gauge
18 Return probe (S5)
19 HE control valve
20 Safety valve HE 3 Bar
21 Plate heat exchanger HE (Insulated)
22 Low pressure switch
23 Expansion vessel
24 Ambient unit or Thermostat
25 MM control unit
26 Supply voltage
27 Card Reader (option)
28 GSM (option)
29 Drain pipe
30 Blending valve

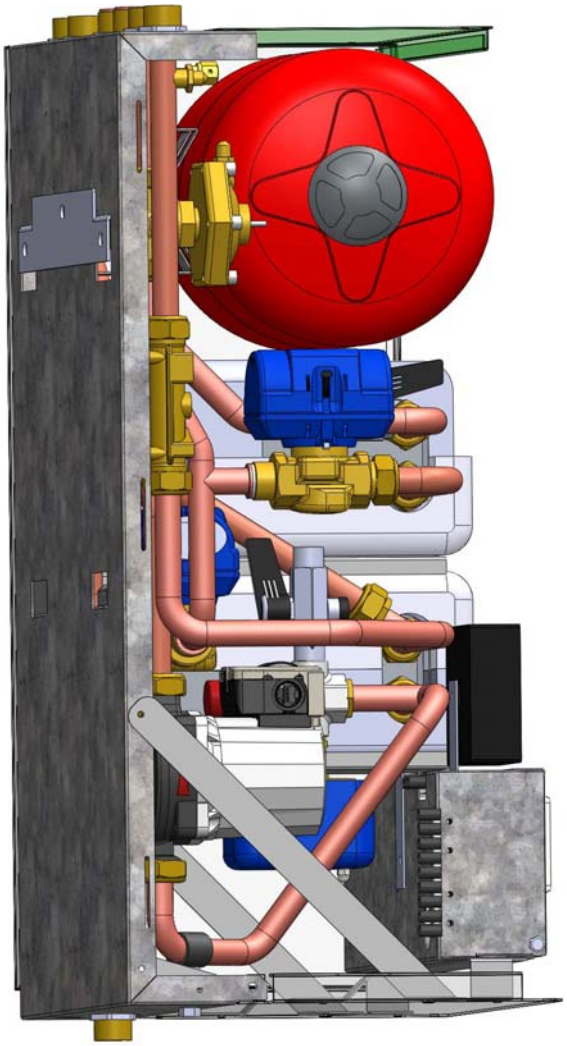
The cabinet is made of painted steel, white colour RAL 9010.

Dimensions: (hxlxd) 670x470x300 mm
Electric supply: 240 Vac, 50 Hz

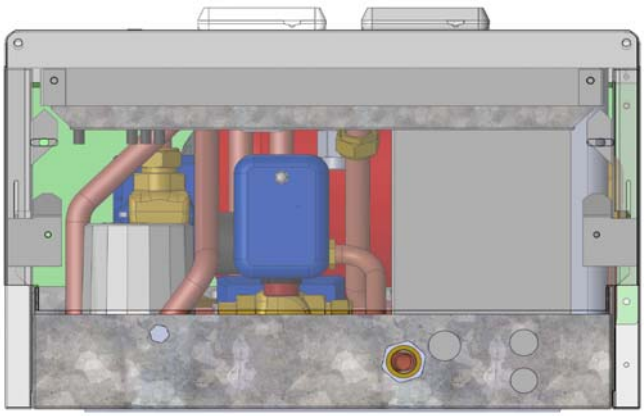
Front view



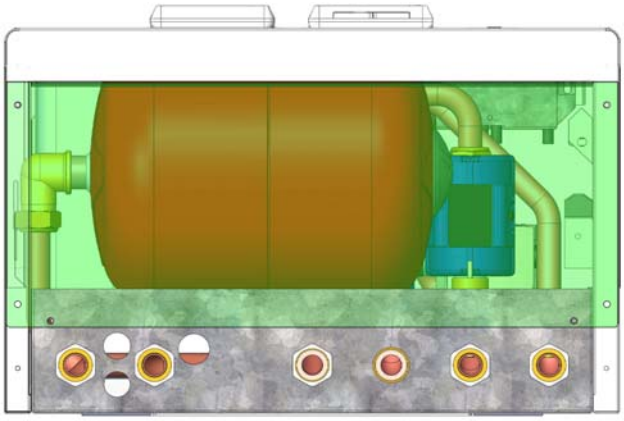
Side view



Bottom view



Top view



2.2 Connection configurations

Different connection versions are available; a few of them are shown here below. Other configurations are available on request.

Legend: PF primary flow, PR primary return, SF secondary flow, SR secondary return
DR drain, CW cold water, HW domestic hot water

TL1

T1	T2	T3	T4	T5	T6	T7
PF	PR	CW	HW		SF	SR
				DR		
B1	B2	B3	B4	B5	B6	B7

TL2

T1	T2	T3	T4	T5	T6	T7
PF	PR	CW			SF	SR
			HW	DR		
B1	B2	B3	B4	B5	B6	B7

TL3

T1	T2	T3	T4	T5	T6	T7
PF	PR		HW		SF	SR
		CW	DR			
B1	B2	B3	B4	B5	B6	B7

TL4

T1	T2	T3	T4	T5	T6	T7
PF	PR				SF	SR
		CW	HW	DR		
B1	B2	B3	B4	B5	B6	B7

TL5

T1	T2	T3	T4	T5	T6	T7
PF	PR	CW	HW			
			DR		SF	SR
B1	B2	B3	B4	B5	B6	B7

TL6

T1	T2	T3	T4	T5	T6	T7
PF	PR	CW				
			HW	DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

TL7

T1	T2	T3	T4	T5	T6	T7
PF	PR		HW			
		CW		DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

TL8

T1	T2	T3	T4	T5	T6	T7
PF	PR					
		CW	HW	DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

BL1

T1	T2	T3	T4	T5	T6	T7
		CW	HW			
PF	PR			DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

BL2

T1	T2	T3	T4	T5	T6	T7
		CW				
PF	PR		HW	DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

BL3

T1	T2	T3	T4	T5	T6	T7
			HW			
PF	PR	CW		DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

BL4

T1	T2	T3	T4	T5	T6	T7
PF	PR	CW	HW	DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

BL5

T1	T2	T3	T4	T5	T6	T7
		CW	HW		SF	SR
PF	PR			DR		
B1	B2	B3	B4	B5	B6	B7

BL6

T1	T2	T3	T4	T5	T6	T7
		CW			SF	SR
PF	PR		HW	DR		
B1	B2	B3	B4	B5	B6	B7

BL7

T1	T2	T3	T4	T5	T6	T7
			HW		SF	SR
PF	PR	CW		DR		
B1	B2	B3	B4	B5	B6	B7

BL8

T1	T2	T3	T4	T5	T6	T7
PF	PR					
		CW	HW	DR	SF	SR
B1	B2	B3	B4	B5	B6	B7

2.3 Technical features

Electrical

Electric supply	240 Vac
Frequency	50 Hz
Current absorption	0,6 A

Hydraulic connections

Primary circuit supply	¾" ext. thread
Primary circuit return	¾" ext. thread
Apartment circuit supply	¾" ext. thread
Apartment circuit return	¾" ext. thread
DHW supply	¾" ext. thread
DCW inlet	¾" ext. thread
Drain	¾" ext. thread

Hydraulic characteristics

Primary circuit max pressure	10 bar
Apartment circuit max pressure	3 bar
Apartment circuit min pressure	1 bar
DHW max static pressure	4 bar
DCW min static pressure	0,5 bar
Heating capacity	See section 2.7
DHW capacity	See section 2.6
Max DH supply temperature	90 °C
Min DH supply temperature	70 °C
Min DH flow rate	800 l/h
Heating circuit water capacity	2,5 l
Brazing material	copper

Weight and dimensions

Weight	~ 36 kg
Depth	300 mm
Length	470 mm
Height	670 mm

2.4 Part number

The part number identifies the unit model and the components fitted on board, for instance MTP40-10 means

- MTP: ModuSat Twin Plate
- 40: number of plates (and also nominal capacity) of DHW plate heat exchanger
- 10: number of plates of DHW (and also nominal capacity) heating heat exchanger

2.5 Components

Please find here listed the main components technical characteristics.

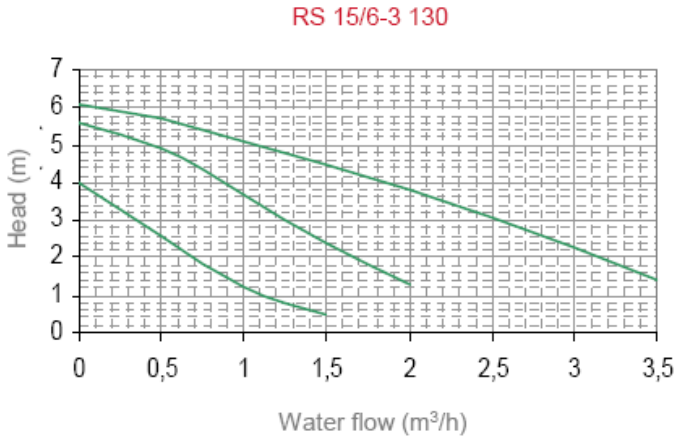
2.5.1 Expansion vessel

Max operating pressure: 4,5 bar

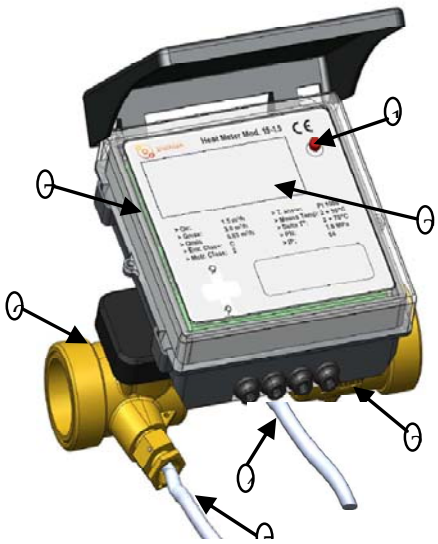
Working temperature:	-10 / +99 °C
Factory pre-charge:	1,5 +/- 20% bar
Nominal volume:	8 litres
Colour:	Red
Diameter:	205 mm
Height:	300 mm
Connection:	¾" M

2.5.2 Pump

Model:	NY:/63
n:	1850 1/min
P:	62 W
I:	0,30 A
Capacitor:	3,5 mF – 400 VDB



2.5.3 Heat meter



1. Display Button
2. Display
3. Wiring Holder
4. M-Bus Output Cable
5. Temperature Probe
6. Ultrasonic Transducer
7. Electronic Calculator Unit

- Metrological Class : 2
- Environmental Class : C
- Nominal flow rate Qn: 1,5 m³
- Maximum flow rate Qmax: 3,0 m³
- Minimum flow rate Qmin: 0,03 m³
- Water temperature range: 2 to 95 °C

- Temperature difference range: 3 / 70 °C (max accuracy)
- Temperature sensors: Pt1000, DIN/IEC751B
- Max. temperature deviation of pairing sensors: <0,01 °C
- Internal storage: EEPROM
- Display: LCD (8 digits + prompting character) word height 8,5 mm
- Communication mode: M-BUS or RS485
- Heat unit displayed: kWh
- Battery life: A 3,6 V lithium battery cell capable of working continuously for minimum 6 years
- Working temperature: +5 / +55 °C, Storage temperature: -30 / +60 °C
- Max working pressure 1,6 MPa
- Pressure loss at nominal flow rate: 60 mbar
- Protection class: IP65
- Weight: 0,58 kg
- The meter can be mounted vertically or horizontally
- Temperature sensor cable length: 1,5 m (one sensor fitted on flowrate transducer)
- Dimensions (LxHxW): 110x86x120 mm
- Connections: 3/4" male

2.5.4 Control valves

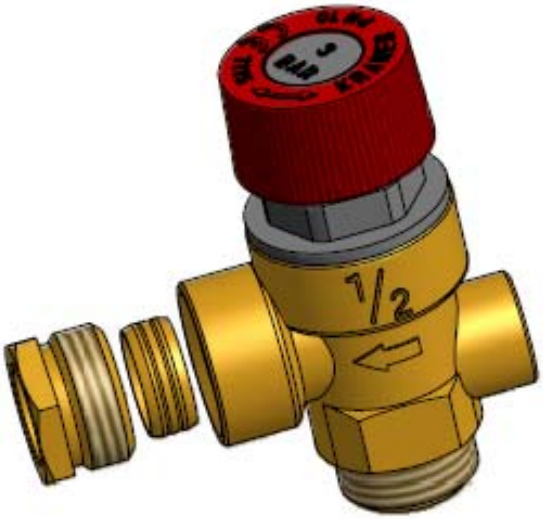
VMR valves are motorized valves used in home applications and small installations to control the flow of hot and cold water. The 2 ports are designed for proportional control of domestic systems. The valve, thanks to its cylindrical shut-off, shunts flow which is independent from the differential pressure between ports. This shut-off can have two operating positions depending on how the electric motor that moves it is powered. The head of the valve can be removed without draining up the plumbing system: this makes valve maintenance quick and flexible. Without the head the valve is normally closed. Valves have an external lever for manually positioning the shut-off in its central position.

2.5.5 Plate heat exchangers

Due to their peculiar manufacturing ZB series brazed heat exchangers are particularly suitable for heating and DHW production.

Model:	ZB 207
Material:	Stainless steel
Brazing:	Copper
Dimensions:	207x77 mm
Socket distance:	172/42 mm
N. of plates:	10-40 heating 30-50 DHW
Connections:	½" + ¾" Inox

2.5.6 HE safety valve

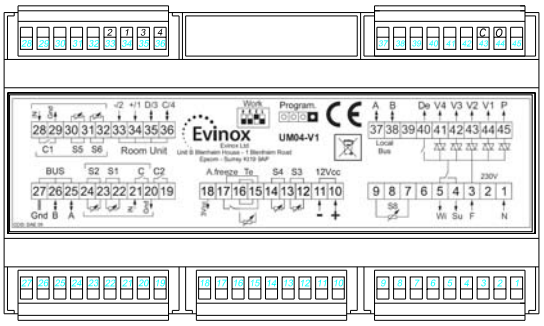


Diaphragm safety valve with male inlet and female outlet connections. Fitted with ¼" pressure gauge connection.
Set pressure: 3 bar
Size ½"
EC PED compliant
Design temperature: 0-110 °C
Overpressure: 10%
Resetting pressure: 20% (min 0,6 bar)

2.5.7 Pressure switch

Electric: 10A/250Vac
Pressure range: 0,5-1,5 bar
Connection: ¼"

2.5.8 Electronic control

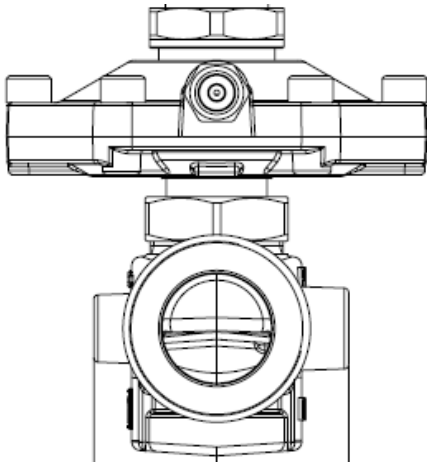


This is a custom designed electronic controller for heat/cooling management units. It includes all the measurement and control circuits to drive pumps, valves and other devices used in such applications. It has also three communication channels to connect it to slave devices as well as to a main communication bus used to collect data from the modules.
Relay outputs: 2 (2Amax at 230Vac)
Triac outputs: 5 (3Amax at 230Vac)
Analog Outputs: 1 – 0 -10Vdc, 1 – 3Vdc (20mA)
On/Off inputs: 2 (clean contact)
Sensor inputs: 4 Pt1000, 3 NTC (range 0 -100°C)
Communication channels: 1 RS485 (isolated),
1 RS485 non (isolated), 1 local bus
Power supply: 12 - 18Vdc
Max current: 250mA
Operating temperature: 5 - 60°C

2.5.9 Lime scale reducer

Lime scale has long been a major source of trouble for domestic water supply pipes and appliances that use hot water like washing, machines, dish washers, steam operated irons, kettles and so on. Many years of research worldwide has produced evidence that lime scale build-up can effectively be reduced by applying electromagnetic fields around the pipe. SCALE-OFF III is a water conditioning unit based on the latest technology that employs high frequency modulated pulses. It is designed to be used on the feed of appliances that require scale protection such as electric showers, all kind of boilers and other water heaters. The high frequency signals are injected into the pipe by means of two wires, often called antennas that are winded around the pipe. A 32 bit microprocessor generates a suitable pattern of high frequency pulses that 'IONIZE' the hardness salt particles passing through the pipe. This prevents them to stick to the pipe internal walls. Although the hardness salts are not removed, it prevents hard scale build up.
Power supply/Power: 230Vac/3W
Power cable length: 1.5m
Operating temperature: 5 - 70°C
Humidity: Waterproof
Size: 104mm x 104mm x 58mm
Operating frequency: 1 – 10kHz
Output voltage: 18V (pulses)
Arial length: 2m each (two pieces)
Flow-rate: the greater the flow, the more effective the system is

2.5.10 DP Controller



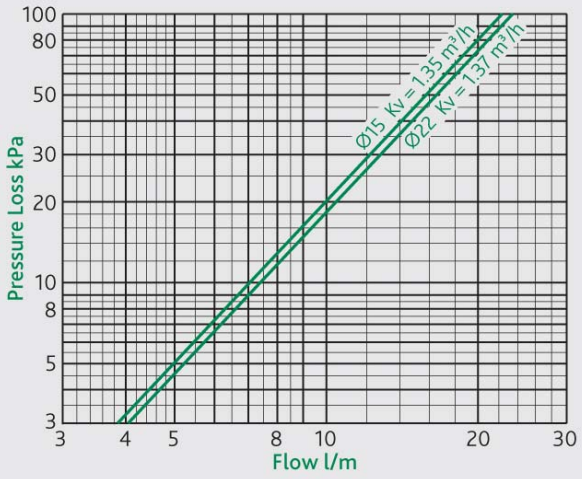
The DP controller, as an option, can be fitted on the return pipe.
It has a linear characteristic and works without external energy. The setting of the DP controller is fixed at 23 kPa.

2.5.11 Blending Valve

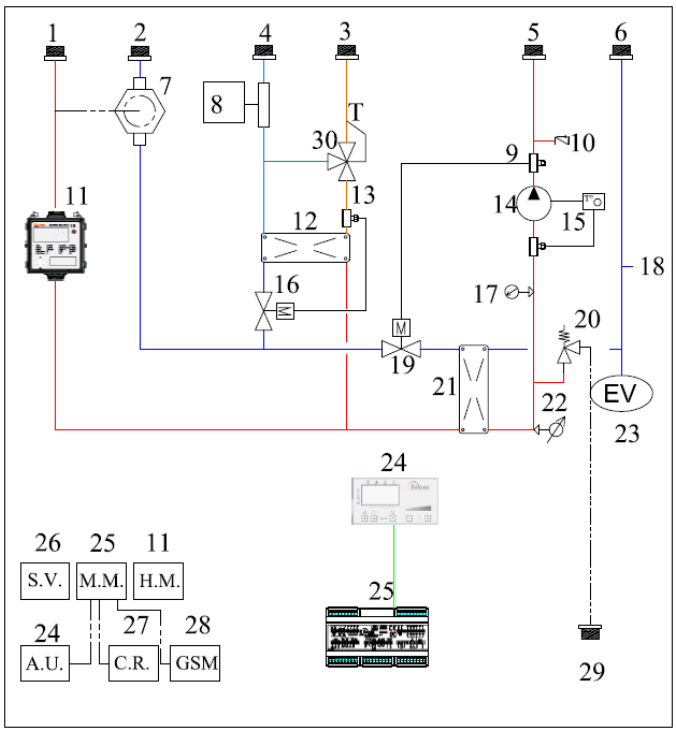
Technical Data

Max. working pressure:		10 bar - Static
Min. working temperature		0.2 Bar : Dynamic
Max. inlet temperature:		85˚C
Inlet temperature range	- hot supply:	52 - 65°C
	- cold supply:	0.5 - 20°C
D08 working pressure	- low pressure:	0.2 - 1.0
	- high pressure:	1.0 - 5.0
Max. inlet pressure ratio (H/C or C/H):		5:1
Accuracy:		±2˚C
Setting Range:		30 to 50˚C
Min. temperature difference between inlet hot water and outlet mixed water:		10˚C
Min. flow for stable operation		4 l/m

Kv Value & Flowrate



2.6 Control specification



All Evinox satellites are equipped with a regulation system for heating and DHW production control. The regulation strategy foresees different applications: radiators, fancoils, underfloor heating, and can be configured to meet the needs of different applications.

2.6.1 Heating

When the room temperature Ta drops below the set point Ts and no dhw demand occurs:

- Valve (16) OFF
- Pump (14) ON – Valve (19) OFF for 90 sec
- Calculation of water supply temperature Tmc (climatic control)
- Valve (19) ON to regulate S4 according to Tmc
- Control of primary flow lower than max allowed rate (Qmax)
- Pump control to keep the set value S4-S5 (priority con S4 control)
- Pump (14) + Valve (19) OFF when Ta>Ts+DTs (DTs = 0,5 – 1,5 °C)
- Pump (14) + Valve (19) OFF when S4>Tmmax (UFH = 45 – 55 °C)

2.6.2 DHW production

When S3 drops more than 0,2 °C/sec:

- Pump (14) – Valve (19) OFF
- Valve (16) ON
- Control of primary flow lower than max allowed rate (Qmax)
- Valve (16) OFF when S1-S2< 1 °C for more than 60 sec

2.6.3 Keep warm facility

When S3 drops below a set value (30-40 °C):

- Pump (14) – Valve (19) OFF
- Valve (16) ON
- Valve (16) OFF when S3>Tmacs+DTs (DTs = 3 – 7 °C) for more than 60 sec

2.6.4 Primary flow rate balancing

It is possible to set a max allowed value for the primary water flow (Qmax). The system activates the valves (16 or 19) to keep the actual flow rate Q lower than Qmax. This function is not available during the keep warm facility.

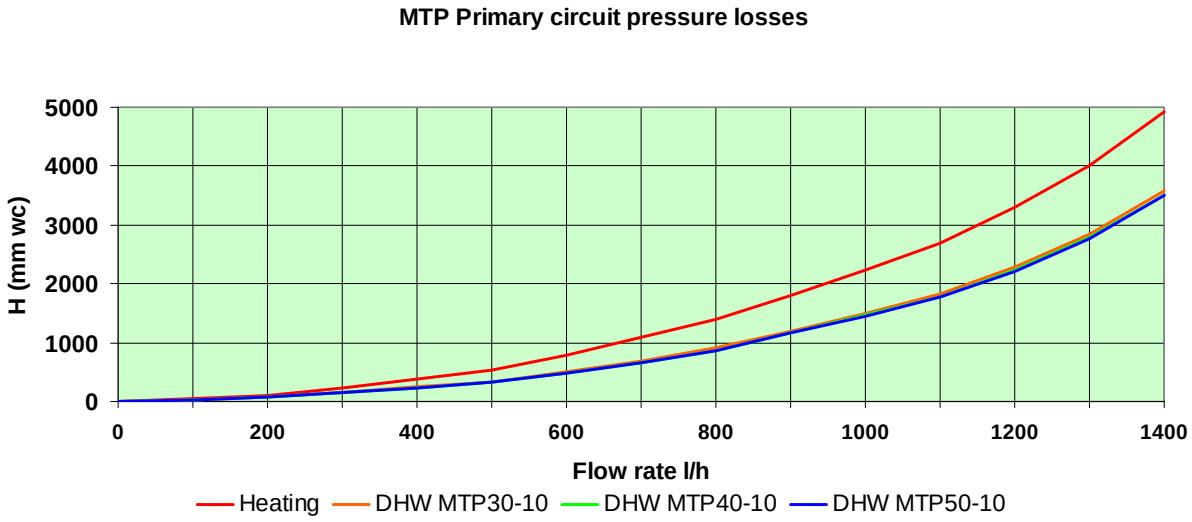
2.6.5 Safety control

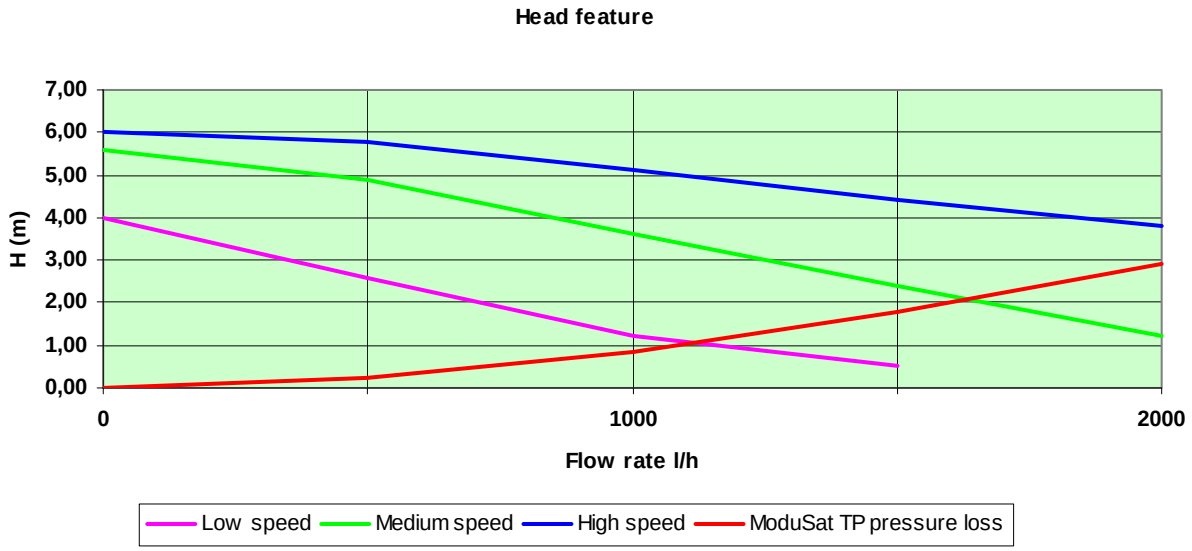
In case of pressure switch ON:

- Step 1 (pressure between 0,5 and 0,7 bar): Alarm on the room module display
- Step 2 (pressure lower than 0,5 bar): Heating and DHW production OFF
- Alarm sent to the Master

2.7 Pressure loss and head

The following diagrams show the primary circuit pressure loss according to the ModuSat TP equipping and the pressure head available to the apartment circuit.



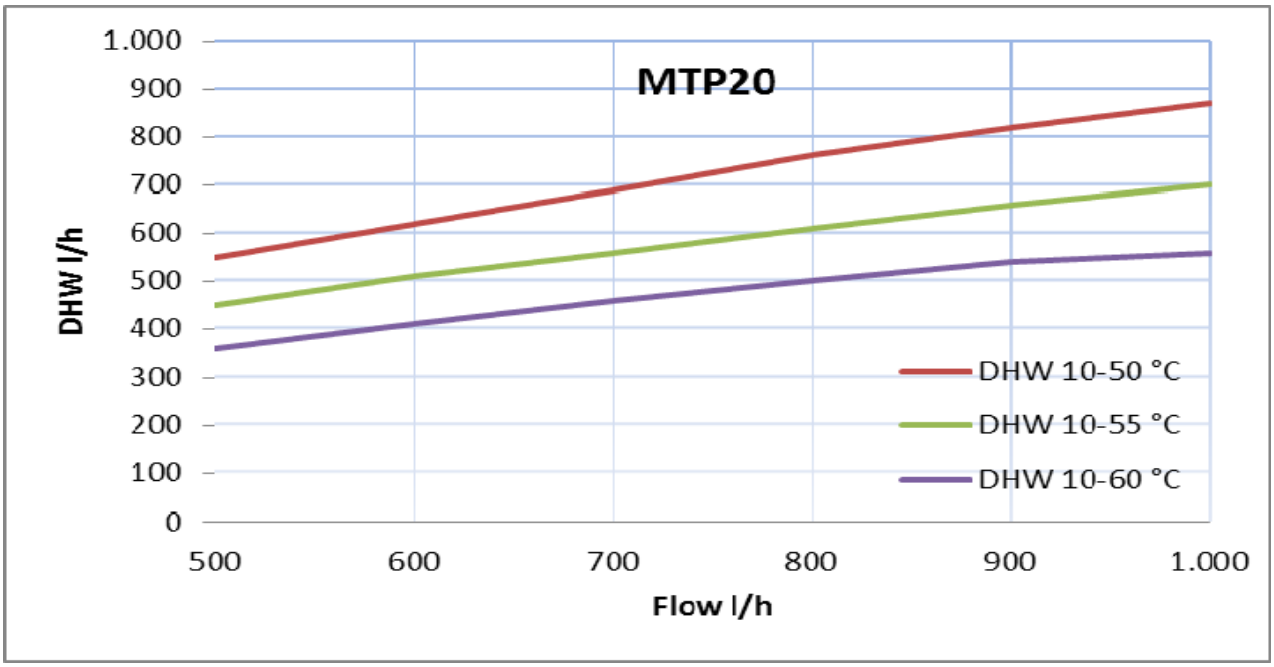


The head available for the apartment circuit is given by the difference between the pump head and the ModuSat pressure loss.

2.8 DHW capacity

The following diagrams show the DHW performances. The correction factors allow to estimate the performances with different working conditions.

2.8.1 MTP20-XX



Correction factors for flow temperature

	Flow °C			
DHW	**70**	**75**	**80**	**85**
10-50 °C	0,74	0,87	1,00	1,23
10-55 °C	0,70	0,85	1,00	1,21
10-60 °C	0,63	0,83	1,00	1,18

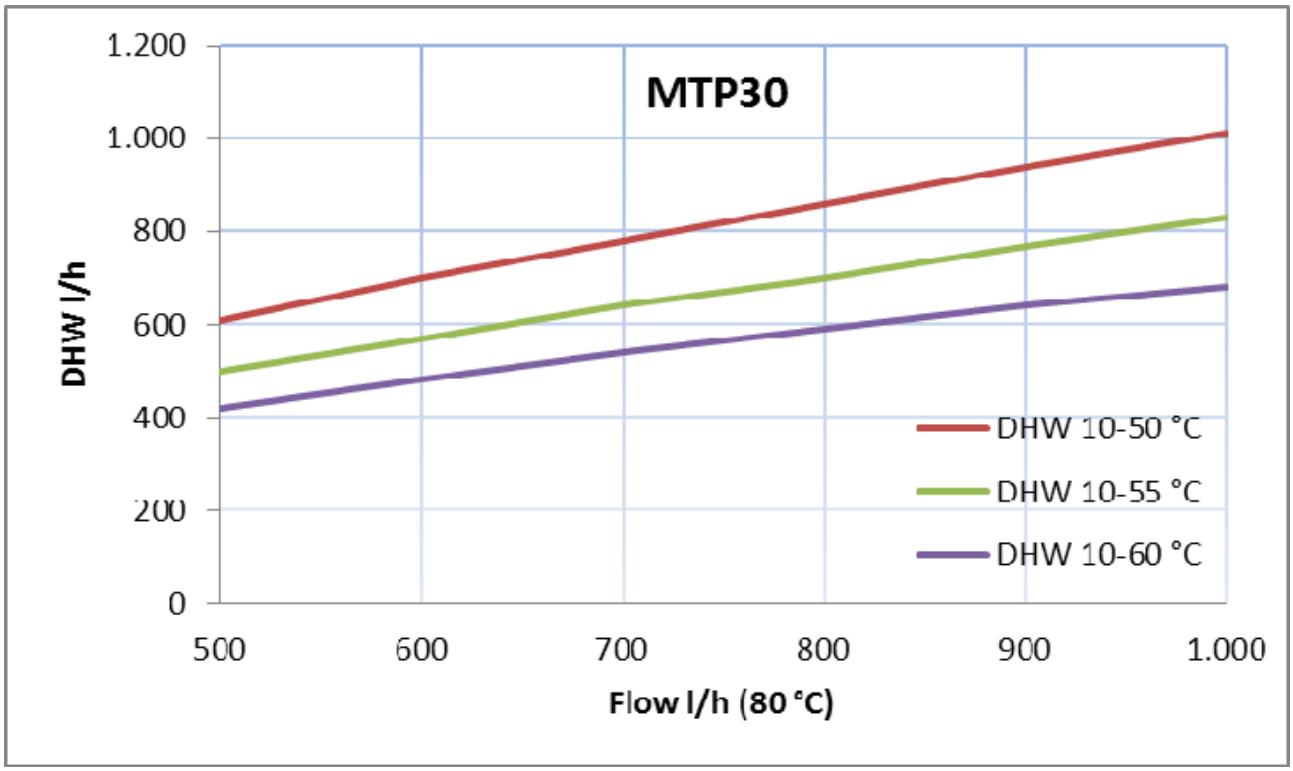
Correction factors for cold water temperature

	DHW °C		
CWT °C	**50**	**55**	**60**
10	1,00	1,00	1,00
11	1,01	1,01	1,01
12	1,02	1,02	1,01
13	1,04	1,03	1,03
14	1,07	1,06	1,05
15	1,10	1,09	1,07

Example: DHW 12-55 °C
Flow 75 °C
Actual DHW 15-55 = (DHW 10-55) x 0,85 x 1,09

Power = DHW/3600*DT*4,187 = kW
Return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.8.2 MTP30-XX



Correction factors for flow temperature

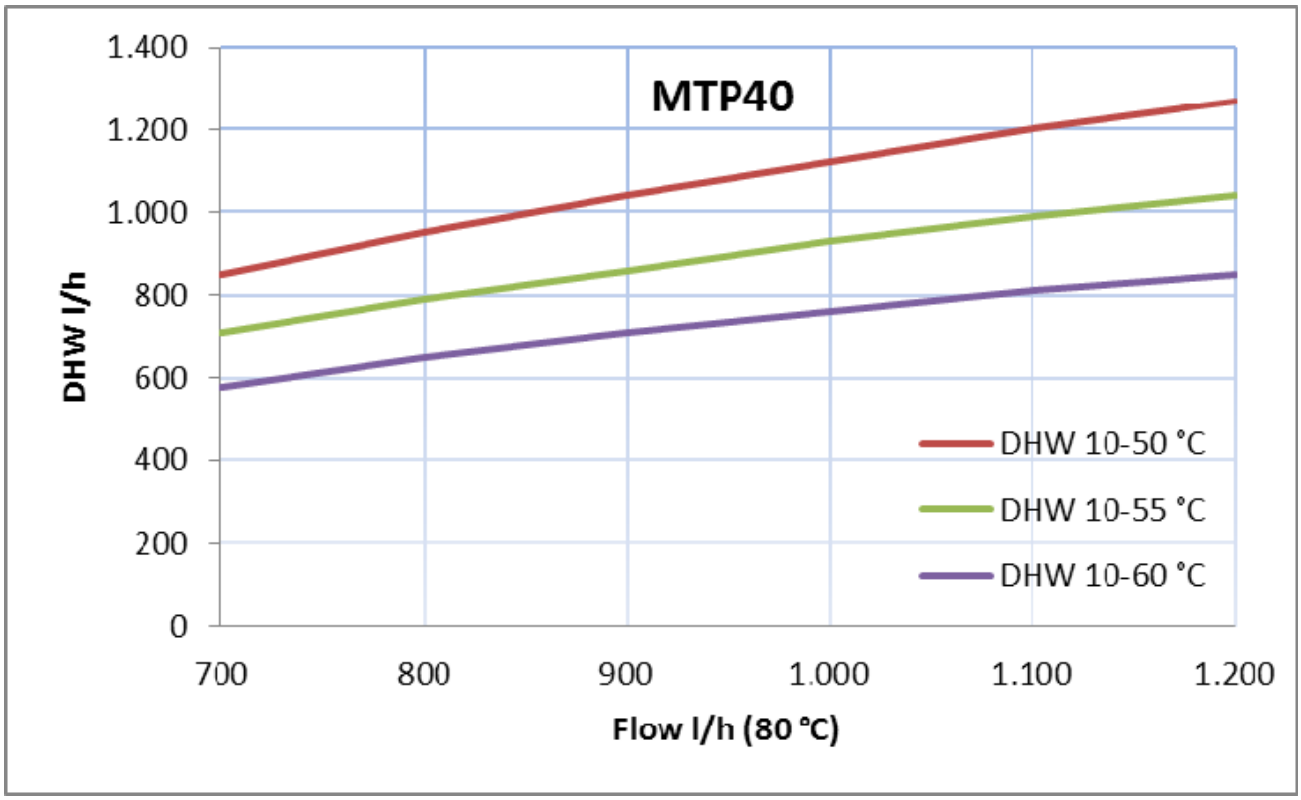
	Flow °C			
DHW	**70**	**75**	**80**	**85**
10-50 °C	0,76	0,88	1,00	1,19
10-55 °C	0,73	0,88	1,00	1,17
10-60 °C	0,66	0,85	1,00	1,15

Correction factors for cold water temperature

	DHW °C		
CWT °C	**50**	**55**	**60**
10	1,00	1,00	1,00
11	1,01	1,01	1,01
12	1,03	1,03	1,02
13	1,06	1,05	1,03
14	1,09	1,08	1,05
15	1,12	1,11	1,07

Example: DHW 15-55 °C
Flow 75 °C
Actual DHW 15-55 = (DHW 10-55) x 0,88 x 1,11
Power = DHW/3600*DT*4,187 = kW
Return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.8.3 MTP40-XX



Correction factors for flow temperature

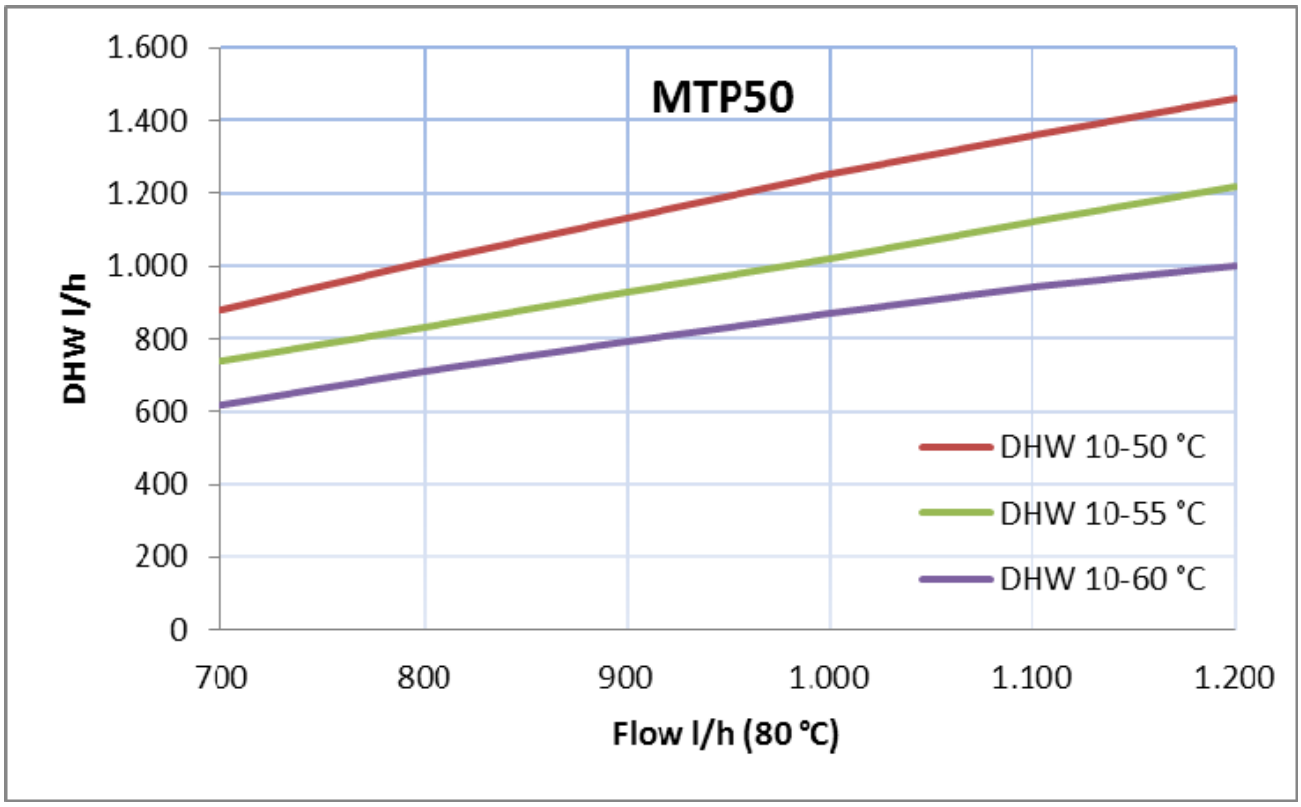
	Flow °C			
DHW	**70**	**75**	**80**	**85**
10-50 °C	0,75	0,87	1,00	1,14
10-55 °C	0,71	0,85	1,00	1,13
10-60 °C	0,66	0,83	1,00	1,12

Correction factors for cold water temperature

	DHW °C		
CWT °C	**50**	**55**	**60**
10	1,00	1,00	1,00
11	1,01	1,01	1,01
12	1,02	1,02	1,01
13	1,05	1,03	1,03
14	1,07	1,05	1,05
15	1,10	1,08	1,06

Example: DHW 15-55 °C
Flow 75 °C
Actual DHW 15-55 = (DHW 10-55) x 0,85 x 1,08
Power = DHW/3600*DT*4,187 = kW
Return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.8.4 MTP40-XX



Correction factors for flow temperature

	Flow °C			
DHW	**70**	**75**	**80**	**85**
10-50 °C	0,74	0,91	1,00	1,12
10-55 °C	0,72	0,88	1,00	1,12
10-60 °C	0,70	0,85	1,00	1,11

Correction factors for cold water temperature

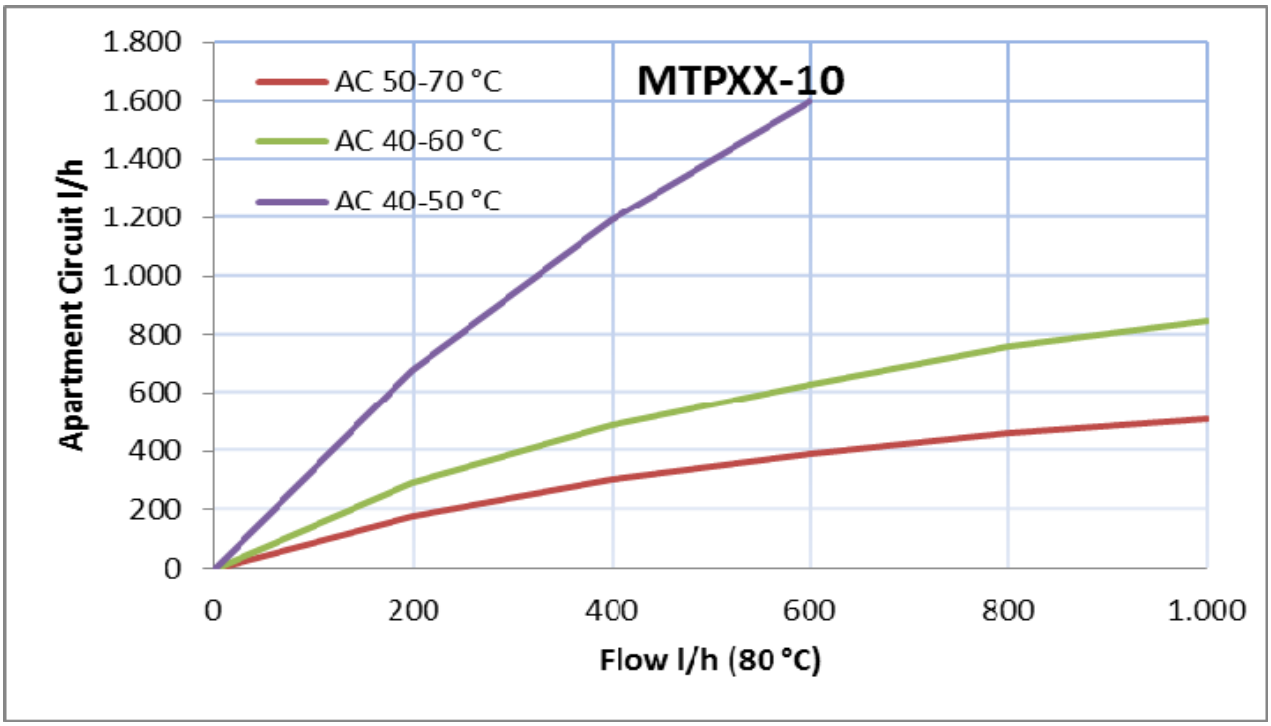
	DHW °C		
CWT °C	**50**	**55**	**60**
10	1,00	1,00	1,00
11	1,01	1,01	1,01
12	1,02	1,02	1,01
13	1,03	1,03	1,03
14	1,06	1,06	1,05
15	1,09	1,09	1,07

Example: DHW 15-55 °C
Flow 75 °C
Actual DHW 15-55 = (DHW 10-55) x 0,88 x 1,09
Power = DHW/3600*DT*4,187 = kW
Return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.9 Heating capacity

The following diagrams show the heating performances. The correction factors allow to estimate the performances with different working conditions.

2.9.1 MTPXX-10



Correction factors for flow temperature

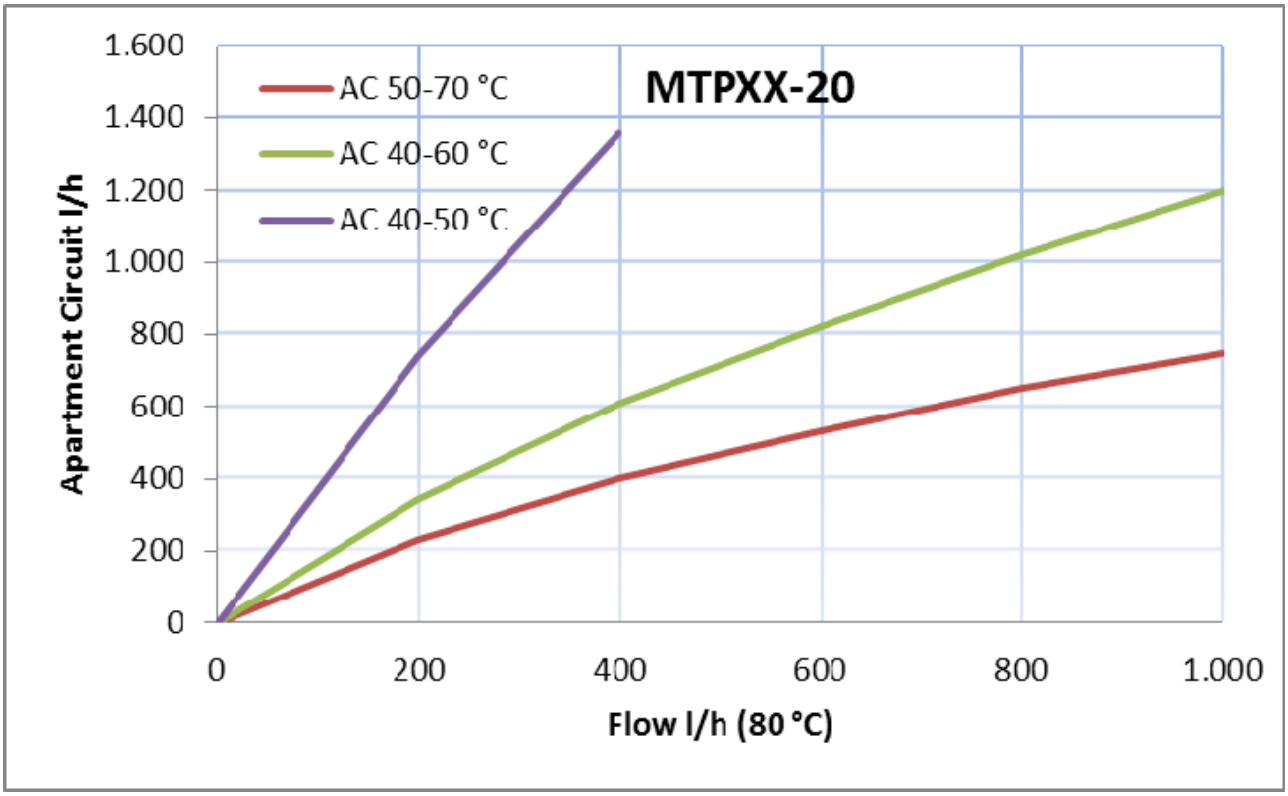
	Flow °C			
AC	**70**	**75**	**80**	**85**
50-70 °C	xx	0,64	1,00	1,33
40-60 °C	0,58	0,77	1,00	1,20
40-50 °C	0,69	0,83	1,00	1,15

Correction factors secondary return temperature

	AC supply °C		
Ret. T °C	**50**	**60**	**70**
30	0,54	0,71	0,61
35	0,69	0,84	0,65
40	1,00	1,00	0,74
45	xx	1,27	0,85
50	xx	1,79	1,00
55	xx	xx	1,23

Example: Apartment Circuit 45-60 °C
Flow 75 °C
Actual AC 45-60 = (AC 40-60) x 0,77 x 1,27
Power = AC/3600*DT*4,187 = kW
Primary return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.9.2 MTPXX-20



Correction factors for flow temperature

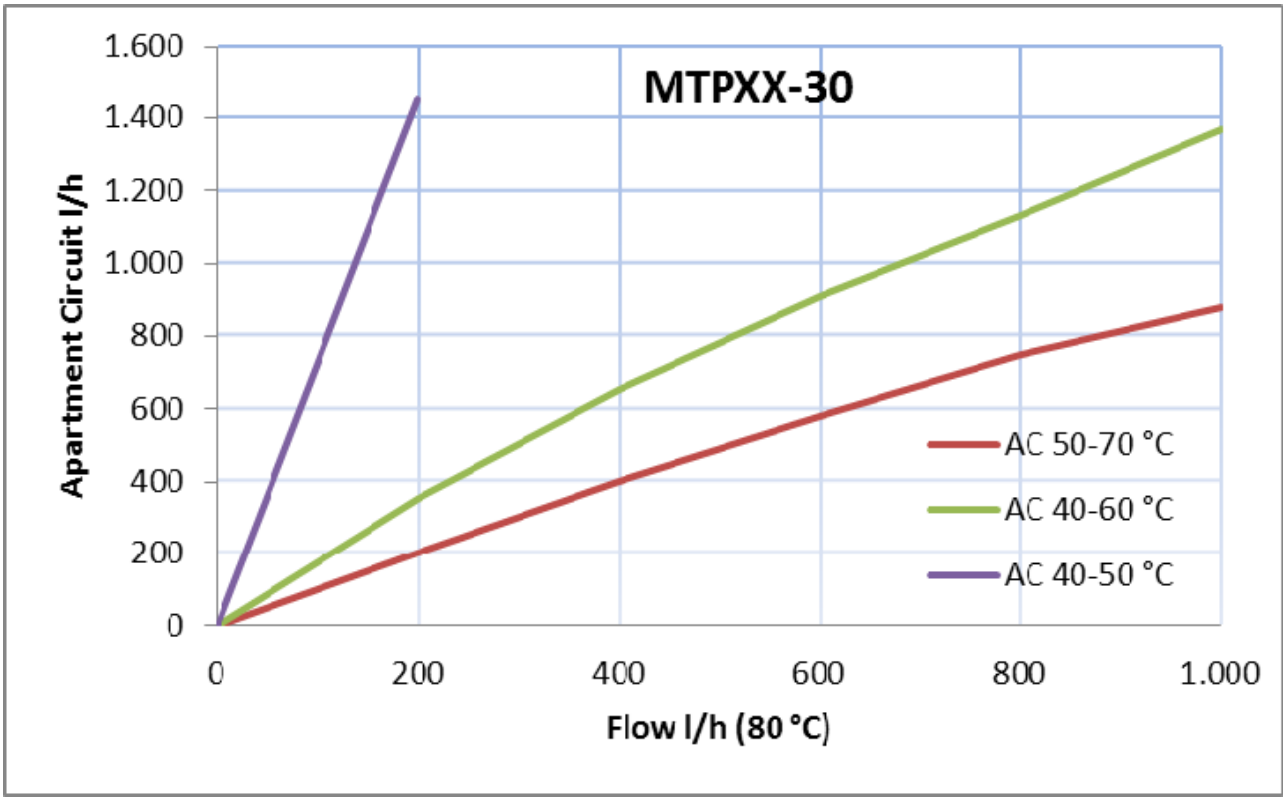
	Flow °C			
AC	**70**	**75**	**80**	**85**
50-70 °C	xx	0,66	1,00	1,32
40-60 °C	0,62	0,81	1,00	1,18
40-50 °C	0,73	0,88	1,00	1,16

Correction factors secondary return temperature

	AC supply °C		
Ret. T °C	**50**	**60**	**70**
30	0,56	0,75	0,66
35	0,72	0,85	0,70
40	1,00	1,00	0,77
45	xx	1,27	0,87
50	xx	1,71	1,00
55	xx	xx	1,23

Example: Apartment Circuit 45-60 °C
Flow 75 °C
Actual AC 45-60 = (AC 40-60) x 0,81 x 1,27
Power = AC/3600*DT*4,187 = kW
Primary return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.9.3 MTPXX-30



Correction factors for flow temperature

	Flow °C			
AC	**70**	**75**	**80**	**85**
50-70 °C	xx	0,70	1,00	1,34
40-60 °C	0,65	0,83	1,00	1,17
40-50 °C	0,75	0,90	1,00	1,15

Correction factors secondary return temperature

	AC supply °C		
Ret. T °C	**50**	**60**	**70**
30	0,31	0,77	0,69
35	0,40	0,87	0,74
40	1,00	1,00	0,82
45	xx	1,24	0,91
50	xx	1,69	1,00
55	xx	xx	1,25

Example: Apartment Circuit 45-60 °C
Flow 75 °C
Actual AC 45-60 = (AC 40-60) x 0,83 x 1,24
Power = AC/3600*DT*4,187 = kW
Primary return temperature = Flow T - (Powerx3600)/(Flowx4,187)

2.10 Problems and solutions

Problems only occur with ModuSat TP installations if our instructions are not adhered to. Poor insulation can result in various problems so it is imperative that the insulation standards of BS.3958 and BS.5422 are followed at all times.

Insulation of the primary circuit

Noted errors	Effects	Solutions
Primary riser and connecting pipes to the ModuSat TP not well insulated	Overheating of common areas Overheating of flat/apartment	Follow recommendation to insulate below
Primary and cold water distribution not well insulated	Cold water reaches 20 °C and more	Separate cold water pipes Insulate according to current regulations
Primary riser and connecting pipes to the ModuSat TP not well insulated	Lack of hot water Lack of heating	Carry out correct balancing

The primary distribution circuits, which supply the ModuSat TP, may be maintained at a temperature of 70°C for the summer period and at 80°C for the winter period. The total output of the installation of the system will be dependent on the quality of the insulation of the primary circuit. It will be necessary to take care to choose an insulation material of good quality and to ensure a good installation of the chosen material. Pipe rings/supports will be selected with an integral insulation, which will limit the thermal conduction towards the fabric of the building. Particular care will have to be taken to the insulation of the branch connections and changes of direction. In the same way as the rising mains the horizontal distribution network to the ModuSat TP units will be insulated perfectly up to the satellite. The length of the horizontal distribution pipework should be limited to the minimum while placing the rising mains as near as possible to the satellites.

Insulation thickness within service voids and risers

NOTE: A minimum of 20mm thickness insulation should be applied to all pipework within the ModuSat TP cupboard.

Primary pipework concealed in the fabric of the building

This solution should not be used in a new building as it can cause serious overheating problems of the building if detailed attention is not given to this type of installation practice. Evinox will not be held responsible for problems generated by bad design or bad installation practice.

Pipe Size	Min wall thickness
15 to 35	25 mm
35 to 60	35 mm
60 to 100	50 mm

Recommendations:

- Use good installation practice by using pitcher tees and swept bends instead of square tees and elbows
- Use high quality pipe insulation installed by a thermal insulation contractor
- Obligatory use of the optional 230V energy cut off valve when the heating and hot water are satisfied (Not applicable to solar and CHP systems)
- Use insulated pipe rigs to prevent thermal transfer of heat into the fabric of the building

2.11 Sizing of the primary circuit

The primary circuit will be sized in order to satisfy the flow necessary to each ModuSat TP installed in each apartment. The total flow D supplied by the circulating pumps of the boiler room being the sum of the individual flows of each ModuSat TP, is:

$$D = \sum_{1}^{n} dn$$

The sizing of the piped circuit constituting the primary circuit could be carried out in order to obtain a self-balancing of the installation. The diameter of the rising main primaries will be selected so that the pressure loss is weak compared to each apartment branch pipework. The reduction in diameter between each branch connection will be limited or even better non-existent. The use of a speed lower than 1 m/s, for example 0,5 m/s will be optimal.

This way, the apartments closest to the boiler room will not require a very reduced setting of the balancing valves. A diameter of 22 mm will be optimal for branches towards each apartment. The pressure loss of each satellite branch is defined by the loss through energy meter, the dirt separator, the 2-way valve, the pipework and the pressure loss of the PHE in the ModuSat TP. The total pressure loss is 1,5 m at 1000 litres per hour.

In order to guarantee the hydraulic independence of the boilers and of the installation, a mixing header is installed between the boilers and the primary distribution system. Use either Evinox headers or Evinox packaged boilers with built in headers.

2.12 Design of the boiler room

The ModuSat TP's provide each apartment with heating and hot water, which is supplied by a primary circuit coming from a central boiler room. When the boiler room supplies one or more buildings, its power usually exceeds 72kW and it must satisfy the regulations relating to this size of plant.

2.12.1 Determining the kW load required for the boiler plant

The ModuSat TP can be classified in the system of production of hot water with PHE. The power of the boiler room for heating will be calculated in a traditional way starting from the losses of the building and the power absorbed for the production of domestic hot water (increased by a coefficient, which will take into account the losses of distribution: for example x 1.05).

However the boiler must be designed to satisfy the peak demand corresponding to the use of domestic hot water considering that for DHW each apartment needs 25-30 kW

The peak hour period, taking into account the natural proliferation of collective housing buildings, enables the power for heating and domestic hot water not to be added. A coincidence factor has been defined statistically for centralised hot water production systems.

See the table below (ref. GDF/SDIG gas fired collective heating).

N	10	20	30	50	75	100	200
T hours	1.72	2.45	2.87	3.34	3.65	3.83	4.14
S	0.50	0.40	0.36	0.31	0.29	0.27	0.24

N = number of standard housing units T = peak period in hours S = Coincidence factor

The examples below correspond to the sizing of ‘standard’ housing units. For installations known as ‘luxury’ or for specific hot water requirements, please contact the technical department at Evinox.

$$S = \frac{1}{\sqrt{N-1}} + 0.17 \qquad T = 5 \times \frac{N^{0.905}}{15 + N^{0.92}}$$

The calculated power is the power required at the boiler room outlet. The basic hypotheses for these calculations tend to the best sizing of the boiler room plant in order to obtain the best efficiency of annual generation. Under these conditions, the flow temperature is allowed to undergo a slight drop during the peak hot water period in extreme winter conditions.
For standard applications the weighting is obtained by using a forfeit value F of 25 kW for each apartment. Where heat losses are greater than these values, it is the heating power of the apartment that is used as the basis of calculation.

P1 = losses x 1.05

P2 = F x N x S x 1.05

The upper value of P1 or P2 will be used.

2.12.2 Example 1

Installation of 10 housing units featuring ModuSat TP.
Average heating power 3.5 kW per housing unit.
P1 = [(10 x 3.5 kW) x 1.05 = 37 kW
P2 = 10 x 25 kW x 0.5 x 1.05 = 131 kW
The minimum power required is 125 kW.

2.12.3 Example 2

100 housing units fitted with ModuSat TP. Average losses of 3.5 kW per housing unit.
P1 = [(100 x 3.5 kW) x 1.05 = 370 kW
P2 = 100 x 25 x 0.27 x 1.05 = 709 kW
The minimum power required is 709 kW.

2.12.4 Cleaning

The cleaning of the system must be carried out strictly in accordance with BSRIA cleaning guidelines and the relevant British Standards. It is necessary to proceed by stages:

- Clean the boiler room plant
- Cleaning of the primary circuit, with the isolating valves of the ModuSat TP closed
- Cleaning of the horizontal pipework and the ModuSat TP satellite
- Use the dirt separator in the boiler room and strainer on each ModuSat TP to help in cleaning the system

The system can then be filled; all the air eradicated by bleeding and adjusting the system pressure. The system has to be cleaned in accordance with the latest building regulations BSRIA or British Standards that form part of the design criteria and specification. If the tender specification does not enforce a particular standard then we would always recommend the BSRIA standard.
Note: Never leave the system filled with raw untreated water for any length of time.

2.12.5 Balancing

Hydraulic balancing is very important because it will ensure the flow necessary to each satellite. The system balancing valves shall be automatically adjusted and set by the two-way valve on the ModuSat TP primary circuit according to the desired setting.
The same valve also stops primary circulation when there is no request for domestic hot water or request for heating. Operation by closing the primary circulation circuit (in particular in summer) results in energy saving by limiting the losses of the primary education circuit

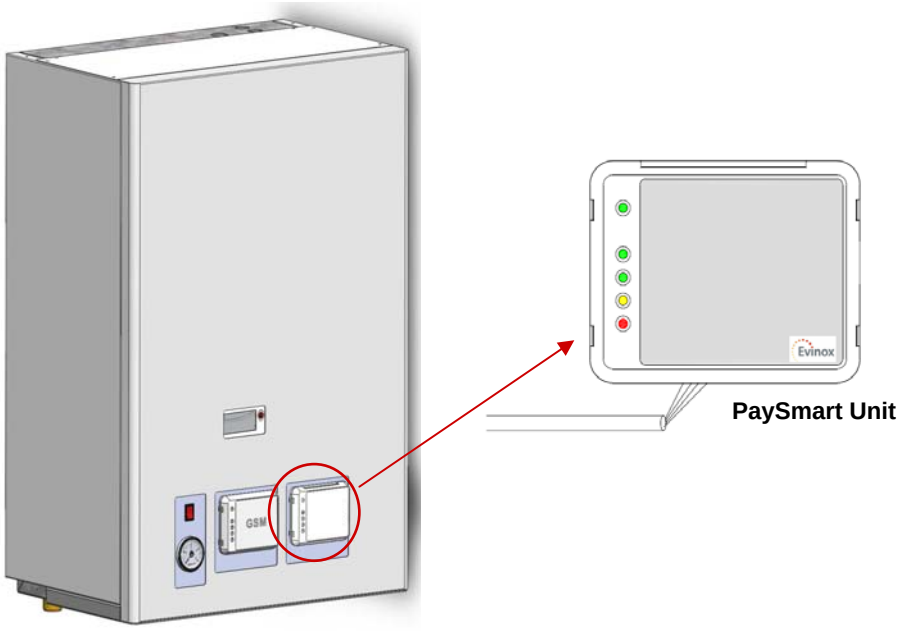
2.12.6 Maximising the performance of the ModuSat TP installation

The collective heating systems producing centralised hot water require the operation in circulation, of the recycling loop all year long.
The ModuSat TP, which removes the domestic loop, nevertheless requires the operation in circulation of the primary circulation loop in summer.
In order to reduce the energy consumption, the primary circuit will have to be perfectly isolated and its temperature could be lowered to 70°C, for the summer period. The water flow feeding each ModuSat cannot be lower than 800 l/h in order to satisfy the needs for a bathroom.
The assembly on the ModuSat TP of the 230V energy cut off valve will also have the advantage of reducing the thermal losses of the primary circuit particularly during the summer and of thus improving the total efficiency. The energy cut off valve limits the primary circulation of the horizontal distributions to the hours of use of hot water and thermal maintenance of the PHE (i.e. a few hours per day).

The boiler room can profit from the systems of regulation and programming. Nevertheless, the temperature of the primary circuit will not be lowered under 70°C, in order to ensure a production of satisfactory domestic hot water on demand.

The small units will be able to satisfy an individual regulation of the boiler, which will maintain the constant primary temperature.

3 PAYSMART – PRE-PAYMENT SYSTEM



The Evinox PaySmart system enables residents to be in control of their own energy bills by paying for energy in advance and therefore removing any burden of building up unpaid bills or debt. A PaySmart Unit is mounted on the ModuSat heat interface unit and is uniquely identified to a particular dwelling. Residents can purchase their energy via Payzone, online, over the telephone or by Direct Debit. Unlike traditional pre-payment systems, the process of adding energy credit to the ModuSat PaySmart Security Unit is automated so there is no requirement for the resident to insert a card into the unit for activation.

3.1 Application

The PaySmart unit can be fitted to all Evinox ModuSat units. Each unit is provided with a heat meter that continuously measures the actual consumption of energy. It is a highly precise system that can scale the amount due for heating according to the cost of the energy unit. The PaySmart unit includes a memory chip that enables activation, monitors heat consumption and calculates the relevant cost, which is then automatically scaled. The unit will automatically stop heating and hot water from being provided if there is no credit or trust available.

Features & Benefits

- **Simple energy bill payment**
- **Payment of actual energy consumption**
- **Total transparency**
- **Certainty of payments**
- **Easy to install and manage**
- **Highly precise**
- **Heating only provided when credit is available**
- **Data security**
- **Flexible management**
- **Immediate display of remaining credit**
- **Ability to set a trust in addition to the credit**

3.2 Technical data

The system integrates different devices:

- USB Windows driver for card reading and charging (building manager);
- Memory chip embedded in PaySmart unit with unique identification code ID;
- PaySmart unit with five LEDs indicating the remaining credit;

The units are installed in each apartment and connected to the ModuSat system for communication and power supply;

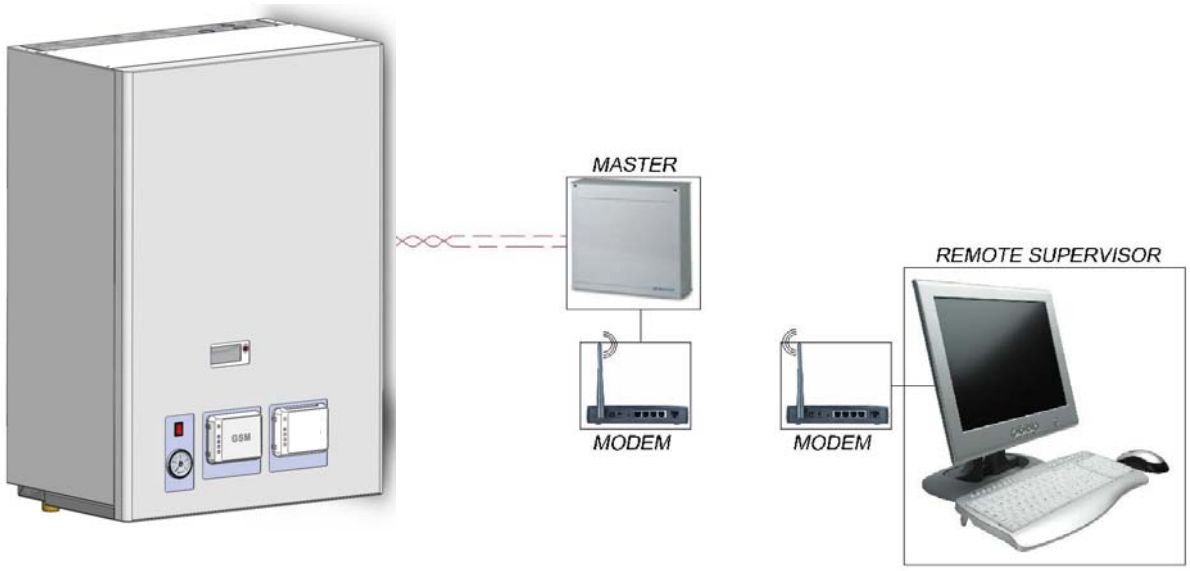
3.3 System operation

The building manager sets the cost of the energy unit (kWh or else). When a resident makes a payment for energy the credit amount is communicated to a master unit managing the whole system and via a modem to the remote supervisor software that keeps the account of each user and provides reports of usage.

As energy is used, the master decreases the credit accordingly. The amount of credit left is indicated by the LEDs on the PaySmart unit and is also shown on the room unit display.

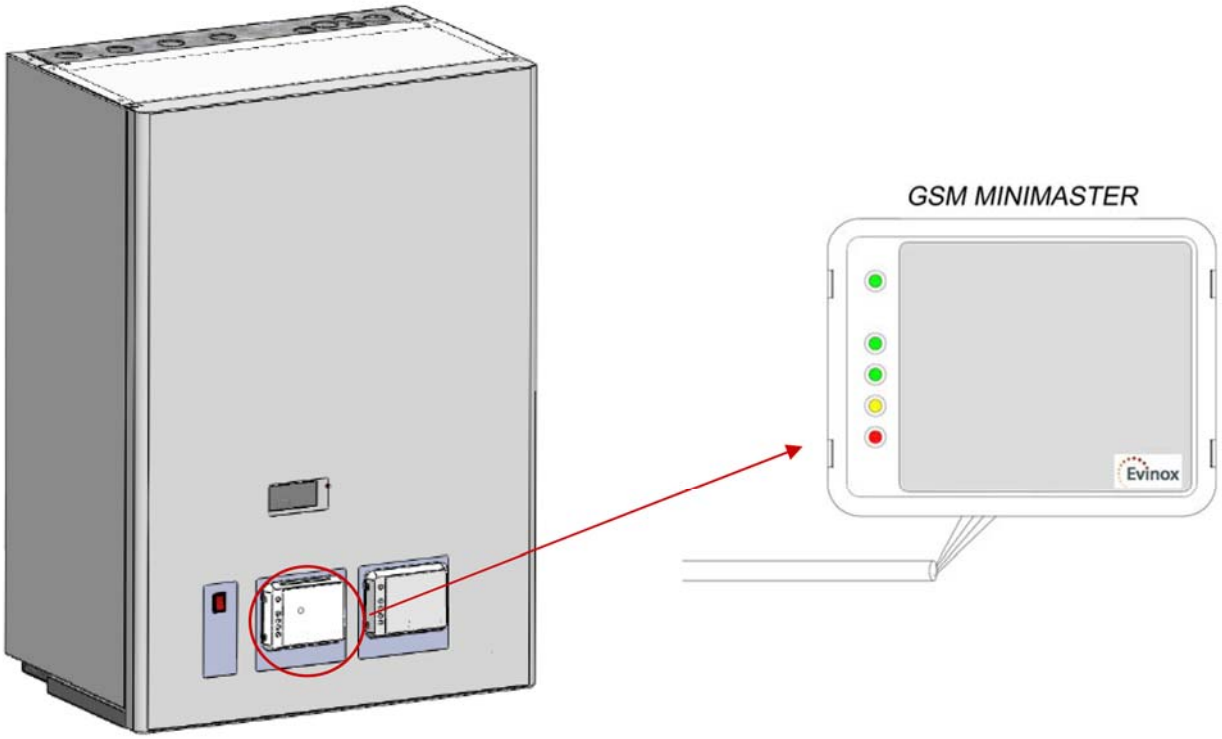
The security of the data is guaranteed as:

- each attempt to read or write must be followed by a 3 byte code (> 16 million combinations);
- after 3 consecutive attempts with a wrong code the Memory chip becomes useless;



For PaySmart unit wiring see section 7.

4 GSM MINIMASTER



The MiniMaster is used for remote monitoring when the bus connection to the master is not available. It basically consists of a GSM modem providing stand alone ModuSat's directly connected to the machine module on board of the unit. It allows the direct connection from and to a remote supervisor personal computer to be provided with a GSM modem.
The system is composed of the following main components:
Plastic case (the same used for the card reader)
GSM modem
Microprocessor for communication with ModuSat

4.1 Main features

The firmware will be developed to perform the following functions:

- Sending SMS with programmable intervals of all parameters of the satellite, namely:
  - Project code
  - Apartment code
  - Room temperature
  - Room humidity
  - Setpoint
  - Primary water flow
  - Primary supply temperature
  - Primary return temperature
  - Apartment circuit supply temperature (with S4)
  - Apartment circuit return temperature (with S5)
  - Storage or PHE temperature (with S3)
  - Outdoor temperature (with SE)
  - Consumptions (heating and cold water)
  - Credit card parameters

- Sending via SMS alarms (together with project and apartment codes) to a list of GSM numbers (GSM supervisor, GSM maintenance); the list of GSM numbers can be set on the supervisor only;
- Receiving SMS commands to change status and setpoint of the room unit from any GSM (GSM supervisor, maintenance or GSM user) if known password and apartment code
- The SMS variable size from the MiniMaster is max 160 characters
- The SMS alarm size is max 50 characters

4.2 Supervisor

The software will be updated to perform the following functions:

- Receiving text messages of the parameters above listed from the MiniMasters
- Receiving text messages of alarms from the MiniMasters
- Sending the received list of alarms to a list of GSM numbers that can be set on the supervisor itself
- Management of consumptions data from MiniMasters and Master unit with combined bus-modem system (i.e. when part of the ModuSat's are connected to a master unit via bus and part directly to the supervisor via MiniMaster) as actually possible
- Direct connection, with password, to the MiniMasters (one at a time) with the possibility of management as it is actually possible by the master
- Sending a SMS to all MiniMasters to require a immediate reply with above listed variables on the basis of which a screen shot with the variables of all apartments will be shown
- Management of PaySmart system if present

4.3 GSM commissioning

The Set MM program will permit the addressing of the MiniMaster (apartment and project codes) and the Supervisor GSM number;
In case of SIM card not available the commissioning will be carried out using a "commissioning SIM card" to be removed immediately after: as soon as the ModuSat is electrically supplied the MiniMaster sends a SMS to the supervisor (in this case a normal mobile);
Addressing and setting of all ModuSat parameters will be possible by the supervisor if the MiniMaster is provided with SIM card and known the apartment where the ModuSat is installed;

5 INSTALLATION

All ModuSat TP's are delivered in protective packaging, after removing it check the integrity of the unit as well as the presence of all parts. In case of damage or missing parts contact Evinox.
Packaging materials must not be left at children's reach because they are potentially harmful.
The installation and commissioning must be carried out only by authorised and qualified personnel according to the local governing laws and regulations.

Before connecting the ModuSat TP to the piping, wash the piping thoroughly and remove all residual parts of metal and any other dirt that may be present and would compromise the correct operation.
Next rinse the entire circuit to make sure all products used to wash it are removed. During this process, it's forbidden to use any chemical or other products not approved by EVINOX. The non observance of this rule invalidated the warranty.

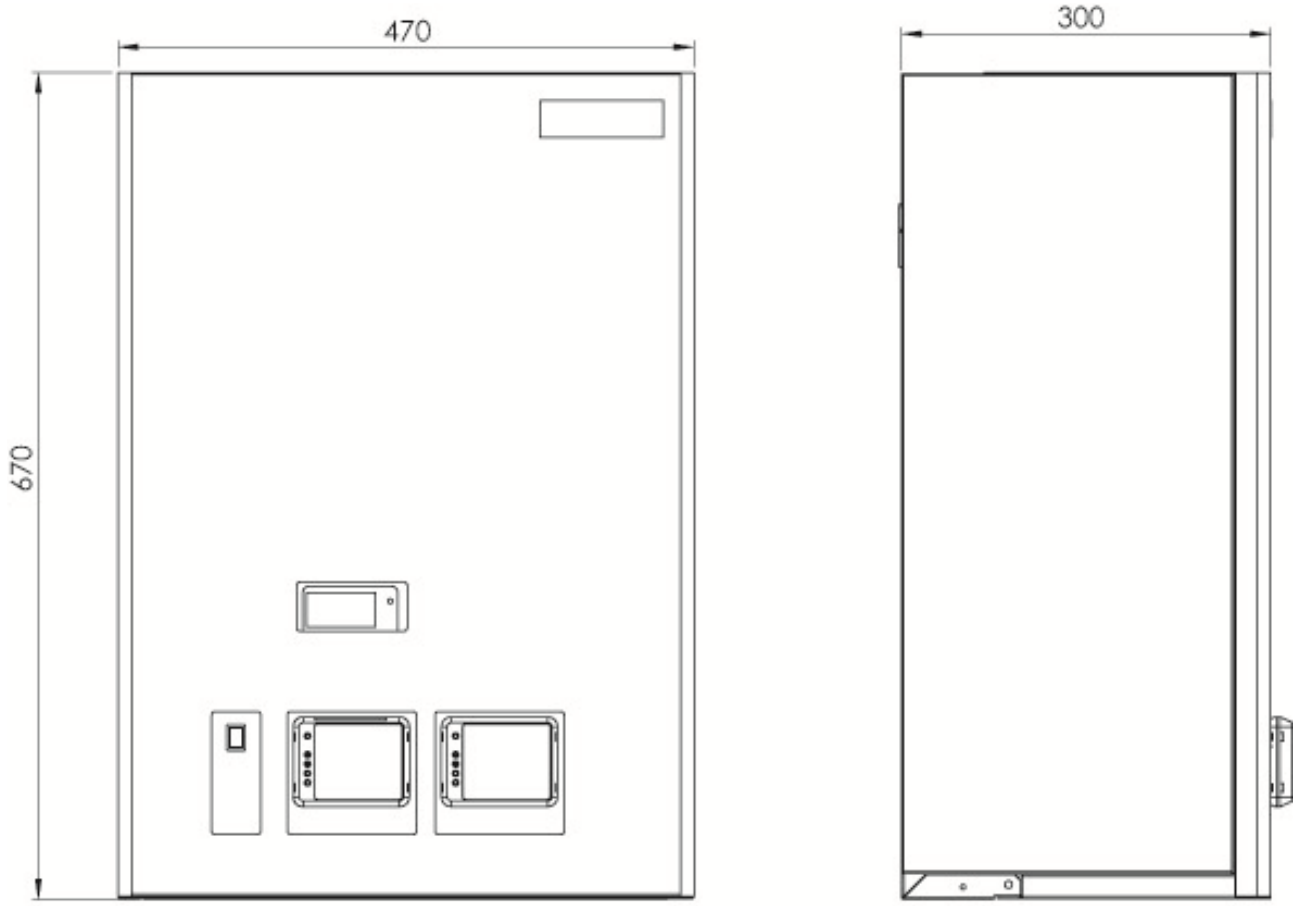
Make sure the environment where the ModuSat TP is to be installed complies with governing rules and laws.
There is no limitation about where the unit can be located due to size and air flow.
In order not to compromise the correct unit operation the site working temperature must be within the limits indicated in the product technical specifications and the unit must be sheltered from atmospheric agents (harsh weather).
Remove the electric power supply before any installation operation.
The unit needs a 230/240Vac – 50Hz supply line, check also the Line and Phase polarity.
Protect the cables so to prevent any damage.
Make sure an efficient earth connection is present to guarantee the safety against electric shocks.
Have the electric wiring checked by qualified personnel; EVINOX will not be liable for damage caused by incorrect electric wiring, bad or missing earth connection.
Check also that the electric supply line is protected by a thermal and a differential switch.
These switches must be adequate for the ModuSat TP current consumption and the wiring cables must be adequately sized.
It is ABSOLUTELY FORBIDDEN to use the piping's for electric earth connections.
ModuSat TP has no protection against lightning or other overvoltage shocks.

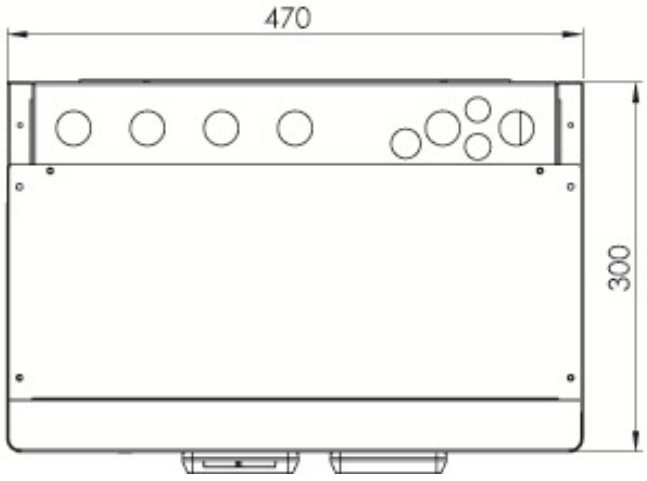
In case an antifreeze fluid is required, ONLY EVINOX APPROVED products are allowed. The non observance of this directive may result in the damage of the units and circuits.

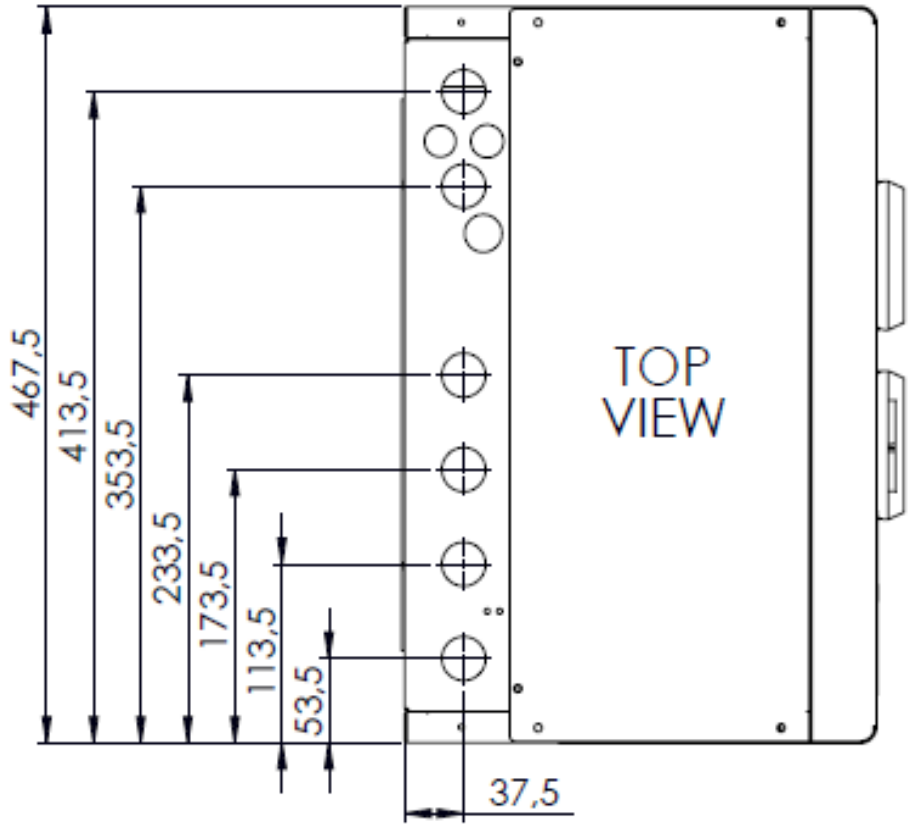
Don't install or stock this product outdoor. ModuSat TP is designed to be used only inside and in a protected area.
In order not to compromise the correct unit operation the site working temperature must be within the limits indicated in the product technical specifications.

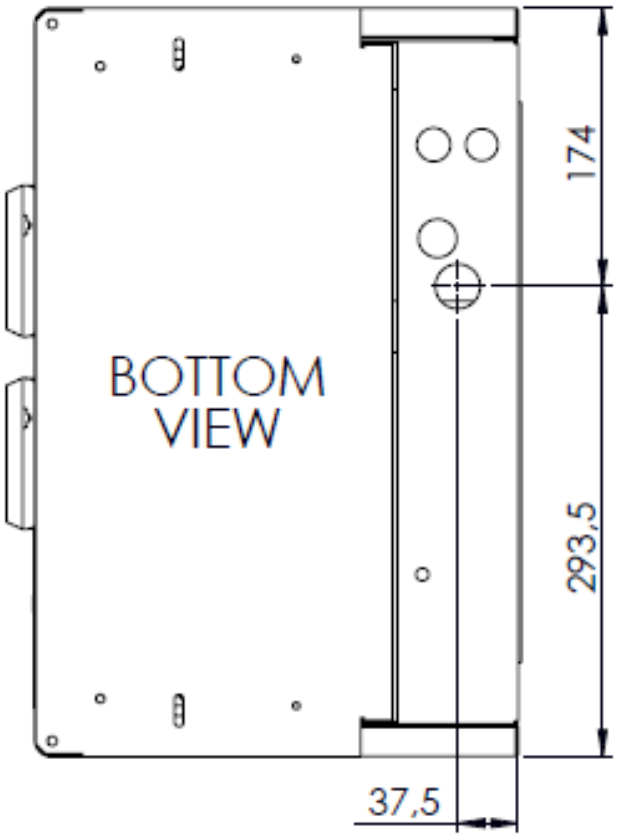
Repair work must be carried out using original spare parts only and must be done by qualified personnel only. The non observance of this directive may compromise the unit operation and performance. This will decline any responsibility from the manufacturer and supplier.

5.1 Dimensions (standard configuration)









For the configurations 1 and 2 the pitch of the connections is the same.

5.2 Hydraulic connections

The ModuSat TP is designed to be wall mounted with the primary circuit and domestic water hydraulic connections as shown here below.

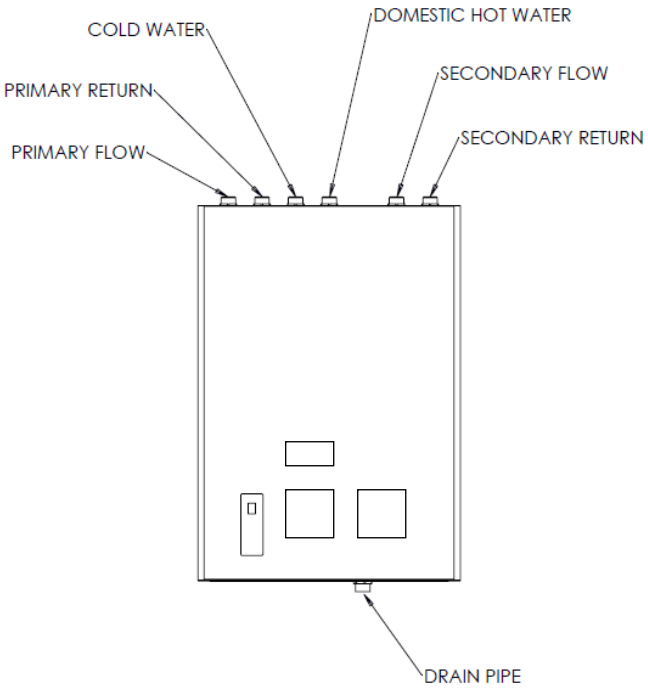
In order to ease the installation and maintenance of the unit, it is recommended to follow the instructions about minimum spacing.

Connection to the heating circuit

The primary circuit must be equipped with:

- Al the devices indicated in the current norms
- One or more pumps suitable to handle the pressure drops on the primary circuit, in order to guarantee the proper operation of all modules.
- The circuit must be filled with clean water. Refer to EVINOX technical office for approved additional products.

The apartment circuit must guarantee the sufficient and correct flow of fluid into the module.



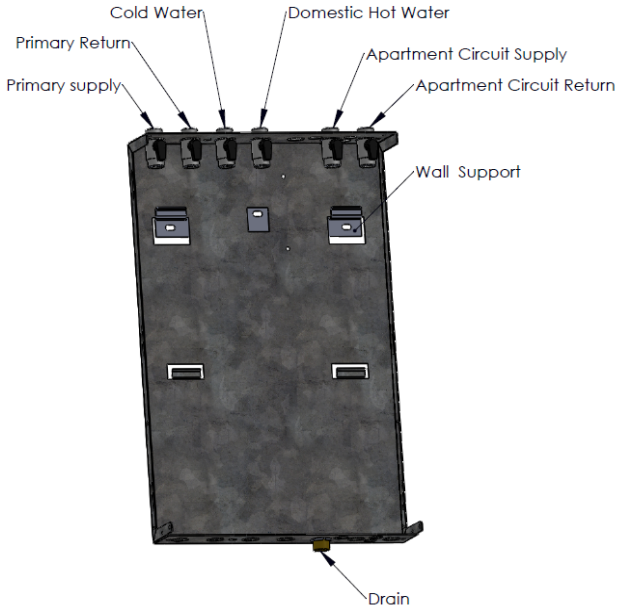
The safety valve drain must be connected to a tundish that allows a visual check in order to prevent, in case of activation, damage to people, animals and objects that cannot be attributed to the manufacturer or to the supplier.

Minimum space requirements for access and servicing:

- **Front: 700 mm**
- **Side: 50 mm**
- **Bottom: 400 mm**

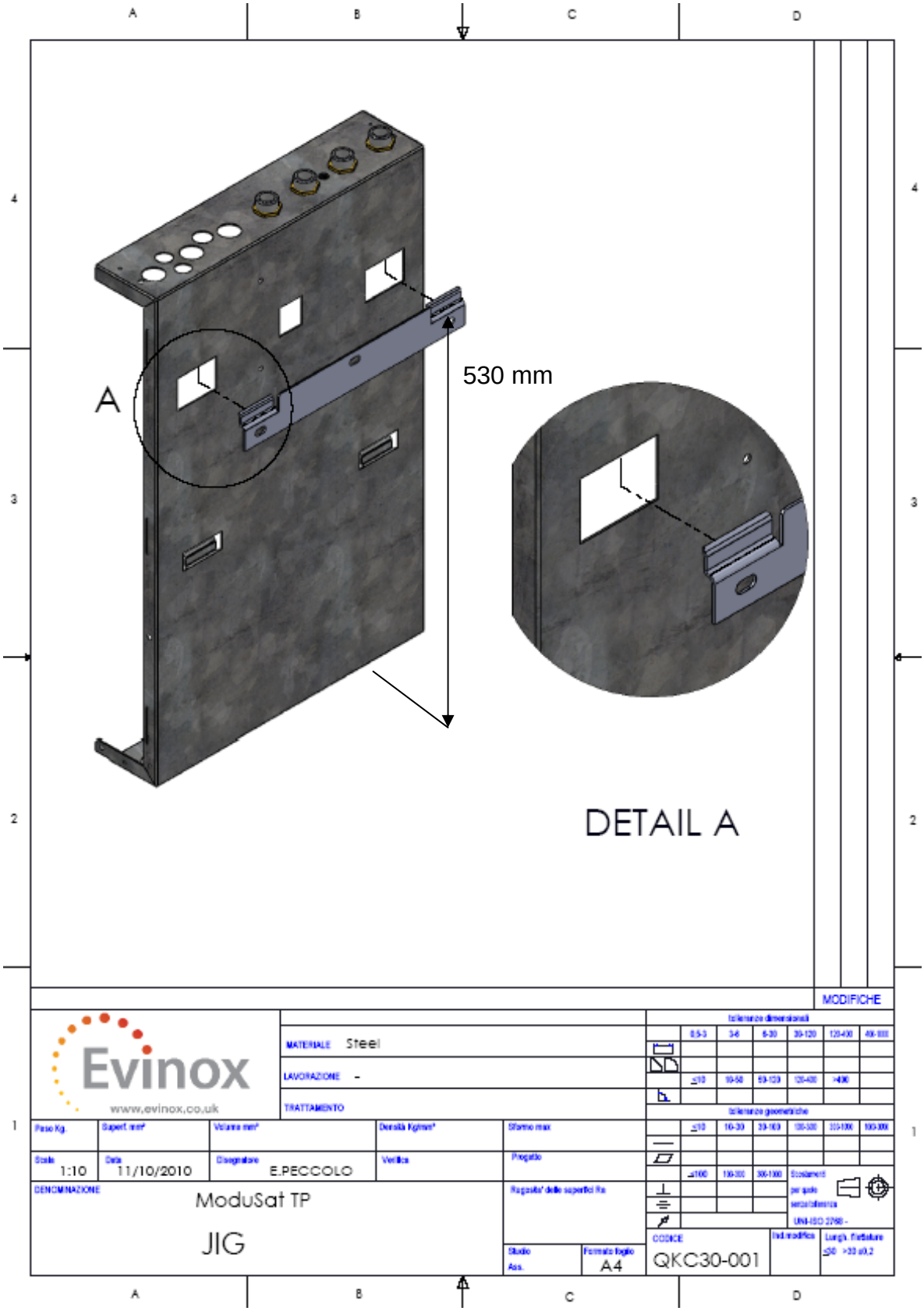
5.3 Preinstallation rig

A pre-installation rig is available on request. It consists of a frame constructed in steel with the upper and lower connections for the correct positioning of piping entering and leaving the unit.

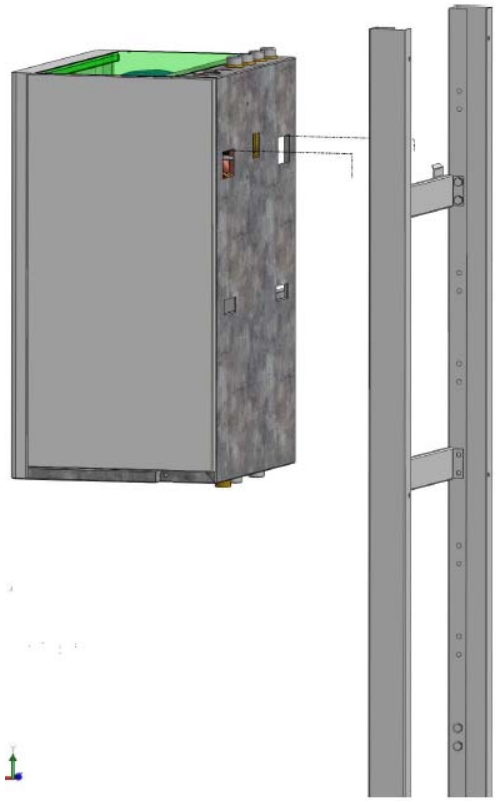


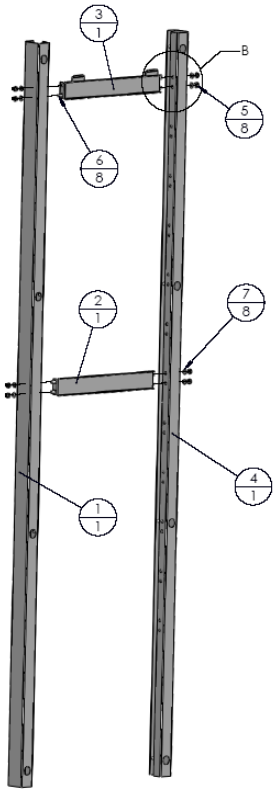
5.4 Wall fixing

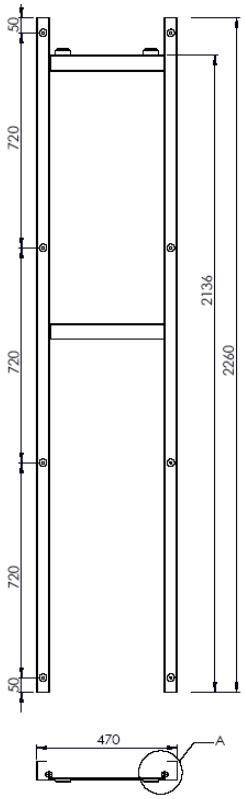
The ModuSat TP is designed for wall mounting using brackets to be screwed to the wall as shown below.



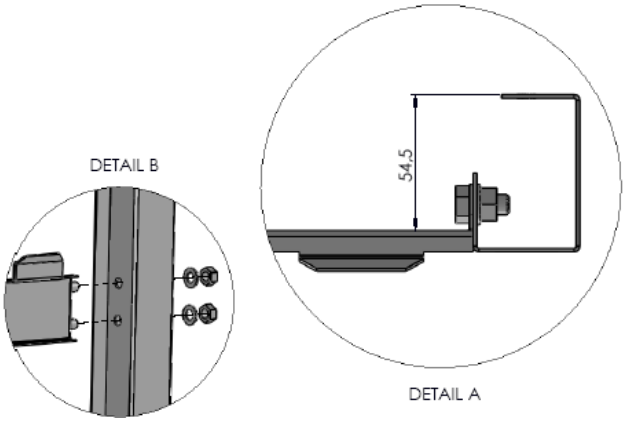
The wall must be able to take the weight of the ModuSat TP. In case it is not load bearing a support frame is available on request.







1	RIGHT SUPPORTING BAR	WS10-112	1
2	ModuSat LOWER CROSS-BAR	WS10-111	1
3	ModuSat TOP CROSS-BAR	WS10-110	1
4	LEFT SUPPORTING BAR	WS10-113	1
5	M8 NUTS	WS10-102	8
6	SCREWS M8x15mm	WS10-100	8
7	NUT WASHERS size 8	WS10-101	8



6 CIRCUIT FILLING WATER

The primary circuit is a closed circuit that isn't connected to the fresh water supply. Therefore the circuit must be checked for leakage that can compromise the integrity and correct operation of the unit.

6.1 Water treatment

It's important to prevent corrosion and oxidisation so that all parts work in the best conditions; therefore it is necessary to check the quality of the water circulating in the circuit. A non correct water quality increases the chance of scale build up in the warmer parts as well as corrosion due to the presence of dissolved oxygen.

Parameter	Recommended
Hardness (TH)	About 10 °F
Clorides	Up to 100 mg/l
PH	7 to 8,5
Resistivity	Higher than 2000 Ohm/cm
Salinity	Up to 50 mg/l
Conductivity	200 crs
TDS	0-200 ppm
Iron	Up to 1 mg/l
Free copper	Up to 1 mg/l

It is therefore necessary to apply suitable water treatment using approved chemicals.

6.2 Water characteristics

In order to guarantee the optimal performance of the unit check that the water parameters fit the values in the table above:

SCALE BUILD UP AND CORROSION Topping up the circuit with non treated fresh water can produce:

- Dissolved oxygen (cause corrosion): install a relief valve, in a higher position, after each heat generator or on the main fold.
- Carbonates: (produce scale build up): the water top ups must be reduced to the minimum. It is also necessary to install a flow meter and disable the automatic filling system.

N.B: Scale and other residues may clog the heat meter causing errors in the energy consumption calculation.

WATER TREATMENT IS MANDATORY IN THE FOLLOWING CASES:

- Circuits with large capacity that produce large amounts of dissolved oxygen.
- Frequent top ups due to leaks, repair and maintenance.
- Use of water with non suitable characteristics (check the table)

6.3 Precautions

The correct operation of the unit, and the whole heating system, depends on the water quality. Often water treatment is considered an unnecessary cost, not considering the amount of damage that can result from this choice.

The warranty of the ModuSat TP is strictly related to the absolute respect of the instructions and procedures indicated in this manual

The warranty doesn't cover damage caused by scale and corrosion due to unsuitable water treatment.

Check also that the parts and materials use to build the system don't produce dissolved oxygen that cause corrosion:

- Ensure there are no air pockets in the system
- Remove gas permeable parts and materials
- Ensure the expansion vessels are properly sized and the pre-charge pressure value in order to guarantee positive pressure values, with respect to the ambient pressure, throughout the circuits
- Use suitable chemicals (BIONIBAL- BIONIBAGEL) compatible with the materials used and that can **PREVENT CORROSION**

During a unit installation or circuit service it's important to consider a few points about the supply water used, in order to guarantee the optimal system performance, energy saving and prevention of problems.

For this reason it's necessary to adopt some precautions in order to guarantee that the wet surfaces and the heat exchanging paths of the unit remain clean thus preventing the build up of scale, limes and other residues non compatible with the water used in the circuits. The company in charge of the installation must therefore use the appropriate solution to achieve the results expected, in compliance with the technical specifications.

Our technical personnel, who will visit when the installation is fully completed to arrange for its final commissioning and calibration, do not perform the role of quality control or inspector of the installation or provide approval for the works carried out. The systems compliance with current standards and legislation and accordance with the consultant's requirements remains the exclusive responsibility of the installation company.

6.4 Corrosion prevention

BIONIBAL corrosion inhibitor for hot and cold water circuits resulting from a specific research work and is ideal to protect you heating system circuits in four ways:

- **FIRST LEVEL** corrosion inhibition and block of rust build up.
- **SECOND LEVEL** acidic component that stops bacteria and algae growth, particularly useful in under floor heating working at low temperature.
- **THIRD LEVEL** prevents the aggregation of suspended particles such as tartar, keeping the surfaces clean (pumps, valves, heat meters, etc.).
- **FOURTH LEVEL** enables its traceability to monitor the dosage so to guarantee the best protection level.

Electrolytic corrosion prevention, in a circuit employing different metals.
IT IS ADVISABLE to **ADD** the corrosion inhibitor **BIONIBAL** before the system is put in function (except when different directives are given for boiler protection).

6.5 Bionibal dosage and use

NEW INSTALLATIONS:

Fill the circuit with water to check for leakage. Empty the circuit in order to discard all sorts of residuals that could cause problems (if necessary clean it with appropriate products and make sure that the circuit is well rinsed at the end).
Once the circuit is well cleaned, fill it with water again and add **BIONIBAL** according to the dosage indicated.

EXISTING INSTALLATIONS:

Because **BIONIBAL** doesn't dissolve existing limes and other residuals accumulated over the years, proceed with empting the circuit and perform a thorough cleaning process of it. Use accredited companies for this work.
Once the circuit is well cleaned, fill it with water again and add **BIONIBAL**

according to the dosage indicated below:

To guarantee the ModuSat TP, Evinox insists that only its own heating system water conditioning products are used:

- BIONIBAL corrosion inhibitor
- BIONIBAGEL antifreeze and corrosion inhibitor.

IMPORTANT WARNING:
Bionibal or Bionibagel must only be put in a clean installation that has been checked. It is therefore imperative to fill the entire system one or more times with clean water as required. In some cases, the system may need washing by a suitable product:

SUGGESTED DOSE:

- 1 litre every 100 litres of the radiator circuit capacity
- 1 litre every 100 litres of the under floor heating circuit capacity with oxygen blocking barrier pipes
- 2 litres every 100 litres of the under floor heating circuit capacity without oxygen blocking barrier pipes.

Over dosage doesn't cause damage to the circuits.

Restore the correct concentration every time the circuit is emptied.

6.6 Freeze prevention

In case it is necessary to guarantee frost as well as corrosion prevention, **IT IS ADVISABLE** to use **BIONIBAGEL,** as this is compatible with BIONIBAL (except when different directives are given for boiler protection)
BIONIBAGEL has specifically been developed to be used in circuits treated with BIONIBAL or as a multi-function fluid for new installations.
The following table indicates the percentage of additive to use according to the protection temperature chosen.

Protection temperature	Circuit capacity			
	50	100	150	200
- 5 °C	7	15	22	30
- 10 °C	12	25	37	50
- 15 °C	17	35	50	70
- 20 °C	20	40	60	80
- 30 °C	22	45	67	90

6.7 Unit filling

The DHW circuit must be filled and pressurised before applying pressure to the primary circuit. In order to guarantee the safety and correct functioning of the unit, the start up must be carried out by qualified technical personnel.

To fill the DHW circuit proceed as follows:

- open the heating circuit ball valves in the unit
- release the air contained by opening the relief valve

7 ELECTRIC CONNECTIONS

MODUSAT TP requires a 230/240V mains connection.

Before attempting any installation, repair or maintenance work remove the electric supply line, possibly with an external switch.
Follow the instructions below to connect the electric power supply to the unit: cover pipes and cables in order not to damage them

- use cables of suitable size for electric connections
- ask a qualified technician to check the electric wiring because the manufacturer/supplier is not responsible for possible damage due to missing earth connection or any other anomalies.
- check also that the supply line is adequate for the maximum electric power needed and indicated on the label. Make also sure that the cable size is correct and in any case not less than 1.5 mm^2

An efficient earth connection is essential to guarantee the safety against electric shocks.
The unit is supplied with a 3 pole cable to be connected to 230/240Vac – 50Hz supply.
Make sure to identify the earth wire and connect it to the relevant earth point.
Important! The connection to the electric power supply line must be fixed (no plugs), a fused switch (6A – 3mm gap min) must also be used to break the supply.
In case it's required to change the supply cable, refer to qualified personnel.
Extension cords, multiple plugs, and other adapters are not allowed.
It is **FORBIDDEN** to use the circuit pipes to earth electric connections.
The unit is not protected from lightning.

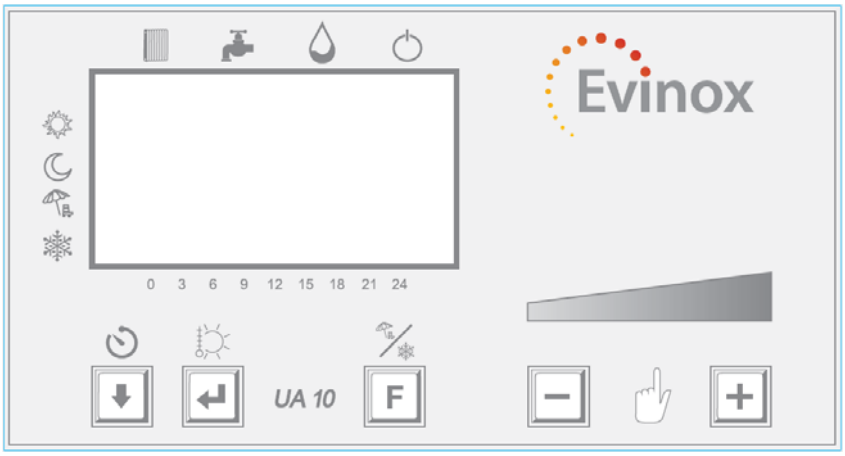
7.1 Auxiliary connections

Don't connect the mains power supply to the Room Unit, it would destroy it!

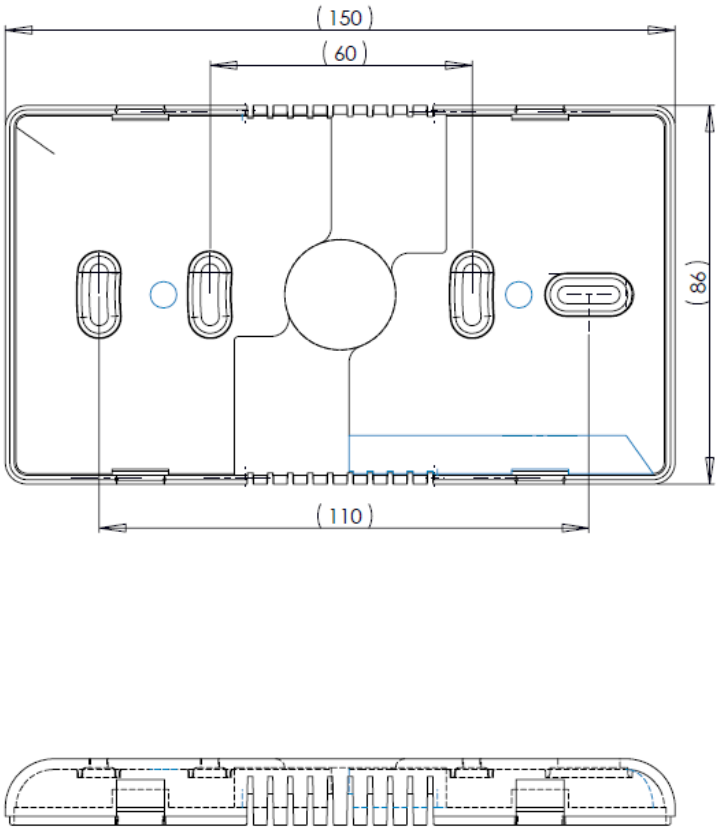
- Use the relevant 4 pole connector and a suitable 4 wire shielded cable (4x0,35 mm^2) for this connection and follow the procedure indicated below
- Remove the electric supply to the unit using the external switch
- Remove front panel
- Remove then the screw blocking the electric box and swivel it

Now you can access the high and low voltage connectors

7.2 Room Unit connection

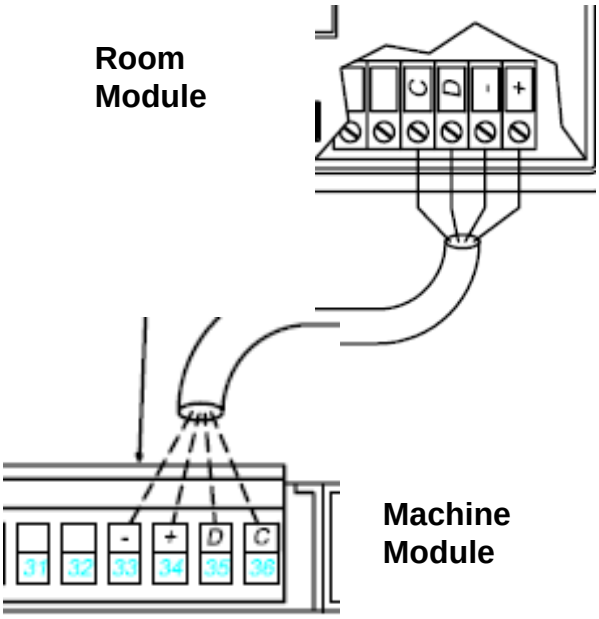


The Room Controller is a white ABS box with graphic display. It must be installed in the apartment in such a way to read the average room temperature. It has to be connected to the ModuSat (please refer to the electrical diagram) by means a 4x0.35 mm2 screened cable. The cable must not be installed adjacent to other 230 Volt lines. The ModuSat room controller's power is supplied by the ModuSat board and does not require batteries.



For Room Controller wiring please refer to the following instructions.

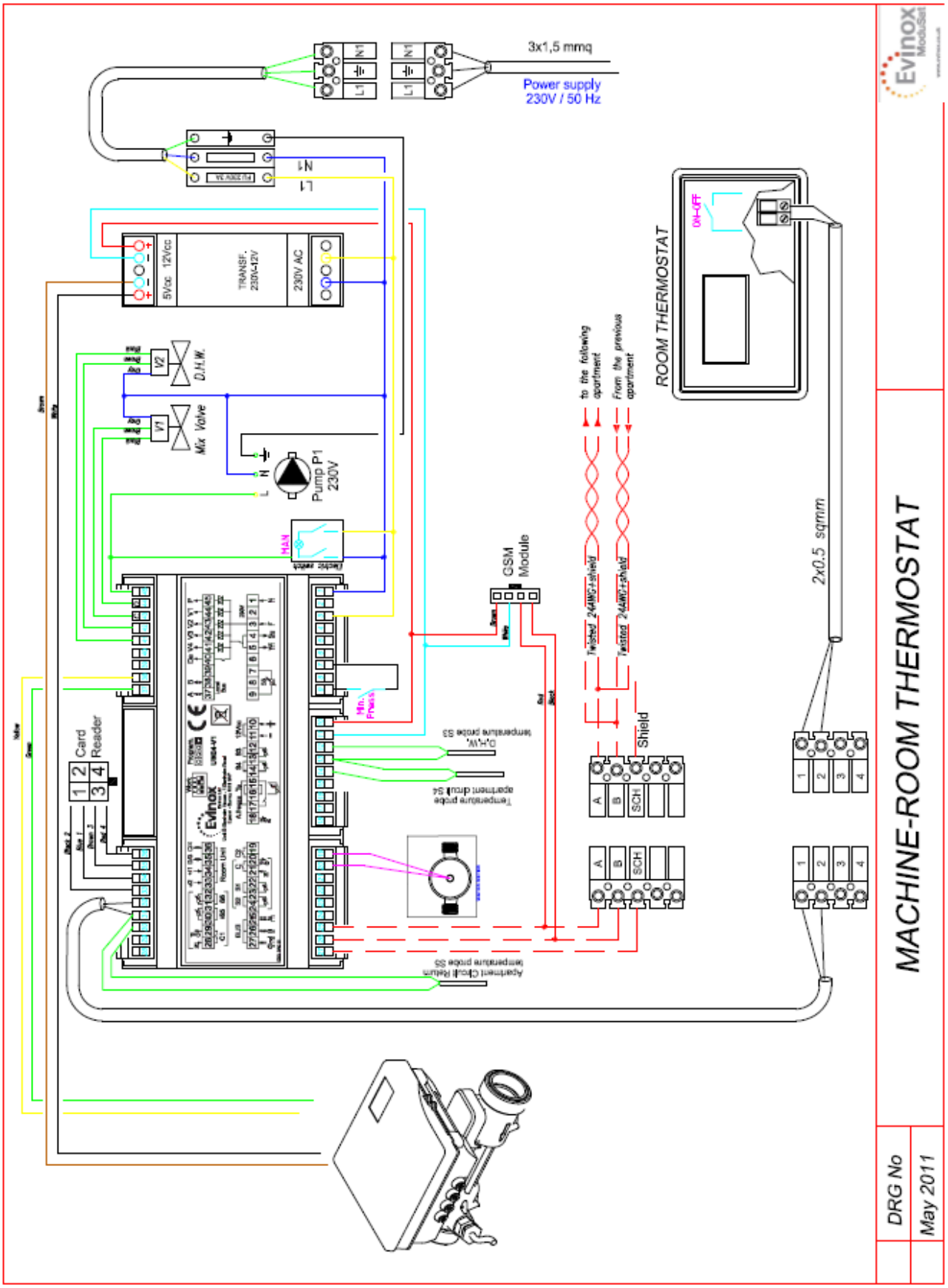
Room Module



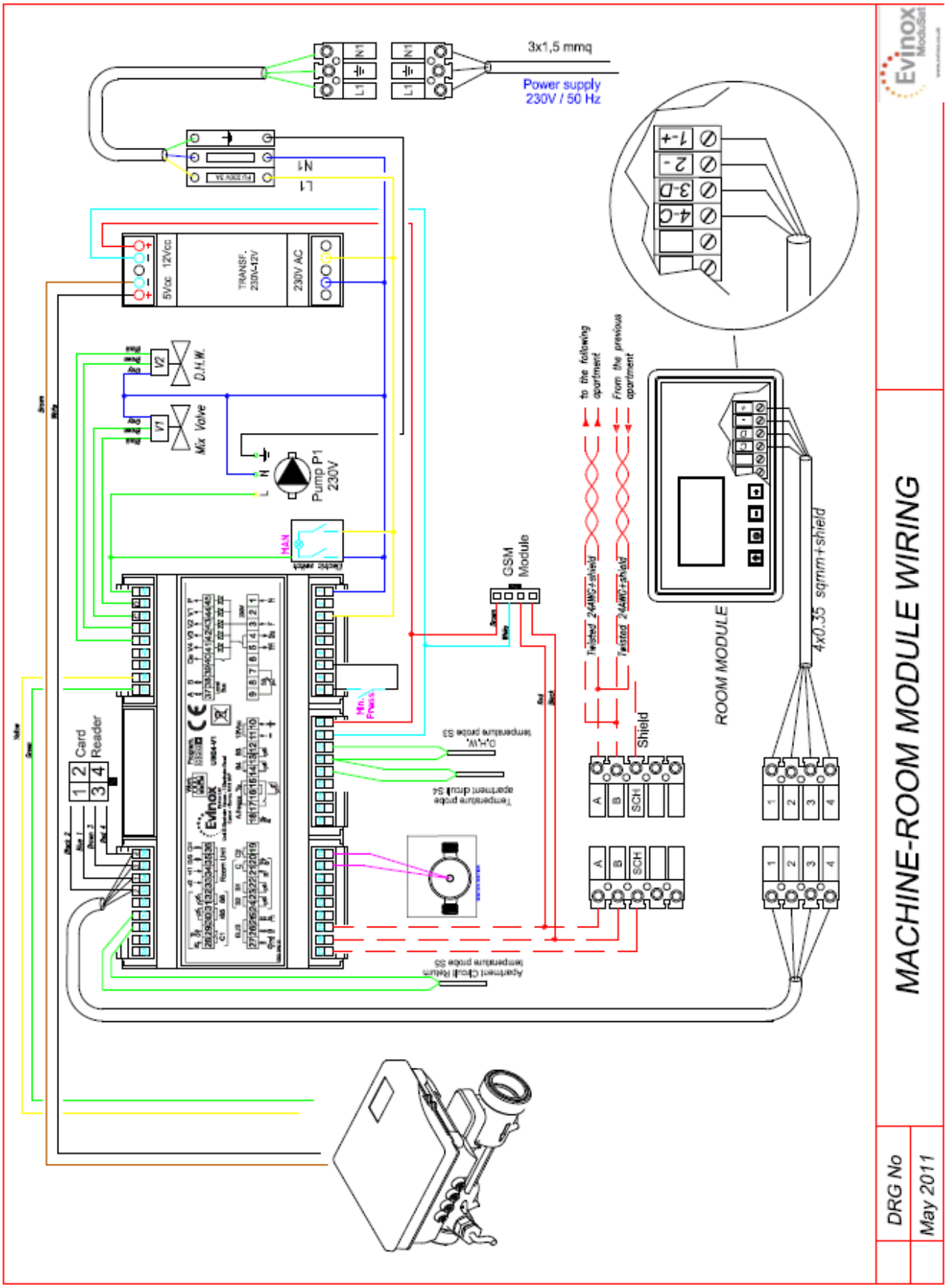
Machine Module

Dimensions: H= 86 mm
L= 150 mm
D= 34 mm

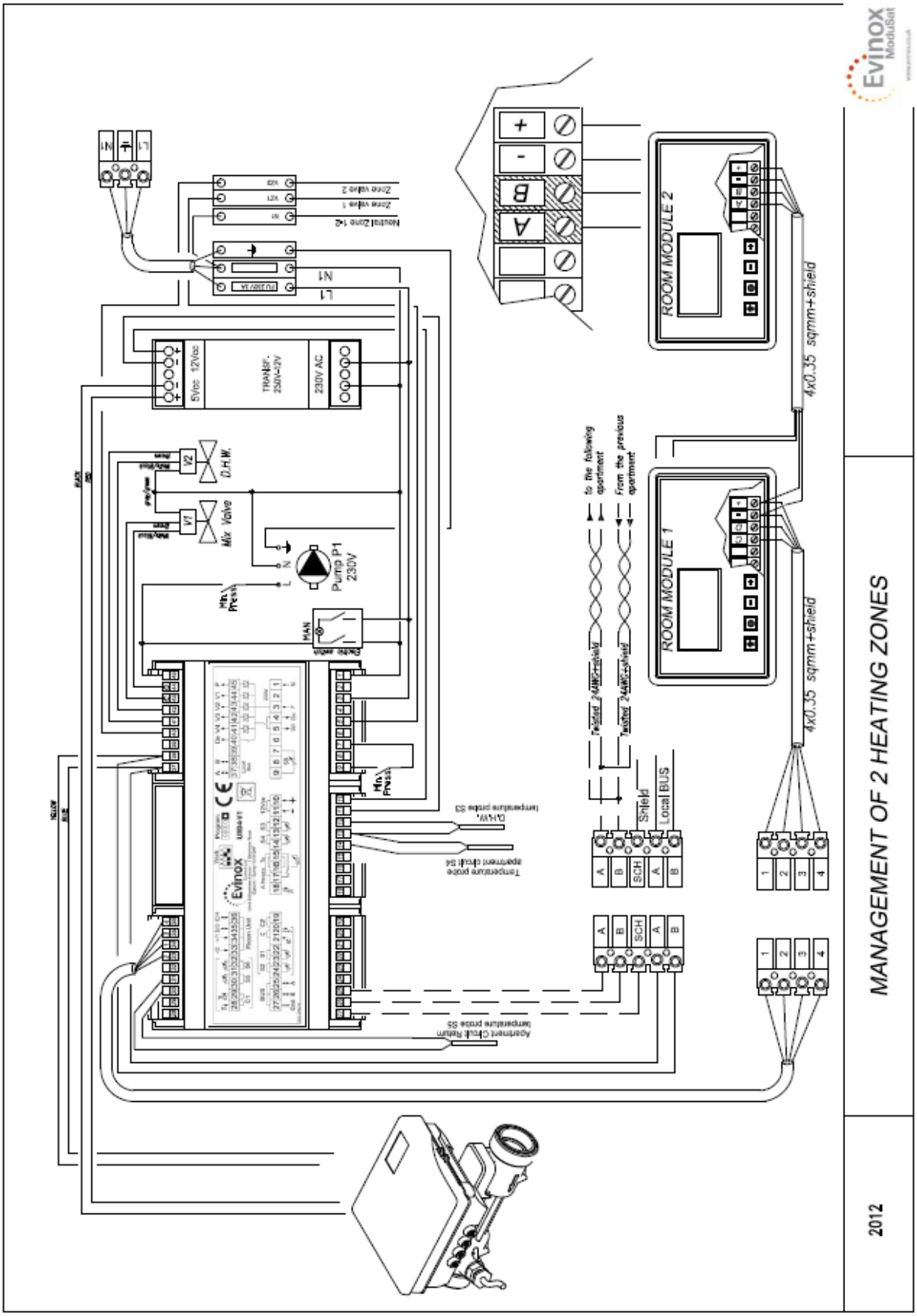
7.3 Electric diagram with Thermostat



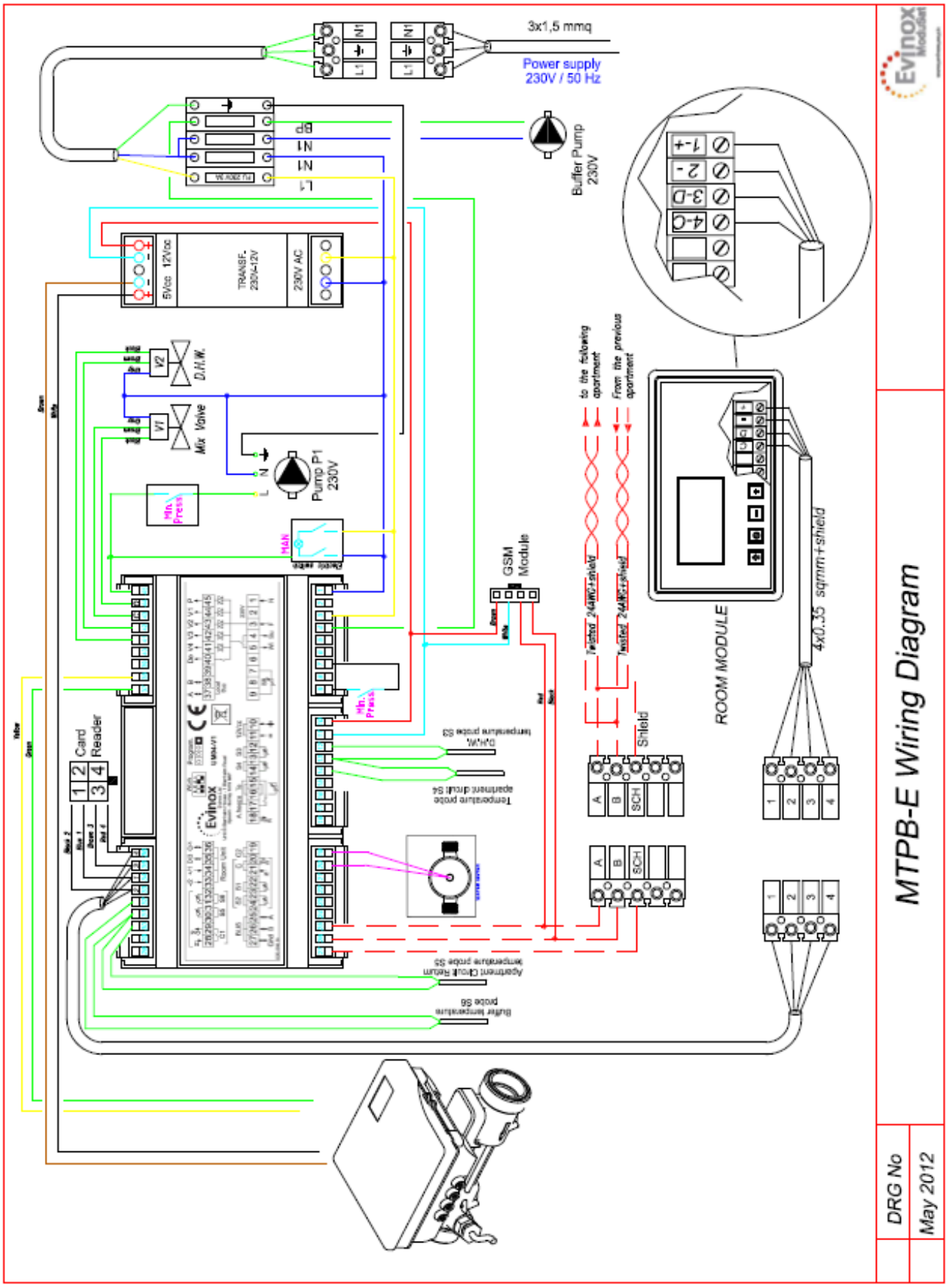
7.4 Electric diagram with Room Unit



7.5 Electric diagram with double Room Unit



7.6 Electric diagram with external buffer



8 COMMISSIONING

Before starting to use the unit:

- check that the domestic water, primary and secondary circuits are full or relevant fluids
- check that the air has been removed from the circuits and that the relief valve is properly closed
- check that the pipes connected to the DHW circuit are connected properly
- make sure that the electric wiring is made according to diagrams and instructions
- check that there is no leakage
- check that the voltage and frequency of the supply line is correct (see the unit label) and that the earth connection is efficient
- check the connection of other components, when present (thermostats, probes, etc.)
- check that the pump runs properly, in case it's blocked remove the plastic cover and use a screw driver on the shaft to unlock it
- if the pressure is less than 1 bar, add some water to the circuit
- make sure all manual valves are in the open position

If any of the above listed checks fail, the unit MUST NOT BE OPERATED.

Only after having checked that all the checks gave a positive result the unit can be put in function. According to the installation type, identify the operations to use to start the unit, then:

- apply electric power to the unit using the external switch
- check that the Room Unit display powers on
- check that the regulation components work properly
- check that the DHW temperature
- check the correct operation of the safety thermostat (when present)

Note: Our technical personnel, who will visit when the ModuSat TP has been installed to arrange for its final commissioning and calibration, do not perform the role of inspector and/or approval officer for the system. Its compliance with standards and instructions remains the exclusive responsibility of the installation company.

The ModuSat TP may have been transported and handled many times if you consider the on-site storage, handling and installation, therefore it is vitally important that all unions and connections are checked and tightened as required.

NOTE: Check flow and return connections are correct before any water flows through the ModuSat TP to prevent damage to the heat meter.

Hydraulic Connections

Each input / output of the ModuSat TP must be isolated to allow for maintenance. Operating pressure must remain within the values indicated in the technical data. Close the isolation immediately and cut electricity if there is leakage inside the module.

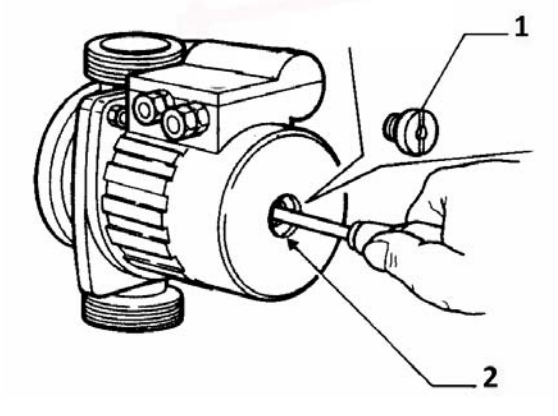
Electrical Connections

The electrical power supply must be connected after having checked that the electrical connections are correct and the hydraulic connections are sealed.

Heat Meter
Check the values read by the meter (see room module instructions). Above all verify the input and output temperature, the instantaneous flow rate and the total measured energy. Note the total measured energy at the moment it starts. Check that the meter does not present errors.

Pump Release
Before powering the ModuSat TP, check that the pump rotor is not jammed (this can occur after a period of inactivity).
Act as follows to release it:

Isolate the electricity to the pump before draining it.



1. Remove the cap, making sure that the water coming out does not cause any damage.

2. Introduce a screwdriver in the shaft trace and turn it both ways to unblock it. Screw the cap back on and check the correct position of the gasket. Whenever the heating is turned on or after a long period of inactivity ensure that the pump starts freely.

It is normal that a small amount of water may leak out during this operation.

Volumetric Meters
Note the measured values at the moment it starts. Check that actual reading increase on the board and/or ModuSat TP room controller display.

Expansion Vessel
Check the water heater expansion vessel charge.

Temperature Setting
Set the DHW delivery temperature (from the board or ModuSat TP room controller). Set the heating delivery temperature (from the board or ModuSat TP room controller). If there is climatic operation, set the curve and temperature limit i.e. UFH.

DHW Production
Check the actual hot water output at the set temperature (if this is possible depending on the requested flow rate and the primary temperature).

Heating Delivery
Activate heating with the relevant room unit (thermostat or ModuSat TP room controller) and ensure that the pump starts. Delivery temperature must remain at the set value (as long as the primary is up to temperature).

8.1 Annual inspection

It is recommended to carry out the following controls on the appliance at least once a year:

- The control and safety devices (sensors, thermostats, etc.) must work correctly
- The system must be watertight
- DHW flow must be regular

The system should not be emptied frequently except for modifications or repairs. In zones subject to freezing, the system must be emptied if it remains inactive. The operation can be avoided only by adding appropriate antifreeze. N.B.: In zones where water is particularly hard, it is recommended to install a water softener or de-scaling device on the cold water input in order to prevent lime scale from forming quickly.

8.2 Warranty

The warranty has value if good practice has been strictly observed for installation and use. Evinox is not liable for equipment breakdown and damage to persons and objects caused by:

- Transportation
- Installation in which the Standards in force and good practice were not complied with
- Improper use of the device, abnormal use conditions, tampering by unauthorised personnel or inadequate maintenance; therefore by: Corrosion and/or sludge accumulation; lack of electrical energy; absence of suitable drainage; exceeding operating pressures; electrical and water system anomalies
- Freezing or fortuitous causes
- Wear due to normal use
- Malfunctioning of control and safety parts
- Corrosion due to oxygenation or roaming currents

From commissioning, ModuSat TP appliances are guaranteed against all manufacturing faults and material defects for a period of:

- 2 years for parts and labour * (Where Evinox do not carry out the commissioning or have a developer agreement in place the two year warranty will cover parts with no labour cover)

However, the ModuSat TP warranty will always start from the date of the serial number and will be extended by a maximum of 6 months to allow for project completion. If the ModuSat TP is commissioned before the 6 month extensions the warranty will start from the commissioning date.
This guarantee is strictly limited to the supply, free of charge, of parts acknowledged as being defective after inspection by our technical departments, with the exclusion of labour and transport costs arising from this. These parts once again become the property of Evinox and must be returned to them without delay.
Failure to comply with the relevant installation requirements of the Building Regulations, Local Water Byelaws and Building Standards will invalidate any warranty claim.

The ModuSat TP must be fitted with an isolation valve for servicing and warranty work. Warranty calls that include draining the system will be chargeable if isolation valves have not been fitted.
It is imperative that the level of corrosion protector within the system is kept within industry guidelines at all times. Special attention should be given to ensure that, after any decoration or building works where radiators might be removed, the system is replenished with chemicals. Non-use of inhibitor will invalidate the warranty.

We will register the warranty when we commission the boiler and ModuSat TP units.
Any warranty claims that are a result of user error, poor installation or lack of servicing will be chargeable. Please note that all replacement parts provided under warranty are subject to factory inspection to determine cause of failure. Replacement parts are chargeable until passed as faulty by Evinox, when a credit will be provided. Any parts that have failed as a result of poor servicing or misuse will not be covered by our warranty.
Any modifications to the appliance will invalidate the warranty.
Your Evinox appliance is one of the most reliable and technically advanced products available. However, it is imperative that it is installed correctly, commissioned and serviced in accordance with Evinox installation and servicing manuals to ensure long life, reliability and fuel savings.

Exclusion of the Guarantee
The following are not covered by the guarantee:
a) Electric indicators
- Electric degradation of parts resulting from connection and installation on electricity supply whose voltage measured at the entry of the apparatus would be lower by 15 % or higher of 10 % than the nominal voltage of 230 volts
- Degradation of parts coming from external elements with apparatus (effect of storm, moisture, freezing, etc)
- Seals
- Automatic air vents
- All consecutive incidents resulting from a lack to check the safety components (unvented kit etc)
- Scaling, nor its consequences
- Corrosions due to chloride concentrations in domestic hot water higher than 60 mg/l
- The wear of the P and T valve

b) Postage costs of the parts, labour and displacement

Note: in a constant preoccupation with an improvement of our materials, any modification considered to be useful by our engineering departments and commercial can intervene without notice.

* See full terms and conditions of warranty

9 USE

Ensure the instructions below are followed to guarantee the correct operation.

Before starting any maintenance operation remove the electric supply using the switch outside the unit. Then close the manual valves of the circuit's object of the maintenance.

Empty the parts that contain hot water before proceeding; this must be done using the circuits connected to them.

The adjustment of the thermostatic/mixing valve cannot be altered by the end user; only qualified personnel can do this operation.

Check periodically that no air is present in the circuit and eventually remove it.

Check the correct operation of control and safety devices at least once a year.

Before discharging hot water, make sure that the discharge pipe is connected to the drain in order to avoid burning people or damaging objects.

All discharge pipes must allow air to flow through them.

If the safety group leaks occasionally, it could be due to materials expansion or valve clog.

Follow the instruction for pump maintenance.

Check the correct operation of valves, taps and electric accessories used.

At every maintenance operation clean the "Y" filter when present.
A clogged filter would affect the correct operation and eventually cause the unit to stop working altogether.

Before starting any maintenance work on the unit remove the electric supply using the switch outside the unit. This is because the unit is permanently supplied, even when the external thermostat is off.

The ModuSat TP is provided on the front panel with a Manual/Automatic push button: in manual mode the DHW valve is completely opened thus allowing DHW production.

<u>In manual mode no control of DHW temperature is possible and the water temperature can reach up to 70 °C.</u>

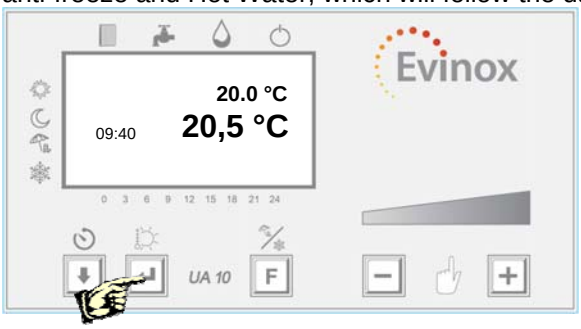
9.1 Maintenance

As the Modusat has no internal combustion, it requires a limited amount of maintenance.

There is no need for regular maintenance other than the annual inspection. **Only the filter, when installed outside, needs to be cleaned at commissioning and when a flow reduction is reported**. A flow reduction reduces the Modusat performance, although there is no increase in the energy consumption.

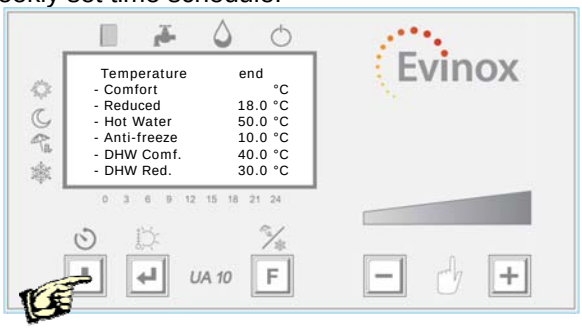
9.2 Room Unit

Parameter Setting This operation allows the user to set the temperature set point for comfort, reduced, anti-freeze and Hot Water, which will follow the daily or weekly set time schedule.



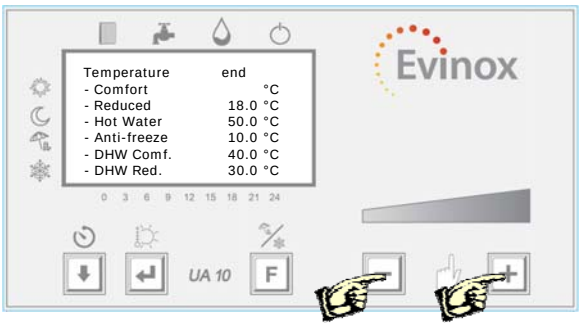
1

Press and hold down 'ENTER' for more than 3 sec



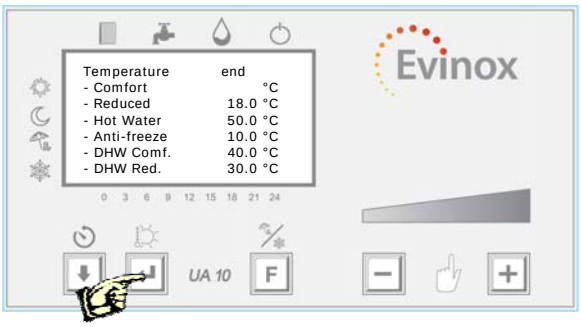
2

Use the 'Down Arrow' to select a parameter



3

Use the '-' or '+' buttons to decrease or increase the value

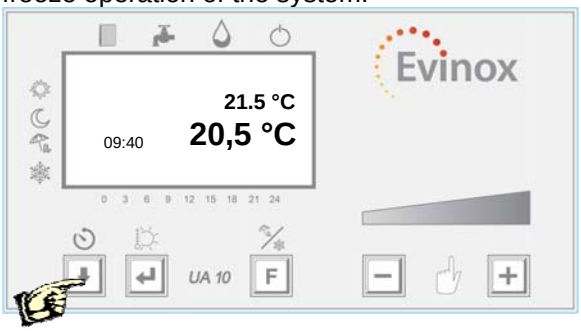


4

Scroll through using the 'Down arrow' until 'end' is highlighted and press 'ENTER' to exit the screen

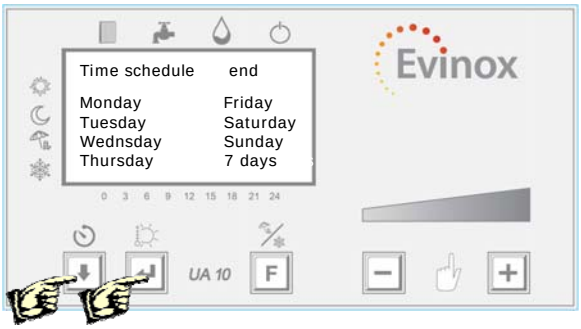
The temperature set point can be changed using the '+' or '-' buttons. The set temperature can be changed within +/- 3 °C.

Time Schedule Programming The time schedule can be set to control the comfort, reduced or anti-freeze operation of the system.



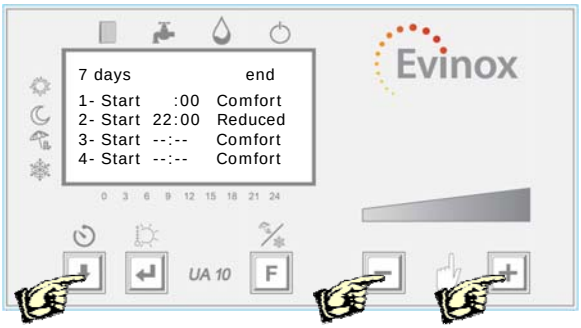
1

Press and hold the 'Down Arrow' button for more than 3 sec



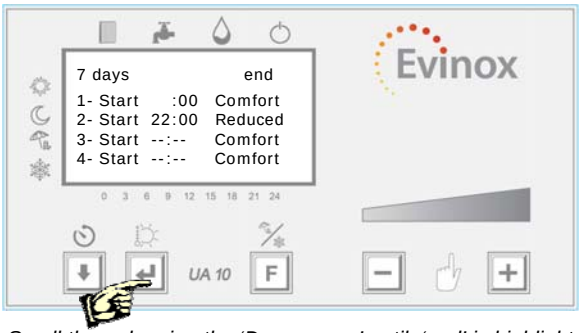
2

Use the 'Down Arrow' button to select a parameter and press 'ENTER'



3

Use the '-' or '+' buttons to change the value



4

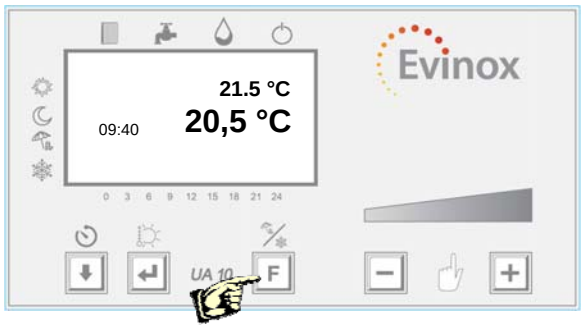
Scroll through using the 'Down arrow' until 'end' is highlighted and press 'ENTER' to exit the screen

Please Note: You must select the operating mode, as shown over the page, to activate the time schedule programme.

(For example, if you have selected a weekly programme you must select the "Weekly" mode in the "Set Mode" screen)

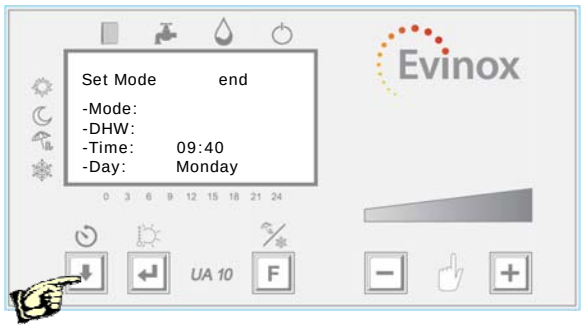
Operating Mode Selection

This operation allows the user to set the operating mode: comfort, reduced, daily, 7 days, anti-freeze, clock date and time.



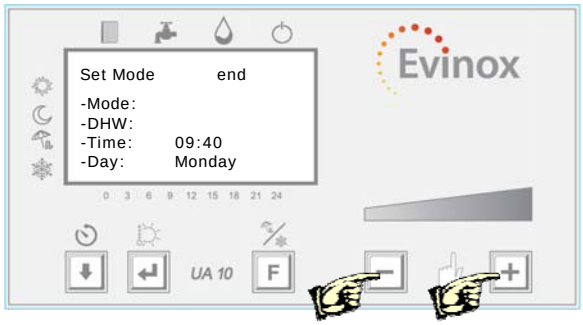
1

Press 'F"' to enter the menu



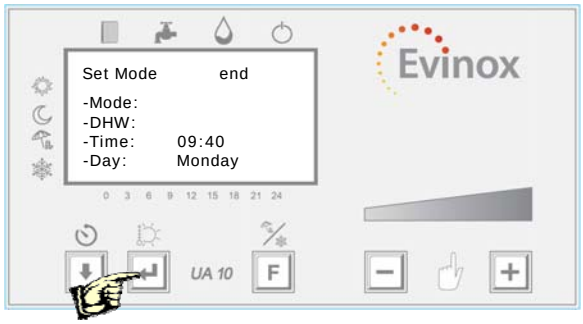
2

Use the 'Down Arrow' to scroll down and select a parameter



3

Use the '-' or '+' buttons to change the value

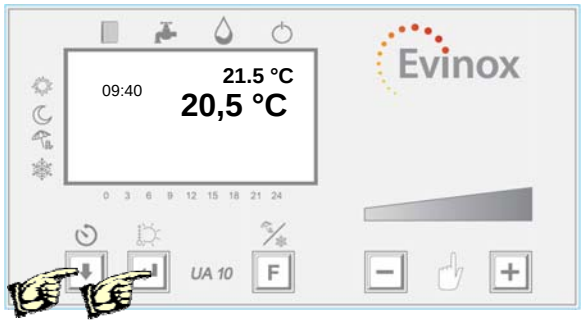


4

Scroll through using the 'Down arrow' until 'end' is highlighted and press 'ENTER' to exit the screen

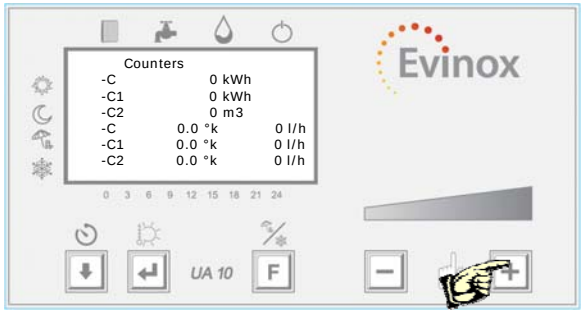
Reading Consumption Figures

The user can read the consumption figures for the unit, for example: C for heating, C1 cooling (when present) and C2 cold water (Only when a cold water meter is installed within the dwelling and connected to the Evinox system) The display also shows the temperature and flow rate related to the three counters.



1

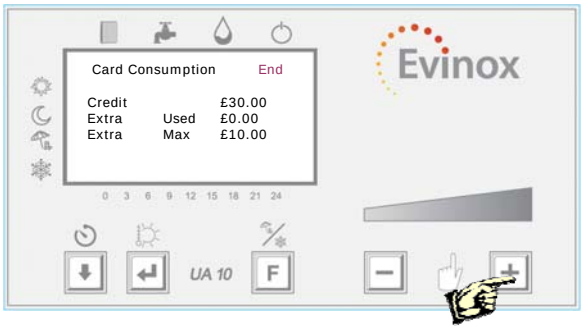
Press and hold 'ENTER' and the 'Down Arrow' button together for more than 3 sec



2

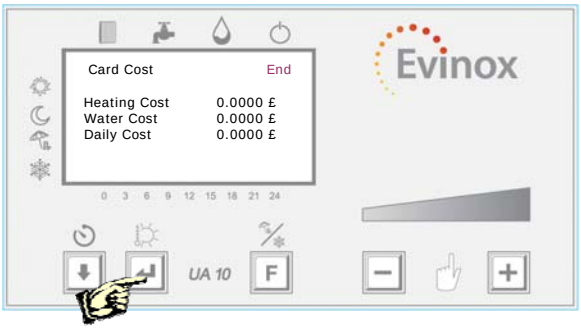
Press the '+' button to view the card consumption screen

Screen 3 & 4 below are only accessible when the PaySmart prepayment system is fitted.



3

Press the '+' button to view the tariff information screen
(Please note, if you exit this screen you must wait for 15 seconds before pressing t he '+' button to get back in)



4

Scroll through using the 'Down arrow' until 'end' is highlighted and press 'ENTER' to exit the screen

Definition of Card Consumption Figures:
Credit: The remaining energy credit
Extra Max: The max amount of emergency credit available
Extra Used: The amount of emergency credit that has been used
Heating Cost: The cost of each energy unit (per kwh)

Evinox Ltd T. +44 (0)1372 722277 E. technical@evinox.co.uk W. www.evinox.co.uk

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