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Installation and

user guide for

ExoTrol

MULTI C

Green Energy

1306-123EN Draft 1.0

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Introduction

This manual is intended for Euronoms control unit Exotrol Multi C. Observe that this is only a draft manual with the most important information in order to get a function system. A complete manual will be released during October 2013

Exotrol Multi C

Exotrol Multi is an advanced control system developed for use in bigger facilities and/or commercial buildings. The system is capable of controlling up to 8 heat pumps, 3 heating system, hot water recirculation, external power sources, solar panels etc and can also be added with integtrated energy measurements for both heat pumps and/or heating system/domestic hot water.
From version 1.0 available from june 2013 maximum of connected heat pump is set to 3.
Also from version 1.0 it's only possible to control 1 type of tank solution, called 2-tank system, with mixing valves. During 2013 different system solutions will be added.

System overview

Basic idea

The system solution available from june 2013 can be explained schematic with below picture.
One or more heat pumps operate to either of tank 1 or tank 2. This is controlled by the changing valve between the tanks. Energy is transferred to the heating system through 1 or more 4-way mixing valves controlled by the control unit. Domestic hot water is provided by curled copper pipes, cold water preheated in tank 1 and after heated in tank 2. If necessary also a electric boiler can be connected in series with the tanks hot water supply.

Tank 1

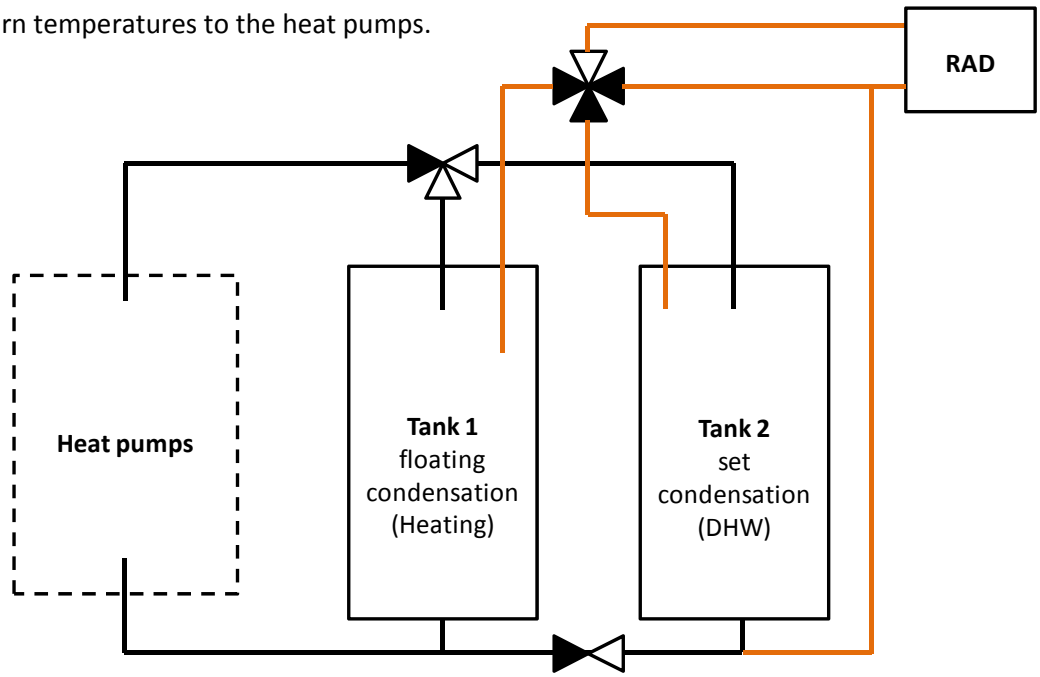
Tank 1 is the primary energy storage and supplier of heat to the heating system. As heating systems demands different temperatures depending on ambient conditions the temperature in tank 1 will be of a floating nature, i.e. temperature demand will be different depending on the conditions. This floating behavior is realized by using a heating curve that adapts to ambient conditions, mostly outdoor temperature. For each of the 3 heating system controls available, it's possible to set a unique heating curve. Heat pumps will operate to the demanded temperature plus a set temperature difference.

Tank 2

Tank 2 primary task is to provide enough temperature of the domestic hot water. As domestic hot water must be available independent of ambient conditions the temperature in this tank will be at a constant state, set condensation. Tank 2 is also used as a storage for any external energy sources connected, like electric heater, oil boilers etc. As 4-way mixing valve is used also the heating system can use energy from tank 2 if the energy demand to heating system from tank 1 exceeds energy supply from the heat pumps.

Heat pumps

The heat pumps operate in a special way in order to supply correct temperature to the tanks at all times. This is called the VFC-technology and means that the heat carrier flow is controlled by controlling a variable speed circulation pump. By controlling the flow also the flow temperature can be controlled and unlike standard systems, high temperature water can be supplied also with low return temperatures to the heat pumps.



Installation

Hydralic system

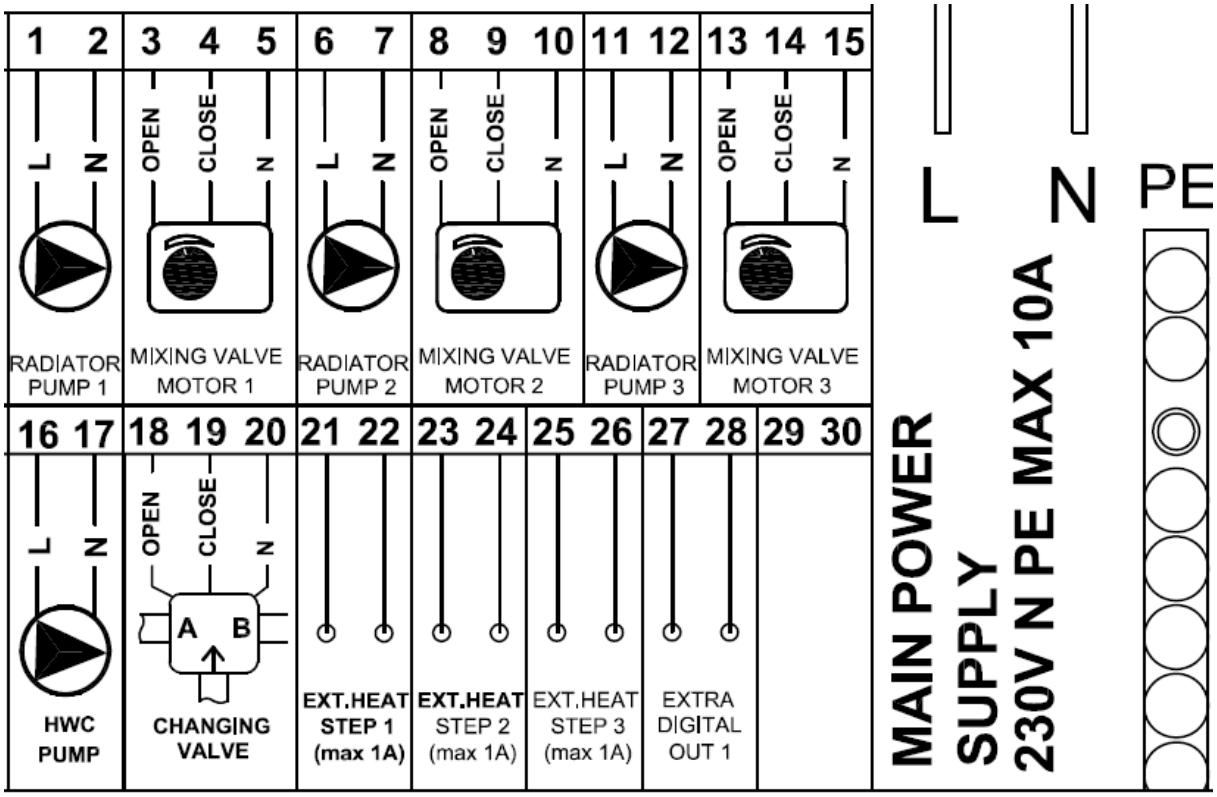
Regarding the hydraulic system (pipe dimension, valves etc.) please refer to the suppliers drawings.

Heat pumps

Refer to the manual shipped with the heat pump. Observe especially the chapter regarding setting the heat pump in Exotrol Multi mode. The setting “b” must be set to “3”. Also make sure that the setting CAN-id is set unique for each heat pump, setting “C”.
Heat pump 1-> C=0 (CanID 0)
Heat pump 2-> C=1 (CanID 1)
Heat pump 3-> C=2 (CanID 2)

Electrical installation

High voltage connections



Power supply

230V N PE, max 10A

Number 1/2 – Radiator pump 1

Block used for the radiator pump to heating system 1. If a 3-phase 400V pump is used this signal can be used as a maneuver signal to a contactor.

Number 3/4/5- Mixing valve motor 1
Block used for the mixing valve motor to heating system 1.

Number 6/7- Radiator pump 2
Block used for the radiator pump to heating system 2. If a 3-phase 400V pump is used this signal can be used as a maneuver signal to a contactor.

Number 8/9/10 – Mixing valve motor 2
Block used for the mixing valve motor to heating system 2.

Number 11/12 – Radiator pump 3
Block used for the radiator pump to heating system 3. If a 3-phase 400V pump is used this signal can be used as a maneuver signal to a contactor.

Number 13/14/15 – Mixing valve motor 3
Block used for the mixing valve motor to heating system 3.

Number 16/17 – Hot water recirculation pump
Block used for the mixing valve motor to heating system 3.

Number 18/19/20 – Changing valve
Block used for changing valve between tank 1 and tank 2.
Observe that output 19 is a direct line, i.e. the motor must be a 2-point motor.

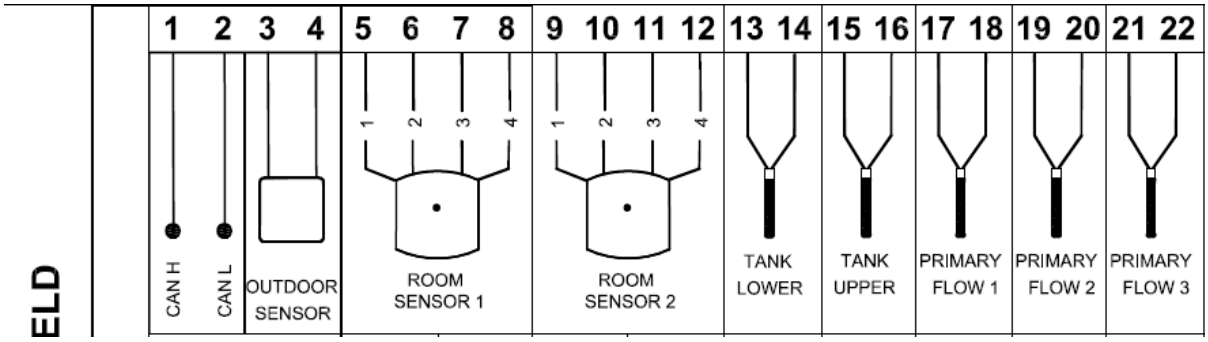
Number 21/22 – External heat step 1
Block used if external power sources should be controlled from Exotrol Multi .
Observe that the output is a digital out, 230V.

Number 23/24 – External heat step 2
Block used if external power sources should be controlled from Exotrol Multi .
Observe that the output is a digital out, 230V.

Number 25/26 – External heat step 3
Block used if external power sources should be controlled from Exotrol Multi .
Observe that the output is a digital out, 230V.

Number 27/28 – Extra digital out
Not used.

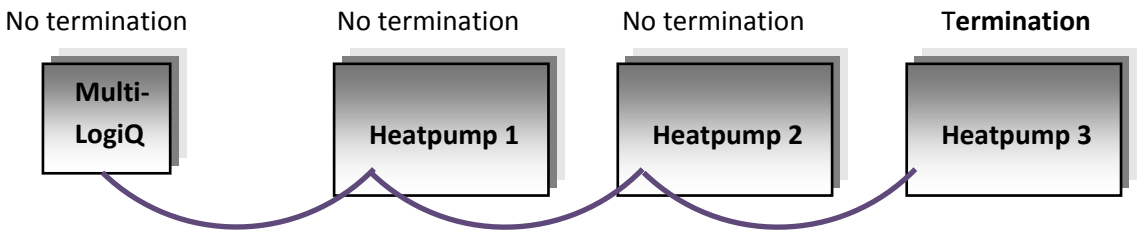
Low voltage connections

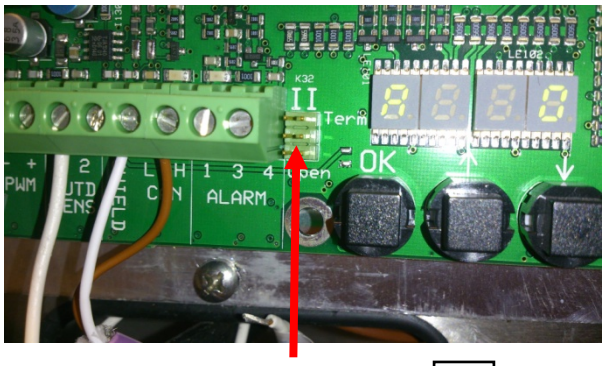


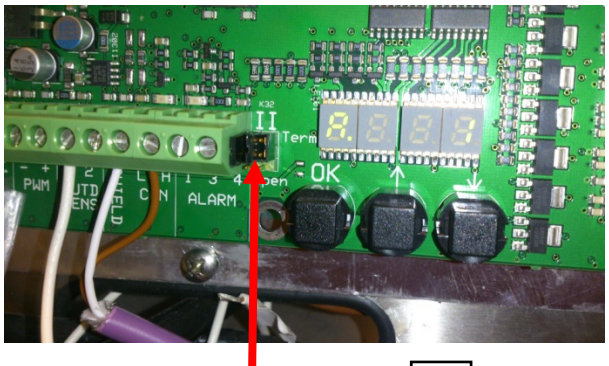
Number 1/2 – CAN communication

The CAN cable should be connected in series with the heat pumps. Observe the termination jumpers on the circuit board in the heat pumps. Only the last in the series should have termination jumpers mounted. The CAN-cable also have a shield that should be connected on all points, both heat pumps and in the Exotrol Multi .

No other cable than approved CAN-BUS cable is allowed.







Number 3/4 – Outdoor sensor

Outdoor sensor must always be installed and should be placed heading north.

Number 5/6 /7/8– Room sensor 1

Room sensor 1 is arbitrary to install. If installed it can adjust the set heating curve for heating system 1 and thereby improve system efficiency. However, it demands a central place in the building in order to function well.

Number 9/10 /11/12– Room sensor 2

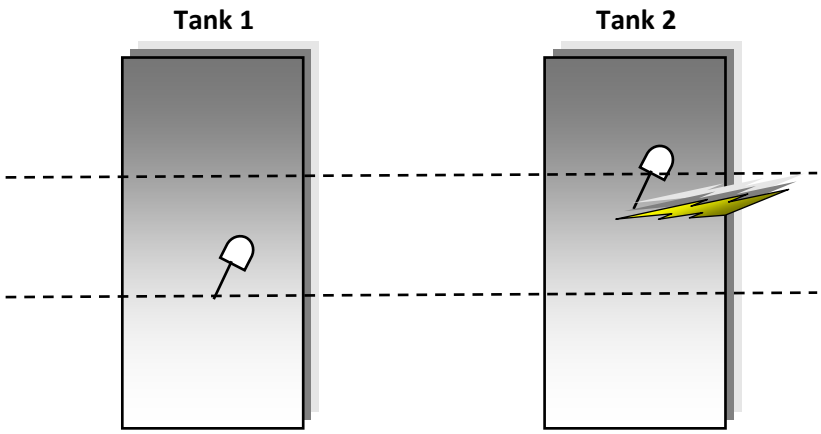
Room sensor 2 is arbitrary to install. If installed it can adjust the set heating curve for heating system 2 and thereby improve system efficiency. However, it demands a central place in the building in order to function well.

Number 13/14 – Temp sensor tank 1

Temp sensor tank 1 should be installed in tank 1. Placing is of great importance as the heat pumps will operate according to this temperature. Installation in a pocket is recommended; avoid mounting on the tank shell. Mount the sensor somewhere between 1/2 to 1/3 from the bottom, see picture below.

Number 15/16 – Temp sensor tank 2

Temp sensor tank 2 should be installed in tank 2. Placing is of great importance as both the heat pumps and external power sources will operate according to this temperature. Installation in a pocket is recommended; avoid mounting on the tank shell. If electric heaters are installed the sensor must be placed above them. Mount the sensor somewhere between 1/2 to 2/3 from the bottom, see picture below.



Number 17/18 – Temp sensor heating system 1

Temp sensor tank heating system 1 should be installed **after** the mixing valve controlling heat to heating system 1. Mount Mount it on the pipe and insulate it well.

Number 19/20 – Temp sensor heating system 2

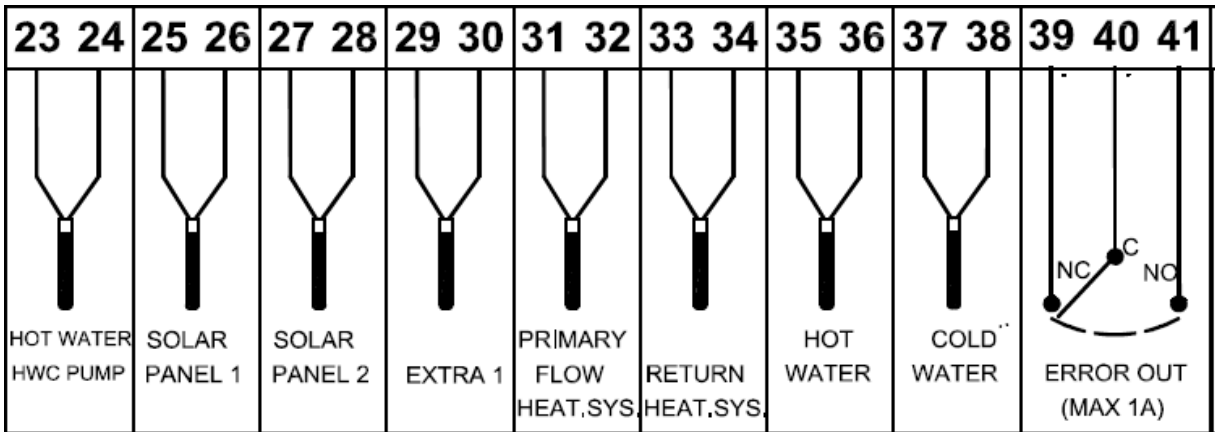
Temp sensor tank heating system 1 should be installed **after** the mixing valve controlling heat to heating system 2. Mount it on the pipe and insulate it well.

Number 21/22 – Temp sensor heating system 3

Temp sensor tank heating system 1 should be installed **after** the mixing valve controlling heat to heating system 3. Mount it on the pipe and insulate it well.

Number 9/10 /11/12– Room sensor 2

Room sensor 2 is arbitrary to install. If installed it can adjust the set heating curve for heating system



Number 23/24 – Temp sensor hot water recirculation

There are different ways to control hot water recirculation directly from Exotrol Multi . One way is to measure the temperature on the domestic hot water pipe and thereby decide when the circulation pump needs to operate. If using this method the sensor must be installed. Place the sensor on the hot water recirculation return pipe at least 1m from tank 2 (or electric boiler). Insulate well.

Number 25/26 – Temp sensor solar panel system 1

Not implemented

Number 27/28 – Temp sensor solar panel system 2

Not implemented

Number 29/30 – Temp sensor extra 1

Not used

Number 31/32 – Temp sensor heating system flow pipe

Not implemented

Number 33/34 – Temp sensor heating system return pipe

Not implemented

Number 35/36 – Temp sensor domestic hot water

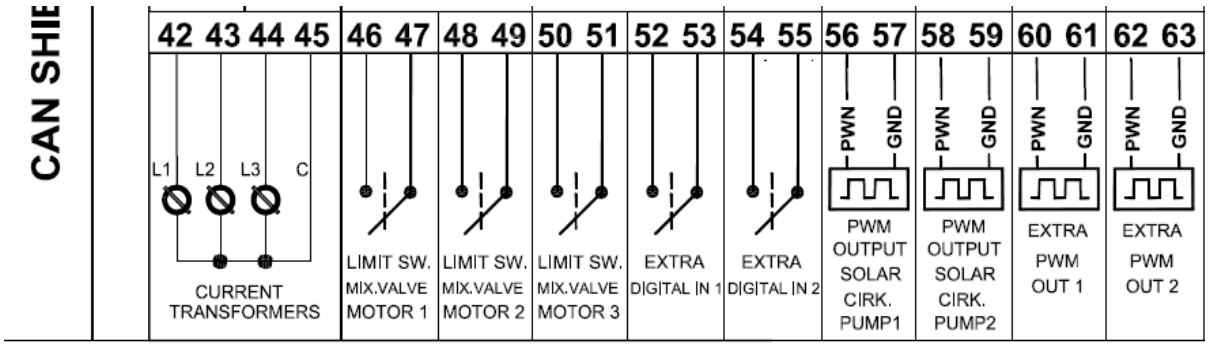
Not implemented

Number 37/38 – Temp sensor domestic cold water

Not implemented

Number 39/40/41 – External error relay

This block can be used if a signal to another control system is needed. The signal can be both NC or NO. At normal operation without errors 39 and 40 is closed. If error occurs (or power failure) contact between 40 and 41 will be true.



Number 42/43/44/45 – Current transformers

Not implemented

Number 46/47 – Limit switch mixing valve motor 1

If the mixing valve motor is equipped with a limit switch it's possible to set a time delay before the mixing valve get permission to collect energy from tank 2 and thereby improve system efficiency. It's recommended but not necessary to install in order to get the system running.

Number 48/49 – Limit switch mixing valve motor 2

If the mixing valve motor is equipped with a limit switch it's possible to set a time delay before the mixing valve get permission to collect energy from tank 2 and thereby improve system efficiency. It's recommended but not necessary to install in order to get the system running.

Number 50/51– Limit switch mixing valve motor 3

If the mixing valve motor is equipped with a limit switch it's possible to set a time delay before the mixing valve get permission to collect energy from tank 2 and thereby improve system efficiency. It's recommended but not necessary to install in order to get the system running.

Number 52/53– Extra digital in 1

Not implemented

Number 54/55– Extra digital in 2

Not implemented

Number 56/57– PWM output solar circulation pump 1

Not implemented

Number 58/59– PWM output solar circulation pump 1

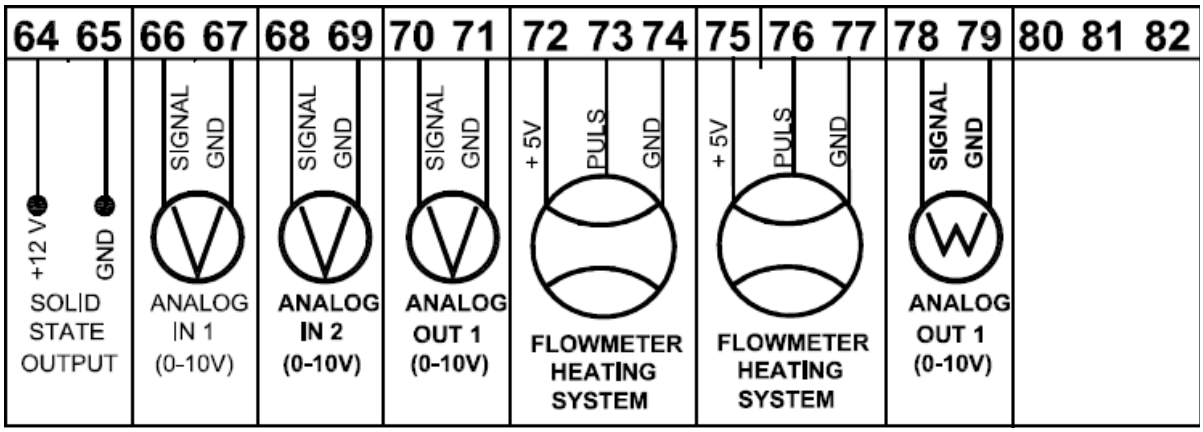
Not implemented

Number 62/63– PWM out extra 1

Not implemented

Number 63/64– PWM out extra 2

Not implemented



Number 64/65– Solid state output

Not implemented

Number 66/67– Analog in 1

Not implemented

Number 68/69– Analog in 2

Not implemented

Number 70/71– Analog out 1

Not implemented

Number 72/73/74 – Flow meter heating system 1

Not implemented

Number 75/76/77 – Flow meter heating system 2

Not implemented

Number 78/79 – Power input pulse

Not implemented

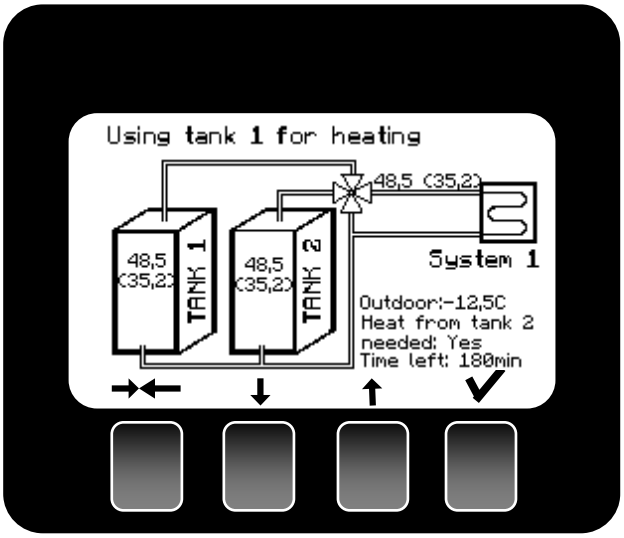
The display

The display contains 4 buttons and has different functionality depending on what page in the menu system that is active.
Above every button symbols describe what function the button has in the present view.

In general the first button (from left) is used to enter menus, to escape/go back in the different views. A short push for enter menus and a long push in order to go back.

Buttons in the middle (up/down) is used to choice where to enter or when setting values

Button to the right is used to confirm settings.



There are 2 modes for the display:

Graphical system overview	This mode is shown when no menu is entered. The system will show actual values and settings in the system.
Menu system	This mode is entered by pushing the left button short. First show is the main menu described in next chapter

Menu system

Main menu have the following head texts:

```
> Settings
  History
  Manual Control
  Language
  SystemInfo
```

Settings	In this entry all possible settings of the system, both customer, installer and service, is adjusted.
History	History contains all information that the system collects during operation, for example operation times, energy consumption etc.
Manual Control	This entrance is protected by code and should only be used of service technicians or educated installers
Language	From this release only English is possible to set
System info	This entry gives information of the what products that have beenfound on the CAN-bus, i.e. found heat pumps.

Settings

Settings menu have the following sub menus

> Customer settings
System configuration
Advanced settings
Display
Factory reset
Clear times
Reset errors

Customer settings	In this entry settings for the customer is available. For example adjusting the heating curves.
System configuration	System configuration must be entered by the installer in order to start the system. In this menu the system will be informed what components that are installed and how it's configured. For example how many heating system that will be controlled.
Advanced settings	This entrance is used of the installer to make advanced settings for the system, for example how the hot water recirculation pump should be used.
Factory reset	Menu for making factory reset of all set parameters.
Clear times	Menu for resetting all history collected by the system, for example operation times.
Reset errors	Menu for resetting errors in the system.

Customer settings

Customer settings have the following sub menus.

```
> Heating system 1
  Heating system 2
  Heating system 3
  Hot water settings
```

Heating system 1	Settings for heating system 1
Heating system 2	Settings for heating system 2
Heating system 3	Settings for heating system 3
Hot water settings	Settings for domestic hot water
Time schedule settings	Not active

Heating system

(The same display views is available for heating system 2 and 3)

Room sensor setting

This setting is possible to enter only if room sensor is set to be installed in system menu.
In this menu one can choose if the room sensor should be used to adjust the heating curve or not.

Room temperature

This setting is possible to set only if room sensor is set to be installed in system configuration menu and that room sensor is set to control the heating curve, above setting.
In this setting a desired indoor temperature can be set. If the temperature on room sensor exceeds set value the system will decrease primary flow temperature.

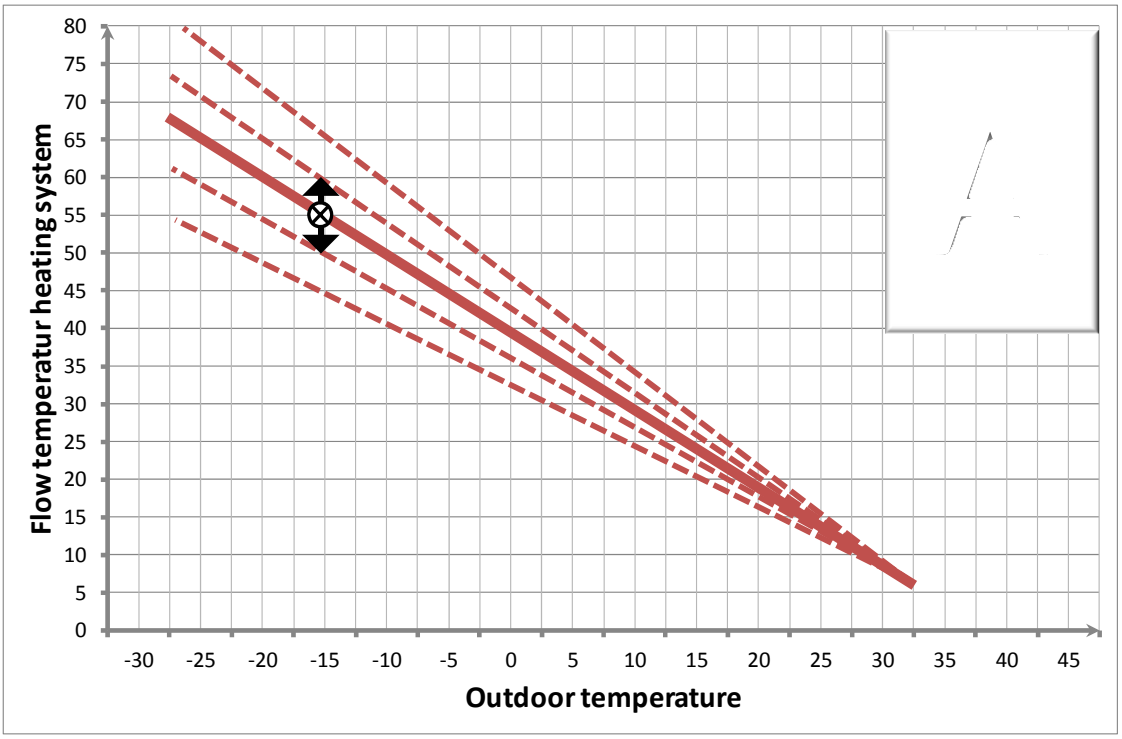
Heat curve point A

There are 3 basic settings for the heating curve, points A, B and C. With these 3 points, you can adjust the gradient and vertical position.

The aim is always to set the curve as low as possible.

Point A describes the temperature of the water to be sent to the heating system if the outdoor temperature is -15°C. The factory default setting for this item is 55°C. In other words, when it is -15°C outside, the mixing valve open in order to transmit 55°C hot water to the heating system.
When you adjust this point, you change the angle of the entire heating curve. The biggest changes occur when outdoor temperatures are cold - see the graph below.

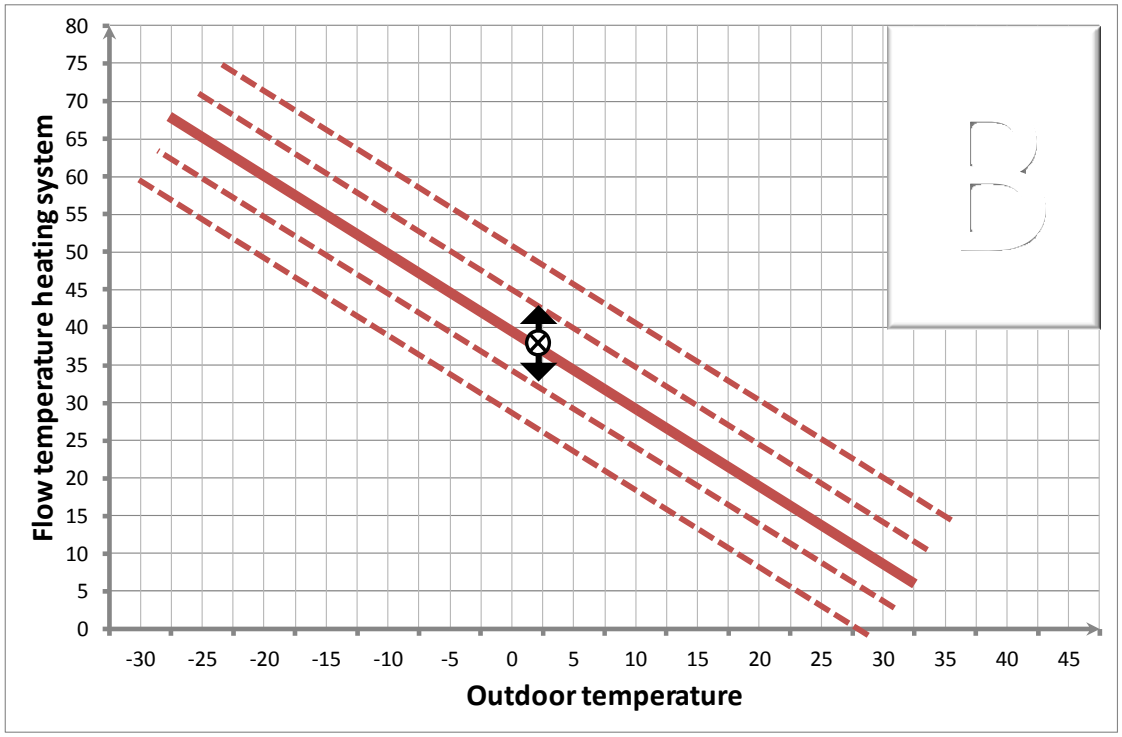
Adjusting point A on the heating curve. (The factory default setting 55° C is marked with a cross)



Heat curve point B

Adjusting point B means that the entire heating curve moves upwards or downwards (parallel movement). In other words, you don't adjust the gradient for any particular outdoor temperature, rather you adjust the curve for the entire outdoor temperature range. The factory default setting is 0°C, i.e. no movement at all. If you increase this value, the curve moves upwards, i.e. becomes warmer, and if you reduce this value, the temperature drops.

Adjusting point B on the heating curve.

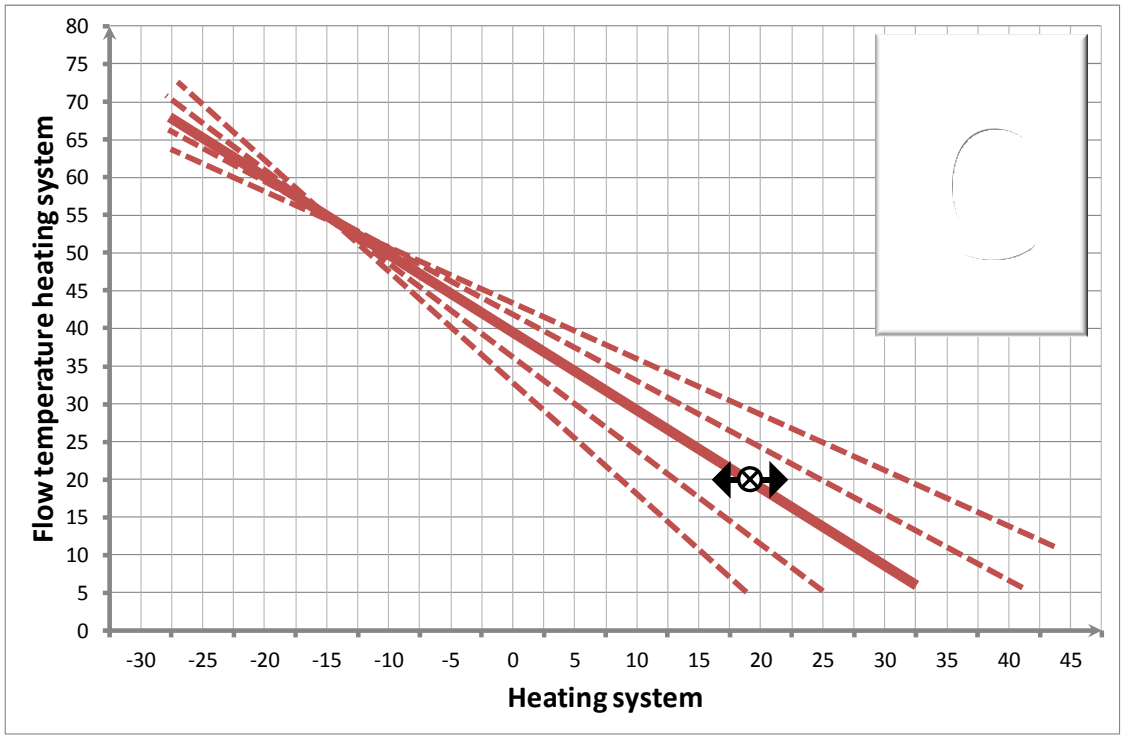


Heat curve point C

Point C has 2 meanings.
On the one hand, it is used to adjust the gradient of the heating curve during warmer outdoor temperatures, but it is also used as a "shutoff temperature" for the heat to the heating system. When the outdoor temperature reaches this temperature and stays there for at least 8 hours, the mixing valve closes fully and the radiator pump is set off, i.e. no heat is sent to the heating system.

During summer time when heat is in off-mode both circulation pump and mixing valve, which determines the temperature to the heating system, will be run periodically in order to prevent sticking.

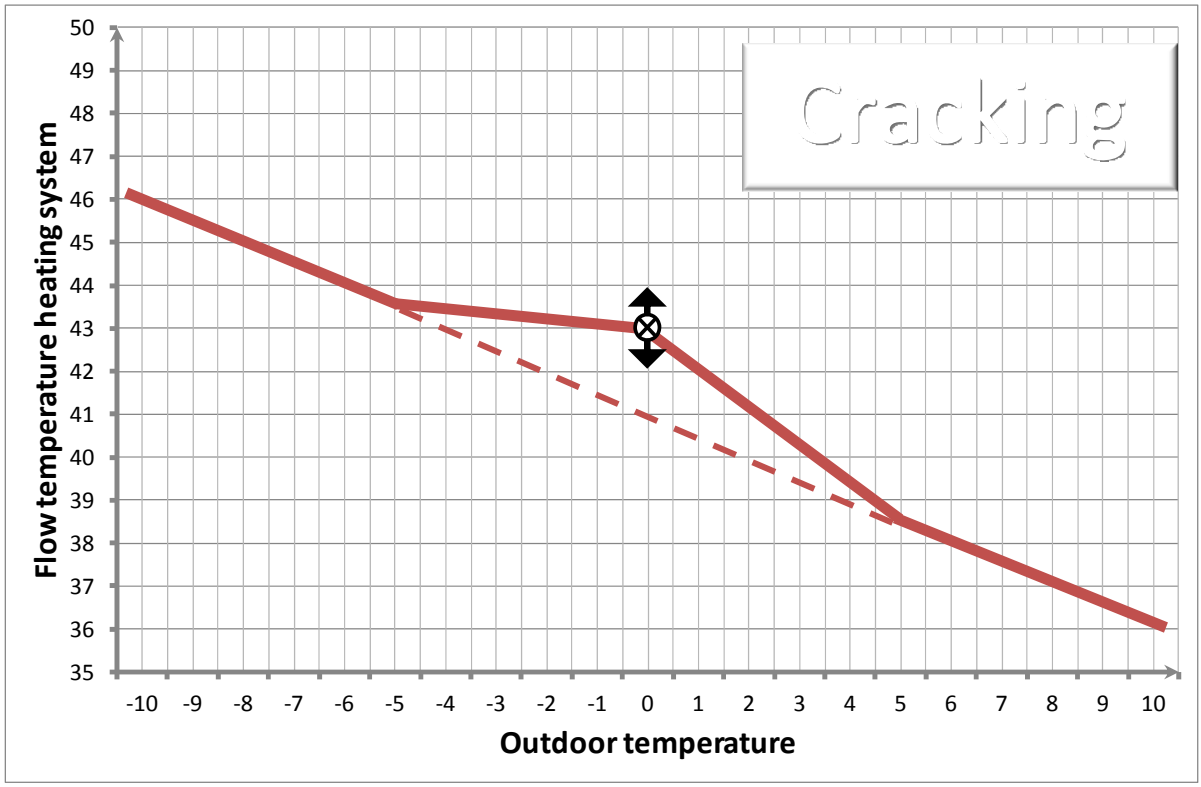
Adjusting point C on the heating curve. (The factory default value of +17°C is marked with a cross).



Cracking of heat curve

When the outdoor temperature is around 0°C and it is very windy, slightly warmer water may sometimes need to be sent to the heating system. We call this adjustment, when the outdoor temperature is 0°C, cracking the curve.
If you feel that there isn't enough heating when it is around 0°C outside, but it is otherwise sufficient, you can increase this setting somewhat.

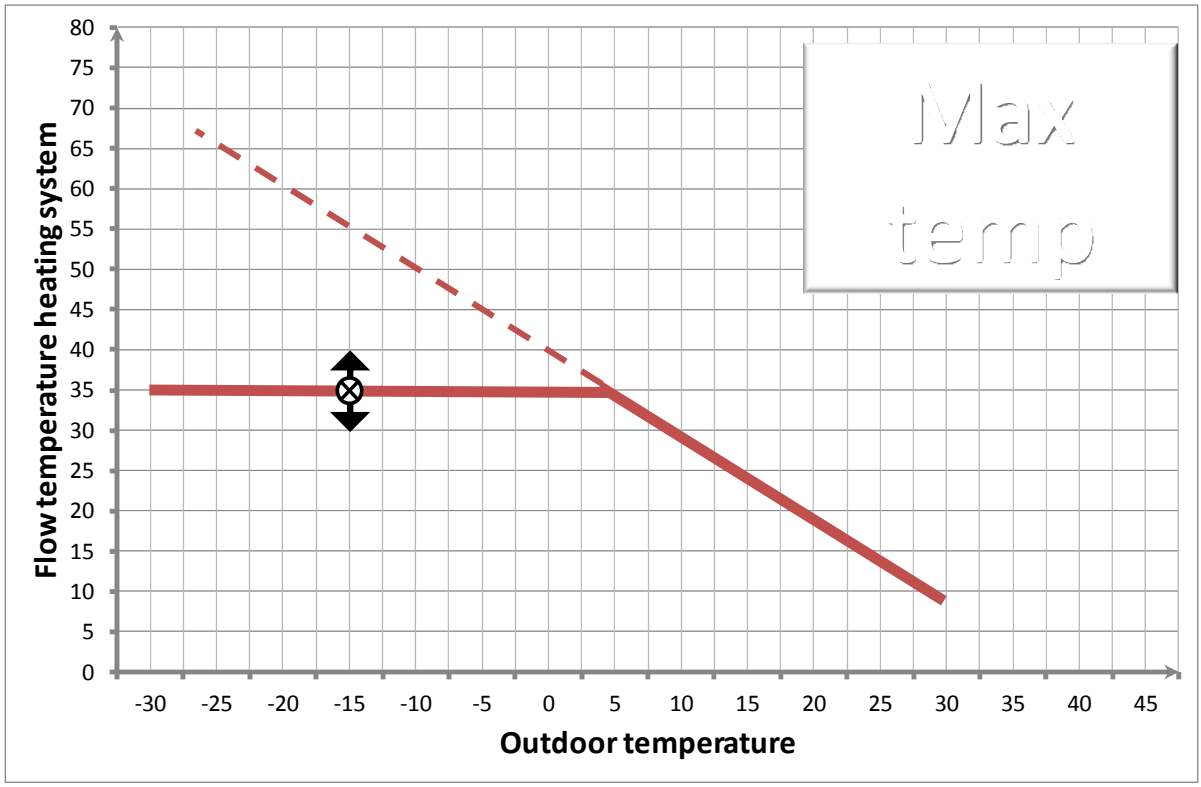
Adjusting the cracking point. (The factory default value is 0)



Max temp heating system

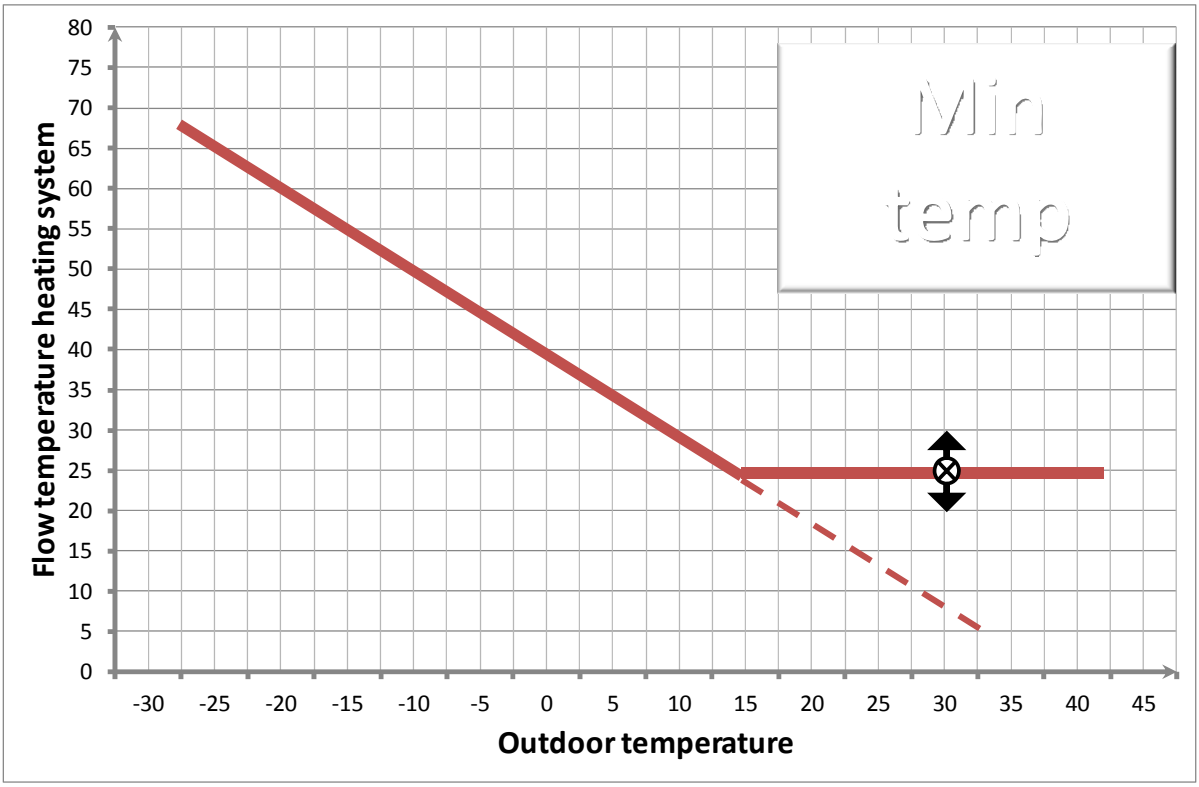
Points A, B and C are all used to set the curve in different positions. There are also settings for the max and min temperature that will be sent to the heating system.
These settings do not affect the gradient or the position of the heating curve. Instead, they restrict the curve and allow you to set a minimum and maximum temperature that is sent to the heating system.

Max temperature is mainly used to prevent too hot water to enter an under floor heating system
This setting limits the heating curve and sets the maximum temperature at which water can be sent to the heating system, regardless of how cold it is outside.



Min temp heating system

The min temperature setting allows you to cancel the function described in point C, "heat off", which means that the mixing valve stops sending energy to your heating system. If you activate basement heating, Exotrol Master will continue to send water at the temperature you set, even if the outdoor temperature is above the set point.
The function is activated if the set temperature is above 10C.



Hot water settings

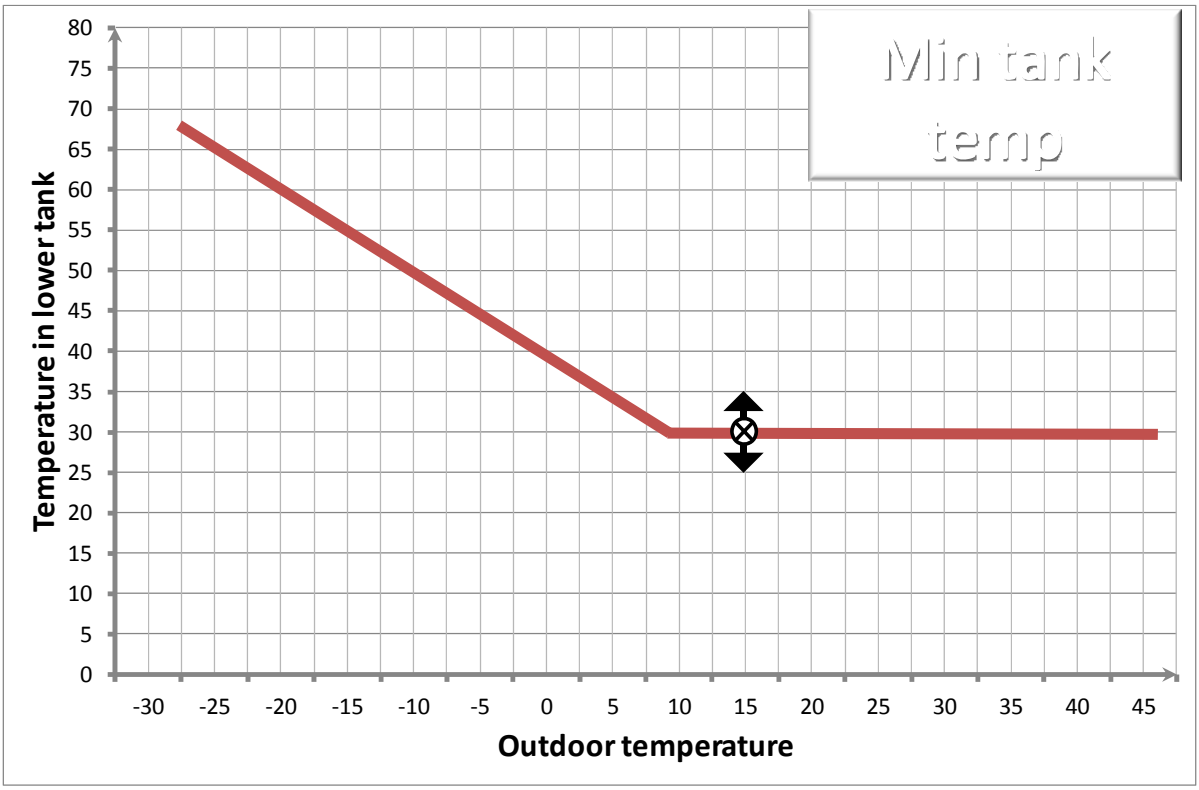
This menu gives possibility to set temperatures in the tanks that affect the hot water comfort.

Max tank temperature

This setting decides the set temp that tank 2 will hold at all conditions. Observe that higher values will decrease system efficiency and possibly make it impossible for the heat pumps to charge the tank. Always start at default setting (53C) and increase later if higher domestic hot water temperatures is needed.

Min tank temperature

This setting decides the lowest allowed temperature in tank 1. As tank 1 operates according to the heating curve the temperature will differ dependent on ambient conditions. At summer time there's no or small heating need and therefore no meaning to keep a high temperature for the heating system. However, tank 1 is also used for pre heating of the domestic hot water. This setting set the lowest temperature that tank 1 will have at all conditions, despite the heating curve.



System configuration

System configuration must be entered by the installer in order to start the system. In this menu the installed system will configured.
The menu is code protected. **Code: 3 5 5 0**

The configuration menu has 4 submenus:

```
> Heat pumps
  Heating system
  Solar system
  Communication
```

Heat pumps	Configuration of installed/found heat pump
Heating system	Configuration of tank system, heating systems, hot water recirculation, external energy sources etc.
Solar system	Not available in this version
Communication	Not available in this version

Heat pumps

When entering this menu all found heat pumps will be shown. In order to make it possible to run the heat pumps they need to be “installed” in the system.

ID	No	Found	Installed
0	Heat pump 1	Exotic 17	0
1	Heat pump 2	Exotic 10	0
2	Heat pump 3	Polaris 20	0
3			
4			
5			
6			
7			
8			

Heating system

There are 13 settings available in this menu:

Number of heating system

Set the number of installed heating systems (mixing valves).

External power sources

Set the number of installed external power sources that should be controlled by Exotrol Multi

Current sensors installed

Not used

Room sensor heating system 1

Set to “1” if room sensor for heating system 1 is installed in the system

Room sensor heating system 2

Set to “1” if room sensor for heating system 2 is installed in the system

Floor heating only in heating system 1

If heating system 1 has floor heating only this setting should be set to “1”. It will change default settings for maximum temperature to the heating system.

Floor heating only in heating system 2

If heating system 2 has floor heating only this setting should be set to “1”. It will change default settings for maximum temperature to the heating system.

Floor heating only in heating system 3

If heating system 3 has floor heating only this setting should be set to “1”. It will change default settings for maximum temperature to the heating system.

Number of solar systems

Not used

Hot water recirculation pump

If hot water recirculation pump is installed in Exotrol Multi this setting should be set to “1”

Allow external power source 1

If at least 1 external power source is installed (in previous settings) this setting will be activated. Here it’s possible to allow or block operation of the installed source.

Allow external power source 2

If at least 2 external power sources are installed (in previous settings) this setting will be activated. Here it’s possible to allow or block operation of the installed source.

Allow external power source 3

If at least 3 external power sources are installed (in previous settings) this setting will be activated. Here it's possible to allow or block operation of the installed source.

Advanced settings

The advance settings menu is code protected and should be used only by installer and/or service technician. Depending on the choices in the system configuration menu different views will be available.

Code: **7 9 0 2**

Available sub menus:

> Heat pumps
> Accumulator tanks
> Heating system
> Hot water recirculation
> External power sources
> Solar system
> Calibration (not heat pumps)

Heat pumps	Settings for installed heat pumps
Accumulator tanks	Settings affecting the tanks behavior
Heating system	Settings affecting heat supply to the heating systems
Hot water recirculation	Settings for hot water recirculation
External power sources	Settings for installed external power sources
Solar system	Not used
Calibration (not heat pumps)	Calibration of all sensors except heat pump sensors.

Heat pumps

First choice when entering this menu is a list with all installed heat pumps. Choose the heat pump where the settings should be changed.

```
>   Heat pump 1    (Exotic 17)
    Heat pump 2    (Exotic 10)
    Heat pump 3    (Polaris 20)
    Heat pump 4
    Heat pump 5
    Heat pump 6
    Heat pump 7
    Heat pump 8
```

Depending on installed heat pump model different settings will be available

Enable compressor operation

As per default the compressor is blocked. Used this setting to unlock the compressor and allow operation.

Defrost cycle start temperature (only A/W heat pumps)

At different times depending on ambient temperature the heat pump check if a defrosting is necessary. When this check is done the defrosting sensor is compared with this set value. If sensor value is below this temperature a defrosting cycle will initiate.

Defrost cycle start temperature (only A/W heat pumps)

If a defrosting cycle is initiated defrosting will continue until the defrost sensor reaches this set value.

Fan high speed at set outdoor temperature (only A/W heat pumps)

The fan(s) on the heat pumps have both high and low speed. From a performance point of view it’s always best to run the fans at high speed, but it’s possible to set a temperature where the speed is lowered. Above the set temperature low speed is activated.

Max flow temperature

All heat pumps have limits due to compressor operation envelope. Max temperature is the max temperature that the heat pump can achieve before it stops on too high temperature. For A/W heat pumps this limitation will depend also on outdoor temperature, i.e. even if a high value is set, it might not be possible for the heat pump to achieve.

Adjust motor protection setting

The heat pumps have an electronic motor protection which momentarily monitor operation currents to the compressor. At some conditions it might be necessary to adjust the default value. If for example the phase voltage is low the currents will increase and an adjustment is necessary. However, this setting should be handled carefully as careless setting may harm the compressor.

Calibration of flow temperature sensor
Calibration of sensor

Calibration of return temperature sensor
Calibration of sensor

Calibration of hot gas temperature sensor
Calibration of sensor

Calibration of defrost temperature sensor (A/W heat pumps only)
Calibration of sensor

Calibration of brine out temperature sensor (B/W heat pumps only)
Calibration of sensor

Calibration of brine in temperature sensor (B/W heat pumps only)
Calibration of sensor

Calibration of current sensor (B/W heat pumps only)
Calibration of current sensor (electronic motor protector)

Freezing alarm temperature for brine fluid (B/W heat pumps only)
This setting makes it possible to set the lowest permitted temperature on the brine fluid. If the temperature (measured on brine out) gets below this temperature the heat pump will stop and warn for too low brine temperature

Max temperature difference brine in/out (B/W heat pumps only)
Setting for controlling that the flow on brine side isn't too poor. If the difference between brine in and out sensor exceeds set value the heat pump will stop and warn for poor flow on brine side.

Autorun brine circulation pump for 48 hours (B/W heat pumps only)
After installation this setting can be used in order to help air venting the brine circuit. When activated brine circulation pump will run for 48 hours independent on if the compressor is running or not.

PI-regulator settings for charge pump
The charge pump operates with variable speed dependent on requested flow temperature. The control is achieved with a software PI-regulator. It might in some cases be necessary to adjust the parameters of the regulator depending on the hydraulic installation. There are 3 different settings available, see below.
Contact the reseller before changing any of these parameters

PGain for PI-regulator to pwm charge pump
Gain for the regulator. Increased values will fasten the control but can result in overshooting and possible high pressure cut out.

IGain for PI-regulator to pwm charge pump
Integral part for the regulator. This part will increase the regulator signal every 15 seconds as long as the set value isn't reached. If increased to much overshooting will be the result.

Minimum allowed flow for pwm charge pump
The charge pump has, dependent on the hydraulic installation, a minimum flow that can be achieved. Long pipe installations and bows will increase the pressure drop and thereby the minimum flow might be necessary to increase. (Observe that the setting is only a estimation of the flow)

Accumulator tanks

Following settings is available

> Restart hysteresis tank 1
Restart hysteresis tank 2
Tempdiff between heat pumps
Step time between heat pump
Max temp diff tank 1/heat pump
Max temp diff tank 2/heat pump
Max operation time tank 1
Max operation time tank 2

Restart hysteresis tank 1

The set value for tank 1 will differ depending on the set heating curve (or minimum allowed temperature). The restart hysteresis is the temperature that the tank temperature has to drop before restart of the heat pump will be true. If for example the setting is 4,5C and the nominal value calculated by the heating curve is 39,2C, then restart of first heat pump will be true at tank temperature 39,2-4,5=34,7C

Restart hysteresis tank 2

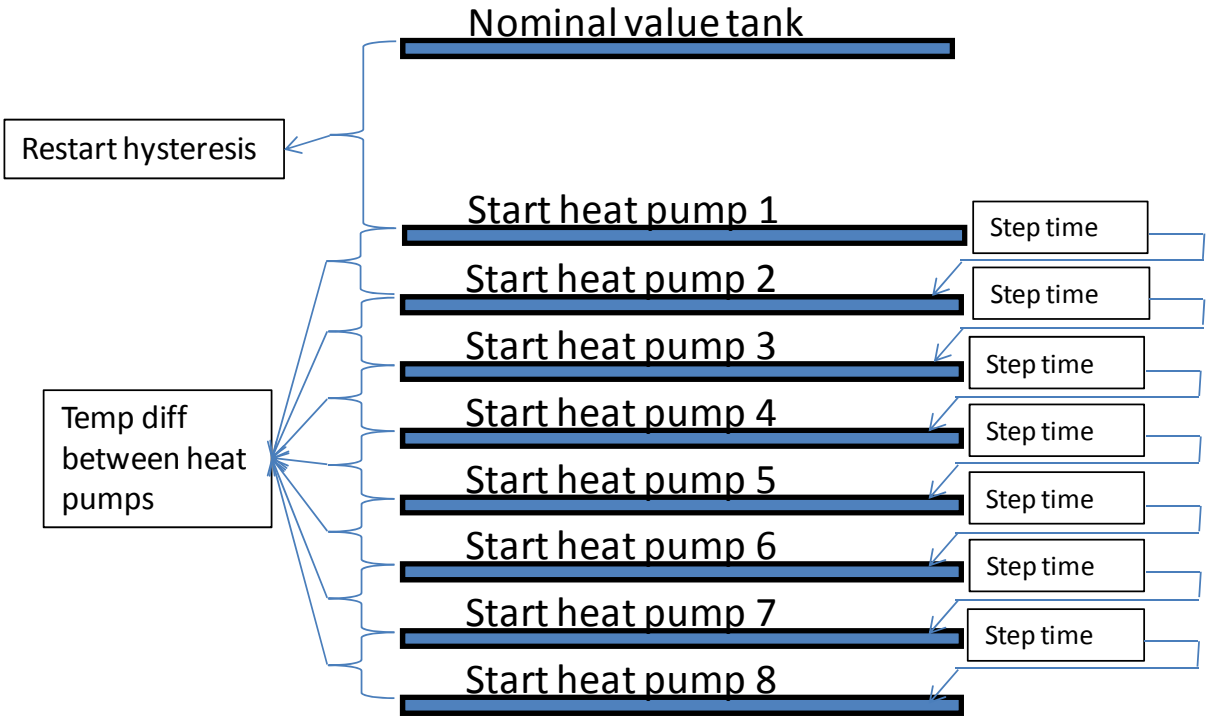
Same analogy as restart hysteresis for tank 1

Tempdiff between heat pumps

As described in "Restart hysteresis" the first heat pump (with least operation time) will start when the tank temperature reaches "tank temp"-"restart hysteresis".
Second heat pump (if installed) will start if the temperature decreases from this point-set value, i.e. "tank temp"-"restart hysteresis"-"set value"
The same is true for remaining heat pumps. (Also see figure below)

Step time between heat pumps

As written in "Tempdiff between heat pumps" heat pumps will start when the temperature decreases in the tank. However it's also possible to start heat pumps with time control even if the temperature hysteresis isn't fulfilled.
When first heat pump is started a timer start and after the set time delay has passed next heat pump will start. (Also see figure below)



Max temp diff tank 1/heat pump

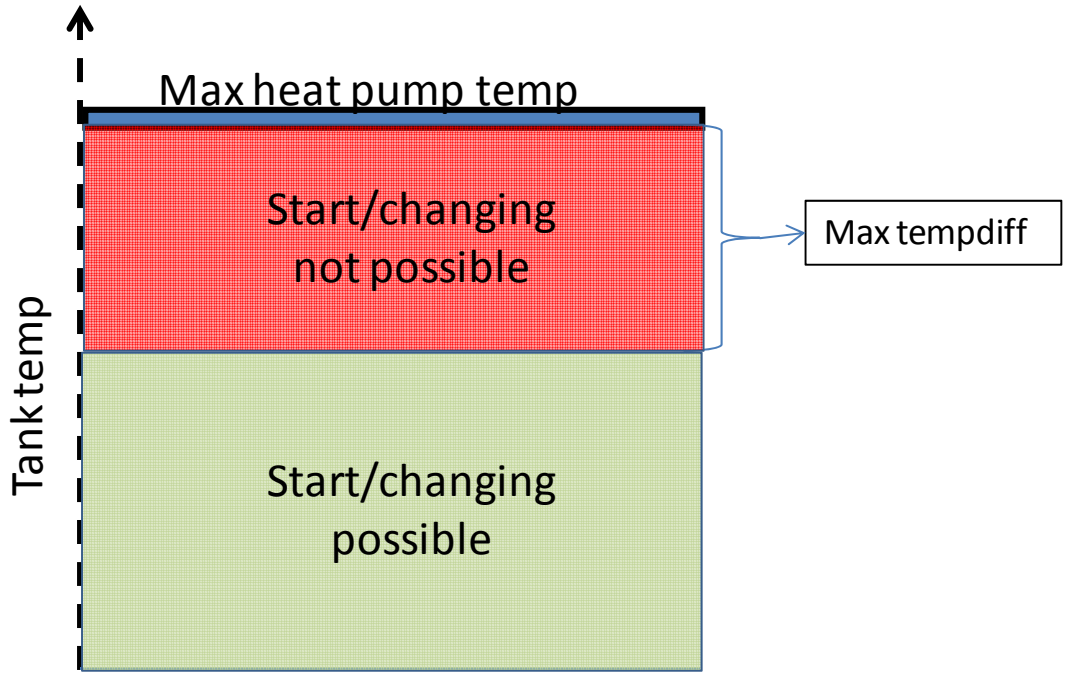
Before any heat pump is started a control is done in order to check if it's possible for the heat pump to operate to any of the tanks. This check is done by comparing the actual value on the tank sensor and the maximum temperature that the heat pump can provide at the given point. The setting gives the minimum temperature difference between the tank temperature and the heat pumps max flow temperature.

If for example the max allowed flow temperature for the heat pump is 59C and the set value is 8C it gives that the maximum allowed temperature in the tank can be 59-8C=51C in order for the heat pump to start.

The same control is done when the system is switching between charging tank 1 and tank 2.

Max temp diff tank 1/heat pump

Same analogy as max temp diff tank 1/heat pump



Max operation time tank 1

If there's a heating need in both tank 1 and tank 2 the latter will be charged first. However it's possible to set a maximum time for charging any of the tanks if there's a need in the other on. When the time has passed the system will switch to the other tank and operate until the need is fulfilled or until the max operation time has passed.

Max operation time tank 2

Same analogy as max operation time tank 1

Heating system

Following settings are available in this menu

> Time delay mixing valve 1
> Time delay mixing valve 2
> Time delay mixing valve 3
> Temp diff heating curves&tank1

Time delay mixing valve 1

If a mixing valve motor with a limit switch is installed it's possible to set a time delay before the mixing valve gets permission to open to tank 2. This function gives the heat pumps longer time to fulfill the energy need to the heating system instead of opening to the more expensive energy in tank2.

Time delay mixing valve 2

Same analogy as time delay mixing valve 1

Time delay mixing valve 3

Same analogy as time delay mixing valve 1

Temp diff between heating curve&tank1

As there needs to be an energy buffert in tank 1in order to provide the correct temperature to the heating system the nominal value for the tank is the calculated heating curve value plus this set value.
If for example the setting is set to 4,5C and the demanded temperature to the heating system is 41,2C at a given point the nominal value for tank 1 will be 41,2+4,5=45,7C

Hot water recirculation

Following settings are available in this menu

> Function choice
Temperature control
Time control – cycle time
Time control – period time

Function choice

In this setting there are 4 different choices:

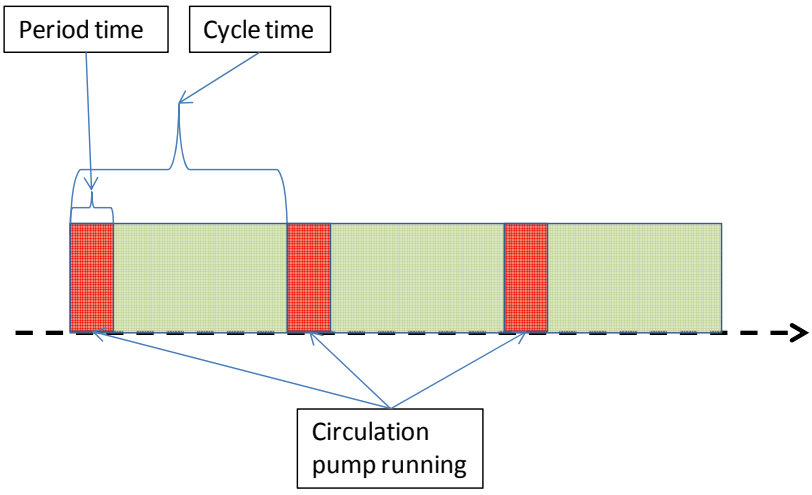
1.	Recirc off	Hot water recirculation pump inactivated
2.	Always on	Hot water recirculation pump is always on
3.	Temp ctrl	Hot water recirculation pump is controlled by temp sensor
4.	Time ctrl	Hot water recirculation pump is controlled by a time schedule

Temperature control

Only available if function choice is set to “Temp ctrl”
The setting gives possibility to set a temperature where the hot water recirculation pump starts to operate. Operation will continue for 10 minutes after the start or as long as the temperature doesn’t increase.

Time control – cycle time

Only available if function choice is set to “Time ctrl”
The function for time control has 2 settable parameters, cycle time and period time.
Cycle time is the total loop for the function and period time is the active time where the circulation pump runs during the cycle. See below figure.



External power sources

Following settings are available in this menu

> External power source 1
External power source 2
External power source 3
Delay time power source 1
Step time between source 1&2
Step time between source 2&3
Main fuse
Step model

External power source 1,2,3

Following settings are available in this submenu (same for source 1, 2, 3)

> Type of source
Power of source
Hysteresis
Allow operation

Type of source

Setting for type of power source. Following sources are available:

- El heat (Electric heater)
- Oil (Oil boiler)
- Gas (Gas boiler)
- Pellets (Pellets boiler)
- Wood (Wood boiler)

Power of source

Setting for the estimated power of the external source in kW.

Hysteresis

Restart hysteresis for the power source. Observe that external power sources only can be installed to tank 2.

Allow operation

The external source can be blocked by using this setting

Delay time power source 1

It's possible to set a time delay that delays the start of power source 1 even if the restart hysteresis is fulfilled.

Step time between source 1&2

This setting provides a possibility to start power source 2 even if the hysteresis isn't fulfilled. When source 1 starts the time starts to count. When the time has passed source 2 will be activated

Step time between source 2&3

Same analogy as step time between source 1&2

Main fuse

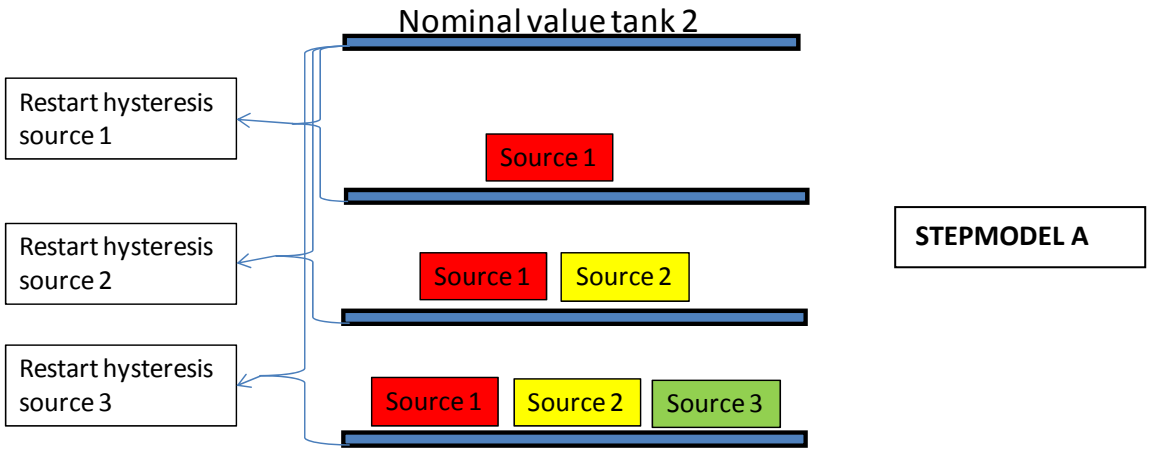
Not used

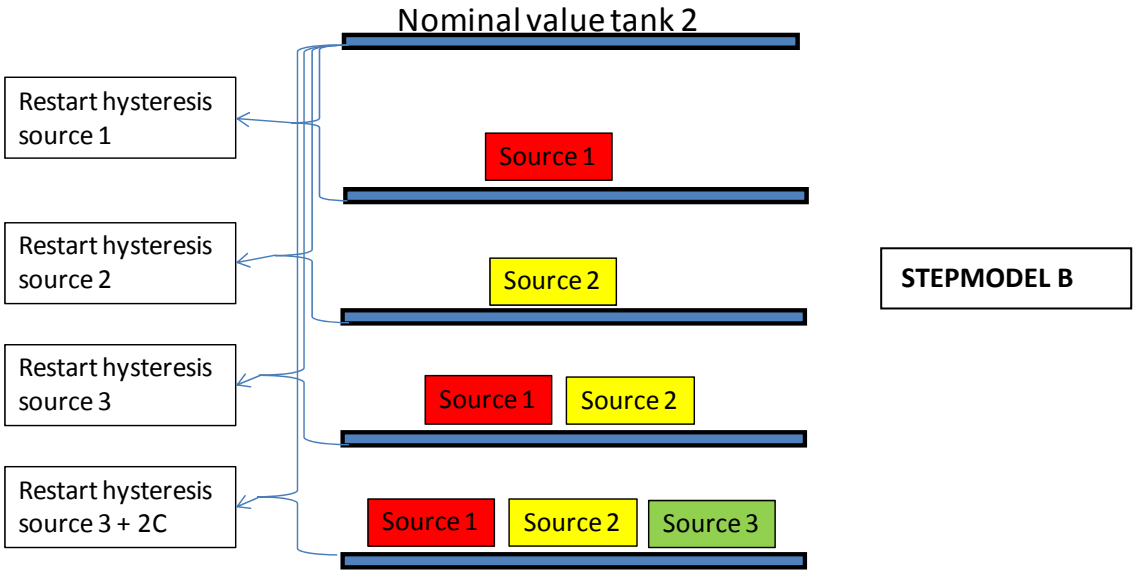
Step time between source 2&3

Same analogy as step time between source 1&2

Step model

There are 2 different models for the control of external power sources. Model A and model B. See figure below.





Calibration

This menu contains calibration of all sensors used in the heating system (not heat pump sensors). Depending on how the system is configured different view will be available. Following sensors can be calibrated in this version:

- Tank sensor tank 1
- Tank sensor tank 2
- Flow temp sensor heating system 1
- Flow temp sensor heating system 2
- Flow temp sensor heating system 3
- Room sensor heating system 1
- Room sensor heating system 2

History

The history menu have 3 submenus

> Operation heat pumps
Operation ext power sources
Alarm history heat pumps

Operation heat pumps

Following sub menus are available

> Heat pumps total operation time
Compressor total operation time
Compressor operation last 24h
Compressor starts last 24h

Heat pumps total operation time

Total operation times is shown in hours and is counted from first power up.

Compressor total operation time

Total compressor operation times is shown in hours and is counting when the compressor is active. The system will control the heat pumps in order to run the heat pumps equal time, i.e. total time for compressors should be close to each other.

Compressor operation time last 24h

Compressor operation time last 24h.

Compressor starts last 24h

Number of compressor starts last 24h.

Operation ext power sources

Following sub menus are available

> Total energy consumption
Average power
Energy consumption last 24h
Average power last 24h

Total energy consumption

Total energy consumption is shown for each of the power sources. The calculation is based from the set value of the estimated power of each source.
The view also shows the total operation time for the external sources

Total time energy source 1	125h
Energy source 1 (el.heat)	958kWh
Total time energy source 2	82h
Energy source 2 (el.heat)	614kWh
Total time energy source 3	25h
Energy source 3 (oil)	298kWh

Average power

Average power is shown for each of the power sources. The calculation is based from the set value of the estimated power of each source and the total power up time for the Exotrol Multi .

Energy source 1 (el.heat)	7,2kW
Energy source 2 (el.heat)	2,8kW
Energy source 1 (oil)	1,3kW

Energy consumption last 24h

Same analogy as for total energy consumption but calculated for the last 24h. Also operation times last 24h is shown

Time last 24h source 1	7h54min
Energy source 1 (el.heat)	154kWh
Time last 24h source2	2h15min
Energy source 2 (el.heat)	83kWh
Time last 24h source 3	1h04min
Energy source 3 (oil)	45kWh

Average power last 24h

Same analogy as for total average power but calculated for the last 24h.

Energy source 1 (el.heat)	7,2kW
Energy source 2 (el.heat)	6,8kW
Energy source 1 (oil)	2,1kW

Alarm history heat pumps

When entering this menu an overview with all installed heat pumps and number of logged errors.

			Alarms
>	Heat pump 1	(Exotic 17)	5
	Heat pump 2	(Exotic 10)	4
	Heat pump 3	(Polaris 20)	2
	Heat pump 4		
	Heat pump 5		
	Heat pump 6		
	Heat pump 7		
	Heat pump 8		

When a specific heat pump is chosen a new menu will open.

>	Alarm 1	Hot gas temp high
	Alarm 2	Hot gas temp high
	Alarm 3	High pressure cut out
	Alarm 4	Low pressure cut out
	Alarm 5	Brine in sensor error

When entering a specific alarm below log will open. Values shown is the momentarily values from when the error occurred.

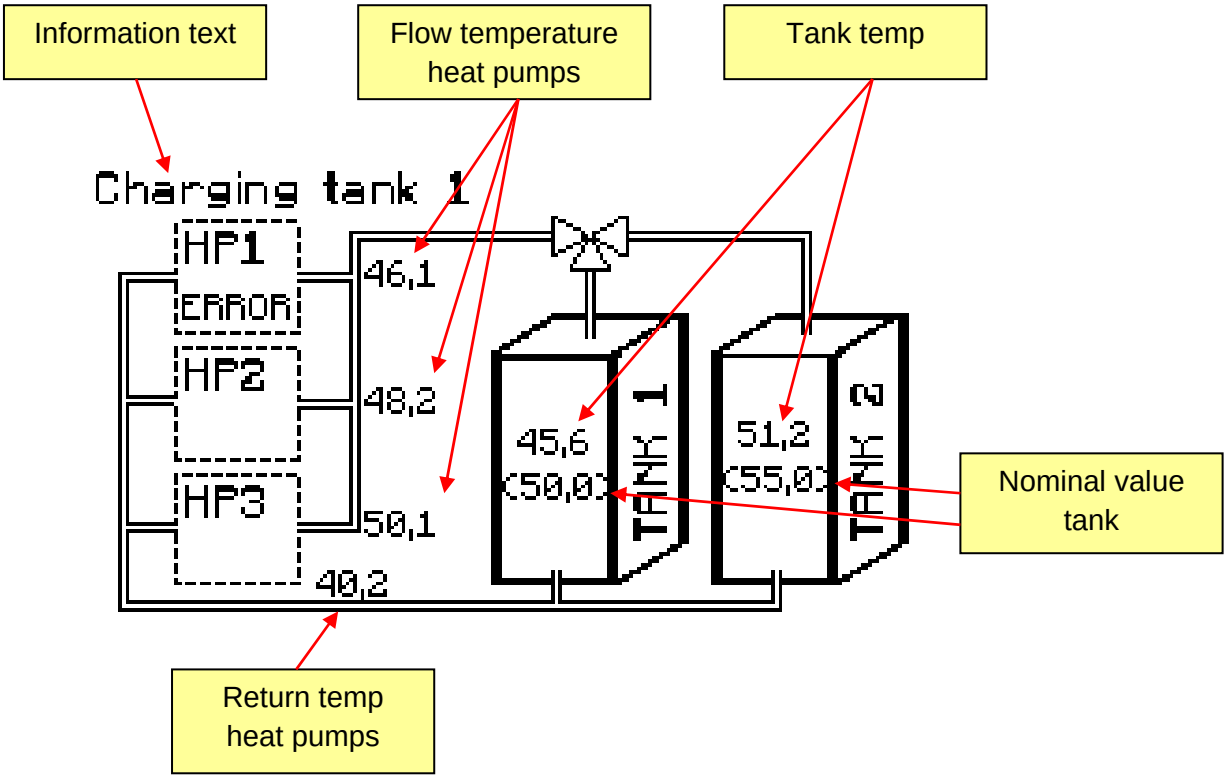
Alarm 1 Hot gas temp high	
Temp tank 1	44,2C
Temp tank 2	51,6C
Flow temp	59,5C
Return temp	50,2C
Brine in temp	-1,5C
Brine out temp	-4,1C
Hot gas temp	130C
Defrost temp	
Outdoor temp	-5,8C
Current commpressor	13,1A
Flow PWM pump	1386l/h

Graphical system overview

This chapter handle all the graphical pages that shows the different system parameters and the actual values in the system. To scroll between the shows use the up/down buttons.

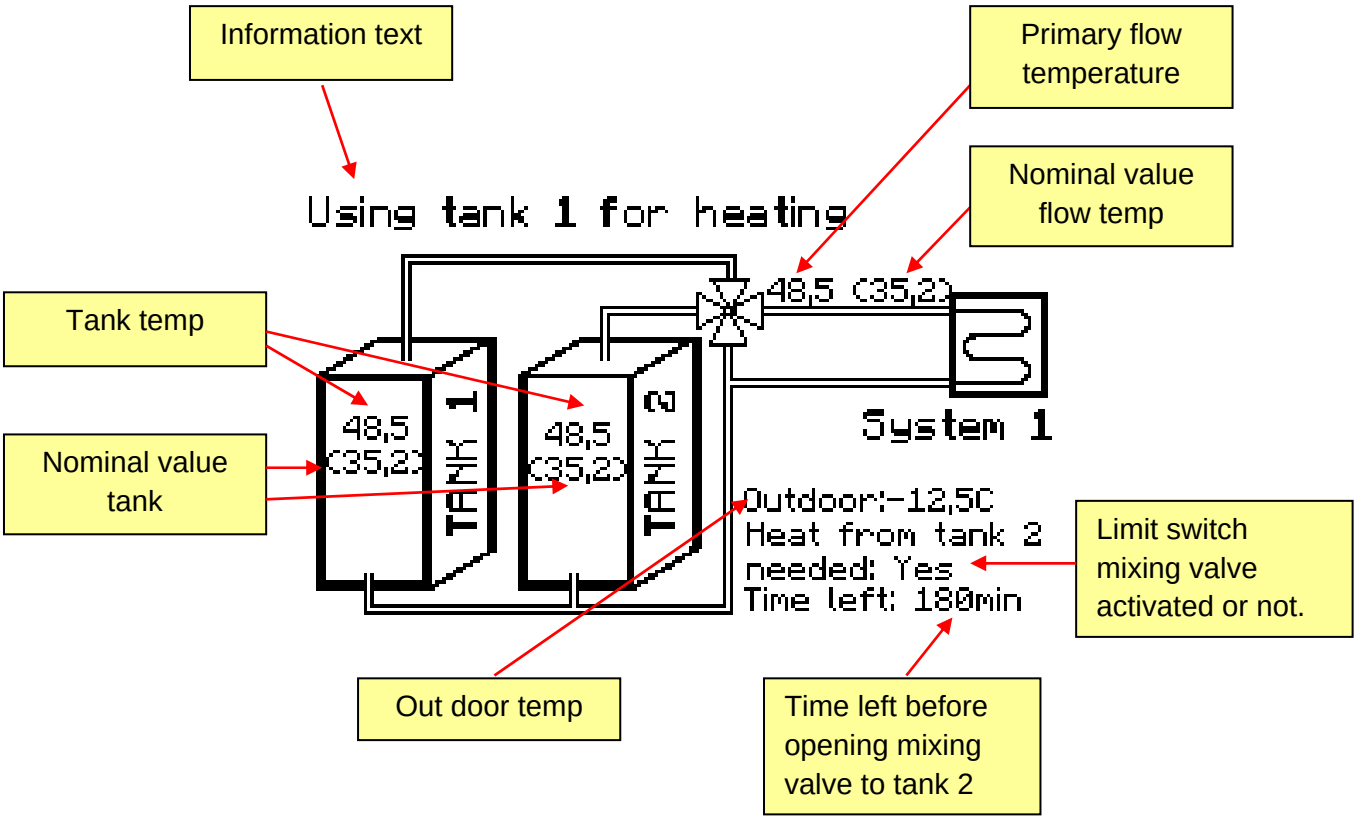
Charging tanks

This page shows the heat pump operation to tank 1 or tank 2. When charging is running the flow will be simulated to the tank which is charged. If an error is present in a heat pump the text “ERROR” will be shown inside the heat pump box.



Heating system operation

This page is available for each of the heating systems (max 3) and shows temperatures sent to the heating system and the mixing valve behavior etc.
The flow from the tanks through the mixing valve will be simulated.



Tank charge control

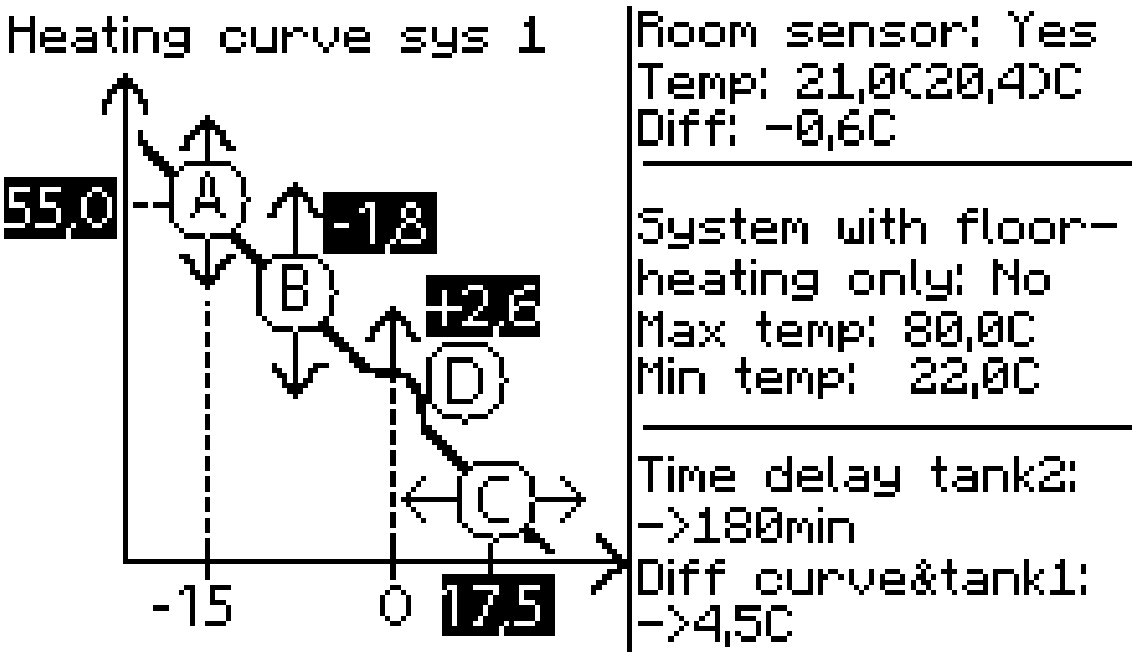
This page provides information of the different settings controlling the charging of the tank. These parameters have been explained in the settings menu chapter.

```
SETTINGS CHARGE CONTROL TANKS

Restart hysteresis tank 1:          5,0C
Restart hysteresis tank 2:          3,4C
Tempdiff between heat pumps:        2,0C
Step time between heat pumps:      30min
Max operation time to tank 1:     180min
Max operation time to tank 2:     120min
```

Heating curve

This page provides information of the settings of the heating curve and is available for all of theheating systems (max 3). A majority of these settings is done in customer menu, please see chapter “Customer settings”.



External power sources

This page provides information on the status for external power sources if installed. Both settings and actual values are shown.

External power sources

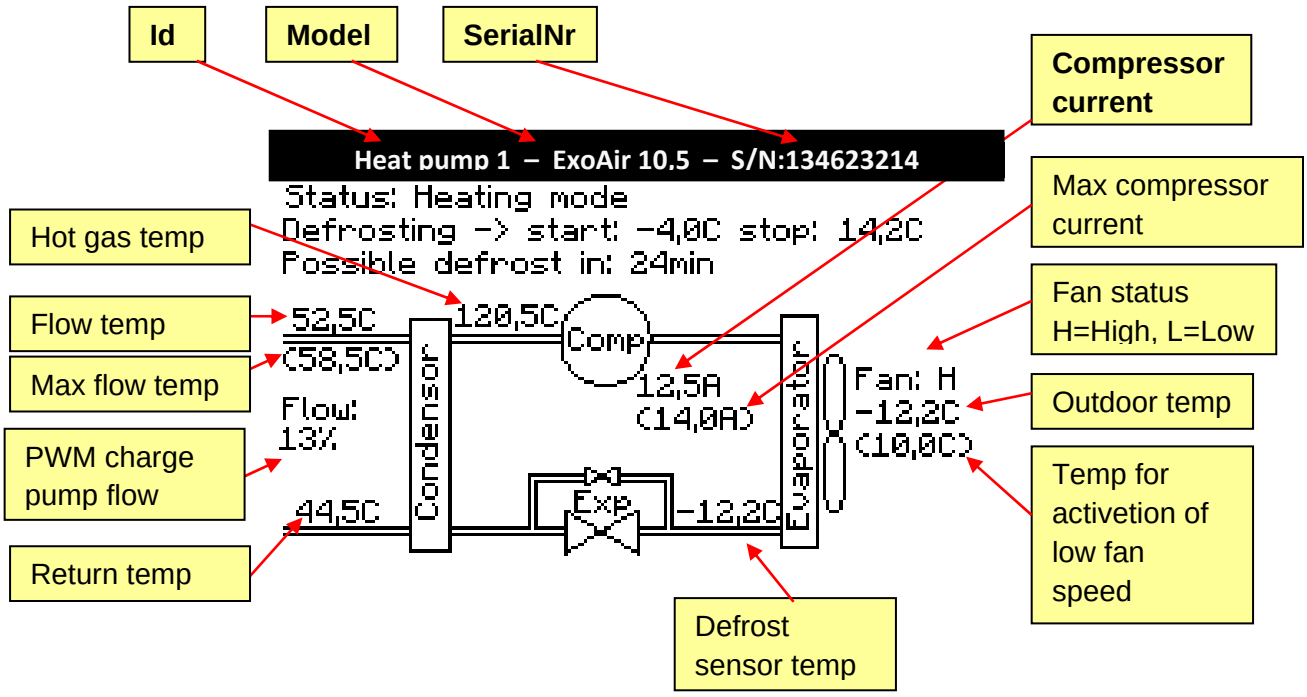
Total current power: 14,5kW
Max available power: 40,0kW

Step	Step1	Step2	Step3
Allowed	Yes	Yes	Yes
Status	On	On	Off
Type	El.heat	El.heat	Pellets
Power	8,5kW	6,0kW	25,5kW
Hysteresis	8,5C	10,5C	15,0C
Delay time	20min	-	-
Step time	-	40min	100min

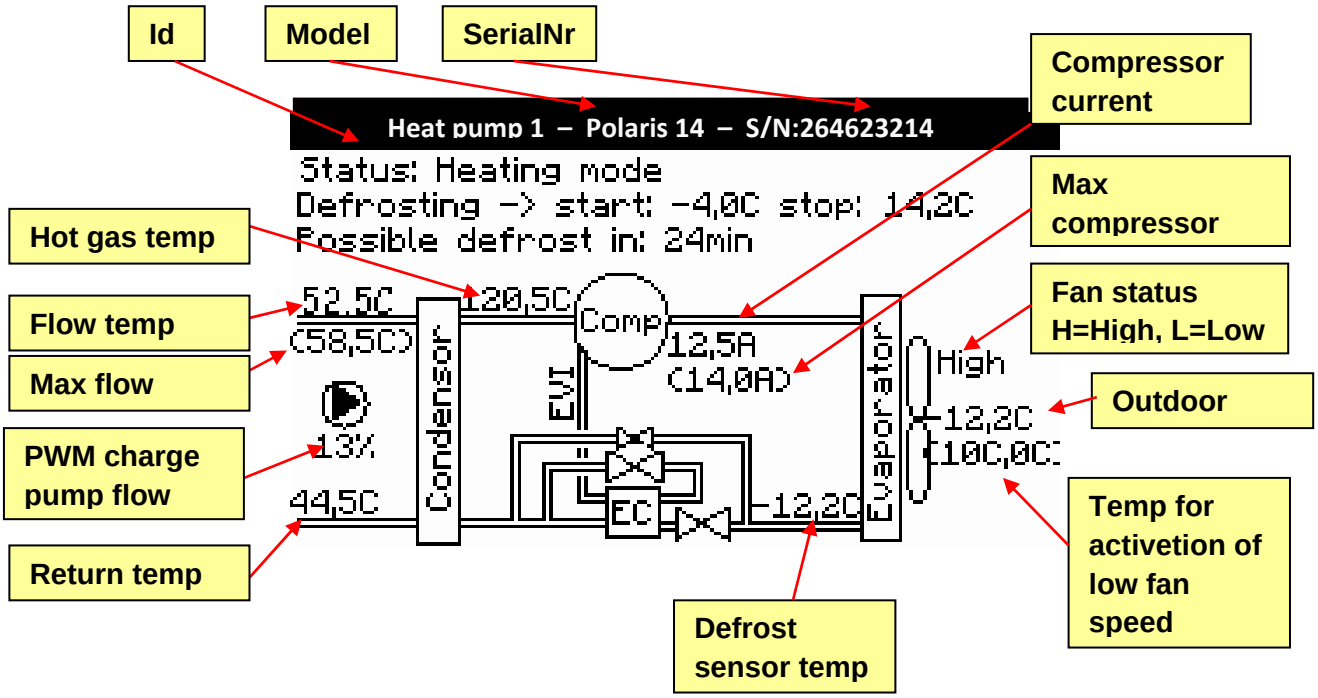
Heat pumps

Every installed heat pump has its own page where all parameters and current status is shown. Depending on heat pump model the pages differ.

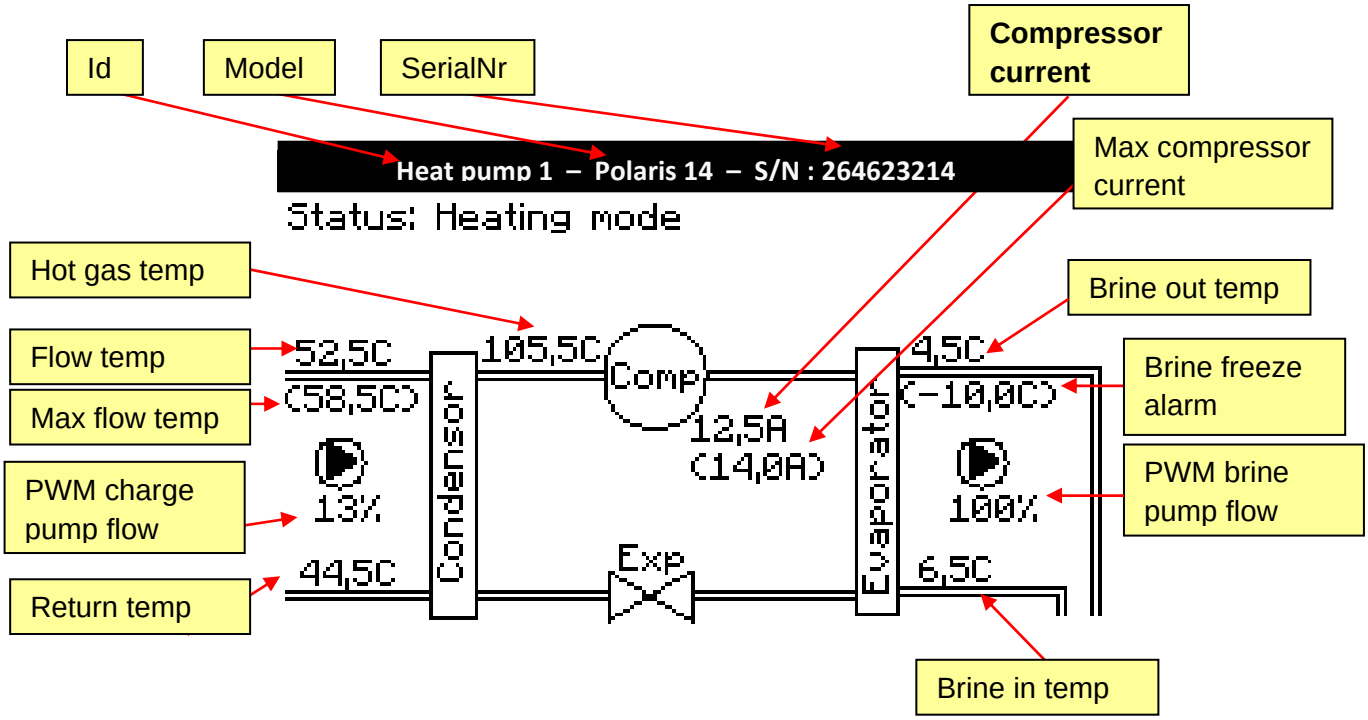
ExoAir



Polaris



Exotic


Id
Model
SerialNr
Compressor current
Max compressor current
Heat pump 1 – Polaris 14 – S/N : 264623214
Status: Heating mode
Hot gas temp
Brine out temp
Flow temp
Max flow temp
PWM charge pump flow
Return temp
Brine freeze alarm
PWM brine pump flow
Brine in temp
52,5C
(58,5C)
13%
44,5C
Condensor
105,5C
Comp
12,5A
(14,0A)
Exp
Evaporator
4,5C
(-10,0C)
100%
6,5C

R/T tables sensors

Temperature sensor				Hot gas sensor (only for heat pump)			
Temp (°C)	R (kΩ)	Temp (°C)	R (kΩ)	Temp (°C)	R (kΩ)	Temp (°C)	R (kΩ)
-15	11,50	21	2,34	0	163.4	72	8.2
-14	10,94	22	2,25	2	147.6	74	7.6
-13	10,42	23	2,16	4	133.5	76	7.1
-12	9,92	24	2,08	6	120.9	78	6.7
-11	9,45	25	2,00	8	109.7	80	6.2
-10	9,00	26	1,93	10	99.6	82	5.8
-9	8,58	27	1,85	12	90.5	84	5.5
-8	8,18	28	1,79	14	82.4	86	5.1
-7	7,80	29	1,72	16	75.1	88	4.8
-6	7,44	30	1,66	18	68.5	90	4.5
-5	7,10	31	1,60	20	62.6	92	4.2
-4	6,78	32	1,54	22	57.3	94	4.0
-3	6,48	33	1,48	24	52.4	96	3.7
-2	6,19	34	1,43	26	48.0	98	3.5
-1	5,91	35	1,38	28	44.1	100	3.3
0	5,65	36	1,33	30	40.5	102	3.1
1	5,40	37	1,28	32	37.2	104	2.9
2	5,17	38	1,24	34	34.2	106	2.8
3	4,95	39	1,19	36	31.5	108	2.6
4	4,73	40	1,15	38	29.1	110	2.5
5	4,53	41	1,11	40	26.8	112	2.3
6	4,34	42	1,07	42	24.8	114	2.2
7	4,16	43	1,04	44	22.9	116	2.1
8	3,98	44	1,00	46	21.2	118	2.0
9	3,82	45	0,97	48	19.7	120	1.9
10	3,66	46	0,94	50	18.2	122	1.8
11	3,51	47	0,90	52	16.9	124	1.7
12	3,37	48	0,87	54	15.7	126	1.6
13	3,23	49	0,85	56	14.5	128	1.5
14	3,10	50	0,82	58	13.5	130	1.4
15	2,98	51	0,79	60	12.5	132	1.3
16	2,86	52	0,77	62	11.7	134	1.3
17	2,74	53	0,74	64	10.9	136	1.2
18	2,64	54	0,72	66	10.1	138	1.1
19	2,53	55	0,70	68	9.4	140	1.1
20	2,43	56	0,67	70	8.8	142	1.0

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