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Operating and installation manual (version 1.01)

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Heat pumps air-water Split systems



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1 Introduction

Dear customers,

we thank you for your confidence and purchase of the HP heat pump. At the same time we ask you to read carefully this Operating manual before you begin to use the heat pump and to observe the instructions. The Operating manual is a part of the product and contains important operating instructions. Keep it at a safe place for possible later use.

2 Purpose of the use

The heat pump may be used as a heat source for heating and water warming. For other applications, it is necessary to consult with its manufacturer.

3 Explanation of the symbols used in this Operating manual



The triangle framed lightning symbol draws attention to possible health endangering, e.g. electrical accident.



The triangle framed exclamation mark draws attention to important instructions to be adhered to.



The pointing index finger draws attention to special tips and information relating to device operating.

4 Safety rules, measures and instructions

To be the heat pump used correctly and safely, we call your attention to the following facts :



- The guarantees given by the heat pump manufacturer and the supplier do not apply to the damages arising from non-observance of this manual, violation of valid laws, standards and regulations of the existing legislation, unauthorized and faulty putting into operation as well as incorrect operating. The manufacturer and the supplier are not liable for consequential damages arising from the above and a possible fault of the heat pump.
- Electric installations and the heating system must correspond to valid regulations and ČSN and EN standards.
- No own modifications or alterations of wiring are allowed from the reasons of safety and registration (CE).
- Do not remove any covers of the heat pump, a risk of electrical accident threatens. Any repairs must be entrusted to professional service personnel.
- Do not re-adjust any adjustable safety elements (safety pressure switches etc.)
- Do not touch hot parts of non-insulated supply pipelines.
- Prevent unattended handling by children and irresponsible persons!

5 Maintenance

The heat pump does not require any routine maintenance. It is recommended to inspect the heat pump prior to each heating season by a professional service firm authorized to this activity by the manufacturer; see chapter 16, the „Heat pump maintenance“ item.



Keep the device clean. The control panel shall be cleaned only with a damp cloth. In no case use any chemical cleaning agents and sands.

6 Overview of the elements on the heating pump control panel and their functions



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Control push buttons Navimec

1. **Left hand context push button** : As a rule, it is used for exit from a function or return to a higher level. It is comparable with the function of the „ESC“ key of a computer keyboard. The function of this push button is always represented by a small picture situated on the display above the push button.
2. **Right hand context push button**: By means of this push button entering into the operation condition display is possible. The function of this push button is always represented by a small picture situated on the display above the push button.
3. **The „Menu“ push button**: It is used for entrance into the menu or for acknowledgement of a change.
4. The **(Up, Down, Left, Right)** push buttons : By means of these push buttons, a change in parameter „editing“ and other setting is made.

7 Heat pump switching On/Off



When installing the heat pump, it is necessary to build-in a mains disconnecting device into the fixed electric installations. (To provide it with an appropriate main switch.)

The device **switching On** is done by means of the main switch. This switch puts the heat pump in the ready-to-start condition (in this condition, its power consumption is negligible). The Navimec push button annuluses give red light which indicates device preparedness for putting into operation.

Through pressing and holding push button 3 (**Menu**) for 3 seconds, the device is put into operation and simultaneously the Navimec push button annuluses give blue light indicating that the device is in operation.

The device **switching Off** is done by pressing and holding push button 3 (**Menu**) for 5 seconds at first. After the elapse of 5 minutes the Navimec push button annuluses start to give red light – the heat pump is again in its ready-to-start condition. Only now the device may be entirely switched off using the main switch.



In the case of an electric power outage, the heat pump puts itself into such condition in which it was prior to that outage (ready-to-start condition / operation).

The heat pump main switch is On during the whole heating season, it is switched off after the heating system is shut down at the heating season end or in the case of repairs. It shall be switched on at the heating period beginning.



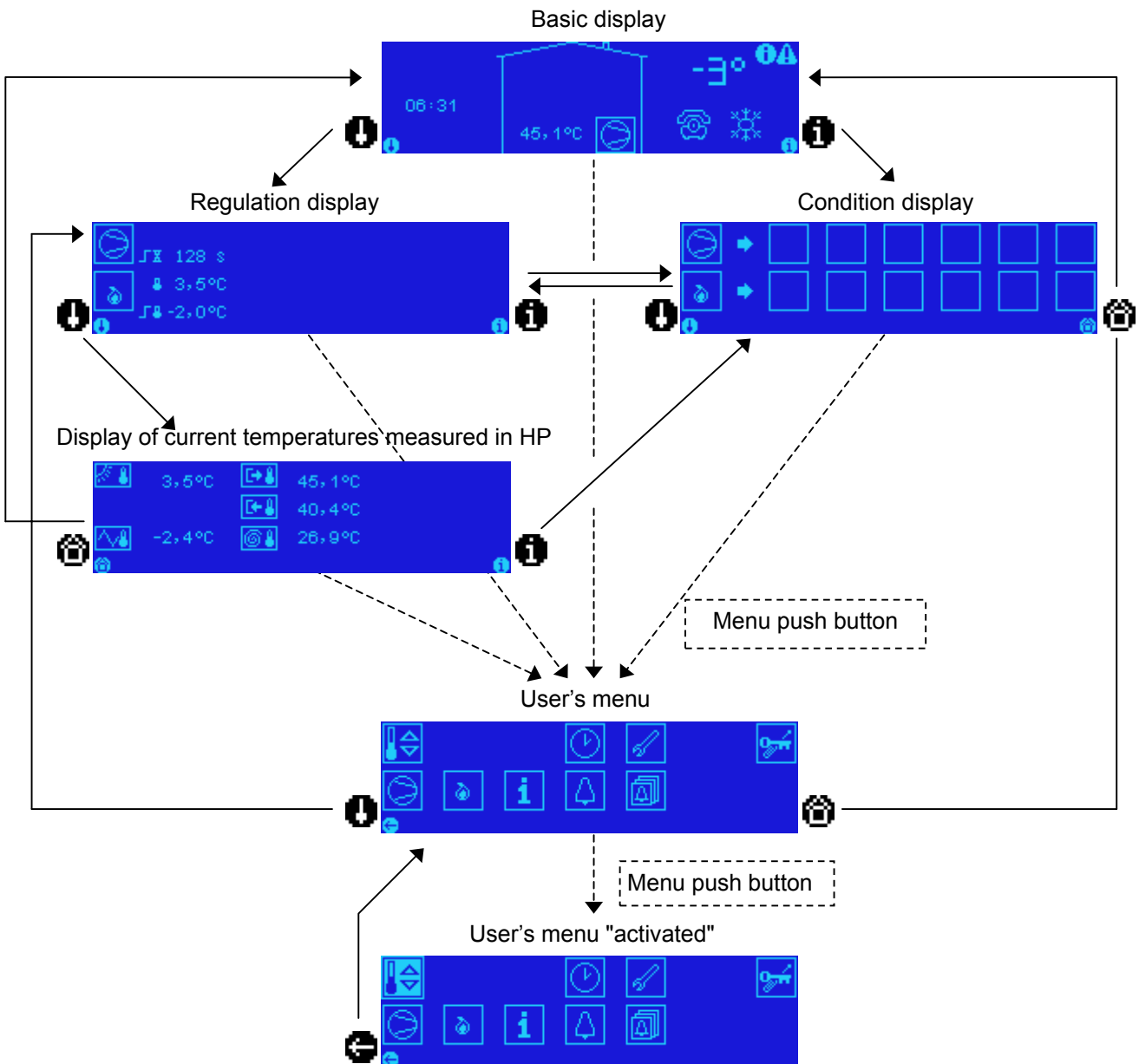
The main switch must be switched on at least 12 hours prior to heat pump putting into operation. At the same time, by pressing and holding push button 3 (**Menu**) for 3 seconds, the heat pump must be put into the operating mode in order that compressor warming can operate. Operation is enabled only after compressor oil is warmed. If oil temperature is insufficient, starting is blocked by the control system.

In case the heat pump is used for domestic hot water warming all the year round, the main switch remains On continuously.

8 Heat pump control and the diagram of display continuity

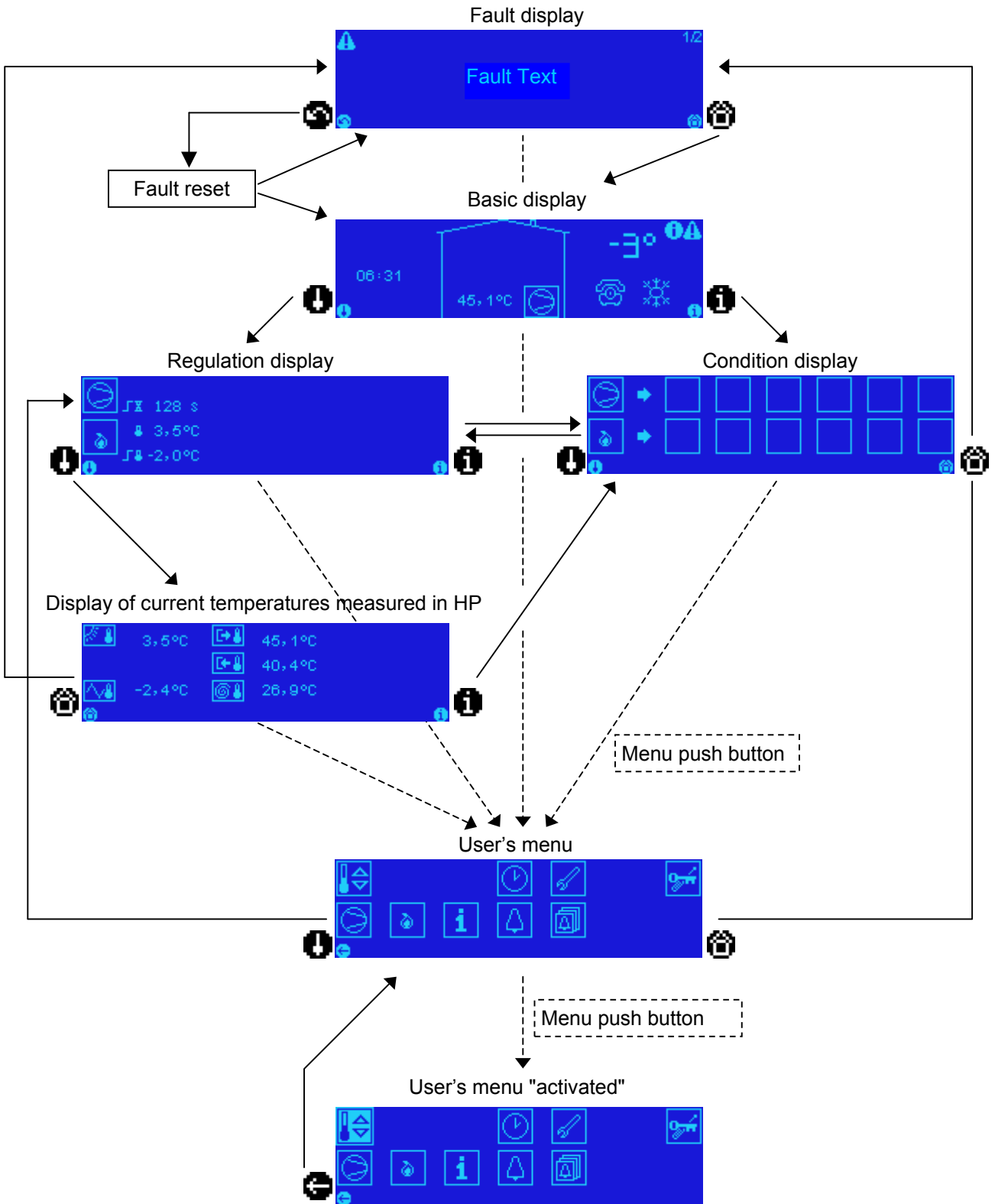
Being switched on from the ready-to-start condition to the operating condition and if not in fault condition, the screen on the control panel shows the initial basic display. The way, how to move between the individual displays is obvious from the diagram below:

8.1 The diagram of display continuity



The data shown on the displays must not correspond to the reality. Their detailed description is in the following chapters of the Manual.

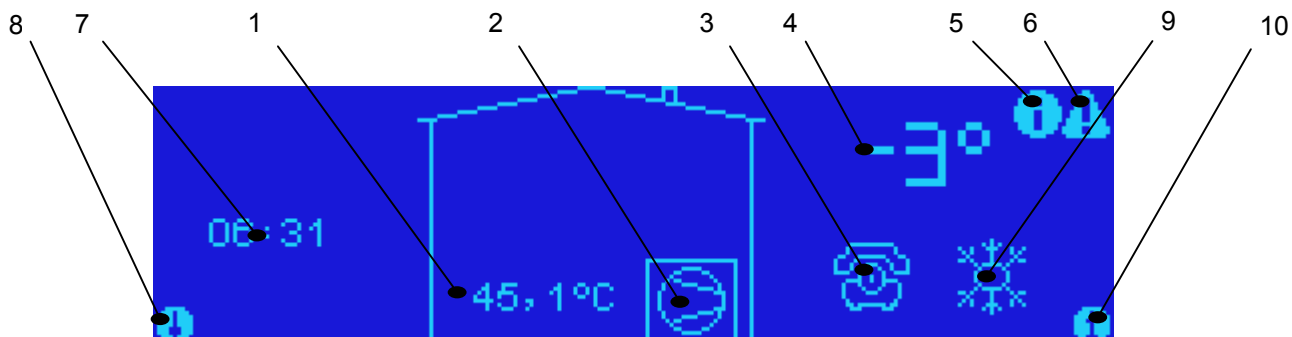
8.2 The diagram of display continuity in fault condition



The data shown on the displays must not correspond to the reality. Their detailed description is in the following chapters of the Manual.

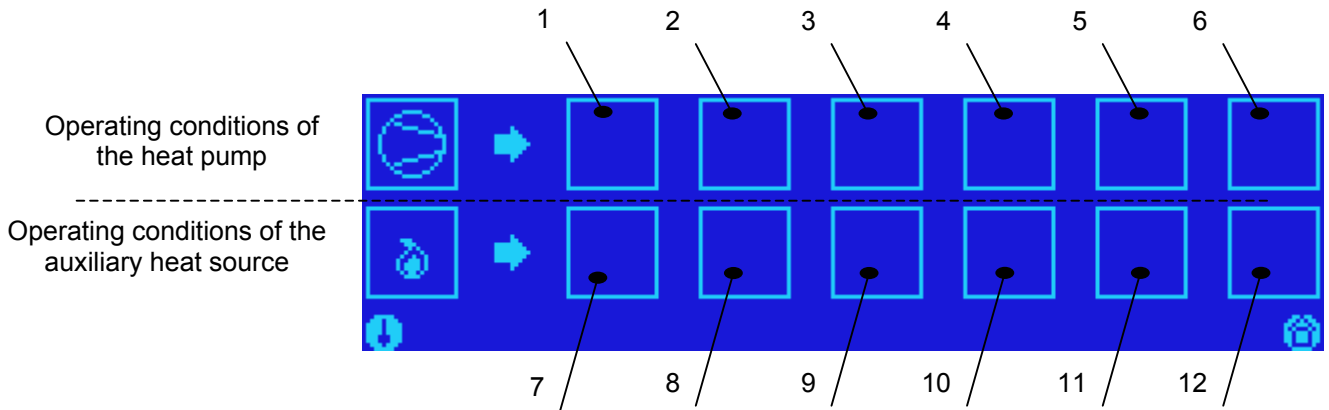
9 The description of displays

9.1 Basic display



1. The current temperature at the heat pump outlet.
2. Animation of the heat pump symbol indicates operation of the compressor or the auxiliary heat source.
3. If the symbol of „phone“ is displayed, operating hours of the heat pump compressor have exceeded the time set by the service firm for service inspection of your heat pump. When this symbol is displayed, contact your service firm.
4. Current outdoor temperature.
5. The „i“ (information) symbol giving light is shown only in fault condition of heat pump operation.
The flashing symbol of „i“ (information) warns that during user’s absence a fault condition arose and already lapsed. Information on this fault condition may be obtained from the history of faults and events. After the history of faults and events is displayed on the screen, this flashing symbol disappears.
6. The „exclamation mark“ symbol giving light is shown in the event of heat pump fault condition. After its cause is removed and reset on the fault display, the symbol disappears.
7. Current time.
8. Function symbol for the left hand context push button.
9. If the symbol of „snow flake“ is flashing, evaporator defrosting by means of reversion is running.
10. Function symbol for the right hand context push button.

9.2 Condition display



Operating conditions of the heat pump :



The heat pump compressor is switched off manually. The device is in the so called „monovalence mode“, only auxiliary heat source operation is; the auxiliary source is executing all heating activity. Compressor operation may be released from the user's menu activated, under the „compressor“ symbol. *This symbol may be displayed on position 1.*



The room thermostat is blocking heat pump operation. *This symbol may be displayed on position 2.*



Outdoor temperature is too low for heat pump operation. All heating activity is executed by the auxiliary heat source. *Tento symbol se může zobrazit na pozici 3.*



The temperature at the heat pump outlet is too high for heat pump operation. The probable cause of this condition is heating water warming above the permitted limit by another heat source. *This symbol may be displayed on position 3.*



Preparation of the heat pump compressor for its start is in progress. The time remaining till start is displayed on the regulation display. *This symbol may be displayed on position 3.*



The heat pump compressor is blocked by the HDO signal (HDO = Ripple control; this signal is dynamically transmitted into the mains by power distributors according to the current energetic load). *This symbol may be displayed on position 4.*



Compressor temperature is too low for its start. *This symbol may be displayed on position 5.*



Evaporator defrosting by means of fan run down is running. *This symbol may be displayed on position 5.*



Defrosting by means of fan run down took a longer time and it was terminated. If this condition repeats more frequently contact your service firm. *This symbol may be displayed on position 5.*



Evaporator defrosting by means of reversion is running. *This symbol may be displayed on position 5.*



Reversion defrosting took a longer time and was terminated. If this condition repeats more frequently, contact your service firm. *This symbol may be displayed on position 5.*



The device is in fault condition. More detailed information is on the fault display. In this condition, auxiliary heat source running is de-blocked. *This symbol may be displayed on position 6.*



The operating hours of the heat pump compressor have exceeded the time set by the service firm for service inspection of your heat pump. When this symbol is displayed, contact your service firm. *This symbol may be displayed on position 6.*

Operating conditions of the supplementary heat source:



The supplementary heat source is switched off manually. In this condition, the supplementary source is switched off in the „bivalence“ mode. It can be switched on under the „supplementary heat source“ symbol in the user’s menu activated. *This symbol may be displayed on position 7.*



The room thermostat blocks supplementary heat source operation. *This symbol may be displayed on position 8.*



Supplementary heat source operation is blocked by high outdoor temperature according to the R12 parameter. For optimum economic operation of the heat pump, leave setting of parameter R12 as set by the service firm. *This symbol may be displayed on position 9.*



The supplementary heat source is in preparation for its start. The time remaining till the start is displayed on the regulation display. *This symbol may be displayed on position 9.*



The temperature at the heat pump inlet is too high for supplementary heat source operation. The cause of this condition is probably heating water warming above the permitted limit by another heat source or the heat pump. When heating water is cooled down, supplementary heat source functioning is renewed automatically. *This symbol may be displayed on position 9.*



The supplementary heat source is blocked by signal HDO (HDO = Ripple control; this signal is dynamically transmitted into the mains by power distributors according to the current energetic load). *This symbol may be displayed on position 10.*

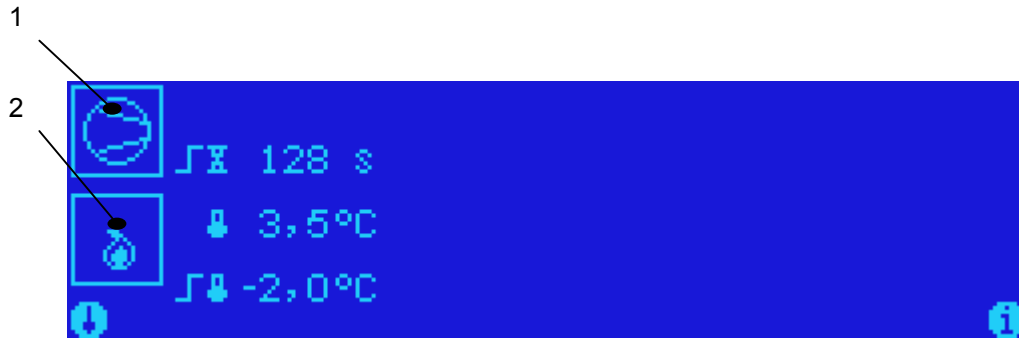


The supplementary heat source is de-blocked by reversion defrosting interruption caused by low temperature in the heat pump secondary circuit. *This symbol may be displayed on position 11.*

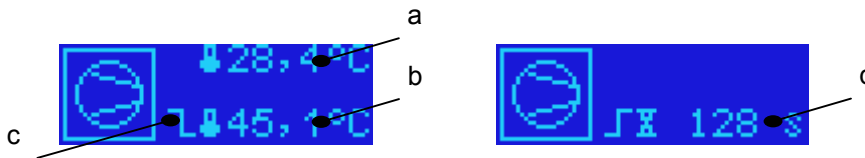




The supplementary heat source is de-blocked by a fault condition of the heat pump. *This symbol may be displayed on position 11.*

9.3 Regulation display





1. Animation of this symbol indicates compressor running.



- a) The current temperature of water at the heat pump inlet.
- b) The outdoor temperature, at which compressor running is changed.
- c)  the „edge down“ symbol indicates compressor switching off in „a)“ and „b)“ temperatures equalizing.
-  the „edge up“ symbol indicates compressor switching on in „a)“ and „b)“ temperatures equalizing.
- d) The time till compressor switching on.

2. Animation of this symbol indicates supplementary heat source running.

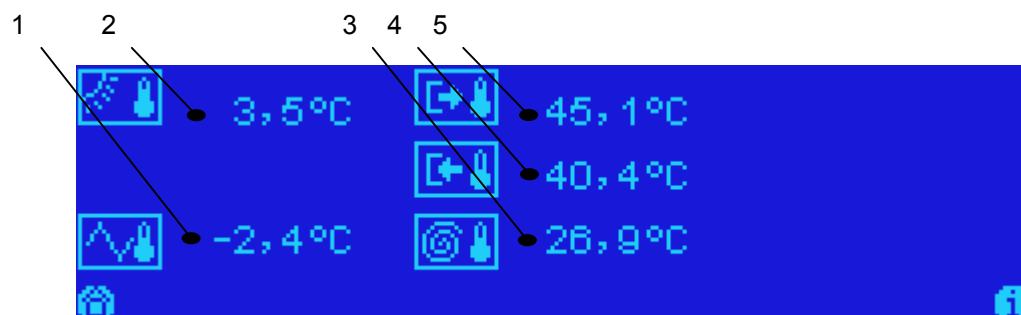


- a) Current outdoor temperature
- b) The outdoor temperature, at which a change in heat supplementary source running occurs according to „c)“.
- c)  The „edge down“ symbol indicates supplementary heat source switching off in „a)“ and „b)“ temperatures equalizing.
-  The „edge up“ symbol indicates supplementary heat source switching on in „a)“ and „b)“ temperatures equalizing.



On a change in the condition, the „b)“ temperature varies according to the hysteresis set by the service firm.

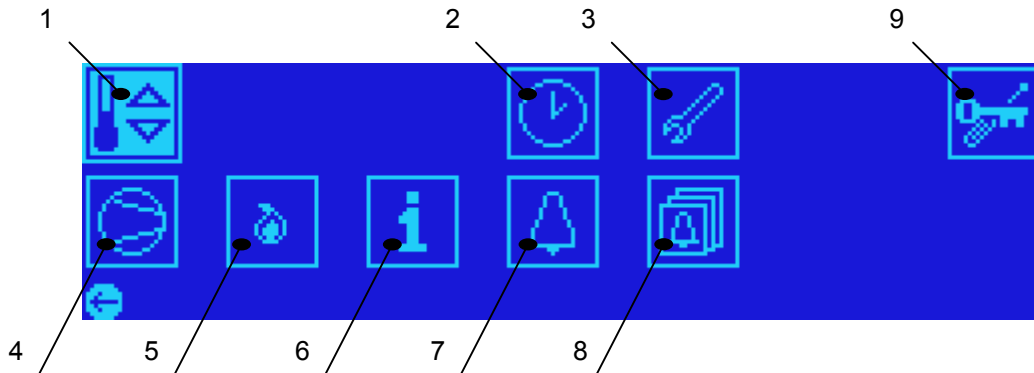
9.4 The display of current temperatures measured in the heat pump



1. Evaporator surface temperature
2. Outdoor temperature
3. Compressor temperature
4. Heat pump inlet temperature
5. Heat pump outlet temperature

9.5 The display and description of the user's menu activated

From the „User's menu“ display, you can pass to the „User's menu activated“ display by means of repeated pressing the „Menu“ Navimec control push button



In the left upper corner of this display on the screen, the „heating water“ symbol is always highlighted (negatively coloured). Using the (**Up, Down, Left, Right**) push buttons, it is possible to move over the individual symbols with highlighting. If located on a required symbol and the **Menu** push button is pressed, the respective menu is opened, where changes in parameters and other settings can be made. Over the menu we scroll using the (**Up, Down**) push buttons. In this case, the **Menu** push button has the function of acknowledgement (as with the „Enter“ key of a PC keyboard). When an own change in parameter value or other setting is made, the new value must be confirmed „stored“ by means of this push button. To return to the previous display, the **Left hand context push button** is always used.

1. Heating water



Parameter **B1**, „Heating curve correction“

9.5.1 Setting of heating curve shift

Description of the related parameters :

□ **B1 : Heating curve correction**

Range : -10,0°C to 10,0°C

Basic setting : 0,0°C

Description : This parameter specifies rise in heating water temperature. It is a shift of the main regulation point.

2. Time



Parameter **T1**, „Real time setting“.

Parameter **T6**, „ Heating attenuation start – real time, Mo to Fri“.

Parameter **T7**, „ Heating attenuation end – real time, Mo to Fri“.

Parameter **T8**, „ Heating attenuation start – real time, Sat to Sun“.

Parameter **T9**, „ Heating attenuation end – real time, Sat to Sun“.

9.5.2 Setting of real time and the times of heating attenuation

Real time setting by the **T1** parameter.

Procedure : Pass to the Menu „activated“ display. Enter into the „Time“ symbol and find the T1 parameter, „Real time setting“ in the menu. When editing this parameter, use the (**Up**, **Down**, **Left**, **Right**) push buttons.

By the **Up** and **Down** push buttons, time data are changed.

By the **Left** and **Right** push buttons, the cursor changes „moves“ among the time data.

The format of the set time : Week day, Day, Month, Year, Hours, Minutes, Seconds

Remember to store the new time using the **Menu** push button.

Description of the related parameters :

□ T1 : Real time setting

Range : Mo, 01.01.00 00:00:00 to Sun, 31.12.99 23:59:59

Description : The format of real time setting: Week day, Day, Month, Year, Hours, Minutes, Seconds



The heat pump passes automatically from the summer time to the winter time and vice versa.

3. Setting



„Displayed temperature units“

Range : Celsius - Fahrenheit

Basic setting:

Celsius

Description : Setting of required units of temperature.

„Push button sound“

Range : none – in editing – in pressing

Basic setting:

none

Description : *none*: A beep on push button pressing is switched off.

in editing: Beeping on push button pressing only in editing parameters and settings.

in pressing: A beep on push button pressing is switched on.

„Language selection“

Range : Czech – German – English

Basic setting :

Czech

Description : Setting of the language required for the text file.

„Display contrast setting“

Range : 0 to 7

Basic setting:

3

Description : Setting of the required display contrast.

„Display backlight setting“

Range: full - half

Basic setting:

full

Description : Setting of the required display backlight.

6. Information



The display informing on the serial number, the type and the software in the control panel of your heat pump.

7. Fault



Parameter **A12**, „Output 2 fault – Siren“.
Parameter **A13**, „ Fault output 2 - automatic shut down time “.



The „ **Fault output 2** “ is the fault output of the control system controlling the siren .

9.5.4 Setting of fault signalling

Description of the related parameters :

❑ **A6 : Fault output 2 - Siren**

Range : YES/NO

Basic setting : YES

Description : If „YES“ is selected, the siren, a part of the heat pump, will hoot in certain fault conditions. If „NO“ is selected the siren will never hoot.

❑ **A7 : Fault output 2 - automatic shut down time**

Range : 0 minutes to 900 minutes

Basic setting : 0 minutes

Description : Setting of the time of siren hooting in the case of a certain fault. If the A13 parameter is set to 0 minutes, this function is switched off.

8. History of faults and events



The informative display of already happened conditions.

The cursor can be controlled using the **Down** and **Up** push buttons. By means of the **Left**, **Right** and **Menu** push buttons, another display may be shown on which also the current temperatures of the respective events are displayed.

TZ1 : Heat pump inlet temperature

TZ2 : Heat pump outlet temperature

TZ3 : Outdoor temperature

TZ4 : Evaporator surface temperature

TZ5 : Compressor temperature

S11 : Return heating water temperature

S12 : Domestic hot water temperature

9. Entrance into service or manufacture menu



In this display, use the **Left context push button** for return. This display of „Enter extended parameter entrance code“ is intended for the service firm.

9.6 Fault display



1. Identification of a serious fault. After removal of the fault cause it is necessary to confirm – reset it by the **left hand context push button**.
2. Identification of a fault which need not reset. It is an operating condition after the lapse of which the fault identification disappears automatically.
3. Fault reset. Made by the **left hand context push button**. If reset is made and the fault cause is not removed, the respective fault is re-indicated.
4. Fault display sequence. If more faults are indicated at the same time, their text may be viewed using the (**Up, Down or Left, Right**) push buttons.
5. Information on the number of indicated faults.



Simultaneously with fault indication, the siren can be started. It can be switched off by pressing any push button on the control panel. If doing so, after the elapse of 60 minutes the control panel tries to reset the indicated faults.

9.6.1 Faults and their removal

If any fault arises, the respective device is promptly blocked. The fault is shown on the control panel screen, push button annuluses start flashing in red and the fault is signalled by sound if necessary. In fault-free state, the push button backlight is blue.

9.6.2 Faults with necessity for acknowledgement – reset by the user

These faults need user's acknowledgement by pressing the **left hand context push button** on the fault display. The device may not be started earlier than the fault is removed and acknowledgement – reset made.

- ❑ **Compressor high pressure.** Compressor overload on its discharge side. If the fault persists, contact your service firm.

In the event of this fault, water pressure in the heating system is to be checked. Replenish and de-aerate the water in the heating system if necessary. Furthermore, the heating water filter at the heat pump inlet shall be cleaned and the heat pump circuit shall be checked for free flow of the water in it. Also the circulation pump shall be checked for possible air pockets developing e.g. after a longer pump shut down.

- ❑ **Compressor low pressure.** Compressor overload on its suction side. If the fault persists, contact your service firm.

The cause of this fault may be a frozen evaporator. In the event that the evaporator is frozen, it can be mechanically defrosted using hot water. If the fault repeats frequently, contact your service firm.

- ❑ **High temperature of warmed water.** The outlet temperature of the warmed water is too high for heat pump operation. If the fault persists, contact your service firm.

In the event of this fault, water pressure in the heating system need to be checked. Replenish and de-aerate the water in the heating system if necessary. Furthermore, the heating water filter at the heat pump inlet shall be cleaned and the heat pump circuit shall be checked for free flow of the water in it. Also the circulation pump shall be checked for possible air pockets developing e.g. after a longer pump shut down.

- ❑ **TZ1 – TZ5, S11- S13 probes fault.** A thermal probe has a fault. If the fault remains even after user's acknowledgement – reset, contact your service firm.

9.6.3 Operating faults and conditions without necessity for acknowledgement – reset by the user

The faults which need not user's acknowledgement. After automatic removal of their cause they terminate themselves and the whole system continues in operation.

- ❑ **Compressor thermal overload.** The fault will be cleared automatically after a drop in temperature. If the fault repeats, contact your service firm.

- ❑ **Electric phases check.** A voltage outage or drop on an electric phase. If the fault persists for a longer time, contact your service firm.

In the event of this fault, check the condition of three-phase mains voltage and the protection of power supply line for the space containing the heat pump.

- ❑ **RTC battery discharge.** The battery for RTC backup must be replaced. Contact your service firm.

- ❑ **Low compressor temperature.** Low temperature of the compressor. After its automatic warming, the heat pump is put into operation.

This fault may happen after a heat pump shut down in the switched off condition or after a longer electric power outage. Wait, until the compressor oil is automatically warmed.

- ❑ **Fan overload.** The fault will be cleared automatically. If the fault persists for a longer time, contact your service firm.

In the event of this fault, switch off the heat pump and check the fan for free rotation (fan icing or mechanical blocking).

- ❑ **Fan 2 overload.** The fault will be cleared automatically. If the fault persists for a longer time, contact your service firm.

In the event of this fault, switch off the heat pump and check the fan 2 for free rotation (fan icing or mechanical blocking).

- ❑ **Low outdoor temperature.** Outdoor temperature is too low for heat pump operation. After an increase in temperature, operation will be automatically restored.

In this event, all heating activity is provided by the supplementary heat source.

- ❑ **Low temperature of warmed water.** After the heating water is warmed, heat pump operation will be automatically restored.

In the event of this failure, wait till the heating system water is warmed by the auxiliary heat source. This source is put into operation automatically. After an increase in the heating water temperature, the operation of the heat pump compressor is restored.

9.6.4 The faults of the control system

In the event of such faults contact your service firm immediately!

❑ **Communication error! MicoTC**

Upon pressing any push button the device queries activation of a control panel „demo version“. Always select „No“ and the device tries to re-establish the communication. If „Yes“ is selected, a code must be entered to activate that demo version.

❑ **Communication error! RVS**

Upon pressing any push button the device queries activation of a control panel „demo version“. Always select „No“ and the device tries to re-establish the communication. If „Yes“ is selected, a code must be entered to activate that demo version.

❑ **EEPROM error**

Contact your service firm.

10 Overall technical data

are given in the „Design basic documents“ enclosure divided as follows :

The air-water heat pumps Split systems

- Generally - Use
- Characteristic features – Heating system
- Working principle
- Technical description and heat pump models
- Circulation circuit
- HP primary circuit
- HP secondary circuit
- Electric switchboard, control panel, control system
- Design of a heating system comprising HP
- Heat pump installation, putting into operation
- Inquiry (order) data
- Working conditions
- Delivery scope
- Technical parameters of air-water heat pumps
- Dimensional sketches of air-water heat pumps
- Recommendation concerning evaporators of air-water heat pumps
- Wiring diagram of air-water heat pumps - Split models
- Protection and design of air-water heat pump supply line

11 Safety and ecological measures, working medium

□ Working medium

As the working medium in the cooling circuit, there is used **R 404A**, an ecologically harmless cooling agent not impairing the Earth ozone layer!

The used cooling agent is indicated on the heat pump name plate and it may not be changed !

□ Ecological safety of work

Notwithstanding the facts mentioned in the previous paragraph, during any actions in the cooling circuit (in the case of repairs) it shall be ensured, that minimum of cooling agent may escape into the atmosphere. For this reason, it is always desirable to suck off the cooling agent from the respective part of the circuit or from the whole circuit, as the case may be.

□ Working medium properties

The **R 404A cooling agent** is non-combustible, inexplosive and non-poisonous. The cooling agent is incorporated in the A1/A1 safety group according to ČSN EN 378-1. Cooling agent vapours are suffocating in their higher concentrations due to oxygen quantity decreasing in the atmosphere. A practical threshold value for the critical concentration is 0,48 kg/m³.

The **R 404A cooling agent** decomposes itself in fire; decomposition products are poisonous. Welding and soldering of cooling circuit parts is possible only after previous cooling agent suction off and respective part flushing, preferably with nitrogen.

□ Safety in cooling agent handling

For cooling agent handling, ČSN 07 8304 is applicable. As to the use of personal protective aids, ČSN EN 378-3 is applicable. When carrying out any works on the cooling circuit (e.g. maintenance, repair, recovery) or in cooling agent handling, any worker must use the personal protective aids, namely protective gloves and eye protecting goggles.

□ Requirements for heat pump location

In the case of its location in a special machinery room, the heat pump is not subject to any limitation according to ČSN EN 378-1, as to the volume of the space in which the heat pump is situated, in relation to the cooling agent filling quantity.

In a contrary case, it must be applicable, that the volume [in m³] of the space, in which the heat pump or any its part containing the cooling agent is situated, shall be larger than the cooling agent filling [in kg] divided through 0,48 (critical concentration [in kg/m³]).

❑ **Preventive measures in the event of a fault**

All parts of the heat pump cooling circuit are designed and manufactured so that they remain tight and resist overpressure that may develop in the course of operation, idle condition and transport.

In the event of a cooling circuit breakdown during heat pump operation, the heat pump is automatically shut down, its further operation is blocked and a fault is indicated.

In the case that there is found a leakage in the cooling circuit or a cooling agent leak which quantity is so small that it does not cause automatic heat pump putting out of operation, then the heat pump operation must be terminated by means of heat pump switching off.

In both above events, the heat pump main supply shall be switched off and a professional service must be called.

If it happens that people stay in the room with a high cooling agent concentration in the air, the first aid is to take the afflicted out into the fresh air.

With respect to the quantity and type of the cooling agent, no personal protective aids for safety of persons must be placed at the heat pump.

12 Testing and adjusting, output inspection

12.1.1 Testing and adjusting, output inspection

❑ **The cooling circuit of the heat pump**

Both parts of the cooling circuit are tested for strength and leakage by means of nitrogen.

The test overpressure equals to the highest working overpressure, i.e. 2,7 MPa (ČSN EN 378-2). Its leakage is verified with a local leakage indicator after the circuit was partially filled with the cooling agent. In the course of assembly, the tests for the throughput of individual cooling circuit parts are carried out by means of blowing with nitrogen.

❑ **Secondary circuit spaces which are parts of HP**

It is the heating medium space in the condenser.

The space is inspected for leakage using the working medium – water.

❑ **Electric installations**

The phases in the control cabinet are arranged so that there is shining LED indication lamp on the phase sequence indicator in the control cabinet if the connection is correct.

Electric switchboard function is tested, or more precisely, the function of the control system.

The initial inspection in accordance with ČSN 33 1500 is carried out.

❑ **Adjustment of protective devices and control elements**

Protective devices and control elements are adjusted according to the enclosed table „Adjustment of protective devices and control elements“.

❑ **Certificate of product quality and comprehensiveness**

Based on the previous actions, the „Certificate of product quality and comprehensiveness“ is made.

❑ **Initial inspection report**

Initial inspection is carried out concurrently and the “Report on electric equipment initial inspection“ is issued.

13 Taking over, delivery, dispatch and transport

- ❑ The heat pump is delivered in two parts, without joining material and without cooling agent filling. For transport, the outdoor as well as the interior part is filled with nitrogen under overpressure of 3 to 5 bar! Take particular care when cutting off bushings.

- ❑ The outdoor as well as the interior part is provided with a manufacturer's name plate where there are stated the type and the serial number of the heat pump and its basic technical data.

- Together with the heat pump, the following is delivered :
 - Operating and installation manual
 - Thermal probes - 3 pcs for the **SE** and **SC** models or 1 pc for the **SB** model. The probes are connected in the HP switchboard.
 - A table containing data according to ČSN EN 378-2
 - Silent blocks – 4 pcs, intended for horizontal alignment of the HP interior part
 - An internal hexagon wrench 8 mm
- Both parts of the heat pump are dispatched in protective packing. The parts are fixed to wooden transport pallets. The packing of the delivered heat pump consists of paper cardboard packing and PE foil. Those shall be disposed as waste paper and plastic packing.
- Both parts of the heat pump are transported by ordinary means of transport.

When loading those onto a vehicle and unloading them from it, it is necessary to proceed in such a way that they cannot be damaged. On the vehicle must be placed both HP parts so that their shifting and damaging cannot happen.



The heat pump may be lifted only by its bottom bearing frame.

The HP interior part must be transported in its upright position, i.e. „standing“ !!!

The HP interior part may not be transported in its vertical position, i.e. „lying“ !!!

The HP outdoor part must be transported in its vertical position, i.e. „lying“ !!!

14 Installation instructions

Heat pump assembly, or more precisely, interconnection of both parts of HP and its putting into operation **must be carried out by a professional worker** (having completed the apprenticeship in the field of the „Refrigeration engineering technician“) or **a professional firm; both shall have heat pump manufacturer’s authorization**. The said firm will provide electric interconnection of both heat pump parts as well.

Furthermore, the following is presupposed:

- Assembly of the heat pump and the whole heating system shall be carried out based on the project documentation being processed for the event in question;
- Heat pump integration into the heating system and heating system putting into operation shall be carried out by a professional worker or a professional „heating engineering“ firm in compliance with the items below;
- Electric installation mounting and HP electric switchboard connection to the main supply line and its interconnection with the control system of the heating system shall be carried out by a person who has the necessary qualifications in the branch of „electrical engineering“.

The following „Installation instructions“ as well as the next chapter „Instructions on putting into operation“ are no detail description of the related actions but only the most important principles or specific requirements that must be unconditionally adhered to as to the heat pump installation in the heating system, and that are prerequisites of HP putting into operation. Safety warnings and recommendations for a suitable working method are stated below.

□ **Machinery part - realization provided by a „refrigeration engineering“ firm**

- Both parts of the heat pump must be positioned in such a manner that there must be ensured access for assembly of connecting pipes and maintenance of the machinery and electric parts.

For the outdoor HP part, there is necessary to ensure access (due to cleaning) to the heat exchanging area of the evaporator.

At the interior HP part, a free and freely accessible space (min. 70 cm) must remain before its front face and furthermore a free space (min. 50 cm) in front of at least one side face. The minimum distance of HP and a wall is 5 cm.

Further details are given in the Design basic documents.

- The interior part shall be vertically aligned by means of the silent blocks delivered together with HP. The silent blocks shall be fitted to the HP bottom side when removing HP from its transport pallet.
- When assembling the two parts, perfect cleanliness inside the interconnecting pipes must be ensured.
- The pipelines must be designed so that they will ensure oil circulation in the cooling circuit.



For both parts of the heat pump – **ATTENTION** - when cutting off the necks made blind; the cooling agent circuit in both parts is filled with nitrogen under pressure.

The Rotalock valves of the compressor are closed in dispatching. They will be opened only after interconnection of both HP parts or more precisely, just before cooling circuit vacuum degassing and drying.

- When soldering joints of interconnecting pipes and interior part necks, pipe bushings inside the box shall be wrapped in a wet cloth in order not to damage them thermally !!
- Inspection prior to putting into operation

The following shall be checked :

- If the heating medium flow through the heat pump is independent on the flow through the heating system, i.e. if the flows through the heat pump and the heating system are ensured by their individual circulation pumps and if the connection is in compliance with the design basic documents;
- If an efficient mechanical filter is installed before the inlet neck of the secondary circuit and if it is connected so that the filter can be cleaned;
- If elements enabling flow control and circuit adjustment are installed in the secondary circuit; i.e. either a flow-meter or thermometer wells at the HP inlet and outlet.

□ **Machinery part – realization provided by a „heating engineering“ firm**

- The assembly of outdoor parts of the secondary circuit and the integration of HP into the heating system must comply with the requirements of the design basic documents (see the enclosures).

□ **Electric installations - realization provided by a qualified worker**

- Both heat pump parts shall be interconnected by means of necessary wires according to the electric diagram :
 - motors of the fan(s)
 - thermal protection of the motor(s)
 - thermal probe(s) for evaporator(s) defrosting (evaporator(s) surface temperature)
 - thermal probe indicating outdoor temperature
- The heat pump will be connected to the main switchboard through a supply line. The main supply line must be equipped with a device (main switch) disconnecting it from the mains. The connection of phases shall be checked. If the connection is incorrect, there is not shining the LED indication lamp on the phase sequence indicator in the main switchboard and the control system indicates a fault.
- Control signals (HDO and external initiation) of HP operating control must be connected, or the circulation pump of the heating circuit will be connected to the power terminal according to the electric wiring diagram, as the case may be.



The selection of the fixed main electric supply line, dimensions and protection must comply with ČSN 33 2000-5-523, ČSN 33 2000-4-43, ČSN EN 60898-1 and ČSN 33 2000-4-41 standards. The dimensions and protection recommended for the main supply line of the heat pump are given in the design basic document which is a part of this documentation.

15 Instructions on putting into operation

❑ **Testing for strength and tightness**

After its assembly, the cooling circuit is (pipelines are) nitrogen tested for strength and tightness.

The testing overpressure equals to the highest working overpressure, i.e. 2,7 MPa (ČSN EN 378-2).

Tightness is in addition verified by the cooling agent and a local leakage indicator.

❑ **Cooling circuit vacuum degassing and drying**

If the tests mentioned above are successful, cooling circuit degassing and drying is carried out using a vacuum pump. When drying the circuit, it is recommended to „break“ vacuum by nitrogen or the cooling agent. Prior to vacuum degassing, open the Rotalock valves on the suction and discharge sides of the compressor. Vacuum degassing continues until the target of the inspection window (which is integrated in the HP interior part) gets dark namely it corresponds to the „DRY“ state. Only in this condition the cooling circuit is ready for filling with the cooling agent and putting into operation.

❑ **Check of phase configuration in the electric switchboard**

Check the connection of phases. If the connection is correct, there is shining the LED indication lamp on the phase sequence indicator in the switchboard.

❑ **Check of the control system connection with its superior system**

Functioning of the external input signal shall be verified; this signal is provided by means of either a switching (potential free) contact, e.g. a room thermostat, or an external actuator (potentiometer) which is used for stepless setting of correction of the equithermic condition curve.

❑ **Check of adjustment of protective and control elements**

The adjustment of protective and control elements shall be checked according to the enclosed table „Adjustment of protective and control elements“.

❑ **A prerequisite for putting into operation**

The heat pump may be put into operation only after the **whole heating system is operational**.

The secondary circuit and the whole heating system including the heat pump must be filled with the heating medium – water and must be perfectly de-aerated. The heat pump may be put into operation only after the heating system has become operational!

❑ **Cooling agent filling**

The circuit is filled with the cooling agent during the operation of the heating system, i.e. under operation of the circulation pumps providing heating medium circulation through HP.

The heat pump is put into operation, see chapter 7, HP switching On/Off.



The circuit is filled with liquid cooling agent !!! If the cooling agent bottle is not provided with a separate liquid outlet, the bottle valve must be turned downwards when filling. In each filling, the filled up quantity of the cooling agent must be weighted and recorded.

It is recommended to fill in two stages :

- In the first stage during HP idle condition, the cooling agent is filled into the cooling agent tanks up to pressure balancing; it is about 1,5 to 4,5 kg of the cooling agent depending on the HP size. Tank filling is not necessary in HP with lower performance.
- Another cooling agent filling follows through the compressor suction valve after HP initiation.

It is to be filled slowly, for the time so long until indication inspection window is fully filled with the liquid – without any vapour bubbles.

Then, the maximal required operating temperature of water in HP must be achieved. Under this condition, cooling agent quantity is checked. If the cooling agent foams, it must be replenished until the inspection window is fully filled with the liquid.



In this stage of filling, the turn-off pressure on the under-pressure safety catch may be decreased; it must be set to its original value after filling up.

Check the function of evaporator defrosting. In the case, that a low pressure fault is indicated, there is shortage of the cooling agent in the cooling circuit and it must be replenished.

❑ **Inspection of HP and control system functions**

Check heat pump functions, temperatures and pressures in the cooling circuit.

Check the function of cooling circuit protective (blocking) elements.

According to through-flow or temperatures, check the correctness of heating medium flow through the heat pump and adjust it, if necessary.

Check the function of HP controlled by its superior control system.

❑ **Supplementary heat source**

(Its inspection is ensured by the professional firm which provides putting HP into operation.)

Check the function of the supplementary heat source (electric or gas boiler) and temperatures in the heating medium circuit.

❑ **Comprehensive operation trial**

(Testing in cooperation with a „heating engineering“ firm.)

In simultaneous operation of HP and EB, check the operation of the whole system.

The worker providing the heat pump initiation makes the user familiar with heat pump operating – within the meaning of the „Operating manual“.

Near the heat pump, place the plate containing data according to ČSN EN 378-2. The plate is delivered together with the heat pump and there is to be filled in information on the installation and service firms there.

After several hours of operation, stop the whole system and check it; clean the secondary circuit filter at the HP inlet, if necessary.

❑ **Continuous operation**

After the initial inspection of electric installations is successfully made, the heat pump and the heating system may be put into continuous operation.

16 Operating and maintenance manual – Continuous operation

❑ **The operation itself**

The operation of the device is automatic. The control of HP is described in detail in the introductory part of this documentation.

❑ **Supervision of the device**

The device does not require any continuous attendance, it is however recommended to check daily if:

- the monitored temperatures correspond to the set operating mode;
- non-presence of fault indications confirms fault-free operation;
- the device runs regularly and problem-free.



Operating the main switch

The main switch on the HP power supply line remains On over the whole heating season.

The main switch shall be switched off upon heating system shut down at the heating season end or in repairs as the case may be.

The main switch is switched on at the heating season beginning.



The main switch must be switched on at least 12 hours before heat pump putting into operation. At the same time, using the Menu push button, HP must be put into its operating mode in order that compressor warming can run. HP operation will be enabled only after the compressor oil is warmed. If oil temperature is not sufficient, starting is blocked by the control system.

In the event that the heat pump is utilize for domestic hot water warming all the year round, the main switch remains On permanently !

• Delayed starting

After voltage connection (by means of the main switch or after a power outage), the control system and the heat pump is put into operation with a delay (60 to 100 s) !

In this way, the device is protected against undesirable repeated initiation, e.g. in defects of the mains or inappropriate handling with electric installations.

□ Caution against incorrect actions

Any actions in the cooling circuit of the heat pump may be made only by a qualified person having completed the apprenticeship in the branch of the „Cooling engineering technician“.

Any actions in the electric devices may be made only by a person qualified in the branch of electrical engineering according to § 6 Vyhl. č.50/78 Sb.



During the guarantee period, only the firm which has put the heat pump into operation and is authorized by the manufacturer may made any actions in the machinery or electric part of the heat pump.

The user is not authorized to alter the values set on the protective devices.!

The user may not make such handling in the heating system and the whole device that could cause flow restrictions in either heat pump primary or the secondary circuit or an increase in secondary circuit temperature at the heat pump inlet above 55 °C.

□ Maintenance of the heat pump

The heat pump does not require any routine maintenance.

Heat pump inspection carried out by a professional service firm authorized by the manufacturer is recommended to be made prior to each heating season. During the inspection, especially the following shall be checked:

- the heat pump cooling circuit for leakage;
- all switchboards;
- the adjustment of protective and regulation devices;
- the condition of water filters in the heating system.

All inspections, repairs and service actions made on the heat pump shall be recorded in the service record which is attached to the heat pump documentation.

The packing of the spare parts used for service works on the heat pump shall be returned to the heat pump manufacturer together with defective components; the manufacturer will use them when lodging a complaint to their producer. According to ČSN EN 378-1, all parts of the cooling device (e.g. the cooling agent, oil, the heat-carrying agent, the dryer, insulating materials) must be recovered, re-used in maintenance, repair and setting aside or disposed in the proper manner.



Keep the device clean. Clean the control panel only using a damp cloth. In no case use any chemical cleaning agents or sands.

❑ **User's training**

The user is trained during the device acceptance.

All important facts are stated in this documentation.

17 Guarantee conditions

- ❑ The guarantee period of the heat pump is specified in the purchase agreement.
- ❑ The guarantee is applicable under the prerequisite that :
 - the heat pump is installed and put into operation by a firm authorized by the manufacturer !
 - the heat pump is installed and operated under the conditions given in this documentation (other conditions must be approved by the manufacturer) and in adherence to all requirements specified in this documentation.

- ❑ The manufacturer will accept a possible complaint in the event that the user lodges it properly and in written and any imperfections are communicated to the manufacturer immediately after their discovery, but before guarantee period elapsing at the latest.

In the case of a justified complaint, the manufacturer repairs the heat pump duly and cost free.

- ❑ The manufacturer's guarantee lapses if without prior consent from the manufacturer, the user makes any alterations to the heat pump or gets them made, including any changes in adjustments of protective devices and regulators, or modifications, or repairs. The guarantee lapses also due to user's encroachment in safety seals.
- ❑ The guarantee does not apply to any damages arising from third party actions, unqualified handling or force majeure impacts.

18 Manufacturer's address

The manufacturer of the heat pumps is :

PZP KOMPLET a.s.

Dobré 149, 517 93 Dobré u Dobrušky

Tel./fax/recorder: +420 494 664 203

Tel. : +420 494 664 201

E-mail : pzp@pzp.cz

<http://www.pzp.cz>

Unless otherwise stated in the purchase agreement, the manufacturer is the bearer of the guarantees and guarantee repairs.

With progressive improvement of the heat pumps, the manufacturer reserves the right to alter these basic documents