HEAT RECOVERY UNITS WITH COOLING CIRCUIT

RHE Series
# Index

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General norms</td>
<td>4</td>
</tr>
<tr>
<td>Unit description</td>
<td>5</td>
</tr>
<tr>
<td>Components description</td>
<td>6</td>
</tr>
<tr>
<td>Accessories</td>
<td>7</td>
</tr>
<tr>
<td>Technical data</td>
<td>8</td>
</tr>
<tr>
<td>Operating limits</td>
<td>10</td>
</tr>
<tr>
<td>Sound data</td>
<td>10</td>
</tr>
<tr>
<td>Cooling performance variation</td>
<td>11</td>
</tr>
<tr>
<td>Fresh air temperature variations on the change of the external air temperature</td>
<td>12</td>
</tr>
<tr>
<td>Heating efficiencies, pressure drops on air side, accessories MBCH, MSS</td>
<td>13</td>
</tr>
<tr>
<td>Cooling scheme summer operation</td>
<td>14</td>
</tr>
<tr>
<td>Cooling scheme winter operation</td>
<td>15</td>
</tr>
<tr>
<td>Dimensions</td>
<td>16</td>
</tr>
<tr>
<td>Accessories dimensions</td>
<td>19</td>
</tr>
<tr>
<td>Accessories assembly instructions</td>
<td>21</td>
</tr>
<tr>
<td>Instructions for assembling roofs for outside installation</td>
<td>21</td>
</tr>
<tr>
<td>Installation and use of the unit</td>
<td>23</td>
</tr>
<tr>
<td>Positioning of the supporting brackets</td>
<td>24</td>
</tr>
<tr>
<td>Ducts connection</td>
<td>25</td>
</tr>
<tr>
<td>Hydraulic connections, condensate drain discharge</td>
<td>25</td>
</tr>
<tr>
<td>FCH Free-cooling accessory</td>
<td>26</td>
</tr>
<tr>
<td>Electrical connections</td>
<td>27</td>
</tr>
<tr>
<td>Changing SET fans flow rate</td>
<td>27</td>
</tr>
<tr>
<td>Maintenance of the unit</td>
<td>30</td>
</tr>
<tr>
<td>Filters</td>
<td>30</td>
</tr>
<tr>
<td>Condensate drain pan</td>
<td>30</td>
</tr>
<tr>
<td>Recuperator</td>
<td>31</td>
</tr>
<tr>
<td>Fans motor assembly</td>
<td>31</td>
</tr>
<tr>
<td>Heat exchange coil</td>
<td>31</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>31</td>
</tr>
<tr>
<td>Disposal</td>
<td>31</td>
</tr>
<tr>
<td>Diagnosis and fault solving</td>
<td>32</td>
</tr>
</tbody>
</table>
The present manual is an integral part of the documentation enclosed with the machine.
It must be conserved for future reference and must accompany the machine throughout its working life.
The manual defines the purpose to which the machine was built and establishes the correct installation and use limits.
• All use, installation and maintenance instructions of the unit are described in this manual as well as the main accident prevention standards.
• Read carefully and fully all information contained in this manual before the installation, starting, use, maintenance and cleaning of the unit. Pay particular attention to the use regulations that are accompanied by "DANGER" or "WARNING", because if not observed, they could cause damage to the machine and/or persons and property.
• For irregularities not contemplated by this manual, please consult the local After Sales Service.
• FAST S.p.A. decline any responsibility for any damage due to the improper use of the machine, and to a partial or superficial reading of the information contained in this manual.
• Installation and maintenance must be carried out by trained and qualified personnel, having the requirements laid down by law 46/90 and/or DPR 380/2001 for electric/electronic and air conditioning installations, with consequent registration at the local CHAMBER of COMMERCE. Otherwise FAST S.p.A. decline all responsibility regarding the safety of the product.

THE MANUFACTURER DECLINES ANY RESPONSIBILITY FOR DAMAGE TO PROPERTY, PERSONS OR ANIMALS CAUSED BY THE NON OBSERVANCE OF THE INDICATIONS AND REGULATIONS CONTAINED IN THE PRESENT MANUAL.

General norms

Even though a suitable risk analysis was carried out during the design of the HRR unit, pay ATTENTION to the pictograms on the machine that make the reading of the manual easier catching the readers attention concerning risks that can’t be avoided or sufficiently limited with the adoption of protection means and measures.

GENERAL DANGER SIGNS
Carefully observe all indications at the side of the pictogram.
The non observance of the indications could cause hazardous conditions with possible injury to the operator and to the user in general.

VOLTAGE DANGER SIGN
Carefully observe all indications at the side of the pictogram.
The signs indicate components on the unit or, in the present manual, identify areas that could generat risks of an electrical nature.

GENERAL WARNING SIGNS
Carefully observe all indications to the side of the pictogram that limit some actions in order to ensure greater safety for the operator.

MAIN GUARANTEE CONDITIONS
• The guarantee does not include payment for damages due to incorrect installation by the installer.
• The guarantee does not include payment for damages due to the improper use of the unit by the user.
• The manufacture is not responsible for injuries to the installer or user, caused by incorrect installation or improper use of the unit;
• The equipment must be installed in such a manner so as to allow maintenance and/or repair operations;
• The guarantee does not cover in any case costs due to turntable ladders, scaffolding or other similar elevating systems that are necessary to carry out operations under guarantee.

The guarantee is not valid if:
• the services and repairs have been carried out by unauthorised personnel or companies;
• the unit has been previously repaired or modified with non original parts;
• the unit has not been suitably maintained;
• the instructions illustrated in the present manual have not been observed;
• unauthorised modifications have been made.

Note:
The manufacturer reserves the right to carry out modifications at any time deemed necessary to improve their product, and are not obliged to apply the said modifications to previously manufactured machines that have already been delivered or are being constructed.
The general conditions are in any case subject to the general sale conditions included on the stipulation of the contract.
Description of the unit

The RHE series is the mono-block solution to the needs of systems normally used in bars, restaurants, offices, meeting rooms. The RHE units, which are divided into four sizes with a rated airflow from 1000 to 3300 m³/h, have been designed to guarantee a wellbeing conditions allowing a suitable air change in order to reduce the build-up of gas and undesired particles present in the environment to be treated (CO₂, cigarette smoke, unpleasant odours, sweat, dust, ...).

The peculiarity of these series is represented by the high efficiency got thanks to the use of the cross flows plate recuperator combined with a cooling circuit in heat pump operating with refrigerant R410A.

The RHE unit, in addition to the ventilation, filtration and recovery of heat, also includes, in a mono-damper unit, a heat pump refrigerating circuit. This allows to obtain a complete machine which operates independently in all seasons and which is capable of combining the necessary renewal of air with an efficient recovery of heat.

The accurate design of the machine combines the extremely compact size, which makes installation on suspended ceilings easier, with easy accessibility for the maintenance of all internal parts. This gives the opportunity, also thanks to the management and installation simplicity, to satisfy many system requirements.

WARNING
The RHE series is made to guarantee indoor air supply and extraction. The refrigerating circuit is calculated not only for giving supply air characteristics near to that of the indoor air, with the aim of avoiding disease conditions near vents, but also for covering in part ambient thermal loads.

Thermal and refrigerating capacities, which carry air conditions from the indoor air ones to those who cover in part ambient thermal loads, are referred to as thermal available capacity and refrigerating available capacity. These capacities are only an integration of those guaranteed by a conditioning unit.

The RHE series is not a conditioning unit, and it cannot be set apart from a conditioning unit if prefixed indoor air conditions (temperature and humidity) have to be guaranteed.

Available versions

The RHE units are available in 4 different sizes: Each model can be configured in such a manner to satisfy the system requirements by suitable combining the available options.

The table in fig. 01 shows the procedure of the commercial acronym in the 6 fields from which it is made.
Description of the components

Panels and frame:
The frame is made up of 25 mm thick galvanised self-supporting sandwich panels with injected polyurethane insulation (density of 42 kg/m³) and nylon reinforced corners with glass fibre. The construction of the casing simplifies installation and maintenance.

Fans:
They are centrifugal fans with forward-curved blades and with directly connected motor. The 230V - 50 Hz single-phase motor has one speed. The airflow in case of pressure drops changes of internal components (clogging filters) and distribution system remains constant.

Refrigerating circuit
This is a highly efficient and silent heat pump with scroll or rotative compressor operating with refrigerant R410A (according to sizes), four-way valve for cycle inversion, evaporating coil, safety valve, condensing coil, liquid receiver, thermostatic valve, liquid light, high/low pressure switch and by-pass valve (for little sizes).

Condensate drain pan:
Made of aluminium alloy, removable and with double discharge.

Evaporating/condensating coil:
With copper grooved tube and high efficiency aluminium fins.

Filters:
These are cell undulated type placed before the recovery unit on the supply and return airflow. The standard filters are class G4 type in accordance with classification UNI EN 779 with weighted efficiency of 90%. They are 48 mm thick and are easily removable from the top or bottom of the unit for to do the cleaning or replacement.

Dirty filters pressure switch:
A differential pressure switch is present, placed close to the electronic controllers, for the detection of the supply filter clogging. The intervention value can be set. The pressure switch includes clean contacts (NA, NC) to remote the alarm.

Heat recovery unit:
This is static cross flows recuperator made of aluminium sheets to grant high performances. During winter operation, the average efficiency is above 80% for the first two sizes and 70% for the last two sizes, ensuring first-class energy recovery from the air expelled from the room.

Support brackets:
They allow the unit to be rapidly and securely fixed to the false ceiling.

Accessibility:
The heat recovery, the condensate tank, fans and filters are removable from the bottom, removing the two lower panels (if the unit is hanging), the same can be easily removed from the air by removing the two top panels (if units is on the ground). The inspection of the filters, in both the cabinet and the floor version, you can disassemble the openings on the top and bottom panels are fastened with flyers.

Regulation
The unit is equipped with an electrical panel with power and regulation section (including the three-way valve for the additional hot water coil and related servomotor), aimed at guaranteeing the management of all refrigerating circuit functions. Also present: NTC temperature probe on the internal air recovery, external air temperature probe, pressure switch on the supply filter. With the free-cooling accessory are supplied dampers and servomotors. A remote control terminal is also supplied for the automatic management of the unit, remottable up to 150 meter (cable not supplied). The unit is equipped for the management of a luminous sign (230V) which switches on in case of generic alarm or unit OFF, in conformity with the norms in force for rooms for smokers. The following operations can be performed on the microprocessor: switching on and off of the unit, summer/winter changeover, setting of setpoint parameters, reading of room temperature.

N.B. For further information refer to the user manual.
### Accessories

- **MBCH** Hot water coil module  
  This is an external module that can be installed downstream from the motor fan assembly on the fresh air flow, equipped with:
  - Two-row water heating coil with copper pipes and aluminium fins with P2519 geometry. The collectors are equipped with a \( \frac{3}{4} " \) G UNI 338 threaded connector for the water inlet and outlet.
  - The three-way valves and related ON/OFF actuator.

- **MBCX** Module with battery  
  This is an outside module that can be installed downstream from the motor fan assembly on the fresh air flow, equipped with:
  - Electric battery with armoured finned elements.
  - Double safety thermostat with automatic and manual reset.

- **FCT** F7 efficiency filters  
  The units can be fitted with two cell-type undulated filters in class F7 according to the UNI EN 779 classification which can be placed as a replacement of the G4 filters. The filtrating cell is 48 mm thick.

- **MSS** Module with silencers  
  The accessory is made up of one module that is equipped with silencer positioned on the supply or exhaust. (For sizes 10 and 15, the accessory is only inlet compatible).
  - It is made of rockwool panels with the surfaces in contact with the air and protected by a polyester film held between two galvanised and micro-perforated laths.

- **FGE** Circular flanges  
  One accessory is supplied. 
  The accessory should be joined to the rectangular openings of the base unit in such a way as to allow for the use of circular channels. The accessory is not compatible with the MBCH, MBCX, MSS and FBH accessories. NB for further information refer to the tables in this manual and to the various accessory kits; for compatibility refer to fig. 02

- **FCH** Free-cooling kit  
  It allows for the unit operation in free cooling (temperature only). The “free-cooling kit” includes 2 dampers with related ON/OFF 230V servomotors. For further information refer to the Use manual.

**BIT Base for floor installation**

**BIM Base for floor installation of the additional modules**

**TPM Roof for outside installation**

**TPM Roof for outside installation of the additional modules**

**TPMSS Roof for outside installation of the silencers modules**

This accessory, made of galvanized sheet, allows for the protection from rainings for unit and its accessories. *: supplied with appendages near the speed regulators on the outside of the base unit, to protect these from solar irradiation.

**RS485 Interface card**  
Interface card necessary for the interface to surveillance systems according to the MOD-BUS protocol.

---

### Accessories and description

<table>
<thead>
<tr>
<th>Accessories and description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBCH Module with hot water coil</td>
<td>10 MBCH1 15 MBCH2 25 MBCH3 33 MBCH4</td>
</tr>
<tr>
<td>MBCX Module with electric battery</td>
<td>MBCX1 MBCX2 MBCX3 MBCX4</td>
</tr>
<tr>
<td>BIM Base for add. modules floor install</td>
<td>BIM1</td>
</tr>
<tr>
<td>TPM Roof for add. modules outside install</td>
<td>TPM1 TPM2</td>
</tr>
<tr>
<td>FCT Compact filters efficiency class F7</td>
<td>FCT1 FCT2 FCT3</td>
</tr>
<tr>
<td>BIT Base for floor installation</td>
<td>BIT1 BIT2 BIT3</td>
</tr>
<tr>
<td>TPE Roof for outside installation</td>
<td>TPE1 TPE2 TPE3</td>
</tr>
<tr>
<td>FCH Free-cooling Kit</td>
<td>FCH1 FCH2</td>
</tr>
<tr>
<td>RS485 RS485 cards</td>
<td>RS485</td>
</tr>
<tr>
<td>MSS Silencers modules</td>
<td>MSS1 MSS2</td>
</tr>
<tr>
<td>TPMSS Roof for silencers outside installation</td>
<td>TPMSS1 TPMSS2</td>
</tr>
<tr>
<td>FGE Circular flanges</td>
<td>FGE1</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>RHE MODEL</th>
<th>10</th>
<th>15</th>
<th>25</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>External maximal air flow [m³/h]</td>
<td>1000</td>
<td>1500</td>
<td>2500</td>
<td>3300</td>
</tr>
<tr>
<td>Recovery maximal air flow [m³/h]</td>
<td>1000</td>
<td>1500</td>
<td>2500</td>
<td>3300</td>
</tr>
<tr>
<td>Minimum air flow [m³/h]</td>
<td>800</td>
<td>1000</td>
<td>2000</td>
<td>2500</td>
</tr>
<tr>
<td>Supply static available pressure (1) [Pa]</td>
<td>320</td>
<td>245</td>
<td>140</td>
<td>220</td>
</tr>
<tr>
<td>Exhaust static available pressure (1) [Pa]</td>
<td>320</td>
<td>245</td>
<td>140</td>
<td>220</td>
</tr>
<tr>
<td>Total heating capacity (rec. + compr.) (3) [kW]</td>
<td>7,5</td>
<td>14,2</td>
<td>24,8</td>
<td>33,1</td>
</tr>
<tr>
<td>Total cooling capacity (rec. + compr.) (2) [kW]</td>
<td>6,6</td>
<td>8,7</td>
<td>13,8</td>
<td>19,8</td>
</tr>
<tr>
<td>Available heating capacity (3) [kW]</td>
<td>2,8</td>
<td>2,9</td>
<td>3,9</td>
<td>7,0</td>
</tr>
<tr>
<td>Available cooling capacity (2) [kW]</td>
<td>1,8</td>
<td>3,1</td>
<td>3,3</td>
<td>5,4</td>
</tr>
<tr>
<td>Recovered heating capacity (3) [kW]</td>
<td>3,6</td>
<td>10,0</td>
<td>15,3</td>
<td>19,6</td>
</tr>
<tr>
<td>Recovered cooling capacity (2) [kW]</td>
<td>2,2</td>
<td>3,2</td>
<td>4,5</td>
<td>5,6</td>
</tr>
<tr>
<td>Refrigerating circuit heating capacity (3) [kW]</td>
<td>3,9</td>
<td>4,2</td>
<td>9,5</td>
<td>13,5</td>
</tr>
<tr>
<td>Refrigerating circuit cooling capacity (2) [kW]</td>
<td>4,4</td>
<td>5,5</td>
<td>9,3</td>
<td>14,0</td>
</tr>
<tr>
<td>Total input power in winter (3) [kW]</td>
<td>2,2</td>
<td>2,4</td>
<td>4,2</td>
<td>4,9</td>
</tr>
<tr>
<td>Total input power in summer (2) [kW]</td>
<td>2,6</td>
<td>2,9</td>
<td>5,1</td>
<td>6,5</td>
</tr>
<tr>
<td>Sound pressure level (4) [db(A)]</td>
<td>66</td>
<td>69</td>
<td>72</td>
<td>75</td>
</tr>
<tr>
<td>Power supply</td>
<td>1-230-50</td>
<td>1-230-50</td>
<td>3+N-400-50</td>
<td>3+N-400-50</td>
</tr>
</tbody>
</table>

### RECUPERATOR

- **Efficiency in winter [ %]**: 82, 80, 73, 71
- **Efficiency in summer [ %]**: 82, 80, 68, 65

### FANS

- **Fans number**: 2, 2, 2, 2
- **Total nominal input power [kW]**: 0,9, 0,9, 2,1, 2,1
- **Total max. absorbed current [A]**: 7,6, 7,6, 10,5, 10,5
- **Protection class IP**: 55, 55, 55, 55

### FILTERS

- **Classification according to EN779**: G4, G4, G4, G4
- **Weight efficiency [%]**: 90, 90, 90, 90
- **Classification according to EN779 (filters, accessories)**: F7, F7, F7, F7
- **Additional pressure drop for F7 filters (optional) [ Pa]**: 35, 59, 58, 63

### REFRIGERATING CIRCUIT (COMPRESSOR)

- **Refrigerant**: R410a, R410a, R410a, R410a
- **Compressors input power in winter (3) [kW]**: 1,3, 1,5, 2,1, 2,8
- **Compressors input power in summer (2) [kW]**: 1,7, 2,0, 2,8, 4,4
- **Compressors max. absorbed current [A]**: 10,0, 11,0, 7,0, 10,3

### CONDENSATE DRAIN PANEL

- **Diameter of the condensate drain panel charge [in]**: 1", 1", 1", 1"
## ACCESSORIES

### MBCH - Water heating coil

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>15</th>
<th>25</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rows</strong></td>
<td>[n]</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Front surfaces</strong></td>
<td>[m²]</td>
<td>0.238</td>
<td>0.238</td>
<td>0.238</td>
</tr>
<tr>
<td><strong>Air side pressure drop at nominal flow rate</strong></td>
<td>[Pa]</td>
<td>7</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td><strong>Heating capacity</strong></td>
<td>(1) [kW]</td>
<td>7.68</td>
<td>10.35</td>
<td>15.56</td>
</tr>
<tr>
<td><strong>Heating capacity</strong></td>
<td>(2) [kW]</td>
<td>2.57</td>
<td>4.04</td>
<td>6.45</td>
</tr>
<tr>
<td><strong>Water flow rate</strong></td>
<td>(1) [l/h]</td>
<td>673</td>
<td>906</td>
<td>1363</td>
</tr>
<tr>
<td><strong>Water side pressure drop (nominal conditions)</strong></td>
<td>(1) [kPa]</td>
<td>11</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td><strong>Water flow rate</strong></td>
<td>(2) [l/h]</td>
<td>446</td>
<td>700</td>
<td>1118</td>
</tr>
<tr>
<td><strong>Water side pressure drop (nominal conditions)</strong></td>
<td>(2) [kPa]</td>
<td>3</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td><strong>Water coil manifolds diameter</strong></td>
<td>[in]</td>
<td>3/4”</td>
<td>3/4”</td>
<td>3/4”</td>
</tr>
</tbody>
</table>

### MBCX - Electric heating coil

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heating capacity</strong></td>
<td>[kW]</td>
<td>5</td>
<td>7.5</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Air side pressure drop at nominal flow rate</strong></td>
<td>[Pa]</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Stages</strong></td>
<td>[n]</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Electric absorbed current</strong></td>
<td>[A]</td>
<td>7.6</td>
<td>11.4</td>
<td>19.0</td>
</tr>
</tbody>
</table>

1) Inlet/outlet water temperature 70/60°C. Compressor running. Operating conditions: return air 20°C 50%, external air -2°C 80%;

2) Inlet/outlet water temperature 45/40°C. Compressor running. Operating conditions: return air 20°C 50%, external air -5°C 80%;
Operating limits

In their standard set-up, the equipment is not suitable for installation in a saline environment. Refer to fig. 03 for the operating limits.

N.B: Please contact FAST technical sales office in the event it is necessary to operate the machine outside the limits indicated in the diagram.

Sound data

• **Data outside the panel**: (the data are calculated at the following conditions: 1 m. distance from the unit, ducted supply vent and in free field)

<table>
<thead>
<tr>
<th>RHE</th>
<th>Press. sonora per frequenza centrale di banda (Hz)</th>
<th>Press. sonora</th>
<th>Press. sonora</th>
<th>Pot. sonora</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63 dB</td>
<td>125 dB</td>
<td>250 dB</td>
<td>500 dB</td>
</tr>
<tr>
<td>10</td>
<td>57</td>
<td>58</td>
<td>51</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>61</td>
<td>64</td>
<td>56</td>
<td>50</td>
</tr>
<tr>
<td>25</td>
<td>62</td>
<td>68</td>
<td>57</td>
<td>53</td>
</tr>
<tr>
<td>33</td>
<td>65</td>
<td>72</td>
<td>64</td>
<td>56</td>
</tr>
</tbody>
</table>

• **Sound attenuation with SUF - Module with silencers (accessory)**

<table>
<thead>
<tr>
<th></th>
<th>63 dB</th>
<th>125 dB</th>
<th>250 dB</th>
<th>500 dB</th>
<th>1000 dB</th>
<th>2000 dB</th>
<th>4000 dB</th>
<th>8000 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSS</td>
<td>9</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>
Cooling Performance variations

The RHE series heat recovery unit with refrigerating circuit allow the renewal of the internal air giving the necessary hourly change in order to obtain the ideal comfort conditions. The use of a high efficiency cross-flow heat recovery unit and a heat pump refrigerating circuit allows, in most applications and in the most common external air temperature conditions, in addition to the neutralisation of the heating load of the external air, to supply an adequate heating and cooling capacity to compensate the internal heating loads. The fig. 4 illustrates the graph from which it is possible to draw the coefficients to be multiplied by the nominal values which are present in the technical data table to determine the total refrigerating and heating performance based on the outside conditions.

Multiplicative Coefficients for the cooling and heating performance to room air temperature variation in summer/winter operation

**SUMMER OPERATION:**
- Room conditions 22°C, 50% RH → corrective coefficient = 1.050
- Room conditions 24°C, 50% RH → corrective coefficient = 1.025
- Room conditions 26°C, 50% RH → corrective coefficient = 1
- Room conditions 28°C, 50% RH → corrective coefficient = 0.975

**WINTER OPERATION:**
- Room conditions 18°C, 50% RH → corrective coefficient = 0.980
- Room conditions 20°C, 50% RH → corrective coefficient = 1
- Room conditions 22°C, 50% RH → corrective coefficient = 1.020
- Room conditions 24°C, 50% RH → corrective coefficient = 1.040
Fresh air temperature variations on the change of the external air temperature

The following charts allow to determine the variation of the temperature within the room on the variation of the external conditions. The variability of the air flows is that allowed to guarantee that the refrigerating circuit operates correctly.

Note: The following diagrams are representative for all sizes, but without accessories.

**Summer operation**

<table>
<thead>
<tr>
<th>Outside air temperature (°C)</th>
<th>Inlet air temperature variation (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

*Conditions: exhaust air 26°C, 50% RH.*

**Winter operation**

<table>
<thead>
<tr>
<th>Outside air temperature (°C)</th>
<th>Inlet air temperature variation (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15</td>
<td></td>
</tr>
<tr>
<td>-10</td>
<td></td>
</tr>
<tr>
<td>-5</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

*Conditions: exhaust air 20°C, 50% RH.*
The diagram in fig. 06 allows to determine for each model, according to the water temperature and outside air temperature variation the corrective factor to multiply for the nominal capacity value are present in the technical data table.

Fig. 07 illustrates the pressure drops (Pa) on the air side based on the flow rate for the MBCH and MSS accessories.

Fig. 08 illustrates the pressure drops (kPa) water side of the MBCH accessory coil.

Note: The pressure drops illustrated in the diagram also include those of the three-way valve.
Refrigerating circuit summer operation

**KEY**
- **CP** Compressor
- **BC** Condensing coil
- **BE** Evaporating coil
- **F** Filter
- **RL** Liquid receiver
- **PA** High pressure probe
- **VIC** Inversion valve
- **AP** High pressure switch
- **BP** Low pressure switch

---

Selection, installation, use and maintenance manual 14
Refrigerating circuit winter operation

KEY

- CP Compressor
- BC Condensing coil
- BE Evaporating coil
- F Filter
- RL Liquid receiver
- PA High pressure probe
- VIC Inversion valve
- AP High pressure switch
- BP Low pressure switch
High efficiency heat recovery unit with cooling circuit - RHE -  

Dimensions

### Weights and c.g.

<table>
<thead>
<tr>
<th>Model</th>
<th>kg</th>
<th>Gx</th>
<th>Gy</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHE 10</td>
<td>300</td>
<td>700</td>
<td>650</td>
</tr>
<tr>
<td>RHE 15</td>
<td>310</td>
<td>740</td>
<td>745</td>
</tr>
</tbody>
</table>
RHE 25

Weights and c.g. kg Gx Gy
RHE 25 373 1130 920
Selection, installation, use and maintenance manual
Accessories Dimensions

**MSS - Silencers Modules**

<table>
<thead>
<tr>
<th>Mod.</th>
<th>MSS 1</th>
<th>MSS 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>684</td>
<td>846,5</td>
</tr>
<tr>
<td>B</td>
<td>684</td>
<td>684</td>
</tr>
<tr>
<td>C</td>
<td>574</td>
<td>574</td>
</tr>
<tr>
<td>D</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>E</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>F</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>G</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>H</td>
<td>718</td>
<td>880,5</td>
</tr>
<tr>
<td>I</td>
<td>12,5</td>
<td>12,5</td>
</tr>
<tr>
<td>L</td>
<td>342</td>
<td>432,5</td>
</tr>
<tr>
<td>M</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>N</td>
<td>624</td>
<td>624</td>
</tr>
</tbody>
</table>

**BIT - Base for floor installation**

<table>
<thead>
<tr>
<th>Mod.</th>
<th>BIT 1</th>
<th>BIT 2</th>
<th>BIT 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1490,5</td>
<td>1978</td>
<td>2303</td>
</tr>
<tr>
<td>B</td>
<td>1490,5</td>
<td>1490,5</td>
<td>1815,5</td>
</tr>
<tr>
<td>C</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>
**High efficiency heat recovery unit with cooling circuit** - **RHE** -

**MBCH - Module with water coil**

![Diagram of MBCH module]

**MBCX - Module with electric coil**

![Diagram of MBCX module]

<table>
<thead>
<tr>
<th>Mod. [mm]</th>
<th>RHE 10-15-25</th>
<th>RHE 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>684</td>
<td>846</td>
</tr>
<tr>
<td>B</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>C</td>
<td>423</td>
<td>423</td>
</tr>
<tr>
<td>D</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>E</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>F</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>G</td>
<td>345</td>
<td>423</td>
</tr>
<tr>
<td>H</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>I</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>L</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>M</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>N</td>
<td>345</td>
<td>423</td>
</tr>
<tr>
<td>O</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>P</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>Q</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>R</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>S</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>T</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>U</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>V</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>W</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>X</td>
<td>201</td>
<td>201</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mod. [mm]</th>
<th>RHE 10-15-25</th>
<th>RHE 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>610</td>
<td>772,5</td>
</tr>
<tr>
<td>B</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>C</td>
<td>423</td>
<td>423</td>
</tr>
<tr>
<td>D</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>E</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>F</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>G</td>
<td>345</td>
<td>423</td>
</tr>
<tr>
<td>H</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>I</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>L</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>M</td>
<td>287</td>
<td>287</td>
</tr>
<tr>
<td>N</td>
<td>345</td>
<td>423</td>
</tr>
<tr>
<td>O</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>P</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>Q</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>R</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>S</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>T</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>U</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>V</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>W</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>X</td>
<td>201</td>
<td>201</td>
</tr>
</tbody>
</table>

Selection, installation, use and maintenance manual
MSS, MBCH, MBCX assembly

Accessories MBCH, MBCX and MSS are equipped with:
- “L” supporting brackets;
- M6 screws to draw close the accessory to unit;
- for MBCX only: electrical box put outside the accessory;

- for MBCH only: electrical cables for connection between three way valve servocontrol (230V, ON/OFF running) and electrical box and between electrical box and unit electrical panel;
- for MBCX only: electrical cables for connection between coil and electrical box and between electrical box and unit electrical panel (electrical cables for coil electrical supply and protection differential magnetic switch are not supplied).

For accessories installation on the ceiling and their connection to the unit please refer to the following instructions:
- collocate the support brackets on the wall following the instructions at page 24;
- draw close to the accessory MBCH, MBCX, MSS to unit;
- fix with screws the accessory to unit prepared with threaded hexagonal inserts;
- connect electrical cables coming from the accessory electrical box to the unit electrical panel (please refer to electrical schemes equipped with the unit).

Instructions for assembling roofs for outside installation

Base unit roof (TPE)
The roofs of the base unit are composed of two parts (1+2); one part has an accessible panel(1) for allowing the flat filters to be serviced. The two parts should be joined together using the metric screws supplied. It is recommended that every point where water might infiltrate be sealed with silicone. Also coming with the delivery are: an appendage (3) for protecting the speed controllers from solar irradiation; a frame (4) that is fixed to (2) if there are no accessory modules. Both the appendage (3) and the frame (4) should be fixed to the roof with the bolts and screws provided. Then the roof should be fixed to the side of the unit with the bolts and screws provided. The roof should protrude on the electrical panel side, while it will be flush with the other three sides.

Roof accessories (TPM - TPMSS)
Roof accessories are composed of a single piece that should be mounted on the top of the accessory itself with the bolts and screws provided. The roof accessory has a raised part that should be above the part of the roof of the base unit when the accessory is joined to the machine. The frame (4) needs to be removed from the roof of the base unit in order to allow the raised part of the roof accessory to cover the side of the roof of the base machine (5). The two strips of the roof resting on each other will have to be properly sealed with silicone.
Dampers and actuators (accessory FCH)

2 dampers with actuators ON/OFF 230V are included in the accessory free-cooling kit FCH.

<table>
<thead>
<tr>
<th>Mod. [mm]</th>
<th>RHE 10</th>
<th>RHE 15-25</th>
<th>RHE 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>450</td>
<td>550</td>
<td>600</td>
</tr>
<tr>
<td>H</td>
<td>310</td>
<td>410</td>
<td>460</td>
</tr>
</tbody>
</table>

Circular flanges (FGE accessory)

Unit accessibility

Panels for inspection and/or filters replacement
Once damages are detected during transport it is prohibited:
• the unit and accessories are not reconnected without informing the installer following the instructions in this manual.
• all parts are present.
• the unit and accessories must be protected against protruding parts such as the coil connections, condensate drain, electrical components, etc., from being knocked during transport.
• the items must be protected against bad weather during transport.

The necessary controls are the following:
• integrity of the finned coil manifolds and condensate trays;
• water connections (that these are protected with the rubber plugs). If they are not provide suitable closure devices;
• integrity of the panels;
• integrity of the electrical panel and electrical/electronic parts.

Installation
It is recommended to carefully follow the indications in the sections below when installing the equipment. The sections are in chronological order in order to make each phase of the installation easier. The necessary technical space must be verified before installation (fig.08):
• for the arrangement of the supply and exhaust ducts as well as those for the free-cooling;
• for the dampers with free-cooling function;
• for the passage of the power supply cables.
• if the unit and/or the relative accessory modules are positioned outside, the protective roof must be installed;

The necessary controls are the following:
• integrity of the finned coil manifolds and condensate trays;
• water connections (that these are protected with the rubber plugs). If they are not provide suitable closure devices;
• integrity of the panels;
• integrity of the electrical panel and electrical/electronic parts.

Installation and use of the unit

Handling
CAUTION!
During the handling phase, wear proper individual protection devices (IPD).

Before installation and use you are recommended to fully unpack the base unit and all the components that come with it.
The units are supplied packed with polythene film and, as a standard, on wooden pallets.

For transport reasons, some accessories travel separately from the standard unit and are to be reassembled by the installer following the instructions in this manual.

Transport
Refer to the weight indications on the plate on each unit in order to transport the unit safely.
In any case, the following precautions must be taken when transporting the unit:
• The unit and its accessories, if any, must not be subject to intense knocks which could compromise the integrity of the structure and internal parts;
• The unit and possible accessories must be suitably secured to the platform of the transportation by means of cables or similar in order to prevent its movement;
• the unit and accessories must be protected in order to prevent protruding parts such as the coil connections, condensate drain, electrical components, etc., from being knocked during transport;
• the items must be protected against bad weather during transport.

Checks at material receipt
When the unit is received it is necessary to carry out an initial inspection to make sure that:
• all parts are present;
• the unit and accessories are not damaged.
If there are signs of damage it is necessary to specify it on the carriage note.
for the components (three-way valves, condensate drainage traps, etc.) without which the correct functioning of the unit cannot be guaranteed;

In particular:
• a space of at least 200 mm must be available for the trap in correspondence with the condensate drain (fig. 11).

Positioning of the supporting brackets

The unit must be positioned on a horizontal surface to avoid:
• the damage of the motor fan assemblies caused by weight imbalance
• the incorrect operation of the condensate drain.

The unit and the coil and silencer module are equipped with "L" supporting brackets for horizontal installation.
The unit can be fixed by means of fins bars by steel M6 of suitable length, blocked through nuts and washers to support brackets assembled to unit; it must be used one bar for each bracket (n.6 bars in all). It is advisable to use fins bars with resistance class at least 4.6. In alternative, can be used tiranti with equal or higher mechanical resistency.

If they are used fins bars with high resistancy (class 8.8 at least), it is possible to use n.4 fins bars for the blocking of unit, not connecting the central brackets.

N.B.: It is recommended to place rubber dampers to decrease the vibrations generated by the unit.
Ducts connection

CAUTION!
Never start up the unit when the fan opening vents are not ducted or covered by protective mesh.

See fig. 10 for the installation of the ducts:
- use adequate brackets to support the ducts in order to avoid that the recovery unit is overloaded by their weight;
- in order to prevent the transmission of vibrations and noise, FAST S.p.A. suggests the use of ducts with a frontal mass higher than 10 kg/m²;
- connect the supply and exhaust vents to the ducts using vibration-damping joints (canvas). The vibration-damping joint must be screwed to the panel with self-tapping screws, positioning the screws inside the border highlighted in the following layout avoiding that the canvas joints are over stretched (point 1);
- connect a earth wire to the vibration-damping joint to act as a jumper to guarantee the unipotentiality between the ducts and the recovery unit;
- place the supply duct with a straight section of at least one meter, before the bends, branches, etc., and make sure that the ducting does not have inclinations of the divergent sections greater than 7°.

Hydraulic connections of the condensate drain
The condensate drain pan is equipped with 2 exhaust diameter threaded 1 "G UNI 338:

- 1) The drainage system should feature an adequately sized trap to:
  - freely discharge the condensate;
  - prevent the undesired entry of air into the vacuum systems;
  - prevent the undesired exit of air from the pressure systems;
  - prevent the infiltration of odours or insects.
In the lower part of the syphon must have a bleed cap or must anyway permit fast dismantling for its cleaning.
Rules to follow for the scaling and production of the syphon are given below.

- 2) A drain is plugged.

NB. DURING INSTALLATION INCLINE THE UNIT TO FACILITATE DRAINAGE OF CONDENSATE FROM THE SIPHON.
The assembly of the "free-cooling kit" accessory must be performed by qualified personnel in accordance with the present standards and must be made following the indications in the electrical layout supplied with the unit. The compressor is off during the functioning of the unit in the free-cooling mode. The temperature settings are pre-set at fixed values (on request these values can be changed by contacting the After-Sales office).

**Operation**
The free-cooling function foresees that the air expelled from the room does not affect the heat recovery unit, passing directly to the outside through a duct connected to the damper B. In order to use the free-cooling function a duct is required to connect to damper A and another to connect to damper B. The two dampers A and B have an opposing function. When the outside temperature is close to the ideal temperature of the room, damper A is closed while damper B is open.

**Accessory assembly**
For the assembly of the free-cooling accessory please refer to fig. 12:
- place the two dampers with servomotors as indicated in the figure;
- make sure that the damper is closed during the free-cooling function while the damper is open (opposing functions);
- connect the damper servomotors;

**CAUTION!**
Before assembling the free-cooling kit, make sure that the power is not connected to the unit.
The unit is completely wired in the factory and requires the power supply, intercepted with inline protections, indicated on the unit specification plate in order to be started.

The installer should define the power supply line based on the length, the type of cable, the absorption of the unit and the displacement. (TAB.3)

All electrical connections must be in accordance with the present standard at the moment of installation.

CAUTION:
Refer to the electrical layout supplied with the equipment for installation needs.

Check that all power cables are correctly secured to the terminals when switched on for the first time and after 30 days of use. Afterwards, check the connection of the power cables every six months. Slack terminals could cause the cables and components to overheat.

The electrical wiring and connections must be done by qualified persons in accordance with regulations currently in force.

### TABLE 3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>± 10% the nominal voltage (EN60204)</td>
</tr>
<tr>
<td>Frequency</td>
<td>± 1% frequency in continuous way</td>
</tr>
<tr>
<td>Room humidity during operation</td>
<td>from 30% to 95%, without condensate</td>
</tr>
<tr>
<td>Room humidity during operation</td>
<td>included between +5 and +40°C (EN60204)</td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 1000 m s.l.m (EN60204)</td>
</tr>
</tbody>
</table>

CAUTION!
Once the connections have been made, check that:
- all the cables have been correctly connected, and that there are no short circuits between terminals and the terminals and ground.
- the electrical terminals both within the electrical panel as well as in the terminal board of the compressor are secured and that the mobile and fixed contacts of the remote control switches do not show signs of wear.
- Do not block the air intake of the panel.
- Never connect or disconnect the remote terminal with energised main board.

The inverters mounted on the machine have the function of keeping the flow rate of the fans constant when the unit experiences pressure drops (blocked filters, new accessories installed, etc.). For this reason it is possible to use certain dip-switches based on the tables shown below.

Naturally, before working on the inside of the inverter, you need to have carefully read the instructions for use, the user manual and the programming sheet, and you need to know the operating modes and the relative settings.

Access to the inverter and changing the settings should always be carried out in the absence of supply voltage by qualified technical personnel, who are knowledgeable of the safety applications required by the legislation, regulations and standards in force for the location of the installation. There are 7 dip-switches: some of them absolutely

### Changing SET fans flow rate

The inverter must have to remain at their factory settings so as not to void the warranty.

Positions of the fixed dip-switches.

NB: The dip-switches 1, 2, 3 and 7 must absolutely stay in the positions indicated by FAST, while 4, 5 and 6 can be changed in relation to the desired flow rates.
### MODEL RHE 10

<table>
<thead>
<tr>
<th>DIP-SWITCHES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow 800 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 900 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 1000 (factory setting) ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MODEL RHE 15

<table>
<thead>
<tr>
<th>DIP-SWITCHES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow 1100 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 1200 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 1300 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 1400 ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 1500 (factory setting) ([\text{m}^3/\text{h}])</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### MODEL RHE 25

<table>
<thead>
<tr>
<th>DIP-SWITCHES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow 2050</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 2300</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 2550 (factory setting)</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MODEL RHE 33

<table>
<thead>
<tr>
<th>DIP-SWITCHES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow 2550</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 2800</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 3050</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow 3300 (factory setting)</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td>OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flow values are given in $[m^3/h]$.
Before the start-up

Before start-up check that:
- the system has been charged and the air has been blown out;
- the electrical connections have been made correctly;
- the line voltage is within the permitted allowance (±10% of the rated value);

Unit start-up

For detailed information regarding the operating parameter settings and all other machine or control card operations, please refer to the user manual.

CAUTION!

Make sure that all the instructions have been complied with before carrying out the commissioning checks.

Before the first start-up of the heat recovery unit check the following points:

Checks during operation

The air flow rate values must not be lower than 15% of the nominal values indicated in the technical specifications table. If an electrical resistance is present, check the cut-in by measuring its electrical absorption.

Requirements for R407C gas

The circuit chillers that work on R407C cooling gas require particular attention during assembly and maintenance, to prevent operating faults.

Unit maintenance

CAUTION!

- During the maintenance phase, wear proper individual protection devices (IPD).
- Before performing maintenance and/or cleaning operations on the unit, make sure the unit is disconnected from the power supply and that it cannot be turned back on without the knowledge of the person performing maintenance, and that the heat exchanger coils are not working.
- During maintenance the weight of the inspection panelling could hinder the work.

The RHE series recovery units have been designed to require very little maintenance and to make every operation easy. Some simple pieces of advice follow for the proper maintenance of the unit.

Filters

Filter cleaning is imperative to maintain high air quality in the room. The synthetic filters installed in the RHE unit can be regenerated with compressed air or can be washed with cold water. To disassemble the filters:
- remove the inspection panel with knobs;
- remove the filters;
- clean the filters;
- replace all parts in reverse order.

Therefore it is necessary to:
- Avoid refilling with oil different from the one specified and already used in the compressor.
- If there are gas leaks causing the unit to be even partially empty, do not refill with refrigerant, but empty the unit completely and refill it with the foreseen amount.
- In the event of replacement of one of the refrigerating circuit parts, do not leave the circuit open for more than 15 minutes.
- In particular, in the event of replacing the compressor, complete the installation within the above-mentioned time after the rubber plugs have been removed.

- When empty, do not switch on the compressor; do not compress the air within the compressor.
- When using R407C gas bottles, it is recommended to take care of the maximum number of drawings permitted in order to guarantee the correct ratio of components of the R407C gas.

Refrigerant charge

For data related to refrigerant gas quantity R410A to charge, please refer to the identification plate on the unit.

Condensate drain pan

Dirt can hoard up in the condensate drain pan. You are therefore recommended to clean the pan regularly and check that the discharge pipe is not clogged.

To remove the condensate drain pan of the heat recovery unit:
- If the unit is placed in the ceiling:
  - remove all bottom panels;
  - disassemble the cross bar;
  - disconnect the pan from the condensate drain pipes;
  - disassemble the pan supporting brackets;
  - clean the pan;
  - replace all parts in reverse order.
- If the unit is placed on the ground:
  - remove all above panels;
• disassemble the cross bar;
• disconnect the pan from the condensate drain pipes;
• disassemble the pan supporting brackets;
• clean the pan;
• replace all parts in reverse order.

In order to access the condensate drain pan on the coil module, detach the module from the unit and disassemble it.

**Heat recovery unit**

The heat recovery unit can be cleaned with a jet of compressed air or cold water. To disassemble the heat recovery unit:
• remove the condensate drain pan (if the unit is placed in the ceiling);
• remove the heat recovery unit supporting brackets;
• clean the heat recovery unit;
• replace all parts in reverse order.

**Components**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>OPERATION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters</td>
<td>cleanliness control</td>
<td>twice a week</td>
</tr>
<tr>
<td>Heat exchanger coil</td>
<td>coil cleaning control</td>
<td>each year</td>
</tr>
<tr>
<td>Condensate pan</td>
<td>cleanliness control</td>
<td>each year</td>
</tr>
<tr>
<td>Heat recovery unit</td>
<td>coil cleaning control</td>
<td>each year</td>
</tr>
</tbody>
</table>

The table indicates the maintenance operations concerning each component, indicating the type of check to perform and when it should be performed. The frequency is approximate and varies depending on the working and environmental conditions in which the heat recovery unit operates.

**Decommissioning**

**Disconnect the unit**

All decommissioning operations must be performed by authorized personnel in accordance with the national legislation in force in the country where the unit is located.
• Avoid spills or leaks into the environment.
• Before disconnecting the machine please recover:
  • the refrigerant gas;
  • Glycol mixture in the hydraulic circuit;
  • the compressor lubricating oil.

Before decommissioning the machine can be stored outdoors, providing that it has the electrical box, refrigerant circuit and hydraulic circuit intact and closed.

**Disposal, recovery and recycling**

The frame and components, if unsuitable, should be taken apart and sorted by type, especially copper and aluminum that are present in large quantities in the machine. All materials must be recovered or disposed in accordance with national regulations.

**RAEE Directive (only UE)**

• The RAEE Directive requires that the disposal and recycling of electrical and electronic equipment must be handled through a special collection, in appropriate centers, separate from that used for the disposal of mixed urban waste.
• The user has the obligation not to dispose of the equipment at the end of the useful life as municipal waste, but to send it to a special collection center.
• The units covered by the RAEE Directive are marked with the symbol shown above.
• The potential effects on the environment and human health are detailed in this manual.
• Additional information can be obtained from the manufacturer.

**Disposal**

All units are checked and tested at the factory before shipment, however, during operation an anomaly or failure can occur.

BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT.

At the end of their operating life, the RHE units must be disposed of according to the present laws. The main components including the unit of the URFC series are made from:
• Galvanised sheet steel (panels, condensate drain pan, fans);
• aluminium sheet metal (coil fins, dampers, electrical motor casing);
• copper (coil tubes, electric motor winding);
• polyurethane foam (insulation of the sandwich panels);
• rock wool (silencers);
• the cooling gas is recuperated by specialised personnel and forwarded to the disposal centre;
• the compressor oil is also recovered and forwarded for disposal.

**Fans-motor assembly**

The fans motor assembly needs to be checked to see how clean the rotor is, whether there is corrosion or damage, and whether there are abnormal noises. If necessary disassemble the motor fan assembly as follows:
• remove all inspection panels;
• disconnect the power supply cable;
• unscrew the four screws that hold each of the motor fan assemblies to the frame;
• check the motor fan assemblies and replace them if necessary;
• replace all parts in reverse order.

**Heat exchanger coils**

To maintain an efficient heat exchange the coils must be cleaned with a jet of compressed air and the circuit (water coil) must be free from air.
To access the heat exchanger coil of the MBC accessory, disconnect the module from the unit and disassemble it.
# Diagnosis and fault solving

## 1. Insufficient air flow rate
- Fans rotation speed too low
- Pressure drop of the distribution system underestimated
- Blocked filters
- Blocked intake grating
- Coil incrustation
- Clean the components; increase the fan speed

## 2. Excessive air flow rate
- Fans rotation speed too high
- Pressure drop of the distribution system overestimated
- Filters not fitted
- Fit filters

## 3. No air flow rate
- Power supply off
- Electric motor burnt out
- Make sure power supply is available
- Replace the electric motor

## 4. Abnormal noise
- Excessive flow rate
- Bearings worn or defective
- Foreign objects on the fan blades
- Reduce flow rate
- Replace bearings
- Clean blades

## 5. Water movement
- Trap Blocked
- No trap or incorrectly carried out
- Clean trap
- Use an adequate trap

## 6. The compressor does not start
- Defective connection or contacts open
- Thermostat does not respond functioning
- Safety device does not respond
- Check the voltage and close the contact
- System at temperature, no request; check the setting and the functioning
- See point 9) and 10)
- Defective compressor
- Replace compressor

## 7. The compressor does not start
- Compressor burnt out or seized
- Compressor remote control switch de-energised
- Power circuit open
- Replace compressor
- Check the voltage across the operating time of the protection; automatic compressor shutdown
- Check why the protection cut in compressor; automatic shutdown

## 8. The compressor starts and then stops
- Defective compressor remote control switch
- Defective compressor
- Check and if necessary replace it
- Check and if necessary replace it

## 9. The compressor does not start due to the intervention of the high pressure switch
- Pressure switch out or order
- Excessive refrigerant
- Presence of incondensable gas in the refrigerating circuit
- The condensate coil is not sufficiently covered in air
- Blocked refrigerant filter
- Check and replace
- Discharge excess gas
- Refill the circuit after having discharged and placed in vacuum.
  (See point 1)
- Check and replace
<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Potential Causes</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| 10. The compressor does not start due to the intervention of the low pressure switch | - Pressure switch out of order  
- Machine completely empty  
- Poor air flow  
- Blocked refrigerant filter  
- The thermal expansion valve does not function correctly | - Check and replace  
- See point 11)  
- Check the air duct and the state of the filters.  
- Check and replace  
- Check, clean or if necessary replace it. |
| 11. Lack of gas                                                                    | - Leak in the refrigerating circuit  
- Pressure switch out of order  
- Machine completely empty  
- Low pressure switch  
- Poor air flow  
- Blocked refrigerant filter  
- The thermal expansion valve does not function correctly | - Check and replace  
- See point 11)  
- Check and replace  
- Check the refrigeration circuit with a leak detector |
| 12. Hot liquid pipe                                                                | - Lack of refrigerant  
- Low pressure switch  
- Poor air flow  
- Blocked refrigerant filter  
- The thermal expansion valve does not function correctly | - Check and replace  
- See point 11)  
- Check, clean or if necessary replace it. |
| 13. The refrigerating circuit functions correctly but with insufficient proficiency | - Leak in the refrigerating circuit  
- Pressure switch out of order  
- Machine completely empty  
- Low pressure switch  
- Poor air flow  
- Blocked refrigerant filter  
- The thermal expansion valve does not function correctly | - Check and replace  
- See point 11)  
- Check and replace  
- Check, clean or if necessary replace it. |
| 14. Compressor suction tube frosted                                                | - Thermal expansion valve  
- Poor air flow  
- Lack of refrigerant  
- Blocked liquid filter  
- The thermal expansion valve does not function correctly | - Check the valve and if it is not working correctly replace it  
- Check filters, fans and ducts.  
- See point 11)  
- Clean and replace |
| 15. Abnormal noise in the system                                                   | - Vibration in the pipes  
- Noisy compressor  
- Noisy thermostatic valve  
- Vibrations in the pipes  
- Thermocouple  
- Pressure switch  
- Compression switch  
- Temperature switch  
- Watering switch  
- Low pressure switch | - Secure the pipes  
- Check electrical phases connection  
- Check and add refrigerant |
- Thermostatic expansion valve over closed: suction pipe too hot  
- Thermostatic expansion valve over closed: expansion valve bulb partially blocked or pressure intake pipe blocked  
- Filter-drier blocked: bubbles in the flow indicator and liquid pipe colder at the filter drier outlet  
- The manifold feed pipes are blocked or oil has accumulated in the coil: not all of the evaporator circuits are working | - Check for leaks and eliminate them roofling up with refrigerant.  
- Reduce the overheating of the thermostatic expansion valve turn the valve stem and check the suction pressure.  
- Change the valve or free the control pipe.  
- Change the filter-drier.  
- Remove the obstruction; clean or change the evaporator. |
| 17. Compressor too hot                                                              | - Thermostatic expansion valve over closed: excessive overheating of the evaporator discharge gas | - Reduce the overheating of the thermostatic valve |
| 18. Compressor too cold and noisy                                                   | - Expansion valve over open: the system works with the overheating to low (return of liquid to the compressor).  
- Thermostatic valve out of order: the stem or the seat of the expansion valve is corroded. Pressure inlet pipe blocked.  
- Foreign objects between the stem and the seat of the thermostatic valve: abnormal function of the thermostatic valve | - Measure and reset the overheating by closing the valve  
- Replace the valve or free the pressure inlet pipe  
- Clean the stem and the holes of the thermostatic valve |
Technical data shown in this booklet are not binding. FAST S.p.A. shall have the right to introduce at any time whatever modifications deemed necessary to the improvement of the product.