

<b>C.I.C. Jan Hřebec s.r.o.</b> Na Zlate stezce 1075 CZ 263 01 Dobris Czech Republic tel.: +420 326 531 311 fax: +420 326 531 312 info@cic.cz	<b>Assembly and operation  regulation for  air-conditioning  units H and HL</b>	<b>TP 12 105</b>
		<b>Supplement  No.4</b>

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This supplement forms an integral part of the TP 12 105 Technical Conditions for projecting air conditioning units of H and HL series.

## I. General Provisions

**1.1** This supplement includes instructions for assembly, putting into operation, operation itself and maintenance of air conditioning units of H and HL series.

Prior to commencing any of the stated above activities it is necessary to study carefully the instructions and adhere to them afterwards. Adherence to the instructions is the condition of the guarantee validity.

## II. Transport to the assembly site and handling on the building site

**2.1** The transport of all parts must be carried out in working position. During the transport and handling with individual sections or with the compact unit it is permissible to hoist them only by bottom reinforced frame. There are holes in the base frames and supports which serve for gripping rope hooks at a vertical transport or for clamping to a conveyance loading area. The units, their components and eventual assemblies must be sufficiently secured against any movement and overturning on the conveyance.

When loading and unloading by means of a fork-lift truck the transported parts must be hoisted by the transport pallet. Careful handling is required.

When hoisting by crane it is necessary to pass the ropes through the transport pallet and to balance the part transported. The holes in base frames of smaller parts will be used for gripping the rope hooks.

In both cases the ropes above the section must be braced so that they cannot compress the section itself. The spacers can also be created as a crate on the section edges.

## III. Storage on the building site

**3.1** The units are stored depending on the package type in warehouses according to the standard CSN EN 60721-3-1: „Classification of environment conditions – Part 3: Classification of the environment parameter groups and their strictness rates – Section 1: Storage“.

The units packed into the PE foil must be stored in the warehouses of the IE11 type. For storage under a shed, in the warehouses of the IE13 type, but fauna and flora negligible, it is necessary to make an advanced agreement about the packaging into the PE-foil, cardboard, crate on the edges and taping.

For a possible storage in the open area in the warehouses of the IE14 type, but fauna and flora negligible, it is possible to make an agreement on wooden packing.

## IV. Unit assembly

The equipment installation may be executed exclusively by a specialized assembly company with a licence pursuant to the Trade Licensing Act.

#### 4.1 Checking before commencing the assembly

In particular, the following must be checked:

- delivery completeness
- if there is no damage from transport and storage
- if the fan set can be freely turned (by hand) and V-belts tension
- if the heat recovery rotary exchanger rotor can be freely turned (by hand) and belt tension
- movability of dampers
- construction readiness
- voltage supply system parameters
- pressure and temperature of the heating and cooling media

All defects found must be unconditionally removed before assembly.

#### 4.2 Seating of the units

The units can be freely seated on a horizontal base (floor, landing); there is no need to anchor them but it is recommended to place a strip of riffled rubber under the unit to compensate small unevenness of the base.

**The evenness and horizontal position of the unit seating are conditions of the correct unit function.**

The units that are designated for a suspension under a ceiling are hanged only on the suspenders (grips) which are components of the unit. The connection of the grips with the ceiling construction is provided by galvanized threaded bars M8 or M10, according to hole of the grip, into a steel anchor. The threaded bars and anchors are not a part of the delivery of the units. It is necessary to ensure the horizontal position of the unit suspension.

The units that contain water heat exchangers or sections with a condensate removal must be situated in such a way that their eventual failure (e.g. exchanger freezing or condensate outlet out of function) could not cause any damage. It is recommended to place the units in a machine room with the water-proof floor and a gully trap.

#### 4.3 Lateral space-gap of the units

On the floor-projection seating of the unit the following minimum lateral space-gaps

between the service side of the units and other objects must be ensured:

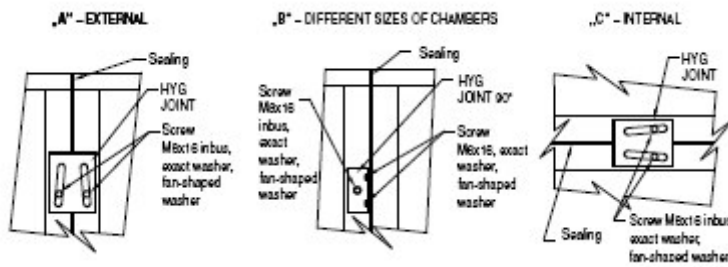
- fan section – 0.7 of the part width, however, the minimum of 600 mm to enable the aggregate being shifted out;
- filtration section – the minimum of 600 mm to enable the filtration inserts being shifted out;
- exchanger section – the minimum of 1.15 of the part width to enable the exchanger being shifted out;
- exchanger section with eliminator - the minimum of 1.15 of the part width to enable the eliminator being shifted out;
- section with the plate heat recovery exchanger - the minimum of 1.15 of the part width to enable the plate exchanger being shifted out;
- section with the service opening – the minimum of 600 mm to enable access for the maintenance staff.

**Note:** At the units which are to be installed under a ceiling the doors and service openings are opened are opened downwards, exchangers and eliminators are shifted out in lateral direction.

#### 4.4 Connection of the sections

The connection of the individual sections in case of composed units is carried out by means of special connecting elements by screwing them one to another (see figure):

1. The contact surfaces of the individual sections will be equipped with self-adhesive gasket on one side.
2. After sticking the self-adhesive gaskets, the sections will be matched up one to another up to the stop.
3. The sections will be connected by means of bolts, washers and key joints. The key joints will be first loosely screwed together, then put together by hammering on the bent part of the sections and finally the key joints will be tightened by the bolts. This procedure is repeated according to the number of sections.



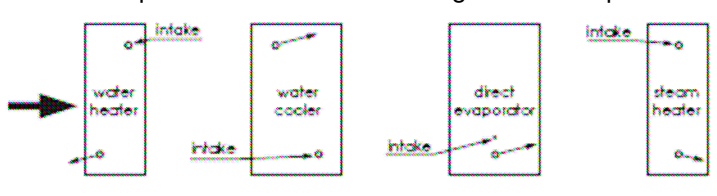
The connecting and joining material for connecting the sections is a part of the supply of the unit and is attached in the fan section.

#### 4.5 Connection to the air-conditioning conduit

The connection of the air-conditioning conduit to flexible adapters of the unit shall be executed in such a way that the weight of the conduit does not act on the adapters and does not deform them.

#### 4.6 Connection to the heating and cooling media

Multiple-row water heat exchangers and evaporators are always connected in counter-flow.



Dilatation forces and the weight of fittings which supply the medium into the heat exchangers may not exert load on the unit. The connecting pipeline of the heater must be insulated in such a way that the surface temperature is lower than 60 °C.

**Notice: During joining fittings to the heat exchangers it is necessary to tighten the connection by means of two spanners in order to prevent any damage of the exchangers branch.**

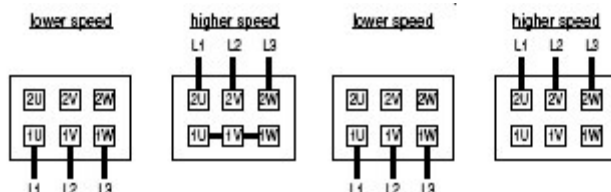
#### 4.7 Protection against contacting dead parts

The protection is secured by a conductive interconnection of air-conditioning conduit and other conductive dead parts with the unit. Pressed-in nuts marked with the earth symbol and bolts on the damper flanges serve for this purpose.

#### 4.8 Power supply cables

The power supply cable for motors must be flexible and must go through the panel bushing. If the switchgear is not near the unit, the motors have to be connected through a service switch which is situated within the reach of the unit. If the holes for motor cable and wires are closed with „casted membrane“, it is necessary to force out it by a suitable tool. The terminal box, terminal block, cable terminals etc. placed in the internal space of the terminal box may not be damaged! Insert suitable bushings into the holes. Close the unused holes for cables and wires in the terminal box with dust-tight covers.

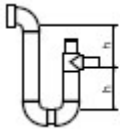
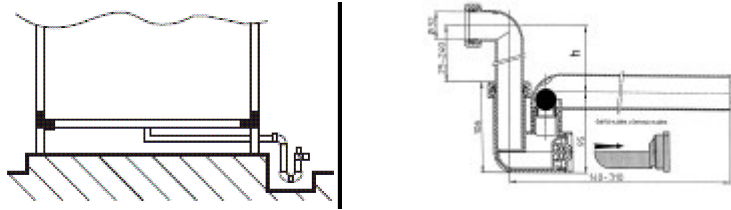
Wiring diagram of the multispeed motors:



The electrical equipment situated inside the unit (power units, differential pressure gauges, solenoid valves, ...) is connected also with cable going through the panel bushing.

#### 4.9 Connection of condensate drain

Condensate drains must be connected through a siphon to sewerage. The siphon must be placed directly at the unit. Each condensate drain must have its own siphon.



min. height of siphon = 100 mm, if the total pressure of ventilator  $dP < 1000 \text{ Pa}$   
 for higher total pressure  
 $H(\text{mm}) = dP(\text{Pa}) \cdot 10$

#### 4.10 Gaseous heater assembly:

Connection to exhaust – installation of exhaust must comply with any applicable standards and must be carried out by a professional firm. Every exchanger part equipped with a gas overpressure burner must be linked through a separate exhaust to a separate stack duct.

**Notice: An unconditional necessity for all designs of exchanger parts of MTP-V is ensuring of outlet of condensate from the stack exhaust and from the exchanger.**

Connection of condensate outlet – it is necessary to arrange outlet of condensate from the exchanger and stack duct through a siphon (combustion gases are under overpressure). Condensate has the temperature up to 100 °C, the features of light carbonic acid. Considering the environment the condensate has the nature of drinkable water, only lower pH.

Installation of the burner – connection of the heating body must be carried out by a professional firm (under respective project) and it must comply with standards for operation of the specific type of burner.

Installation and adjustment of the burner will be carried out by a serviceman of the burner producer. After handover of the protocol on the burner adjustment and performance of respective revisions the exchanger part is ready for final approval and operation.

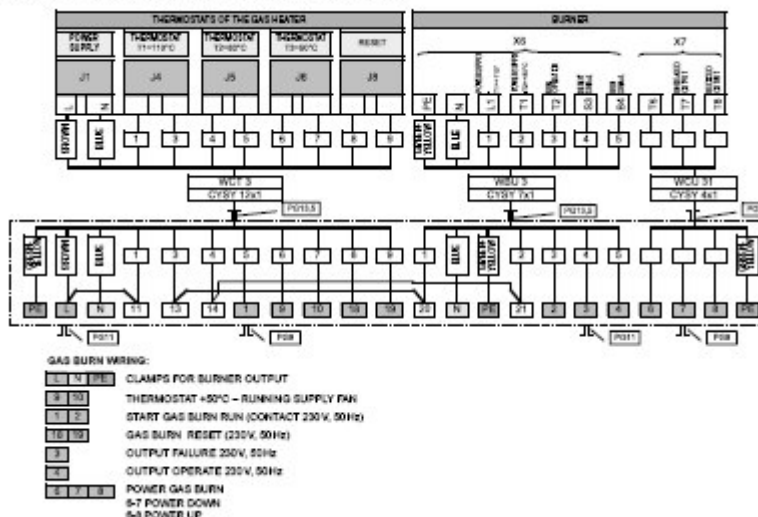
Exchanger parts are as standard equipped with collars with sealing for assembly of the burner using screw joints. For external design of the exchanger part respective cover is screwed above the burner.

Before installation it must be checked whether local conditions of fuel distribution, the fuel features overpressure and existing setup of the heater are compatible

#### Electric installation and measuring and control system:

The gaseous burner is connected to a superior system through the control box which secures failure functions of the heater.

Picture: Connection of terminal board of the control box



If it is necessary to start the unit with the heater warmed (winter operation), switch on the burner first and after connecting the terminals 9 – 10 start the fans. If there is no need to heat, start the unit regardless the state of the terminals 9 – 10.

In case of switching off the whole air conditioning unit in heating mode the fans have to be controlled by fan thermostat (terminals 9 – 10 of the control box) – at connected contacts the fans have to run.

The fan motors can be several times switched on by thermostat until the section is completely cooled (about 3x).

It is not possible to switch off the whole equipment without securing the run out of the fans. The heat accumulated in the heat exchanger could damage surrounding equipment as a result as a result of flowing.

The situation must be excluded that the fans can be switched off without switching off the burner.

#### **Modification with by-pass:**

In the gas heater section with by-pass there are two continuously controlled variables – the burner power output and the angle of the by-pass damper setting. The damper controls the ratio of air volumes flowing around the heat exchanger and through the bypass.

It is recommended to regulate a by-pass damper position continuously according to the flue gas outlet temperature. The optimum flue gas outlet temperature is 160 °C because at this temperature the highest heat exchanger utilizing and the lowest condensation occur. The required supply air temperature can be reached by burner power output setting.

This regulation method requires two PI controllers. The first one works in a closed loop and controls the by-pass damper position in dependence on the flue gas outlet temperature. The other one regulates the burner power output in dependence on the required temperature.

#### **4.11 Assembly of the water humidifier section (air washer):**

If the washer is not initiated by a professional serviceman of the producer or a trained service firm it is necessary to carry out the following procedure.

##### **Procedure:**

- check perfect fixing of the suction basket of the pump.
- check perfect placement of the jets handle and of jets.
- fill the pan with water (filled so much to overflow through the siphon). If the pump operates with a valve closed on the delivery conduit the closing valve must be closed during filling so that the pump is filled with water.
- Only now the direction of the pump turning is checked. The correct direction is marked with an arrow on the pump wall.
- If the engine of the pump does not turn in the direction of the arrow connection of the engine must be rephased.
- The pump is shortly switched on and off. On no account operation of the pump no load is allowed because it would cause damage of the pump sealing.
- If the engine of the pump does not turn in the direction of the arrow connection of the engine must be rephased.

Washer is subject to testing operation before dispatch. During assembly, however, washers can again retain dirtiness and solid substances. They must be removed on principal. The producer is not liable for dirtiness at the place of assembly and resulting damage (e.g. damage of the pump) and it cannot be claimed.

##### **Notice: No load run of the pump is forbidden!**

**4.12** All connecting pipes and cables, i.e. central heating, cooling, voltage supply, control system etc. eventually other construction may not obstruct full door opening, filters and drops eliminators shifting off, operation and maintenance of the unit.

**4.13** Assembly on any potential accessories shall be executed in accordance with the unit specification and assembly instruction of the accessory manufacturer.

**4.14** Dust and impurities occurred as a result of assembly shall be removed from the unit.

## V. Putting into a trial operation

**5.1** The service technician having the required qualification shall be the only person entitled to put the unit into operation for the first time.

**5.2** Before the first putting the unit into operation it is necessary to check:

- completeness, unit cleanness and assembly quality
- tension of the V-belts of the fan set
- tension of the belt the rotary heat recovery exchanger
- if the fan and motor can be freely turned
- if the rotor of the rotary heat recovery exchanger can be freely turned
- supply voltage of the motors according to the rating plates
- control and supply voltage of the power units
- connection of heat exchangers to the heat and cold source of 0.6 MPa, as the maximum
- deaeration of the heat exchangers
- function of the condensate removal and pouring water into the siphons
- cleanness of the filtration inserts
- movability of the damper valves
- tightness of the unit connection to the pipeline system
- if the doors and service openings are closed

All defects must be removed before the first start of the unit.

**5.3** In accordance with the CSN EN 33 1500 standard „Electrical Regulations. Electrical Equipment Inspection” the initial revision of electrical equipment according to the CSN EN 33 2000-6-61 standard „Electrical Regulations. Electrical Equipment. Part 6: Inspection. Chapter 61: Initial Revision Procedure” shall be executed prior to putting the unit into its first operation.

**5.4** During the first unit starting the following checks are executed:

- if the fan sense of rotation is correct according to the arrow on spiral casing
- if the rotary heat recovery exchanger sense of rotation is correct according to the arrow in the section.
- current consumption of the motors may not exceed the value from the rating plate
- current protections of the motors must be set to the value which is the same or lower than the value stated on the rating plate of the motor

**5.5** During operation of the rotary heat recovery exchanger with a frequency inverter the output frequency of the inverter may not exceed 50 Hz (maximum rotor speed – 11 RPM).

**5.6** Gaseous heater – Inspections of the electrical, gas and flue gas system have to be carried out before putting into operation.

The burners can be put into operation only by specialist with corresponding qualification which elaborates a protocol about it.

It is necessary to check the function of the emergency thermostats and the thermostat which switches on the fans run.

In the case of modification with the by-pass, it is necessary to set the maximum closed position of the by-pass damper in such a way that the rated air flow through the heater section, which is written on its plate, is retained.

**5.7** After meeting all these requirements, the unit may be put into a trial operation.

**5.8** During the trial operation, the distribution elements on the pipeline system shall be adjusted, and complex tests of the equipment shall be executed, including measuring of the output parameters of the unit and testing the control and measuring system. The results of the testing shall be executed in writing.

**5.9** A specialized firm, putting the unit into operation, or trial operation, respectively, shall be obligated to provide special training for operational personnel of the user and to execute a protocol thereof in writing. Without the protocol the guarantee shall not become effective and the equipment shall not be set into a permanent operation.

## VI. Operation, service and maintenance

To secure safe operation and maintenance of the air conditioning system we recommend to elaborate an internal operation instruction according to the volume and equipment of the air conditioning system and local conditions, including fitting of individual units with safety labels and/or messages. The internal operation instruction must contain among others also provisions from this article.

### Notice:

- **If activities are carried out with opening the unit, it is unconditionally necessary to disconnect the unit from voltage supply and to realize such provisions, that would prevent any unintentional switching on during the work.**
- **It is forbidden to operate the unit with the doors or service opening opened.**

**6.1** During the operation the operator checks the function and work of all parts of the unit, tightness of connections, doors, fastenings and removable panels, the temperature of media and transported air, filters clogging by means of sensors.

**6.2** The operator checks in the same time the state and function of other systems, to which the unit is connected and with which the correct function of the unit coheres, but they are not a part of the unit. These are according to unit type especially:

- electrical installation
- measuring and control system
- central heating system
- cooling system
- sanitary (hygienic) installation – condensate removal

**6.3** According to the operational conditions the user determines the intervals between thorough inspections, however, not less than once every three months.

### **6.4 Activity during operation and maintenance of individual sections:**

All sections must be checked by the operator for contamination and impurities.

#### **6.4.1 Fan section**

- Make inspection and tightening V-belts.
- In case of belt wear it is necessary to change all belts in the set. After changing belts check co-axial alignment of the pulleys.
- Check impeller for impurities, clean it if necessary. If the impurities cause impeller unbalance and excessive vibrations, contact the producer.
- Bearings of lower output fans are fitted with permanent grease filling and do not need lubrication. They are filled with plastic grease of the lithium type and their theoretical durability is 20,000 hours.
- Bearings of higher output fans are fitted with grease nipple and must be lubricated with plastic grease of the lithium type. For calculation of a time interval the Pitroff formula can be used:

$$t = K \left( \frac{14 \cdot 10^6}{n\sqrt{d}} - 4d \right)$$

where:

t = lubricating time interval

K = 10 for all fans up to the size 1000 (up to H80)

K = 1 for fan sizes 1120 and 1250 (H100)

n = RPM

d = internal bearing diameter (mm) = diameter of the fan axis

If the fans work at heavy conditions, the lubricating interval must be changed according to the following formula:

$$T = t \cdot K_T \cdot K_U$$

where:

$K_U$  = environment factor (includes external effects as humidity, shocks and vibrations, not extreme effects as aggressive media, high content of impurities, splashing water)

$K_U = 0.8$  low load

$K_U = 0.5$  middle load

$K_U = 0.2$  high load

$K_T$  = temperature factor, if the bearing temperature increases above 70 °C

$K_T = 0.55$  for temperature 80 °C

$K_T = 0.3$  for temperature 90 °C

$K_T = 0.15$  for temperature 100 °C

$K_T = 0.08$  for temperature 110 °C

$K_T = 0.05$  for temperature 120 °C

$K_T = 0.03$  for temperature 130 °C

#### **6.4.2 Damper and damper sections**

- Check the movability of damper.
- Check the correct damper closing.

#### **6.4.3 Filtr sections**

- Regularly and often check clogging of filters. Inspection interval will be stated according to the results of of the trial operation.
- If the filters are clogged, it will be carried out in accordance with the filter type: prefilters, pocket filters: exchange of the filtration inserts grease traps: regeneration by degreasing agents, it is necessary to clean the grease catching vat as well filters with active coal: exchange of cartridges, eventually only filling
- All filtration materials used must be liquidated in ecological way

#### **6.4.4 Attenuator section**

- In case of a contamination the section is cleaned by sucking.

#### **6.4.5 Heating and cooling sections**

Before the beginning and during the winter season it is necessary to secure antifreeze protection of the heat exchangers:

- as for the heaters by checking the correct function of the measuring and control system.
- as for the coolers by draining-off the water, or filling with non-freezing mixture.
- If the exchanger is drained-off for winter, the water must be removed perfectly from the exchanger, e.g. by blowing through with pressure air. During exchanger draining-off, the water temperature must be lower than 60 °C.
- In case of a section contamination, the exchanger surfaces are cleaned with pressure air, steam or hot water cleaner with a nozzle. Cleaning must be carried out very carefully to prevent the mechanical damage of the fins.

#### **6.4.6 Sections with condensate removal**

- Check the correct function of the condensate removal and siphon.
- It is necessary to add water to siphon because of the correct function of the pressure closure.
- Before the beginning of the winter season the provisions must be executed against freezing water in the siphon.

#### **6.4.7 Plate heat recovery section**

- In case of a section contamination, the exchanger is cleaned with pressure air, steam or hot water cleaner with a nozzle. Cleaning must be carried out very carefully to prevent the mechanical damage of the fins. To make cleaning more easy the exchanger can be shifted to the operator side after removing service panel.



#### 6.4.8 Rotary heat recovery section

- Check of the rotor turning.
- Check of the tension of the driving belt.
- Change or refill oil in gearbox: oil content in gearbox is 0.08 l, PP 90H or TOP-BLEND oil is used, oil change is after every 4 000 (TOP BLEND 10 000) operational hours or after 2 years.
- In case of a section contamination, the exchanger is cleaned with pressure air or steam. Cleaning must be carried out very carefully to prevent the mechanical damage of the fins.

#### 6.4.9 heat recovery section – glycol circuit

- Before the beginning of the winter season the check of the liquid circuit must be executed, especially tightness, pump condition and antifreeze liquid filling.
- Draining-off and cleaning sections is to be carried out in accordance with the paragraph 6.4.5.

#### 6.4.10 Water humidifier section (air washer)

In compliance with these instructions for operation and maintenance, the following basic points must be complied with:

- to check the sucking net, remove strange particles from the washer and fill it up to approx. 10–20 mm under the overflow neck. Use both filling through the float, filling using washing jets. Attention: when the level of water in the float is reached, close the washing jets.. Filling will be terminated automatically through the float valve.
  - Check setting of the float valve with the required operation pressure of fresh water max. 2.5 bar. The float valve is correctly set when the level of water ranges between min. 1 cm above the sensor of the lowest level and max.1cm above the lower edge of the overflow.
- It is normal when the drop separator shows breakdown at the beginning because profiles are not yet wet.
- This effect often disappears (switch off the device repeatedly and let the water dry).
- Check the direction of turning of the pump and pressure (2.5 – 3 bar) at inlet into jets only when the washer pan is full and after starting with the required amount of air.
  - Check all cables, screwed joints and fixing of jets for sealing.

#### Instructions for operation and maintenance of the pump:

The following are the most important points for proper operation of the pump.

Please, comply with these special instructions for operation and maintenance delivered by the pump producer.

(Pumps LOWARA CA, CEA and CO series are horizontal centrifugal pumps).

- **The pump run must never be initiated dry.**
- The pump must be switched on in intervals of 2 days, because otherwise it gets rigid in the course of time. (this does not apply to block pumps from premium steel).
- External particles must not get into the pump.
- Maximum frequency of switching on in an hour:  
20 for output over 5,5 kW  
15 for output over 15 kW  
12 for higher output.
- Supply voltage according to the type label of the pump: +6%/-10%.
- Maximum variations of supply voltage compared to the value on the type label: ±5%.
- The engine is suitable for delivery of additional output in rooms with temperature under +40 °C and efficiency of 10.000 m under the standard IEC 34-1.
- Relative humidity max. 95 %. Coverage IP 55.
- Operation frequency of the pump must not be under 25 Hz.
- Electrical connection and proper protection must be carried out in compliance with the applicable regulations.
- The pump is protected against no load run by monitoring of the level in the washer pan.
- The level switch HRH-2 must be set as follows:
  - choice of function DOWN
  - setting of delay of outlet to 10 s
  - setting sensibility of the sensor to medium value (to be adjusted according to the used water).
- Any manipulation of setting during operation is forbidden.

## Operation and maintenance

- The section of the water washer does not have much demand for maintenance.
- Specification of regular intervals for cleaning of air washers considering the given degree of dirtiness. Do not use cleaning agents generating foam.
- Most suitable is use of pressure water cleaner with dosing of disinfection agent.
- During filling and discharge of the pan the device must not be used for humidizing of air.

In a longer interruption of operation, water must be discharged from the washer and the washer must be disinfected before next filling.

Damage on the device resulting from insufficient cleaning or circulating water of not allowed parameters are

not included in the guarantee and cannot be claimed.

- Water in the washer must be regularly exchanged. Frequency of it is subject to the level of dirtiness. Optimum is 1 x weekly.

– Drops separators, jets and rectifiers must be checked for content of deposits and cleaned when needed.

– For disinfection of the washer section we recommend utilization of SAVO for drinking water in concentration according to the producer's instructions for use.

For repeated fast filling use the following procedure:

- Open the inlet valve of clear water and at the same time jets for washing the pan. When reaching the level of water >1 cm above the lowest level close the valve of jets for washing the pan.
- The maximum level will be ensured by the float valve.
- For maintenance establish an „Operation log“.

## Recommended marginal values of features of circulated water into the spray humidizer (air washer):

**Notice: Even a short-time exceeding of the defined marginal values results in breaking of drops separators and dangerous deposit of salts in connected devices.**

Feature	Air-conditioning for				
	Normal requirements for air-conditioning	Sections of data processing	Sterile and clean premises <sup>1) 5)</sup>		
Appearance	–	Clear, pure, without deposits			
pH value	–	7 – 8,5			
Total content of salts	GSG	g/m <sup>3</sup>	< 800	< 250	< 100
Conductivity <sup>2)</sup>		mS/m	< 100	< 30	< 12
		µS/cm	< 1000	< 300	< 120
Calcium	Ca <sup>++</sup>	mol/m <sup>3</sup>	> 0,5		–
		g/m <sup>3</sup>	> 20		–
Carbon hardness	KH	mol/m <sup>3</sup>		< 0,7	
		°d		< 4,0	
-//- sterilization in hardness testing <sup>1)</sup>	KH	mol/m <sup>3</sup>		< 3,5	
		°d		< 20	
Chloride	Cl <sup>-</sup>	mol/m <sup>3</sup>	< 5	–	–
		g/m <sup>3</sup>	< 180	–	–
Sulphate	SO <sub>4</sub> <sup>-</sup>	mol/m <sup>3</sup>	< 3	–	–
		g/m <sup>3</sup>	< 290	–	–
Consumption of KMnO <sub>4</sub>		g/m <sup>3</sup>	< 50	< 20	< 10
Number of pathogens <sup>3)</sup>		ml <sup>-1</sup>	< 1000	< 100	< 10

1) Sterilizing with organic phosphate plus dispersion agent, depending on the sterilizing effect even higher concentration is possible.

2) A precondition for a low content of pathogens is a dark (not transparent) air washer.

3) When humidizing up to more than 95% of the relative humidity it is necessary to reduce conductivity to **800 µS/cm**. (Otherwise the valve separator will be broken.).

4) Material in contact with water: plastics and steel CrNiMo.

5) In a specific case, for example additional filling water permeate RO, it is possible to admit even higher values, for example 200 µS/cm (it results in a higher dust load on the filter).

When using aluminium and with an increased concentration of SiO<sub>2</sub> to more than 10 to 20 g/m<sup>3</sup> covers are created. It is necessary to comply with marginal values for discharge of waste water and with protection of the environment.

During a check, all values must be measured. They must be under the recommended marginal values.

Usually, the mentioned parameters are complied with by drinking water from public water supply network.

#### 6.4.11 Gas heater section

**Notice: It is not possible to switch off the whole device (the burner as well as fans) without ensuring delay of fans to cool the exchanger. Heat accumulated in the exchanger could due to flow damage surrounding devices! It must not be possible to switch off fans and to leave the burner switched on!**

To a burner which is installed on the exchanger part the Instructions for use apply which are delivered together with it by the producer.

#### Breakdown of the safety thermostat

When max. temperature is exceeded set on the triple thermostat T1 (100÷120°C) which is located optionally on the left or on the right form the burner, the burner is switched off and blocked. To enable new automated run of the burner it is necessary to press the button on the triple thermostat. Between the moment of the burner blocking and unblocking of the triple thermostat temperature must drop under the value set on the thermostat T1. The condition for restart of the heater is removal of the cause of the overheating.

The used electronic thermostat allows remote resetting of the safety thermostat T1 (for example by the button placed on the door of the control box) which is suitable for exchanger parts placed in poorly accessible places (e.g. hung under the ceiling).

In the case of breakdown of the power supply (during the burner run) the accumulated heat in the exchanger section and non-functionality of the fan will cause an increase in temperature. If the temperature exceeds the temperature set on the safety thermostat T1, this disconnect supply of the burner. The electronic thermostat resets itself upon recovery of the power supply if the temperature has dropped under the set value (with a longer breakdown of power supply). With a shorter breakdown of power supply you must wait until the section is cooled by the fan and carry out the reset by pressing the button on the thermostat.

**Important:** After professional commissioning the set parameters of the device must not be changed to ensure smooth operation of the device.

Maintenance of the exchanger part is carried out always when it is not operating.

#### Our maintenance includes:

- a) Inspection and adjustment of the burner by an authorized mechanic at least once a year (before the beginning of the heating season, if possible). Heater operation is necessary for burner adjustment.
- b) Tightening of screws of the burner plate and the tube sheet cover, inspection after the first month of operation, and then regularly before the beginning of the heating season.
- c) Clean the tube sheet at least once a year (as needed).

For burners using light heating oils (LTO) and mineral oil, to carry out cleaning of the tube sheet regularly always when efficiency of heating drops (as necessary even once a month). After cleaning always properly fix screws on the cover of the tube sheet or to exchange sealing (fixing of screws check repeatedly after one month of operation!).

#### 6.5 Elemental operations that must be unconditionally and demonstrably secured are as follows:

- exchange of the filtration inserts in case of their,
- checking the function of the antifreeze protection of the heaters in the measuring and control system before and during winter season,
- antifreeze protection of the coolers,
- exchange (refilling) of oil in gearbox of the rotary heat recovery section.

## VII. Spare parts

7.1 Spare parts are not delivered with the unit. In case of the need it is possible to order spare parts needed at the producer. The following data are to be specified in the order: unit type and production number, production year, specification of the parts needed.

## VIII. Supplier service

8.1 Supplier service can be arranged contractually by the user directly from the producer. The producer can assign trained service forms to carry out the supplier service.