

RecovAir

Hydraulic station for AHUs with run-around glycol heat recovery system



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1. Product description

RecovAir hydraulic stations are designed for the control of heat recovery from exhaust air to supply air in air handling units equipped with a glycol heat recovery system.

Heat recovery takes place indirectly on the air-glycol-air route. The supply and extract air flows do not come into contact with each other when flowing through the air handling unit.

The rate of recovery of the air handling unit's glycol exchangers is continuously controlled according to the actual demand. This is achieved in 2 ways: first by the pump speed and then by mixing on the three-way valve.

RecovAir hydraulic stations are offered in three different versions depending on where they are installed:

- prepared for installation inside the empty section of an air handling unit
- suitable for indoor installation (standard version),
- suitable for outdoor installation, station delivered in own housing (outdoor version).

All variants are complete units, fully wired and factory tested. They only require a hydraulic connection to the heat exchangers in the air handling unit and the supply of power and control signals to the frequency converter from AHU's switchboard.

Indoor version of the hydraulic station is built into a frame made of stainless steel profiles, with a stainless steel floor (drain tray) and adjustable feet (see cover page, top picture).

Outdoor version of the hydraulic stations is additionally put into a housing made of 50 mm thick wool-insulated panels, with inspection doors and a support frame. That enclosure is also equipped internally with a 1 kW electric heater inside (see cover page, bottom picture).

The RecovAir hydraulic stations consists of:

- a Danfoss flood-proof frequency converter (protection class IP55) that smoothly regulates the RecovAir unit by controlling the pump speed accordingly to the current heat recovery demand,
- a Grundfos pump designed for use with glycol thanks to a silicon carbide seal on the motor shaft, with stepless flow control in the range of 30–100% of nominal pump flow, and a vent valve,
- a Siemens three-way valve with actuator, fluently mixing the medium, serves to further control the heat recovery rate according to current demand, below the minimum working point (flow) of the pump,
- Siemens liquid temperature transmitters for continuous monitoring of the medium temperature,
- a WIKA pressure switch that stops the RecovAir unit when the system pressure drops below the required minimum, thus protecting the most expensive component of the system – the pump – from dry running and seizure,



- a WIKA dial pressure gauge for continuous system pressure monitoring,
- a Reflex expansion vessel to stabilise system operation by compensating for pressure variations due to changes in the medium's temperature,
- an IMI Hydronic flow meter to measure the medium flow in the system and set the pump capacity according to design requirements,
- an SYR safety valve to prevent the maximum allowable pressure in the system being exceeded, thus protecting components from damage,
- ball valves for easy and quick connection of the RecovAir unit to the heat recovery system, and for trouble-free maintenance,
- a drain-fill ball valve with hose coupling and plug for easy and quick filling (or emptying) of the system with medium,
- a mesh filter that captures contaminants in the system, thus significantly increasing the life of the pump.

2. Unit selection

The hydraulic stations are offered in eight sizes.

RecovAir hydraulic stations can be easily and quickly selected to meet design needs based on the required medium flow and total pressure losses in the system (heat exchangers and pipes between them).

A hydraulic station must be selected in a such a way to provide sufficient pressure at the required flow rate.

Example of selection:

The medium flow rate is 5 m³/h, the resistance throughout the system is 190 kPa. In this case, a Type B Model 6 hydraulic station should be selected.

Should the head prove to be too low for the application, a pump that meets the design requirements can be selected on a special demand.

3. Technical data

The hydraulic stations should operate with a pressure of the medium between 2.0 and 5.0 bar.

If the pressure in the system falls below 1.0 bar, the dry-running pump protection is activated and shuts down the device.

If the pressure in the system exceeds 6.0 bar, a safety valve will operate to release some of the medium from the system to bring the pressure back to correct value.

Typoszereg RecovAir

Type	Model	Hydraulic connections	Capacity range (medium flow)						Available pressure at given flow		
			m ³ /h			l/min			kPa		
			MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
A	0,5	DN15 = ½"	0,3	0,5	0,6	5	8	10	240	195	150
	1,5	DN20 = ¾"	0,6	1,5	1,75	10	25	30	360	245	150
B	3	DN25 = 1"	1,5	3	4	25	50	65	510	420	290
	6	DN40 = 1 ½"	3,5	6	7	60	100	120	490	365	290
	10	DN50 = 2"	6	10	12	100	165	200	440	335	250
C	15	DN65 = 2 ½"	10	15	17,5	165	250	290	455	385	330
	20	DN65 = 2 ½"	15	20	22,5	250	330	375	450	370	310
	30	DN80 = 3"	20	30	35	330	500	580	455	345	230

As you can see the Model of the hydraulic stations is the same as the nominal flow rate of the medium, expressed in m³/h.

The technical details of a particular Model can also always be found on the rating label affixed to each hydraulic station.

Electrical data, dimensions, weight – indoor version (standard)

Type	Model	Electrical connections	L	B	H	Net weight	Unit capacity	Gross weight
		V / kW / A	mm	mm	mm	kg	L	kg
A	0,5	3 x 400 / 0,37 / 1,0	1000	400	800	77	4	81
	1,5	3 x 400 / 0,37 / 1,0				82	5	87
B	3	3 x 400 / 1,1 / 2,5	1200	500	1000	96	11,5	107,5
	6	3 x 400 / 1,5 / 3,3				108	13,5	121,5
	10	3 x 400 / 2,2 / 4,7				126	15	141
C	15	3 x 400 / 4,0 / 7,9	1500	700	1300	178	23	201
	20	3 x 400 / 5,5 / 11				230	24	254
	30	3 x 400 / 5,5 / 11				275	28	303

Net weight means the weight of the unit without the medium (empty)

Gross weight means the weight of the unit filled with the medium (ready for operation).

Electrical data, dimensions, weight – outdoor version (in housing)

Type	Model	Electrical connections	L	B	H total (H housing)	Net weight	Unit capacity	Gross weight
		V / kW / A	mm	mm	mm	kg	L	kg
A	0,5	3 x 400 / 0,37 / 1,0 1 x 230 / 1 / 6	1400	700	1290 (1100)	172	4	176
	1,5	3 x 400 / 0,37 / 1,0 1 x 230 / 1 / 6				177	5	182
B	3	3 x 400 / 1,1 / 2,5 1 x 230 / 1 / 6	1700	850	1490 (1300)	231	11,5	242,5
	6	3 x 400 / 1,5 / 3,3 1 x 230 / 1 / 6				243	13,5	256,5
	10	3 x 400 / 2,2 / 4,7 1 x 230 / 1 / 6				261	15	276
C	15	3 x 400 / 4,0 / 7,9 1 x 230 / 1 / 6	2000	1100	1790 (1600)	368	23	391
	20	3 x 400 / 5,5 / 11 1 x 230 / 1 / 6				420	24	444
	30	3 x 400 / 5,5 / 11 1 x 230 / 1 / 6				465	28	493

Net weight means the weight of the unit without the medium (empty) including the housing.

Gross weight means the weight of the unit filled with the medium (ready for operation) including the housing.

H total means the overall height of the housing itself plus height of the support frame and the roof.

4. Operating principle, functions

RecovAir units operate on the basis of two types of signals that are sent from the control system of the air handling unit:

- on/off work permit signal – potential-free – necessary to start/end operation,
- setpoint signal – 0–10 V – for operation control.

It is necessary to provide the device with both signals simultaneously for proper operation.

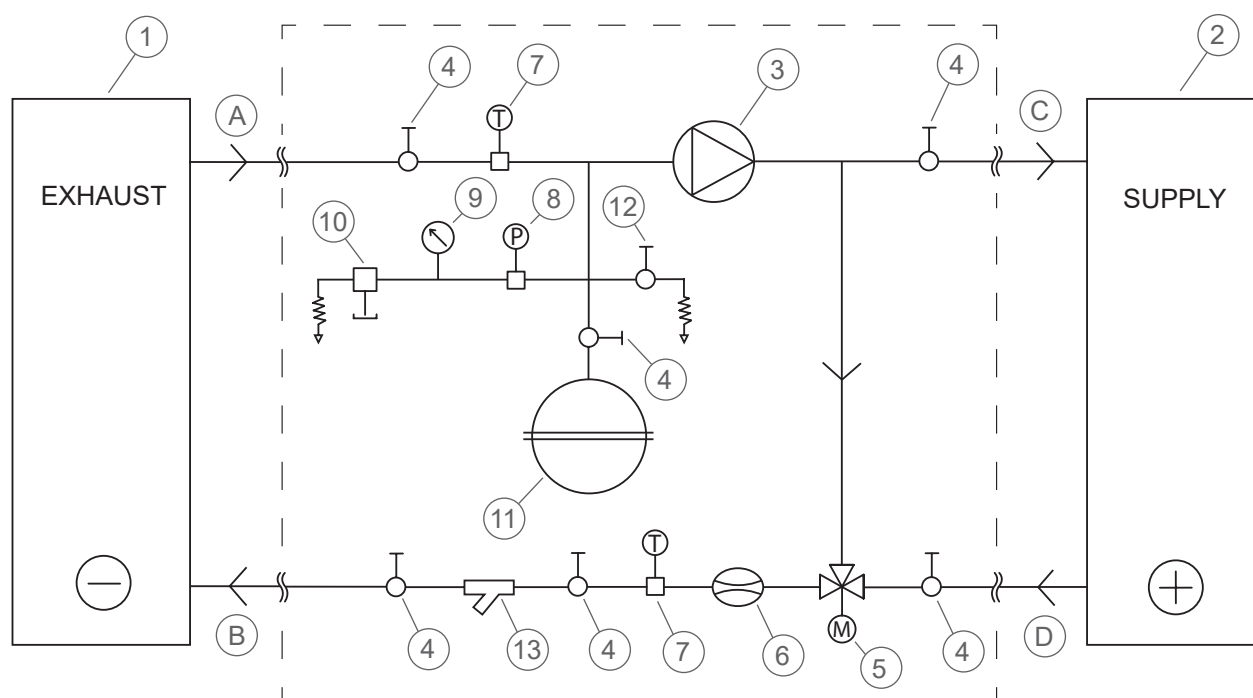
The heat recovery rate is regulated steplessly on the basis of a 0–10 V analogue signal from the AHU's control system. The value of 10 V is to be understood as full capacity (100%), which decreases as the signal value decreases down to zero at 0 V (0%).

The set-point signal from the air handling unit control primarily affects the speed of the pump that circulates the medium between the exchangers throughout operating range of the pump. In case where recovery rate is still too high, the set-point signal affects the opening of the three-way valve and the medium mixing as the next step.

If a fault occurs and the unit stops operating, the control system of the hydraulic stations sends a cumulative fault signal to the master control together with an indication of one of the following situations:

- failure of the frequency converter,
- pump failure,
- dry-running protection tripped – system pressure too low.

Hydraulic diagram of the pumping and control unit:



- | | |
|---|----------------------------|
| A. Cooler (exhaust) outlet | 6. Flow meter |
| B. Cooler (exhaust) inlet | 7. Temperature sensor |
| C. Heater (supply) inlet | 8. Minimum pressure sensor |
| D. Heater (supply) outlet | 9. Pressure gauge |
| 1. Heat recovery cooler (exhaust air handling unit) | 10. Safety tap |
| 2. Heat recovery heater (supply air handling unit) | 11. Expansion vessel |
| 3. Pump (with vent valve) | 12. Drain/fill valve |
| 4. Ball valve | 13. Mesh filter |
| 5. Three-way valve with actuator | |

Note that heater/cooler exchangers can swap places on the diagram and the device will still work properly, giving required heat recovery rate based on demand.

Attention!

Counterflow has to be maintained in both cases (see diagrams on the next page)!

5. Installation

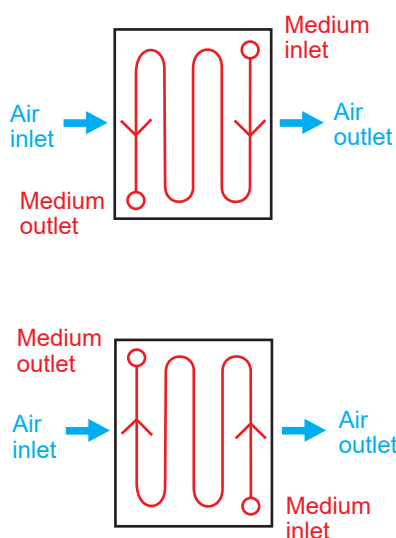
If the hydraulic station is installed externally to the air handling unit (in the room), make sure that the location of the unit provides space for operation and maintenance and does not interfere with the operation (or service) space of the air handling unit or other equipment in the vicinity.

The following steps must be taken to install and prepare the heat recovery hydraulic stations for operation:

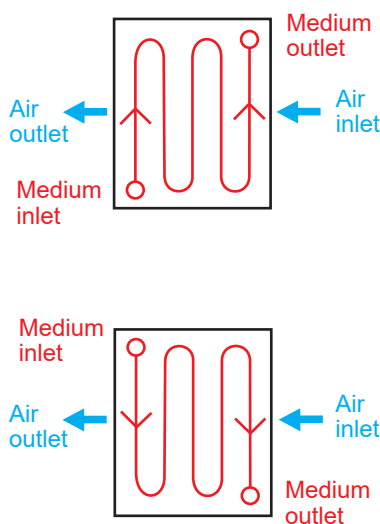
- check the completeness of the delivery and the condition of the equipment after transport,
- place the unit on a smooth and level surface,
- connect the pipes to the corresponding heat exchangers in the air handling unit,
- fill the system to a pressure of approx. 3 bar and then bleed it, repeating the process as necessary,
- check all connections for any leaks,
- insulate piping and components of the system exposed to water condensation,
- supply power cable close to the frequency converter of the hydraulic station (cable type as specified),
- report the readiness of the hydraulic station for start-up to the Leven Group Service Centre.

Connection diagram for countercurrent connection to the glycol exchanger

Exchanger (air handling unit), right-hand



Exchanger (air handling unit), left-hand



Comments:

- the pipes (and all other components) connecting the hydraulic station to the exchangers in the air handling unit must be suitable for operation with medium (glycol) for the entire temperature range (typically -20°C to +40°C),
- the glycol solution should be prepared in accordance with the technical data sheet of the air handling unit or the data on the unit rating plate,
- if concentrated glycol is used, the solution must be prepared (diluted) before it is poured into the system,
- when bleeding, pay attention to all points in the system – pump, heat exchangers, piping – especially highest points where air pockets can form.

6. Delivery and transport

Use a pallet truck or forklift to unload the device.

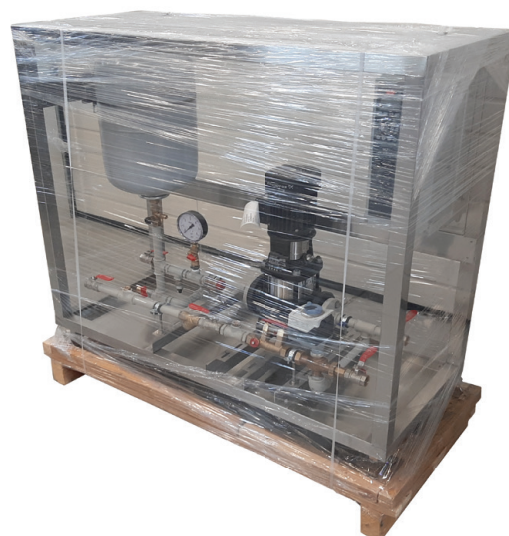
During unloading, attention should be paid to:

- the correct fork length for the forklift,
- securing of the load against tipping, sliding or falling,
- health and safety regulations.

Hydraulic stations in indoor & outdoor design are delivered on a pallet with dimensions depending on the Type and Model of the station:

a) Standard version – a unit located in a room

Type	Model	Length L	Width B	Height H	Transport weight
		mm	mm	mm	kg
A	0,5	1100	500	920	87
	1,5				92
B	3	1300	600	1120	111
	6				123
	10				140
C	15	1600	800	1420	198
	20				250
	30				295



Transport weight means the weight of the unit without the medium (empty), including the pallet and packaging.

b) External version – a unit in an enclosure for external installation

Type	Model	Length L	Width B	Height H	Transport weight
		mm	mm	mm	kg
A	0,5	1440	840	1410	182
	1,5				187
B	3	1840	990	1610	246
	6				258
	10				275
C	15	2040	1240	1910	388
	20				440
	30				485



Transport weight means the weight of the unit without the medium (empty), including the pallet and packaging.

Attention!

Delivered hydraulic stations are not filled with medium!

Hydraulic stations are marked to clearly and unambiguously indicate the correct way of connecting the piping to the heat exchangers in the air handling unit.

7. Start-up

The following conditions must be met for the hydraulic stations to be started up for the first time:

- correct hydraulic connection to the air handling unit exchangers,
- filling and bleeding of the system with the correct medium, pressure of min. 2 bar is recommended,
- completely assembled ventilation system in the building (ducts, air intake, exhaust, air valves, AHU etc.),
- air handling unit itself ready for start-up (connected to the system, to the utilities and to the power supply).

8. Warranty and inspections

To ensure effective and trouble-free operation of the Recovair hydraulic station, it must undergo regular maintenance by the Leven Group Service Centre.

The standard inspection cycle is 6 months.

Each hydraulic station is factory tested and calibrated before shipment to the customer.

Hydraulic stations manufactured by Leven Group come with a 2-year warranty.

The 2-year warranty is conditional on the hydraulic station being started up (warranty acceptance) by the Leven Group Service Centre and signing a service agreement for regular paid inspections to guarantee its correct and safe operation.

The warranty acceptance of the hydraulic station is always certified by a Commission Report made during the start-up.

If a device error message occurs during operation of the RecovAir hydraulic station, contact the Leven Group Service Centre immediately.

Attention!

All start-up, inspection and repair work on the units must only be carried out by the qualified Leven Group Service Centre or authorized personnel!

Unauthorised work carried out on the RecovAir device will void the warranty!

Any work on the device must only be carried out with the power supply disconnected for safety!

9. Commissioning Report

	<i>Place, date</i>
Site/Investment name	
Item No	
RecovAir Type & Model	
Name/type of AHU working with the RecovAir station	
Unit version (indoor/outdoor/built-in AHU)	
Operating (design) flow	
Operating (design) pressure losses	
Nominal pump power	
Nominal pump flow	
Glycol type & concentration	
Correct power supply including earthing	YES/to be done
Correct control signals	YES/to be done
System tightness	YES/to be done
Correct system pressure (in range of 2-5 bar)	YES/to be done
Correct pump operation (including direction of rotation)	YES/to be done
Correct operation of the three-way valve (including flow direction)	YES/to be done
Correct operation of temperature sensors	YES/to be done
Correct operation of dry-running protection	YES/to be done
Actual medium flow [m ³ /h lub l/s] at pump frequency [Hz]	
Comments:	
<i>Customer's signature</i>	<i>Authorized service engineer's signature</i>

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