HRMURAL

Double flow ventilation units

Ventilation units
with high efficiency
energy recovery

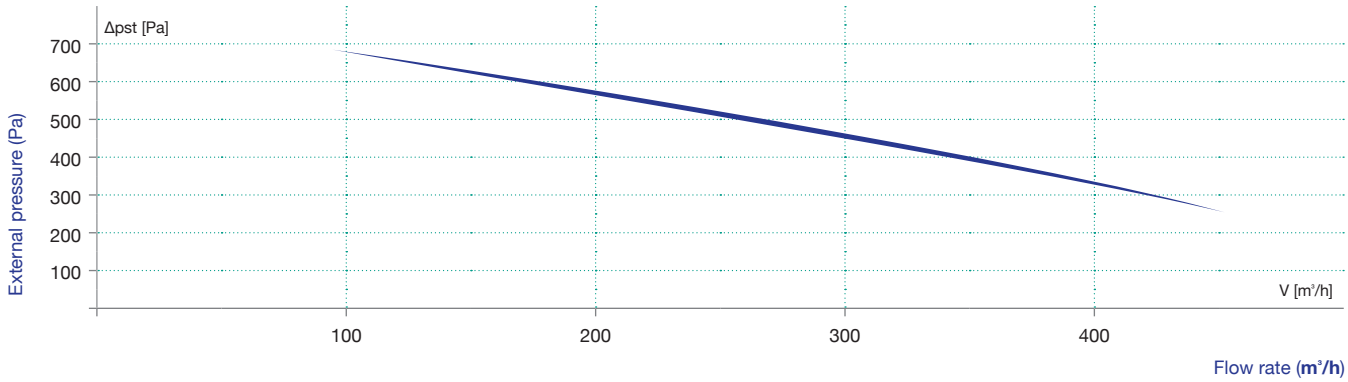
www.lemmens.com

P.LEMMENS
A Swegon Group company

HRMURALUP.450

ErP READY 2016 - 2018

Technical characteristics



General characteristics

• AIRFLOW	50 - 450 m³/h
• DIMENSIONS (L X W X H)	720 x 500 x 675
• WEIGHT	74,5 kg*
• NOMINAL VOLTAGE	1 x 230V - 50Hz
• MAXIMUM INTENSITY	3,1 A
• RECOMMENDED ELECTRICAL PROTECTION	8 A / D-10000A-AC3
• SUPPLY / EXTRACTION FILTER	G4 / G4 (F7 optional)
• AVAILABLE OPTIONS	ER and SR as standard, KWin, BA+/-
• AUTOMATIC FREE COOLING	Yes / Partial
• OPERATING TEMPERATURE RANGE	-20°C to +50°C
• COLOUR OF PANELS	RAL 9002
• CID	884204

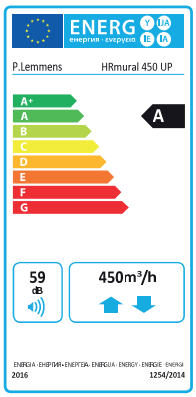
* The weight may change depending on the options.

Technical data

FLOW RATE	POWER ABSORBED	SFP	EXCHANGER EFFICIENCY	OUTLET T° AFTER EXCHANGER	SOUND LEVEL
m³/h	W	W/m³/h	%	°C	dB(A)
100	8	0,08	95,6	20,6	-
200	40	0,2	93,4	19,9	22,5
300	108	0,36	92,1	19,5	30,5
450	310	0,69	90,7	19	39,5

Conditions:

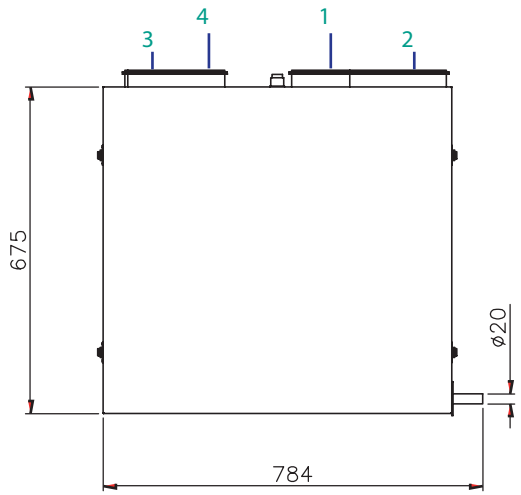
1. values calculated on the basis of an external 100 Pa system curve at maximum flow rate.
2. efficiency calculations for external conditions of -10°C, 90% RH and internal conditions of +22°C, 50% RH.
3. Sound level in the free field at 3m.

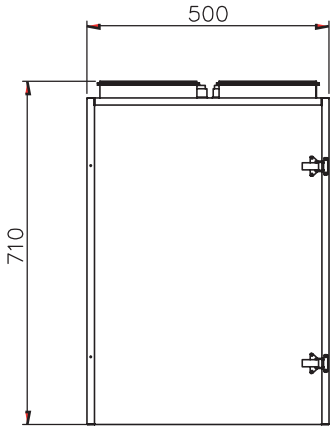


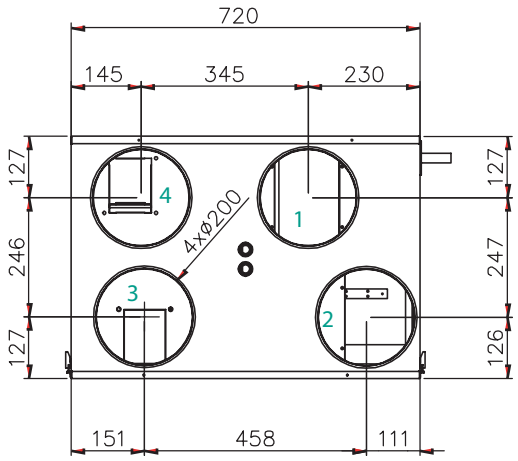
DIMENSIONS (mm)

1 **From the outside** 2 **From the inside** 3 **To the outside** 4 **To the inside**

HRMURAL UP 450







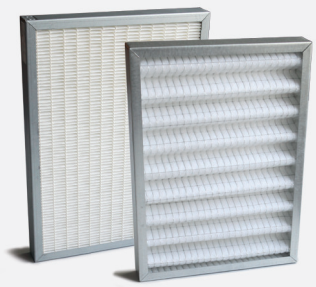
External electrical pre-heating coils (kwin)

The HRMURAL units can be equipped with an external heating elements at the fresh air entrance (pre-heating). It is possible to insert an electric preheating coil in order to prevent the exchanger to freeze. This option is useful in case of very low exhaust air temperatures. Supplied entirely pre-wired and connected to the TAC5, the Kwin can withstand an outdoor air temperature as low as -40°C without any risks of freezing and even reach a temperature up to +22°C on the outlet air regarding the flowrate and humidity.

The KWin capacity exchanger is modulated to maintain the post-exchange temperature equal to the no frost set point of the counter flow exchanger. If the climate environments are such that the desired temperature cannot be reached even though the maximum power of the KWin, the control will reduce the supply and exhaust air flow rates (balance maintained) to attain the set point.
An internal pre-post heating element is possible on the Mural up 300 & 400.

MODEL	POSITION	MAXIMUM POWER	ΔT (1)	MINIMUM EXTERIOR T°(1) (3)	MAXIMUM INTENSITY ADMISSIBLE PER PHASE	PRESSURE DROP (2)	CID
		[KW]	[°C]	[°C]	[A]	[PA]	
HRMURAL UP 300 & 400	internal						
HRMURAL (UP) 450 (ECO)	external	1,5	10/15/30	-22/-27/-42	6,5	9	520982
HRMURAL 600	external	3	15/22/44	-27/-34/-56	13	9	520983
HRMURAL 800	external	3	11/17/33	-23/-29/-45	13	14	521043
HRMURAL 1200	external	4,5	15/22/44	-27/-34/-56	6,5	10	520984

Replacement filter kits



The HRmural units are delivered as a standard with M5 or G4 filters on incoming and outgoing airflows.
Class F7 filtering on incoming air is available as an option.
A replacement kit with all the necessary filters is available for each unit.

MODEL	CID	FILTERS FRESH AIR IN	FILTERS STALE AIR OUT
HRmural up 300&400 ECO	510115	G4	G4
HRmural(up) 450 (ECO)	510042	G4	G4
HRmural(up) 450 (ECO)	510014	F7	G4
HRmural 600/800	510096	M5	M5
HRmural 600/800	510083	F7	M5
HRmural 1200	510097	M5	M5
HRmural 1200	510084	F7	M5

(1) Calculated at 100 %, 66% and 33% of the maximum flow rate.
(2) Calculated at maximum flow rate.
(3) Calculated with extract air at 22°C - 50%RH.

Module BA+/-

This extra heat or cooling module is easy to install on air ducts.
Equipped with a warm (2 or 4 rows) / cold (4 rows) water coil or an evaporation coil (dx) (4rows) or even a condensation dx coil (4 rows) depending on the need. This module enables the final contribution at very competitive prices to deliver the ideal temperature to the supply air.
In order to drain the condensation water, cold units will be equipped with a condensate tank. Optionally, it is equipped with a drain pan and 3-way motorized damper. It can be delivered with a full set of controls, including a temp sensor, designed to pilot a motorized 3-way damper (except for the evaporation coil).
Once the desire air temperature is set, the controller will modulate the capacity of the coil to reach it.

EVAPORATION

MODEL	CONNEC-TIONS	MAXIMUM POWER (1) (2) (3)	ΔT (1) (3)	PRESSURE DROP AIR (2)	FLUID FLOW RATE (2) (3)	PRESSURE DROP FLUID (2) (3)	CID
	[MM]	[KW]	[°C]	[PA]	[KG/H]	[KPA]	
HRMURAL (UP) 450 (ECO)	12/22	2,5 / 1,6	11 / 13	53	61,1	0,6	882745 882751
HRMURAL 600	12/22	3,0 / 1,9	10 / 12	80	72,9	0,9	882745 882751
HRMURAL 800	12/28	5,3 / 3,2	13 / 15	35	127,9	3,9	882746 882755
HRMURAL 1200	12/28	8,1 / 4,7	13 / 14	41	196,5	10,2	882747 882756

Conditions :
Exterior air: -30°C and 40% RH
Interior air: +22°C and 50% RH
Exit air temperature without BA: 23.5 °C

(1) Calculated at 100% and 50% of the maximum flow rate.
(2) Calculated at maximum flow rate.
(3) R410A / Evaporation temperature = 4°C

CONDENSATION

MODEL	CONNEC-TIONS	MAXIMUM POWER (1) (3)	ΔT (1) (3)	PRESSURE DROP AIR (2)	FLUID FLOW RATE (2) (3)	PRESSURE DROP FLUID (2) (3)	CID
	[MM]	[KW]	[°C]	[PA]	[KG/H]	[KPA]	
HRMURAL (UP) 450 (ECO)	22/12	1,9 / 1,2	13 / 16	40	27,2	0,1	882745 882751
HRMURAL 600	22/12	2,3 / 1,4	11 / 14	61	32,2	0,1	882745 882751
HRMURAL 800	28/12	5,2 / 3	19 / 22	27	72,7	0,7	882746 882752
HRMURAL 1200	28/12	7,9 / 4,6	20 / 23	31	110,7	1,7	882747 882759

Conditions :
Exterior air: -10°C and 90% RH
Interior air: +22°C and 50% RH
Exit air temperature without BA evaporation: 19°C

(1) Calculated at 100% and 50% of the maximum flow rate.
(2) Calculated at maximum flow rate.
(3) R410A / Condensation temperature = 40°C

HOT WATER (BA+ 4 RANG)

MODEL	CONNEC-TIONS	WATER TEMPERA-TURE	MAXIMUM POWER (1)	ΔT (1)	PRES-SURE DROP AIR (2)	WATER FLOW RATE (2)	PRES-SURE DROP WATER (2)	CID
		[°C]	[KW]	[°C]	[PA]	[L/H]	[KPA]	
HRMURAL (UP) 450 (ECO)	3/4''	80/60 50/40 40/35	6,3/3,5 2,0/1,6 2,3/1,2	41/46 20/21 15/16	43 41 40	277 267 396	0,9 0,9 1,9	882745 882749
HRMURAL 600	3/4''	80 / 60 50 / 40 40 / 35	7,8/4,5 3,8/2,1 2,8/1,6	38/44 19/21 14/15	65 62 61	343 330 489	1,3 1,3 2,7	882745 882749
HRMURAL 800	3/4''	80 / 60 50 / 40 40 / 35	12,6/6,9 6,3/3,4 4,6/2,4	47/51 23/25 17/18	28 27 27	554 550 795	2,0 2,2 4,4	882746 882753
HRMURAL 1200	3/4''	80 / 60 50 / 40 40 / 35	18,5/10,2 9,3/5,0 6,7/3,6	45/50 23/25 17/18	33 31 31	813 807 1166	2,6 2,8 5,6	882747 882757

HOT WATER (BA+ 2 RANG)

MODEL	CONNEC-TIONS	WATER TEMPERA-TURE	MAXIMUM POWER (1)	ΔT (1)	PRES-SURE DROP AIR (2)	WATER FLOW RATE (2)	PRES-SURE DROP WATER (2)	CID
		[°C]	[KW]	[°C]	[PA]	[L/H]	[KPA]	
HRMURAL (UP) 450 (ECO)	3/4''	80/60 50/40 40/35	4,0/2,4 1,9/1,1 1,5/0,9	26 / 31 12,5/ 15 10/ 11	21 21 20	174 169 256	1,2 1,3 2,7	882745 882748
HRMURAL 600	3/4''	80 / 60 50 / 40 40 / 35	4,8/2,9 2,3/1,4 1,8/1,0	25/29 12/23 8,7/10	32 31 31	209 202 305	1,7 1,7 3,7	882745 882748
HRMURAL 800	3/4''	80 / 60 50 / 40 40 / 35	8,3/4,9 4,2/2,4 3,1/1,8	31/36 15/17 11/13	14 13 13	363 361 535	2,8 3,1 6,4	882746 882752
HRMURAL 1200	3/4''	80 / 60 50 / 40 40 / 35	11,5/6,8 5,6/3,5 4,3/2,46	28,3/34 14/16 10/12	16 15 15	505 492 742	1,2 1,3 2,8	882747 882756

Conditions : Outside air:-10°C and 90% RH, Extract air: +22°C and 50% RH, exit air temperature without BA cond: 19°C
(1) Calculated at 100% and 50% of the maximum flow rate.
(2) Calculated at maximum flow rate.

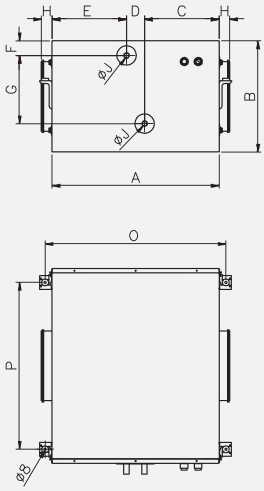
COLD WATER (BA-)

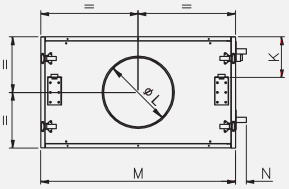
MODEL	CONNEC-TIONS	WATER TEMPERA-TURE	MAXIMUM POWER (1)	ΔT (1)	PRES-SURE DROP AIR (2)	WATER FLOW RATE (2)	PRES-SURE DROP WATER (2)	CID
		[°C]	[KW]	[°C]	[PA]	[L/H]	[KPA]	
HRMURAL (UP) 450 (ECO)	3/4''	7 / 12 10 / 15 13 / 18	1,4/1,0 1,0/0,7 0,7/0,5	8,0/9,7 6,5/8,1 4,6/6	43 39 38	240 171 119	0,9 0,5 0,3	882745 882750
HRMURAL 600	3/4''	7 / 12 10 / 15 13 / 18	1,6/1,1 1,1/0,8 0,8/0,5	6,8/8,8 5,7/7,3 4,0/5,3	66 58 59	275 197 136	1,2 0,6 0,3	882745 882750
HRMURAL 800	3/4''	7 / 12 10 / 15 13 / 18	3,9/2,0 2,3/1,4 1,4/0,9	10,2/10,7 7,8/8,9 5,4/6,7	32 27 25	663 401 246	3,7 1,5 0,6	882746 882754
HRMURAL 1200	3/4''	7 / 12 10 / 15 13 / 18	5,7/2,8 3,6/1,9 2,0/1,3	10,0/10,1 7,9/8,4 5,0/	37 32 29	980 620 344	4,7 2,1 0,7	882747 882758

Conditions : Outside air: 30°C and 40% RH, Extract air: +22°C and 50% RH, supply air temperature without BA+: 23,5°C
(1) Calculated at 100% and 50% of the maximum flow rate.
(2) Calculated at maximum flow rate.

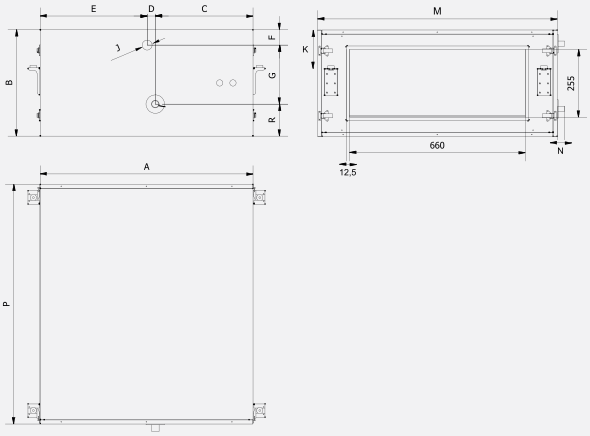
DIMENSIONS BA W (HOT WATER/COLD WATER)

400 / 600 /800





1200



MODEL 4 ROWS HOT & COLD WATER	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
HRMURAL 450 / 600	600	320	267	65	268	51	158	40	3/4''	107	250	500	35	650	400
HRMURAL 800	600	400	267	65	268	55	245	40	3/4''	142	250	700	35	650	600
HRMURAL 1200	600	400	367	65	368	55	245	-	3/4''	142	660 x 255	900	35	850	800

MODEL 2 ROWS HOT WATER	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
HRMURAL 450 / 600	600	320	290	22	288	51	158	40	3/4''	107	250	500	35	650	400
HRMURAL 800	600	400	290	22	288	55	245	40	3/4''	147	250	700	35	650	600
HRMURAL 1200	800	400	368	22	400	55	245	40	3/4''	147	660 X 255	900	35	850	800

BA DX DIMENSIONS (EVAPORATION/CONDENSATION)

MODEL 4 ROWS	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R
HRMURAL 450 / 600	600	320	267	65	268	90	100	40	12/22	107	250	500	35	650	400	130
HRMURAL 800	600	400	267	130	203	58	222	40	12/22	142	250	700	35	650	600	120
HRMURAL 1200	800	400	367	65	403	58	222	-	12/28	142	660 x 255	900	35	850	800	120

TAC5: Advanced airflow control technology

Depending on the requirements and characteristics of the application, there is an airflow control mode that will fit the situation: constant airflow (CA), constant pressure (CPs), variable constant airflow liked to a 0-10V signal (LS) or constant torque (TQ) are the 4 airflow controls from which to choose.
The master/slave link between supply and exhaust (which may be deactivated if necessary) always ensures for a balanced ventilation. When the exhaust airflow fluctuates because of a higher ventilation request, the supply airflow will be adapt in order to preserve the preset balanced between the 2 flows. This occurs, regardless from the pressure conditions.

- **Constant airflow (CA mode)** is used when one or several stable air volumes are needed. The fan will deliver the requested airflow regardless from the pressure conditions. This is the simplest mode, it allows 3 different pre-set airflows (low, medium, high) and is used with simple control systems.
- **Variable constant airflow (LS mode)** is probably the most economical ventilation mode, because the airflow provided depends on the actual air renewal needed, so there will not be superfluous ventilation. In this case, the constant airflow requested is linked to a 0-10V signal. Measuring the CO2 level for example. When the level is high (many people present), the airflow rate will be adjusted accordingly, and vice-versa, when there are few people in the room. Energy consumption will follow the real ventilation requirement.
- Variable flow rate to maintain a **constant pressure (CPs mode)**: a particularly interesting application of this operating mode is undoubtedly the individualized ventilation of apartments by a centralized ventilation unit. Once configured, the ventilation of each apartment remains constant even if several apartments change their ventilation demand, as the pressure in the network is maintained constant. A pressure measurement sensor is used to configure this very useful mode.
- **Constant torque mode (TQ mode):** This mode simulates the 'normal' way for a fan to operate when using a frequency controller or a transformer. The fan torque is modulated instead of the airflow. The mode allows the preset of 3 different 'percentages' of the maximum fan torque. This mode is available for Eco units with plug fans when constant airflow is not required.

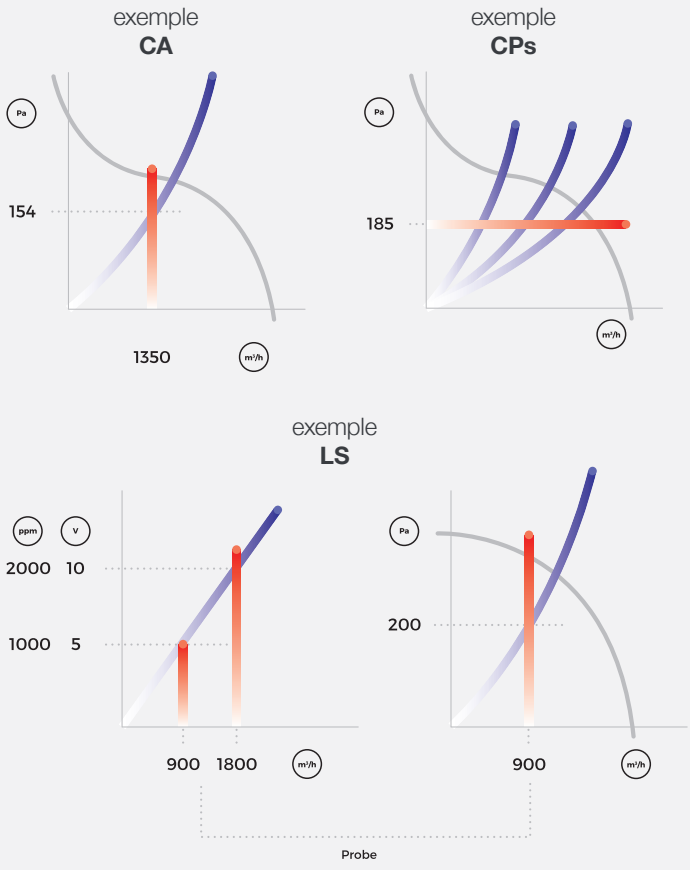
The 4 operating modes: concrete examples

CA stands for "constant airflow." This means that one (or more) airflow is selected and the TAC5 controller will operate the fan to provide the actual airflow request, regardless of the pressure drop. Example: A setpoint of 1350 m³/h will provide not about 1350 m³/h but exactly 1350m³/h.

LS stands for "link to a 0-10V signal." This means that a specific linear relationship between a 0/10V value (representing temperature, humidity, CO2 rate, etc.) and the actual airflow is configured. The fan/control will ensure this link will be delivered irrespective of the network pressure drop. Consider for example a link between the airflow and a CO2 level as shown on graph 2. For a CO2 level of 1000 ppm, the fan will deliver 900m³/h independently from the pressure conditions."

CPs stands for "constant pressure." During the setup, the initialization flow rate will determines the resulting pressure. This pressure value will be stored and used as reference in order to maintain the pressure constant. The pressure setpoint can also be introduced manually. The fan will operate as CA mode, but with the mission to keep the stored pressure value constant. For example: "Once the network is balanced, each apartment of a building has an airflow of 150 m³/h, if a pressure drop of 185 Pa (for example) appears. The controller will act in order to maintain the set pressure. This will ensure a constant flow rate in each apartment, irrespective of the air demands of each room…"

TQ stands for "constant torque". This means the fan will operate like a "normal" fan without constant airflow features, just like if an AC motor being powered through a variable frequency controller.



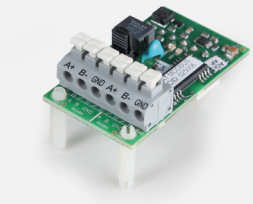
- **Alarms :**
  The TAC5 can generate up to 74 specific alarms out of the following 16 categories:
  1. Fan failure alarm
  2. Pressure variation alarm
  3. Alarm in cas of problem during reference pressure initialization
  4. Alarm if the system cannot fulfil the set point
  5. Alarm in case of data failure in the control circuit
  6. Fire alarm
  7. Maintenance alarm
  8. Alarm reporting a communication breakdown between the TAC5 circuit and the RC
  9. T° sensor failure alarm
  10. Drain pump alarm
  11. Alarm reporting that the comfort T° is too low (set T° value not achieved)
  12. Alarm reporting that the comfort T° is too high (set T° value not achieved)
  13. Alarm reporting a too low supply T°
  14. Alarm reporting the heat exchanger anti-frost activation
  15. Alarm reporting the hydraulic coils anti-frost
  16. Alarm reporting a bad positioning of the bypass
- **Boost :** activates preset configurable supply and exhaust airflows. The activation of the boost has a higher priority than any normal working mode.
- **Basic Time table :** enables the automatic working of the unit based on 4 time slots having their own configurable set points. Each day of the week has the same time slots but can be set as an offday.
- **Advanced Time table (available with GRC option or through Modbus communication) :** enables the automatic working mode of the unit following 6 time slots having their own configurable set points. Each days of the week has its own 6 time slots with independent settings. In addition, for each time slot, the bypass status can be forced and a different comfort temperature can be configured.
- **Seasonal management :** allows to disable features such as bypass, post heating and post cooling according to the current period of the year.
- **Free cooling :** automatic free cooling of the building during summer nights, when specific temperature conditions are met, with:
  - Open/closed bypass: based on inside and outside T°.
  The bypass is opened to supply fresh air in the building without energy recovery to cool the building down. The bypass will be closed automatically when set temperatures values are reached. The opening can also be forced independently from T° values.
- **Post heating / cooling :** automatic power control of a heating or cooling coil to reach the set temperature and keep it constant. The temperature reference can be either on supply or exhaust air (“room t°”).
- **Comfort T° :** comfort temperature control can be made by the post heating/cooling or the free cooling with bypass.
- **Advanced anti frost protection of the heat exchanger :**
  The TAC5 controls the exhaust T° after the heat exchangers and keep it above a set value (antifrost T°)
  2 types of protection are available :
  1. Warming up the incoming fresh air using an electrical or water preheating coil.
  2. Reduction of the supply airflow.
- **A new intelligent control is also available:** taking into account measured inlet temperature (in the ventilation duct or in a local) of stale air, it allows the variation of the outlet temperature of the heating coil.
  This technology allows the AHU to arrive quickly at its set temperature while keeping the consumption at its minimum.

The TAC5 regulation mounted in the HR units can be combined with different options :

TAC5 SAT MODBUS

- MODBUS communication circuit to be plugged on the TAC5 control board.
- It gives the possibility to communicate in a network with one or several HR units. It allows to configure, control and display them from a central point.
- A direct application of the SAT MODBUS is the integration of HR units in a BMS system.

ARTICLE	CID
SAT TAC5 MODBUS	025006



TAC5 SAT ETHERNET

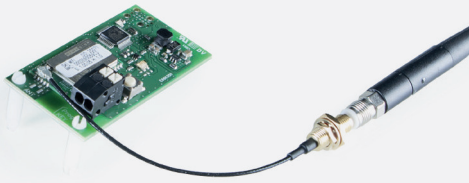
- MODBUS TCP/IP communication device to be plugged on the TAC5 control board.
- Ethernet 10 base T to set in network HR units to configure, control display from one or several access points.
- Interface with dedicated App for computer.
- Configuration enabling remote access through the internet.

ARTICLE	CID
TAC5 SAT ETHERNET	025072

TAC5 SAT WIFI

- MODBUS TCP/IP communication device to be plugged in the TAC5 control board.
- Wireless WIFI to set in network HR units to configure, control display from one or several access points.
- Works as Access Point and creates automatically its own Wi-Fi network or as base station to an already existing Wi-Fi network.
- Interface with dedicated App for smartphone and tablet.
- Configuration enabling remote access through the internet.

ARTICLE	CID
TAC5 SAT WIFI	025071



TAC5 SAT KNX

- KNX communication device to be plugged on the TAC5 control board.
- It allows the communication with a deported KNX device for the set up, visualisation and control of the HR unit.

ARTICLE	CID
TAC5 SAT KNX	025045

TAC5 RC

- Remote control box that includes an LCD screen (2x8 characters), LEDs and 5 control buttons.
- It is used to configure the HR unit based on sequential menus and to visualize all actual parameters.
- It is used to manage 4 time slots and OFF days.
- It can be connected temporartly or permanently to set and/or to display the settings.

TAC5 GRC

- This is a 4.3” colour touch screen.
- It can be mounted or built in.
- It contains a very user-friendly and intuitive, Windows type menu.
- It is used to configure the HR unit based on sequential menus and to visualize all actual parameters.
- It is used to manage 6 different time slots per day, as well as the seasonal management of the bypass, the post-heating and post-cooling coil.
- A GRC can be connected to several units (247 maximum); provide one SAT TAC5 MODBUS per unit.

ARTICLE	CID
KIT GRC TAC5	372002
EXPOSED ASSEMBLY KIT	372020
BUILT-IN ASSEMBLY KIT	372013

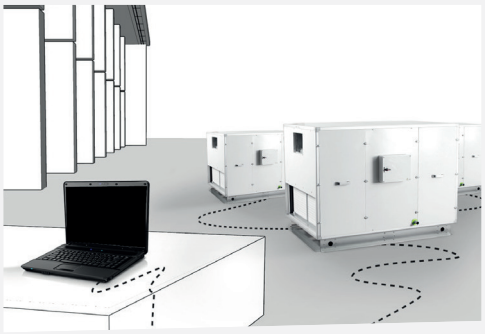
Application

Dedicated Lemmens App for tablet and smartphone featuring:

- Complete control of the unit
- Synoptic view of the unit with actual airflows, pressures and temperatures
- Basic and advanced setup
- Alarm diagnostic
- Time scheduler with 6 time slots for each day of the week
- Seasonal management
- Automatic detection of the unit(s) inside the network for fast and easy access.
- To obtain the advantages of the Lemmens App you need SAT-Ethernet or WIFI- extra board on each unit.

PC

- The TAC5 control built in the HR units can communicate in MODBUS, which means that the unit can be networked. A Pc application (to be developed by the user) can then be used to communicate easily with the units.
- A converter of the COM or USB port to RS485 is needed to be able to connect to the MODBUS network.
- Each unit has to be equipped with the SAT MODBUS option.
- The gate of creativity is wide open here…



Building management systems (BMS)

The TAC5 control box can be connected to the network thanks to the its communication option.

The integration into a BMS system is then possible and very easy.

The building management system can send the different settings (flow rate, pressure, etc.) and read all the settings of the HR units in real time.

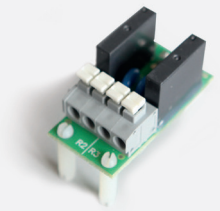
Communication is possible in several ways:

- KNX
- MODBUS
- WIFI
- ETHERNET

COM4

- Remote 4 position switch to start/ stop the unit and control the setpoint.

ARTICLE	CID
COM 4	010007



SAT3

- This boards integrates 2 relays associated to 3 functions: Fan alarm, Pressure alarm and Bypass status.
- The signaling is carried out by potential-free contact as well as by an LED placed above each relay.
- It is very simple to install: just plug it in the TAC5 control board.

ARTICLE	CID
SAT 3	370005

TAC SAT BA/KW

- This is a regulation circuit for hot (water/electric) and/or cold (water) coils.
- It regulates the external heat exchangers (BA+ option) to maintain constant a set temperature. It can operate in both summer or winter logic.
- It is very simple to install: just plug it in the TAC5 control circuit.

ARTICLE	CID
SAT TAC5 BA/KW KIT	372004

We are constantly working to make our products better and more reliable. Therefore we cannot guarantee the information contained in our leaflets reflects the last version of the described product. Also, although we put a lot of care in the making of our documentation, we cannot be held responsible for any error and/or omissions that could have slipped in.

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