NEW MODULAR HYDROLUTION SYSTEM

Air-water heat pump for heating, DHW production and cooling

heating
domestic hot water
cooling

WHAT IT IS

HYDROLUTION is a complete, versatile air-water heat pump system: designed to meet the needs of heating, domestic hot water, cooling production and also to guarantee maximum application flexibility thanks to the three available configurations: **Flexible heating, Flexible heating and DHW and All in One**.

It is possible to enjoy a pleasant "cooling effect" (free) inside rooms served by a radiant panel system during the summer months, making use of the energy produced by photovoltaic panels.

The wide range of available power (6 kW, 8 kW, 10 kW and 16 kW) and its modularity (it is possible to manage up to 8 HYDROLUTION cascading systems in Flexible version in heating configuration, for a maximum power of 128 kW) are the two specific features that distinguish HYDROLUTION, which can be installed both in a single apartments and in a large apartment building.

HOW IT WORKS

HYDROLUTION absorbs free energy from the outside air to produce hot water at ideal temperatures for heating systems with distribution to:

- **Radiant panels**
- **Medium-temperature radiators**
- **Fan coils**

The system can product domestic hot water both in Flexible and in All in One configuration.

The control systems can manage modular operation and the main circuit components necessary for water circulation (mixing valve, circulation pump, diverter valves) and reverse operation.

System regulation is complete and efficient.

THE HYDROLUTION SYSTEM - LINE UP

Outdoor units


6 kW


8 kW


10 kW


16 kW

"All in One" indoor units


Mod. HMK 60 for 6 kW outdoor units


Mod. HMK 100 for outdoor units from 8 to 10 kW

Tanks


Storage volume 300 L


Storage volume 500 L

Split box


Exchangers for units up to 16 kW

THE HYDROLUTION SYSTEM - ACCESSORIES

Model	Description	Code
	Exchangers for 6 kW units.	HSB60
	Exchangers for units from 8 to 10 kW.	HSB100
	Exchangers for 16 kW units.	HSB140
	Heating element integration KIT.	ELK9M
	Single unit control.	RC-HY20
	Modular unit control (up to 8).	RC-HY40
	Circulation pump (mods. 2 - 3.5HP).	CPD11-25M-65
	Circulation pump (mod. 6HP).	CPD11-25M-75
	Hot water and heating diverter valve (2 - 3HP).	VST05M
	Hot water and heating diverter valve (3.5 - 6HP).	VST11M
	Heating element (3 kW) for tanks (PT300 - PT500).	MEL 1030 M
	Flow reversing valve for power > 16 kW and up to 40 kW.	VST20M
	Conditioning heating diverter valve (2 - 3HP).	VCC05M
	Conditioning heating diverter valve (3.5 - 6HP).	VCC11M
	Control kit for secondary heating systems (max 8 syst.) up to 1200 L/h.	ECS40M
	Control kit for secondary heating systems (max 8 syst.) up to 1950 L/h.	ECS41M
	Circulator control kit for modular combinations.	AXC30M
	Room temperature sensor.	RTS40M
	Energy measurement KIT (PT300/500).	EMK300/500M
	Remote control.	RMU40M
	Titanium Anode (PT300/500).	ANODE-T300/500
	Magnesium Anode (PT300/500).	ANODE-M300/500

THE HYDROLUTION SYSTEM - MODULAR COMBINATIONS

UP TO 128 KW

Maximum power 128 kW

8 FDCW 140VNX-A 16 kW units

UP TO 112 KW

Maximum power 112 kW

7 FDCW 140VNX-A 16 kW units

UP TO 96 KW

Maximum power 96 kW

6 FDCW 140VNX-A 16 kW units

UP TO 80 KW

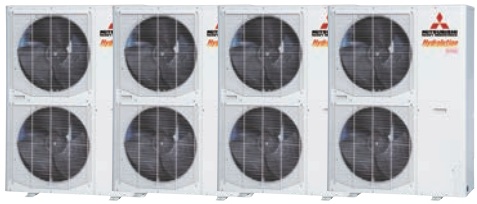
Maximum power 80 kW

5 FDCW 140VNX-A 16 kW units

UP TO 72 KW

Maximum power 72 kW

4 FDCW 140VNX-A 16 kW units + 1 FDCW 71VNX-A 8 kW unit



UP TO 64 KW

Maximum power 64 kW

4 FDCW 140VNX-A 16 kW units

UP TO 56 KW

Maximum power 56 kW

3 FDCW 140VNX-A 16 kW units + 1 FDCW 71VNX-A 8 kW unit

MITSUBISHI HEAVY INDUSTRIES

THE HYDROLUTION SYSTEM - MODULAR COMBINATIONS

UP TO 48 KW

Maximum power 48 kW

3 FDCW 140VNX-A 16 kW units

UP TO 40 KW

Maximum power 40 kW

2 FDCW 140VNX-A 16 kW units + 1 FDCW 71VNX-A 8 kW unit

UP TO 36 KW

Maximum power 36 kW

1 FDCW 140VNX-A 16 kW units + 2 FDCW 100VNX-A 10 kW unit

UP TO 32 KW

Maximum power 32 kW

2 FDCW 140VNX-A 16 kW units

UP TO 28 KW

Maximum power 28 kW

2 FDCW 100VNX-A 10 kW units + 1 FDCW 71VNX-A 8 kW unit

UP TO 24 KW

Maximum power 24 kW

1 FDCW 140VNX-A 16 kW units + 1 FDCW 71VNX-A 8 kW unit

UP TO 20 KW

Maximum power 20 kW

2 FDCW 100VNX-A 10 kW units

THE HYDROLUTION SYSTEM - ADVANTAGES

Cutting-edge design and technological innovation are the basis of the HYDROLUTION system.

ENERGY SAVING

HYDROLUTION outdoor units are equipped with Inverter technology and a Twin Rotary compressor: it is possible to vary the operating frequency of the compressor according to the actual demand of the system, resulting in optimisation of the COP and EER values.

VERY QUIET OUTDOOR UNIT OPERATION

The noise emitted by outdoor air conditioning system units can be a problem, especially during the night.
HYDROLUTION systems can reduce fan and compressor speed thanks to their "Silent" mode. The result is significantly less noise. Outdoor unit operation can be set to "Silent" mode via the RC-HY20/40 control.

EXTREME COMPACTNESS

The reduced overall size of outdoor All in One (HMK 60 and HMK 100) unit versions is thanks to integration of the domestic hot water tank together with the heat exchanger inside the unit itself.

HOT WATER UP TO 65°C

HYDROLUTION is a heat pump that is particularly suitable for primary heating, tested in numerous projects in Europe: it is capable of producing hot water **up to 58°C**. It is possible to raise this limit up to 65°C by means of an integrative heat source **and to keep it constant, even with an external temperature of -20°C**. For this reason, it can be combined with: low-temperature heating elements (radiant panels), medium-temperature heating elements (radiators, warmcoils).

HIGHLY RELIABLE

The outdoor unit compressor is designed for efficiency even in very cold climates.

BLUE FIN TREATMENT

Outdoor unit corrosion due to weathering can compromise correct system operation. The "Blue Fin" treatment applied on the heat exchanger helps prevent corrosion.

The installation conditions of the new HYDROLUTION system, which can be implemented as needed, are as follows:

Flexible in heating configuration

Available for power levels 6 - 8 - 10 - 16 kW

This configuration is composed of separate components: outdoor unit, indoor unit (Split Box HSB), control system and system circulation pump.

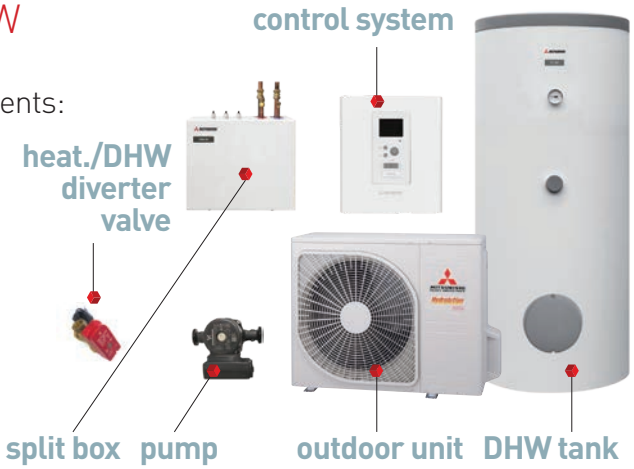
The system can heat and cool.

Flexible in heating and DHW configuration

Available for power levels 6 - 8 - 10 - 16 kW

This configuration is composed of separate components: outdoor unit, indoor unit (Split Box HSB), system circulation pump, control system, domestic hot water production tank and heat/DHW diverter valve.

The system can heat, produce domestic hot water and cool.



All in One

Available for power levels 6 - 8 - 10 kW

This is a configuration composed of an outdoor and indoor unit in which the following are integrated: a heat exchanger, a domestic hot water (DHW) tank, a circulation pump and an electric heater. **ALL IN ONE**.

The system can heat, produce domestic hot water and cool.

The HYDROLUTION installation version in modular mode lets you combine 8 systems to one another in the FLEXIBLE version in heating configuration, managed by the RC-HY40 control.

In addition to raising the power output, the modular HYDROLUTION combination guarantees **installation flexibility, regulation efficiency, system durability and continuity of service**.

Flexible installation

It is possible to combine all the power levels of the individual systems to one another in order to achieve an installed power commensurate with the actual needs. In this way, it is possible to avoid having an oversized system, significantly reducing costs.

Below are some examples of possible modular configuration combinations.

Example of modular configuration with two 10 kW and 16 kW outdoor units for a total installed power of 26 kW.

Example of modular configuration with two 16 kW outdoor units for a total installed power of 32 kW.

Example of modular configuration with two 16 kW outdoor units and a 10 kW unit for a total installed power of 42 kW.

HYDROLUTION operation is managed by the DM parameter. The DM parameter is defined as the sum of the differences, calculated each minute, between the actual delivery temperature and the temperature calculated by the control system.

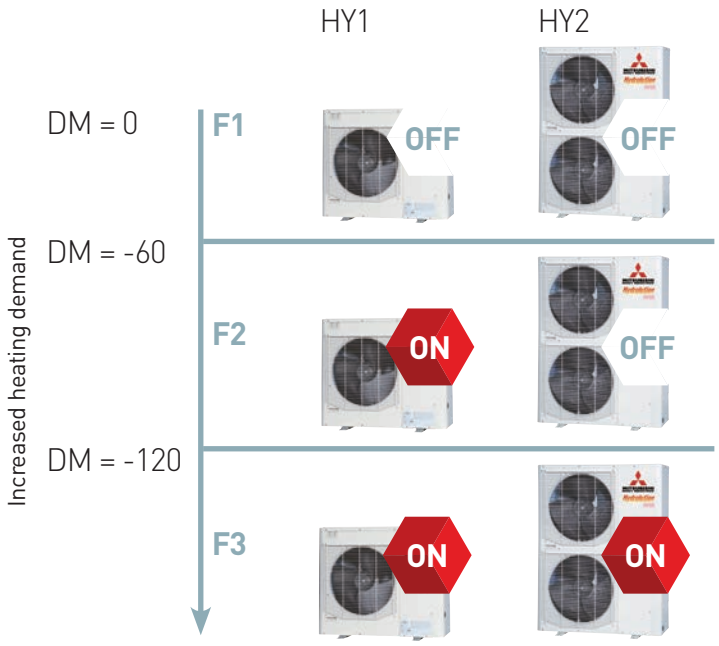
Regulation efficiency

Thanks to its control logic, it is possible through the RC-HY40 to have quick system responses to changing loads and efficient on/off management of individual outdoor units combined to one another.
The various HYDROLUTION operating phases (operating frequency of compressors, activation/deactivation of one or more outdoor units) in both individual installation mode and in modular installation mode are activated based on the variation of the DM parameter (degrees per minute).

Phase 1: DM more than -60.

Phase 2: DM between -120 and -60.

Phase 3: DM less than -120.



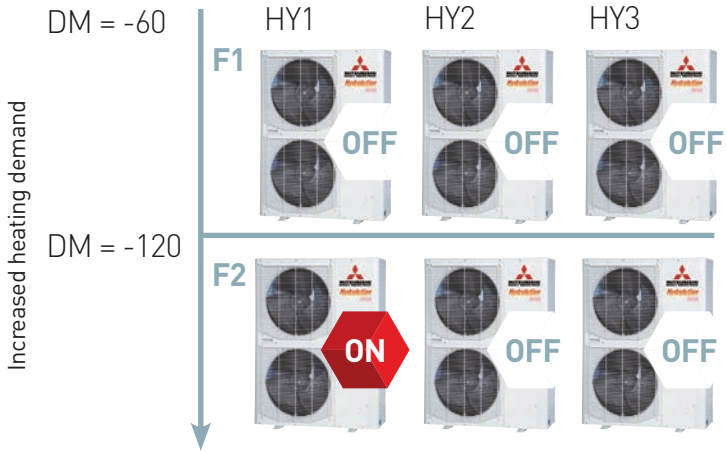
A durable system

The RC-HY40 control system is able to store the number of operating hours of compressors on each individual outdoor unit of the system in its memory.
To meet system demands, RC-HY40 gives priority to first starting the outdoor unit with less operating hours, so as to optimise the useful life of the entire system.

Phase 1: DM more than -60.

Phase 2: DM between -120 and -60.

Below is an example:
HY1 = 100 cumulated hours of operation
HY2 = 120 cumulated hours of operation
HY3 = 150 cumulated hours of operation



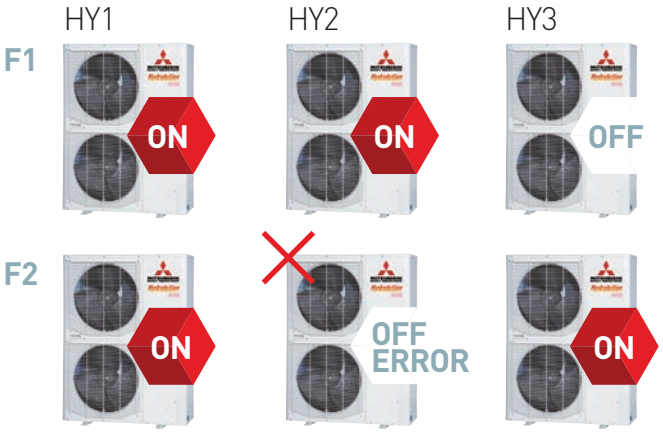
When the heat demand increases, first HY1 starts up, then HY2 and H3 in sequence.

Continuity of service

In the event of malfunction of one of the outdoor units in a modular combination, continuity of service is guaranteed by the starting up of another outdoor unit that is part of the system.
Below is an example:

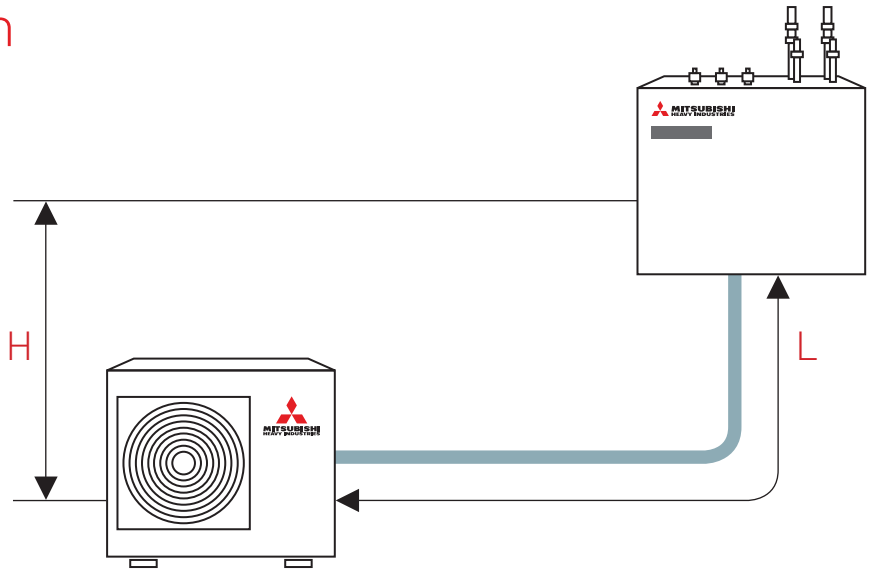
Phase 1: HY3 off.

Phase 2: HY2 error, HY3 switches on.



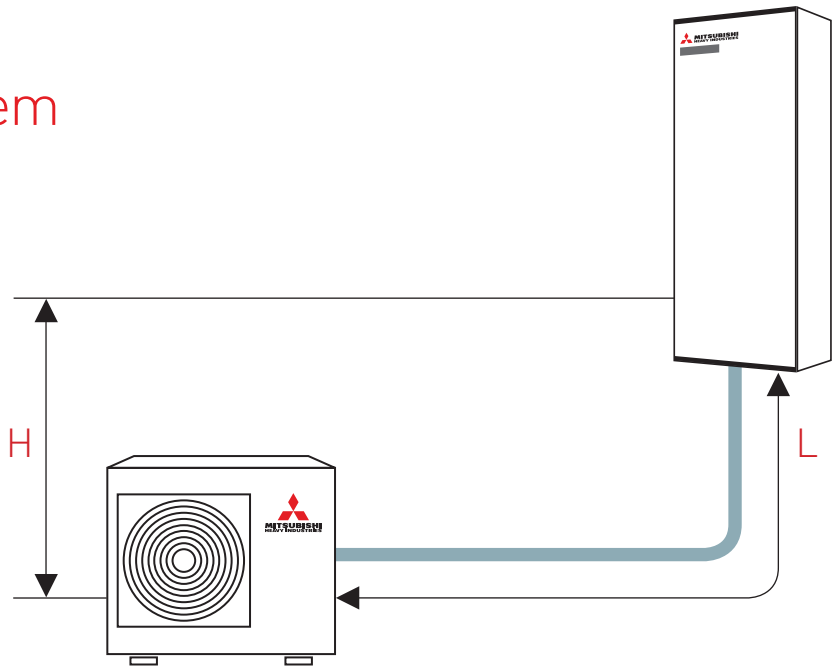
THE HYDROLUTION SYSTEM - INSTALLATION LIMITS

Flexible system



Limitations		60VNX-A	71VNX-A	100VNX-A	140VNX-A
Splitting length (L)		30 m or less			
Height difference between an indoor unit and an outdoor unit	outdoor unit higher up than the indoor unit	7 m or less			
	outdoor unit lower than the indoor unit	7 m or less			

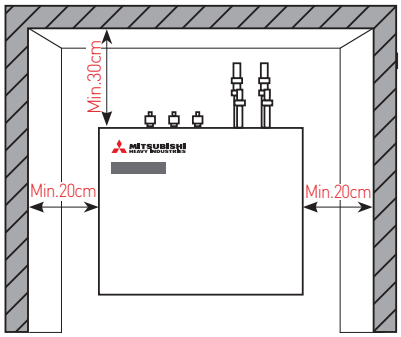
All in One system



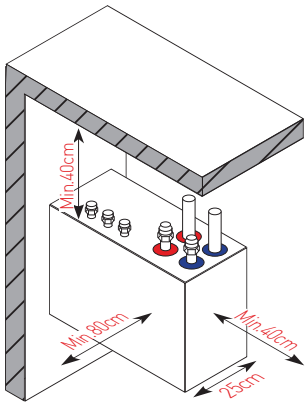
Limitations		60VNX-A	71VNX-A	100VNX-A
Splitting length (L)		30 m or less		
Height difference between an indoor unit and an outdoor unit	outdoor unit higher up than the indoor unit	7 m or less		
	outdoor unit lower than the indoor unit	7 m or less		

Split box overall dimensions
(HSB60/100/140)

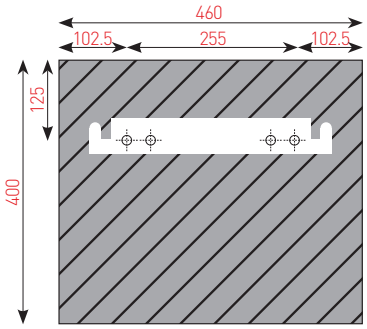
The indoor Split box unit can be installed on walls (using a special bracket) or floors.



Wall installation.

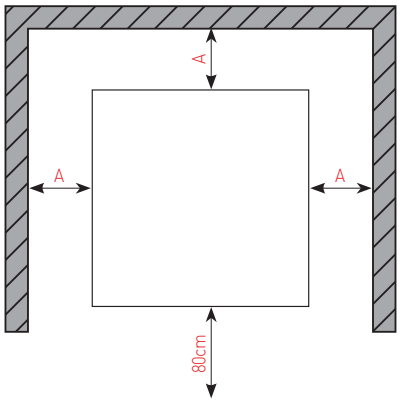


Corner installation.

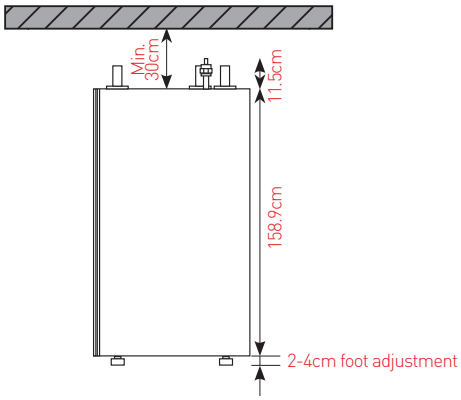


Front view of installation.

All in One overall dimensions

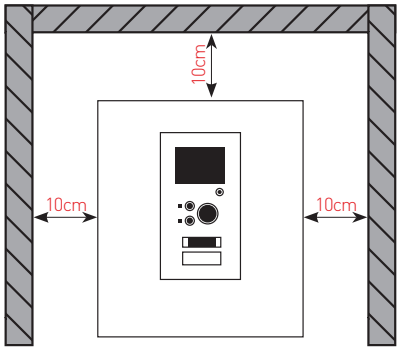


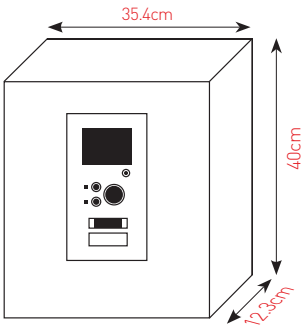
A: 10-25 cm of free space between All in One and surrounding walls, for the installation of pipes and cables.



180 L tank capacity.

RC-HY20/40 device overall dimensions





THE HYDROLUTION CONTROL SYSTEM

To guarantee maximum system efficiency in an air-water heat pump like that of HYDROLUTION, MHI has designed and built a complete line of management and monitoring devices [RC-HY20 and RC-HY40].

A residential heating system must be subjected to accurate control 24/7: **RC-HY20 and RC-HY40** have been designed to simplify this control and reduce management costs and energy consumption. The functions of these control devices are extremely flexible and as such they adapt to the configuration of the system to which they are applied.

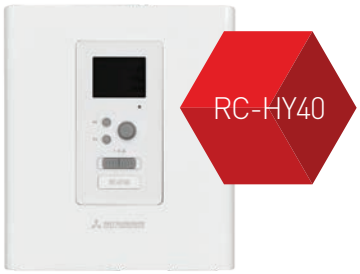
Sectors of application

Flexible heating
Flexible heating and DHW
All in One

RC-HY20 and RC-HY40 Features and functions

The **RC-HY20 and RC-HY40** control devices can be used to manage and regulate **centralised and autonomous** systems made with HYDROLUTION in the Flexible heating, Flexible heating and DHW, All in One versions. More specifically, they:

- Manage the system operating modes (on/off) and timing programs.
- Guarantee system regulation efficiency.
- Automatically manage supply water temperature.
- Manage the Anti-legionella cycles and DHW recirculation pump activation.
- Activate the 'Silent' function.



Sectors of application

Flexible heating
Flexible heating and DHW
All in One
Modular flexible heating

System ON/OFF and timing programming

The **RC-HY20** and **RC-HY40** control devices can be used to manage operation (on and off) of the **HYDROLUTION** system as well as "Silent" function operation, programming heating and DHW supply, over the period of a week. During heat pump heating operation, it is possible to:

- Create 3 daily programs in heating mode with the possibility of setting the deviation with respect to the climatic reference curve, or the desired temperature in the single period (only if the internal temperature sensor is present)
- Set 2 hourly system operating programs in "Silent" mode
- **Program DHW temperature and supply**

  a) It is possible to program two daily production cycles with different temperature levels for each day of the week using the 3 different DHW production control parameters: economic – normal – luxury.

  b) It is possible to increase the DHW production temperature for a certain period of time (up to 12 hours) by activating the "Temporary luxury" function.

  c) It is possible to reduce heating and temporarily suspend DHW production by activating the "Holiday" function.

System regulation efficiency

It is possible to guarantee system efficiency by monitoring the DM parameter (degrees per minute), which allows for quick responses and better management of the operating frequencies of the outdoor unit compressor. Please see the "Modularity" section on pages 32-33.

Anti-legionella cycle and DHW recirculation

It is possible to set Anti-legionella cycle programming using the "Sterilyze" function: the cycle activation interval is from 1 to 90 days.

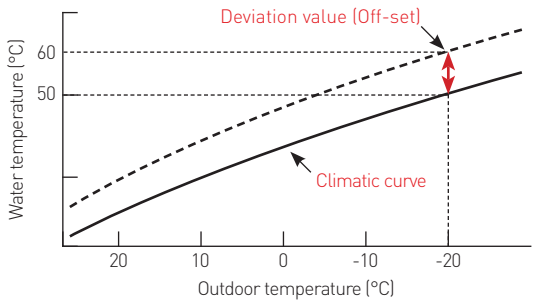
It is also possible to set 3 daily DHW recirculation pump operating periods.

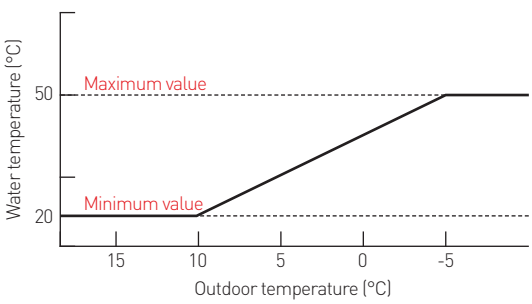
"Silent" function

Activation of the "Silent" function significantly reduces the noise emitted by outdoor units, reducing compressor and fan speed. It is possible to set 2 hourly programs in this operating mode.

Automatic system delivery temperature management

System delivery temperature management is carried out by means of the operating climatic curve setting. From the control device, the user can set a custom climatic curve and modify it quickly as needed, indicating the deviation value with respect to the reference climatic curve ("Off-set" function). A lower and upper system delivery water temperature limit can be established.





Climatic curve: to guarantee energy efficiency and indoor comfort, the system regulates the degrees °C of the supply water when the outside temperature changes.

RC-HY40.
Features and functions
[Modular Flexible heating configuration]

In addition to being equipped with the characteristics listed in the previous paragraphs, the RC-HY40 control device offers highly sophisticated continuous monitoring features and provides valuable information on consumption and performance, as well as a wide range of operational data.

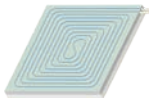
The features are described in more detail below.

- **RC-HY40 is able to manage up to 8 HYDROLUTION systems** in Flexible heating configuration.

- The **RC-HY40 offers ensured** regulation efficiency, system durability and continuity of service; please see the "Modularity" section on pages 32-33.

fancoils

radiators



radiant panels

- **RC-HY40 is able to manage up to 8 distribution systems at different temperatures** (radiant panels, radiators and fancoils). If there are heating systems that work at different delivery temperatures inside an apartment building, users can set the corresponding climatic curve for each system and use the RC-HY40 control to manage up to 8 distribution systems at different temperatures. An ECSM40/ECSM41 accessory kit needs to be added for each distribution system.

- **RC-HY40 is able to manage energy consumption metering and distribution**: connection of an energy meter kit to the RC-HY40 control makes it possible to quantify system consumption and view it directly from the control system. Distribution of the energy consumption of the various utilities can be implemented through the installation of separate heat meters and distribution boxes for each apartment.

RC-HY40.
Integration with external heat sources

RC-HY40 is able to manage HYDROLUTION system integration with external heat generators. It is possible to raise the maximum water temperature limit of the system to **65°C** through an external generator (i.e. pellet or methane boilers). In the event of heat pump failure, DHW production and heating are guaranteed by the aid of the emergency function, which activates the automatic integration system.

Below are the possible operating modes for this management.

AUTOMATIC MODE

Lets you set the external operating temperature limits of heat pump and boiler heating.

MANUAL MODE

Lets you activate/deactivate integration from external heat generators.

Lets you activate/deactivate heat pump heating.

EXTERNAL GENERATOR ONLY MODE

Lets you use a single external generator for heating and DHW production.

In the event of heat pump failure, DHW production and heating are guaranteed by the aid of the emergency function, which activates the automatic integration system.

Technical data

Power class			6 kW	8 kW	10 kW	16 kW
HEATING	A7/W35	kW	7.01	8.3	10	16
Rated power including loss due to defrost	A7/W45		8	8	11	16
HEATING	A7/W35	kW	2.67 (0.5~7.4)	8.3 (2.0~8.3)	9.2 (3.5~10.0)	16.0 (4.2~16.0)
Power output at optimised partial load	A7/W45		2.28 (0.5~8.0)	8.0 (3.0~8.0)	9.0 (3.5~11.0)	16.0 (5.8~16.0)
HEATING	A7/W35	kW	0.5	2.03	2.15	3.81
Electrical absorption	A7/W45		0.63	2.40	2.62	4.83
Rated energy performance	A7/W35	COP	5.32	4.09	4.28	4.20
coefficient	A7/W45		3.63	3.33	3.44	3.31
Seasonal energy efficiency class for ambient heating (W35/W55) ALL IN ONE version			A+++/A++	A+/A+	A++/A++	-
Seasonal energy efficiency class for ambient heating (W35/W55) Flexible version			A+++/A++	A+/A+	A++/A++	A++/A++
Seasonal energy efficiency (W35/W55) ALL IN ONE version		%	188/138	149/119	165/126	-
Seasonal energy efficiency (W35/W55) Flexible version		%	188/138	149/119	165/126	166/133
COOLING	A35/W7	kW	4.86 (0.8~6.0)	7.1 (2.0~7.1)	8.0 (3.0~9.0)	11.8 (3.1~11.8)
Rated output power	A35/W18		7.03 (1.2~7.8)	10.7 (2.7~10.7)	11.0 (3.3~12.0)	16.5 (5.2~16.5)
COOLING	A35/W7	kW	1.84	2.65	2.85	4.45
Electrical absorption	A35/W18		2.00	3.19	3.04	4.36
Rated energy efficiency coefficient	A35/W7	EER	2.64	2.68	2.81	2.65
	A35/W18		3.52	3.35	3.62	3.78
Operating limits (ambient temperature)	heating	°C	-20-43			
	cooling	°C	15-43			
Operating limits (water temperature)	heating	°C	25-58 (65°C with auxiliary electric heater)			
	cooling	°C	7-25			
Maximum refrigerant piping length		m	30			
Maximum height difference between I.U. and O.U.		m	7			

ALL IN ONE indoor unit

Indoor unit with build-in tank (ALL IN ONE)		**HMK60**	**HMK100**	
Power		1 ph-230V-50Hz1 / 3 ph-400V-50Hz		
Height x Width x Depth	mm	1715 x 600 x 610		
Weight (no load)	kg	165		
Accumulation tank volume	litres	180		-
Coil volume	litres	4.8		
Expansion tank volume	litres	10		
Heat./cool. system piping	mm	22		
DHW piping	mm	22		

FLEXIBLE internal unit+TANK

Split box indoor unit (FLEXIBLE)		**HSB60**	**HSB100**	**HSB140**
Power		1 ph-230V-50Hz		
Height x Width x Depth	mm	400 x 460 x 250		
Weight (no load)	kg	16	18	23
Heat./cool. system piping	mm	22	28	
Liquid - Gas refrigerant piping	mm (in)	ø6.35 (1/4) - ø12.74 (1/2)	ø9.52 (3/8) - ø15.88 (5/8)	
DHW TANK		**PT 300**		**PT 500**
Height x Width x Depth	mm	1634 x 673 x 743		1835 x 832 x 897
Weight (no load)	kg	115		156
Heat. coil connections	inch	1 (M)		
DHW - Recirculation connections	inch	1 (M) / 3/4 (M)		

Outdoor unit

Outdoor unit		**FDCW60VNX-A**	**FDCW71VNX-A**	**FDCW100VNX-A**	**FDCW140VNX-A**
Power		1 ph-230V-50Hz			
Height x Width x Depth	mm	640 x 800 x 290	750 x 880 x 340	845 x 970 x 370	1300 x 970 x 370
Net	kg	46	60	81	105
Sound power level	dB(A)	53	64	64.5	71
Handled air (max)	m³/h	2,500	3,000	4,380	6,000
Compressor	type	Twin Rotary DC Inverter			
Refrigerant volume (R410A)	kg	1.5	2.55	2.9	4.0
Pipe length without additional load	m	15	15	15	15
Liquid - Gas refrigerant piping	mm (in)	ø6.35 (1/4) - ø12.74 (1/2)	ø9.52 (3/8) - ø15.88 (5/8)		

Thedatacontainedabovereferstothefollowingstandards:EN14511:2013;EN14825:2013;EN16147:2011;EN50564:2011;EN12102:2011;(EU)No:811:2013;(EU)No:813:2013; OJ 2014/C 207/02:2014.

1. In case of power supply 1 ph-230V-50Hz, the maximum electrical integration power is limited to 1.5 kW.
   For more information contact your reseller.

Yield curves in heating at 35°C

	HSB60 FDCW 60 VNX-A (35°C)	HSB100 FDCW 71VNX-A (35°C)	HSB100 FDCW 100 VNX-A (35°C)	HSB140 FDCW 140 VNX-A (35°C)
External temperature	Supplied power (kW)	Supplied power (kW)	Supplied power (kW)	Supplied power (kW)
-20	3.01	5.1	5.2	10
-15	3.6	6.1	6.3	11.6
-7	4.64	7.3	8	14.2
-2	4.85	5.2	7.5	10.5
2	5.38	5.9	8.5	12
7	7.01	8.3	10	16
15	7.99	9	9.5	17.2
20	7.57	9.2	11.5	19.8
25	8	9.8	12	22.5

Yield curves in heating at 55°C

	HSB60 FDCW 60 VNX-A (55°C)	HSB100 FDCW 71 VNX-A (55°C)	HSB100 FDCW 100V NX-A (55°C)	HSB140 FDCW 140 VNX-A (55°C)
External temperature	Supplied power (kW)	Supplied power (kW)	Supplied power (kW)	Supplied power (kW)
-20	2.8	4	4.1	6.9
-15	3.32	4.9	5	7.4
-7	4.2	5.4	6.3	8.3
-2	4.06	4.4	6	8.7
2	4.33	5	6.5	10.4
7	6.6	7.1	9	14
15	6.48	8.3	9	15.5
20	6.63	8.4	9.7	17.5
25	6.78	9	10.3	20

The data contained in the individual tables take into account the defrost cycles.