



GALAXY FC

High efficiency air cooled Free-cooling chillers



- **Low seasonal power consumption solution**
- **High efficiency at partial loads**
- **Low noise level**
- **Robust and well-finished metalwork**
- **R410a Multiscroll unit**
- **Optional internal hydronic kit**
- **Available in a STD or SUPER SILENT (SLN) version**
- **Standard RS485 card**
- **Wide range of accessories (optional)**

The GALAXY FC is a high efficiency air cooled water chillers, for outdoor installations with scroll compressors. Available in a wide range of models with multi-compressor and cooling capacity 40 up to 180 kW. All units are equipped with scroll compressors, with refrigerant R410A and are designed for optimal energy efficiency, particularly high operating at partial loads.

The compactness and the presence of a wide range of equipments and accessories, allow the use of the GALAXY units in any plant environment. Thanks to the adopted construction solutions, the installation and maintainance activities are particularly facilitated, allowing time and money saving to the installation personnel.

In situations where chilled water is required during periods of low external temperatures, the GALAXY chillers can be integrated with the "Free Cooling Kit".

This device use the external air for direct cooling of the medium and enables considerable savings of electrical energy. Free Cooling Kit consists of the following main

elements which integrate the equipments already present in the standard GALAXY unit:

- air to water finned coils;
- three-way valve for automatic switching of the medium to be cooled;
- Electronic control with dedicated functions and outside air temperature sensor.

The use of free cooling system involves mixing the water to be cooled with antifreeze fluids. The performance data provided in this document refer to the use of ethylene glycol at 30%. Please refer to the table below to check the correct concentration, based on the minimum outdoor air Temperature at the site of installation.

% ETHYLENE GLYCOL WEIGHT								
	5%	10%	15%	20%	25%	30%	35%	40%
Cooling temperature (°C)	-2.0	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4
Safety temperature (°C)	3.0	1.0	-1.0	-4.0	-6.0	-10.0	-14.0	-19.0

Galaxy FC main components

OPERATING LOGIC

The system has been designed to optimise power consumption by automatically activating the free cooling kit. As a rule, the adjustment device constantly compares the outside air temperature with the temperature of the fluid to be cooled. If the temperature differential allows, the device enables the cooling mode through the free cooling heat exchanger via the 3-way valve.

The "free cooling" operation can be attributed to 3 main scenarios:

1) The outdoor air temperature is higher than the temperature of the fluid entering the chiller.

When this occurs, the free cooling kit is turned off due to the absence of conditions which allow heat to be recovered. The fluid is only cooled down by the compressors.

2) The outdoor air temperature is lower than the temperature of the fluid entering the chiller (min. differential of 2°C).

The free cooling kit is activated. In this context, there are two possible op-

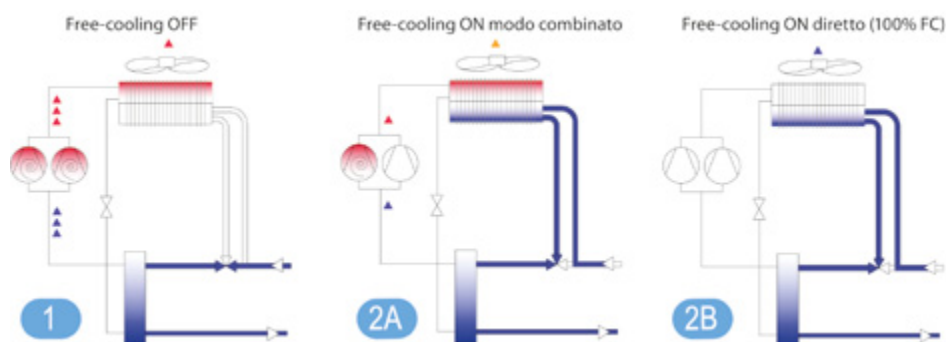
rating conditions determined by the entity of the temperature differential between the two fluids.

• 2A) Combined mode

This condition occurs when the air temperature is slightly lower than the temperature of the fluid. The energy recovery from the free cooling kit is only partial and the missing cooling power is supplied by the supplementary activity of the compressors which are managed automatically by the adjustment.

• 2B) Direct FC mode (100% FC)

The outside air temperature conditions cool the fluid and supply the cooling power required without needing to use the compressors. If the fluid is excessively cooled due to particularly low air temperatures, the electronic control automatically starts the ventilation modulation so that the desired temperature is maintained. On average, the operating conditions in Direct FC mode (100% FC) are obtained with temperature differentials (air/ fluid to be cooled) between 13 and 18°C, depending on the models.



ACCESSORIES

1 pump	Condensing coils protection grids
1 HP pump	Compressors soft starter
2 pumps	Coils with prevarnished fins
2 HP pumps	Power factor regulator kit (cos ϕ 0,95)
Refrigerants gauges	Electrical panel ventilation] Heating kit
Top remote control	Modulating fan speed control (INCLUDED)
Antifreeze evaporator heater + pipes	Electronic thermostatic expansion valve
Compressor crankcase heater (INCLUDED)	El. exp. valve backup battery
Compressor magnetothermal protection	EC Fans
Rubber antivibration mountings std	Standard RS485 Modbus card (INCLUDED)



Galaxy FC STD Technical Data

GALAXY FC STD			102 A	122 A	152 A	123 A	153 A	154 A
A35 / W7 (1)	Cooling capacity	kW	49,4	60,2	73,4	86,1	111,5	150,5
	Total power input	kW	19,4	22,6	29,1	34	44	57,9
	EER (EN 14511-2013) *		2,54	2,65	2,51	2,53	2,52	2,59
PNFC (2)	Rated Cooling power in Free Cooling	kW	54	63,5	82,6	91,8	122,6	165,2
	Ambient temp. (100% PNFC)	°C	-2,5	1	0	1	-1,5	-2,5
Max current			A	40,6	48,8	65,8	75,3	96,4
Current at start			A	131,1	142,2	172,5	166,4	203
Scroll Compressors			n°	2	2	2	3	4
Refrigerant Circuits			n°	1	1	1	1	2
Capacity steps			n°	2	2	2	3	4
Supply voltage			V/Ph/Hz	400/3/50				
Sound power Lw ***			dB(A)	79,5	79,5	83	82,2	84
Sound pressure Lp ***			dB(A)	47,8	47,8	51,1	50,3	51,8
USER PLANT HEAT EXCHANGER								
Braze plate exchanger			n°	1	1	1	1	1
Water flow (A35/W7)			l/s	2,43	2,96	3,61	4,24	5,49
Water section pressure drops **			kPa	61,76	87,01	80,78	63,45	95,56
FAN SECTION								
Fans			n°	1	1	2	2	3
Air flow			m³/s	6,38	6,25	12,77	12,77	16,66
Rotation speed			min ⁻¹	880	880	880	880	880
Unit power input			kW	1,9	1,9	1,9	1,9	1,9
Unit current input			A	4,2	4,2	4,2	4,2	4,2
SIZES AND WEIGHT								
Length			mm	3005	3005	3005	3005	4255
Width			mm	1123	1123	1123	1123	1123
Height			mm	1954	1954	1954	1954	1954
Weight ****			Kg	788	832	845	1004	1150
WATER SECTION (OPTIONAL)								
Storage water tank			l	N.D.	N.D.	N.D.	N.D.	N.D.
Plant side expansion vessel			l	6	6	10	10	18
Max. water pressure			kPa	600	600	600	600	600
Nitrogen pre-charge pressure			kPa	150	150	150	150	150
Weight P1 hydronic kit			Kg	49	49	66	66	70
Weight P2 hydronic kit			Kg	77	77	100	100	108
USER PLANT STD PUMP			n°	1	1	1	1	1
Available externe pressure			kPa	101	70	67	64	40
Power input			kW	1,1	1,1	1,5	1,5	2
Current input			A	1,96	1,96	2,51	2,51	3,41
USER PLANT HP PUMP			n°	1	1	1	1	1
Available externe pressure			kPa	183	148	145	156	105
Power input			kW	1,9	1,9	2,5	2,5	2,5
Current input			A	3,08	3,08	4,53	4,53	5,86

(1) The cooling power provided when the compressors are working at full load under the following conditions:
 Fluid: 70/30% water/ ethylene glycol - IN/OUT fluid temp. 15-10°C - Ambient temp. 35°C A7/ W35 with the compressors working at 100%
 FCNP Free cooling nominal power (the CP provided when working mechanically (with the compressors active) under these conditions: Fluid temp. 15/10°C Est. air temp. 35°C
 * Ratio of the heating/cooling capacity to the total effective power input (without pump) according to EN 14511 Regulation

** FC exchangers + 3-way valve + pipes, at the nominal flow rate with 70/30% water/ethylene glycol
 *** Noise pressure according to ISO 3744. Sound pressure at 10 meters in free field
 **** Empty weight
 n.D.: Not available



Galaxy FC SLN Technical Data

GALAXY FC SLN			102 A	122 A	152 A	123 A	153 A
A35 / W7 (1)	Cooling capacity	kW	47,3	57,2	70,2	82,4	106,7
	Total power input	kW	19,6	23,3	28,9	32,6	43,4
	EER (EN 14511-2013) *		2,41	2,44	2,41	2,52	2,45
PNFC (2)	Rated Cooling power in Free Cooling	kW	51,8	64,1	79,5	92,8	119,2
	Ambient temp. (100% PNFC)	°C	-3	-1	2,5	-1	-0,5
Max current		A	40,8	50,2	65,4	73,2	96
Current at start		A	131,1	143,6	172,1	164,3	202,6
Scroll Compressors		n°	2	2	2	3	3
Refrigerant Circuits		n°	1	1	1	1	1
Capacity steps		n°	2	2	2	3	3
Supply voltage		V/Ph/Hz	400/3/50				
Sound power Lw ***		dB(A)	76,4	78,8	80	79,1	80,8
Sound pressure Lp ***		dB(A)	44,7	46,9	48,2	47,2	49
USER PLANT HEAT EXCHANGER							
Braze plate exchanger		n°	1	1	1	1	1
Water flow (A35/W7)		l/s	2,33	2,81	3,45	4,05	5,25
Water section pressure drops **		kPa	56,6	78,6	73,9	58,1	87,5
FAN SECTION							
Fans		n°	1	2	2	2	3
Air flow		m³/s	5,41	10,27	9,77	9,72	13,72
Rotation speed		min ⁻¹	690	690	690	690	690
Unit power input		kW	1,3	1,3	1,3	1,3	1,3
Unit current input		A	2	2	2	2	2
SIZES AND WEIGHT							
Length		mm	3005	3005	3005	3005	4255
Width		mm	1123	1123	1123	1123	1123
Height		mm	1954	1954	1954	1954	1954
Weight ****		Kg	806	884	909	1022	1268
WATER SECTION (OPTIONAL)							
Storage water tank		l	N.D.	N.D.	N.D.	N.D.	N.D.
Plant side expansion vessel		l	6	6	10	10	10
Max. water pressure		kPa	600	600	600	600	600
Nitrogen pre-charge pressure		kPa	150	150	150	150	150
Weight P1 hydronic kit		Kg	49	60	66	66	70
Weight P2 hydronic kit		Kg	77	90	100	100	108
USER PLANT STD PUMP		n°	1	1	1	1	1
Available externe pressure		kPa	107	80	75	84	75
Power input		kW	1,1	1,1	1,5	1,5	2
Current input		A	1,96	1,96	2,51	2,51	3,41
USER PLANT HP PUMP		n°	1	1	1	1	1
Available externe pressure		kPa	188	160	153	163	116
Power input		kW	1,9	1,9	2,5	2,5	2,5
Current input		A	3,08	3,08	4,53	4,53	4,53

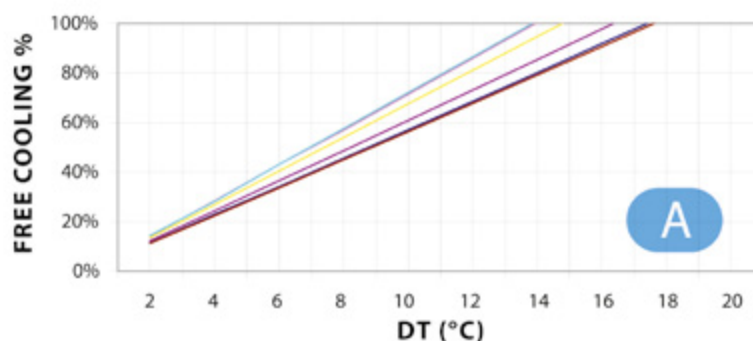
(1) The cooling power provided when the compressors are working at full load under the following conditions:
 Fluid: 70/30% water/ethylene glycol - IN/OUT fluid temp. 15-10°C - Ambient temp. 35°C A7/W35 with the compressors working at 100%
 FCNP Free cooling nominal power (the CP provided when working mechanically (with the compressors active) under these conditions: Fluid temp. 15/10°C Est. air temp. 35°C
 * Ratio of the heating/cooling capacity to the total effective power input (without pump) according to EN 14511 Regulation

** FC exchangers + 3-way valve + pipes, at the nominal flow rate with 70/30% water/ethylene glycol
 *** Noise pressure according to ISO 3744. Sound pressure at 10 meters in free field
 **** Empty weight.
 n.D.: Not available

Free-cooling Std unit performance

DT											
Model		2	4	6	8	10	12	14	16	18	20
102	kW	6.2	12.4	18.4	24.6	30.8	37	43.2	49.6	55.8	62
122	kW	9	18	27.4	36.2	45.4	54.6	63.8	73.2	82.4	91.8
152	kW	11.2	22.2	33.4	44.6	55.8	67	78.2	89.4	100.8	112.2
123	kW	13.2	25.8	39.6	52.8	66.2	79.4	92.8	106.2	119.6	133.2
153	kW	15	29.8	44.8	59.6	74.6	89.6	104.6	119.8	135	150.2
154	kW	18.6	37	55.6	74.4	93	111.8	130.8	149.8	168.8	187.8

PNFC		
Model		
102	kW	54
122	kW	63.5
152	kW	82.6
123	kW	91.8
153	kW	122.6
154	kW	165.2



PNFC Free Cooling power ratio:

the cooling power provided when working mechanically (with the compressors active) at full load under the following conditions:

- Water/ethylene glycol: 70/30%
- IN/OUT fluid temp.: 15/10 °C
- Ambient temp.: 35 °C

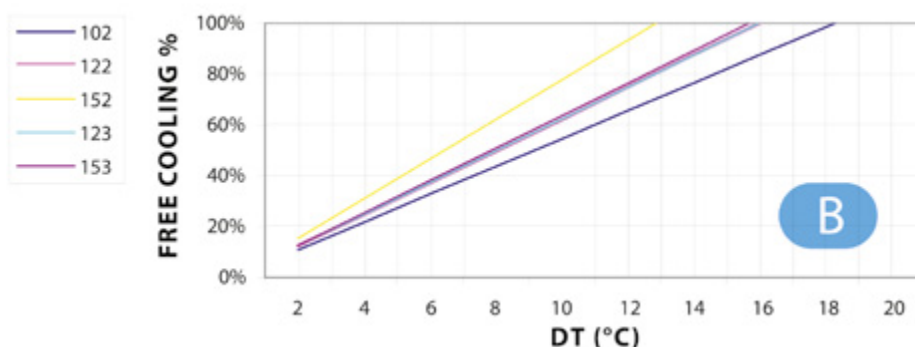
DT: the difference in temperature between the outside air and the fluid entering the chiller.

Graphs A and B identify the TD as the point when the Free Cooling function reaches 100% of its FCNP nominal capacity. The percentage of the cooling power being provided, according to the change in TD, can also be seen quickly from these graphs.

Free-cooling Supersilenced unit performance

DT											
Model		2	4	6	8	10	12	14	16	18	20
102	kW	5.6	11.2	17	22.6	28.2	34	39.6	45.4	51	56.8
122	kW	8	15.8	23.8	31.8	39.8	48	56.2	64.2	72.4	80.8
152	kW	12.2	24.6	37	49.4	61.8	74.2	86.8	99.4	112	124.8
123	kW	11.6	23	34.6	46.2	57.8	69.4	81.2	93	104.6	116.6
153	kW	15	30.2	45.4	60.6	75.8	91	106.4	121.8	137.2	152.6

PNFC		
Model		
102	kW	51.8
122	kW	64.1
152	kW	79.5
123	kW	92.8
153	kW	119.2



PNFC Free Cooling power ratio:

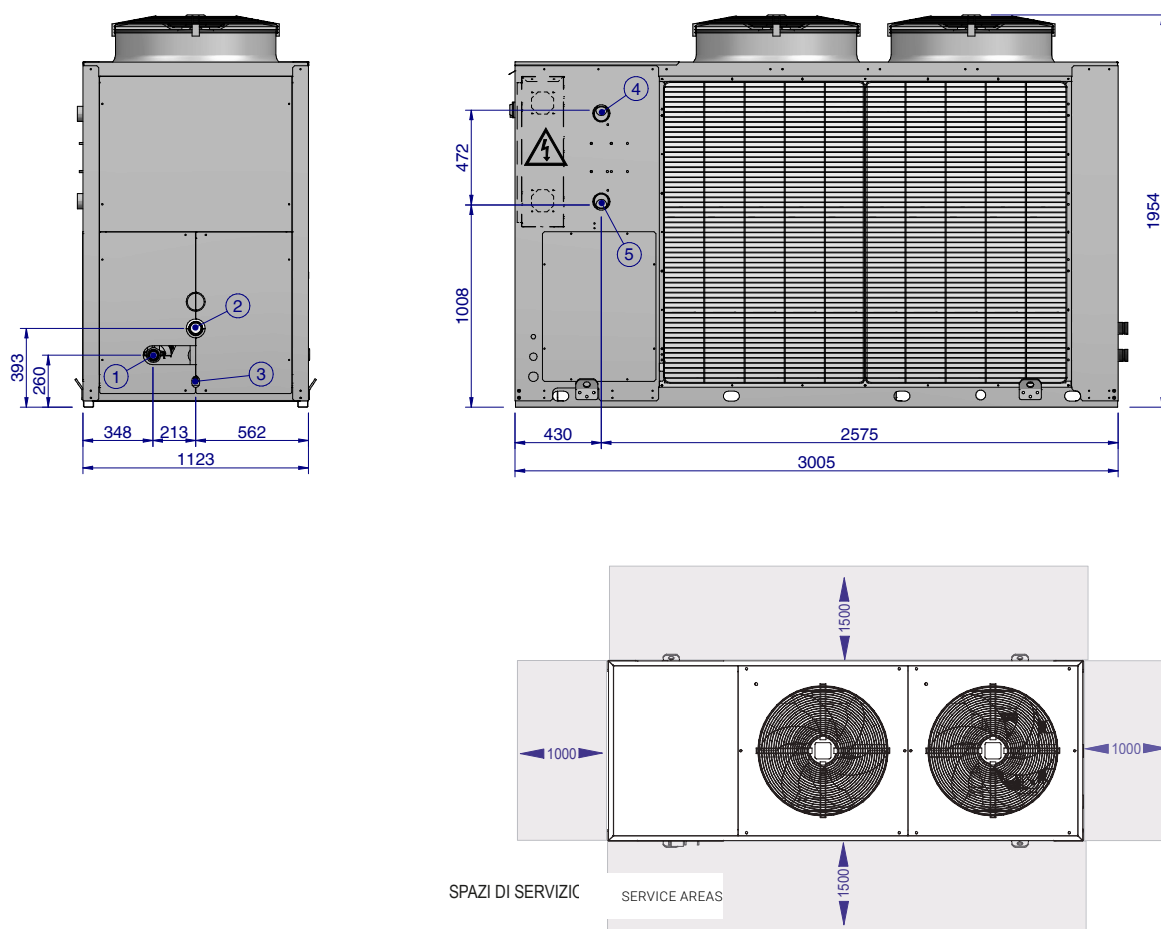
the cooling power provided when working mechanically (with the compressors active) at full load under the following conditions:

- Water/ethylene glycol: 70/30%
- IN/OUT fluid temp.: 15/10°C
- Ambient temp.: 35°C

DT: the difference in temperature between the outside air and the fluid entering the chiller.

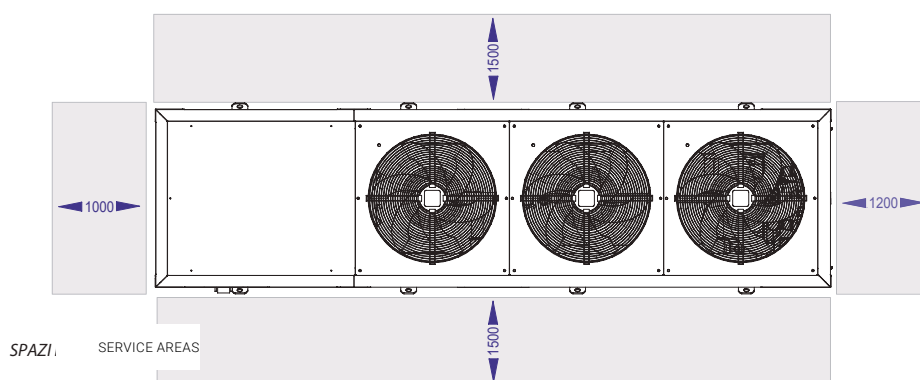
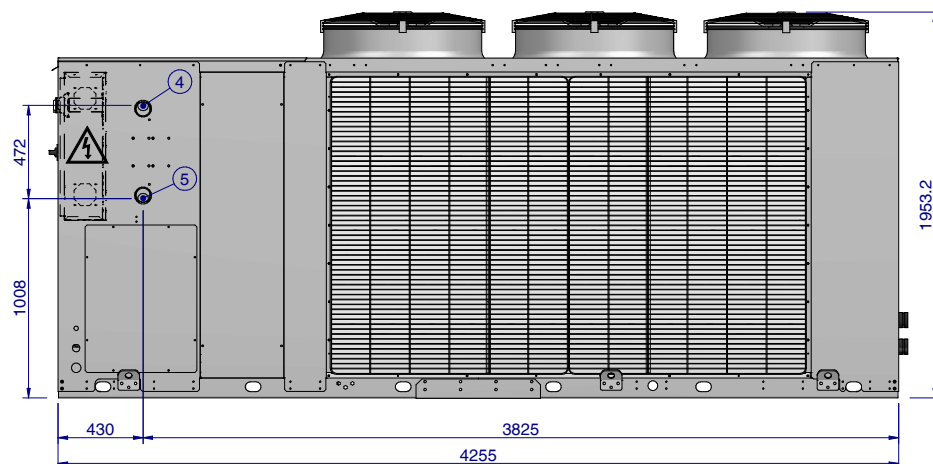
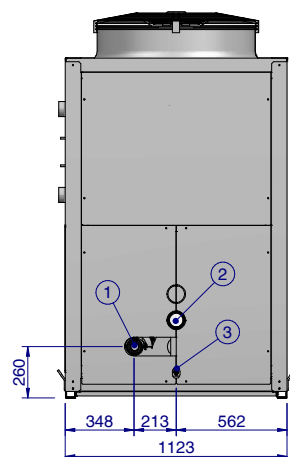
Graphs A and B identify the TD as the point when the Free Cooling function reaches 100% of its FCNP nominal capacity. The percentage of the cooling power being provided, according to the change in TD, can also be seen quickly from these graphs.

Galaxy FC STD/SLN sizes and operating spaces



Model	GALAXY FC		1	2	3	4 (HRP)	5 (HRP)	4 (HRT)	5 (HRT)
	STD	SLN	Victaulic joint with welding connection						
102	X	X	2"	2"	1/2"	N.A.	N.A.	N.A.	N.A.
122	X	X	2"	2"	1/2"	1"-1/2"	1"-1/2"	2"	2"
152	X	X	2"	2"	1/2"	1"-1/2"	1"-1/2"	2"	2"
123	X	X	2"	2"	1/2"	1"-1/2"	1"-1/2"	2"	2"

- 1 User side - Medium inlet connection
- 2 User side - Medium outlet connection
- 3 User side - Vessel drain connection
- 4 (HRP) Partial heat recovery - Medium outlet connection
- 5 (HRP) Partial heat recovery - Medium inlet connection
- 4 (HRT) Total heat recovery - Medium outlet connection
- 5 (HRT) Total heat recovery - Medium inlet connection
- N.A. not available



GALAXY FC			1	2	3	4 (HRP)	5 (HRP)	4 (HRT)	5 (HRT)
Model	STD	SLN	Victaulic joint with welding connection						
153	X	X	2"-1/2	2"-1/2	1/2"	N.A.	N.A.	N.A.	N.A.
154	X		2"-1/2	2"-1/2	1/2"	2"-1/2	2"-1/2	2"-1/2	2"-1/2

- 1 User side - Medium inlet connection
 2 User side - Medium outlet connection
 3 User side - Vessel drain connection
 4 (HRP) Partial heat recovery - Medium outlet connection
 5 (HRP) Partial heat recovery - Medium inlet connection
 4 (HRP) Total heat recovery - Medium outlet connection
 5 (HRP) Total heat recovery - Medium inlet connection
 N.A. not available