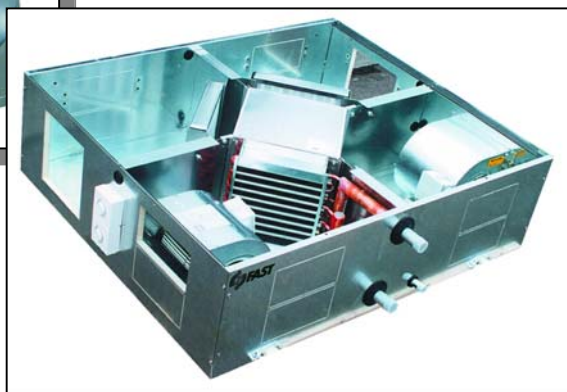


HEAT RECOVERY UNITS NRC Series



0405-6180542



SELECTION, INSTALLATION, USE AND
MAINTENANCE MANUAL



SELECTION MANUAL

1. OPERATING PRINCIPLE	5
2. NOMINAL TECHNICAL DATA	5
2.1 Air flow range	5
2.2 Nominal performance	6
3. TECHNICAL CHARACTERISTICS	7
3.1 Main unit components	7
3.1.1 Horizontal configuration	7
3.1.2 Vertical configuration	7
3.1.3 Coil module	7
3.2 Identification	8
3.3 Description of the units	9
3.3.1 Horizontal configuration	9
3.3.1.1 NRCxxB Version	9
3.3.1.2 NRCxxA Version	10
3.3.1.3 NRCxxE Version	10
3.3.2 Vertical configuration	10
3.3.2.1 NRCxxVB Version	10
3.3.2.2 NRCxxVA Version	11
3.3.2.3 NRCxxVE Version	11
3.4 Accessories	12
3.4.1 Chilled water coil module (BF accessory)	12
3.4.2 Module with a chilled water coil + water reheating coil (MPW accessory)	12
3.4.3 Module with a chilled water coil + electrical reheating coil (MPX accessory)	13
3.4.4 Direct expansion coil (BFD accessory)	13
3.4.5 Module with direct expansion coil and water reheating coil (BFDW accessory)	13
3.4.6 Module with direct expansion coil and electrical reheating (BFDX accessory)	13
3.4.7 G4 efficiency filters (G4 accessory)	14
3.4.8 Silencers (SU accessory)	14
3.4.9 Circular flanges (FGC accessory)	14
3.4.10 Dampers (SE accessory)	14
3.4.11 Control system (RG accessory)	14
3.5 Vent positioning	14
3.5.1 Horizontal configuration	14
3.5.2 Vertical configuration	15
3.6 Free-cooling operation	15
3.7 Overall dimensions and weights	16
3.7.1 Base unit	16
3.7.2 Accessories	15
4. PERFORMANCE	17
4.1 Fan characteristic curves	17
4.2 Heat recovery unit performance curves	19
4.2.1 Winter operation	20
4.2.2 Summer operation	21
4.3 Water heating coil performance curves	22
4.3.1 Inside heating coil (NRCxxA version)	22
4.3.2 Re-heating coil (MPW, BFDW accessories)	23
4.4 Pressure drop curves	24
4.4.1 Inside water heating coil (NRCxxA version)	25
4.4.2 Re-heating water coil (MPW, BFDW accessories)	26
4.5 Electric coils performance tables (NRCxxE, MPX, BFDX version)	27
4.5.1 Inside heating coil (NRCxxE, URxxVE version)	27
4.5.2 Re-heating coil (MPX, BFDX accessories)	27
4.6 Cooling coil performance tables	27
4.6.1 Water cooling coil (BF, MPW, MPX accessories)	27
4.6.2 Direct expansion cooling coils (BFD, BFDW, BFDX accessories)	31
4.7 Noise data	34

INSTALLATION, USE AND MAINTENANCE MANUAL

1. CONFORMITY DECLARATION	35
2. MAIN WARRANTY CONDITIONS	35
3. INTRODUCTION	36
3.1 General considerations	36
3.2 Description of icons	36
3.3 General safety rules	36
4. UNIT IDENTIFICATION	37
5. TRANSPORT AND HANDLING	37
5.1 Packing	37
5.2 Transport	38
5.3 Checks at material receipt	38
5.4 Stocking at site	38
6. INSTALLATION	38
6.1 Sizes	39
6.2 Technical spaces	42
6.3 Inside components positioning and vent opening	43
6.4 Support brackets positioning	44
6.5 Unit lifting and positioning	46
6.6 Coil module and silencer assembly	46
6.7 Connection of ducts	46
6.8 Hydraulic connections	47
6.8.1 Condensate discharge	47
6.8.2 Water coil connection	48
6.9 Electrical wiring	48
6.9.1 Earthing	48
6.9.2 Connection to the electricity mains	48
6.9.3 Connection to the electric heating coils	52
6.10 First start-up checks	54
7. USAGE INSTRUCTIONS	54
8. UNIT MAINTENANCE	55
9. WASTE	57
10. DIAGNOSIS AND TROUBLESHOOTING	58

SELECTION MANUAL

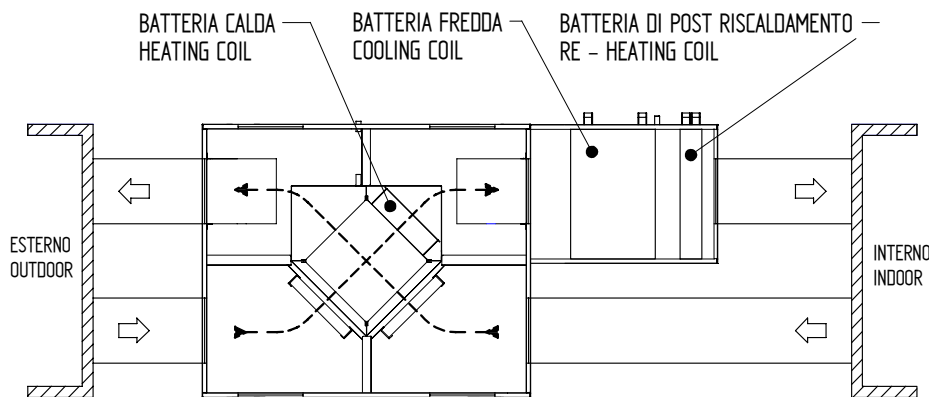
1. Operating principle

The **NRC** series brings together the ventilation, filtering and recovery sections into a single unit that also permits connection with various accessories for meeting the specific levels of comfort each environment requires.

Environmental comfort is provided by the extraction of stale air from the room and the simultaneous replacement of new air from the outside. The air is filtered adequately by means of filters on both delivery and recovery. Energy recovery is provided by an efficient recovery unit with aluminium plates that makes it possible to save more than 50% of the energy in winter that would otherwise be lost through the expulsion of exhaust air.

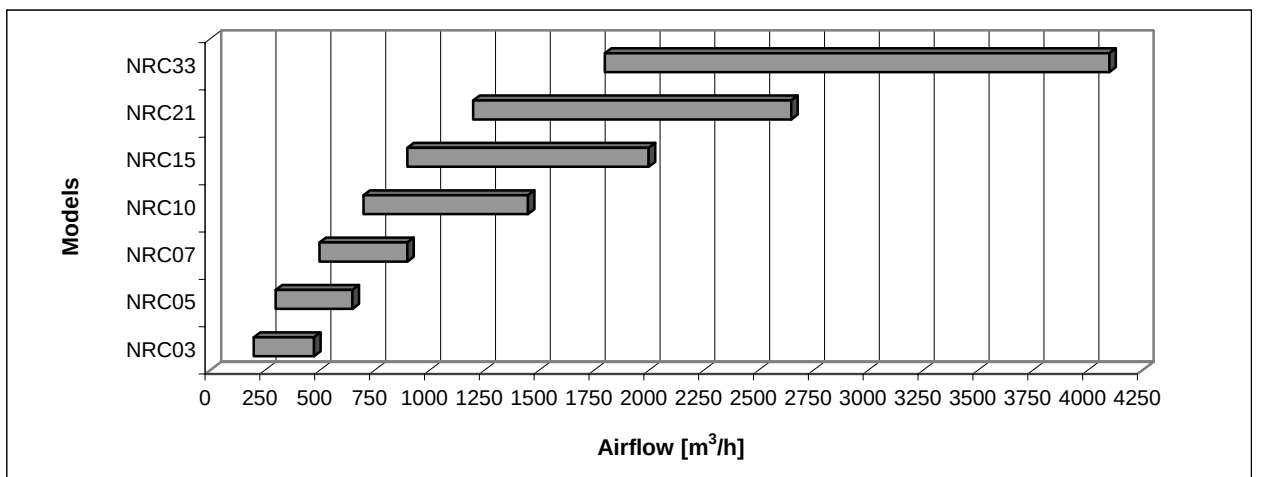
The careful design of the product has made it possible to reduce the dimensions and thereby make it extremely easy to install in false ceilings or in cramped areas, improving, among other things, the accessibility for the maintenance of all the machine components, as well.

The range consisting of seven models (with rated air flows of 350 cu. m/h to 3300 cu. m/h), available in both vertical and horizontal versions, is the very best currently available on the market, thus uniting the compliance with "antismoking" law with the advantages, in terms of lower power consumption, deriving from a recovery system.



2. Nominal technical data

2.1 AIR FLOW RANGE



2.2 NOMINAL PERFORMANCE

NRC MODEL		03	05	07	10	15	21	33	
All the versions	Nominal airflow	m³/h	350	550	750	1000	1500	2100	3300
	Ext. static pressure (for NRCxxB and NRCxxVB) (*)	Pa	125	140	170	150	120	120	150
	Recuperator								
	Efficiency (**)	%	52,1	55,0	54,3	54,4	53,1	52,7	52,0
	Recovered thermal power (**)	kW	1,5	2,5	3,4	4,6	6,7	9,3	14,3
	Recovered cooling power (***)	kW	0,4	0,7	1	1,3	1,9	2,6	4,3
	Motor ventilatin assembly								
	Number of fans	n°	2	2	2	2	2	2	4
	Total maximum input power	kW	0,27	0,44	0,65	1,12	1,12	2	4
	Power supply (voltage/phases/frequency)	V/Ph/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
	Maximum input power	A	1,1	1,7	2,8	5	5	8,6	17,2
	Fan speed variation		continuous	continuous	continuous	continuous	continuous	continuous	continuous
	Electrical protection	IP	44	44	44	55	55	55	55
	Insulation class		B	F	F	F	F	F	F
Filters									
Classification according to EN 779	%	G3	G3	G3	G3	G3	G3	G3	
Efficiency		80	80	80	80	80	80	80	
NRCxxA ; NRCxxVA	Inside water heating coil								
	Geometry		P2519	P2519	P2519	P2519	P2519	P2519	P2519
	Rows	n°	3	3	3	3	3	3	3
	Fin pitch	mm	1,8	1,8	1,8	1,8	1,8	1,8	2,1
	Face area	m²	0,027	0,047	0,052	0,092	0,119	0,165	0,237
	Air side pressure drop	Pa	105	86	123	74	97	99	102
	Heating capacity (input air 8°C; water 80/70°C)	kW	4,9	8,1	10,6	15,5	22,4	31	43
	Output air temperature (input air 8°C; water 80/70°C)	°C	48	50	48	52	51	50	46
	Heating capacity (input air 8°C; water 70/60°C)	kW	4,1	6,7	8,8	13	18,7	25,9	36,6
	Output air temperature (input air 8°C; water 70/60°C)	°C	41,2	43	41,3	45	43,6	43	39,5
	Heating capacity (input air 8°C; water 45/40°C)	kW	2,4	4	5,2	7,7	11,2	15,4	22
	Output air temperature (input air 8°C; water 45/40°C)	°C	27,7	28,7	27,8	30	29,2	29	27
NRCxxE; NRCxxVE	Inside electric heating coil								
	Heating capacity	kW	3	3	6	6	10	15	25
	Air side pressure drop	Pa	10	10	10	10	10	10	10
	Power supply (voltage/[phases/frequency])	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
	Stages	n°	2	2	2	2	3	3	3
	Absorbed current	A	4,6	4,6	9,1	9,1	15,2	22,7	37,9
Output air temperature (input air 8°C)		°C	34	25	32	26	28	29	31
COIL MODULE									
BF	Water-cooling coil								
	Geometry		P2519	P2519	P2519	P2519	P2519	P2519	P2519
	Rows	n°	4	4	4	4	4	4	4
	Fin pitch	mm	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	Face area	m²	0,075	0,075	0,113	0,213	0,213	0,25	0,325
	Air side pressure drop	Pa	22	52	43	23	48	66	93
	Cooling capacity (input air 30°C,RH 60%; water 7/12°C)	kW	3,4	4,9	6,5	10,2	13,8	18,5	28
	Air output conditions	°C/UR	15,7/91	16,8/87	16,9/88	15,1/91	16,5/87	16,9/86	16,9/85
BFD	Direct expansion cooling coil								
	Geometry		P2519	P2519	P2519	P2519	P2519	P2519	P2519
	Rows	n°	4	4	4	4	4	4	4
	Fin pitch	mm	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	Face area	m²	0,075	0,075	0,113	0,213	0,213	0,25	0,325
	Air side pressure drop	Pa	22	52	43	23	48	66	105
	Cooling capacity (input air 30°C,RH 60%;Tev/Tcon 5/47°C)	kW	3,8	5,1	7,2	10,9	14,8	19,2	27
	Air output conditions	°C/UR	14,2/90	16,6/87	16,1/88	14,3/90	15,9/87	16,8/86	18/85
MPW; BFDW	Water-reheating coil								
	Geometry		P2519	P2519	P2519	P2519	P2519	P2519	P2519
	Rows	n°	1	1	1	1	1	1	1
	Fin pitch	mm	2,5	1,8	1,8	2,1	2,1	2,1	2,1
	Face area	m²	0,05	0,05	0,068	0,128	0,128	0,15	0,195
	Air side pressure drop	Pa	6	17	18	8	17	23	32
	Heating capacity (input air 17°C,RH 90%; water 80/70°C)	kW	1,9	3	4,2	5,9	7,1	9,1	12,7
	Air output temp. (input air 17°C,RH 90%; water 80/70°C)	°C	33	33	33,3	34,5	31	30	28,3
	Heating capacity (input air 17°C,RH 90%; water 70/60°C)	kW	1,5	2,4	3,4	4,8	5,7	7,4	10,2
	Air output temp. (input air 17°C,RH 90%; water 70/60°C)	°C	30	30	30	31	28,2	27,3	26
	Heating capacity (input air 17°C,RH 90%; water 45/40°C)	kW	0,8	1,2	1,7	2,5	3	3,8	5,2
	Air output temp. (input air 17°C,RH 90%; water 45/40°C)	°C	23,4	23,5	23,8	24,3	22,8	22,3	21,7
MPX; BFDX	Electric-reheating coil								
	Heating capacity	kW	1,5	2	3	4	6	8	13
	Air side pressure drop	Pa	10	10	10	10	10	10	10
	Power supply (voltage/phases/frequency)	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
	Stages	n°	2	2	2	2	3	3	3
	Absorbed current	A	2,3	3	4,6	5,3	9,1	12,1	19,7
	Air output temperature (input air 17°C RH 90%)	°C	30	28	29	29	29	28	29

(*) At full motor speed with a stretch of channelling at least 1 m long for delivery and with clean filters.

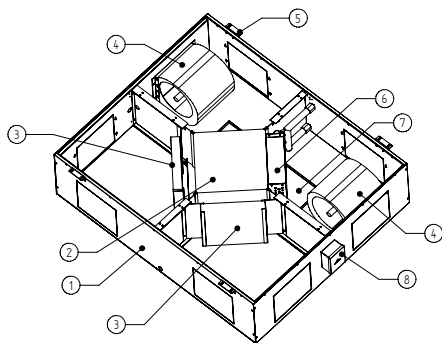
(**) Performance referring to: renewal air flow rate equal to the expulsion air flow rate; external air temperature on input -5° C, 80% RH; room air temperature 20° C, 50% RH.

(***) Performance referring to: renewal air flow rate equal to the expulsion air flow rate; external air temperature on input 34° C, 50% RH; room air temperature 26° C, 50% RH.

3. Technical characteristics

3.1 FUNDAMENTAL UNIT COMPONENTS

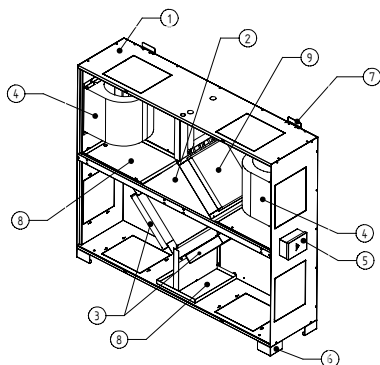
3.1.1 HORIZONTAL CONFIGURATION



1. Bearing structure with sandwich panelling fitted with pre-sheared plates
2. Static heat recovery unit with crossover flows
3. Flat filter with undulated septum
4. Motor ventilating assembly
5. Support brackets
6. Hot water heating coil (in the NRCxxA version) or electric heating coil (in the NRCxxE version)
7. Condensate collection tank
8. Electronic regulators

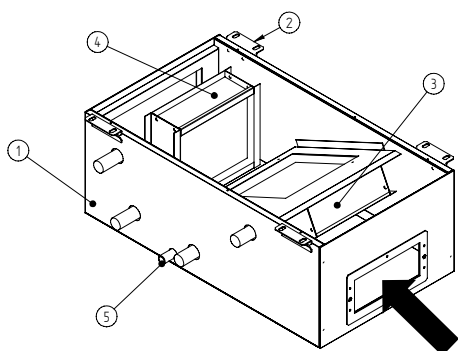
N.B. : The horizontal configuration is supplied as standard with inspection from below for ceiling installation.
The units can be supplied on request with top inspection for floor installation.

3.1.2 VERTICAL CONFIGURATION



1. Bearing structure with sandwich panelling fitted with pre-sheared plates
2. Static heat recovery unit with crossover flows
3. Flat filter with undulated septum
4. Motor ventilating assembly
5. Electronic regulators
6. Feet
7. Support brackets
8. Condensate collection tank
9. Hot-water heating coil (in the NRCxxVA version) or electric heating coil (in the NRCxxVE version)

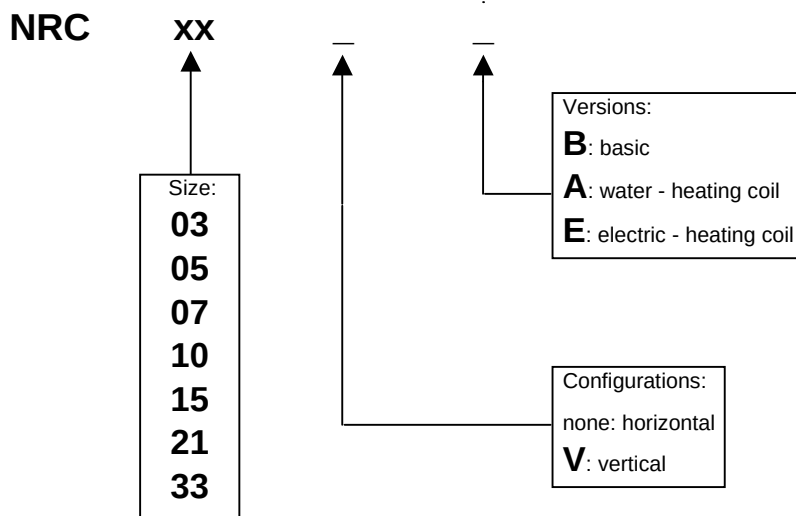
3.1.3 COIL MODULE



1. Load-bearing structure
2. Support brackets
3. Water-cooling coil (on the BF, MPW, MPX module) or direct expansion cooling coil (on the BFD, BFDW, BFDX module)
4. Post-heating hot-water coil (on the MPW, BFDW module) or electric post-heating coil (on the MPX, BFDX module)
5. Condensate collection tank drain.

N.B. : The heat recovery units NRC series have been designed for indoor installation and may not be installed outside.

3.2 IDENTIFICATION



□ ACCESSORIES:

BF	module with water cooling coil
MPW	module with water cooling coil and water re-heating coil
MPX	module with water cooling coil and electric re-heating coil
BFD	module with direct expansion cooling coil
BFDW	module with direct expansion cooling coil and water re-heating coil
BFDX	module with direct expansion cooling coil and electric re-heating coil
G4	G4 efficiency filters (as option to the standard G3 type)
SU	module with silencer septums
FGC	circular flanges
SE	dampers
RG	regulation system complete with electrical panel terminal that can be used remotely with digital display

□ ACCESSORY COMPATIBILITY CHARTS:

Horizontal configuration

	NRC	03	05	07	10	15	21	33
ACCESSORIES	BF	BF35	BF55	BF75	BF100	BF150	BF210	BF330
	MPW	MPW35	MPW55	MPW75	MPW100	MPW150	MPW210	MPW330
	MPX	MPX35	MPX55	MPX75	MPX100	MPX150	MPX210	MPX330
	BFD	BFD35	BFD55	BFD75	BFD100	BFD150	BFD210	BFD330
	BFDW	BFDW35	BFDW55	BFDW75	BFDW100	BFDW150	BFDW210	BFDW330
	BFDX	BFDX35	BFDX55	BFDX75	BFDX100	BFDX150	BFDX210	BFDX330
	G4	G435	G455	G475	G4100	G4150	G4210	G4330
	SU	SU1	SU1	SU2	SU3	SU3	SU4	SU5
	FGC	FGC1	FGC1	FGC1	FGC2	FGC2	\	\
	SE	SE1	SE1	SE2	SE3	SE3	SE4	SE5
	RG	RG35	RG55	RG75	RG100	RG150	RG210	RG330

Vertical configuration

	NRC V	03	05	07	10	15	21	33
ACCESSORIES	BF	\	\	\	\	\	\	\
	MPW	\	\	\	\	\	\	\
	MPX	\	\	\	\	\	\	\
	BFD	\	\	\	\	\	\	\
	BFDW	\	\	\	\	\	\	\
	BFDX	\	\	\	\	\	\	\
	G4	G435	G455	G475	G4100	G4150	G4210	G4330
	SU	\	\	\	\	\	\	\
	FGC	FGC1	FGC1	FGC1	FGC2	FGC2	\	\
	SE	SE1	SE1	SE2	SE3	SE3	SE4	SE5
	RG	RG35	RG55	RG75	RG100	RG150	RG210	RG330

Example:

NRC07B + MPW75 + FGC1 + SE2 : NRC unit in basic version in a horizontal configuration + module with water cooling coil and water re-heating coil + circular flanges + dampers.

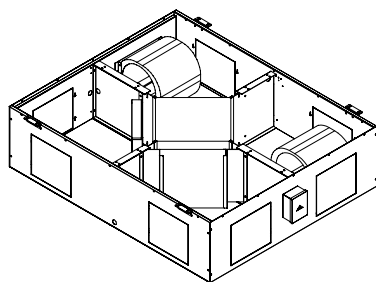
3.3 DESCRIPTION OF THE UNIT

HORIZONTAL configuration	VERTICAL configuration
NRCxxB (basic version)	NRCxxVB (basic version)
NRCxxA (indoor water type heating coil version)	NRCxxVA (indoor water type heating coil version)
NRCxxE (indoor electric type heating coil version)	NRCxxVE (indoor electric type heating coil version)

3.3.1 HORIZONTAL CONFIGURATION

3.3.1.1 NRCxxB VERSION

The NRCxxB series (basic version in horizontal configuration) has the following characteristics:

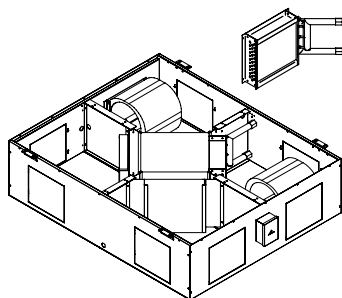


- ❑ **Structure:** the structure consists of self-bearing sandwich panels 20 mm thick made of galvanised steel plate with insulation formed by injected pol yurethane (density 40 kg/m³). The steel sheet is fitted with pre-shearing ne ar the opening for the aeraulic connections (in such a way as to permit the motorfan assemblies to be oriented in different ways), and near the exits of the manifolds of any water-heating coil (NRCxxA version) for plumbing con nections.
- ❑ **Inspection capacity:** from below (ceiling installation) or above (floor instal lation) by easily dismantling the panels.
- ❑ **Delivery and return motorfan assembly:** the fans are centrifugal with blades and double extraction directly linked to the electric motors. The electric motors are single-speed and are commanded by electronic regulators for variation that is continuous and independent of the speed. The fans are extractor type on the recovery unit to ensure the maximum uniformity of flow on the recovery unit itself and thus the maximum yield.
- ❑ **Filters:** these are cell type with an undulating septum positioned before the recovery unit on airflow deliver and return. The standard filters are class G3 type in accordance with classification UNI EN 779 with weighted efficiency of 80%. They are 48 mm thick and are easily unthreaded for cleaning and replacement.
- ❑ **Heat recovery unit:** this is static with crossover flows made of aluminium sheets. During winter operation, the average efficiency is above 50% ensuring first-class energy recovery from the air expelled from the room.

- ❑ Condensate collection tank: this is made of galvanised steel and positioned under the heat recovery unit and under any water or electric coils supplied as accessories. It is easy to dismantle thanks to the rubber fitting lining the threaded discharge tubing with a diameter of ½" G UNI 338 positioned near the sidewall of the unit.
- ❑ Electronic fan speed regulators: they allow the independent and continuous regulation of the fan motor speed for optimal flow regulation. The regulators have three speed indicators in addition to the indicator showing the direction of fan air flow. The electronic regulators are supplied as standard.
- ❑ Support brackets: these allow rapid and secure fitting to the ceiling or the floor.

3.3.1.2 NRCxxA VERSION

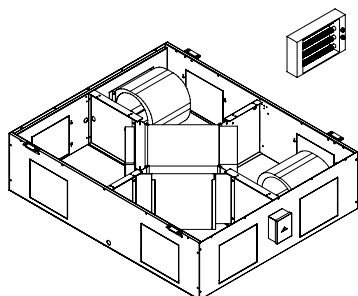
These have the same constructional features and the same components as the NRCxxB version with the addition of:



- ❑ Water-type heating coils in three rows with copper pipes, aluminium fins with P2519 geometry positioned downline from the heat recovery unit on the fresh air flow. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded connections and bleed valve are supplied as standard.

3.3.1.3 NRCxxE VERSION

These have the same constructional features and the same components as the NRCxxB version with the addition of:

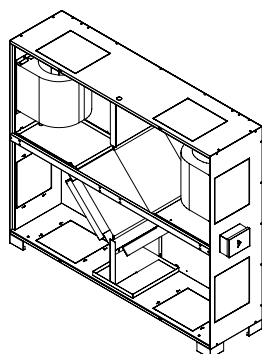


- ❑ Electric heating coil with reinforced finned coils with two or three stages according to the size positioned down line from the heat recovery unit on the fresh air flow. The coil is fitted with a safety thermostat with manual resetting.

3.3.2 VERTICAL CONFIGURATION

3.3.2.1 NRCxxVB VERSION

The NRCxxVB series units (basic version in vertical configuration) have the following characteristics:

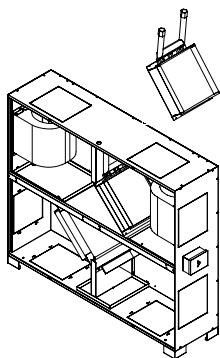


- ❑ Structure: the structure consists of self-bearing sandwich panels 20 mm thick made of galvanised steel plate with insulation formed by injected polyurethane (density 40 kg/m³). The steel sheet is fitted with pre-shearing near the opening for the aerodynamic connections (in such a way as to permit the motorfan assemblies to be oriented in different ways), and near the exits of the manifolds of any water heating coil (NRCxxVA version) for plumbing connections. The structure has feet and two tanks for condensate collection, one positioned near the heat recovery unit and one near the motor extractor fan unit. Any condensate in the last tank is led directed into the lower tank through a flexible rubber tube.
- ❑ Inspection capacity: this is guaranteed by easily dismantling the panels.

- ❑ Delivery and return motorfan assembly: the fans are centrifugal with blades and double extraction directly linked to the electric motors. The electric motors are single-speed and are commanded by electronic regulators for variation that is continuous and independent of the speed. The fans are extractor type on the recovery unit to ensure the maximum uniformity of flow on the recovery unit itself and thus the maximum yield.
- ❑ Filters: these are cell type with an undulating septum positioned before the recovery unit on airflow supply and return. The standard filters are class G3 type in accordance with classification UNI EN 779 with weighted efficiency of '80%. They are 48 mm thick and are easily unthreaded for cleaning and replacement.
- ❑ Heat recovery unit: this is static with crossover flows made of aluminium sheets. During winter operation, the average efficiency is above 50% ensuring first-class energy recovery from the air expelled from the room.
- ❑ Condensate collection tanks: these are made of galvanised steel and are positioned under the heat recovery unit and under the motor extractor fan assembly . The condensate collection tank that leads to the outside is fitted with a ½" G UNI 338 threaded discharge.
- ❑ Electronic fan speed regulators: by these it is possible to regulate the fan motor speed continuously and independently for optimal flow rate calibration. The regulators have three speed indicators in addition to the indicator showing the direction of fan air flow. The electronic regulators are supplied as standard.
- ❑ Support brackets: these permit rapid and secure fixing of the wall unit.
- ❑ Feet: four 60 mm high feet are situated at the lower corners of the structure for supporting the floor unit.

3.3.2.2 NRCxxVA VERSION

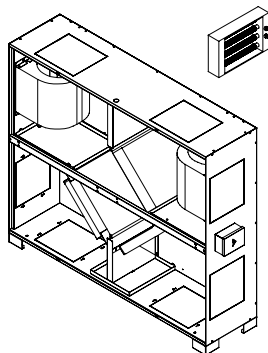
These have the same constructional features and the same components as the NRCxxVB version with the addition of:



- ❑ Water-type heating coils in three rows with copper pipes, aluminium fins with P2519 geometry positioned downline from the heat recovery unit on the fresh air flow. The manifolds are fitted with threaded female attachments for the entry and exit of the water, sleeves with 1" G UNI 338 threaded attachment and bleed valve. Both of these components come as standard.

3.3.2.3 NRCxxVE VERSION

These have the same constructional features and the same components as the NRCxxVB version with the addition of:



- ❑ Electric heating coil with reinforced finned coils with two or three stages according to the size positioned down line from the heat recovery unit on the fresh air flow. The coil is fitted with a safety thermostat with manual resetting.

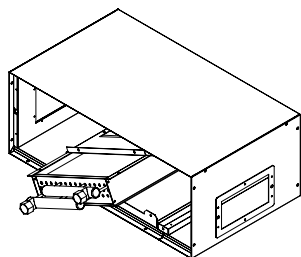
3.4 ACCESSORIES

HORIZONTAL configuration	VERTICAL configuration
BF (module with water-type cold coil)	/
MPW (module with water type cold coil and water type reheating)	/
MPX (module with water type cold coil and electric reheating)	/
BFD (module with direct expansion coil)	/
BFDW (module with direct expansion type coil and water reheating coil)	/
BFDX (module with direct expansion coil and electric reheating coil)	/
G4 (optional G4 efficiency filters)	G4 (optional G4 efficiency filters)
SU (module with silencers)	/
FGC (circular flanges)	FCG (circular flanges)
SE (dampers)	SE (dampers)
RG (control system)	RG (control system)

3.4.1 CHILLED WATER COIL MODULE (BF ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

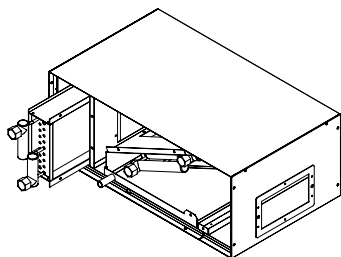


- ❑ Water-cooling coil with four rows with copper pipes and aluminium fins with P2519 geometry and a tank for collecting condensate with threaded diameter $\frac{1}{2}$ " G UNI 338 drainage pipe. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded attachment and bleed valve are supplied as standard.

3.4.2 MODULE WITH A CHILLED WATER COIL AND WATER REHEATING COIL (MPW ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

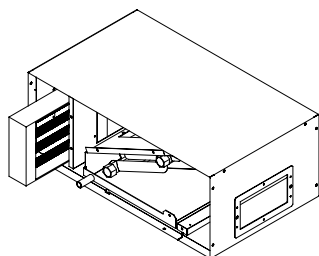


- ❑ Water-cooling coil with four rows with copper piping and aluminium fins with P2519 geometry. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded attachment and bleed valve are supplied as standard.
- ❑ Water-reheating coil with two rows with copper piping and aluminium fins with P2519 geometry. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded attachment and bleed valve are supplied as standard.
- ❑ Condensate collection tank in galvanised steel with threaded drainage pipe with diameter $\frac{1}{2}$ " G UNI 338.

3.4.3 MODULE WITH A CHILLED WATER COIL AND ELECTRICAL REHEATING COIL (MPX ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

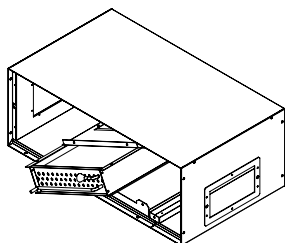


- ❑ Water-cooling coil with four rows with copper piping and aluminium fins with P25 19 geometry. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded attachment and bleed valve are supplied as standard.
- ❑ Electric reheating coil with reinforced finned coils with two or three stages according to the size positioned downline from the heat recovery unit on the fresh air flow fitted with a safety thermostat that can be reset manually.
- ❑ Condensate collection tank in galvanised steel with threaded drainage pipe with diameter ½" G UNI 338.

3.4.4 DIRECT EXPANSION COIL (BFD ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

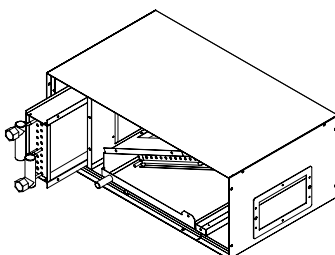


- ❑ Direct expansion cooling coil with R407C refrigerant with four rows with copper piping and aluminium fins with P2519 geometry.
- ❑ Condensate collection tank in galvanised steel with threaded drainage pipe with diameter ½" G UNI 338.

3.4.5 MODULE WITH DIRECT EXPANSION COIL AND WATER REHEATING COIL (BFDW ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

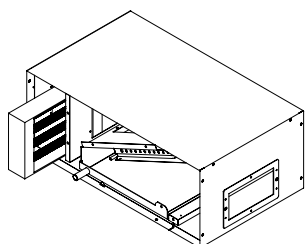


- ❑ Direct expansion cooling coil with R407C refrigerant with four rows with copper piping and aluminium fins with P2519 geometry.
- ❑ Water-reheating coil with two rows with copper piping and aluminium fins with P2519 geometry. The manifolds are fitted with threaded female attachments for the water to enter and exit. Sleeves with 1" G UNI 338 threaded attachment and bleed valve are supplied as standard.
- ❑ Condensate collection tank in galvanised steel with threaded drainage pipe with diameter ½" G UNI 338.

3.4.6 MODULE WITH DIRECT EXPANSION COIL AND ELECTRICAL REHEATING COIL (BFDX ACCESSORY)

Only available in the horizontal configuration.

This is an outside module that can be installed downline from the motor fan assembly on the fresh air flow, fitted with:

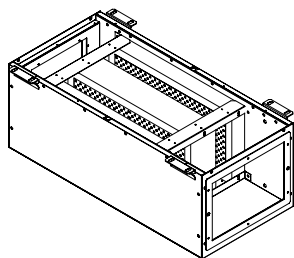


- ❑ Direct expansion cooling coil with R407C refrigerant with four rows with copper piping and aluminium fins with P2519 geometry.
- ❑ Electric heating coil with reinforced finned coils with two or three stages according to the size positioned downline from the heat recovery unit on the fresh air flow fitted with a safety thermostat that can be reset manually.
- ❑ Condensate collection tank in galvanised steel with threaded drainage pipe with diameter ½" G UNI 338.

3.4.7 G4 EFFICIENCY FILTERS (G4 ACCESSORY)

The units can be fitted with two cell-type filters with undulated septum in class G4 according to the UNI EN 779 classification (weighted efficiency of 90%) that can be positioned as a replacement of those in class G3. The filtering cell is 48 mm thick.

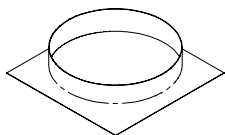
3.4.8 SILENCERS (SU ACCESSORY)



An accessory only available for the horizontal configuration.

There are two modules that can be installed on the side turned towards the room fitted with silencer septums made of rock wool panels with surfaces in contact with the air protected by polyester film containing two or three stretched and micro-perforated galvanised zinc plates.

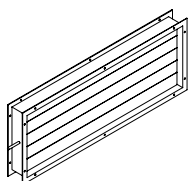
3.4.9 CIRCULAR FLANGES (FGC ACCESSORY)



The accessory is not available for the NRC21 and NRC33 sizes and is supplied as one unit.

The accessory consists of a flange to couple with the rectangular mouths of the unit in such a way as to allow the use of circular section channels.

3.4.10 DAMPERS (SE ACCESSORY)



They can be used with the antifreeze function or to provide the bypass for the free-cooling function. They consist of a galvanised sheet frame and aluminium fins with nylon wheel mechanism. The damper pin can be servo-commanded.

The accessory comes as two units.

3.4.11 CONTROL SYSTEM (RG ACCESSORY)

The optional RG control system accessory replaces the electronic regulators provided as standard and consists of:

- electrical panel complete with power part and fitted out for thermo-regulation (three-way mixer valves and relative servo-commands are excluded).

The terminal block on the panel contains:

- one ON/OFF contact with the possibility of remote operation;
- one contact with the possibility of remote operation for the management of the alarms;
- one contact with the possibility of remote operation for SUMMER / WINTER selection.

- terminal with remote action with digital display for the management:

- of the fan speed;
- of the water heat exchange coils.

The regulation system manages three-way mixer valves controlled by modulating signals for the NRCxxA and NRCxxVA version while for the water coil in the accessory module the regulation system controls three-way mixer valves controlled by digital signals with three-point control.

The three-way valves and relative servo-commands are not however supplied;

- electric heat exchange coils (the management of the electrical coils with the regulation system is limited to two stages);
- of the ON/OFF signal of the motorcondensing in the case there is a direct expansion coil.

3.5 VENT POSITIONING

❑ NRC without accessory regulation system:

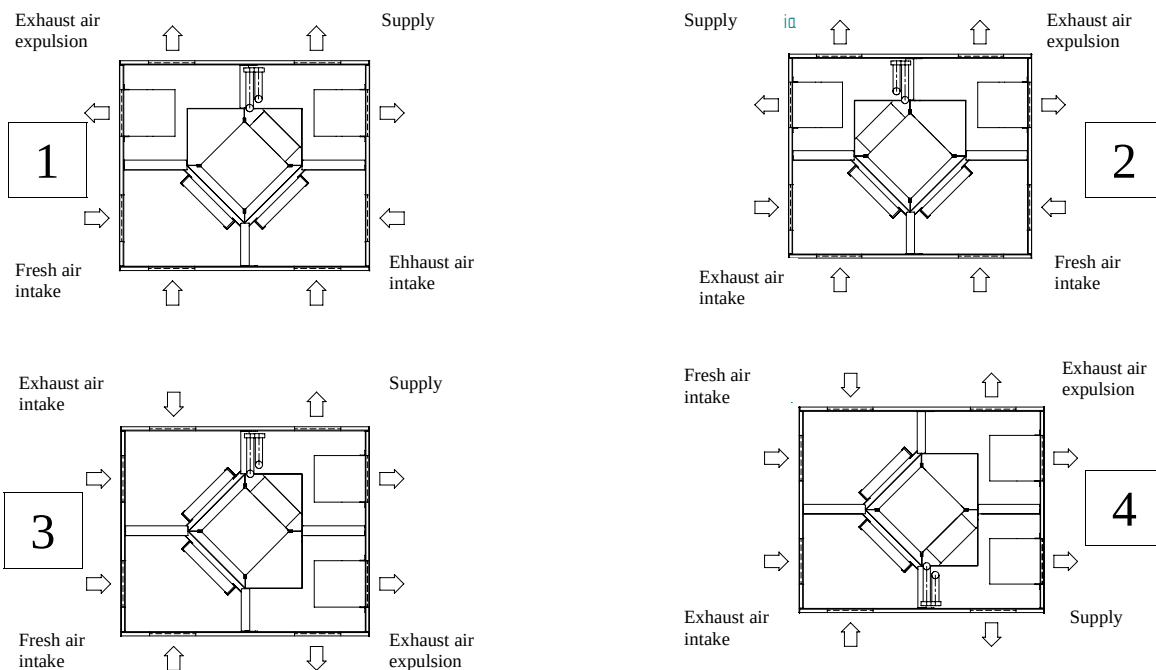
The units come with all the vents closed and with the inside components positioned as shown in figure 1. below.

At the moment of installation the arrangement of the internal components can be varied in accordance with the specific system requirements (position 2, 3, 4 for the horizontal configuration and position 2 for the vertical configuration) following the indications in the use, maintenance and installation manual.

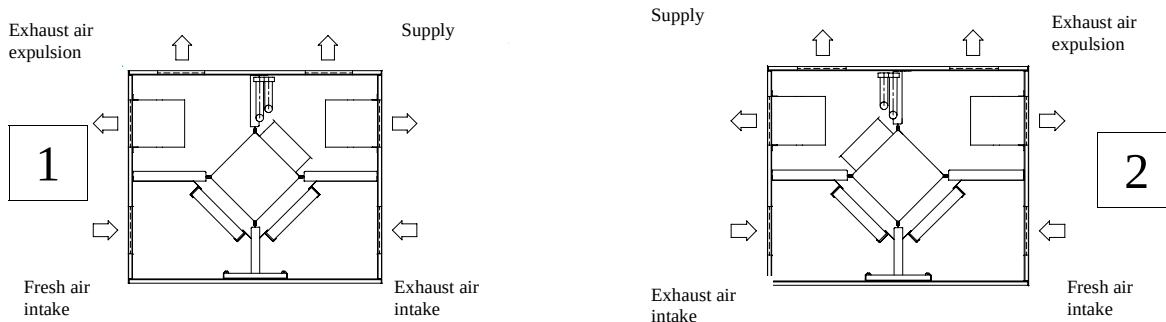
□ **NRC with accessory regulation system:**

The units come with all the vents closed. The inside items (fans, any coils, pressure switches, probes, etc.) are positioned on site as specified in the order.

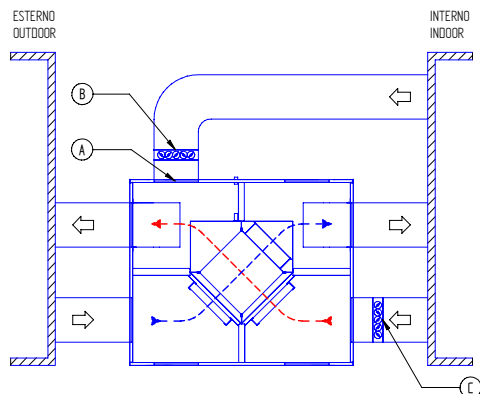
3.5.1 HORIZONTAL CONFIGURATION



3.5.2 VERTICAL CONFIGURATION



3.6 FREE-COOLING OPERATION



Free-cooling function requires the expelled-air flow from the room does not affect the heat recovery unit going directly to the outside through a channel attached to the vent (A).

The fresh air flow thus passes through the filter and the heat recovery unit without being touched by the heat exchangers.

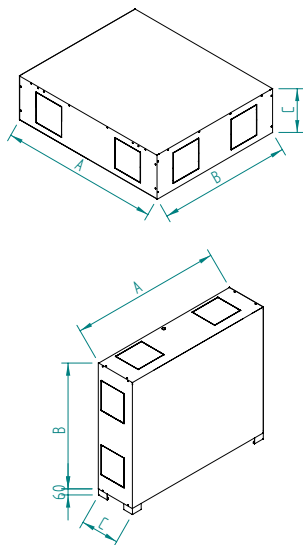
To use the free-cooling function it is therefore necessary to have a channel to couple to the opening (A) and then position two dampers with opposite action (B and C).

When the external air temperature is near the ideal temperature for the room, the damper (C) is closed while damper (B) is open.

3.7 OVERALL DIMENSIONS AND WEIGHTS

3.7.1 BASE UNIT

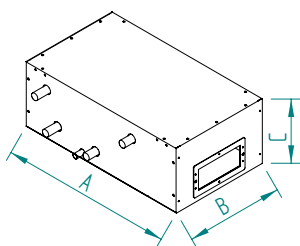
- Horizontal and vertical configuration



NRC MODEL		03	05	07	10	15	21	33
Dimensions								
A	mm	1090	1090	1190	1500	1500	1750	2500
B	mm	900	900	1000	1250	1250	1400	1750
C	mm	300	300	330	390	390	390	390
Weights								
NRCxxB; NRCxxVB	kg	61	65	74	115	140	180	330
NRCxxA; NRCxxVA	kg	66	70	79	121	146	188	340
NRCxxE; NRCxxVE	kg	68	73	84	126	152	195	350

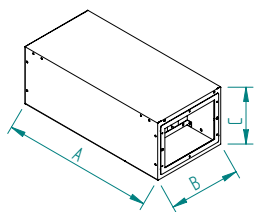
3.7.2 ACCESSORIES

- Coil module



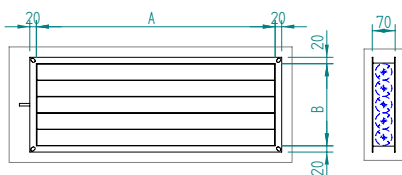
NRC MODEL		03	05	07	10	15	21	33
Dimensions								
A	mm	800	800	850	970	970	970	970
B	mm	460	460	510	635	635	710	860
C	mm	300	300	330	390	390	390	390
Weights								
BF	kg	40	40	50	60	60	70	75
MPW	kg	43	43	54	65	65	76	85
MPX	kg	45	45	57	68	68	79	90
BFD	kg	40	40	50	60	60	70	75
BFDW	kg	43	43	54	65	65	76	85
BFDX	kg	45	45	57	68	68	79	90

- Silencers (SU)



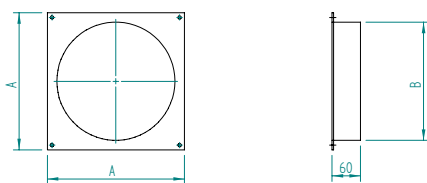
NRC MODEL		03	05	07	10	15	21	33
Dimensions								
A	mm	800	800	800	800	800	800	800
B	mm	380	380	430	550	550	620	820
C	mm	300	300	330	390	390	390	390
Weights								
SU	kg	25	25	30	36	36	45	60

- Dampers (SE)



NRC MODEL		03	05	07	10	15	21	33
Dimensions								
A	mm	250	250	250	320	320	500	700
B	mm	200	200	250	250	250	250	250

□ Circular flanges (FGC)



NRC MODEL		03	05	07	10	15	21	33
Dimensions								
A	mm	290	290	290	320	320	\	\
B	mm	250	250	250	300	300	\	\

4. Performance

4.1 FAN CHARACTERISTIC CURVES

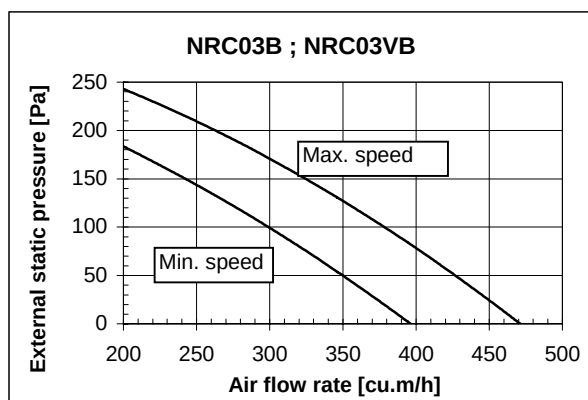
The characteristic curves of the fans are shown in the following diagrams, for each base unit size in the horizontal and vertical configurations.

The curves refer to the maximum and minimum fan speed. For intermediate speeds the curves move in the range between the two curves shown.

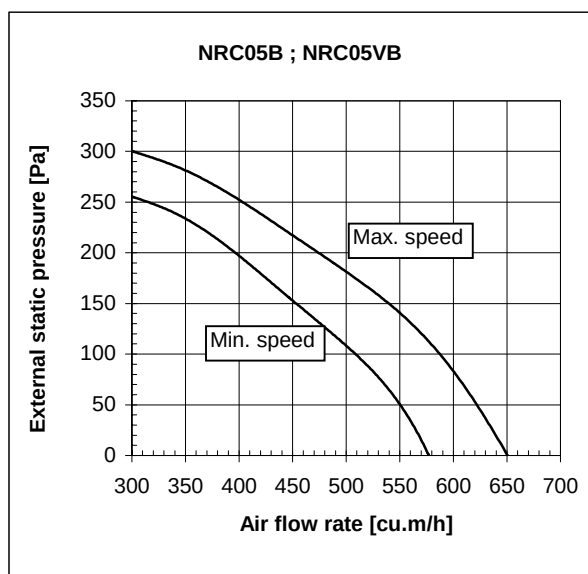
The static pressure available is read on the ordinate, for a determined air flow expressed in cu.m/h providing that a delivery channel equal to at least one meter is installed downline from the fan.

The pressure drops for each accessory to be subtracted from the value of the useful static pressure read in function of the flow rate are shown in the table next to each graph.

The static pressures are net of the pressure drops of the heat recovery unit and the clean filters.

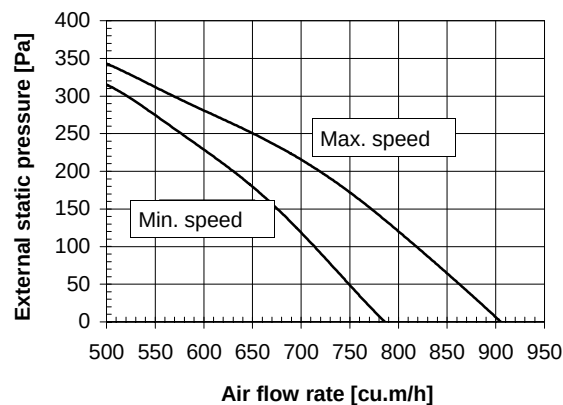


Additional pressure drops [Pa]						
Flow rate [m³/h]	200	250	300	350	400	450
NRC 03 E/VE	10	10	10	10	10	10
NRC 03 A/VA	37	56	79	105	134	167
ACCESSORIES						
BF 35	8	12	17	22	29	36
MPW 35	10	15	22	28	37	45
MPX 35	18	22	27	32	39	46
BFD 35	8	12	17	22	29	36
BFDW 35	10	15	22	28	37	45
BFDX 35	18	22	27	32	39	46
G4 35	0	0	0	0	0	0
SU 1	50	50	50	50	50	50



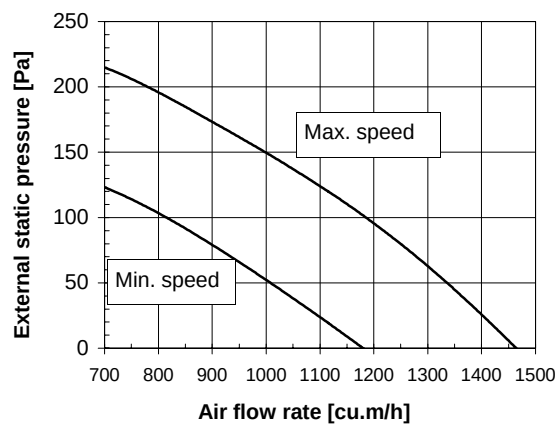
Additional pressure drops [Pa]								
Flow rate [m³/h]	300	350	400	450	500	550	600	650
NRC 05 E/VE	10	10	10	10	10	10	10	10
NRC 05 A/VA	28	37	48	59	72	86	101	117
ACCESSORIES								
BF 55	17	22	29	36	43	52	61	70
MPW 55	23	30	39	48	58	69	81	93
MPX 55	27	32	39	46	53	62	71	80
BFD 55	17	22	29	36	43	52	61	70
BFDW 55	23	30	39	48	58	69	81	93
BFDX 55	27	32	39	46	53	62	71	80
G4 55	0	0	0	0	0	0	0	0
SU 1	50	50	50	50	50	50	50	50

NRC07B ; NRC07VB



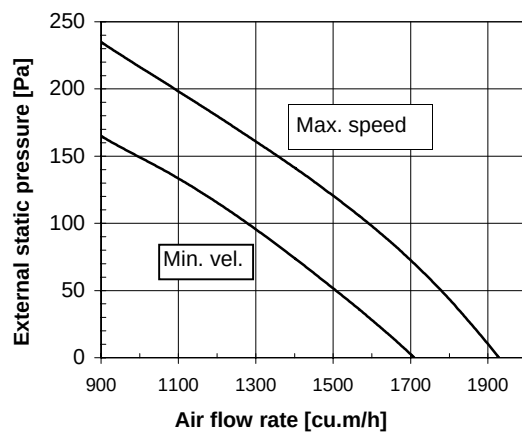
		Additional pressure drops [Pa]							
Flow rate [m³/h]	500	550	600	650	700	750	800	850	900
NRC 07 E/VE	10	10	10	10	10	10	10	10	10
NRC 07 A/VA	58	69	81	94	108	123	138	155	172
ACCESSORIES									
BF 75	20	24	29	33	38	43	49	54	61
MPW 75	29	34	41	47	54	61	69	76	85
MPX 75	30	34	39	43	48	53	59	64	71
BFD 75	20	24	29	33	38	43	49	54	61
BFDW 75	29	34	41	47	54	61	69	76	85
BFDX 75	30	34	39	43	48	53	59	64	71
G4 75	0	0	0	0	0	0	0	0	0
SU 2	50	50	50	50	50	50	50	50	50

NRC10B ; NRC10VB

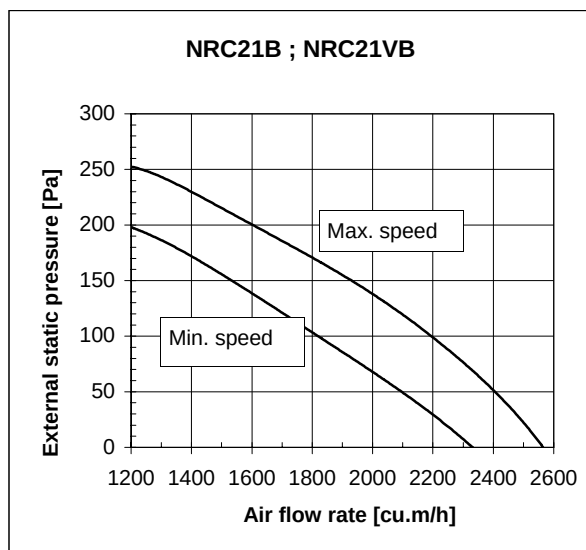


		Additional pressure drops [Pa]							
Flow rate [m³/h]	700	800	900	1000	1100	1200	1300	1400	
NRC 10 E/VE	10	10	10	10	10	10	10	10	10
NRC 10 A/VA	38	49	61	74	89	104	121	139	
ACCESSORIES									
BF 100	12	15	19	23	27	32	37	42	
MPW 100	17	21	26	31	37	44	50	57	
MPX 100	22	25	29	33	37	42	47	52	
BFD 100	12	15	19	23	27	32	37	42	
BFDW 100	17	21	26	31	37	44	50	57	
BFDX 100	22	25	29	33	37	42	47	52	
G4 100	0	0	0	0	0	0	0	0	
SU 3	50	50	50	50	50	50	50	50	

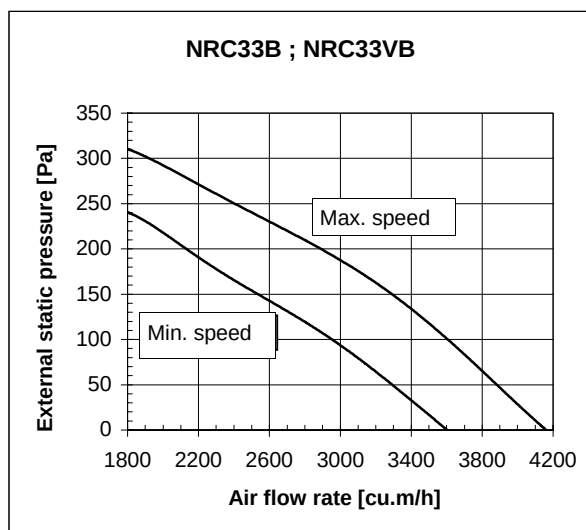
NRC15B ; NRC15VB



		Additional pressure drops [Pa]					
Flow rate [m³/h]	900	1100	1300	1500	1700	1900	
NRC 15 E/VE	10	10	10	10	10	10	10
NRC 15 A/VA	38	55	74	97	122	150	
ACCESSORIES							
BF 150	19	27	37	48	61	74	
MPW 150	26	37	50	65	82	100	
MPX 150	29	37	47	58	71	84	
BFD 150	19	27	37	48	61	74	
BFDW 150	26	37	50	65	82	100	
BFDX 150	29	37	47	58	71	84	
G4 150	0	0	0	0	0	0	
SU 3	50	50	50	50	50	50	



Additional pressure drop [Pa]							
Flow rate [m³/h]	1200	1400	1600	1800	2000	2200	2400
NRC 21 E/VE	10	10	10	10	10	10	10
NRC 21 A/VA	35	47	60	74	90	108	126
ACCESSORIES							
BF 210	24	31	40	50	61	72	85
MPW 210	33	42	54	68	82	97	114
MPX 210	34	41	50	60	71	82	95
BFD 210	24	31	40	50	61	72	85
BFDW 210	33	42	54	68	82	97	114
BFDX 210	34	41	50	60	71	82	95
G4 210	0	0	0	0	0	0	0
SU 4	50	50	50	50	50	50	50



Additional pressure drop [Pa]						
Flow rate [m³/h]	1800	2200	2600	3000	3400	3800
NRC 33 E/VE	10	10	10	10	10	10
NRC 33 A/VA	33	48	66	86	108	133
ACCESSORIES						
BF 330	31	44	61	79	99	122
MPW 330	42	60	82	106	133	164
MPX 330	41	54	71	89	109	132
BFD 330	31	44	61	79	99	122
BFDW 330	42	60	82	106	133	164
BFDX 330	41	54	71	89	109	132
G4 330	0	0	0	0	0	0
SU 5	50	50	50	50	50	50

3.5 HEAT RECOVERY UNIT PERFORMANCE CURVES

The following diagrams represent the heat recovery units' performance (efficiency, recovered power) in function of the air flow for each unit size.

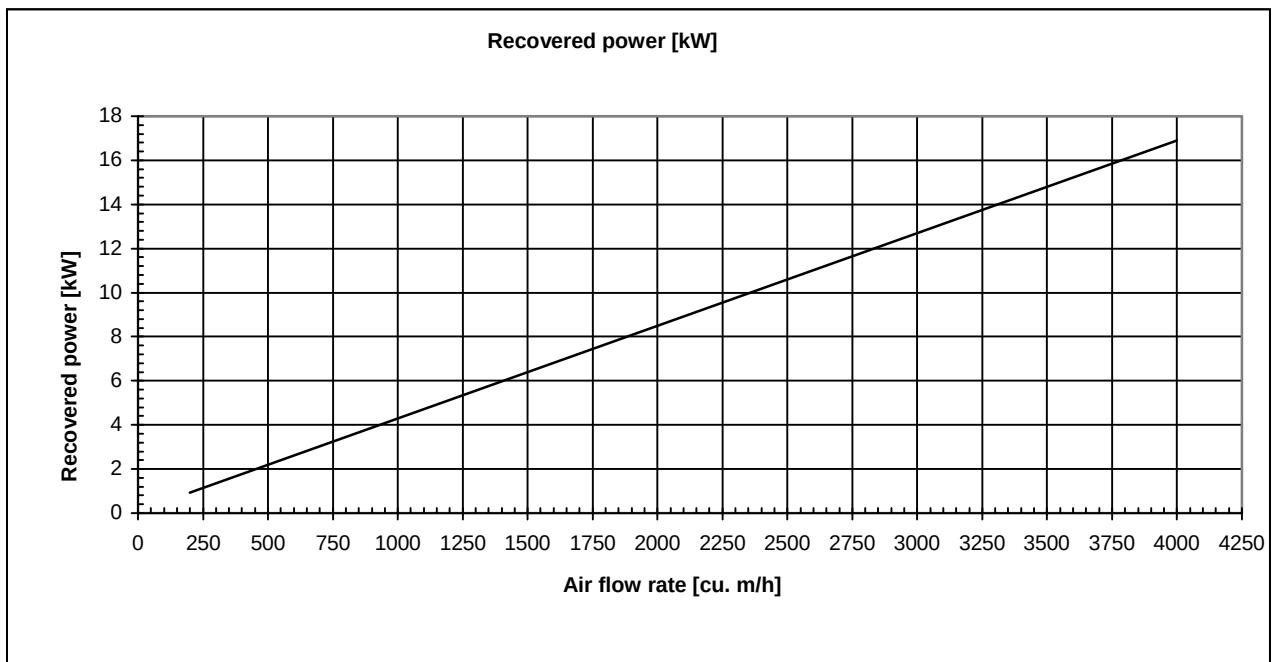
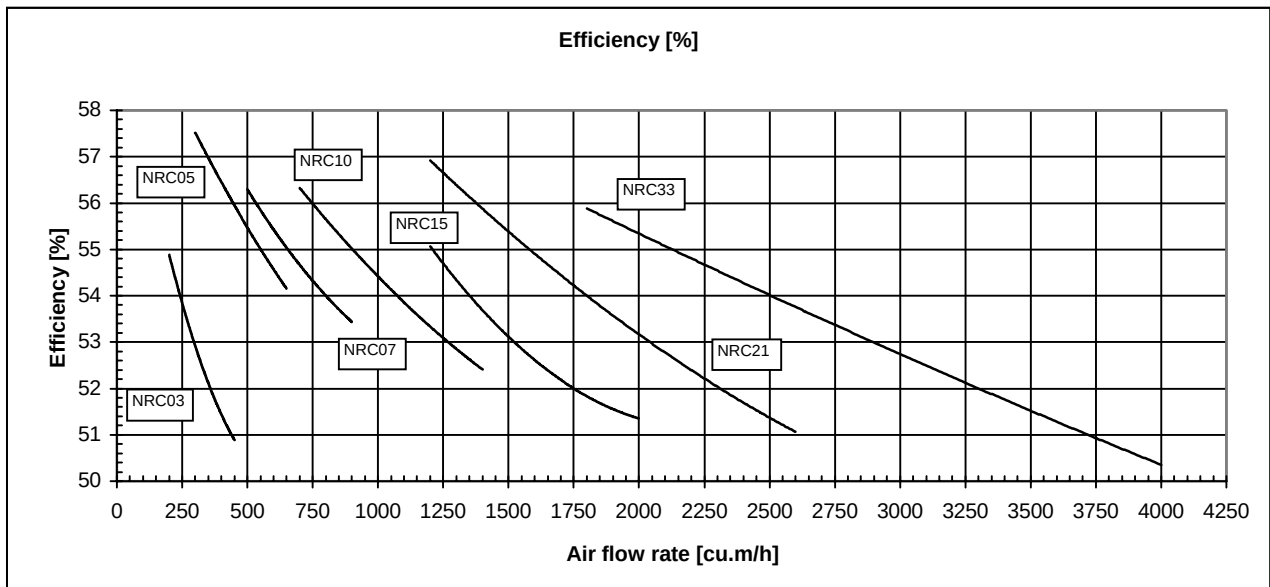
The performance refers to the following conditions:

- Winter functioning:** fresh air flow rate equal to the expulsion air flow rate; external air temperature on input - 5° C, 80% RH; room air temperature 20° C, 50% RH.
- Summer operation:** fresh air flow rate equal to the expulsion air flow rate; external air temperature 34° C, 50% RH; room air temperature 26° C, 50% RH.

For conditions other than the ones shown above, the values read in the diagram must be multiplied by the respective corrective coefficient in the following tables.

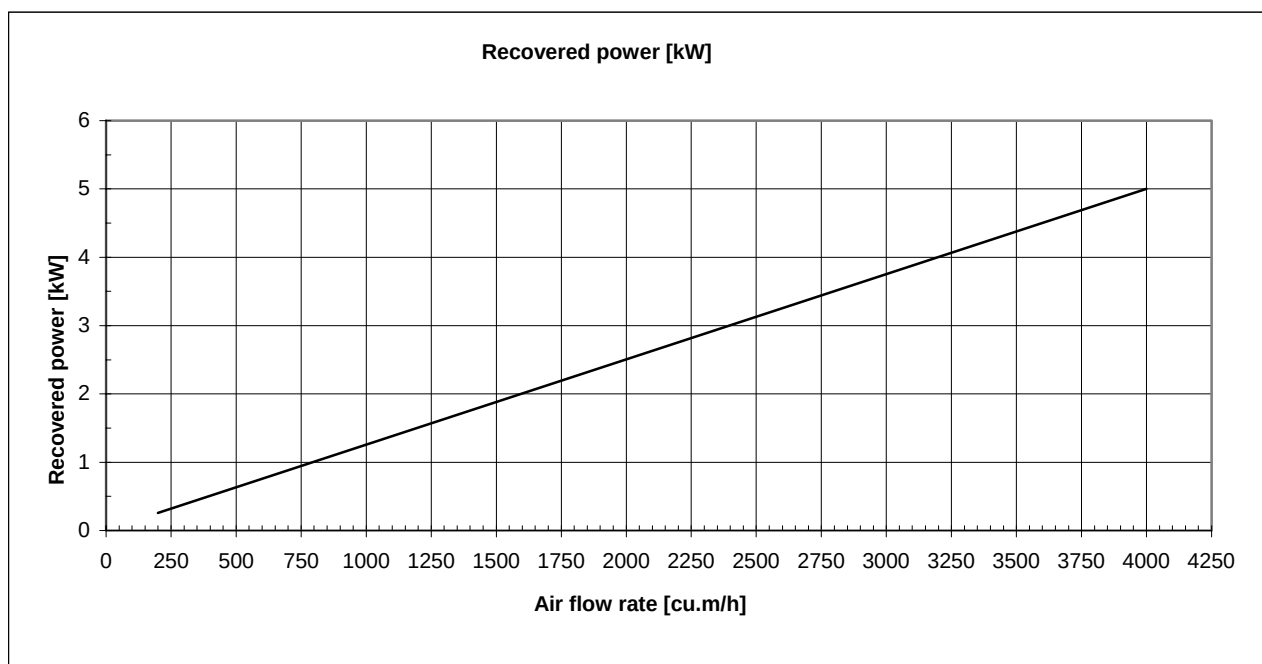
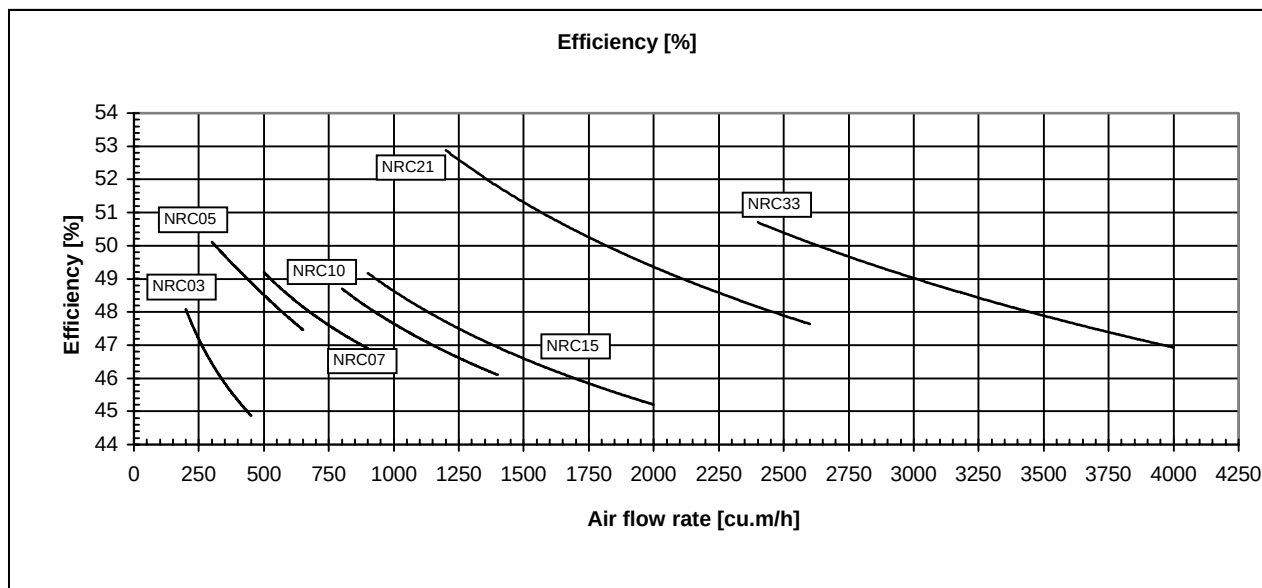
The fresh air temperature on output from the heat recovery unit (Tur) is indicated in the last column of the table in the different external air temperature conditions.

4.2.1 WINTER OPERATION



External air temperature [°C]	K Efficiency	K Recovered power	T _{ur} [°C]
-15	1,05	1,47	5
-10	1,03	1,23	6
-5	1	1	8
0	0,93	0,75	10
5	0,90	0,52	12
10	0,89	0,36	14

4.2.2 SUMMER OPERATION



External air temperature [°C]	K _{Efficiency}	K _{Recovered power}	T _{ur} [°C]
28	1	0,25	27
30	1	0,50	28
32	1	0,75	29
34	1	1	30

4.3 WATER HEATING COIL PERFORMANCE CURVES

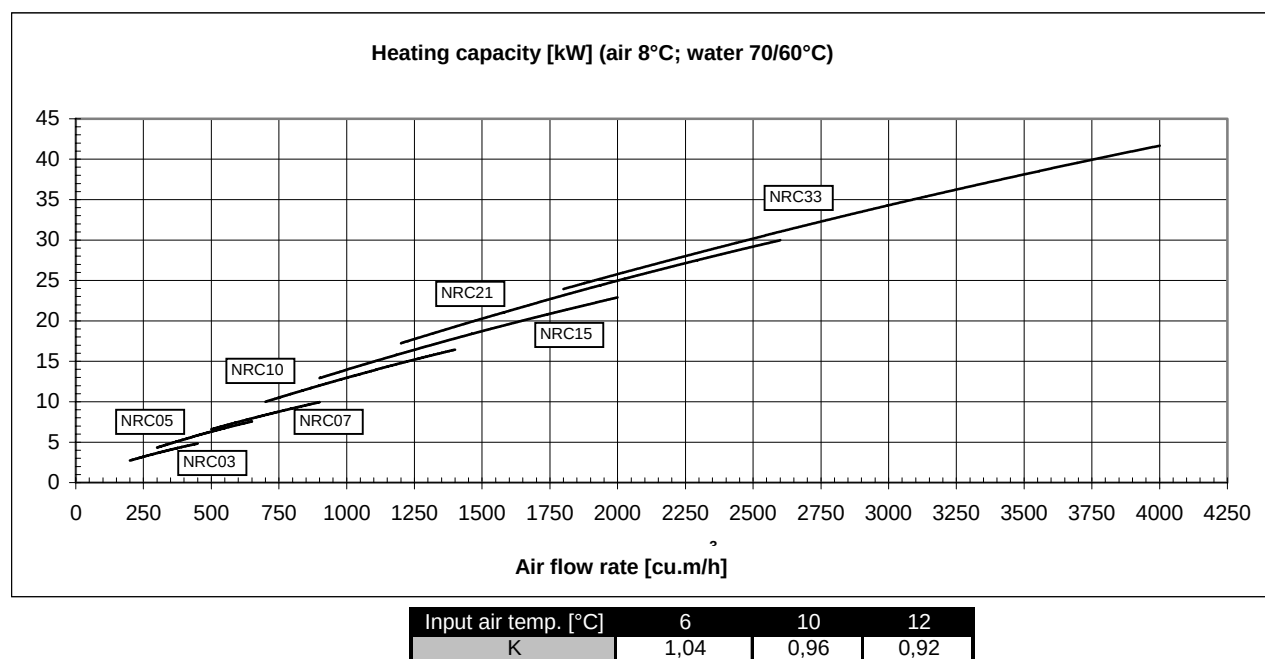
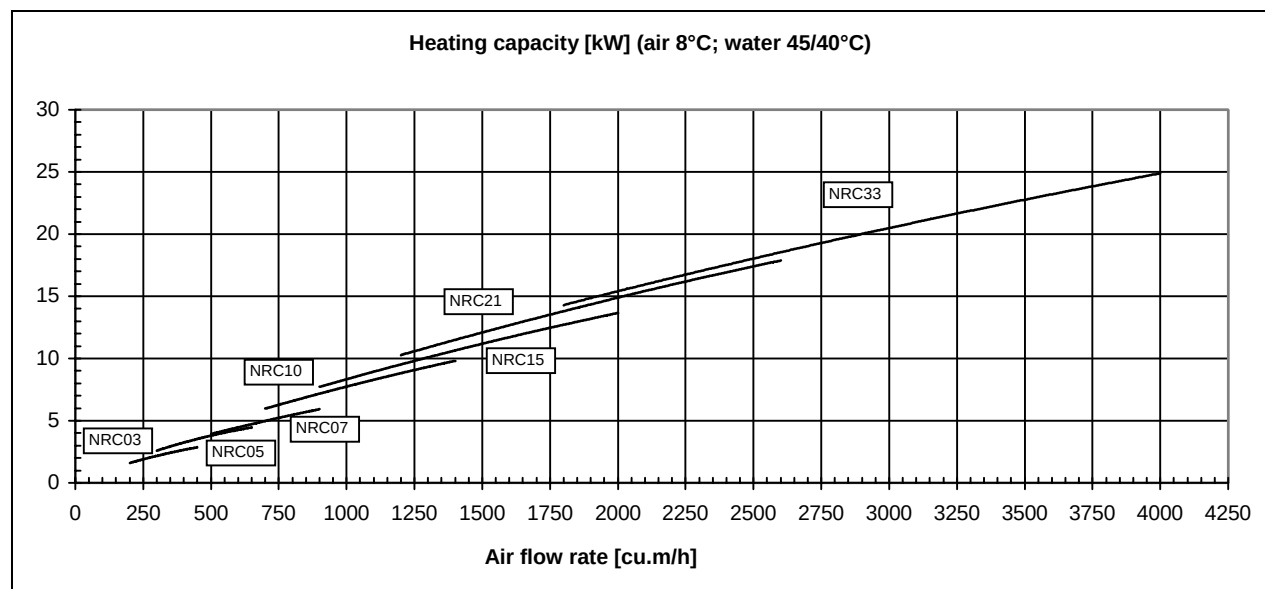
4.3.1 INDOOR HEATING COIL (NRCxxA VERSION)

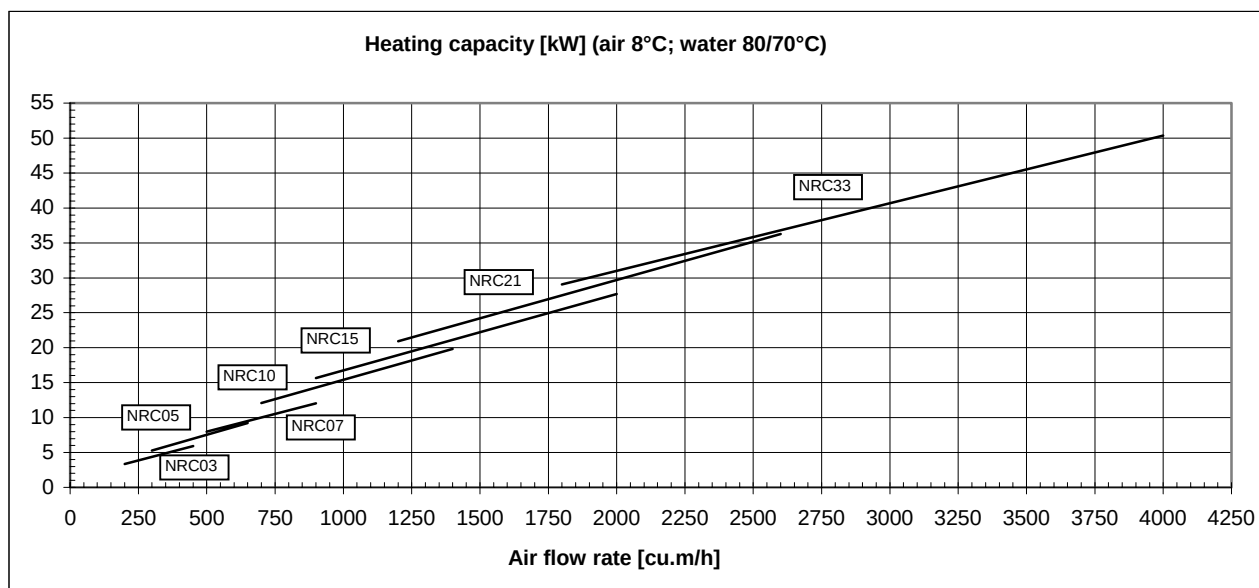
The heat power exchanged by the heating coils downline from the heat recovery units can be read for each unit size and in function of the air flow in the following diagrams.

The diagrams refer to:

- air temperature on input to the coil (that coincides with the air temperature leaving the heat recovery unit) equal to 8°C;
- water temperature entering/leaving the coil equal to 45/40°C, 70/60°C and 80/70°C respectively.

For input air conditions of coils other than those shown above (6°C, 10°C, 12°C), the value read on the ordinate in the diagram must be multiplied by the corrective coefficient (K) shown in the tables below.



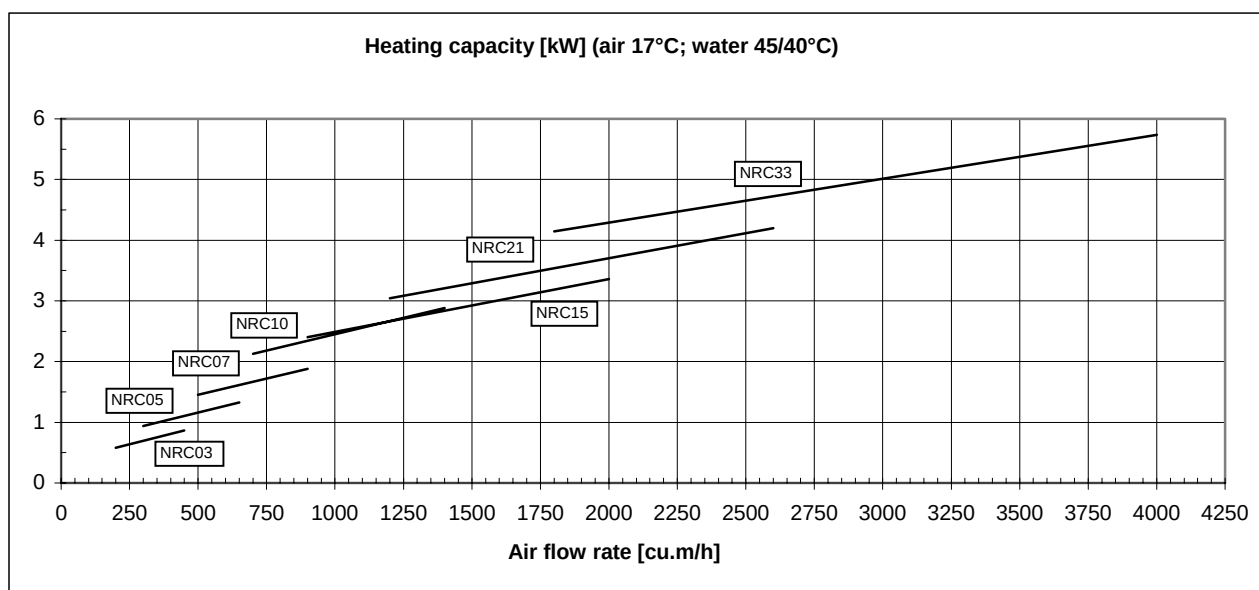


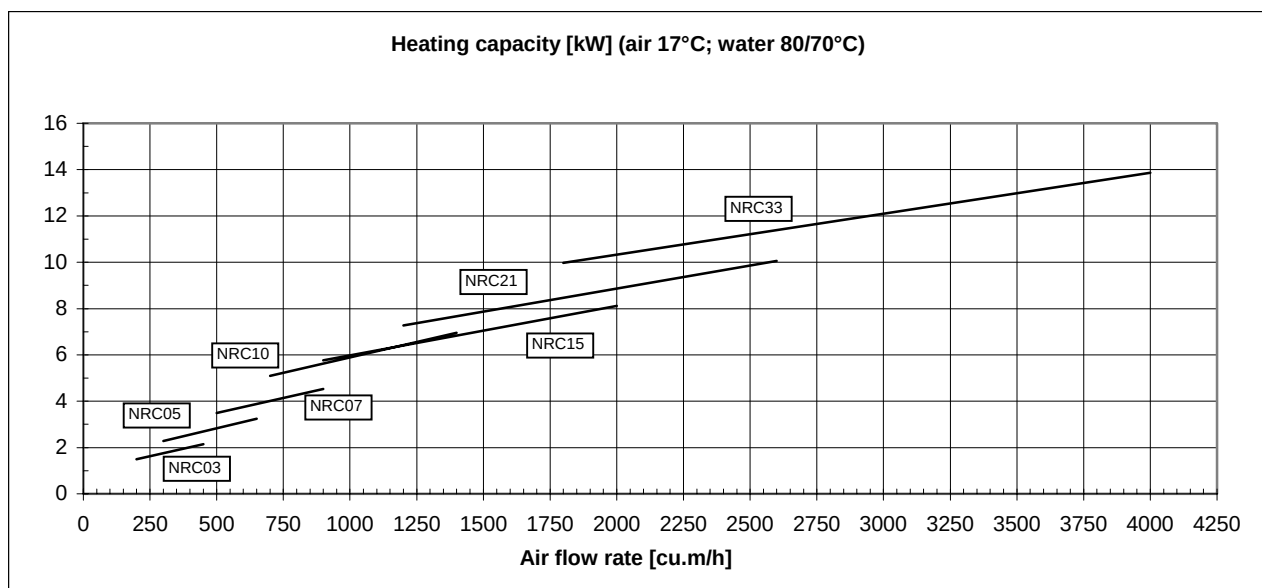
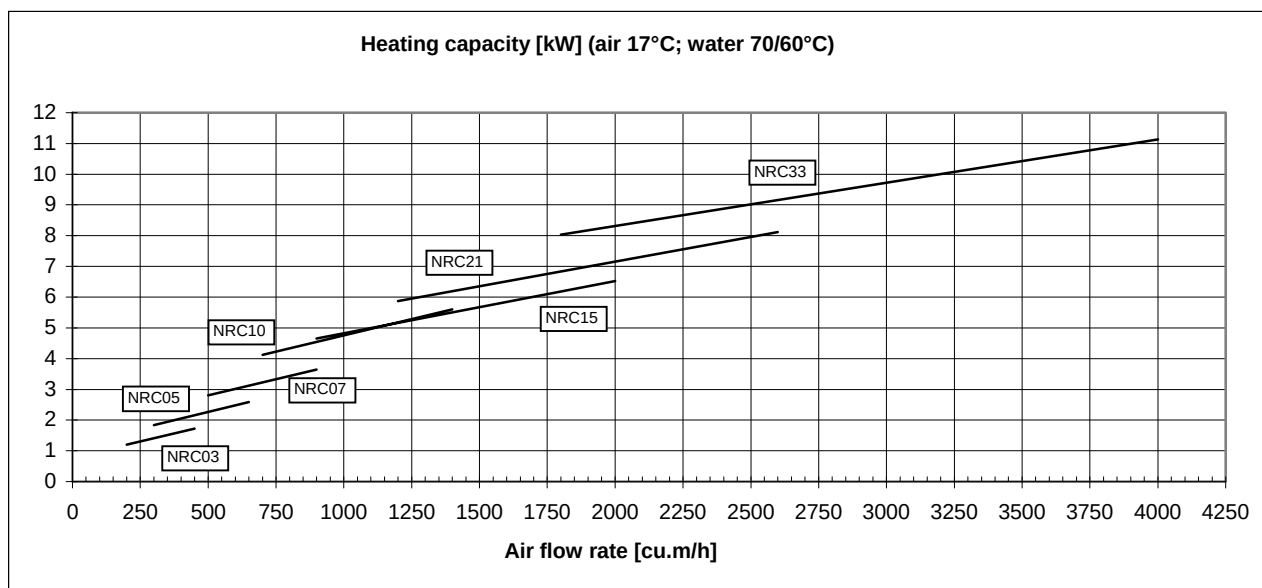
4.3.2 RE-HEATING COIL (MPW, BFDW ACCESSORY)

The heat power exchanged by the heating coils downline from the cold coil in the "coil module" can be read for each unit size and in function of the air flow, in the following diagrams.

The diagrams refer to:

- air temperature on input to the coil (that coincides with the air temperature leaving the cold coil) equal to 17°C;
- water temperature entering/leaving the coil equal to 45/40°C, 70/60°C and 80/70°C respectively.





4.4 PRESSURE DROPS CURVES

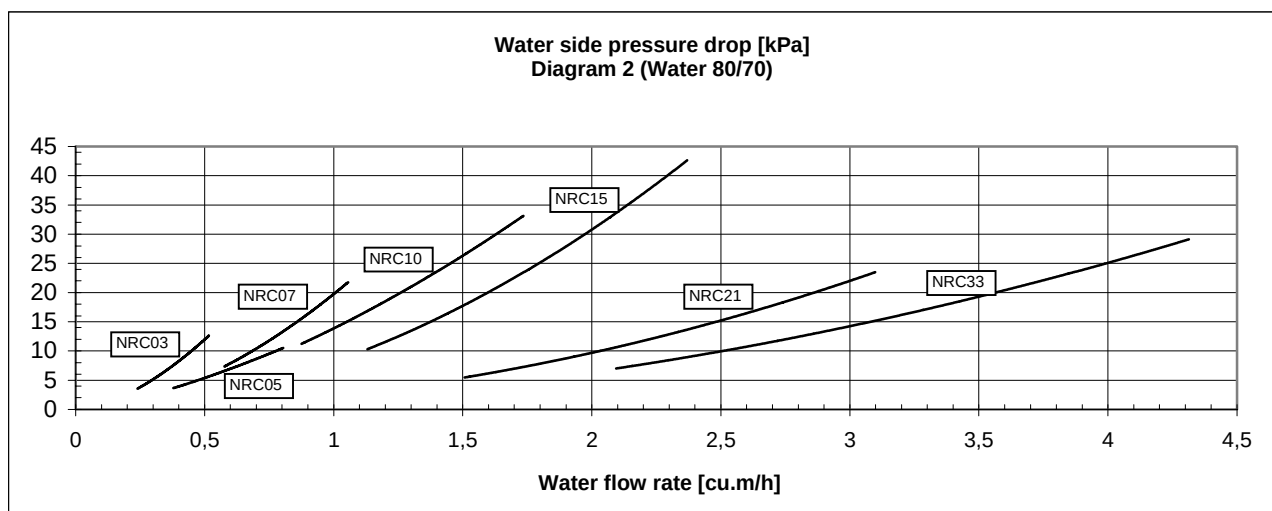
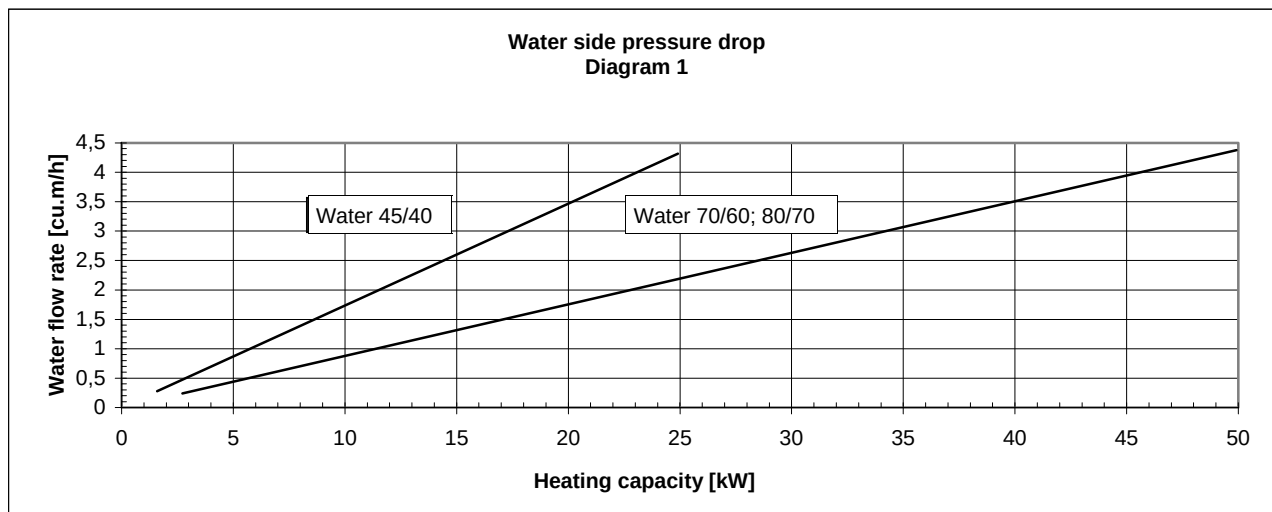
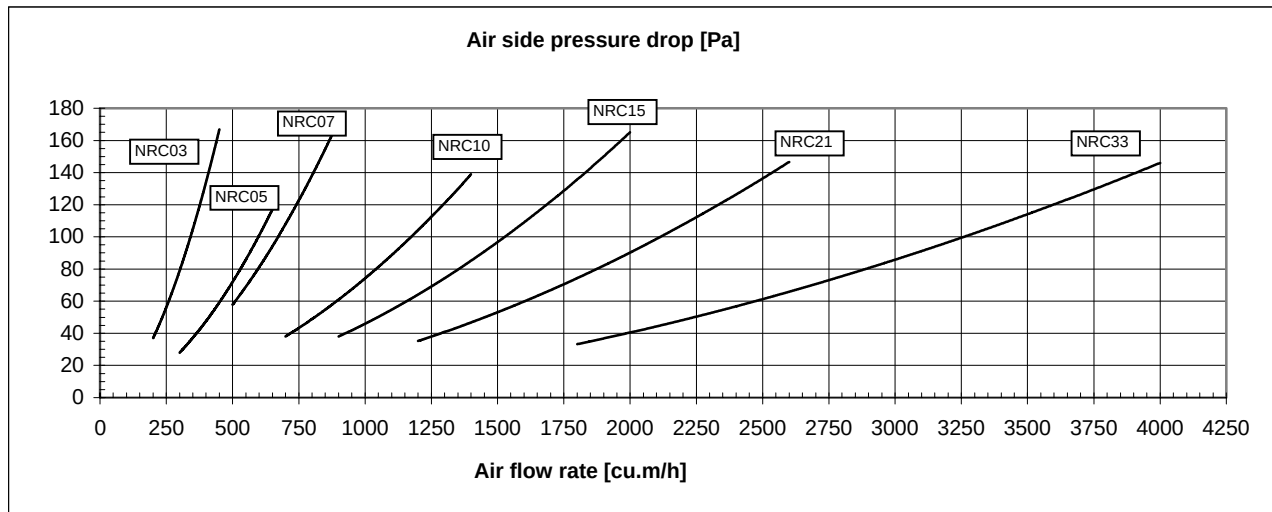
The pressure drops on the water side of the heating coil situated immediately after the heat recovery unit and the reheating coil in the "coil module" are shown in the following diagrams.

The pressure drops on the air side can be read in function of the air flow rate and the size, on the ordinate axis.

As far as the pressure loss on the water side is concerned the following procedure must be adopted:

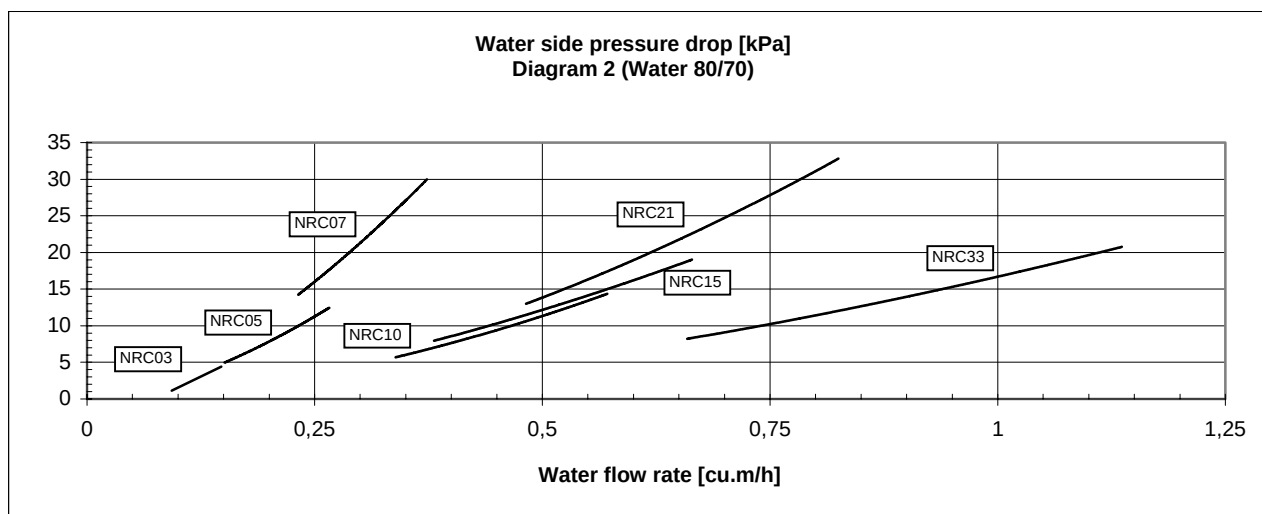
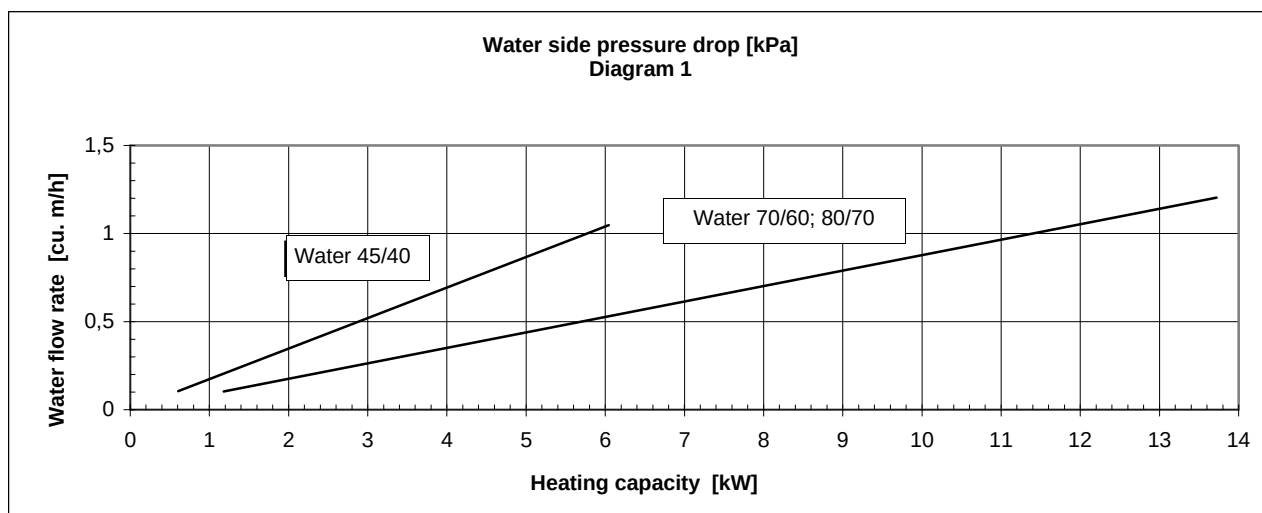
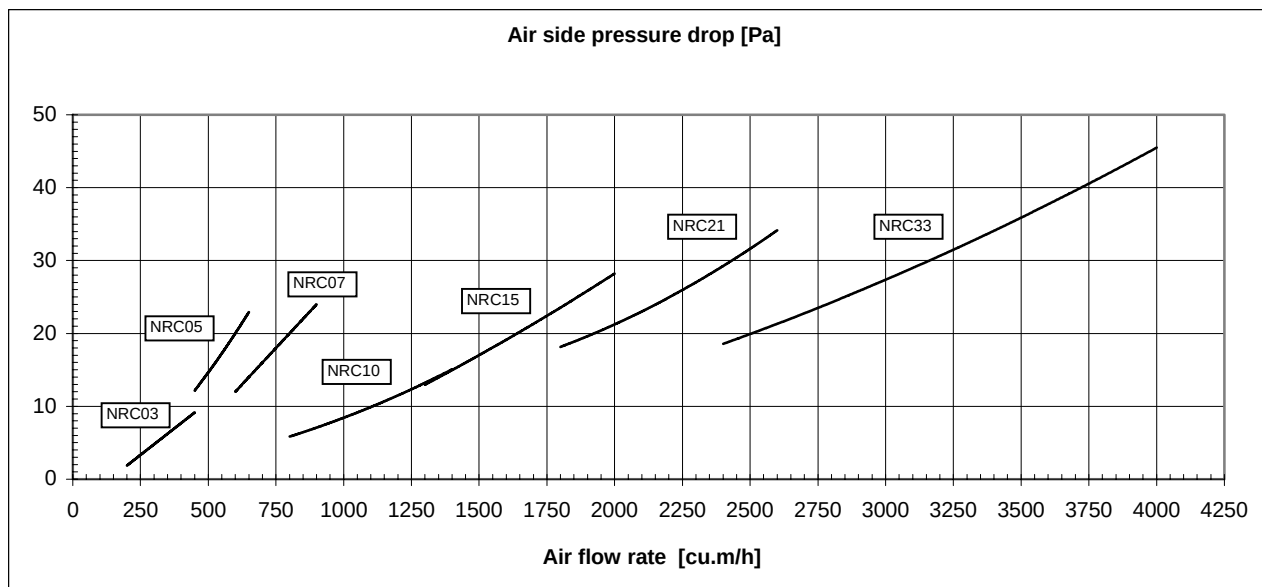
- in diagram 1, when the thermal power required by the coil and the thermal head of the water is known, the water supply flow rate is found on the ordinate axis;
- in diagram 2, when the water flow rate taken from diagram 1 is known, the pressure drops of the coil (including the manifold pressure drops) are read on the ordinate axis. The curves proposed in diagram 2 refer to the 80/70°C supply water: to get the water side pressure drops for other supply temperatures, the values read on the ordinate in diagram 2 must be multiplied the coefficients present in the table.

4.4.1 INSIDE WATER TYPE HEATING COIL (NRCxxA VERSION)



T water in / T water out [°C]	K
45/40	1,15
70/60	0,8
80/70	1,0

4.4.2 WATER RE-HEATING COIL (MPW, BFDW ACCESSORY)



T water in / T water out [°C]	K
45/40	0,85
70/60	0,8
80/70	1,0

4.5 ELECTRIC COILS PERFORMANCE TABLES

4.5.1 INSIDE HEATING COIL (NRCxxE, NRCxxVE VERSION)

NRC MODEL		03	05	07	10	15	21	33
Heating capacity	kW	3	3	6	6	10	15	25
Air side pressure drop (*)	Pa	10	10	10	10	10	10	10
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Stages	n°	2	2	2	2	3	3	3
Absorption	A	4,6	4,6	9,1	9,1	15,2	22,7	37,9
Thermal head (*)	°C	26	17	24	18	20	21	23

(*) At nominal air flow

4.5.2 REHEATING COIL (MPX, BFDX VERSION)

NRC MODEL		03	05	07	10	15	21	33
Heating capacity	kW	1,5	2	3	4	6	8	13
Air side pressure drop (*)	Pa	10	10	10	10	10	10	10
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Stages	n°	2	2	2	2	3	3	3
Absorption	A	2,3	3	4,6	5,3	9,1	12,1	19,7
Thermal head (*)	°C	13	11	12	12	12	11	12

(*) At nominal air flow

4.6 COOLING COIL PERFORMANCE TABLES

4.6.1 WATER COOLING COIL (BF, MPW, MPX accessory)

It is possible to read the operating data for the water cooling coil in the "coil module" in the following table for each unit size and dependent on the air flow rate.

Key

Pa: air flow rate
Tia: Input air temperature
UR: Relative humidity
Tua: air output temperature
Qtot: total refrigerating capacity
Qsen: sensible refrigerating capacity
Pw: feed water flow rate
DPw: water side pressure drops (including the coil manifold pressure drops)

NRC 03 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
200	27	60	13,4	95	1,63	0,89	280	5,7	8
	28	60	13,6	95	1,80	0,94	309	5,7	8
	29	60	13,8	95	1,98	0,99	340	7,6	8
	30	60	14,2	95	2,12	1,03	365	9,5	8
250	27	60	14,2	93	1,90	1,05	326	7,6	12
	28	60	14,4	93	2,11	1,11	363	9,5	12
	29	60	14,6	93	2,33	1,18	402	9,5	12
	30	60	14,7	93	2,58	1,25	443	11,4	12
300	27	60	14,8	92	2,15	1,20	370	9,5	17
	28	60	15,0	92	2,41	1,28	414	11,4	17
	29	60	15,1	92	2,68	1,36	461	13,3	17
	30	60	15,3	92	2,97	1,44	511	15,2	17
350	27	60	15,3	91	2,40	1,35	413	11,4	22
	28	60	15,5	91	2,70	1,44	465	13,3	22
	29	60	15,6	91	3,02	1,53	520	17,1	22
	30	60	15,7	91	3,37	1,63	579	19	22
400	27	60	15,7	90	2,64	1,49	455	13,3	29
	28	60	15,9	90	2,98	1,59	512	15,2	29
	29	60	16,0	90	3,37	1,70	579	19	29
	30	60	16,1	90	3,76	1,81	647	24,7	29
450	27	60	16,0	89	2,88	1,63	496	15,2	36
	28	60	16,2	89	3,28	1,75	564	19	36
	29	60	16,3	89	3,71	1,87	638	22,8	36
	30	60	16,4	89	4,16	2,00	715	28,5	36

NRC 05 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
300	27	60	14,8	92	2,15	1,20	370	9,5	17
	28	60	15,0	92	2,41	1,28	414	11,4	17
	29	60	15,1	92	2,68	1,36	461	13,3	17
	30	60	15,3	92	2,97	1,44	511	15,2	17
350	27	60	15,3	91	2,40	1,35	413	11,4	22
	28	60	15,5	91	2,70	1,44	465	13,3	22
	29	60	15,6	91	3,02	1,53	520	17,1	22
	30	60	15,7	91	3,37	1,63	579	19	22
400	27	60	15,7	90	2,64	1,49	455	13,3	29
	28	60	15,9	90	2,98	1,59	512	15,2	29
	29	60	16,0	90	3,37	1,70	579	19	29
	30	60	16,1	90	3,76	1,81	647	24,7	29
450	27	60	16,0	89	2,88	1,63	496	15,2	36
	28	60	16,2	89	3,28	1,75	564	19	36
	29	60	16,3	89	3,71	1,87	638	22,8	36
	30	60	16,4	89	4,16	2,00	715	28,5	36
500	27	60	16,3	89	3,13	1,76	538	17,1	43
	28	60	16,4	88	3,57	1,90	614	20,9	43
	29	60	16,5	88	4,05	2,04	696	26,6	43
	30	60	16,6	88	4,55	2,18	783	32,3	43
550	27	60	16,5	88	3,37	1,90	579	19	52
	28	60	16,6	88	3,86	2,05	665	24,7	52
	29	60	16,7	87	4,39	2,20	755	30,4	52
	30	60	16,8	87	4,94	2,35	850	38	52
600	27	60	16,7	87	3,61	2,03	620	22,8	61
	28	60	16,8	87	4,16	2,20	715	28,5	61
	29	60	16,9	87	4,73	2,36	814	36,1	61
	30	60	17,0	87	5,33	2,53	916	43,7	61
650	27	60	16,9	86	3,86	2,16	664	24,7	70
	28	60	17,0	86	4,45	2,34	766	32,3	70
	29	60	17,1	86	5,08	2,53	873	39,9	70
	30	60	17,2	86	5,71	2,70	982	49,4	70

NRC 07 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
500	27	60	15,6	92	3,3	1,88	567	5,7	20
	28	60	15,8	92	3,71	2	638	7,6	20
	29	60	15,9	91	4,15	2,13	714	9,5	20
	30	60	16,1	91	4,62	2,26	795	11,4	20
550	27	60	15,9	91	3,51	2,01	605	7,6	24
	28	60	16,1	91	3,97	2,15	682	9,5	24
	29	60	16,3	91	4,43	2,28	762	11,4	24
	30	60	16,4	91	4,99	2,44	858	13,3	24
600	27	60	16,1	90	3,73	2,15	641	7,6	29
	28	60	16,3	90	4,23	2,29	727	9,5	29
	29	60	16,5	90	4,77	2,45	820	11,4	29
	30	60	16,6	90	5,35	2,62	920	15,2	29
650	27	60	16,4	90	3,94	2,27	678	9,5	33
	28	60	16,6	90	4,48	2,44	771	11,4	33
	29	60	16,7	90	5,08	2,61	873	13,3	33
	30	60	16,8	89	5,72	2,79	983	17,1	33
700	27	60	16,6	89	4,15	2,4	714	9,5	38
	28	60	16,8	89	4,74	2,58	816	11,4	38
	29	60	16,9	89	5,39	2,77	927	15,2	38
	30	60	17,0	89	6,08	2,96	1046	19	38
750	27	60	16,8	89	4,36	2,53	750	9,5	43
	28	60	16,9	89	5	2,72	860	13,3	43
	29	60	17,1	88	5,7	2,92	980	17,1	43
	30	60	17,2	88	6,45	3,13	1109	20,9	43
800	27	60	16,9	88	4,57	2,65	786	11,4	49
	28	60	17,1	88	5,25	2,86	904	15,2	49
	29	60	17,2	88	6,01	3,08	1034	19	49
	30	60	17,3	88	6,82	3,3	1172	22,8	49
850	27	60	17,1	88	4,77	2,77	820	11,4	54
	28	60	17,2	88	5,53	3	950	15,2	54
	29	60	17,3	87	6,33	3,23	1089	19	54
	30	60	17,4	87	7,18	3,48	1236	24,7	54
900	27	60	17,2	87	4,99	2,9	859	13,3	61
	28	60	17,4	87	5,79	3,14	996	17,1	61
	29	60	17,5	87	6,65	3,39	1144	20,9	61
	30	60	17,6	87	7,55	3,64	1299	26,6	61

NRC 10 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Q _{tot} [kW]	Q _{sen} [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
700	27	60	14,1	93	5,35	2,96	921	9,5	12
	28	60	14,2	93	6,02	3,16	1035	11,4	12
	29	60	14,2	93	6,72	3,37	1156	13,3	12
	30	60	14,3	93	7,46	3,59	1283	17,1	12
800	27	60	14,5	93	5,94	3,29	1022	11,4	15
	28	60	14,5	92	6,71	3,53	1154	13,3	15
	29	60	14,6	92	7,53	3,77	1294	17,1	15
	30	60	14,6	92	8,38	4,02	1441	20,9	15
900	27	60	14,8	92	6,53	3,62	1123	13,3	19
	28	60	14,8	92	7,41	3,89	1275	17,1	19
	29	60	14,8	92	8,32	4,16	1431	20,9	19
	30	60	14,8	91	9,29	4,44	1598	24,7	19
1000	27	60	15,0	91	7,12	3,94	1225	15,2	23
	28	60	15,0	91	8,11	4,25	1395	19	23
	29	60	15,1	91	9,14	4,55	1572	24,7	23
	30	60	15,1	91	10,2	4,86	1755	28,5	23
1100	27	60	15,2	90	7,72	4,26	1328	17,1	27
	28	60	15,2	90	8,81	4,6	1516	22,8	27
	29	60	15,3	90	9,94	4,94	1711	28,5	27
	30	60	15,3	90	11,11	5,27	1911	34,2	27
1200	27	60	15,4	90	8,32	4,59	1431	20,9	32
	28	60	15,4	89	9,52	4,95	1637	26,6	32
	29	60	15,4	89	10,75	5,32	1849	32,3	32
	30	60	15,5	89	12	5,68	2064	38	32
1300	27	60	15,5	89	8,93	4,9	1535	22,8	37
	28	60	15,5	89	10,22	5,3	1758	28,5	37
	29	60	15,6	89	11,54	5,69	1985	36,1	37
	30	60	15,6	88	12,88	6,07	2215	43,7	37
1400	27	60	15,7	88	9,53	5,22	1639	26,6	42
	28	60	15,7	88	10,92	5,65	1879	32,3	42
	29	60	15,7	88	12,32	6,06	2120	39,9	42
	30	60	15,8	88	13,74	6,46	2365	49,4	42

NRC 15 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Q _{tot} [kW]	Q _{sen} [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
900	27	60	15,2	92	6,15	3,48	1059	7,6	19
	28	60	15,4	92	6,98	3,73	1201	9,5	19
	29	60	15,4	92	7,87	3,99	1353	13,3	19
	30	60	15,4	92	8,81	4,26	1515	15,2	19
1100	27	60	15,8	90	7,18	4,07	1235	11,4	27
	28	60	15,8	90	8,22	4,39	1414	13,3	27
	29	60	15,9	90	9,33	4,72	1605	17,1	27
	30	60	15,9	90	10,5	5,05	1806	20,9	27
1300	27	60	16,1	89	8,2	4,64	1411	13,3	37
	28	60	16,2	89	9,48	5,03	1630	17,1	37
	29	60	16,2	89	10,81	5,43	1859	22,8	37
	30	60	16,2	89	12,18	5,82	2096	26,6	37
1500	27	60	16,4	88	9,29	5,23	1597	17,1	48
	28	60	16,4	88	10,76	5,68	1851	22,8	48
	29	60	16,5	88	12,29	6,13	2114	28,5	48
	30	60	16,5	87	13,84	6,57	2381	34,2	48
1700	27	60	16,6	87	10,37	5,8	1784	20,9	61
	28	60	16,7	87	12,05	6,32	2073	26,6	61
	29	60	16,7	87	13,75	6,82	2366	34,2	61
	30	60	16,8	86	15,47	7,3	2661	41,8	61
1900	27	60	16,8	86	11,48	6,38	1974	24,7	74
	28	60	16,8	86	13,33	6,95	2294	32,3	74
	29	60	16,9	86	15,19	7,49	2613	39,9	74
	30	60	17,1	86	16,94	7,97	2914	49,4	74

NRC 21 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
1200	27	60	15,9	91	7,58	4,37	1304	7,6	24
	28	60	16,0	91	8,68	4,71	1493	9,5	24
	29	60	16,1	91	9,88	5,06	1699	11,4	24
	30	60	16,1	91	11,15	5,43	1918	13,3	24
1400	27	60	16,3	90	8,5	4,92	1462	9,5	31
	28	60	16,4	90	9,86	5,33	1695	11,4	31
	29	60	16,4	90	11,28	5,76	1941	15,2	31
	30	60	16,4	90	12,78	6,19	2199	17,1	31
1600	27	60	16,6	89	9,5	5,48	1633	11,4	40
	28	60	16,6	89	11,05	5,96	1901	13,3	40
	29	60	16,7	89	12,71	6,45	2186	17,1	40
	30	60	16,7	89	14,43	6,94	2482	22,8	40
1800	27	60	16,8	88	10,49	6,03	1804	13,3	50
	28	60	16,8	88	12,28	6,58	2113	17,1	50
	29	60	16,9	88	14,15	7,14	2434	20,9	50
	30	60	16,9	87	16,06	7,68	2763	26,6	50
2000	27	60	17,0	87	11,51	6,59	1981	15,2	61
	28	60	17,0	87	13,53	7,2	2327	19	61
	29	60	17,0	87	15,59	7,81	2681	24,7	61
	30	60	17,1	87	17,67	8,4	3039	32,3	61
2200	27	60	17,1	86	12,56	7,14	2161	17,1	72
	28	60	17,1	86	14,78	7,82	2542	22,8	72
	29	60	17,2	86	17,01	8,48	2927	30,4	72
	30	60	17,3	86	19,25	9,11	3311	36,1	72
2400	27	60	17,2	86	13,63	7,7	2344	20,9	85
	28	60	17,3	85	16,02	8,43	2756	26,6	85
	29	60	17,3	85	18,42	9,13	3169	34,2	85
	30	60	17,5	85	20,74	9,78	3568	41,8	85

NRC 33 [Water 7/12°C]									
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	Pw [l/h]	DPw [kPa]	DPa [Pa]
1800	27	60	16,5	90	10,64	6,22	1830	7,6	31
	28	60	16,5	90	12,4	6,77	2134	9,5	31
	29	60	16,5	90	14,32	7,34	2462	13,3	31
	30	60	16,5	90	16,31	7,92	2806	15,2	31
2200	27	60	16,9	88	12,6	7,34	2168	9,5	44
	28	60	16,8	88	14,87	8,04	2558	13,3	44
	29	60	16,8	88	17,24	8,75	2966	17,1	44
	30	60	16,8	88	19,65	9,44	3380	22,8	44
2600	27	60	17,1	87	14,68	8,46	2526	13,3	61
	28	60	17,1	87	17,41	9,3	2995	17,1	61
	29	60	17,1	87	20,17	10,13	3470	22,8	61
	30	60	17,1	87	22,93	10,91	3945	28,5	61
3000	27	60	17,3	86	16,85	9,59	2899	17,1	79
	28	60	17,3	86	19,97	10,56	3435	22,8	79
	29	60	17,3	86	23,06	11,47	3967	28,5	79
	30	60	17,4	85	26,11	12,32	4491	36,1	79
3400	27	60	17,4	85	19,06	10,72	3278	20,9	99
	28	60	17,4	85	22,51	11,78	3871	28,5	99
	29	60	17,5	84	25,88	12,76	4452	36,1	99
	30	60	17,8	84	28,64	13,49	4927	41,8	99
3800	27	60	17,5	84	21,27	11,83	3658	24,7	122
	28	60	17,6	84	24,99	12,96	4299	34,2	122
	29	60	17,8	84	28,14	13,85	4840	41,8	122
	30	60	18,2	83	31,14	14,64	5358	49,4	122

4.6.2 DIRECT EXPANSIONS COOLING COILS (BFD, BFDX, BFDW ACCESSORIES)

It is possible to read the operating data for the direct expansion cooling coil in the "coil module" in the following table for each unit size and dependent on the air flow rate.

The performance refers to the following conditions:

- R407C refrigerant; average evaporation temperature 5°C; condensing temperature 47°C.

Key

Pa: air flow rate
 Tia: input air temperature
 UR: relative humidity
 Tua: air output temperature
 Qtot: total refrigerating capacity
 Qsen: sensitive refrigerating capacity
 DPf: refrigerant fluid side pressure drop
 DPa: air side pressure drop

NRC 03 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	DPf [kPa]	DPa [Pa]
200	27	60	10,9	94	2,03	1,06	7	8
	28	60	11,2	94	2,19	1,1	8	8
	29	60	11,4	94	2,36	1,15	9	8
	30	60	11,6	94	2,54	1,2	10	8
250	27	60	11,8	93	2,4	1,25	9	12
	28	60	12,1	93	2,6	1,31	10	12
	29	60	12,3	93	2,8	1,36	12	12
	30	60	12,6	93	3,01	1,41	14	12
300	27	60	12,5	92	2,74	1,43	12	17
	28	60	12,8	91	2,96	1,49	13	17
	29	60	13,2	91	3,19	1,55	15	17
	30	60	13,5	91	3,43	1,61	17	17
350	27	60	13,2	90	3,05	1,59	14	22
	28	60	13,5	90	3,29	1,66	16	22
	29	60	13,9	90	3,55	1,73	18	22
	30	60	14,2	90	3,82	1,79	21	22
400	27	60	13,7	89	3,33	1,74	16	29
	28	60	14,1	89	3,6	1,82	19	29
	29	60	14,5	89	3,88	1,89	21	29
	30	60	14,9	89	4,17	1,96	24	29
450	27	60	14,2	89	3,59	1,89	19	36
	28	60	14,7	89	3,88	1,97	21	36
	29	60	15,1	89	4,18	2,04	25	36
	30	60	15,5	89	4,5	2,12	28	36

NRC 05 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	DPf [kPa]	DPa [Pa]
300	27	60	12,5	92	2,74	1,43	12	17
	28	60	12,8	91	2,96	1,49	13	17
	29	60	13,2	91	3,19	1,55	15	17
	30	60	13,5	91	3,43	1,61	17	17
350	27	60	13,2	90	3,05	1,59	14	22
	28	60	13,5	90	3,29	1,66	16	22
	29	60	13,9	90	3,55	1,73	18	22
	30	60	14,2	90	3,82	1,79	21	22
400	27	60	13,7	89	3,33	1,74	16	29
	28	60	14,1	89	3,6	1,82	19	29
	29	60	14,5	89	3,88	1,89	21	29
	30	60	14,9	89	4,17	1,96	24	29
450	27	60	14,2	89	3,59	1,89	19	36
	28	60	14,7	89	3,88	1,97	21	36
	29	60	15,1	89	4,18	2,04	25	36
	30	60	15,5	89	4,5	2,12	28	36
500	27	60	14,7	88	3,83	2,02	21	43
	28	60	15,2	88	4,14	2,1	24	43
	29	60	15,6	88	4,47	2,19	28	43
	30	60	16,1	88	4,8	2,27	31	43
550	27	60	15,1	87	4,05	2,15	23	52
	28	60	15,6	87	4,38	2,24	27	52
	29	60	16,1	87	4,73	2,32	31	52
	30	60	16,6	87	5,09	2,41	35	52
600	27	60	15,5	87	4,26	2,27	25	61
	28	60	16	87	4,61	2,36	29	61
	29	60	16,5	87	4,98	2,45	33	61
	30	60	17	87	5,35	2,54	38	61
650	27	60	15,9	86	4,46	2,38	28	70
	28	60	16,4	86	4,83	2,48	32	70
	29	60	16,9	86	5,21	2,57	36	70
	30	60	17,4	86	5,6	2,66	41	70

NRC 07 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	DPf [kPa]	DPa [Pa]
500	27	60	13	91	4,42	2,31	12	20
	28	60	13,3	91	4,78	2,41	14	20
	29	60	13,6	91	5,15	2,51	16	20
	30	60	14	91	5,54	2,6	18	20
550	27	60	13,4	90	4,71	2,47	13	24
	28	60	13,7	90	5,1	2,57	15	24
	29	60	14,1	90	5,5	2,68	18	24
	30	60	14,5	90	5,91	2,78	20	24
600	27	60	13,7	89	4,99	2,62	15	29
	28	60	14,1	89	5,4	2,73	17	29
	29	60	14,5	89	5,82	2,84	20	29
	30	60	14,9	89	6,26	2,94	22	29
650	27	60	14,1	89	5,25	2,76	16	33
	28	60	14,5	89	5,68	2,88	19	33
	29	60	14,9	89	6,13	2,99	21	33
	30	60	15,3	89	6,59	3,1	24	33
700	27	60	14,4	88	5,5	2,9	18	38
	28	60	14,8	88	5,95	3,02	20	38
	29	60	15,3	88	6,42	3,14	23	38
	30	60	15,7	88	6,91	3,26	26	38
750	27	60	14,7	88	5,74	3,03	19	43
	28	60	15,2	88	6,21	3,16	22	43
	29	60	15,6	88	6,7	3,28	25	43
	30	60	16,1	88	7,2	3,4	29	43
800	27	60	15	87	5,97	3,16	20	49
	28	60	15,5	87	6,46	3,29	24	49
	29	60	15,9	87	6,97	3,42	27	49
	30	60	16,4	87	7,49	3,54	31	49
850	27	60	15,3	87	6,19	3,28	22	54
	28	60	15,7	87	6,69	3,42	25	54
	29	60	16,2	87	7,22	3,55	29	54
	30	60	16,7	87	7,76	3,68	33	54
900	27	60	15,5	87	6,39	3,4	23	61
	28	60	16	87	6,92	3,54	27	61
	29	60	16,5	87	7,46	3,67	30	61
	30	60	17	87	8,03	3,81	35	61

NRC 10 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	DPf [kPa]	DPa [Pa]
700	27	60	11,7	93	6,75	3,51	18	12
	28	60	12	93	7,3	3,67	21	12
	29	60	12,3	93	7,87	3,82	24	12
	30	60	12,6	93	8,45	3,97	27	12
800	27	60	12,3	92	7,43	3,87	22	15
	28	60	12,6	92	8,04	4,04	25	15
	29	60	12,9	92	8,67	4,21	29	15
	30	60	13,2	92	9,32	4,38	33	15
900	27	60	12,8	91	8,08	4,22	25	19
	28	60	13,1	91	8,74	4,4	29	19
	29	60	13,4	91	9,42	4,58	33	19
	30	60	13,8	91	10,12	4,76	38	19
1000	27	60	13,2	90	8,68	4,54	29	23
	28	60	13,6	90	9,39	4,73	33	23
	29	60	13,9	90	10,12	4,93	38	23
	30	60	14,3	90	10,88	5,11	43	23
1100	27	60	13,6	90	9,24	4,84	32	27
	28	60	14	90	10	5,05	37	27
	29	60	14,4	90	10,78	5,25	42	27
	30	60	14,8	90	11,6	5,45	48	27
1200	27	60	14	89	9,78	5,14	36	32
	28	60	14,4	89	10,58	5,35	41	32
	29	60	14,8	89	11,41	5,57	47	32
	30	60	15,2	89	12,27	5,78	53	32
1300	27	60	14,3	88	10,29	5,41	39	37
	28	60	14,8	88	11,13	5,64	45	37
	29	60	15,2	88	12	5,86	51	37
	30	60	15,6	88	12,91	6,08	59	37
1400	27	60	14,7	88	10,77	5,68	42	42
	28	60	15,1	88	11,65	5,92	49	42
	29	60	15,5	88	12,56	6,15	56	42
	30	60	16	88	13,51	6,38	64	42

NRC 15 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Q _{tot} [kW]	Q _{sen} [kW]	DP _f [kPa]	DP _a [Pa]
900	27	60	12,1	91	8,54	4,4	16	19
	28	60	12,4	91	9,2	4,59	18	19
	29	60	12,8	91	9,88	4,76	20	19
	30	60	13,1	91	10,59	4,94	23	19
1100	27	60	13	89	9,78	5,06	20	27
	28	60	13,4	89	10,54	5,26	23	27
	29	60	13,8	89	11,32	5,46	26	27
	30	60	14,2	89	12,13	5,66	29	27
1300	27	60	13,8	88	10,88	5,65	24	37
	28	60	14,2	88	11,73	5,87	27	37
	29	60	14,7	88	12,6	6,09	31	37
	30	60	15,1	88	13,51	6,31	35	37
1500	27	60	14,5	87	11,88	6,19	28	48
	28	60	14,9	87	12,8	6,43	32	48
	29	60	15,4	87	13,76	6,67	37	48
	30	60	15,9	87	14,75	6,9	41	48
1700	27	60	15	86	12,78	6,69	32	61
	28	60	15,5	86	13,78	6,94	37	61
	29	60	16	86	14,81	7,2	42	61
	30	60	16,5	86	15,87	7,45	47	61
1900	27	60	15,5	86	13,61	7,15	36	74
	28	60	16,1	86	14,67	7,43	41	74
	29	60	16,6	86	15,77	7,69	47	74
	30	60	17,1	86	16,91	7,96	53	74

NRC 21 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Q _{tot} [kW]	Q _{sen} [kW]	DP _f [kPa]	DP _a [Pa]
1200	27	60	12,7	90	10,94	5,65	16	24
	28	60	13	90	11,79	5,88	18	24
	29	60	13,4	90	12,67	6,11	21	24
	30	60	13,8	90	13,57	6,33	24	24
1400	27	60	13,4	89	12,11	12,11	19	31
	28	60	13,8	89	13,05	13,05	22	31
	29	60	14,2	89	14,02	14,02	25	31
	30	60	14,6	89	15,02	15,02	28	31
1600	27	60	14	88	13,17	13,17	22	40
	28	60	14,4	88	14,19	14,19	26	40
	29	60	14,9	88	15,25	15,25	29	40
	30	60	15,3	88	16,34	16,34	33	40
1800	27	60	14,5	87	14,14	7,37	25	50
	28	60	15	87	15,24	7,66	29	50
	29	60	15,5	87	16,38	7,94	33	50
	30	60	16	87	17,56	8,22	38	50
2000	27	60	15	86	15,04	7,87	28	61
	28	60	15,5	86	16,21	8,17	33	61
	29	60	16	86	17,42	8,47	37	61
	30	60	16,5	86	18,68	8,76	42	61
2200	27	60	15,5	86	15,87	8,34	31	72
	28	60	16	86	17,11	8,65	36	72
	29	60	16,5	86	18,39	8,97	41	72
	30	60	17,1	86	19,72	9,27	46	72
2400	27	60	15,9	85	16,65	8,78	34	85
	28	60	16,4	85	17,95	9,11	39	85
	29	60	17	85	19,29	9,44	44	85
	30	60	17,5	85	20,68	9,76	50	85

NRC 33 [R407C; Tev 5°C; Tcond 47°C]								
Pa [m³/h]	Tia [°C]	UR [%]	Tua [°C]	UR [%]	Qtot [kW]	Qsen [kW]	DPf [kPa]	DPa [Pa]
1800	13,9	60	13,9	89	14,77	7,75	8	31
	14,3	60	14,3	89	15,98	8,08	9	31
	14,7	60	14,7	89	17,23	8,4	10	31
	15,1	60	15,1	89	18,53	8,72	11	31
2200	14,8	60	14,8	88	16,74	8,84	9	44
	15,2	60	15,2	88	18,11	9,21	11	44
	15,7	60	15,7	88	19,53	9,57	13	44
	16,1	60	16,1	88	21,01	9,92	14	44
2600	27	60	15,5	87	18,47	9,82	11	61
	28	60	16	87	19,99	10,22	13	61
	29	60	16,5	87	21,56	10,62	15	61
	30	60	17	87	23,19	11	17	61
3000	27	60	16,1	86	20,01	10,72	13	79
	28	60	16,7	85	21,66	11,15	15	79
	29	60	17,2	85	23,36	11,57	17	79
	30	60	17,7	85	25,13	11,99	20	79
3400	27	60	16,7	85	21,4	11,55	15	99
	28	60	17,2	85	23,16	12	17	99
	29	60	17,8	85	24,99	12,45	19	99
	30	60	18,3	85	26,88	12,89	22	99
3800	27	60	17,1	84	22,66	12,32	16	122
	28	60	17,7	84	24,52	12,8	19	122
	29	60	18,3	84	26,46	13,27	22	122
	30	60	18,9	84	28,47	13,74	25	122

4.7 NOISE DATA

In the following table, the following is provided for each unit size :

- the values of the weighted sound pressure level A for each frequency band indicated [dB(A)];
- the overall weighted sound pressure level A [dB(A)].

The data refers to the unit operating with fans at top speed, delivery and expulsion vents channelled for at least two meters, reading distance from the unit 1.5 m, direction factor 2.

Sound pressure level								
Model	Frequencies (Hz)							Total
	125	250	500	1000	2000	4000	8000	Lp _{TOT} (A)
NRC03	42,3	35,6	33,1	34,0	31,9	28,2	14,1	44,4
NRC05	38,6	37,7	35,6	36,3	34,4	31,6	20,4	44,0
NRC07	35,9	36,5	37,5	38,1	37,6	34,4	22,1	44,6
NRC10	36,2	40,3	41,4	42,2	41,4	37,6	24,4	48,1
NRC15	37,5	40,7	41,2	40,8	39,8	37,0	24,4	47,6
NRC21	38,8	44,0	45,9	48,2	45,9	42,2	29,4	52,9
NRC33	41,0	45,6	49,4	51,0	49,1	43,2	29,3	55,6

INSTALLATION, USE AND MAINTENANCE MANUAL

1. Conformity declaration

N.B.: This conformity declaration is valid if the instructions in this manual are complied with

CONFORMITY DECLARATION  FAST S.p.A. 35044 Montagnana (PD) – Italy Via Luppia Alberi, 170 – Tel. (+39) 0429 806311 Telefax (+39) 0429 806340 www.fastaer.com
NRC series heat recovery unit We the undersigned declare under our own responsibility that this machine complies with the provisions of: - Machine directive 89/392/CE and subsequent modifications; - Low Tension directive 73/23/CE and subsequent modifications; - Electromagnetic compatibility directive 89/336/CE and subsequent modifications;
Montagnana, 03/05/2004 Rag. Paolo Gasparini 

2. Main warranty conditions

- The warranty does not include payment for damage due to wrong installation of the unit by the installer.
- The warranty does not include payment for damage due to improper use of the unit by the user.
- The Manufacturer shall not be held liable for accidents to the installer or the user deriving from improper installation or improper use of the unit.

The warranty is not valid when:

- servicing and repairs have been carried out by non-authorised companies or persons;
- the unit has been previously repaired or modified using non-OEM spare parts;
- the unit has not been maintained properly;
- if the instructions described in this manual have not been carried out;
- if non-authorised modifications have been made;

The Manufacturer reserves the right at all times to make any modification for the improvement of its product and is not obliged to add these modification to machines of previous manufacture that have already been delivered or are being built.

The warranty conditions are subject to the general sales conditions at the moment the contract is finalised.

3. Introduction

3.1 GENERAL



This manual is an integral part of the documentation enclosed with the unit. It must be kept for future reference and must accompany the machine throughout its life. The manual defines the purpose for which the machine has been built and establishes its correct installation and the limits of its use. This manual contains all the use, installation and maintenance instructions and the main accident prevention standards. You are advised to read and adhere carefully to all the instructions before beginning to install, start up, use, maintain and clean the unit.

THE MANUFACTURER DECLINES ALL LIABILITY FOR DAMAGE TO THINGS OR INJURY TO PERSONS AND ANIMALS CAUSED BY THE FAILURE TO OBSERVE THE INSTRUCTIONS AND STANDARDS IN THIS MANUAL.

3.2 DESCRIPTION OF ICONS

Although during the design of the NRC unit, hazards were adequately analysed, the use of the icons described below makes the reading of the manual easier by quickly drawing the attention of the reader to hazardous situations that cannot be avoided or sufficiently limited by the adoption of measures and technical means of protection.



GENERAL HAZARD SIGNAL

Carefully adhere to all the indications next to the icon. Failure to comply with the instructions may generate hazardous situations with possible damage to the health of the operator and user in general.



DANGEROUS ELECTRICAL VOLTAGE SIGNAL

Carefully adhere to all the indications next to the icon. The signal indicates components of the unit or, in this manual, specifies actions that could generate electrically-related risks.



GENERAL PROHIBITION SIGNAL

Carefully adhere to all the indications next to the icon that limit actions in order to guarantee better operator safety.

3.3 GENERAL SAFETY RULES



CAUTION!

The units in the NRC series are for civil and tertiary sector use: for all other uses (in highly corrosive environments, in potentially explosive atmospheres etc.) it is not permitted.

- Before installation check that the units have not been damaged during the transport: the use of the damaged machine might be dangerous;
- Installation and extraordinary maintenance must be carried out by persons with the required qualifications in compliance with the regulations currently in force;
- Never store tools, spare parts, etc. in or on top of the unit. Any use other than that set forth in this manual can generate hazards and is therefore prohibited;
- Before beginning maintenance or cleaning operations, make sure that the unit is not operating and that it cannot be supplied unbeknownst to the people carrying out said operations on the unit;
- During the maintenance and cleaning phases be careful of possible burns deriving from the heating coils;
- Before starting up the unit make sure that the electrical components have been connected to the building's earthing system;

- Before starting up the unit, make sure that the fan vents have been channelled or fitted with an accident prevention mesh;
- The unit has not been designed for external installation: external installation requires special technical installation characteristics and features that the FAST S.p.A. engineering office can evaluate when asked to do so;
- Use proper Individual Protection Devices (IPD) for installation, maintenance and cleaning.

4. Unit Identification

The units are fitted with:

- an adhesive plate that summarises the main technical data such as the model, nominal air flow rate, heat recovery efficiency, electrical data and performance of any coils;
- an adhesive plate that indicates the gross weight and the customer as well as the model.

 FAST S.p.A. MONTAGNANA (PADOVA) - ITALY 	
Mat.	XXXXXXXXXXXX
Mod.	NRCxxX
Portata Air flow [l/s]	XXX
Débit d'air Luftmenge [m³/h]	XXX
Potenza elettrica Power input Puissance électrique Gesamtleistung [W]	X x XXX
V - ph - Hz	230-1-50
Efficienza recuperatore Recovery efficiency Rendement de récupérateur Rekuperator Wirkungsgrad [%]	XX
Riscaldamento (Pot. nominale) Heat (Nominal power) Chaud (Puissance nominale) Heizung (Nennleistung) [kW]	XX

 FAST S.p.A. MONTAGNANA (PADOVA) - ITALY 	
Mat.	XXXXXXXXXXXX
Mod.	NRCxxX
COLLO PACKAGE	MONOBLOCCO
PESO LORDO - GROSS WEIGHT POIDS BRUT - BRUTTO WEIGHT	KG XX
CLIENTE	XXXXXXXXXXXXXXXXXXXX

Each UR unit is identified by means of a serial number on the plates.

For all future references and for all communication with FAST S.p.A. it is necessary to indicate the serial number.

5. Transport and Handling



CAUTION!

During the handling phase, wear proper individual protection devices (IPD)

5.1 PACKING



CAUTION!

The packaging of the unit must be disposed of in accordance with the regulations currently in force.

Before installation and use you are recommended to fully unpack basic unit and the all the components that accompany it.

The units are supplied in packaged form with polyethylene film and normally rest on the wooden pallet with the following modes:

- the first five sizes travel in a horizontal position and are fixed with bolts to the pallets by means of brackets that will serve for anchoring the unit during installation;
- the NRC21 and NRC33 travel in a vertical position and are fixed to the pallet with hoops and with bolts by means of support brackets that cannot later be used for installation purposes.

Some accessories will be despatched separately from the basic unit for transportation reasons and it is therefore the installer's job to reassemble them in accordance with the instructions in this manual.

5.2 TRANSPORT

Refer to the weight indications on the plate on each unit in order to transport the unit safely.

In any case, the following precautions must be taken when transporting the unit:

- the unit or any accessories must not be subject to violent impacts of any kind in order to ensure the frame or internal components do not get broken;
- ropes or other devices that can impede movement must be used to properly fix the unit and any accessories to the transport surface;
- during transportation the unit and any accessories must be protected to prevent the protruding parts such as coil plumbing attachments, condensate drains, electrical components etc. being knocked;
- during transportation the load must be protected from bad weather;



CAUTION!!

During transportation make sure the unit cannot move. Any movement that can generate possibly dangerous situations should be avoided by using suitable means of fixing the piece.

5.3 CHECKS AT MATERIAL RECEIPT

When the unit is received it is necessary to carry out an initial inspection to make sure that:

- all the components are there;
- the basic unit and the accessories have not been damaged.

If there are signs of damage it is necessary to specify it on the delivery note.

The checks are the following:

- check the manifolds of any finned coils and the condensate drains are undamaged;
- check that any plumbing attachments are protected by the relevant rubber caps. If they are not provide suitable closure devices;
- make sure the panelling is undamaged;
- make sure the electrical panel and the electrical and electronic components are undamaged.

5.4 STOCKING AT SITE

The following precautions must be taken when stocking on site:

- the unit and any accessories must be stored inside and protected from accidental strokes;
- the unit must be protected from dust



CAUTION!

The units must not be used as supports for people or objects.

6. Installation



CAUTION!

During the installation phase, wear proper individual protection devices (IPD)



CAUTION!!

Installation and extraordinary maintenance must be carried out by persons with the required qualifications in compliance with the regulations currently in force.

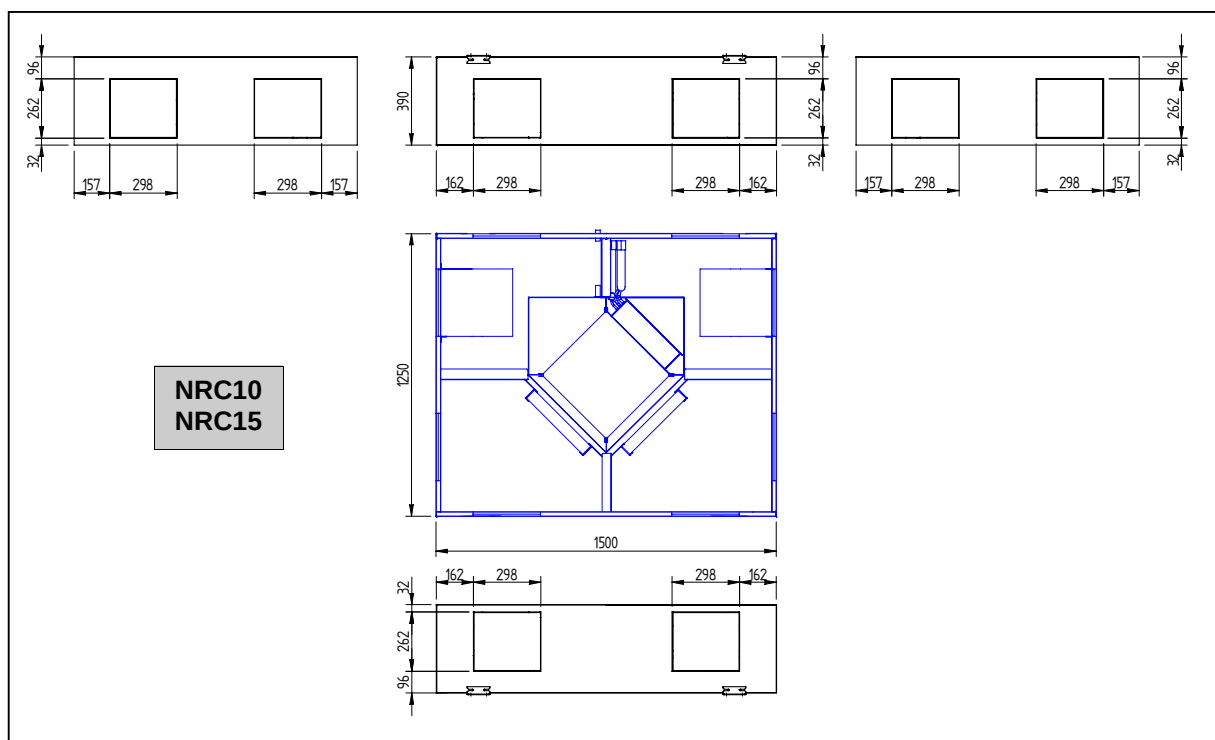
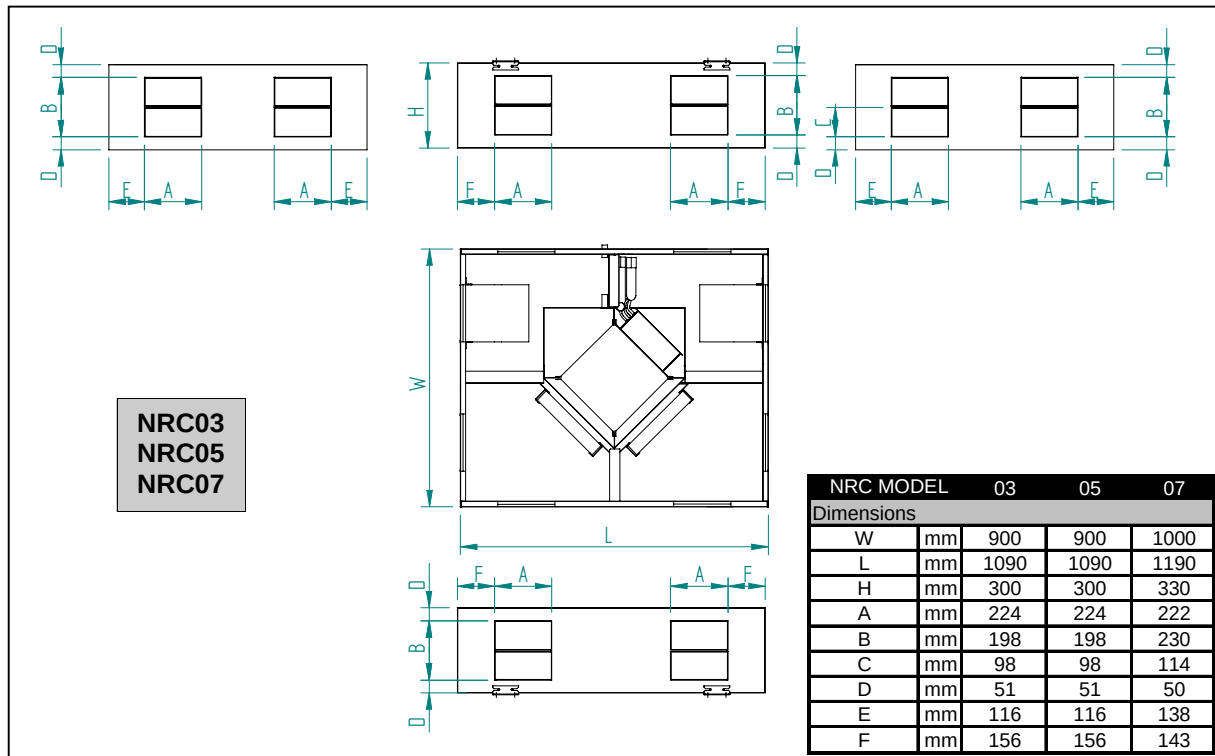
You are recommended to carefully follow the indications in the sections below when installing the equipment. The sections are in chronological order so as to make each phase of the installation easier.

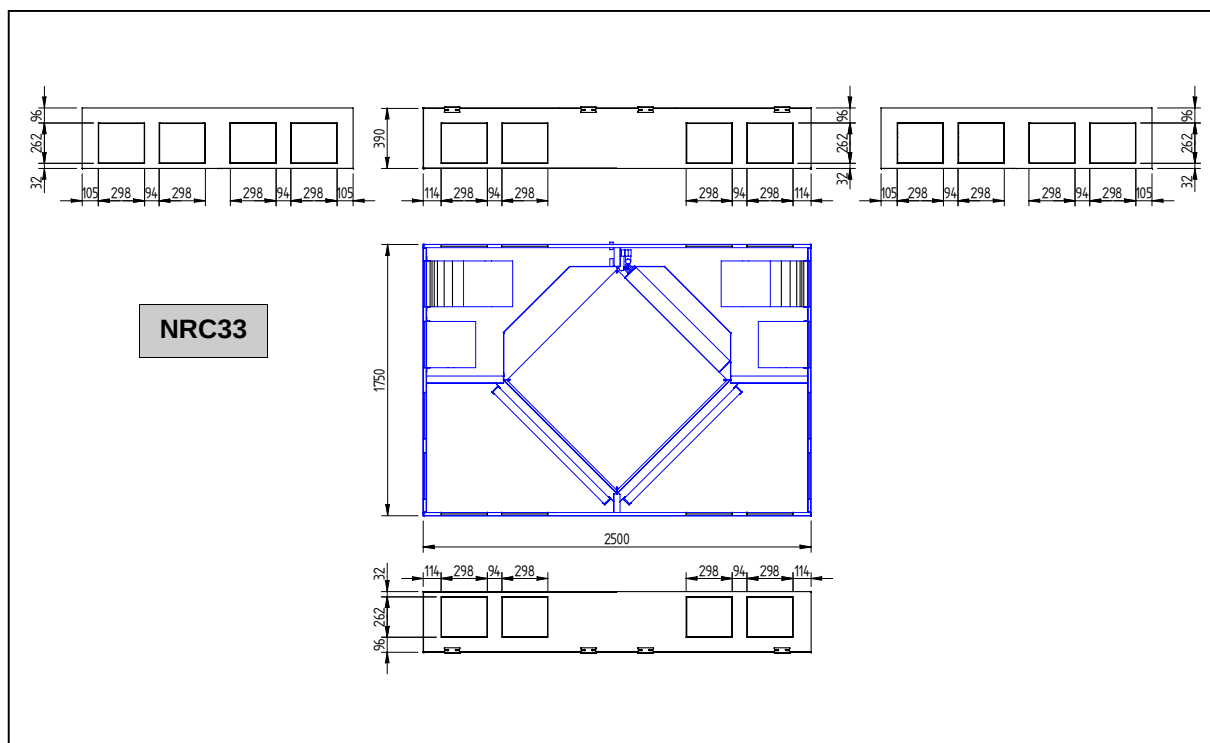
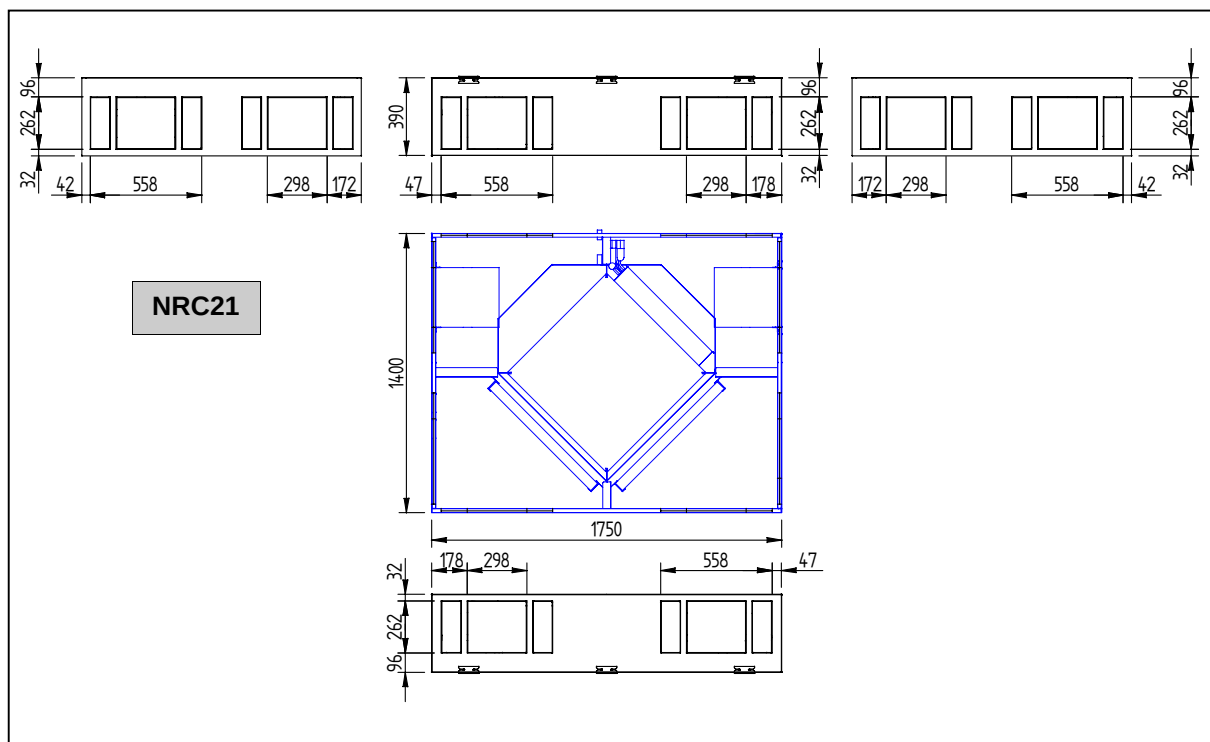
6.1 SIZES

- BASIC UNIT (NRCxxB, NRCxxA, NRCxxE, NRCxxVB, NRCxxVA, NRCxxVE)

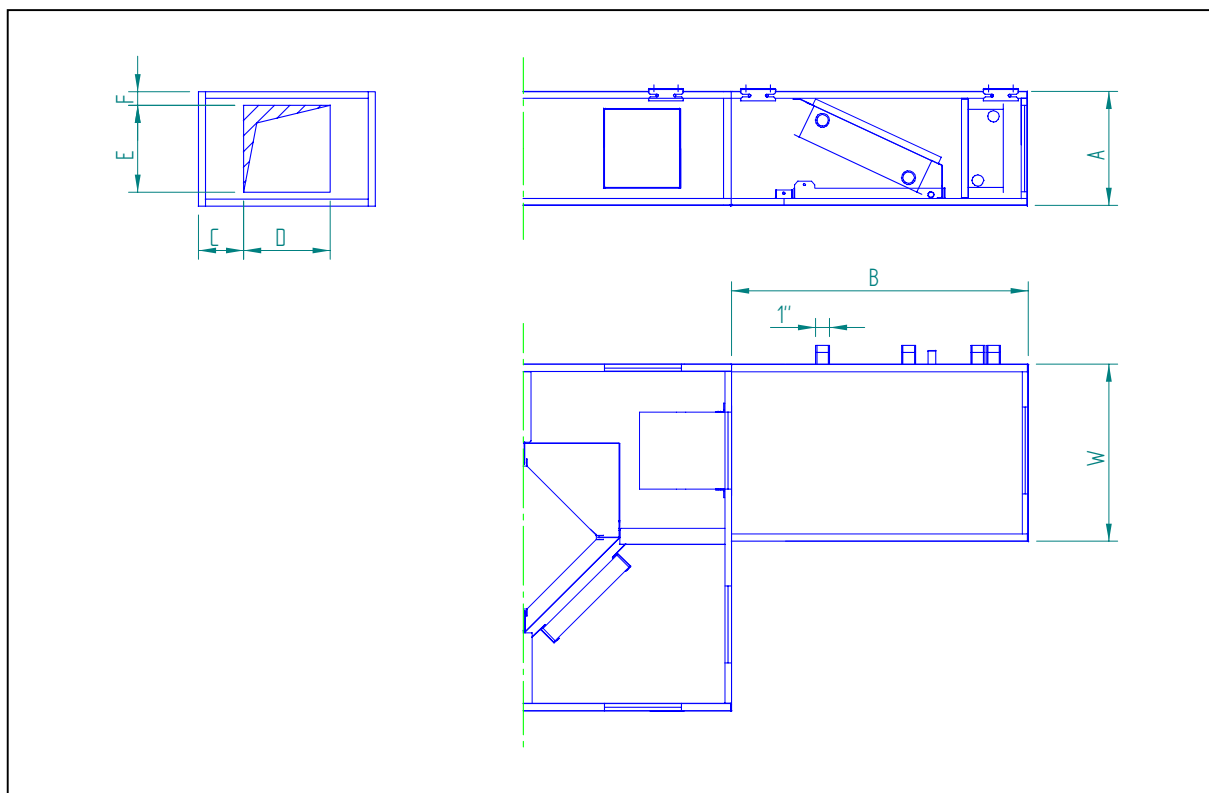
N.B. : opening with pre-sheating must be fully made on the intake side of the unit.

On the delivery side, the openings must be limited to the space necessary for the housing and fixing of the fan vents.



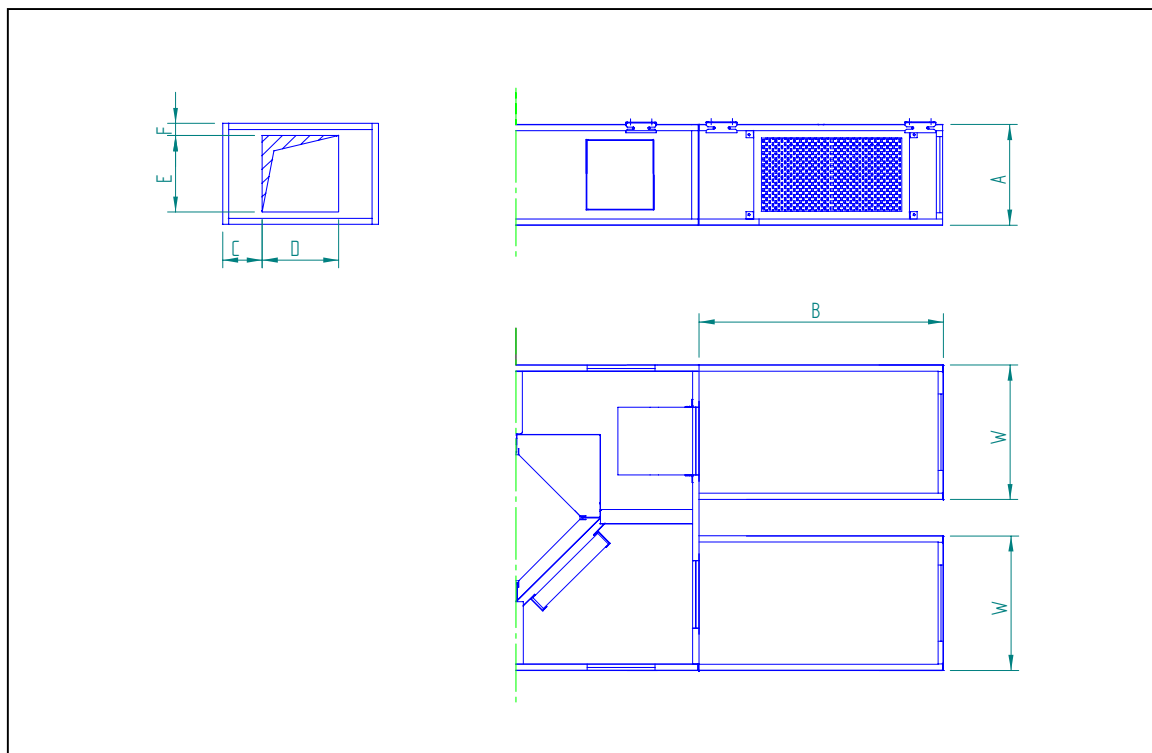


□ COIL MODULE ACCESSORY (BF, MPW, MPX, BFD, BFDW, BFDX)



NRC MODEL		03	05	07	10	15	21	33
Dimensions								
W	mm	460	460	510	635	635	710	860
A	mm	300	300	330	390	390	390	390
B	mm	800	800	850	970	970	970	970
C	mm	105	105	130	167,5	167,5	155	80
D	mm	250	250	250	300	300	400	700
E	mm	220	220	220	300	300	300	300
F	mm	40	40	55	45	45	45	45

□ SILENCERS ACCESSORY (SU)



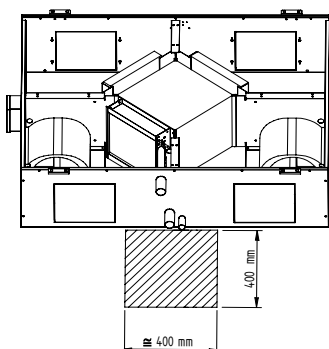
NRC MODEL		03	05	07	10	15	21	33
Dimensions								
W	mm	380	380	430	550	550	620	820
A	mm	300	300	330	390	390	390	390
B	mm	800	800	800	800	800	800	800
C	mm	65	65	90	125	125	110	110
D	mm	250	250	250	300	300	400	700
E	mm	220	220	220	300	300	300	300
F	mm	40	40	55	45	45	45	45

6.2 TECHNICAL SPACES

Before beginning operations a check must be made to ensure that sufficient space is available:

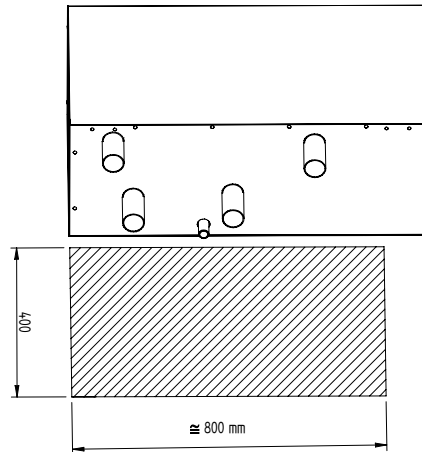
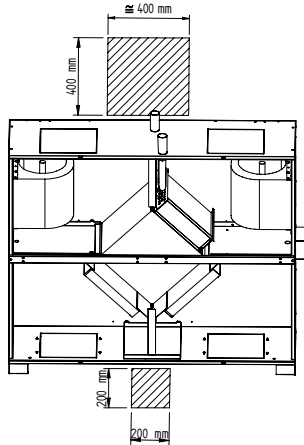
- for installing the delivery, expulsion and, if relevant, the free-cooling channels;
- for fitting the gates with antifreeze function or for the by-pass for free-cooling;
- for the power supply cables;
- for the installation of some components (three way valves, syphons for the condensate drain, etc.) without which the proper functioning of the unit is not guaranteed;
- for the correct maintenance and cleaning operations.

The figures below show the necessary spaces for the proper installation of the units in a horizontal, vertical and coil module configuration.



In particular:

- for the condensate drain, a space of at least 200 mm must be provided to make the syphon;
- at the water coil a space of at least 400 mm must be provided to install the three-way valve and the relative servo-commands.



6.3 INSIDE COMPONENTS POSITIONING AND VENT OPENING



CAUTION!

The vents opened with the saw could have small stretches of sheet steel with a cutting edge. During assembly of the channelling and any accessories pay attention to the sharp edges.

N.B. : opening with pre-sawing must be fully made on the intake side of the unit.

On the delivery side, the openings must be limited to the space necessary for the housing and fixing of the fan vents.

The position of the fans and any water heating coil (NRCxxA, NRCxxVA) or electrical heating coil (NRCxxE, NRCxxVE) inside the NRC unit are easy to identify because the corresponding inspection panels are fitted with an adhesive plate indicating the hazard presented by live and moving parts (see figure on the right).

The above-mentioned panels are fitted with screws needing a screwdriver to be undone.

The panels near the filters are fitted with knobs to make maintenance and cleaning easier.



□ UR without accessory RG (control system):



If the position of the fan and internal components is suitable for the requirements of the designed system the only thing that needs to be done is:



- opening the vents in the chosen position using a saw and following the pre-sheated lines on the steel sheet;

- assembling the discharge sleeve of the condensate collection tank by cutting the polyurethane at the point of the hole provided for. The flange of the sleeve must be fixed with three bolts on the inside of the unit frame. The sleeve must then be connected to the tank with a stretch of rubber hose and clips. The external rubber gasket must be positioned up to the panelling to stop air leaks;
- clean any excess polyurethane or sheet steel away that might damage the unit.



If the fans are not oriented correctly, do the following:

- remove the fan inspection hatches;
- dismantle the fans by undoing the four screws and disconnect the electrical cables if necessary;

- open the vents in the chosen position using a saw and following the pre-sawing lines on the steel sheet;
- refit the fans in the required position and, if necessary, reconnect the electrical wires following the wiring diagram and using the holes in the frame for the wires to pass through;
- assemble the discharge sleeve of the condensate collection tank by cutting the polyurethane at the point of the hole provided for. The flange of the sleeve must be fixed with three bolts on the inside of the unit frame. The sleeve must then be connected to the tank with a stretch of rubber hose and clips. The external rubber gasket must be positioned up to the edge of the panelling to stop air leaks;
- clean any excess polyurethane or sheet steel away that might damage the unit.
- refit the inspection hatches.



If the position of the fans and any heating coils is not suitable for the system requirements designed, do the following:

- remove the inspection hatches;
- remove the crossways bar by undoing the two screws at the end (only for horizontal position);
- remove the condensate drain by dismantling the two stops (only for the horizontal configuration);
- position the filter holder guides in the position required;
- dismantle the fans by undoing the four screws and disconnect the electrical cables if necessary;
- open the vents in the chosen position using a saw and following the pre-sheated lines on the steel sheet;
- dismantle any water or electrical coil by undoing the four screws, position it in the position required and fix it with the screws. Make the openings at the manifold outlet with the saw (for water coils);
- refit the fans in the required position and, if necessary, reconnect the electrical wires following the wiring diagram and using the holes in the frame for the wires to pass through and cable clips;
- refit the condensate collection tank (only for the horizontal configuration) and fit the drain hose of the condensate collection tank making a cut in the polyurethane where the holes have been provided for. The flange of the sleeve must be fixed with three bolts on the inside of the unit frame. The sleeve must then be connected to the tank with a stretch of rubber hose and clips. The external rubber gasket must be positioned up to the edge of the panelling to stop air leaks;
- clean any excess polyurethane or sheet steel away that might damage the unit.
- refit the cross bar (only for the horizontal configuration);
- refit the inspection hatches and position their screws that need a screwdriver near the fans.

❑ NRC with accessory RG (control system):

The position is chosen beforehand and linked at the moment of the order. For technical reasons it is not advisable to reposition the NRC unit components.

To open the vents, do as follows:

- open the vents in the chosen position using a saw and following the pre-sheated lines on the steel sheet;
- assemble the discharge sleeve of the condensate collection tank by cutting the polyurethane at the point of the hole provided for. The flange of the sleeve must be fixed with three bolts on the inside of the unit frame. The sleeve must then be connected to the tank with a stretch of rubber hose and clips. The external rubber gasket must be positioned up to the edge of the panelling to stop air leaks;
- clean any excess polyurethane or sheet steel away that might damage the unit.

6.4 POSITIONING OF THE SUPPORT BRACKETS



You are advised not use cross bars near the inspection hatches as fixing systems so as not make the components inside the unit harder to maintain and clean.

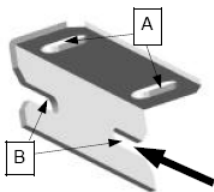


CAUTION!

Check that the characteristics of the walls and fixing systems used for the support of the unit and any accessories are suitable for supporting the mass of the unit with an adequate degree of safety.

The unit must be positioned on a flat surface to avoid:

- damage to the fan motor assemblies when the various masses are not well balanced
- the malfunctioning of the condensate drains.

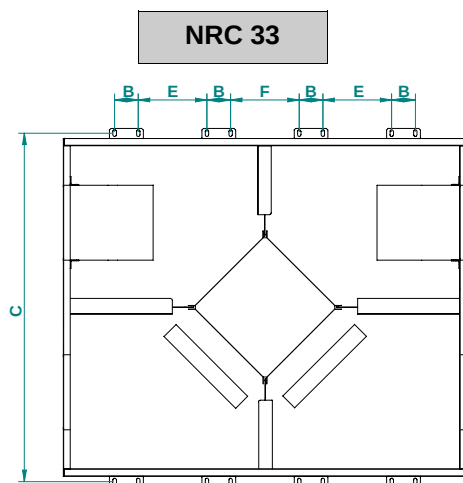
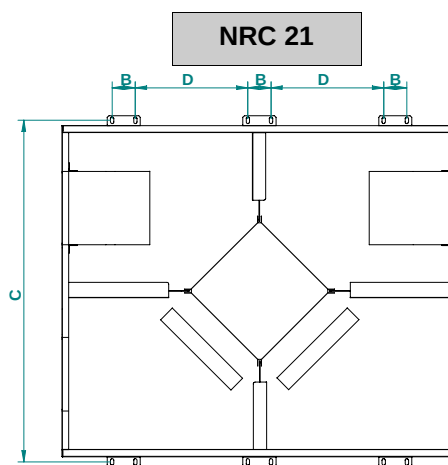
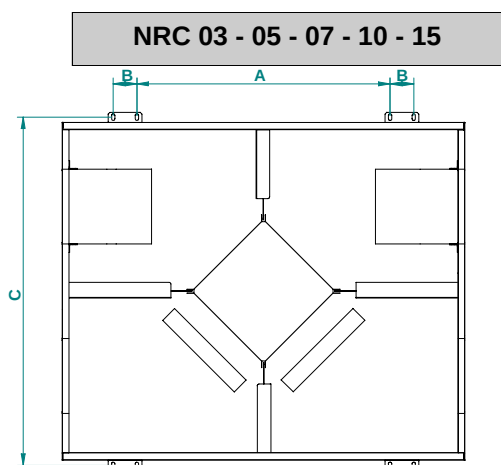


The units and coil module and silencers have L-shaped support brackets for horizontal ceiling installation or floor installation or vertical wall installation.

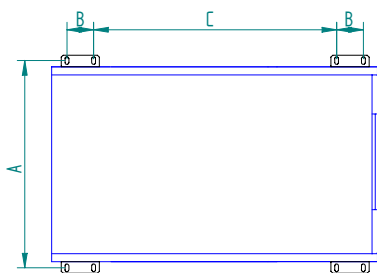
N.B.: You are advised to place rubber dampers between the brackets and the walls to deaden the vibrations generated by the machine.

Refer to the following indications to position the brackets correctly:

- make holes in the wall corresponding to the points shown in the following figures;
- dismantle the brackets from the unit or the coil module or the silencers by undoing the screws corresponding to the holes B;
- screw the brackets to the wall with screws (not supplied) to be placed in correspondence with holes A;
- partially screw one screw for each bracket in correspondence to holes B to the unit or the coil module or the silencers;



NRC MODEL		03	05	07	10	15	21	33
A	mm	650	650	750	1060	1060	\	\
B	mm	70	70	70	70	70	70	70
C	mm	930	930	1030	1280	1280	1430	1780
D	mm	\	\	\	\	\	620	\
E	mm	\	\	\	\	\	\	810
F	mm	\	\	\	\	\	\	300



NRC MODEL		03	05	07	10	15	21	33
Coil Module								
A	mm	490	490	540	665	665	740	890
B	mm	70	70	70	70	70	70	70
C	mm	580	580	630	750	750	750	750
SU Accessory								
A	mm	415	415	465	585	585	655	855
B	mm	70	70	70	70	70	70	70
C	mm	580	580	580	580	580	580	580

6.5 UNIT LIFTING AND POSITIONING

In order to be able to lift and position the units and any accessories safely, refer to the weight specifications on the plate or in this manual.

The unit and any accessories must preferably be lifted using mechanical means and anyway in conformity with current safety-related regulations.



CAUTION!

When lifting and handling the unit pay attention as it might be top or bottom heavy.

Adhere to the following indications for positioning the unit:

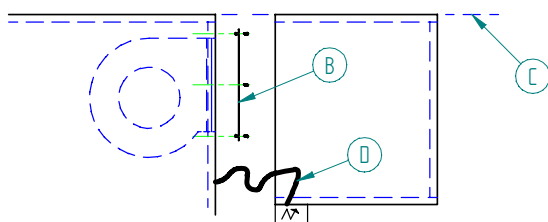
- position the brackets as described in paragraph 6.4;
- lift the unit;
- hook the unit to the brackets on walls by means of the partially tightened screws
- slide the unit along bracket holes (B) ;
- tighten the other screws to the unit for each bracket corresponding to holes (B);
- tighten both the screws.

6.6 COIL MODULE AND SILENCER ASSEMBLY

Indications about what to do when fitting the coil module are given below.

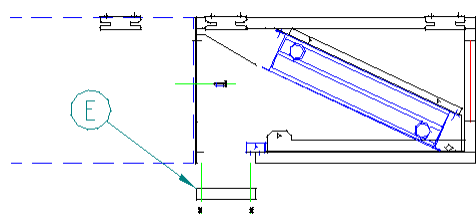
Considering that the structure of the module containing the silencer septums is substantially the same as the coil module, the following indications can also be used for fitting the silencer module:

Operate as follows:



- dismantle the connection flange (B) of the coiling section;
- prepare the holes in the heat recovery unit needed for the housing of the threaded inserts present on the flange (B);
- fix the connection flange (B) to the heat recovery unit with the six self-threading screws, in correspondence to the fan's delivery vent;
- move the electrical box and position it as in the figure, passing the electrical cables (D) through the fairways on the unit and on the module;

- position the support brackets following the instructions in paragraph 6.4, in such a way that the module is aligned along side (C);
- lift the module;
- using the screws partially screwed to the module hook the module to the brackets on the walls and slide it along until it rests on the unit;



- remove the lower panel (E) of the module and, with the screws supplied, lock the panel to the connection flange (B) through the slots provided and tighten the screws into the relevant hexagonal inserts;
- reposition the lower panel (E) of the module;
- screw the other screw of each bracket to the module;
- tighten both the screws right up.

6.7 CONNECTION OF DUCTS



CAUTION!

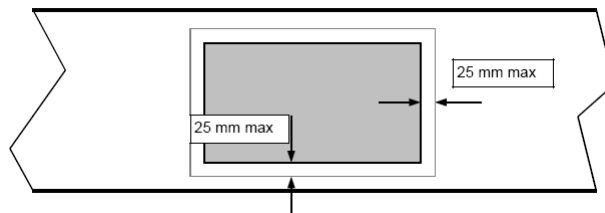
Never start up the NRC unit when the fan outlets are not ducted or covered by protective mesh.

The circular flange accessory can easily be fitted at the rectangular vents using self-threading screws.

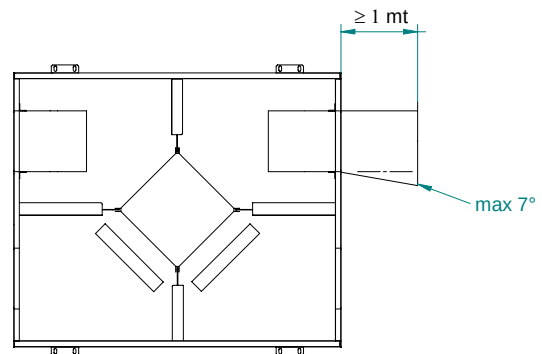
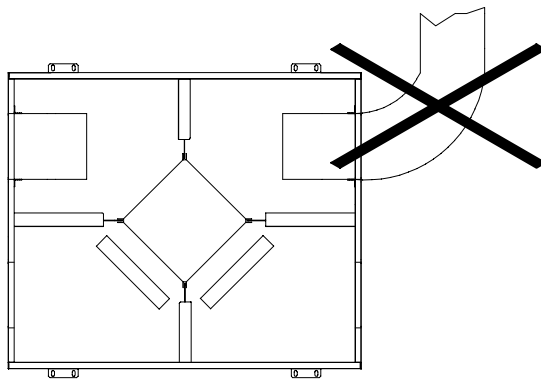
As the NRC33 is fitted with two parallel fans for each air flow, two circular flanges are required for delivery and extraction.

For the installation of the channels we recommend the following:

- the preparation of sufficient brackets to support the channelling in order to prevent its weight bearing on the heat recovery unit;
- connect the delivery and recovery vents to the channels and put anti-vibrating joints (canvas) between them. The anti-vibrational joint must be screwed to the panel with anti-threading screws and the screws must be positioned inside the edge shown in the following diagram so as to ensure that the canvas joints are taut during the operational phase;



- set up an electrical earth wire that acts as the bridge on the anti-vibrating joint to ensure the equipotential between the channel and the recovery unit;
- set up the delivery channel with a straight stretch before the curves, branches etc. of approximately one meter and prevent the channel from having branch stretches with an inclination of more than 7°.



6.8 HYDRAULIC CONNECTIONS

6.8.1 CONDENSATE DISCHARGE

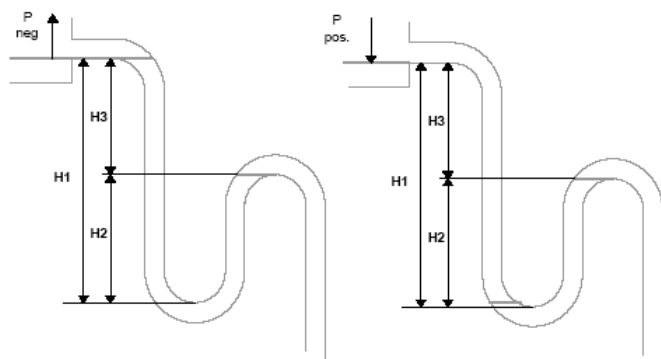
The drain pan is provided with a threaded drain pipe with a diameter of 1/2" G UNI 338.

The drainage system should feature an adequately sized siphon to:

- ensure free condensate drainage;
- prevent the inadvertent entry of air into the circuit under negative pressure;
- prevent the inadvertent leakage of air from the pressurised circuit;
- prevent the entry of unpleasant odours and insects.

In the lower part of the syphon must have a bleed cap or must anyway permit fast dismantling for its cleaning.

Rules to follow for the scaling and production of the syphon are given below.



$$H1 = 2P$$

$$H2 = H1 / 2$$

where P is the pressure expressed in mm of the water column (1 mm c.a. = 9.81 Pa).

6.8.2 WATER COIL CONNECTION

All the water coil manifolds are fitted with female threaded attachments for the entry and exit of the water. Hoses with threaded attachments with a diameter of 1" G UNI 338 and bleed valve are supplied as standard.

For proper installation, follow these simple instructions:

- in the case of bad climate conditions it is better to fit antifreeze devices;
- the route of the piping must be studied in such a way so as not to create obstacles when the coil is extracted and not prevent inspection and maintenance of the unit and any accessories;
- the preparation of sufficient brackets to support the piping in order to prevent its weight bearing on the heat recovery unit;
- when screwing the manifolds and the hydraulic circuits make sure that you do not generate stresses that could damage the coil manifolds;
- provide for cut off valves to isolate the coil from the rest of the circuit should it need to be disconnected from the hydraulic circuit;
- for the connection of the water feed piping, follow the indications on the "WATER IN" and "WATER OUT" plates on the external panelling;
- fit the bleed valve at the highest part of the coil and a water drainage valve in the lowest part;
- when the connection has been made position the external rubber gasket flush with the panelling to stop air leaks;



CAUTION!

To avoid being burnt the pipes must be carefully insulated with suitable material until the edge of the panelling.

6.9 ELECTRICAL WIRING



CAUTION!

The electrical wiring and connections must be done by qualified people in accordance with regulations currently in force.

6.9.1 EARTHING



CAUTION!

Every electrical component must be connected to the system earthing.



Use the connectors marked with this symbol to connect the earth of the unit and all accessories to the building's earth.

The electrical board at the side of the unit has connectors for earth connection of its components and accessories.

6.9.2 CONNECTION TO THE ELECTRICITY MAINS



CAUTION!

Make sure the characteristics of the mains are compatible with the electrical characteristics indicated on the component nameplates.

A manually-controlled power sectioning device must be provided for each power supply.

❑ NRC without accessory RG (regulation system):

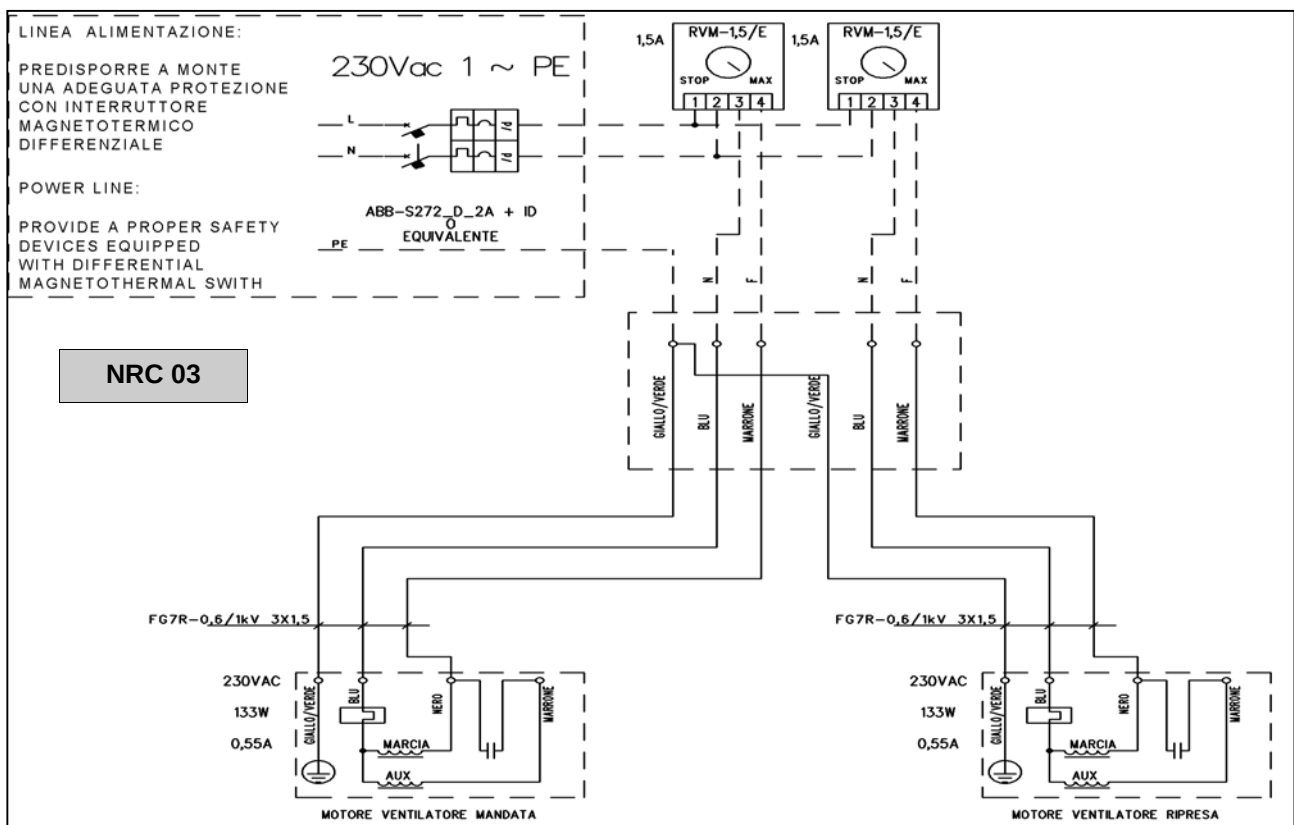
The NRC series heat recovery units are fitted with external electrical boxes. These host the unit motor feed cables and the electrical coil cables.

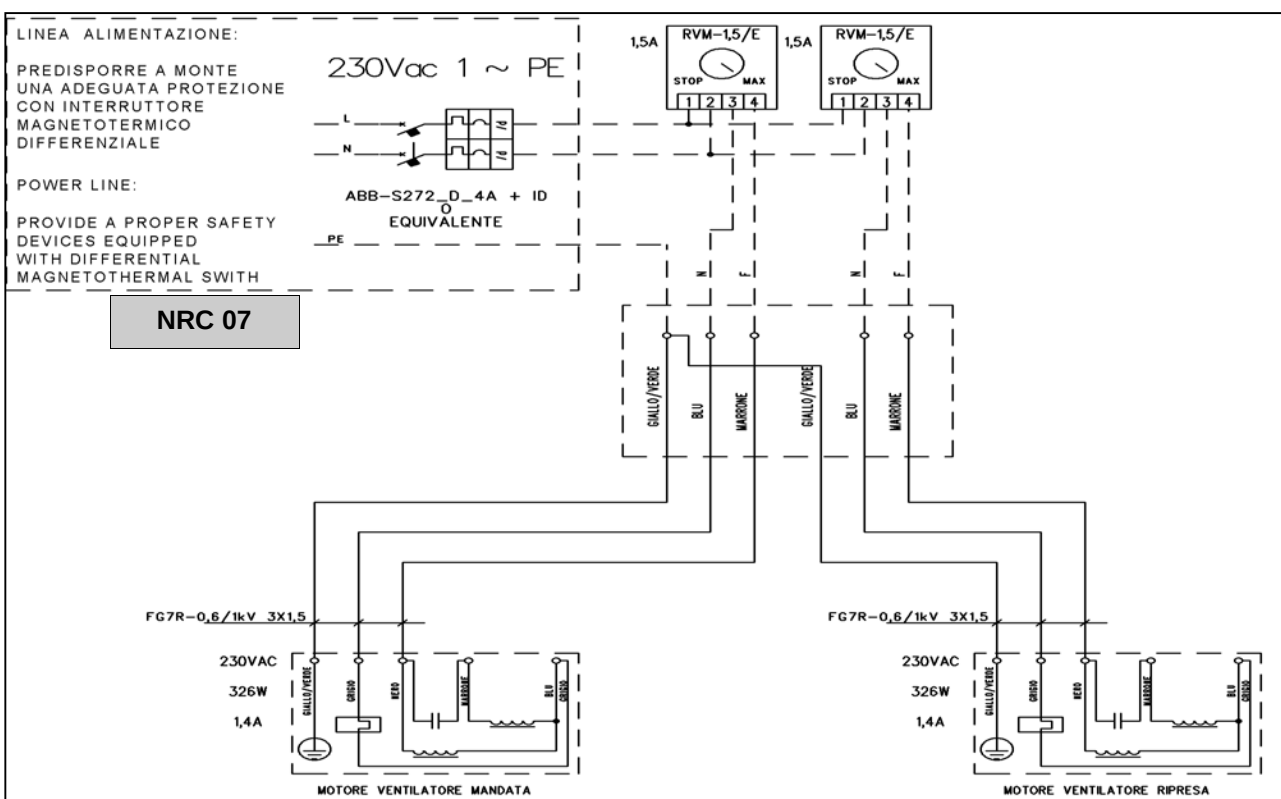
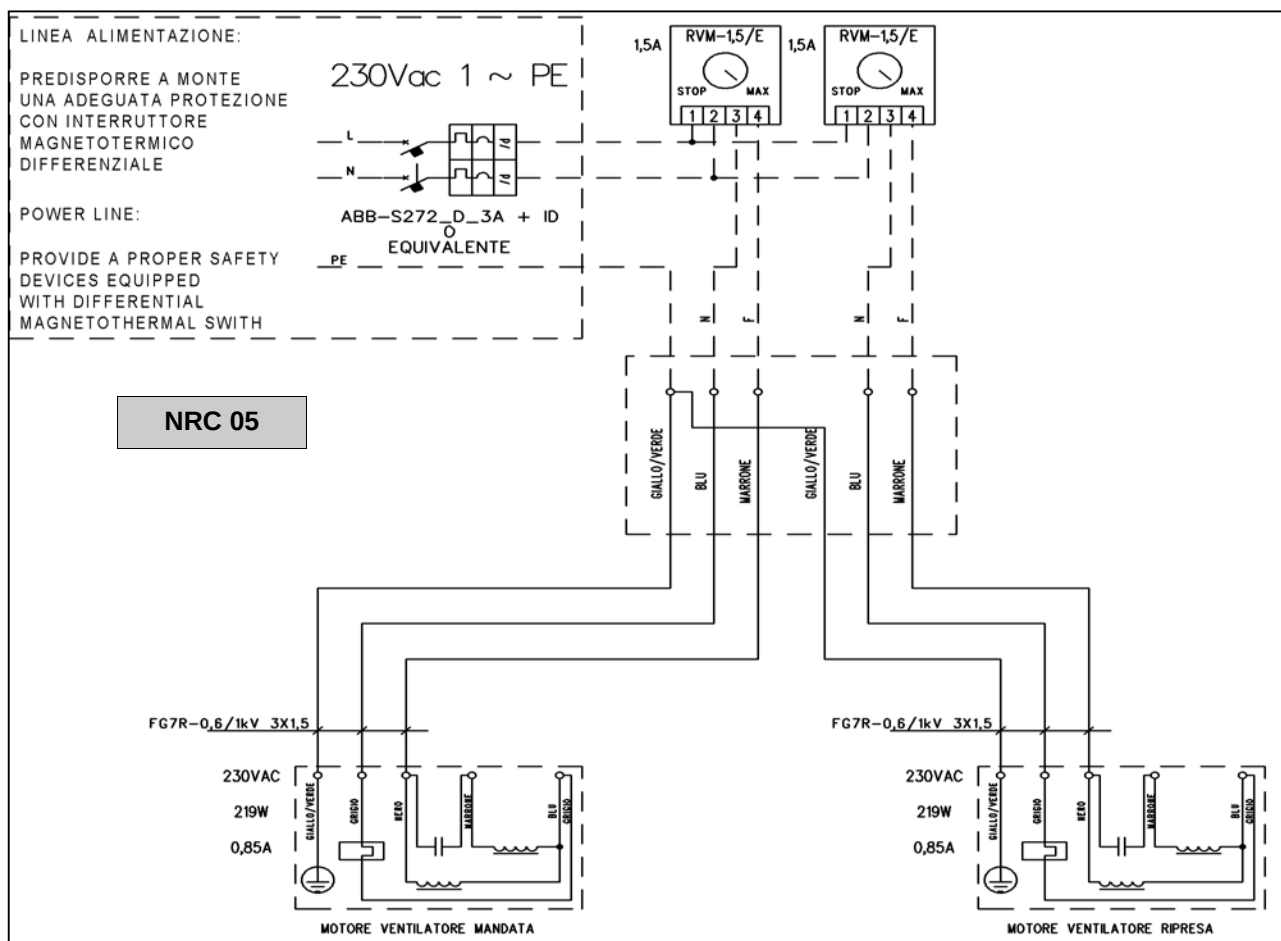
If the accessory module is being assembled (silencer or coil module), the electrical box must be moved.

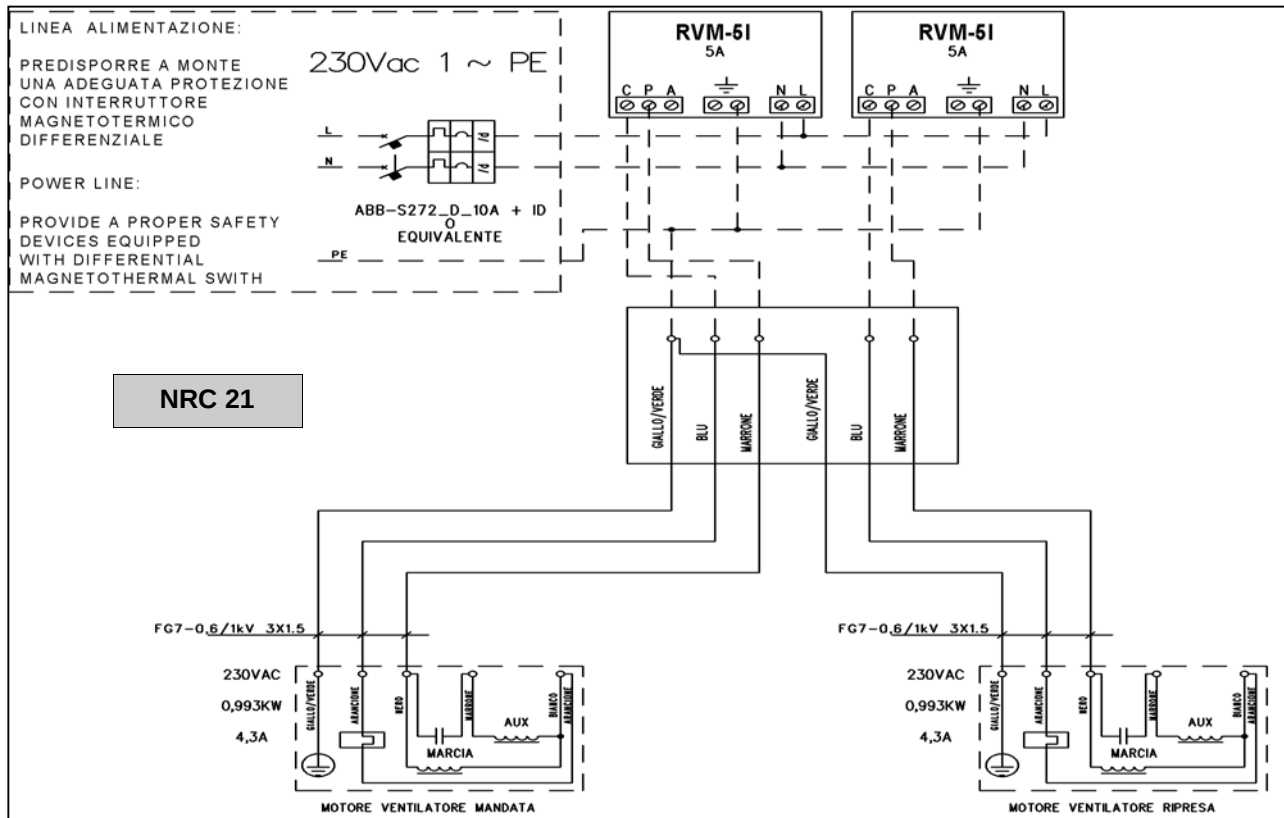
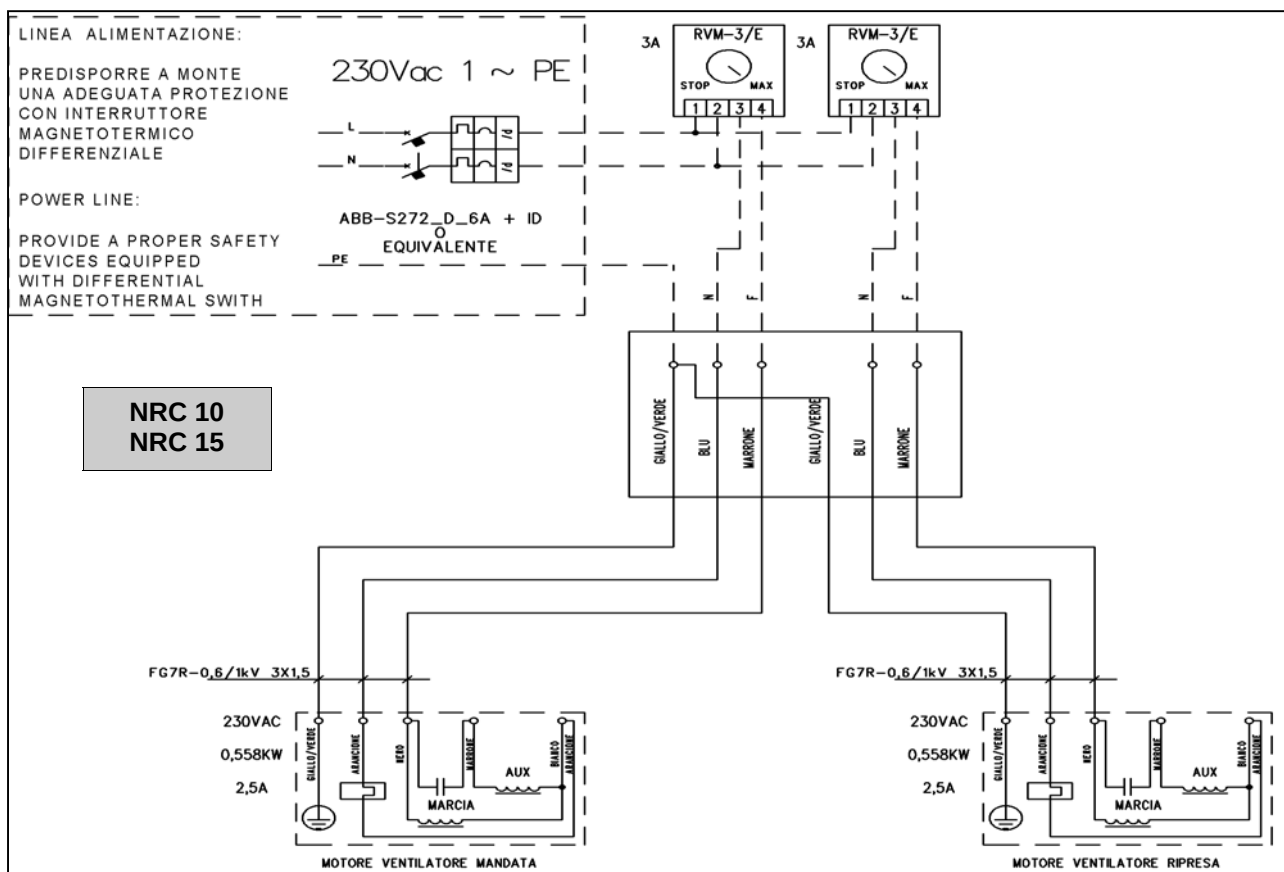
The terminal plate on the electrical box allows the connection between motors and electronic regulators (supplied as standard) to be made by the installing company following the wiring diagrams below taking care to have differential thermal trips upline (one for each fan).

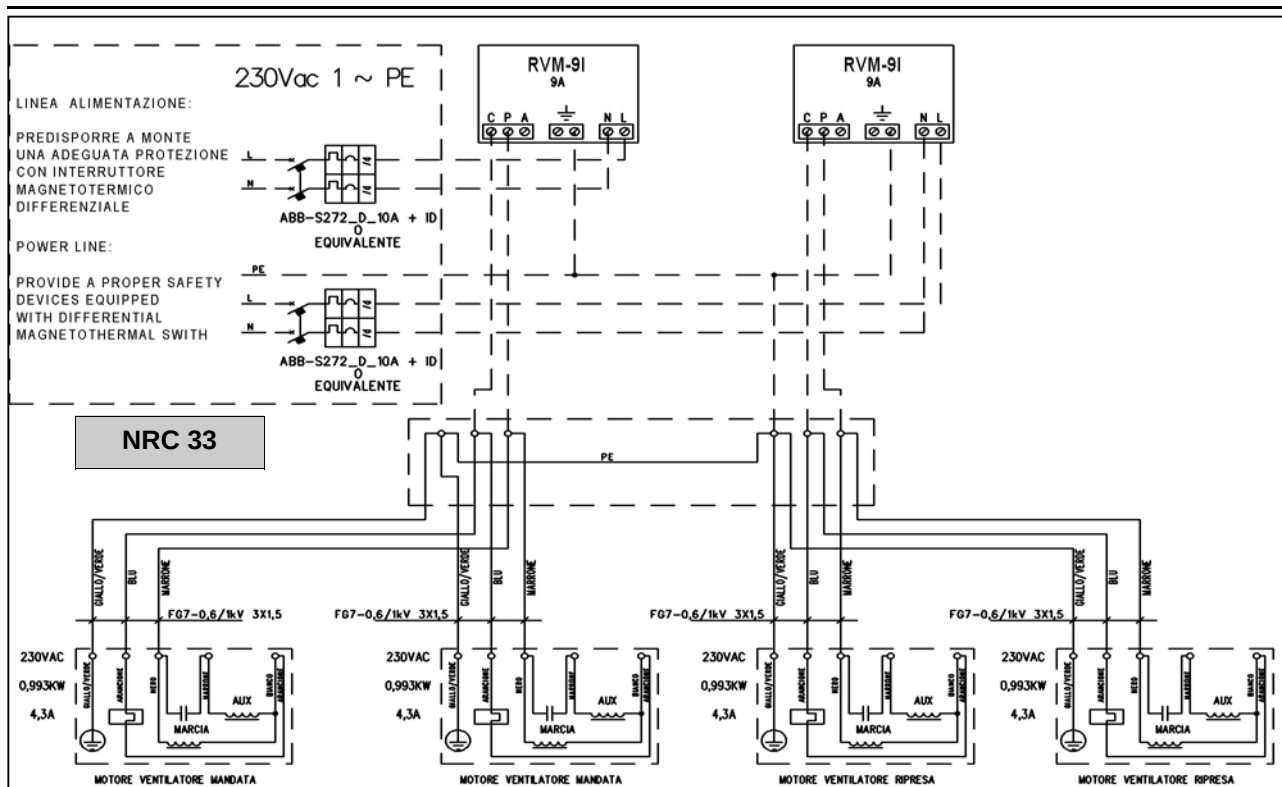
The electronic regulators can operate remotely in the environment to make for an easy regulation of the flow rate.

Two stickers are supplied as standard to be applied on the regulators to show the supply and the exhaust fans.









❑ NRC with accessory RG (control system):

The wiring diagrams for the complete electrical panel are supplied as standard with the machine.

6.9.3 CONNECTION TO THE ELECTRICAL HEATING COILS



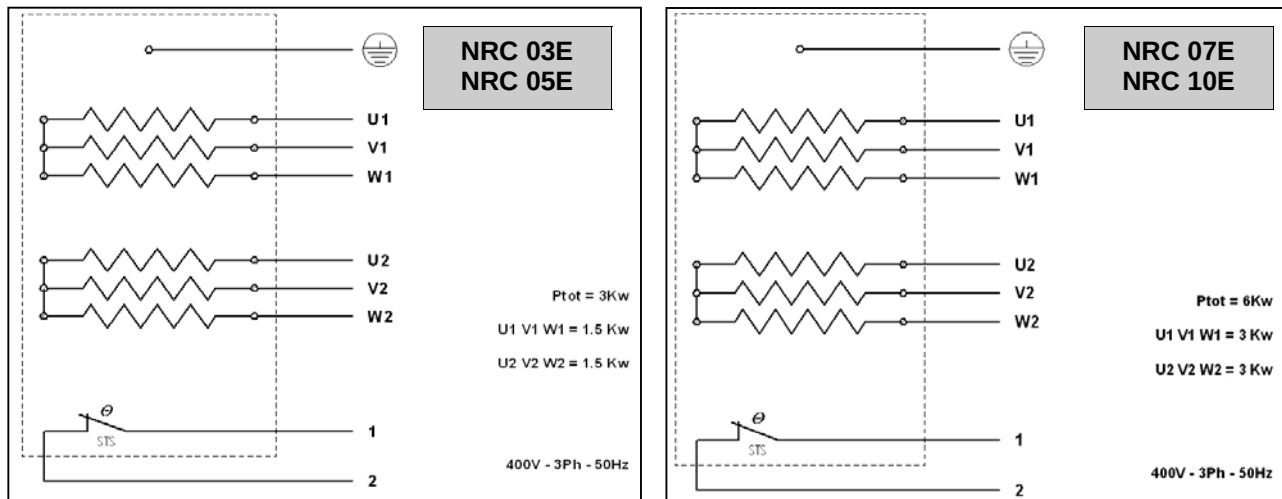
CAUTION!

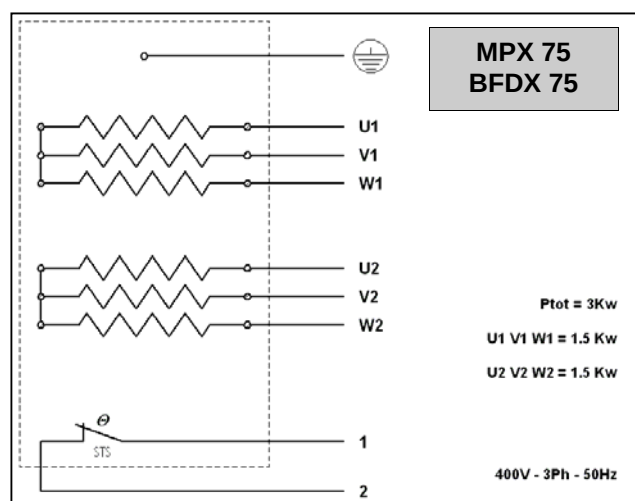
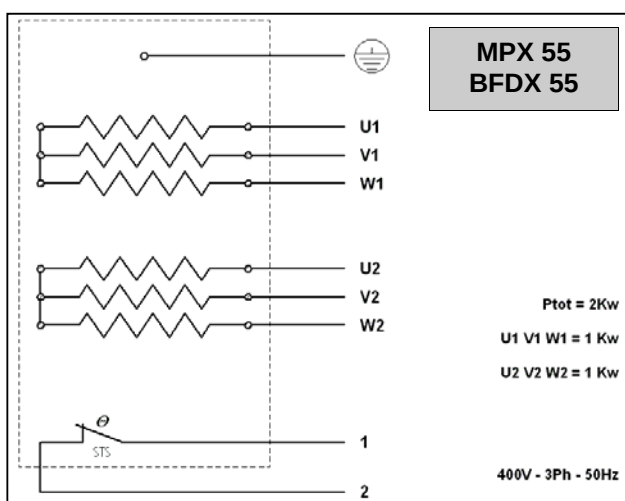
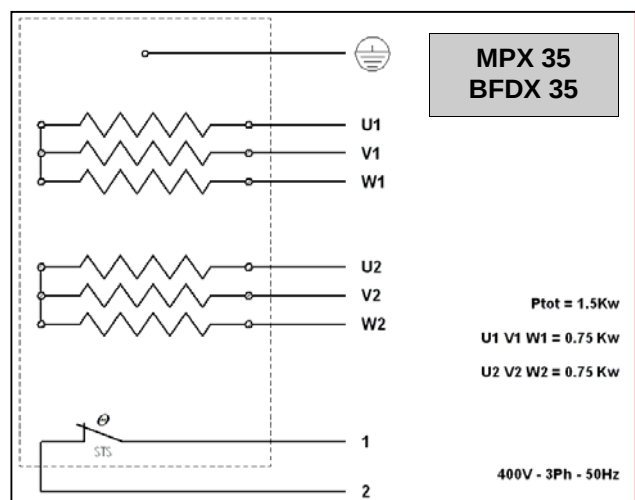
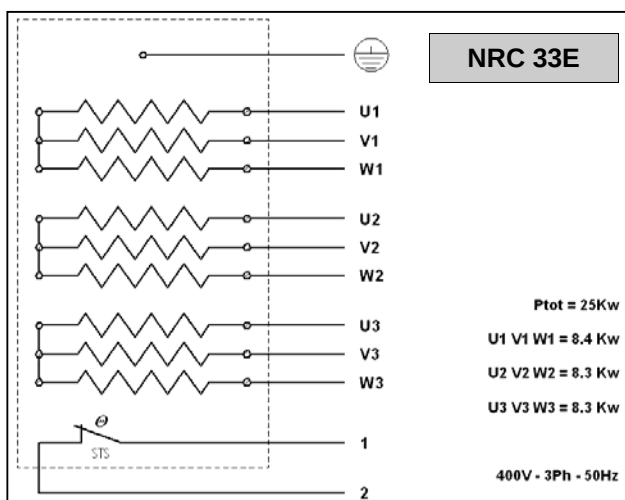
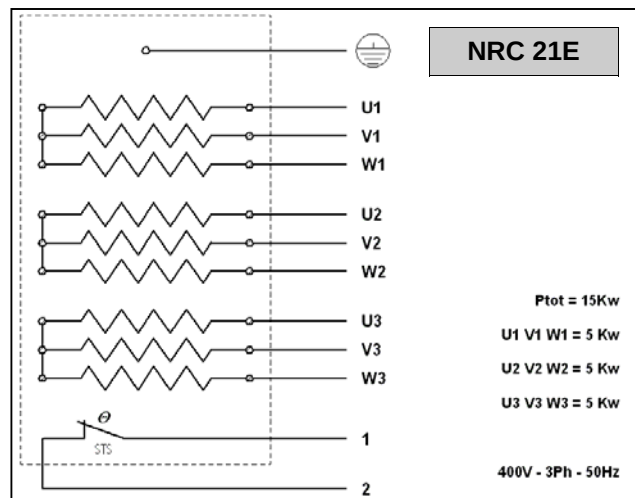
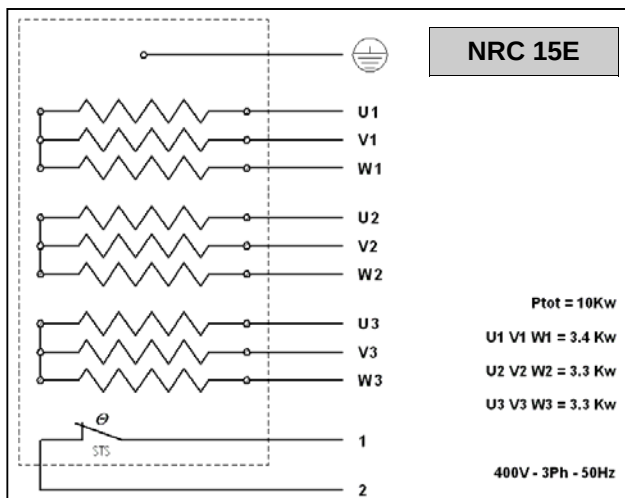
Make sure the characteristics of the mains are compatible with the electrical characteristics indicated on the component nameplates.

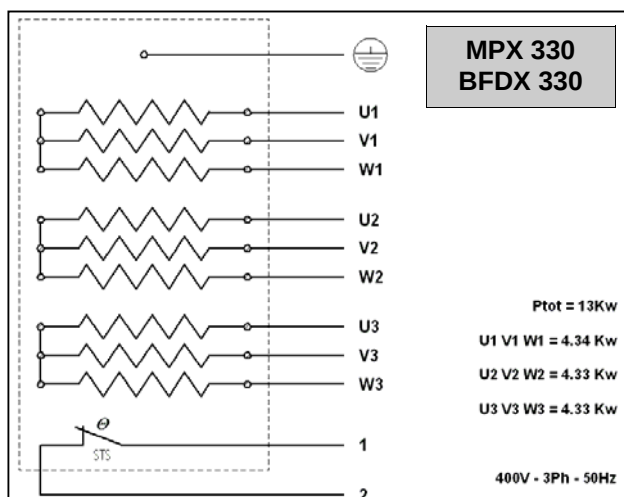
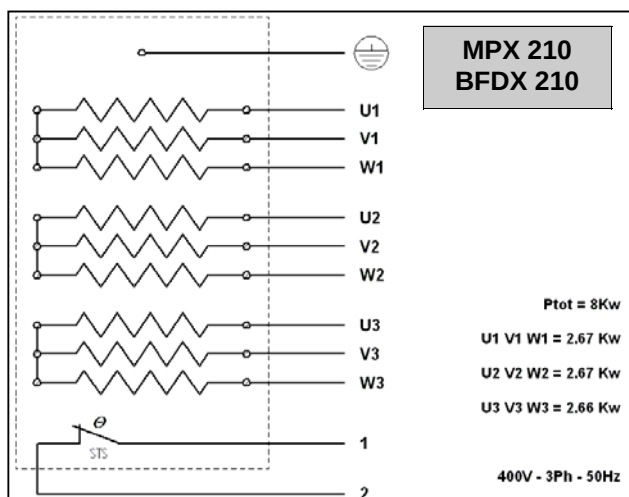
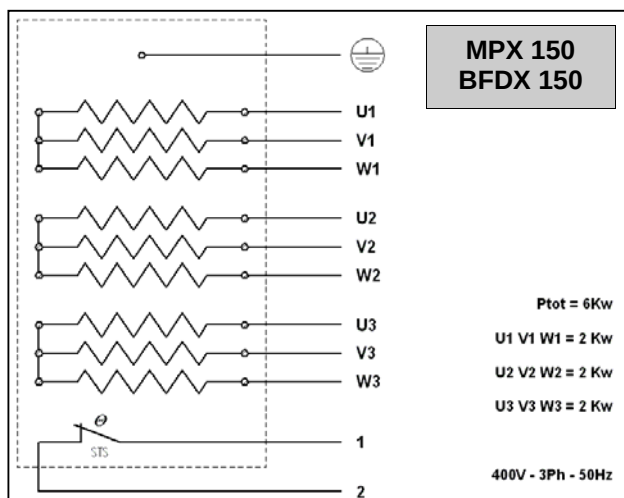
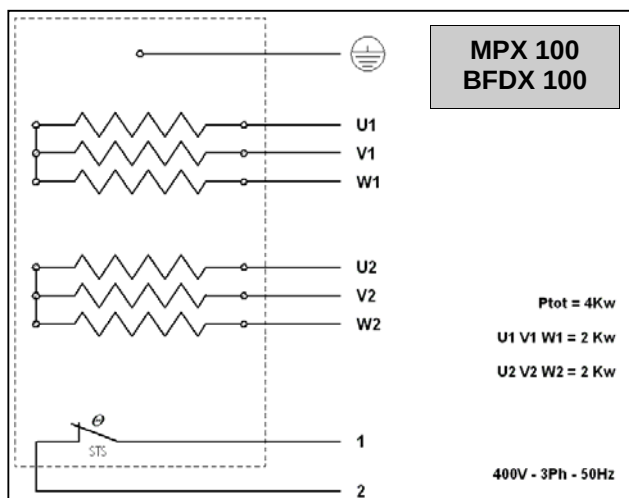
For the correct connection of the electrical heating elements follow these instructions:

- prepare adequate protection with differential thermal bridges upline;
- always connect the safety thermostat to guarantee the interruption of the feed of the electrical battery in case of overheat temperature;
- the safety thermostat must be serial with the regulation thermostat (not supplied);
- the power feed of the coil must be interlocked with the fan function;
- always connect the earth cable of the electrical heating element with the terminal in the electric box.

Please remember that, if the RG control system accessory is present, only two of the coil stages can be managed.







6.10 FIRST STARTUP CHECKS



CAUTION!

Make sure that all the instructions have been complied with before carrying out the commissioning checks.

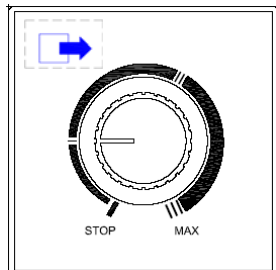
Before the first startup of the heat recovery unit check the following:

- exact positioning of the panels, for whose opening a screwdriver is necessary, near the fan motor units;
- fixing of the unit to the walls;
- connection of the unit to the building's earthing system;
- connection with the channels;
- connection of the condensate drain with syphon;
- insulation of the coil feeding pipes;
- connection of the earth wires of the electrical components;
- absence of air in the water coils.

7. Usage

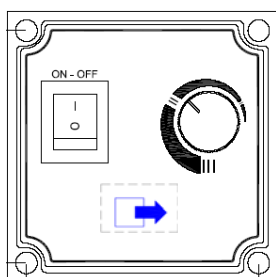
□ NRC fitted with electronic regulators:

A sticker must be placed on each regulator during installation to show the supply and the exhaust fans.



For models NRC03, NRC05, NRC07, NRC10 and NRC15:

- to switch on the supply and exhaust fan, turn the knob of the relevant regulator from STOP clockwise until a click is heard;
- to regulate the flow iturn the knob continuously into the required position, regardless of each fan;
- to turn off the supply and exhaust fan, turn the knob of the relevant regulator to the STOP position.



For models NRC21 and NRC33:

- to switch on the supply and exhaust fan, turn the knob of the relevant regulator to 1;
- to regulate the flow iturn the knob continuously into the required position, regardless of each fan;
- to turn off the supply and exhaust fan, turn the knob of the relevant regulator to 0.

□ NRC with regulation system (accessory RG):



The RG (regulation system) accessory replaces the previously-described electronic regulators.

The terminal that can be operated remotely (visible from the side), through a simple and intuitive graphic interface, permits:

- the independent control of the fan speed;
- the setting of the temperature in the room and the variables for permitting the management of the machine.

8. Unit Maintenance



CAUTION!

During the maintenance phase, wear proper individual protection devices (IPD)



CAUTION!

Before accessing the unit for maintenance and cleaning make sure that it is not operating and that it cannot be supplied unbeknownst to the person working on it and that the heat exchanger coils are not operating.



CAUTION!

During the maintenance phase the weight of the panelling could be heavy for the operator.

The NRC series heat recovery units have been designed for requiring reduced maintenance and to make all operations easy. Here follows some easy recommendations for the proper maintenance of the unit.

Filters:

Filter cleaning is imperative to maintain high air quality in the room. Synthetic filters on the NRC unit can be regenerated with compressed air or they can be washed with cold water.

To dismantle the filters:

- remove the inspection hatch with knobs;
- remove the filters;
- clean the filters;
- refit all the components in the reverse order.

Condensate drain pan:

Dirt can accumulate in the condensate drain pan. We recommend to clean the pan regularly and check that the discharge piping is not clogged.

To remove the condensate collection tank on the heat recovery unit:

- remove the inspection panelling;
- dismantle the cross bar;
- loosen the clip and remove the rubber fitting connecting the pan to the discharge hose;
- remove the pan support brackets;
- clean the pan;
- refit all the components in the reverse order.

In order to have access to the condensate drain pan on the coil module, disconnect the module from the unit and dismantle it.

Heat recovery unit:

The heat recovery unit can be cleaned with compressed air or cold water.

To dismantle the heat recovery unit:

- remove the collection recovery pan;
- remove the heat recovery unit support brackets;
- clean the heat recovery unit;
- refit all the components in the reverse order.

Motor ventilating assembly:

The motor ventilating assembly needs to be checked to verify the cleanness of the and whether there are abnormal noises.

If necessary dismantle the motor ventilating assembly as follows:

- remove all the inspection panelling;
- disconnect the power cables;
- unscrew the four screws supporting each motor ventilating assembly on the structure;
- check the motor ventilating assemblies and replace them if necessary;
- refit all the components in the reverse order.

Heat exchanger coils:

To maintain an efficient heat exchange the coils must be cleaned with compressed air and the circuit (water coil) must be free from air.

To dismantle the heat exchange coils:

- empty the coils (water coils) completely;
- disconnect the coil from the hydraulic circuit;
- remove the condensate collection pan;
- undo the two screws that fix the coil to the heat recovery unit pack,
- undo the two screws fixing the battery to the unit frame through the L shaped support bracket;
- check and clean the coil;
- refit all the components in the reverse order.

In order to have access to the condensate drain pan on the coil module, disconnect the module from the unit and dismantle it.

The following table shows the operations for the maintenance of each component showing what type of check has to be performed and the frequency of the interventions. The frequency is approximate and varies depending on the working and environmental conditions of the heat recovery unit.

Component	Operation	Scheduled time
Filters	Check dirt	fortnightly
Coils	Check pack cleanliness	yearly
Drain pan	Check dirt	yearly
Recovery exchanger	Check pack cleanliness	yearly

9. Waste

At the end of the NRC operating life, these units must be disposed of according to the regulations in force.

The main materials the NRC series systems are:

- galvanised steel sheet (panels, condensate drain pan, fans);
- aluminium sheet (coil fins, heat recovery unit, dampers, electrical motor body);
- copper (coil pipes, electrical motor windings);
- polyurethane foam (insulation in sandwich panels);
- rock wool (silencers).

10. Diagnosis and troubleshooting

Some of the possible solutions to the main problems that may be encountered during NRC unit functioning are given below.

Please consider that other causes of malfunctioning may depend on the system of which the unit is part.

Problem	Possible cause	Possible solution
Insufficient air flow rate	- Too low fan rotation speed	- Clean the components - Increase the fan speed
	- Underestimated distribution system pressure drop	
	- Filters clogged	
	- Extraction grill clogged	
	- Coils encrusted	
Excess air flow	- Too high fan rotation speed	- Reduce the fan speed
	- Overestimated distribution system pressure drops	
	- Missed assembly of the filters	- Assemble the filters
No air flow rate	- Power off	- Check power
	- Electric motor burnt out	- Replace the electric motor
Strange noises	- Excessive flow rate	- Reduce the flow rate
	- Worn or defective bearings	- Replace the bearings
	- Foreign bodies in the fan rotors	- Clean the impeller
Flow	- Clogged syphon	- Clean syphon
	- No syphon or one that has not been made properly	- Fit a proper syphon
	- Input temperature not required	
The required temperature is not reached	- Air in the coils	- Bleed the coils
	- Insufficient water flow rate	- Increase the water flow
	- Water temperature too low	- Check the water temperature
	- Fault in the regulation system	- Check the regulation system
	- Dirty pack surface	- Clean the pack surface



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