



GROUND SOURCE HEAT PUMPS

WDH

SERIES



TECHNICAL MANUAL

INDEX

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The WDH manual, contains any information that is needed for a correct use of the equipment while safeguarding operator safety, according to what indicated in the actual directives on units safety.

AIM AND CONTENTS OF THIS MANUAL

This manual provides basic information on the installation, operation and maintenance off the WDH unit. It is addressed to machine operators and it enables them to use the equipment efficiently, even if they do not have any previous specific knowledge of it. This manual describes the characteristics of the equipment at the time it is being put on the market; therefore it may not capture later technological improvements introduced by HIDROS SRL as part of its constant endeavour to enhance the performance, ergonomics, safety and functionality of its products.

HOW TO KEEP THIS MANUAL

The manual must be always with the unit it refers to. It must be stored in a safe place, away from the dust and moisture. It must be accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.

HIDROS SRL reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

HIDROS SRL is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

GRAPHIC SYMBOLS



Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment..



Indicates prohibited operations.








Indicates important information that the operator must follow in order to guarantee the correct operation of the equipment in complete safety

SAFETY LAWS

The units single components or the complete units produced by HIDROS have been designed according to the actual CE and national Directives. For the detailed list of the project technical Directives, refer to the CE declaration enclosed.

GENERAL SAFETY GUIDELINES

Before beginning to operate on WDH units every user must be perfectly knowledgeable about the functions of the equipment and its controls and must have read and understood the information container in this manual.

	<p>It's strictly forbidden to remove and/or camper with any safety device.</p>
	<p>Any routine or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric and pneumatic power source and after its pneumatic system has been discharged.</p>
	<p>Do not put your hands or insert screwdrivers, spanners or other tools into moving parts of the equipment.</p>
	<p>The equipment supervisor and the maintenance man must receive training suitable for the performance of their tasks in safety</p>
	<p>Operators must know how to use personal protective devices and must know the accident-prevention guidelines contained in national and international laws and norms.</p>

WORKERS' HEALTH AND SAFETY

The European Community has emanated some Directives about worker's safety and health which the employers have to respect and make the others respect. For the detailed list, see the CE declaration enclosed.

- | | |
|--|---|
| | Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations. |
| | Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the equipment |
| | The operator's workplace must be kept clean, tidy and free from objects that may hamper free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks. |
| | Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force... |

PERSONAL PROTECTIVE EQUIPMENT

When operating and maintaining the WDH unit, use the following personal protective equipment.

- | | | |
|--|--|--|
| | Equipment: people who make maintenance or work with the unit, must wear an equipment in accordance with the safety Directives. They must wear accident prevention shoes with anti-slip sole where the paving is slippery. | |
| | Gloves: During the cleanings and the maintenance operations, it's necessary the use of appropriate gloves. In case of gas recharge, it's compulsory the use of appropriate gloves to avoid the risk of freezing. | |
| | | Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations. |

SAFETY SIGNS

The equipment features the following safety signs, which must be complied with:

- | | |
|--|------------------------------|
| | General hazard |
| | Electric shock hazard |

TECHNICAL CHARACTERISTICS

The WDH ground source heat pump units have been designed to guarantee high heating capacities with excellent efficiencies; units are suitable either for heating or domestic hot water production. WDH heat pumps have been optimised for applications in buildings where water temperature demand for space heating is around 50°C. The WDH heat pumps allow to efficiently produce water temperature up to 60°C during cold winter time. This new technology in space heating and tap water production allows traditional boilers to be replaced by Heat Pumps in retrofit applications without changing the radiators.

Frame

All WDH units are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents. The frame is self-supporting with removable panels. All screws and rivets are in stainless steel. The colour of the units is RAL 7035.

Refrigerant circuit

The refrigerant gases used in these units is R407C. The refrigerant circuit is made by using international primary brands components and according to ISO 97/23 concerning welding procedures. Each refrigerant circuit is totally independent from the other. Any incorrect operation of one circuit does not influence the other circuit. The refrigerant circuit includes:

- sight glass,
- filter drier,
- thermal expansion valve with external equalizer,
- Schrader valves for maintenance and control,
- pressure safety device (according to PED regulation).

Compressors

The WDH units are supplied with ***scroll type compressors, optimized for heating applications with a special scroll design who allows extreme high efficiencies especially when the heat source temperature is low.*** Compressors are supplied with crankcase heater and thermal overload protection by a klixon embedded in the motor winding. The compressors used are all in tandem execution. This solution allows much higher efficiencies in partial loads compared to the units with independent refrigerant circuits. In all units the crankcase heaters are always powered when the compressors are in stand-by. The inspection is possible through the frontal panel of the unit that allows the maintenance of the compressors even if the unit is working.

Source side heat exchangers

The source side heat exchangers are made of AISI 316 stainless steel braze-welded plates type. From size 039 to size 162 they are single water side circuit, from the size 144 they are double circuit "cross flow" type. The use of these kind of heat exchangers allows a massive reduction of the refrigerant charge of the unit compared to the traditional shell-in-tube ones and increases the efficiency of the refrigerant cycle in partial loads. The source heat exchangers are factory insulated with flexible close cell material and are provided with a temperature sensor as antifreeze protection.

User side heat exchangers

The user side heat exchangers are made of AISI 316 stainless steel braze-welded plates type. From size 039 to size 162 they are single water side circuit, from the size 144 they are double circuit "cross flow" type. All units are supplied with sub-cooler to enhance the performance of the refrigerant cycle. The user heat exchangers are factory insulated with flexible close cell material.

Electric enclosure

The electric switch board is made according to electromagnetic compatibility norms CEE 73/23 and 89/336. The accessibility to the board is possible after removing the front panel of the unit and the OFF positioning of the main switch. The moisture protection degree is IP55. In all WDH units are installed, standard, the compressors sequence relay who disables the operation of the compressor in case the power supply phase sequence is not the correct one (scroll compressors in fact, can be damaged if they rotate reverse wise). The following components are also standard installed: main switch, magnetic-thermal switches as a protection of compressors and pumps (where present), control circuit automatic breakers, compressor contactors, pump contactors. The terminal board is supplied with voltage free contacts for remote ON-OFF, Summer / winter change over and general alarm.

Microprocessors

All WDH units are supplied standard with microprocessor controls. The microprocessor controls the following functions: regulation of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence, alarm reset, potential free contact for remote general alarm, alarms and operation leds. Upon request any microprocessor can be connected to a BMS system for the remote control and management. The technical department is available to study, together with the customer, different solutions using MODBUS; LONWORKS; BACNET or TREND protocols.

Control and protection devices

All units are supplied with the following control and protection devices: Return and supply user heat exchanger sensors, return and supply source heat exchanger sensors, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, pump thermal overload protection (when present), source heat exchanger flow switch.

OTHER VERSIONS**WDH/A1NT UNIT WITH WATER PUMP**

This version is supplied with a single centrifugal type water pump with a high available pressure. The pump is connected, standard, to the user heat exchanger but, upon request, can also be connected to the source heat exchanger

WDH/RV/SW6 UNIT WITH DOMESTIC HOT WATER PRODUCTION (SW6) – 6 PIPE WATER CONNECTIONS

This version is suitable to produce domestic hot water: the unit is supplied with an additional heat exchanger used as condenser for the domestic hot water that, is independent from the operation mode of the unit. The activation of the additional heat exchanger is done automatically by the microprocessor control when the domestic hot water temperature measured by the sensor is lower than the required set point. This unit is supplied, standard, with a reverse cycle valve to allow even the production of cold water in summer mode.

WDH/SW5 UNIT WITH DOMESTIC HOT WATER PRODUCTION (SW5) – 5 PIPE WATER CONNECTIONS

This version is suitable to produce domestic hot water: the unit is supplied with an ON/OFF 3 way valve to deviate the water flow in a water accumulator; the activation of the 3 way valve is done automatically by the microprocessor control when the domestic hot water temperature in the accumulator is lower than the required set point.

WDH/FC – WDH/FC/SW5 – WDH/FC/RV/SW6 FREE COOLING VERSIONS

These versions in addition to the standard characteristics are suitable for cold water production during summer operation using the cold water flow coming from the ground probes. During free cooling mode the compressors are not working; the system is supplied with an intermediate heat exchanger and a modulating 3 way valve who manage the water flow to the user circuit depending on the required cold water temperatures.

WDH/RV REVERSIBLE VERSION

This version is suitable for cooling during summer operation by using a 4 way reverse cycle valve in the refrigerant circuit.

WDH/LS LOW NOISE VERSION

The low noise versions LS include the complete acoustic insulation of the unit (compressor + heat exchangers vanes with insulating material having high density media with the interposition of heavy bitume layer.

WDH TECHNICAL DATA

Mod.		039	045	050	060	070	080	090	110	120	130
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Heating capacity	Kw	48,2	58,7	67,9	75,8	83,7	101,7	118,4	135,2	152,3	169,5
Compressors input power	Kw	9,4	11,4	12,9	14,6	16,2	19,4	22,5	25,7	28,9	32,1
C.O.P.	W/W	5,1	5,1	5,3	5,2	5,2	5,2	5,3	5,3	5,3	5,3
User water flow rate	l/h	8300	10100	11700	13100	14400	17500	20400	23300	26200	29200
Source water flow rate	l/h	6680	8140	9460	10530	11650	14170	16500	18850	21230	23640
Total input current	A	27,0	30,6	32,0	34,7	37,4	47,2	53,9	58,4	67,3	76,4
Total peak current	A	116,0	143,0	149,0	189,0	194,0	230,0	257,0	266,0	313,0	324,0
Maximum input current	A	34,0	40,0	44,0	49,0	54,0	64,0	73,0	82,0	93,0	104,0
Power supply	V/Ph/Hz	400/3/50									
Compressor	type	Scroll									
	n°	2	2	2	2	2	2	2	2	2	2
Refrigerant circuit	n°	1	1	1	1	1	1	1	1	1	1
Step controls	n°	2	2	2	2	2	2	2	2	2	2
Sound power level ⁽¹⁾	dB(A)	80	80	81	82	82	83	83	84	84	85
Sound pressure level ⁽²⁾	dB(A)	52	52	53	54	54	55	55	56	56	57
Water pump (option)	Kw	1,1	1,1	1,1	1,1	1,1	1,5	1,5	2,2	2,2	2,2
Water pump input current	A	2,9	2,9	2,9	2,9	2,9	2,9	4,3	5,3	5,3	5,3
Weight (Standard configuration)	Kg	470	500	520	540	570	590	650	660	720	770

Mod.		152	162	144	164	190	210	240	260	300	320
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Heating capacity	Kw	189,1	208,7	185,4	203,4	236,8	270,3	304,7	339,1	378,2	417,4
Compressors input power	Kw	35,2	38,3	35,6	38,7	45,1	51,4	57,8	64,2	70,3	76,5
C.O.P.	W/W	5,4	5,4	5,2	5,3	5,3	5,3	5,3	5,3	5,4	5,5
User water flow rate	l/h	32550	35900	32000	35000	40800	46500	52500	58400	65100	71800
Source water flow rate	l/h	26500	29400	25800	28400	33000	37700	42500	47300	53000	58700
Total input current	A	83,9	91,4	86,0	94,4	105,0	122,4	134,6	152,8	167,8	182,8
Total peak current	A	362,0	372,5	279,8	294,0	330,0	348,0	406,0	428,0	476,5	497,5
Maximum input current	A	114,5	125,0	109,6	128,0	146,0	164,0	186,0	208,0	229,0	250,0
Power supply	V/Ph/Hz	400/3/50									
Compressor	type	Scroll									
	n°	2	2	4	4	4	4	4	4	4	4
Refrigerant circuit	n°	1	1	2	2	2	2	2	2	2	2
Step controls	n°	2	2	4	4	4	4	4	4	4	4
Sound power level ⁽¹⁾	dB(A)	85	85	85	85	86	88	88	88	90	90
Sound pressure level ⁽²⁾	dB(A)	57	57	57	57	58	60	60	60	62	62
Water pump (option)	Kw	2,2	2,2	2,2	3,0	3,0	3,0	4,0	4,0	4,0	5,5
Water pump input current	A	5,3	5,3	5,3	9,6	9,6	9,6	9,6	9,6	9,6	13,2
Weight (Standard configuration)	Kg	790	820	980	1030	1150	1190	1250	1320	1400	1490

Performances are referred to the following conditions:

Heating: User water temperature in/out 35/30 °C, Source water temperature in/out 10/5°C.

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

**WDH
HEATING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.							
			TWUC (°C)						TWUC (°C)													
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60		
039	0	-5	34,4	33,8	33,4				9,6	10,7	12,0				3,6	3,1	2,8					
	2	-3	36,8	36,1	35,6	35,2			9,6	10,7	12,0	13,4			3,8	3,4	3,0	2,6				
	5	0	40,8	39,9	39,2	38,7			9,5	10,7	12,1	13,5			4,3	3,7	3,3	2,9				
	7	2	43,6	42,6	41,8	41,2	40,7			9,5	10,7	12,1	13,6	15,3		4,6	4,0	3,5	3,0	2,7		
	10	5	48,2	47,0	46,0	45,1	44,5			9,4	10,6	12,0	13,6	15,3		5,1	4,4	3,8	3,3	2,9		
	13	8	53,3	51,8	50,5	49,4	48,6	48,0			9,4	10,6	12,0	13,6	15,4	17,4	5,7	4,9	4,2	3,6	3,2	2,8
	15	10	57,0	55,3	53,8	52,5	51,5	50,7			9,4	10,5	11,9	13,5	15,4	17,4	6,1	5,2	4,5	3,9	3,4	2,9
20	15	67,3	64,9	62,9	61,1	59,6	58,3			9,5	10,5	11,8	13,4	15,3	17,4	7,1	6,2	5,3	4,5	3,9	3,4	

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.							
			TWUC (°C)						TWUC (°C)													
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60		
045	0	-5	42,5	41,9	41,3				11,5	12,8	14,3				3,7	3,3	2,9					
	2	-3	45,4	44,6	43,9	43,3			11,5	12,8	14,3	15,9			4,0	3,5	3,1	2,7				
	5	0	50,0	49,0	48,1	47,2			11,5	12,8	14,3	16,0			4,4	3,8	3,4	3,0				
	7	2	53,4	52,2	51,1	50,1	49,3			11,4	12,8	14,3	16,0	17,9		4,7	4,1	3,6	3,1	2,8		
	10	5	58,7	57,3	56,0	54,7	53,7			11,4	12,8	14,3	16,1	18,0		5,1	4,5	3,9	3,4	3,0		
	13	8	64,6	62,9	61,3	59,8	58,4	57,2			11,4	12,8	14,3	16,1	18,0	20,2	5,7	4,9	4,3	3,7	3,2	2,8
	15	10	68,9	66,9	65,1	63,5	61,9	60,5			11,4	12,8	14,3	16,1	18,0	20,2	6,1	5,2	4,5	3,9	3,4	3,0
20	15	80,5	78,1	75,8	73,5	71,4	69,5			11,3	12,7	14,3	16,1	18,1	20,3	7,1	6,1	5,3	4,6	3,9	3,4	

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.							
			TWUC (°C)						TWUC (°C)													
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60		
050	0	-5	49,5	48,6	47,7				13,1	14,6	16,1				3,8	3,3	3,0					
	2	-3	52,7	51,7	50,7	49,8			13,1	14,6	16,3	18,0			4,0	3,5	3,1	2,8				
	5	0	58,0	56,8	55,6	54,5			13,0	14,6	16,4	18,2			4,4	3,9	3,4	3,0				
	7	2	61,8	60,4	59,1	57,8	56,6			13,0	14,6	16,4	18,3	20,4		4,7	4,1	3,6	3,2	2,8		
	10	5	67,9	66,2	64,7	63,2	61,8			12,9	14,6	16,4	18,4	20,5		5,2	4,5	3,9	3,4	3,0		
	13	8	74,5	72,6	70,8	69,0	67,3	65,7			12,9	14,5	16,4	18,4	20,6	23,1	5,8	5,0	4,3	3,7	3,3	2,8
	15	10	79,3	77,2	75,1	73,2	71,3	69,5			12,8	14,5	16,3	18,4	20,7	23,2	6,2	5,3	4,6	4,0	3,4	3,0
20	15	92,7	89,8	87,2	84,6	82,2	79,9			12,8	14,4	16,2	18,3	20,7	23,3	7,3	6,3	5,4	4,6	4,0	3,4	

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.							
			TWUC (°C)						TWUC (°C)													
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60		
060	0	-5	55,2	54,2	53,4				14,6	16,3	18,2				3,8	3,3	2,9					
	2	-3	58,9	57,7	56,7	55,8			14,6	16,4	18,3	20,3			4,0	3,5	3,1	2,7				
	5	0	64,7	63,4	62,1	61,0			14,6	16,4	18,4	20,5			4,4	3,9	3,4	3,0				
	7	2	69,0	67,4	66,0	64,6	63,4			14,6	16,4	18,4	20,6	23,0		4,7	4,1	3,6	3,1	2,8		
	10	5	75,8	73,9	72,2	70,6	69,1			14,6	16,4	18,4	20,7	23,2		5,2	4,5	3,9	3,4	3,0		
	13	8	83,3	81,1	79,0	77,0	75,2	73,5			14,6	16,4	18,4	20,7	23,3	26,1	5,7	5,0	4,3	3,7	3,2	2,8
	15	10	88,7	86,2	83,8	81,7	79,6	77,7			14,6	16,4	18,4	20,8	23,4	26,2	6,1	5,3	4,6	3,9	3,4	3,0
20	15	103,7	100,4	97,4	94,5	91,7	89,2			14,7	16,4	18,4	20,7	23,4	26,4	7,1	6,1	5,3	4,6	3,9	3,4	

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.							
			TWUC (°C)						TWUC (°C)													
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60		
070	0	-5	61,0	59,9	59,0				16,2	18,1	20,2				3,8	3,3	2,9					
	2	-3	65,0	63,8	62,7	61,8			16,2	18,1	20,3	22,7			4,0	3,5	3,1	2,7				
	5	0	71,5	70,0	68,6	67,4			16,2	18,2	20,4	22,8			4,4	3,9	3,4	3,0				
	7	2	76,2	74,4	72,8	71,4	70,2			16,2	18,2	20,4	22,9	25,7		4,7	4,1	3,6	3,1	2,7		
	10	5	83,7	81,6	79,7	78,0	76,4			16,2	18,2	20,5	23,0	25,9		5,2	4,5	3,9	3,4	3,0		
	13	8	92,1	89,5	87,2	85,1	83,1	81,4			16,3	18,2	20,5	23,1	26,0	29,2	5,7	4,9	4,3	3,7	3,2	2,8
	15	10	98,0	95,2	92,6	90,2	87,9	85,9			16,3	18,2	20,5	23,1	26,0	29,3	6,0	5,2	4,5	3,9	3,4	2,9
20	15	114,7	111,0	107,5	104,3	101,3	98,5			16,5	18,4	20,6	23,2	26,1	29,4	6,9	6,0	5,2	4,5	3,9	3,3	

TWIE: Source inlet water temperature (°C)
 TWUE: Source outlet water temperature (°C)
 TWUC: User outlet water temperature (°C) (Dt=5°C)
 PH: Heating capacity (Kw)
 PA: Compressors input power (Kw)

**WDH
HEATING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
080	0	-5	74,2	73,0	72,0				19,6	22,0	24,5				3,8	3,3	2,9			
	2	-3	79,0	77,7	76,5	75,3			19,6	22,0	24,7	27,5			4,0	3,5	3,1	2,7		
	5	0	86,9	85,2	83,7	82,3	31,0		19,5	22,0	24,8	27,8	31,0		4,5	3,9	3,4	3,0		
	7	2	92,5	90,6	88,8	87,3	85,8		19,4	21,9	24,8	27,9	31,2		4,8	4,1	3,6	3,1	2,7	
	10	5	101,7	99,3	97,1	95,2	93,4		19,4	21,8	24,7	27,9	31,4		5,2	4,5	3,9	3,4	3,0	
	13	8	111,8	108,8	106,2	103,8	101,5	99,5	19,4	21,8	24,6	27,9	31,5	35,4	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	119,1	115,7	112,7	109,9	107,4	105,1	19,5	21,8	24,6	27,8	31,5	35,5	6,1	5,3	4,6	4,0	3,4	3,0
	20	15	139,6	135,0	130,8	127,0	123,5	120,3	20,0	22,0	24,5	27,7	31,3	35,5	7,0	6,1	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
090	0	-5	85,7	84,1	82,7				22,4	25,1	28,2				3,8	3,4	2,9			
	2	-3	91,5	89,6	87,9	86,5			22,4	25,1	28,2	31,7			4,1	3,6	3,1	2,7		
	5	0	100,8	98,5	96,4	94,5			22,5	25,2	28,3	31,9			4,5	3,9	3,4	3,0		
	7	2	107,5	104,9	102,5	100,3	98,3		22,5	25,2	28,4	31,9	36,0		4,8	4,2	3,6	3,1	2,7	
	10	5	118,4	115,3	112,4	109,7	107,2		22,5	25,3	28,4	32,0	36,1		5,3	4,6	4,0	3,4	3,0	
	13	8	130,3	126,7	123,2	120,0	116,9	114,2	22,6	25,3	28,5	32,1	36,2	40,8	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	138,9	134,9	131,0	127,3	123,9	120,7	22,7	25,4	28,5	32,1	36,2	40,9	6,1	5,3	4,6	4,0	3,4	3,0
	20	15	162,6	157,5	152,5	147,8	143,3	139,0	23,0	25,6	28,7	32,3	36,4	41,0	7,1	6,1	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
110	0	-5	97,3	95,2	93,4				25,2	28,2	31,8				3,9	3,4	2,9			
	2	-3	103,9	101,5	99,3	97,6			25,3	28,3	31,8	36,0			4,1	3,6	3,1	2,7		
	5	0	114,8	111,8	109,1	106,7			25,4	28,4	31,9	36,0			4,5	3,9	3,4	3,0		
	7	2	122,6	119,3	116,2	113,3	40,7		25,5	28,5	32,0	36,0	40,7		4,8	4,2	3,6	3,1	1,0	
	10	5	135,2	131,4	127,7	124,2	121,1		25,7	28,7	32,2	36,1	40,8		5,3	4,6	4,0	3,4	3,0	
	13	8	148,9	144,6	140,3	136,2	132,3	128,8	25,9	28,9	32,4	36,3	40,9	46,2	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	158,7	154,0	149,3	144,8	140,4	136,4	25,9	29,0	32,5	36,5	41,0	46,3	6,1	5,3	4,6	4,0	3,4	2,9
	20	15	185,6	180,0	174,3	168,6	163,1	157,8	26,0	29,3	32,9	36,9	41,4	46,6	7,1	6,1	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
120	0	-5	108,8	106,2	104,1				28,3	31,7	35,8				3,8	3,3	2,9			
	2	-3	116,4	113,4	110,8	108,8			28,4	31,8	35,8	40,6			4,1	3,6	3,1	2,7		
	5	0	128,9	125,2	121,9	119,1			28,5	31,9	35,9	40,5			4,5	3,9	3,4	2,9		
	7	2	137,8	133,7	129,9	126,6	123,7		28,7	32,0	36,0	40,5	45,9		4,8	4,2	3,6	3,1	2,7	
	10	5	152,3	147,5	143,0	138,8	135,1		28,9	32,2	36,1	40,6	45,8		5,3	4,6	4,0	3,4	2,9	
	13	8	168,2	162,6	157,3	152,3	147,7	143,7	29,1	32,4	36,3	40,7	45,9	51,8	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	179,6	173,5	167,6	162,0	156,8	152,1	29,3	32,6	36,4	40,8	45,9	51,8	6,1	5,3	4,6	4,0	3,4	2,9
	20	15	210,8	203,4	196,0	188,9	182,2	175,8	29,6	33,0	36,8	41,2	46,2	52,0	7,1	6,2	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
130	0	-5	120,3	117,3	114,7				31,4	35,3	39,9				3,8	3,3	2,9			
	2	-3	129,0	125,4	122,3	120,0			31,5	35,3	39,9	45,2			4,1	3,5	3,1	2,7		
	5	0	143,0	138,6	134,7	131,5			31,7	35,5	39,9	45,1			4,5	3,9	3,4	2,9		
	7	2	153,1	148,2	143,7	139,8	136,6		31,8	35,5	39,9	45,1	51,0		4,8	4,2	3,6	3,1	2,7	
	10	5	169,5	163,7	158,3	153,4	149,2		32,1	35,7	40,0	45,1	50,9		5,3	4,6	4,0	3,4	2,9	
	13	8	187,5	180,7	174,3	168,4	163,1	158,5	32,4	36,0	40,2	45,1	50,9	57,5	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	200,4	192,9	185,8	179,2	173,2	167,8	32,6	36,1	40,3	45,2	50,9	57,4	6,2	5,3	4,6	4,0	3,4	2,9
	20	15	236,1	226,8	217,8	209,3	201,3	193,9	33,2	36,7	40,7	45,5	51,0	57,3	7,1	6,2	5,3	4,6	3,9	3,4

TWIE: Source inlet water temperature (°C)
TWUE: Source outlet water temperature (°C)
TWUC: User outlet water temperature (°C) (Dt=5°C)
PH: Heating capacity (Kw)
PA: Compressors input power (Kw)

**WDH
HEATING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
152	0	-5	133,9	130,3	126,7				34,4	38,6	43,5				3,9	3,4	2,9				
	2	-3	143,7	139,7	135,7	131,7			34,6	38,7	43,6	49,1			4,2	3,6	3,1	2,7			
	5	0	159,4	154,8	150,2	145,6			34,8	38,9	43,7	49,2			4,6	4,0	3,4	3,0			
	7	2	170,8	165,6	160,5	155,5	150,4		34,9	39,0	43,8	49,2	55,5		4,9	4,2	3,7	3,2	2,7		
	10	5	189,1	183,1	177,1	171,3	165,5		35,2	39,2	43,9	49,3	55,6		5,4	4,7	4,0	3,5	3,0		
	13	8	209,3	202,2	195,3	188,6	181,9	175,2		35,5	39,4	44,1	49,5	55,6	62,7	5,9	5,1	4,4	3,8	3,3	2,8
	15	10	223,8	216,0	208,4	200,9	193,6	186,3		35,7	39,6	44,2	49,5	55,7	62,7	6,3	5,5	4,7	4,1	3,5	3,0
	20	15	264,4	254,4	244,7	235,2	225,9	216,8		36,4	40,2	44,6	49,8	55,9	62,8	7,3	6,3	5,5	4,7	4,0	3,5

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
162	0	-5	147,4	143,3	138,6				37,5	42,0	47,1				3,9	3,4	2,9				
	2	-3	158,3	154,0	149,1	143,5			37,6	42,2	47,2	53,0			4,2	3,7	3,2	2,7			
	5	0	175,8	170,9	165,7	159,8			37,9	42,4	47,5	53,3			4,6	4,0	3,5	3,0			
	7	2	188,4	183,0	177,3	171,2	164,3		38,0	42,5	47,6	53,4	60,0		5,0	4,3	3,7	3,2	2,7		
	10	5	208,7	202,5	196,0	189,2	181,9		38,3	42,7	47,8	53,6	60,2		5,5	4,7	4,1	3,5	3,0		
	13	8	231,1	223,7	216,3	208,7	200,6	191,9		38,6	42,9	48,0	53,8	60,4	67,9	6,0	5,2	4,5	3,9	3,3	2,8
	15	10	247,3	239,1	230,9	222,6	214,0	204,7		38,8	43,1	48,1	53,9	60,5	68,0	6,4	5,5	4,8	4,1	3,5	3,0
	20	15	292,7	282,0	271,5	261,1	250,6	239,7		39,6	43,7	48,5	54,2	60,7	68,3	7,4	6,5	5,6	4,8	4,1	3,5

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
144	0	-5	135,1	132,9	131,0				35,8	40,0	44,7				3,8	3,3	2,9				
	2	-3	144,0	141,5	139,2	137,1			35,8	40,1	44,9	50,2			4,0	3,5	3,1	2,7			
	5	0	158,3	155,2	152,3	149,7			35,7	40,1	45,1	50,6			4,4	3,9	3,4	3,0			
	7	2	168,7	165,0	161,7	158,7	156,0		35,6	40,1	45,2	50,8	56,9		4,7	4,1	3,6	3,1	2,7		
	10	5	185,4	180,9	176,8	173,1	169,8		35,6	40,0	45,2	50,9	57,3		5,2	4,5	3,9	3,4	3,0		
	13	8	203,9	198,4	193,4	188,8	184,7	180,9		35,6	40,0	45,1	50,9	57,5	64,6	5,7	5,0	4,3	3,7	3,2	2,8
	15	10	217,2	210,9	205,2	200,1	195,3	191,0		35,8	40,0	45,1	50,9	57,5	64,8	6,1	5,3	4,6	3,9	3,4	2,9
	20	15	254,3	246,0	238,4	231,3	224,8	218,8		36,5	40,3	45,1	50,8	57,5	64,9	7,0	6,1	5,3	4,5	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
164	0	-5	148,4	146,1	143,9				39,2	44,0	49,1				3,8	3,3	2,9				
	2	-3	158,0	155,4	153,0	150,7			39,1	44,0	49,3	55,0			4,0	3,5	3,1	2,7			
	5	0	173,7	170,4	167,4	164,7			39,0	44,0	49,5	55,6			4,5	3,9	3,4	3,0			
	7	2	185,0	181,1	177,7	174,5	171,6		38,9	43,9	49,5	55,7	62,4		4,8	4,1	3,6	3,1	2,7		
	10	5	203,4	198,5	194,2	190,3	186,7		38,7	43,7	49,4	55,8	62,8		5,2	4,5	3,9	3,4	3,0		
	13	8	223,6	217,7	212,3	207,5	203,1	199,0		38,8	43,5	49,2	55,7	63,0	70,8	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	238,2	231,5	225,3	219,8	214,8	210,1		38,9	43,5	49,1	55,6	62,9	71,0	6,1	5,3	4,6	4,0	3,4	3,0
	20	15	279,3	270,0	261,7	254,0	247,0	240,6		39,9	43,9	49,1	55,4	62,7	71,0	7,0	6,1	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
190	0	-5	171,4	168,2	165,4				44,8	50,2	56,3				3,8	3,4	2,9				
	2	-3	182,9	179,2	175,8	172,9			44,8	50,3	56,5	63,5			4,1	3,6	3,1	2,7			
	5	0	201,6	197,0	192,8	189,0			44,9	50,4	56,6	63,7			4,5	3,9	3,4	3,0			
	7	2	215,1	209,9	205,0	200,6	196,7		45,0	50,4	56,7	63,9	71,9		4,8	4,2	3,6	3,1	2,7		
	10	5	236,8	230,6	224,8	219,4	214,4		45,1	50,5	56,9	64,0	72,2		5,3	4,6	4,0	3,4	3,0		
	13	8	260,7	253,4	246,4	239,9	233,9	228,3		45,2	50,7	57,0	64,2	72,4	81,6	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	277,8	269,7	262,0	254,7	247,8	241,5		45,4	50,8	57,1	64,3	72,5	81,7	6,1	5,3	4,6	4,0	3,4	3,0
	20	15	325,2	315,0	305,1	295,6	286,6	278,1		46,0	51,2	57,4	64,6	72,8	82,1	7,1	6,1	5,3	4,6	3,9	3,4

TWIE: Source inlet water temperature (°C)
 TWUE: Source outlet water temperature (°C)
 TWUC: User outlet water temperature (°C) (Dt=5°C)
 PH: Heating capacity (Kw)
 PA: Compressors input power (Kw)

**WDH
HEATING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
210	0	-5	194,5	190,3	186,8				50,3	56,4	63,6				3,9	3,4	2,9				
	2	-3	207,9	203,0	198,7	195,1			50,5	56,5	63,6	71,9			4,1	3,6	3,1	2,7			
	5	0	229,5	223,7	218,2	213,4			50,8	56,8	63,8	71,9			4,5	3,9	3,4	3,0			
	7	2	245,1	238,6	232,4	226,7	221,8		51,1	57,0	63,9	72,0	81,4		4,8	4,2	3,6	3,1	2,7		
	10	5	270,3	262,7	255,3	248,4	242,1		51,4	57,4	64,3	72,3	81,5		5,3	4,6	4,0	3,4	3,0		
	13	8	297,8	289,1	280,6	272,3	264,6	257,6		51,7	57,8	64,7	72,6	81,8	92,3	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	317,4	308,0	298,6	289,5	280,9	272,9		51,9	58,1	65,0	72,9	82,0	92,5	6,1	5,3	4,6	4,0	3,4	2,9
	20	15	371,1	359,9	348,5	337,2	326,1	315,5		52,1	58,5	65,7	73,7	82,8	93,2	7,1	6,1	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
240	0	-5	217,6	212,4	208,1				56,5	63,5	71,7				3,8	3,3	2,9				
	2	-3	232,9	226,9	221,7	217,5			56,7	63,6	71,7	81,1			4,1	3,6	3,1	2,7			
	5	0	257,7	250,4	243,8	238,2			57,1	63,9	71,8	81,0			4,5	3,9	3,4	2,9			
	7	2	275,7	267,4	259,9	253,2	247,5		57,4	64,1	71,9	81,1	91,7		4,8	4,2	3,6	3,1	2,7		
	10	5	304,7	295,0	285,9	277,6	270,2		57,8	64,4	72,2	81,2	91,7		5,3	4,6	4,0	3,4	2,9		
	13	8	336,4	325,2	314,6	304,6	295,4	287,3		58,2	64,9	72,5	81,5	91,8	103,6	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	359,1	346,9	335,1	324,0	313,6	304,2		58,5	65,2	72,8	81,7	91,9	103,7	6,1	5,3	4,6	4,0	3,4	2,9
	20	15	421,7	406,7	392,1	377,9	364,4	351,7		59,2	65,9	73,6	82,3	92,4	103,9	7,1	6,2	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
260	0	-5	240,7	234,5	229,5				62,8	70,6	79,8				3,8	3,3	2,9				
	2	-3	257,9	250,7	244,7	239,9			63,0	70,7	79,8	90,3			4,1	3,5	3,1	2,7			
	5	0	286,0	277,2	269,5	262,9			63,3	70,9	79,8	90,2			4,5	3,9	3,4	2,9			
	7	2	306,2	296,3	287,4	279,6	273,2		63,6	71,1	79,9	90,1	102,0		4,8	4,2	3,6	3,1	2,7		
	10	5	339,1	327,3	316,5	306,8	298,4		64,2	71,5	80,1	90,1	101,8		5,3	4,6	4,0	3,4	2,9		
	13	8	375,0	361,4	348,6	336,8	326,2	317,0		64,7	71,9	80,4	90,3	101,7	115,0	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	400,9	385,8	371,6	358,4	346,4	335,6		65,2	72,3	80,6	90,4	101,7	114,8	6,2	5,3	4,6	4,0	3,4	2,9
	20	15	472,2	453,6	435,7	418,6	402,6	387,8		66,4	73,3	81,5	90,9	102,0	114,7	7,1	6,2	5,3	4,6	3,9	3,4

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
300	0	-5	267,8	260,6	253,3				68,9	77,3	86,9				3,9	3,4	2,9				
	2	-3	287,3	279,4	271,4	263,4			69,1	77,5	87,1	98,1			4,2	3,6	3,1	2,7			
	5	0	318,8	309,5	300,4	291,2			69,5	77,8	87,4	98,3			4,6	4,0	3,4	3,0			
	7	2	341,5	331,2	321,0	311,0	300,9		69,8	78,0	87,5	98,5	111,0		4,9	4,2	3,7	3,2	2,7		
	10	5	378,2	366,1	354,3	342,6	331,0		70,3	78,4	87,8	98,7	111,1		5,4	4,7	4,0	3,5	3,0		
	13	8	418,6	404,4	390,6	377,1	363,7	350,4		70,9	78,9	88,2	98,9	111,3	125,4	5,9	5,1	4,4	3,8	3,3	2,8
	15	10	447,7	432,0	416,7	401,8	387,1	372,5		71,4	79,2	88,4	99,1	111,4	125,4	6,3	5,5	4,7	4,1	3,5	3,0
	20	15	528,8	508,8	489,3	470,4	451,9	433,6		72,8	80,3	89,3	99,7	111,7	125,6	7,3	6,3	5,5	4,7	4,0	3,5

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.						
			TWUC (°C)						TWUC (°C)												
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60	
320	0	-5	294,9	286,6	277,1				75,0	84,0	94,1				3,9	3,4	2,9				
	2	-3	316,7	308,0	298,2	286,9			75,3	84,3	94,5	105,9			4,2	3,7	3,2	2,7			
	5	0	351,7	341,9	331,3	319,5			75,7	84,7	94,9	106,5			4,6	4,0	3,5	3,0			
	7	2	376,8	366,0	354,7	342,3	328,5		76,0	85,0	95,2	106,8	120,0		5,0	4,3	3,7	3,2	2,7		
	10	5	417,4	404,9	392,1	378,5	363,7		76,5	85,4	95,6	107,2	120,4		5,5	4,7	4,1	3,5	3,0		
	13	8	462,1	447,5	432,7	417,4	401,3	383,8		77,1	85,8	95,9	107,5	120,8	135,8	6,0	5,2	4,5	3,9	3,3	2,8
	15	10	494,5	478,1	461,8	445,2	427,9	409,5		77,6	86,2	96,2	107,8	121,0	136,1	6,4	5,5	4,8	4,1	3,5	3,0
	20	15	585,4	563,9	543,0	522,3	501,2	479,4		79,1	87,4	97,1	108,4	121,5	136,5	7,4	6,5	5,6	4,8	4,1	3,5

TWIE: Source inlet water temperature (°C)
 TWUE: Source outlet water temperature (°C)
 TWUC: User outlet water temperature (°C) (Dt=5°C)
 PH: Heating capacity (Kw)
 PA: Compressors input power (Kw)

WDH / RV
COOLING CAPACITY AND COMPRESSORS INPUT POWER

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
039	5	45,2	42,7	40,3	37,8	34,4	30,6	7,3	8,0	8,8	9,9	11,7	14,3
	7	49,0	46,4	43,7	41,1	37,5	33,4	7,4	8,0	8,8	9,8	11,7	14,3
	9	53,0	50,2	47,4	44,6	40,7	36,3	7,6	8,1	8,8	9,8	11,6	14,3
	11	57,3	54,3	51,3	48,3	44,2	39,5	7,8	8,2	8,9	9,8	11,6	14,2
	13	61,8	58,6	55,4	52,3	47,8	42,8	8,0	8,3	8,9	9,8	11,6	14,2
	15	66,5	63,2	59,8	56,4	51,7	46,3	8,3	8,5	9,0	9,9	11,6	14,1

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
045	5	54,4	51,7	49,0	46,2	42,2	37,5	8,5	9,5	10,7	12,0	14,0	16,8
	7	58,8	55,9	53,0	50,0	45,7	40,7	8,5	9,5	10,6	11,9	14,0	16,8
	9	63,4	60,4	57,2	54,1	49,5	44,2	8,4	9,5	10,6	11,9	14,0	16,8
	11	68,3	65,1	61,7	58,4	53,5	47,8	8,4	9,4	10,6	11,9	14,0	16,9
	13	73,5	70,0	66,5	62,9	57,7	51,7	8,4	9,4	10,6	11,9	14,0	16,9
	15	78,9	75,3	71,5	67,7	62,2	55,8	8,4	9,4	10,5	11,9	14,0	16,9

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
050	5	63,0	60,0	56,8	53,6	49,0	43,4	9,6	10,7	12,0	13,6	16,0	19,2
	7	68,0	64,7	61,4	58,0	53,0	47,1	9,6	10,7	12,0	13,5	16,0	19,3
	9	73,2	69,8	66,2	62,6	57,3	51,0	9,6	10,7	12,0	13,5	16,0	19,3
	11	78,7	75,1	71,3	67,5	61,9	55,2	9,7	10,7	11,9	13,4	15,9	19,3
	13	84,6	80,7	76,8	72,7	66,7	59,7	9,8	10,7	11,9	13,4	15,9	19,3
	15	90,8	86,7	82,5	78,1	71,9	64,4	9,9	10,8	11,9	13,4	15,8	19,2

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
060	5	70,3	66,9	63,4	59,8	54,5	48,3	11,0	12,2	13,6	15,3	18,0	21,7
	7	75,9	72,2	68,5	64,6	59,0	52,4	11,1	12,2	13,6	15,3	18,0	21,7
	9	81,7	77,8	73,8	69,7	63,8	56,8	11,2	12,3	13,6	15,3	18,0	21,8
	11	87,9	83,8	79,5	75,2	68,9	61,4	11,3	12,3	13,6	15,3	18,0	21,8
	13	94,4	90,1	85,6	80,9	74,3	66,3	11,5	12,4	13,7	15,3	18,0	21,8
	15	101,3	96,7	91,9	87,0	80,0	71,6	11,7	12,6	13,8	15,3	18,0	21,8

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
070	5	77,7	73,8	69,9	65,9	60,1	53,2	12,4	13,7	15,2	17,0	20,0	24,1
	7	83,8	79,7	75,5	71,2	65,0	57,7	12,6	13,7	15,2	17,0	20,0	24,2
	9	90,2	85,9	81,4	76,9	70,3	62,5	12,7	13,8	15,3	17,0	20,0	24,2
	11	97,0	92,4	87,7	82,9	75,9	67,6	12,9	14,0	15,3	17,1	20,0	24,3
	13	104,3	99,4	94,4	89,2	81,8	73,0	13,2	14,1	15,5	17,1	20,1	24,3
	15	111,9	106,7	101,4	96,0	88,1	78,8	13,5	14,3	15,6	17,2	20,1	24,3

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
080	5	94,4	89,8	85,2	80,4	73,4	65,2	15,0	16,3	18,1	20,3	24,1	29,3
	7	101,8	97,0	92,0	86,9	79,5	70,7	15,3	16,5	18,1	20,3	24,0	29,3
	9	109,6	104,5	99,2	93,8	85,9	76,6	15,8	16,7	18,2	20,3	24,0	29,2
	11	118,0	112,5	106,9	101,1	92,8	82,8	16,3	17,1	18,4	20,4	23,9	29,2
	13	126,8	120,9	115,0	108,9	100,0	89,5	17,0	17,5	18,7	20,5	23,9	29,1
	15	136,0	129,9	123,5	117,0	107,7	96,5	17,9	18,1	19,1	20,7	24,0	29,1

TWUC: User outlet water temperature (°C) (Dt=5°C)
TWIE: Source inlet water temperature (°C) (Dt=5°C)
PF: Cooling capacity (Kw)
PA: Compressors input power (Kw)

**WDH / RV
COOLING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
090	5	110,0	104,7	99,3	93,6	85,2	75,1	17,1	18,9	21,1	23,6	27,8	33,6
	7	118,6	113,0	107,3	101,2	92,3	81,6	17,3	19,0	21,1	23,6	27,8	33,6
	9	127,7	121,8	115,7	109,3	99,9	88,6	17,4	19,1	21,2	23,7	27,8	33,7
	11	137,4	131,2	124,7	117,9	108,0	96,0	17,6	19,3	21,3	23,8	27,9	33,7
	13	147,6	141,0	134,1	127,0	116,5	103,8	17,9	19,5	21,5	23,9	28,0	33,8
	15	158,3	151,4	144,1	136,5	125,5	112,1	18,1	19,7	21,6	24,0	28,0	33,9

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
110	5	125,6	119,6	113,4	106,8	97,0	85,0	19,2	21,6	24,1	26,9	31,4	37,9
	7	135,4	129,1	122,5	115,5	105,2	92,6	19,2	21,6	24,2	27,0	31,6	38,0
	9	145,8	139,2	132,2	124,8	113,9	100,6	19,1	21,6	24,2	27,1	31,7	38,1
	11	156,8	149,8	142,4	134,7	123,2	109,1	18,9	21,5	24,2	27,2	31,8	38,3
	13	168,4	161,0	153,2	145,1	132,9	118,2	18,7	21,4	24,2	27,2	32,0	38,5
	15	180,6	172,9	164,7	156,0	143,3	127,7	18,4	21,3	24,2	27,3	32,1	38,6

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
120	5	143,5	136,0	128,2	120,2	108,6	94,7	22,1	24,5	27,1	30,2	35,3	42,6
	7	154,9	147,0	138,8	130,3	118,0	103,2	22,2	24,6	27,3	30,3	35,4	42,7
	9	167,1	158,7	150,0	141,0	127,9	112,3	22,3	24,7	27,4	30,5	35,5	42,7
	11	179,9	171,0	161,8	152,3	138,5	122,0	22,4	24,8	27,5	30,6	35,7	42,8
	13	193,5	184,1	174,3	164,3	149,7	132,2	22,4	24,9	27,7	30,8	35,8	43,0
	15	207,8	197,8	187,6	176,9	161,5	143,1	22,5	25,0	27,8	30,9	36,0	43,1

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
130	5	161,3	152,3	143,1	133,7	120,2	104,3	25,0	27,4	30,2	33,5	39,1	47,3
	7	174,4	164,9	155,1	145,1	130,7	113,9	25,3	27,6	30,4	33,6	39,2	47,3
	9	188,3	178,1	167,7	157,1	141,9	124,0	25,6	27,9	30,6	33,8	39,4	47,3
	11	203,0	192,2	181,2	169,9	153,8	134,8	25,9	28,2	30,9	34,0	39,5	47,4
	13	218,5	207,1	195,4	183,5	166,4	146,3	26,2	28,4	31,1	34,3	39,7	47,5
	15	234,9	222,8	210,5	197,8	179,7	158,4	26,5	28,8	31,4	34,5	39,9	47,6

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
152	5	178,9	169,4	159,8	150,0	135,4	117,3	27,1	29,8	33,0	36,7	42,9	51,7
	7	193,7	183,5	173,3	162,8	147,3	128,3	27,5	30,1	33,2	36,9	43,0	51,8
	9	209,4	198,6	187,6	176,4	160,0	140,0	27,8	30,4	33,5	37,1	43,2	51,9
	11	226,3	214,6	202,8	190,8	173,5	152,3	28,2	30,8	33,8	37,3	43,3	51,9
	13	244,1	231,6	219,0	206,2	187,7	165,4	28,7	31,1	34,1	37,5	43,5	52,0
	15	263,2	249,7	236,2	222,5	202,9	179,3	29,2	31,6	34,4	37,8	43,7	52,1

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
162	5	196,4	186,5	176,6	166,3	150,6	130,2	29,2	32,3	35,9	40,0	46,7	56,1
	7	212,9	202,2	191,5	180,5	164,0	142,7	29,6	32,6	36,1	40,1	46,8	56,3
	9	230,6	219,0	207,4	195,6	178,1	155,9	30,1	33,0	36,4	40,3	47,0	56,4
	11	249,5	236,9	224,4	211,7	193,1	169,8	30,6	33,4	36,7	40,6	47,1	56,5
	13	269,8	256,1	242,5	228,9	209,1	184,6	31,2	33,8	37,0	40,8	47,3	56,6
	15	291,4	276,5	261,9	247,2	226,1	200,2	31,8	34,4	37,4	41,1	47,5	56,7

TWUC: User outlet water temperature (°C) (Dt=5°C)
 TWIE: Source inlet water temperature (°C) (Dt=5°C)
 PF: Cooling capacity (Kw)
 PA: Compressors input power (Kw)

WDH / RV
COOLING CAPACITY AND COMPRESSORS INPUT POWER

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
144	5	172,0	163,7	155,1	146,3	133,5	118,3	27,5	30,0	33,3	37,3	44,1	53,4
	7	185,5	176,6	167,5	158,1	144,5	128,4	27,9	30,2	33,3	37,3	44,0	53,5
	9	199,9	190,4	180,7	170,7	156,2	139,1	28,5	30,6	33,5	37,3	44,0	53,5
	11	215,0	204,9	194,6	184,0	168,7	150,4	29,3	31,0	33,8	37,4	44,0	53,4
	13	231,0	220,3	209,4	198,1	181,8	162,5	30,2	31,7	34,2	37,6	44,0	53,4
	15	247,9	236,6	225,0	213,0	195,8	175,3	31,3	32,5	34,7	37,9	44,1	53,4

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
164	5	188,7	179,7	170,3	160,8	146,9	130,3	30,0	32,6	36,2	40,6	48,2	58,5
	7	203,6	193,9	184,0	173,8	159,0	141,4	30,7	32,9	36,3	40,6	48,1	58,5
	9	219,3	209,0	198,4	187,6	171,9	153,1	31,6	33,5	36,5	40,6	48,0	58,5
	11	235,9	225,0	213,8	202,2	185,5	165,6	32,7	34,2	36,9	40,7	47,9	58,4
	13	253,5	241,9	230,0	217,7	200,0	178,9	34,0	35,1	37,4	41,0	47,9	58,3
	15	272,1	259,7	247,1	234,1	215,3	193,0	35,7	36,2	38,1	41,4	48,0	58,2

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
190	5	219,9	209,5	198,5	187,1	170,4	150,2	34,3	37,9	42,2	47,2	55,5	67,2
	7	237,2	226,1	214,5	202,4	184,7	163,2	34,5	38,1	42,3	47,3	55,6	67,3
	9	255,4	243,7	231,4	218,6	199,8	177,2	34,8	38,3	42,5	47,4	55,7	67,4
	11	274,8	262,3	249,3	235,8	215,9	191,9	35,2	38,6	42,7	47,5	55,8	67,5
	13	295,1	282,0	268,2	253,9	232,9	207,6	35,7	39,0	42,9	47,7	55,9	67,6
	15	316,7	302,7	288,2	273,1	250,9	224,2	36,3	39,4	43,3	48,0	56,1	67,7

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
210	5	251,1	239,3	226,7	213,5	193,9	170,0	38,5	43,1	48,1	53,7	62,8	75,8
	7	270,8	258,3	245,0	231,1	210,4	185,1	38,4	43,2	48,3	54,0	63,1	76,0
	9	291,6	278,4	264,4	249,7	227,8	201,2	38,1	43,1	48,4	54,2	63,4	76,3
	11	313,6	299,6	284,9	269,3	246,3	218,2	37,8	43,0	48,5	54,4	63,7	76,6
	13	336,8	322,0	306,5	290,1	265,9	236,3	37,4	42,8	48,5	54,5	64,0	76,9
	15	361,2	345,7	329,3	312,1	286,6	255,5	36,9	42,5	48,4	54,6	64,2	77,2

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
240	5	286,9	272,0	256,5	240,4	217,2	189,3	44,3	48,9	54,2	60,3	70,5	85,2
	7	309,8	294,0	277,6	260,6	235,9	206,4	44,5	49,2	54,5	60,6	70,8	85,3
	9	334,1	317,3	299,9	282,0	255,8	224,6	44,7	49,5	54,8	60,9	71,1	85,5
	11	359,8	342,0	323,6	304,6	277,0	243,9	44,8	49,7	55,1	61,2	71,3	85,7
	13	386,9	368,1	348,7	328,6	299,3	264,4	44,9	49,9	55,4	61,5	71,7	85,9
	15	415,5	395,7	375,1	353,9	323,0	286,2	44,9	50,0	55,6	61,8	72,0	86,2

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
260	5	322,7	304,6	286,2	267,3	240,4	208,7	50,1	54,8	60,3	66,9	78,2	94,6
	7	348,9	329,7	310,1	290,1	261,4	227,8	50,6	55,2	60,7	67,3	78,5	94,6
	9	376,6	356,3	335,5	314,3	283,8	248,1	51,2	55,8	61,2	67,7	78,7	94,7
	11	406,0	384,4	362,4	339,9	307,6	269,7	51,8	56,3	61,7	68,1	79,0	94,8
	13	437,1	414,2	390,8	367,0	332,8	292,6	52,4	56,9	62,2	68,6	79,3	95,0
	15	469,8	445,6	420,9	395,7	359,5	316,9	53,0	57,5	62,8	69,0	79,7	95,2

TWUC: User outlet water temperature (°C) (Dt=5°C)
 TWIE: Source inlet water temperature (°C) (Dt=5°C)
 PF: Cooling capacity (Kw)
 PA: Compressors input power (Kw)

**WDH / RV
COOLING CAPACITY AND COMPRESSORS INPUT POWER**

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
300	5	357,7	338,9	319,7	299,9	270,8	234,5	54,2	59,7	66,0	73,4	85,8	103,5
	7	387,3	367,1	346,6	325,5	294,7	256,6	54,9	60,2	66,5	73,8	86,1	103,6
	9	418,9	397,1	375,2	352,7	320,0	279,9	55,6	60,8	67,0	74,2	86,3	103,7
	11	452,5	429,1	405,6	381,6	346,9	304,7	56,5	61,5	67,5	74,6	86,6	103,9
	13	488,3	463,2	438,0	412,4	375,5	330,9	57,3	62,3	68,1	75,1	87,0	104,1
	15	526,3	499,3	472,3	445,1	405,8	358,7	58,3	63,1	68,8	75,7	87,4	104,3

Mod.	TWUC (°C)	PF (kW)						PA (kW)					
		TWIE (°C)						TWIE(°C)					
		15	20	25	30	37	45	15	20	25	30	37	45
320	5	392,8	373,1	353,2	332,5	301,3	260,4	58,4	64,6	71,7	79,9	93,4	112,3
	7	425,8	404,4	383,0	360,9	327,9	285,5	59,2	65,2	72,2	80,3	93,7	112,5
	9	461,2	438,0	414,8	391,2	356,2	311,8	60,1	65,9	72,7	80,7	93,9	112,7
	11	499,0	473,8	448,8	423,4	386,3	339,7	61,1	66,7	73,3	81,1	94,2	112,9
	13	539,5	512,1	485,1	457,8	418,2	369,2	62,3	67,6	74,0	81,6	94,6	113,2
	15	582,8	553,0	523,8	494,5	452,2	400,5	63,7	68,7	74,9	82,3	95,0	113,4

TWUC: User outlet water temperature (°C) (Dt=5°C)
TWIE: Source inlet water temperature (°C) (Dt=5°C)
PF: Cooling capacity (Kw)
PA: Compressors input power (Kw)

DOMESTIC HOT WATER PRODUCTION (OPTION)

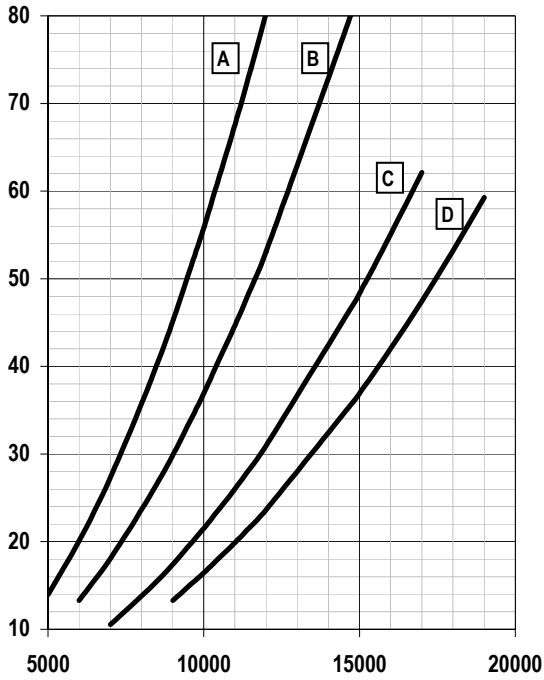
The maximum hot sanitary water capacity and temperature can be calculated in the table at pages 11,12,13,14 depending on the source water temperature conditions. The table below shows the capacity of the model WDH080/SW.

Mod.	TWIE (°C)	TWUE (°C)	PH (kW)						PA (kW)						C.O.P.					
			TWUC (°C)						TWUC (°C)											
			35	40	45	50	55	60	35	40	45	50	55	60	35	40	45	50	55	60
080	0	-5	74,2	73,0	72,0				19,6	22,0	24,5				3,8	3,3	2,9			
	2	-3	79,0	77,7	76,5	75,3			19,6	22,0	24,7	27,5			4,0	3,5	3,1	2,7		
	5	0	86,9	85,2	83,7	82,3	31,0		19,5	22,0	24,8	27,8	31,0		4,5	3,9	3,4	3,0		
	7	2	92,5	90,6	88,8	87,3	85,8		19,4	21,9	24,8	27,9	31,2		4,8	4,1	3,6	3,1	2,7	
	10	5	101,7	99,3	97,1	95,2	93,4		19,4	21,8	24,7	27,9	31,4		5,2	4,5	3,9	3,4	3,0	
	13	8	111,8	108,8	106,2	103,8	101,5	99,5	19,4	21,8	24,6	27,9	31,5	35,4	5,8	5,0	4,3	3,7	3,2	2,8
	15	10	119,1	115,7	112,7	109,9	107,4	105,1	19,5	21,8	24,6	27,8	31,5	35,5	6,1	5,3	4,6	4,0	3,4	3,0
20	15	139,6	135,0	130,8	127,0	123,5	120,3	20,0	22,0	24,5	27,7	31,3	35,5	7,0	6,1	5,3	4,6	3,9	3,4	

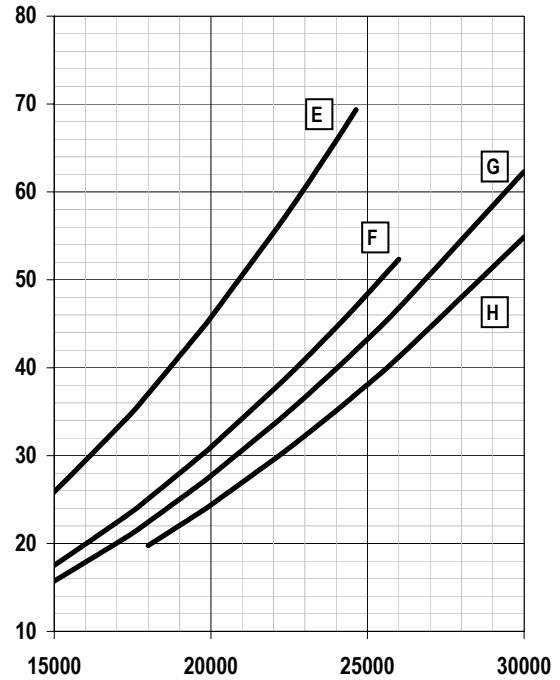
The heat pump model WDH080/SW can produce hot sanitary water temperature up to 60°C (Heating capacity 99,5 kW) if the TWIE (Source inlet water temperature) is not less than 13°C. In case the TWIE ground water temperature is 5°C, the maximum hot sanitary water temperature will be 55°C and the heating capacity 31kW.

TWIE: Source inlet water temperature (°C)
TWUE: Source outlet water temperature (°C)
TWUC: User outlet water temperature (°C) (Dt=5°C)
PH: Heating capacity (Kw)
PA: Compressors input power (Kw)

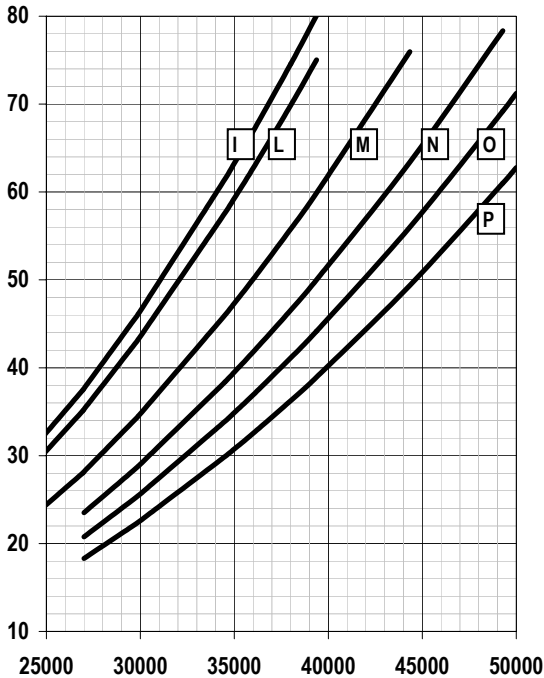
SOURCE SIDE HEAT EXCHANGER WATER PRESSURE DROPS



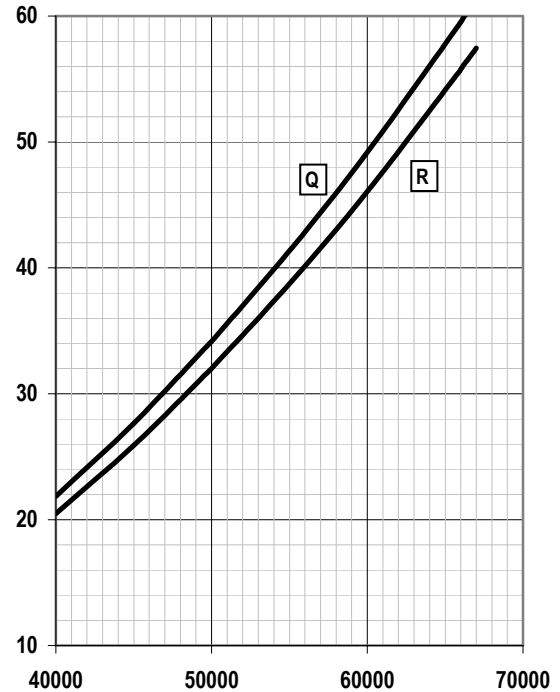
A: WDH039-045 B: WDH050
C: WDH 060-070 D: WDH 080



E: WDH090 F: WDH110
G: WDH120 H: WDH130

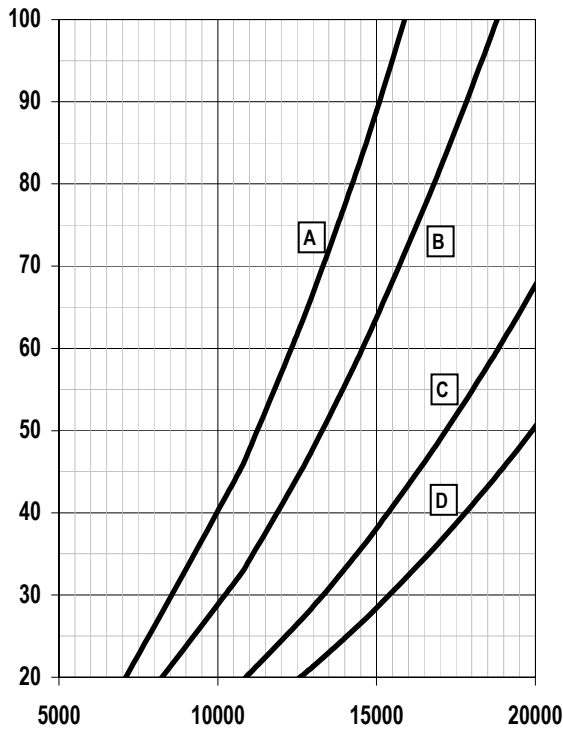


I: WDH152-144 L: WDH162-164
M: WDH 190 N: WDH 210
O: WDH240 P: WDH260

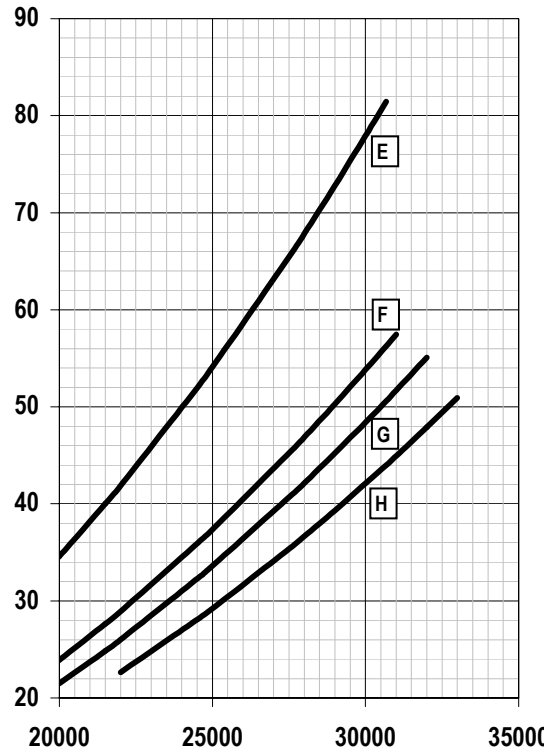


Q: WDH300
R: WDH320

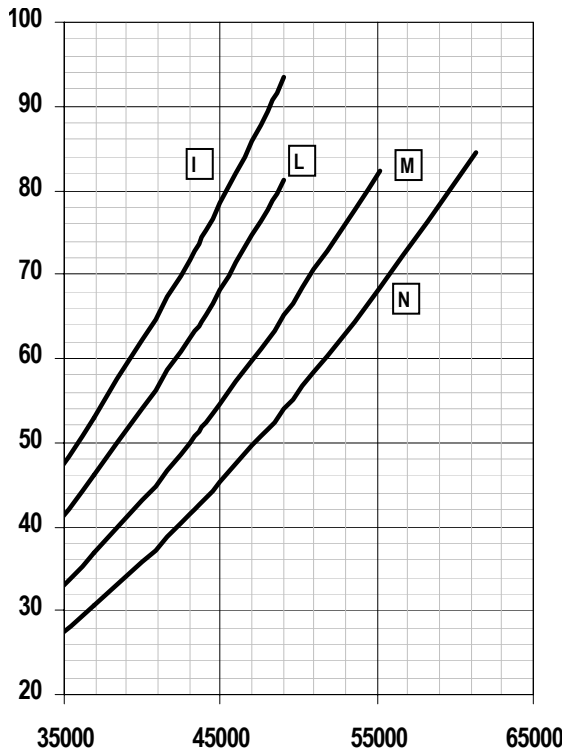
USER SIDE HEAT EXCHANGER WATER PRESSURE DROPS



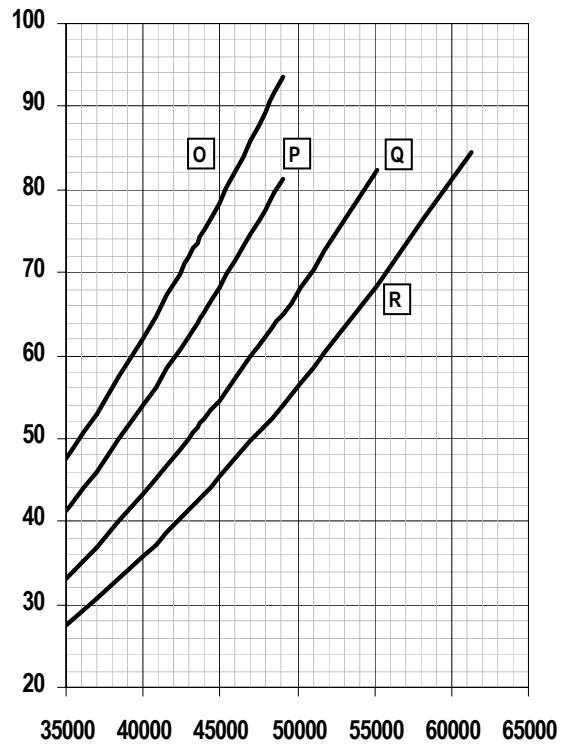
A: WDH039-045 B: WDH050
C: WDH 060-070 D: WDH 080



E: WDH090 F: WDH110
G: WDH120 H: WDH130



I: WDH152-144 L: WDH162-164
M: WDH 190 N: WDH 210

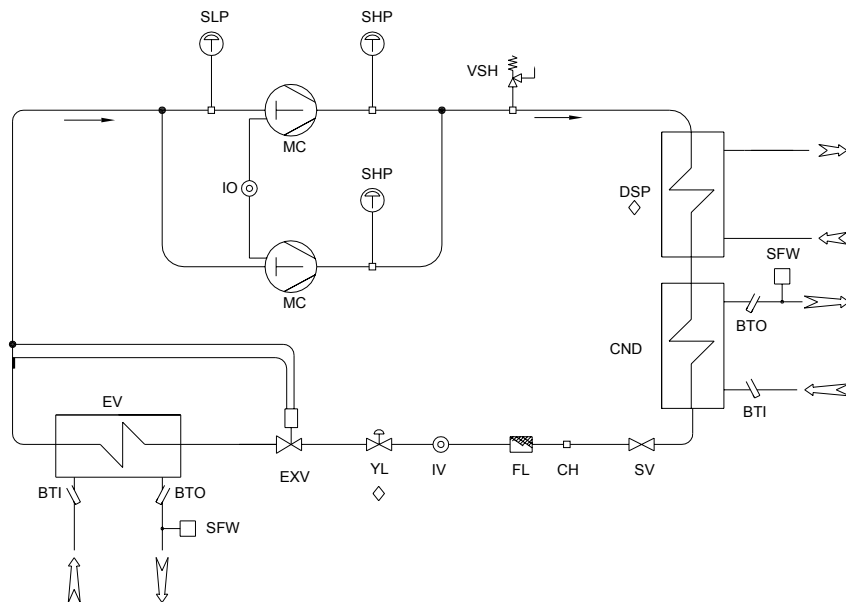


O: WDH240 P: WDH260
Q: WDH300 R: WDH320

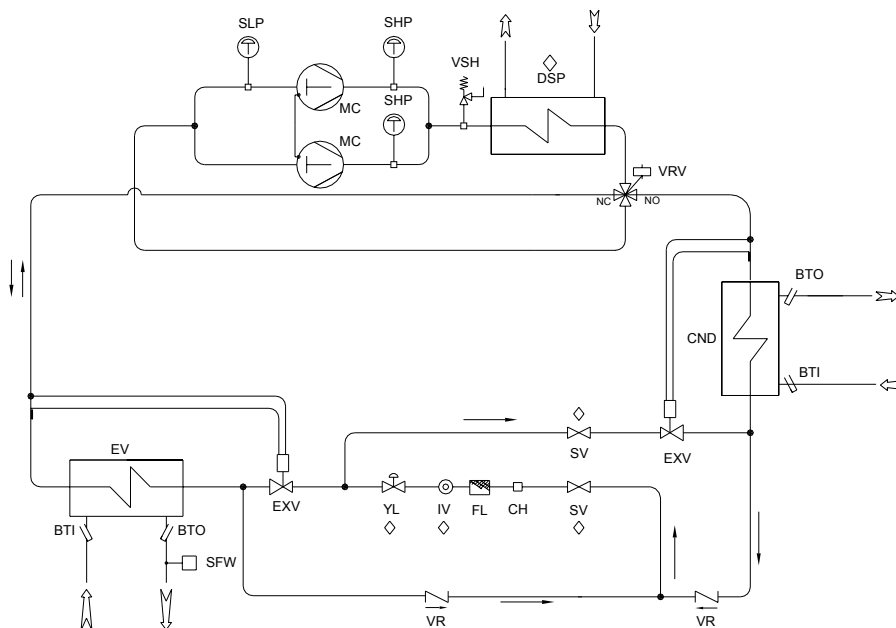
REFRIGERANT LAYOUTS

AAS	Domestic hot water feeding	SFW	Flow switch
BTI	Return water sensor	SHP	High pressure switch
BTO	Supply water sensor	SLP	Low pressure switch
CH	Charging plug	SV	Manual valve
CN	User heat exchanger	BW	Domestic hot water accumulator
CNSW	Domestic hot water heat exchanger	V3V	On/off 3 way valve
DSP	Partial heat recovery	VR	One way valve
EV	Source heat exchanger	VRV	Reverse cycle valve
EXV	Thermostatic valve	VSH	High pressure safety valve
FL	Refrigerant filter	YBP	Hot gas by-pass valve
IV	Sight glass	YL	Liquid line solenoid valve
LR	Liquid receiver	YW	Water solenoid valve
MC	Compressor	◇	Option
SFC	Free cooling heat exchanger		

WDH - STANDARD CONFIGURATION

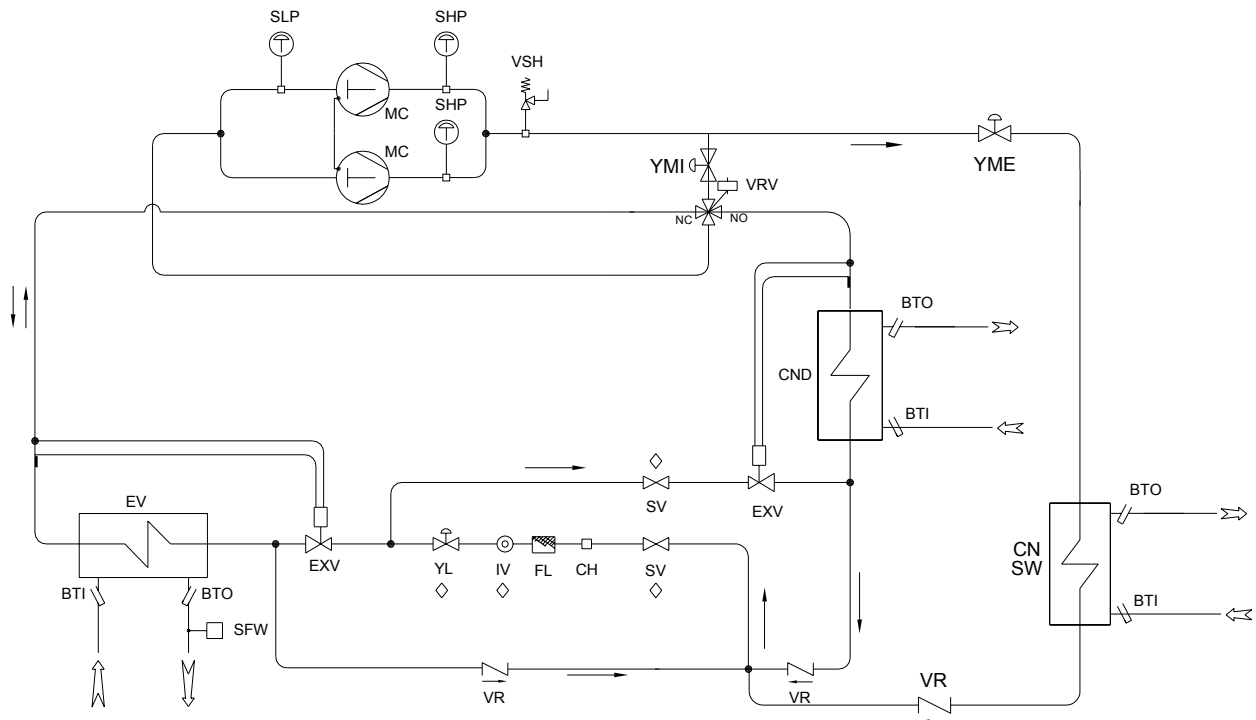


WDH/RV - REVERSIBLE VERSION



DOMESTIC HOT SANITARY WATER VERSION (WDH/RV/SW6) – 6 WATER PIPE CONNECTIONS

The WDH/SW6 version is suitable to produce cold water, hot water for heating and domestic hot water: the unit is supplied with an additional heat exchanger used as condenser for the domestic hot water that, is independent from the operation mode of the unit. The activation of the additional heat exchanger is done automatically by the microprocessor control when the domestic hot water temperature measured by the sensor is lower than the required set point.



The WDH/RV/SW6 unit, allows the production of cold and hot water, independently from the operation mode of the unit (heating or cooling).



During winter operation, if domestic hot water is required, it is temporarily stopped the water flow into the heating system. During summer operation the domestic hot water can be produced at the same time of the cold water flow.

Domestic hot water is available even when the cooling system is in stand-by or the set point has been reached.

The unit microprocessor gives always priority to the domestic hot water.



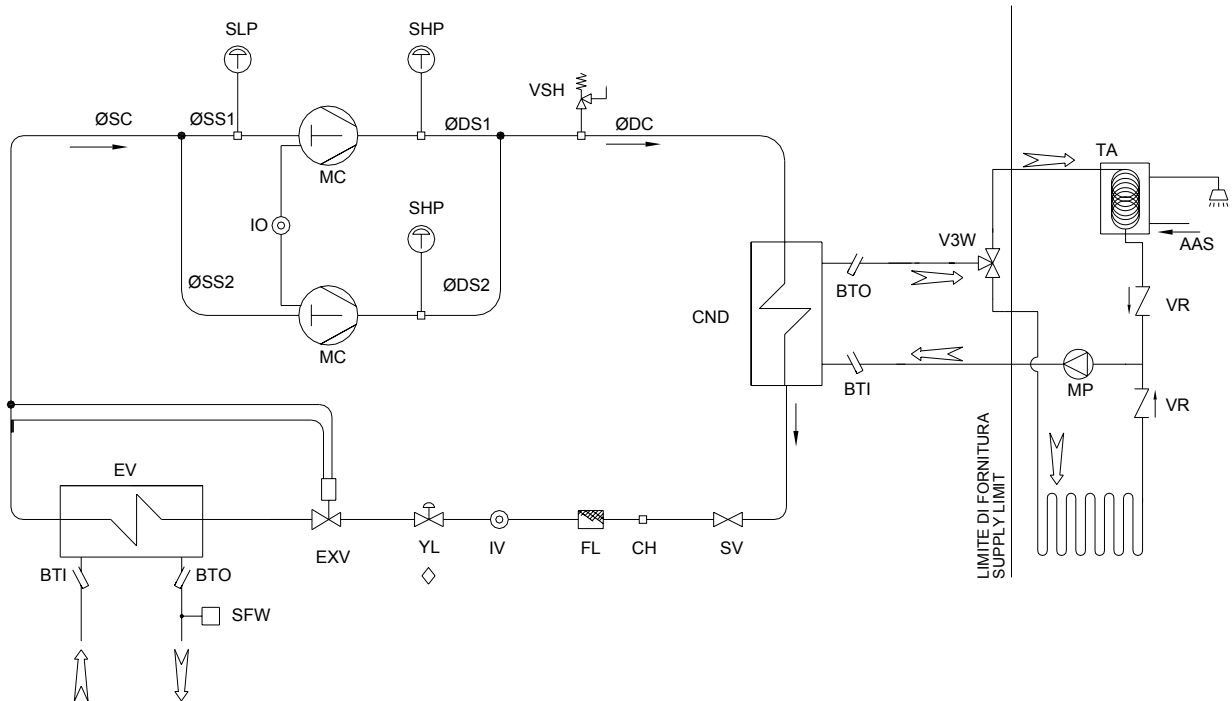
The WDH/RV/SW6 version is only available in the reverse cycle option.



The WDH/RV/SW6 can also be combined with the free cooling version (WDH/FC/RV/SW6).

DOMESTIC HOT SANITARY WATER VERSION (WDH/SW5) – 5 WATER PIPE CONNECTIONS

This version is suitable to produce domestic hot water: the unit is supplied with an ON/OFF 3 way valve to deviate the water flow in a water accumulator; the activation of the 3 way valve is done automatically by the microprocessor control when the domestic hot water temperature is lower than the required set point.



During winter operation, if domestic hot water is required, it is temporarily stopped the water flow into the heating system. The unit microprocessor gives always priority to the domestic hot water.



WARNING: The WDH/SW5 is not available in the reversible version (RV).



The WDH/SW5 can also be combined with the free cooling version (WDH/FC/SW5).

FREE COOLING VERSION WDH/FC

The Free Cooling versions (FC) is suitable for cold water production during summer operation using the cooling capacity coming from the ground probes.

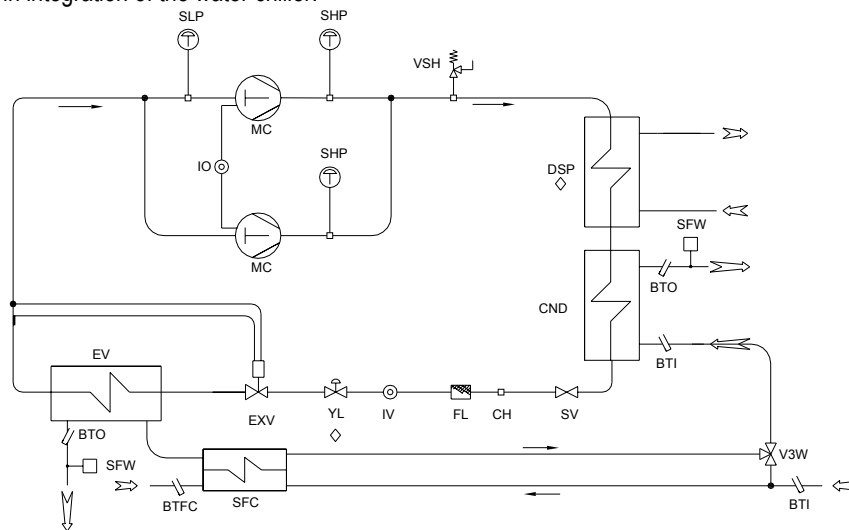
Operation principle:

The free-cooling heat exchanger is installed in series with the user heat exchanger; the 3 way valve controls the water flow through the coil. When the ambient temperature is lower than the return water temperature the microprocessor allows the water flow to pass through the free-cooling coil first, then through the evaporator.

The free cooling versions can operate in 2 different working modes.

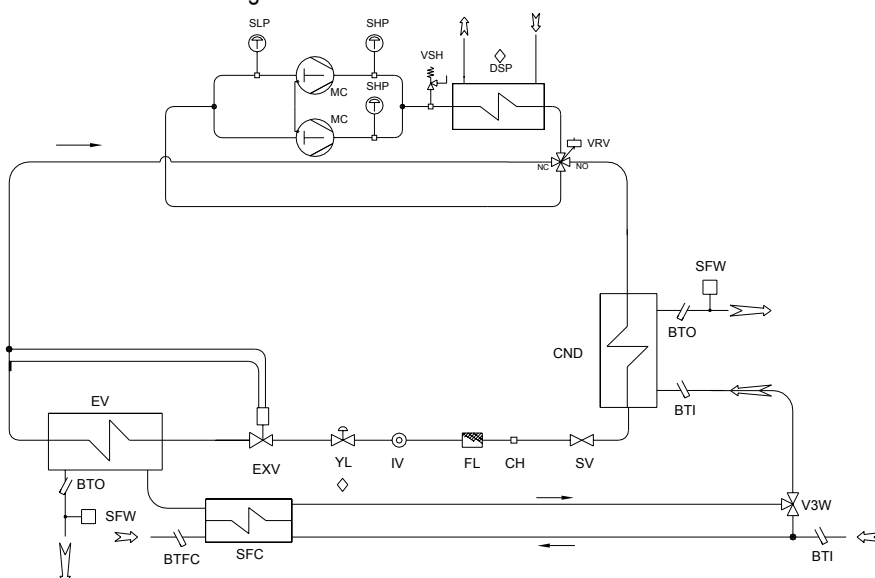
Free cooling mode: The ground source probes can grant enough cooling capacity to the system; In this case the 3 way valve opens the way (A) and the water flow passes into the free cooling heat exchanger coil where the ground probes are sufficient to give the total required load; the compressors are OFF. In this case, the free cooling system works in substitution of the water chiller.

Free cooling mode + Compressors operation: The ground source probes can NOT grant enough cooling capacity to the system; In this case the 3 way valve opens the way (A) and the water flow passes into the free cooling heat exchanger coil where it is pre-cooled down to the maximum capacity of the ground probes; then the reverse cycle valve is activated, compressors are switches ON; and the user water, passing then in the user heat exchanger is cooled down to the required temperature. In this case the free cooling system works in integration of the water chiller.



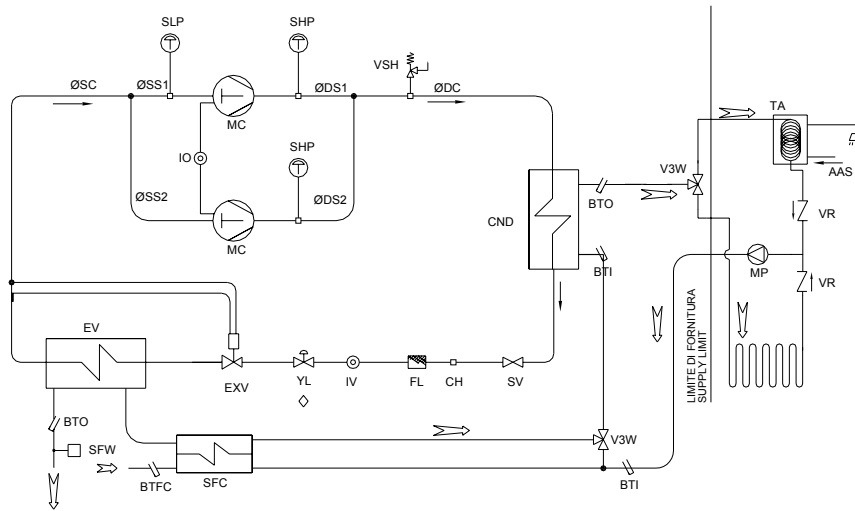
FREE COOLING VERSION WDH/FC/RV

The WDH/FC/RV performs the same features of the WDH/FC with the possibility of hot water production in winter. Free cooling operation is stopped when the unit is in heating mode.



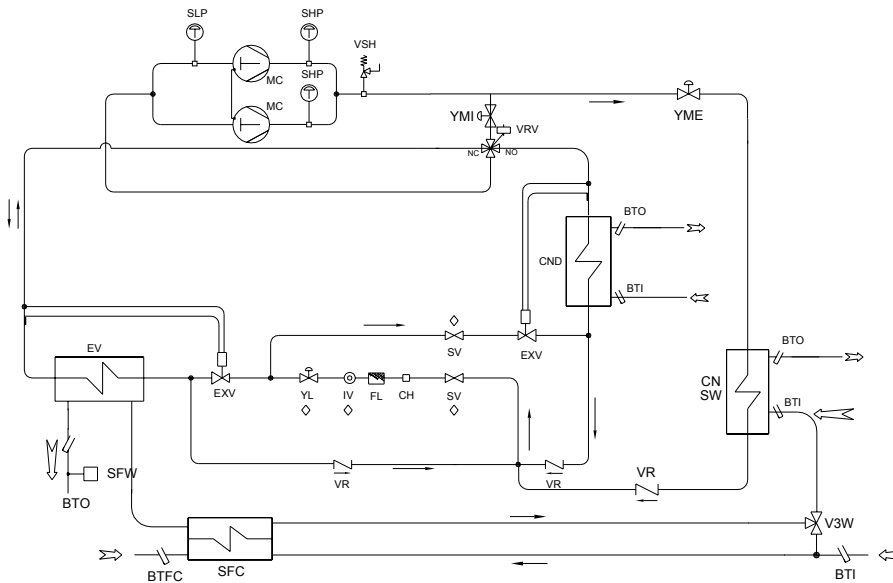
DOMESTIC HOT SANITARY WATER VERSION + FREE COOLING WDH/FC/SW5 – 5 WATER PIPE CONNECTIONS

This unit is able to combined the features of the WDH/SW5 + the FC version;



DOMESTIC HOT SANITARY WATER VERSION + FREE COOLING WDH/FC/RV/SW6 (6 WATER PIPE CONNECTIONS)

This unit is able to combined the features of the WDH/RV/SW6 + the FC version;



FREE COOLING VERSION CAPACITIES (FC)

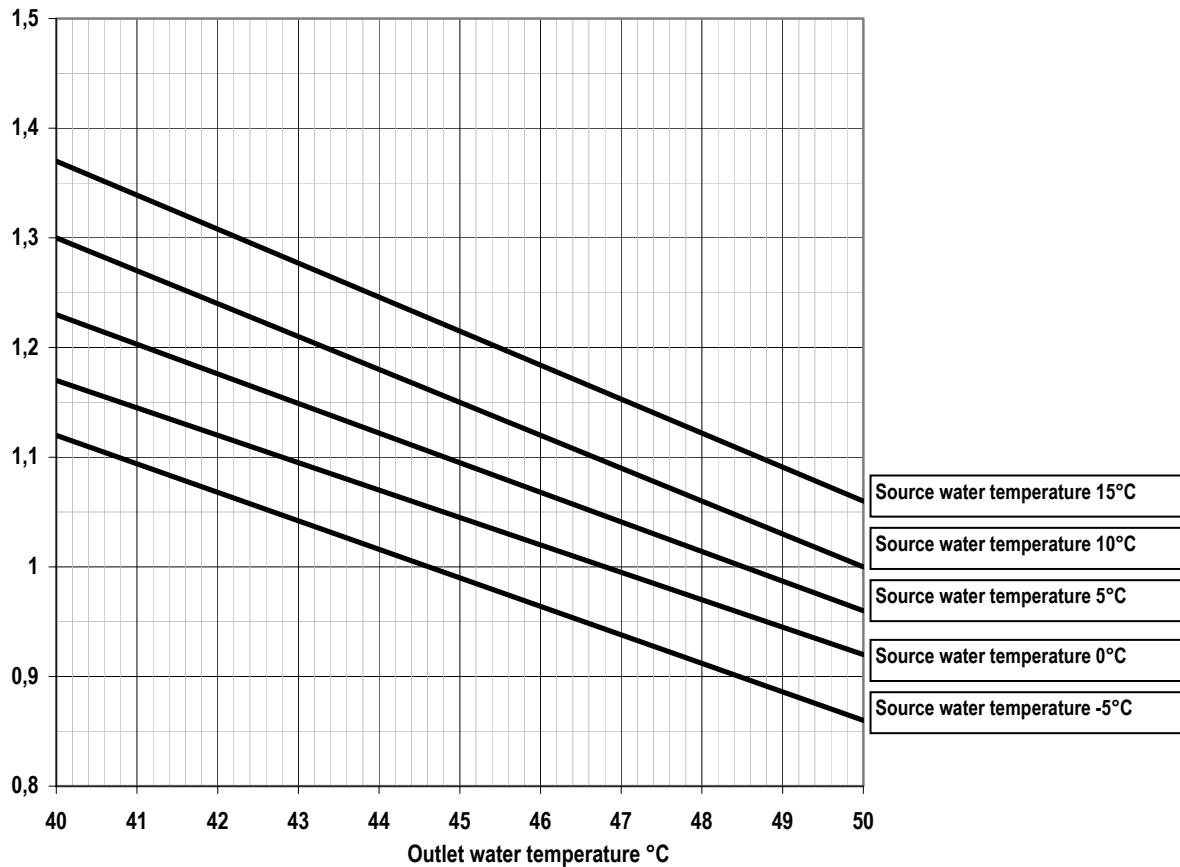
The nominal Free Cooling capacity is obtained when all compressors are OFF, the ground source water inlet temperature is 10°C, the user return water temperature is 20°C and the nominal water flow (for each model) is the one reported in the table.

Mod.		039	045	050	060	070	080	090	110
Free cooling nominal capacity	kW	24	28	33	37	41	50	58	66
Water consumption	l/h	6680	8140	9460	10530	11650	14170	16500	18850
Water pressure drops	kPa	34	44	38	45	52	33	44	56
Mod.		120	130	152	162	144	164	190	210
Free cooling nominal capacity	kW	74	83	92	102	90	99	115	162
Water consumption	l/h	21230	23640	26500	29400	25800	28400	33000	130
Water pressure drops	kPa	48	56	42	55	39	51	55	34
Mod.		240	260	300	320				
Free cooling nominal capacity	kW	148	165	184	204				
Water consumption	l/h	42500	47300	53000	58700				
Water pressure drops	kPa	42	46	44	56				

PARTIAL HEAT RECOVERY CAPACITY (OPTION)

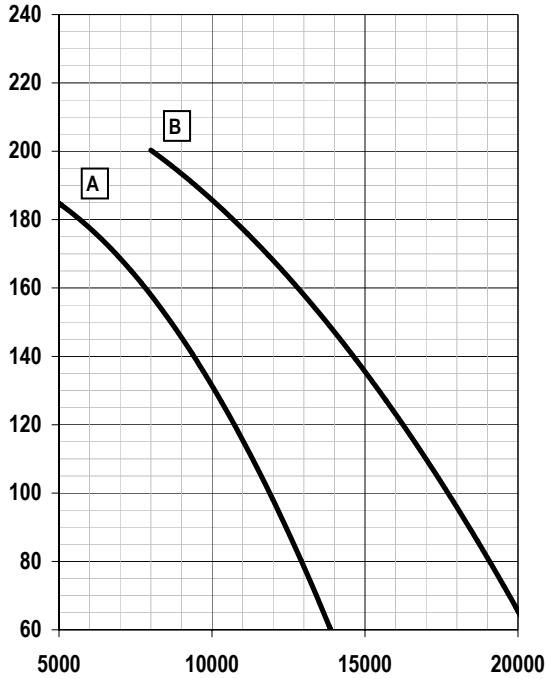
Mod.		039	045	050	060	070	080	090	110
Partial heat recovery nominal capacity	kW	9,5	12,8	13,0	15,0	15,3	18,5	21,5	24,8
Water flow	l/h	1635	2200	2240	2580	2630	3190	3700	4270
Water pressure drops	kPa	10	14	11	15	16	18	11	15
Mod.		120	130	140	160	190	210	240	260
Partial heat recovery nominal capacity	kW	27,5	30,0	34,0	37,0	43,0	49,0	55,0	61,5
Water flow	l/h	4730	5160	5850	6360	7400	8430	9460	10570
Water pressure drops	kPa	13	18	18	25	11	15	19	25
Mod.		300	320						
Partial heat recovery nominal capacity	kW	69,0	76,0						
Water flow	l/h	11850	13000						
Water pressure drops	kPa	20	25						

The nominal value refers to an source water temperature 10/5°C and user outlet water temperature 50°C (Dt 5°C).

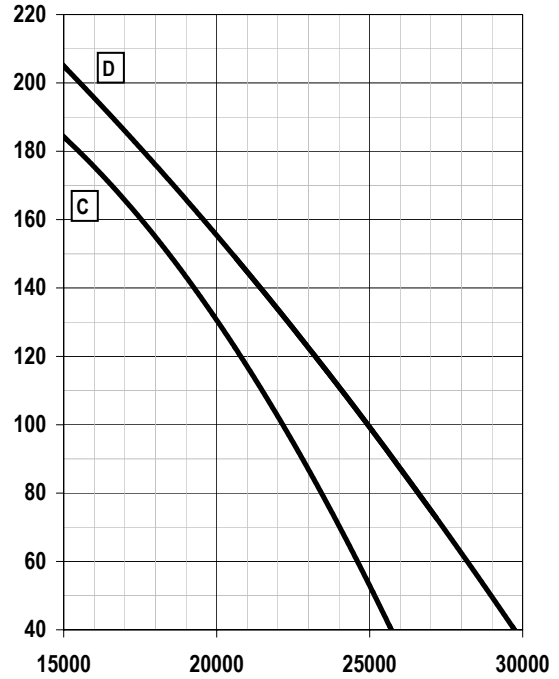


The heat recovery capacity in different conditions can be obtained multiplying the nominal capacity (See above), by the correction factor indicated in the table.

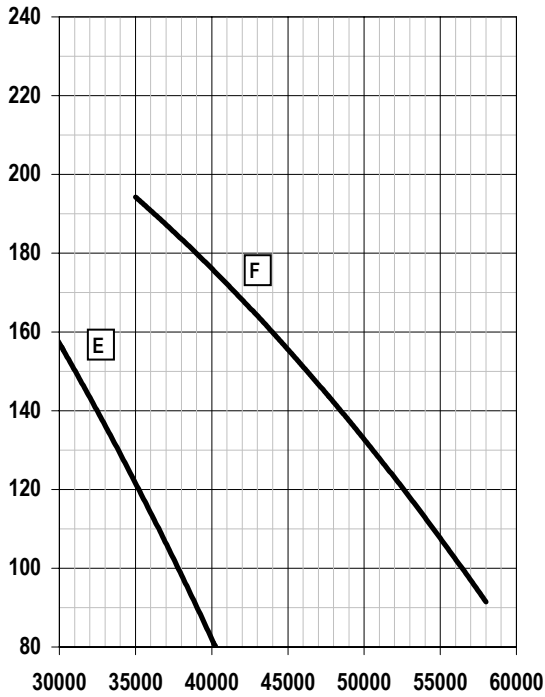
WATER PUMPS AVAILABLE STATIC PRESSURE (OPTION)



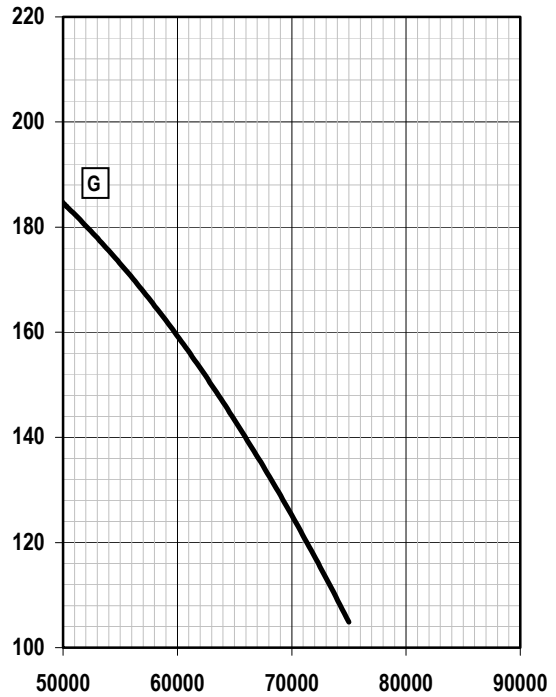
A: WDH039,045,050,060,070
B: WDH080, 090



C: WDH110, 120
D: WDH130

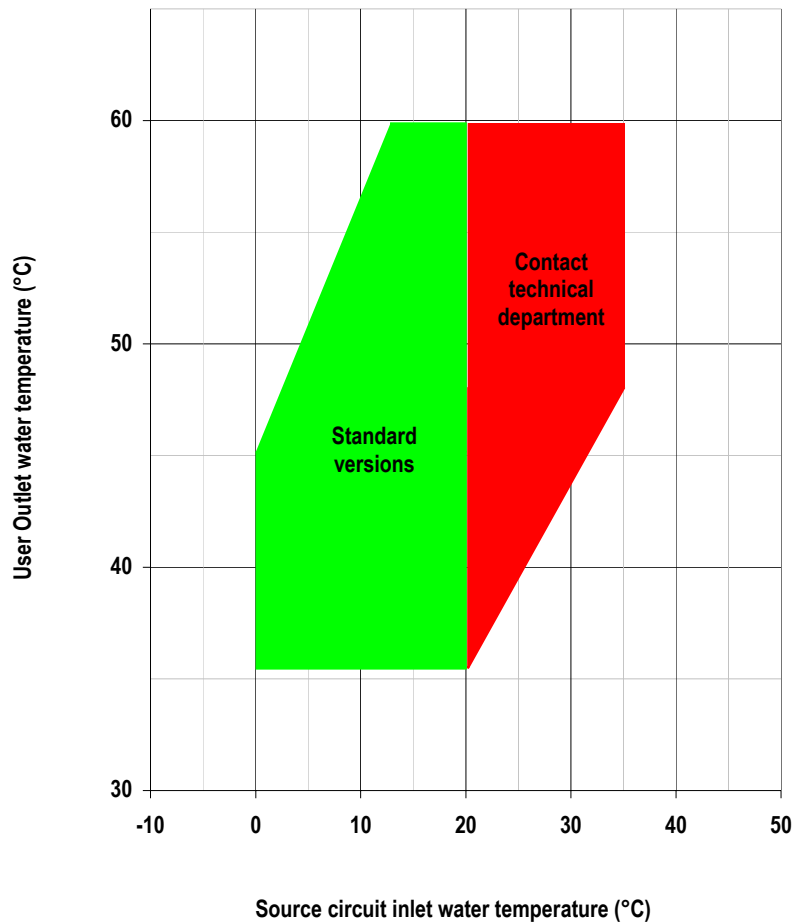


E: WDH 152,144, 162,164,190
F: WDH 210, 240, 260



G: WDH300, 320

OPERATION LIMITS



Source circuit water flow rate

The nominal water flow rate given by HIDROS is referred to a Dt of 5 °C. Maximum flow rate allowed is the one that presents a Dt of 3°C: higher values may cause too high pressure drop. The minimum water flow rate allowed is the one presenting a Dt of 8 °C. Insufficient values cause too low evaporating temperatures with the action of safety devices which would stop the unit.

User heat exchanger water temperature

Once the system is on temperature, water temperature at the user heat exchanger inlet does not have to be less than 30°C: lower values could cause incorrect working operation of the compressor and compressor failure may occur. The maximum water outlet temperature at the user heat exchanger is 58°C.

Source heat exchanger water temperature

The minimum evaporator water outlet temperature is 7°C. To operate below this limit a glycol mixture must be used. In case of glycol use the minimum evaporator water outlet is -5°C. The maximum evaporator water outlet is 20°C. In case of operation outside this range of temperatures please contact the company.



WARNING: In case of operation outside this range of temperatures please contact our technical department.

COMPRESSORS CAPACITY STEP CONTROLS

COMPRESSORS NUMBER				
Model	1	2	3	4
039	50%	50%	---	---
045	50%	50%	---	---
050	50%	50%	---	---
060	44%	56%	---	---
070	50%	50%	---	---
080	50%	50%	---	---
090	43%	57%	---	---
110	50%	50%	---	---
120	45%	55%	---	---
130	50%	50%	---	---
152	44%	56%	---	---
162	50%	50%	---	---
144	21,5%	21,5%	28,5%	28,5%
164	25%	25%	25%	25%
190	21,5%	21,5%	28,5%	28,5%
210	25%	25%	25%	25%
240	22,5%	22,5%	27,5%	27,5%
260	25%	25%	25%	25%
300	22%	22%	28%	28%
320	25%	25%	25%	25%

CORRECTION TABLES Source side heat exchanger temperature difference °C

Fouling factor	3	5	8	10
HCCCP	1,02	1	0,98	0,97
IPCF	1,01	1	0,99	0,98

CORRECTION TABLES User side heat exchanger temperature difference °C

Fouling factor	3	5	8	10
HCCCP	0,99	1	1,01	1,015
IPCF	1,01	1	0,99	0,99

HCCF = Heating capacity correction factor. IPCF = Input power correction factor.

The correction factors have to be applied to the nominal data reported in the previous tables that shows the capacities with $Dt5^{\circ}C$.

CORRECTION TABLES Operation with glycol

Glicol percentage	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10	-3,2	0,985	1	1,02	1,08
20	-7,8	0,98	0,99	1,05	1,12
30	-14,1	0,97	0,98	1,09	1,22
40	-22,3	0,965	0,97	1,14	1,25
50	-33,8	0,955	0,965	1,2	1,33

CCF: Capacity correction factor

IPCF: Input power correction factor

WFCF: Water flow correction factor

PDCF: Pressure drops correction factor.

The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to maintain the same temperature difference as that which would be obtained without glycol. The pressure drop correction factor takes into account the different flow rate obtained from the application of the flow rate correction factor.

CORRECTION TABLES Different Fouling factors

Fouling factor	0,00005	0,0001	0,0002
CCCP	1	0,98	0,94
IPCF	1	0,98	0,95

CCF = Cooling capacity correction factor.

IPCF = Input power correction factor.

SOUND DATA

SOUND LEVELS STANDARD VERSIONS											
Mod.	Octave bands (Hz)								Lw		Lp
	63 dB	125 dB	250 dB	500 dB	1K dB	2K dB	4K dB	8K dB	dB	dB(A)	dB(A)
039	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	52
045	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	52
050	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	53
060	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	54
070	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	54
080	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	55
090	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	55
110	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	56
120	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	56
130	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	57
152	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	57
162	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	57
144	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	57
164	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	57
190	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	58
210	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	60
240	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	60
260	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	60
300	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	62
320	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	62

SOUND LEVELS (LS) LOW NOISE VERSIONS											
Mod.	Octave bands (Hz)								Lw		Lp
	63 dB	125 dB	250 dB	500 dB	1K dB	2K dB	4K dB	8K dB	dB	dB(A)	dB(A)
039/LS	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	46
045/LS	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	46
050/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	47
060/LS	89,1	80,3	74,2	72,7	71,6	66,2	62,8	53,7	89,9	76	48
070/LS	89,1	80,3	74,2	72,7	71,6	66,2	62,8	53,7	89,9	76	48
080/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	49
090/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	49
110/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	50
120/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	50
130/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	51
152/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	51
162/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	51
144/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	51
164/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	51
190/LS	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	52
210/LS	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	54
240/LS	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	54
260/LS	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	54
300/LS	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	56
320/LS	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	56

Lw: Sound power level according to ISO 3746.

Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

SAFETY DEVICE SETTING

Device		Capacity Steps		Capacity steps		Reset Type
		2		4		
		Set-point	Differential	Set point	Differential	
Control thermostat (summer)	°C	10	2	9	3	...
Control thermostat (winter)	°C	42	2	43	3	...
Anti-freeze thermostat	°C	4	6	4	6	MANUAL
Electric heater thermostat	°C	4	6	4	6	MANUAL
High pressure switch	Bar	28	7	28	7	MANUAL
Low pressure switch	Bar	0,7	1	0,7	1	MANUAL
Water safety valve (Optional)	Bar	6	...	6

ELECTRIC DATA

Power supply	V/-/Hz	400 / 3 / 50	Control board	V/-/Hz	24 / 1 / 50
Auxiliary circuit	V/-/Hz	230 / 1 / 50			

Electric data may change for updating. It is therefore necessary to refer always to the wiring diagram inside the units.



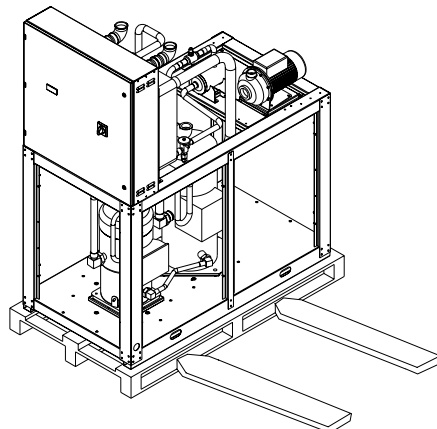
WARNING: All this operation described in next chapters MUST BE DONE BY TRAINED PEOPLE ONLY. Before every operation of servicing on the unit, be sure that the electric supply is disconnected.

INSPECTION

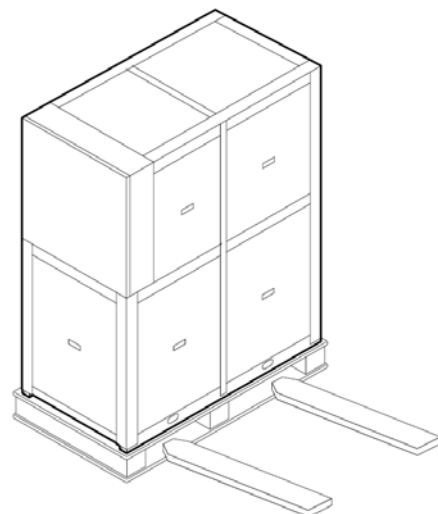
When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. Not observing the rules reported on this manual can create dangerous situations. After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage must be questioned to the carrier and recorded on the Delivery Note before it is signed. HIDROS must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.

LIFTING AND HANDLING

Standard version



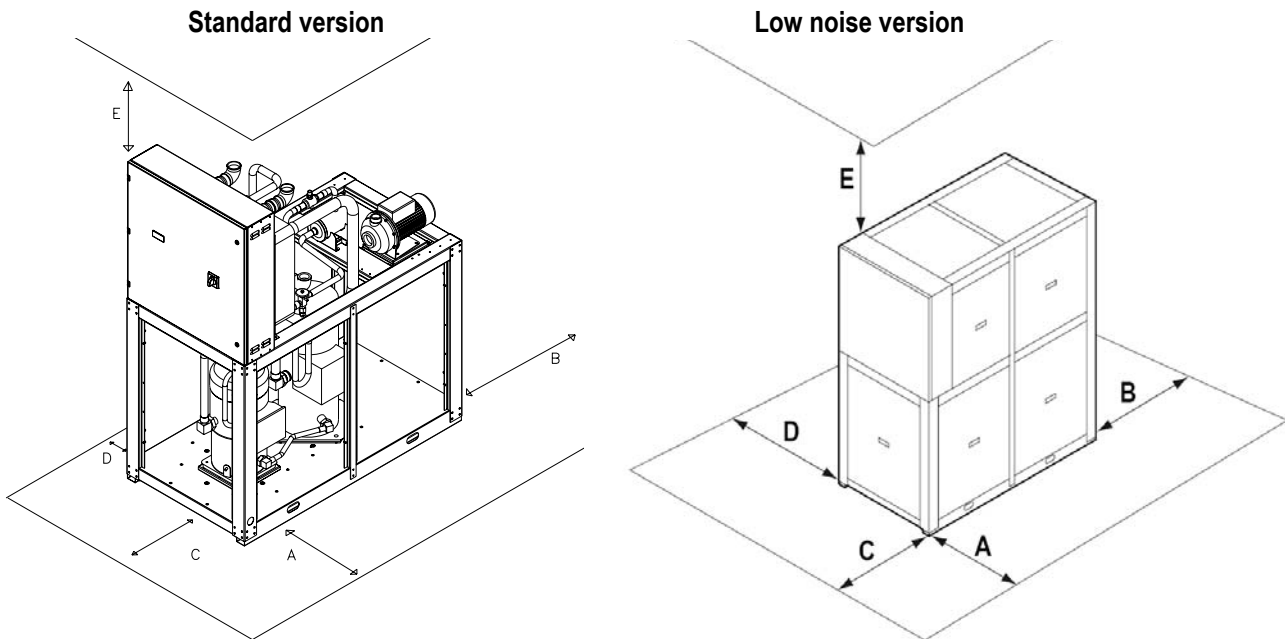
Low noise version



When unloading the unit, it is highly recommended to avoid any sudden move in order to protect refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, in alternative, using belts, being sure that the method of lifting does not damage the lateral panels and the cover. It is important to keep the unit horizontal at all time to avoid damages to the internal components.

LOCATION AND MINIMUM TECHNICAL CLEARANCES

WDH units are designed for indoor installation. It is advisable to create a proper basement, with a size similar to unit foot-print. Unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. If it is the case, it is possible to install anti-vibration mounts (spring or rubber), to keep vibrations at a very low level. It is also necessary to observe the following clearances for service and maintenance:



Mod.	A	B	C	D	E
039-045 -050-060-070-080-090-110-120-130	1000	500	600	0	500
144-164-190-210-240-260-300-320-380-430-500	1000	500	800	0	500



WARNING: The equipment should be installed so that maintenance and/or repair services be possible. The warranty does not cover costs due to lifting apparatus and platforms or other lifting systems required by the warranty interventions.



WARNING: All the maintenance operation must be done by TRAINED PEOPLE only.



WARNING: Before any service operation on the unit, be sure that the electric supply is disconnected.



WARNING: Inside the unit some moving components are present. Be very careful when operating in their surroundings even if the electric supply is disconnected.



WARNING: The top shell and discharge line of compressor are usually at high temperature level. Be very careful when operating in their surroundings.



WARNING: After servicing operation close the unit with cover panels, fixing them with locking screws

HYDRAULIC CIRCUIT

Unit water pipe-work must be installed in accordance with national and local regulation, pipes can be made either in steel , galvanized steel or PVC. Pipes have to be designed depending on the nominal waterflow and the hydraulic pressure drops of the system. All pipes must be insulated with closed-cell material of adequate thickness. The unit has to be connected to the piping by using flexible joints. Piping should include:

- Temperature and pressure gauges for the ordinary maintenance or servicing operations.
- Shut-off manual valves to separate the unit from the hydraulic circuit.
- Metallic filters to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.

The installation of the following accessories is also recommended: Water tank for economic operation and constant user water temperature (P); Hydraulic circuit manual shut-off valves (D); Air separator with safety valve (H); Automatic system feeder with pressure gauge (A);



WARNING: Unit water inlet must be in correspondence with the connection labelled: "USER WATER IN", otherwise the heat exchangers may freeze.



WARNING: It is compulsory to install on the heat exchangers water inlet connections a metallic filter with a mesh not larger than 1 mm. THE FILTER IS MANDATORY, the warranty will no longer be valid if it is not present or removed. The filter must be kept clean, so make sure it is clean after the unit has been installed, and then check it periodically.



WARNING: All units are factory supplied with the user heat exchanger flow switch. The flow switch MUST BE INSTALLED on the water outlet connection (labelled USER WATER OUT); If the flow switch is altered, removed, or the water filter should not be present on the unit, the warranty will be invalidated. Please refer to the wiring diagram for flow switch electric connections.



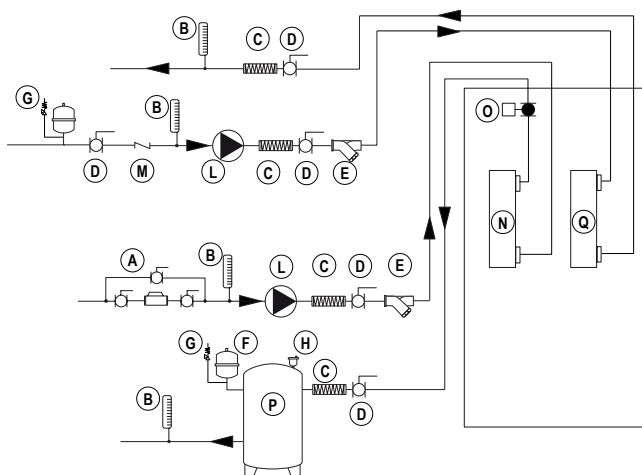
WARNING: Water flow in the user heat exchanger MUST BE CONSTANT.

In the following picture there is a layout of the WDH hydraulic circuit to show the suggested devices.

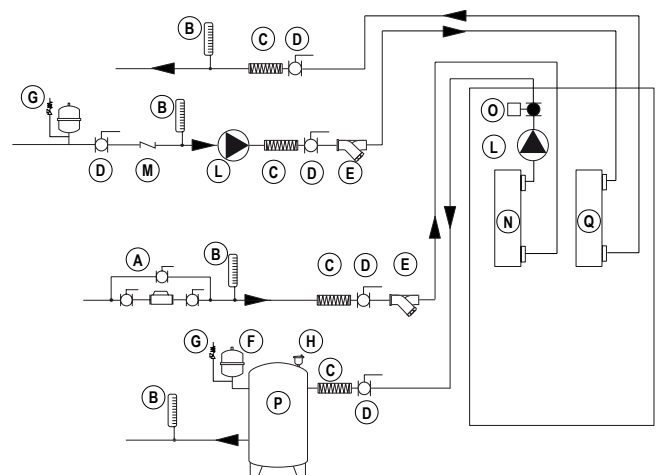
LEGEND

A	System filling group	H	Vent valve
B	Thermometer	L	Water pump
C	Flexible connection	N	User heat exchanger
D	Ball shut-off valve	O	Flow switch
E	Water strainer	P	Water tank
F	Expansion vessel	Q	Source heat exchanger
G	Safety valve		

WDH



WDH A1NT



UNIT DISPLAY

MODELS 039÷162



MODELS 144 ÷320



REMOTE CONTROL PANEL

MODELS 039÷162
Dimensions : 100 x 64 mm



MODELS 144 ÷320
Dimensions: 100 x 64 mm



WARNING: The remote control panel is connected to the water chiller by 2 wires of 2,5 mm² section. Power supply cables must be separated by remote control wires. Maximum distance 50 metres.



WARNING: The remote control panel can not be installed in area in with strong vibrations, corrosive gases, excess of dirtiness or high humidity level. Leave free the area near the cooling openings.

ELECTRICAL CONNECTIONS

It must be verified that electric supply is corresponding to the unit electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit. Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force. Power cable and line protection must be sized according to the specification reported on the form of the wiring diagram enclosed with the unit.



WARNING: The line voltage fluctuations can not be more than $\pm 5\%$ of the nominal value, while the voltage unbalance between one phase and another can not exceed 2%. If those tolerances should not be respected, please contact our Company.



WARNING: Electric supply must be in the limits shown: in the opposite case warranty will terminate immediately. Before every operation on the electric section, be sure that the electric supply is disconnected.

WARNING: The Flow switch must be connected following the indication reported in the wiring diagram. Never bridge the flow switch connections in the terminal board. Guarantee will be invalidated if flow switch connections are altered or not properly made.

START UP

Before start-up

- Check that all power cables are properly connected and all terminals are hardly fixed.
- The voltage at the phase R S T is the one shown in the unit labels.
- Check that there is not any refrigerant leakage.
- Check that crankcase heaters are powered correctly.
- Check that all water connections are properly installed and all indications on unit labels are observed.
- The system must be bleed off in order to eliminate any air.
- Before proceeding to start up check that all the cover panels are re-located in the proper position and locked with fastening screws.



WARNING: Crankcase heaters must be powered at least 12 hours before start up by closing the main switch (heaters are automatically supplied when main switch is closed). The crankcase heaters are working properly if after some minutes the compressor crankcase temperature is about 10-15°C higher than ambient temperature

Start up

Please refer to the microprocessor manual enclosed with the unit.

If the unit should not start:

- Check that the control thermostat is set to the correct value.



WARNING: Do not modify internal wiring of the unit otherwise warranty will terminate immediately.

WARNING: In the reverse cycle versions, the summer/winter operation must be selected at the beginning of the related season. Frequent change over of the seasonal operation mode must be avoided in order to prevent severe damage to compressors.

Refrigerant charge checking

- After few hours the unit is working, check that sight glass shows a green colour core: if the core is yellow moisture would be present in the circuit. In this case it is necessary circuit dehydration to be carried out by qualified people only. Check that at the sight glass there is no continuous vapour bubbles presence. In this case additional refrigerant charge could be required. It is however allowed the presence of few vapour bubbles.
- Check that refrigerant superheat on the evaporator is about 5-7 °C
- Check if refrigerant sub-cooling on the condenser is about 5-7 °C.

Unit switch OFF

Please refer to the microprocessor manual enclosed with the unit.



WARNING: Never switch off the unit (for temporary stop), by opening the main switch: this component should be used only to disconnect the unit from power supply when the current is not passing through, i.e. when the unit is in OFF mode. Moreover, with no supply to crankcase heater, at the unit start up, compressor could be seriously damaged.

MAINTENANCE AND PERIODIC CHECKS



WARNING: All operations described in this chapter MUST BE DONE BY TRAINED PEOPLE ONLY. Before every operation of servicing on the unit, be sure that the electric supply is disconnected. The top shell and discharge line of compressor are usually at high temperature level. Be very careful when operating in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating in their surroundings. After servicing operation close the unit with cover panels, fixing them with locking screws.

It is a good rule to carry on periodic checks in order to verify the correct operation of the unit.

- Check that safety and control devices work correctly as previously described (monthly).
- Check all the terminals on the electric board and on the compressor are properly fixed. Periodic cleaning of the sliding terminals of the contactors should be done.
- Verify refrigerant charge checking sight glass (monthly).
- Check there is no oil leakage from compressor (monthly).
- Check there is no water leakage in the hydraulic system (monthly).
- If the unit is to be expected to be stopped for a long period, unit hydraulic circuit should be emptied from all the tubes and heat exchanger. This operation is compulsory if, during seasonal stop, ambient temperature is expected to go down below the freezing point of employed mixture (typical seasonal operation).
- Check flow switch proper working (monthly).
- Check compressor crankcase heater proper supply and functioning (monthly).
- Clean metallic filters on water pipings (monthly).
- Check the colour of the sight glass core (green=no moisture, yellow=moisture present): if it has a yellow colour, change the refrigerant filter (every 4 months).

REFRIGERANT CIRCUIT REPAIR

In the case that refrigerant circuit should be discharged, all the refrigerant must be recovered with proper machines. The system must be charged with nitrogen, using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any eventual leakage must be searched with a bubble leak finder. In case bubbles appear discharge the circuit before welding with proper alloys.



WARNING: Never use oxygen instead of nitrogen: explosions may occur.

ENVIRONMENT PROTECTION

According to European norms dealing with the use of depleting stratospheric ozone substances, it is forbidden to release refrigerants fluids in the atmosphere. They must be redelivered to the seller or to proper gathering points at the end of their operating life. Refrigerant R407C is mentioned among controlled substances and for this reason it must be subjected to said norms. **A particular care is recommended during service operations in order to reduce as much as possible any refrigerant loss.**

UNIT OUT OF SERVICE

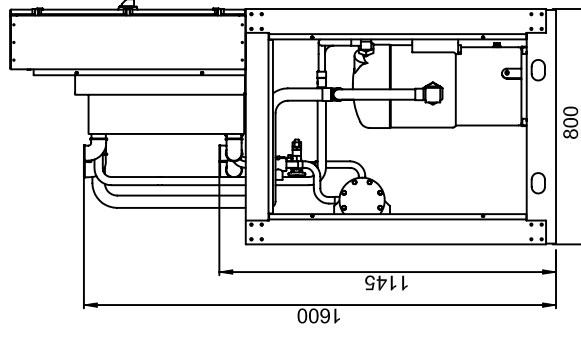
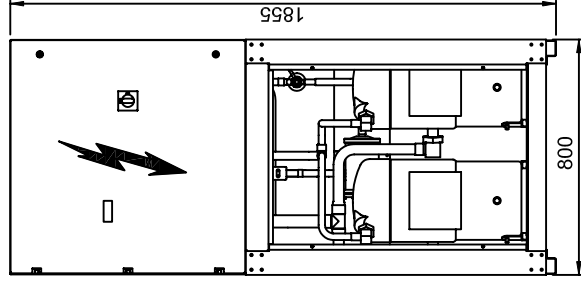
Once the unit is arrived at the end of its life and needs to be removed or replaced, the following operations are recommended:

- the unit refrigerant has to be recovered by trained people and sent to proper collecting centre;
- compressor lubricating oil has to be recovered and sent to proper collecting centre;
- the frame and various components, if not usable any longer, have to be dismantled and divided according to their nature; particularly copper and aluminium, which are present in conspicuous quantity in the unit. These operations allow easy material recover and recycling process, reducing environmental impact.

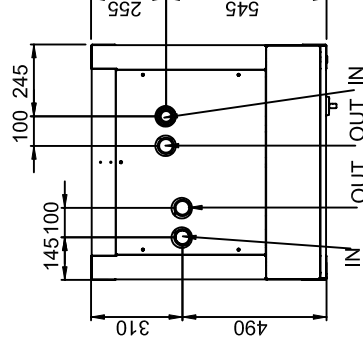
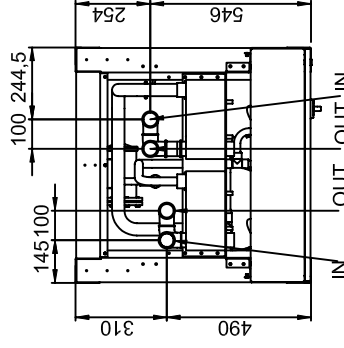
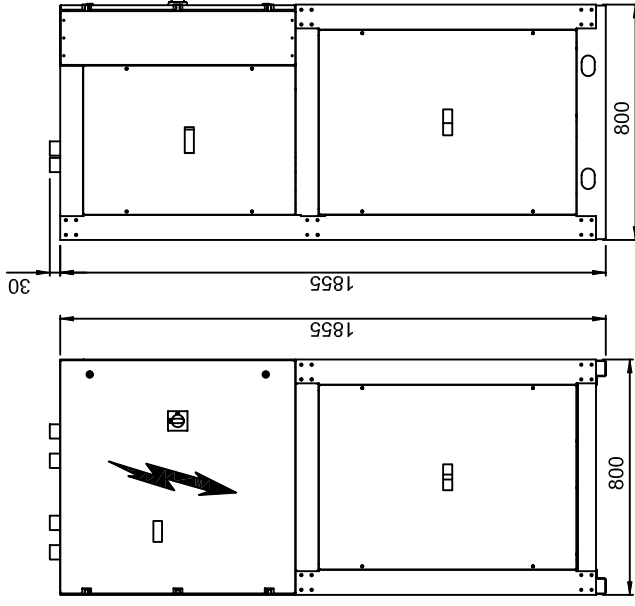
FAULT FINDING

Please refer to the unit microprocessor manual.

VERSIONE STANDARD
VERSION STANDARD



VERSIONE SILENZIATA
LOW NOISE VERSION



Descrizione modifica/Review description

Visto/Checked by

Dis./Draftsman

Data/Date

REV.

WDR / WDH

MODELLI	IN	OUT
039-045	1" 1/4	1" 1/4
050-060-070-080	1" 1/2	1" 1/2

Denominazione/Denomination

SHCEMA DIMENSIONALE WDR-H 039...080
DIMENSIONAL DRAWING WDR-H 039...080

Disegno/Drawing

SD.1WDR.0001A

Sost. il dis./Replace draw.

Rev.

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Data/Date

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Foglio Sheet

N. 1 di 1

Scala/Scale

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Form.

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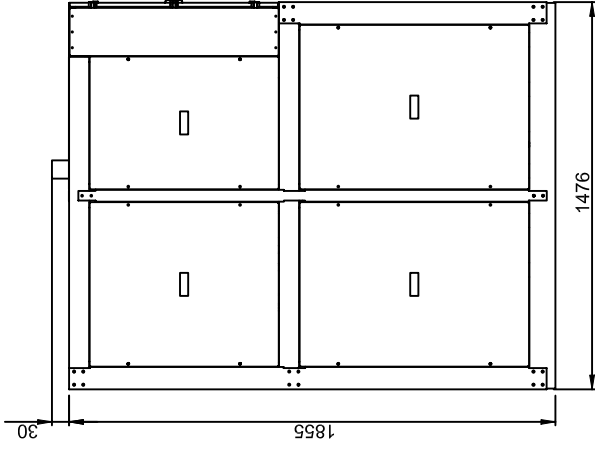
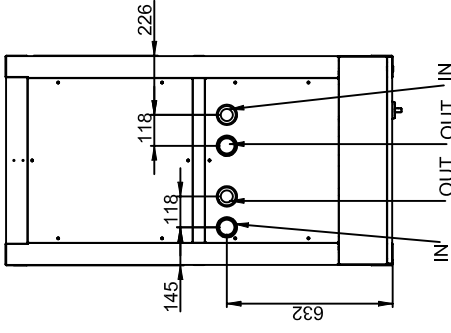
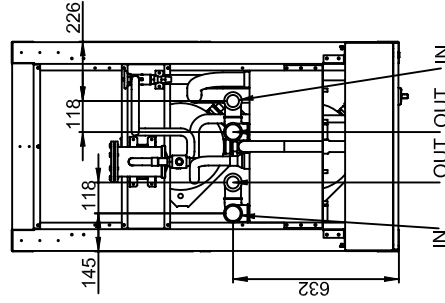
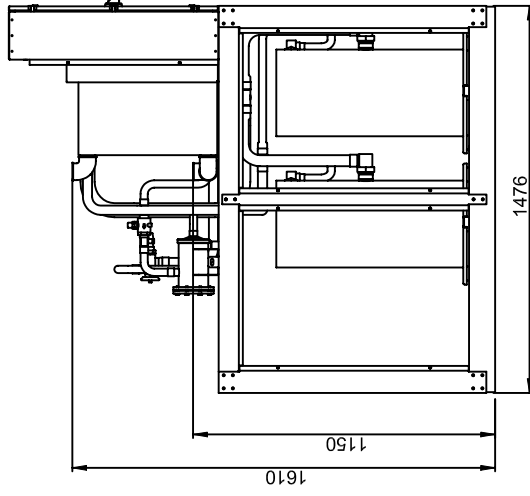
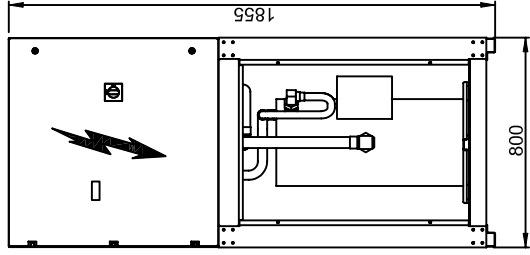


Visto/Checked by

Ordine-Order

VERSIONE STANDARD
VERSION STANDARD

VERSIONE SILENZIATA
LOW NOISE VERSION



Descrizione modifica/Review description

Visto/Checked by

Dis./Draftsman

Data/Date

REV.

MODELLI	WDR / WDH	
	IN	OUT
090-110-120-130	2"	2"
142-162	2" 1/2	2" 1/2

Denominazione/Denomination
SHCEMA DIMENSIONALE WDR-H 090...162
DIMENSIONAL DRAWING WDR-H 090...162

Disegno/Drawing
SD.1WDR.0005A
Sost. il dis./Replace draw.

Rev. --
Data/Date --
Sost. dal dis./Replaced by draw.

Foglio Sheet N. 1 di 1
Dis./Draftsman

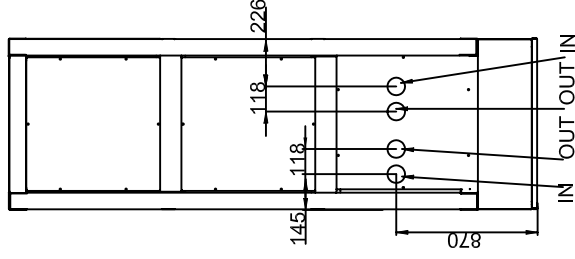
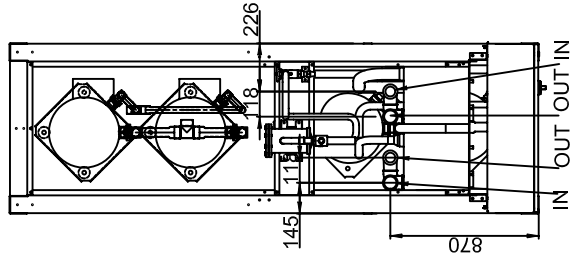
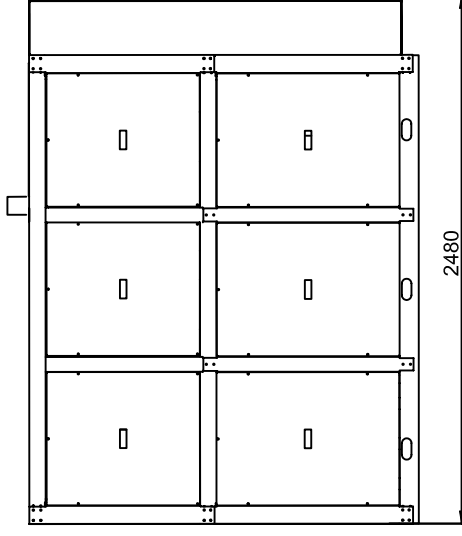
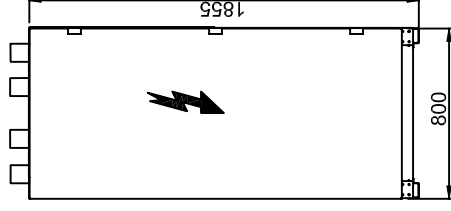
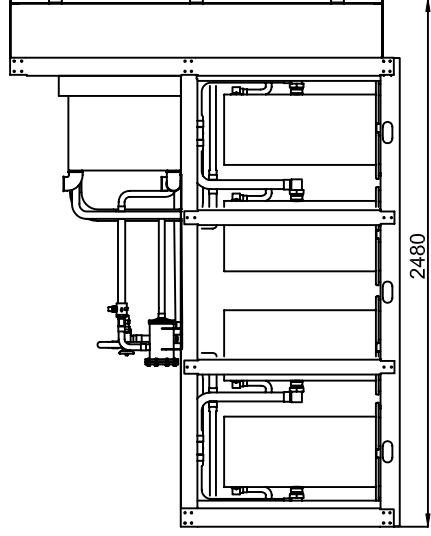
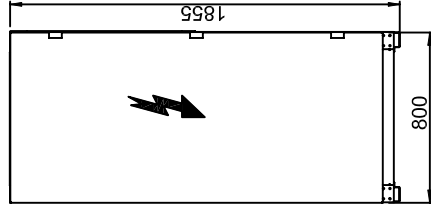
Scala/Scale --

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VERSIONE STANDARD
VERSION STANDARD

VERSIONE SILENZIATA
LOW NOISE VERSION



Descrizione modifica/Review description

Visto/Checked by

Dis./Draftsman

Data/Date

REV.

WDR / WDH	
MODELLI	IN OUT
190-210	2" 1/2 2" 1/2
240-260	3" 3"
300-320	4" 4"

Denominazione/Denomination
SHCEMA DIMENSIONALE WDR-H 190...320
DIMENSIONAL DRAWING WDR-H 190...320

Disegno/Drawing
SD.1WDR.0010A

Sost. il dis./Replace draw.

Rev. --

Data/Date --

Foglio Sheet N. 1 di 1

Scala/Scale --

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