

TECHNICAL MANUAL

INSTALLATION

USE

MAINTANCE



EWR-EPR

Single-compressor unit

05 - 06 - 08 - 10

13 - 16 - 22 - 26 - 32 - 38

Two-compressors unit

44 - 53 - 65 - 76



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WATER CHILLERS – EWR SERIES HEAT PUMPS – EPR SERIES

1.0 GENERAL INFORMATION ABOUT THE PRODUCT

Air cooled liquid chillers for indoor installation. 10 models available with single-compressors, up to a capacity of 37.0 kW, and 4 models with twin-compressors up to a capacity of 74.2kW.

All the units are fitted with Scroll sealed compressors, dimensioned to use R407C refrigerant or on request, EPR models which use R22 refrigerant.

The size of the EWR range of units has been calculated to satisfy installation requirements in residential or commercial buildings, paying particular attention to overall dimensions and noise level, while offering a range of accessories for facilitating installation and maintenance.

Assembly is carried out on a self-bearing frame in galvanised steel sections, stove-enamelled with polyester powders.

All the units are supplied fully wired and prepared for connection to the user system. Each appliance is tested for operation, including a check that all the installed safety devices are in proper working order, prior to delivery.

1.1 AVAILABLE VERSIONS:

AP Hydraulic kit separated for all the range (except for Mod. 05-06-08-10 oneblock unit)

The version AP includes the following devices:

- water circulating pump;
- water storage tank;
- water flow;
- expansion tank;
- safety valve 300kPa;

Models 05 - 06 - 08 - 10 are supplied with the water vessel installed inside the unit, completely wired and assembled.

HP version "High Pressure"

All the models, except for Mod. 05 - 06 - 08 - 10, can be supplied in the HP version completely wired and assembled in a single enbloc unit.

1.2 STANDARD UNIT ARRANGEMENT. MAIN COMPONENTS

Leading brand of Scroll sealed **compressor** particularly suitable for application in civil air-conditioning and able to guarantee not only high efficiency, but also decidedly moderate noise levels and vibrations. All the models are supplied with overload motor protection and cut-off cocks.

Finned block cooling **condensers** made with copper pipes expanded into a finned aluminium block and a galvanised steel heat exchanger supporting frame. A version with copper or pre-painted fins is possible on request for installation in particularly hostile atmospheres.

Dry expansion **cooler** with braze-welded plates in AISI 316 stainless steel and very thick closed-cell anti-condensate layer

OPERATING LIMITS:

Cooling cycle:	
Outside air temperature	B.S. + 20°C ÷ + 40°C
Chilled water temperature	+ 4°C ÷ + 15°C
Heating cycle:	
Outside air temperature	B.S. - 5°C ÷ +20°C
Hot water temperature	+ 35°C ÷ + 50°C

All the units are supplied with threaded hydraulic fittings for easy connection to the user's plant.

Ventilating section: comprising double - suction radial fans with curved forwards blades coupled to a three phase electric motor by a drive belt (from model 13/1), a variable diameter belt pulley is fitted on the motor which optimises air flow in the field depending on air expulsion. Models 05 - 06 - 08 - 10 have directly coupled fans.

Cooling circuit, fully wired with connections in copper pipe, including:

- dehydrator filter, liquid and humidity indicator, (from Mod. Ewr 22 - 1 and Mod. Epr 13 - 1),
- thermostatic valve with external equalising, safety pressure switches on high and low pressure side, pipe taps for filling and draining refrigerants and any connection of control pressure gauges. The low pressure side is insulated with a very thick anti-condensate closed-cell layer.

Epr models

- Cooling cycle reverse valve, check valve, liquid container to balance the refrigerant load in the two different seasons.

Electric control board completely wired inside a sealed steel box, constructed in conformity with the strictest European standards. The power circuit supplies 400/3/50 V / ph / Hz (from Mod. 10-1), including the neutral lead (**3pH+N+Pe**).

The auxiliary circuit has a separate magnetothermal cut-out. Adjustments and controls are managed by a microprocessor unit linked to safety devices installed in the appliance or connected externally.

The operating parameters are programmed and set directly on the display module situated on the outside of the electric control board.

1.3 MAIN FUNCTIONS MANAGED BY THE CONTROL DEVICE:

m.a/Ch.

- Compressor cut-in control in relation to the return water temperature.
- Optical and acoustic alarm signal with display of the type of alarm that has been triggered or, if more than one, of the sequence in order of activation.
- Possibility of managing an external pump or -onboard the appliance.
- Count of operating time for the compressor and the pump.

- Storage of programming data in the event of a -power failure.
- Possibility of connecting to a remote control panel designed for wall-mounting
- Storage of up to a maximum of 50 historic alarms.
- Possibility of checking the compressor start up (dynamic set-point) on the basis of the outside temperature.
- Combined control of temperature/pressure for the defrosting function.

1.4 OPTIONAL ACCESSORIES:

- MHL low and high pressure pressu (from Mod. 08-1);
- SAB basic anti-vibration supports;
- KRC base basic remote control kit;
- KRC top complete remote control kit;
- DCP 4/8 Condensation pressure control kit with 4/8 pole motor;

Technical data sheet:

EWR																
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
Cooling capacity	kW	4,9	5,7	8,4	10,4	13	15,4	22,3	27	33	37	43	50,5	62,5	74,2	
Cooling capacity	Frig/h	4214	4902	7224	8944	11180	13244	19178	23220	28380	31820	36980	43430	53750	63812	
Scroll compressors	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Refrigerant circuits	n°	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Capacity steps	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Suppluy voltage		V/Hz/Ph230/50/1					V/Hz/Ph400/50/3									
Noise power level	dB(A)	70,3	70,3	72,5	73,5	78,5	83,1	81,2	87,6	89,9	87,7	81,3	81,5	83,8	87,3	
Noise pressure level	dB(A)	59,3	59,3	61,5	62,5	67,5	72,1	70,2	76,6	78,9	76,7	70,3	70,5	72,8	76,3	
Air flow	mc/s	0,83	0,83	1,03	1,06	1,60	1,94	2,90	3,61	3,89	4,44	5,42	5,47	5,97	8,61	
External head	Pa	100	100	102	84	150	150	81	122	147	150	150	131	125	150	
EWR-HP																
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
Cooling capacity	kW	4,9	5,7	8,4	10,4	13	15,4	22,3	27	33	37	43	50,5	62,5	74,2	
Cooling capacity	Frig/h	4214	4902	7224	8944	11180	13244	19178	23220	28380	31820	36980	43430	53750	63812	
Scroll compressors	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Refrigerant circuits	n°	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Capacity steps	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Suppluy voltage		V/Hz/Ph230/50/1					V/Hz/Ph400/50/3									
Noise power level	dB(A)	70,3	70,3	72,5	73,5	80,8	82,9	84,0	85,7	87,7	87,2	81,9	83,0	85,7	86,5	
Noise pressure level	dB(A)	59,3	59,3	61,5	62,5	69,8	81,9	73,0	74,7	76,9	76,7	70,9	72,0	74,7	75,5	
Air flow	mc/s	0,83	0,83	1,03	1,06	1,60	1,94	2,90	3,61	3,89	4,44	5,42	5,47	5,97	8,61	
External head	Pa	/	/	/	/	301	291	286	292	287	294	267	296	287	246	
EPR																
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
Cooling capacity	kW	5,5	6,9	9,7	11,5	14,8	19,3	26,0	30,4	39,4	44	52	60,2	73,2	91,6	
Cooling capacity	Frig/h	4730	5934	8342	9890	12728	16598	22360	26144	33884	37840	44720	51772	62952	78776	
Scroll compressors	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Refrigerant circuits	n°	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Capacity steps	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Suppluy voltage		V/Hz/Ph230/50/1					V/Hz/Ph400/50/3									
Noise power level	dB(A)	71,0	71,0	72,4	72,4	78,3	78,4	82,5	82,6	90,1	85,5	79,1	79,2	85,5	82,5	
Noise pressure level	dB(A)	60,0	60,0	61,4	61,4	67,3	67,4	71,5	71,5	79,1	74,5	68,1	68,2	74,5	71,5	
Air flow	mc/s	0,83	0,83	1,06	1,06	1,60	1,60	2,90	2,90	3,89	4,44	5,42	5,47	5,97	8,61	
External head	Pa	130	130	80	80	147	147	150	150	113	145	145	130	148	153	
EPR-HP																
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
Cooling capacity	kW	5,5	6,9	9,7	11,5	14,8	19,3	26,0	30,4	39,4	44	52	60,2	73,2	91,6	
Cooling capacity	Frig/h	4730	5934	8342	9890	12728	16598	22360	26144	33884	37840	44720	51772	62952	78776	
Scroll compressors	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Refrigerant circuits	n°	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Capacity steps	n°	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Suppluy voltage		V/Hz/Ph230/50/1					V/Hz/Ph400/50/3									
Noise power level	dB(A)	71,0	71,0	72,4	72,4	81,8	81,8	84,4	84,4	90,4	89,5	83,2	83,2	86,0	89,1	
Noise pressure level	dB(A)	60,0	60,0	61,4	61,4	70,8	70,8	73,4	73,4	79,4	78,5	72,2	72,2	75,0	78,1	
Air flow	mc/h	0,83	0,83	1,06	1,06	1,60	1,60	2,90	2,90	3,89	4,44	5,42	5,47	5,97	8,61	
External head	Pa	/	/	/	/	297	297	300	300	193	292	255	220	263	272	

INSTALLATION

2.0 GENERAL INFORMATION

All installation and maintenance operations should be carried out by qualified personnel, who should scrupulously comply with instructions given in this manual and on the appliance.

The manufacturer cannot be held liable for any injury to persons and animals or damage to property due to failure to observe these instructions.

Prior to carrying out any maintenance on the appliance, make sure the electric control board has been disconnected from the power supply by deactivating the general line circuit breaker, which should necessarily be installed near the appliance.

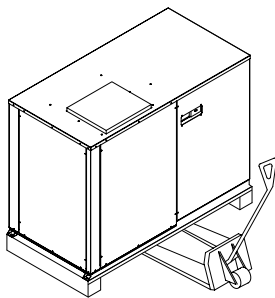
2.1 INSPECTION

Upon arrival at destination the unit should be visually checked very carefully for any damage during transit. Any imperfections or obvious signs of damage should be immediately pointed out to the carrier and noted on the accompanying document as well as reported in writing directly to Tonon S.p.A. or to its area agent.

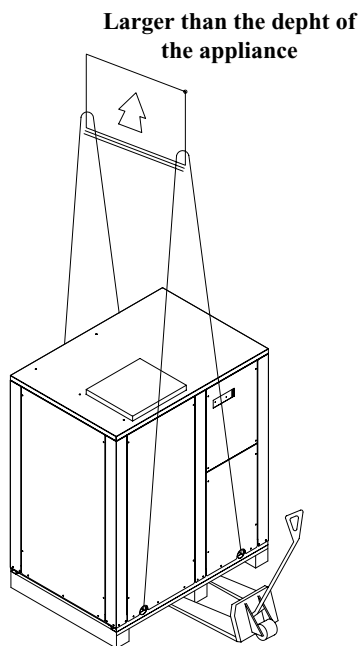
2.2 HANDLING

It is advisable to handle the unit in its original packing, which should be removed when the unit is in its final location. Handling may be with a common manual pallet truck or if lifting is required, with ropes suspended from a sufficiently wide spacer to prevent possible crushing of the upper part of the housing.

**Models
05-06-08-10**



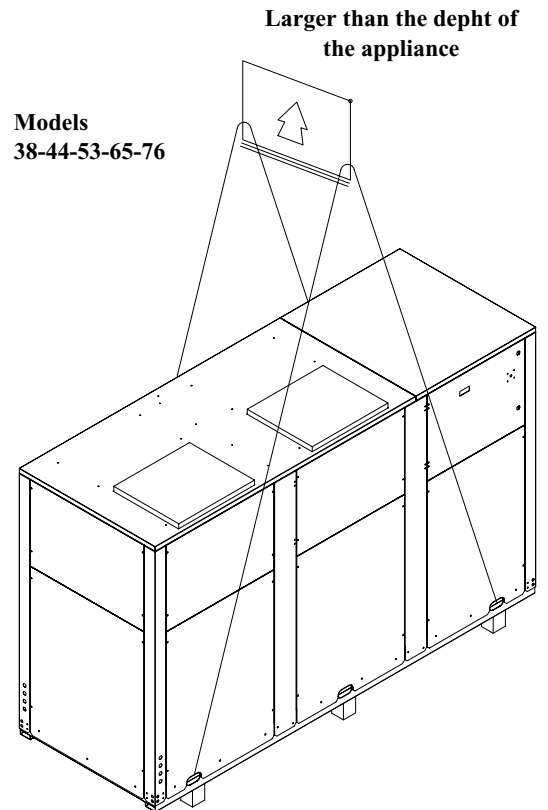
**Models
13-16-22-26-32**



2.3 POSITIONING

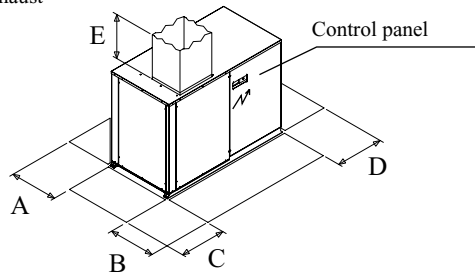
Positioning of the unit should be precise, bearing in mind the following precautions:

- any flat, horizontal surface capable of withstanding the weight (ground, attic, ecc.).
- For installation in the attic it is advisable to place a layer of rubber or suitable vibration-damping supports (available as accessory) between the supporting base and the appliance, in order to prevent any transmission of vibrations from the unit to the building structure.
- Preferably choose areas far from windows or apertures communicating with the inside of rooms if adjacent.
- Avoid positioning near chimney stacks, flues, ventilation or air-extraction devices in order to avoid the unit from being enveloped by flows of hot or polluted air.
- The free spaces for servicing all around the unit, as shown in the following diagrams, should be complied with under all circumstances. Insufficient circulation of air or any closed circulation through the finned block exchanger would cause malfunctioning and eventually lead to the appliance stopping.



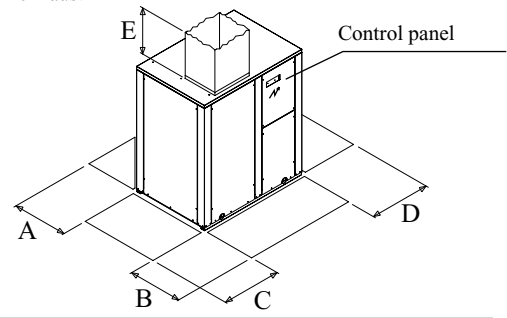
POSITIONING - SERVICING SPACES -

Air suction on the back
Vertical air exhaust

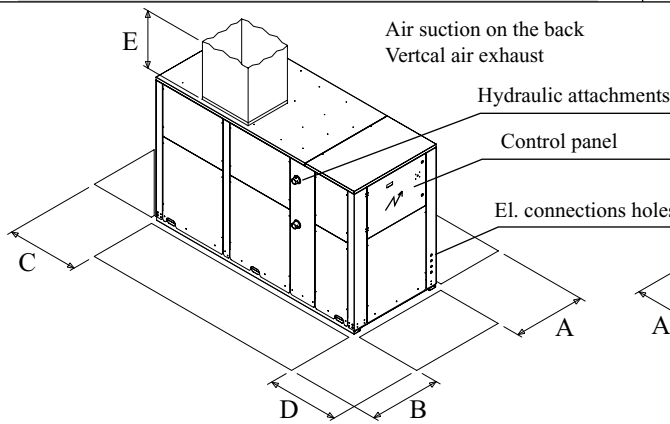


Mod.	A	B	C	D	E
05-1	195	1000	500	500	289
06-1	195	1000	500	500	289
08-1	235	1000	500	500	289
10-1	235	1000	500	500	289

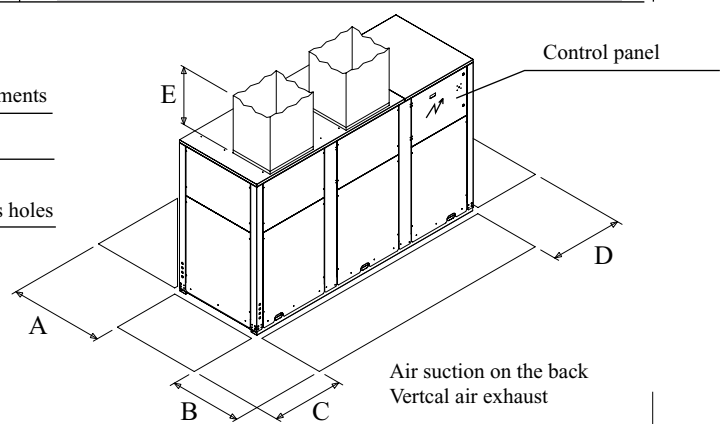
Air suction on the back
Vertical air exhaust



Mod.	A	B	C	D	E
13-1	270	1000	350	350	341
16-1	270	1000	350	350	341
22-1	405	1000	500	350	404
26-1	405	1000	500	350	404
32-1	405	1000	800	350	404



Mod.	A	B	C	D	E
38-1	500	1000	1000	1000	478



Mod.	A	B	C	D	E
44-2	500	1000	1000	1000	404
53-2	500	1000	1000	1000	404
65-2	500	1000	1000	1000	404
76-2	660	1000	1000	1000	478

E : Duct minimal length from fan outlet (without curves)

EWR - EWR/HP											
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
DIMENSIONS AND WEIGHT											
Lenght	mm	1176	1176	1176	1176	1120	1120	1460	1460	1460	2414
Width	mm	605	605	605	605	780	780	780	780	780	1000
Height	mm	847	847	1115	1115	1280	1280	1387	1387	1387	1541
Weight	Kg	149	152	202	214	228	234	349	360	381	594
		44-1	53-1	65-1	76-1						
Lenght	mm	2414	2414	2414	2800						
Width	mm	1000	1000	1000	1000						
Height	mm	1541	1541	1541	1541						
Weight	Kg	709	746	802	943						
EPR - EPR/HP											
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
DIMENSIONS AND WEIGHT											
Lenght	mm	1176	1176	1176	1176	1120	1120	1460	1460	1460	2414
Width	mm	605	605	605	605	780	780	780	780	780	1000
Height	mm	847	847	1115	1115	1280	1280	1387	1387	1387	1541
Weight	Kg	154	157	208	219	233	241	357	363	395	601
		44-2	53-2	65-2	76-2						
Lenght	mm	2414	2414	2414	2800						
Width	mm	1000	1000	1000	1000						
Height	mm	1541	1541	1541	1541						
Weight	Kg	728	769	806	955						

POSITIONING THE BASE SUPPORTS

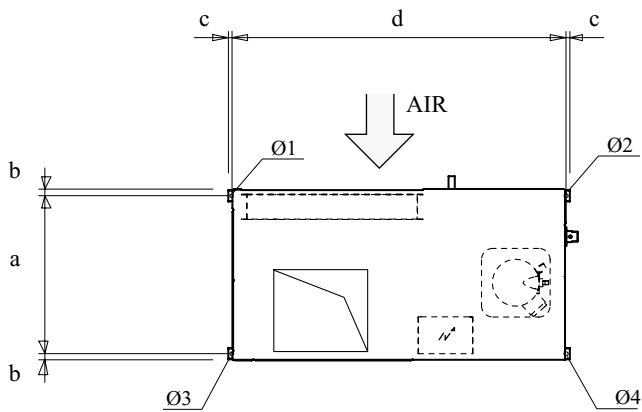
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SPREADING THE WEIGHT

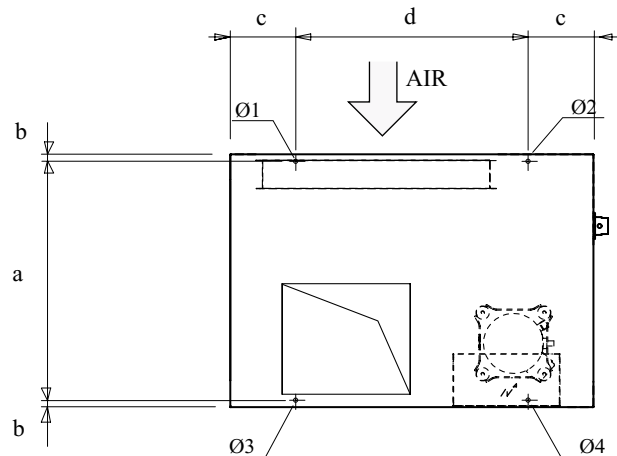
		Standard version													
		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2
a	mm	557	557	557	557	737	737	737	737	737	925	925	925	925	925
b	mm	20	20	20	20	21,5	21,5	21,5	21,5	21,5	37,5	37,5	37,5	37,5	37,5
c	mm	12,5	12,5	12,5	12,5	202	202	202	202	202	159	159	159	159	285,5
d	mm	1179,5	1179,5	1179,5	1179,5	717	717	1056,5	1056,5	1056,5	1048	1048	1048	1048	1114,5
e	mm	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Ø1	kg	37	38	54	58	52	56	87	87	96	86	109	120	118	143
Ø2	kg	50	50	68	70	65	65	92	95	102	110	130	135	145	170
Ø3	kg	37	38	54	58	52	56	87	87	96	86	109	120	118	143
Ø4	kg	50	50	68	70	65	65	92	95	102	110	130	135	145	170
Ø5	kg										105	125	130	140	165
Ø6	kg										105	125	130	140	165

(The weight distribution for the unit refers to the basic model (models 05-06-08-10 with a full water tank)
 Ø 13mm all the fixing holes in the base supports.

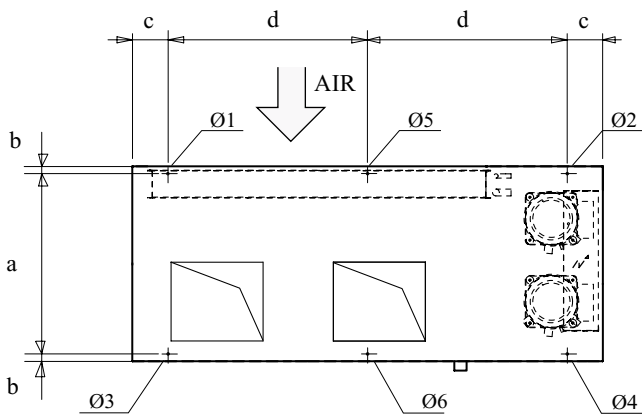
mod. 05/1-06/1-08/1-10/1



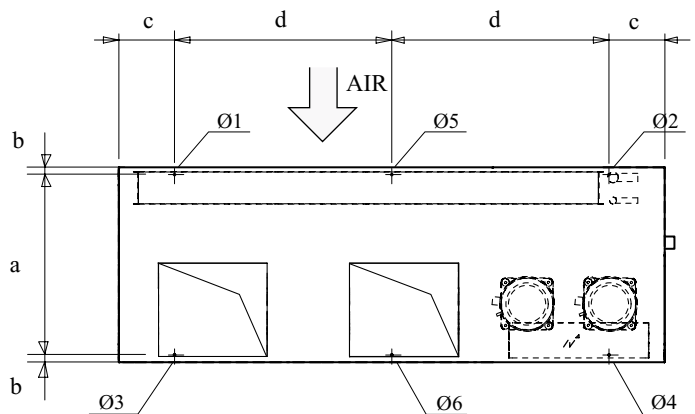
mod. 13/1-16/1-22/1-26/1-32/1



mod. 38/1-44/2-53/2-65/2



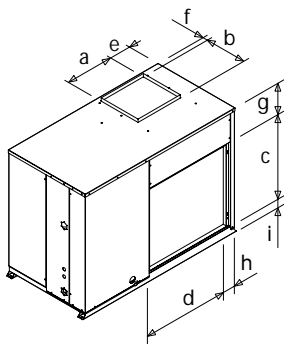
mod. 76/2



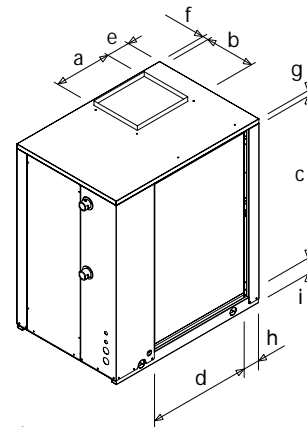
DUCTING DIMENSIONS

		Standard and HP versions													
		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2
a	mm	331	331	331	331	395	395	471	471	471	557	471	471	471	557
b	mm	289	289	289	289	341	341	404	404	404	478	404	404	404	478
c	mm	550	550	1030	1030	1124	1124	1227	1227	1227	1200	1200	1200	1200	1462,5
d	mm	602	602	602	602	700	700	1222	1222	1222	1710	1710	1710	1710	2360
e	mm	144	144	144	144	160	160	331	331	331	516	199	199	199	203,5
f	mm	31,5	31,5	31,5	31,5	40	40	21	21	21	49,5	104	104	104	29,5
g	mm	235,5	235,5	23	23	54,5	54,5	55	55	55	144,5	144,5	144,5	144,5	63
h	mm	51,5	51,5	51,5	51,5	100	100	67	67	67	103	103	103	103	100
i	mm	61,5	61,5	61,5	61,5	95	95	75	75	75	166	166	166	166	169
l	mm	/	/	/	/	/	/	/	/	/	/	362	362	362	424,5

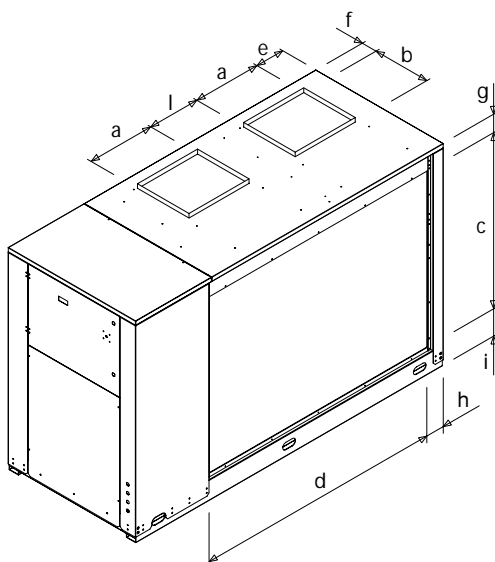
mod. 05/1-06/1-08/1-10/1



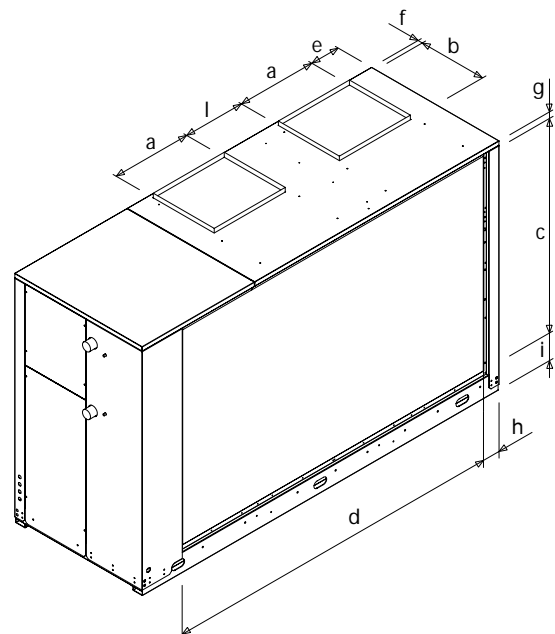
mod. 13/1-16/1-22/1-26/1-32/1



mod. 38/1-44/2-53/2-65/2



mod. 76/2



FAN SPEED

EWR												
MODEL		13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
WORKING CONDITIONS												
Power input		kW	1,1	1,5	1,5	3	4	3	2,2	2,2	2,2	3
Ø fixed pulley		mm	190	170	280	224	224	280	200	200	200	280
Ø expanding pulley	min	mm	88	88	109	109	109	109	109	109	109	109
	med	mm	101	101	121	121	121	121	121	121	121	121
	max	mm	114	114	133	133	133	133	133	133	133	133
Fan speed	min	rpm	644	720	553	691	693	553	774	774	774	553
	med	rpm	739	826	614	767	770	614	859	859	859	614
	max	rpm	834	932	675	843	846	675	944	944	944	675
EWR / HP												
MODEL		13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
WORKING CONDITIONS												
Power input		kW	1,1	1,5	2,2	3	4	3	3	3	3	3
Ø fixed pulley		mm	150	150	224	200	200	250	224	200	200	224
Ø expanding pulley	min	mm	88	88	109	109	109	109	109	109	109	109
	med	mm	101	101	121	121	121	121	121	121	121	121
	max	mm	114	114	133	133	133	133	133	133	133	133
Fan speed	min	rpm	815	818	691	774	777	619	691	774	774	619
	med	rpm	936	939	767	859	862	687	767	859	859	687
	max	rpm	1056	1060	843	944	948	755	843	944	944	755
EPR												
MODEL		13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
WORKING CONDITIONS												
Power input		kW	1,1	1,1	2,2	2,2	4	3	2,2	2,2	3	3
Ø fixed pulley		mm	180	180	250	250	224	280	250	250	224	280
Ø expanding pulley	min	mm	88	88	109	109	109	109	109	109	109	109
	med	mm	101	101	121	121	121	121	121	121	121	121
	max	mm	114	114	133	133	133	133	133	133	133	133
Fan speed	min	rpm	680	680	619	619	693	553	619	619	691	553
	med	rpm	780	780	687	687	770	614	687	687	767	614
	max	rpm	880	880	755	755	846	675	755	755	843	675
EPR / HP												
MODEL		13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2	
WORKING CONDITIONS												
Power input		kW	1,5	1,5	3	3	4	4	2,2	2,2	3	4
Ø fixed pulley		mm	150	150	200	200	200	250	200	224	190	224
Ø expanding pulley	min	mm	88	88	109	109	109	109	109	109	109	109
	med	mm	101	101	121	121	121	121	121	121	121	121
	max	mm	114	114	133	133	133	133	133	133	133	133
Fan speed	min	rpm	818	818	774	774	777	621	774	691	815	693
	med	rpm	939	939	859	859	862	690	859	767	904	770
	max	rpm	1060	1060	944	944	948	758	944	843	994	846

3.0 WATER CONNECTIONS

PIPING

The system piping may be in steel, galvanised steel, polyethylene or PVC.

The size of the pipes should be in relation to the nominal water flow rate, the system loss of head and the characteristics of the circulating or other pump provided for in the system.

The KAP module is supplied with a pump that guarantees the useful pressure as shown in the enclosed table.

In this way the size of the pipes has to be calculated in relation to the performance of the pump, carefully assessing the losses of head in the system.

All the pipes should be suitably lagged to prevent storage of heat (with consequent drop in unit efficiency) and formation of condensation on the outer surface.

For this purpose use closed-cell insulating material with a min. thickness of 10 mm.

To prevent the transmission of vibrations from the unit to the user system and to compensate for thermal expansion, it is a good rule to install flexible couplings on the pipe fittings of the unit.

The system should be in compliance with regulations and standards of the country of installation.

In any case it is a good rule to install the following devices to guarantee correct use and maintenance of the appliance.

- vibration-damping flexible couplings
- cut-off cocks
- pockets for housing water temperature measuring sensors
- metal mesh filter
- air vent devices
- automatic efficiency unit
- drain cock
- expansion tank (1)
- safety valve (1)
- flow switch (1)

(1) - These device are already installed on the unit in the KAP modules.

To guarantee correct operation and performance, each unit requires a nominal water flow rate as indicated in the following table;

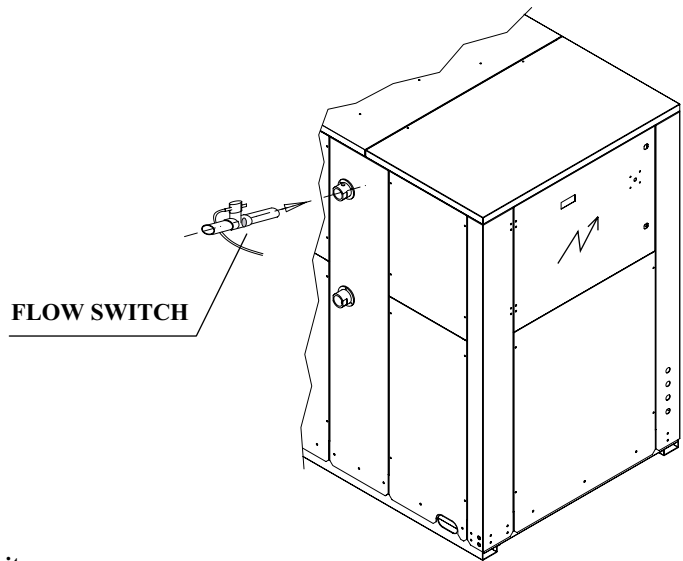
Using lower water flow rates could cause malfunctioning with serious consequences and damage to some components of prime importance, such as the compressor and the cooler.

The main plumbing diagrams are given on the following page, showing the components installed on the unit and those to be installed in the field for the standard units and the KAP (storage and pump kit) modules.

CAUTION

A water flow switch has to be fitted on the water piping when the chiller is of standard type.

We suggest to use the electrical consense “Pump on/off” as main regulation for the external mounted pumps.



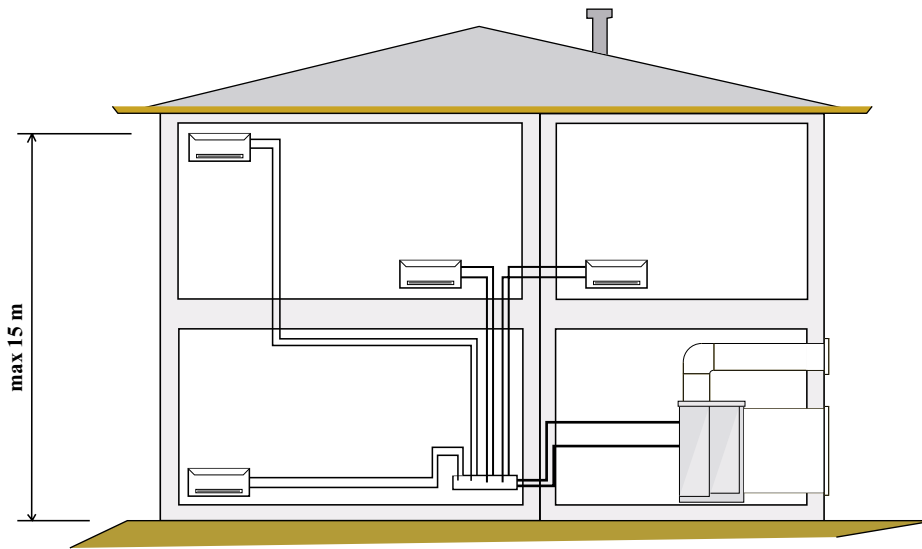
Technical data table for dimensioning the hydraulic circuit:

MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
EWR standard version											
Water flow	l/s	0,234	0,272	0,401	0,502	0,621	0,736	1,065	1,29	1,58	1,77
Pressure drops	kPa	3	5	17	25	17	30	21	28	29	46
MODEL		44-2	53-2	65-2	76-2						
EWR standard version											
Water flow	l/s	2,05	2,41	2,99	3,54						
Pressure drops	kPa	57	55	50	53						
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
EPR standard version											
Water flow	l/s	0,263	0,330	0,463	0,549	0,707	0,922	1,24	1,45	1,88	2,10
Pressure drops	kPa	3	5	17	25	17	30	21	28	29	46
MODEL		44-2	53-2	65-2	76-2						
EPR standard version											
Water flow	l/s	2,49	2,88	3,53	4,38						
Pressure drops	kPa	57	55	50	53						

DEPENDING ON THE MODELS AND THE USER'S PLANT LAYOUT, THE MACHINES MUST BE FITTED WITH A SERIES OF COMPONENTS, THAT HAVE ALREADY BEEN LISTED, TO GUARANTEE THE BEST OPERATIONS FROM THE SYSTEM. HOWEVER, THESE COMPONENTS MUST BE PERIODICALLY CHECKED TO ENSURE THEY ARE STILL OPERATING CORRECTLY.

- * PERIODICALLY CHECK THE SAFETY FLOW SWITCH TRIGGERS.
- * CHECK THE READING ON THE ANTIFREEZE PROBE, AND COMPARE IT WITH A CERTIFIED INSTRUMENT. IF THE READING IS INCORRECT, THEN THE PROBE MUST BE GAUGED.
- * PERIODICALLY CLEAN THE MESH FILTER AT THE ENTRANCE TO THE MACHINE HEAT EXCHANGER.
- * CHECK THE PRESSURE IN THE HYDRAULIC PLANT IS WITHIN THE SAFETY LIMITS (MAX 3 bar). IN NORMAL CONDITIONS, THE HYDRAULIC PRESSURE CAN VARY BETWEEN 0.8 ÷ 1.2 bar.

DIFFERENCE IN LEVEL BETWEEN THE CHILLING UNIT AND THE HIGHEST POINT IN THE SYSTEM



3.1 USING ANTIFREEZE

If the water system is not drained during the winter period of idleness, it is necessary to mix the water with anti-freeze in suitable percentage parts.

The use of anti-freeze only slightly affects cooling capacity, but causes considerable variation to the water flow rate and loss of head of the system.

In these circumstances pump efficiency should be meticulously checked to prevent malfunctioning and damage which would undoubtedly result if the required nominal water flow rate is not guaranteed.

The table below gives the recommended percentage mix values if ethyl glycol is used, in relation to the min. temperature outside the room in which the unit is situated.

The standard pumps installed in theKAP module can operate with a maximum of 30% of glycol. If the machine is to be used with mixtures containing more than 30%, contact TONON S.p.a..

Outside air temperature in winter (appliance off)	°C	5	2	-3	-10	-15
Recommended % of ethyl glycol (in weight)	%	0	10	20	30	40
Cooling capacity corr. coefficient *	-	1	0.97	0.95	0.93	0.9
Input power corr. coefficient *	-	1	0.99	0.98	0.97	0.96
Water flow rate corr. coefficient	-	1	1.02	1.1	1.14	1.3
Cooler loss of head corr. coefficient	-	1	1.08	1.3	1.39	1.6
Mix freezing point	°C	0	-3	-8	-15	-23

*** for operation under nominal conditions (ext. air temp. 35°C/cool. water temp. 7°C)**

4.0 ELECTRICAL CONNECTIONS

Rules of a general nature.

All the units are supplied with electric control board with all the elements necessary for appliance operation and control of installed safety devices.

The electrical connections to the unit should be carried out in compliance with CEI regulations in force in Italy or the regulations in force in the country of installation and in compliance with indications given in the wiring diagram enclosed with the appliance.

Before carrying out any operation on electrical parts inside or outside the unit, make sure that it is disconnected from the power supply.

The section of the supply cables should be in relation to the total maximum absorbed current. The wiring diagram gives the recommended sections for installations where there is a circuit breaker with fuses installed near the unit.

Earth the appliance properly, using the corresponding terminal inside the electric control board.

The supply voltage should be in conformity with unit specifications (voltage/frequency/No. phases/presence of neutral wire) and should not be subject to variations exceeding ± 5% with less than 2% unbalance between the phases (with three-phase power supply).

The use of electrical power supply sources not in conformity with the manufacturer’s instructions could jeopardise operation and soundness of the appliance and render the warranty null and void.

4.1 ELECTRICAL CONNECTIONS

The electrical connections for which the user is responsible are given on page 01 or 05 of the wiring diagram and may be summed up as follows:

- **Power supply line connections:**

Terminal numbering Q.E.

Models 05-1 : 08-1	L-N-PE
Models 10-1 : 38-1	L1-L2-L3-N-PE
Models 44-2 : 76-2	L1-L2-L3-N-PE

The Mod. 05-06-08 are dimensioned for a power supply of 230V/50Hz + N (neutral lead for auxiliary supply) + Pe.

The other units are dimensioned for a power supply of 400V/50Hz + N (neutral lead for auxiliary supply) + Pe.

- **Remote ON/OFF switch:**

Models 05-1 : 38-1	2-3
Models 44-2 : 76-2	2-3

Use a clean unpowered contact

Parameter CF16=0

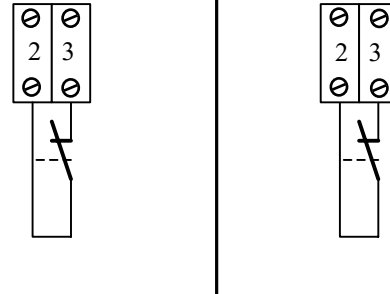
Logic: - closed: function disconnected
 - open: function enabled.

The functioning logics for the digital ON/OFF input can be inverted, modifying the CF16 parameter, in the user sub-menu (see point 12.1).

E.g.:

CF16=0

CF16=1



N.B. the unit can only be turned on and off from the keyboard if the input is disconnected (priority for the remote control)

- **Remote Summer/Winter switch:**

Models 05-1 : 38-1	2-6
Models 44-2 : 76-2	2-6

- This function is only fitted for models with EPR heat pump, and allows installing chiller/heat pump remote selection.

Use a clean unpowered contact

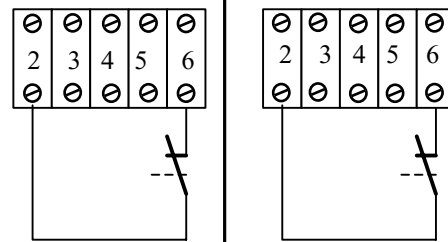
Functioning logic:

With parameter CF13=1 (standard configuration) and remote “open” consent, the machine works with the heat pump, if it is “closed” the chiller works.

With parameter CF13=0 and remote “open” consent, the machine works with the “Chiller”, if it is closed the heat pump works.

CF13=0

CF13=1



Contact clouse
 Unit Heat-pump
 function

Contact clouse
 Unit Chiller function

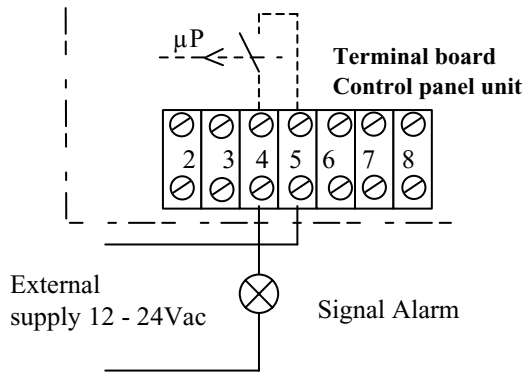
To use the remote summer/winter consent, the CF 28 parameter must be enabled which is found in the User Menu (CF28=1).

- Remote alarm signals:

Models 05-1 : 38-1 **4-5**
Models 44-2 : 76-2 **4-5**

- This allows an “activated alarm” signal to be given at a distance.
 Terminals 4-5 are connected to a clean exchange contact, which changes its status as soon as one of the alarms controlled by the microprocessor is triggered.
 Any alarm signal device to be connected to terminals 4-5 should preferably be powered with voltage 12 - 24 Vac.

µP direct consent from the relay on the regulator display



4.2 ELECTRIC WIRING FOR STANDARD MODELS

- Besides the connections given in paragraph 4.1, the without pump and storage tank:

Flow switch consent:

Models 05-1 : 38-1 **17-18**
Models 44-2 : 76-2 **17-18**

Il flussostato non viene fornito di serie nei modelli standard, ma dev'essere installato direttamente sul posto.

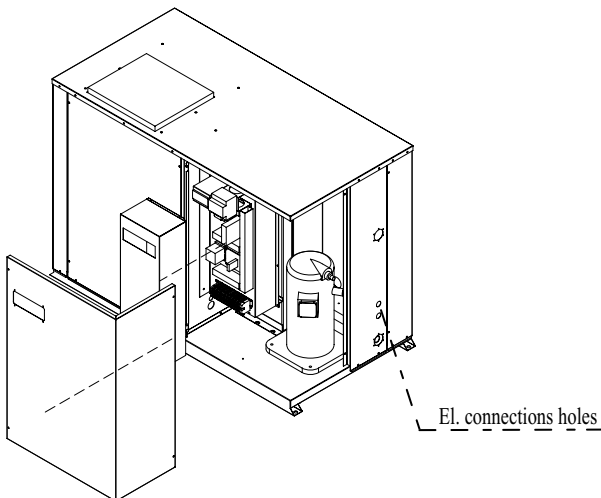
The flow-switch is not supplied standard on the standard models, but must be installed directly on site.

Use a clean unpowered contact

Functioning logic:

- closed: alarm deactivated
- open: alarm activated

N.B. however, the start-up and functioning delays are activated for the pump to allow the system to reach the set levels.



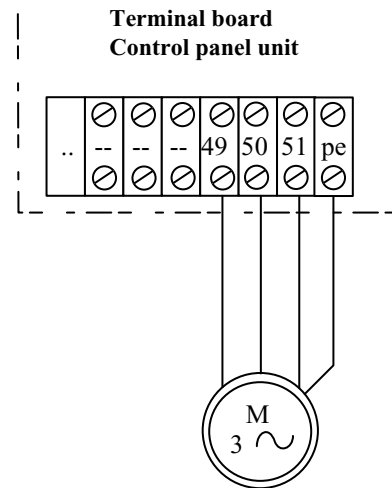
- Pump commands:**

All the standard models have the terminal board prepared for the pump commands on the user plant side.

Depending on the model, a contactor and an automatic protection switch are provided as follows:

Models 13/1 - 16/1 - 22/1 - 26/1 - 32/1
 Contactor 4kW/AC3 400V
 Automatic switch 3P/2AC
 Models 38/1 - 44/2 - 53/2 - 65/2 - 76/2
 Contactor 4kW/AC3 400V
 Automatic switch 3P/6AC

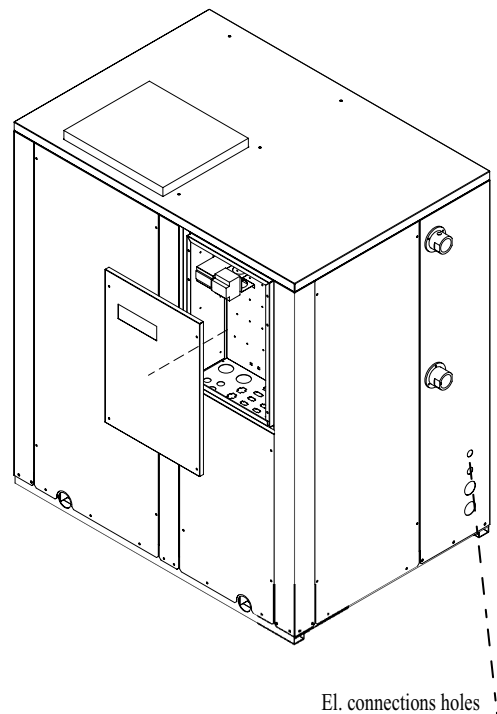
For models from 38/1 up, the following connections are supplied in the terminal board:



The passage holes for the supply and control wires of the machine are on the hydraulic attachment side.

The supply wires enter the electric control panel from the bottom through the specific fairleads.

In all units, access to the control panel is by removing the top panel on the right side of the machine (seen from the front).



EWR											
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
COMPRESSOR n°		1	1	1	1	1	1	1	1	1	1
Compressor contactor		4kW/ac3/400V	4kW/ac3/400V	5,5kW/ac3/400V	4kW/ac3/400V	5,5kW/ac3/400V	7,5kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V
Power rating	kW	1,61	2,06	2,87	3,36	4,11	5,39	7,6	8,73	10,67	13,25
Automatic Compressor overload		-	-	-	-	-	-	-	-	-	-
Rated current	A	7,5	9,6	13,4	6,15	7,87	10,21	13,92	15,99	18,56	22,32
Max current	A	11,4	14,8	23,1	10	13	16	18	21	26	30
Starting current	A	47	61	100	50	66	101	123	127	167	198
FAN SECTION											
Fans	n°	1	1	1	1	1	1	1	1	1	1
Power rating	kW	0,515	0,515	0,515	0,515	1,1	1,5	1,5	3	4	3
Rated current	A	3,8	3,8	3,8	3,8	2,7	3,6	3,6	6,4	8,6	6,4
TOTAL CONSUMPTION											
Supply voltage	V	230	230	230	400	400	400	400	400	400	400
Line frequency	Hz	50	50	50	50	50	50	50	50	50	50
Number of leads	n°	pH+N+PE	pH+N+PE	pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE
Auxiliary circuit voltage	V	12	12	12	12	12	12	12	12	12	12
Power rating	kW	2,125	2,575	3,385	3,875	5,21	6,89	9,1	11,73	14,67	16,25
Rated current	A	11,3	13,4	17,2	9,95	10,57	13,81	17,52	22,39	27,16	28,72
Max current	A	15,2	18,6	26,9	13,8	15,7	19,6	21,6	27,4	34,6	36,4
Starting current	A	50,8	64,8	103,8	53,8	68,7	104,6	126,6	133,4	175,6	204,4
Main switch overload	-	20A/1p/D	20A/1p/D	25A/1p/D	16A/3p/D	16A/3p/D	25A/3p/D	25A/3p/D	32A/3p/D	63A	80A
Minimum section for the power lead	mmQ	2,5	2,5	4	2,5	4	4	6	6	6	16
EWR											
MODEL		44-2	53-2	65-2	76-2						
COMPRESSOR n°		2	2	2	2						
Compressor contactor		11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V						
Power rating	kW	7,6	8,75	10,67	13,25						
Automatic Compressor overload		20A/3p/D	25A/3p/D	40A/3p/D	40A/3p/D						
Rated current	A	13,9	16	18,56	22,3						
Max current	A	18	21	26	30						
Starting current	A	123	127	167	198						
FAN SECTION											
Fans	n°	2	2	2	2						
Power rating	kW	2,2	2,2	2,2	3						
Rated current	A	4,9	4,9	4,9	6,4						
TOTAL CONSUMPTION											
Supply voltage	V	400	400	400	400						
Line frequency	Hz	50	50	50	50						
Number of leads	n°	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE						
Auxiliary circuit voltage	V	12	12	12	12						
Power rating	kW	19,6	21,9	25,74	32,5						
Rated current	A	37,6	41,8	46,92	57,4						
Max current	A	45,8	51,8	61,8	72,8						
Starting current	A	150,8	157,8	202,8	240,8						
Main switch overload	-	80A	80A	80A	80A						
Minimum section for the power lead	mmQ	16	16	25	25						

Technical data about pump for Mod. 05-06:

Power rating: 0,09 kW

Rated current: 0,45 A

V / Ph / Hz: 230 / 1 / 50

Technical data about pimp for Mod. 08-10:

Power rating: 0,235 kW

Rated current: 1,02 A

V / Ph / Hz: 230 / 1 / 50

N.B. The data for total consumption does not include the pump

EPR											
MODEL		05-1	06-1	08-1	10-1	13-1	16-1	22-1	26-1	32-1	38-1
COMPRESSOR n°		1	1	1	1	1	1	1	1	1	1
Compressor contactor		4kW/ac3/400V	4kW/ac3/400V	4kW/ac3/400V	4kW/ac3/400V	5,5kW/ac3/400V	7,5kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V
Power rating	kW	1,59	2,03	2,83	3,31	4,00	5,25	7,44	8,55	10,37	13,00
Automatic Compressor overload		-	-	-	-	-	-	-	-	-	-
Rated current	A	7,4	9,5	13,2	6,09	7,74	10,03	13,72	15,75	18,11	21,99
Max current	A	11,4	14,8	23,1	10	13	16	18	21	26	30
Starting current	A	47	61	100	50	66	101	123	127	167	198
FAN SECTION											
Fans	n°	1	1	1	1	1	1	1	1	1	1
Power rating	kW	0,515	0,515	0,515	0,515	1,1	1,1	2,2	2,2	4	3
Rated current	A	3,8	3,8	3,8	3,8	2,7	2,7	4,9	4,9	8,6	6,4
TOTAL CONSUMPTION											
Supply voltage	V	230	230	230	400	400	400	400	400	400	400
Line frequency	Hz	50	50	50	50	50	50	50	50	50	50
Number of leads	n°	pH+N+PE	pH+N+PE	pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE
Auxiliary circuit voltage	V	12	12	12	12	12	12	12	12	12	12
Power rating	kW	2,105	2,545	3,345	3,825	5,1	6,35	9,94	11,05	14,37	16,00
Rated current	A	11,2	13,3	17,0	9,89	10,44	12,73	18,62	20,65	26,71	28,39
Max current	A	15,2	18,6	26,9	13,8	15,7	18,7	22,9	25,9	34,6	36,4
Starting current	A	50,8	64,8	103,8	53,8	68,7	103,7	127,9	131,9	175,6	204,4
Main switch overload	-	20A/1p/D	20A/1p/D	25A/1p/D	16A/3p/D	20A/3p/D	20A/3p/D	25A/3p/D	32A/3p/D	40A/3p/D	80A
Minimum section for the power lead	mmQ	2,5	2,5	4	2,5	6	6	6	6	6	16
EPR											
MODEL		44-2	53-2	65-2	76-2						
COMPRESSOR n°		2	2	2	2						
Compressor contactor		11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V						
Power rating	kW	7,45	8,56	10,37	13,00						
Automatic Compressor overload		20A/3p/D	25A/3p/D	25A/3p/D	40A/3p/D						
Rated current	A	13,72	15,78	18,12	21,99						
Max current	A	18	21	26	30						
Starting current	A	123	127	167	198						
FAN SECTION											
Fans	n°	2	2	2	2						
Power rating	kW	2,2	2,2	3	3						
Rated current	A	4,9	4,9	6,4	6,4						
TOTAL CONSUMPTION											
Supply voltage	V	400	400	400	400						
Line frequency	Hz	50	50	50	50						
Number of leads	n°	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE						
Auxiliary circuit voltage	V	12	12	12	12						
Power rating	kW	19,3	21,52	26,74	32,0						
Rated current	A	37,24	41,36	49,04	56,78						
Max current	A	45,8	51,8	64,8	72,8						
Starting current	A	150,8	157,8	205,8	240,8						
Main switch overload	-	80A	80A	80A	80A						
Minimum section for the power lead	mmQ	16	16	25	25						

Technical data about pump for Mod. 05-06:

Power rating: 0,09 kW

Rated current: 0,45 A

V / Ph / Hz: 230 / 1 / 50

Technical data about pimp for Mod. 08-10:

Power rating: 0,235 kW

Rated current: 1,02 A

V / Ph / Hz: 230 / 1 / 50

EWR/HP - EPR/HP - TOTAL CONSUMPTION TABLE

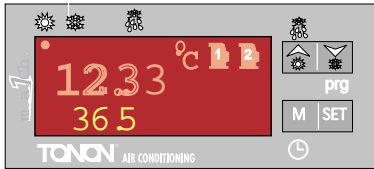
EWR / HP												
MODEL	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2		
COMPRESSOR												
Compressor contactor	5.5kW/ac3/400V	7.5kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V		
Power rating	4.11	5.39	7.6	8.73	10.67	13.25	7.6	8.75	10.67	13.25		
Automatic Compressor overload	-	-	-	-	-	-	20A/3p/D	25A/3p/D	40A/3p/D	40A/3p/D		
Rated current	7.87	10.21	13.92	15.99	18.56	22.32	13.9	16	18.56	22.3		
Max current	13	16	18	21	26	30	18	21	26	30		
Starting current	66	101	123	127	167	198	123	127	167	198		
FAN SECTION												
Fans	1	1	1	1	1	1	2	2	2	2		
Power rating	1.1	1.5	2.2	3	4	3	3	3	3	3		
Rated current	2.7	3.6	4.9	6.4	8.6	6.4	6.4	6.4	6.4	6.4		
TOTAL CONSUMPTION												
Supply voltage	V	400	400	400	400	400	400	400	400	400		
Line frequency	Hz	50	50	50	50	50	50	50	50	50		
Number of leads	n°	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE		
Auxiliary circuit voltage	V	12	12	12	12	12	12	12	12	12		
Power rating	KW	5.21	6.89	9.8	11.73	14.67	21.2	23.5	27.34	32.5		
Rated current	A	10.57	13.81	18.82	22.39	27.16	40.6	44.8	49.92	57.4		
Max current	A	15.7	19.6	22.9	27.4	34.6	48.8	54.8	64.8	72.8		
Starting current	A	68.7	104.6	127.9	133.4	175.6	153.8	160.8	205.8	240.8		
Main switch overload	-	16A/3p/D	20A/3p/D	25A/3p/D	32A/3p/D	40A/3p/D	80A	80A	80A	80A		
Minimum section for the power lead	mm ² Q	4	4	6	6	6	16	16	16	25		

EPR / HP												
MODEL	13-1	16-1	22-1	26-1	32-1	38-1	44-2	53-2	65-2	76-2		
COMPRESSOR												
Compressor contactor	5.5kW/ac3/400V	7.5kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	11kW/ac3/400V	11kW/ac3/400V	15kW/ac3/400V	15kW/ac3/400V		
Power rating	4.00	5.25	7.44	8.55	10.37	13.00	7.45	8.56	10.37	13.00		
Automatic Compressor overload	-	-	-	-	-	-	20A/3p/D	25A/3p/D	25A/3p/D	40A/3p/D		
Rated current	7.74	10.03	13.72	15.75	18.11	21.99	13.72	15.78	18.12	21.99		
Max current	13	16	18	21	26	30	18	21	26	30		
Starting current	66	101	123	127	167	198	123	127	167	198		
FAN SECTION												
Fans	1	1	1	1	1	1	2	2	2	2		
Power rating	1.5	1.5	3	3	4	4	2.2	2.2	2.2	3		
Rated current	3.6	3.6	6.4	6.4	8.6	8.6	4.9	4.9	4.9	6.4		
TOTAL CONSUMPTION												
Supply voltage	V	400	400	400	400	400	400	400	400	400		
Line frequency	Hz	50	50	50	50	50	50	50	50	50		
Number of leads	n°	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE	3pH+N+PE		
Auxiliary circuit voltage	V	12	12	12	12	12	12	12	12	12		
Power rating	KW	5.5	6.75	10.44	11.55	14.37	19.3	21.52	26.74	34.0		
Rated current	A	11.34	13.63	20.12	22.15	26.71	37.24	41.36	49.04	61.18		
Max current	A	16.6	19.6	24.4	27.4	34.6	45.8	51.8	64.8	77.2		
Starting current	A	69.6	104.6	129.4	133.4	175.6	150.8	157.8	205.8	245.2		
Main switch overload	-	20A/3p/D	20A/3p/D	25A/3p/D	32A/3p/D	40A/3p/D	80A	80A	80A	80A		
Minimum section for the power lead	mm ² Q	6	6	6	6	6	16	16	16	25		

**5.0 USE
MICROPROCESSOR CONTROL DEVICE**

m.a1ch. All the units are fitted with microprocessor control device designed to control all the characteristic parameters essential for appliance operation.

5.1 USER INTERFACE



The instrument display is divided into three areas.

- **Left Upper Area:**
It shows user system water IN / OUT temperature.
IN - inlet water temperature (return from user system)
OUT - outlet water temperature (delivery to user system)
- **Left Lower Area:**
It shows condensation temperature / pressure or the active time (function activated on call as an accessory).
- **Right Area:** Signalling icons.

5.2 DISPLAY ICONS

The display icons give some general informations as for the following description:

°C **Degrees Celsius**
This icon explains the value showed on the display is a Temperature (° C)

bar **Bar**
This icon explains the value showed on the display is a Pressure (Bar)

1 2 **Compressor 1 / 2**
This icon explains the compressor status
Flashing: Compressor 1 / 2 enabled. Timing in process.
Fixed Compressor 1 / 2 running

Zz **Unit on Stand-by**
As well as the unit is switched ON or OFF, the Stand-by mode is enabled and the correspondent icon lights.

Even if the Stand-by mode is enabled, the regulator allows the following:

- 1) Temperature sensors reading
- 2) Alarm code reading
- 3) Antifreeze el. heaters control

! **Alarm Generic**
it signals the presence of one or more alarms. In case of auto-resetting alarm, access the M key function menu and select the "AlrM" function.

H **Alarm High Pressure**
it signals that an alarm has been triggered by the high pressure safety pressure switch. The safety device is connected to ID3 digital input. (see the applicable wiring diagram).

L **Alarm Low Pressure**
it signals that an alarm has been triggered by the low pressure safety pressure switch. The safety device is connected to ID4 digital input. (see the applicable wiring diagram).

↑↑↑ **Heater antifreeze**
Heater antifreeze on

Flow I **Alarm Flow Switch.**
it signals that an alarm has been triggered by the safety water flow switch. The safety device is connected to ID1 digital input. (see the applicable wiring diagram).

⌚ **Defrosting Start Count Down time / Clock**

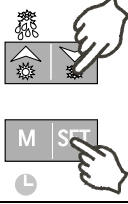
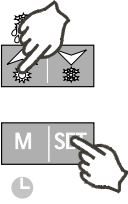
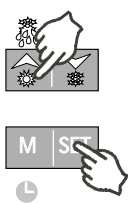
🔧 **Maintenance required**
Compressor running time limit over. Service required

Menu **Menu**
"Menu Funzioni" enabled







5.3 KEY FUNCTIONS

	The M key allows to access function menu and time set-up.
	The SET key allows to display or change the set point value. In programming mode, it selects a parameter or confirms a value.
	Keeping this key pressed for 5 sec will start or stop the unit in either cooling (chiller) or heating (H.P.) mode of operation. It selects water IN/OUT temperatures on the upper display. In programming mode, it scrolls through parameters codes or increases their value.
	Keeping this key pressed for 5 sec will start the unit in either cooling (chiller) or heating (H.P.) mode of operation. It selects outside air temperature / defrost display. In programming mode, it scrolls through parameters codes or increases their value.

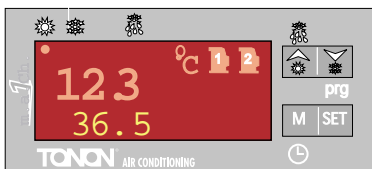
5.4 COMBINED KEY FUNCTIONS

	To access programming mode
	To exit programming mode.
	Pressing and holding these keys for more than 5 sec will start a manual defrost cycle.

5.5 FRONT PANEL SYMBOLS AND LEDS

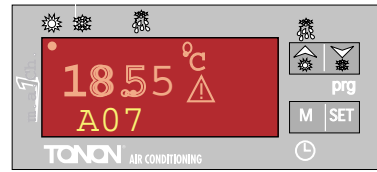
Symbol	LED	Function
	On	Unit ON in heat pump
	On	Unit ON in chiller
	Blinking	During programming phase (it blinks together with  LED)
	Blinking	Defrost Start Delay Time
	On	Defrost active
	Off	Defrost disabled or finished
		Time Clock set-up

6.0 DISPLAY
6.1 STANDARD DISPLAY



In normal conditions, the following are displayed:
Top display:
 Intake water temperature (user plant recycle); outlet water temperature (user plant delivery).
Bottom display:
 condensation temperature or pressure, with relative unit of measure.
Current time (optional on request).


6.2 DISPLAY DURING ALARMS

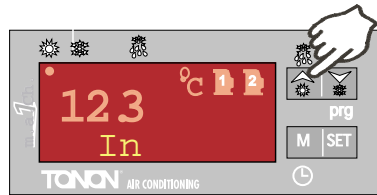
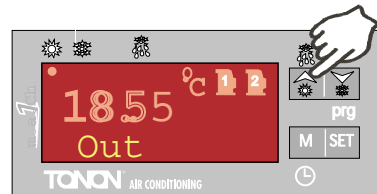



Varying from a normal condition (no alarm active), as soon as an alarm condition is detected, the instrument alternately shows blinking alarm code and respective icon, and temperature / pressure on the **lower display** (example given in the fig.: presence of alarm high pressure).

6.3 QUICK DISPLAY OF MAIN INFORMATION

In order to help user during the machine test-and-check phase, the procedure for displaying main information without accessing selection menu has been simplified.


- Pressing the  key will display in rotation system delivery and return temperatures. This function helps to check the actual evaporator inlet/outlet thermal head, which should corresponds approximately to 5°C in normal working conditions.



- Pressing the  key will display in rotation outside air temperatures (probe available as optional) / and condensation or defrost temperatures (heat-pump unit).



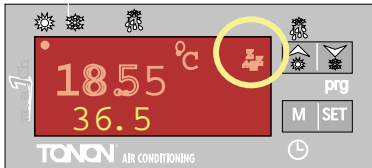
7.0 UNIT ON STAND-BY

Stand-by mode is enabled any time the unit is turned off, either in chiller or in p.d.c. mode of operation. When the unit is in stand-by mode, the icon  will light up.




Also in stand-by mode, the controller allows to:

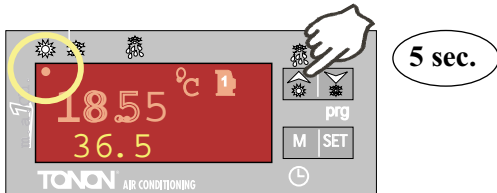
- 1) Display the detected measurements
- 2) Manage alarm events by displaying and signalling them.
- 3) Activate heating elements as evaporator anti-freeze safety device depending on thermoregulator.

E' possibile passare dalla modalità chiller alla modalità Only by turning off the unit will it be possible to switch from chiller to heat-pump mode of operation.






7.1 ACTIVATING/DEACTIVATING THE CHILLING FUNCTION (SUMMER MODE)

When you press the key  for five seconds, the unit goes from stand-by to chiller and vice versa. When the delay time is up, if no alarms are active, the compressors are activated in sequence. During the ignition phase, the stand-by icon  is turned off, while the sun led  is alight showing the chiller mode. During the chiller operations, only the relative set-point can be changed ("StC" set chiller), or the dynamic set can be displayed if it is activated ("StD").



7.2 ACTIVATING/DEACTIVATING HEATING FUNCTION (WINTER MODE)

When you press the key  for five seconds the unit goes from stand-by to heat pump "h.p." and vice versa. When the delay time is up, if no alarms are active, the compressors are activated. During the ignition phase, the stand-by icon  is turned off, while the snow led  is alight showing the heat pump function. During the heat pump operations, only the relative set-point can be changed ("StH" Set heat pump) or the dynamic set can be displayed if it is activated ("StD").



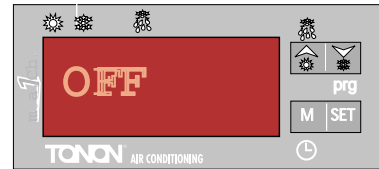
7.3 ACTIVATING/DEACTIVATING FROM THE DIGITAL INPUT

This can be used if you want to control the activation and deactivation of the machine from the remote control, e.g. from the clock (see paragraph 4.1 on page 6).

USE A CLEAN UNPOWERED CONTACT

1. It has priority over the keyboard
2. The unit can only be turned on and off from the keyboard if the input is deactivated.
3. When the digital input is deactivated, the instrument returns to the previous state.

The top display shows "OFF" with the tenths led flashing
N.B. the polarity of the id5 input can be inverted, so that with the signal activated the unit is ON. The parameter to fix this function is CF16=1 which can be directly changed by the user (see the paragraph access to the user menu).



7.4 CONTROLLING THE CHILLER / HEAT PUMP FUNCTIONS FROM THE DIGITAL INPUT

To use the remote summer/winter consent, the CF 28 parameter must be enabled which is found in the User Menu (CF28=1). Once the parameter has been activated, the selection has priority from the remote control.

With the CF28=1 activated, if the unit is running in Chiller or Heat pump and the functioning mode needs changing, the controller turns off all the outlets (compressor, pump, etc.) waits for a certain delay time, which is shown by the chiller or heat pump led flashing. The flashing led shows the functioning mode that unit will be turned back on to, respecting the protection time delay for the compressors.

8.4 SET.S Energy saving (Optional on request)

Energy Saving function allows to run two different working set points in both chiller/ heat-pump modes of operation.

It could be programmed daily or weekly by time bands (version with on-board time clock, on-request accessory), or run by external contact. During an Energy Saving cycle, the set point is increased by the value set in **ES10 / ES12**, so that the working set point will become **SET+ES10** in chiller mode of operation, or **SET+ES12** in heat pump mode of operation. The referring differential for thermoregulation with active energy saving will correspond to the value of **S11** parameter in chiller mode of operation, **ES13** parameter in heat pump mode of operation.

E.S. Daily Programming (Only for models with on-board time clock. Optional on request)

Set the energy saving parameter relating to the day to 1.
E.g.: ES03 = 1 (energy saving active on Monday, 24 hour a day).

Set parameters from ES04 to ES09 to 1 to enable energy saving during all the other days of the week.

Time Band Programming (Only for models with on-board time clock. Optional on request)

Set the parameter ES01 (Energy Saving cycle start time), ES02 (Energy Saving cycle stop time).
 E.g.: ES01 = 8.0 ES02 = 10.0 energy saving active 8÷10.0 all days of the week.

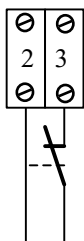
E.g.: ES01 = 23.0 ES02 = 8.0 energy saving active from 11.00 P.M. to 8.00 A.M. of the following day, all days of the week. The time band function will be prohibited if parameters ES01 / ES02 are set to the same time or to 0.

Running from External Contact

The E.S. function can always be run directly from id5 external contact. To enable this function, set the parameter **CF10=8**.

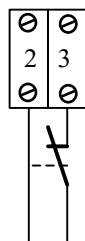
N.B. The functioning logics for the digital E.S. input can be inverted, modifying the CF16 parameter, in the user sub-menu (see point 12.1).

E.g.:
CF16=0



Contact closed
 Energy saving active

CF16=1



Contact closed
 Energy saving not activated

Use a clean unpowered contact

Energy Saving Parameters

ES01 Energy saving start time

ES02 Energy saving stop time

ES03 Monday

0 = disabled

1 = enabled

ES04 Tuesday

0 = disabled

1 = enabled

ES05 Wednesday

0 = disabled

1 = enabled

ES06 Thursday

0 = disabled

1 = enabled

ES07 Friday

0 = disabled

1 = enabled

ES08 Saturday

0 = disabled

1 = enabled

ES09 Sunday

0 = disabled

1 = enabled

ES10 Energy saving setting increase in chiller mode of operation

ES11 Energy saving differential in chiller mode of operation

ES12 Energy saving setting increase in heat pump mode of operation

ES13 Energy saving differential in heat pump mode of operation

8.5 AUTOMATIC CHANGE-OVER (Optional on request)

It automatically changes the unit state of functioning (chiller / heat pump) according to programming and external climatic conditions.

The change-over can occur only if the models are heat-pumps EPA, with sensor ambient optional Pb4.

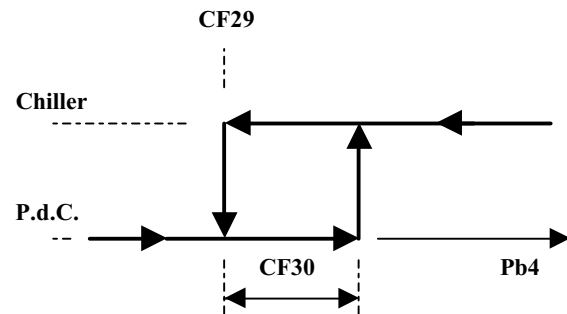
Parameters governing the change over function:

CF29 It allows to set the change over set point, which is the value of the PB4-detected temperature below which the instrument will force a p.d.c. mode of operation.

CF30 It allows to set the change over differential, which is the temperature differential depending on which the instrument will force a chiller mode of operation.

In order to help user set up the change over set point, pressing and releasing the arrow key will display the temperature of **PB4** probe for 5sec on the upper display, while the lower display will show the **Et** label.

Change-Over Regulator Chart



For temperatures within the CF30 differential, change over via keypad is allowed.

9.0 BASIC REMOTE CONTROL PANEL KRCbase (Optional on request)

This panel allows ON/OFF control for all the EWA and EPA units. If a EPA unit which can be inverted to heat pump function is involved, it allows switching over the functioning mode, from chiller to heat pump and vice versa. It also signals if an alarm is active in the machine with a red led lighting up. Once the electric wiring is complete, as shown below, check that the jumper on the right side of the electric terminal board is closed (12Vac power supply). If the jumper is not correctly positioned it can damage the remote control.

N.B. Change the CF16 = 1 parameter so that the activation logic respects that of the remote control. The parameter can be changed directly from the user menu, see paragraph 12.1.

COMMANDS

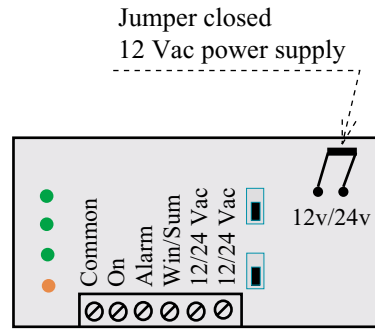
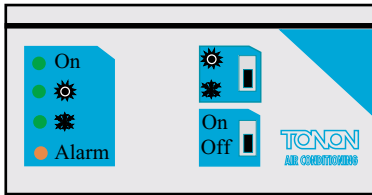
1. ON/OFF switch
2. Summer/Winter switch

DISPLAY

- 3 Green led On
- 4 Green led Summer
- 5 Green led Winter
- 6 Red led Alarm

MEASUREMENTS

- 120 x 70 x 28.7 mm

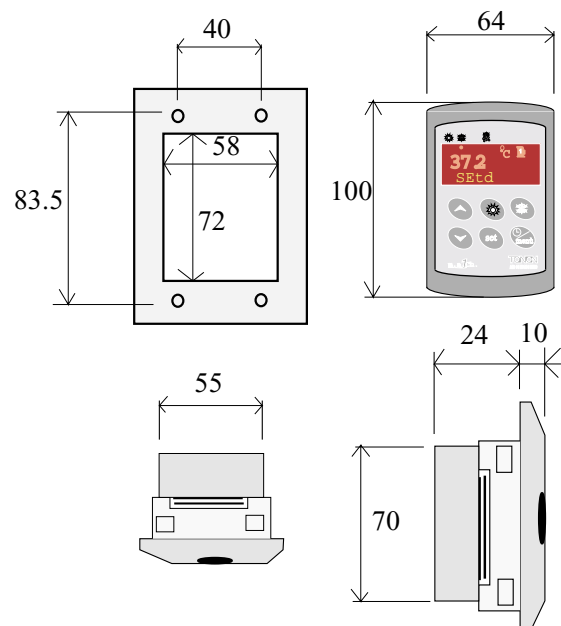


Rear view of the remote control panel

10.0 TOP REMOTE CONTROL PANEL KRCtop (Optional on request)



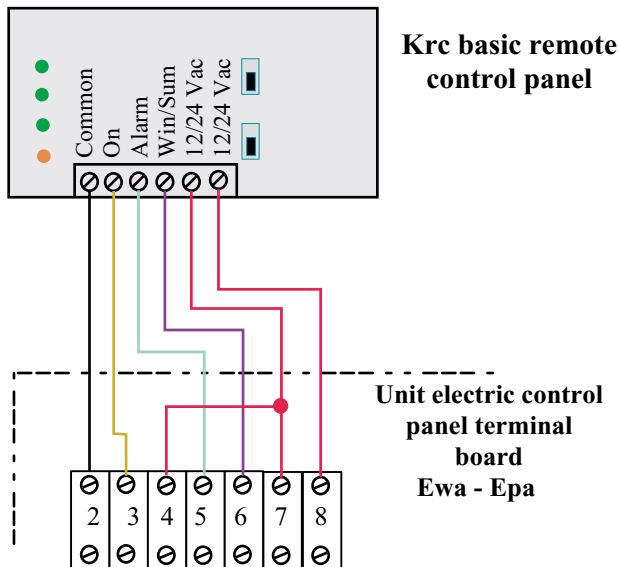
Provided as an on-request accessory, this kit allows to display and run all control parameters displayed as from machine controller. The keypad size enables the device to be installed within the very common (3 modules) wall boxes used in civil electrical systems. The remote terminal must be mounted on the panel, or on a 72x56 mm hole, and fixed using screws.



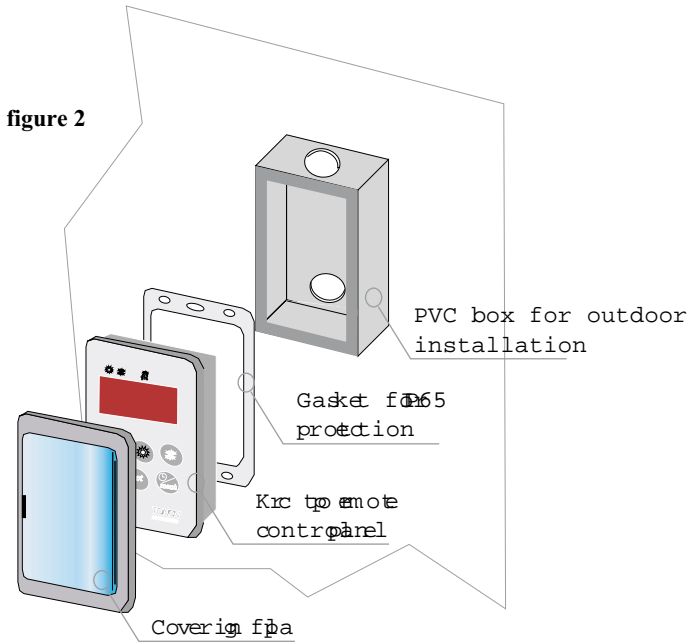
9.1 ELECTRIC CONNECTIONS FOR THE KRC BASIC REMOTE CONTROL PANEL

The electric connections between the remote control panel and the electric control board on the unit must be made on site, using a 6-pole cable with a minimum section of 0.5 sq.mm. The maximum recommended length must not exceed **150 meters**.

The electric connections to the remote control panel are the following:



To obtain a IP65 front protection, use the front protection rubber, mod. RGW-V (optional). For external fixing on wall, a V-KIT vertical keypad adapter, as the one shown in figure 2, is available.



10.1 FUNCTION OF THE KRC Top KEYS

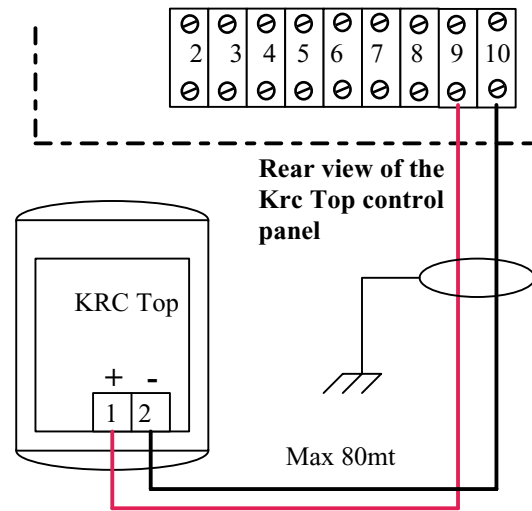
	The M key allows to access function menu and time set-up.
	The SET key allows to display or change the set point value. In programming mode, it selects a parameter or confirms a value.
	This key allows to select water IN/OUT temperatures, on the upper display. In programming mode, it scrolls through parameter codes or increase their values.
	This key allows to display outside air / defrost temperature. In programming mode, it scrolls through parameter codes or decrease their values.
	Keeping this key pressed for 5 sec will start or stop the unit in either chiller or heat pump mode of operation.
	Keeping this key pressed for 5 sec will start or stop the unit in either chiller or heat pump mode of operation

10.2 ELECTRIC CONNECTIONS FOR THE KRC Top

El. Wiring between the unit switchboard and the remote control panel have to be done using a 2 way 0,5 mmq size. The Max suggested lenght is 80 m. Over this lenght the wire size have to be increased up tp 1,5 mmq for a 150 m max lenght.

Connection wire is NOT included on the KRC accessory

ELECTRIC CONTROL PANEL



11.0 “ M KEY ” FUNTION MENU

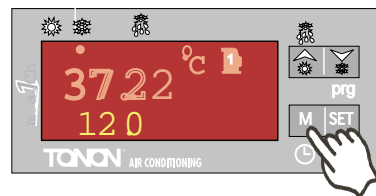
Accessing function menu will allow to:

- 1) Display and reset triggered alarms
- 2) Display and reset controlled load working hours
- 3) Enable the control via infrared transmission (supplied as an accessory)
- 4) Display the remaning time before defrost start (only if the unit is configured as heat-pump)
- 5) Transfer parameters from the instrument to the key (see point ----)
- 6) Display alarm history
- 7) Delete alarm history

(While the function menu is displayed, the “menu” icon is lit up).

11.1 ACCESS TO THE “M” FUNCTION MENU

Press and release the M (menu) key. The “menu” icon will appear.



11.2 EXIT FROM THE FUNCTION MENU

Press and release the M key or wait for time-out (15s). The “menu” icon will disappear.

11.3 - HOW TO DISPLAY AND RESET ALARMS

The system runs about 30 alarm codes. The most important ones are displayed by means of icons at the sides of the two displays. All the alarms can be identified through a code, and stored, up to 50, in time wise order.

Access function menu:

- 1) By using the keys, select the “ALrM” function.
- 2) Press and release the SET key.
- 3) By using the keys, scroll through all the alarms. To exit, press the menu key or wait 15s for time-out.

11.4 HOW TO RESET AN ALARM

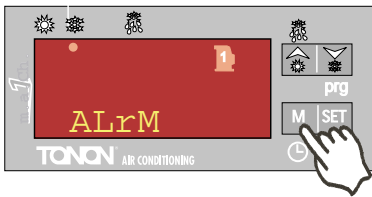
In the case of a serious alarm, such as high pressure, evaporator antifreeze, etc., the system must be reset manually.

All the alarms code arised (manual and auto reset) are recorded on the Eprom, in order to let the alarm diagnosis even long time later.

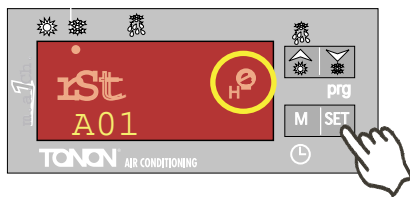
N.B. If the alarm continues, call the TONON Authorized Service Centre.

- Procedure for manually resetting the alarms:

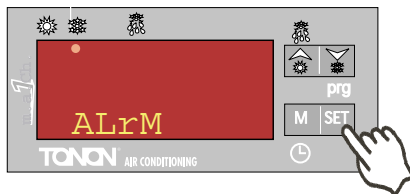
- 1) Access function menu.
- 2) Select the "ALrM" function



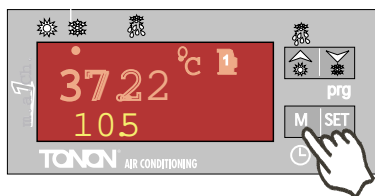
- 3) By pressing SET, the lower display will show the alarm code
- 4) Upper display: rSt label, if the alarm is resettable, NO label, if it is not. Scroll through all available alarms by using the up/down keys.



- 5) Press SET next to the rSt label to reset the alarm and move to the next one.

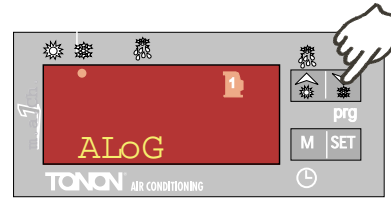


- 6) To exit, press the menu key or wait 15s for the time out.

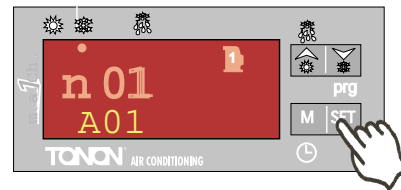


11.5 HOW TO DISPLAY THE ALARM HISTORY

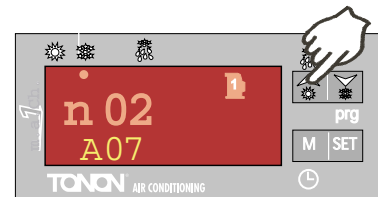
- 1) Access function menu
- 2) By using the up/down keys, select the ALoG function



- 3) Press SET: the lower display will show a label indicating an alarm code, the upper display the "n" label indicating a progressive number

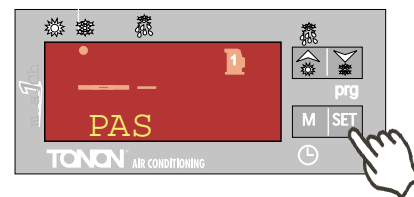
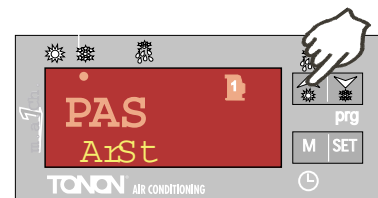


- 4) By using the up/down keys, scroll through all the available alarms



- 5) To exit ALoG function and revert to standard display, press the M key or wait for time-out (15 sec) to expire.

Memory can store up to 50 alarms; any new detected alarm exceeding that number will automatically delete the oldest alarm from memory (alarms are displayed from the oldest to the most recent).



N.B. Only through the maintenance password will it be possible to delete alarm history.

11.6 ALARM CODES AND FUNCTIONS



Code	Meaning	Cause	Action	Reset
P1	Alarm PB1 probe	Faulty probe or resistive value out of range	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic if the value returns within the set range
P2	Alarm PB2 probe	Faulty probe or resistive value out of range	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic if the value returns within the set range
P3	Alarm PB3 probe	Faulty probe or resistive value out of range	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic if the value returns within the set range
P4	Alarm PB4 probe	Faulty probe or resistive value out of range	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic if the value returns within the set range.
A01	Alarm maximum pressure switch	One of the high-pressure pressure gauges triggers Hp1 – Hp2	Open-collector / alarm relay activated Buzzer activated “ Alarm High Pressure ” icon blinking Code displayed	Manual Return to the pressure range plus reset procedure at point 11.4
A02	Alarm minimum pressure switch	Low pressure pressure gauge triggers Lp1	Open-collector / alarm relay activated Buzzer activated “ Alarm Low Pressure ” icon blinking Code displayed	Automatic Becomes manual after 2 triggers in one hour Manual Return to the pressure range plus reset procedure at point 11.4
A05	High temperature High pressure	AL11 limit exceeded by the pB3 probe (condensation control)	Open-collector / alarm relay activated Buzzer activated “ Alarm High Pressure ” icon blinking Code displayed	Manual Return to the temperature range plus reset procedure at point 11.4
A06	Alarm Low temperature low pressure	AL13 limit exceeded by pB3 probe (defrosting control)	Open-collector / alarm relay activated Buzzer activated “ Alarm Low Pressure ” icon blinking Code displayed	Automatic Becomes manual after 2 triggers in one hour. Manual Return to the pressure range plus reset procedure at point 11.4
A07	Alarm anti-freezing	AR03 limit exceeded set antifreeze alarm by pB2 probe on the evaporator (delivery temperature)	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Return to the temperature range plus reset procedure at point 11.4
A08	Alarm Flow switch (air/water, water/water units)	Safety device triggers on the evaporator water delivery (FL)	Open-collector / alarm relay activated Buzzer activated “ Alarm Flow Switch ” icon blinking Code displayed	Automatic Becomes manual after 2 triggers in one hour Manual Return to the pressure range plus reset procedure at point 11.4
A09	Alarm Compressor 1 thermal relay	Digital input activated by the magnetothermal switch on compressor 1	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Reset the safety device plus reset procedure at point 11.4.
A10	Alarm Compressor 2 thermal relay	Digital input activated by the magnetothermal switch on compressor 2	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Reset the safety device plus reset procedure at point 11.4.

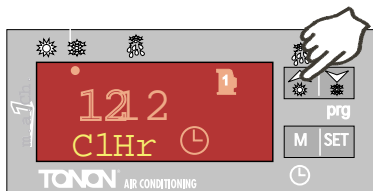
A11	Alarm Condensation fan thermal relay	Digital input activated by the fan thermal switch (thermal and klixon)	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Reset the safety device plus reset procedure at point 11.4.
A12	Alarm Defrost Error	End of defrosting for dF07 (maximum time)	Code displayed Only signalling	Automatic By a subsequent correct defrost Manual
A13	Alarm Compressor 1 maintenance	Compressor 1 functioning hours exceeded	Open-collector / alarm relay activated Buzzer activated “ Alarm Maintenance ” icon blinking Code displayed	Manual Working hour reset point 11.9
A14	Alarm Compressor 2 maintenance	Compressor 2 functioning hours exceeded	Open-collector / alarm relay activated Buzzer activated “ Alarm Maintenance ” icon blinking Code displayed	Manual Working hour reset point 11.9
A15	Alarm Water pump maintenance	Working hours > CO16	Open-collector / alarm relay activated Buzzer activated “ Alarm Maintenance ” icon blinking Code displayed	Manual Working hour reset point 11.9
rtC	Alarm Time Clock	Time Clock to be set	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Clock setting plus reset procedure point 11.4
rtF	Alarm Time Clock	Time Clock fault Clock malfunctioning	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Manual Reset procedure point 11.4 If after resetting the alarm re-occurs, change the clock
EE	Alarm Eeprom error	Loos in the data stored	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Reset procedure point 11.4 If after resetting the alarm re-occurs, the device will remain blocked
ACF 1	Alarm Configuration	Unit configured as p.d.c. with non-configured reversal valve	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic By correct reprogramming
ACF 2	Alarm Configuration	Air/air air/water units without probe configured for condensation control	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic By correct reprogramming
ACF 3	Alarm Configuration	Two digital inputs having the same configuration	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic By correct reprogramming
ACF 4	Alarm Configuration	CF28= 1 and digital input non-configured or CF28= 2 probe PB4 other than 3	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic By correct reprogramming
Afr	Alarm Supply mains frequency	Mains supply frequency out of range	Open-collector / alarm relay activated Buzzer activated “ Alarm Generic ” icon blinking Code displayed	Automatic When frequency returns within working range


11.7 OUTPUT BLOCK TABLE

Alarm code	Alarm description	Comp.1	Comp.2	Anti-freeze heating elements	Pump	Cond. fan	boiler
P1	Probe PB1	OFF	OFF	Si con Ar19 =0		OFF	OFF
P2	Probe PB2	OFF	OFF	Si con Ar19 =0		OFF	OFF
P3	Probe PB3	OFF	OFF	Si con Ar19 =0		OFF	OFF
P4	Probe PB4	OFF	OFF	Si con Ar19 =0		OFF	OFF
A01	Maximum pressure switch	OFF	OFF				
A02	Minimum pressure switch	OFF	OFF			OFF	
A05	High temperature High pressure	OFF	OFF				
A06	Low pressure Low temperature	OFF	OFF			OFF	
A07	Anti-freeze	OFF	OFF			OFF	
A08	Flow switch	OFF	OFF	Res. Boiler OFF	OFF		OFF
A09	Compressor 1 thermal relay	OFF	OFF				
A10	Compressor 2 thermal relay						
A11	Condensation fan thermal relay	OFF	OFF			OFF	
A12	Defrost error						
A13	Compressor 1 maintenance						
A14	Compressor 2 maintenance						
A15	Delivery fan water pump maintenance						
rtC	Alarm Time clock						
RtF	Alarm Time clock						
EE	Error Eeprom	OFF	OFF	OFF	OFF	OFF	OFF
ACF1	Alarm Configuration	OFF	OFF	OFF	OFF	OFF	OFF
ACF2	Alarm Configuration	OFF	OFF	OFF	OFF	OFF	OFF
ACF3	Alarm Configuration	OFF	OFF	OFF	OFF	OFF	OFF
ACF4	Alarm Configuration	OFF	OFF	OFF	OFF	OFF	OFF
AFr	Alarm Configuration	OFF	OFF	OFF	OFF	OFF	OFF




11.8 DISPLAY OF LOAD WORKING HOURS

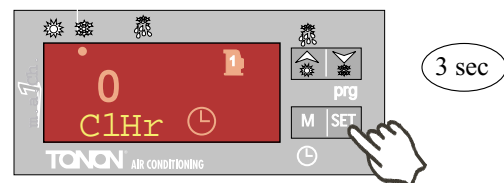
- 1) Access function menu
- 2) Press the   keys until the lower display shows the label of the single load; C1Hr (compressor 1 working hours), CHr2 (compressor 2 working hours), PFHr (system water pump working hours).



The upper display will show the working hours.
The icon  is lit up.

11.9 RESET OF LOAD WORKING HOURS

- 1) Access function menu
- 2) Press the   keys until the lower display shows the label of the single load (C1Hr, C2Hr, PFHr) and the upper display shows the working hours.
- 3) Keep the SET key  pressed for 3 sec **the upper display will show 0, which means the reset has been carried out correctly.**
- 3) Exit function menu by pressing the M key or waiting for exit time-out to expire (15s)
- 4) Repeat operations 1 to 4 for other loads.



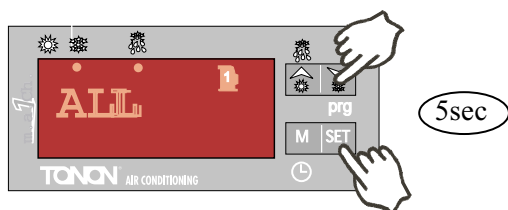
Before to reset this Alarm code, a check by the authorized Service is suggested in order to avoid subsequents troubles rise.

12.0 SUB-MENU SELECTION

The regulator parameters are managed under Family Labels. This system allows a quicker access to the required parameter.

LABEL	MEANING
ALL	Display all the parameters
ST	Display only thermoregulation parameters
CF	Displays only configuration parameters
SD	Display only dynamic set point parameters
ES	Display only energy saving parameters
CO	Display only compressor parameters
FA	Display only ventilation parameters
Ar	Display only heating element parameters
DF	Display only defrost parameters
AL	Display only alarm parameters

12.1 TO ACCESS “PR1” PARAMETERS (USER-LEVEL)



To access the user-accessible “pr1” parameter menu:

- 1) Keep the SET + and keys pressed for few seconds. (and will start blinking); the upper display will show “ALL”, the first family of parameters.
- 2) Select the different families of parameters by using the and keys.
- 3) After selecting the family, by pressing the SET key, the instrument will display label and code of the first parameter included into the family in “Pr1” on the lower display, and its value on the upper display.

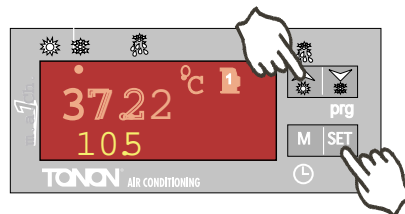
It will now be possible to scroll and change only the parameters included into that family.

12.2 TO CHANGE PARAMETER VALUES

1. Access programming mode
2. Select the desired parameter.
3. Press the SET key to allow the value to be changed.
4. Change the value by using the and keys
5. Press “SET” to store the new value and move to the next parameter.

6. TO EXIT PROGRAMMING MODE:

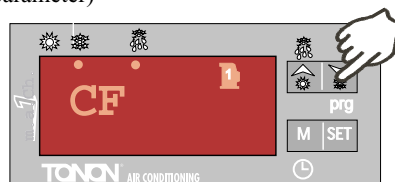
Press SET + , when a parameter is displayed, or wait (15s) without pressing any key.



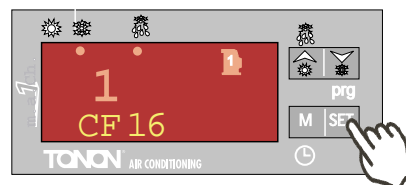
N.B.: The new set value is stored also in case of time-out exit without pressing SET.

12.3 SEQUENCE OF KEYS TO CHANGE THE PARAMETERS

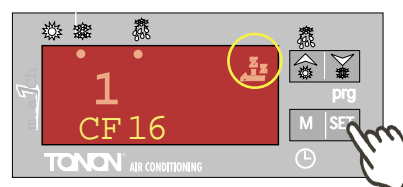
- 1) Press SET + arrow UP, to access the user menu “PR1”
- 2) Press the keys and , select the range of parameters to display (e.g. CF is the configuration parameter)



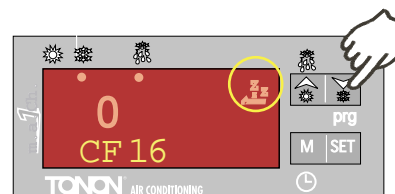
- 3) Press SET to access the parameters of the selected range.



- 4) Press SET to select the set value to be changed
N.B. this is only possible with the unit on stand-by



- 5) Press and to change the parameter. Press SET to save the change.

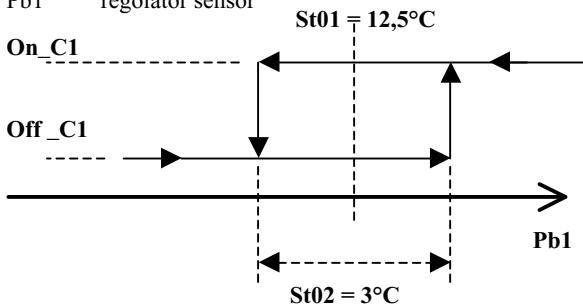


13.0 COMPRESSOR REGULATIONS IN “Chiller” or “Heat-Pump” MODE OF OPERATION

All the units are controlled depending on temperature detected by pB1 probe located at the evaporator inlet (temperature returning from user system). The compressors functioning is set out below:

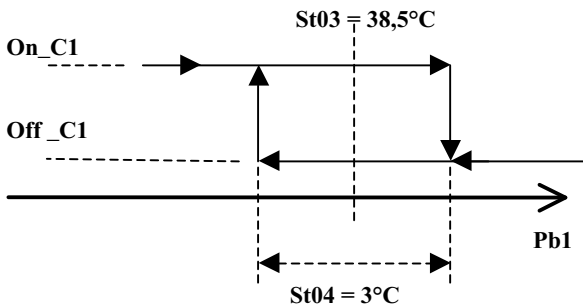
Unit single compressor (Models 051 ÷ 151)

- St01 summer set point
- St02 summer differential
- C1 Compressor 1
- Pb1 regulator sensor



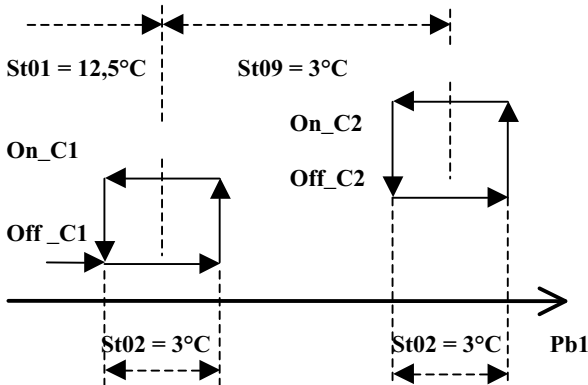
Unit single compressor (Models 051 ÷ 151)

- St03 winter set point
- St04 winter differential
- C1 Compressor 1
- Pb1 regulator sensor



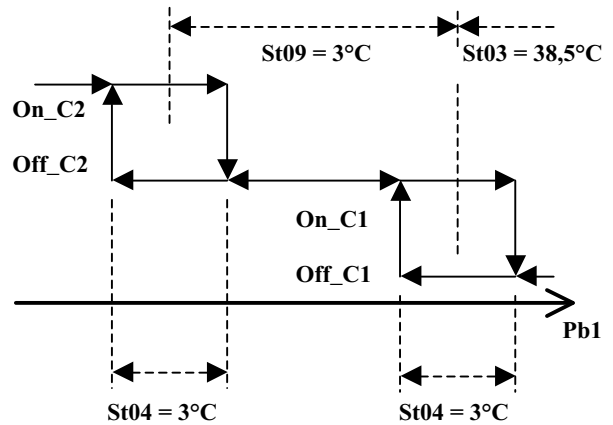
Unit two-compressors (Models 092 ÷ 152)

- St01 summer set point
- St02 summer differential
- St09 compressor 1 / 2 regulation band
- C1 Compressor 1
- C2 Compressor 2
- Pb1 regulation probe



Unit two-compressors (Models 092 ÷ 152)

- St03 winter set point
- St04 winter differential
- St09 compressor 1 / 2 regulation band
- C1 Compressor 1
- C2 Compressor 2
- Pb1 regulation probe



13.1 OPERATING MODE FOR THE CIRCULATION PUMP

The plant circulation pump functions are controlled by the machine regulator. For the standard versions without storage tank and pump, in the electric control panel terminal board there is the on/off consent which interfaces with an external power relay (see the electric connections paragraph 4.2).

13.2 TIMING

To guarantee a correct machine functioning and avoid untimely triggering of some safety devices during compressor starting and stopping phase. In the regulation system the following timings are active:

CO02 360sec

Minimum Off-time.

It determines the time during which the compressor must stay **deactivated**, even when there is a call for it to restart. During this phase, the LED relating to the compressor is blinking.

CO03 10sec

Delay On-time between the two compressors.

It determines starting delay between the two compressors, in order to reduce the electrical inputs at each starting. During this phase, the LED relating to the compressor is blinking.

CO05 60sec

Delay on-time meant as actual power supply to the control.

It delays the activation of outputs in order to distribute mains electrical inputs and protect the compressor/s against repeated startings in case of frequent mains power supply failures.

CO07 250sec

Delay off-time between water pump and compressor.

The water pump will be stopped only as machine stops (unit in stand by).

13.3 FAN FUNCTIONS

All the units have a fan speed control device. They can be regulated on the basis of a temperature (pb3) or a pressure (TR3), which is supplied on request as an accessory (DCP). N.B. for units working with low outside air temperatures in chiller function, we recommend using the DCP for a more reliable control.

Ideal temperature ranges for control type:
Chiller operations:

Outside air temperature: 20 ÷ 35°C
Control in standard temperature

Outside air temperature: -10 ÷ 35°C
Control in DCP pressure

For the EPA models with heat pump, the DCP gives better control for the defrosting function too.

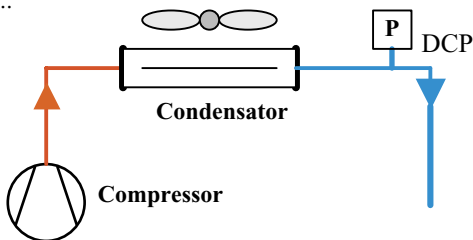
13.4 DCP PRESSURE CONTROL DEVICE

This type of control has a pressure probe with 4-20mA outlet signals. The regulation range for the probes goes from 0 to 30 bar. The device can also be installed on site, which besides the installation of a transducer also requires a series of changes to the control parameters. Therefore this operation must only be performed by qualified TONON S.p.A. staff or by the authorized service centres.

EWA models with only “Chiller”:

The position for the pressure test point for installing the pressure transducer is on the liquid pipe coming out of the condensation battery.

E.g.:



EPA models “Chiller + Heat pump”:

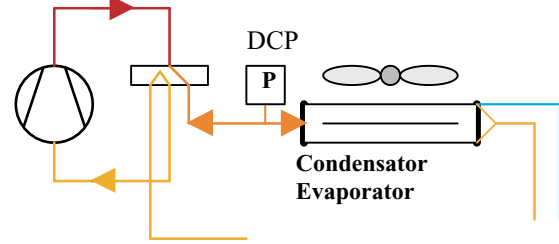
The position for the pressure test point for installing the pressure transducer is on the delivery pipe coming out of the 4-way reverse valve, going into the finned battery (summer condenser / winter evaporator). This gives the following controls:

- Condensation pressure control in Chiller mode, to control the fan speed during summer functions.
- Evaporation pressure control in Heat pump mode, to control the fan speed during winter functions.

Defrosting control with low pressure input and high pressure outlet (see paragraph 13,5).

E.g.:

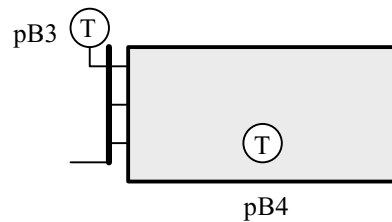
Compressor



13.5 DEFROSTING

All the EPA units with heat pump use a combined defrosting control. The control takes place depending on two temperatures, one on the battery head and one between the battery fins. This system avoids useless defrosting cycles, therefore improving machine performance. On request, a pressure/temperature probe can be used as combined control.

- **Combined temperature control**



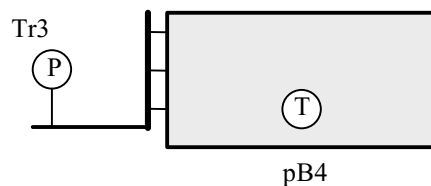
The probes are positioned as shown in the diagram, respectively:

- pb3** defrosting temperature probe
- pb4** combined temperature probe

Functions:

When the defrosting temperature has been reached pb3 (paragraph DF03), the delay countdown begins. Once the delay is complete, the combined defrosting set point is checked (paragraph DF19) on the pb4 probe. If both set points have been reached, the defrosting cycle begins. It is exited from a set function (paragraph DF04), once the probe level has been reached pb3. The maximum for the cycle is set at 5 minutes, once the maximum time has been exceeded the display shows the incorrect defrosting message.

- **Combined pressure control**



The probes are positioned as shown in the diagram, respectively:

- Tr3** defrosting pressure control probe
- pb4** combined temperature probe

Functions:

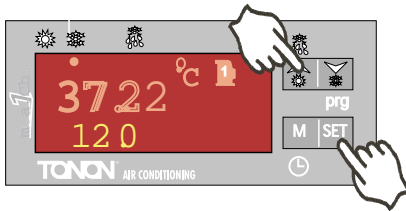
when the pressure is reached to begin defrosting Tr3 (paragraph DF03), the delay countdown begins. Once the delay is complete, the combined defrosting set-point is checked (paragraph DF19) by the probe pB4. If both the set points have been reached, the defrosting cycle begins. It is exited from a set function (paragraph DF04), once the defrosting final pressure level has been reached Tr3. The maximum for the cycle is set at 5 minutes, once the maximum time has been exceeded the display shows the incorrect defrosting message

N.B. during defrosting the heating elements are turned on which are fitted inside the pipes on the bottom of the battery. This way the bottom of the battery is heated up which assists dripping and avoids ice building up.

13.6 MANUAL DEFROSTING


The control also gives the possibility of forcing a manual defrosting cycle. Once the cycle has been started it continues until the set temperature or pressure are reached (paragraph DF04).

To start the manual function, press the SET+arrow up keys together for 5 seconds.

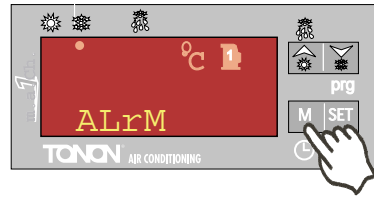


13.7 DISPLAYING THE TIME LEFT TO COMPLETE DEFROSTING

The amount of time left can be shown directly on the display before beginning the defrosting cycle. For this press the key

M and use the keys UP and DOWN  until you reach the “dEF” label. The bottom display shows the time in minutes and seconds.

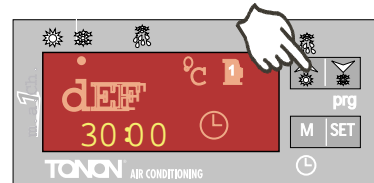
1- Press the M key to access the FUNCTION MENU



2- Use the keys  until you reach the dEF label.

The bottom display shows the amount of time left before defrosting.

N.B. In the case of combined defrosting, once the delay time is up, the defrosting function is only activated if the combined set point status is satisfied (see paragraph 13.5).



14.0 STARTING

14.1 PRELIMINARY CHECKS

Certain general checks are indispensable prior to starting the appliance in order to guarantee trouble-free operation of the assembly.

- 1) Check that the water connections have been carried out correctly in accordance with the general diagrams enclosed with this manual.
Ensure that the user system return water pipe is connected to the fitting marked “**COOLER WATER INLET**”, while the system water supply pipe is connected to the fitting “**COOLER WATER OUTLET**”.
- 2) Bleed the water system properly with the pump switched off. Any air bubbles could cause malfunctioning and even ice in the cooler, with the possibility that this could break and pollute the refrigerant circuit.
- 3) Check that all the on/off valves in the system are open, that the system is up to pressure and that water circulation is normal.
- 4) Check the electrical connections and that the sections of the wires and their raceways corresponds to what is indicated on the enclosed wiring diagram.
- 5) Check that the terminals are tight.
- 6) Check that the supply voltage corresponds to indications given on the wiring diagram. Also check that the voltage is constant and does not deviate more than 5% from the required value.
- 7) All the units included in models 10-1 / 32-1 come with a three-phase compressor and are fitted with a cyclic phase connection control relay.
If connection is incorrect, the appliance cannot be activated.
If the green LED on the relay lights up, this indicates that the connections and the phase sequence are correct. The LED goes out if phase connection is incorrect.
In this case it is sufficient to invert the connection of two of the three phases to ensure the correct direction of rotation of the compressor.
- 8) All the units have a compressor oil heater (casing resistance), which should be activated for at least 8 hours before starting the compressor.
The casing resistance should be powered by switching on the power on/off switch without starting the compressor by the On/Off control on the display panel.
- 9) Ensure that airflow through the finned block condenser is not obstructed (presence of foreign objects, packing material, leaves, etc.).

Avoid using the power on/off circuit breaker for starting or stopping the unit mode

14.2 START UP

Once all the above tests have been performed, the unit can be turned on.

From the front panel on the machine, you can directly have access to the controller through the PVC flap

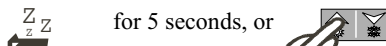
All the thermal switches on the QMI electric control board, etc., must be turned on so that they power all the users.


If the regulator display is not on, check that the phase control relay KA3 is active. Otherwise invert the phases on the line terminal board input (see the previous paragraph at point 7).

The regulator display shows respectively the plant return temperature (plant water intake) and the bottom display shows the fan control temperature or pressure.

The machine awaits a command, the stand-by icon is alight.

To start the unit in summer mode (chiller) press the key



press key to  activate the unit in winter mode

(just EPA units) see paragraph 7.1 or 7.2.

SUMMER MODE START UP

The regulation device is set in the factory with the summer function set-point (chiller) at 12.5°C with a differential of 3°C.

This shows that the unit is set to function when the recycle water temperature is above 14°C and will automatically stop when the temperature falls to 11°C.

Before starting the unit, we recommend checking the set-point value as follows:

- Press the SET key
- The bottom display shows the Set C code (summer set point)
- The top display shows the set value 12.5.

To change the value refer to paragraph 8.0.

WINTER MODE START UP

The regulation device is set in the factory with the winter function set-point (heat pump) at 38.5°C with a differential of 3°C.

This shows that the unit is set to function when the recycle water temperature is less than 37°C and will automatically stop when the temperature reaches 40°C.

Before starting the unit, we recommend checking the set-point value as follows:

- Press the SET key
- The bottom display shows the set H code (winter set point)
- The top display shows the set value 38.5

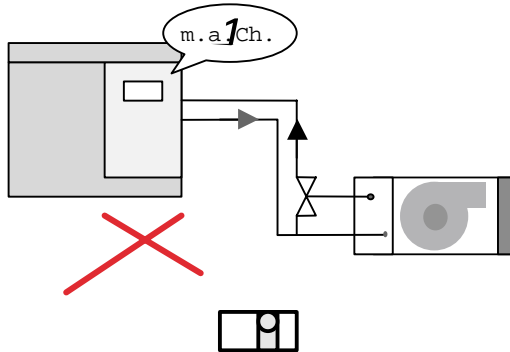
To change the value refer to paragraph 8.0.

N.B. if the unit is not started from a remote control the top display shows the OFF label (see paragraph 7.3).

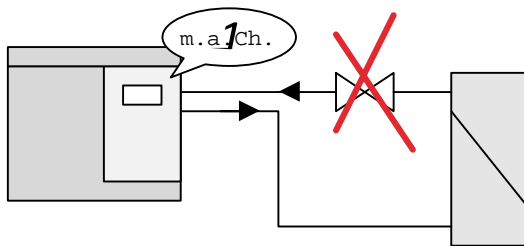
14.3 INTERFACE WITH THE USER'S SYSTEM

TONON® chiller and heat pump units can interface with various types of systems. However, certain hydraulic and electric requirements must be respected to avoid problems of varying entity during operations.

- All the units are automatically heat-regulated. During the relative period, it is best if the unit is always on so that the water temperature is maintained in the user's system. **DO NOT USE THE ROOM THERMOSTAT AS THE ON/OFF SWITCH FOR THE MACHINE**



- All the standard units need a constant water flow to the heat exchanger. Therefore it is important that when the unit is running there is no variation in the flow. **UNDER NO CIRCUMSTANCES MUST THE WATER DELIVERY AND RECYCLE LINES ON THE UNIT BE BLOCKED.**



- All the units need a rated flow, refer to paragraph 3.0, which guarantees a thermal jump of around 5°C between entrance and exit to the exchanger. One of the simplest checks is to ensure there are no large pressure drops in the system.

15.0 OPERATING CHECKS

GENERAL INDICATIONS

- All the appliances come with condensate temperature / control device to allow operation even with low external air temperatures (min. -10°C).

This device activates the modulation of the fan speed of rotation in relation to the condensed refrigerant temperature. Upon starting the compressor, the fan starts immediately at maximum speed of rotation. After a few moments the control device automatically enables the modulation of the airflow in order to keep the temperature/condensation pressure constantly within the set values in relation to the external air temperature.

The control device is set to prevent subsequent compressor start-ups at short intervals, which could cause damage. The following time settings are therefore active during a normal operating cycle: (see par.13.2).

15.1 CHECKS

- Temperatura dell'acqua

Once steady operating conditions have been reached, check the difference between the inlet and outlet water temperature. The inlet temperature is normally shown on the display.

Pressing the key will display in rotation system delivery and return temperatures. The temperature difference should be between 4.5 - 5.5 °C. Greater differences indicate poor water circulation in the system (in this case, check pump specifications). Smaller differences indicate excessive water circulation in the system (in this case the water flow rate may be reduced by means of the on/off valves in the system).

- Working pressures

After a few minutes operation, using the pressure gauges (supplied as accessory or to be connected in the field), check the condensation (high-pressure side) and evaporation temperatures (low-pressure side).

High pressure side:

Pressure	Bar	17.5	-	1 9
	kPa	17500	-	19000

Low pressure side:

Pressure	Bar	4	-	4.7
	kPa	400	-	470

- Refrigerant load

The temporary presence of bubbles that can be seen through the liquid indicator (when included) is to be considered normal. Persistence of the bubbles indicates lack of refrigerant inside the cooling circuit. The refrigerant load is indicated on the adhesive identification plate on the appliance.

- Presence of humidity

After a few hours of operation, check the colour of the crown inside the liquid level indicator (when included):

- a somewhat yellow colour indicates the presence of humidity in the cooling circuit. In this case, have qualified personnel remove the moisture from the circuit.

- Overheating temperature of the refrigerant gas

This value corresponds to the difference between the temperature of the gas measured on the intake pipe and the temperature of evaporation measured on the pressure gauge.

For optimal appliance performance, the values should be between 4 and 10 °C.

- Under-cooling temperature of the refrigerant liquid

This value corresponds to the difference between the temperature of condensation measured on the pressure gauge and the temperature measured on the liquid pipe.

For optimal appliance performance, the values should exceed 2-3 °C.

- Electrical input

Check that electrical input corresponds to the values given on the technical data sheet.

15.2 CONTROL AND SAFETY DEVICES

All the appliances are fitted with a control device and a series of safety components, as listed on the following pages. These devices are calibrated in the factory and checked during the final test prior to dispatch.

Once the appliance has been installed and after a reasonable period of operation, it is a good rule to check the efficiency of the control/safety devices and that the calibration values given in the following tables correspond.

Safety devices

safety device	set point	differenzial
Antifreeze thermostat	4°C	3°C

- alarm activation temperature: set point
- reenabling temperature: set point + differential

High pressure Pressostat	24Bar 2400kPa	6Bar 600kPa
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- alarm activation temperature: set point
- reenabling temperature: set point - differential

Low pressure Pressostat	2Bar 200kPa	1Bar 100kPa
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- alarm activation temperature: set point
- reenabling temperature: set point + differential

Overload compressor	1,33 x I nom. comp.
---------------------	---------------------

The antifreeze alarm and high pressure, are manual resetting. Before resetting the unit after lock out (refer to paragraph 11.4), check the reason for the problem. If the alarm continues contact the **TONON® Authorised service centre** who will provide the necessary maintenance.

16.0 MAINTENANCE

16.1 GENERAL INFORMATION

Before leaving the factory all the machines are carefully tested and left running for a sufficient period to ensure that all components work properly and that all the control and safety devices trigger correctly.

After correct installation no further adjustments need to be made unless repairs are carried out or malfunctioning occurs.

It is, however, indispensable to periodically check that the appliance is working correctly, especially after prolonged periods of idleness.

This maintenance should be carried out by qualified personnel **TONON®** only, following the instructions given in this manual.

The maintenance operations described on the following pages should be considered as routine and are extremely important for the quality of operation and for long life of the appliance.

A troubleshooting list is given at the end of the chapter, in which possible troubles that could be encountered are listed, plus the corresponding causes and remedies.

16.2 PERIODIC MAINTENANCE AND CHECKS

Monthly checks.

- Check the working pressures on the high and low pressure side using a common pressure gauge unit or, if provided, the pressure gauges installed on the appliance.

Rated working pressures:

External air temperature:		35°C
High pressure side:	Bar	18,5
	kPa	1850
Water temperature :		12-7 °C
Low pressure side:	Bar	4,2
	kPa	420

Check the safety devices work correctly, and that the set trigger levels correspond as given in paragraph 15.2.

Check the refrigerant load through the liquid indicator installed on all the appliances. If bubbles can be seen through the indicator under steady operating conditions, this indicates possible lack of refrigerant.

Also check the colour of the crown inside the liquid indicator. Any tendency towards yellow indicates the presence of moisture or humidity and the filter should therefore be

replaced. If the problem persists, dehydrate the cooling circuit.

Check the oil level in the compressor sump (from model 22/1). After a few hours operations, the level should settle slightly below the middle line on the inspection window.

Check the total consumptions correspond to the levels give on the electrical data table.

Check that the liquid circuit is properly filled, carefully bleeding the circuit through suitable air valves to eliminate any remaining air bubbles.

- Check that the electric terminals inside the electric control board and on the external user devices are tight.

Six-monthly maintenance checks

- Carry out all maintenance operations scheduled at monthly intervals.
- Check that the condenser unit is clean. If necessary clean the fins using compressed air blown in the opposite direction to the airflow or, if there is concentrated clogging, a jet of water at moderate pressure.
- Check that the noise and vibration levels of the moving parts (compressor/fan/pump) are within normal limits.

16.3 STOPPING FOR THE SEASON

The EWR range of water coolers are normally used in civil type air-conditioning systems which remain idle during the winter.

If the appliance is installed in areas where there is the possibility of freezing during winter, the system must be drained of water or the latter mixed with anti-freeze solutions in suitable percentage parts. In this case appliance efficiency may be slightly affected and the size of the pump should be calculated taking into consideration the variation in the parameters of water flow rate and loss of head of the cooler (see table 3.0).

N.B. FOR UNITS WITH EVAPORATOR ANTIFREEZE ELEMENTS, DO NOT TURN THE POWER OFF TO THE UNIT TO AVOID THE SAFETY DEVICE BEING TURNED OFF DURING COLD PERIODS

The antifreeze elements are active even when the unit is on stand-by.

16.4 SAFETY INFORMATION

All maintenance, repairs and replacement operations to any component, adding refrigerant gas, dismantling the unit, must all be done by qualified personnel trained in air conditioning units.

Electric connections

Fit a differential automatic switch near to the unit, with adequate capacity for the electric intake. Connect the unit to earth, checking it is efficient.

Refrigerant fluids

The type of refrigerant to use is given on the technical data plate on the hydraulic attachment side of the unit. The lubrication oil to use is given on the compressor plate.

Warnings

If the refrigerant gas accidentally leaks, take the following precautions:

- if the refrigerant gas comes into contact with skin or eyes, it can cause frostbite. Therefore, use protective gloves and clothing, and protect the face and eyes.
- Prolonged inhalation of refrigerant gas can cause unconsciousness or heart disorders. Elevated concentrations can cause asphyxia due to the lack of oxygen in the surrounding atmosphere.
- Never use open flames, which due to combustion can cause toxic substances.

16.5 DEMOLISHING THE MACHINE AND DISPOSING OF TOXIC SUBSTANCES.

Demolition and processing of the substances used in the machine must be entrusted to authorised persons, in accordance with legislation in force. Harmful substances like compressor oil and refrigerant, must not be emptied directly into the atmosphere, but collected in special containers and delivered to the special disposal centres. all the identification plates and technical documents must be destroyed.

17.0 FAULT SEEKING

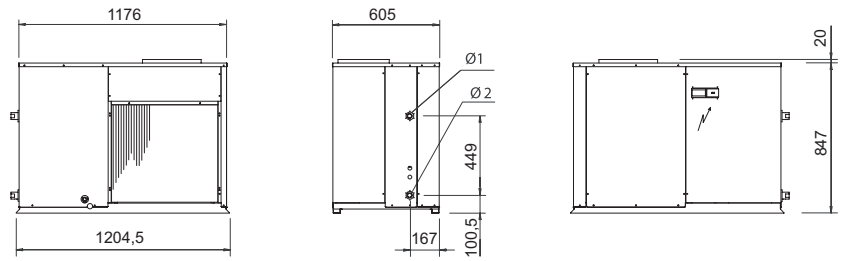
FAULT	SYMPTOM	PROBABLE CAUSE	REMEDY
The appliance does not start.	The display panel does not light up	Power supply failure.	Check the electric wiring to the main power terminals and check the voltage levels. Check the fuses on the secondary side of the auxiliary transformer.
		Inverted phases. The KA3 phase control relay does not give consent. Alarm led not active.	Invert the phases into the electric control terminal board,
	The display panel comes on but the appliance does not start.	Unit on STAND-BY	refer to paragraph 7.0 to start up the machine.
	The display panel comes on, the on/off control is activated but the appliance does not start.	Lack of external acknowledgement.	Check the connections to external acknowledgement terminals 2-3. If unused, a jumper should be connected between the terminals.
	The appliance does not start and the comp. LED on the display panel blinks.	Time setting in progress.	Wait for the time setting to elapse (max. 360 sec.), after which the compressor should start.
	The control panel display blinks indicating one or more alphanumeric codes alternating with the temperature value.	One or more safety devices triggered.	Check which safety device has triggered, eliminate the cause for the alarm and reset the safety device (see the list of alarm codes paragraph 11.6)
The compressor continuously stops and starts again.	Normal operation, stops and starts too frequent due to activation of the low-pressure pressure switch.	Lack of refrigerant.	Identify and eliminate the refrigerant leak and refill.
	Intake pressure too low and rime on filter.	Clogged filter.	Replace the filter.
The compressor continues to operate; it never stops.	Temperature too high in the air-conditioned environment.	Excessive heat load.	Check infiltration and insulation.
	Temperature too low in the air-conditioned environment.	The thermostat trips with too low a temperature.	Recalibrate or repair the thermostat.
	Bubbles on refrigerant flow indicator.	Lack of refrigerant.	Identify and eliminate the refrigerant leak and refill.
The compressor is noisy	The compressor “knocks”.	Broken compressor internal parts.	Overhaul the compressor.
		Return of liquid.	Check overheating and the position of the expansion valve bulb.
	The intake piping is abnormally cold.	Expansion valve locked in the open position.	Repair or replace the expansion valve.

17.0 FAULT SEEKING

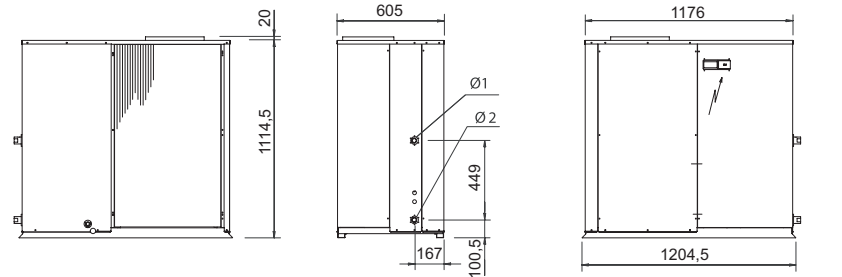
FAULT	SYMPTOM	PROBABLE CAUSE	REMEDY
System efficiency is lower than normal.	The thermostatic valve whistles.	Vaporisation of liquid refrigerant.	Add refrigerant.
	Difference in temperature in the refrigerant pipe around the filter or the expansion valve.	Clogged filter or solenoid valve.	Clean or replace.
	Intermittent or interrupted operation.	Locked or obstructed expansion valve.	Repair or replace.
	Excessive overheating.	Badly adjusted overheating.	Repair the expansion valve and check overheating.
		Excessive drop in pressure in the cooler.	Check overheating and recalibrate the expansion valve.
Delivery pressure too high.	Cold air at capacitor outlet.	Insufficient condensation air flow.	Check fan conditions and check for airflow obstruction.
		Dirty capacitor.	Remove the material clogging the capacitor (leaves, paper, etc.)
	Air at capacitor outlet too hot.	Circuit too full of refrigerant; capacitor partially flooded.	Remove refrigerant from the capacitor.
Intake pressure too high.	The compressor continues to operate; it never stops	Excessive charge to the cooler.	Check that external air infiltration into the air-conditioned environment is not excessive
	Intake piping too cold	Overfed expansion valve.	Adjust the degree of overheating and check the bulb position.
	Return of liquid to compressor	Expansion valve locked in the open position.	Repair or replace the valve.
	Noisy compressor.	Faulty compressor compression coils.	Overhaul the compressor.

18.0 IDENTIFYING THE FITTINGS

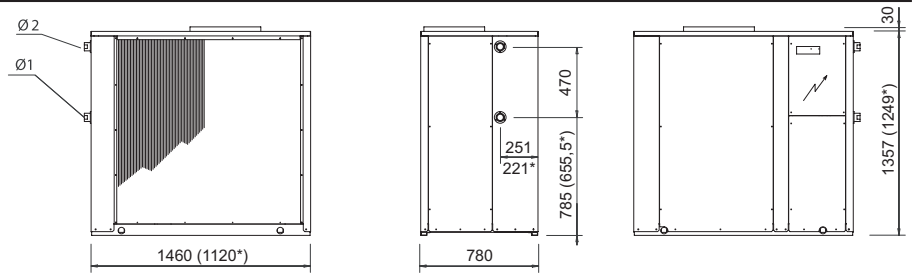
EWR - EPR		
	Ø1	Ø2
05-1	3/4"	3/4"
06-1	3/4"	3/4"



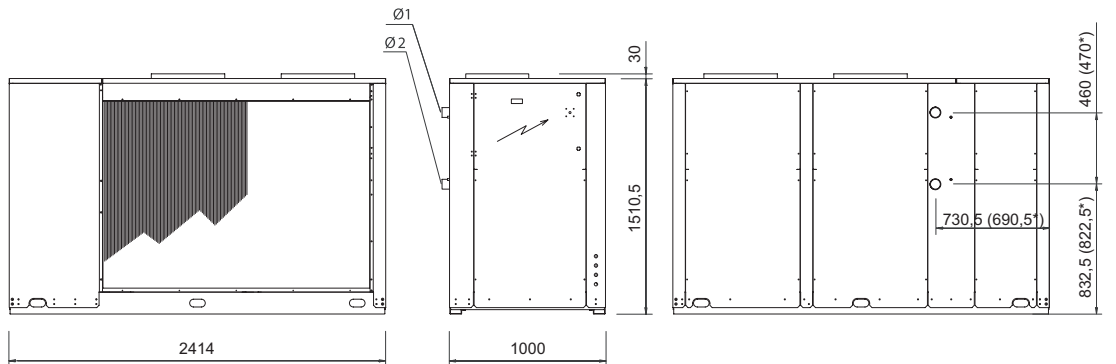
EWR - EPR		
	Ø1	Ø2
08-1	3/4"	3/4"
10-1	3/4"	3/4"



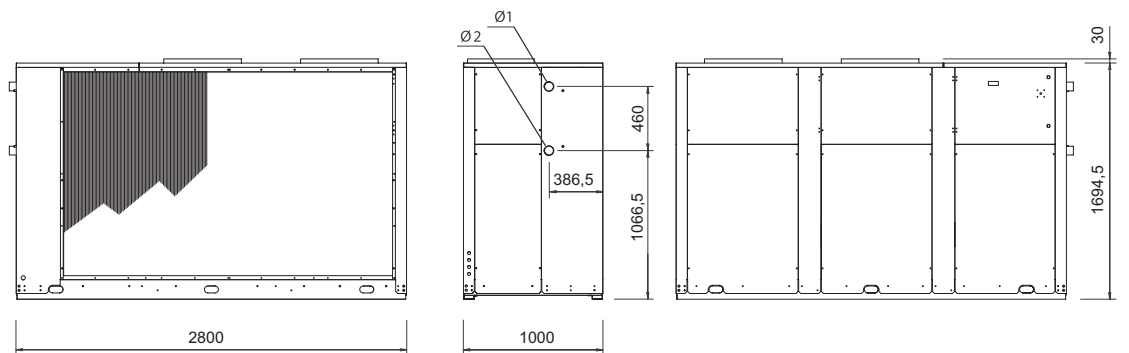
EWR - EPR		
	Ø1	Ø2
13-1*	1"1/4	1"1/4
16-1*	1"1/4	1"1/4
22-1	1"1/4	1"1/4
26-1	1"1/4	1"1/4
32-1	1"1/4	1"1/4



EWR - EPR		
	Ø1	Ø2
38-1*	1"1/4	1"1/4
44-2	2"	2"
53-2	2"	2"
65-2	2"	2"



EWR - EPR		
	Ø1	Ø2
76-2	2"	2"



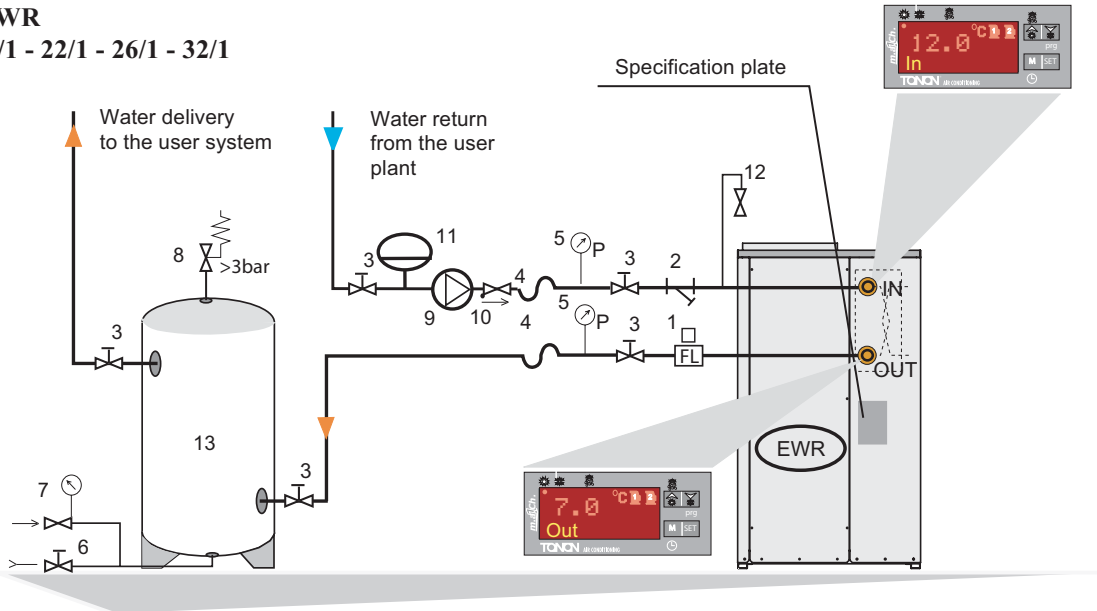
-IN system water intake (return from the user system)
 -OUT system water outlet (delivery to the user system)
 N.B. HYDRAULIC FITTINGS: 3/4" F - 1"1/4 F - 2" M

19.0 GENERAL WATER CONNECTION DIAGRAMS

TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

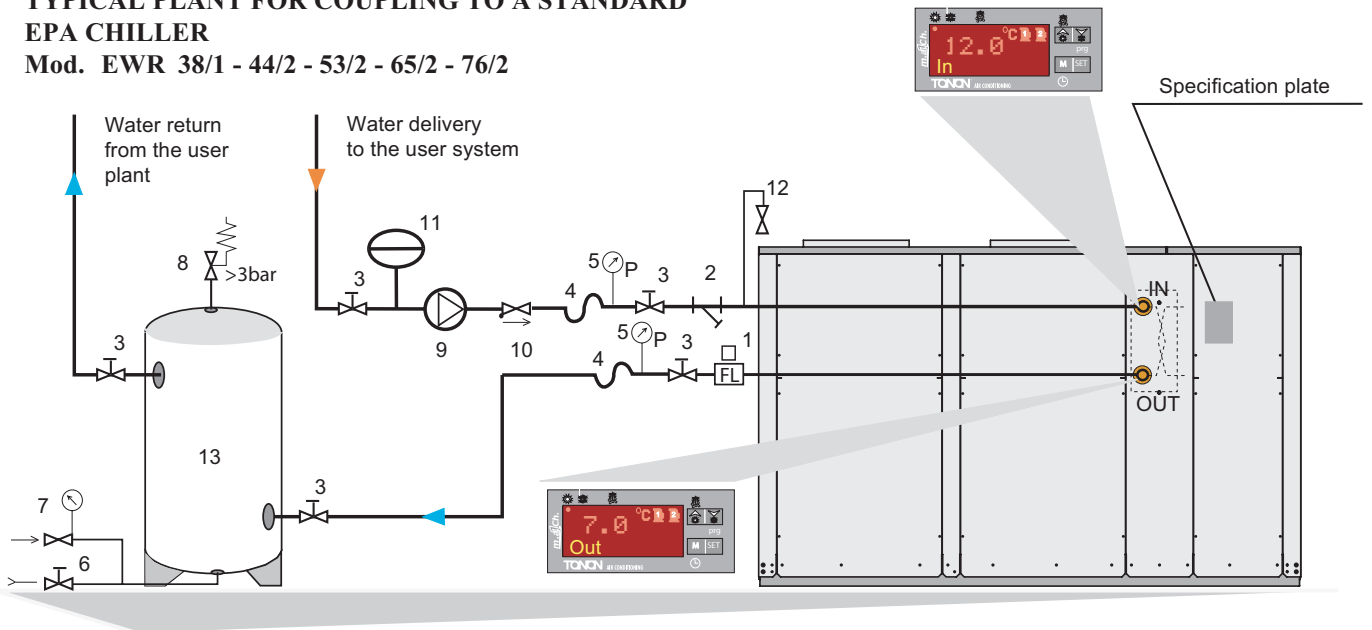
Mod. EWR

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EPA CHILLER

Mod. EWR 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

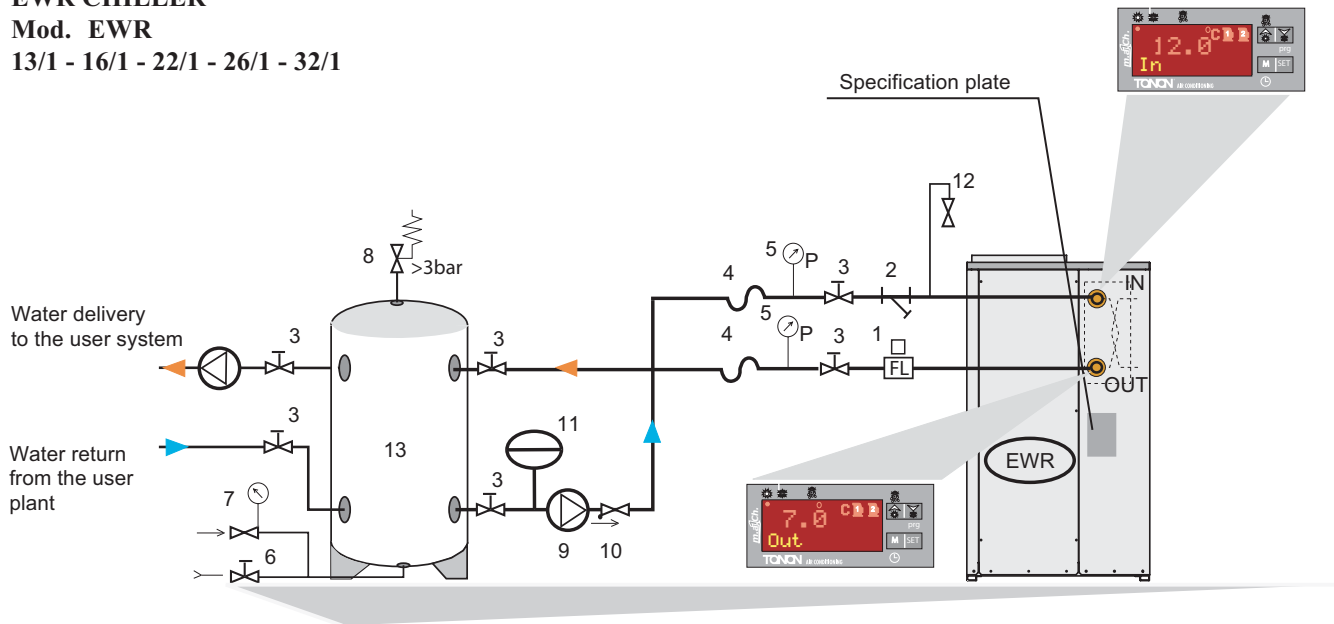
- | | |
|---------------------------------------|---|
| 1- flow meter | 8- 3 bar safety valve |
| 2- mesh filter | 9- circulation pump |
| 3- cut-off valve | 10- check valve |
| 4- vibration damping hydraulic joints | 11- expansion tank |
| 5- pressure gauges | 12- air breather valve |
| 6- discharge cocks | 13- water storage tank (type with 2 fittings) |
| 7- filling assembly (automatic) | |

N.B. ON UNITS WITH STORAGE TANKS FITTED STANDARD, THE CIRCULATION PUMP MUST BE DIMENSIONED TO OVERCOME ANY PRESSURE DROPS IN THE MACHINE AND THE PLANT. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY

TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

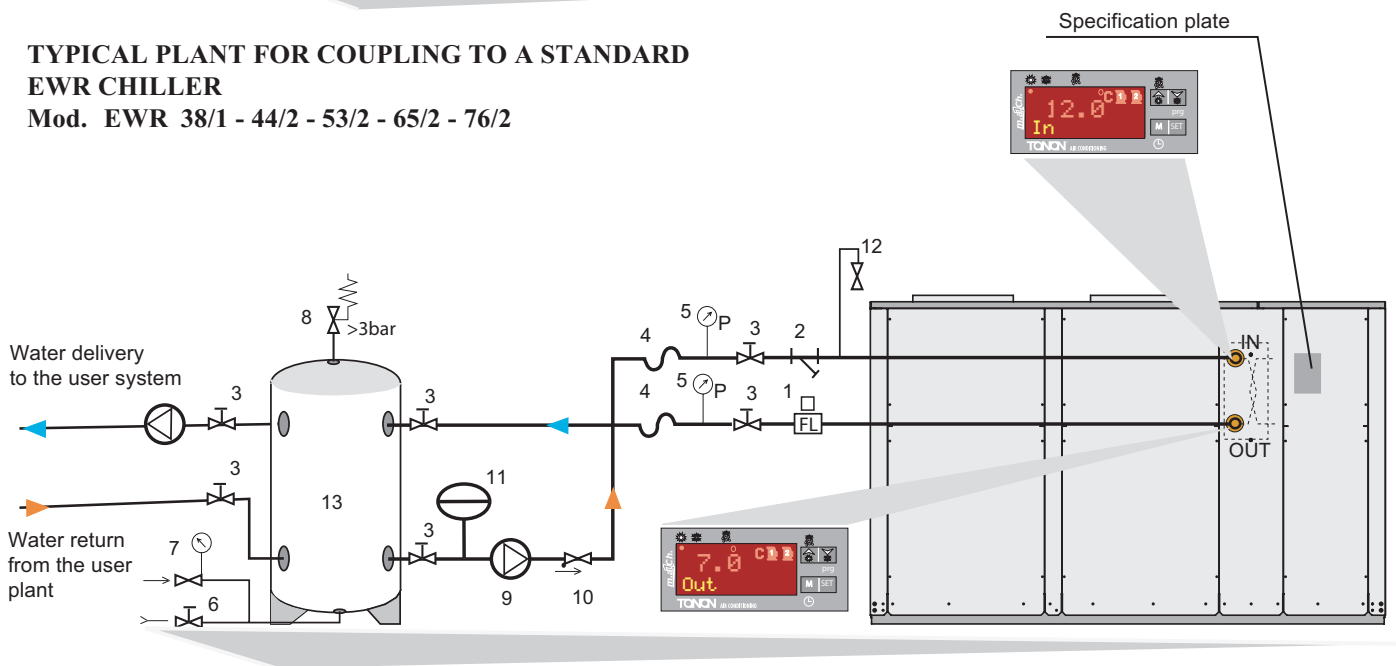
Mod. EWR

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

Mod. EWR 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

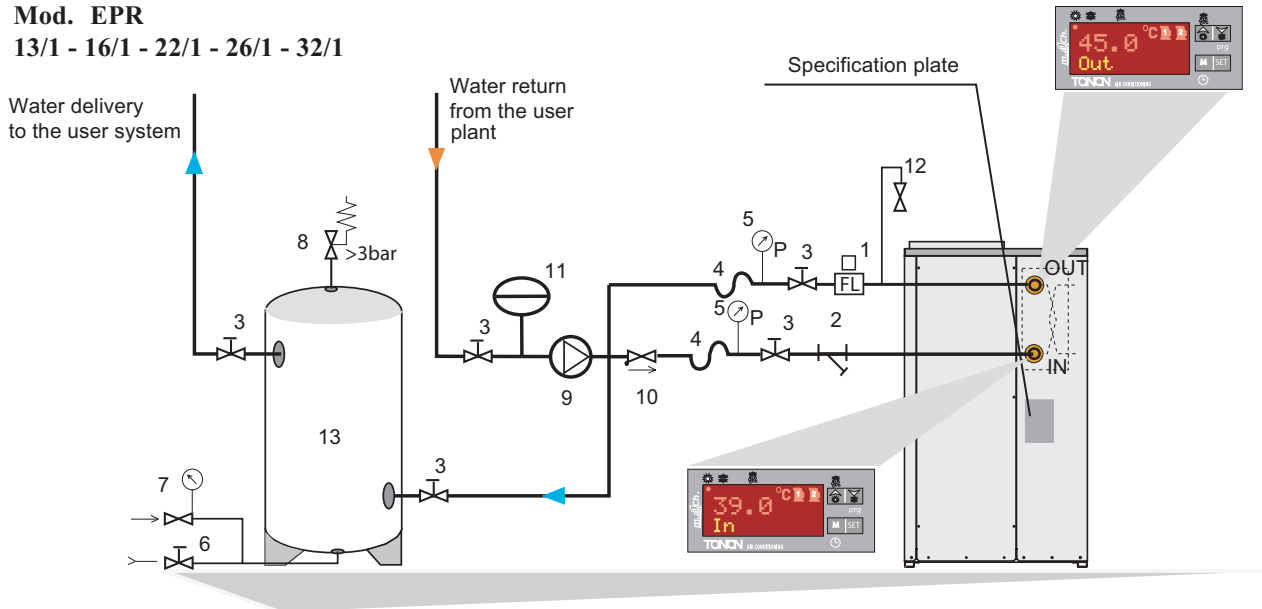
- | | |
|---------------------------------------|---|
| 1- flow meter | 8- 3 bar safety valve |
| 2- mesh filter | 9- circulation pump |
| 3- cut-off valve | 10- check valve |
| 4- vibration damping hydraulic joints | 11- expansion tank |
| 5- pressure gauges | 12- air breather valve |
| 6- discharge cocks | 13- water storage tank (type with 4 fittings) |
| 7- filling assembly (automatic) | |

N.B. ON SYSTEMS WITH PARALLEL STORAGE TANKS, THE RECYCLE PUMP MUST BE DIMENSIONED ON THE BASIS OF THE PRESSURE DROPS IN THE MACHINE. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY.

TYPICAL PLANT FOR COUPLING TO A STANDARD EPR HEAT PUMP UNIT

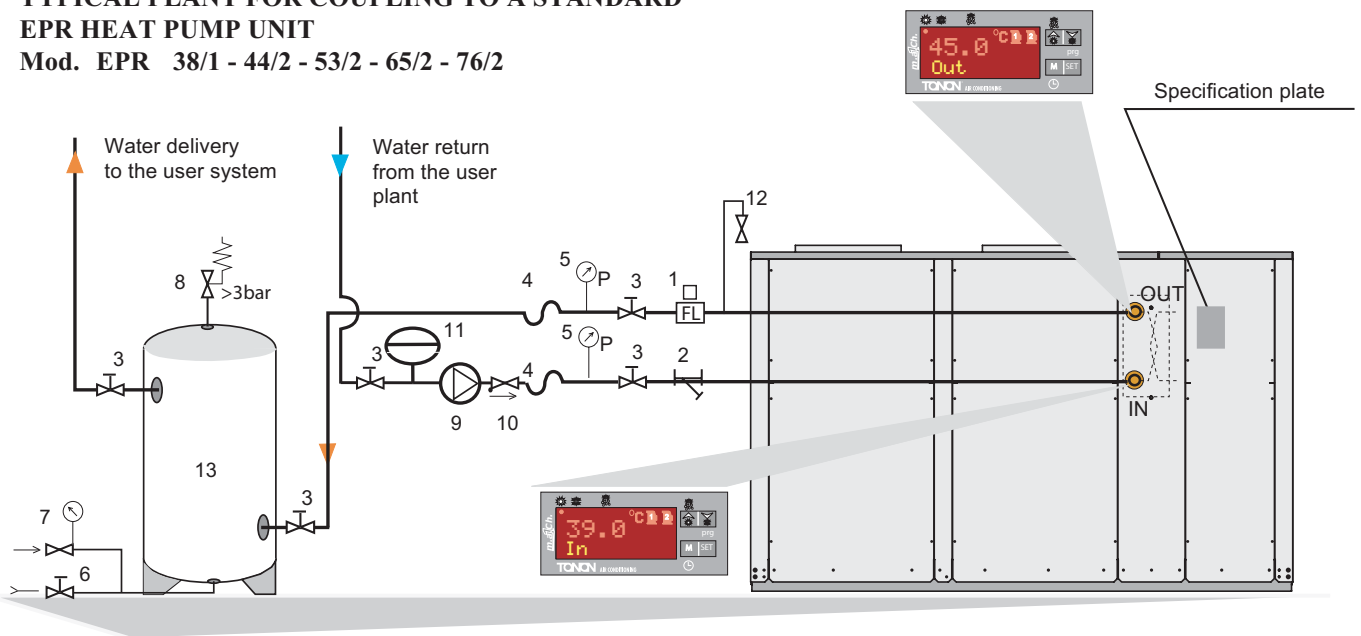
Mod. EPR

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EPR HEAT PUMP UNIT

Mod. EPR 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

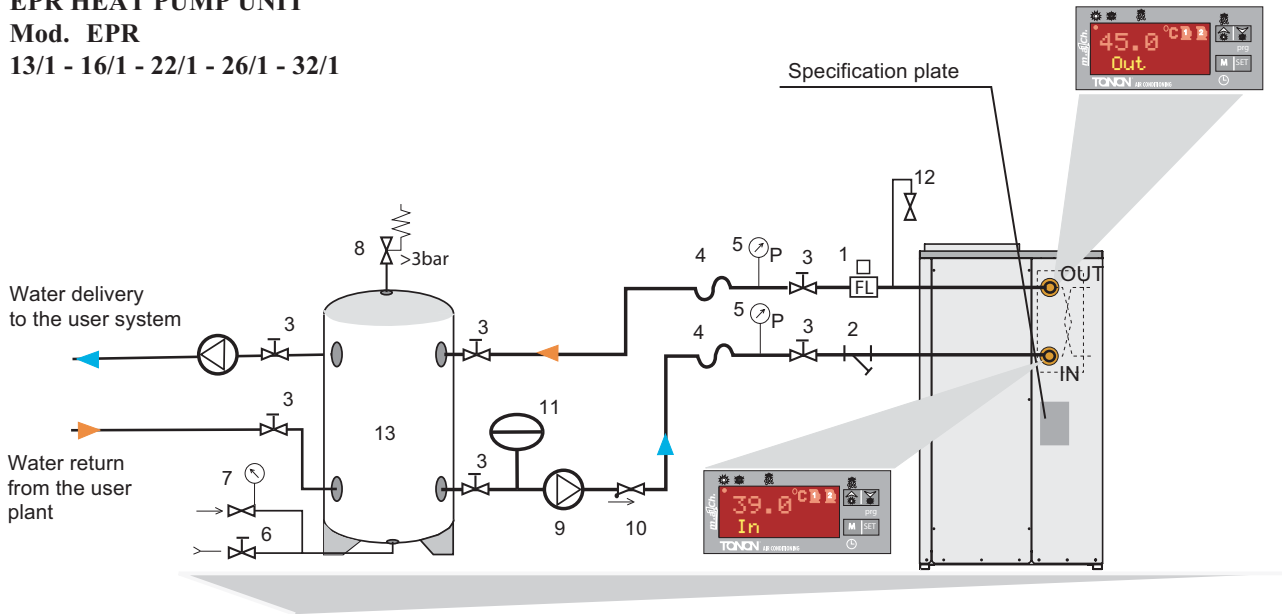
- | | |
|---------------------------------------|---|
| 1- flow meter | 8- 3 bar safety valve |
| 2- mesh filter | 9- circulation pump |
| 3- cut-off valve | 10- check valve |
| 4- vibration damping hydraulic joints | 11- expansion tank |
| 5- pressure gauges | 12- air breather valve |
| 6- discharge cocks | 13- water storage tank (type with 2 fittings) |
| 7- filling assembly (automatic) | |

N.B. ON UNITS WITH STORAGE TANKS FITTED STANDARD, THE CIRCULATION PUMP MUST BE DIMENSIONED TO OVERCOME ANY PRESSURE DROPS IN THE MACHINE AND THE PLANT. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY

TYPICAL PLANT FOR COUPLING TO A STANDARD EPR HEAT PUMP UNIT

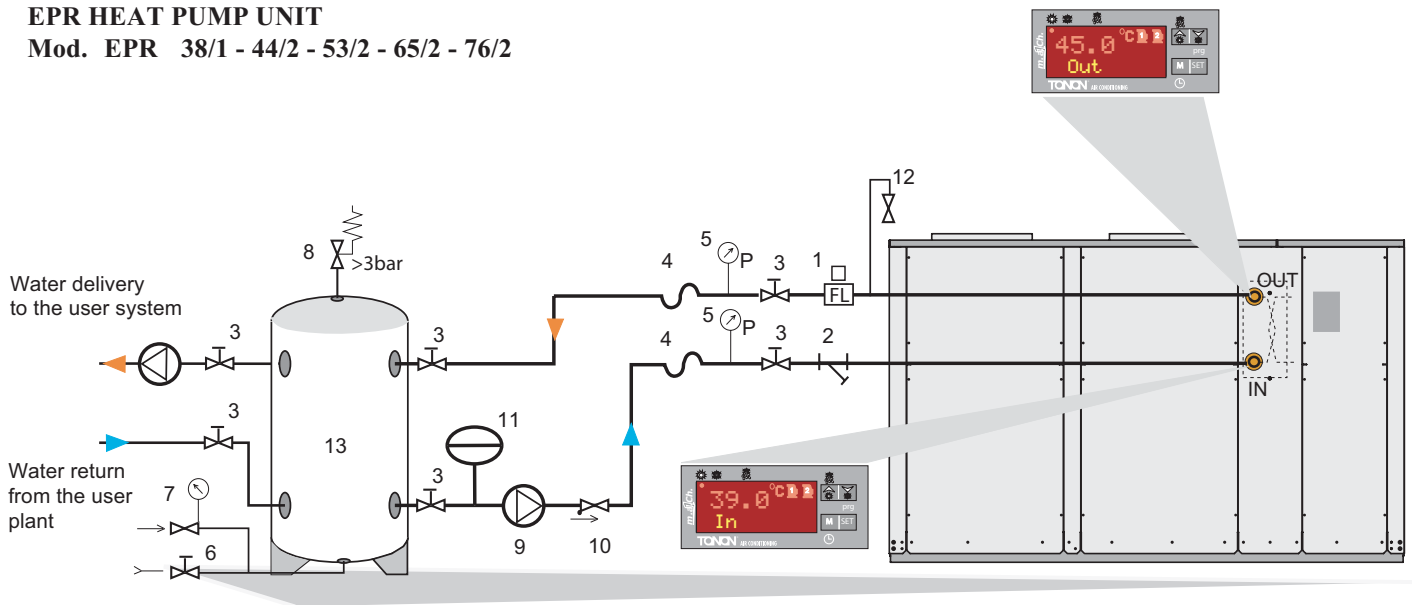
Mod. EPR

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EPR HEAT PUMP UNIT

Mod. EPR 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

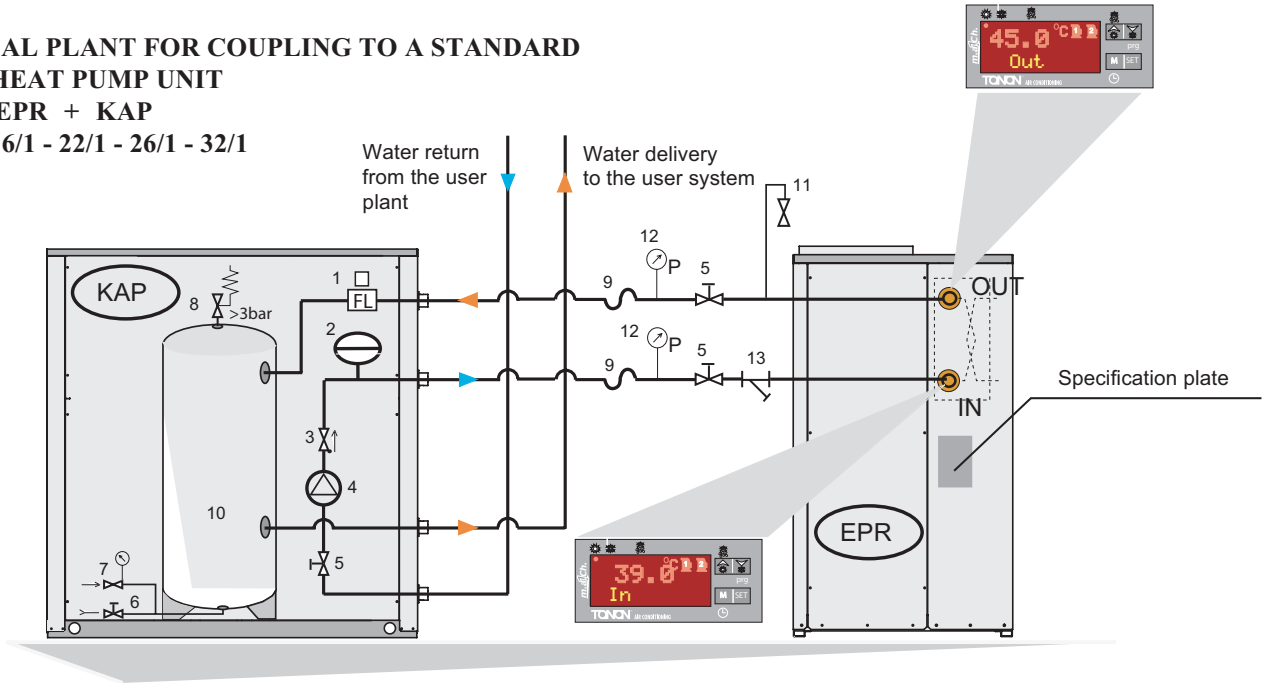
- | | |
|---------------------------------------|---|
| 1- flow meter | 8- 3 bar safety valve |
| 2- mesh filter | 9- circulation pump |
| 3- cut-off valve | 10- check valve |
| 4- vibration damping hydraulic joints | 11- expansion tank |
| 5- pressure gauges | 12- air breather valve |
| 6- discharge cocks | 13- water storage tank (type with 4 fittings) |
| 7- filling assembly (automatic) | |

N.B. ON SYSTEMS WITH PARALLEL STORAGE TANKS, THE RECYCLE PUMP MUST BE DIMENSIONED ON THE BASIS OF THE PRESSURE DROPS IN THE MACHINE. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY.

TYPICAL PLANT FOR COUPLING TO A STANDARD EWR HEAT PUMP UNIT

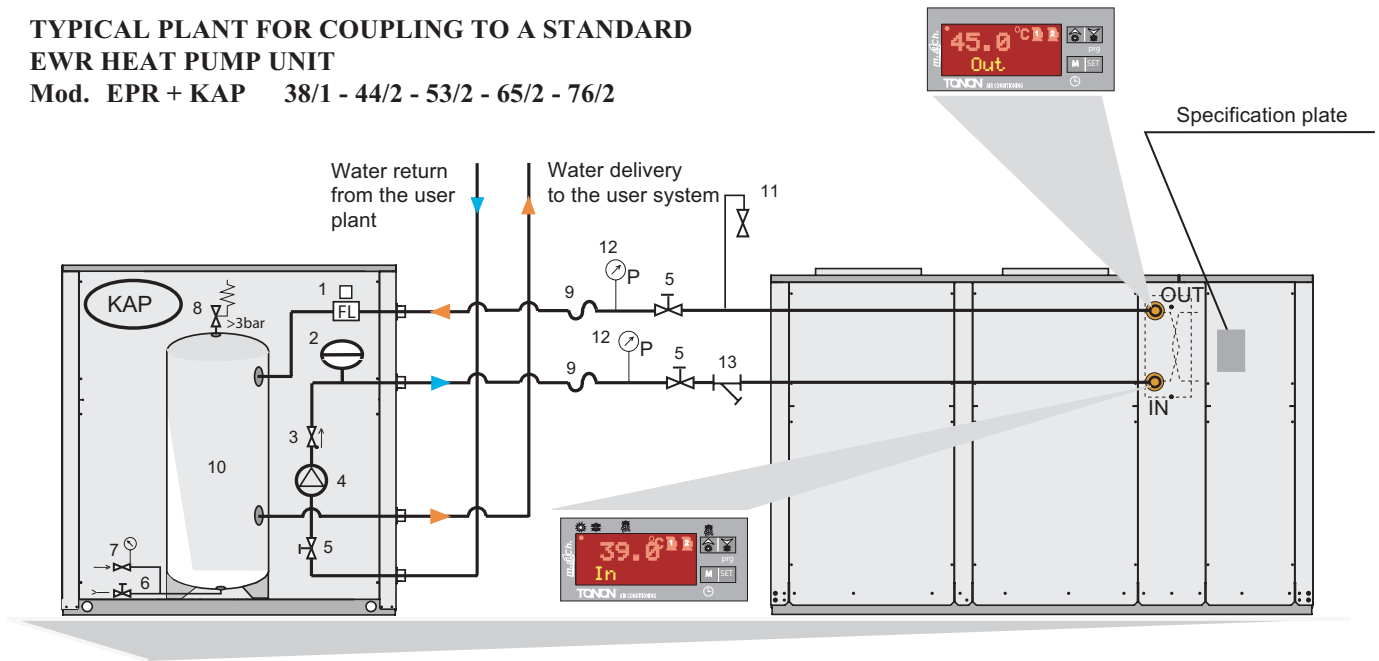
Mod. EPR + KAP

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EWR HEAT PUMP UNIT

Mod. EPR + KAP 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

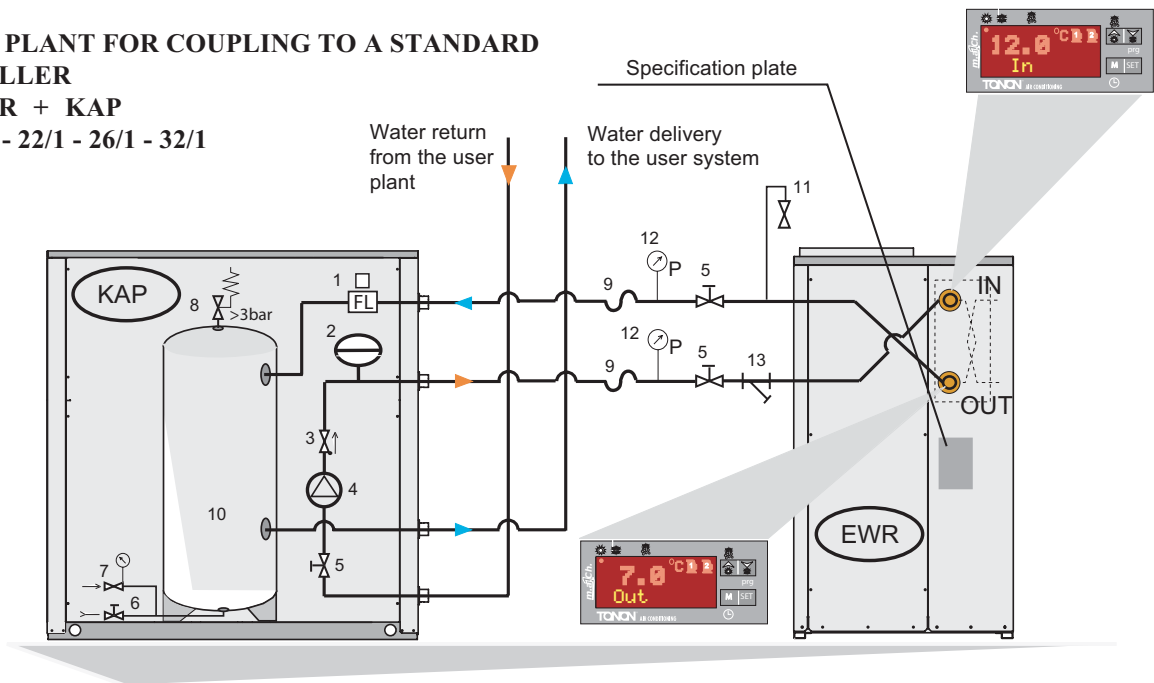
- | | |
|---------------------------------|---------------------------------------|
| 1- flow meter | 8- 3 bar safety valve |
| 2- expansion tank | 9- vibration damping hydraulic joints |
| 3- check valve | 10- water storage tank |
| 4- circulation pump | 11- air breather valve |
| 5- cut-off valve | 12- pressure gauges |
| 6- discharge cocks | 13- mesh filter |
| 7- filling assembly (automatic) | |

N.B. ON UNITS WITH STORAGE TANKS FITTED STANDARD, THE CIRCULATION PUMP MUST BE DIMENSIONED TO OVERCOME ANY PRESSURE DROPS IN THE MACHINE AND THE PLANT. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY

TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

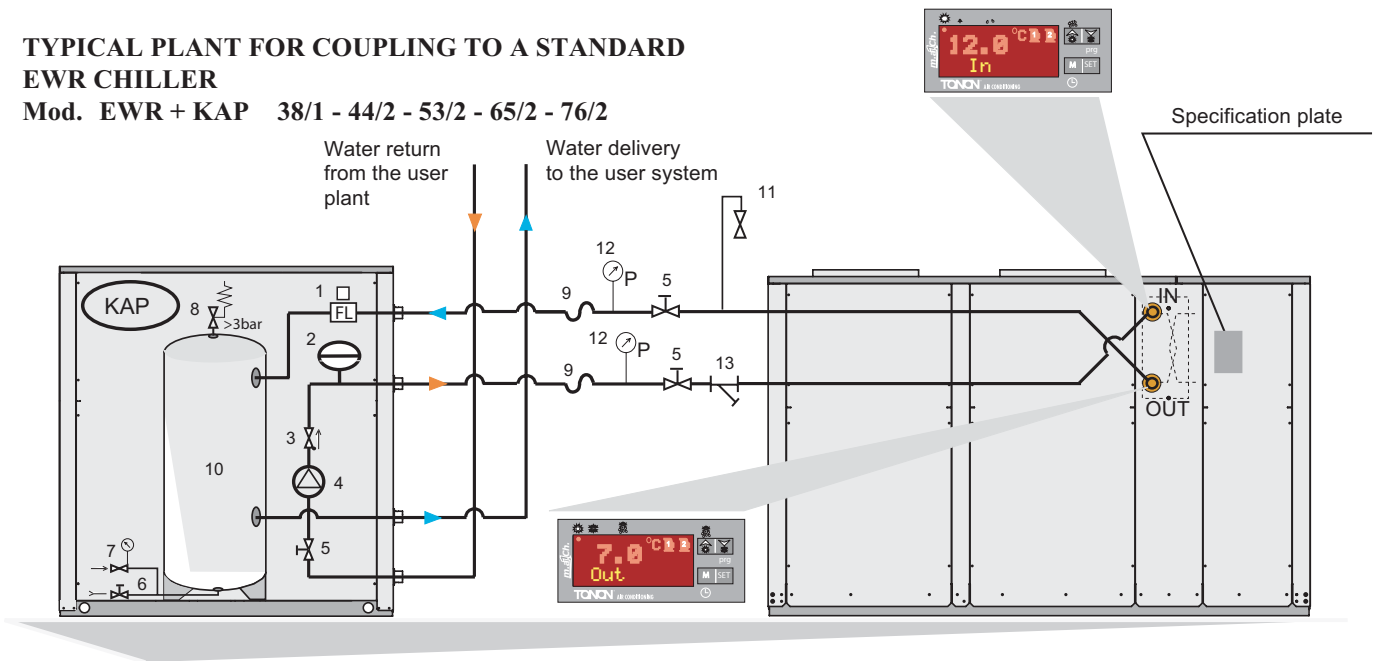
Mod. EWR + KAP

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

Mod. EWR + KAP 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

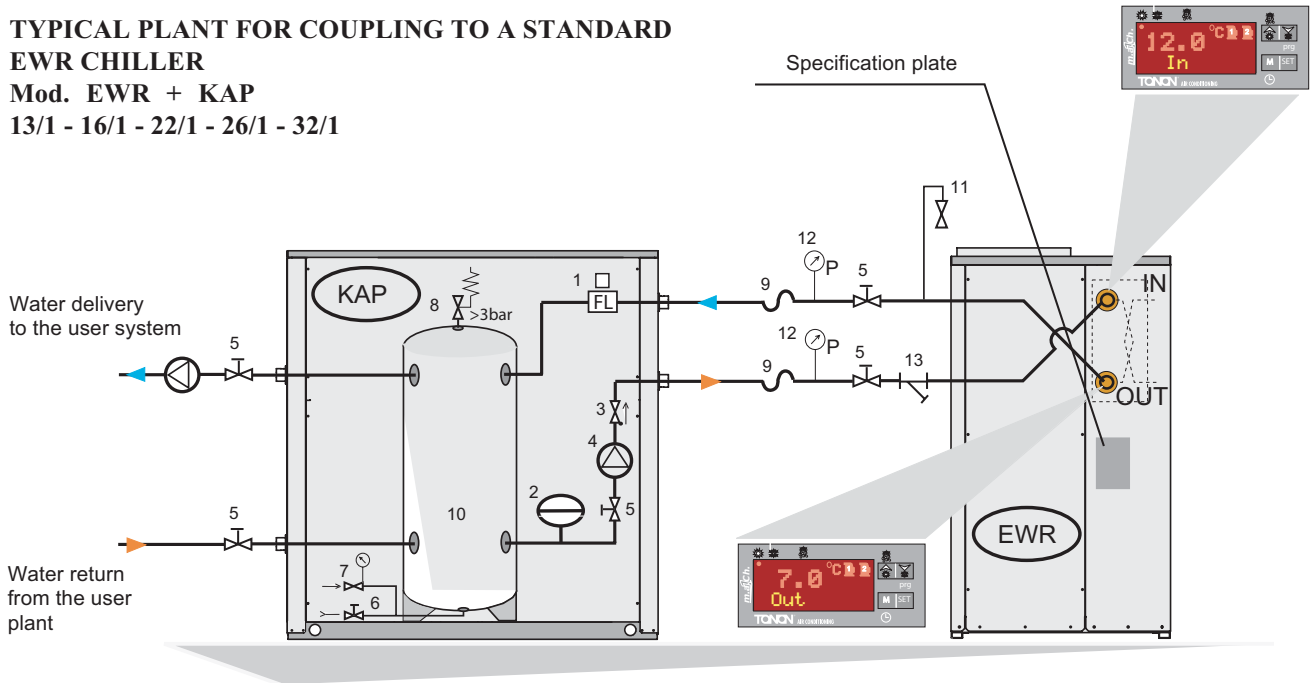
- | | |
|---------------------------------|---------------------------------------|
| 1- flow meter | 8- 3 bar safety valve |
| 2- expansion tank | 9- vibration damping hydraulic joints |
| 3- check valve | 10- water storage tank |
| 4- circulation pump | 11- air breather valve |
| 5- cut-off valve | 12- pressure gauges |
| 6- discharge cocks | 13- mesh filter |
| 7- filling assembly (automatic) | |

N.B. ON UNITS WITH STORAGE TANKS FITTED STANDARD, THE CIRCULATION PUMP MUST BE DIMENSIONED TO OVERCOME ANY PRESSURE DROPS IN THE MACHINE AND THE PLANT. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY

TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

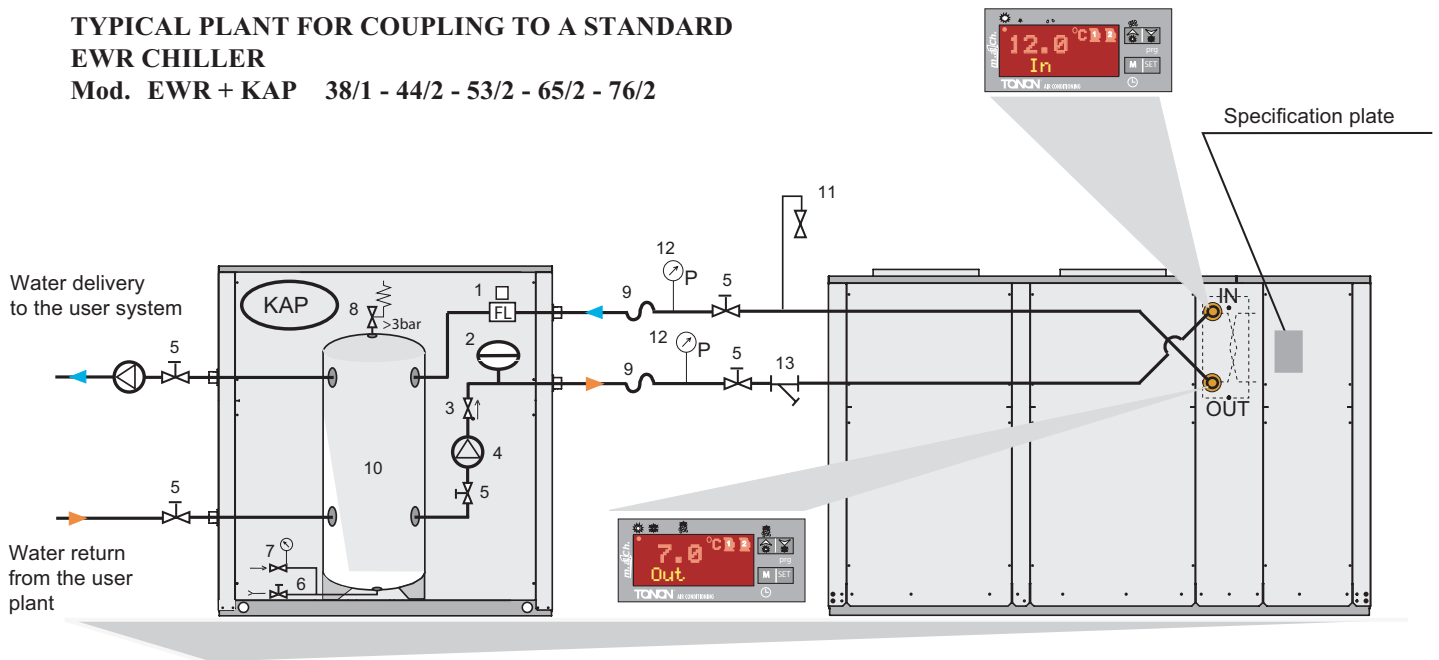
Mod. EWR + KAP

13/1 - 16/1 - 22/1 - 26/1 - 32/1



TYPICAL PLANT FOR COUPLING TO A STANDARD EWR CHILLER

Mod. EWR + KAP 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

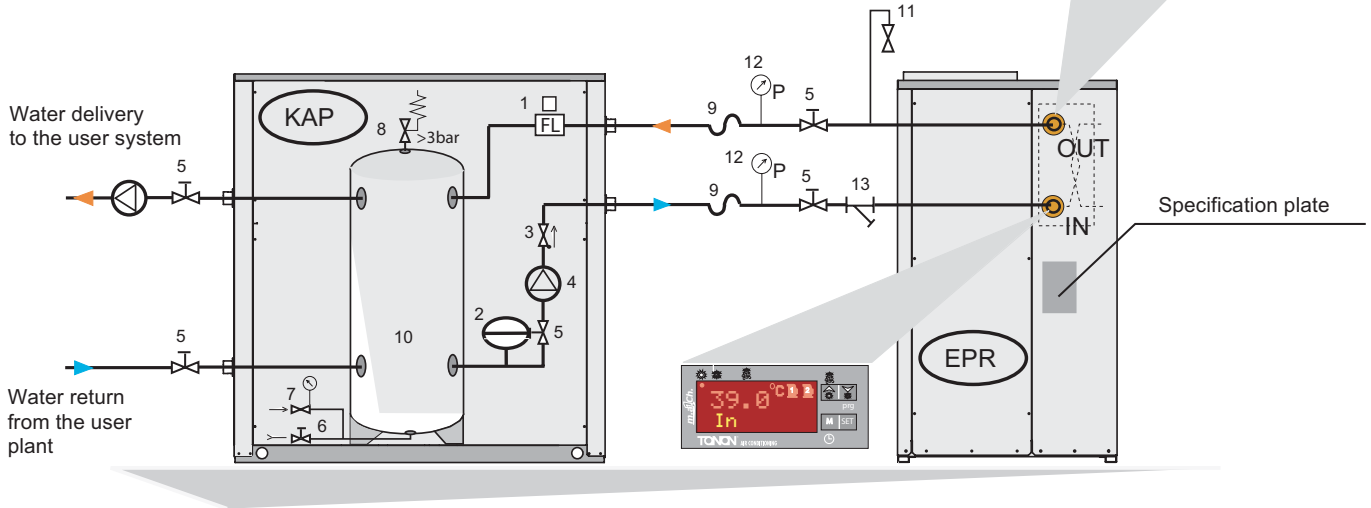
- | | |
|---------------------------------|---------------------------------------|
| 1- flow meter | 8- 3 bar safety valve |
| 2- expansion tank | 9- vibration damping hydraulic joints |
| 3- check valve | 10- water storage tank |
| 4- circulation pump | 11- air breather valve |
| 5- cut-off valve | 12- pressure gauges |
| 6- discharge cocks | 13- mesh filter |
| 7- filling assembly (automatic) | |

N.B. ON SYSTEMS WITH PARALLEL STORAGE TANKS, THE RECYCLE PUMP MUST BE DIMENSIONED ON THE BASIS OF THE PRESSURE DROPS IN THE MACHINE. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY.

**TYPICAL PLANT FOR COUPLING TO A STANDARD
EPR HEAT PUMP UNIT**

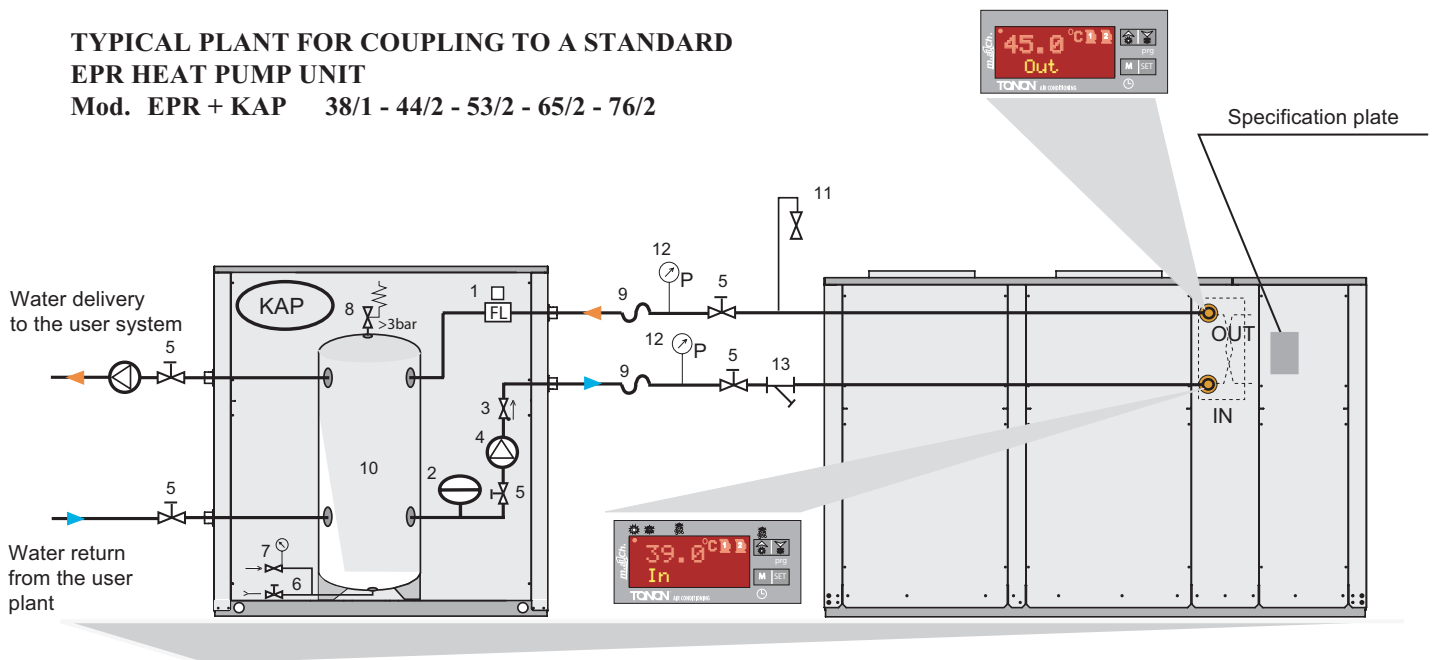
Mod. EPR + KAP

13/1 - 16/1 - 22/1 - 26/1 - 32/1



**TYPICAL PLANT FOR COUPLING TO A STANDARD
EPR HEAT PUMP UNIT**

Mod. EPR + KAP 38/1 - 44/2 - 53/2 - 65/2 - 76/2



KEY

- | | |
|---------------------------------|---------------------------------------|
| 1- flow meter | 8- 3 bar safety valve |
| 2- expansion tank | 9- vibration damping hydraulic joints |
| 3- check valve | 10- water storage tank |
| 4- circulation pump | 11- air breather valve |
| 5- cut-off valve | 12- pressure gauges |
| 6- discharge cocks | 13- mesh filter |
| 7- filling assembly (automatic) | |

N.B. ON SYSTEMS WITH PARALLEL STORAGE TANKS, THE RECYCLE PUMP MUST BE DIMENSIONED ON THE BASIS OF THE PRESSURE DROPS IN THE MACHINE. ALL THE LISTED COMPONENTS MUST BE INSTALLED IN THE DESCRIBED ORDER IN THE ENCLOSED DIAGRAMS TO GUARANTEE THE SYSTEM WORKS CORRECTLY.

