

TWA 251/981 TT/Y
TWA 522/1102 TT/Y

Agua Cooling

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STADCO
COOLING



R134A

Air cooled liquid chillers with axial fans and Turbocor compressors (magnetic levitation centrifuges) from 236kW to 1027kW

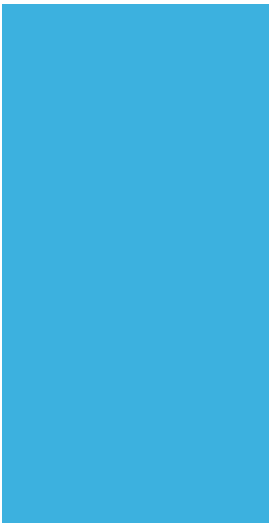
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according to
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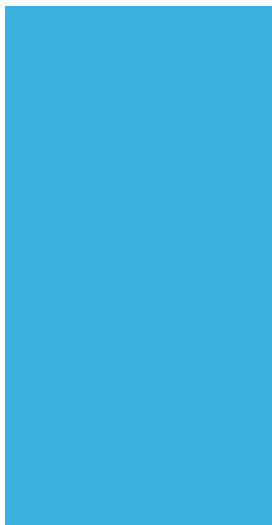
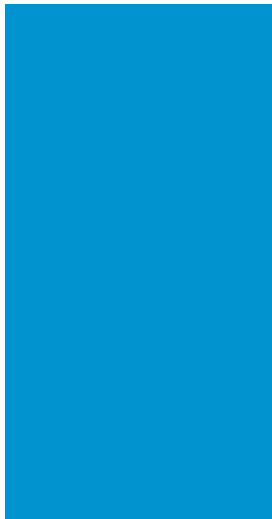
The complete solution to all your cooling needs

TWA 251/981 TT/Y
TWA 522/1102 TT/Y



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The complete solution to all your cooling needs

TWA 251/981 TT/Y
TWA 522/1102 TT/Y



General Description

Air cooled water chiller units, with axial fans for outdoor installation. The range consists of 13 models covering a cooling capacity from 236 to 1027 kW.

Versions

- TWA – cooling only
- TWA/MC – cooling only with Microchannel condensing coil

Technical Features

Frame

Self-supporting galvanized steel frame further protected with polyester powder painting. Easy to remove panels allow access to the inside of the unit for maintenance and other necessary operations.

Compressors

Semi-hermetic dual Turbocor turbine centrifugal, oil free, magnetic rising rotor, thermal protection, flow and delivery tap, continuous capacity adjustment system (built-in inverter), and automatic anti-cavitation system. The power circuit of the compressor is fitted with a set of electrolytic condensers to control the rising in the event of a power failure, reactor for the power factor correction, EMI filter for electromagnetic compatibility.

Fans

Axial fans directly coupled to a three-phase electric motor with external rotor. A safety fan guard is fitted on the air flow discharge.

Condenser

Consists of two finned coils with copper pipes and aluminium fins or, in the MC version, of two all-aluminium Microchannel coils.

Evaporator

Flooded shell and tube type with casing with high efficiency tube nest designed for R134a, with one or two independent circuits on the cooling side and one on the water side.

Electrical panel

Includes: main on-off switch with door lock, fuses, electronic/digital overload device to protect the compressors and thermal contacts for the fans, interface relay and terminals for external connections.

Microprocessor

For the automatic running of the unit. Allows the viewing and control of all the variables of the compressor and unit, in particular: operating pressures, saturation temperatures, current, shaft speed, IGV position, evaporator liquid level, active alarms and alarms/events history. The microprocessor is fitted with RS485 serial interface and a device for remote monitoring via GSM/GPRS/TCP-IP network.

Electronic proportional device

To cut down the noise level, obtained by continuously adjusting the speed of rotation of the fans; this device also allows the unit to operate at external air temperatures of -20°C .

Cooling circuit

Made with copper pipes, including for all models the following components: electronic thermostatic expansion valve, taps on the liquid line, liquid filter, dehydrator filter, liquid and humidity indicator, level probe on the evaporator, motor cooling line, high pressure switches and high and low pressure transducers (fixed calibration), ambient temperature probe, probe on the compressor flow/delivery, safety valve and digital high and low pressure gauges.

Hydraulic circuit

Includes: evaporator, inlet probe, antifreeze/operating probe, differential pressure, water inlet/outlet pressure transducers to monitor the water flow, water discharge.

Microchannel

The TWA/MC units are equipped with Microchannel condensing coils, which is a technology that provides many advantages in comparison to traditional copper/aluminium coils, including: reduction in overall dimensions, reduction in weight, reduction in coolant and, due to improved heat exchange, reduction in fan power. Furthermore, with the all aluminium coil, galvanic corrosion is impossible and maintenance is reduced.



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Factory Fitted Accessories

- IM** – **Magnetothermic switches** instead of fuses and thermal relays.
- HR** – **Desuperheater** with 20% heat recovery.
- HRT/S** – **Total heat recovery serial connected** for 70% to 95% heat recovery, according to the working conditions.
- HRT/P** – **Desuperheater** with 100% heat recovery.
- PU** – **Pump** inserted inside the unit.
- PD** – **Double pump** installed in the unit, working one in standby to the other; by every start request, the pump with the least number of working hours is activated first.
- FE** – **Evaporator heater** with thermostatic control.
- CP** – **Potential free contacts** for remote alarm and control.

Loose Accessories

- CR** – **Remote control panel** to be inserted in the room for remote control of the unit, with the same functions as that inserted in the machine.
- RP** – **Coil protection guards** in steel with cataphoresis treatment and painting.
- FP** – **Coil protection grills** with woven metal filter.
- AG** – **Rubber vibration dampers** to be inserted at the bottom of the unit to dampen possible vibrations due to the type of floor where the machine is installed.
- AM** – **Spring shock absorbers** to be inserted at the bottom of the unit to dampen possible vibrations due to the type of floor where the machine is installed.
- FL** – **Flow switch** to prevent any water flow interruption.

Reference Conditions

All technical data, indicated on pages 5-8, refer to the following unit operating conditions:

- Cooling:
 - entering water temperature 12°C
 - leaving water temperature 6°C
 - ambient air on condenser 32°C
- Sound capacity level according to Standard ISO 3744 and Eurovent 8/1.
- Sound pressure level (according to DIN 45635): measured in free field conditions at 1m from the unit and at 1.5m from the ground. The power supply is 400V/3Ph/50Hz; auxiliary supply is 230V/1Ph/50Hz.

Operating Range		Min.	Max.
Inlet water temperature	°C	8	20
Outlet water temperature	°C	5	15
Water thermal difference (1)	°C	3	9
Ambient air temperature (2)	°C	-20	42*
Minimum chilled water outlet temperature with glycol mixture	°C	2**	
Max. operating pressure heat exchanger water side	kPa	1000	

* in the Microchannel version; 40° C in the standard version.

** -6° C upon request.

(1) In all cases the water range will have to re-enter within the reported limits on page 13.

(2) Except where it is differently limited in the tables page 9-12.

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TWA 251/981 TT/Y
TWA 522/1102 TT/Y



Technical Data

Standard version models 251-522

Model		251	291	341	411	521	522
Cooling							
Cooling capacity (1)	kW	236	269	321	385	486	486
Absorbed power (1)	kW	67	75	91	110	133	133
E.E.R		3.52	3.59	3.53	3.50	3.65	3.65
Compressors	n°	1	1	1	2	2	2
Refrigerant circuits	n°	1	1	1	1	1	2
Capacity steps	n°	<-----Stepless----->					
Evaporator							
Water flow	l/s	9.40	10.71	12.78	15.33	19.35	19.35
Pressure drops	kPa	25	30	27	31	24	25
Water connections	DN	100	100	100	130	125	125
Water volume	dm ³	70	70	80	130	140	150
Compressor							
Unitary absorbed power	kW	56.2	64.2	80.2	47.8	57.5	57.5
Unitary absorbed current	A	87.6	100	123	74.0	89.6	89.6
Oil charge	kg	<-----Oil free----->					
Standard version							
Airflow	dm ³	28.3	28.3	31.7	38.3	41.1	41.1
Fans	n°	6	6	6	8	10	10
Nominal power - fans	kW	10.8	10.8	10.8	14.4	18.0	18.0
Nominal current - fans	A	25.8	25.8	25.8	34.4	43.0	43.0
Sound power (1)	dB(A)	81	81	82	82	83	83
Sound pressure level (1)	dB(A)	73	73	74	74	75	75
Refrigerant charge R134a	kg	110	110	135	142	158	160
Length	mm	4000	4000	5000	5000	6200	6200
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2100	2100	2100	2100	2100	2100
Unit transport weight	kg	2440	2440	2770	3240	3570	3700
Total electrical consumption							
Power supply	V/Ph/Hz	<-----400 / 3 / 50----->					
Max. current	A	161	161	161	304	313	313
Starting current	A	31	31	31	114	138	138

(1) Referential conditions on page 4.

Technical Data

Standard version models 641-1102

Model		641	642	801	802	981	982	1102
Cooling								
Cooling capacity (1)	kW	602	602	749	749	912	912	1027
Absorbed power (1)	kW	172	172	218	218	256	256	297
E.E.R		3.50	3.50	3.44	3.44	3.56	3.56	3.46
Compressors	n°	2	2	3	4	4	4	4
Refrigerant circuits	n°	1	2	1	2	1	2	2
Capacity steps	n°	<-----Stepless----->						
Evaporator								
Water flow	l/s	23.97	23.97	29.82	29.82	36.31	36.31	40.89
Pressure drops	kPa	33	24	24	25	26	26	24
Water connections	DN	125	150	150	150	150	150	200
Water volume	dm ³	150	170	100	100	110	110	130
Compressor								
Unitary absorbed power	kW	75.2	75.2	64.3	48.2	57.7	57.7	65.3
Unitary absorbed current	A	118	118	101	76.2	81.0	81.0	103
Oil charge	kg	<-----Oil free----->						
Standard version								
Airflow	dm ³	56.7	56.7	72.2	72.2	72.2	72.2	94.4
Fans	n°	12	12	14	14	14	14	20
Nominal power - fans	kW	21.6	21.6	25.2	25.2	25.2	25.2	36.0
Nominal current - fans	A	51.6	51.6	60.2	60.2	60.2	60.2	86.0
Sound power (1)	dB(A)	84	84	85	85	85	85	86
Sound pressure level (1)	dB(A)	77	77	77	77	77	77	78
Refrigerant charge R134a	kg	225	230	270	280	280	300	325
Length	mm	7200	7200	8400	8400	8400	8400	11100
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2100	2100	2500	2500	2500	2500	2500
Unit transport weight	kg	4000	4050	5750	5900	5900	5950	7570
Total electrical consumption								
Power supply	V/Ph/Hz	<-----400 / 3 / 50----->						
Max. current	A	322	322	465	600	600	600	626
Starting current	A	175	175	267	293	336	336	399

(1) Referential conditions on page 4.

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TWA 251/981 TT/Y
TWA 522/1102 TT/Y



Technical Data

Microchannel version models 251-522

Model		251	291	341	411	521	522
Cooling							
Cooling capacity (1)	kW	236	269	321	385	486	486
Absorbed power (1)	kW	61	69	83	100	126	126
E.E.R		3.87	3.90	3.87	3.86	3.86	3.86
Compressors	n°	1	1	1	2	2	2
Refrigerant circuits	n°	1	1	1	1	1	2
Capacity steps	n°	<-----Stepless----->					
Evaporator							
Water flow	l/s	9.40	10.71	12.78	15.33	19.35	19.35
Pressure drops	kPa	25	30	27	31	24	25
Water connections	DN	100	100	100	130	125	125
Water volume	dm ³	70	70	80	130	140	150
Compressor							
Unitary absorbed power	kW	51.4	59.4	73.4	43.5	55.0	55.0
Unitary absorbed current	A	80.1	93.1	113	67.4	85.7	85.7
Oil charge	kg	<-----Oil free----->					
Microchannel version							
Airflow	dm ³	32.2	32.2	36.1	43.9	47.2	47.2
Fans	n°	6	6	6	8	10	10
Nominal power - fans	kW	9.6	9.6	9.6	12.8	16.0	16.0
Nominal current - fans	A	22.8	22.8	22.8	30.4	38.0	38.0
Sound power (1)	dB(A)	80	80	80	81	82	82
Sound pressure level (1)	dB(A)	72	72	73	73	74	74
Refrigerant charge R134a	kg	95	95	115	121	135	140
Length	mm	4000	4000	5000	5000	6200	6200
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2100	2100	2100	2100	2100	2100
Unit transport weight	kg	2100	2100	2390	2810	3080	3120
Total electrical consumption							
Power supply	V/Ph/Hz	<-----400 / 3 / 50----->					
Max. current	A	158	158	158	300	308	308
Starting current	A	28	28	28	103	131	131

(1) Referential conditions on page 4.



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Technical Data

Microchannel version models 641-1102

Model		641	642	801	802	981	982	1102
Cooling								
Cooling capacity (1)	kW	602	602	749	749	912	912	1027
Absorbed power (1)	kW	157	157	194	194	234	234	270
E.E.R		3.83	3.83	3.86	3.86	3.90	3.90	3.80
Compressors	n°	2	2	3	4	4	4	4
Refrigerant circuits	n°	1	2	1	2	1	2	2
Capacity steps	n°	<-----Stepless----->						
Evaporator								
Water flow	l/s	23.97	23.97	29.82	29.82	36.31	36.31	40.89
Pressure drops	kPa	33	24	24	25	26	26	24
Water connections	DN	125	150	150	150	150	150	200
Water volume	dm ³	150	170	100	100	110	110	130
Compressor								
Unitary absorbed power	kW	68.9	68.9	57.2	42.9	52.9	52.9	59.5
Unitary absorbed current	A	109	109	89.7	68.8	83.3	83.3	93.6
Oil charge	kg	<-----Oil free----->						
Microchannel version								
Airflow	dm ³	65.0	65.0	81.1	81.1	81.1	81.1	108
Fans	n°	12	12	14	14	14	14	20
Nominal power - fans	kW	19.2	19.2	22.4	22.4	22.4	22.4	32.0
Nominal current - fans	A	45.6	45.6	53.2	53.2	53.2	53.2	72.0
Sound power (1)	dB(A)	83	83	84	84	84	84	85
Sound pressure level (1)	dB(A)	75	75	76	76	76	76	77
Refrigerant charge R134a	kg	195	197	213	221	237	255	277
Length	mm	7200	7200	8400	8400	8400	8400	11100
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2100	2100	2500	2500	2500	2500	2500
Unit transport weight	kg	3450	3480	4960	5060	5110	5160	6540
Total electrical consumption								
Power supply	V/Ph/Hz	<-----400 / 3 / 50----->						
Max. current	A	316	316	458	593	593	593	612
Starting current	A	159	159	238	265	308	308	358

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TWA 251/981 TT/Y TWA 522/1102 TT/Y



Cooling Capacity

Standard version models 251-641

Model	To (°C)	Ambient Air Temperature °C									
		25		28		32		35		40	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
251	5	254	61.0	251	65.7	236	69.8	231	73.2	160	68.1
	6	254	59.5	251	64.4	236	67.0	231	71.1	168	66.2
	7	254	58.4	252	62.6	241	66.2	232	70.4	178	64.5
	8	254	56.3	252	60.0	247	66.4	232	68.6	188	62.1
	9	255	55.0	252	59.1	247	65.2	234	67.0	193	60.3
291	5	279	68.5	269	71.1	269	79.9	264	84.8	181	73.8
	6	280	66.7	269	69.8	269	75.0	264	82.2	185	71.1
	7	280	65.5	270	68.9	269	74.5	266	81.2	190	68.2
	8	280	63.6	270	66.7	270	73.6	266	79.5	195	66.1
	9	281	61.2	270	64.1	270	71.5	268	78.5	198	63.0
341	5	326	79.4	321	84.5	316	93.0	310	99.0	225	76.4
	6	327	77.1	321	81.2	321	91.0	312	96.9	223	73.3
	7	329	74.0	324	80.4	321	88.8	316	94.0	229	74.5
	8	329	72.2	327	78.9	322	85.5	319	92.5	233	73.8
	9	330	70.8	327	75.2	322	82.2	319	89.2	235	73.6
411	5	404	95.1	400	103	385	112	383	119	344	120
	6	409	93.2	403	101	385	110	386	116	346	119
	7	411	91.5	405	99.2	389	106	386	113	346	115
	8	413	89.7	408	97.1	396	105	388	111	347	113
	9	413	87.8	409	95.4	400	103	391	109	347	111
521	5	518	120	516	129	486	136	475	144	345	124
	6	518	117	516	125	486	133	475	140	348	120
	7	519	114	518	122	497	131	477	138	351	117
	8	520	111	518	119	508	131	477	134	355	114
	9	521	108	519	116	512	128	482	133	360	112
522	5	522	105	520	113	516	127	484	130	369	110
	6	518	120	516	129	486	136	475	144	345	124
	7	519	114	518	122	497	131	477	138	351	117
	8	520	111	518	119	508	131	477	134	355	114
	9	521	108	519	116	512	128	482	133	360	112
641	5	622	149	606	156	602	176	589	193	559	183
	6	623	144	607	151	602	172	589	189	563	179
	7	624	140	609	147	603	172	595	185	568	176
	8	625	136	611	143	605	171	595	181	572	172
	9	626	131	612	139	607	171	602	178	576	169
	10	626	128	613	136	607	170	602	172	581	166

kWf: Cooling capacity (kW)

kWe: Power input (kW)

To: Evaporator leaving water temperature (Δt in/out = 6K)



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Cooling Capacity

Standard version models 642-1102

Model	Ambient Air Temperature °C										
	To (°C)	25		28		32		35		40	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
642	5	622	149	606	156	602	176	589	193	559	183
	6	623	144	607	151	602	172	589	189	563	179
	7	624	140	609	147	603	172	595	185	568	176
	8	625	136	611	143	605	171	595	181	572	172
	9	626	131	612	139	607	171	602	178	576	169
	10	626	128	613	136	607	170	602	172	581	166
801	5	791	194	759	201	744	222	708	241	609	223
	6	796	190	762	195	749	218	712	234	612	219
	7	799	184	766	190	754	210	715	228	615	214
	8	803	180	766	184	757	204	718	221	618	209
	9	808	175	768	178	757	198	721	215	621	205
	10	811	172	770	174	759	193	724	208	624	200
802	5	791	194	759	201	744	222	708	241	609	223
	6	796	190	762	195	749	218	712	234	612	219
	7	799	184	766	190	754	210	715	228	615	214
	8	803	180	766	184	757	204	718	221	618	209
	9	808	175	768	178	757	198	721	215	621	205
	10	811	172	770	174	759	193	724	208	624	200
981	5	967	212	940	223	912	258	891	259	830	262
	6	974	208	944	217	912	256	893	257	833	258
	7	979	204	948	212	915	244	895	245	837	253
	8	986	200	952	207	917	232	897	240	840	249
	9	992	196	956	203	921	222	899	235	844	244
	10	997	192	960	199	923	212	901	229	848	238
982	5	967	212	940	223	912	258	891	259	830	262
	6	974	208	944	217	912	256	893	257	833	258
	7	979	204	948	212	915	244	895	245	837	253
	8	986	200	952	207	917	232	897	240	840	249
	9	992	196	956	203	921	222	899	235	844	244
	10	997	192	960	199	923	212	901	229	848	238
1102	5	1070	270	1048	272	1027	305	950	306	873	301
	6	1075	263	1054	265	1027	297	958	299	880	295
	7	1081	257	1060	259	1038	292	966	294	888	291
	8	1085	250	1066	253	1048	286	974	289	894	286
	9	1090	252	1071	247	1059	281	982	283	902	281
	10	1096	239	1083	244	1070	276	990	279	909	276

kWf: Cooling capacity (kW)

kWe: Power input (kW)

To: Evaporator leaving water temperature (Δt in/out = 6K)

The complete solution to all your cooling needs

TWA 251/981 TT/Y TWA 522/1102 TT/Y



Cooling Capacity

Microchannel version models 251-641

Model	To (°C)	Ambient Air Temperature °C											
		25		28		32		35		40		42	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
251	5	254	55.1	250	58.9	231	62.9	230	66.9	218	71.0	160	62.0
	6	254	54.1	251	58.2	236	61.0	231	65.2	222	68.5	168	60.8
	7	254	52.3	252	55.7	241	59.7	232	62.7	225	67.0	178	59.6
	8	254	51.2	253	55.3	246	60.3	233	62.3	229	66.5	188	58.5
	9	255	50.3	254	53.6	252	58.6	234	60.6	232	65.5	193	57.3
291	5	279	63.2	269	65.2	269	73.3	264	77.9	259	83.3	---	---
	6	280	60.7	269	64.2	269	69.0	264	76.2	258	79.7	---	---
	7	280	59.2	270	61.7	269	69.2	266	73.7	261	79.2	190	67.3
	8	280	58.2	270	60.3	270	66.9	267	72.3	262	76.4	195	64.7
	9	281	55.7	270	58.7	270	65.9	268	70.9	263	76.9	198	63.2
341	5	326	72.2	321	76.9	316	84.3	310	89.9	305	96.0	---	---
	6	327	69.9	321	74.2	321	83.0	312	88.2	309	94.5	---	---
	7	329	67.9	324	72.7	321	80.3	316	85.7	312	92.0	229	77.9
	8	329	66.2	327	70.9	322	77.6	319	84.3	316	90.0	233	75.5
	9	330	63.7	327	69.2	322	75.5	319	80.7	315	86.5	235	73.2
411	5	407	86.5	402	93.8	385	102	385	109	374	117	---	---
	6	411	85.4	405	91.7	385	100	388	107	375	115	---	---
	7	414	83.3	407	89.6	389	96.9	388	104	376	111	---	---
	8	416	81.3	409	87.5	396	94.8	391	102	381	109	311	101
	9	416	79.2	410	85.4	400	92.7	393	100	385	107	322	98.6
521	5	482	96.8	482	102	480	125	474	126	473	140	---	---
	6	490	95.6	488	100	486	126	477	124	476	139	---	---
	7	491	93.4	488	97.9	486	113	480	120	478	130	---	---
	8	493	91.1	491	95.6	488	110	482	118	480	128	395	114
	9	493	88.9	492	93.4	489	108	486	116	484	125	398	112
522	5	482	96.8	482	102	480	125	474	126	473	140	---	---
	6	490	95.6	488	100	486	126	477	124	476	139	---	---
	7	491	93.4	488	97.9	486	113	480	120	478	130	---	---
	8	493	91.1	491	95.6	488	110	482	118	480	128	395	114
	9	493	88.9	492	93.4	489	108	486	116	484	125	398	112
641	5	642	142	639	152	602	161	589	171	569	180	549	190
	6	642	138	639	148	602	157	589	166	569	175	549	184
	7	643	135	642	145	615	155	591	163	578	173	559	183
	8	644	131	642	141	629	155	591	158	584	170	566	180
	9	645	127	643	137	634	151	597	157	591	169	576	179
	10	647	123	644	133	639	150	599	153	596	166	581	177

kWf: Cooling capacity (kW)

kWe: Power input (kW)

To: Evaporator leaving water temperature (Δt in/out = 6K)



Cooling Capacity

Microchannel version models 642-1102

Model	Ambient Air Temperature °C												
	To (°C)	25		28		32		35		40		42	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
642	5	642	142	639	152	602	161	589	171	569	180	549	190
	6	642	138	639	148	602	157	589	166	569	175	549	184
	7	643	135	642	145	615	155	591	163	578	173	559	183
	8	644	131	642	141	629	155	591	158	584	170	566	180
	9	645	127	643	137	634	151	597	157	591	169	576	179
	10	647	123	644	133	639	150	599	153	596	166	581	177
801	5	774	167	754	176	749	199	733	217	721	233	622	211
	6	775	162	756	171	749	194	733	214	720	229	627	206
	7	776	159	758	166	750	194	740	209	727	226	632	201
	8	778	154	760	161	753	193	740	204	727	223	632	201
	9	778	148	761	157	756	193	749	201	738	224	632	201
802	5	774	167	754	176	749	199	733	217	721	233	622	211
	6	775	162	756	171	749	194	733	214	720	229	627	206
	7	776	159	758	166	750	194	740	209	727	226	632	201
	8	778	154	760	161	753	193	740	204	727	223	632	201
	9	778	148	761	157	756	193	749	201	738	224	632	201
981	5	963	209	925	216	906	239	863	258	834	273	---	---
	6	969	204	927	210	912	234	866	252	838	267	---	---
	7	973	198	932	204	918	226	870	245	843	259	---	---
	8	978	193	932	198	922	220	874	238	846	251	700	224
	9	984	188	935	192	922	213	878	230	847	243	704	220
982	5	963	209	925	216	906	239	863	258	834	273	---	---
	6	969	204	927	210	912	234	866	252	838	267	---	---
	7	973	198	932	204	918	226	870	245	843	259	---	---
	8	978	193	932	198	922	220	874	238	846	251	700	224
	9	984	188	935	192	922	213	878	230	847	243	704	220
1102	5	1089	224	1058	234	1027	272	1003	270	972	294	935	312
	6	1096	220	1063	230	1027	270	1005	264	971	289	938	306
	7	1102	216	1068	224	1031	257	1008	258	972	279	943	295
	8	1111	211	1072	219	1033	245	1010	253	972	269	946	284
	9	1117	207	1076	213	1037	233	1013	248	973	261	951	276
	10	1122	202	1081	210	1039	224	1015	242	973	253	955	267

kWf: Cooling capacity (kW)
 kWe: Power input (kW)
 To: Evaporator leaving water temperature (Δt in/out = 6K)

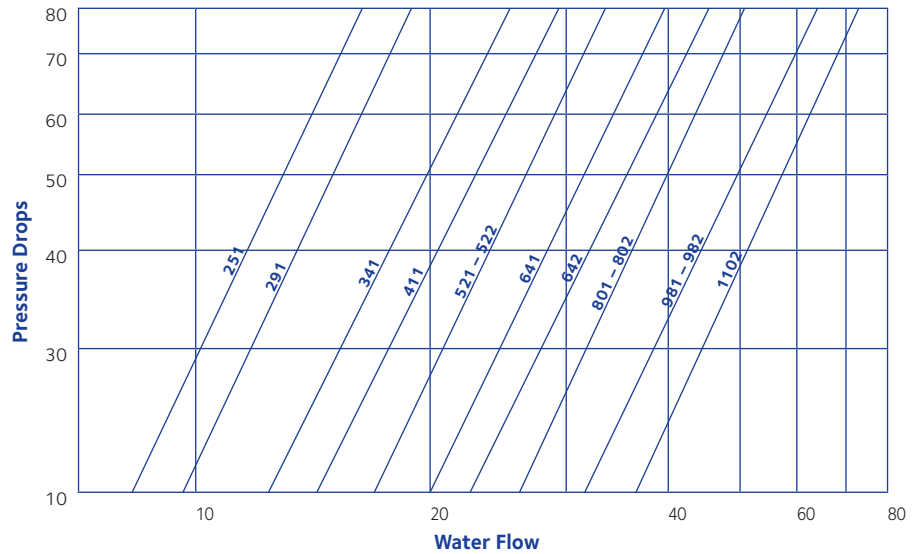
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Water Circuit Pressure Drops

Evaporator Water flow limits		
Model	Min. flow l/s	Max. flow l/s
251	6.6	15.0
291	6.6	16.2
341	7.5	19.3
411	10.6	23.4
521	11.9	29.8
641	18.6	36.1
801	21.0	47.3
981	28.4	58.7
522	11.9	29.8
642	18.6	36.1
802	21.0	47.3
982	28.4	58.7
1102	29.3	64.0



Correction factors

If a unit is made to operate with a glycol-water solution, the following correction factors should be applied to any calculations.

0	10	20	30	40	50	Ethylene glycol percent by weight (%)
0	-4.5	-9.5	-15.5	-21.5	-32.5	Freezing point (°C)
1	0.975	0.95	0.93	0.91	0.88	Cooling capacity correction factor
1	1.01	0.995	0.990	0.985	0.975	Power input correction factor
1	1.01	1.04	1.08	1.14	1.20	Mixture flow correction factor
1	1.05	1.13	1.21	1.26	1.32	Pressure drop correction factor

Evaporator fouling factor corrections

f1	fp1	
1	1	0 Clean evaporator
0.98	0.99	0.44×10^{-4} (m ² °C/W)
0.96	0.99	0.88×10^{-4} (m ² °C/W)
0.93	0.98	1.76×10^{-4} (m ² °C/W)

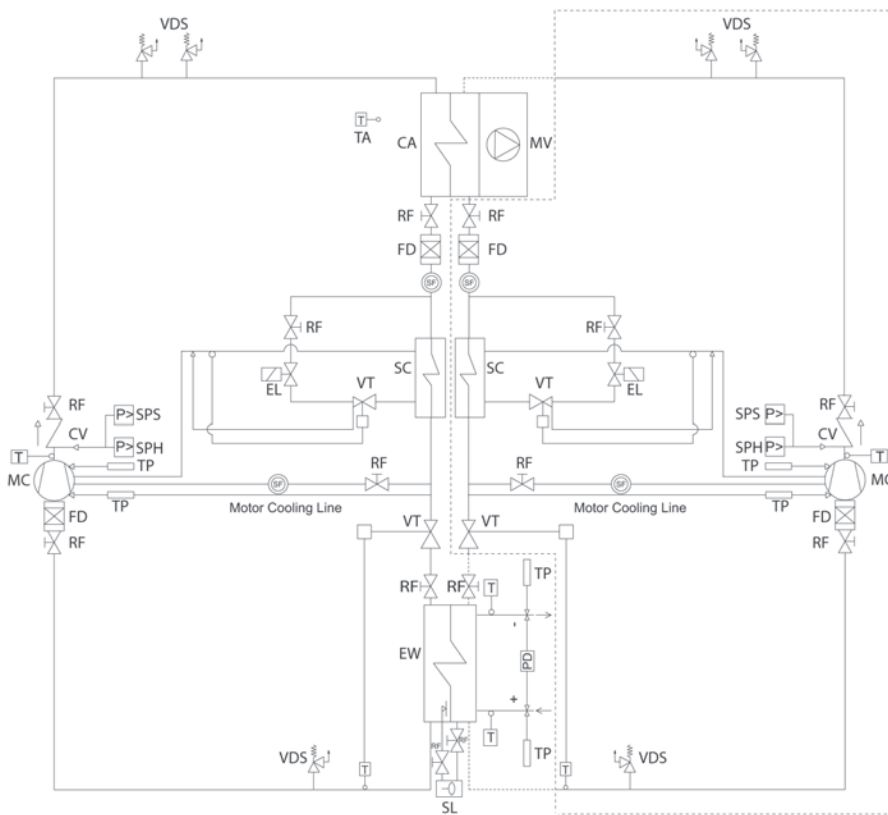
f1: Capacity correction factors

fp1: Compressor power input correction factor

Unit performances reported in the tables are given for the condition of clean exchanger (fouling factor = 0). For different fouling factor values, unit performances should be corrected with the correction factors shown above.

Refrigeration Circuit Diagram

Units with 1 compressor each circuit
 Models 251, 291, 341, 522, 642



The components enclosed within the dotted lines are referring to two circuits models (Model 522, 642).

	Description		Description
CA	Condenser	SC	Exchanger
CV	Gate valve	SF	Sight glass
EL	Electro valve on liquid line	SL	Level sensor
EW	Evaporator	SPH	High pressure switch
FD	Filter-drier	SPS	Safety pressure gauges
MC	Compressor	TP	Pressure transducer
MV	Axial fans	VDS	Safety valve
PD	Differential pressure switch	VT	Expansion valve
RF	Shut-off valves (accessory)		

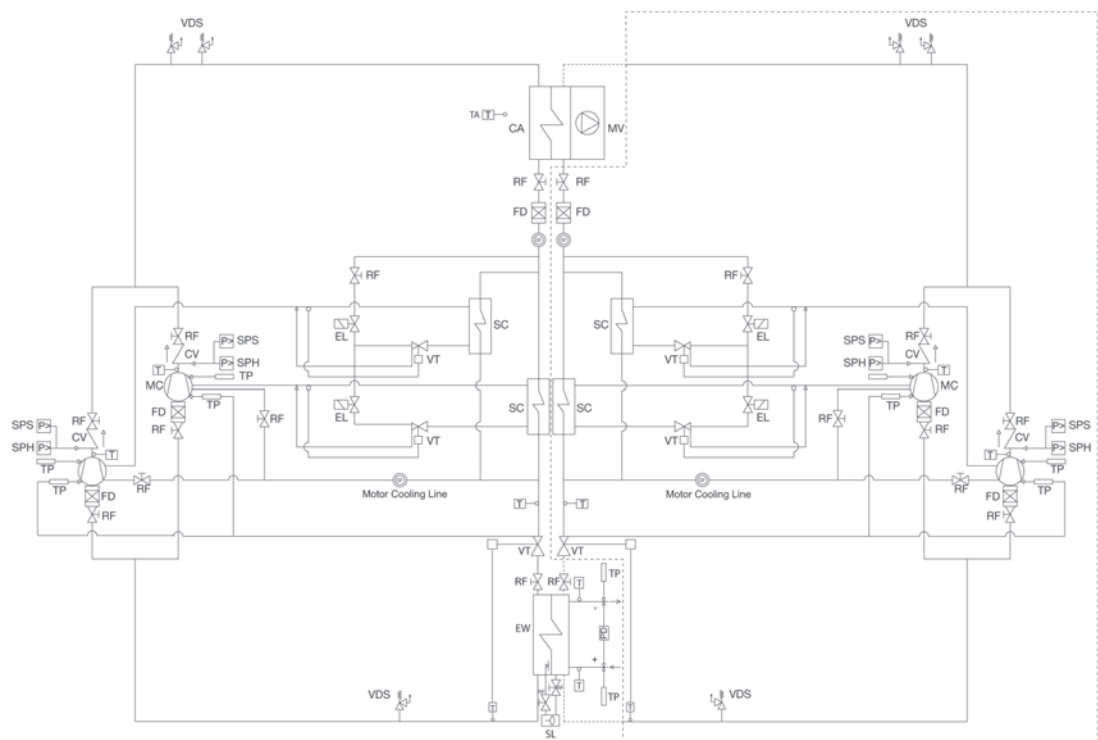
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Refrigeration Circuit Diagram

Units with 2 compressors each circuit
Models 411, 521, 641, 802, 982, 1102

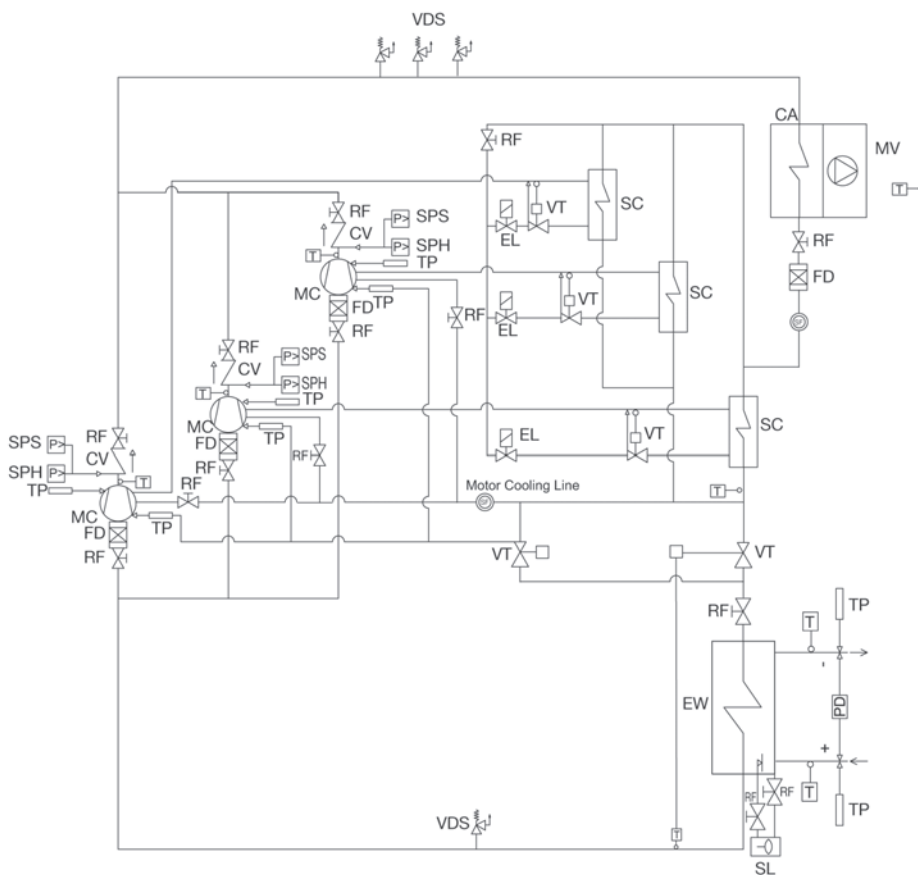


The components enclosed within the dotted lines are referring to two circuits models (Model 802, 982, 1102).

	Description		Description
CA	Condenser	SC	Exchanger
CV	Gate valve	SF	Sight glass
EL	Electro valve on liquid line	SL	Level sensor
EW	Evaporator	SPH	High pressure switch
FD	Filter-drier	SPS	Safety pressure gauges
MC	Compressor	TP	Pressure transducer
MV	Axial fans	VDS	Safety valve
PD	Differential pressure switch	VT	Expansion valve
RF	Shut-off valves (accessory)		

Refrigeration Circuit Diagram

Units with 3 compressors each circuit
 Model 801



Description		Description	
CA	Condenser	SC	Exchanger
CV	Gate valve	SF	Sight glass
EL	Electro valve on liquid line	SL	Level sensor
EW	Evaporator	SPH	High pressure switch
FD	Filter-drier	SPS	Safety pressure gauges
MC	Compressor	TP	Pressure transducer
MV	Axial fans	VDS	Safety valve
PD	Differential pressure switch	VT	Expansion valve
RF	Shut-off valves (accessory)		

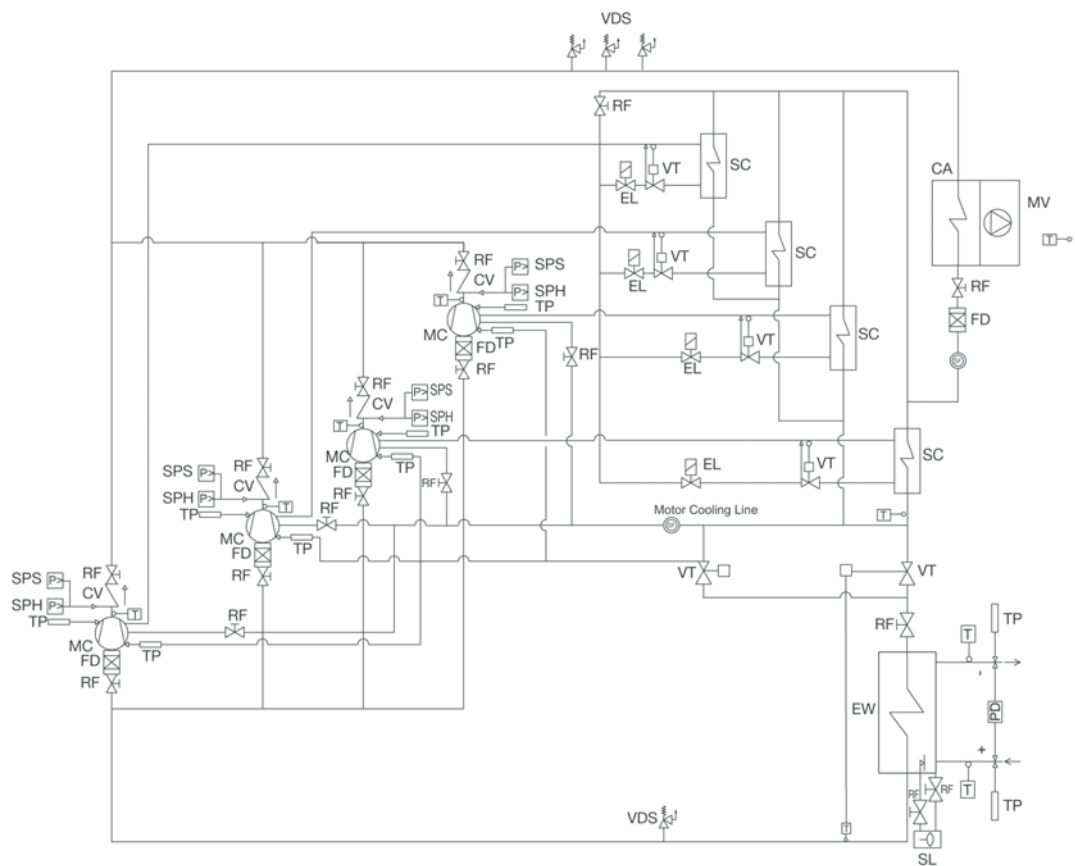
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TWA 522/1102 TT/Y



Refrigeration Circuit Diagram

Units with 4 compressors each circuit
Model 981



	Description		Description
CA	Condenser	SC	Exchanger
CV	Gate valve	SF	Sight glass
EL	Electro valve on liquid line	SL	Level sensor
EW	Evaporator	SPH	High pressure switch
FD	Filter-drier	SPS	Safety pressure gauges
MC	Compressor	TP	Pressure transducer
MV	Axial fans	VDS	Safety valve
PD	Differential pressure switch	VT	Expansion valve
RF	Shut-off valves (accessory)		

Water Circuit

General characteristics

Hydraulic circuit

Includes: evaporator, inlet probe, antifreeze/operating probe, water inlet/outlet pressure transducers to monitor the water flow, water discharge.

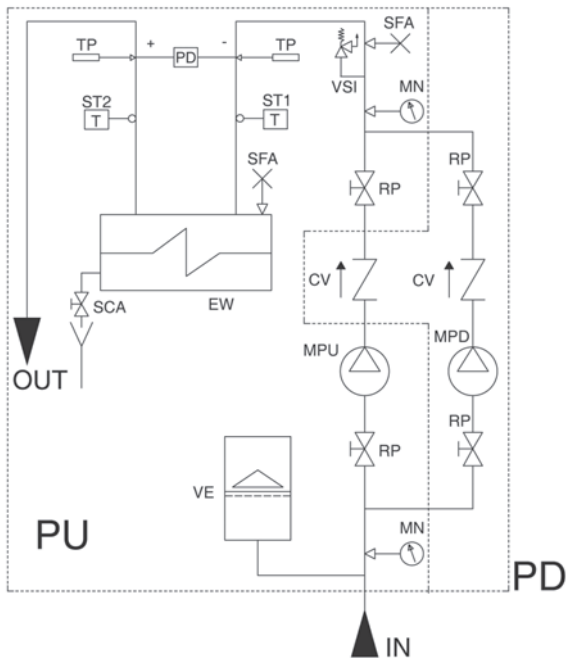
Hydraulic circuit with additional pump

Includes: evaporator, inlet probe, antifreeze/operating probe, water inlet/outlet pressure transducers to monitor the water flow, pump, expansion vessel, safety valve, thermal relay and water discharge.

Water circuit with additional double pump

Includes: evaporator, inlet probe, antifreeze/operating probe, water inlet/outlet pressure transducers to monitor the water flow, double pump, expansion vessel, safety valve, check valve, thermal relay and water discharge.

Water circuit diagram



	Description		Description
CV	Gate valve	SCA	Water drain
EW	Evaporator	SFA	Manual air vent
MPD	Double circulating pump	ST1	Sensor for unit operation
MPU	Single circulating pump	ST2	Antifreeze sensor
MN	Water manometer	TP	Pressure transducer
PD	Differential water pressure switch	VE	Expansion vessel
RP	Intercepting valve	VSI	Safety valve (600 kPa)

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Sound Pressure Level

The sound level values indicated in accordance with DIN 45635 in dB(A) have been measured in free field conditions. The measurement is taken at 1m distance from the side of condensing coil and at a height of 1.5m with respect to the base of the machine.

On the noise levels that are indicated, a tolerance of +/- 3dB(A) should be considered (according to DIN 45635). The values refer to a machine without pump.

STD	Model												
	251	291	341	411	521	522	641	642	801	802	981	982	1102
Hz	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
63	66.0	66.0	66.5	66.5	67.5	67.5	68.5	68.5	69.0	69.0	69.0	69.0	70.0
125	65.5	65.5	65.5	66.5	67.0	67.0	68.0	68.0	68.5	68.5	69.0	69.0	70.0
250	68.0	68.5	69.0	69.5	71.0	71.0	72.0	72.0	72.5	72.5	72.5	72.5	73.5
500	65.0	65.0	65.0	66.0	67.0	67.0	69.0	69.0	69.5	69.5	70.0	70.0	71.0
1000	65.0	65.0	65.5	66.0	67.0	67.0	68.0	68.0	68.5	68.5	68.5	68.5	69.5
2000	57.0	57.0	57.5	58.5	59.5	59.5	60.0	60.0	60.5	60.5	61.0	61.0	62.0
4000	51.0	51.0	51.0	51.5	53.0	53.0	54.0	54.0	54.5	54.5	55.0	55.0	56.5
8000	50.0	50.0	50.5	51.5	52.0	52.0	52.5	52.5	52.5	52.5	53.0	53.0	54.0
Tot. dB(A)	73.2	73.4	73.7	74.3	75.4	75.4	76.5	76.5	77.0	77.0	77.2	77.2	78.2

MC	Model												
	251	291	341	411	521	522	641	642	801	802	981	982	1102
Hz	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
63	64.5	65.0	65.0	65.5	67.0	67.0	67.5	67.5	68.5	68.5	68.0	68.0	69.0
125	64.5	64.0	64.5	65.5	66.0	66.0	67.0	67.0	67.0	67.0	68.0	68.0	68.5
250	66.5	67.5	67.5	68.0	69.5	69.5	70.5	70.5	71.5	71.5	71.0	71.0	71.5
500	63.5	64.0	63.5	64.5	66.5	66.5	67.5	67.5	68.5	68.5	69.0	69.0	70.0
1000	64.5	63.5	65.0	65.5	66.0	66.0	67.5	67.5	67.0	67.0	68.0	68.0	68.5
2000	56.0	56.5	56.5	57.5	58.0	58.0	59.0	59.0	60.0	60.0	60.0	60.0	60.5
4000	49.5	50.0	49.5	50.0	52.5	52.5	52.5	52.5	53.5	53.5	53.5	53.5	56.0
8000	49.0	48.5	49.5	51.0	51.0	51.0	52.0	52.0	51.0	51.0	52.5	52.5	53.0
Tot. dB(A)	72.0	72.2	72.5	73.1	74.4	74.4	75.3	75.3	76.0	76.0	76.1	76.1	76.8



Units with Pump

Technical data

Model		251	291	341	411	521	522	641	642	801	802	981	982	1102
Nominal power - pump	kW	3.0	4.0	5.5	5.5	7.5	7.5	7.5	7.5	11	11	11	11	15
Max. working pressure	kPa	600	600	600	600	600	600	600	600	600	600	600	600	600
Head pressure (1)	kPa	220	274	274	244	226	225	207	216	251	250	224	224	256
Expansion vessel volume	/	18	18	18	18	18	18	18	18	18	18	18	18	18

Weight calculation:

The weight in operation indicated below is composed of:

- water weight for full unit;
- weight of the pump and pipework.

The value is then to be added to the TRANSPORT WEIGHT of the machine referred to. The result is the total weight of the unit in operation. This is a necessary detail to calculate the concrete base of the chiller and select antivibration mounts.

Additional weight in operation and water connections															
Model			251	291	341	411	521	522	641	642	801	802	981	982	1102
H₂O	Additional weight while functioning	kg	70	70	80	129	137	145	152	182	268	253	297	297	394
	PU	Additional weight while functioning	kg	140	150	170	170	230	230	240	240	250	250	260	260
	Water connections	DN	100	100	100	125	125	125	125	150	150	150	150	150	200
PD	Additional weight while functioning	kg	200	220	250	250	360	360	380	380	400	400	410	410	450
	Water connections	DN	100	100	100	125	125	125	150	150	150	150	150	150	200

(1) Referential conditions on page 4.

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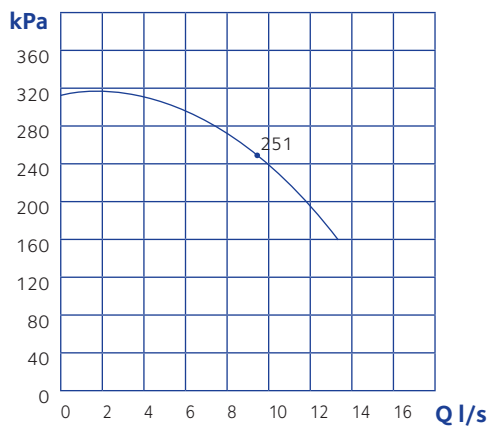
TWA 251/981 TT/Y
TWA 522/1102 TT/Y



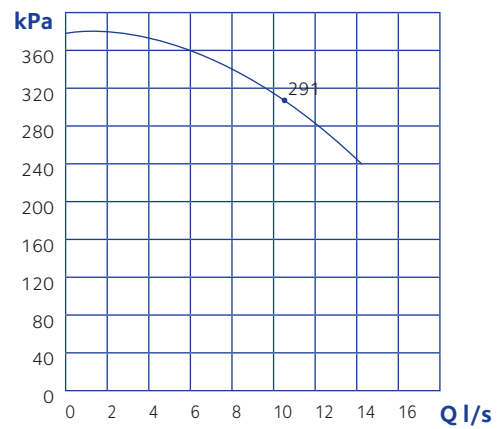
Units with Pump

Standard pump curves (higher pressures available upon request)

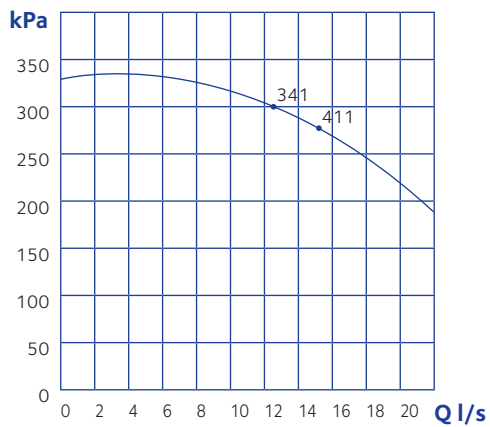
Model TWA 251 TT/Y



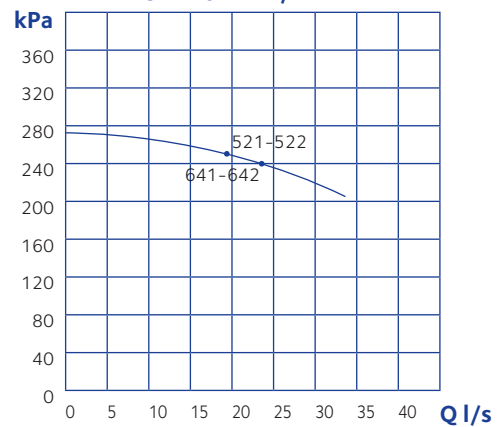
Model TWA 291 TT/Y



Model TWA 341-411 TT/Y

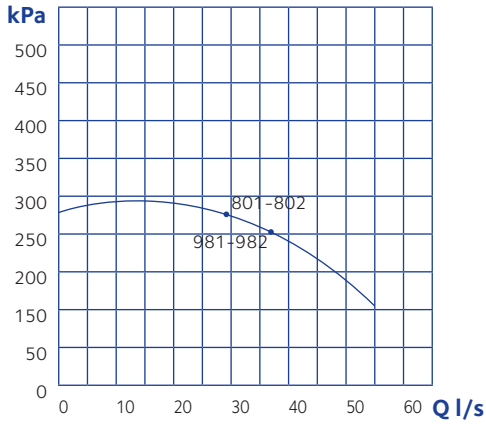


Model TWA 521-641 TT/Y
TWA 522-642 TT/Y

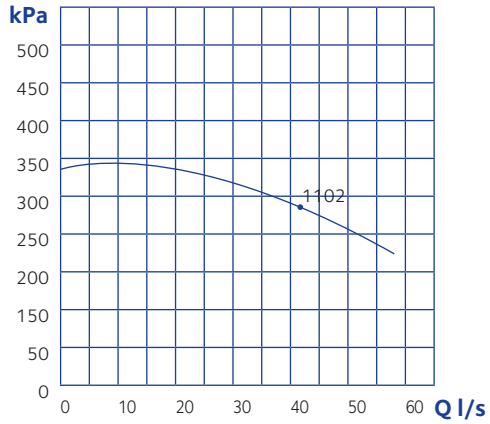


Incorporating

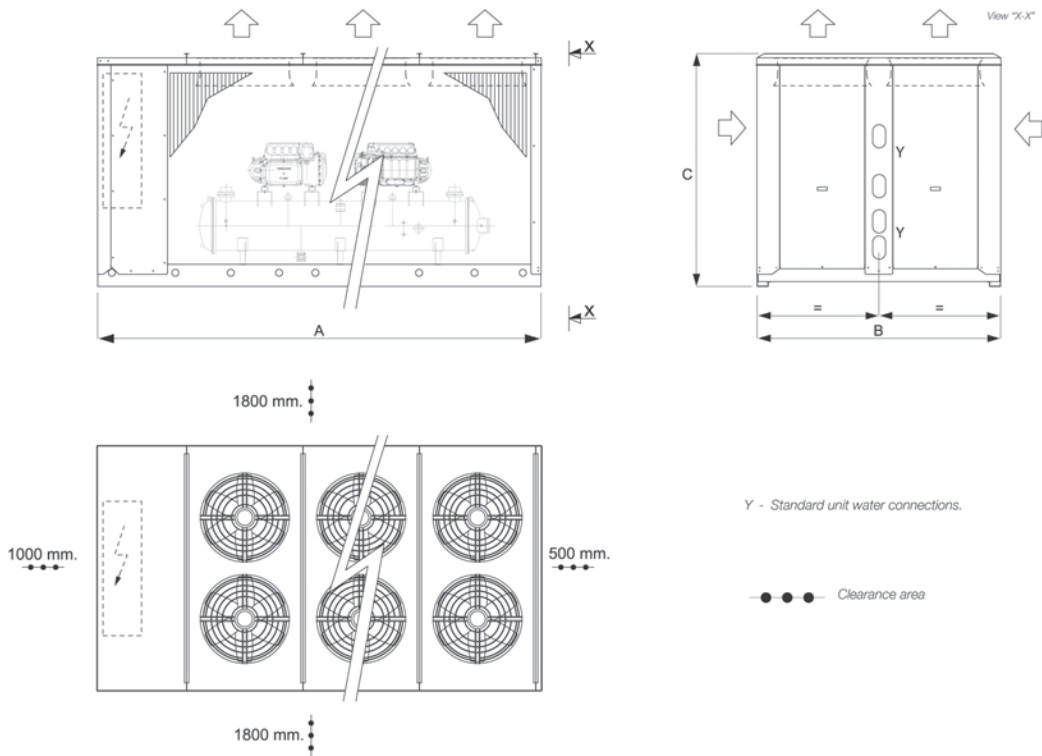
Model TWA 801-981 TT/Y
TWA 802-982 TT/Y



Model TWA 1102 TT/Y



Dimensions and Clearances



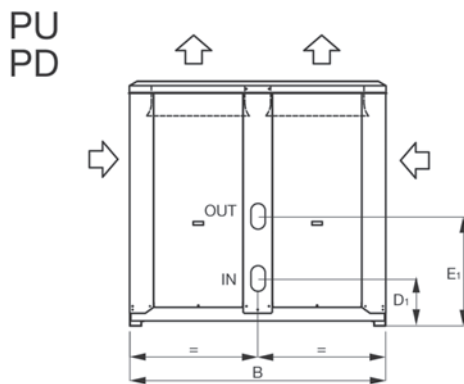
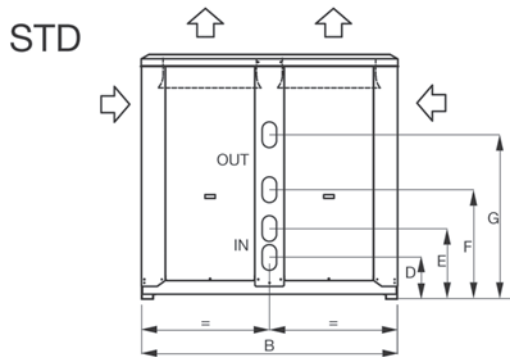
		Dimensions												
Model		251	291	341	411	521	522	641	642	801	802	981	982	1102
A	mm	4000	4000	5000	5000	6200	6200	7200	7200	8400	8400	8400	8400	11100
B	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
C	mm	2100	2100	2100	2100	2100	2100	2100	2100	2500	2500	2500	2500	2500

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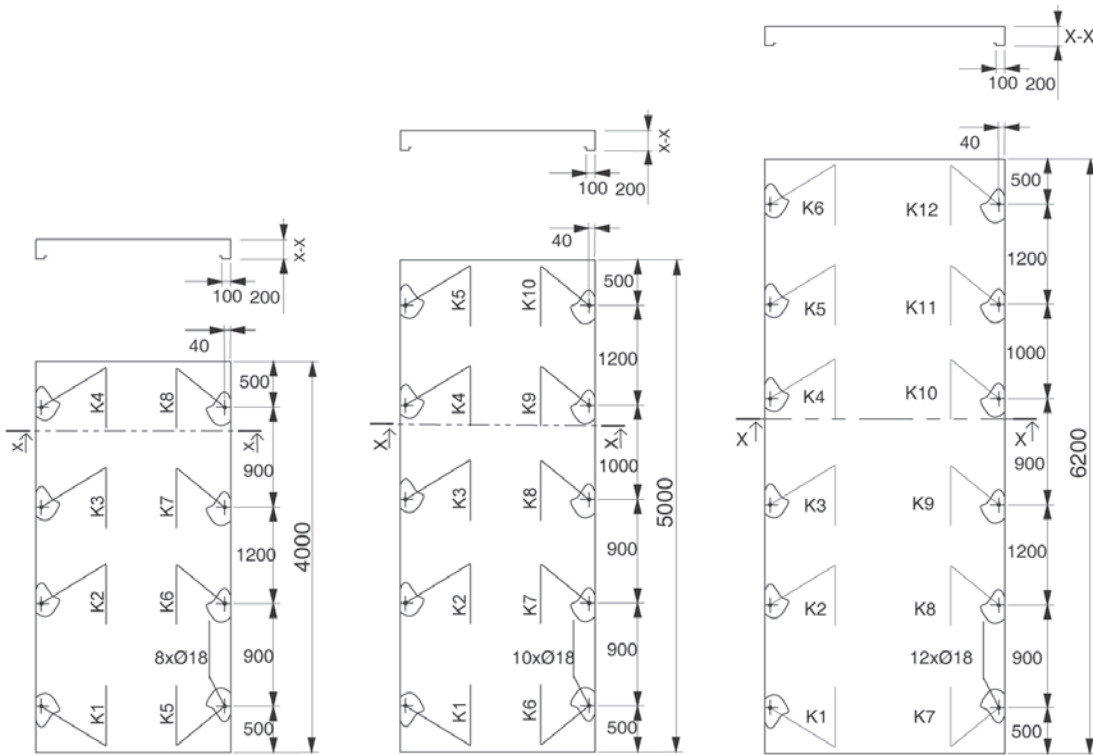


Position of water connections



Model		251	291	341	411	521	522	641	642	801	802	981	982	1102
B	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
D	mm	375	375	375	375	375	375	375	375	375	375	---	---	---
E	mm	657	657	657	657	657	657	657	657	657	657	---	---	---
F	mm	982	982	982	982	982	982	982	982	982	982	---	---	---
G	mm	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	---	---	---
D1	mm	335	335	360	360	360	360	360	360	425	425	425	425	425
E1	mm	1000	1000	1000	1000	1000	1000	1000	1000	1250	1250	1250	1250	1250

Weights/models 251-641



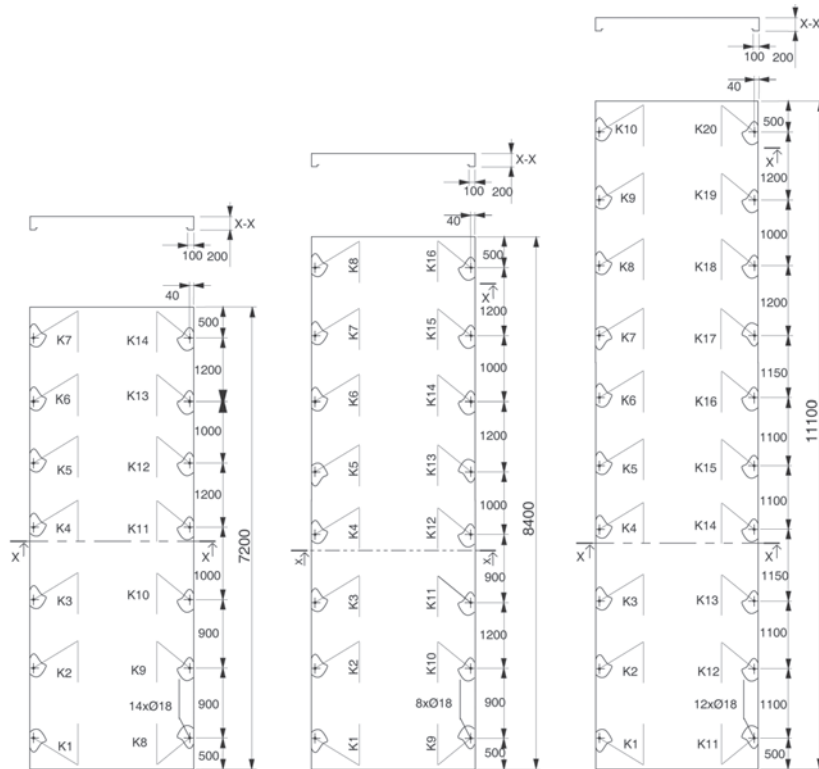
Operating weight (kg)														
Model	251		291		341		411		521		522		641	
	STD	MC	STD	MC	STD	MC	STD	MC	STD	MC	STD	MC	STD	MC
K1	335	330	335	330	310	290	360	345	330	310	350	335	290	285
K2	325	270	325	270	300	255	350	300	335	290	350	295	300	255
K3	305	250	305	250	290	245	345	295	340	295	355	300	320	275
K4	290	235	290	235	270	225	330	280	320	275	330	275	330	285
K5	335	330	335	330	255	210	300	250	280	235	285	230	310	265
K6	325	270	325	270	310	310	360	345	250	205	255	200	275	230
K7	305	250	305	250	300	255	350	300	330	310	350	335	250	205
K8	290	235	290	235	290	245	345	295	335	290	350	295	290	285
K9	---	---	---	---	270	225	330	280	340	295	355	300	300	255
K10	---	---	---	---	255	210	300	250	320	275	330	275	320	275
K11	---	---	---	---	---	---	---	---	280	235	285	230	330	285
K12	---	---	---	---	---	---	---	---	250	205	255	200	310	265
K13	---	---	---	---	---	---	---	---	---	---	---	---	275	230
K14	---	---	---	---	---	---	---	---	---	---	---	---	250	205
K15	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K16	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K17	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K18	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K19	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K20	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total	2510	2170	2510	2170	2850	2470	3370	2940	3710	3220	3850	3270	4150	3600

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TWA 251/981 TT/Y
TWA 522/1102 TT/Y



Weights/models 642-1102



Operating weight (kg)

Model	642		801		802		981		982		1102	
	STD	MC	STD	MC	STD	MC	STD	MC	STD	MC	STD	MC
K1	315	300	390	380	395	390	395	380	365	340	430	410
K2	320	275	395	345	410	345	425	370	380	335	450	395
K3	340	295	410	355	430	365	445	390	395	345	480	425
K4	350	305	405	345	420	355	415	360	385	340	470	420
K5	300	255	365	310	375	320	390	340	370	325	445	390
K6	250	205	340	285	345	290	335	280	335	285	395	340
K7	235	190	325	270	330	275	315	260	300	255	365	310
K8	315	300	295	240	295	240	285	230	260	215	305	250
K9	320	275	390	380	395	390	395	380	230	185	265	210
K10	340	295	395	345	410	345	425	370	360	345	245	190
K11	350	305	410	355	435	370	445	390	375	325	430	400
K12	300	255	405	345	415	350	415	360	390	345	450	395
K13	250	205	365	310	375	320	390	340	380	335	480	425
K14	235	190	340	285	350	295	335	280	370	320	470	420
K15	---	---	325	270	325	270	315	260	325	280	445	390
K16	---	---	295	240	295	245	285	230	295	250	395	340
K17	---	---	---	---	---	---	---	---	255	210	365	310
K18	---	---	---	---	---	---	---	---	290	235	305	250
K19	---	---	---	---	---	---	---	---	---	---	265	210
K20	---	---	---	---	---	---	---	---	---	---	245	190
Total	4220	3650	5850	5060	6000	5160	6010	5220	6060	5280	7700	6670



Incorporating



Turbosoft Adjustment System

Unit adjustment and control are done by means of the Turbosoft controller, which was specifically developed to adjust units with Turbocor compressors. Turbosoft is able to dynamically and flexibly control all chiller variables for any type of productive cycle and define in real time the best configuration and operation of the compressors in the chiller circuit, guaranteeing compliance with the most rigorous energy efficiency standards. The adjustment algorithms that are used were specifically developed to communicate and control the entire Turbocor compressor line and to follow all of its development and innovation phases ("Milestone II" generation).

Main functions

- Adjustment: PID.
- Remote monitoring: GSM/GPRS/TCP-IP.
- Monitoring: water flow rate.
- Management: economiser.
- Prevention: antifreeze, high pressure, low pressure, high current, live, compressor cavitation.
- Display and logging of all system variables: intake overheating, delivery overheating, undercooling, saturation temperature, circuit pressures, thermostatic valve position.
- Display and logging of Turbocor compressor specifications: IGV position, rotor speed, absorbed current/power, inverter temperature, stator temperature, rectifier temperature, refrigerant level.
- Display and logging of alarms, date, time and display of the main system variables correlated to the event.

Web monitoring

Managed on a user level, thanks to an SMS protocol, it permits the logging of alarms on a dedicated internet site, designed for the latest remote assistance techniques, indispensable for service and prevention activities.

Alarms

All of the alarms managed by the Turbosoft controller are reset automatically. An automatic logic precedes the event and manages it depending on the type. Most of the automatic managed functions can be implemented manually to easily and immediately start the chiller.

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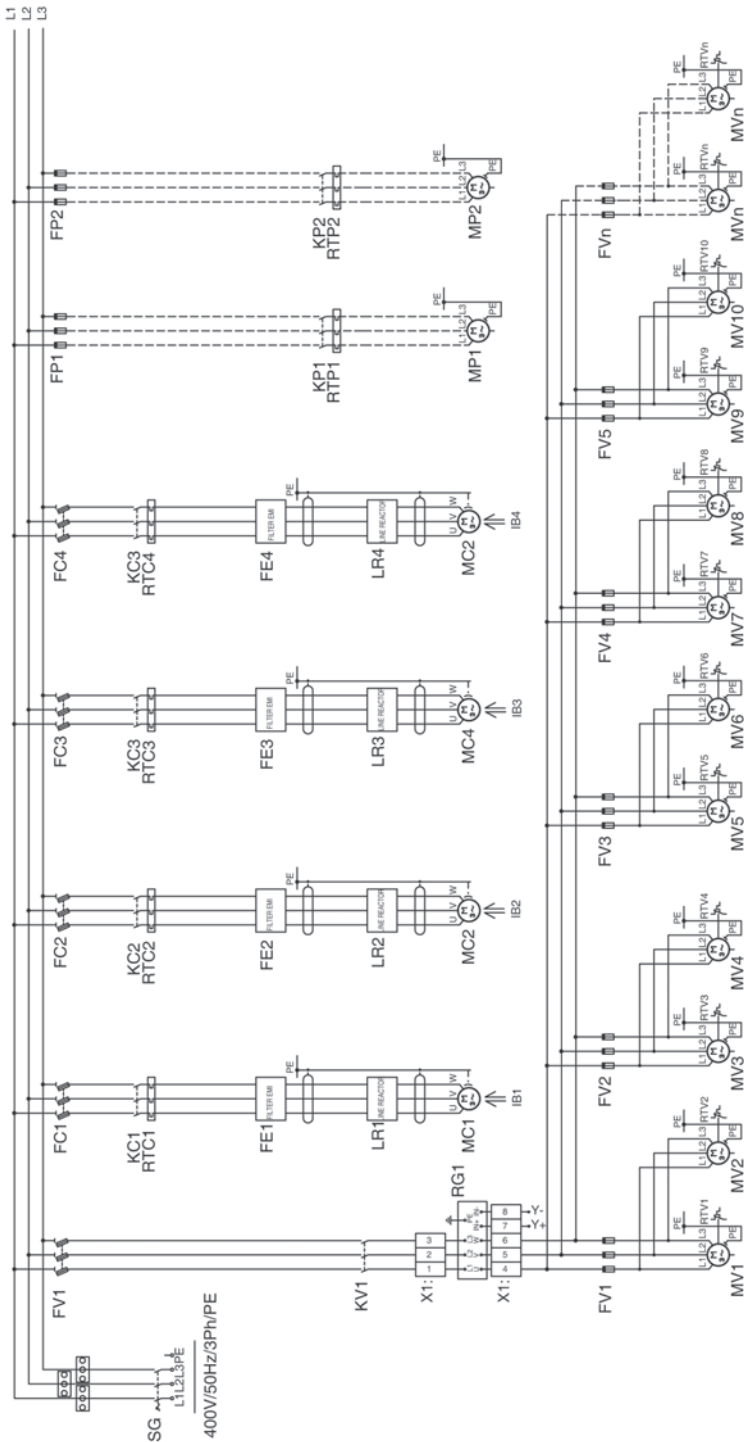
Wiring Diagram Explanations

	Description		Description
D	Display (User Interface)	RC	Crankcase heater
DR	* Remote display	REV	Evaporator heater
EC	Economiser	RF	Sequence relay
FC	Compressor fuses circuit	RG	Speed governor
FE	Line filter	RQ	Electrical board heater
FP	Pump fuses	RT	Resistance pipes heater
FV	Fan motor fuses	RTC	Compressor overload relay
IB	Serial interface	RTP	Pump overload relay
KA	Auxiliary contactor	RTV	Fan motor pump overload
KC	Compressor	SA	Antifreeze sensor
KP	Pump	SB	Microprocessor
KV	Fan motor contactor	SG	Main switch
LR	Line reactance	SL	Temperature sensor
MB	Battery module	SLL	Temperature sensor
MC	Compressor	SOT	Overheating temperature sensor
MD	Driver module	STE	Ambient air temperature sensor
MG	GSM gateway	TP	Pressure transducer
MP	Pump	TQ	Electrical board thermostat
MTA	Magnetothermic auxiliary automatic motor breaker	TT	Auxiliary transformer
MTV	Magnetothermic automatic fan motor breaker	VQ	Electric box ventilation fan
PD	Flow switch	VT	Electronic thermostatic valve
PH	HP switch circuit		

*Loose accessory

Power Electrical Diagram

- Wiring diagram explanation on page 27;
- Dotted lines indicate optional electrical connections or to carry out during the installation.



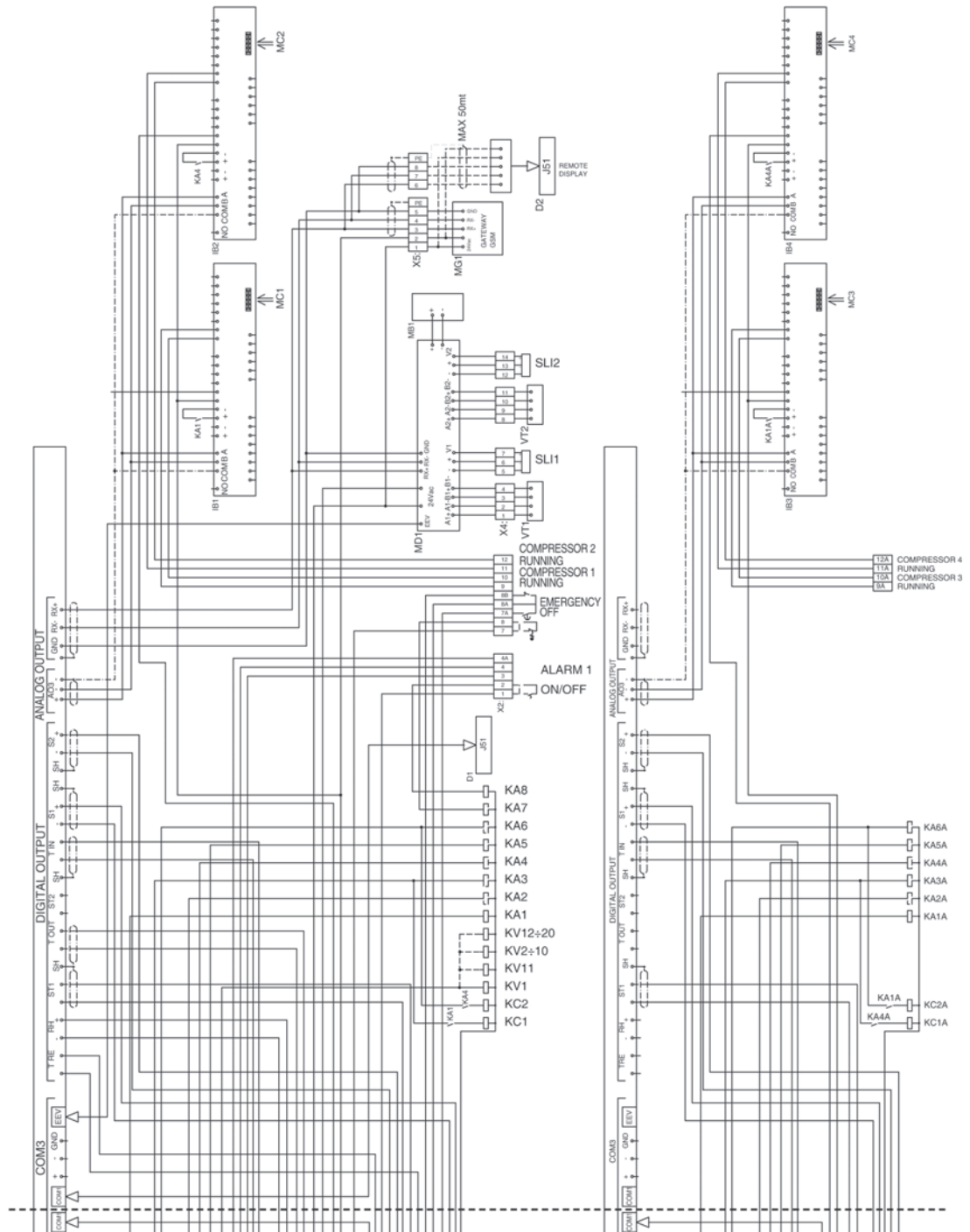
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Control Electrical Diagram

- Wiring diagram explanation on page 27;
- Dotted lines indicate optional electrical connections or to carry out during the installation.



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Installation Recommendations

Location

- Strictly allow clearances as indicated.
- Locate the unit in order to be compatible with environmental requirements (sound level, integration into the site, etc.).

Electrical connections

- Check the wiring diagram enclosed with the unit, in which all the instructions necessary to the electrical connections are always present.
- Before opening the main switch, stop the unit by acting on the suitable running switches or, if lacking, on the remote control.
- Before servicing the inner components, disconnect electrical supply by opening the main switch.
- The electrical supply line must be equipped with an automatic circuit breaker (to be provided by the installer).
- Electrical connections to be done:
 - Three-wire power cable + ground cable.
- Optional electrical connections to be done:
 - External interlock;
 - Remote alarm signalling.

Hydraulic connections

- Carefully vent the system, with pump turned off, by acting on the vent valves. This procedure is fundamental: as little air bubbles can freeze the evaporator causing the general failure of the system.
- Drain the system during seasonal stops (winter time) or use proper mixtures with low freezing point.
- Install the hydraulic circuit including all the components indicated in the recommended hydraulic circuit diagrams (expansion vessel, storage tank, vent valves, balancing valve, shut off valves flexible connections, etc.).

Start up and maintenance operations

- Please refer to the operations and maintenance manual. All these operations must be carried out by trained personnel only.

The data indicated in this manual is purely indicative. The manufacturer reserves the right to modify the data whenever it is considered necessary.

