



refrigerating systems

EPTABERG PLUS

INSTALLATION, USER AND MAINTENANCE MANUAL

**READ CAREFULLY
AND KEEP WITH THE MACHINE**

Number of document : **QSM000555E**

Revision status: **"B"**

Daye of 1st issue: **24.March.09**

Date of the present issue: **24.April.10**



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USE AND MAINTENANCE MANUAL

010 - GENERAL INFORMATION/TABLE OF CONTENTS

This manual has been compiled in a simple and easy-to-read manner so our units can be installed, set up and serviced correctly. **Please read its contents carefully and keep it near the machine at all times.**

The following points are of capital importance:

- The equipment must be installed, tested and serviced by skilled and legally qualified personnel.
- Local safety regulations applicable at the time of installation must be observed.
- The refrigerating equipment must only ever be used for the purpose for which it was designed. Uses other than those specified shall in no way be binding for the Manufacturer.
- The packaging components (plastic bags, polystyrene, wood, etc.) represent a potential hazard and must be kept out of the reach of children. Sort them out and recycle according to local applicable regulations.
- Power supply specifications must comply with the details shown on the serial plate of the equipment.
- In the event of a fault or of faulty operation, always switch off the machine.
- Modifications to the power system or unauthorized alterations in general, which are not envisaged in this manual, shall invalidate the warranty.
- To service or repair the machine, always contact an authorized EPTA after-sales service center and ask for original spare parts. Failure to do so could jeopardize machine and operator safety.

THE MANUFACTURER DISCLAIMS ALL LIABILITY FOR DIRECT OR INDIRECT DAMAGE TO PROPERTY OR INJURY TO PERSONS RESULTING FROM FAILURE TO COMPLY WITH THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

Table of contents

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020 – DESCRIPTION / TECHNICAL DETAILS

General information

Eptaberg Plus refrigerating units are available in various versions with three, four, five and six parallel-connected semi-hermetic Bitzer, Copeland and Frascold compressors. They are suitable for positive and negative-temperature applications using R404A refrigerant.

They were designed to be installed indoors in ad-hoc technical premises termed "plant rooms" or outdoors, provided they are duly fitted with an enclosure to protect them from the elements.

The range was designed and constructed to the applicable laws and EU Directives and includes a base version for indoor and outdoor installation, featuring every component required to guarantee total reliability and correct performance of the machine, in keeping with Epta quality standards.

The electrical board controlling the on-board compressors is insulated from the metal support structure by means of rubber damper pads. The compressors are fastened to a sturdy undercarriage made of galvanized steel-sheet profiles (epoxy-powder painted RAL5010); the undercarriage rests on rubber-core bell-shaped vibration damper pads that ensure viscous vibration damping.

A high customizability level stems from the possibility to have - as an option for the base version - as many as four different types of electronic controllers and a power board that can be fitted with overcurrent protection (OCPD) or overcurrent plus residual current protection (RCBO).

The refrigerating circuit undergoes leak testing and is subsequently filled with dry air at the factory.

Main features (standard version)

The refrigerating equipment in the EptaBerg Plus family features, among the standard mechanical components, a steel suction header (also stainless-steel available), acting as anti-liquid bottle, suction filters fitted with interchangeable filtering cartridges of size appropriate to withhold any impurity in the system (one per compressor). Each filter is fitted with two valves that make it possible to shut off the relevant pipework stretch when replacing the cartridge, with no need to shutdown the system. The discharge header, copper or steel construction, is fastened to the undercarriage by way of sturdy polyamide collars. For low temperature applications a compressor-head cooling fan is featured. The refrigerating equipment at hand, in all versions, have systems providing for the return of oil to the compressors, which are composed of the following:

- inspectable-type oil separator, which can either be one for the entire pack or individual for each compressor;
- oil reserve of suitable capacity, with minimum and maximum level warning lamps;
- oil filter for every compressor;
- pressure valve;
- oil-level regulator: to be chosen between a float-type mechanical version and an electronic version.

As for the electrical and control components, the EptaBerg Plus pack family offers as standard:

- Electrical power supply panel constructed pursuant to EN 60204-1, on board the equipment and pre-wired. It undergoes functional testing at the factory before delivery. Master circuit-breaking handle on the outside.
- Pressure-switch panel and pressure probes (transducers) including:

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Two high-pressure switches (manual-reset for system safety) to protect from high pressure due to mismaneuvers or other causes. When commissioned as per operational instruction QOP019110A, correct tripping of safety pressure-switches is simulated and verified one high pressure switch for each compressor (compressor safety);
one compressor/system low pressure switch;
one back-up low pressure-switch
one back-up high pressure-switch;
pressure transducers (high and low);

All service pipework for control and regulation elements are flexible type.

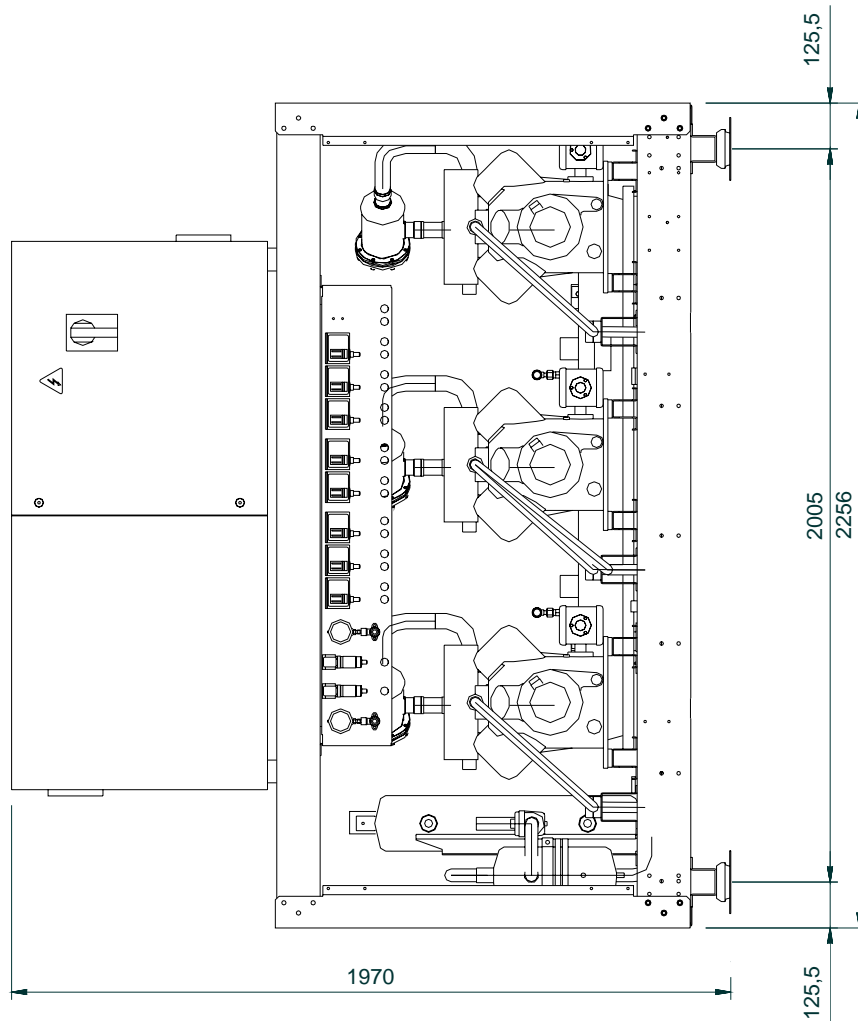
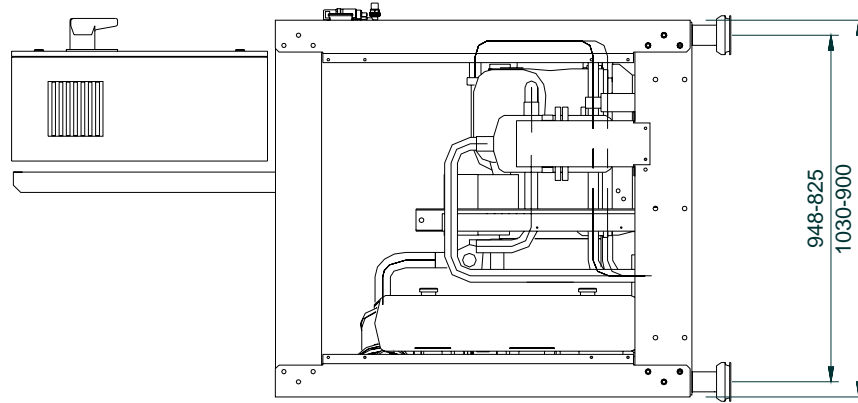
Accessories

The refrigerating systems in the EptaBerg Plus family include the possibility to add a wide range of accessories to the base version. Among these:

- Housing suitable for outdoor installation with standard sound-proofing (housing lining made of double-layer expanded polyurethane sheet embossed on the outside and bituminous coating). Easily-to-remove panels fitted with 90° angle tabs and fall-proof pins. As an option, on the electrical board side the enclosure is fitted with a door that can be lifted open by way of spring bolts.
- anti-liquid tank: anti-liquid tanks prevent liquid from flowing back from the system into the compressors; optionally available with a safety valve, they are available in two alternatives, one per system or one per compressor. Supplied as including a stainless steel condensed water collection tray.
- complete suction line insulation: suction header, filter dryer and ball valve; (thickness 13mm or 19 mm for TN and 19mm or 32mm for BT);
- compressor head cooling fan available for positive-temperature applications
- compressor muffler: standard or adjustable version;
- check valve on each individual compressor
- check valve for separator outlet (discharge line to condenser)
- system muffler (available for some models)
- oil viewer on the oil return circuit;
- glycerin-bath pressure meters with shut-off valve for high and low pressure (on the pressure-switch board)
- liquid sub-coolers.
- desuperheaters: these make sanitary-use water warm by counter-current exchange with vapor state refrigerant, as it comes out of the compressor; this reduces temperature and yet does not cause the formation of liquid;
- liquid-receiver vessel: detached from the system, horizontal or vertical; acts as a refrigerant reserve capable of making up for the thermal load variations in the evaporator, which occur during system operation. The receiver, which meets the requirements of Directive 97/23/EC, is installed on a steel frame and is available in sizes from 80L to 400L. Each receiver vessel is equipped with liquid level viewers and a low liquid level alarm; receiver is protected by one or two safety valves, depending on capacity, mounted on an exchange valve; anti-acid dryer filter fitted with a high-capacity replaceable cartridge on the liquid line, including a humidity viewer with shut-off ball valve.

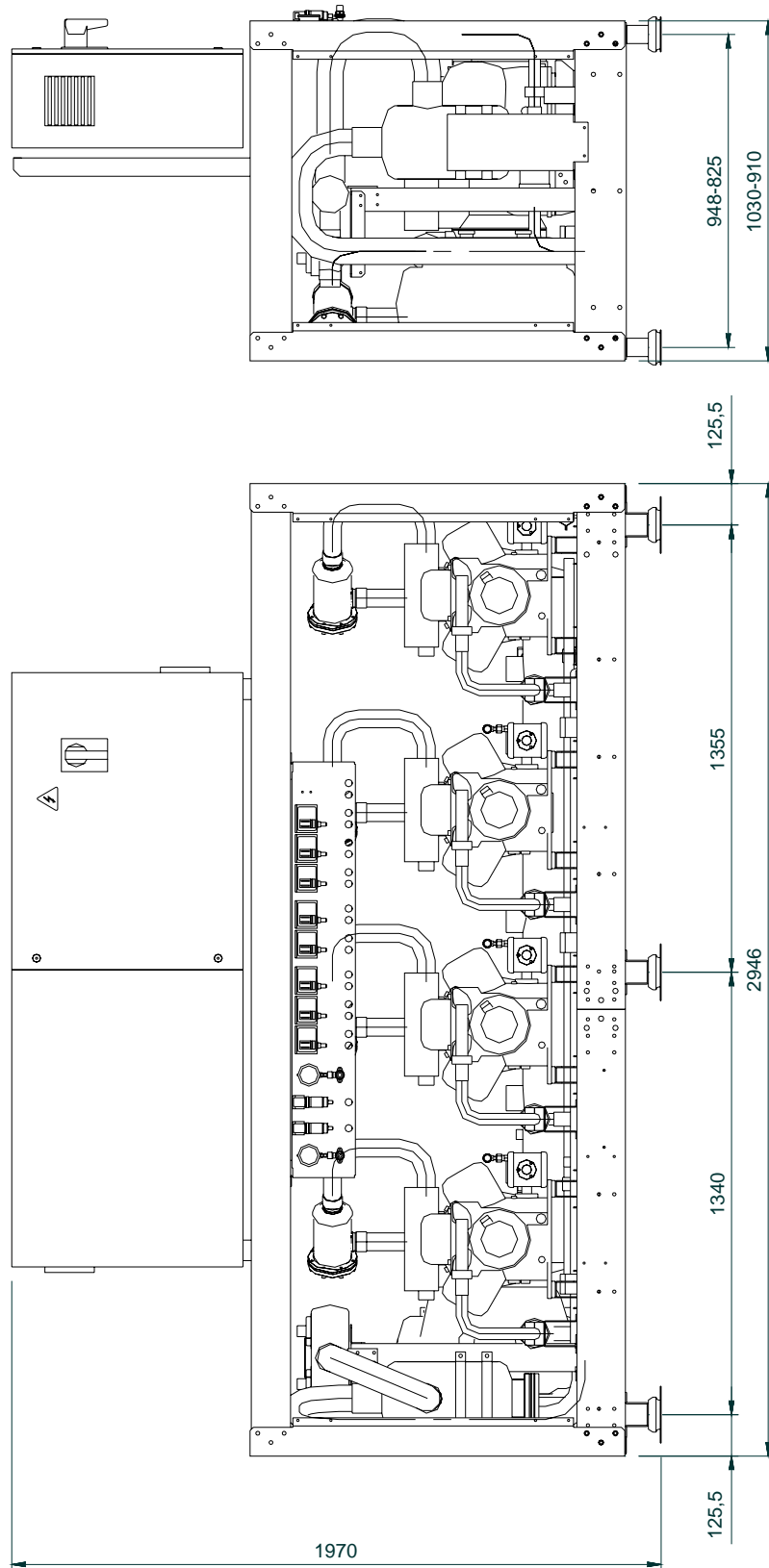
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Dimensional drawings - EptaBerg Plus – 3 compressors



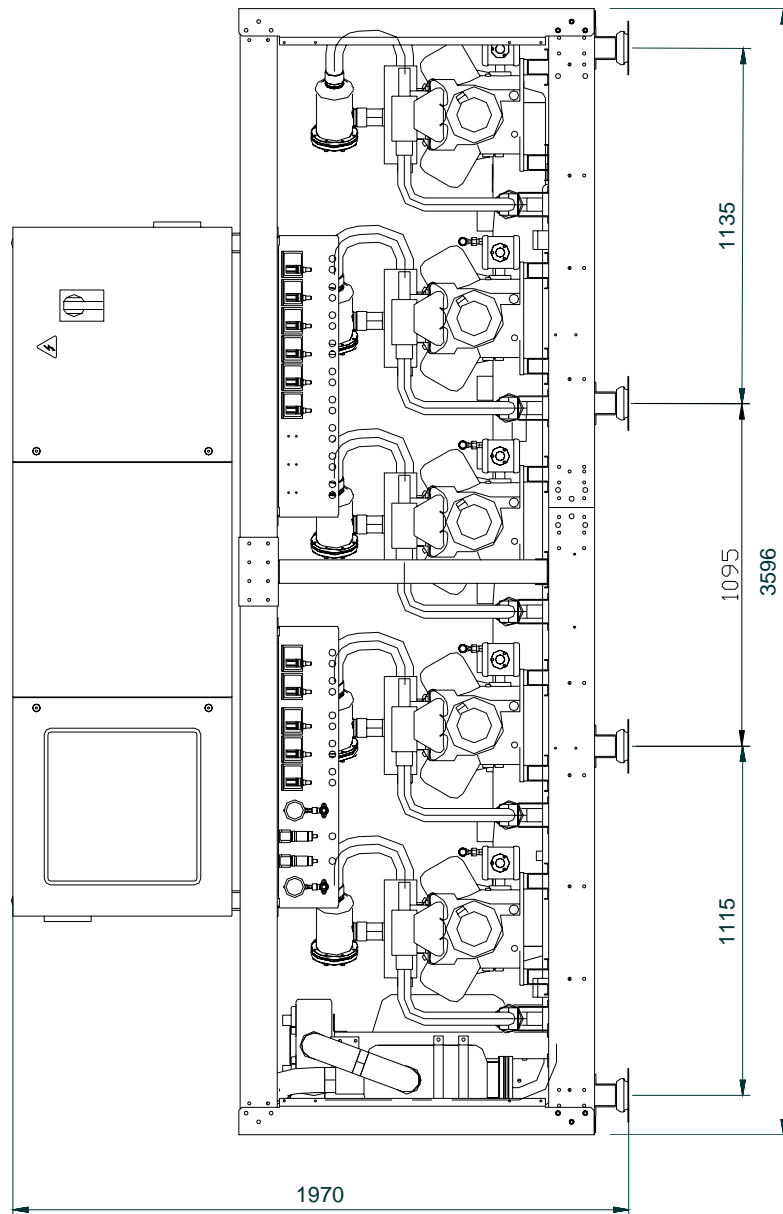
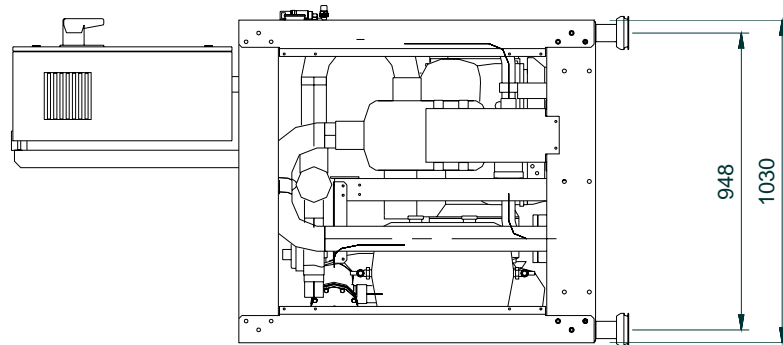
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Dimensional drawings - EptaBerg Plus – 4 compressors



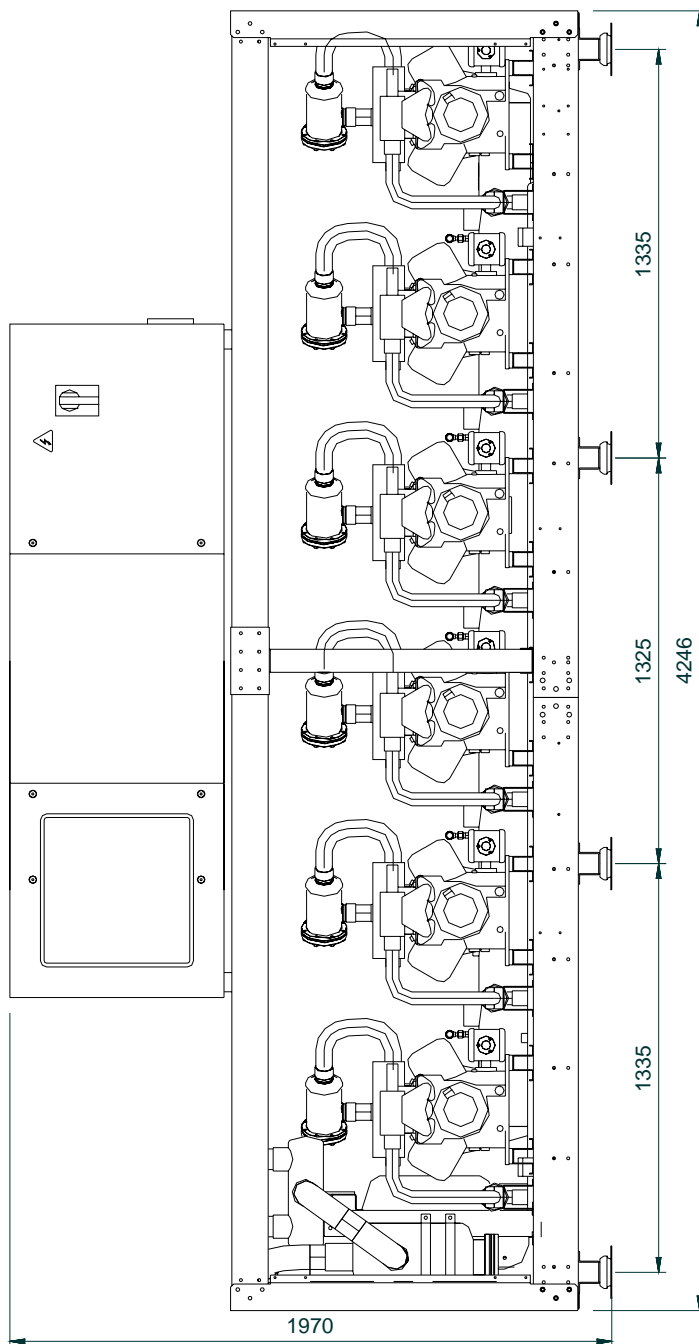
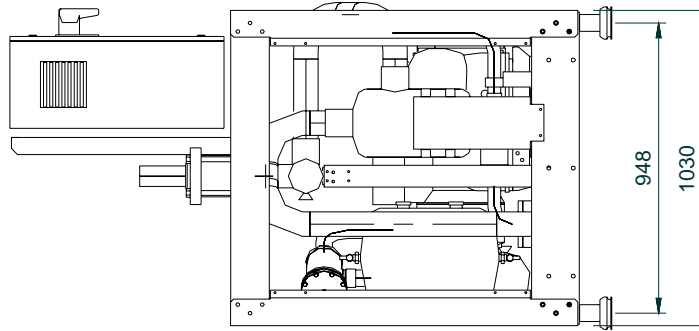
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Dimensional drawings - EptaBerg Plus – 3 compressors



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Dimensional drawings - EptaBerg Plus – 6 compressors



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TECHNICAL DETAILS FOR BITZER COMPRESSOR PACKS

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS											
Equipment model	3 x 4TCS-8.2Y	3 x 4PCS-10.2Y	3 x 4NCS-12.2Y	3 x 4J-13.2Y	3 x 4H-15.2Y	3 x 4G-20.2Y	3 x 6J-22.2Y	3 x 6H-25.2Y	3 x 6G-30.2Y	3 x 6F-40.2Y	
Application	MT										
N. Compressors	3										
Rated output (HP)	8	10	12	13	15	20	22	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	68400	79500	91800	105600	123300	141900	157800	184800	207900	249300	
Power input (W) [1]	27150	31350	36990	42240	50340	58050	63900	75600	85500	100200	
Maximum power (W) [4]	31025	35765	41100	49675	57510	68790	72615	84795	98290	138585	
Length A (mm)	2250										
Width N/O (mm)	900				1020						
Height M (mm)	1400										
Height of 2 levels (mm)	N.A.										
Diam. Discharge line (mm)	42		54				67				
Diam. Suction line (mm)	2x54			4x54							2x54 + 2x67
Weight (kg) [5]	936	956	971	1106	1116	1151	1231	1276	1291	1336	
Compressor											
Model	4TCS-8.2Y	4PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y	
Power input under op. (A) [2]	14,7	17,22	20,6	23,3	27,3	31,5	34,8	40,6	46,6	57,7	
Max. power input (A) [3]	17	21	24	27	31	37	39	45	53	78	
Type	Semi-hermetic reciprocating										
Lubricant	Oil Bitzer BSE 32										
Refrigerant	R404A										

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling), sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard electrical board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS												
Equipment model	3 x 4CC-6.2Y	3 x 4TCS-8.2Y	3 x 4PCS-10.2Y	3 x 4NCS-12.2Y	3 x 4J-13.2Y	3 x 4H-15.2Y	3 x 4G-20.2Y	3 x 6J-22.2Y	3 x 6H-25.2Y	3 x 6G-30.2Y	3 x 6F-40.2Y	
Application	BT											
N. Compressors	3											
Rated output (HP)	6	8	10	12	13	15	20	22	25	30	40	
Power voltage	400/3/50											
Heat extraction rate (W) [1]	15720	19560	22560	26220	31410	37680	43590	46920	55800	63000	73800	
Power input (W) [1]	11820	13980	15900	18570	22320	27120	31380	33600	40080	45180	53190	
Maximum power (W) [4]	27300	31025	35765	41100	49675	57510	68790	72615	84795	98290	138585	
Length A (mm)	2250											
Width N/O (mm)	900					1020						
Height M (mm)	1400											
Height of 2 levels (mm)	N.A.											
Diam. Discharge line (mm)	28			35				42				
Diam. Suction line (mm)	2x54					4x54					2x54 + 2x67	
Weight (kg)	771	926	946	946	1101	1111	1146	1221	1266	1281	1326	
Compressor												
Model	4CC-6.2Y	4TCS-8.2Y	4PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y	
Power input under op. (A) [2]	9,36	8,43	10,13	12,47	14,2	16,26	18,96	21,4	24,1	27,7	37,9	
Max. power input (A) [3]	15,9	17	21	24	27	31	37	39	45	53	78	
Type	Semi-hermetic reciprocating											
Lubricant	Oil Bitzer BSE 32											
Refrigerant	R404A											

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1
[2] per compressor at rated conditions
[3] per compressor
[4] WinQ data
[5] Standard electrical board

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS											
Equipment model	4 x 4TCS-8.2Y	4 x 4PCS-10.2Y	4 x 4NCS-12.2Y	4 x 4J-13.2Y	4 x 4H-15.2Y	4 x 4G-20.2Y	4 x 6J-22.2Y	4 x 6H-25.2Y	4 x 6G-30.2Y	4 x 6F-40.2Y	
Application	MT										
N. Compressors	4										
Rated output (HP)	8	10	12	13	15	20	22	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	91200	106000	122400	140800	164400	189200	210400	246400	277200	332400	
Power input (W) [1]	36200	41800	49320	56320	67120	77400	85200	100800	114000	133600	
Maximum power (W) [4]	41370	47690	54800	66240	76680	91720	96820	113060	131060	184780	
Length B (mm)	2950										
Width N/O (mm)	900					1020					
Height M (mm)	1400										
Height of 2 levels (mm)	N.A.										
Diam. Discharge line (mm)	42	54				67			80		
Diam. Suction line (mm)	2x67				5x67						
Weight (kg) [5]	1221	1256	1261	1441	1461	1501	1611	1661	1686	1761	
Compressor											
Model	4TCS-8.2Y	4PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y	
Power input under op. (A) [2]	14,7	17,22	20,6	23,3	27,3	31,5	34,8	40,6	46,6	57,7	
Max. power input (A) [3]	17	21	24	27	31	37	39	45	53	78	
Tipo	Semi-hermetic reciprocating										
Lubricant	Oil Bitzer BSE 32										
Refrigerant	R404A										

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1
[2] per compressor at rated conditions
[3] per compressor
[4] WinQ data
[5] Standard Electrical Board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS												
Equipment model	4 x 4CC-6.2Y	4 x 4TCS-8.2Y	4 x 4PCS-10.2Y	4 x 4NCS-12.2Y	4 x 4J-13.2Y	4 x 4H-15.2Y	4 x 4G-20.2Y	4 x 6J-22.2Y	4 x 6H-25.2Y	4 x 6G-30.2Y	4 x 6F-40.2Y	
Application	BT											
N. Compressors	4											
Rated output (HP)	6	8	10	12	13	15	20	22	25	30	40	
Power voltage	400/3/50											
Heat extraction rate (W) [1]	20960	26080	30080	34960	41880	50240	58120	62560	74400	84000	98400	
Power input (W) [1]	15760	18640	21200	24760	29760	36160	41840	44800	53440	60240	70920	
Maximum power (W) [4]	36400	41370	47690	54800	66240	76680	91720	96820	113060	131060	184780	
Length B (mm)	2950											
Width N/O (mm)	900					1020						
Height M (mm)	1400											
Height of 2 levels (mm)	N.A.											
Diam. Discharge line (mm)	28		35			42			54			
Diam. Suction line (mm)	2x67					5x67						
Weight (kg) [5]	1001	1211	1241	1241	1431	1451	1496	1581	1656	1676	1736	
Compressor												
Model	4CC-6.2Y	4TCS-8.2Y	PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y	
Power input under op. (A) [2]	9,36	8,43	10,13	12,47	14,2	16,26	18,96	21,4	24,1	27,7	37,9	
Max. power input (A) [3]	15,9	17	21	24	27	31	37	39	45	53	78	
Type	Semi-hermetic reciprocating											
Lubricant	Oil Bitzer BSE 32											
Refrigerant	R404A											

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS												
Equipment model	5 x 4TCS-8.2Y	5 x 4PCS-10.2Y	5 x 4NCS-12.2Y	5 x 4J-13.2Y	5 x 4H-15.2Y	5 x 4G-20.2Y	5 x 6J-22.2Y	5 x 6H-25.2Y	5 x 6G-30.2Y	5 x 6F-40.2Y		
Application	MT											
N. Compressors	5											
Rated output (HP)	8	10	12	13	15	20	22	25	30	40		
Power voltage	400/3/50											
Heat extraction rate (W) [1]	114000	132500	153000	176000	205500	236500	263000	308000	346500	415500		
Power input (W) [1]	45250	52250	61650	70400	83900	96750	106500	126000	142500	167000		
Maximum power (W) [4]	51710	59610	68500	82800	95850	114650	121030	141330	163820	230980		
Length C (mm)	3600											
Width N/O (mm)	900					1020						
Height M (mm)	1400											
Diam. Discharge line (mm)	54			67			80					
Diam. Suction line (mm)	4x54					6x67						
Weight (kg) [5]	1520	1555	1570	1800	1825	1875	2000	2045	2085	2165		
Compressor												
Model	4TCS-8.2Y	4PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y		
Power input under op. (A) [2]	14,7	17,22	20,6	23,3	27,3	31,5	34,8	40,6	46,6	57,7		
Max. power input (A) [3]	17	21	24	27	31	37	39	45	53	78		
Tipo	Semi-hermetic reciprocating											
Lubricant	Oil Bitzer BSE 32											
Refrigerant	R404A											

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1
[2] per compressor at rated conditions
[3] per compressor
[4] WinQ data
[5] Standard Electrical Board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS								
Equipment model	5 x 4NCS-12.2Y	5 x 4J-13.2Y	5 x 4H-15.2Y	5 x 4G-20.2Y	5 x 6J-22.2Y	5 x 6H-25.2Y	5 x 6G-30.2Y	5 x 6F-40.2Y
Application	BT							
N. Compressors	5							
Rated output (HP)	12	13	15	20	22	25	30	40
Power voltage	400/3/50							
Heat extraction rate (W) [1]	43700	52350	62800	72650	78200	93000	105000	123000
Power input (W) [1]	30950	37200	45200	52300	56000	66800	75300	88650
Maximum power (W) [4]	68500	82800	95850	114650	121030	141330	163990	230980
Length C (mm)	3600							
Width N/O (mm)	900	1020						
Height M (mm)	1400							
Diam. Discharge line (mm)	35	42			54			
Diam. Suction line (mm)	4x54	6x67						
Weight (kg) [5]	1540	1770	1790	1845	1970	2030	2055	2140
Compressor								
Model	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y
Power input under op. (A) [2]	12,47	14,2	16,26	18,96	21,4	24,1	27,7	37,9
Max. power input (A) [3]	24	27	31	37	39	45	53	78
Tipo	Semi-hermetic reciprocating							
Lubricant	Oil Bitzer BSE 32							
Refrigerant	R404A							

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 6-COMPRESSOR SYSTEMS					
Equipment model	6 x 4H-15.2Y	6 x 4G-20.2Y	6 x 6J-22.2Y	6 x 6G-30.2Y	6 x 6F-40.2Y
Application	MT				
N. Compressors	6				
Rated output (HP)	15	20	22	30	40
Power voltage	400/3/50				
Heat extraction rate (W) [1]	246600	283800	315600	415800	498600
Power input (W) [1]	100680	116100	127800	171000	200400
Maximum power (W) [4]	115020	137580	145230	196580	277170
Length D (mm)	4250				
Width O (mm)	1020				
Height M (mm)	1400				
Diam. Discharge line (mm)	67		80		
Diam. Suction line (mm)	5x80				
Weight (kg) [5]	2150	2210	2370	2480	2570
Compressor					
Model	4H-15.2Y	4G-20.2Y	6J-22.2Y	6G-30.2Y	6F-40.2Y
Power input under op. (A) [2]	27,3	31,5	34,8	46,6	57,7
Max. power input (A) [3]	31	37	39	53	78
Tipo	Semi-hermetic reciprocating				
Lubricant	Oil Bitzer BSE 32				
Refrigerant	R404A				

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K
0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 6-COMPRESSOR SYSTEMS			
Equipment model	6 x 4H-15.2Y	6 x 6H-25.2Y	6 x 6G-30.2Y
Application	BT		
N. Compressors	6		
Rated output (HP)	15	25	30
Power voltage	400/3/50		
Heat extraction rate (W) [1]	75360	111600	126000
Power input (W) [1]	54240	80160	90360
Maximum power (W) [4]	115020	169590	196580
Length D (mm)	4250		
Width O (mm)	1020		
Height M (mm)	1400		
Diam. Discharge line (mm)	42	54	
Diam. Suction line (mm)	5x80		
Weight (kg) [5]	2150	2460	2490
Compressor			
Model	4H-15.2Y	6H-25.2Y	6G-30.2Y
Power input under op. (A) [2]	16,26	24,1	27,7
Max. power input (A) [3]	31	45	53
Tipo	Semi-hermetic reciprocating		
Lubricant	Oil Bitzer BSE 32		
Refrigerant	R404A		

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K
0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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TECHNICAL DETAILS FOR COPELAND COMPRESSOR PACKS

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS							
Equipment model	3 x D3DC-100X	3 x D3DS-150X	3 x D4DA-200X	3 x D4DH-250X	3 x D4DJ-300X	3 x D6DH-350X	3 x D6DJ-400X
Application	MT						
N. Compressors	3						
Rated output (HP)	10	15	20	25	30	35	40
Power voltage	400/3/50						
Heat extraction rate (W) [1]	66000	87900	97500	124500	150000	189000	220500
Power input (W) [1]	23400	32100	35100	46800	56100	69000	83400
Maximum power (W) [4]	33420	47340	52920	68520	84480	103440	131070
Length A (mm)	2250						
Width N/O (mm)	900			1020			
Height M (mm)	1400						
Height of 2 levels (mm)	N.A.						
Diam. Discharge line (mm)	42	54			67		
Diam. Suction line (mm)	2x54		4x54				
Weight (kg) [5]	1076	1101	1221	1261	1291	1401	1461
Compressor							
Model	D3DC-100X	D3DS-150X	D4DA-200X	D4DH-250X	D4DJ-300X	D6DH-350X	D6DJ-400X
Power input under op. (A) [2]	14,4	19,7	21,9	28	33	43,1	49,8
Max. power input (A) [3]	20,5	29	32,5	41,5	52,5	63,5	83
Type	Discus one-stage semi-hermetic reciprocating						
Lubricant	Mobil Eal Arctic 22						
Refrigerant	R404A						

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS					
Equipment model	3 x D3DS-100X	3 x D4DL-150X	3 x D4DT-220X	3 x D6DL-270X	3 x D6DT-320X
Application	BT				
N. Compressors	3				
Rated output (HP)	10	15	22	27	32
Power voltage	400/3/50				
Heat extraction rate (W) [1]	28500	39450	46500	57900	69600
Power input (W) [1]	19350	27150	31800	38700	48000
Maximum power (W) [4]	29430	45600	53550	70170	87360
Length A (mm)	2250				
Width O (mm)	900		1020		
Height M (mm)	1400				
Height of 2 levels (mm)	N.A.				
Diam. Discharge line (mm)	35	42		54	
Diam. Suction line (mm)	2x54		4x54		
Weight (kg) [5]	1081	1246	1286	1381	1451
Compressor					
Model	D3DS-100X	D4DL-150X	D4DT-220X	D6DL-270X	D6DT-320X
Power input under op. (A) [2]	12,3	18,5	20,7	26	30,1
Max. power input (A) [3]	19,5	28,5	33	43	53,1
Type	Discus one-stage semi-hermetic reciprocating				
Lubricant	Mobil Eal Arctic 22				
Refrigerant	R404A				

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS							
Equipment model	4 x D3DC-100X	4 x D3DS-150X	4 x D4DA-200X	4 x D4DH-250X	4 x D4DJ-300X	4 x D6DH-350X	4 x D6DJ-400X
Application	MT						
N. Compressors	4						
Rated output (HP)	10	15	20	25	30	35	40
Power voltage	400/3/50						
Heat extraction rate (W) [1]	88000	117200	130000	166000	200000	252000	294000
Power input (W) [1]	31200	42800	46800	62400	74800	92000	111200
Maximum power (W) [4]	44560	63120	70560	91360	112640	137920	174760
Length B (mm)	2950						
Width N/O (mm)	900			1020			
Height M (mm)	1400						
Height of 2 levels (mm)	N.A.						
Diam. Discharge line (mm)	42	54			67	80	
Diam. Suction line (mm)	2x67	5x67					
Weight (kg) [5]	1411	1436	1596	1656	1686	1841	1911
Compressor							
Model	D3DC-100X	D3DS-150X	D4DA-200X	D4DH-250X	D4DJ-300X	D6DH-350X	D6DJ-400X
Power input under op. (A) [2]	14,4	19,7	21,9	28	33	43,1	49,8
Max. power input (A) [3]	20,5	29	32,5	41,5	52,5	63,5	83
Tipo	Discus single-stage semi-hermetic reciprocating						
Lubricant	Mobil Eal Arctic 22						
Refrigerant	R404A						

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS					
Equipment model	4 x D3DS-100X	4 x D4DL-150X	4 x D4DT-220X	4 x D6DL-270X	4 x D6DT-320X
Application	BT				
N. Compressors	4				
Rated output (HP)	10	15	22	27	32
Power voltage	400/3/50				
Heat extraction rate (W) [1]	38000	52600	62000	77200	92800
Power input (W) [1]	25800	36200	42400	51600	64000
Maximum power (W) [4]	39240	60800	71400	93560	116480
Length B (mm)	2950				
Width N/O (mm)	900		1020		
Height M (mm)	1400				
Height of 2 levels (mm)	N.A.				
Diam. Discharge line (mm)	35	42		54	
Diam. Suction line (mm)	2x67		4x54		
Weight (kg) [5]	1441	1626	1666	1811	1881
Compressor					
Model	D3DS-100X	D4DL-150X	D4DT-220X	D6DL-270X	D6DT-320X
Power input under op. (A) [2]	12,3	18,5	20,7	26	30,1
Max. power input (A) [3]	19,5	28,5	33	43	53,1
Tipo	Discus single-stage semi-hermetic reciprocating				
Lubricant	Mobil Eal Arctic 22				
Refrigerant	R404A				

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).
sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS				
Equipment model	5 x D4DH-250X	5 x D4DJ-300X	5 x D6DH-350X	5 x D6DJ-400X
Application	MT			
N. Compressors	5			
Rated output (HP)	25	30	35	40
Power voltage	400/3/50			
Heat extraction rate (W) [1]	207500	250000	315000	367500
Power input (W) [1]	78000	93500	115000	139000
Maximum power (W) [4]	114200	140800	172400	218450
Length C (mm)	3600			
Width O (mm)	1020			
Height M (mm)	1400			
Diam. Discharge line (mm)	67	80		
Diam. Suction line (mm)	6x67			
Weight (kg) [5]	2065	2098	2280	2370
Compressor				
Model	D4DH-250X	D4DJ-300X	D6DH-350X	D6DJ-400X
Power input under op. (A) [2]	28	33	43,1	49,8
Max. power input (A) [3]	41,5	52,5	63,5	83
Type	Discus single-stage semi-hermetic reciprocating			
Lubricant	Mobil Eal arctic 22			
Refrigerant	R404A			

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K
0K liquid subcooling).sw Bitzer 4.2.1

[2] per compressor, at the conditions referred to

[3] Per compressor

[4] WinQ details

[5] Standard Electrical Board

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS

Equipment model	5 x D6DL-270X	5 x D6DT-320X
Application	BT	
N. Compressors	5	
Rated output (HP)	27	32
Power voltage	400/3/50	
Heat extraction rate (W) [1]	96500	116000
Power input (W) [1]	64500	80000
Maximum power (W) [4]	116950	145600
Length C (mm)	3600	
Width O (mm)	1020	
Height M (mm)	1400	
Diam. Discharge line (mm)	54	
Diam. Suction line (mm)	6x67	
Weight (kg) [5]	2230	2340
Compressor		
Model	D6DL-270X	D6DT-320X
Power input under op. (A) [2]	26	30,1
Max. power input (A) [3]	43	53,1
Tipo	Discus single-stage semi-hermetic reciprocating	
Lubricant	Mobil Eal Arctic 22	
Refrigerant	R404A	

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling). sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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EPTABERG - POSITIVE-TEMPERATURE – 6-COMPRESSORS

Equipment model	6 x D6DJ-400X
Application	MT
N. Compressors	6
Rated output (HP)	40
Power voltage	400/3/50
Heat extraction rate (W) [1]	441000
Power input (W) [1]	166800
Maximum power (W) [4]	262140
Length D (mm)	4250
Width O (mm)	1020
Height M (mm)	1400
Diam. Discharge line (mm)	80
Diam. Suction line (mm)	5x80
Weight (kg) [5]	2810
Compressor	
Model	D6DJ-400X
Power input under op. (A) [2]	49,8
Max. power input (A) [3]	83
Tipo	Discus single-stage semi-hermetic reciprocating
Lubricant	Mobil Eal Arctic 22
Refrigerant	R404A

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K

0K liquid subcooling).sw Bitzer 4.2.1

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

[5] Standard Electrical Board

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TECHNICAL DETAILS FOR FRASCOLD COMPRESSOR PACKS

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS											
Equipment model	3x S 7 39 Y	3x S 10 51 Y	3x S 15 56 Y	3x V 15 59 Y	3x V 15 71 Y	3x V 20 84 Y	3x V 32 93 Y	3x Z 25 106 Y	3x Z 30 126 Y	3x Z 40 154 Y	
Application	MT										
N. Compressors	3										
Rated output (HP)	7	10	15	15	15	20	32	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	64251	83685	94803	97440	115800	135699	150204	178794	205302	255051	
Power input (W) [1]	26502	35130	37284	40410	48660	56133	59433	71976	79626	103773	
Maximum power (W) [4]	30294	38082	47271	51084	56532	69309	87921	80622	96738	119118	
Length (mm)	2260										
Width (mm)	910			1030							
Height (mm)	1970										
Height of 2 levels (mm)	N.A.										
Diam. Discharge line (mm)	42		54				67				
Diam. Suction line (mm)	2x54		4x54						2x54 + 2x67		
Weight (kg)	950	960	1000	1135	1135	1180	1230	1320	1355	1395	
Compressor											
Model	S 7 39 Y	S 10 51 Y	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	V 32 93 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y	
Power input under op. (A) [2]	15,63	20,54	24,13	25,6	29,75	33,58	35,14	43,67	46,04	61,01	
Max. power input (A) [3]	19,2	24,4	30,7	31,1	39,2	42,6	53,1	48,3	55,7	79,4	
Tipo	Semi-hermetic reciprocating										
Lubricant	Olio Frascold POE 32										
Refrigerant	R404A										

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

EPTABERG - LOW-TEMPERATURE APPLICATIONS – 3-COMPRESSOR SYSTEMS											
Equipment model	3x Q 5 33.1 Y	3x S 7 39 Y	3x S 10 51 Y	3x S 15 56 Y	3x V 15 59 Y	3x V 15 71 Y	3x V 20 84 Y	3x Z 25 106 Y	3x Z 30 126 Y	3x Z 40 154 Y	
Application	BT										
N. Compressors	3										
Rated output (HP)	6	7	10	15	15	15	20	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	16542	21228	27198	29742	30996	36765	40479	49533	58419	82323	
Power input (W) [1]	12213	15009	18897	20100	20973	25449	29508	38154	42534	47607	
Maximum power (W) [4]	24798	30294	38082	47271	51084	56532	69309	80622	96738	119118	
Length (mm)	2260										
Width (mm)	910			1030							
Height (mm)	1970										
Height of 2 levels (mm)	N.A.										
Diam. Discharge line (mm)	28		35								
Diam. suction line (mm)	2x54		4x54						2x54 + 2x67		
Weight (kg)	795	935	945	970	1130	1130	1170	1315	1340	1390	
Compressor											
Model	Q 5 33.1 Y	S 7 39 Y	S 10 51 Y	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y	
Power input under op. (A) [2]	7,73	10,24	12,42	17,57	17,84	19,31	21	27,16	27,68	35,85	
Max. power input (A) [3]	14,4	19,2	24,4	30,7	31,1	39,2	42,6	48,3	55,7	79,4	
Type	Semi-hermetic reciprocating										
Lubricant	Oil Frascold POE 32										
Refrigerant	R404A										

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor, at the conditions referred to

[3] Per compressor

[4] WinQ details

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EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS											
Equipment model	4x S 7 39 Y	4x S 10 51 Y	4x S 15 56 Y	4x V 15 59 Y	4x V 15 71 Y	4x V 20 84 Y	4x V 32 93 Y	4x Z 25 106 Y	4x Z 30 126 Y	4x Z 40 154 Y	
Application	MT										
N. Compressors	4										
Potenza Nominale (HP)	7	10	15	15	15	20	32	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	85668	111580	126404	85920	154400	180932	200272	238392	273736	340068	
Power input (W) [1]	35336	46840	49712	53880	64880	74844	79244	95968	106168	138364	
Maximum power (W) [4]	40392	50776	63028	68112	75376	92412	117228	107496	128984	158824	
Length (mm)	2950										
Width (mm)	910				1030						
Height (mm)	1970										
Height of 2 levels (mm)	N.A.										
Diam. Discharge line (mm)	42	54				67			80		
Diam. Suction line (mm)	2x67			5x67							
Weight (kg)	1225	1245	1290	1470	1485	1520	1630	1715	1845	1925	
Compressor											
Model	S 7 39 Y	S 10 51 Y	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	V 32 93 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y	
Power input under op. (A) [2]	15,63	20,54	24,13	25,6	29,75	33,58	35,14	43,67	46,04	61,01	
Max. power input (A) [3]	19,2	24,4	30,7	31,1	39,2	42,6	53,1	48,3	55,7	79,4	
Type	Semi-hermetic reciprocating										
Lubricant	Oil Frascold POE 32										
Refrigerant	R404A										

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 4-COMPRESSOR SYSTEMS										
Equipment model	4x Q 5 33.1 Y	4x S 7 39 Y	4x S 10 51 Y	4x S 15 56 Y	4x V 15 59 Y	4x V 15 71 Y	4x V 20 84 Y	4x Z 25 106 Y	4x Z 30 126 Y	4x Z 40 154 Y
Application	BT									
N. Compressors	4									
Rated output (HP)	5	7	10	15	15	15	20	25	30	40
Power voltage	400/3/50									
Heat extraction rate (W) [1]	22056	28304	36264	39656	41328	49020	53972	66044	77892	109764
Power input (W) [1]	16284	20012	25196	26800	27964	33932	39344	50872	56712	63476
Maximum power (W) [4]	33064	40392	50776	63028	68112	75376	92412	107496	128984	158824
Length (mm)	2950									
Width (mm)	910					1030				
Height (mm)	1970									
Height of 2 levels (mm)	N.A.									
Diam. Discharge line (mm)	28		35			42		54		
Diam. Suction line (mm)	2x67				5x67					
Weight (kg)	1020	1210	1240	1260	1460	1470	1515	1705	1745	1810
Compressor										
Model	Q 5 33.1 Y	S 7 39 Y	S 10 51 Y	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y
Power input under op. (A) [2]	7,73	10,24	12,42	17,57	17,84	19,31	21	27,16	27,68	35,85
Max. power input (A) [3]	14,4	19,2	24,4	30,7	31,1	39,2	42,6	48,3	55,7	79,4
Tipo	Semi-hermetic reciprocating									
Lubricant	Oil Frascold POE 32									
Refrigerant	R404A									

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS											
Equipment model	5x S 7 39 Y	5x S 10 51 Y	5x S 15 56 Y	5x V 15 59 Y	5x V 15 71 Y	5x V 20 84 Y	5x V 32 93 Y	5x Z 25 106 Y	5x Z 30 126 Y	5x Z 40 154 Y	
Application	MT										
N. Compressors	5										
Rated output (HP)	7	10	15	15	15	20	32	25	30	40	
Power voltage	400/3/50										
Heat extraction rate (W) [1]	107085	139475	158005	162400	193000	226165	250340	297990	342170	425085	
Power input (W) [1]	44170	58550	62140	67350	81100	93555	99055	119960	132710	172805	
Maximum power (W) [4]	50490	63470	78785	85140	94220	115515	146535	134370	161230	198530	
Length (mm)	3600										
Width (mm)	1030										
Height (mm)	1970										
Diam. Discharge line (mm)	54			67				80			
Diam. suction line (mm)	4x54			6x67							
Weight (kg)	1505	1530	1585	1835	1850	1890	1970	2100	2170	2250	
Compressor											
Model	S 7 39 Y	S 10 51 Y	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	V 32 93 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y	
Power input under op. (A) [2]	15,63	20,54	24,13	25,6	29,75	33,58	35,14	43,67	46,04	61,01	
Max. power input (A) [3]	19,2	24,4	30,7	31,1	39,2	42,6	53,1	48,3	55,7	79,4	
Type	Semi-hermetic reciprocating										
Lubricant	Oil Frascold POE 32										
Refrigerant	R404A										

[1] -10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor, at the conditions referred to

[3] Per compressor

[4] WinQ details

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 5-COMPRESSOR SYSTEMS							
Equipment model	5x S 15 56 Y	5x V 15 59 Y	5x V 15 71 Y	5x V 20 84 Y	5x Z 25 106 Y	5x Z 30 126 Y	5x Z 40 154 Y
Application	BT						
N. Compressors	5						
Rated output (HP)	15	15	15	20	25	30	40
Power voltage	400/3/50						
Heat extraction rate (W) [1]	49570	51660	61275	67465	82555	97365	137205
Power input (W) [1]	33500	34955	42415	49180	63590	70890	79345
Maximum power (W) [4]	78785	85140	94220	115515	134370	161230	198530
Length (mm)	3600						
Width (mm)	1030						
Height (mm)	1970						
Diam. Discharge line (mm)	35	42			54		
Diam. Suction line (mm)	6x67						
Weight (kg)	1560	1795	1800	1855	2100	2130	2225
Compressor							
Model	S 15 56 Y	V 15 59 Y	V 15 71 Y	V 20 84 Y	Z 25 106 Y	Z 30 126 Y	Z 40 154 Y
Power input under op. (A) [2]	17,57	17,84	19,31	21	27,16	27,68	35,85
Max. power input (A) [3]	30,7	31,1	39,2	42,6	48,3	55,7	79,4
Type	Semi-hermetic reciprocating						
Lubricant	Oil Frascold POE 32						
Refrigerant	R404A						

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

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EPTABERG - POSITIVE-TEMPERATURE APPLICATIONS – 6-COMPRESSOR SYSTEMS					
Equipment model	6x V 15 71 Y	6x V 20 84 Y	6x V 32 93 Y	6x Z 30 126 Y	6x Z 40 154 Y
Application	MT				
N. Compressors	6				
Rated output (HP)	15	20	32	30	40
Power voltage	400/3/50				
Heat extraction rate (W) [1]	231600	271398	300408	410604	510102
Power input (W) [1]	97320	112266	118866	159252	207546
Maximum power (W) [4]	113064	138618	175842	193476	238236
Length (mm)	4250				
Width (mm)	1030				
Height (mm)	1970				
Diam. Discharge line (mm)	67		80		
Diam. Suction line (mm)	5x80				
Weight (kg)	2150	2215	2330	2570	2660
Compressor					
Model	V 15 71 Y	V 20 84 Y	V 32 93 Y	Z 30 126 Y	Z 40 154 Y
Power input under op. (A) [2]	29,75	33,58	35,14	46,04	61,01
Max. power input (A) [3]	39,2	42,6	53,1	55,7	79,4
Type	Semi-hermetic reciprocating				
Lubricant	Oil Frascold POE 32				
Refrigerant	R404A				

[1] –10°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor, at the conditions referred to

[3] Per compressor

[2] WinQ details

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EPTABERG - LOW-TEMPERATURE APPLICATIONS – 6-COMPRESSOR SYSTEMS			
Equipment model	6x V 15 71 Y	6x Z 25 106 Y	6x Z 30 126 Y
Application	BT		
N. Compressors	6		
Rated output (HP)	15	25	30
Power voltage	400/3/50		
Heat extraction rate (W) [1]	73530	99066	116838
Power input (W) [1]	50898	76308	85068
Length C (mm)	113064	161244	193476
Maximum power (W) [4]	4250		
Width (mm)	1030		
Height (mm)	1970		
Diam. Discharge line (mm)	42	54	
Diam. suction line (mm)	5x80		
Weight (Kg)	2115	2495	2540
Compressor			
Model	V 15 71 Y	Z 25 106 Y	Z 30 126 Y
Power input under op. (A) [2]	19,31	27,16	27,68
Max. power input (A) [3]	39,2	48,3	55,7
Type	Semi-hermetic reciprocating		
Lubricant	Oil Frascold POE 32		
Refrigerant	R404A		

[1] -35°C/+40°C – according to EN12900 (20°C suction gas temp. 0K liquid subcooling).

[2] per compressor at rated conditions

[3] per compressor

[4] WinQ data

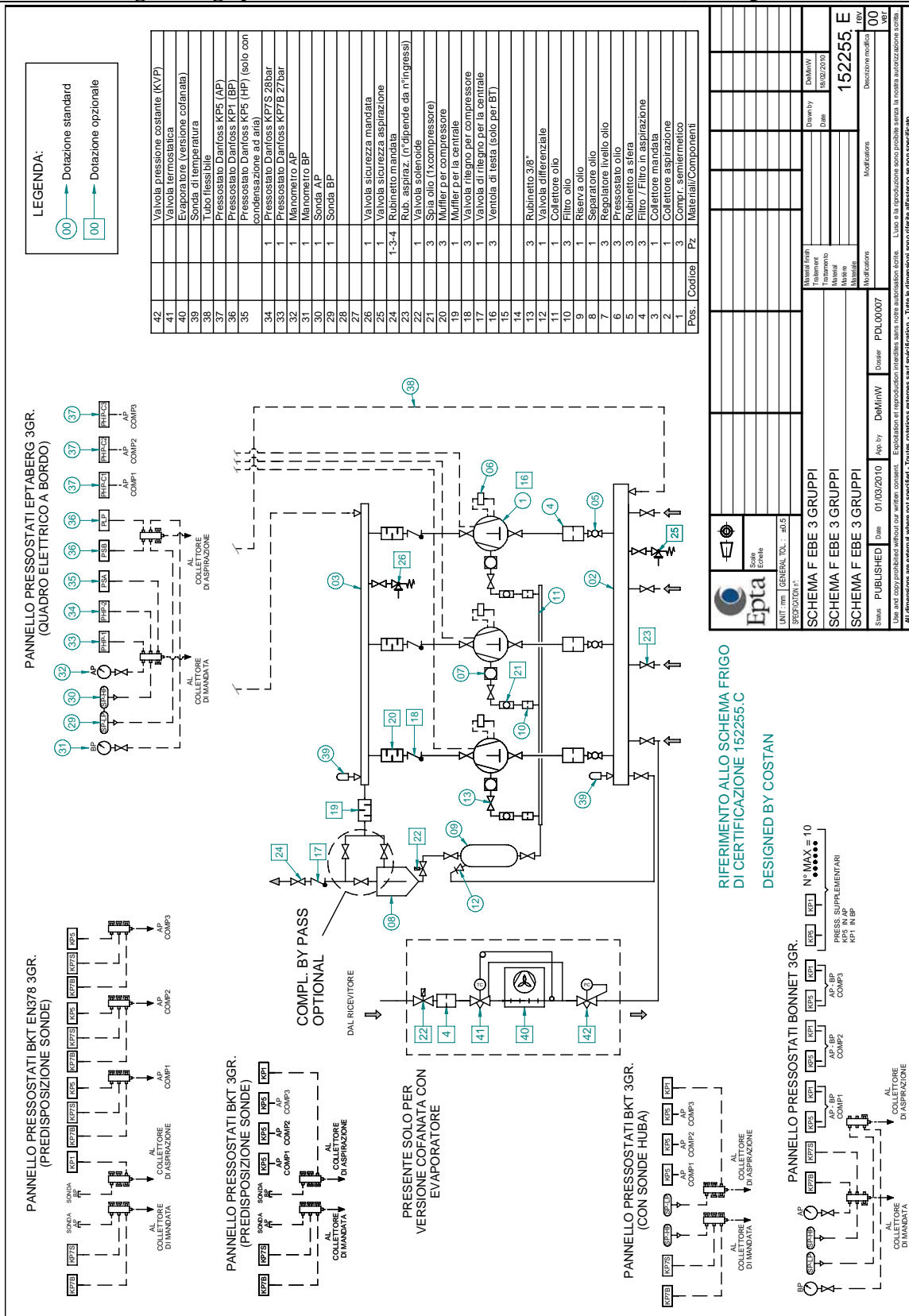
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REFRIGERATING SYSTEM SCHEMATICS

List of refrigerating diagrams attached to the manual, as being an integral part thereof.

Function	Diagram n°	Notes
Refrigerating schematics for 3-compressor Eptaberg	152255.E	single oil separator
Refrigerating schematics for 4-compressor Eptaberg	152256.D	single oil separator
Refrigerating schematics for 5-compressor Eptaberg	152257.D	single oil separator
Refrigerating schematics for 6-compressor Eptaberg	152258.D	single oil separator
Refrigerating schematics for 3-compressor Eptaberg	152259.E	multiple oil separator also applicable to 4-5-6 compressors
Refrigerating schematics for 3-compressor Eptaberg	152335.D	single anti-liquid tank also applicable to 4-5-6 compressors
Refrigerating schematics for 3-compressor Eptaberg	152336.D	multiple anti-liquid tank also applicable to 4-5-6 compressors

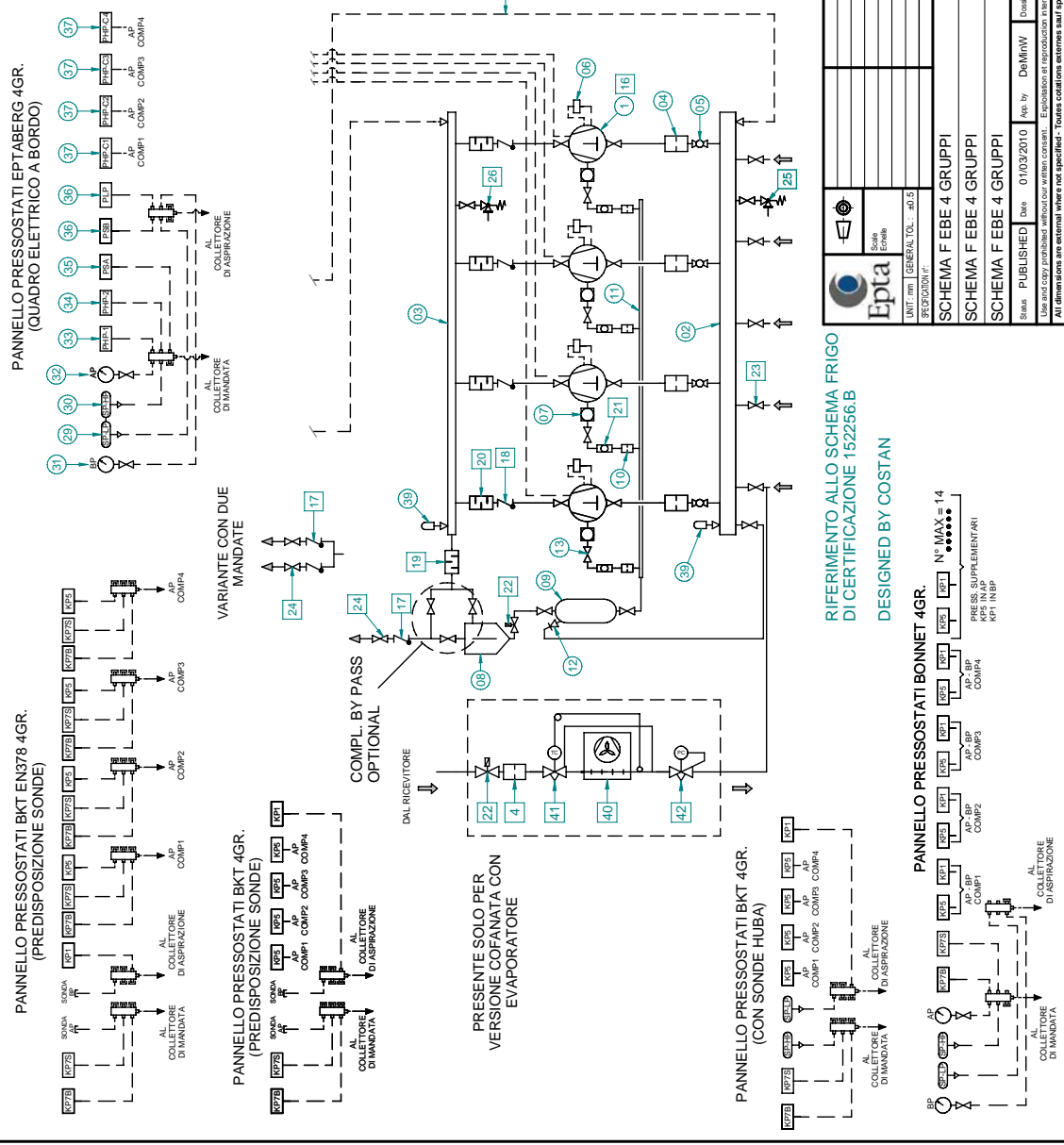
Refrigerating system schematics for EPTABERG 3GR (3 compressors)



Refrigerating system schematics for EPTABERG 4GR (4 compressors)

LEGENDA:

42	Valvola pressione costante (KVP)
41	Valvola termostatica
40	Evaporatore (serie cofanata)
39	Sonda di temperatura
38	Termostato Danfoss KPS (AP)
37	Termostato Danfoss KP1 (BP)
36	Pressostato Danfoss KP5 (HP) (solo con condensazione ad aria)
34	Pressostato Danfloss KP7S 28bar
33	Pressostato Danfloss KP7B 27bar
32	Manometro AP
31	Manometro BP
30	Sonda AP
29	Sonda BP
28	
27	
26	Valvola sicurezza mandata
25	Valvola sicurezza aspirazione
24	Rubinetto mandata
23	1-3-4-5
22	Rub. aspiraz. (n° dipende da n° ingressi)
21	Valvola solenoide
20	Spia olio (1xcompressore)
19	Muffler per compressore
18	Muffler per la centrale
17	4
16	Valvola ritengo per compressore
15	1-2
14	Valvola di ritengo per la centrale
13	4
12	Valvola di testa (solo per BT)
11	4
10	Rubinetto 3/8"
9	4
8	Valvola differenziale
7	Collettore olio
6	4
5	Filtro olio
4	4
3	Riserv a olio
2	Separatore olio
1	4
	Regolatore livello olio
	4
	Pressostato olio
	4
	Rubinetto a sfera
	4
	Filtro / Filtro in aspirazione
	4
	Collettore mandata
	1
	Collettore aspirazione
	1
	Compr. semiermetico
	4
	Materiali/Componenti
	Pz



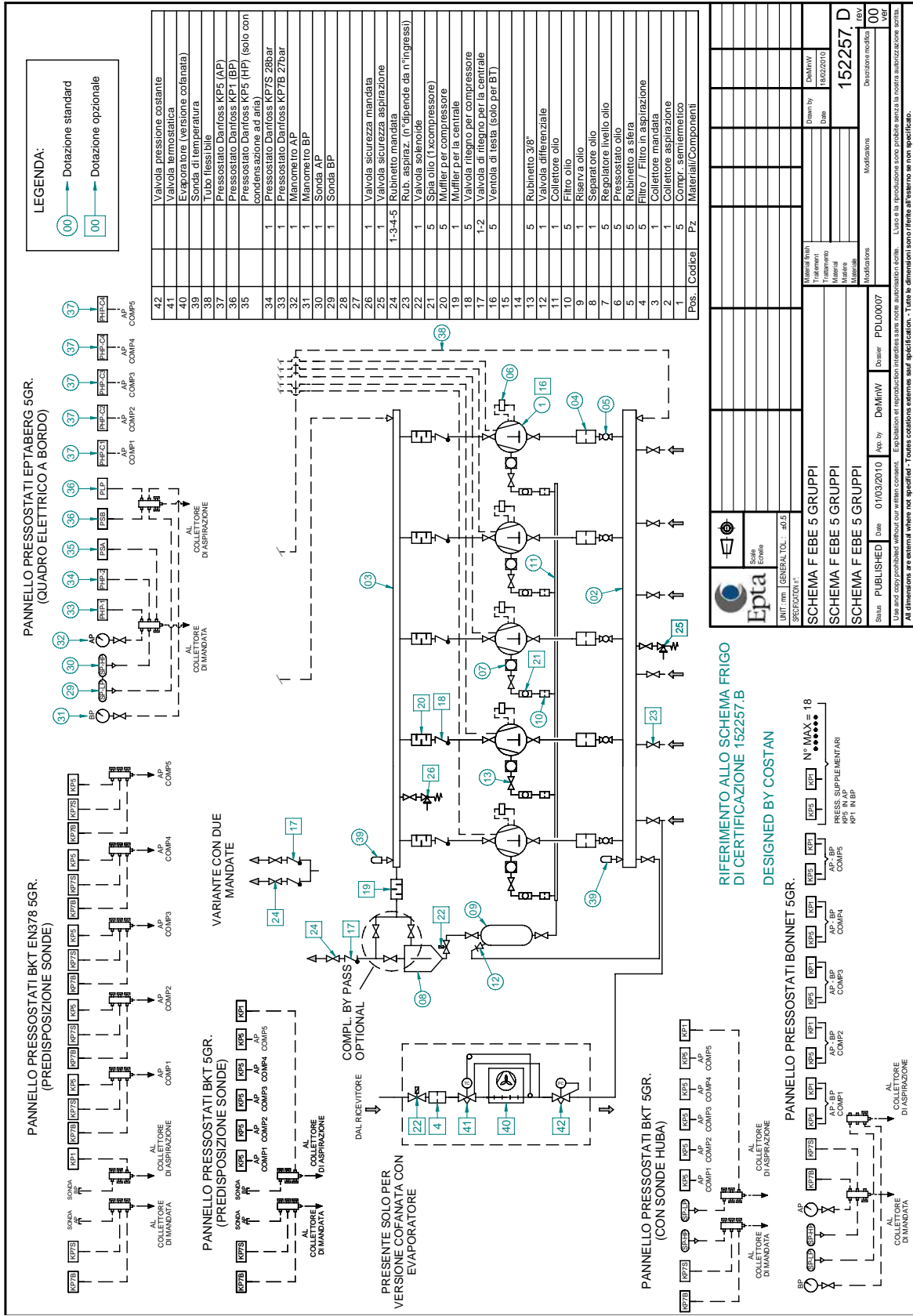
**REFERIMENTO ALLO SCHEMA FRIGO
 DI CERTIFICAZIONE 152256.B
 DESIGNED BY COSTAN**

PANNELLO PRESSOSTATI BONNET 4GR.
 N° MAX = 14
 PRESS. SUPPLEMENTARI
 KPS IN/AP
 KPI IN/BP

	UNIT: mm GENERAL TOL.: ±0.2	SEZIONATA IN:	Modificata da: Tiratura: Modificata: Modificata:	Disegnata da: Data: Disegnata:	152256 D	00
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Serie: PUBLISHED Date: 01/03/2010 App. by: DeMinW Dossier: PDL00007		Modificatore: Modificatore: Modificatore: Modificatore:		Modificatore: Modificatore: Modificatore: Modificatore:		152256 D Disegnatore/modificatore: Disegnatore/modificatore: Disegnatore/modificatore: Disegnatore/modificatore:

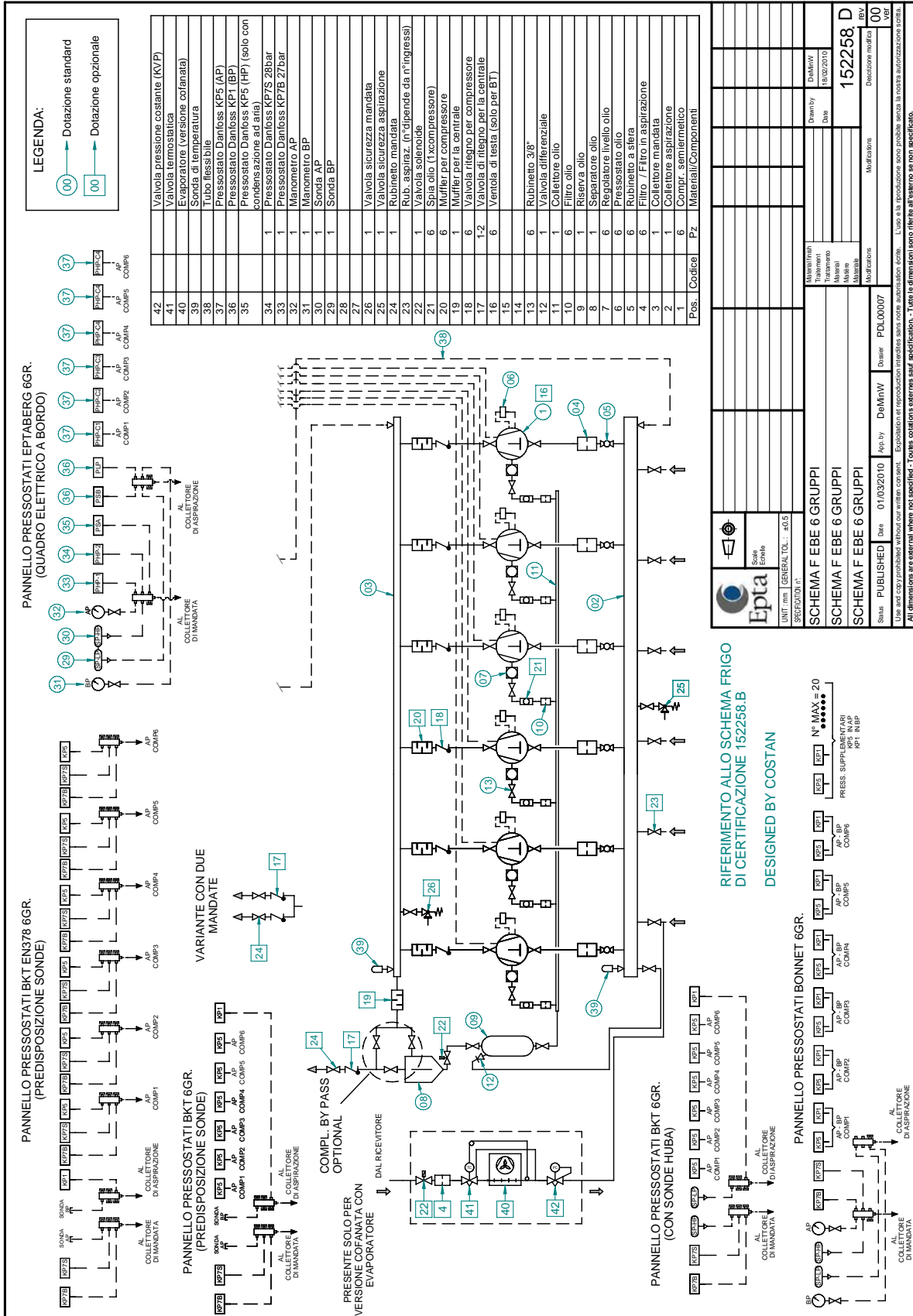
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Refrigerating system schematics for EPTABERG 5GR (5 compressors)



	UNIT: mm GENERAL TOL: +/-0.15 SPECIFICATION:	SCALE:	Revision: D Date: 01/03/2010
SCHEMA F EBE 5 GRUPPI SCHEMA F EBE 5 GRUPPI SCHEMA F EBE 5 GRUPPI		Status: PUBLISHED Author: DeMinW Date: 01/03/2010 Drawn: PDU0007	Drawn by: DMARW Date: 16/03/2010 152257. D Descrizione modifica:
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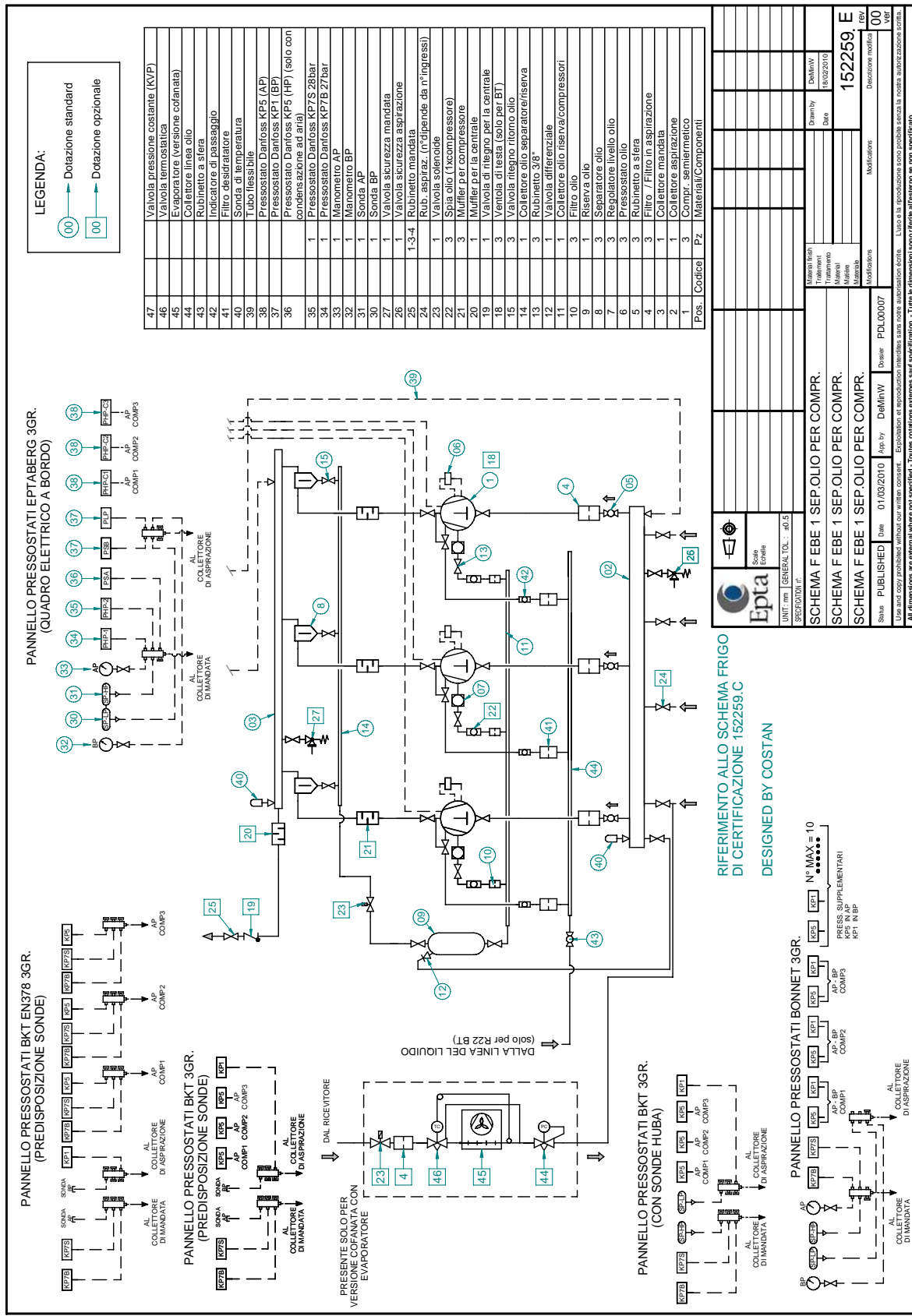
Refrigerating system schematics for EPTABERG 6GR (6 compressors)



RIFERIMENTO ALLO SCHEMA FRIGO
 DI CERTIFICAZIONE 152258.B
 DESIGNED BY COSTAN

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Refrigerating system schematics for EPTABERG - 3 compressors - with one oil separator per compressor, also applicable to 4, 5 and 6-compressor packs



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Refrigerating system schematics for EPTABERG and EPTABERG PLUS – 3 compressors - with one anti-liquid tank, also applicable to 4 and 5-compressor packs

Nota bene: per collegamento pannello pressostatati vedi schemi cod. 152255, 152256, 152257, 152258.

LEGENDA:
00 — Dotazione standard
00 — Dotazione opzionale

43	Rubinetto a sfera (capellotto)	Completamento escabibile	TRATT.	TRATT.	TRATT.	IMq	D
42	Indicatore di passaggio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
41	Filtro distributore	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
40	Collettore linea liquido (per iniezz.)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
39	Sonda di temperatura	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
38	Tubo flessibile	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
37	Pressostato Danfoss KP5 (HP)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
36	Pressostato Danfoss KP1 (BP)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
35	Pressostato Danfoss KP5 (HP)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
34	Pressostato Danfoss KP7S 28 bar	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
33	Pressostato Danfoss KP7B 27 bar	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
32	Manometro AP	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
31	Manometro BP	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
30	Sonda AP	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
29	Sonda BP	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
28	Collettore in aspirazione	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
27	Bottiglia anti-olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
26	Valvola sicurezza mandata	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
25	Valvola sicurezza aspirazione	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
24	Rubinetto mandata	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
23	Rub. aspiraz. (r' dipende da n' ingressi)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
22	Valvola solenoide	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
21	Sala olio (1 compressore)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
20	Muffler x compressore	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
19	Muffler x la centrale	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
18	Valvola filtraggio x compressore	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
17	Valvola filtraggio x la centrale	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
16	Ventola di testa (solo per BT)	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
15	Valvola sicurezza accum. di liquido	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
14	Insieme ritorno olio gravitazionale	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
13	Rubinetto 3/8"	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
12	Valvola differenziale	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
11	Collettore olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
10	Filtro olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
09	Riserva olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
08	Separatore olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
07	Regolatore livello olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
06	Pressostato olio	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
05	Rubinetto a sfera	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
04	Filtro in aspirazione	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
03	Collettore mandata	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
02	Collettore aspirazione	Completamento	TRATT.	TRATT.	TRATT.	IMq	D
01	Compr. semiautomatico	Completamento	TRATT.	TRATT.	TRATT.	IMq	D

All dimensions are external where not specified - Toutes cotations externes sauf specification - Tutte le dimensioni sono riferite all'esterno se non specificato.

UNIT: mm GENERAL TOL.: ±0.05

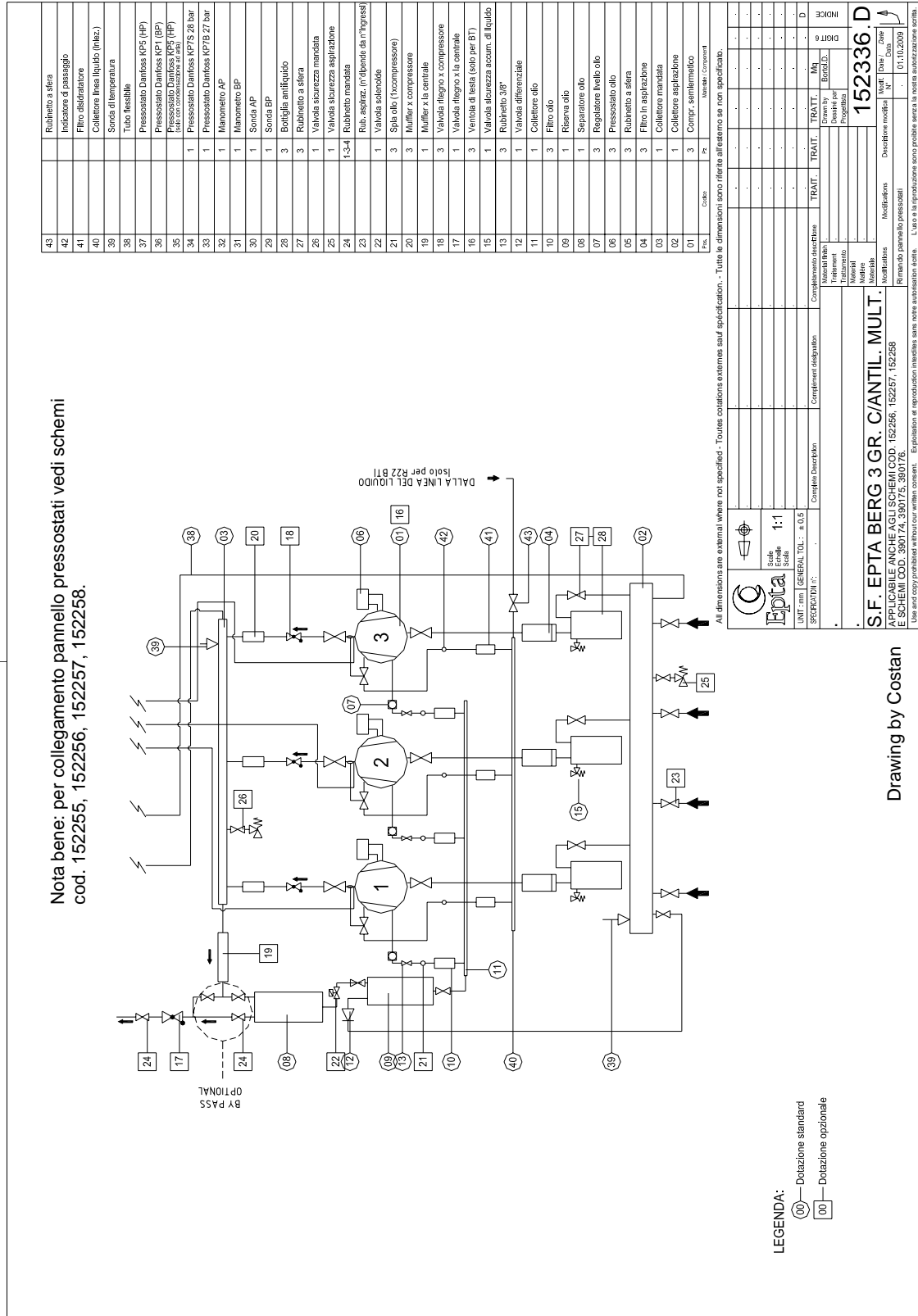
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C				MKT	

Refrigerating system schematics for EPTABERG and EPTABERG PLUS 3GR with one anti-liquid tank per compressor, also applicable to 4 and 5-compressor packs



LEGENDA:
 (00) — Dotazione standard
 (00) — Dotazione opzionale

Drawing by Costan

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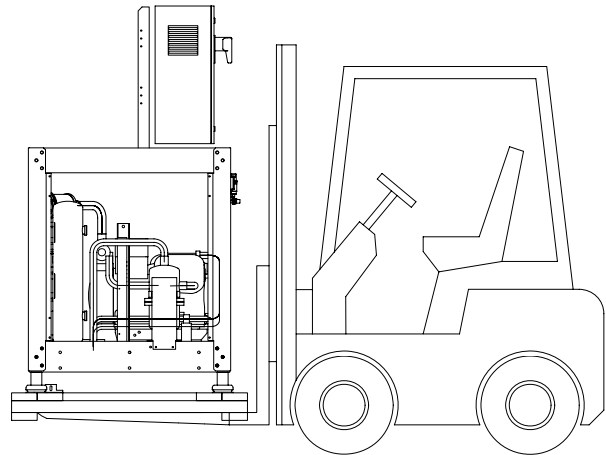
030 - HANDLING AND POSITIONING

For correct machine handling and positioning, the following precautions will have to be taken, bearing in mind that all the operations indicated below must be carried out by authorized personnel only and in conformity with the applicable safety regulations in terms of both handling equipment and operating procedures.

Hoisting by lift truck

Steps to be taken:

- Upon receiving the unit, make sure that this has not been damaged. If it has, contact your nearest Epta after-sales service center;
- When delivered, the standard unit is fastened to wood skids; check that these are firmly secured to the unit before starting to lift.
- make sure the carrying capacity of the fork-lift truck is suitable for the weight of the pack in question (check the weight as stated in the table at the end of this chapter and on the pack's serial plate);
- Slide the forks of the truck in between the undercarriage and the wood pallet; check that the unit is balanced before starting to lift and move. The maximum overall dimensions, wood pallet included, are those shown at the end of this chapter.



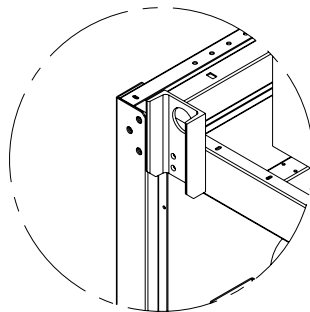
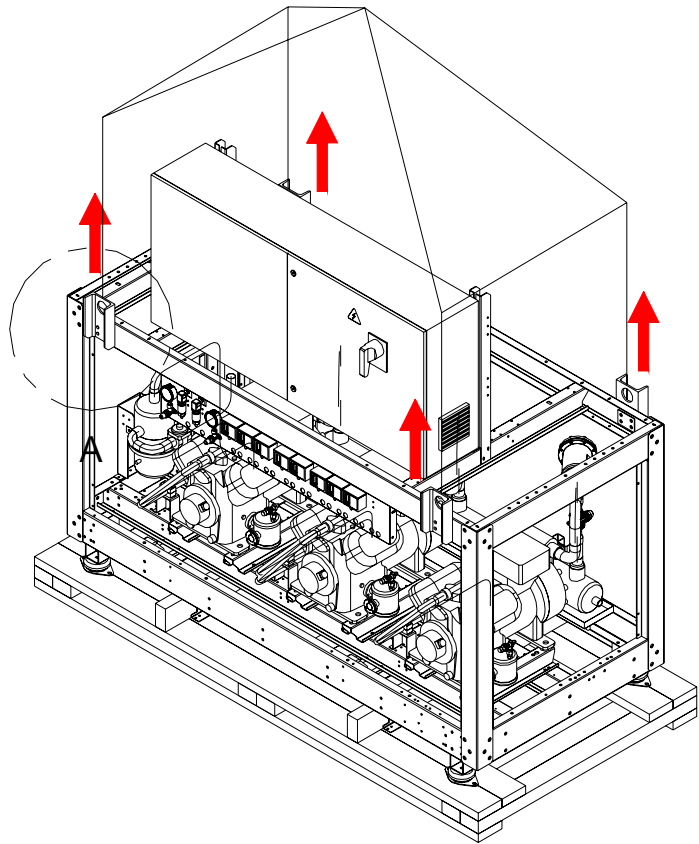
Ensure that nobody is in the handling area during the hoisting procedures.

Handling by crane

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Steps to be taken:

- ensure that the carrying capacity of the crane is suitable for the weight of the pack in question (check the weight as stated in the table at the end of this chapter and on the pack's serial plate);
- It is advisable to hoist it using only the ad-hoc yellow supports located at the corners of the pack.
- It is advisable to use a lifting rocker arm in order to avoid damage to the electrical board.
- Ensure that the unit is balanced and stable before starting to lift.
- The equipment is standard-supplied on a wood platform to which it is secured; hoist the equipment as much as needed to remove the platform.
- Finish equipment hoisting.
- When the equipment is in its position, remove the yellow supports used for handling, as these could hamper access to the electrical board.



Hoisting support



Ensure that nobody is in the handling area during the hoisting procedures.



Epta disclaims whatever responsibility for damage to the electrical board and/or to the refrigerating equipment as could result from handling by procedures other than those indicated in these pages.

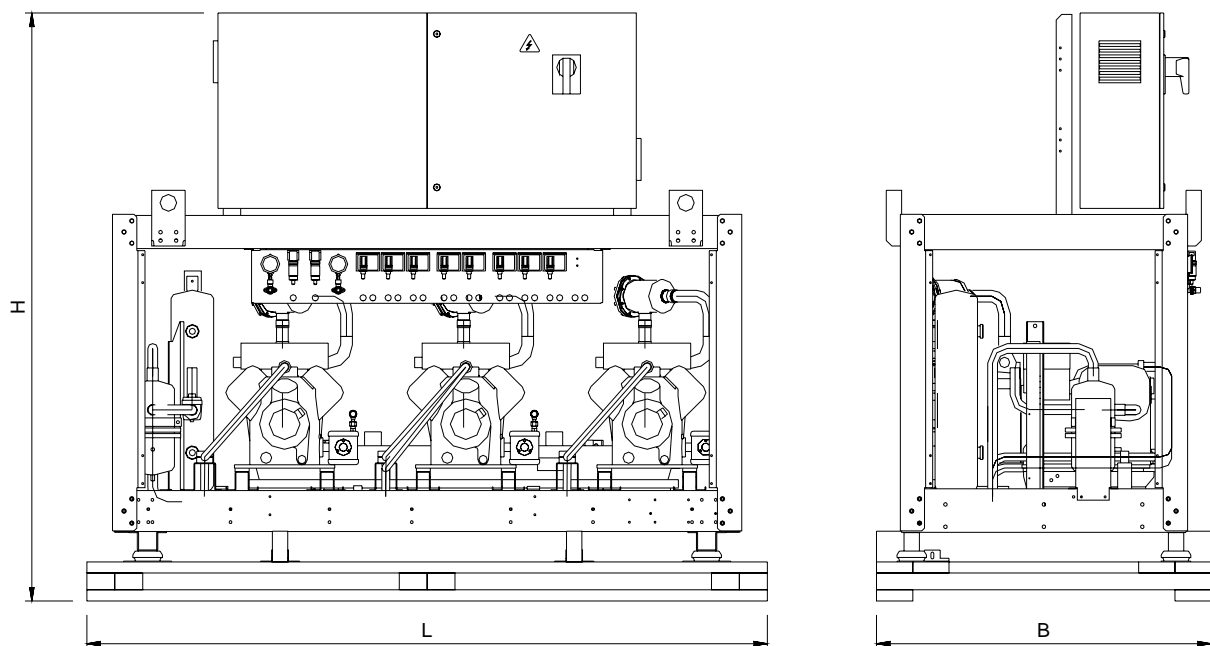
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Indoor/outdoor installation

In the event of the equipment not being immediately installed in its place of work but being temporarily positioned in the open, it is advisable to keep it dry and in a suitably sheltered position.

Dimensions and maximum weights, handling pallet included

The table below states the maximum mass, pallet included, for every equipment version in the EptaBerg Plus family: it is advisable to use this table to ensure that the hosting device to be used meets the requisite lifting capacity and guarantees safe positioning of the equipment.



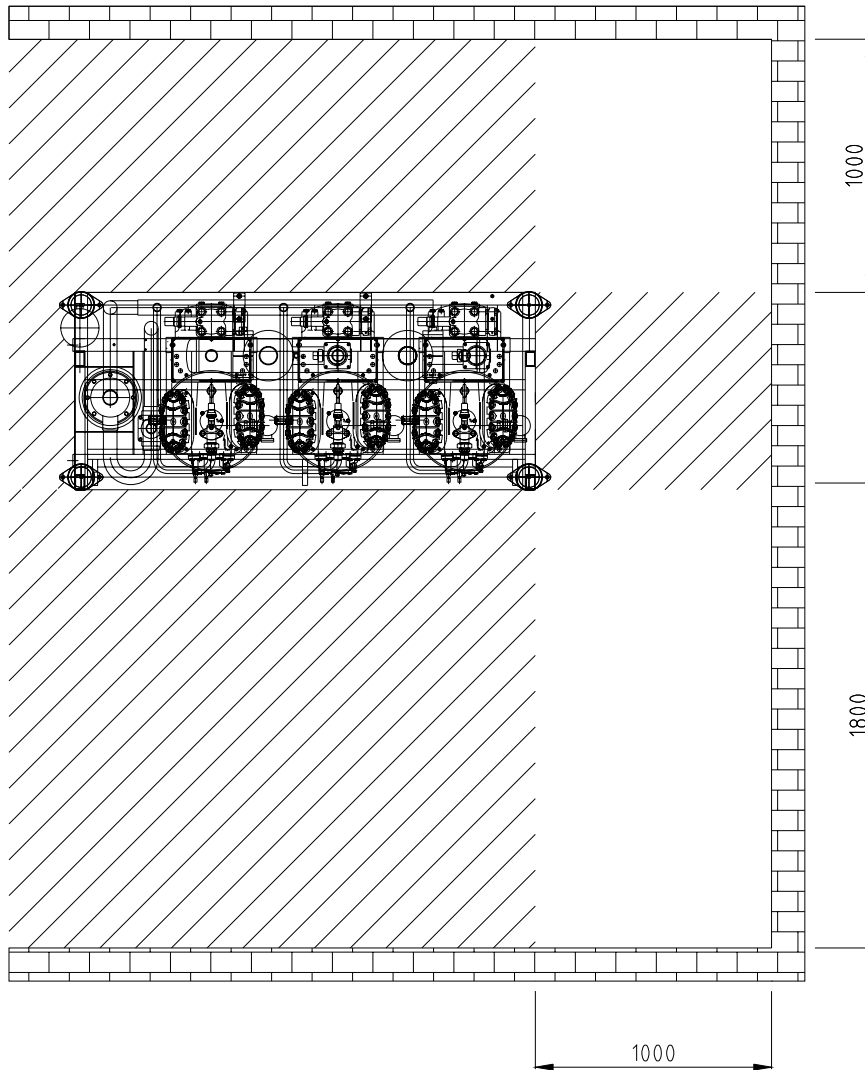
Equipment model	Maximum mass (kg)	Maximum dimensions (mm)		
		Length (mm) L	Height (mm) H	Width (mm) B
3 compressors	1530	2590	2110	1200
4 compressors	2020	3240	2110	1200
5 compressors	2470	3890	2110	1200
6 compressors	2920	4540	2110	1200

Functional clearance

Correct unit operation and servicing can be ensured by proper placement. Sufficient clearance must therefore be allowed for maintenance purposes, with a view to protecting authorized operators.

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Make certain that the grids and slots providing ventilation to the plant room are unobstructed and that any mechanical air devices are in perfect working order.



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040 - INSTALLATION

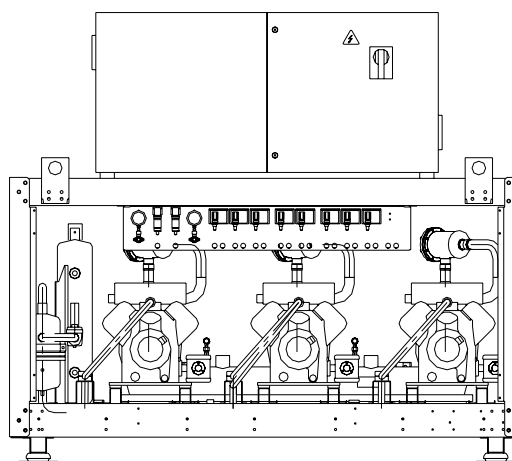
Take the protective packaging (if provided) off the equipment and position this wherever it is to be installed. Being potentially hazardous, packaging components (plastic bags, polystyrene, wood, cardboard, nails, etc.) must never be left within the reach of children, and must be disposed of in accordance with applicable regulations.

For correct operation it is important to lay the machine horizontally.

Use shims to correct any unevenness existing on the laying surface.

Check that the equipment is level by resting a spirit level on the support of the suction manifold.

Then secure the system to the base stiffly using screw anchors and the fastening holes on the machine's vibration dampening pads.



Installation in machine rooms

Non-standard plant rooms must satisfy the requirements established by standards EN 378-3. The provisions concerning dimensions, construction, accessibility and ventilation must be especially complied with.

If the plant room enjoys natural ventilation, the total area of natural ventilation outlets must be at least (EN378-3:2002 5.5):

$$A = 0,14 \times m^{1/2}$$

where:

A = is a free opening in square meters;

m = is the mass in kilos of the refrigerant fluid with the greatest charge, having one part whatsoever in the special plant room;

0,14= is the ratio between the area and the mass – in square meters – divided by the square root of the kilos

The free flow of air from windows, grids and outlets or pipes must not be impaired by walls or barriers, enclosing walls, buildings or other obstruction means. Mind the density of the refrigerating fluid.

Mechanical ventilation, if any, must be ensured by fans able to exchange the air in the plant room, and at least:

$$V = 14 \times m^{2/3}$$

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where:

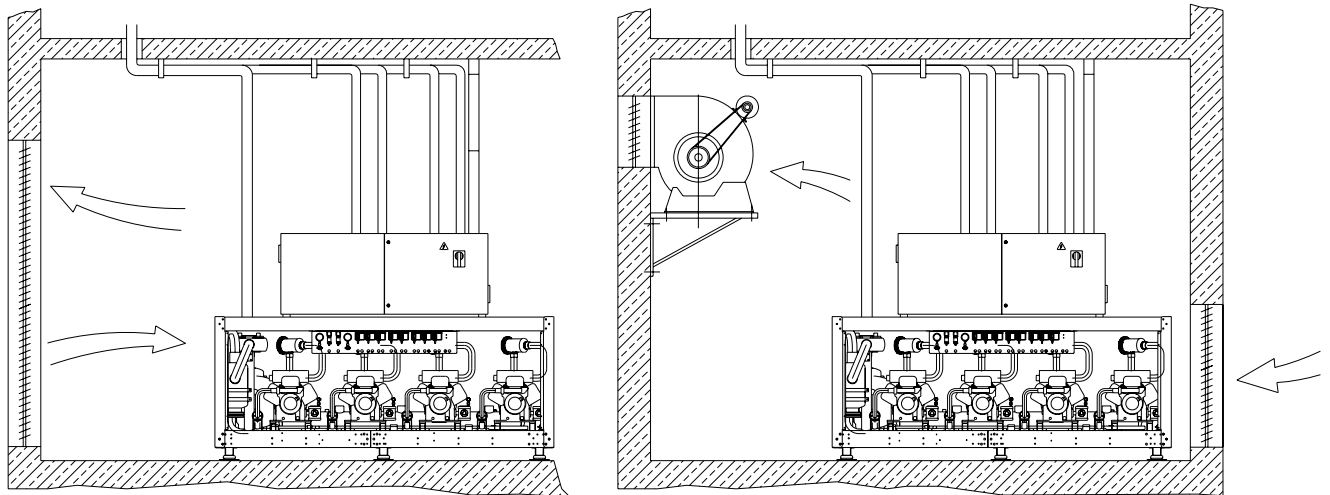
$V =$ is the air flow rate in liters per second;

$m =$ is the mass in kilos of the refrigerant fluid with the greatest charge, having one part whatsoever in the special plant room;

$14 =$ is the conversion factor

The ventilation system must renew the air in the room 15 times per hour.

It must be possible to operate the fans from both inside and outside the plant room, and when the special plant room is installed in a basement, the outside plant room control switch must be on ground floor.



Detectors and alarm

When plant rooms are near areas in which people are present on a regular basis, restricted areas of difficult evacuation, detectors and alarms must be installed as established by standards EN378-3 in order to speedily give warning of any hazardous concentration of cooling fluid vapor in the air. Such devices must operate an attended alarm and/or a noticeable alarm that may enable the consequent actions by the personnel.

Machine accessibility

To set or service the electronic door module (controller box), open the door using the appropriate key that only the authorized technical personnel has.

Power connections

The electrical board was designed for the power supply available at the place of installation.

To select operating voltage it is necessary to relocate the jumpers on the auxiliary transformer as appropriate.

The electrical board must be supplied power using a cable with a cross-section suitable for the equipment's power rating and for the laying conditions existing in the place of installation.

The serial number plate on the machine shows, among other details, maximum electrical power. This value is also indicated in the performance table of the DESCRIPTION / TECHNICAL

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DETAILS section of this manual. It is the electrician's duty to size the wiring and earthing systems in accordance with applicable regulations 64-8 (Italian Law 46 - 5 March 1990).

For equipment installed indoor, power cables must enter the board from above, through a hole drilled on the appropriate plate, which is located above the master switch.

For equipment installed outdoors the power cables must enter from below, using the plate at the bottom of the electrical board (the plate is on the right and is accessed by opening the electrical board).

For the purposes of maintaining the electrical board's protection rating it is necessary to use the appropriate grommet.



EPTA disclaims all liability for incorrectly set-up wiring systems or which are not in conformity with the applicable CEI standards.

All machine parts are connected to the earth system lead (yellow-green).



The fitter must connect the machine to the earthing system of the building.



Short-circuit hazard: when drilling the hole through which cables are going to run it is necessary to exercise maximum caution and prevent metal chips from entering the electrical panel.



EPTA disclaims all liability for untimely triggering due to incorrect differential relay setting or accidents caused by lack of coordination between the differential relay setting and the earthing system.

Ensure that the cables not having spring-terminals (e.g. motor power cables connected to contactors) are tightly secured to the terminal-strip. During transportation and handling vibrations may have loosened them. Check electrical board wiring and make sure that the cable sheaths do not touch the refrigerant pipes or the compressor. Also ensure that no component undergoes wear due to friction.

Refrigerating connection

The equipment is supplied including;

- set of filtering elements (cartridges)
- pressurized dry-air in the refrigerating circuit.

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The pipes for connection to the system are located at the rear of the equipment. The discharge pipe leading to the condenser is blocked; all other valves leading to the open are closed. Take off the copper disks, open the taps and scavenge the pressurized air before connecting the unit up to the system. Use a stiff annealed copper pipe suitable for refrigeration systems.

Certain basic rules have to be followed when making R404A systems. Brazing must be done in nitrogen gas atmosphere to prevent the formation of system-damaging residue. It is most important that the fitter keep to the following instructions:

- Use nitrogen gas suitable for refrigeration purposes, marked "R".
- Connect one end of the pipe to be brazed to the nitrogen tank using a pressure-reducing valve. To adjust the pressure correctly, remember that the flow of nitrogen must be only just perceived by the palm of the hand. Braze as usual.


Place BOA flexible vibration absorbers between the equipment and the system's fixed pipes; install shutoff valves on the discharge and condenser return lines, on the liquid line and on the suction line, referring to the connection diagrams contained in the equipment's technical literature and to the instructions in the Use and Maintenance Instructions for refrigerating systems QSM000446A_ (for systems serviced by Epta).

Fit one pressure intake connection (Schrader valve) on the suction stretch and one on the liquid line for scavenging (vaccum) operations and the leak test.

Introduce an initial amount of oil into the oil reserve through the filling connection 1/4"SAE located on the inlet valve (shut the valve beforehand) until the oil level reaches the upper viewer. The approximate amount to be let in ranges from approximately 6 to 22 liters, depending on the reserve model installed (HCYR 80, HCYR 120 or HCYR 200 and HCYR 300). Then open the valve. The safety valves, when located outdoors, must be adequately protected to avoid their getting soiled and damaged by the elements;

The position of outdoor-leading exhaust pipes starting from the safety valves must ensure that no obstruction hazard exists and must avoid any personal or property damage during the exit of refrigerant Complete suction line insulation.

Below are some regulations covering the installation of systems that use POE oils and R404A gas refrigerant. For more detailed information and in case of doubt, contact the Epta after-sales service.

	<p>The semi-hermetic compressors used on the EptaBerg Plus equipment use polyester oil as lubricant (POE). A drawback of this oil, which is compatible with chlorine-free refrigerants (HFC), is that it is very sensitive to environmental humidity (strong hygroscopicity), which means that certain rules have to be observed as regards use, in order not to jeopardize its functional characteristics. All oil containers must stay sealed until the oil has to be introduced into the compressor. Avoid leaving the inside of the compressors and parts of the refrigeration circuit in contact with the outside environment even during routine system maintenance. Never pour left-over lubricant into damp-permeable containers (e.g. plastic containers) but keep it in its original metal can.</p>
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Visual inspection of the equipment

All permanent connections must be individually appraised by duly qualified and experienced personnel.

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Pressure-tightness test

The dimensions of the safety valve were chosen in order to avoid excessive pressure rise in the vessels not protected by safety pressure switch due to a fire event, as per the instructions in European standards EN 13136.

This must be performed after visual inspection.

Before and during the test, every measure to prevent hazards to persons and property in case of explosion must be taken.

The pressure-tightness test is performed with equal pressure values on both sides of the system:

- High pressure side: test pressure = 16 bar ($PSa=28 \text{ bar}$)
- low pressure side: test pressure = 16 bar ($PSb=17 \text{ bar}$)

In order to achieve test pressure it is necessary to:

- shut off all those components that may be damaged (low pressure-switches, low-pressure transducers, low-pressure meters);
- open all taps and automatic valves and keep them open;

The minimum overpressure time for the system undergoing the pressure-resistance test is 6 hours (system leakage check).

The pressure-tightness test may be performed, if this is considered useful, also for system sections shut off by taps (partial tests). The pressure test is finished when both sides of the system have been put to overpressure and no works are needed on permanent joints.

The outcome of the test must be recorded by the person in charge of the jobs.

Preparation of filters and vacuum test

When the machine is delivered, filter internal parts are not mounted. These are supplied in air-tight containers, in numbers appropriate for initial startup and first replacement.

At first place the supplied dryer cartridges Castel 4490/A on both filters (liquid and suction). **Dryer cartridges 4490/A must be placed in the filter using the appropriate holding device (mesh inner tube, cap and spring); cartridges 4495/C (on the suction line) only use a top cap, a bottom cap and a spring according to the instructions on the filter's packaging.**


Close the circuit, connect up the vacuum pump and scavenge the system and/or affected stretches. In case of systems containing charges above 20 kg of halides or hydrocarbons, the system must be dried and scavenged to a vacuum below 270 Pa absolute (same value for both sides, high and low pressure). Vacuum must be kept for at least 30 minutes and then dry nitrogen must be introduced. Then scavenge again to vacuum below 270 Pa absolute. Keep the system in this condition for at least 6h. Then ensure that the pressure was actually kept and introduce the system refrigerating fluid. The vacuum test may be performed, if this is considered necessary or useful, also for system sections shut off by taps (partial tests).


The charge will only be filled up when the appliances fed have reached their operating temperature.

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Checking pressure switches, filling and starting up the system

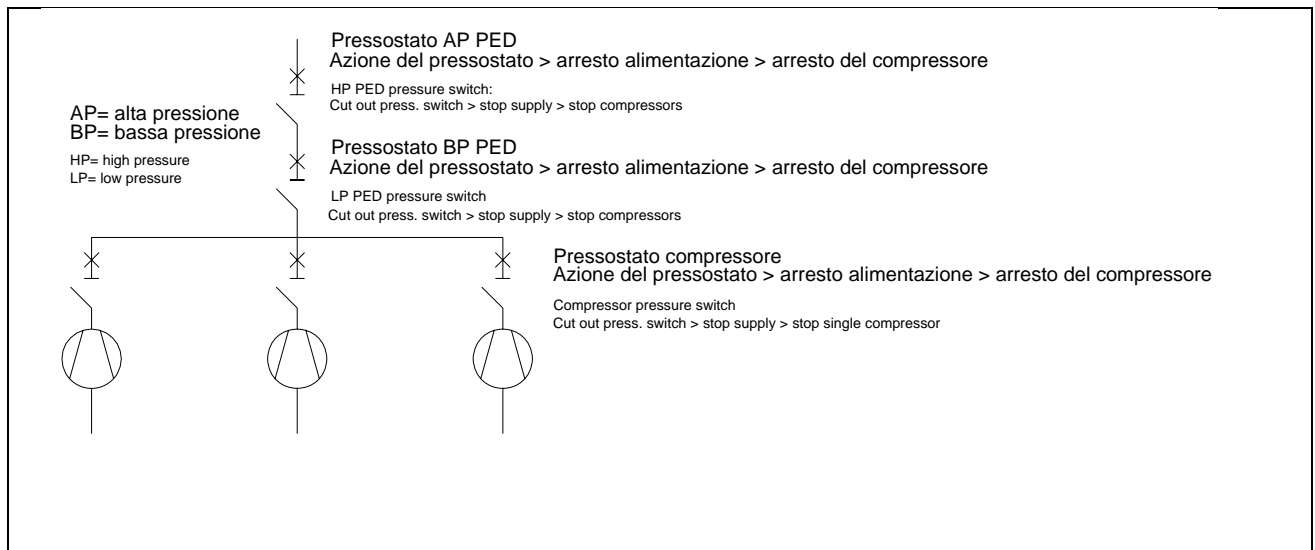
The system's safety pressure switches KP7S and KP7B have a sticker on the outside, that indicates tripping pressure and serial number. Pressure switches KP7S are marked red and factory-set for a pressure of 28bar whereas pressure switches KP7B are marked blue and factory-calibrated for a pressure of 27bar. After being calibrated, the adjustment screw is sealed with lead to prevent tampering. Both pressure switches are manual-*reset* type. to *reset* pressure switch KP7B just remove the upper lid and push the green lever inwards; to reset pressure switch KP7S it is necessary to open the pressure switch (the reset button is up in the right corner).

 **Check that the lead seals are intact; do not tamper with the adjustment screw of safety pressure switches.**

 **Prior to resetting safety switches manually (KP7S or KP7B), identify and remove the causes that have led to system failure.**

The high pressure switches protecting the compressors are set to trip at 26.5bar. Set the system/compressor safety low pressure switch. Set the high pressure switches for fan capacity operation and the electromechanical security (duty cycle) low pressure switch.

The figure below shows the running diagram for the safety pressure switches featured in each single compressor.



The action of pressure switches, with reference to the refrigerating diagrams in Chapter 2, can be summarized as follows:


- HP safety pressure switches: (HP PED pressure switch): when pressure rises above the calibration value downstream of the compressors, then these pressure switches trip, shutting down the power supply and consequently stopping all the compressors.

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- BP safety high-pressure switch (LP PED pressure switch): when pressure drops below the calibration value following an excessive decrease in suction temperature, then this pressure switch trips, which shuts down the power supply and consequently stops all the compressors;
- Compressor protecting pressure switch HP side: when pressure rises in an individual compressor then this pressure switch trips, which shuts down the power supply to that compressor and stops it immediately.

Perform an initial charge of refrigerant in liquid condition on the line downstream from the receiver (liquid line) using tanks with liquid-gas tap or overturning the container if this is equipped with a standard valve. These steps are necessary to prevent any change in the relative concentration of refrigerant components.

Before starting up the machine it is necessary to power the crankcase outer heater (oil heater) for at least 6-8 hours. Ensure that the discharge and suction taps are open. Then start one compressor at a time, supervising the relevant equipment (pressure-meter) and operating pressure on both the discharge side (compression) and on the return side (suction).

	Jobs requiring the electrical board to be live and open may be carried out only by qualified and expert personnel. When the electrical board is open and energized, this is visually signalled by an alarm/danger red intermittent light. The person in charge of these jobs must absolutely not leave the machine when the safety devices provided by the manufacturer are disabled.
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Check rotation of the remote condenser fans (the fans must expel air from the condenser battery). Then, if necessary, correct high pressure switch settings.

Top up with refrigerant through the suction line following the instructions above and modulating the amount of refrigerant.

Check the oil level in the oil reserve and in each compressor (while the compressor is off). The oil level in the float regulator must reach 3/8 of the viewer, whereas in the oil reserve it must be at the upper viewer after the system has run for a couple of days. If this is not the case, top up the initial charge until the required levels are reached, strictly following the above instructions. Do not add oil unless the oil level has dropped below the lower viewer's mid-line. After a certain operation time (about 12 hours), or when a remarkable increase in leaks through the suction filters is detected, stop the plant. Shut both filters off and replace the filtering cartridges: place a mechanical filtering cartridge (Castel 4495/C) in the suction filter and a dryer cartridge (Castel 4490/C) in the liquid line filter using the supplies. Evacuate the affected pipe stretches and then restart the system. Check the oil level in the compressors and in the oil reserve again. The oil level in the reserve must never reach below the lower viewer.

NOTE: If the oil reserve should be replaced in a system that has already worked, add oil very carefully. Top up again only after the system has worked for a whole day (which is enough for oil to get back to the oil reserve). If the oil level does not reach the upper viewer, add the necessary amount. Conversely, if the oil level should exceed the upper viewer, it is indispensable to empty the excess through the bottom valve¹.

¹ As stated in Carly literature 13.3 (6/95)

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Overcurrent circuit breakers

I.D.	SETTING
QM1	Compressor rated current (In)
QM2	Compressor rated current (In)
QM3	Compressor rated current (In)
QM4	Compressor rated current (In)

Pressure switch for compressor mechanical backup operation

Low pressure side		TN	BT
I.D.	FUNCTION	R404A bar ¹ (°C) ²	R404A bar (°C)
PSB ³	COMPRESSOR SHUTDOWN	2,6 (-15)	0,5 (-37)
	RESIDUAL CURRENT DEVICE (differential)	1,0	0,7

SAFETY PRESSURE SWITCHES

Low pressure side		TN	BT
I.D.	FUNCTION	R404A bar (°C)	R404A bar (°C)
PLP ⁴	SYSTEM PROTECTION	1,5 (-25)	0 (-46)
	DIFFERENTIAL	1,0	0,7

High pressure side		TN	BT
I.D.	FUNCTION	R404A bar (°C)	R404A bar (°C)

¹ Bar relative.

² The saturation temperature corresponding to calibration pressure is shown in brackets.

³ Low pressure switch, automatic-reset, adjustable-calibration type, for mechanical back-up operation in the event of controller failure (compressor cycling).

⁴ System-protection low-pressure switch KP1, automatic-reset, adjustable-calibration type.

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PHP-1	SYSTEM PROTECTION	27	27
		(+59)	(+59)
	DIFFERENTIAL	fixed 4,0	fixed 4,0
PHP-2	SYSTEM PROTECTION	28	28
		(+60,6)	(+60,6)
	DIFFERENTIAL	fixed 4,0	fixed 4,0
PHP-C	COMPRESSOR PROTECTION	26,5	26,5
		(+58,1)	(+58,1)
	DIFFERENTIAL	6,0	6,0

DELAY DEVICES

DESCRIPTION	I.D.	TIME (MIN)
LIQUID LEVEL (if any)	RLL	30
ACTUATION OF EMERGENCY BACK-UP REGULATION	R0	40-50
BACK-UP CUT-IN FOR COMPRESSOR #1	R1	1
BACK-UP CUT-IN FOR COMPRESSOR #2	R2	2
BACK-UP CUT-IN FOR COMPRESSOR #3	R3	3
BACK-UP CUT-IN FOR COMPRESSOR #4	R4	4
BACK-UP CUT-IN FOR COMPRESSOR #5	R5	5
BACK-UP CUT-IN FOR COMPRESSOR #6	R6	6

ON-SITE TESTING AND INSPECTION ADVICE



1. All the settings in these tables must be verified.
2. All pressure switches and delay devices must be tested and test-operated.
3. Pressure switches are factory-calibrated by Quality Control Dept. following procedure OP00144Q. They must be attached an I.D. label including calibration values and date, as well as the ID of the person who performed the calibration. Their lead seal must be intact. When commissioned as per operational instruction QOP019110A, correct tripping of safety pressure-switches was simulated and verified

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050 - ELECTRICAL BOARD TECHNICAL SPECIFICATIONS

1.Overview.

1.1 On-board electrical panel for the control of # **3/6** compressors and # **0-6** condenser fans.

2.Reference standards

2.1 **EN 60204-1** in force (Electrical equipment of machines)

2.2 **EN 60439-1** in force (Low-voltage electrical board)

3.Power supply and operating voltage

3.1 Standard: 400V/3Ph/50Hz

3.2 As for 230V auxiliary voltage adjustment, cfr. chap.6.

3.3 Observe the wiring inlet position

The cables conveying power to the equipment must enter the board from the front, left hand side of the electrical board, through a hole drilled on the appropriate plate, which is located above the master switch.

For the purposes of maintaining the electrical board's protection rating it is necessary to use the appropriate wire bushing.

Short-circuit hazard: when drilling the hole through which cables are going to run it is necessary to exercise maximum caution and prevent metal chips from entering the electrical panel.

3.5 Power wires must be directly connected to terminals L1-L2-L3 of the master switch, observing the cyclic direction of phases.

**The earthing wire must be connected to the earthing terminal marked PE.
Connect this before connecting the phases.**

4. Master circuit breaker and power distribution.

4.1 Master circuit breaker, magnetic type: SIEMENS series 3VL from 63A to 1600A including terminal caps.

4.2 Yellow-red handle that can be padlocked (emergency) assembled onto the door.

When servicing the equipment the circuit breaker must be OFF

5.Distribution.

5.1 Bus bar feeder system SIEMENS SIRIUS 3R, distance between bar centers 60mm.

5.2 Overcurrent switches on compressors and fans are connected to the contactors by way of accessories that afford safe current transmission.

5.3. The overcurrent switch-contactor set is fastened to a suitable plate that can be fitted onto the bars by spring terminals, thus ensuring safe electrical transmission.

6.Auxiliary circuit

6.1.1 **Power supply and operating voltage 230V/50-60Hz. /**

6.1.2 **230V** auxiliary voltage from transformer LEGRAND 230V-400V/230V.

The electrical panel is mounted on the machine following the power voltage requested at the time of ordering. Before powering up the machine, verify that the auxiliary transformer's primary voltage setting suits the equipment's voltage and ensure that the transformer's secondary output is constantly **230V** . Transformer output voltage can be adjusted by **+/-15V**: for effective **230V** output, adjusting the transformer's primary is capital. Adjustment depends on the voltage supplied by the electricity company. In the standard version the transformer is always provided readily adjusted for operation on 400V/50-60Hz. Non-standard versions are prepared for the voltage requested at the time of ordering.

6.3 **Red** color wires.

6.4 Cable numbering as per diagram.

6.5 Line start fuses for auxiliary circuits with fuses 5x20 (250Vac).

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6.6 Timers: FINDER 80.11

6.7 Auxiliary relays: FINDER 55.34

6.8 Warning lights: SIEMENS series SB32 52-6AA_0 diameter 22 with a led lamp.

6.9 of Auxiliary circuit distribution 230V through shielded LEGRAND bars art. 004880 / 004881.

6.10 PED Directive-compliant safety general low-pressure and high pressure switches.

6.10.1 System shutdown in case of low pressure emergency by pressure-switch KLP (Danfoss KP1).

6.10.2 System shutdown in case of high pressure emergency by pressure-switch KHP1 (Danfoss KP7B) and KHP2 (Danfoss KP7S). These pressure-switches are pre-set at the factory and need to be re-engaged manually after they have tripped and after the cause of the fault has been removed.

6.11 Emergency regulation (back-up):

Mechanical back-up operation in case of failure of the high and low pressure electronic control.

6.11.1 Low pressure mechanical back-up.

Performed by pressure switch PSB (Danfoss KP1) and delay devices R0-1-2-3. Functioning: when the electronic controller fails, all compressors stay off. If the off time is shorter than the time set for timer R0 (40-50 min.) Safety pressure switch PSB trips and delay timer R1 starts to count. This starts compressor n°1 and actuates delay devices R2/3 which relate to the compressors to be started next. Compressors under backup operation are controlled through pressure switch PSB and the delay devices. PSB must absolutely be set for the pack's average operating value and must never interfere with the KLP (Danfoss KP1) back up low-pressure switch.

The compressors involved in back-up operation can be chosen by placing jumpers on terminals PS2-PS4-PS6-PS8-PS10-PS12.

The electrical board is prepared for a possible connection of one pressure switch per back-up compressor.

6.11.2 High pressure safety back-up

It is performed by safety pressure switch PSA (Danfoss KP2).

Operation: upon reaching its actuation threshold, pressure switch PSA turns all condenser fans on. Its setting must be above the electronic processor's threshold, but below the high pressure value set for back up pressure switches KHP1/2, as per PED Directive (Danfoss KP7B/S). PSA differential must be set to a value that may allow for condenser cooling.

Back-up regulation, low-pressure especially, is an emergency condition that does not optimize compressor and pressure management. Therefore regulation by the electronic control must be restored as soon as possible.

6.12 Alarms

6.12.1 Red alarm warning lamps on the front of the electrical board.

6.12.2 Clean contacts for remote transmission on the terminal board: Alarm contacts are closed when on and open when in alarm status.

6.12.3 **Only clean contacts and voltage below 50V can be led to the alarm terminal and respective contacts. For details on alarm signals, cfr. chapter 15 - Warning lamps .**

6.13 Liquid level and general liquid injection:

6.13.1 The refrigerant liquid level undergoes monitoring; alarm signaling is delayed by a timer.

6.13.2 Liquid injection for low-temperature systems Control of general liquid-injecting valve through auxiliary contacts in parallel with all the compressors.

7. Compressor circuit

7.1 Compact system SIEMENS SIRIUS S0/2/3

7.1.1 Overcurrent switch (Overload cutout) and circuit breaker that can be padlocked when compressors are under maintenance (Siemens series S0/2/3)

7.1.2 Electrical board versions with residual current device **Merlin Gerin RH99M** and associated Toroid TA30 operate the overcurrent circuit breaker (overload cutout) by way of a release coil that ensures AC23 maneuvers and cuts off the electrical circuit.

7.1.3 Contactors: Siemens series S0/2/3, coordinated with their respective overcurrent device following the tables supplied by SIEMENS

7.1.4 Compressors are protected by an overload cutout switch performing the following functions:

- protection against short-circuit
- protection against overcurrent

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- protection against phase loss
- protection against phase imbalance: this trips when current input differs by 30%-50% between phases.

7.1.5 Poor oil level protection circuit. by pressure switch or oil electronic detector.

7.1.6 Overheating-protection circuit monitored by thermistor probes connected to probe monitor KRIWAN INT69VS / SE-BE according to DIN 44081 standards.

7.1.7 Maneuvers and life of contactors

Motor contactors have been designed for a million maneuvers on average (1 maneuver = 1on+1off) with the maximum rated current in category AC3. Considering that the limit of an average compressor is 10-12 starts per hour, the useful life of a contactor will be **10** years if their starts occur under the severest conditions (continuous breakaway - maximum compressor load - rated current). Considering that in systems including several compressors, these are made turn over by the electronic controller, that under normal operation conditions electric motors are used by 50-40% of their rated nominal current and considering also that systems have neutral zone periods (in which systems are stable and compressors are not required to go on or off), contactor life must necessarily be longer than the length they were designed for.

(Data for contactor maneuvers were taken from catalogue SIEMENS SIRIUS 3R).

It is worth underlining and bearing in mind that in our case, contact life is **not** determined by the number of contactor maneuvers performed (which, considering the rated current in category AC3 may total 250 maneuvers/hour) but by the compressor: for small/medium compressors max. 10-15 maneuvers/hour; large compressors: max. 6-7 maneuvers/hour. Exceeding the compressor maneuvers/hour physical limit may damage the equipment itself and even cause short circuit in the electric motor.

Short circuit is prevented by the overcurrent device protecting the compressor.

After a short-circuit, both the overcurrent protection cutout and the contactor will have to be replaced .

(cfr. chapter 23 "important notice").

8. Condenser fan circuit

8.1 Compact system SIEMENS SIRIUS S0/S2.

8.1.1 Overcurrent switch Siemens Sirius series S0/S2

8.1.2 For versions featuring an electrical board with RCBO: overcurrent cutout Siemens Sirius series S0/S2 with release coil operated by residual current device **Merlin Gerin RH99M and associated Toroid TA30.**

8.1.3 Contactor SIEMENS S00/0/2.

8.2 Wire the fan power circuit up strictly following the phase sequence L1-L2-L3.

9. Control circuit to operate the machine-cooling fans and the machine-room air expeller:

9.1 Fuses for the electrical board to power the machine-room air expeller

9.2 Cooling control for machines fitted with an enclosure is performed by a thermostat (Danfoss EKC202D1, Carel iR33C0HB00 or Dixell XC1015D).

10. Control electronics

10.1 The controllers available and installed on request can be chosen among the following four:

10.1.1 Danfoss AK-PC530

10.1.2 Danfoss AK-PC710

10.1.3 Carel pco3

10.1.4 Dixell xc1015d

As for the controller features, cfr. the relevant manual issued by the manufacturer.

11. OPTIONAL residual current circuit protection against indirect contact:

11.1 Two residual current devices for overall safety and general services

11.1.1 residual current device #.1 to protect the PED pressure-switch circuits and back-up operation regulation.

11.1.2 residual current device #.2 protects secondary auxiliary circuits, liquid level, alarms and the electronic regulation box.

The two residual current devices never shut down the machine due to failure of secondary services.

11.2 Residual current devices for compressor protection.

Each compressor has a residual current device, so that when one compressor fails this does not affect the others.

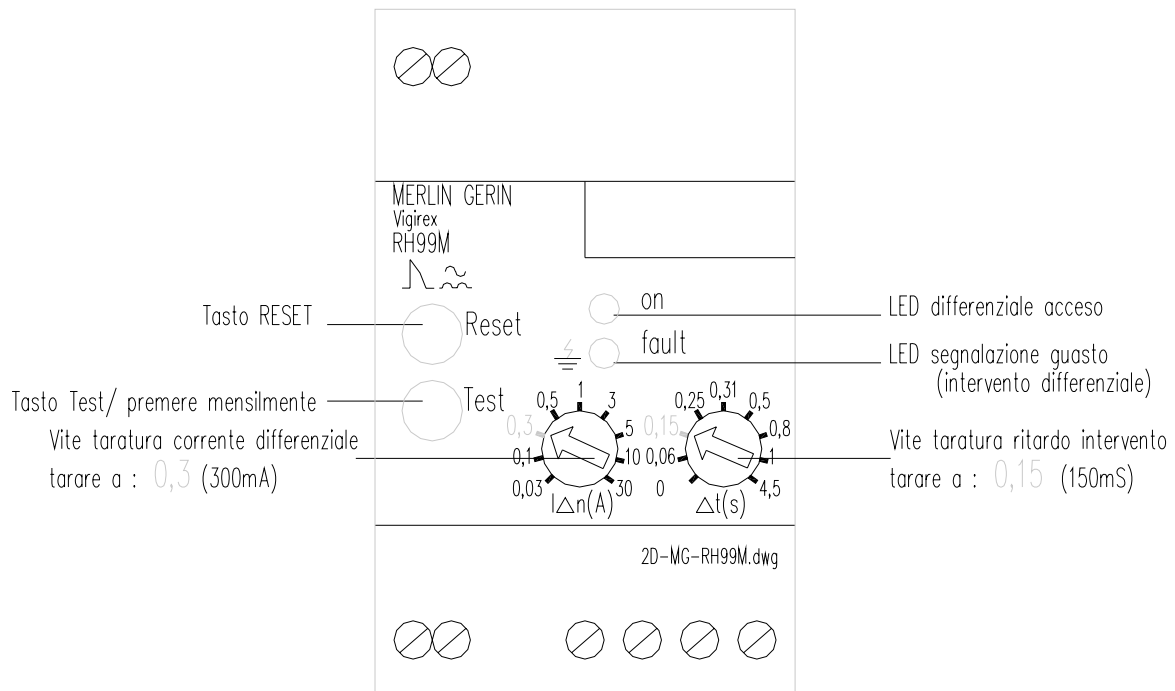
11.3 Residual current devices to protect condenser fans

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Each condenser fan control has a residual current device, which means that when one fan control circuit fails it does not affect the others.

The setting for residual current devices must not be below an ID current of 300mA. Tripping time must not be below 150mS.
Residual current devices must be test-operated regularly, using the appropriate push-button.

Settings for RCDs



11.4 RCDs for compressors and fans act on the cutout coil of their respective overcurrent devices, with the consequent AC23 maneuver cutting off the relevant circuit.

11.5 RCDs are installed on an IP54-rated panel shielded by Plexiglas on the left side of the electrical boards' front. RCDs can be test-operated by opening the Plexiglas door and pressing the ad-hoc button.

They can be reset by actuating the test button; for compressors and fans it will also be necessary to reset the respective overcurrent devices.

12. Terminal strip.

12.0 Phoenix spring terminals organized in terminal strips as below:

12.1 In general terms their layout follows the ergonomic criteria as per Costan's layout, i.e. the following principles, from left to right of the electrical board front: Electronic controller terminals (pressure-switch PED, Back-up op., liquid level, Auxiliary services) – compressors 1-6 – alarms – condenser fans 1-6.

13. Wiring.

13.1 Wiring as per reference EN-IEC standards.

13.2 All wires are flame-proof type.

13.3 The electrical board was designed for an estimated internal temperature of 50°C.

14. Earthing connections.

14.1 The bottom plate, door and all other metal parts are connected to the earthing system.

14.2 For the earthing connection of devices, a copper bar of suitable cross-section and dimensions to standards is provided.

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14.3 When connecting devices to the earthing system on-site (condenser fans, machine-room expeller etc..) always use the earthing bar.

15. Warning lamps

15.1 Warning lamps are diameter d=22, ingress protection rating IP65.

15.2 Bulbs are 230V LED-type.

15.3 Warning lamp color: alarm = red

On = white

15.4 Each lamp is marked as in the wiring diagram; a plate with the inscription indicating the relevant function is at the top front.

15.5 Detail of warning lamps

<i>Type</i>	<i>color</i>	<i>I.D.</i>	<i>name</i>	<i>Function</i>
Operation	white	H230	Voltage	The auxiliary circuit is hot. This warning lamp must be on at all times.
Alarm	red	HLP	Low pressure	Low-pressure alarm on the general circuit. The system is shut down.
Alarm	red	HHP	high pressure	High-pressure alarm on the general circuit Pressure switches KP7B / KP7S have tripped.
Alarm	red	HLL	level Liquid	Low refrigerant liquid level in the circuit.
Alarm	red	H3	back-up regulation	Mechanical back-up regulation has come on due to failure of the electronic control.
Alarm	red	HA1-6	Compressor	General compressor alarm: tripping of overcurrent device due to alarm condition
Alarm	red	H01-6	Compressor	Low oil level in compressor with mechanical oil pressure switch. Warning lamp disabled because of electronic oil pressure switch: in case of low oil level, see oil led in the same.
Alarm	red	HST1-6	Compressor	Alarm from thermistor probe on compressor
Alarm	red	H11-16	Fan	Condenser fan/s general alarm (tripping of overcurrent device/Klixon on motor-driven fan)
Alarm	red	HEC	Controller	Controller alarm: Goes on in the event of any controller alarm.

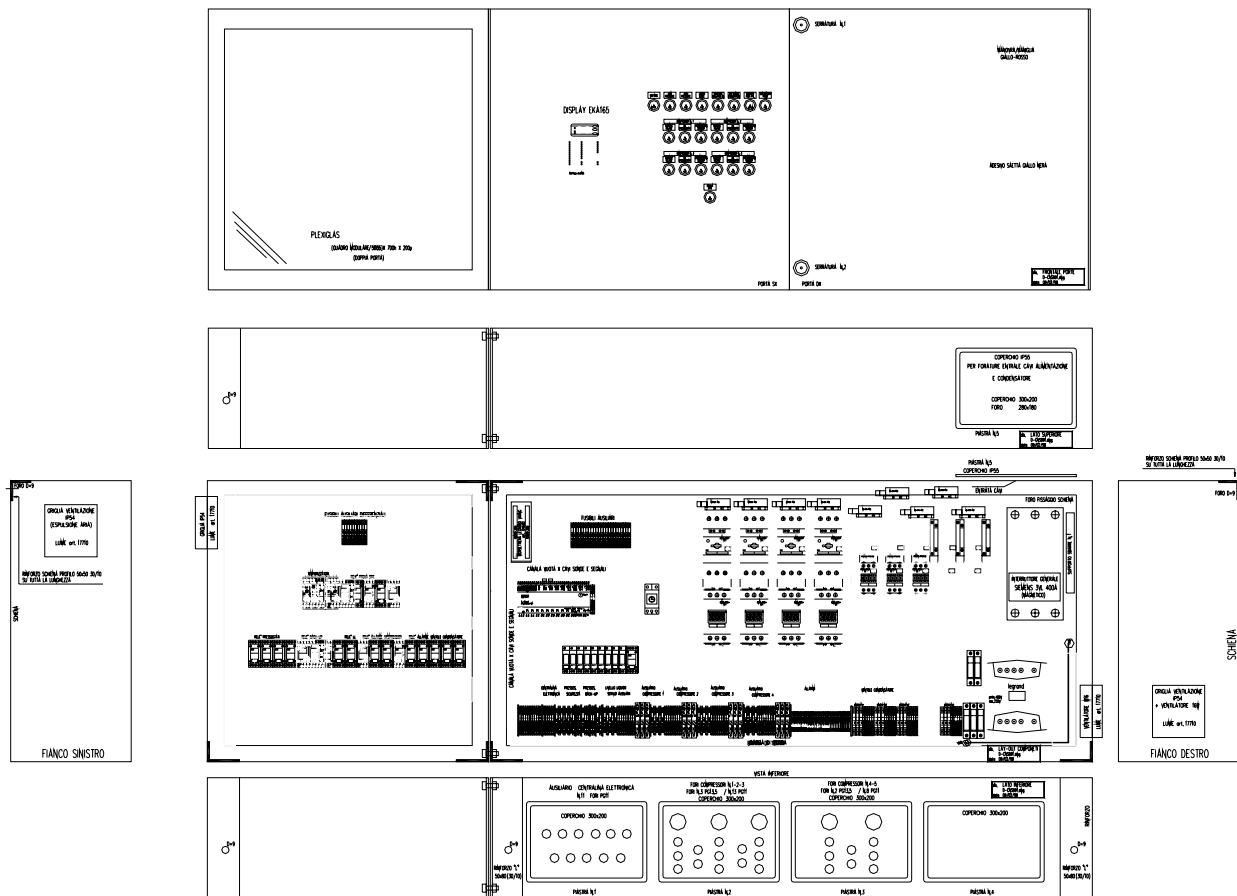
16. Lay-out of components / drilling.

16.1 The lay-out of components is determined by ergonomic principles, with the power section separated from the control section.

A general schematic layout is given below for the electrical boards of the EptaBerg Plus family.

Layout of electrical board

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17. Cooling of electric panel

17.1 The electrical board is cooled by the appropriate slot, which is protected by a grille.

17.2 Based on the specific model, the following cooling fans for electrical boards are provided:

3-4 compressors: n.1 Lume fan art. 17710, 16W, including grille and filter.

5 compressors: n.2 Lume 16Watt fans art. 17710, including grille and filter; (one fan controlled by thermostat).

6 compressors: n.2 Lume 34Watt fans art. 17714, including grille and filter; (one fan controlled by thermostat).

The air filter must be replaced regularly according to the dustiness in the installation site.

18. Component brands / models

18.1 Unchanging components: as listed in the key to the wiring diagrams.

18.2 Variable components, sizes as per Costan tables: (EL. BRD. EC65_1-08-2-QE_BASE.XLS / QE-EC65_1-INV-08-1-QE_BASE.XLS)

19. Accessories supplied.

19.1 none.

20. Inspection and testing.

20.1 The equipment undergoes electrical testing before delivery, including all the tests prescribed by the reference standards: **EN 60439-1** and **EN 60204-1**.

21. Attached documents and certifications.

21.1. Wiring diagrams including relevant key.

21.2 Conformity declaration for the set of equipment making up the refrigerating system;

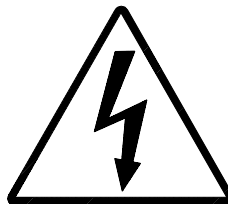
21.3 Installation, use and maintenance manual for the refrigerating system;

21.4 All the documents mentioned above are attached to the equipment and delivered in the relevant document compartment. (pocket inside the electrical board on the right-hand door).

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22. Danger signs

22.1 Caution voltage triangle sign black thunderbolt on yellow background near the master switch handle.



22.2 Manufacturer sticker identifying the electrical board, at the right lower corner inside the panel. It contains the name of the manufacturer, the electrical board code, the serial number and manufacturing date. When failure is reported all these details must be provided to Costan Quality Department.

23 Important warning

Board breaking capacity

The circuit-breaking capacity (Icu) of the electrical board is 50kA.

This information must be carefully considered when installing the equipment.
(Icu=rated ultimate circuit-breaking capacity).

Coordinating power equipment

The devices protecting compressors (overcurrent cutout-contactors) and condenser fans (magnetic circuit-breaker and contactor) must be coordinated according to standards DIN VDE 0660, part 102/IEC947-4-1.

Coordination can be of two types: type one and type two. Costan electrical boards are designed for coordination **type 1 (one): the OCPD cutout and contactor must therefore be replaced if short circuit has occurred downstream of the contactor (e.g. in the compressor electric motor).**

24. Electrical options available on request:

- 24.1 Auxiliary circuit double transformer;
- 24.2 Electromechanical hour meter for compressor operating time;
- 24.3 Relay cutting off compressors on the external control for power peaks;
- 24.4 Timer for day-night set points, for controllers not including a built-in timer;
- 24.5 Voltage monitor for power supply irregularity;
- 24.6 Backup operation warning lamps;
- 24.7 Test-operation circuit for alarm warning lamps;
- 24.8 Test-operation circuit for on-status warning lamps;
- 24.9 Compressor/fan manual switches externally located on the door of the electrical board.

25. Electrical options available

- 25.1 Traxoil oil injection
- 25.2 Oil electronic pressure-switch control
- 25.5 Electronic oil pressure switch

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060 - WIRING DIAGRAMS

The Use and maintenance manual for the EptaBerg Plus packs are attached wiring diagrams suiting the specific configuration.

The wiring diagram for each pack in the EptaBerg Plus family is available inside the relevant electrical board.

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070 – CONTROL AND REGULATION

Control and regulation electric panels

DANFOSS AK-PC530

Table of settings for AK-PC530

DANFOSS AK- PC710

Table of settings for AK- PC710

CAREL PCO3

Table of settings for CAREL PCO3

DIXELL XC1000D

Table of settings for DIXELL XC1000D

As for the features of each specific controller, reference is made to the respective manual, to the table of settings attached thereto, and also contained inside the electrical board and in the technical book.

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080 - OUTSTANDING RISKS AND EMERGENCY SITUATIONS

All jobs carried out around the equipment must be done by authorized and competent personnel.

General risks

Component considered	Outstanding risk	Type	Caution
sheet metal with non-protected edges	Minor injuries	Contact	handle wearing protective gloves to avoid cuts consequent to mishandling
Compressors	Burns	Contact	Avoid accidental contact. Only handle with protective gloves.
Discharge pipes	Burns	Contact	Avoid accidental contact. Only handle with protective gloves.

Area considered	Outstanding risk	Type	Caution
Area around equipment	Injuries Intoxication Serious burns Death	Explosions due to increase in ambient temperature following a fire.	Never leave compressor discharge and suction valves closed. Close only during maintenance and re-open before restarting the equipment
Area around equipment	Injuries Intoxication Serious burns Death	Fire due to short-circuit or overheating of power cable upstream of machine cutoff switches.	Connection cables and protection devices must be correctly sized following the instructions in EPTA's technical literature
Danger area	Serious burns Electric shocks Death	Insulation fault of power cables located upstream of machine power cutoff switches.	Open the circuit breaker on the general electrical board in the event of having to perform any jobs on the terminals upstream from the machine cutoff switch.
Danger area	Electric shocks Death	Metal parts energized.	Connect the earth wires of the equipment's electrical board to the earthing system in the building so that all the metal parts of the unit are properly earthed.
Danger area	Serious burns Electric shocks Death	Contact with energized parts that have become accessible due to removal of covers.	Open the machine cutoff switch and lock this with the safety padlock provided before removing the covers and accessing internal equipment parts.
Danger area	Electric shocks Death	Maintenance of energized parts by authorized persons.	Never perform any jobs in the rain or when in contact with water and always work in the presence of another person.
Danger area	Electric shocks Death	Maintenance of energized parts by authorized persons.	Do not perform any job other than maintenance and setting on the controller-holding module. To this purpose use the appropriate key that only the authorized and qualified personnel is given.

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Refrigerant safety sheet

Substance identifying elements	
Details of components	1, 1, 1 - trifluoroethane (R143a) CAS - No. 420 - 46 - 2 EEC - No. 206 - 996 - 5 Pentafluoroethane (R125) CAS - No. 354 - 33 - 6 EEC - No. 206 - 557 - 8 1, 1, 1, 2 - tetrafluoroethane (R134a) CAS - No. 811 - 97 - 2 EEC - No. 213 - 377 - 0
Hazard identification	Specific hazards: rapid evaporation of the liquid can cause frost-bite. Greater hazards: the vapours are heavier than air and can cause suffocation by reducing the oxygen available for breathing.
FIRST-AID MEASURES	General information: do not administer anything to persons who have fainted Inhalation: take the person involved into the fresh air. Give oxygen or artificial respiration if necessary. Do not administer adrenaline or similar substances. Contact with eyes: Carefully rinse with plenty of water for at least 15 minutes and see a doctor. Contact with skin: Wash immediately with plenty of water. Immediately take off contaminated clothing.
FIRE-PREVENTION MEASURES	Appropriate fire-fighting equipment: any Specific hazards: pressure increase Specific fire-fighting methods: cool containers/tanks with water jets.
Measures to be taken in case of accidental leaks	Individual precautions: evacuate personnel to safety areas. Environmental precautions: none because the fluid evaporates. Cleaning methods: not necessary because fluid evaporates.
Handling and storing	Handling -Technical measures/precautions: make sure sufficient air is circulating in the work premises and/or that air extraction is adequate -Hints for safe use: Use only in well-ventilated premises. Do not breathe vapours or aerosols. Storage -Technical measures/storage methods: carefully close and keep in a cool, dry and well-ventilated environment. -Incompatible products: explosives, inflammable materials, organic peroxides -Packaging materials: keep in original containers
Exposure control / individual protection:	Control parameters – exposure limit values: 1, 1, 1 - trifluoroethane (R143a) AEL (8-H E 12-H TWA) = 1000 lm/cu.m Dupont (1992) Pentafluoroethane (R125) AEL (8-H E 12-H TWA) = 1000 lm/cu.m Dupont (1992) 1, 1, 1, 2 - tetrafluoroethane (R134a) AEL (8-H E 12-H TWA) = 1000 lm/cu.m Dupont (1992) Individual protection: - breathing protection: during salvage and cfc tank operations, independent breathing apparatus must be used. The vapours are in fact heavier than air and can cause suffocation by reducing the oxygen available for breathing. - eye protection: safety goggles. - hand protection: rubber gloves. Specific hygienic precautions: do not smoke.
Chemical-physical properties	Physical state (20°C): liquefied gas Colour: colourless Smell: similar to ether pH: neutral Boiling point/interval: -46.7 °C Flash point: non inflammable Explosive properties: no available details Vapour pressure: 1234 kPa (25°C) 2310 kPa (50°C) Relative density: 1050 kg / cu.m (at 20°C – liquid) Solubility in water: negligible
Stability and reactivity	Stability: no decomposition if used according to instructions. Conditions to be avoided: contact with alkaline metals, earthy alkaline metals, granulated metal salts, Aluminium, Zinc, Beryllium, etc. in powder. Hazardous decomposition products: halogen acids, traces of carbonyl halides.
TOXICOLOGICAL DETAILS	1, 1, 1 - trifluoroethane (R143a) LC50/inhalation/4 hours/on rats => 540 ml / l Pentafluoroethane (R125) LC50/inhalation/1 hour/on rats => 3480 mg / l 1, 1, 1, 2 - tetrafluoroethane (R134a) ALC/inhalation/4 hours/on rats => 567 ml/l Local effects: concentrations well above the TLV value can cause narcotic effects. Inhalation of high concentrations of products in decomposition can cause breathing difficulty (pulmonary oedema). Long-term toxicity: during experiments carried out on animals no carcinogenic, teratogenic or mutagenic effects were found. Specific effects: rapid evaporation of the liquid can cause frost-bite.
ECOLOGICAL INFORMATION	Effects tied to eco-toxicity:

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Substance identifying elements	Pentafluorethane (R125) halocarbons global warming potential; HGWP; (R-11 = 1) =0.84 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0 Trifluorethane (R143a) halocarbons global warming potential; HGWP; (R-11 = 1) =1.1 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0 Tetrafluorethane (R134a) halocarbons global warming potential; HGWP; (R-11 = 1) =0.28 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0	
Disposal	Waste refuse/unused products: usable through reconditioning. Contaminated containers: depressurized containers should be returned to the supplier.	
Details of regulations	EEC DirectiveSafety sheet: D91/155/EEC amended by D 93/112/EEC "hazardous substances and compounds" Hazardous compounds: D 67/548/EEC amended by D 93/21/EEC "labelling guide" Circulars 46/79 and 61/81 issued by the Ministry of Labour "Risks relating to the use of products containing aromatic amines" L.D. 133/92 "Regulations relating to the disposal of hazardous substances in groundwaters" L.D. n. 277/91 "Protection of workers from noise, lead and asbestos" M.D. 28/01/92 "Classification and rules governing packaging and labelling of hazardous Compounds" P.D. N. 175/88 "Activities entailing serious accident risks (Seveso Law)" P.D. N. 203/88 "Emissions into the atmosphere" P.D. N. 303/56 "Work hygiene" P.D. N. 547/55 "Regulations governing accident prevention" Law 319/76 "Protection of waters (also known as Merli law)"	

These indications conform to those provided by the supplier and are to be considered as based on the latest knowledge relating to the substance in question. Products must be used for the specific purposes for which they were intended in accordance with the indications shown above. All other uses must be carefully assessed in terms of the risks involved. The list of rules and regulations is provided as a mere indication and should not be considered complete as the user shall be responsible for making reference to the official regulations of the country of installation, both in terms of use, storage and handling of products.

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090 - MAINTENANCE

Constant supervision of machine conditions and correct maintenance guarantee reliability and efficient operation of the entire system over time. This chapter caters for qualified personnel and addresses scheduled controls and maintenance but also deals with a series of checks that the user himself can do at the indicated intervals. For example, some simple visual controls of the system's main components that require no particular technical skills

Periodic machine maintenance

- Control of machine structural integrity: the metal panels composing the casing must be firmly secured to the structure; removable panels and peep panels must not cause irregular vibration or noise during operation.
- Control oxidized parts: Rust must be removed; ascertain rust causes, remedy and if necessary repair.
- Control of leaks: unusual oil spots on the floor, condensation due to damaged insulation and leaking piping, demand immediate assistance from Epta's after-sales service.
- Check the integrity of the electric power line: the power cord connecting the machine to the mains must be in perfect condition, with no cracks or damage that may jeopardize insulation. Should repairs be needed, request assistance from the after-sales service.
- Check the tripping capacity of safety pressure-switches as per the laws in force
- Check the tripping capacity of the pressure-switches protecting the compressor¹

Machine maintenance

The actions indicated here below are restricted to the authorized personnel and must be performed following the recommended frequency after start up.

Disconnect the machine from the mains before attempting any maintenance. Avoid contact with the hot internal parts.

CONTROL/ACTION	WEEKLY	MONTHLY	2-YEARLY
Measure discharge pressure	X		
Measure suction-line pressure	X		
Measure electrical power voltage	X		
Measure current intensity	X		
Check whether electrical contacts and connections are tight		X	
Check compressor oil level		X	
Check liquid sight glass and moisture indicator		X	
Check suction filters			X
Check whether motor-driven fans are securely fastened			X

¹ The pressure switches are set when tested as per operational instruction QOP019110A


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Control of the liquid sight glass downstream of the filter dryer may indicate that the filter dryer cartridge needs replacing. The color of the sensitive element may vary from green to yellow according to the amount of humidity in the circuit. Deep yellow or yellowish pink indicates that the cartridge is unable to hold any more moisture and must be replaced (code EPTA 761300028).

A strong flow resistance along the suction filters denotes that the mechanical filtering cartridge is clogged with residue and dirt. Cartridges must then be replaced (Code). EPTA 761300034).

Safety valve

It is advisable to replace the safety valve after it has tripped; valve discharging may cause manufacturing residues that proceed form components and pipes to build up against the valve seal, which may impair valve tightness after opening.

	The service life of safety valves Castel of the series “3030/44” is 5 years from installation. No matter the jobs carried out (or periodic inspection), safety valves must be replaced after their lifespan has expired.
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Prior to replacing the valve, make sure that the system area in which the jobs are carried out is free from pressure and high temperature. When installing, strictly follow the instructions on the package.

Compatibility of lubricants for motor-driven Bitzer compressors using R404A

Bitzer compressors appropriate for use with HFC refrigerants and polyester oil charge, are singled out by the letter "Y" in the model acronym (e.g. 4CC-6.2Y). The lubricant oil that the Bitzer compressors in the systems of the EptaBerg Plus family are charged with when delivered is BSE32; it is recommended for a maximum condensing temperature of 55°C.

Before any jobs, it is advisable to check the original oil type on the compressor rating plate. When in doubt, contact EPTA’s service center.

Find below a chart listing the Bitzer-approved lube oils by other manufacturers, which have properties similar to the BSE 32 lube oil of initial charge.

Compressor type	(HFC) Refrigerant	Oil type	Viscosity at 40°C	Oil type
Bitzer 4CC-6.2Y - 6F 40.2Y	R404A R134a R407A R407B R407C R507A	Bitzer BSE 32 (polyester)	32 cst	Castrol Icematic SW 32 CPI Solest 31-HE Exxon Mobil EAL Arctic 22CC Exxon Mobil EAL Arctic 32 Fuchs SEZ 32 Shell Clavus R32 Uniquema RL 32 H

Data given by Bitzer (technical instruction KT-510-3)

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Compatibility of lubricants for Copeland motor-driven compressors using R404A

The Copeland scroll compressors suitable for use with HFC refrigerants and polyester oil charge are marked by the inscription X on the model acronym (e.g. D3DS-100X). The lubricant oil that the Copeland compressors in the systems of the EptaBerg Plus family are charged with when delivered is BSE32; this is recommended for a maximum condensing temperature of 55°C.

Before any jobs, it is advisable to check the original oil type on the compressor rating plate. When in doubt, contact EPTA's service center.

Below a chart is given that lists the Copeland-approved lube oils by other manufacturers, as having properties similar to the Mobil EAL Arctic 22 CC lube oil the system is charged with when delivered.

Compressor type Compressor type	(HFC) Refrigerant	Oil type	Viscosity at 40°C	Oil type
Copeland D3DC-100X - D6DJ-400X	R404A R134a R407A R407B R407C R507A	Mobil EAL Arctic 22 CC (polyester)	22 cst	Exxon Mobil EAL Arctic 22CC ICI Emkarate RL32-3MAF

Compatibility of lubricants for Frascold motor-driven compressors using R404a

The Frascold compressors appropriate for use with HFC refrigerants and polyester oil charge, are marked out by the letter "Y" in the model acronym (e.g. Q 5 33.1Y). The lubricant oil that the Frascold compressors in the systems of the EptaBerg Plus family are charged with when delivered is BSE32; this is recommended for a maximum condensing temperature of 55°C.


Before any jobs, it is advisable to check the original oil type on the compressor rating plate. When in doubt, contact EPTA's service center.

Below a chart is given that lists the Frascold-approved lube oils by other manufacturers, as having properties similar to the FRASCOLD FC series 32 lube oil that the system is charged with when delivered.

Compressor type Compressor type	(HFC) Refrigerant	Oil type	Viscosity at 40°C	Oil type
Frascold Q 5 33.1 Y - Z 40 156 Y	R404A R134a R407A R407B R407C	FRASCOLD D FC series 32 (polyester)	32 cst	Castrol Icematic SW 32 CPI Solest 31-HE Exxon Mobil EAL Arctic 22CC Exxon Mobil EAL Arctic

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	R507A			32 Fuchs SEZ 32 Shell Clavus R32 Uniquema RL 32 H
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	Specific servicing jobs on individual components must be carried out following the schedules and methods stated in the relevant use and maintenance manual attached to this manual.
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Control of operating condition and overall condition as per DM 329/04

Such inspection and testing must be performed by qualified personnel (ISPELS or notified bodies) and specific requests must be addressed to them.
 Inspection intervals depend on the PED category quoted in the conformity declaration for the refrigerating plant as indicated in attachment B to M.D: 329/04.

DM 329/04 Attachment B	
TABLE – Reconditioning intervals for pressure equipment (section 10, subsections 3 and 5)	
PRESSURE EQUIPMENT	INSPECTION LIMITS AND INTERVALS
EQUIPMENT/SETS OF APPLIANCES CONTAINING FLUIDS GROUP 2 (D.Lgs. 93/2000 art.3)	
Vessels/sets of devices containing compressed, liquefied, dissolved or vapor gas other than water vapor under categories III and IV and vapor water and superheated water vessels under categories from I to IV.	Inspection intervals: - every 3 years; Test-operation - every 10 years; Control of overall condition
Vessels/sets of devices containing compressed, liquefied, dissolved or vapor gas other than water vapor under categories I and II	Inspection intervals: - every 4 years; Test-operation - every 10 years; Control of overall condition

Equipment decommissioning and disposal

At the end of its working life, or in case the equipment or parts thereof are decommissioned, the equipment must be disposed of in compliance with the laws in force at the time of decommissioning.

- In particular, the system must be scavenged and the refrigerating fluid must be recovered using the appropriate equipment. The refrigerant can later be re-used or stored and disposed of by an authorized company.
- Compressors contain oil that will have to be duly recovered and disposed of by an authorized company.
- Do not release the refrigerating fluid, the oil and the other materials in the environment.
- Do not use open flames or disassemble parts of the system before having recovered the refrigerating fluid; such recovery must only be performed by specialized personnel.

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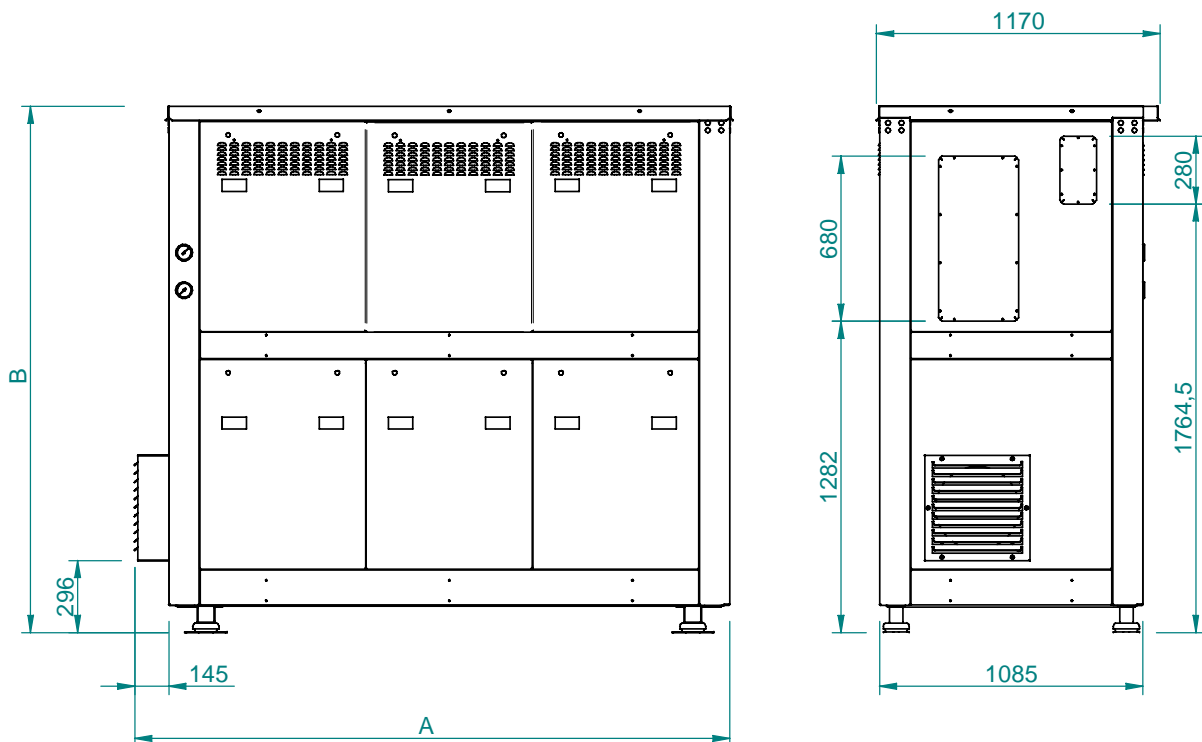
Main features

The enclosure is suitable for outdoor installation, either with “*standard*” or “*plus*” version soundproofing (*standard version*: lining made of suitable sound-absorbing expanded polyurethane sheeting, embossed on the outside, with a single thermoplastic polymer plate in between; *plus version*: lining made of suitable sound-absorbing expanded polyurethane sheeting, embossed on the outside, with a double thermoplastic polymer plate in between:

Enclosure panels are easy to remove, and fitted with quarter-turn fastener tabs and fall-proof pins. As an option, the electrical board side the enclosure can be fitted with a door to be lifted open by way of spring bolts.

To cool the machinery compartment, it is possible have an evaporator with a thermostatic valve inside the enclosure, or forced ventilation by way of an helical extraction fan; the evaporator/fan on/off control is performed by an adjustable electrical thermostat and a temperature probe placed in the compartment itself.

Dimensional schematics EptaBerg Plus with outdoor enclosure



EPTABERG PLUS ENCLOSURE	A(mm)	A(mm)	Maximum weight (Kg)
3GR	2455	2170	1688

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4GR	3145	2170	2209
5GR	3795	2200	2687
6GR	4440	2200	3183

Pipework for Bitzer packs.

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 3 COMPRESSORS											
Pack model	3 x 4CC-6.2Y	3 x 4TCS-8.2Y	3 x 4PCS-10.2Y	3 x 4NCS-12.2Y	3 x 4J-13.2Y	3 x 4H-15.2Y	3 x 4G-20.2Y	3 x 6J-22.2Y	3 x 6H-25.2Y	3 x 6G-30.2Y	3 x 6F-40.2Y
Diam. of Discharge (mm)	28			35			42				
Diam. of user equipment suction line (mm)	1x54		1x67		2x54			2x67			1x80

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 3 COMPRESSORS											
Pack model	3 x 4TCS-8.2Y	3 x 4PCS-10.2Y	3 x 4NCS-12.2Y	3 x 4J-13.2Y	3 x 4H-15.2Y	3 x 4G-20.2Y	3 x 6J-22.2Y	3 x 6H-25.2Y	3 x 6G-30.2Y	3 x 6F-40.2Y	
Diam. of Discharge (mm)	42		54			67					
Diam. of user equipment suction line (mm)	1x54	1x67		2x54			2x67			1x80	

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 4 COMPRESSORS											
Pack model	4 x 4CC-6.2Y	4 x 4TCS-8.2Y	4 x 4PCS-10.2Y	4 x 4NCS-12.2Y	4 x 4J-13.2Y	4 x 4H-15.2Y	4 x 4G-20.2Y	4 x 6J-22.2Y	4 x 6H-25.2Y	4 x 6G-30.2Y	4 x 6F-40.2Y
Diam. of Discharge (mm)	28		35			42			54		
Diam. of user equipment suction line (mm)	2x54			2x67			2x80			2x108	

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 4 COMPRESSORS											
Pack model	4 x 4TCS-8.2Y	4 x 4PCS-10.2Y	4 x 4NCS-12.2Y	4 x 4J-13.2Y	4 x 4H-15.2Y	4 x 4G-20.2Y	4 x 6J-22.2Y	4 x 6H-25.2Y	4 x 6G-30.2Y	4 x 6F-40.2Y	
Diam. of Discharge (mm)	42	54				67			80		
Diam. of user equipment suction line (mm)	2x54			2x67			2x80			2x108	

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 5 COMPRESSORS											
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Pack model	5 x 4NCS-12.2Y	5 x 4J-13.2Y	5 x 4H-15.2Y	5 x 4G-20.2Y	5 x 6J-22.2Y	5 x 6H-25.2Y	5 x 6G-30.2Y	5 x 6F-40.2Y
Diam. of Discharge (mm)	35	42			54			
Diam. of user equipment suction line (mm)	2x67	2x80						2x108

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 5 COMPRESSORS										
Pack model	5 x 4TCS-8.2Y	5 x 4PCS-10.2Y	5 x 4NCS-12.2Y	5 x 4J-13.2Y	5 x 4H-15.2Y	5 x 4G-20.2Y	5 x 6J-22.2Y	5 x 6H-25.2Y	5 x 6G-30.2Y	5 x 6F-40.2Y
Diam. of Discharge (mm)	54			67			80			
Diam. of user equipment suction line (mm)	2x67			2x80						2x108

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 6 COMPRESSORS			
Pack model	6 x 4H-15.2Y	6 x 6H-25.2Y	6 x 6G-30.2Y
Diam. of Discharge (mm)	42	54	
Diam. of user equipment suction line (mm)	2x80		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 6 COMPRESSORS					
Pack model	6 x 4H-15.2Y	6 x 4G-20.2Y	6 x 6J-22.2Y	6 x 6G-30.2Y	6 x 6F-40.2Y
Diam. of Discharge (mm)	67		80		
Diam. of user equipment suction line (mm)	2x80				2x108

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Pipework for Copeland packs.

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 3 COMPRESSORS					
Pack model	3 x D3DS-100X	3 x D4DL-150X	3 x D4DT-220X	3 x D6DL-270X	3 x D6DT-320X
Diam. of Discharge (mm)	35	42		54	
Diam. of user equipment suction line (mm)	1x67	2x54	2x67		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 3 COMPRESSORS							
Pack model	3 x D3DC-100X	3 x D3DS-150X	3 x D4DA-200X	3 x D4DH-250X	3 x D4DJ-300X	3 x D6DH-350X	3 x D6DJ-400X
Diam. of Discharge (mm)	42	54			67		
Diam. of user equipment suction line (mm)	1x54	1x67	2x54		2x67		

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 4 COMPRESSORS					
Pack model	4 x D3DS-100X	4 x D4DL-150X	4 x D4DT-220X	4 x D6DL-270X	4 x D6DT-320X
Diam. of Discharge (mm)	35	42		54	
Diam. of user equipment suction line (mm)	2x67		2x80		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 4 COMPRESSORS							
Pack model	4 x D3DC-100X	4 x D3DS-150X	4 x D4DA-200X	4 x D4DH-250X	4 x D4DJ-300X	4 x D6DH-350X	4 x D6DJ-400X
Diam. of Discharge (mm)	42	54			67	80	
Diam. of user equipment suction line (mm)	2x54		2x67			2x80	

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 5 COMPRESSORS		
Pack model	5 x D6DL-270X	5 x D6DT-320X
Diam. of Discharge (mm)	54	
Diam. of user equipment suction line (mm)	2x80	

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EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 5 COMPRESSORS				
Pack model	5 x D4DH-250X	5 x D4DJ-300X	5 x D6DH-350X	5 x D6DJ-400X
Diam. of Discharge (mm)	67	80		
Diam. of user equipment suction line (mm)	2x80			

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 6 COMPRESSORS	
Pack model	6 x D6DJ-400X
Diam. of Discharge (mm)	80
Diam. of user equipment suction line (mm)	2x80

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Pipework for Frascold packs.

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 3 COMPRESSORS										
Pack model	3x Q 5 33.1 Y	3x S 7 39 Y	3x S 10 51 Y	3x S 15 56 Y	3x V 15 59 Y	3x V 15 71 Y	3x V 20 84 Y	3x Z 25 106 Y	3x Z 30 126 Y	3x Z 40 154 Y
Diam. of Discharge (mm)	28			35			42			
Diam. of user equipment suction line (mm)	1x54		1x67		2x54			2x67		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 3 COMPRESSORS										
Pack model	3x S 7 39 Y	3x S 10 51 Y	3x S 15 56 Y	3x V 15 59 Y	3x V 15 71 Y	3x V 20 84 Y	3x V 32 93 Y	3x Z 25 106 Y	3x Z 30 126 Y	3x Z 40 154 Y
Diam. of Discharge (mm)	42		54			67				
Diam. of user equipment suction line (mm)	1x54	1x67		2x54			2x67		1x80	

EPTABERG – LOW-TEMPERATURE APPLICATION – 4 COMPRESSORS										
Pack model	4x Q 5 33.1 Y	4x S 7 39 Y	4x S 10 51 Y	4x S 15 56 Y	4x V 15 59 Y	4x V 15 71 Y	4x V 20 84 Y	4x Z 25 106 Y	4x Z 30 126 Y	4x Z 40 154 Y
Diam. of Discharge (mm)	28		35			42		54		
Diam. of user equipment suction line (mm)	2x54			2x67			2x80		2x108	

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 4 COMPRESSORS										
Pack model	4x S 7 39 Y	4x S 10 51 Y	4x S 15 56 Y	4x V 15 59 Y	4x V 15 71 Y	4x V 20 84 Y	4x V 32 93 Y	4x Z 25 106 Y	4x Z 30 126 Y	4x Z 40 154 Y
Diam. of Discharge (mm)	42	54				67		80		
Diam. of user equipment suction line (mm)	2x54			2x67			2x80		2x108	

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EPTABERG – LOW-TEMPERATURE APPLICATIONS – 5 COMPRESSORS							
Pack model	5x S 15 56 Y	5x V 15 59 Y	5x V 15 71 Y	5x V 20 84 Y	5x Z 25 106 Y	5x Z 30 126 Y	5x Z 40 154 Y
Diam. of Discharge (mm)	35	42			54		
Diam. of user equipment suction line (mm)	2x67	2x80					2x108

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 5 COMPRESSORS										
Pack model	5x S 7 39 Y	5x S 10 51 Y	5x S 15 56 Y	5x V 15 59 Y	5x V 15 71 Y	5x V 20 84 Y	5x V 32 93 Y	5x Z 25 106 Y	5x Z 30 126 Y	5x Z 40 154 Y
Diam. of Discharge (mm)	54			67			80			
Diam. of user equipment suction line (mm)	2x67			2x80						2x108

EPTABERG – LOW-TEMPERATURE APPLICATIONS – 6 COMPRESSORS			
Pack model	6x V 15 71 Y	6x Z 25 106 Y	6x Z 30 126 Y
Diam. of Discharge (mm)	42	54	
Diam. of user equipment suction line (mm)	2x80		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 6 COMPRESSORS					
Pack model	6x V 15 71 Y	6x V 20 84 Y	6x V 32 93 Y	6x Z 30 126 Y	6x Z 40 154 Y
Diam. of Discharge (mm)	67		80		
Diam. of user equipment suction line (mm)	2x80				2x108

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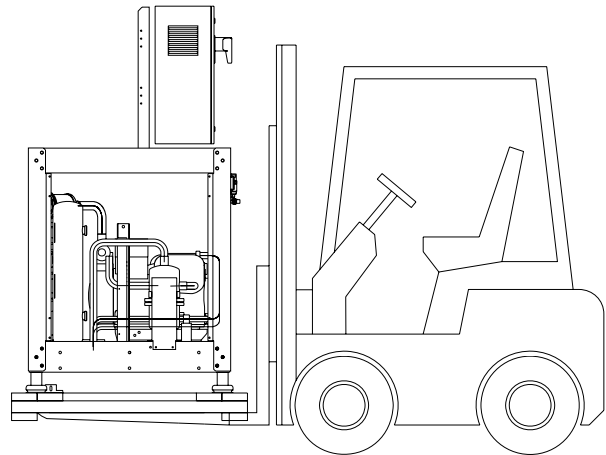
HANDLING AND POSITIONING

In order to correctly handle and position the equipment, it is necessary to observe the following precautions, while keeping in mind that all the jobs referred to must only be performed by authorized personnel and according to the applicable safety standards as regards tooling and methods.

Hoisting by lift truck

Steps to be taken:

- Upon receiving the unit, make sure that this has not been damaged. If it has, contact your nearest Epta after-sales service center;
- When delivered, the standard unit is fastened to wood skids; check that these are firmly secured to the unit before starting to lift.
- make sure the carrying capacity of the fork-lift truck is suitable for the weight of the pack in question (check the weight as stated in the table at the end of this chapter and on the pack's serial plate);
- Slide the forks of the truck in between the undercarriage and the wood pallet; check that the unit is balanced before starting to lift and move. The maximum overall dimensions, wood pallet included, are those shown at the end of this chapter.



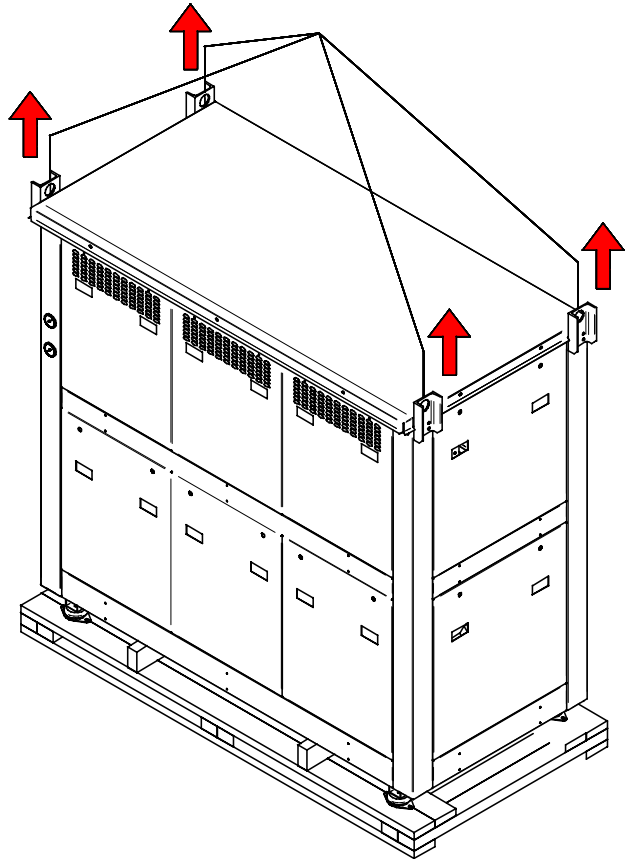
Ensure that nobody is in the handling area during the hoisting procedures.

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Handling by crane

Steps to be taken:

- ensure that the carrying capacity of the crane is suitable for the weight of the pack in question (check the weight as stated in the table at the end of this chapter and on the pack's serial plate);
- It is advisable to hoist it using only the ad-hoc yellow supports located at the corners of the pack.
- The use of a lifting beam is recommended.
- Ensure that the unit is balanced and stable before starting to lift.
- The equipment is standard-supplied on a wood platform to which it is secured; hoist the equipment as much as needed to remove the platform.
- Finish equipment hoisting.
- When the equipment is in its service position, remove the yellow supports used for handling.



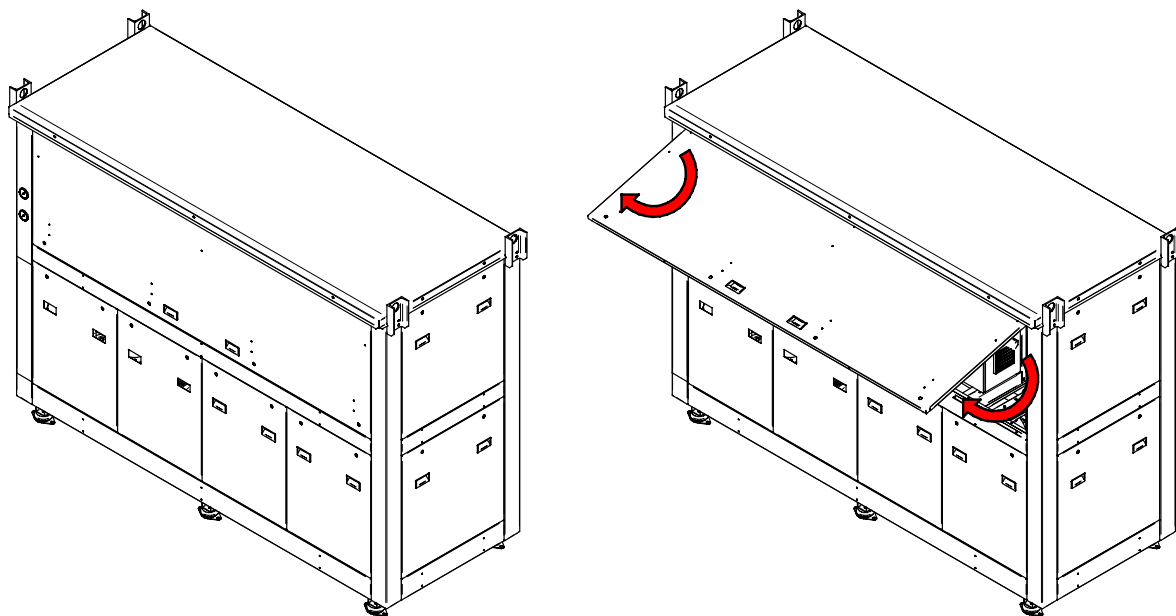
Ensure that nobody is in the handling area during the hoisting procedures.



Epta disclaims whatever responsibility for damage to the electrical board and/or to the refrigerating equipment as could result from handling by procedures other than those indicated in these pages.

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Option: door that can be lifted open by way of spring bolts on the electrical panel side.



Electrical board integration

In reference to Chapter **050** concerning the electrical board, and especially paragraph **9** (cooling fan control circuit), the following remark applies: cooling control in packs fitted with an enclosure is performed by an evaporator or fans and a temperature-control thermostat suiting with the controller installed,

when Danfoss, the respective controller is EKC202D1.

when Carel , the respective controller is iR33C0HB00.

when Dixell, the respective controller is XC1015D.

As for the features of each specific thermostat, reference is made to the respective manual, to the table of settings attached thereto, and also contained inside the electrical board and in the technical book.