



Refrigerating System
EPTABERG
MULTISPEED

**INSTALLATION, USER
AND MAINTENANCE MANUAL**

READ CAREFULLY
AND KEEP WITH THE MACHINE

Number of document : **QSM000564E**

Revision status: C

Daye of 1st issue: **28.May.09**

Date of the present issue: **26.june.12**



EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 2
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 010	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		28.May.2009
CHAPTER: GENERAL INFORMATION TABLE OF CONTENTS	B	24/June/2010	Enclosure and Refr. Diag		MKT
	C	29/June/2012	Chapters 20,70,100 addes		

INSTALLATION, 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.
- Any packaging components included (plastic bags, polystyrene, wood, etc.) represent a potential hazard. They must be kept out of the reach of children and disposed of in compliance with local applicable regulations.
- Power supply specifications must comply with the details shown on the serial plate of the machine.
- In the event of failure or malfunction, always switch off the machine.
- Modifications to the power system or unauthorized alterations in general, which are not contemplated 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 AS WELL AS FOR ANY PERSONAL INJURY ARISING FROM FAILURE TO COMPLY WITH THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

TABLE OF CONTENTS

This manual consists of the following sections representing an integral part thereof and which must not be separated.

N.CHAP	CHAPTER	NUMBER OF PAGES	REVISION STATUS
010	General information/Table of contents	1	“ C “
020	Description / Technical details	10	“C“
030	Handling	4	“B“
040	Installation	9	“ - “
050	Electric panel technical specifications	9	“ A “

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 2
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 010	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		28.May.2009
CHAPTER: GENERAL INFORMATION TABLE OF CONTENTS	B	24/June/2010	Enclosure and Refr. Diag		MKT
	C	29/June/2012	Chapters 20,70,100 addes		

060	Wiring diagrams	1	“ - “
070	Control and regulation	1	“B“
080	Outstanding risks	6	“ - “
090	Maintenance	3	“ - “
100	Enclosure	5	“A“

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 12
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A	22/Oct/2009	Technical details		MKT
	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		

020 – DESCRIPTION / TECHNICAL DETAILS

General

Eptaberg Multispeed refrigeration systems are manufactured in various versions, with three, four or five semi-hermetic parallel Bitzer compressors, one of which is driven by a frequency converter (i.e. inverter). These systems are suitable for medium-temperature applications using refrigerant R404A.

They were designed to be installed indoors in ad-hoc technical premises named "plant rooms" or outdoors, provided that 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 installation, featuring every component strictly required to guarantee total reliability and correct performance of the machine, in keeping with Epta quality standards.

The control and regulation electrical panel and the inverter, both assembled on-board the pack, are insulated from the metal support structure by means of rubber damper pads.

The compressors are stiffly 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 results 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 packs of the EptaBerg Plus family features, among the standard mechanical components, a steel suction header (also stainless-steel is available), acting as anti-liquid bottle, suction filters fitted with interchangeable filtering cores of size appropriate to withhold any impurity in the system (one filter per compressor). Each filter is equipped with two valves that make it possible to shut off the relevant piping stretch when replacing the core, with no need to shutdown the system. The discharge header is copper or steel construction, depending on the diameter, and is fastened to the undercarriage by way of a sturdy polyamide collar that is able to resist high discharge temperature. Whenever use and running conditions recommend it, a compressor head cooling fan is available.

The refrigerating equipment at hand, in all versions, has a system providing for the return of oil to the compressors, which is composed of the following:

- inspectable-type oil separator
- oil reservoir of suitable capacity, with minimum and maximum level warning lamps;
- oil filter for every compressor;
- differential pressure valve;
- oil-level regulator: either float-type mechanical or electronic.

As for the electrical and control components, the EptaBerg Multispeed pack family features the following parts as standard:

- Electric power supply panel constructed to EN 60204-1, on board the equipment and pre-wired. The electric board undergoes functional testing at the factory before being released. Master

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 12
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
CHAPTER: DESCRIPTION /	A	22/Oct/2009	Technical details	MKT	
TECHNICAL DETAILS	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		

circuit-breaking handle on the outside. The power electric panel may be optionally fitted with an OCD or an RCBO.

- Pressure-switch panel and pressure probes (transducers) including:

Two high-pressure switches (manual-reset for system safety) to protect from high pressure caused by mismanoeuvring 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.

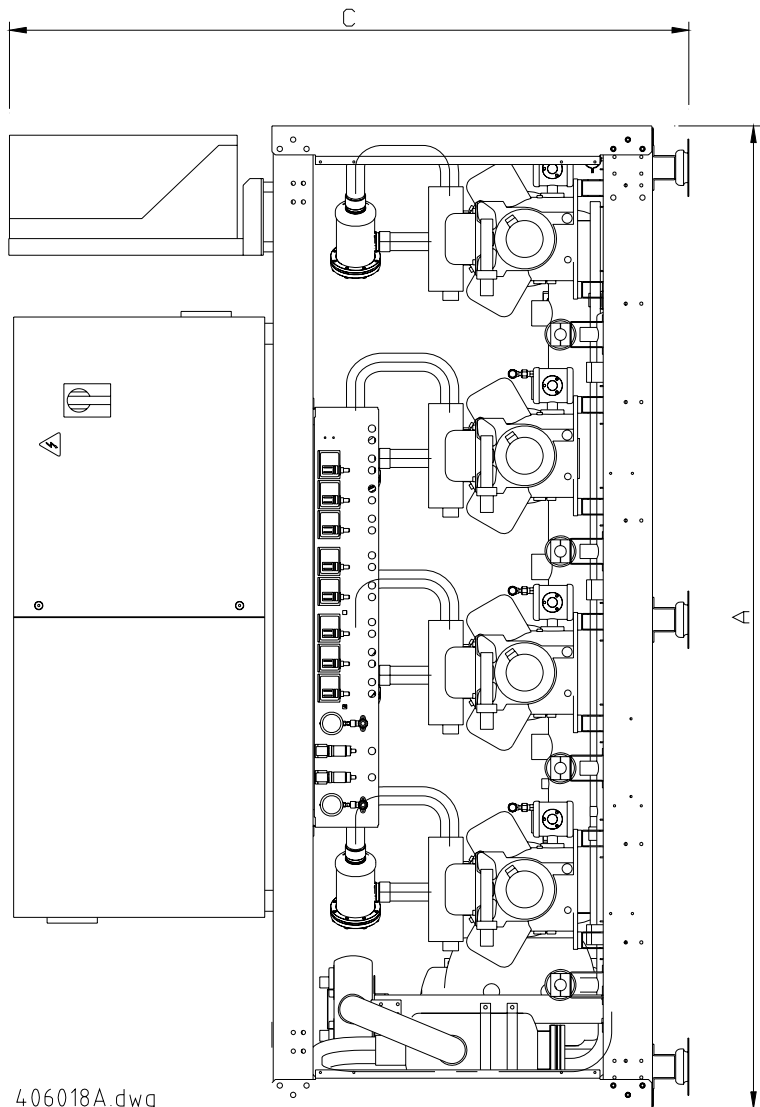
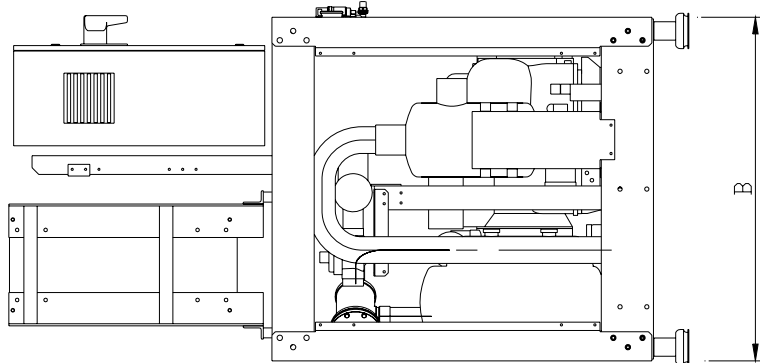
Accessories

The Eptaberg Multispeed range features the possibility to upgrade the basic version with a series of accessories, among which:

- enclosure suitable for outdoor installation with standard sound-proofing (enclosure lining made of double-layer expanded polyurethane sheet embossed on the outside and bituminous coating). Easy-to-remove panels fitted with 90° angle tabs and fall-proof pins. As an option, on the electrical panel side the enclosure is fitted with a door to be lifted open by way of spring bolts.
- complete insulation of the suction line (for the standard suction header), dryer filter and ball tap; insulation is 13mm thick;
- stainless steel suction header and condensation water collection and discharge tray;
- suction filter with stainless steel mesh cap;
- compressor cooling fan, available for medium-temperature applications;
- check valve for separator outlet (discharge line to condenser);
- discharge muffler for individual compressors;
- pack muffler (available for some of the models);
- oil sight glass on the oil return circuit;
- glycerine-bath pressure meters with shut-off valve for high and low pressure (on the pressure-switch board);
- desuperheaters: these make sanitary-use water warm by counter-current exchange with vapour 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 sight glasses 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 core on the liquid line, including a humidity sight glass with shut-off ball valve.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 12
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A	22/Oct/2009	Technical details		
	B	24/June/2010	Enclosure and Refr. Diag.		MKT
	C	29/June/2012	QRM002121A and tech.det		

Dimensional diagrams for Eptaberg Multispeed



406018A.dwg

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 12
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
CHAPTER: DESCRIPTION /	A	22/Oct/2009	Technical details	MKT	
TECHNICAL DETAILS	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		

Medium-temperature (positive-temperature) applications – 3 Bitzer compressors

TAB.1Pack model	2x 4VCS-6.2Y +4DC-7.2Y	2x 4PCS-10.2Y +4VC-10.2Y	2x 4NCS-12.2Y +4TC-12.2Y	2x 4J-13.2Y +4PC-15.2-Y	2x 4H-15.2Y +4NC-20.2Y	2x 4G-20.2Y +4J-22.2Y
Power supply voltage	400 / 3 / 50					
Number of compressors	3					
Refrigerant	R404A					
Heat extraction rate ¹ (W)	51690	71680	83800	97500	113400	129700
Power input ¹ (W)	20780	28040	33380	38150	45470	52390
Maximum output ² (W)	27373	39283	44895	53001	61730	70460
Max. power input ³ (A)	43,9	63	72	85	99	113

Pipework						
Cond. disch. line (mm)	35	42	42	54	54	54
Suction line (mm)	2 x 54	2 x 54	2 x 54	4 x 54	4 x 54	4 x 54

Dimensions and weights ⁴						
Length (A/mm)	2250					
Width (B/mm)	1030					
Height (mm)	2030					
Weight (kg)	951	1010	1010	1140	1155	1220

Compressor #1	4DC-7.2Y	4VC-10.2Y	4TC-12.2Y	4PC-15.2-Y	4NC-20.2Y	4J-22.2Y
Type	semi-hermetic reciprocating					
Brand	Bitzer					
Lubricant	Bitzer BSE 32					
Power input when operating. ¹ (A)	11,55	12,53	15,62	17,53	20,9	23,3
Max. power input ³ (A)	15,9	21	24	31	37	39

Compressors #2/3	4VCS-6.2Y	4PCS-10.2Y	4NCS-12.2Y	4J-13.2Y	4H-15.2Y	4G-20.2Y
Type	semi-hermetic reciprocating					
Brand	Bitzer					
Lubricant	BSE 32					
Power input when operating. ¹ (A)	12,14	17,22	20,6	23,3	27,3	31,5
Max. power input ³ (A)	14	21	24	27	31	37

Electric panel (400/3/50)						
Range of OCD Protecting the INVERTER	(20 - 25)A	(20 - 25)A	(22 - 32)A	(28 - 40)A	(36 - 45)A	(36 - 45)A
Range of OCD protecting compressors #2/3	(11 - 16)A	(20 - 25)A	(20 - 25)A	(22 - 32)A	(22 - 32)A	(28 - 40)A

Danfoss Inverter	FC103 134F7676	FC103 134F7676	FC103 134F7489	FC103 134F7677	FC103 134F7678	FC103 134F7678
-------------------------	----------------	----------------	----------------	----------------	----------------	----------------

Medium-temperature (positive-temperature) applications – 4 Bitzer compressors

¹ Data calculated using software Bitzer 5.3.2 at conditions Te=-10°C ; Tc=+40°C ; Suction gas temp. =20°C ; liquid subcooling 0K (pursuant to Directive EN12900).

The value for the power input does not include condenser fans, which are optionally fitted on the enclosure; it only refers to compressors and does not consider power-factor improving capacitors.

² Data calculated considering Pmax= V*Imax * √3 * 0,9(cos φ)

³ Technical data for Bitzer compressors as in document KP-100-5i.

⁴ The data in the table refer to the version with housing, complete oil circuit and standard electrical panel.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 12		
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009		
	A	22/Oct/2009	Technical details		MKT		
	B	24/June/2010	Enclosure and Refr. Diag.				
C	29/June/2012	QRM002121A and tech.det					

TAB.2

Pack model	3x 4J-13.2Y +4PC-15.2-Y	3x 4H-15.2Y +4NC-20.2Y	3x 4G-20.2Y +4J-22.2Y	3x 6J-22.2Y +4H-25.2Y	3x 6H-25.2Y +4G-30.2Y	3x 6G-30.2Y +6J-33.2Y	3x 6F-40.2Y +6H-35.2Y
Power supply voltage	400 / 3 / 50						
Number of compressors	4						
Refrigerant	R404A						
Heat extraction rate ¹ (W)	132700	154500	177000	198400	231800	260600	310200
Power input ¹ (W)	52230	62250	71740	80000	94480	105600	124500
Maximum output ² (W)	69836	81060	93531	101013	117225	136555	183944
Max. power input ³ (A)	112	130	150	162	188	219	295

Pipework							
Cond. disch. line (mm)	54	54	54	67	67	80	80
Suction line (mm)	5x67	5x67	5x67	5x67	5x67	5x67	5x67

Dimens. and weights⁴							
Length (mm)	2950						
Width (mm)	1030						
Height (mm)	2030						
Weight (kg)	1470	1430	1520	1630	1640	1700	1800

Compressor #1	4PC-15.2-Y	4NC-20.2Y	4J-22.2Y	4H-25.2Y	4G-30.2Y	6J-33.2Y	6H-35.2Y
Type	semi-hermetic reciprocating						
Brand	Bitzer						
Lubricant	Bitzer BSE 32						
Power input when operating ¹ (A)	17,53	20,9	23,3	27,6	32,8	34,5	42,6
Max. power input ³ (A)	31	37	39	45	53	60	61

Compress. #2,3,4	4J-13.2Y	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y
Type	semi-hermetic reciprocating						
Brand	Bitzer						
Lubricant	Bitzer BSE 32						
Power input when operating ¹ (A)	23,3	27,3	31,5	34,8	40,6	46,6	57,7
Max. power input ³ (A)	27	31	37	39	45	53	78

Electric panel (400/3/50)							
Range of OCD Protecting the INVERTER	(28 - 40)A	(36 - 45)A	(36 - 45)A	(45 - 63)A	(45 - 63)A	(57 - 75)A	(57 - 75)A
Range of OCD protecting compressors #2/3/4	(22 - 32)A	(22 - 32)A	(28 - 40)A	(36 - 45)A	(40 - 50)A	(45 - 63)A	(70 - 90)A

Danfoss Inverter	FC103 134F7677	FC103 134F7678	FC103 134F7678	FC103 134F7679	FC103 134F7679	FC103 134F7680	FC103 134F7680
-------------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------

¹ Data calculated using software Bitzer 5.3.2 at conditions Te=-10°C ; Tc=+40°C ; Suction gas temp. =20°C ; liquid subcooling 0K (pursuant to Directive EN12900).

The value for the power input does not include condenser fans, which are optionally fitted on the enclosure; it only refers to compressors and does not consider power-factor improving capacitors.

² Data calculated considering $P_{max} = V * I_{max} * \sqrt{3} * 0,9(\cos \varphi)$

³ Technical data for Bitzer compressors as in document KP-100-5i.

⁴ The data in the table refer to the version with housing, complete oil circuit and standard electric panel.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 6 OF 12
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		28.May.2009
	B	24/June/2010	Enclosure and Refr. Diag.		MKT
	C	29/June/2012	QRM002121A and tech.det		

Medium-temperature (positive-temperature) applications – 5 Bitzer compressors

TAB.3

Pack model	4x 4H-15.2Y +4NC-20.2Y	4x 4G-20.2Y +4J-22.2Y	4x 6J-22.2Y +4H-25.2Y	4x 6H-25.2Y +4G-30.2Y	4x 6G-30.2Y +6J-33.2Y	4x 6F-40.2Y +6H-35.2Y
Power supply voltage	400 / 3 / 50					
Number of compressors	5					
Refrigerant	R404A					
Heat extraction rate ¹ (W)	195600	224300	251000	293400	329900	393300
Power input ¹ (W)	79030	91090	101300	119680	134100	157900
Maximum output ² (W)	100390	116602	125331	145284	169602	232580
Max. power input ³ (A)	161	187	201	233	272	373
Pipework						
Cond. disch. line (mm)	67	67	80	80	80	80
Suction line (mm)	6 X 67	6 X 67	6 X 67	6 X 67	6 X 67	6 X 67
Dimens. and weights⁴						
Length (mm)	3600					
Width (mm)	1030					
Height (mm)	2030					
Weight (kg)	1880	1910	2070	2070	2170	2210
Compressor #1	4NC-20.2Y	4J-22.2Y	4H-25.2Y	4G-30.2Y	6J-33.2Y	6H-35.2Y
Type	semi-hermetic reciprocating					
Brand	Bitzer					
Lubricant	Bitzer BSE 32					
Power input when operating ¹ (A)	20,9	23,3	27,6	32,8	34,5	42,6
Max. power input ³ (A)	37	39	45	53	60	61
Compr. #2,3,4,5	4H-15.2Y	4G-20.2Y	6J-22.2Y	6H-25.2Y	6G-30.2Y	6F-40.2Y
Type	semi-hermetic reciprocating					
Brand	Bitzer					
Bitzer lube	Bitzer BSE 32					
Power input when operating ¹ (A)	27,3	31,5	34,8	40,6	46,6	57,7
Max. power input ³ (A)	31	37	39	45	53	78
Electric panel (400/3/50)						
Range of OCD Protecting the INVERTER	(36 - 45)A	(36 - 45)A	(45 - 63)A	(45 - 63)A	(57 - 75)A	(57 - 75)A
Range of OCD protecting compressors #2/3/4/5	(22 - 32)A	(28 - 40)A	(36 - 45)A	(40 - 50)A	(45 - 63)A	(70 - 90)A
Danfoss Inverter	FC103 134F7678	FC103 134F7678	FC103 134F7679	FC103 134F7679	FC103 134F7680	FC103 134F7680

¹ Data calculated using software Bitzer 5.3.2 at conditions Te=-10°C ; Tc=+40°C ; Suction gas temp. =20°C ; liquid subcooling 0K (pursuant to Directive EN12900).

The value for the power input does not include condenser fans, which are optionally fitted on the enclosure; it only refers to compressors and does not consider power-factor improving capacitors.

² Data calculated considering $P_{max} = V * I_{max} * \sqrt{3} * 0,9(\cos \varphi)$

³ Technical data for Bitzer compressors as in document KP-100-5i.

⁴ The data in the table refer to the version with housing, complete oil circuit and standard electric panel.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 7 OF 12
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N...:020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		28.May.2009
	B	24/June/2010	Enclosure and Refr. Diag.		MKT
	C	29/June/2012	QRM002121A and tech.det		

REFRIGERATION SYSTEM SCHEMATICS

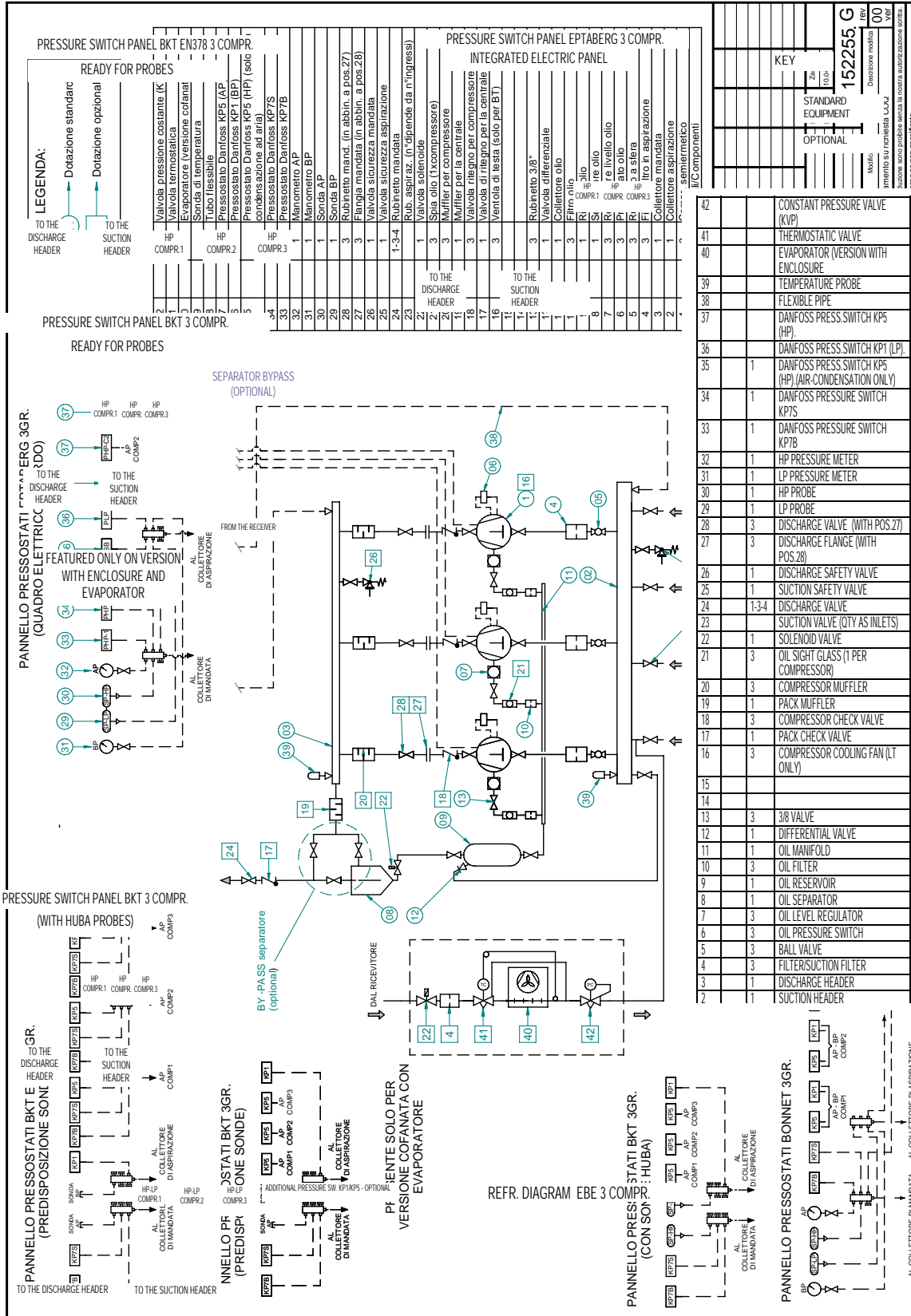
List of refrigerating diagrams attached to the manual, as being an integral part thereof.

Function	Diagram n°	Notes
Refrigerating schematics for 3-compressor Eptaberg	152255.G	Single oil separator
Refrigerating schematics for 4-compressor Eptaberg	152256.F	Single oil separator
Refrigerating schematics for 5-compressor Eptaberg	152257.F	Single oil separator

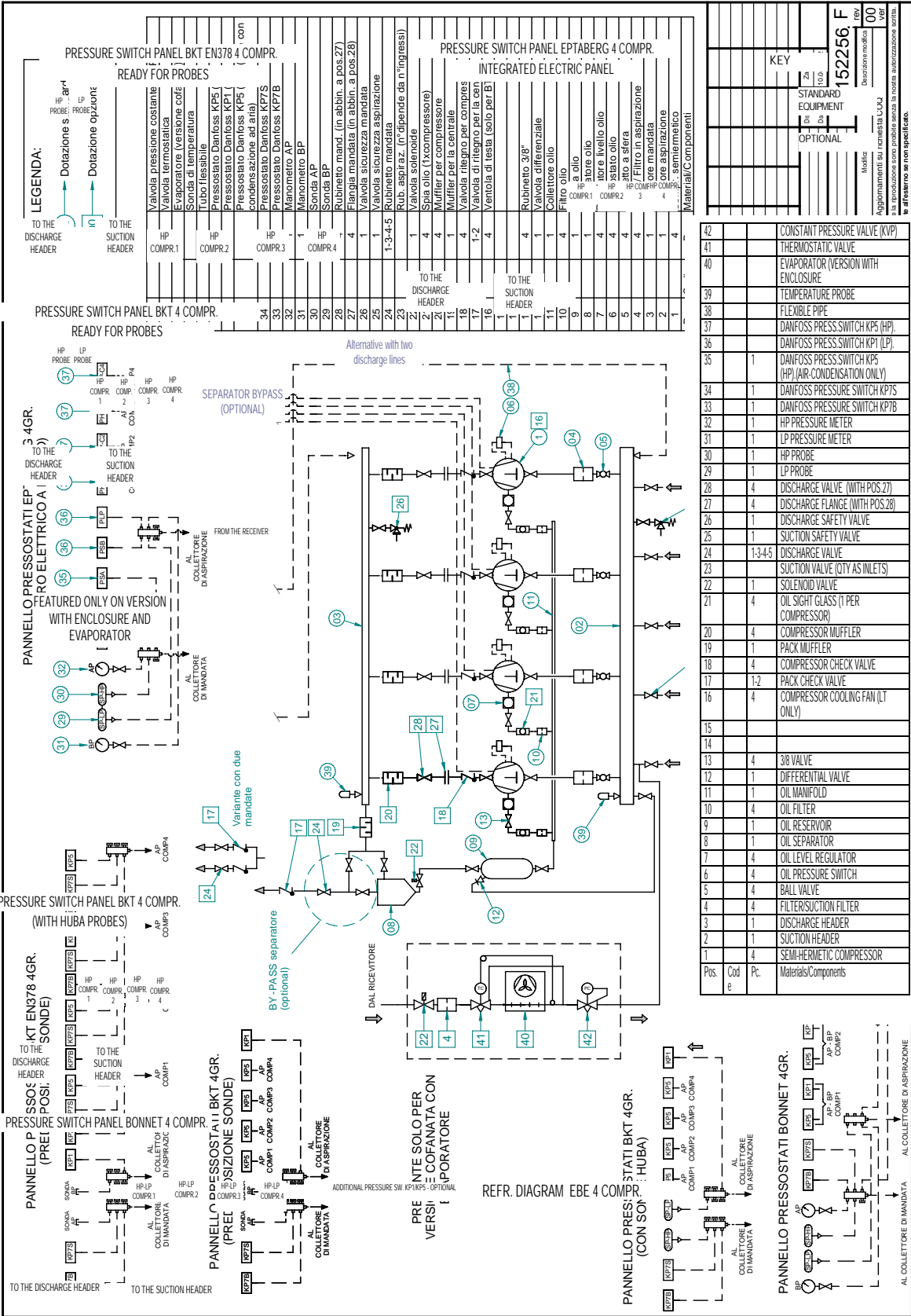
Note the position for compressor #1 in the refrigerating system diagram indicates the compressor that is driven by the inverter, which is on the right of the electric panel.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	REVISION STATUS			APPROVAL SIGNATURE	PAGE 8 OF 12
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A	22/Oct/2009	Technical details		
	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		MKT

Refrigeration system schematics for EPTABERG MULTISPEED 3GR (3 compressors)



EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N...020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	REVISION STATUS			APPROVAL SIGNATURE	PAGE 10 OF 12
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A	22/Oct/2009	Technical details		
	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		MKT

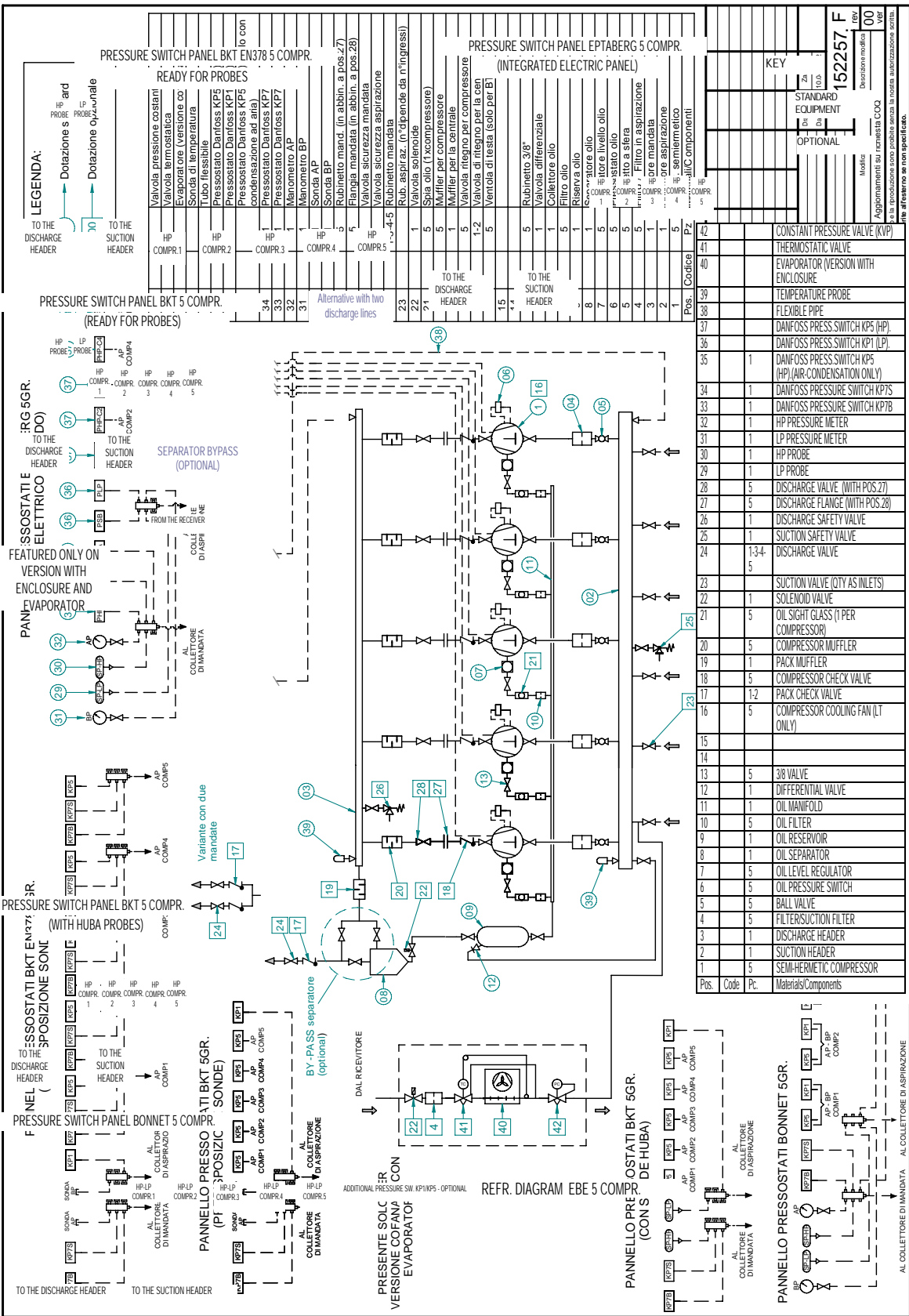


APPENDICE

1.1. Posizione sono indicati nella nostra nomenclatura interna.

2. Il riferimento non è specifico.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 020 CHAPTER: DESCRIPTION / TECHNICAL DETAILS	REVISION STATUS			APPROVAL SIGNATURE	PAGE 12 OF 12
	ORD	DATE	CHANGE ORDER		
	A	22/Oct/2009	Technical details		
	B	24/June/2010	Enclosure and Refr. Diag.		
	C	29/June/2012	QRM002121A and tech.det		DATE OF 1st ISSUE 28.May.2009
					MKT



EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 4
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N...030	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 16.April.2009
CHAPTER: HANDLING AND POSITIONING	A	22/Oct/2009	Technical details		MKT
	B	24/June/2010	Technical details		
C					

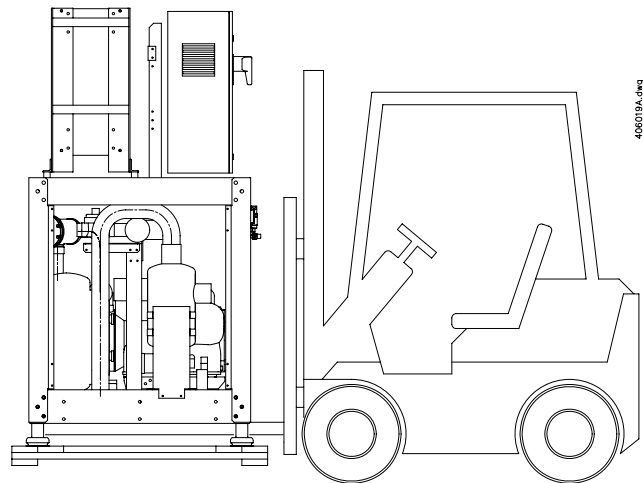
030 - HANDLING AND POSITIONING

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.



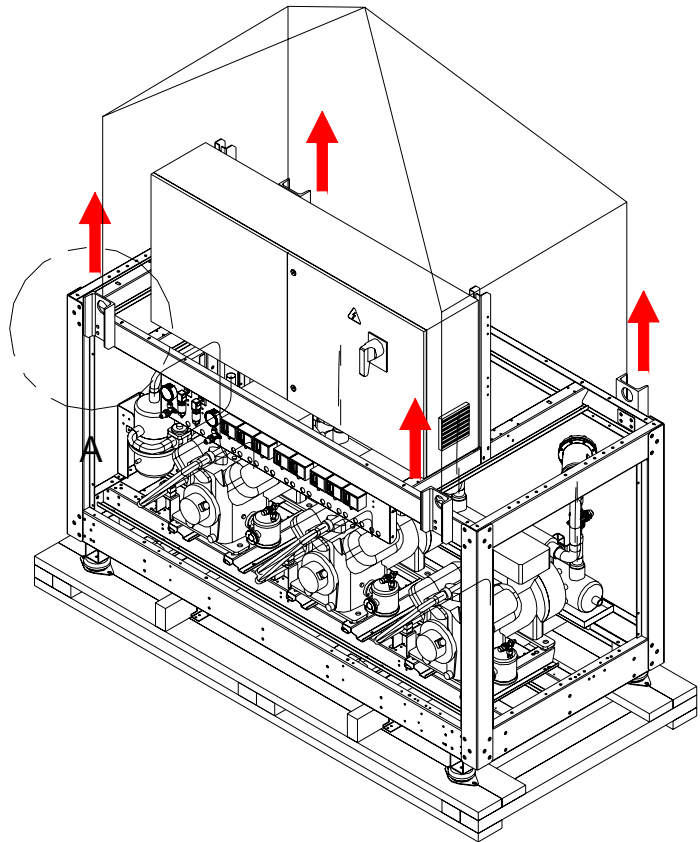
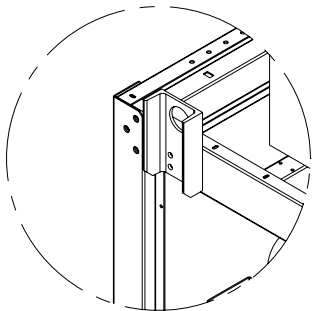
Ensure that nobody is in the handling area during the hoisting procedures.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 030 CHAPTER: HANDLING AND POSITIONING	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 4
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		16.April.2009
	B	24/June/2010	Technical details		MKT
	C				

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.



- It is advisable to use a lifting rocker arm in order to avoid damage to the electrical board and inverter.
- 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.



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.

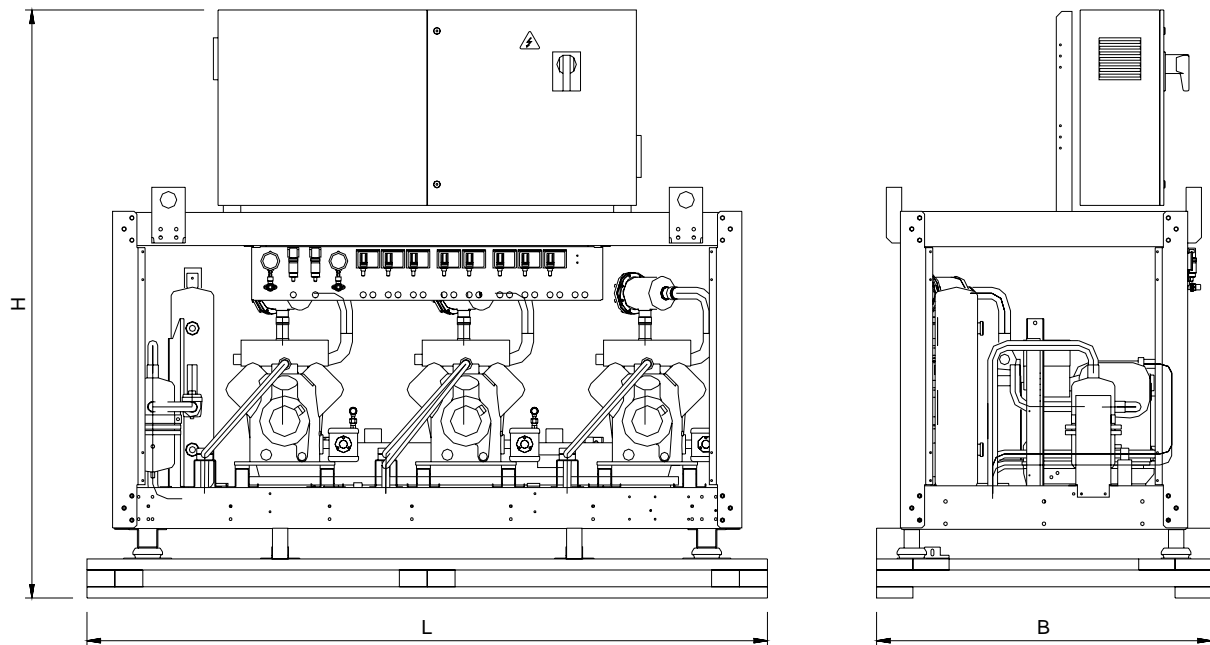
Indoor/outdoor installation

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 030 CHAPTER: HANDLING AND POSITIONING	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 4
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	22/Oct/2009	Technical details		16.April.2009
	B	24/June/2010	Technical details		MKT
	C				

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 Multispeed 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.



Pack model	Maximum mass (kg)	Maximum dimensions (mm)		
		Length (mm) L	Height (mm) H	Width (mm) B
3 compressors	1150	2590	2150	1200
4 compressors	1800	3240	2150	1200
5 compressors	2220	3890	2150	1200

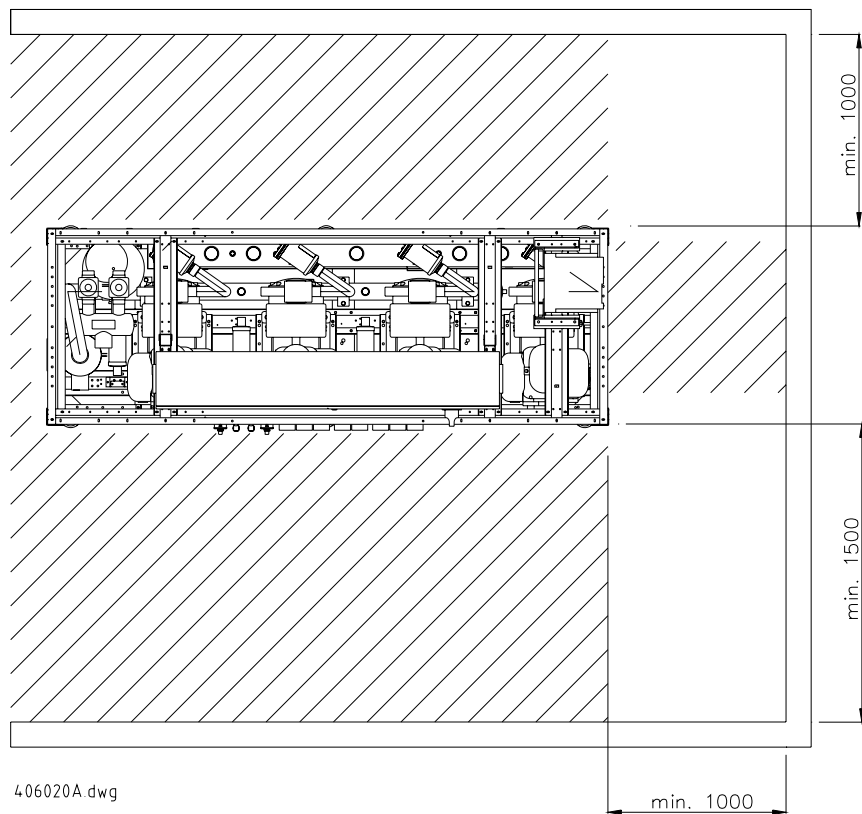
EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 4
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 030 CHAPTER: HANDLING AND POSITIONING	A	22/Oct/2009	Technical details		16.April.2009
	B	24/June/2010	Technical details		MKT
	C				

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.

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.

The clearance on the right hand side of the pack must never be smaller than 1m. in order for easy inverter access by the operator to be ensured.



EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

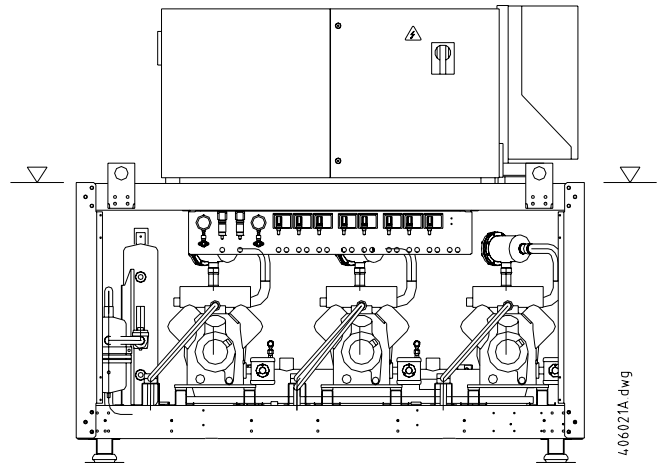
040 - INSTALLATION

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 pallet, cardboard, nails, etc.) must not absolutely ever be left within the reach of children. The installer will have to provide for their disposal and recovery following the laws in force.

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.



Remove the two wood boards located between the inverter frame and the pack's undercarriage.

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 the 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:

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 040 CHAPTER: INSTALLATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 48
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				MKT

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

where:

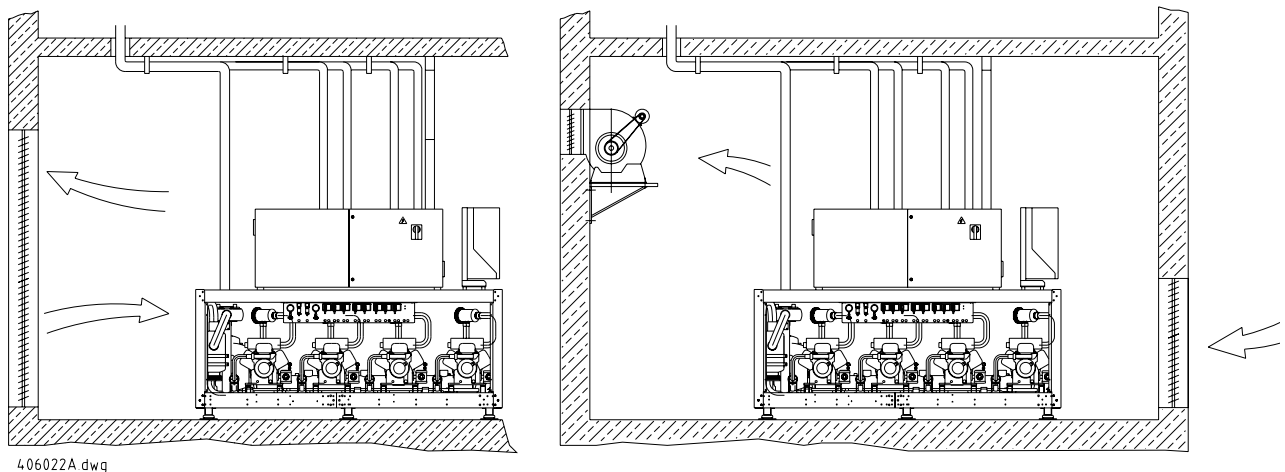
V = is the air flow rate in liters per second;

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 in the close vicinity of areas in which people are present on a regular basis, or are difficult-to-evacuate restricted areas, 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 compressor marked as #1 in the wiring diagrams is the one that is steered by the inverter: it is right underneath the inverter, thus it is the last compressor on the right (looking at the pack from the electrical board side). The numbering then resumes the usual layout – compressors 2, 3 etc. starting from the left hand side.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

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, which does not include the power input for the fans of a possible air condenser, is indicated previously in this manual, in the performance table of DESCRIPTION/ TECHNICAL DETAILS SECTION. 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 indoors, power cables must enter the board from above, through a hole drilled on the appropriate plate (if any), 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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

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.

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 (vacuum) 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 30 liters, depending on the reserve model installed (HCYR 80, HCYR 120 or HCYR 200 and HCYR 300). Then open the valve.

The equipment termed "refrigerating unit" cannot work on its own and must be included in the set termed "system". When inoperative and not connected up to a system, some pack versions contain pressure vessels, that, due to a possible refrigerant accumulation, may entail a potential hazard in case of fire. Suck vessels, named liquid receivers, are duly protected by safety valves ensuring refrigerant discharge.

If the pack is delivered without an on-board liquid receiver, it is the installer's responsibility to fit the receiver with suitable safety valves providing for refrigerant discharge at the time when the pack is connected up to the other system components, i.e. to pressure vessels that may be subject to a pressure rise in case of fire.


Neither the unit nor the system include vessels containing an independent source of heat.

The safety valves, when located outdoors, must be suitably protected to avoid their getting soiled and damaged by the elements;

The position of outdoor-leading exhaust pipes branching off 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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

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 Multispeed 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>
---	--

Visual inspection of the equipment

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

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).

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 6 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

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.

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).

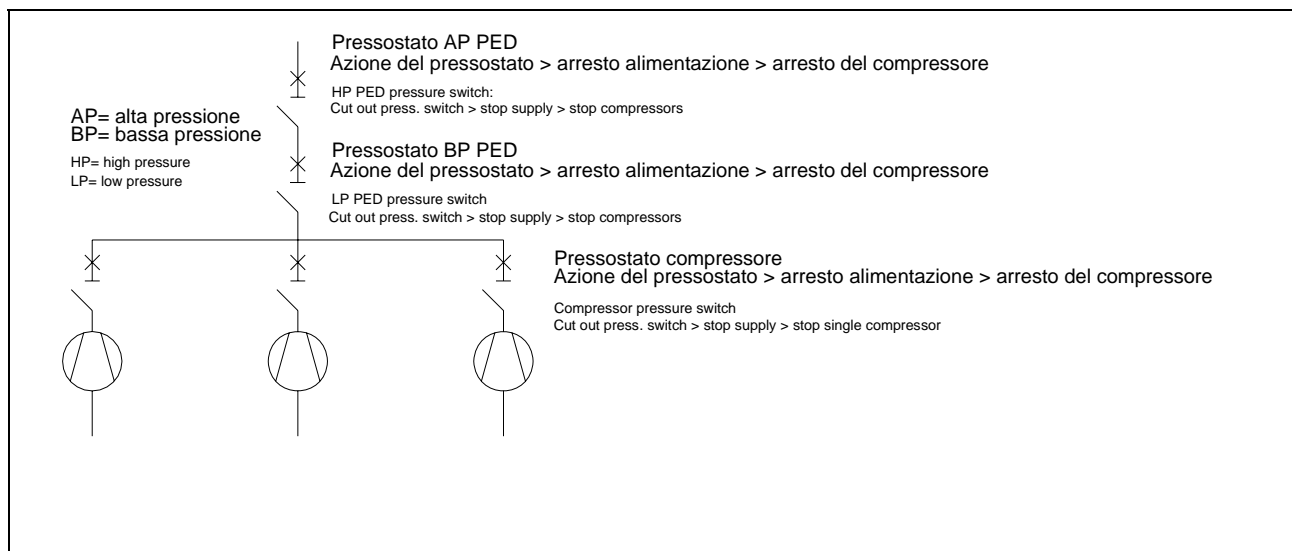
	Check that the lead seals are intact; do not tamper with the adjustment screw of safety pressure switches.
---	---

	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.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 7 OF 48
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
C				MKT	

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




The behavior of pressure switches, with reference to the refrigerating diagrams in Chapter 020, may 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.
- 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).

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 8 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				MKT

	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 signaled 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.
---	---

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. Empty 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.

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)

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

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 9 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

Pressure switch for compressor mechanical backup operation

Low pressure side		TN R404A
I.D.	FUNCTION	bar ¹ (°C) ²
PSB ³	COMPRESSOR SHUTDOWN	2,6 (-15°C)
	DIFFERENTIAL	1,0

SAFETY PRESSURE SWITCHES

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

High pressure side		TN R404A
I.D.	FUNCTION	bar (°C)
PHP-1	SYSTEM PROTECTION	27(+59°C)
	DIFFERENTIAL	fixed 4,0
PHP-2	SYSTEM PROTECTION	28 (60,6°C)
	DIFFERENTIAL	fixed 4,0
PHP-C	COMPRESSOR PROTECTION	26,5(+58,1°C)
	DIFFERENTIAL	6,0

DELAY DEVICES

DESCRIPTION	I.D.	TIME (MIN)
LIQUID LEVEL (if any)	RLL	30

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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 10 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 040 CHAPTER: INSTALLATION	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

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

ON-SITE TESTING AND INSPECTION ADVICE
 <p> 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 </p>

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 050	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 15.May.2009
CHAPTER: ELECTRICAL BOARD FEATURES	A	24/June/2010	QRM001700A		MKT
	B				
	C				

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 suitable 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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		15.May.2009
	B				MKT
	C				

6.3 Red color wires.

6.4 Cable numbering as per diagram.

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

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 to work as mechanical backup may be selected 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.A Circuit for compressor 1 (the one steered by the inverter)

In order to avoid damage to the inverter, the compressor must only be stopped using switch D, which is located on the electrical board's outer panel. Only after the motor has stopped may the inverter be switched off using the QM overcurrent device.

7.A.1 Compact system SIEMENS SIRIUS S0/S2

7.A.1.1 Overcurrent switch (Overload cutout) and circuit breaker that can be padlocked when compressors are under maintenance (Siemens series S0/S2)

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 050	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 15.May.2009
CHAPTER: ELECTRICAL BOARD FEATURES	A	24/June/2010	QRM001700A		
	B				MKT
	C				

- 7.1.2 Electrical board versions with residual current device **Merlin Gerin RH99M and associated Toroid TA30** act on the QM1 overcurrent device overload cutout through a coil that ensures maneuvers in AC23 and cuts off the electrical circuit.
- 7.A.1.3 The inverter is protected from short circuit and overload by overcurrent device QM1, that also provides phase loss protection and phase current imbalance protection (such protection comes on when imbalance is above 30-50%). Therefore overcurrent switch QM1 must be set after the inverter current rating and not after the compressor current rating.
- 7.A.1.4 The inverter is fitted with a built-in electronic device that ensures compressor protection against short circuit and overload.
- 7.A.1.5 If the inverter gets damaged or does not work properly it is possible to exclude the inverter and have the compressor work through contactor KM1. To verify QM1 setting it is necessary that QM1 main switch and QM1 itself are both OFF.
- 7.A.1.6 In order to avoid damage to the inverter, the compressor must only be shut down using switch D, which is located on the electrical board's outer panel. Only after the motor has stopped may the inverter be switched off using the QM overcurrent device.
- 7.A.1.7 Poor oil level protection circuit. by pressure switch or oil electronic detector.
- 7.A.1.8 Overheating-protection circuit monitored by thermistor probes connected to probe monitor KRIWAN INT69VS / SE-BE according to DIN 44081 standards.

The inverter ensures complete short-circuit overload protection on exiting the motor.

After short-circuit has occurred, the company that manufactured the inverter must be contacted to decide whether the inverter needs to be repaired or it needs to be replaced altogether.

7.B Compressor circuit n°.2 / n°.3 / n°.4 / n°.5

7.B.1 Compact system SIEMENS SIRIUS S0/2/3

7.B.1.1 Overcurrent switch (Overload cutout) and circuit breaker that can be padlocked when compressors are under maintenance (Siemens series S0/2/3)

7.B.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.B.1.3 Contactors: Siemens series S0/2/3, coordinated with their respective overcurrent device following the tables supplied by SIEMENS

7.B.1.4 Compressors are protected by an overload cutout switch performing the following functions:

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

7.B.1.5 Poor oil level protection circuit. by pressure switch or oil electronic detector.

7.B.1.6 Overheating-protection circuit monitored by thermistor probes connected to probe monitor KRIWAN INT69VS / SE-BE according to DIN 44081 standards.

7.B.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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		
	B				
	C				
					MKT

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 control thermostat Danfoss EKC202D1 or Carel iR33C0HB00.

10. Control electronics

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

10.1.2 Danfoss AK-PC710

10.1.3 Carel pco3

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

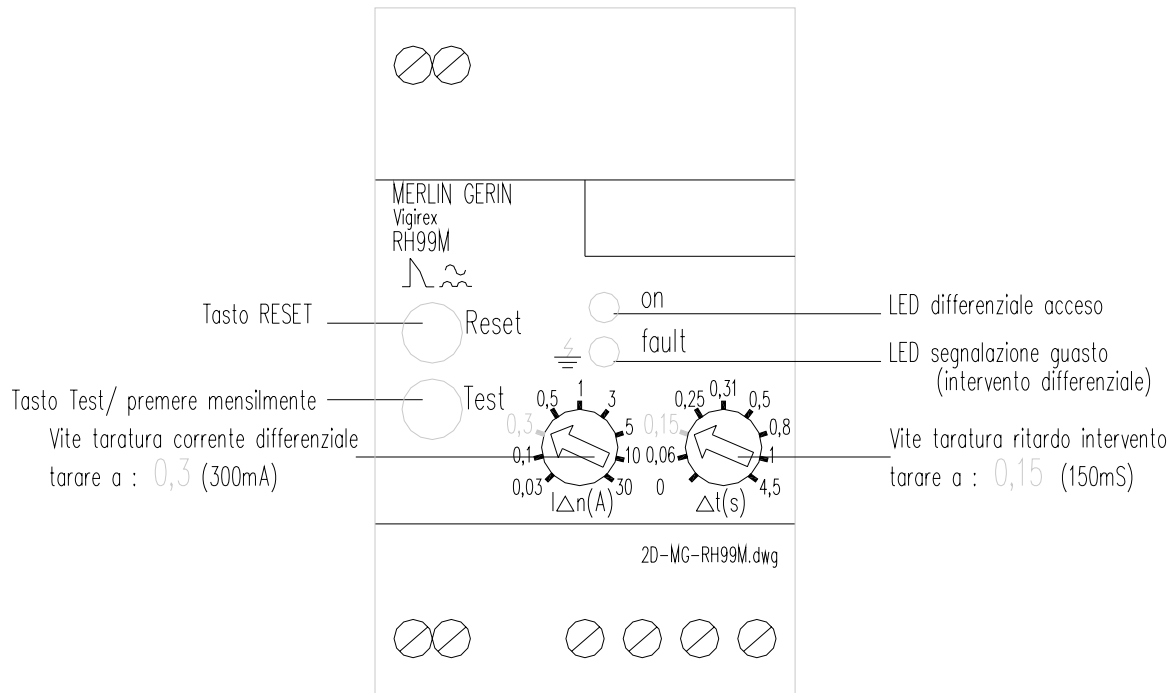
Each condenser fan control has a residual current device, which means that when one fan control circuit fails it does not affect the others.

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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 9	
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE	
	A	24/June/2010	QRM001700A			15.May.2009
	B					
	C					
					MKT	

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.

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

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 6 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		15.May.2009
	B				MKT
	C				

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	Liquid level	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 driven	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.

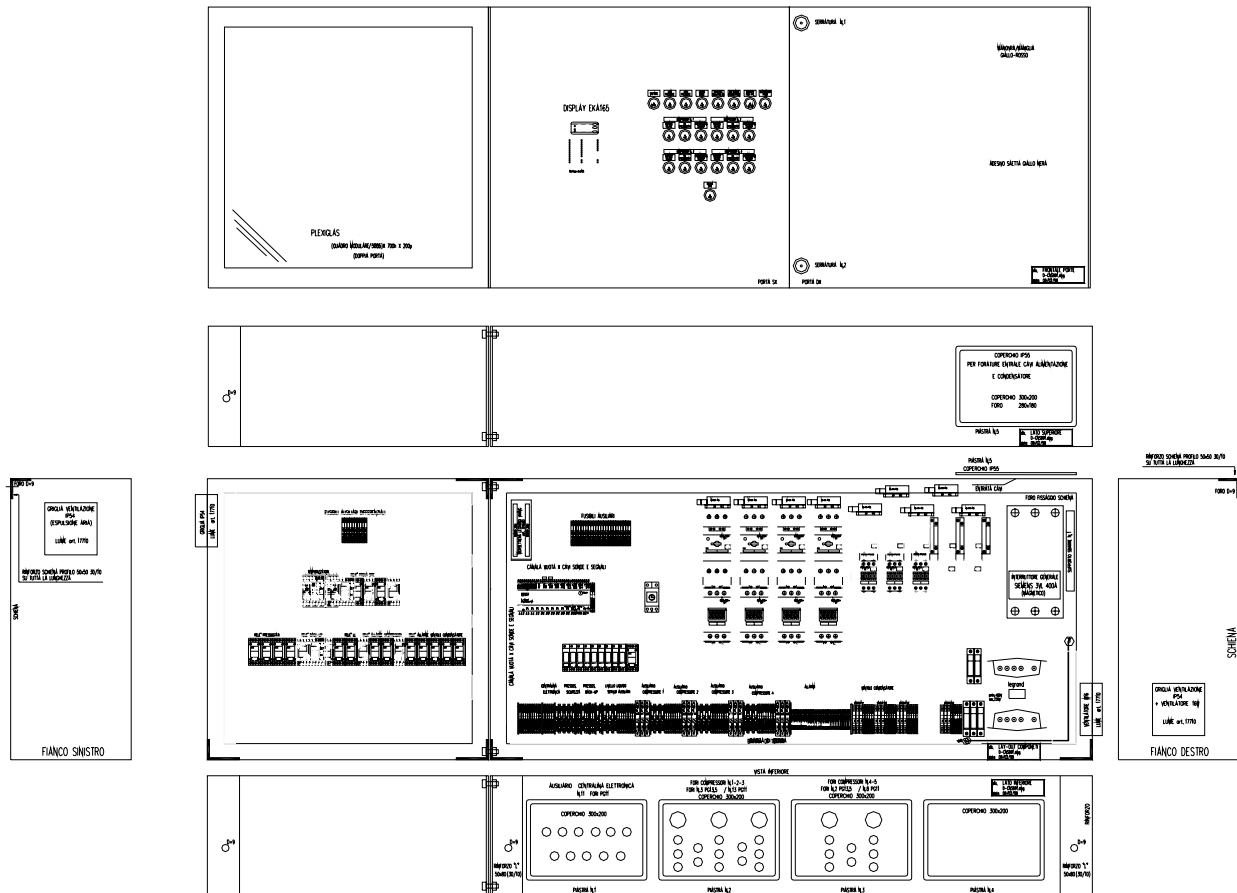
16. Lay-out of components / drilling.

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

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	REVISION STATUS			APPROVAL SIGNATURE	PAGE 7 OF 9
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		15.May.2009
	B				MKT
	C				



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 32Watt 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**.

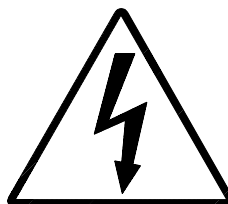
EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 8 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.: 050	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		15.May.2009
	B				
CHAPTER: ELECTRICAL BOARD FEATURES	C			MKT	

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).

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. di serie e la data di produzione. 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-contactor) 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).**



INSTALLATION LIMITS¹
BOTTOM TEMPERATURE LIMIT 0°C
TOP TEMPERATURE LIMIT 45°C

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;

¹ Temperature referred to inverter compartment

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 9 OF 9
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N.:050 CHAPTER: ELECTRICAL BOARD FEATURES	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	24/June/2010	QRM001700A		15.May.2009
	B				MKT
	C				

- 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;
- 25.9 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

26. Eptaberg multispeed packs

Multispeed packs with an inverter are made up of the same components as the standard pack except for the following:

- 25.1 The first compressor is controlled by an inverter with frequency varying from 30 to 55 Hz (value subject to change following compressor type)
- 25.2 Regulation signals 0-10v and ON/OFF for the inverter are transmitted by controller Danfoss AK-PC710 and Carel pco3
- 25.3 The inverter manual start/stop signal can be given by the appropriate selector switch located on the front of the electrical board
- 25.4 The inverter is installed as described in the equipment's manual, complying with all mechanical and electrical instructions.
- 25.6 The cable between the compressor and the inverter is shielded.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 060 CHAPTER: WIRING DIAGRAMS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				MKT
	C				

060 - WIRING DIAGRAMS

The Use and Maintenance Manual for the EptaBerg Multispeed packs are attached wiring diagrams suiting the specific configuration.

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



Compressor #1 as marked on wiring diagrams is the one steered by the inverter: it is right underneath the inverter, thus it is the last compressor on the right (looking at the pack from the electrical board side). The numbering then resumes the usual layout – compressors 2, 3 etc. starting from the left hand side.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 1
PRODUCT: EPTABERG MULTISPEED DOC.N. QSM000524A CHAP.N... 070	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
CHAPTER: CONTROL AND REGULATION /	A	24/June/2010	QRM001700A		MKT
	B	29/June/2012	XC1015D Added		
	C				

070 – CONTROL AND REGULATION

Control and regulation electric panels

DANFOSS AK- PC710

Table of settings for AK- PC710

Settings table attached to wiring diagrams delivered in the electrical panel

CAREL PCO3

Table of settings for CAREL PCO3

Settings table attached to wiring diagrams delivered in the electric panel

DIXELL XC 1015D

Table of settings for XC1015D

Settings table attached to wiring diagrams delivered in the electric panel

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 electric panel and in the technical book.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

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' 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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

Safety sheet for R404A refrigerant

Substance identifying elements	
Details of components	1, 1, 1 - trifluoroethane (R143a) EEC - No. 420 - 46 - 2 EEC - No. 206 - 996 - 5 Pentafluoroethane (R125) EEC - No. 354 - 33 - 6 EEC - No. 206 - 557 - 8 1, 1, 1, 2 - tetrafluoroethane (R134a) EEC - 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 vapors 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 vapors 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 ml/m ³ Dupont (1992) pentafluoroethane (R125) AEL (8-H E 12-H TWA) = 1000 ml/m ³ Dupont (1992) 1, 1, 1, 2 - tetrafluoroethane (R134a) AEL (8-H E 12-H TWA) = 1000 ml/m ³ Dupont (1992) Individual protection: - breathing protection: during salvage and cfc tank operations, independent breathing apparatus must be used. The vapors 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 Color: colorless Smell: similar to ether pH: neutral Boiling point/interval: -46.7 °C Flash point: non inflammable Explosive properties: no available details Vapor 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, Aluminum, 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

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

Substance identifying elements	<p>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 edema).</p> <p>Long-term toxicity: during experiments carried out on animals no carcinogenic, teratogenic or mutagenic effects were found.</p> <p>Specific effects: rapid evaporation of the liquid can cause frost-bite.</p>
Ecological information	<p>Effects tied to eco-toxicity:</p> <p>Pentafluorethane (R125) halocarbons global warming potential; HGWP; (R-11 = 1) =0.84 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0</p> <p>Trifluorethane (R143a) halocarbons global warming potential; HGWP; (R-11 = 1) =1.1 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0</p> <p>Tetrafluorethane (R134a) halocarbons global warming potential; HGWP; (R-11 = 1) =0.28 Potential global warming effect of halocarbons;; ODP; (R-11 = 1) = 0</p>
Disposal	<p>Waste refuse/unused products: usable through reconditioning.</p> <p>Contaminated containers: depressurized containers should be returned to the supplier.</p>
Details of regulations	<p>EEC Directive Safety 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 "labeling guide" Circulars 46/79 and 61/81 issued by the Ministry of Labor "Risks relating to the use of products containing aromatic amines"</p> <p>L.D. #133/92 "Regulations relating to the disposal of hazardous substances in groundwaters"</p> <p>L.D. #277/91 "Protection of workers from noise, lead and asbestos"</p> <p>M.D. 28/01/92 "Classification and rules governing packaging and labeling of hazardous Compounds"</p> <p>P.D. #175/88 "Activities entailing serious accident risks (Seveso Law)"</p> <p>P.D. #203/88 "Emissions into the atmosphere"</p> <p>P.D. #303/56 "Work hygiene"</p> <p>P.D. #547/55 "Regulations governing accident prevention"</p> <p>Law 319/76 "Protection of waters (also known as Merli law)"</p>

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.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

Safety sheets for lubricant oil (Bitzer BSE32) – factory-filled oil.

1. PRODUCT AND SUPPLIER IDENTIFICATION

PRODUCT NAME: Bitzer Kaltmaschinenol BSE32

MANUFACTURER: Fuchs DEA Schmierstoffe GmbH & Co. Export Division, Friesenheimer Str. 9-11

68169 Mannheim (D)

SUPPLIER: BITZER Italy S.r.l., Viale del Mercato Nuovo, 44G 36040 Vicenza (I)

PURPOSE: oil for compressors meant for refrigeration

Health emergency: tel.118 (Italy)

.....

2. COMPOSITION /INGREDIENT INFORMATION

NAMES AND CHEMICAL SINONYMS: synthetic ester

COMPONENTS TO BE LISTED ON THE SAFETY SHEET: (according to EU or other International body): none

3. HAZARD IDENTIFICATION

Under normal use conditions, if due care is exercised, the product cannot be considered as hazardous based on EU guidelines (see Section 15).

POTENTIAL EFFECTS ON HEALTH: Under the normal use conditions provided for by the manufacturer, this product does not represent a health hazard. Excessive exposure may cause eye, skin or breathing system irritation. For further effects on health and/or toxicological details, see Section 11. Note: this product may not be used for applications other than those foreseen by the manufacturer without previous consultation with an expert.

4. FIRST-AID MEASURES

CONTACT WITH EYES: rinse with water thoroughly. If soreness should arise, see a doctor.

CONTACT WITH SKIN: wash contact areas with water and soap. Daily remove and clean garments soaked in oil and also wash affected areas.

NOTICE IN CASE OF ACCIDENTAL INJECTION: if the product is accidentally injected into or under the skin, or in any body part, regardless of the appearance or amount of the wound, have the person in question be seen by a doctor as a surgical emergency. Even though the initial symptoms from a high-pressure injection may be minimal or nonexistent, speedy surgery may significantly reduce damage.

INHALATION: does not represent a problem. However, if following exposure to high vapor or mist concentration the person experiences breathing soreness, dizziness, nausea or a fainting fit, call a doctor immediately. If the person stops breathing, give artificial respiration, using a manual device or either expired air ventilation.

INGESTION should not represent a problem. In case of pain, resort to medical care. Do not cause the person to vomit.

5. FIRE-PREVENTION MEASURES

FIRE-FIGHTING EQUIPMENT: foam, CO2, dust or water-mist extinguishers.

SPECIAL FIRE-FIGHTING PROCEDURES: The use of foam or water may cause foaming. Use water to cool containers that have been exposed to heat. Pressurized water may be used to wash off

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

the material spilt in the area affected by the fire. Prevent leaks from the fire-fighting system and pollution of rivers, sewers and drinkable water lines.

SPECIAL PROTECTION EQUIPMENT: when fighting fire in closed environments, wear appropriate clothing and breathing apparatus.

SPECIAL FIRE AND EXPLOSION HAZARDS: NOTE pressurized mist may form an explosive mixture.

6. PROCEDURES IN CASE OF ACCIDENTAL SPILLING

PROCEDURES TO BE NOTIFIED: notify the competent authority of any possible leak, e.g. the health authorities concerned and the Fire Squad. If the leak may affect the sewer system or rivers, immediately contact the Health authorities.

In case of accident involving transportation means, leaks or spilling on roads, report to the Police and Fire Squad and, if necessary, to the Health Authority.

PROCEDURE IN CASE OF PRODUCT LEAK OR SPILLING:

SPILLING ON FLOOR: stop the spilling at the source using normal safety measures. Use any measure needed to minimize effects on groundwater. Recover by pumping out or contain using sand or other appropriate material and collect in suitable containers.

As for disposal procedures, see section 13.

SPILLING ON WATER: immediately contain using floating barriers. Warn crafts or swimmers.

Inform the relevant authority (port authority, shipping authority, etc..).

Remove the product from the surface by skimming or using suitable substances. When this is allowed by the relevant authority, consider using a suitable dispersant, if appropriate for localized oil-spilling.

ENVIRONMENTAL PROTECTION MEASURES stop the material from reaching the sewer system, water sources or depressions; if the product has pollute the soil and/or vegetation, notify the relevant authority.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORING

SPECIFIC USES: oil for refrigeration compressor

MANIPULATION: this material is not appropriate for use in compressors aimed for breathing air. High-pressure injection of oil under the skin may be determined by a leak of pressurized product due to a hydraulic line failure. Always see a doctor. No special precautions are requested other than good hygienic practice. For further advice on personal means of protection when using this product see section 8.

STOCKING: keep containers closed when they are not in use. Do not keep containers open or unlabelled. Keep away from strongly oxidizing agents and from combustible material. Do not store in the vicinity of heat sources, sparks, flames or strong oxidants.

SPECIAL PRECAUTIONS: Avoid leakage and seepage in order to avoid slipping hazard.

NOTICE REGARDING EMPTY CONTAINERS: empty containers may hold residue (liquid and/or vapor) and therefore be hazardous. **DO NOT PRESSURIZE, CUT, WELD, DRILL, EMERY-POLISH OR EXPOSE CONTAINERS TO HEAT, FLAMES, SPARKS, STATIC ELECTRICITY OR OTHER SOURCES OF IGNITION. CONTAINERS COULD EXPLODE AND CAUSE INJURY OR DEATH.**

Do not try and fill them or clean them because residue is hard to remove. Empty drums must be completely drained and then closed tight and sent to reconditioning.

Dispose of the containers in an environmentally safely manner and following the standards in force.

8. EXPOSURE CONTROL / INDIVIDUAL PROTECTION:

PROFESSIONAL EXPOSURE LIMITS: this product does not contain any component for which exposure limits have been acknowledged.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 6 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

VENTILATION: In case oil mist forming, keep exposure below the limits provided using appropriate ventilation means, localized suction lines or screening.

BREATHING PROTECTION: in case of oil mist and/or insufficient ventilation, wear a suitable and approved breathing system protecting device.

EYE PROTECTION: in order to avoid contact with the eyes, wear safety goggles with side or chemical protection.

SKIN PROTECTION: avoid contact with the liquid by wearing gloves that may resist to oil and/or other protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

For deeper insight, we recommend looking up the data contained in the relevant product sheet.

GENERAL:

PHYSICAL STATE: Liquid

COLOUR: Straw-yellow

SMELL: Weak

pH: NA

BOILING TEMPERATURE: NA

FLASHING TEMPERATURE (C°): 240°C ISO2592

INFLAMMABILITY (solids): ND

SELF-INFLAMMABILITY C(F): NA

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

DENSITY AT 15°C : 1,01 gr/cm³ DIN 51 757

WATER SOLUBILITY: negligible

VISCOSITY AT 40 C, 31,0 mm²/sec DIN 51 562

For further details, please contact the distributor/local dealer.

10. STABILITY AND REACTIVITY

STABILITY (to temperature, light etc.): stable if used at recommended conditions

HAZARDOUS REACTIONS: no hazardous reaction is known

HAZARDOUS PRODUCTS THAT MAY FORM THROUGH DECOMPOSITION: the product does not decompose at ambient temperature..

11. TOXICOLOGICAL DETAILS

ACUTE TOXICOLOGY, ORAL TOXICOLOGY: virtually non toxic

SKIN TOXICOLOGY: virtually non toxic

INHALATION TOXICOLOGY: virtually non toxic

EYE IRRITATION: virtually non irritant.

SKIN IRRITATION: virtually non irritant. ---Based on tests for similar products and/or components.

12. ECOLOGICAL INFORMATION REGARDING ENVIRONMENTAL IMPACT:

Do not disperse in soil, in groundwaters, water reservoirs or sewer systems.

When in water, the product precipitates because of its higher density.

13. DISPOSAL REMARKS

Dispose of used oil and empty containers according to the laws in force.

EUROPEAN CODE FOR WASTE: 13 01 11 (synthetic oil for hydraulic circuits) Code attribution implies that the product has been used for the application it was aimed for. In case of different use

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 7 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:080 CHAPTER: OUTSTANDING RISKS AND EMERGENCY SITUATIONS	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE	
	A					28.May.2009
	B					MKT
	C					

and/or in case of pollutants, the user may have to assign a different code. Pursuant to Directive 91/689/EEC for hazardous waste, this waste product is considered as hazardous and as such it is ruled by the provisions of this directive.

14. HANDLING DETAILS

Handling and shipping must follow the standards in force.

15. INFORMATION REGARDING REGULATIONS, CLASSING AND LABELLING (UE):

Designation as per EU guidelines. EU labeling not required.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:090 CHAPTER: MAINTENANCE	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

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/replace suction filters			X
Check / replace el.brd. fan filter			X
Check whether motor-driven fans are securely fastened ²			X

Control of the liquid sight glass 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

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

² Applicable where these are provided


EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 48
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.:090 CHAPTER: MAINTENANCE	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
	A				
	B				
	C				

in the circuit. Deep yellow or yellow-rose indicates that the cartridge is unable to hold any more humidity and must be replaced.

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.

Safety valve (where this is provided)

It is advisable to replace the safety valve after it has tripped; valve discharging may cause manufacturing residues that proceed from 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.
---	---

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. 4DC-7.2Y). The lubricant oil the Bitzer compressors in Eptaberg systems are charged with when delivered is BSE32 and 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 4DC-7.2Y 6F-40.2 Y	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)

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 48	
PRODUCT: EPTABERG MULTISPEED DOC.N. QQSM000524A CHAP.N.: 090 CHAPTER: MAINTENANCE	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009	
	A					
	B					MKT
	C					

	When performing jobs that involve handling lubricants, regarding their disposal (used oil) and the measures to be taken in case of accidental leak or spillage, strictly abide by the instructions in the Safety sheet, section 080 "OUTSTANDING RISKS AND EMERGENCY SITUATIONS" of this manual.
---	---

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, which is stated in the conformity declaration for the refrigerating plant and 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 vessels containing water vapor or superheated water belonging in 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.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 24.April.2010
	A				MKT
	B				
	C				

0100 - ENCLOSURE

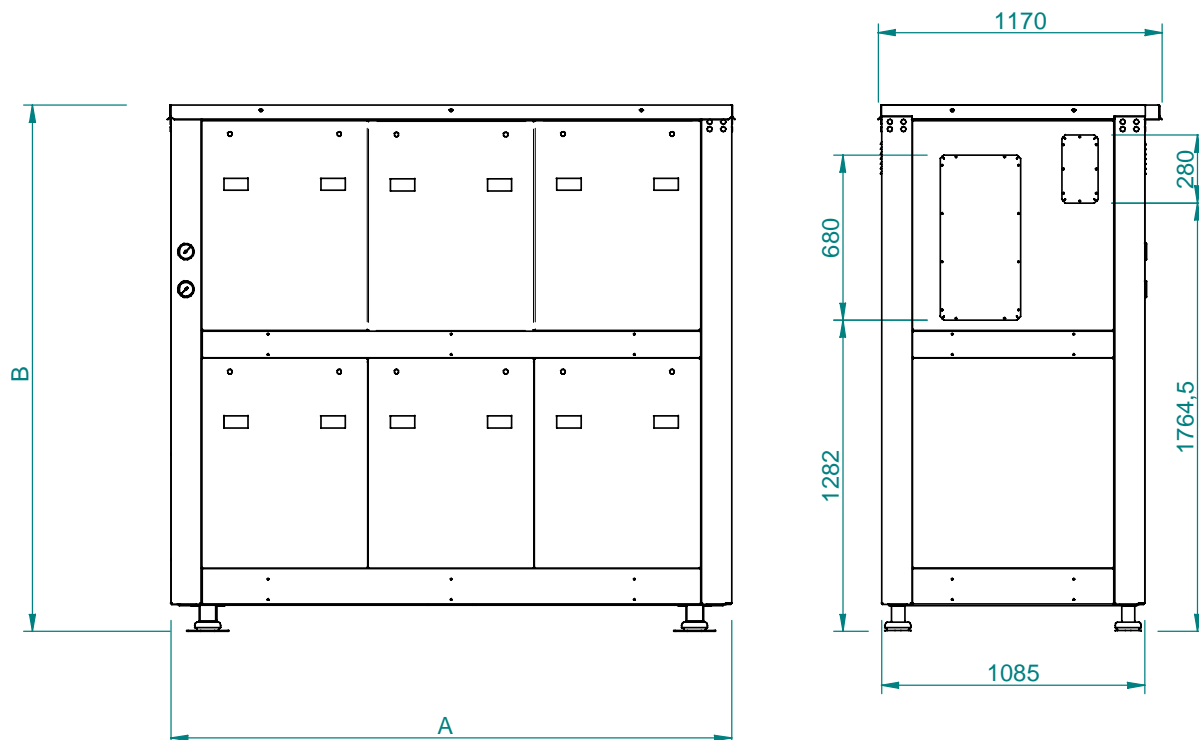
Main features

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 advisable to have an evaporator with a thermostatic valve inside the enclosure; the evaporator on/off control is performed by an adjustable electrical thermostat and a temperature probe placed in the compartment itself.

Dimensional schematics EptaBerg MS with outdoor enclosure



EPTABERG MS CARENATA	A(mm)	B(mm)	Maximum weight (Kg)
3GR	2310	2170	1688
4GR	3000	2170	2209
5GR	3645	2200	2687

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...:100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A				24.April.2010
	B				MKT
	C				

Pipework for Bitzer MS packs.

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 3 COMPRESSORS					
Pack model	2x 4VCS-6.2Y +4DC-7.2Y	2x 4PCS-10.2Y +4VC-10.2Y	2x 4NCS-12.2Y +4TC-12.2Y	2x 4J-13.2Y +4PC-15.2-Y	2x 4H-15.2Y +4NC-20.2Y
Diam. of Discharge (mm)	35	42		54	
Diam. of user equipment suction line (mm)	1x54	1x67		2x54	

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 4 COMPRESSORS							
Pack model	3x 4J-13.2Y +4PC-15.2-Y	3x 4H-15.2Y +4NC-20.2Y	3x 4G-20.2Y +4J-22.2Y	3x 6J-22.2Y +4H-25.2Y	3x 6H-25.2Y +4G-30.2Y	3x 6G-30.2Y +6J-33.2Y	3x 6F-40.2Y +6H-35.2Y
Diam. of Discharge (mm)	54			67		80	
Diam. of user equipment suction line (mm)	2x67			2x80			2x108

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 5 COMPRESSORS						
Pack model	4x 4H-15.2Y +4NC-20.2Y	4x 4G-20.2Y +4J-22.2Y	4x 6J-22.2Y +4H-25.2Y	4x 6H-25.2Y +4G-30.2Y	4x 6G-30.2Y +6J-33.2Y	4x 6F-40.2Y +6H-35.2Y
Diam. of Discharge (mm)	67		80			
Diam. of user equipment suction line (mm)	2x80					2x108

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 5
PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N.:100	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 24.April.2010
CHAPTER: ENCLOSURE	A				MKT
	B				
	C				

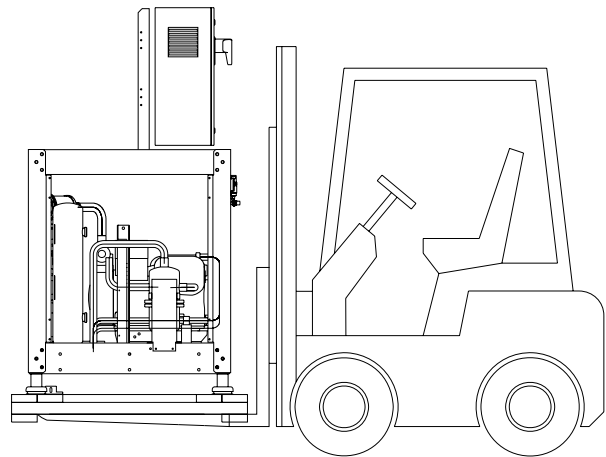
HANDLING AND POSITIONING

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.



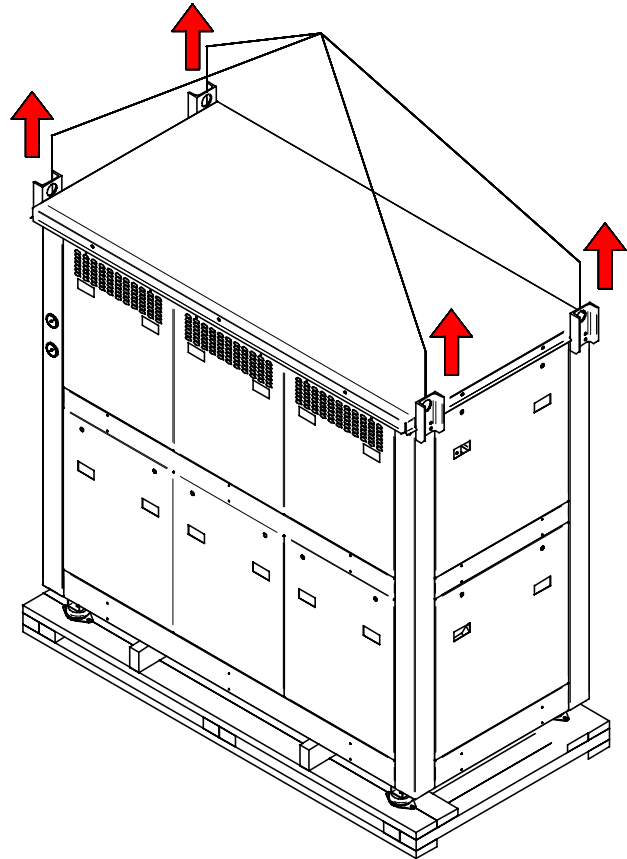
Ensure that nobody is in the handling area during the hoisting procedures.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 24.April.2010
	A				MKT
	B				
	C				

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.



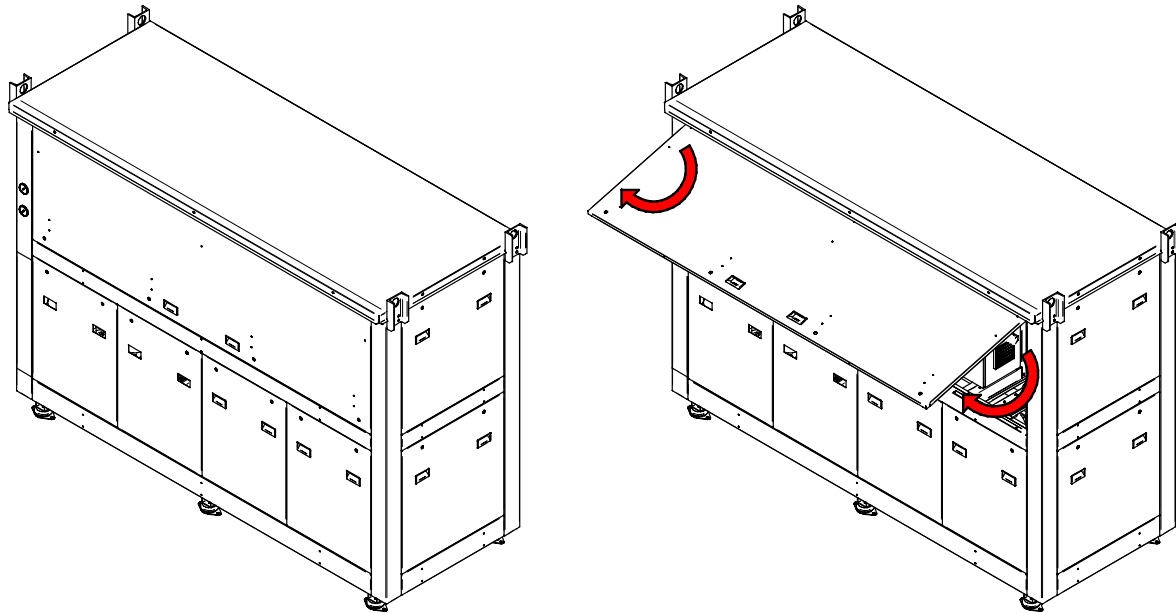
Ensure that nobody is in the handling area during the hoisting procedures.



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.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 24.April.2010
	A				MKT
	B				
C					

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 and a temperature-control thermostat suiting with the controller installed,

when Danfoss, the respective controller is EKC202D1.

when Carel , the respective controller is iR33C0HB00.

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.

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 1 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	29/June/2012	Technical details added		28.May.2009
	B				MKT
	C				

0100 - ENCLOSURE

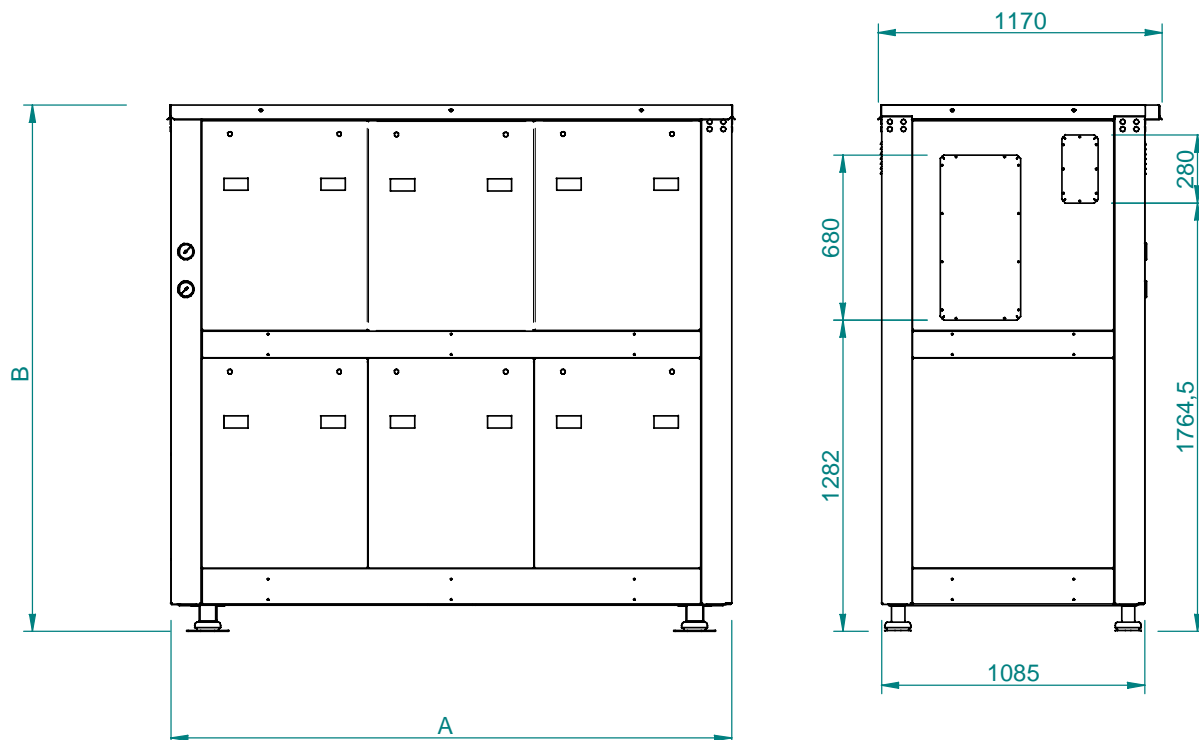
Main features

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, on the electric panel side the enclosure is fitted with a door to be lifted open by way of spring bolts.

To cool the machinery compartment, it is advisable to have an evaporator with a thermostatic valve inside the enclosure; the evaporator on/off control is performed by an adjustable electrical thermostat and a temperature probe placed in the compartment itself.

Dimensional schematics EptaBerg MS with enclosure for outdoors



EPTABERG MS ENCLOSURE	A(mm)	B(mm)	Maximum weight (Kg)
3GR	2310	2170	1746
4GR	3000	2170	2209
5GR	3645	2200	2687

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 2 OF 5
PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...:100	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE 28.May.2009
CHAPTER: ENCLOSURE	A	29/June/2012	Technical details added		MKT
	B				
	C				

Pipework for Bitzer MS packs.

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 3 COMPRESSOR PACKS						
Pack model	2x 4VCS-6.2Y +4DC-7.2Y	2x 4PCS-10.2Y +4VC-10.2Y	2x 4NCS-12.2Y +4TC-12.2Y	2x 4J-13.2Y + 4PC-15.2-Y	2x 4H-15.2Y +4NC-20.2Y	2x 4G-20.2Y +4J-22.2Y
Diam. of Discharge (mm)	35	42		54		
Diam. of user equipment suction line (mm)	1x54	1x67		2x54		

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 4 COMPRESSOR PACKS							
Pack model	3x 4J-13.2Y +4PC-15.2-Y	3x 4H-15.2Y +4NC-20.2Y	3x 4G-20.2Y +4J-22.2Y	3x 6J-22.2Y +4H-25.2Y	3x 6H-25.2Y +4G-30.2Y	3x 6G-30.2Y +6J-33.2Y	3x 6F-40.2Y +6H-35.2Y
Diam. of Discharge (mm)	54			67		80	
Diam. of user equipment suction line (mm)	2x67			2x80			2x108

EPTABERG – MEDIUM-TEMPERATURE APPLICATIONS – 5 COMPRESSOR PACKS						
Pack model	4x 4H-15.2Y +4NC-20.2Y	4x 4G-20.2Y +4J-22.2Y	4x 6J-22.2Y +4H-25.2Y	4x 6H-25.2Y +4G-30.2Y	4x 6G-30.2Y +6J-33.2Y	4x 6F-40.2Y +6H-35.2Y
Diam. of Discharge (mm)	67		80			
Diam. of user equipment suction line (mm)	2x80					2x108

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 3 OF 5
PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	29/June/2012	Technical details added		28.May.2009
	B				MKT
	C				

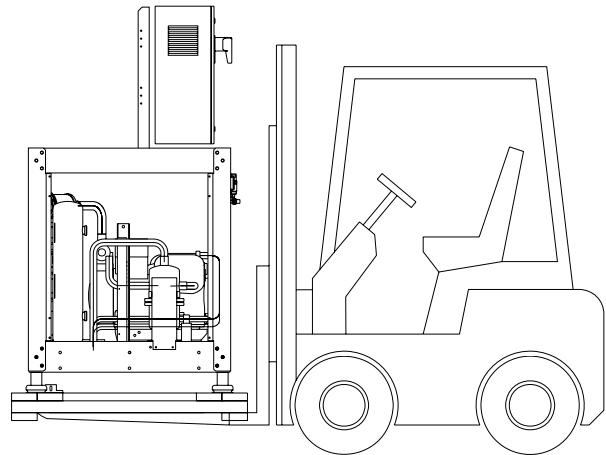
HANDLING AND POSITIONING

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 centre;
- 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 frame 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.



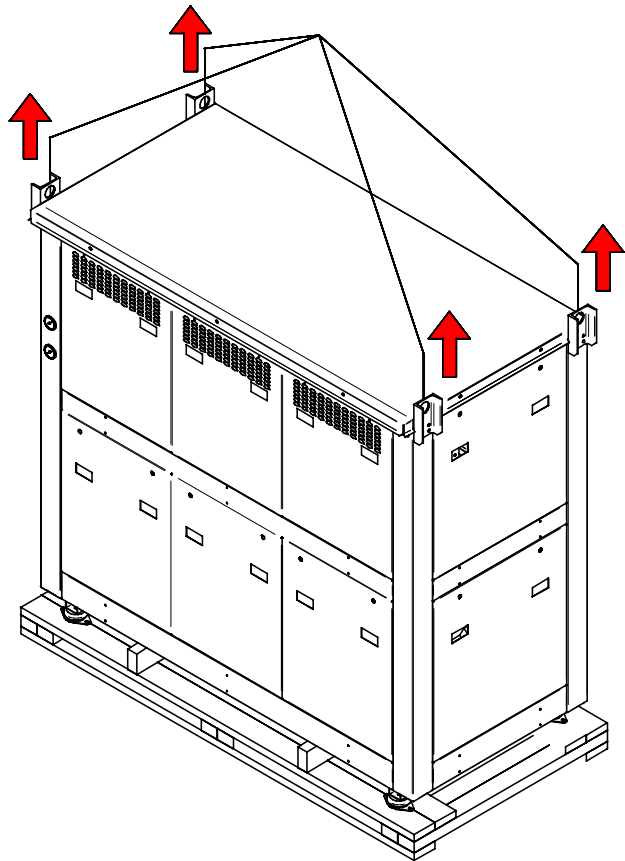
Ensure that nobody is in the handling area during the hoisting procedures.

EPTA TECHNICAL DOCUMENTATION	REVISION STATUS			APPROVAL SIGNATURE	PAGE 4 OF 5
PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...100 CHAPTER: ENCLOSURE	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	29/June/2012	Technical details added		28.May.2009
	B				MKT
	C				

Handling by crane

Steps to be taken:

- Ensure that the carrying capacity of the crane is suitable for the weight of the equipment 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.
- Complete hoisting procedures.
- When the equipment is in its service position, remove the yellow supports used for handling.



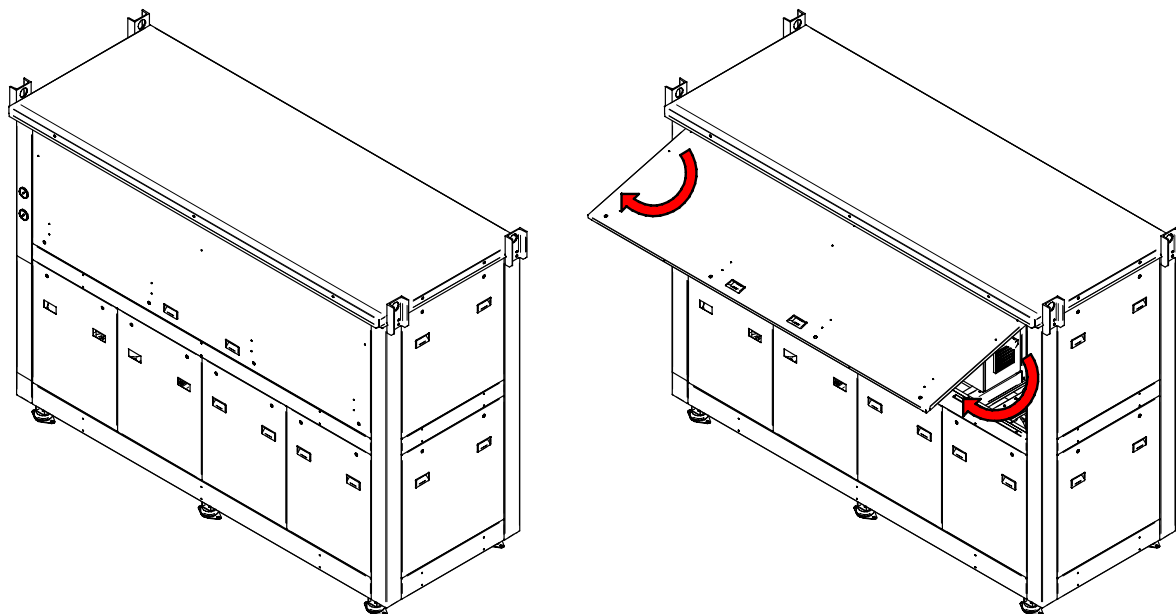
Ensure that nobody is in the handling area during the hoisting procedures.



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

EPTA TECHNICAL DOCUMENTATION PRODUCT: EPTAGLOO DOC.N. QSM000524A CHAP.N...:100 CHAPTER: ENCLOSURE	REVISION STATUS			APPROVAL SIGNATURE	PAGE 5 OF 5
	ORD	DATE	CHANGE ORDER		DATE OF 1st ISSUE
	A	29/June/2012	Technical details added		28.May.2009
	B				MKT
	C				

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



Electric panel integration

In reference to **Chapter 050** concerning the electric panel, 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 and a temperature-control thermostat suiting with the controller installed,

when Danfoss, the respective controller is EKC202D1.

when Carel , the respective controller is iR33C0HB00.

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 electric panel and in the technical book.