We hope that the information will be of help to you. It is based on concrete data and on the best of our current knowledge.
Read the contents of the manual carefully, including the warnings and recommendations.

Hoyer Frigus 600

Tetra Pak Hoyer S.p.A.
Via Monferrato, 54
20098 San Giuliano Milanese (Milano)
Italy
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F60 | 03 | -B | 04

HOYER FRIGUS 600

1 - MACHINE IDENTIFICATION DATA

Contents

1.1 Introduction

Thank you for choosing a machine manufactured by Tetra Pak Hoyer S.p.A.
We recommend that you read this manual carefully as it is indispensable for the installation, checking and maintenance operations required to keep your machine in perfect working order.

Il manuale contiene tavole, disegni e schemi che Vi permetteranno di familiarizzare con la macchina in tutti i suoi dettagli.
Vi preghiamo di segnalarci le Vostre osservazioni nel caso qualche spiegazione sia stata omessa o non sia esauriente. Ne terremo conto per migliorare il carattere funzionale di questo manuale.

1.2 Identification plate

For maintenance and overhaul operations not covered by this manual and for all technical problems, our Service Department will be happy to supply any information required and to agree the necessary course of action.
When calling our Service Department, please quote the data shown on the identification plate affixed to the machine and shown in Fig. 1.1.

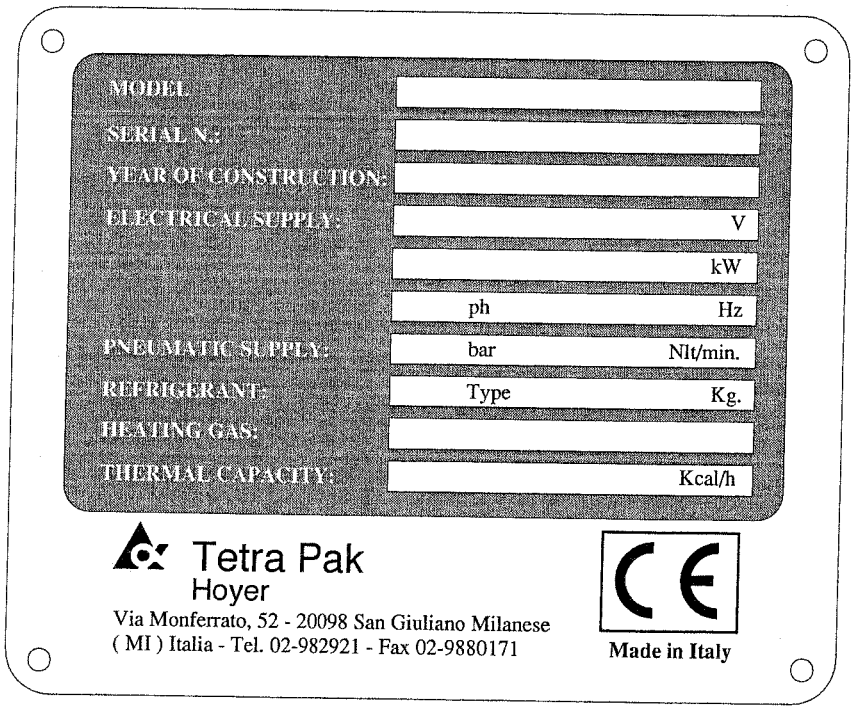


Fig. 1.1 - Identification plate

1.3 Service Centres

For any assistance you may require, please contact one of the following Tetra Pak Hoyer authorised service centres:

EUROPE and MIDDLE EAST:

Tetra Pak Hoyer ApS
Soeren Nymarks Vej 13
DK-8270 Hoejbjerg
Denmark
Phone: +45 89 39 39 39
Fax: +45 86 29 22 00
Tlx: 6 87 70 alhoy dk

Tetra Pak Hoyer S.p.A.
Via Monferrato, 52
I - 20098 San Giuliano Milanese
(Milan)
Italy
Phone: + 39 2 98 29 21
Fax: + 39 2 98 80 171

Tetra Pak Hoyer France
c/o Tetra Laval Service SARL
R.C.S. Versailles B403 276 223
P.O. Box 56
F-78340 Les Clayes-Sous-Bois
France
Phone: +33 1 30818184
Fax: +33 1 30818120

NORTH AMERICA:

Tetra Pak Hoyer Inc.
7711 95th Street
P.O. Box 0902
Pleasant Prairie, WI 53158-0902
USA
Phone: +1 414 947 9100
Fax: +1 414 947 9190

SOUTH AMERICA:

Tetra Pak Hoyer Industria e Comércio Ltda.
Rua Napoleao de Barros, 1038
Cep04024-003 Sao Paulo-SP
Brazil
Phone: +55 11 573 9422
Fax: +55 11 549 5420

ASIA/PACIFIC:

Tetra Pak Hoyer Shanghai
Shanghai Overseas Chinese Mansion
Room 2105-2107
No. 129, Yan'an Xi Lu
200040 Shanghai
P.R. China
Phone: +86 21 6249 0860
Fax: +86 21 6249 9064

Tetra Pak Hoyer Service
3rd Floor, Molace Building
2231 Pasong Tamo Street
Makati, Metro Manila
Philippines
Phone: +63 2 8132848

SOUTH KOREA:

Hoyer Ltd.
4fl. Dookyong Bldg.
66-1/9 Hannam-Dong
Yong San-Ku
140-210 Seoul
South Korea
Phone: +82 2 796 0362
Fax: +82 2 796 0365

THAILAND:

Tetra Pak Hoyer (Thai) Ltd.
1042 Soi Poosin, Sukhumvit Soi 66/1
Bangchak, Prakanong
Thailand
Phone: +66 2 3611680
Fax: +66 2 3612310

C.I.S.:

Tetra Pak Hoyer A/O
4th Rostovsky peureulok
Dom 1, stroenie 1
R-11921 Moscow
C.I.S.
Phone: +7 502 2242160
Fax: +7 502 2242162

HOYER FRIGUS 600

2 - GENERAL INFORMATION

Contents

2.1 Declaration of conformity

This machine has been manufactured in accordance with international standards and hygiene and sanitary legislation applicable to food machinery.
In particular Tetra Pak Hoyer certifies, through the Declaration of Conformity supplied with the machine, that the **HOYER FRIGUS** machine is designed and manufactured in accordance with the provisions of Directive 98/37/CE (Machinery Directive) and with the above-mentioned standards.

2.2 Preliminary observations

- The illustrations and drawings of the machine are intended for general reference only and are not necessarily accurate in every detail;
- The machine dimensions and specifications given in this manual are not binding and may be changed without prior notice;
- The drawings and all other documents provided as a part this machine remain the property of Tetra Pak Hoyer and must not be passed on to third parties without the written permission of Tetra Pak Hoyer.
- The manual includes instructions for all accessories mounted on the standard machine.
- **The machine is covered by warranty as laid down in the purchase contract. Any repair work not authorised by Tetra Pak Hoyer carried out during the warranty period will automatically invalidate the warranty.**

2.3 General safety rules

- THESE SAFETY RULES HAVE BEEN DRAWN UP IN YOUR INTEREST. Strict observance will reduce the risk of accident to yourself ot to others.
- DO NOT attempt to move, install or operate the machine before reading and assimilating the contents of this manual. Ask your superior in case of doubt;
- make sure that all guards and safety covers are in place BEFORE starting the machine;
- NEVER leave tools, mechanical parts or other foreign materials on or inside the machine;
- in the event of a malfunction, press the emergency stop button.
- NEVER PUT YOUR HANDS INSIDE THE MACHINE WHEN IT IS IN OPERATION;
- exercise caution even when the main switch located on the tunnel is in the "OFF" position, as the supply conductors will still be live;
- shut off the compressed air supply before disconnecting any pneumatic component;
- make sure that all guards and safety covers are correctly in place BEFORE restarting the production cycle subsequent to maintenance or repair operations;
- proceed with caution at all times. Remember that you are responsible for your own safety and for that of your colleagues;
- make sure that applicable regulations are observed when moving or lifting the machine.

2.4 Special warnings

- All personnel operating the machine must be familiar with the general safety rules and must observe them strictly. Failure to follow these rules may result in personal injury ordamage to machine components;
- maintenance work must be performed with the machine turned off. The main switch must be in the "OFF" position, the air valve closed and a " work in progress" sign affixed to the machine;
- the user must make sure that all the instructions given in the manual are scrupulously observed;
- users will be solely responsible for risks caused by tampering with the safety system;
- The safety of machines used in conjunction with this machine, if not supplied directly by tetra Pak Hoyer, is the responsibility of the customer.
- The pressure, speed, temperature and voltage limits and all instructions given are indispensable for correct operation of the machine and must always be complied with by the customer.
- Ambient conditions must be taken into consideration during installation.
- National legislation governing this type of machine be observed.

2.5 Ambient operating limits

The machine is suitable for operation in the following ambient conditions:

- Temperature : from 4°C to 40°C
- Humidity : from 20% to 95%.

☞ **NOTE:**

Tetra Pak Hoyer will accept no responsibility for damage or injury caused by failure to comply with the above warnings.

2.6 Residual risks

The Frigus maker is used for combining ice-cream mixture with sanitary air in fixed quantities and, subsequently, for forming the ice-cream with the addition of cold generated by a refrigeration cycle.
The mixture of ice-cream and sanitary air is blended inside a manifold by means of the pressure of a rotating pump and the injection of compressed air which is then pushed to the cylindrical evaporator of a refrigerating system for the treatment of ice-cream.
Several issues arise when adapting the pre-printer to suit the needs of man: more precisely, centralizing the controls on a single instrument panel for the functions of adjustment and control.
The top lid of the freezing cylinder is interfaced with a safety microswitch. The machine will stop if the lid is removed.
All the transmission parts, the kinematic motions and the refrigerating system are protected by fixed boards.
Dismantling side panels (anchored in place with screws) permits contact with moving parts.
This residual risk is referred to in section **3.5 Prohibition and hazard signs** and with a sign indicating **moving parts** positioned on the panels.
A signal of danger is placed on the flap of the electric box to indicate live equipment.
For additional safety, the remaining risk is recalled in paragraph **3.5 Instructions on ban and danger signals.**

HOYER FRIGUS 600

3 - DESCRIPTION OF THE MACHINE AND TECHNICAL DATA

Contents

3.1 Description of the machine

The machine mixes sanitised air into ice cream mix to obtain the desired overrun, cools and agitate the mix with air incorporated in it to create the viscous product known as ice cream, and supplies sufficient pressure to convey the ice cream to its destination through a pipe.

In order to carry out these functions the machine incorporates the following components:

- a set of filters which sanitise air coming from the compressed air supply.
- a pump which receives mix from ageing vats, and sends the product to the freezing cylinder.
- freezing cylinder with a dasher and blades, inside which air is uniformly blended into the mix and the product is cooled until it takes on a thick consistency.
- a refrigerating plant connected to the outside wall of the freezing cylinder to cool it down.
- an electrical system for command and control of all machine functions.

All these items of equipment are assembled on a strong, compact stainless steel frame.

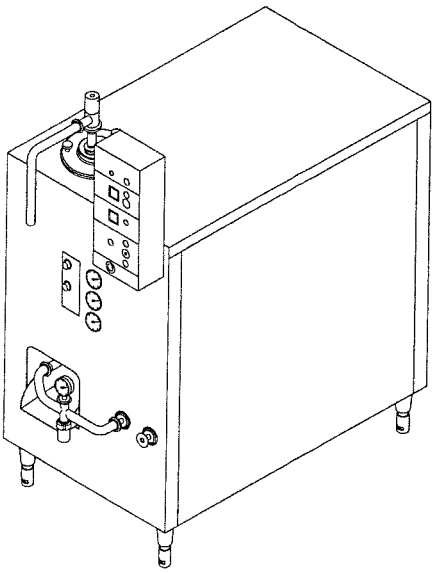


Fig. 3.1

3.1.1 Filter set (3.2)

The shop's compressed air (the machine does not have an air compressor of its own) passes through a pressure reducer (1) and a mesh filter (2) to separate out any large particles; these are followed by a microfilter for oil vapours (3) and an active carbon filter (4) to eliminate odours.
Finally, the clean air goes through a (sterilisable) Teflon (5) membrane filter with microscopic pores specifically intended to stop the passage of bacteria.
The sanitised air thus obtained is let in between the first and second stage of the mixing pump at a rate of flow which may be controlled by the operator using the control panel; changes in the rate of flow permit variation of ice cream volume.

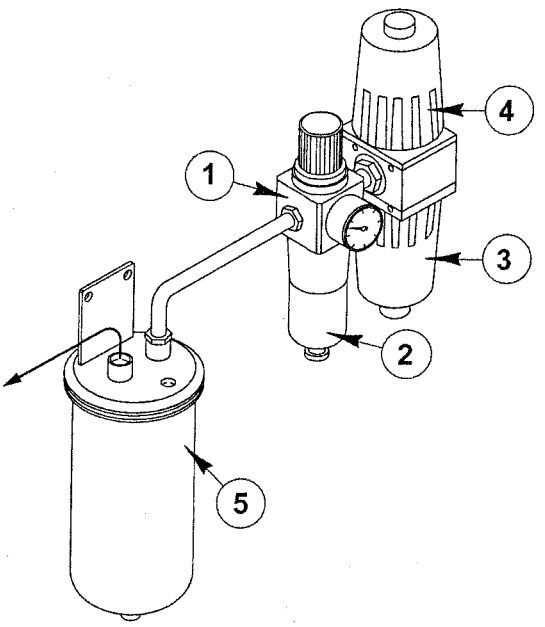
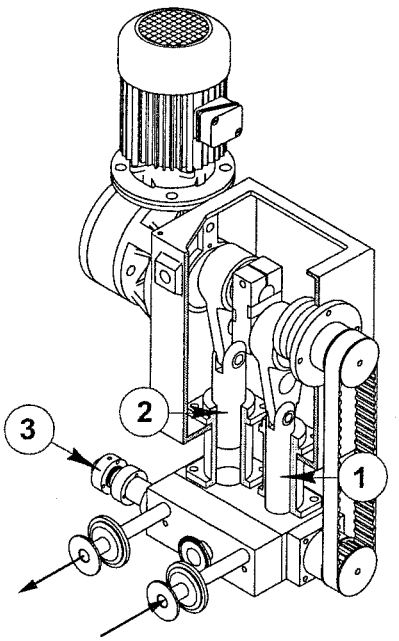


Fig. 3.2

3.1.2 Mix pump

It is a two-stage pump constructed with two pistons of different sizes; the first (1) receives and batches a quantity of mix determined by the operator on the basis of the desired hourly production; the second stage (2) receives mix dispensed by the first stage and sanitised air let in between the two stages and puts it all into the freezer cylinder.
As the difference in volume between the first and the second stage (a result of the size of the pistons) does not change under different pump pressure and speed conditions, the quantity of air let in per mixing unit is also constant and depends on the rate of flow of the air. By adjusting the flow of sanitised air, the operator therefore controls the increase in volume, which remains constant throughout the production cycle.
The pump is driven by an electric motor commanded by an inverter (for speed changes) and incorporates a pneumatically driven by pass (optional) for CIP washing. It works properly at relatively high pressures, so that no extraction pump is needed coming off the machine.

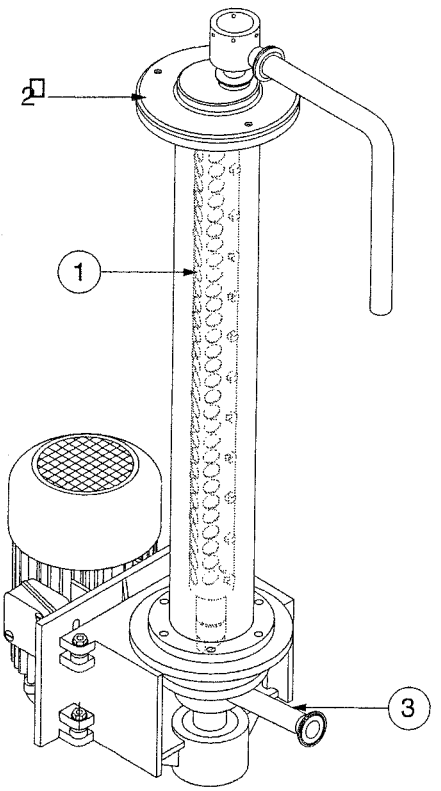
Fig. 3.3



3.1.3 Freezing cylinder

This is the most important part of the machine: an upright pipe with a chrome coating on its inside walls, surrounded by a jacket in which coolant fluid flows to cool down the cylinder. A dasher (1) with three blades rotates inside it, scraping the chrome-plated inside surface to ensure that frozen ice cream does not build up on the walls. The top (2) and bottom (3) ends of the cylinder are closed by two covers, which incorporate the mix feed pipe (bottom) (3) and the ice cream exit valve (top) (2).
Mix blended with sanitary air coming from the pump flows into the bottom part of the cylinder (3); on its way to the top it is whisked by the dasher (1) and cooled by contact with the walls of the cylinder, kept cold by the refrigerating plant. The ice cream forms and then flows out of the ice cream outlet valve (2), which is controlled pneumatically to regulate the pressure of ice cream in the cylinder.
In order to make sure the machine operates correctly, it is important to be very careful not to damage the cylinder, always making sure that the scraper blades are in perfect condition and have been assembled correctly.

Fig. 3.4



3.1.4 Refrigerating plant

Composed of the freezing cylinder (evaporator), a Scroll Compliant rotary compressor, a high efficiency condenser, an economiser, a thermostatic valve and a number of minor accessories. All these components are designed specifically for operation at low temperatures using R404A coolant gas.
Cooling is carried out by steam compression: the compressor pumps gas into the condenser, where it is cooled and liquefied, and the liquid gas then passes through the thermostatic valve and is vaporized in the freezer cylinder (transforming into gaseous state once more) before returning to the compressor and starting the cycle again. Vaporization of gas in the freezing cylinder removes heat from the ice cream mix, which cools down; the heat is then disposed of in the condenser, where it is transferred to the water coming from the cooling tower (or well), heating it.
A pressure switch valve assembled on the condenser water circuit keeps condensation pressure constant, independently of water temperature.
The system mounted on the Frigus 600 is a particularly efficient one which makes use of a dependable, low maintenance Scroll compressor which acts as a two-stage compressor with an economiser to obtain considerable cooling capacity and improved dependability.

3.1.5 Electrical system

The electrical system consists of the operator panel and the electrical panel which covers all of the rear of the machine. The operator panel may be used to activate or deactivate all machine functions, adjust functions and indicate anomalies. The electrical box at the rear contains the main switch and all control and power devices.

3.1.6 Control panel

1 White power indicator lamp

2 Red thermal switch indicator light

3 Pump start/stop switch

4 Litre counter

5 Pump potentiometer

6 Dasher motor ammeter

7 Dasher start/stop selector

8 Compressor start/stop switch

9 Overrun air ON/OFF switch

10 Hot gas control potentiometer

11 C.I.P washing switch.

12 Emergency stop pushbutton

13 Overrun pressure indicator

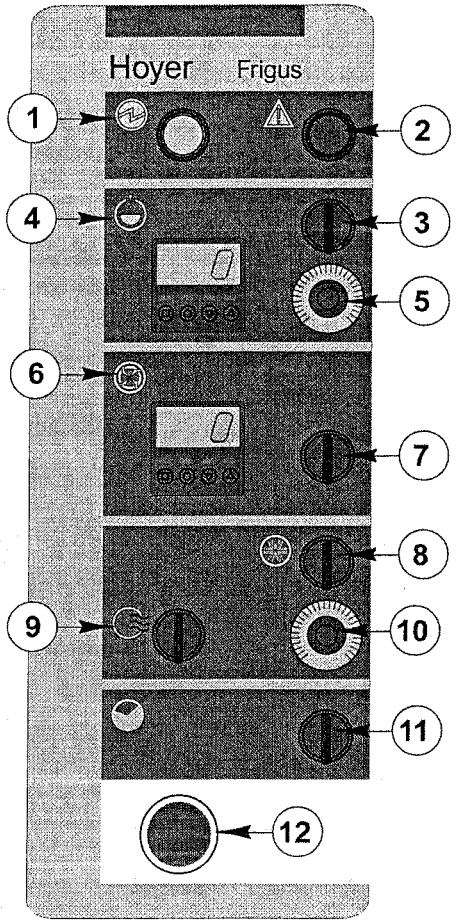
14 Overrun pressure regulator

15 Cylinder outlet valve pressure indicator

16 Cylinder outlet valve pressure control

17 Coolant evaporation pressure gauge

18 Dasher pressure indicator



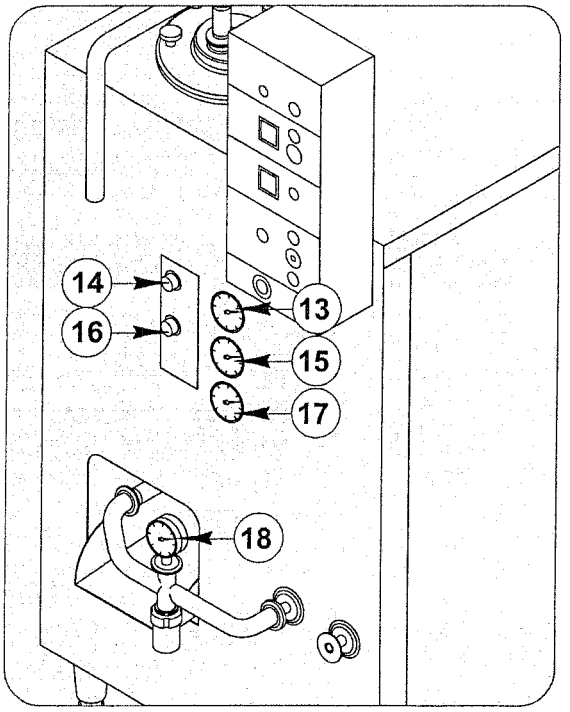


Fig. 3.5

3.2 Technical data

Dimensions and weights:
Dimensions

A = 1330 mm
B = 755 mm
C = 1665 ± 25 mm

Net weight: 525 Kg
Gross weight: 725 Kg
Volume (with packaging): 2.96 m^3
(1,60x0,95x1,95h metres)

Rated capacity in standard conditions:
from 200 to 600litres/hour of ice cream at –5.5°C
Standard conditions:
Mix input temperature: + 4°C
Overrun: 100%
Neutral mix with 38% solids content

Electrical specifications:

Dasher motor:	5.5	kW
Pump motor:	0,75	kW
Refrigerator compressor:	9,5	kW
Auxiliaries:	0,85	kW
Total installed power:	16,6	kW

Compressed air:

Operating pressure:	6-10	bar
Consumption (max):	10	Nl/min
Filtering degree:	A0	
Connector:	1/2" female	

Refrigerating plant:

Coolant gas:	R404A
Quantity:	2.8 Kg

Condensation water:

a) dwell water	+ 5°C	600 l/h
b) mains water	+15°C	1300 l/h
c) tower water	+28°C	3600 l/h

Water inlet connector: 1" gas female
Water outlet connector: 1" gas female

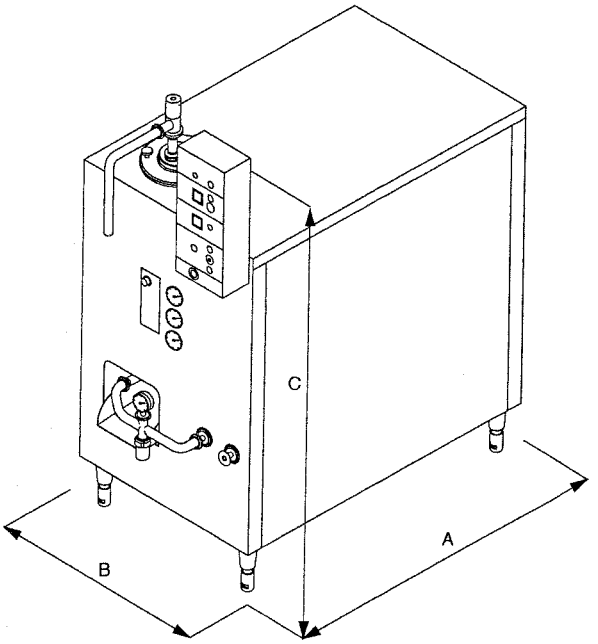


Fig. 3.6

Noise:
A-weighted equivalent sound pressure level at 1 metre:
Leq(A) = 70.5 dB(A)
Max. C-weighted instantaneous sound pressure level at working positions:
Less than 130 dB/20uPa
Max. non-weighted sound pressure level at working positions:
Less than 140 dB/20uPa

Electromagnetic compatibility:
Conforms to VDE 0843/IEC801; wiring in accordance with EN55011

Number of operators: 1

3.3. Improper use

Though the machine is equipped with a number of safety systems, operators must be very careful to make sure that no situations arise which could potentionally put them or others in danger.

The machine is designed and built exclusively for the use described in chapter 3.1. Any other use must be considered improper and unreasonable. The manufacturer shall not be held responsible for any damage caused by improper, erroneous or unreasonable use.

Everyone who works on the machine must be adequately trained in thecorrect working methods and informed of the nature and functioning of safety devices.

3.4. Demolition and disposal

Information of use for disposal of the machine and its components.

The machine must be demolished by specialised personnel wearing appropriate safety garments and working in compliance with safety and environmental legilation.

Construction materials:
- steel, stainless steel, aluminium, cast iron
- copper, silver in electrical components
- rubber, nylon, PVC, resins and fibres.

No component is toxic or harmful.
Dispose of reducting gears carefully as they are full of oil.
Do not abandon these components or dispose of them with regular waste.

WARNING! When finished using machines and components, dispose of them in accordance with the laws in effect in your country.

3.5 Warnings, prohibition and danger signs

WARNING :
The doors of the electric board can be opened using the tools supplied with the machine.
The opening of the doors disconnects the components downstream from the main swutch.
Some components may continue to be powered by residual current for a specific interval of time.
After opening the machine, avoid touching the internal parts for at least 5 minutes.
A sign indicating the presence of **powered parts** is placed on the door.

WARNING :
Dismantling side panels (anchored in place with screws) permits contact with moving parts.
A **moving parts** sign must be positioned on the panels.

HOYER FRIGUS 600

4 - INSTALLATION

Contents

4.1 Unpacking, delivery checks and transport

The machine is packed in wooden crates. Unpacking must be done close to the installation position. The cases may be easily transported by a lift truck.

If the crate has been damaged during transport, notify the insurance company immediately and do not proceed with removal of packaging until authorised by the insurance company.

When the crate is positioned in the place of installation, proceed to remove the machine from its packaging as follows:

a. Unnail the top cover and remove it. Do the same with the side panels. Take care with the wooden spacers between the walls of the crate.
b. Remove the box containing spare parts and the other components from the crate.
c. Unnail the wooden blocks that hold the machine in place during transport and remove the protective cellophane.
d. Check that the content of the package corresponds to the shipping documents.
e. Make sure that all covers and panels are correctly fastened in place and there are no loose parts.
f. Visually inspect all electrical components to make sure they are in perfect condition.
g. If any part or component is missing, notify Tetra Pak Hoyer immediately.

The machine may be moved using a fork lift truck, taking care to position the forks so that the machine's weight is evenly distributed.

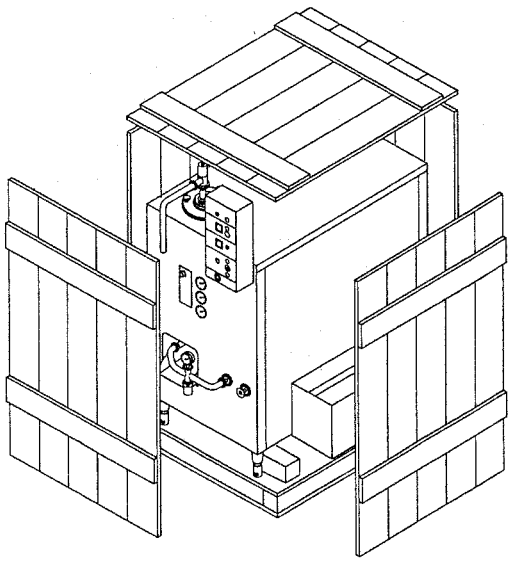


Fig. 4.1

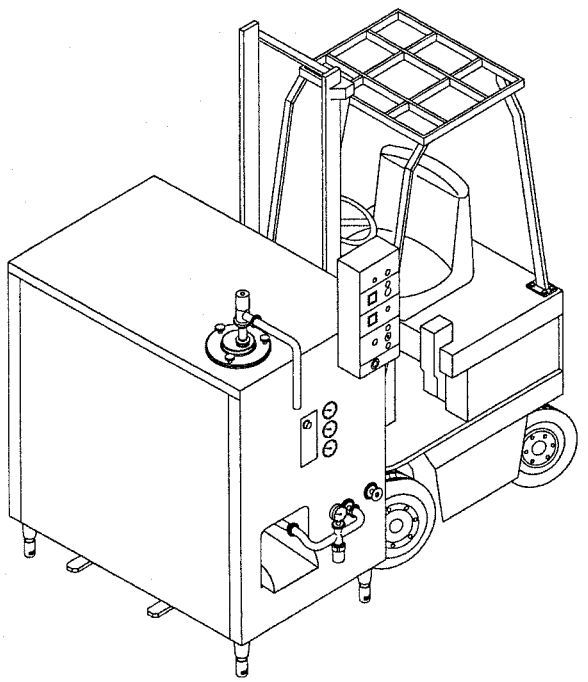


Fig. 4.2

4.2 Installation

The machine is fully tested and regulated in the factory with about one hour of ice cream production prior to shipment to the customer. Installation simply involves connecting up the pipes for the condenser cooling water supply, ice cream mix intake and outlet, compressed air supply and electric power supply. There is no need for internal adjustments to the machine; we recommend that factory settings not be changed. Proceed with the installation procedure as follows:

a. Position the machine in its operating position and check the plate data to make sure that the machine is compatible with the site's electrical power supply, and compressed air supply.

b. Level the machine with a spirit level by means of the adjustable feet.
The plates provided may be applied underneath the feet.

c. Connect up the condenser cooling water pipes (1) (2). If tower water (+28°C) is used for cooling, use inlet (7) and shut off inlet (2).

d. Connect up the ice cream mix intake (3) and outlet (4) pipes to the production line.

e. Connect up the compressed air pipe (5).

f. Connect the machine to the ground and to the electrical power supply (6).

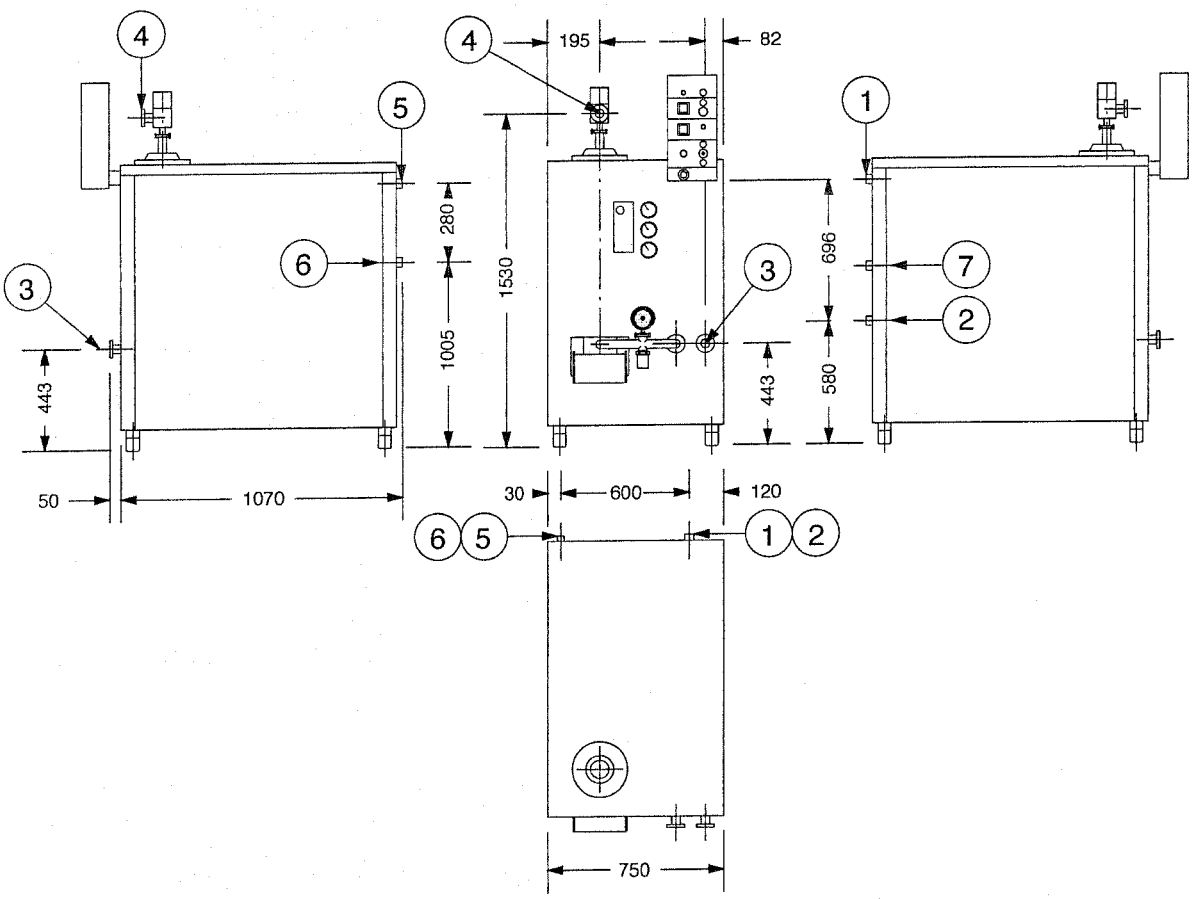


Fig. 4.3

4.2.1 Cooling water connection (tower water)

Connect up the supply of condenser cooling water, taking care to get the direction of water flow correct: water must flow in through the connection at the bottom (1) and out through the connection at the top (2). It is recommended that two on/off taps (3) (4) be installed close to the machine, as well as a small drain tap (5) close to the bottom connection; it is also a good idea to connect up these two taps with the machine through two pipe unions (three-piece connectors) to make it easy to separate the freezer from the installation.

The machine is fitted with a pressure valve which controls the flow of water in inverse proportion to its temperature to obtain constant cooling (constant condensation pressure on the coolant side); this makes it possible to use water supplies with widely varying temperatures for cooling the condenser. The water flow varies as a result, from about 600 litres/hour at 5°C to 3600 litres/hour at 28°C (average values for machine in operation at maximum production rate).

Pipe diameter depends on pipe length and the pumps available, and must never be less than the diameter of the connections, which is 1" gas.

It is essential to wash out the pipes BEFORE connecting them to the machine by flushing them with water to eliminate any particles or dirt. If the water that flows out of the pipes continues to be dirty, it will be necessary to install a filter with a filtering capacity and size appropriate to the type and amount of dirt conveyed at the intake (1) (the bottom connection). In any case, it is recommended that you install the filter to reduce soiling of the condenser.

See Chapter **CLEANING AND MAINTENANCE**.

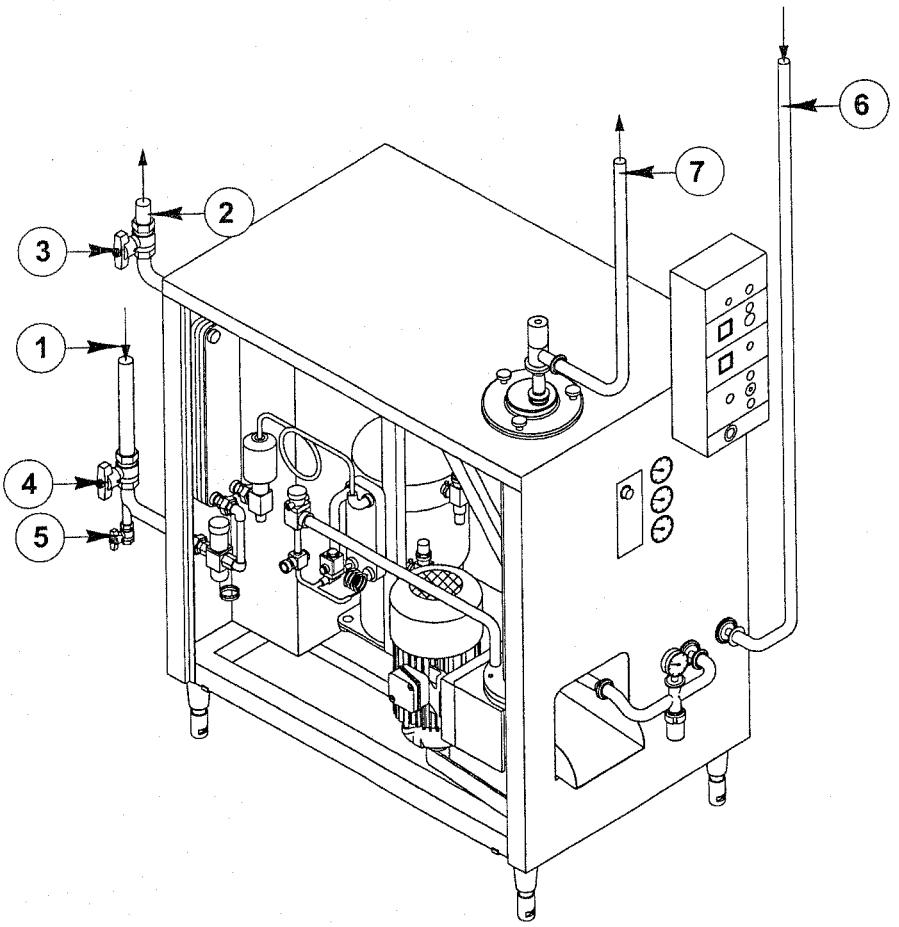


Fig. 4.4

4.2.2 Ice cream intake and outlet connection

Connect the mix supply pipe to the mix pump inlet connection (6) on the front of the machine. The machine has a CIP washing programme permitting thorough, safe washing of the machine without dismantling its parts; it will therefore be necessary to prepare the required connections between the CIP washing pump and solutions and the mix pipe.
Make sure that the mix flows "spontaneously" to the machine connection (6), and does not need to be suctioned by the freezer pump; this may be done by simply positioning the aging vats higher than the freezer (check that the spontaneously flowing supply is sufficient even when the mix level in the containers is low), or by installing a suitable centrifugal pump close to the vats. Take care to ensure that there is no air getting into the pipes, which could pollute the product and result in fluctuation of ice cream overrun.

CAUTION:
Pipes must be dismantled and washed thoroughly after completing this procedure to ensure that no hard solid particles are conveyed toward the freezer mix pump. This is very important as solid particles such as metal burr or welding residues could severely damage the freezer pump and will invalidate the guarantee.

Connect up the ice cream outlet (7) to the utility. Use the shortest possible pipe, with as few curves as possible, and use a pipe which is shiny inside; the pipe does not need to be insulated. Make sure that ice cream pressure in the cylinders does not exceed 12 bar (the absolute maximum permitted value); if this should occur, move the freezer closer to the ice cream utility and/or use hot gas to produce softer ice cream.

4.2.3 Compressed air connection

Connect the compressed air supply pipe to the connection on the rear of the machine; it is recommended that an easily removable tap and connection be assembled close to the machine connection.
The supply pressure measured on the machine must never drop below 6 bar. It is strongly recommended that the compressed air supply in the place of installation be fitted with an air drying system and A0 filters to remove oil vapours and residual fine particles.

4.2.4 Electrical connection

CAUTION:
Electrical connection must be made exclusively by competent technicians who are familiar with safety legislation and authorised to perform and certify electrical installations.

Check the identification plate to make sure that the machine is compatible with the site's power supply. Connect the machine's power supply to the site's distribution panel and protect it with a suitable device, complying with all regulations for correct electrical installation in effect in the place of installation.
We recommend installing an automatic circuit breaker on the distribution panel, complying with local regulations.

Great care must be taken to ensure correct connection with the earth, as incorrect connection could cause severe damage to the machine's electronic parts and injury or death to the operator.
The section of the power supply cable must be determined on the basis of its length and the grid used during testing prior to shipment; if this cable is not long enough, it must be replaced in its entirety, without making any connections.

The machine's electrical installation includes a device for checking that phase sequence is correct to ensure that the motors turn in the right direction; if the machine does not work after connection, but the touch screen light comes on, two of the three wires in the machine's cable must be reversed on the distribution panel which supplies the machine.

4.3 Installation check

Check that connections have been made correctly:

a. Slowly open the cooling water intake tap and check that there are no leaks. Open the outlet tap and check that water can flow freely and that any air in the circuit has been expelled (this involves turning on the machine's cooling compressor because of the pressure valve which blocks the flow of water - see below).

b. Turn on the compressed air supply tap and check that there is no leakage and that pressure is between 6 and 10 bar. If the installation does not have a drier, bleed condensation from the line before turning on the tap on the machine.

c. Turn the main switch on the machine's rear panel to the (**I**) position.
Release the emergency button (1). Make sure that the panel switches on.
In case of the alarm message: "phase seq. not correct", change the rotation direction. of the phases by switching the positions of two wires in the machine's power supply cable on the distribution panel (refer to installation instructions); all motors will then turn correctly in the direction indicated by the arrows in figure 4.5.

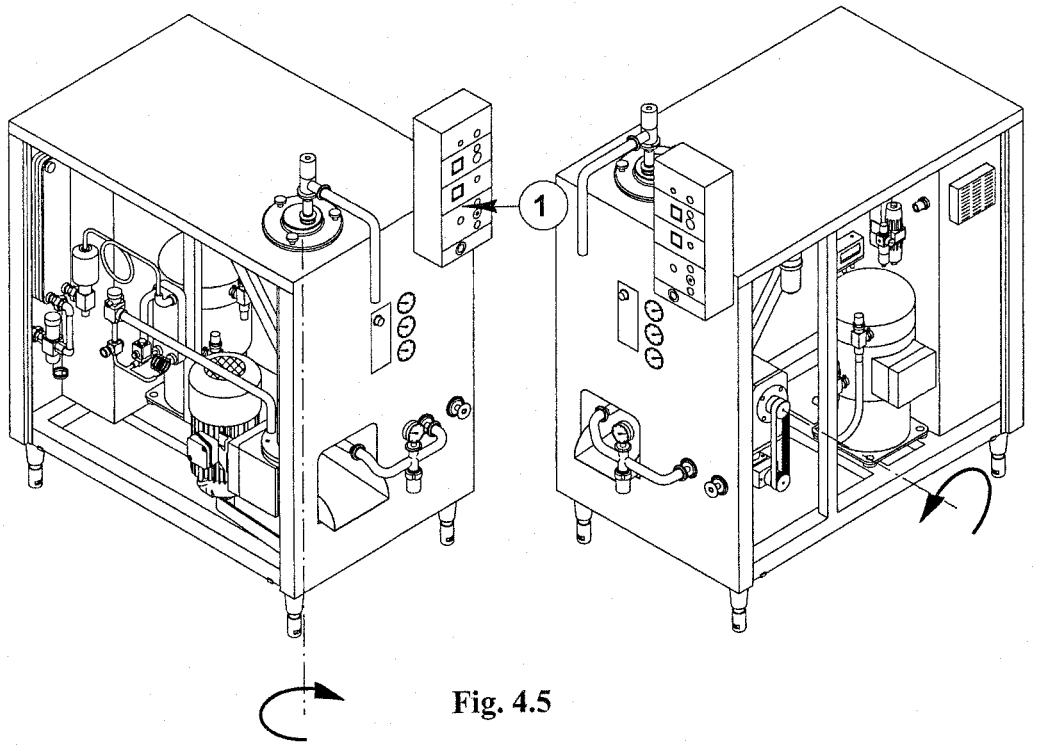


Fig. 4.5

HOYER FRIGUS 600

5 - SET-UP

Contents

5.1 Control panel settings

Description of the controls - Figure 5.1

Emergency
The machine shuts down completely if the emergency stop button (1) is pressed.

(Mix) feed pump
The illuminated switch (2), is turned clockwise to turn on the feed pump, and will light up. The display (3) indicates the rate of flow of the pump in l/h of mix.
Speed may be controlled using the potentiometer (4).

Dasher
The illuminated switch (5), is turned clockwise to turn on the dasher, and will light up.
The ammeter (6) displays the power consumption of the dasher and therefore the hardness of the ice cream - on reaching maximum consumption the hot gas device is activated at 100% until power consumption drops to normal levels. If power consumption continues to rise notwithstanding hot gas activation, the refrigerator compressor is shut off. this prevents excessive hardening of the ice cream, which could stop the dasher. When the dasher is stopped the hot gas device comes on for 30 seconds to prevent ice from forming in the cylinder.

Refrigerator compressor
Illuminated switch (7), is turned clockwise to turn on the refrigerator compressor, and will light up. Switch (7) is active only if the dasher is operating.

Hot gas
As mentioned earlier, the hot gas is activated automatically on excessive input or shut-off of the dasher: in the former case until power consumption is reduced, and in the latter case for a fixed time of 30 seconds. The hot gas device can also be activated manually with the potentiometer (8) to reduce ice cream hardness.

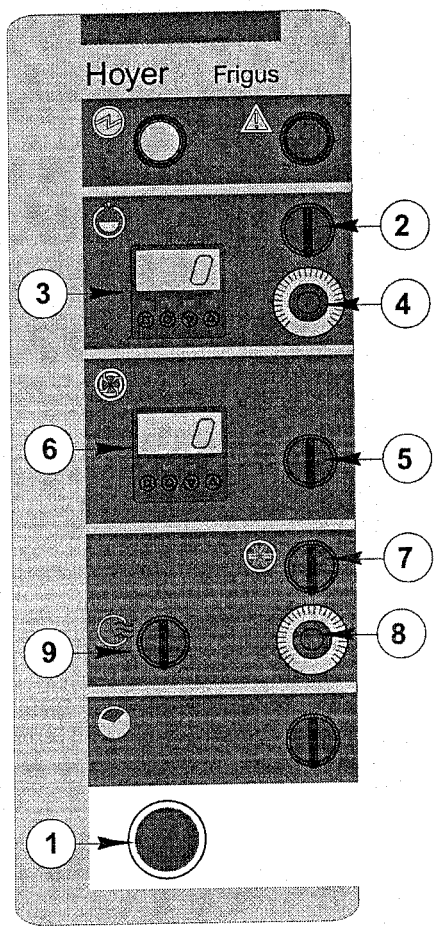


Fig. 5.1

Overrun control
The illuminated switch (9), is turned clockwise, to turn on the compressed air intake to the supply pump and will light up to indicate activation. Pneumatic regulator (2), is used to set the pressure - read on pressure gauge (3) and therefore the quantity of compressed air introduced into the supply pump to obtain the required overrun. The greater the pressure of the compressed air introduced, the greater the overrun obtained; up to the capacity of the mix, over this limit the compressed air cannot be absorbed by the ice cream, and is expelled separately. Switch (9) is active only if the pump and refrigerator compressor are operating.

5.2 Ice cream pressure setting

Ice cream pressure is adjusted using the pneumatic pressure regulator (4); the adjusted air pressure is displayed on the pressure gauge (5).
Pressure is indicated by the pressure gauge placed on the front of the machine, specifically on the pipe between the pump and the cylinder. For good ive cream quality, the pressure should normally be between 4 and 8 bar.
The safety valve opens automatically if the pressure in the cylinder, which appears on the pressure gauge (6),exceeds 12 bar; this prevents pressure from damaging the freezer.

WARNING:
The adjustment described above takes effect after an interval of time which varies according to the operating parameters set.
Wait for the gauge (6) reading to stabilise before proceeding with further adjustments.

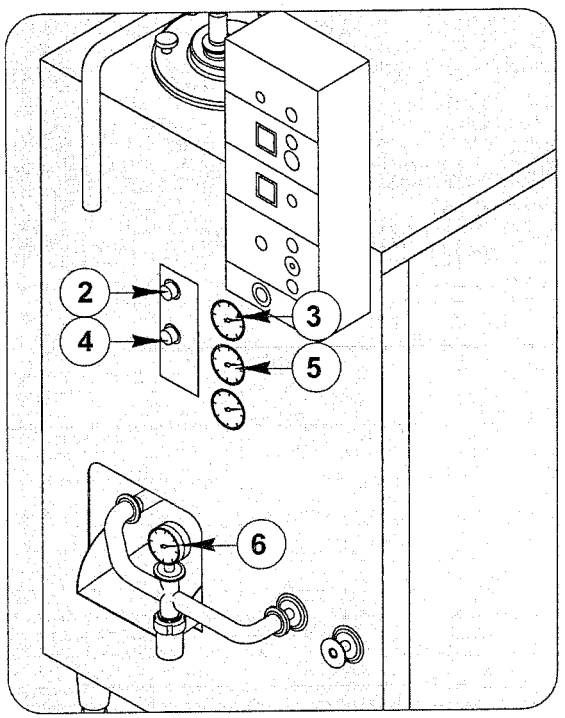


Fig. 5.2

5.3 Emergency stop

If danger should arise during production press the emergency button (1) to shut down the machine completely.

To reset the machine after an emergency stop:
- Release the emergency button.
- Activate the injection of hot gas by turning potentiometer (2) for about 30 seconds.
- Restart the freezer functions, including the pump, the dasher, the refrigerator compressor, and the sanitised air plant.
- Normal production now resumes.

WARNING:
Do not use the emergency button to stop the machine during regular operation.

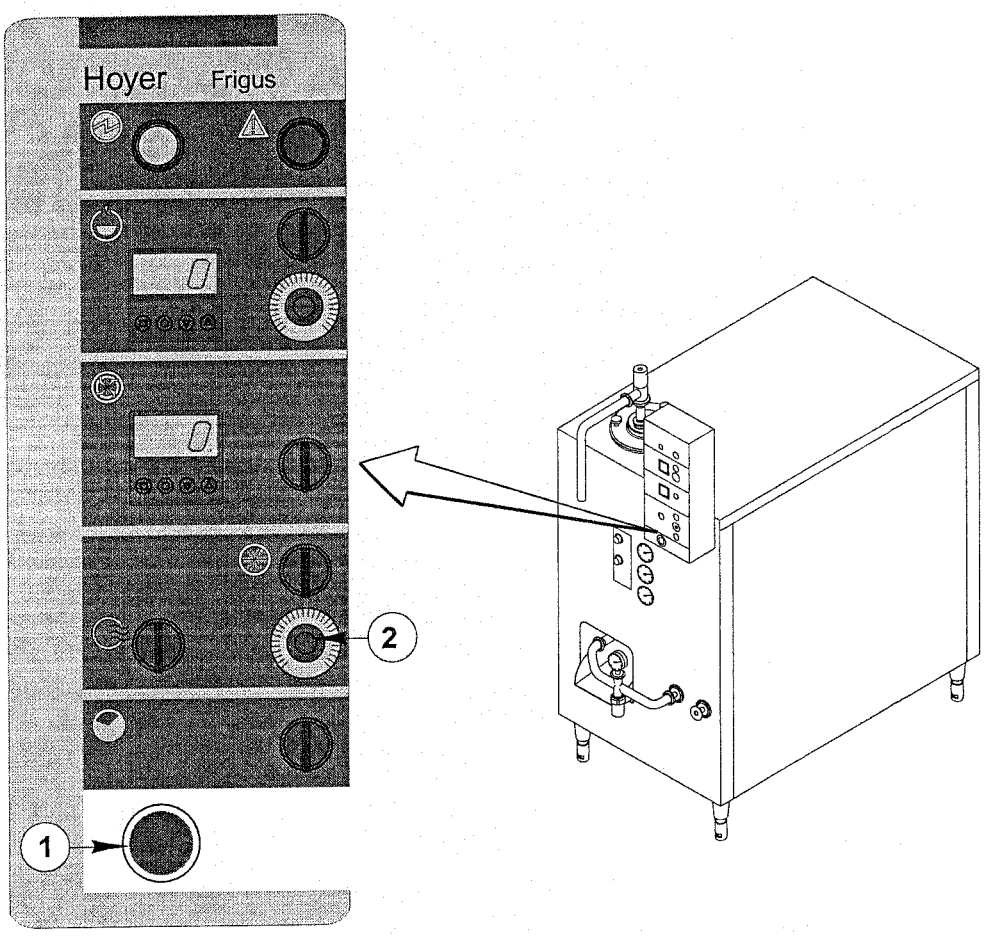


Fig. 5.3

HOYER FRIGUS 600

6 - OPERATING PROCEDURES

Contents

6.1 Preliminary checks

Perform the following checks before starting production:

a. Check that the machine is stable and has been levelled, and adjust feet (5) if necessary.

b. Check that the main switch is on.

c. Check that the water and compressed air valves are open.

d. Check that the emergency stop button (4) has been released.

e. Check that the clamp fittings are tightly fitted.

f. Check that the safety valve (2) is correctly fitted.

g. Check that the mix intake (3) and ice cream outlet (1) pipes are fitted correctly.

h. Check that the all panels are assembled and fitted.

i. Check that the machine has been sterilised.

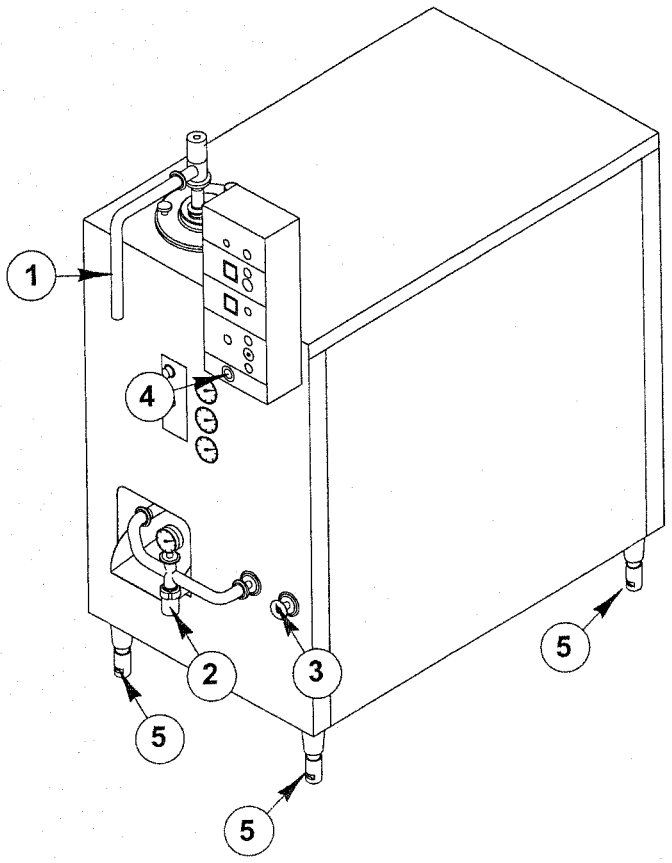


Fig. 6.1

WARNING:

It is dangerous to operate the machine with the closing panels dismantled.

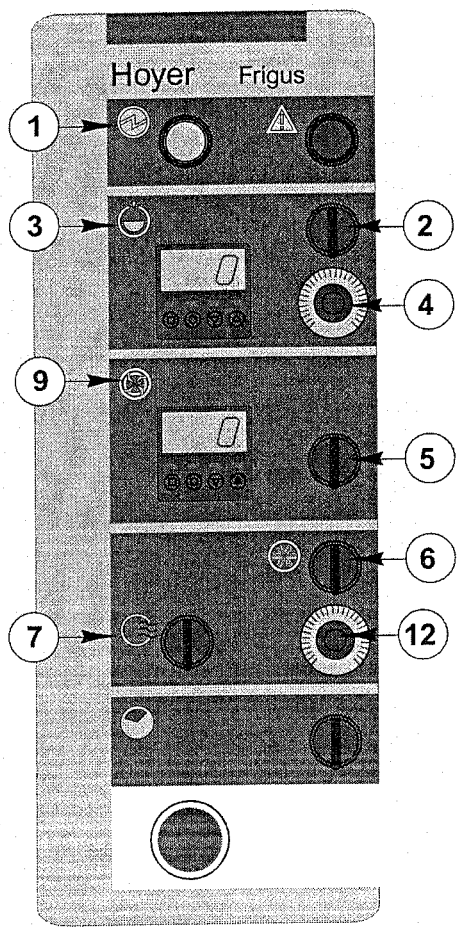
6.2 Start of production

a. Connect the pump intake to the mix container.
b. Check that the power ON indicator (1) on the operator panel is on.
c. Start the pump with the switch (2).
Mix flow in litres/hour corresponding to pump speed will be shown on the indicator (3).
d. Wait for mix to start coming out of the freezer outlet pipe.
e. reduce pump speed to its minimum with the potentiometer (4).
f. Start the dasher with the switch (5) and check that the switch indicator light comes on.
g. Start up the refrigerator compressor using the switch (6). Cooling will begin and the mix contained inside the freezer cylinder will begin to harden.
h. Start up the sanitised air plant with the switch (7).
Check that the switch light comes on.
i. Use the regulator (8) to adjust the percentage of sanitised air to be injected into the mixtures. The regulation takes effect after a few minutes.
k. The hardness of the ice cream can be monitored on the gauge (9) which measures the amount of current absorbed by the dasher motor, proportionate to the hardness of the ice cream.
j. When the ice cream takes on the correct consistency, use the potentiometer (4) to increase pump speed slowly up to the desired rate of flow
l. Set the pressure of the ice cream inside the cylinder with the regulator (10) which activates the pneumatic valve set above the cylinder.
Check that the ice cream pressure inside the freezer cylinder is between 4 and 8 bar on the pressure gauge (11).

The pressure should not exceed 10 bar, and can be reduced as follows:

- make sure that the ice cream outlet hose is not pinched and that it is no longer than 3 metres;
- adjust the hot gas regulator with the potentiometer (12) ti soften the ice cream.

If excessive pressure is due to low production, it may be necessary to increase pump speed using the potentiometer (4).



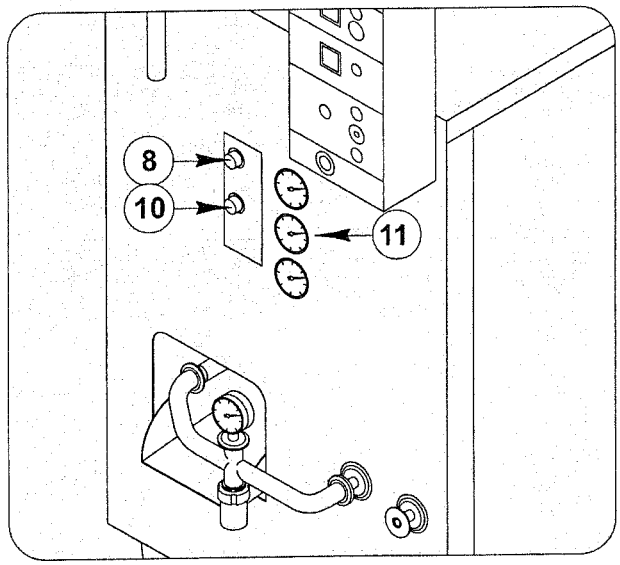


Fig. 6.2

6.3 Production changeover

If production of different flavours of ice cream is organized so as to produce lighter coloured flavours first and successively produce darker and darker flavours, product changeovers will be very quick and involve very little waste.
All that need be done in this case is switch the mix supply from one flavour to another; if the pipes from the containers are set up with switch taps all that need be done is close one tap and open another, without stopping the freezer.

If it takes more time to change the mix and the machine must be stopped.

6.3.1 Stop

If it takes more time to change the mix and the machine must be stopped, proceed as follows:

a. Turn off the refrigerator compressor by turning the switch anti-clockwise (1).
b. Turn off the feed pump by turning the switch anti-clockwise (2).
c. Turn off the dasher by turning the switch (3) anti-clockwise.
d. Disconnect the supply to the freezer (4) from the vat containing the mix for which production is to be stopped, and connect it up to the container containing the new (darker) mix to be produced.

6.3.2 Production restart

a. Turn the pump on at low speed using switch (2) and potentiometer (5).
b. Start up the sanitised air plant using the switch (11).
c. Wait until mix starts to come out (6).
d. Turn on the dasher with the switch (3).
e. Turn on the refrigerator compressor with the switch (1).
f. Adjust the quantity of sanitised air let into the mix using the pneumatic regulator (7).
g. Wait until the ammeter (8) indicates that the ice cream is sufficiently hardened.
h. Increase pump speed to obtain the desired ice cream production speed using the potentiometer (5).
i. Set ice cream pressure using the regulator (9).
l. If necessary, adjust the hardness of the ice cream with the potentiometer (10).

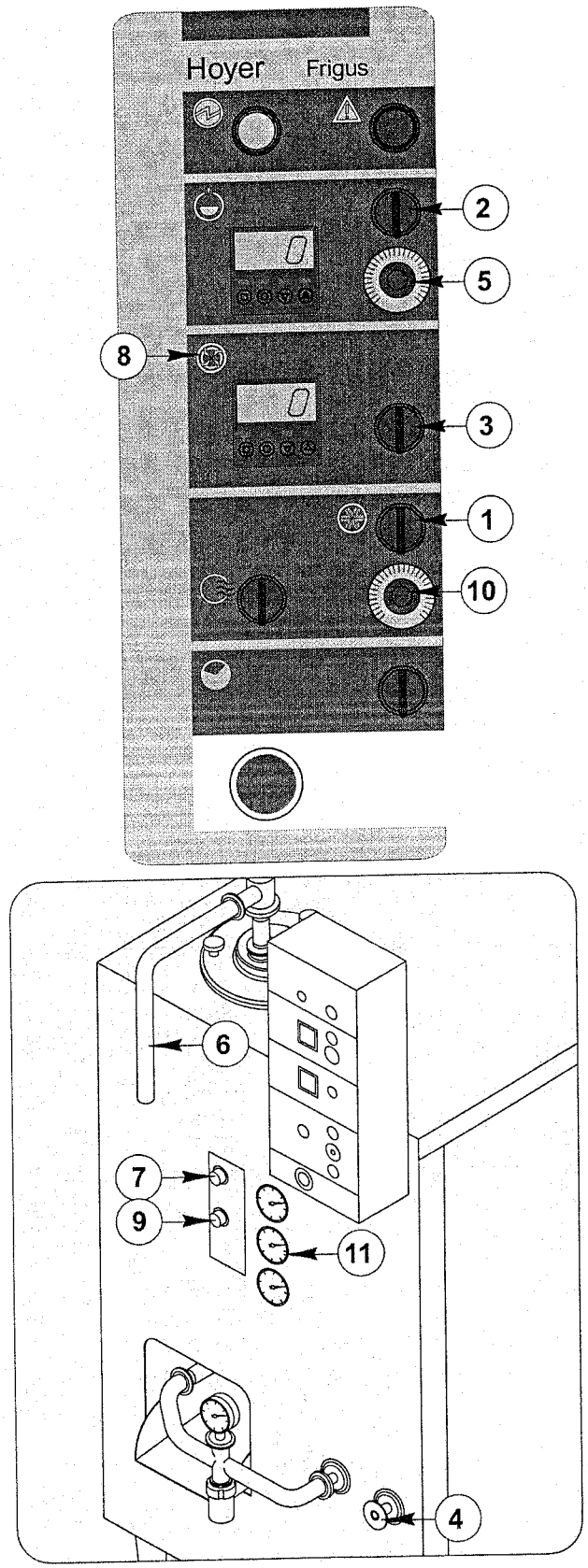


Fig. 6.3

6.4 End of production

a. Turn off the refrigerator compressor by turning the switch (1) anti-clockwise.

b. Turn off the feed pump by turning the awitch (2) anti-clockwise.

c. Turn off the dasher by turning the switch (3) anti-clockwise.

d. Slowly release ice cream pressure in the cylinder until the pressure gauge (11) indicates zero using the regulator (9) and wait for remaining ice cream to come out of the cylinder.

When finished washing, disconnect the freezer from the compressed air supply and cooling water supply.

6.5 Washing

WARNING:

Do not turn the pump or dasher onto continuous operation during washing: this could cause serious damage to mechanical parts due to the lack of lubricant.

Washing of a machine used to process foodstuffs normally involves the following operations:

- Prewash with warm water to remove most of the dirt.
- Basic wash to remove grease residues.
- Acidic wash to remove limestone deposits.
- Disinfecting to remove bacteria.
- Rinse with cold water.

Limestone deposit formation is reduced considerably at the low temperatures of freezers; this means that it is not necessary to carry out an acidic wash every day, provided that the conditions of operation and the hardness of the water used permit. It may be sufficient to carry out an acidic wash only once a week.

In any case, the effectiveness of the washing procedure must be tested by experimentation and adapted to suit the machine's specific conditions of use.

When selecting a detergent solution, it is important to consider ease of use and safety of use for operators and for the materials out of which the machine is made. In order to assist users in the choice, a number of examples of suitable products (which are equivalent to one another) made by well-known manufacturers distributed all over the world are listed below. It is very important to comply with the precise concentrations specified.

WARNING:

The instructions given below represent general guidelines for washing. It may be necessary to adapt the procedure to the specific conditions of operation, and the actual effectiveness of the method must be systematically verified periodically using appropriate instruments. Tetra Pak Hoyer shall not accept liability for damage resulting from inadequate sanitation of the machine.

6.5.1 CIP washing

CIP (Cleaning In Place) washing permits cleaning of the internal parts of the machine which come into contact with the product with no need to dismantle the machine.
If you have no centralised washing system, you will at least need a container and a pump, as shown in the illustration:

1. Prepare washing solution at the correct temperature for the stage in the washing cycle to be performed (refer to table of wash stages and conditions) in an appropriate recipient.
   he correct speed of the flow for a good CIP washing is about 1,5 m/s in the frigus exiting pipe. This involves a capacity of 5000 l/h for a 1 1/2" exiting pipe. In these conditions, the pressure drop is about 2 bar. The CIP washing pump must guarantee these flow rate and pressure characteristics.

3. Connect the pump outlet to the mix inlet hose (1) and the freezer outlet hose (2) to the container.

4. Start the CIP wash cycle (see par. **5.2.4**).
   In this condition the pump by-pass valve and the ice cream output valve are open at all times to maximise flow of cleaning solutions, while the dasher and pump work intermittently. The dasher and pump work for 5 seconds per minute throughout the duration of the wash cycle, so that they can be washed without causing excessive wear or severe damage to mechanical parts due to lack of lubrication.

5. Start up the wash tank pump. The wash cycle will be carried out as follows:

a- Prewash with warm water.
b- Detergent wash. Use an alkaline detergent which is non-caustic and does not form foam (containing a mixture of alkaline, sequestering, anti-corrosive and surfactant agents) with a pH of approximately 11 at a concentration of 1%. Use a concentration of 1.2% to 1.6%, depending on how dirty the machine is and how hard the water supply is.
c- Rinse with cold water.
d- Descaling wash. Use buffered phosphoric acid in a concentration of 0.5% to 1%.
e- Rinse with cold water.
f- Disinfectant wash. Use a moderately alkaline active disinfectant in a concentration of 1% to 1.2%.
g- Rinse with cold water.

6. At the end of the washing programme, stop the tank pump and disconnect hoses for connection with freezer. Wait until all water has flowed out.

7. After the washing programme, fill the machine with disinfectant solution.
   Connect the freezer mix inlet (3) to a container filled with disinfectant solution; start up the freezer pump and wait until solution flows out of the ice cream outlet pipe (4), then stop the pump. Drain the solution and rinse with clean water before starting production again.

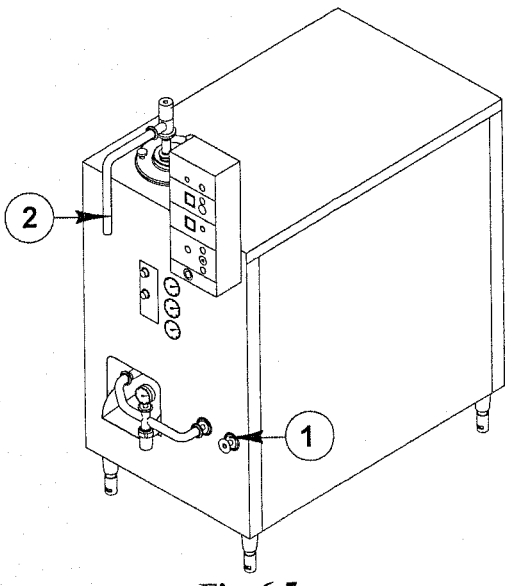


Fig. 6.5

Wash stage	Recommended products	% in water	°C	Minutes	Notes
Prewash	Water	100	50	5	drain away
Detergent wash	SU157 (Diversey Lever) P3-N421 (Henkel Ecolab)	1,2-1,6	max 70	15	recycle
Rinse	Water	100	20	5	drain away
Descaling wash	SU475 (Diversey Lever) P3-PE4 Spezial a (Henkel Ecolab)	0,5-1	max 70	10	recycle
Rinse	Water	100	20	5	drain away
Disinfectant wash	SU330 (Diversey Lever) P3-Dix forte (Henkel Ecolab)	1-1,2	20	10	recycle
Rinse	Water	100	20	10	drain away

6.5.2 Manual washing

If the washing system is not available and the machine must be washed manually, it will be necessary to dismantle a number of parts and reassemble them very carefully after washing. In this case, proceed as follows:

a. Turn off the machine in automatic mode (see paragraph **6.3.1 Stop**).

b. Disconnect the mix supply from the vat and supply the freezer pump with warm water, no hotter than 60 to 65°C.

c. Start up the pump using the switch *(Pos. 5 - Fig. 6.4)*.

d. Start up the dasher using the switch *(Pos.6 - Fig. 6.4)*.

e. Let hot water flow through the machine until the water flowing out of it is fairly clean. Keep washing as short as possible to prevent damage to the pump.

f. Stop the dasher and the pump by pushing the switches *(Pos. 6 Fig. 6.4)* and *(Pos.5 - Fig.6.4)*.

g. Open the safety valve (1) to drain the water contained inside the machine *(Fig. 6.6)*.

h. Remove the cover (2) by unscrewing the knobs holding it in place.

i. Disconnect the pipes and the valve (5) on top of the cover.

l. Remove the dasher (3) using the tool provided, and dismantle the blades (6). Wear strong non-slip gloves to protect against cuts from the blades.

m. Dismantle the cylinder bottom (4).

n. Wash all components thoroughly, immersing them in a solution containing the recommended percentage of an appropriate detergent.

o. Rinse well in running water.

p. Reassemble the parts in precisely the same position as before.
Be very careful when positioning the blades (6); the sharp part must be facing the cylinder.

The latch on the cover (2) of the cylinder between the knobs is connected with a safety system; when closing the cylinder again, tighten up the knobs (by hand) to enable machine operation.

WARNING:

To prevent blows that could damage the freezer cylinder, a "shaft raiser ring" is supplied. The ring must be positioned on the cylinder as shown in the figure (7). Then assemble the shaft (3), being very careful not to hit and damage the ring on the mechanical seal at the bottom (4). Finally, remove the ring and continue assembling all parts.

q. Sanitise the freezer by pumping a sterilising solution. Rinse and then drain the solution.

r. Before beginning production, it is recommended that rinse water be pumped through the system for 2 to 3 minutes. Drain the water by opening the safety valve (1).

s. Reposition the safety valve.

The freezer is now ready for use again.

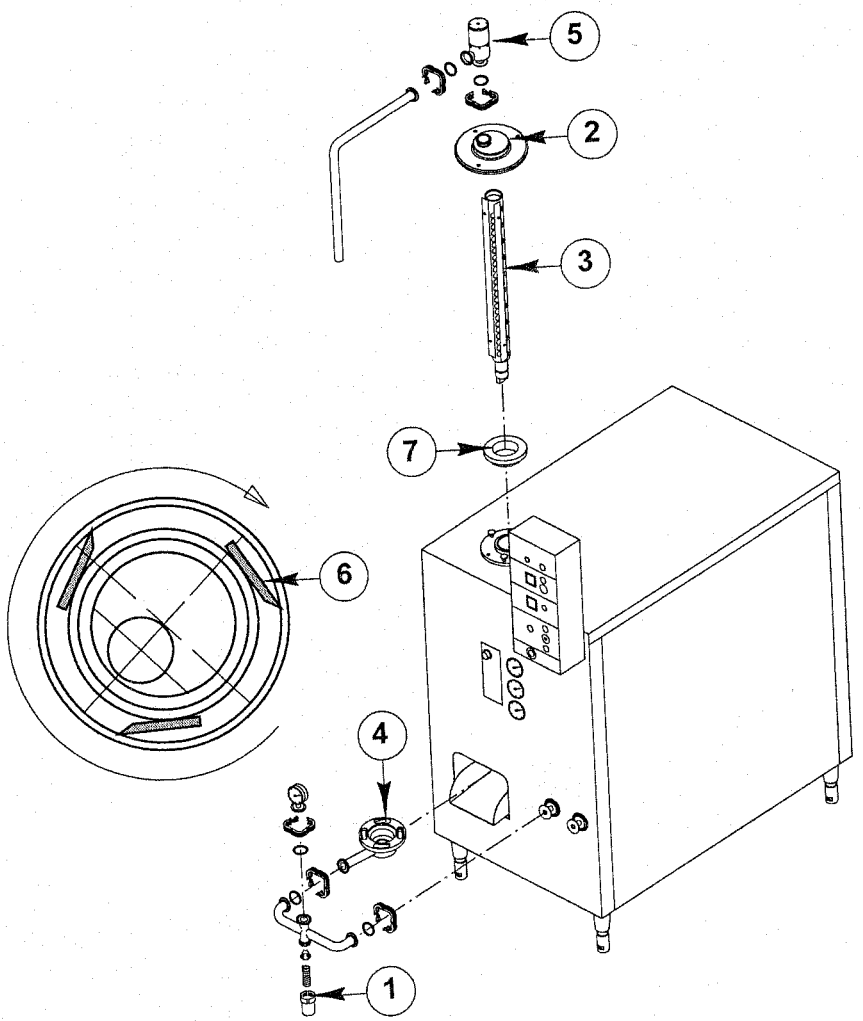


Fig. 6.6

6.5.3 Washing the outside of the machine

Proceed as follows to wash the outside of the machine:

a- Prewash with hot water (50°C).

b - Detergent wash.
Use an alkaline foaming detergent or a gel with high grease emulsifying power in a concentration of 2% to 10%, depending on how dirty the machine is and how hard the water supply is. Leave to act for 10 minutes.

c - Rinse with water.
Remove all soapy, emulsified dirt.

d - Descaling wash.
Use an acidic descaler with low viscosity containing a mixture of wetting and emulsifying agents in a concentration of 2% to 3%. The minimum recommended contact time is 15 - 20 minutes.

e - Rinse with water.

f - Disinfectant wash.
Use a suitable disinfectant diluted in water in a concentration of 1% to 1.2%. The minimum recommended contact time is 15 - 20 minutes.

g - Rinse with water.

CAUTION

Do not use high pressure jets of water.

Recommended products:

Detergent	Descaler	Disinfectant
SU928 (Diversey Lever) SU616 (Diversey Lever)	P3-topax 99 (60°C) (Henkel Ecolab)	P3-topax 99 (60°C) (Henkel Ecolab)

HOYER FRIGUS 400

7 - CLEANING AND MAINTENANCE

Contents

7.1 Maintenance

7.1.1 Mechanical maintenance

- **Transmission belt (Fig. 7.2)**
  Proceed as follows to replace the belt connecting the main motor with the dasher:
  Slacken the lock nut (1) and the nut (2) so that the belt is no longer under tension.
  Remove and replace the belt.
  Tighten up the belt using the nut (2).
  While tightening up the belt, check that it is completely inside the driven pulley and tighten up the lock nut (1).
  Start up the dasher again, and check that the belt stays in position and does not tend to ride up and down on the driven pulley.

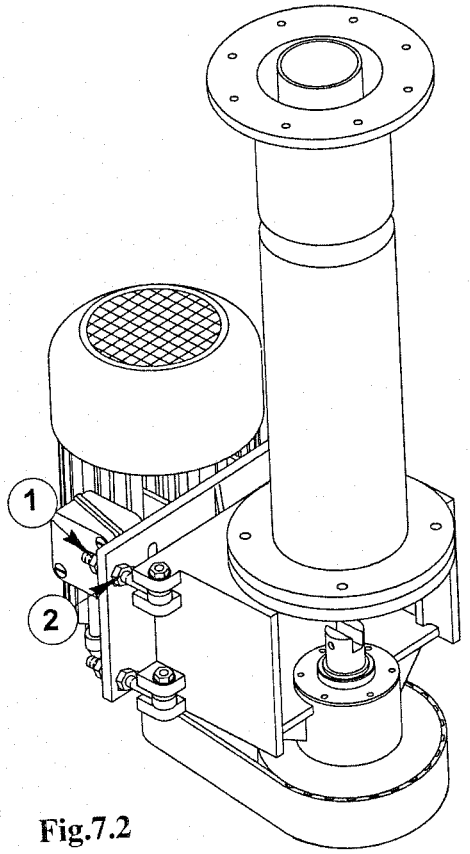


Fig.7.2

- **Rotating seal (Fig. 7.4)**
  Check the rotating seal (1) assembled on the lower end of the dasher and coupled to the bush (2) fastened to the bottom by the ring nut (3).
  The rotating seal has a housing made of hard metal which, under pressure from the spring (5), rotates against the face of the bush (2).
  Check that the surface of the housing has no scratches which could affect its hold.
  Use fine emery paper to polish the two surfaces. Rub them first against a very hard surface (glass), then against one another.
  Replace the ring gaskets (6) if they are worn.

- **Dasher (Fig. 7.4)**
  Check that the eccentric (13) turns freely inside the dasher. If this is not the case, dismantle the elastic ring (14) and remove the support (16) and the eccentric (13) from the dasher (18) and check the condition of the bushings (17). Lubricate the bushings before reassembling the dasher.

- **Scraper blades (Fig. 7.3)**
  Inspect the scraper blades (1).
  They must be assembled in their pins so that they can tilt when the dasher rotates.
  If the edge of the blade is not in perfect condition, the blade should be replaced.

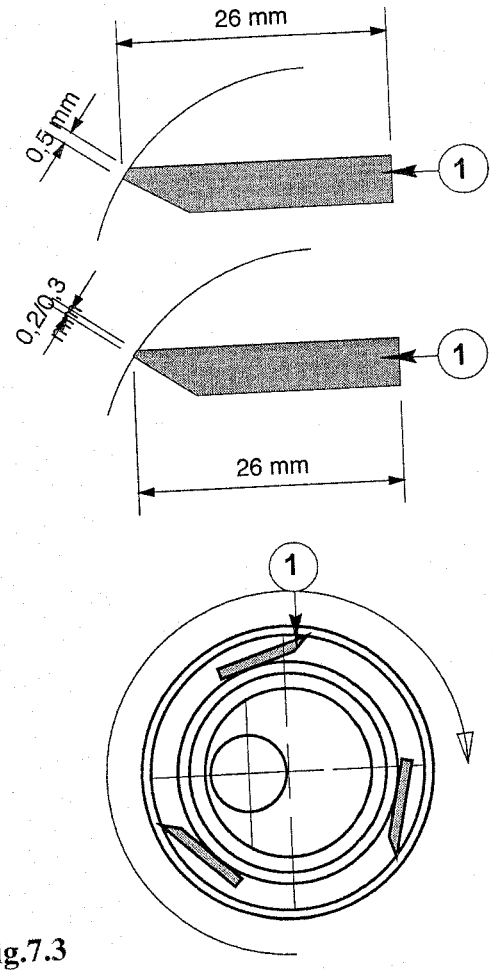


Fig.7.3

NOTE:

The blade may be sharpened, but this requires use of a special machine. The blade needs sharpening if the width of the cutting end exceeds 0.5 mm (Fig. 7.3).
After sharpening the thickness of the cutting edge must be about 26 mm (Fig. 7.3).

CAUTION:

It is important to assemble the blades as shown in Fig. 7.3.

- **Dasher motor drive**
  If the dasher is noisy during operation, dismantle the support (7) and pull out the shaft (8).
  Disassemble the bearings (9) and gaskets (10), check their efficiency and replace them if necessary.
  Reassemble carefully in inverse order.

- **Cylinder bottom**
  Inspect the rotating seal sliding bush (2).
  Check for wear on the gasket (1), spring (5), and lip seals (6) and replace if necessary.

- **Cylinder lid**
  Check for wear on the gasket (11) and replace if necessary.

- **Ice cream** mix pipe connection seals (12)
  Check for wear and replace if necessary.

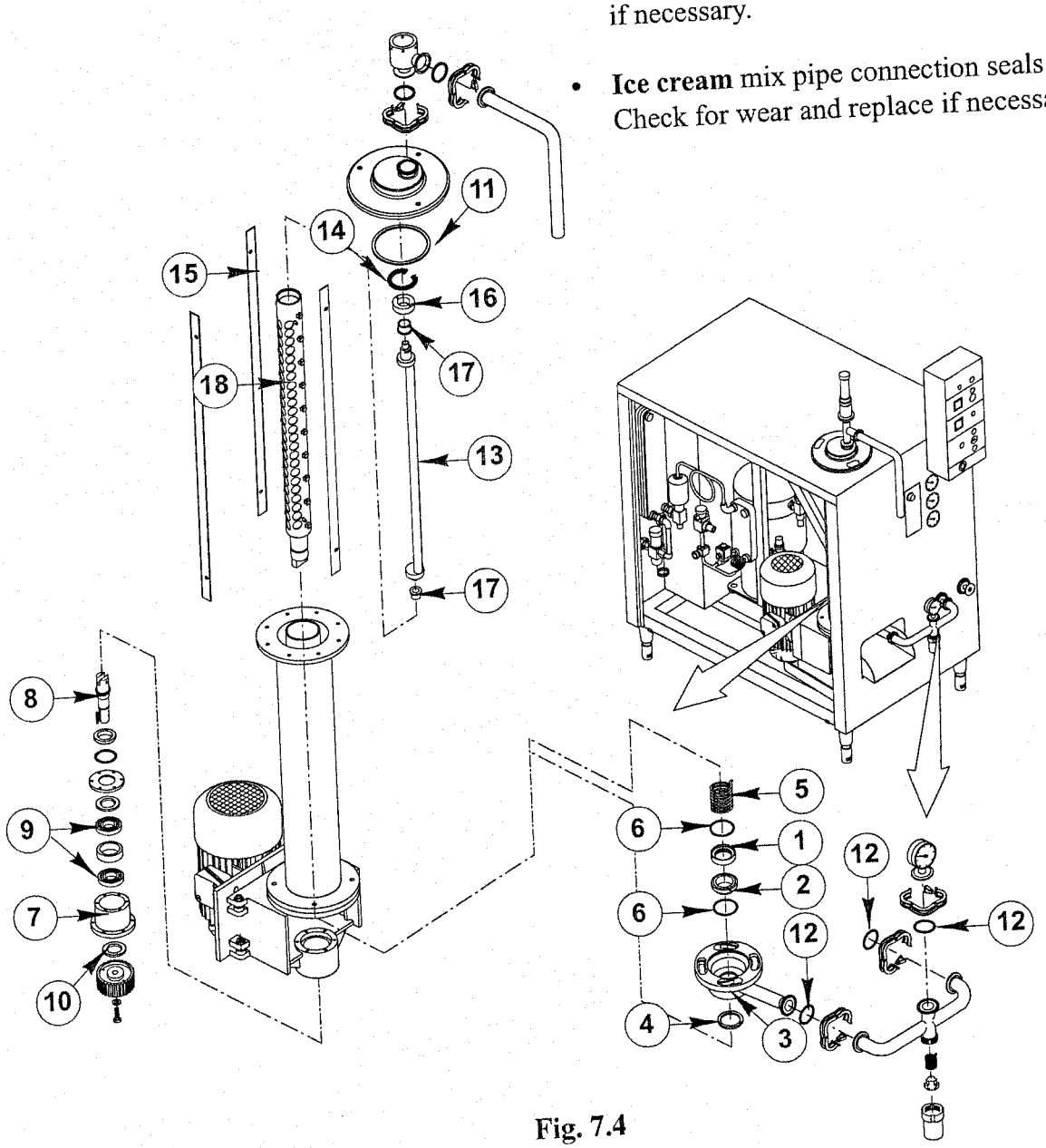


Fig. 7.4

- **Mix supply pump (Fig. 7.6)**
  Extract the rotor (4) and check its surfaces for wear.

WARNING:

Correct operation requires 0.05 mm of play between the rotor and the sleeve, so you should not polish the rotor with a cloth.

Inspecting the check valve (Fig. 7.5)

Check the condition of the check valve (1) which lets air into the pump.
Replace the seal if necessary (2).

Inspecting alignment (Fig. 7.6)

Position the piston (1) at the bottom dead point on the shaft.
Slacken the screws locking the pulleys in place, remove the washers and check that the reference notches on the driving pulley (2) and the driven pulley (3) are vertical and both face upwards.
If the position of the notches is not correct, align them.

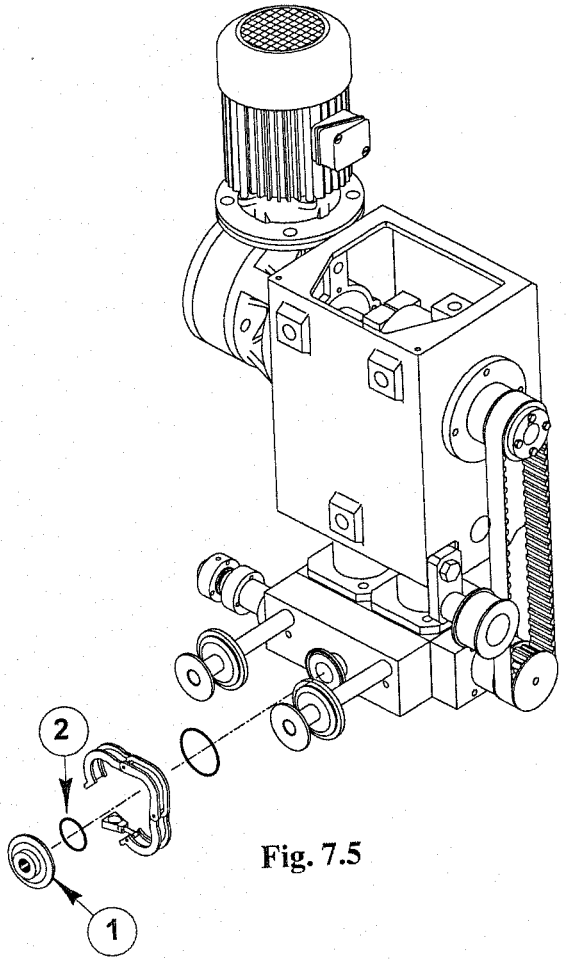


Fig. 7.5

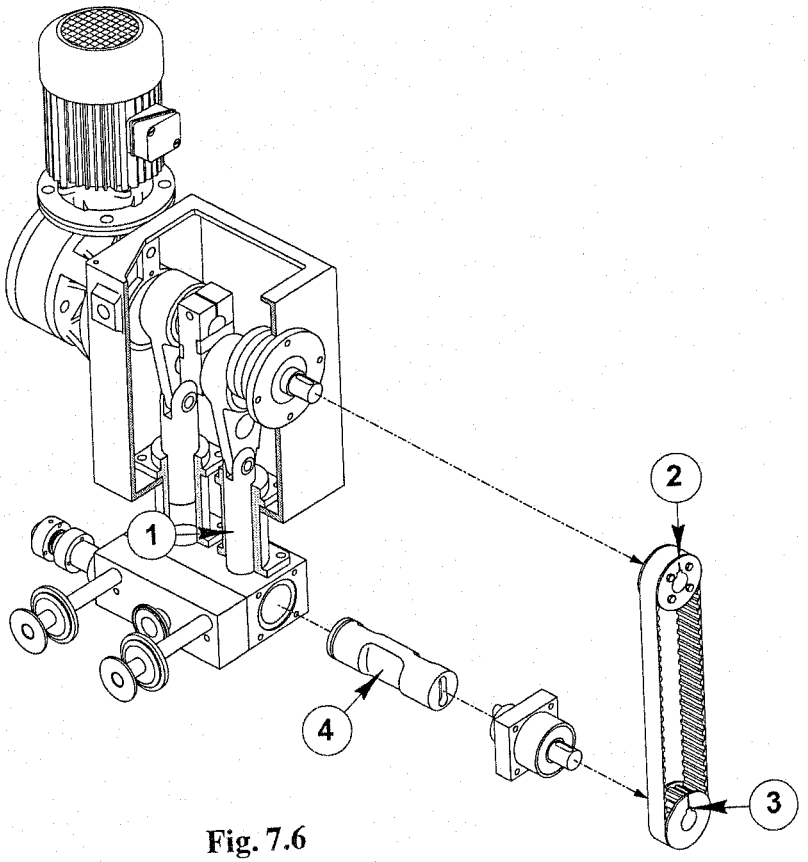


Fig. 7.6

Pump alignment (Fig. 7.7)

After dismantling to replace or inspect a mechanical component, you must align the mix pump again.

Position the piston from the pulley side at its lower dead point.

Slacken the belt tensioner (1), slacken the screws anchoring pulleys (2) and (3) and simultaneously remove the two pulleys and the belt.

Replace the pulley (3) on the rotor shaft and align it manually, turning the pulley (3) until the notch on the pulley is the in vertical position, facing upwards.

Pull the pulley (3) out again, being careful not to change the position of the rotor.

Reassemble the two pulleys and the belt at the same time. Check the alignment of the two notches and anchor the pulleys in place with their screws.

If you cannot manage to keep the two notches aligned, slacken the four bolts (4) on the driving pulley (2) and manually turn the pulley (3) using a setscrew wrench until the reference notch is perfectly vertical.

Tighten the 4 bolts (4) again.

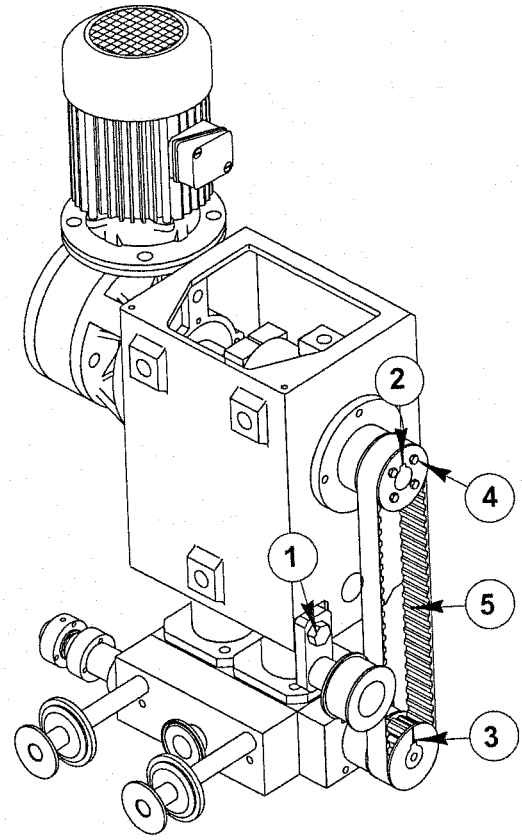


Fig. 7.7

Inspecting the belt (Fig. 7.7)

Check the tension of belt (5) and tighten if necessary by slackening the tensioner screw (1).

Tighten the screw again after tightening the belt.

Replacing piston seals (Fig. 7.8)

Dismantle the pin (1) connecting the piston to the connecting rod.

Dismantle the seal plate (2), turn the connecting rod (3) and remove the seal (4).

Reassemble the new seal (4), taking care not to pinch it.

Reassemble all in reverse order.

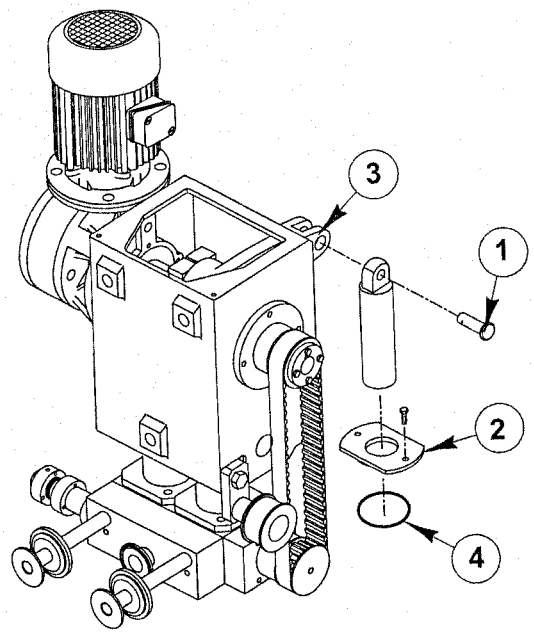


Fig. 7.8

Replacing seals and bearings on chain tensioning wheel

Slacken the screw and release it from the tensioner.

Dismantle the elastic ring (1), pull out the pulley (2) and extract the seals (3) and bearings (4). Reassemble all in reverse order.

Replacing seals and bearings on rotor drive

Dismantle the flange (5), extract the seal (6) and dismantle the elastic ring (7). Extract the bearings (8). Reassemble all in reverse order.

Replacing bearings and seals on crankshaft

Dismantle the reduction gear (9), the flange (10) on the motor side and the flange on the opposite side (11) and remove seals (12) and bearings (13).

Slacken clamp (16) and extract the two semi-shafts (14) and (15).

Remove elastic rings (17) and (18).

Dismantle the connecting rods (19) and extract the bearings (20) and the seals (21).

Reassemble in reverse order, carefully aligning the crankshaft by assembling the keys correctly.

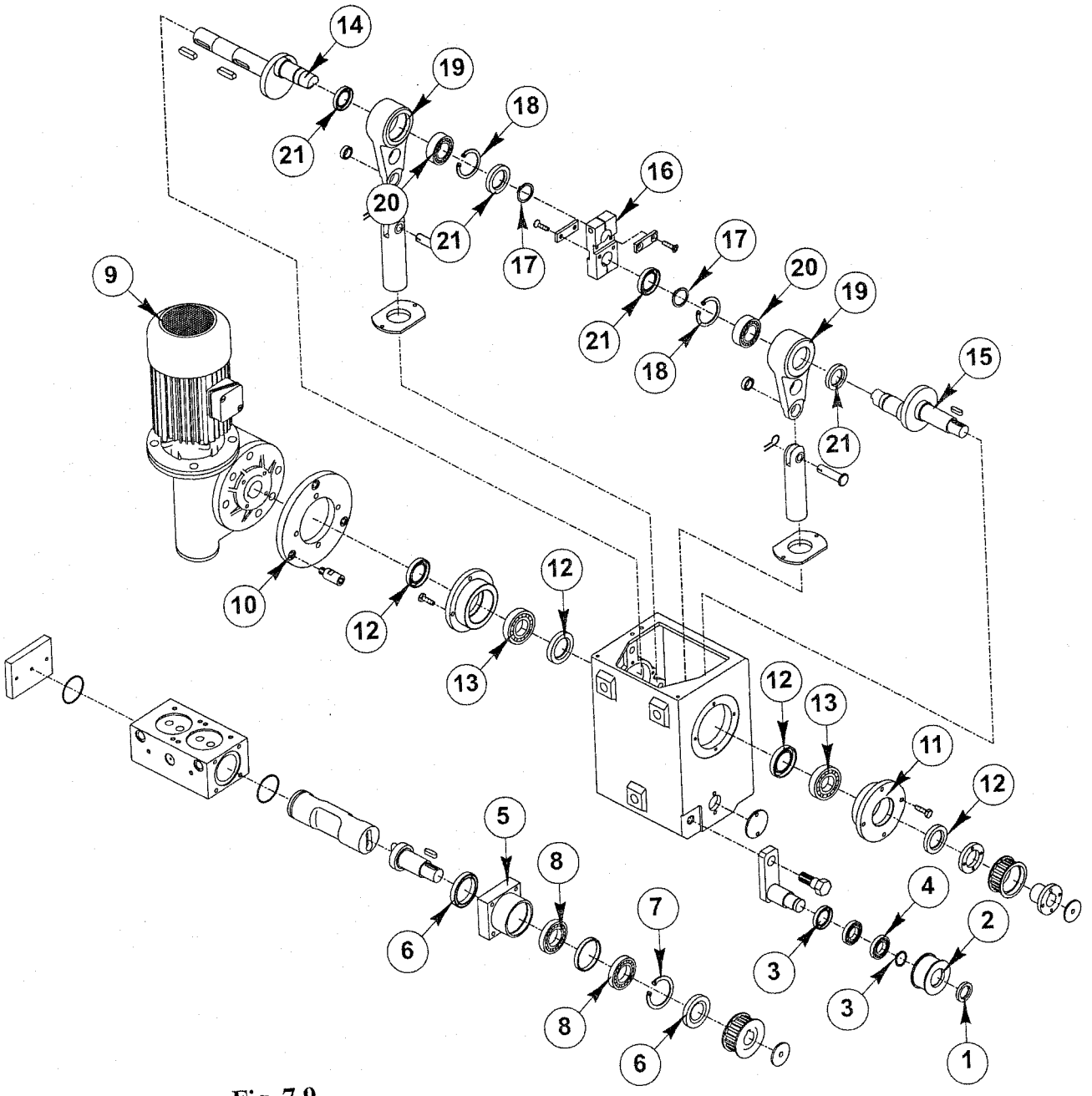


Fig. 7.9

7.1.2 Maintenance of the electrical system

The electrical system is conceived, designed and developed to provide maximum protection for the continuous freezer components.
When a motor shuts down due to overload, the alarm page on the touch-screen signals an alarm message due to a tripped thermal.
If the thermal is tripped again when it is reset, the problem or short circuit persists and it will be necessary to inspect the electrical system and possibly block mechanical components.
If the motor compressor on the refrigerating plant shuts down, check the pressure switch and electronic protection (located in the terminal board above the motor compressor). This must be done before working on the electrical system.
Pay careful attention to the wiring diagram.
The numbered terminal board appearing in the diagram mirrors the board installed on the freezer to make it easy to control it. Maintenance and repair operations should be performed by a qualified electrician.

7.1.3 Maintenance of the refrigerating plant

CAUTION:

All repairs and inspections of the refrigerating plant must be performed exclusively by a qualified refrigerator technician.

Condensation

Coolant exiting the refrigerator compressor is condensed in the plate condenser by water, which may come from the water supply (or a well, or a circuit with a cooling tower). The Frigus 600 has condensers with pressure valves which are factory set and keep condensation pressure at the optimal value (3-4 bar). If water from a cooling tower is used, it should be kept at the same temperature at all seasons, if possible (with a fan in the tower controlled by a thermostat) so as to keep the performance of the refrigerating plant uniform.
The condenser must be kept clean to ensure correct, efficient operation of the machine. All heat taken out of the ice cream mix and all energy consumed by the compressor to transfer this heat are transferred out of the system (in the cooling water) through the condenser. If the condenser is dirty, it will be difficult to get rid of the heat, and the freezer may not cool down sufficiently and may consume excess energy.
Decreased efficiency of the condenser is normally due to the combined action of particles of dirt in the flow of water and substances which have separated from the water (present even in very clean water).
Dirt particles, if large, will obstruct the passage of water; substances which separate from water and deposit on the exchange surfaces will obstruct the passage of heat.

Preventing soiling of the condenser

Prevent problems caused by dirt by keeping dirt out of the condenser. If cooling water comes from a circuit in which it is impossible to prevent entry of foreign particles (such as leaves, blades of grass or tiny insects in water from a tower or sand in well water), it will be necessary to decant and separate out these particles.
As specific protection for the freezer, one or more filters may be installed at the water intake to stop all particles over 1 mm (largest dimension). The size and type of filter must be determined according to the amount and type of dirt in the water.

To prevent efficiency from being decreased by substances separating out of the water, first analyse the water to determine what treatment would be best. All waters tend to corrode or scale the surfaces with which they come into contact; it is very difficult to achieve and maintain a balanced condition in which there is neither corrosion nor scaling.

The trend to corrode or scale depends on the type and amount of substances dissolved in water, the acidity of the water and the temperature at which it is used. It is recommended that users contact a specialist firm capable of recommending and supplying batching devices, substances, and procedures suited to the specific cooling water system in use.
This is particularly important in the case of water towers, where temperature, evaporation and continual ventilation with air in the environment can generate waters which are particularly polluted (by solid particles, algae, mineral salts, micro-organisms, gases, etc.) and damaging for the entire plant and the condenser in particular.

Keeping the condenser clean
When condensation temperature is excessive for the conditions of operation in effect, it is time to clean the condenser.
The condensation temperature must be between 28°C and 36°C. If the water temperature is less than or equal to 28°C; about 3600 litres/hour of water will be required at a temperature of 28°C.
Check that these conditions are met and that all the rest is working properly before deciding that the condenser needs cleaning.
If the condenser does need cleaning, contact a qualified refrigerator technician who has the equipment required to carry out chemical cleaning.

WARNING:

Do not disassemble the condenser and disconnect it from the coolant pipes for cleaning.

The Frigus 600 is fitted with two connections for cleaning the condenser: one inside the machine, at the top of the condenser next to the coolant gas pipe (washing solution intake) and one on the outside halfway between the water intake and outlet (washing solution outlet). Both these connections are normally closed off.
Turn off the cooling water intake and outlet taps.
Use a closed washing circuit consisting of a container and a centrifugal pump as shown in the figure; connect the pump delivery to the washing solution intake (top inside) through a plastic hose. Connect another plastic hose to the washing solution outlet (halfway on the outside) to return solution to the container.
First let water run through to get rid of any solid particles in the condenser.
Then prepare a suitable buffered solution (such as Henkel P3 T288) according to the manufacturer's instructions and put it in the container. Flush it through, following the instructions for use, until the solution's indicator (colour change, pH, etc.) indicates that scale has been removed. This may take a few hours.

WARNING:

Under no circumstances should strong inorganic acids such as hydrochloric acid, nitric acid, or sulphuric acid be used for any reason. These acids are very dangerous and could cause irreparable damage to the condenser in only a few minutes.

Passivate and rinse according to the instructions; remove pipes and close connections up again. Open the cooling water intake and outlet taps again, and check that water is circulating normally with no leakage.

Thermostatic expansion valve
This valve is factory set during final testing to optimise the dependability and performance of the refrigerating plant.
The factory setting should not be changed for any reason. If the machine is not working properly, all parameters affecting performance should be checked, such as the temperature of incoming mix, wear on the scraper blades, and correct circulation of condensation water.

- If the refrigerating plant is not working as well as it should do, the reason may be:
  - insufficient condensation
  - inefficient thermostat valve;
  - dirty or blocked up filter on the line;
  - hot gas solenoid valve blocked up or open,
  - liquid solenoid valve blocked up or closed;

- low coolant level.

- Insufficient condensation may be caused by:
  - insufficient water coming from water supply:check that all taps (on the line that conveys water to the freezer) are open and water is flowing to the freezer properly.
  - optional pressure valve setting needs adjustment: adjust using the knob on its top.
  - if the optional water valve is set correctly, the temperature of the water (flowing out of the outlet with the system in operation) should have a temperature of 28/35°C.
- If the thermostat valve is faulty, it will stay closed, stopping the flow of coolant.
- If the line filter is blocked up, it will get covered with frost which will block the flow of coolant. Dismantle and replace it. It must always be replaced whenever the cooling circuit is opened.
- If the solenoid valve which controls the flow of hot gas stays open, it will compromise the performance of the refrigerating plant considerably. Check the solenoid valve and replace if necessary.
- The liquid solenoid valve automatically closes the liquid line every time the refrigerator compressor stops.
  If the valve does not open, the refrigerating plant will tend to idle, and the vacuum pressure gauge will drop below -35°C. If this occurs, check that the power is on to the solenoid valve coil. If so, replace the coil.
- If the electrical system is working properly and you have checked all the above, poor performance may be due to low coolant level in the refrigerating plant. This will result in formation of gas bubbles which may be detected by the indicator. When the coolant level is low in the refrigerating plant, identify the cause of the leakage before adding more coolant.

CAUTION:

Do not add coolant to the refrigerator circuit unless absolutely necessary.
The refrigerating plant will not work properly with too much gas in it.

7.1.4 Maintenance of the pneumatic system

Periodically check the efficiency of the pneumatic system and check whether the filters are obstructed.

- Check that pneumatic connections are tight.
- Check that mix does not flow back from the pump.
- Check the efficiency of the valves.
- If air flow is insufficient, replace filter cartridges; if not, refer to the table of work listed in the section on preventive maintenance.

CAUTION:

Do not open filters, especially the sterilised filter, unless there are problems with the pump's air supply.

7.2 Lubricating list

Component	Supplier	Type
1-Pump reducer	Agip	Blasia 320 (ISO 3448)
2-Compressor*	Mobil	EAL Arctic 22 CC ICI Emkarate RL 32 CF
3-Bearings	NILS	Atomic T 4938 Longlife grease EP Low temp.
4-Bushings	NILS	Atomic T 4938 Longlife grease EP Low temp.

*Quantity: 4 litres
Life-long lubrication.

☞ **NOTE:**

The compressor guarantee will remain valid only if one of the two oils specified above is used. The compressor works only with these two specific oils. Ester oils must never be mixed with mineral oils and/or alkylic-benzene oils. Do not use mineral oils on cooling circuit components.

7.3 Maintenance summary table

*** = Planned maintenance work**

Component	Lub.	Frequency of work				Rif.
		End of shift	500 hours	3000 hours	6000 hours	
Freezer		A*	-	C*	-	----
Pump - Reducer	1-3	-	-	B*	-	---
Pump - Pistons gaskets	-	-	F*	D*	-	---
Pump - Belt	-	-	F*	-	-	---
Pump - Pistons and wrist pins	4	-	-	E*	-	---
Pump - Check valve	-	-	F	D*	-	---
Freezer cylinder-Blades	-	-	F*	G*	H*	---
Freezer cylinder-Bushings	4	-	F*	-	I*	---
Freezer cylinder-Gaskets	-	-	F	D*	-	---
Freezer cylinder-Rotating seal	-	-	F	-	D*	---
Sterilising filter	-	-	-	-	L*	---
High yield filter	-	-	-	-	L*	---
Active carbon filters	-	-	-	-	L*	---

A = Work: Cleaning
B = Level restoring
C = Work: Bearings lubrication
D = Work: Gaskets replacing
E = Work: Wrist pins and pistons bushings replacing
F = Work: Functional test
G = Work: Grinding blades
H = Work: Blades replacing
I = Work: Bushings replacing
L = Work: Filter replacing

HOYER FRIGUS 600

8 - TROUBLESHOOTING

Contents

8.1 Troubleshooting

Problem	Cause	Remedy
The screen does not switch on.	• Power failure. • General switch in "0" position. • General switch fault. • Protection triggered.	• Restore voltage supply. • Turn general switch to "1". • Replace. • Reset the protection.
The pump stops, or does not start.	• No compressed air. • Switch fault. • Pump rotor seized. • Inverter in emergency state. • Inverter thermal cutout • Bearings blocked. • Inverter fault. • Main motor fault.	• Check compressed air pressure. • Replace switch. • Remove rotor, check condition and if necessary replace. • Turn off the general switch and turn back on after a few minutes. • Wait 20 seconds, then restart the pump. • Replace following instructions in "Mechanical maintenance" section. • Replace. • Replace/repair.
Mixer shaft stops or does not start.	• Thermal cutout tripped. • Switch fault. • Motor fault. • Build up of ice in the cylinder.	• Reset thermal cutout. • Replace switch. • Replace/repair. • Turn on hot gas.
The refrigerator compressor will not start up.	• Dasher off. • Thermal cutout tripped. • Electronic overload tripped. • Switch fault. • High-pressure cutoff switch tripped. • Low pressure cutoff tripped	• Restart dasher. • Reset. • Reset by switching general switch off then on again. • Replace switch. • Check water temperature. • Turn on hot gas for about 30 seconds

Problem	Cause	Remedy
No flow or insufficient flow of mix.	• No mix supply.	• Restore supply.
	• Mix supply hose crimped or blocked.	• Remove blockage/crimp.
	• Air bubbles in the supply hose.	• Stop overrun, increase pump speed to recall mix rapidly into the cylinder, reset desired pump speed and restart overrun.
	• The pump has stopped.	• See problem "The pump stops, or does not start".
	• The pump is out of phase.	• Align the pump.
The mixer shaft is malfunctioning.	• Ice-cream too hard.	• Reduce the set value of ice cream viscosity.
	• Scraper blades worn.	• Sharpen or replace, following correct fitting procedure.
	• Reduction gear broken.	• Replace.
Mix cooling problematic at start-up.	• Condenser out of or low on water.	• Check water supply.
	• Hot water.	• Check water temperature.
	• Refrigerator unit fault.	• Call qualified refrigerator technician.
Ice-cream too soft.	• Excessive ice-cream production rate.	• Reduce the production.
	• Input mix too hot.	• Check that mix is at 4°C.
	• Water supply to condenser insufficient.	• Check water supply. Adjust pressure valve (if present) as explained in the "Refrigerator unit maintenance" section.
	• Condenser cooling water too hot.	• Check temperature of tower water.
	• Ice-cream outlet valve too open.	• Increase pressure on ice-cream outlet valve.
	• No coolant gas.	• Check for leaks in refrigerator unit and reset gas charge.
	• Coolant gas filter blocked.	• Replace filter.
	• Refrigerator unit fault.	• Call refrigerator technician.

Problem	Cause	Remedy
Overrun insufficient.	• Loss of pressure in compressed air system.	• Check compressed air system for leaks and check solenoid valve operation.
	• Clogged filters.	• Replace as described in the "Compressed air system maintenance" section .
	• Check valve seal worn or dirty.	• Replace as described in the "Mechanical maintenance/ Cleaning" section.
	• Water or mix in compressed air system.	• Replace the O-ring as in point above and clean system.
	• Compressed air supply failure.	• Reset.
	• Overrun regulator fault.	• Replace.
	• Insufficient overrun pressure.	• Correct overrun pressure on the internal regulator.
	• The pump is out of phase.	• Align the pump.
	• Pump rotor worn.	• Replace.
Refrigerator compressor starts but shuts down immediately.	• Condenser water supply closed.	• Turn on faucets.
	• Condenser water supply hoses pinched.	• Remove crimps.
	• Condenser water supply hoses of insufficient diameter.	• Replace with hoses of diameter at least as that of the hose connections on the machine.
The compressor ices up.	• Condenser water too cold.	• Check water temperature.
	• Blades worn.	• Replace.
	• Thermostatic valve fault.	• Replace.
	• Excessive quantity of coolant gas.	• Unload gas and reload observing value in technical data.
Hourly ice-cream production rate remains unchanged even by changing the capacity through the panel.	• Inverter fault.	• Replace.

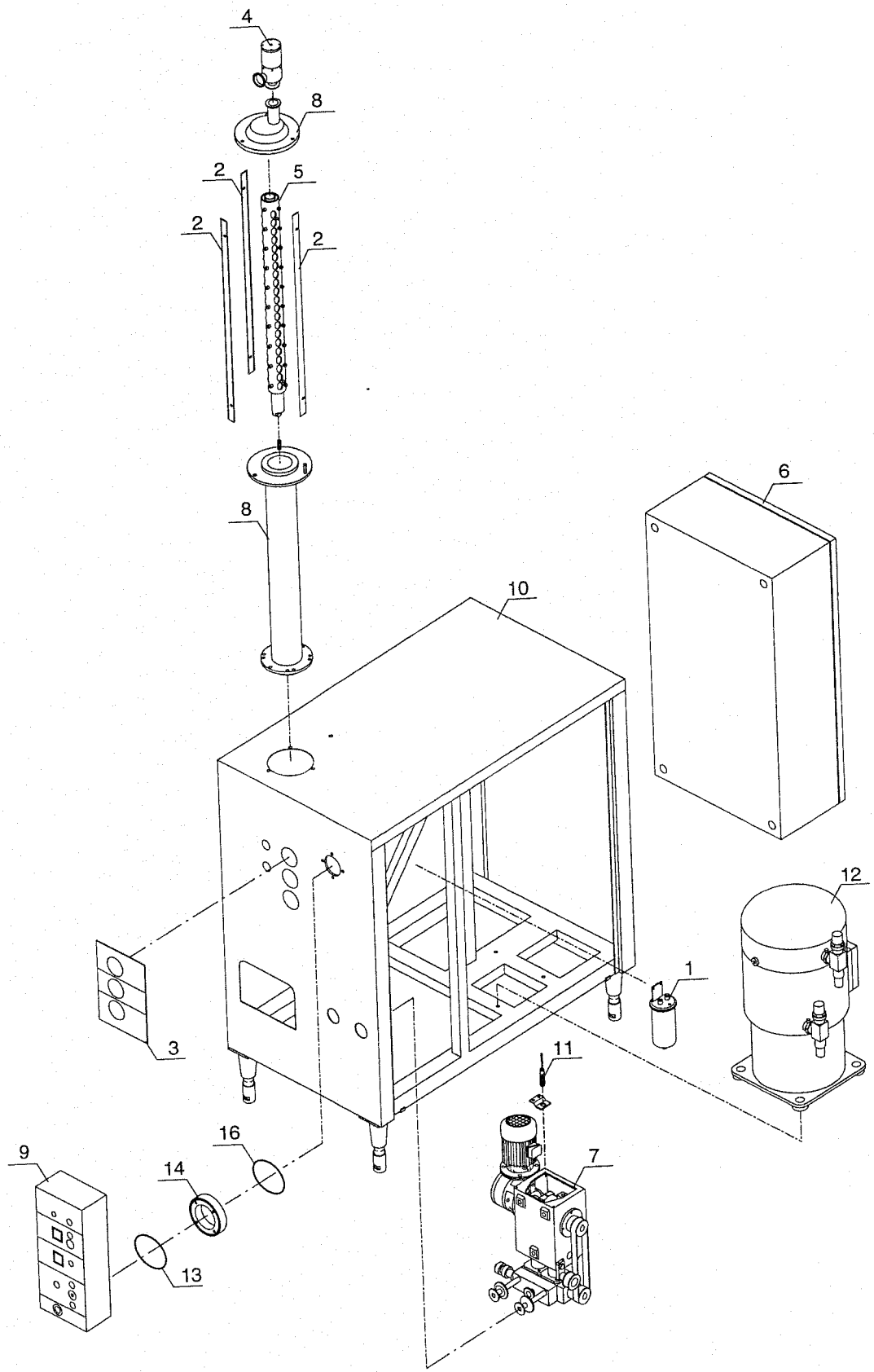
Problem	Cause	Remedy
Hot gas activates before correct time.	• Strumento starato.	• Tarare strumento
Hot gas does not activate.	• Strumento starato. • Strumento guasto	• Tarare strumento • Sostituire strumento
Hot gas activates but with no effect.	• Hot gas faucet closed. • Hot gas solenoid and valve fault.	• Open faucet. • Replace.

HOYER FRIGUS

9 - PARTI DI RICAMBIO - *LIST OF SPARE PARTS - PIECES DE RECHANGE*

Indice - *Contents - Sommaire*

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020080	1	Filtro	Filter	Filtre
2	12020085	3	Lama	Blade	Lame
3	12020392	1	Targhetta	Data plate	Plaquette frigus
4	13020025	1	Uscita gelato	Mix outlet unit	Groupe sortie mélange
5	13020094	1	Dascher	Dasher unit	Groupe dasher
6	13020381	1	Quadro elettrico	Electrical cabinet	Armoire électrique
7	13020361	1	Pompa	Pump	Pompe
8	13020364	1	Cilindro congelatore	Freezer cylinder	Cylindre congélateur
9	13020380	1	Quadro elettrico	Electrical cabinet	Armoire électrique
10	13020376	1	Carpenteria	Carpentry	Charpenterie
11	17035929	1	Proximity	Proximity sensor	Capteur de proximité
12	17020024	1	Compressore	Compressor	Compression
13	336067137	2	Guarnizione	O-ring	Joint
14	540501038	1	Distanziale Q.E. comando	Electrical control panel	Entretoise panneau de



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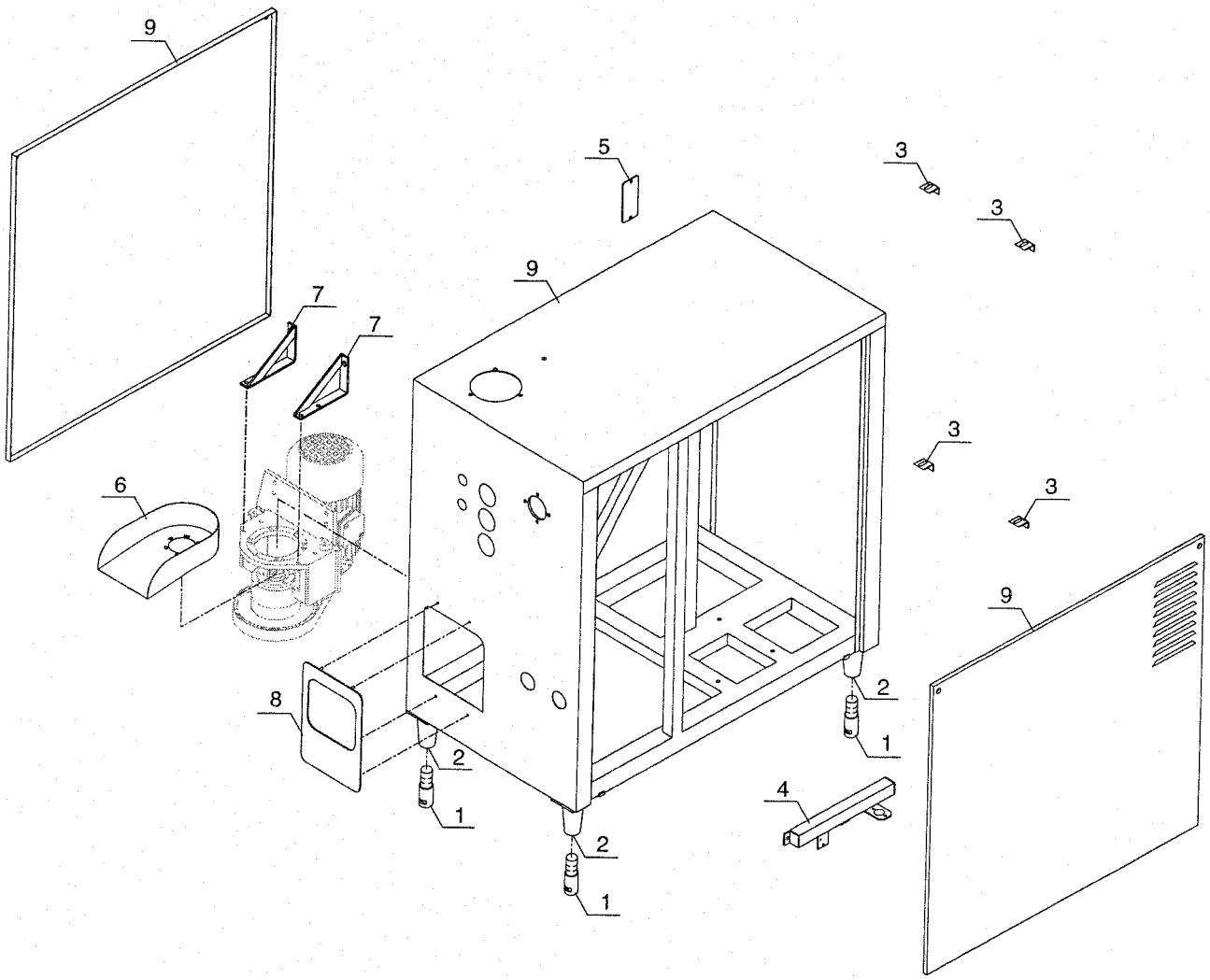
Carpenteria 1/1 13020376

Carpentry - Charpenterie

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12000002	4	Piede	Foot	Pied
2	12000003	4	Boccola	Bush	Bague
3	12020051	1	Piastrina	Plate	Plaquette
4	12020145	1	Supporto	Support	Support
5	12020148	1	Piastrina	Plate	Plaquette
6	12020293	1	Scivolo	Chute	Goulotte
7	12020347	1	Squadra	Bracket	Equerre
8	12020374	1	Pannello	Panel	Panneau
9	12020387	1	Telaio	Frame	Châssis

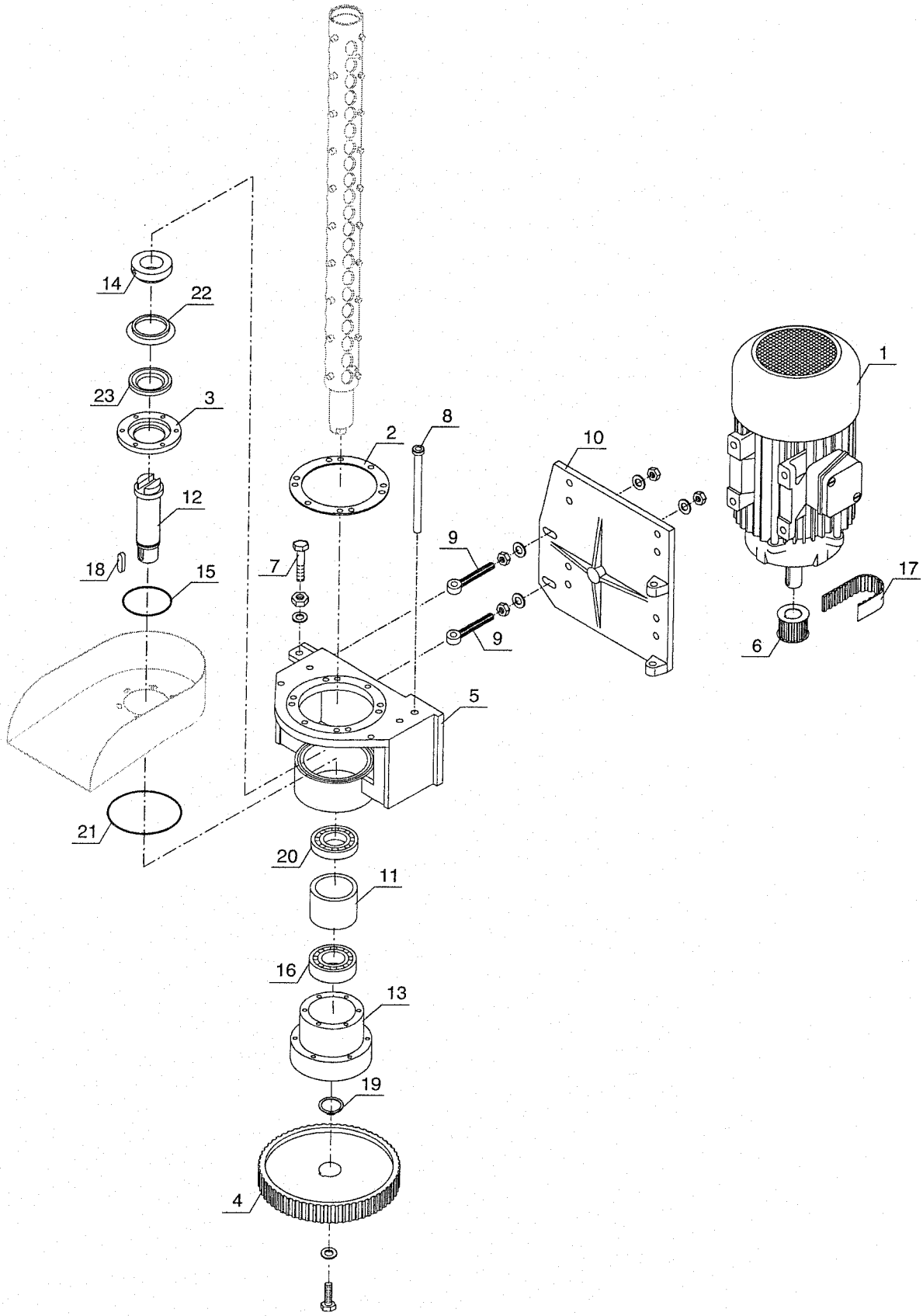


1/1 - 13020376

Gruppo trazione **1/1 13020347**

Drive - Traction

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	014045799	1	Motore	Motor	Moteur
2	12020143	1	Guarnizione	O-ring	Joint
3	12020289	1	Anello	Ring	Anneau
4	12020295	1	Puleggia	Pulley	Poulie
5	12020299	1	Fusione supporto	Support casting	Support coulé
6	12020300	1	Puleggia	Pulley	Poulie
7	12020302	1	Perno	Pin	Axe
8	12020303	2	Perno	Pin	Axe
9	12020304	2	Tirante	Tie rod	Entretoise
10	12020342	1	Piastra	Plate	Plaque
11	12020343	1	Distanziale	Spacer	Entretoise
12	12020344	1	Albero	Shaft	Arbre
13	12020345	1	Flangia	Flange	Bride
14	141015451	1	Anello	Ring	Anneau
15	17000867	1	Guarnizione OR	Seal	Joint torique OR
16	17020127	1	Cuscinetto	Bearing	Roulement
17	17020186	1	Cinghia	Belt	Courroie
18	326013124	1	Chiavetta	Key	Clavette
19	326019040	1	Seeger	Seeger	Seeger
20	336001720	1	Cuscinetto	Bearing	Roulement
21	336067069	1	Guarnizione	O-ring	Joint
22	336069034	1	Guarnizione	O-ring	Joint
23	336071382	1	Corteco	Corteco seal	Corteco

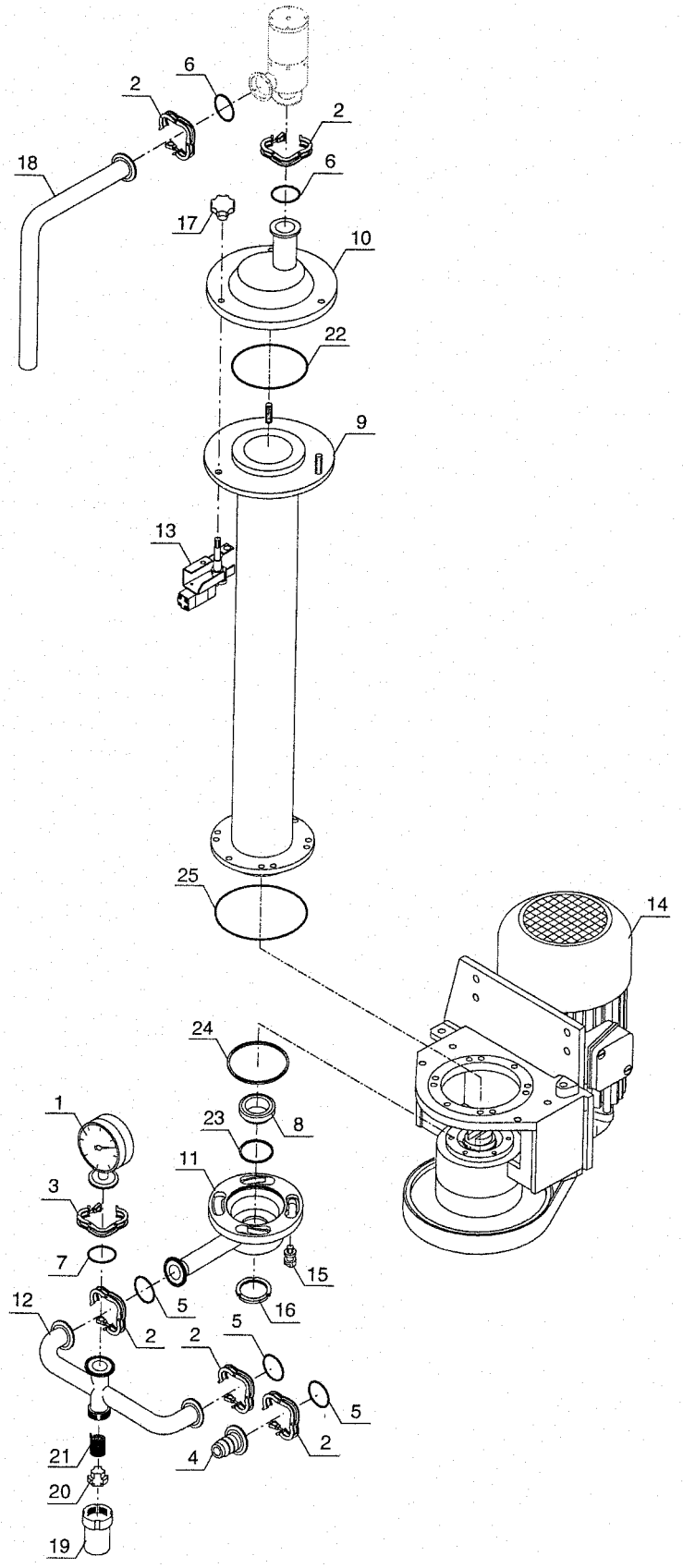


1/1 - 13020347

Cilindro congelatore **1/1 13020364**

Freezer cylinder - Cylindre congélateur

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	015075615	1	Manometro	Manometer	Manomètre
2	016060218	5	Clamp	Clamp	Clamp
3	016060219	1	Clamp 2"	Clamp 2"	Clamp 2"
4	016960007	1	Portagomma	Hose connection	Porte-caoutchouc
5	018020581	3	Guarnizione clamp 1"	Seal	Joint
6	018020582	2	Guarnizione 1 1/2"	Seal	Joint
7	018020583	1	Guarnizione	Seal	Joint
8	12020058	1	Anello	Ring	Anneau
9	12020078	1	Cilindro	Cylinder	Cylindre
10	12020081	1	Coperchio	Cover	Couvercle
11	12020147	1	Culatta	Bottom	Culasse
12	12020367	1	Tubo	Hose	Tube
13	13020113	1	Micro di sicurezza	Safety microswitch	Micro de sécurité
14	13020347	1	Gruppo trazione	Drive	Traction
15	141015458	4	Perno	Pin	Axe
16	141015473	1	Ghiera	Ring nut	Bague
17	141035120	3	Pomolo	Handgrip	Manople
18	141040365	10	Tubo	Hose	Tube
19	146000010	1	Bicchierino	Cup	Godet
20	146000015	1	Tappo	Cap	Bouchon
21	146000020	1	Molla	Spring	Ressort
22	336067069	1	Guarnizione	O-ring	Joint
23	336067141	1	Guarnizione	O-ring	Joint
24	336067145	1	Guarnizione	O-ring	Joint
25	336067184	1	Guarnizione	O-ring	Joint

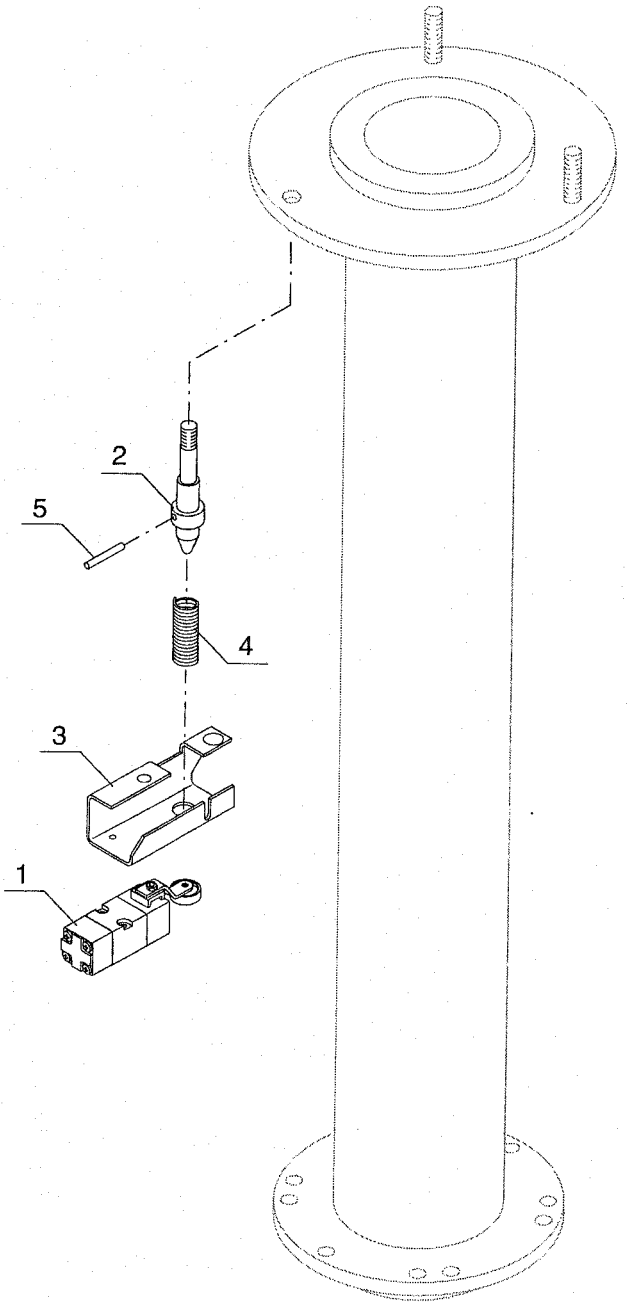


1/1 - 13020364

Micro di sicurezza **1/1 13020113**

Safety microswitch - Micro de sécurité

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	017035938	1	Finecorsa	Limit switch	Fin de course
2	12020282	1	Perno	Pin	Axe
3	12020283	1	Supporto micro	Micro support	Support micro
4	17020090	1	Molla	Spring	Ressort
5	326024270	1	Spina	Pin	Goupille

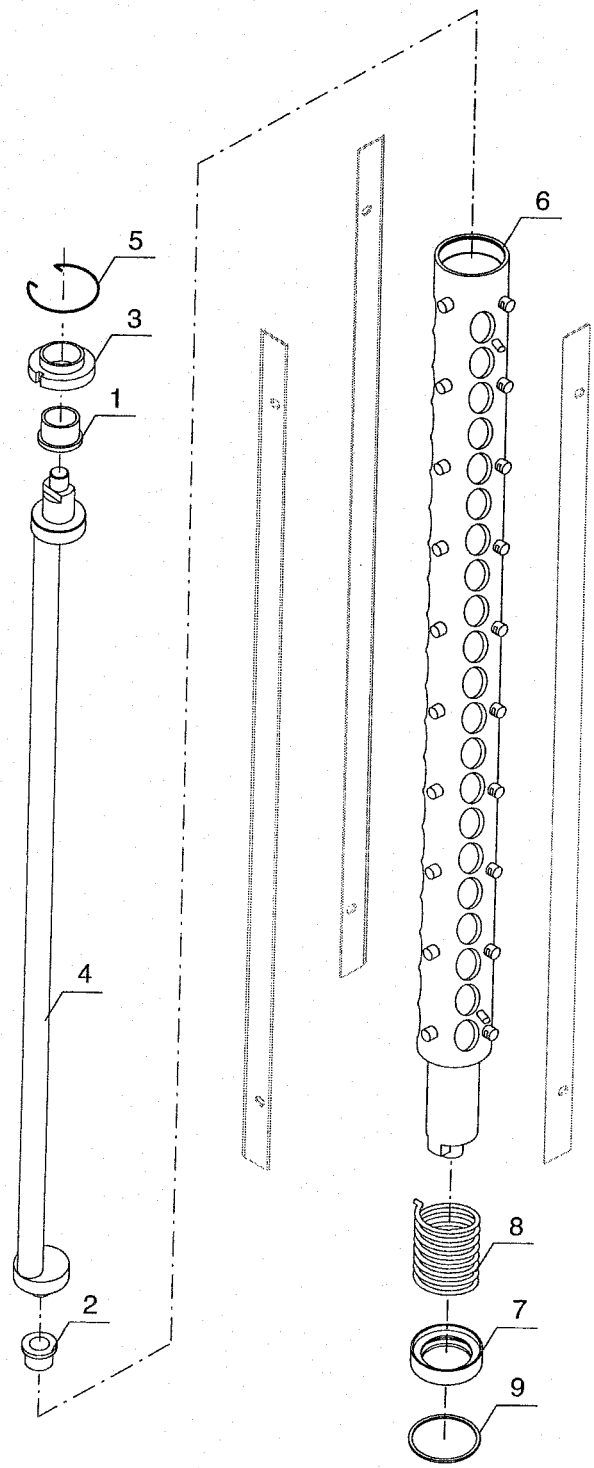


1/1 - 13020113

Albero sbattitore **1/1 13020094**

Dasher unit - Groupe dasher

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020056	1	Bronzina	Bushing	Douille
2	12020057	1	Bronzina	Bushing	Douille
3	12020082	1	Ghiera	Ring nut	Bague
4	12020083	1	Eccentrico	Eccentric cam	Excentrique
5	12020104	1	Molla	Spring	Ressort
6	12020144	1	Albero	Shaft	Arbre
7	145500026	1	Ghiera	Ring nut	Bague
8	145500029	1	Molla	Spring	Ressort
9	336067170	1	Guarnizione OR	Seal	Joint torique OR

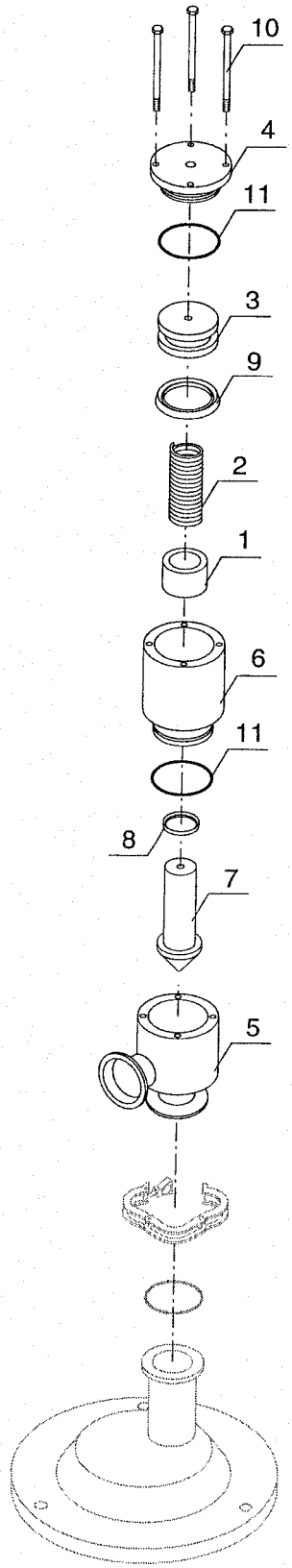


1/1 - 13020094

Uscita gelato **1/1 13020025**

Mix outlet unit - Groupe sortie mélange

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020024	1	Boccola	Bush	Bague
2	12020027	1	Molla	Spring	Ressort
3	12020073	1	Stelo	Stem	Tige
4	12020074	1	Tappo	Cap	Bouchon
5	12020075	1	Corpo inferiore	Lower body	Corps inférieur
6	12020076	1	Corpo superiore	Upper body	Corps supérieur
7	12020077	1	Pistone	Piston	Piston
8	17000134	1	Guarnizione	O-ring	Joint
9	17000436	1	Guarnizione	O-ring	Joint
10	326003078	1	Vite	Screw	Vis
11	336067057	2	Guarnizione	O-ring	Joint

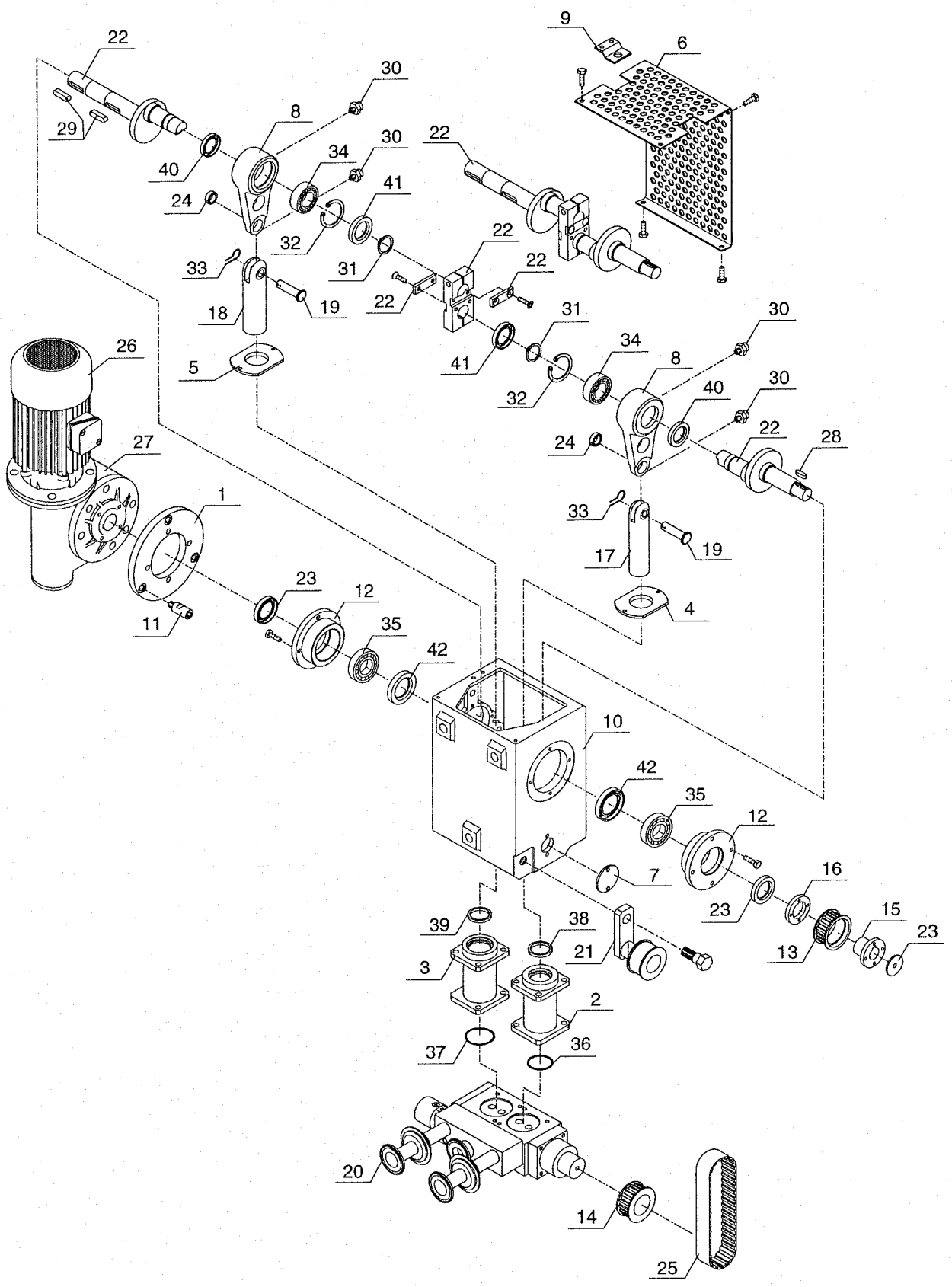


1/1 - 13020025

Pompa 1/1 13020361

Pump - Pompe

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020209	1	Flangia	Flange	Bride
2	12020223	1	Cilindro	Cylinder	Cylindre
3	12020224	1	Cilindro	Cylinder	Cylindre
4	12020227	1	Flangia	Flange	Bride
5	12020228	1	Flangia	Flange	Bride
6	12020241	1	Protezione	Protection	Protection
7	12020245	1	Piattello	Plate	Plateau
8	12020275	2	Biella	Connecting rod	Bielle
9	12020278	1	Piastrina	Plate	Plaquette
10	12020353	1	Corpo	Body	Corps
11	12020354	3	Distanziale	Spacer	Entretoise
12	12020355	2	Flangia	Flange	Bride
13	12020363	1	Puleggia	Pulley	Poulie
14	12020375	1	Puleggia	Pulley	Poulie
15	12020376	1	Flangia	Flange	Bride
16	12020377	1	Anello	Ring	Anneau
17	12020379	1	Pistone	Piston	Piston
18	12020380	1	Pistone	Piston	Piston
19	12020381	2	Spinotto	Piston pin	Branche
20	13020362	1	Gruppo distributori	Distributors	Distributeurs
21	13020363	1	Tendicinghia	Belt tightener	Tendeur de courroie
22	13020394	1	Albero a gomito	Crankshaft	Vilebrequin
23	17020076	2	Anello	Ring	Anneau
24	17020080	2	Cuscinetto	Bearing	Roulement
25	17020233	1	Cinghia	Belt	Courroie
26	17020234	1	Motore	Motor	Moteur
27	17020246	1	Riduttore	Reduction gear	Réducteur
28	326013075	1	Chiavetta	Key	Clavette
29	326013105	2	Chiavetta	Key	Clavette
30	326015095	4	Ingrassatore	Lubricator	Graisseur
31	326019025	2	Seeger	Seeger	Seeger
32	326019152	2	Seeger	Seeger	Seeger
33	326019656	2	Copiglia	Split	Goupille
34	336002405	2	Cuscinetto	Bearing	Roulement
35	336009906	2	Cuscinetto	Bearing	Roulement
36	336067088	1	Guarnizione	O-ring	Joint
37	336067092	1	Guarnizione	O-ring	Joint
38	336067533	1	Guarnizione	O-ring	Joint
39	336067534	1	Guarnizione	O-ring	Joint
40	336071190	2	Anello	Ring	Anneau
41	336071235	2	Corteco	Corteco seal	Corteco
42	17000739	2	Corteco	Corteco seal	Corteco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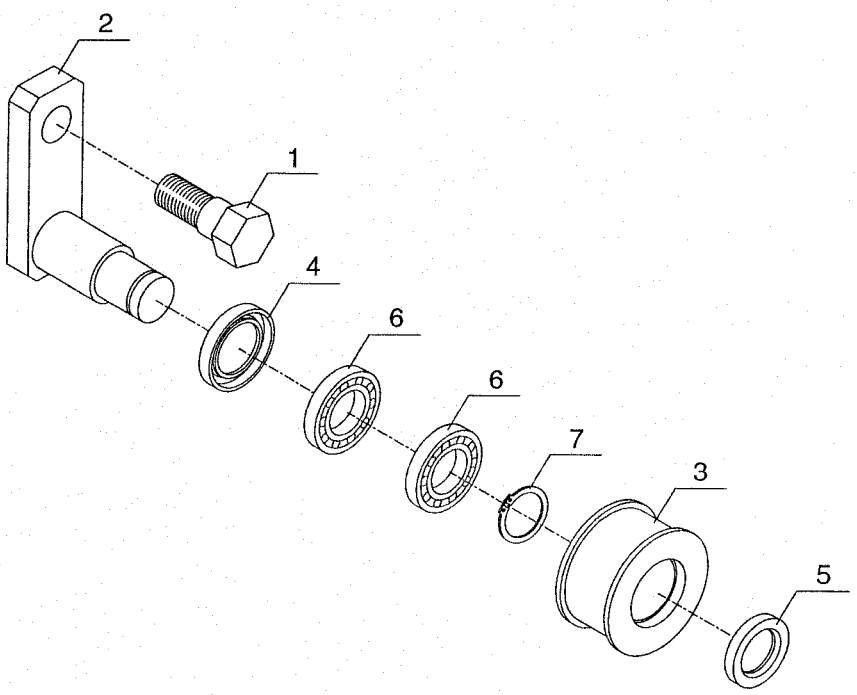
1/1 - 13020361

Tenditore **1/1 13020363**

Idler - Tendeur

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020206	1	Vite per tendicatena	Screw	Vis
2	12020362	1	Leva	Lever	Levier
3	12020364	1	Rotella	Wheel	Roue
4	17000741	1	Corteco	Corteco seal	Corteco
5	17000742	1	Corteco	Corteco seal	Corteco
6	17000743	2	Cuscinetto	Bearing	Roulement
7	326019015	1	Seeger	Seeger	Seeger

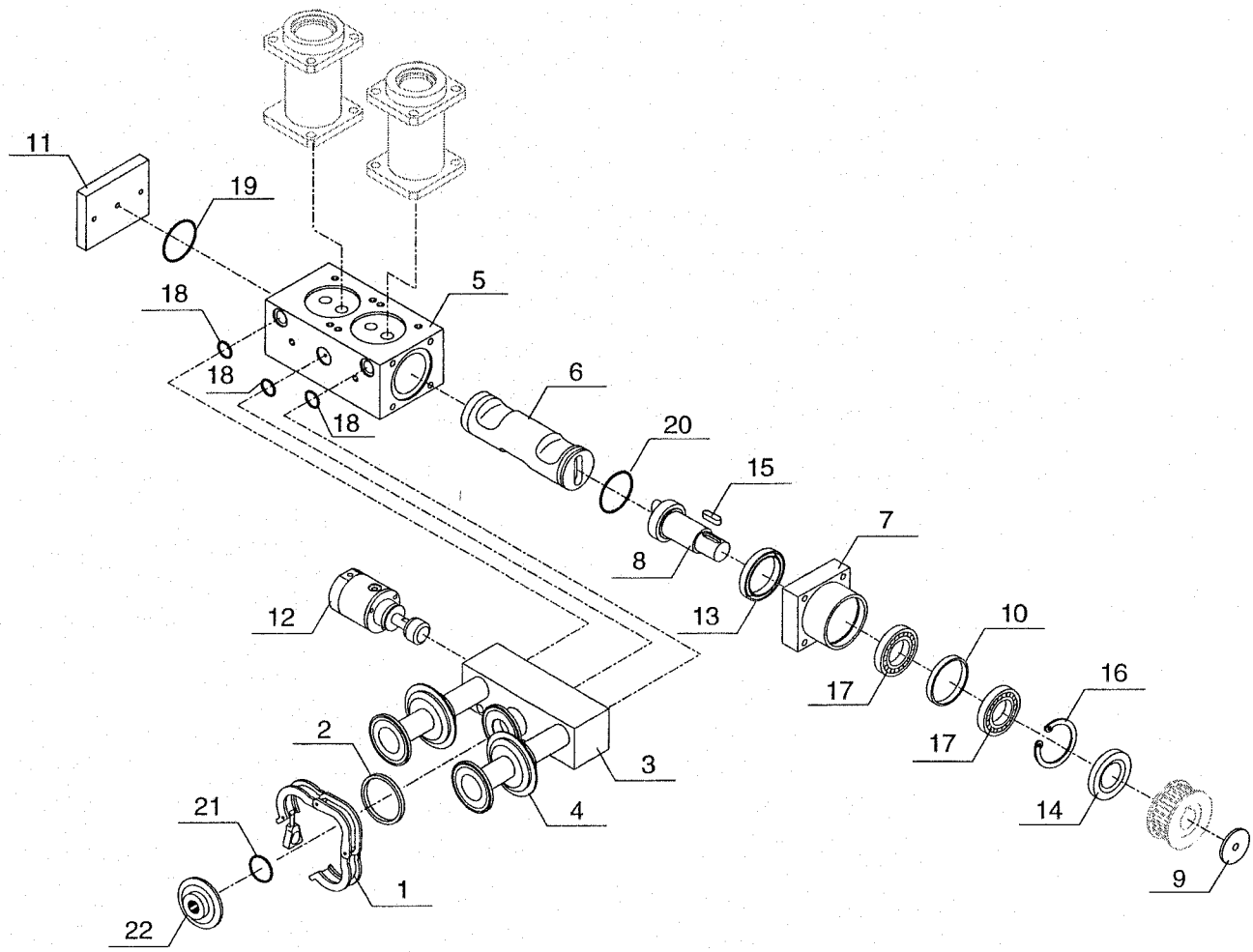


1/1 - 13020363

Distributore 1/1 13020362

Distributors - Distributeurs

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	016060218	1	Clamp	Clamp	Clamp
2	018020581	1	Guarnizione clamp 1"	Seal	Joint
3	12020238	1	Blocchetto	Block	Bloc
4	12020240	1	Chiusura	Closing system	Fermeture
5	12020358	1	Corpo	Body	Corps
6	12020359	1	Distributore	Distributor	Distributeur
7	12020360	1	Flangia	Flange	Bride
8	12020361	1	Albero	Shaft	Arbre
9	12020365	2	Rondella	Washer	Rondelle
10	12020366	1	Distanziale	Spacer	Entretoise
11	12020378	1	Piatto	Plate	Plateau
12	13020105	1	Cilindro By-pass	By-pass cylinder	Cylindre By-pass
13	17000735	1	Anello	Ring	Anneau
14	17000736	1	Anello	Ring	Anneau
15	326013075	1	Chiavetta	Key	Clavette
16	326019147	1	Anello elastico	Seeger	Anneau élastique
17	336001443	2	Cuscinetto	Bearing	Roulement
18	336067045	3	Guarnizione	O-ring	Joint
19	336067088	1	Guarnizione	O-ring	Joint
20	336067092	1	Guarnizione	O-ring	Joint
21	336067532	1	Guarnizione	O-ring	Joint
22	GM50E54001	1	Valvola di non ritorno	Check valve	Soupape de tenue

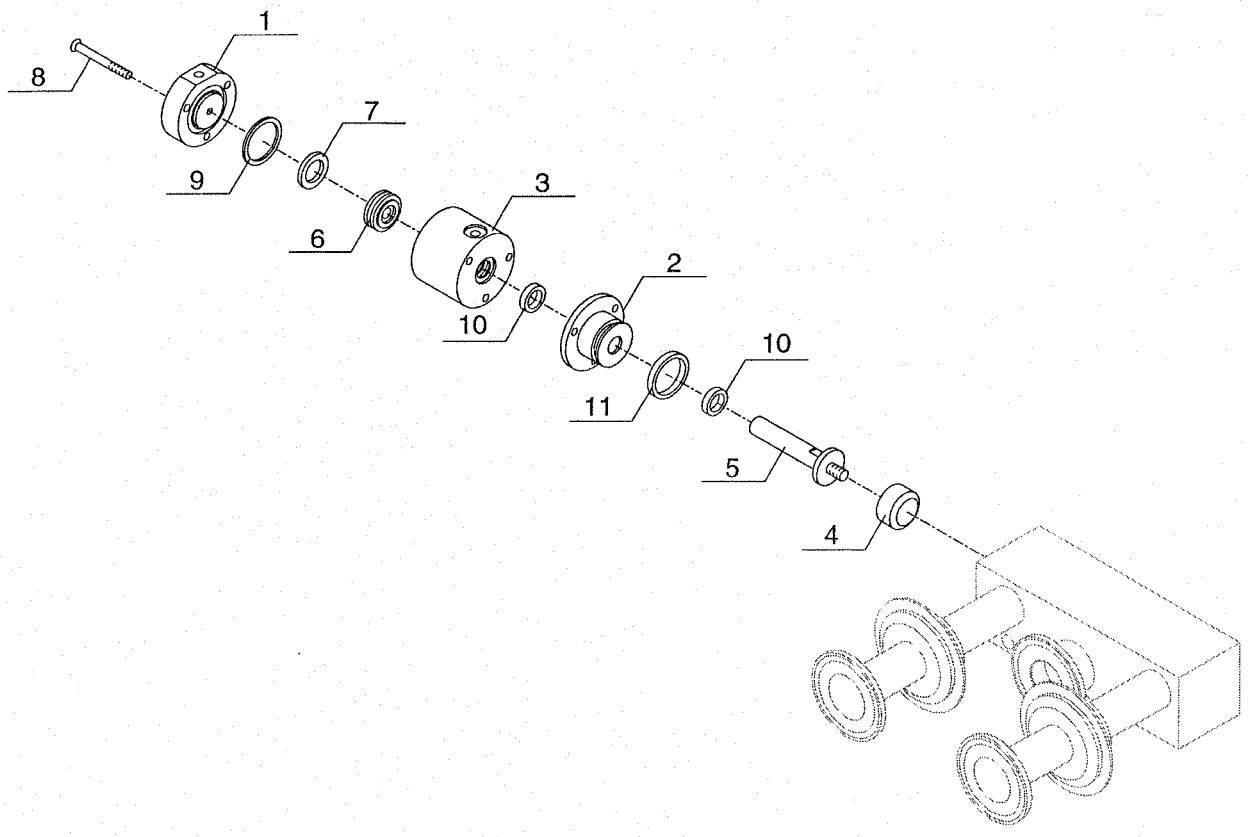


1/1 - 13020362

Cilindro By-pass **1/1 13020105**

By-pass cylinder - Cylindre By-pass

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020202	1	Testata posteriore cilindro	Rear cylinder head	Culasse arrière cylindre
2	12020203	1	Testata anteriore cilindro	Front cylinder head	Culasse avant cylindre
3	12020204	1	Cilindro pompa	Pump cylinder	Cylindre
4	12020242	1	Tampone di chiusura	Buffer	Tampon
5	12020243	1	Stelo cilindro	Cylinder stem	Tige cylindrique
6	12020244	1	Pistone	Piston	Piston
7	17020064	1	Guarnizione OR	Seal	Joint torique OR
8	326002236	3	Vite	Screw	Vis
9	336067020	1	Guarnizione	O-ring	Joint
10	336067030	2	Guarnizione OR	Seal	Joint torique OR
11	336067042	1	Guarnizione	O-ring	Joint

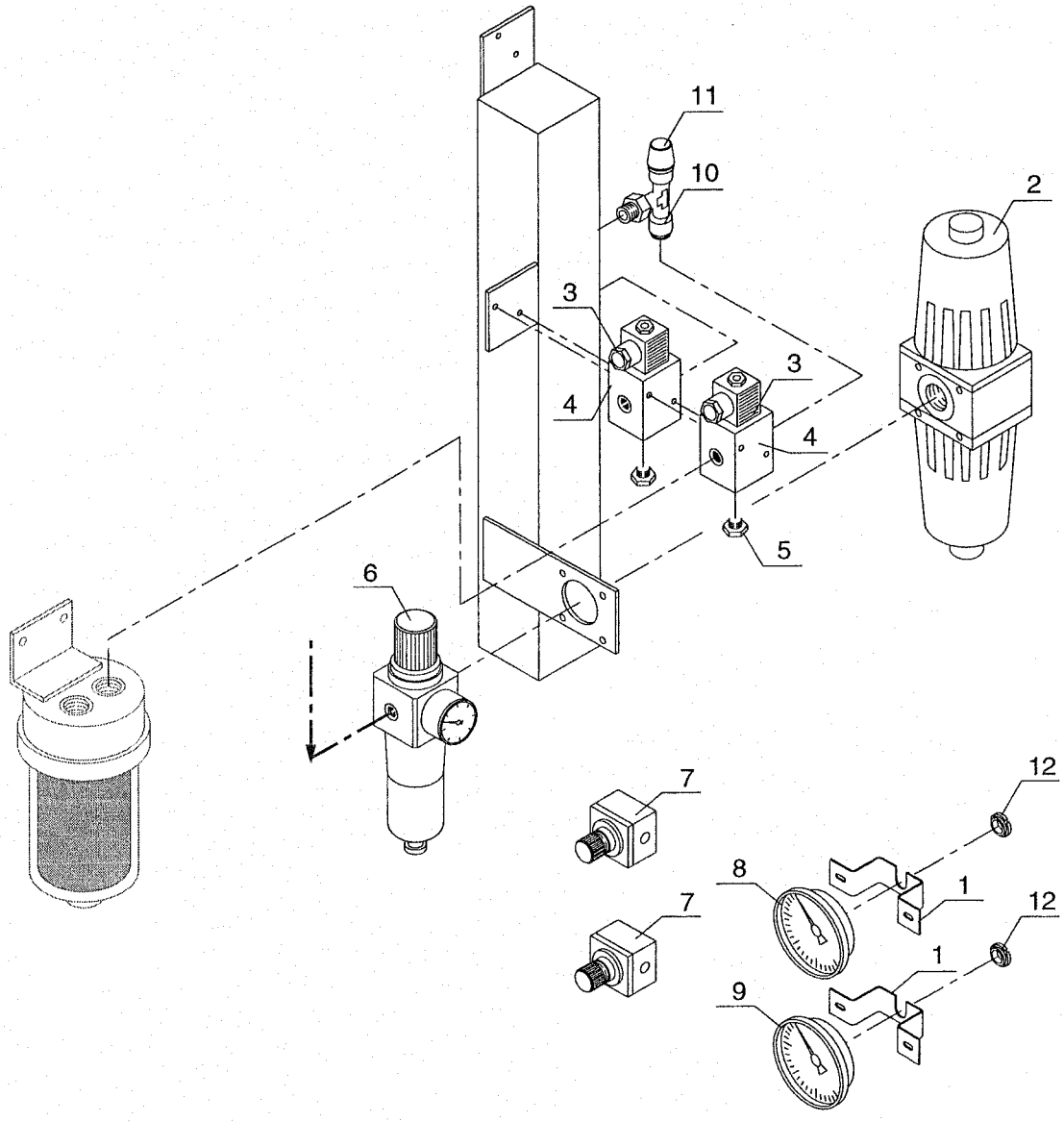


1/1 - 13020105

Impianto pneumatico 1/1 13020379

Pneumatic plant - Installation pneumatique

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	015975052	2	Squadretta	Bracket	Equerre
2	333012022	2	Filtro alta efficienza	High-performance filter	Filtre
3	17000092	2	Connettore	Connector	Connecteur
4	17000087	2	Valvola	Valve	Vanne
5	17020095	2	Tappo	Cap	Bouchon
6	17000168	1	Riduttore	Reduction gear	Réducteur
7	17000729	1	Regolatore	Regulator	Régulateur
8	015975050	1	Manometro	Manometer	Manomètre
9	015975051	1	Manometro	Manometer	Manomètre
10	170000207		Pressostato	Pressure switch	Pressostat
11	17000208	2	Cappuccio	Cover	Couvercle
12	17000234	2	Ghiera	Ring nut	Bague

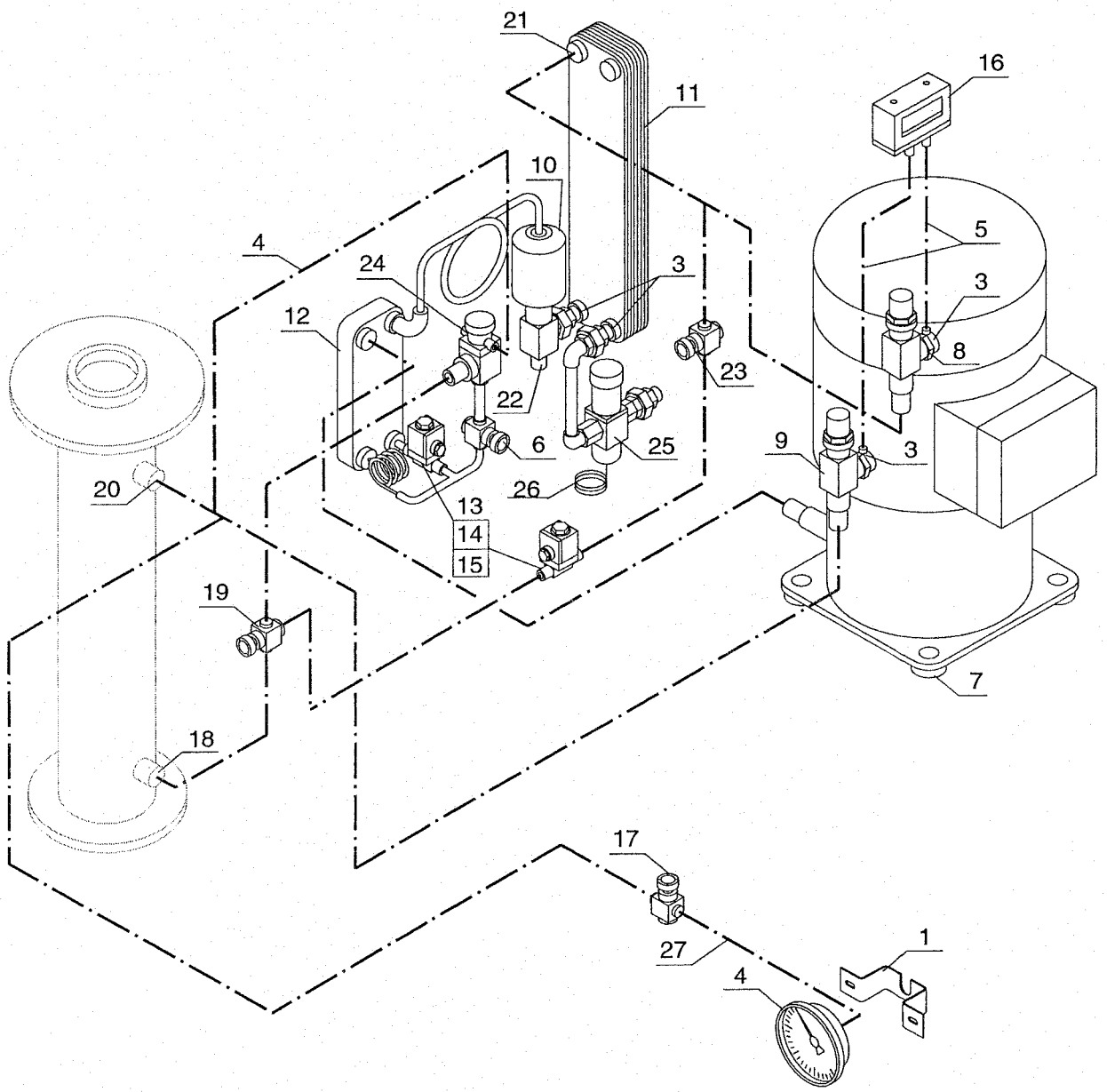


1/1 - 13020379

Impianto frigorifero **1/1 13020185**

Refrigerator plant - Installation frigorifique

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	15075480	1	Staffa	Bracket	Etrier
2	15075387	1	Manovuotometro	Vacuum pressure gauge	Bouton de press.
3	17000364	5	Guarnizione	O-ring	Joint
4	17055101	2	Tubo	Hose	Tube
5	17055100	4	Tubo	Hose	Tube
6	15070074	1	Indicatore di umidità	Humidity indicator	Indicateur d'humidité
7	17020060	4	Ammortizzatore	Shock absorber	Amortisseur
8	17020062	1	Rubinetto	Cock	Robinet
9	17020062	1	Rubinetto	Cock	Robinet
10	17020094	1	Filtro	Filter	Filtre
11	17020035	1	Condensatore	Condenser	Condensateur
12	17020004	1	Economizzatore	Economiser	Economiseur
13	17995005	1	Corpo valvola solenoide	Solenoid valve body	Corps vanne
14	17995004	2	Bobina	Coil	Bobine
15	17995043	2	Connettore	Connector	Connecteur
16	17055056	1	Pressostato	Pressure switch	Pressostat
17	16010860	1	Rubinetto	Cock	Robinet
18	15935066	1	Raccordo	Union	Raccord
19	16050609	1	Miscelatore	Mixer	Mélangeur
20	15935064	1	Raccordo	Union	Raccord
21	15935064	2	Raccordo	Union	Raccord
22	16010474	1	Rubinetto	Cock	Robinet
23	16910002	1	Rubinetto	Cock	Robinet
24	17020049	2	Elemento termostatico	Thermostat element	Elément thermostatique
25	15085233	1	Valvola	Valve	Vanne
27	17055100	1	Tubo	Hose	Tube
	17020045	1	Corpo valvola	Body valve	Corps vanne
	17020048	1	Gruppo orificio	Orifice unit	Groupe orifice
	17020046	1	Gruppo orificio	Orifice unit	Groupe orifice
	17020086	1	Corpo valvola	Body valve	Corps vanne

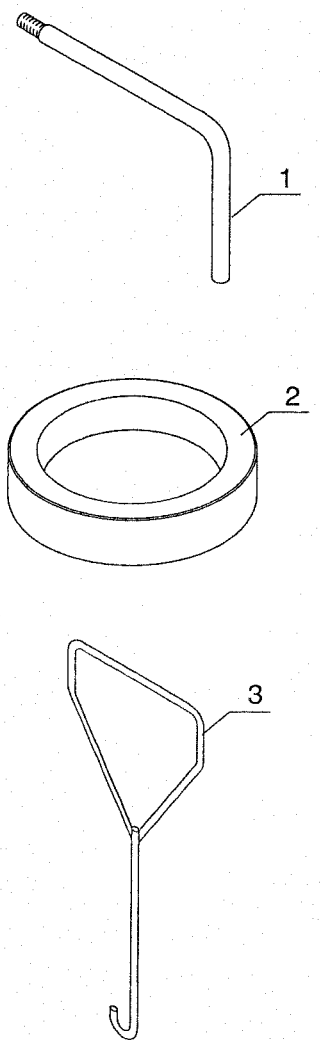


1/1 - 13020185

Dotazione standard **1/1 13020617**

Standard equipment - Dotation standard

POS.	COD.	Q.TA'	DESCRIZIONE	DESCRIPTION	DESCRIPTION
1	12020172	1	Attrezzo estrazione rotore	Rotor removal tool	Equipement extraction rotor
2	12020106	1	Ghiera invito albero	Shaft raiser ring nut	Bague invitation arbre
3	12020124	1	Attrezzo estrazione albero	Shaft removal tool	Equipement extraction arbre



1/1 - 13020617

F 53-T Multifunctional digital device.

(Revolution counter + thermostat, Ammeter + hot gas regulator, Pressure gauge)

Configurable in the following modes:

- ***CG:*** *Revolution counter – impulse/minute counter – litre/hour counter – input temperature thermostat.*
- ***GM:*** *Ammeter with 2 programmable thresholds (gas and comp), hot gas control, defrosting.*
- ***BAR:*** *Pressure gauge with 2 programmable thresholds.*

General features

Display	: 3 green displays, 1 red LED, 1 green LED.
Outputs	: 2 24 V AC 4 A UNPROTECTED with static relays for hot gas and compressor enabling
Proximity sensor input (Px)	: for NPN proximity sensor, supplied at 15 DC
Pressure input (Pr)	: for 16 bar fs 4 – 20 mA self-powered sensor
Amp. input	: for current transformer with 500 turns
Temperature input	: for Pt 100 (2 wires)
Power supply	: 16 – 28 V AC (19 – 40 V DC) – max. 0.5 A
Dimensions	: 49 x 48 x 140 mm
Degree of protection	: IP 65 (frontal)

CG: Revolution counter

- Operates on the principle of measuring mean period and subsequently converting it to frequency using the selected ratio.
- Display updated every second.
- Minimum sampling time (period accumulation) 1 second.
- Digitally set temperature threshold protects pump.
- When temperature threshold is exceeded, the "comp" outlet opens and the "gas" outlet closes.
- Green LED indicates "comp" outlet on (= temperature < 68°C)
- Red LED for proximity sensor signal monitor

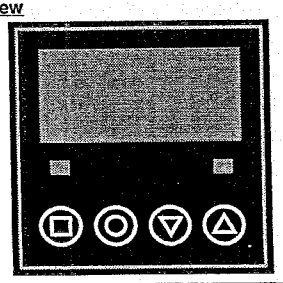
GM: Ammeter

- Indicates absorption from 1.0 to 50.0 A with a resolution of 0.2 A.
- Digitally set threshold triggers intervention of hot gas at 2.0 to 50.0 A.
- Digitally set threshold turns off compressor at 2.0 to 50.0 A.
- Hot gas is turned on and the compressor stopped when the thresholds are exceeded.
- Timing from 0% to 100% for hot gas solenoid valve, with 6 second period and control by external potentiometer.
- Automatic activation of hot gas with defrosting function when appliance is switched on and whenever the dasher stops; the function can be timed to run from 5 to 30 seconds.
- 3 second delay in restarting the compressor when it is stopped due to over-absorption.
- Green LED: compressor-enabling monitor.
- Red LED: hot gas-enabling monitor.
- Blinking display: indicates that the threshold for turning on hot gas has been exceeded.

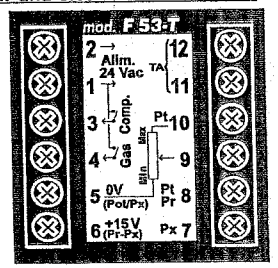
BAR: Pressure gauge

- Displays cylinder outlet pressure between 0 and 16 bar, resolution 0.1 bar.
- 2 digitally set alarm thresholds.
- "Gas" outlet turned on when first threshold is exceeded.
- "Comp" outlet is turned off when second threshold is exceeded.
- Green LED: "comp" outlet monitor.
- Red LED: "gas" outlet monitor.
- Flashing display: at least one threshold has been exceeded.

Front view



Rear view and electrical connections



Programming

- To access the programming mode, keep the ☐ button pressed until the message ***PrG*** appears (10 seconds – or 2 seconds if the button is held down before the power to the device is switched on).
- Release the ☐ button.
- To select a function, press ☐ and release, then press Δ or ∇.
- Hold down O to display parameter name.
- Release O to display parameter value.
- To select a parameter, hold down O and press Δ or ∇.
- To set the selected parameter, release O and press Δ or ∇.

IMPORTANT: **When finished programming, press ☐ and O at the same time to store data in memory and return to operating mode.**

Functions and parameters

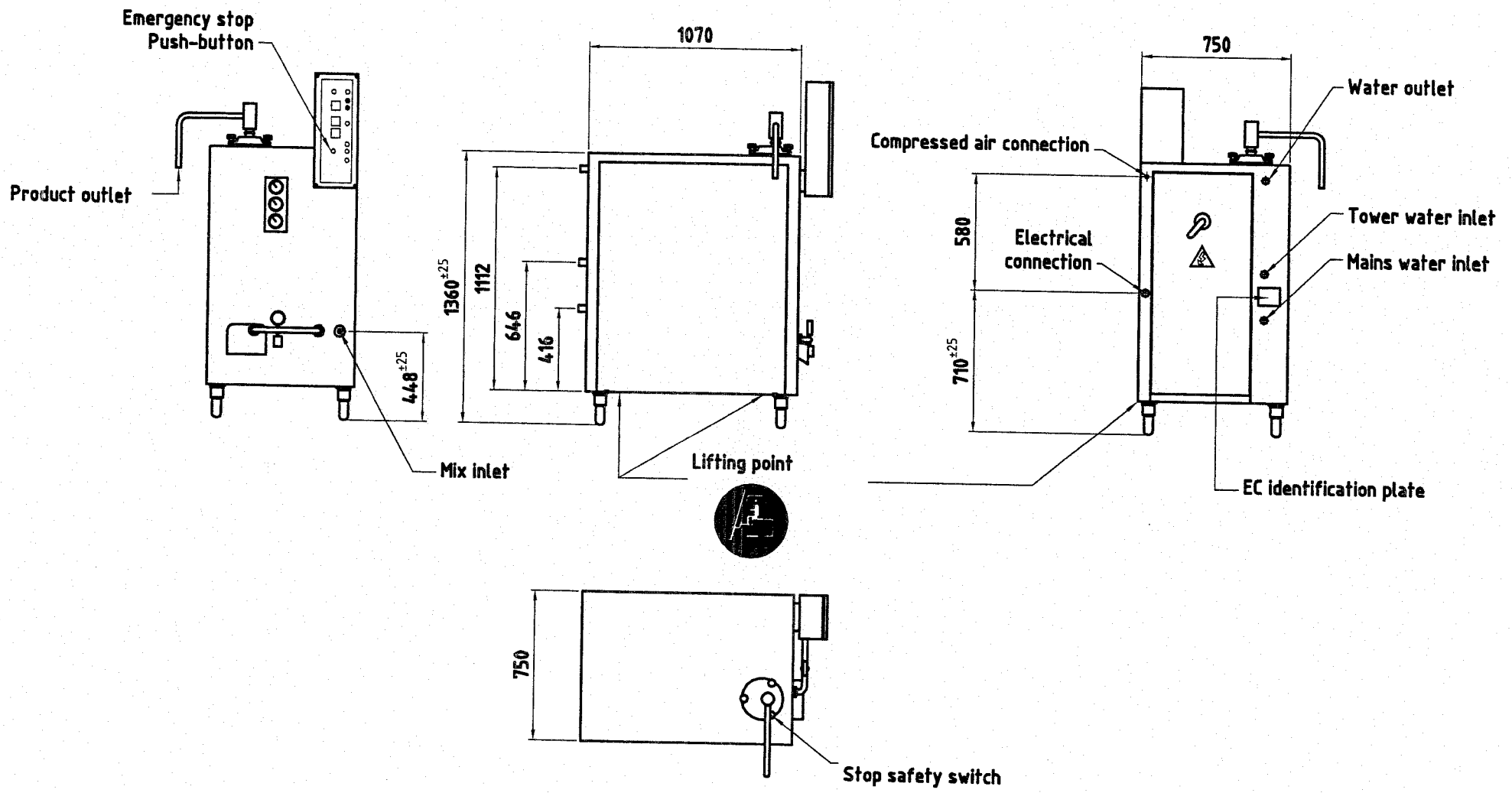
Function	Parameter	Values	Description
CG	***cnt.***	1...5	1 = ratio 1:1 (CG1); 2 = ratio 1:10.33 (CG10); 3 = ratio 1:15 (CG15); 4 = l/h (1 imp. = 0.0282 l); 5 = l/h (1 imp. = 0.0577 l)
	°C	50...90	Threshold for turning off refrigerator compressor.
GM	***GAS***	2.0...50.0	Threshold for turning on hot gas (amperes).
	CMP	2.0...50.0	Threshold for turning off refrigerator compressor.
	dEF	5...30	Duration of defrosting (seconds).
	A		Calibration of ammeter **(must first be enabled)**
bAr	***oFS***		Calibration and resetting of pressure sensor.
	SPn		Calibration of pressure sensor gain.
	Pr1		Threshold 1 – enables "gas" outlet.
	Pr2		Threshold 2 – disables "compressor" outlet.
ISt	***Pot***		Reads potentiometer input (0 – 30) for diagnostic purposes.
	°C		Reads temperature input for diagnostic purposes.

Press Δ or ∇ for more than 1 second to go from slow to rapid repetition.
Press Δ and ∇ together for more than 1 second to set the default value.

Connect terminals 5 and 7 with a jumper to permit control of ammeter readings.
If settings are stored in memory when the device is in ***ISt*** mode, it will return to programming mode again.

Further information

Hi	:	Reading exceeds permitted limit (for instance, short circuit in pressure sensor).
Lo	:	Reading falls below permitted minimum limit (for instance, no pressure to sensor).



Scala 1:20	Tetra Pak Hoyer S.p.A.	CLIENTE
Data 03.11.03	Denominazione	ORDINE
Visto	FRIGUS 600	Disegno N. 12803260
Disegnato	PROPRIETA' RISERVATA—Il presente disegno di proprieta' HOYER S.p.a. non dovra' essere comunicato a terzi ne	FOGLIO N.— 1

FRIGUS 600
400V 50Hz

Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: INTESTAZIONE / COVER	Id/rev.: 13020381	Dev.Func.: =COV
Date: 18/03/03 — Sign.: MASTER		Location:	Global sheet: 1 — Function sheet: 1

Print date : @plotdate

Tetra Pak Hoyer	Project FRIGUS 600 SIEMENS		Title LISTA FOGLI / INDEX	Id/rev. 13020381	Dev.Func. =IND
	Date 18/03/03	Sign. MASTER		Location	Global sheet: 3 Function sheet: 2

Print date : @plotdate

Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: LISTA FOGLI / INDEX	Id/rev.: 13020381	Dev.Func.: =IND
Date: 18/03/03	Sign.: MASTER	Location:	Global sheet: 4 / Function sheet: 3

Print date : @plotdate

SIGLA	CODICE CATALOGO	CODICE INTERNO	COSTRUTTORE	DESCRIZIONE	FOGLIO
=CPSR/1M4				Motore asincrono trifase	=CPSR/1
=CPSR/1QF4	3RV10 31-4FA10		SIEMENS	Int. aut. magnetotermico tripolare	=CPSR/1
=CPSR/2KA7	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=CPSR/2
=CPSR/2KA8	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=CPSR/2
=CPSR/2KM3	3RT10 26-1AB00	17001599	SIEMENS	CONT. S0 24VAC 11KW	=CPSR/2
=CPSR/2S7				Comandato dalla pressione (pressostato) NO	=CPSR/2
=CPSR/2SA4	3SB34 00-0B	17001301	SIEMENS	ELEMENTO 1 CONTATTO NO	=CPSR/2
=CPSR/2SA4	3SB34 00-1A	17001300	SIEMENS	PORTALAMPADA BA9S PER PULSANTI LUMINOSI	=CPSR/2
=CPSR/2SA4	3SB35 01-2EA41	17001595	SIEMENS	SELETTORE LUMINOSO VERDE AD IMPULSO (I-O-I) COMPLETO DI SUPPORTO PER 3 ELEMENTI	=CPSR/2
=CPSR/2SA4	3SB39 01-0AB	17001347	SIEMENS	SUPPORTO PER PULSANTI PER 3 ELEMENTI DI CONTATTO.	=CPSR/2
=CPSR/2SA4	3SB39 01-1QA	17001531	SIEMENS	LAMPADA LED BIANCA ATTACCO BA 9s 24V.	=CPSR/2
=CPSR/2YV6				Elettrovalvola aperta (in chiusura)	=CPSR/2
=DSER/1M2				Motore asincrono trifase	=DSER/1
=DSER/1QF2	3RV10 21-4AA10	17001594	SIEMENS	INT.AUT.MAGNETOT.3x16A S0 11-16A	=DSER/1
=DSER/1TA2	1/500			Trasformatore di corrente	=DSER/1
=DSER/2KM2	3RH19 11-1FA22	17001151	SIEMENS	BLOC.CONT.AUX.2L 2R S00	=DSER/2
=DSER/2KM2	3RT10 17-1AB01	17001595	SIEMENS	CONT.S00 5.5KW 1L 24VAC	=DSER/2
=DSER/2SA2	3SB34 00-0B	17001301	SIEMENS	ELEMENTO 1 CONTATTO NO	=DSER/2
=DSER/2SA2	3SB34 00-0C	17001302	SIEMENS	ELEMENTO 1 CONTATTO NC	=DSER/2
=DSER/2SA2	3SB34 00-1A	17001300	SIEMENS	PORTALAMPADA BA9S PER PULSANTI LUMINOSI	=DSER/2
=DSER/2SA2	3SB35 01-2EA41	17001595	SIEMENS	SELETTORE LUMINOSO VERDE AD IMPULSO (I-O-I) COMPLETO DI SUPPORTO PER 3 ELEMENTI	=DSER/2
=DSER/2SA2	3SB39 01-1QA	17001531	SIEMENS	LAMPADA LED BIANCA ATTACCO BA 9s 24V.	=DSER/2
=ELPR/1A1	INT69 SCY	17001593	COPELAND	PROTEZIONE ELETTRICA MOTORE 220Vac	=ELPR/1
=ELPR/1KA7	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=ELPR/1
=ELPR/1KA8	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=ELPR/1
=ELPR/1RV2				Resistore variabile	=ELPR/1
=EST/1A2	3TK2823	17001596	SIEMENS	MODULO DI SICUREZZA	=EST/1
=EST/1KA3	3RH11 22-1AB00	17001154	SIEMENS	CONT.AUX.S00 - 2L+2R - 24V 50/60Hz	=EST/1
=EST/1SB7	3SB34 00-0C	17001302	SIEMENS	ELEMENTO 1 CONTATTO NC	=EST/1
=EST/1SB7	3SB35 00-1HA20	17001245	SIEMENS	PULANTE FUNGO EM.SBL.ROT.	=EST/1
=EST/1SB7	3SB39 01-0AB	17001347	SIEMENS	SUPPORTO PER PULSANTI PER 3 ELEMENTI DI CONTATTO.	=EST/1
=EST/2HL1				Segnalazione luminosa	=EST/2

Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS

Date: 18/03/03 | Sign.: MASTER

Title: LISTA MATERIALI / *PART LIST*

Id/rev.: 13020381

Location:

Dev.Func.: =BOM

Global sheet: 5 | Function sheet: 1

Print date : @plotdate

SIGLA	CODICE CATALOGO	CODICE INTERNO	COSTRUTTORE	DESCRIZIONE	FOGLIO
=EST/2HL5				Segnalazione luminosa	=EST/2
=EST/2KA9	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=EST/2
=EST/2S1				Fine corsa NO	=EST/2
=FAN/1EV4				Ventilatore monofase	=FAN/1
=HOGA/1A3	F53-T		BARNABE	Sturumento elettronico.	=MXPM/3
=HOGA/1RV4				Resistore con contatto mobile	=HOGA/1
=HOGA/1YV7				Elettrovalvola aperta (in chiusura)	=HOGA/1
=MAIR/1KA1	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MAIR/1
=MAIR/1KA2	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MAIR/1
=MAIR/1KA4	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MAIR/1
=MAIR/1KA5	3RH11 22-1AB00	17001154	SIEMENS	CONT.AUX.S00 - 2L+2R - 24V 50/60Hz	=MAIR/1
=MAIR/1KA5	3RH19 11-1FA22	17001151	SIEMENS	BLOC.CONT.AUX.2L 2R S00	=MAIR/1
=MAIR/1KA8	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MAIR/1
=MAIR/1KA9	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MAIR/1
=MAIR/1KT6				Rele' ritardato all'eccitazione	=MAIR/1
=MAIR/1S1				Comandato dalla pressione (pressostato) NO	=MAIR/1
=MAIR/1SA3	3SB34 00-0B	17001301	SIEMENS	ELEMENTO 1 CONTATTO NO	=MAIR/1
=MAIR/1SA3	3SB34 00-1A	17001300	SIEMENS	PORTALAMPADA BA9S PER PULSANTI LUMINOSI	=MAIR/1
=MAIR/1SA3	3SB35 01-0AA41	17001298	SIEMENS	PULSANTE LUMINOSO METALLO VERDE 22 CON SUPPORTO PER 3 ELEMENTI	=MAIR/1
=MAIR/1SA3	3SB39 01-1QA	17001531	SIEMENS	LAMPADA LED BIANCA ATTACCO BA 9s 24V.	=MAIR/1
=MAIR/1SA5				Selettore 2 posizioni con lampada di segnalazione incorporata NO	=MAIR/1
=MAIR/1YV3				Elettrovalvola aperta (in chiusura)	=MAIR/1
=MAIR/1YV7				Elettrovalvola aperta (in chiusura)	=MAIR/1
=MXPM/1M1				Motore asincrono trifase	=MXPM/1
=MXPM/1QF1	3RV10 21-1BA10	17001597	SIEMENS	INT.AUT.MAGNETOT. 2A S0 1.4/2A	=MXPM/1
=MXPM/1RP4				Potenziometro	=MXPM/1
=MXPM/2KM4	3RH19 11-1FA22	17001151	SIEMENS	BLOC.CONT.AUX.2L 2R S00	=MXPM/2
=MXPM/2KM4	3RT10 15-1AB01	17001598	SIEMENS	CONT.S00 3KW 24Vac 3P+1L	=MXPM/2
=MXPM/2SA3	3SB34 00-0B	17001301	SIEMENS	ELEMENTO 1 CONTATTO NO	=MXPM/2
=MXPM/2SA3	3SB34 00-0C	17001302	SIEMENS	ELEMENTO 1 CONTATTO NC	=MXPM/2
=MXPM/2SA3	3SB34 00-1A	17001300	SIEMENS	PORTALAMPADA BA9S PER PULSANTI LUMINOSI	=MXPM/2
=MXPM/2SA3	3SB39 01-0AB	17001347	SIEMENS	SUPPORTO PER PULSANTI PER 3 ELEMENTI DI CONTATTO.	=MXPM/2

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Project: FRIGUS 600 SIEMENS

Date: 18/03/03 | Sign.: MASTER

Title: LISTA MATERIALI / *PART LIST*

Id/rev.: 13020381

Location:

Dev.Func.: =BOM

Global sheets: 6 | Function sheets: 2

Print date : @plotdate

SIGLA	CODICE CATALOGO	CODICE INTERNO	COSTRUTTORE	DESCRIZIONE	FOGLIO
=MXPM/2SA3	3SB39 01-1QA	17001531	SIEMENS	LAMPADA LED BIANCA ATTACCO BA 9s 24V.	=MXPM/2
=MXPM/3KA1	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MXPM/3
=MXPM/3KA2	3TX70041LB00	17000835	SIEMENS	MORS.INTERF. 1W 1CANALE. 24VAC/DC	=MXPM/3
=MXPM/3RV5				Resistore variabile	=MXPM/3
=MXPM/3SQ6	XS4-P12NA340	017035929	TELEMECANIQUE	PROXIMITY NPN	=MXPM/3
=PSP/1QF7	5SY61 01-7BB	17001172	SIEMENS	INT.AUT.1P C 1A 6KA IP2X	=PSP/1
=PSP/1QF7A	3RV14 21-1EA10	17001592	SIEMENS	INT.AUT MAGNETOT. 3x4A S0 2.8-4A	=PSP/1
=PSP/1QF7B	5SY61 06-7BB	17001157	SIEMENS	INT.AUT.MAGNETOTER. 1P 6A C C60N	=PSP/1
=PSP/1QS0	3LD27 14-0TK53	17001591	SIEMENS	SEZIONATORE 3x100A COMPLETO DI BLOCCO PORTA	=PSP/1
=PSP/1T7				Trasformatore di potenza a tre avvolgimenti	=PSP/1
=PSP/1U3	3UG35 11-1BQ50	17001537	SIEMENS	RELE CONTROLLO FASI 230/380Vac CON 2 CONTATTI DI SCAMBIO.	=PSP/1
X1	WDU 2.5		WEIDMULLER	Morsetto standard 2,5mm per barra Omega	=ELPR/1
X2	WDU 6		WEIDMULLER	Morsetto standard 6mm per barra Omega	=DSER/1
X3	WDU 16		WEIDMULLER	Morsetto standard 16mm per barra Omega	=CPSR/1

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Project FRIGUS 600 SIEMENS

Date 18/03/03 Sign. MASTER

Title LISTA MATERIALI / *PART LIST*

Id/rev. 13020381

Location

Dev.Func. =BOM

Global sheets 7 Function sheets 3

Print date : @plotdate

1 2 3 4 5 6 7 8 9

Tetra Pak Hoyer

Project FRIGUS 600 SIEMENS

Date 18/03/03 | Sign. MASTER

Title RISERVA / *SPARE*

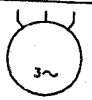
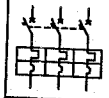
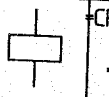
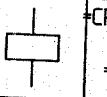
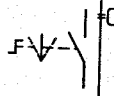
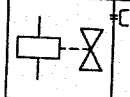
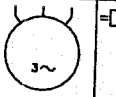
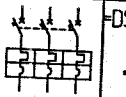
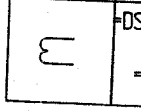
Id/rev. 13020381

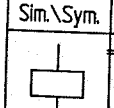
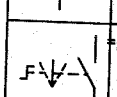
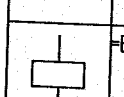
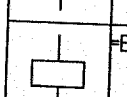
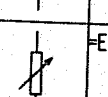
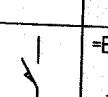
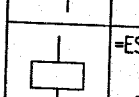
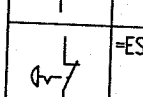
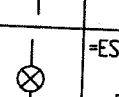
Location

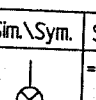
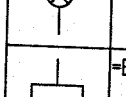
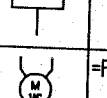
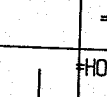
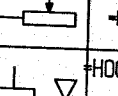
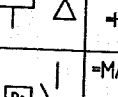
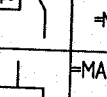
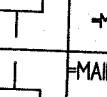
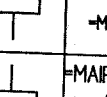
Dev.Func. =BOM

Global sheet: 8 Function sheet: 4

Print date : @plotdate

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=CPSR/1M4 QG =CPSR/1	COMPRESSORE FRIGORIFERO REFRIGERATING COMPRESSOR
	=CPSR/2S7 QG =CPSR/2	
	=CPSR/1QF4 QG =CPSR/1	PROTEZIONE COMPRESSORE COMPRESSOR PROTECTION
	=CPSR/2KA7 QG =CPSR/2	RELE AUSILIARIO AUXILIARY RELAY
	=CPSR/2KA8 QG =CPSR/2	
	=CPSR/2KM3 QG =CPSR/2	MARCIA-ARRESTO COMPRESSORE COMPRESSOR START-STOP
	=CPSR/2SA4 QG =CPSR/2	MARCIA-ARRESTO COMPRESSORE COMPRESSOR START-STOP
	=CPSR/2YV6 QG =CPSR/2	VALVOLA FREON LIQUID FREON VALVE
	=DSER/1M2 QG =DSER/1	ALBERO DASHER
	=DSER/1QF2 QG =DSER/1	PROTEZIONE ALBERO DASHER PROTECTION
	=DSER/1TA2 QG =DSER/1	TRASFORMATORE AMPEROMETRICO AMMETER TRANSFORMER

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=DSER/2KM2 QG =DSER/2	MOTORE ALBERO DASHER DRIVE
	=DSER/2SA2 QG =DSER/2	MARCIA- ARRESTO ALBERO DASHER START-STOP
	=ELPR/1A1 QG =ELPR/1	PROTEZIONE ELETTRONICA MOTORE DRIVE ELECRONIC PROTECTION
	=ELPR/1KA7 QG =ELPR/1	RELE PROTEZIONE PROTECTION RELAY
	=ELPR/1KA8 QG =ELPR/1	RELE PROTEZIONE PROTECTION RELAY
	=ELPR/1RV2 QG =ELPR/1	
	=EST/1A2 QG =EST/1	MODULO DI SICUREZZA SAFETY MODULE
	=EST/2S1 QG =EST/2	
	=EST/1KA3 QG =EST/1	RELE SICUREZZA SAFETY RELAY
	=EST/1SB7 QG =EST/1	PULSANTE EMERGENZA EMERGENCY STOP
	=EST/2HL1 QG =EST/2	PRESENZA TENSIONE POWER ON

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=EST/2HL5 QG =EST/2	ALLARME ALARM
	=EST/2KA9 QG =EST/2	RELE ALLARMI ALARMS RELAY
	=FAN/1EV4 QG =FAN/1	VENTOLA RAFFREDDAMENTO COOLING FAN
	=HOGA/1A3 QG =MXPM/3	AMPEROMETRO GAS CALDO HOT GAS AMMETER
	=HOGA/1A3 QG =HOGA/1	AMPEROMETRO GAS CALDO HOT GAS AMMETER
	=HOGA/1RV4 QG =HOGA/1	
	=HOGA/1YV7 QG =HOGA/1	VALVOLA GAS CALDO HOT GAS VALVE
	=MAIR/1S1 QG =MAIR/1	
	=MAIR/1KA1 QG =MAIR/1	PRESENZA ARIA AIR ON
	=MAIR/1KA2 QG =MAIR/1	PRESENZA ARIA AIR ON
	=MAIR/1KA4 QG =MAIR/1	ARIA C.I.P. C.I.P. AIR

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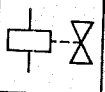
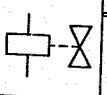
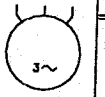
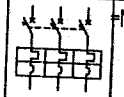
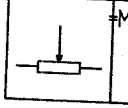
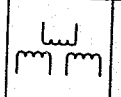
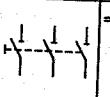
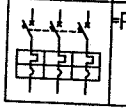
Project	FRIGUS 600 SIEMENS	Title	LEGENDA FUNZIONI *FUNCTION LIST*
Date	18/03/03	Sign.	MASTER
Id/rev.	13020381	Dev.Func.	=FUNL
Location		Global sheet:	9
		Function sheet:	1

Print date : @plotdate

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=MAIR/1KA5 QG =MAIR/1	ARIA PER C.I.P. AIR FOR C.I.P.
	=MAIR/1KA8 QG =MAIR/1	RELE AUSILIARIO AUXILIARY RELAY
	=MAIR/1KA9 QG =MAIR/1	RELE AUSILIARIO AUXILIARY RELAY
	=MAIR/1KT6 QG =MAIR/1	
	=MAIR/1SA3 QG =MAIR/1	INSERIMENTO ARIA OVERRUN
	=MAIR/1SA5 QG =MAIR/1	
	=MAIR/1YV3 QG =MAIR/1	VALVOLA INSERIMENTO ARIA OVERRUN VALVE
	=MAIR/1YV7 QG =MAIR/1	VALVOLA C.I.P. C.I.P. VALVE
	=MXPM/1M1 QG =MXPM/1	POMPA MISCELA MIX PUMP
	=MXPM/1QF1 QG =MXPM/1	PROTEZIONE INVERTER INVERTER PROTECTION
	=MXPM/1RP4 QG =MXPM/1	

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=MXPM/2KM4 QG =MXPM/2	MARCIA-ARRESTO POMPA MISCELA MIX PUMP START-STOP
	=MXPM/2SA3 QG =MXPM/2	MARCIA-ARRESTO POMPA MISCELA START-STOP MIX PUMP
	=MXPM/3KA1 QG =MXPM/3	RELE AUSILIARIO AUXILIARY RELAY
	=MXPM/3KA2 QG =MXPM/3	RELE AUSILIARIO AUXILIARY RELAY
	=MXPM/3RV5 QG =MXPM/3	
	=MXPM/3SQ6 QG =MXPM/3	PORTATA POMPA
	=PSP/1T7 QG =PSP/1	ALIMENTAZIONE AUSILIARI
	=PSP/1U3 QG =PSP/1	RELE CONTROLLO FASI PHASE CONTROL RELAY
	=PSP/1QF7 QG =PSP/1	PROTEZIONE AUSILIARI 220V 220V AUXILIARY PROTECTION
	=PSP/1QS0 QG =PSP/1	SEZIONATORE GENERALE MAIN SWITCH
	=PSP/1QF7A QG =PSP/1	PROTEZIONE TRASFORMATORE TRANSFORMER PROTECTION

Sim.\Sym.	Sigla\Item	Funzione\Use Type
	=PSP/1QF7B QG =PSP/1	PROTEZIONE AUSILIARI 24V 24V AUXILIARY PROTECTION

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Project: FRIGUS 600 SIEMENS	Title: LEGENDA FUNZIONI / *FUNCTION LIST*	Id/rev.: 13020381	Dev.Func.: =FUNL
Date: 18/03/03	Sign.: MASTER	Location:	Global sheet: 10 Function sheet: 2

Print date : @plotdate

1 2 3 4 5 6 7 8 9

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Project FRIGUS 600 SIEMENS		Title RISERVA / SPARE	Id/rev. 13020381	Dev.Func. =FUNL	
Date 18/03/03	Sign. MASTER		Location	Global sheet: 11	Function sheet: 3

Print date : @plotdate

1 2 3 4 5 6 7 8 9

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Project FRIGUS 600 SIEMENS

Date 18/03/03 | Sign. MASTER

Title RISERVA / *SPARE*

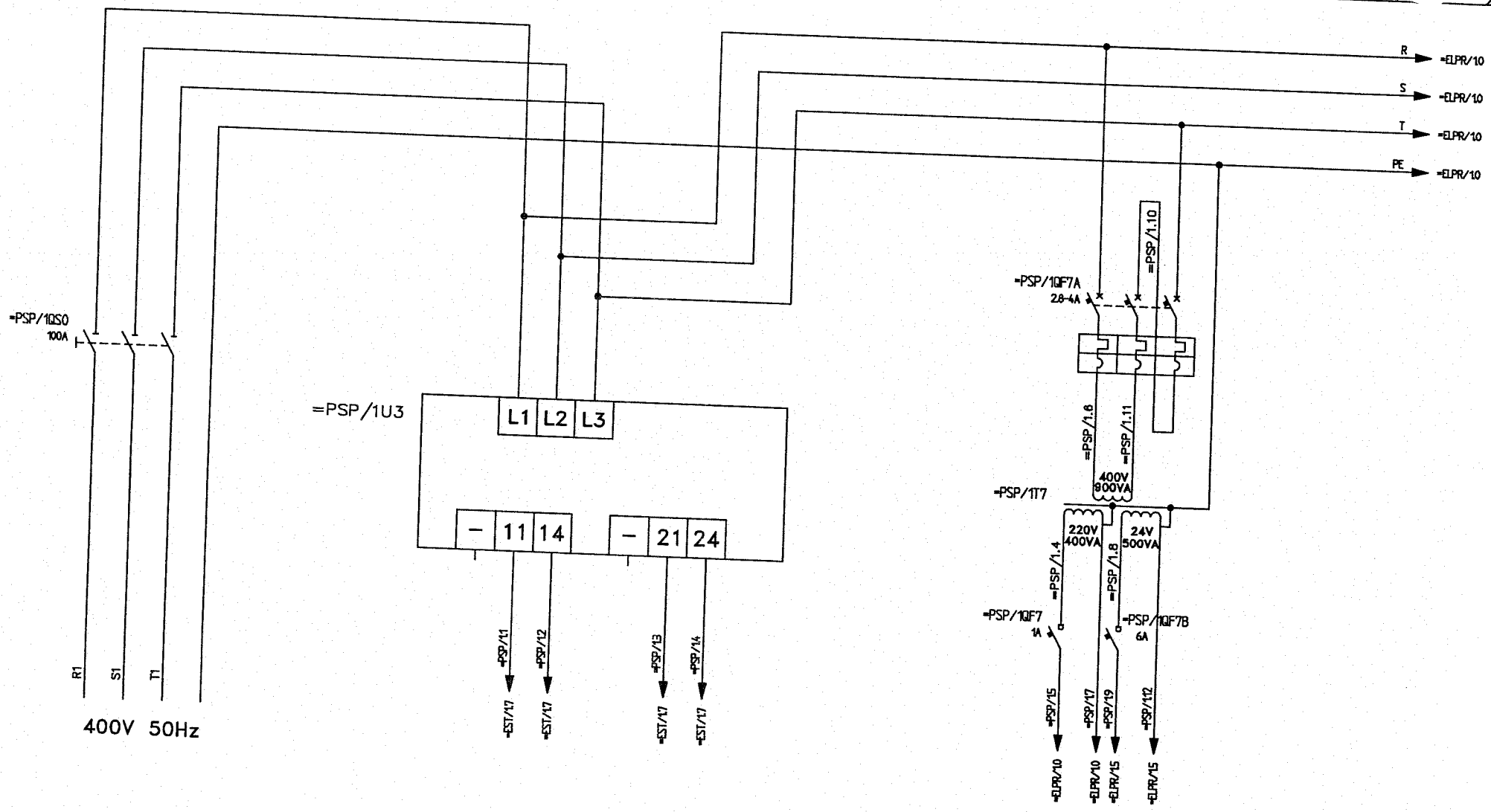
Id/rev. 13020381

Location

Dev.Func. =FUNL

Global sheet: 12 | Function sheet: 4

Print date : @plotdate



Tetra Pak Hoyer

Print date : @plotdate

Project FRIGUS 600 SIEMENS	Title ALIMENTAZIONE GENERALE / POWER SUPPLY	Id/rev. 13020381	Dev.Func. =PSP
Date 18/03/03 Sign. MASTER		Location	Global sheet: 13 Function sheet: 1

1 2 3 4 5 6 7 8 9

Tetra Pak Hoyer

Project FRIGUS 600 SIEMENS

Date 18/03/03 | Sign. MASTER

Title RISERVA / SPARE

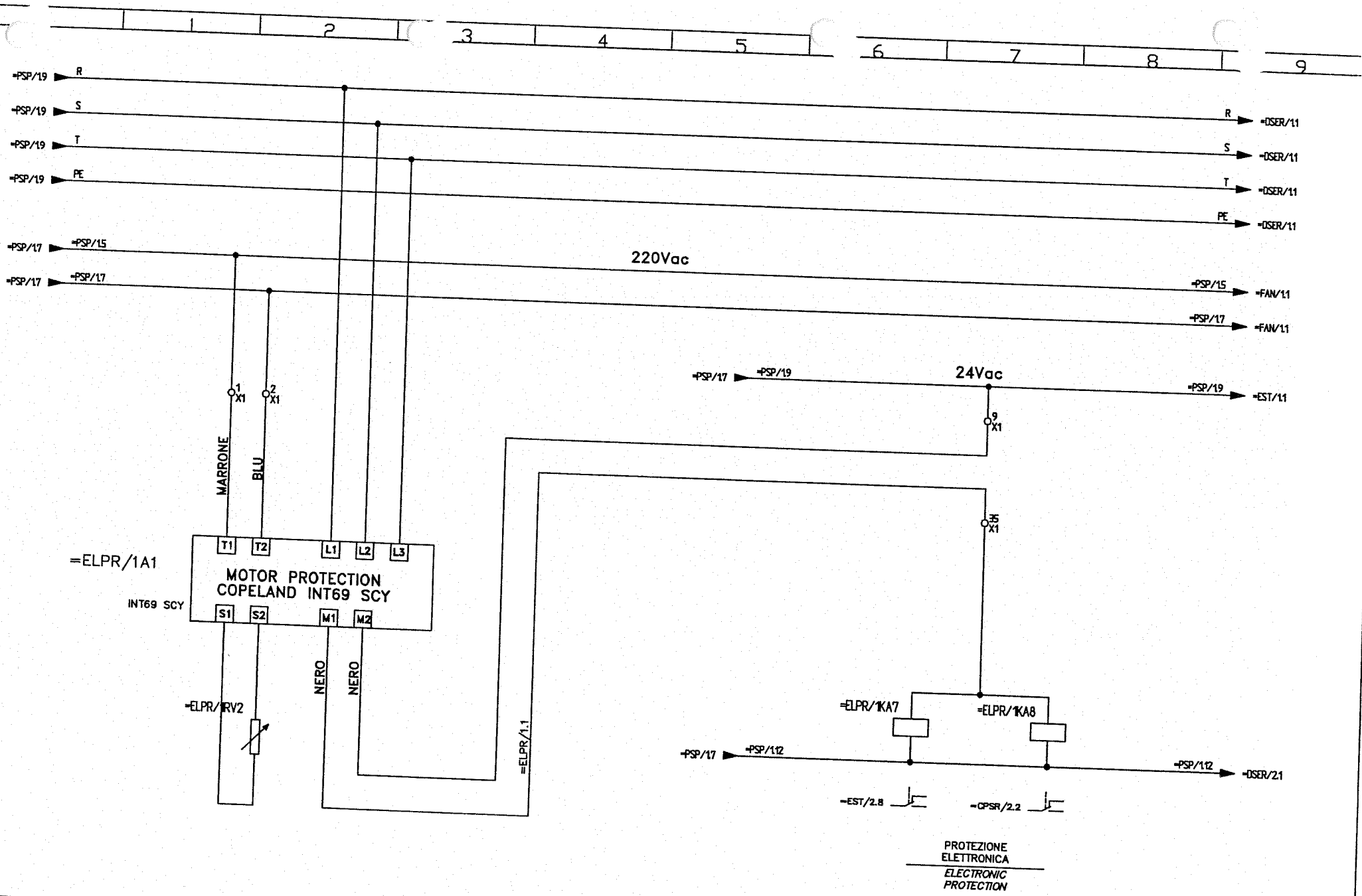
Id/rev. 13020381

Location

Dev.Func. =PSP

Global sheet: 14 Function sheet: 2

Print date : @plotdate



Tetra Pak Hoyer

Project FRIGUS 600 SIEMENS	Title PROTEZIONE ELETTRONICA / ELECTRONIC PROTECTION	Id/rev. 13020381	Dev.Func. =ELPR
Date 18/03/03 Sign. MASTER		Location	Global sheets 15 Function sheets 1

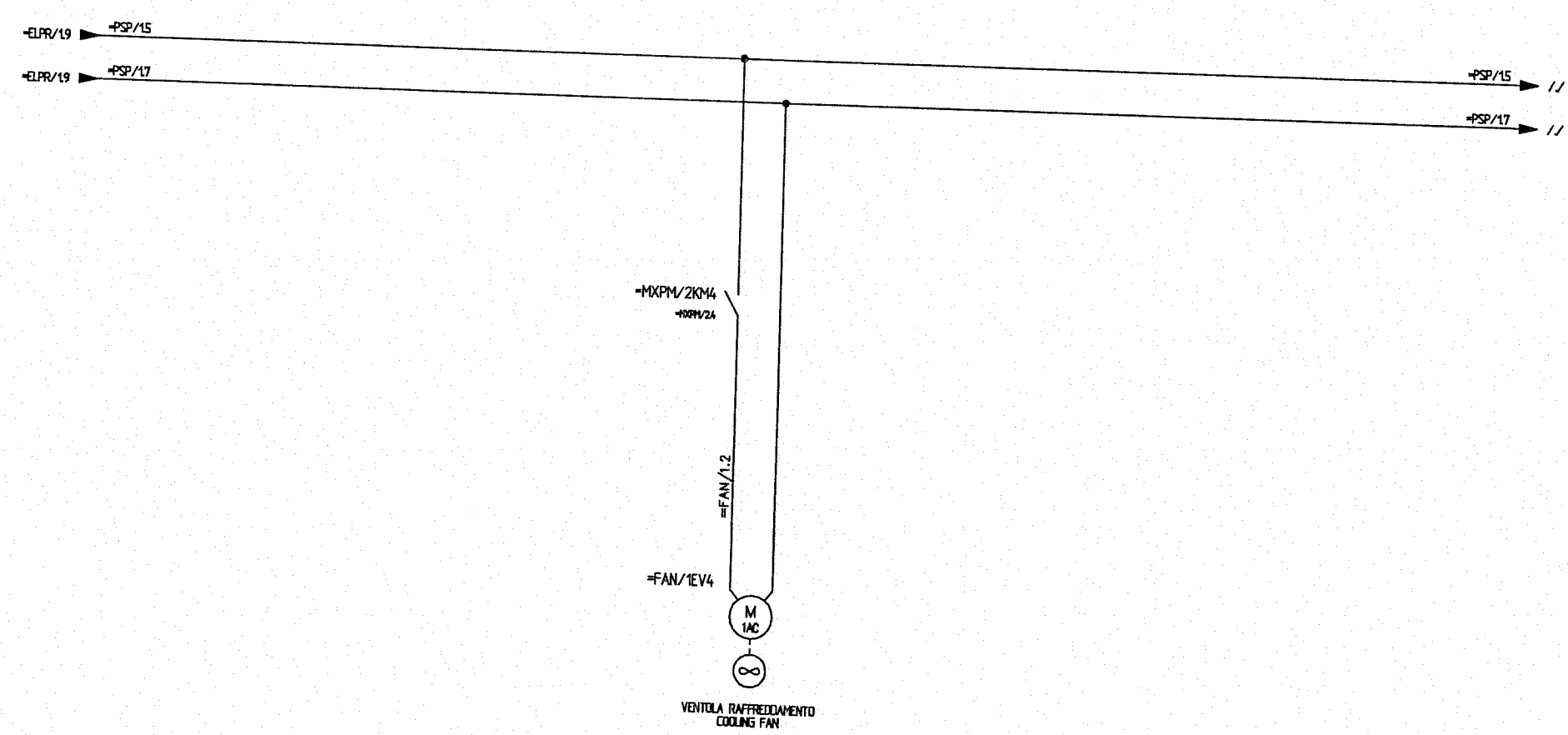
Print date : @plotdate

1 2 3 4 5 6 7 8 9

Tetra Pak Hoyer

Print date : @plotdate

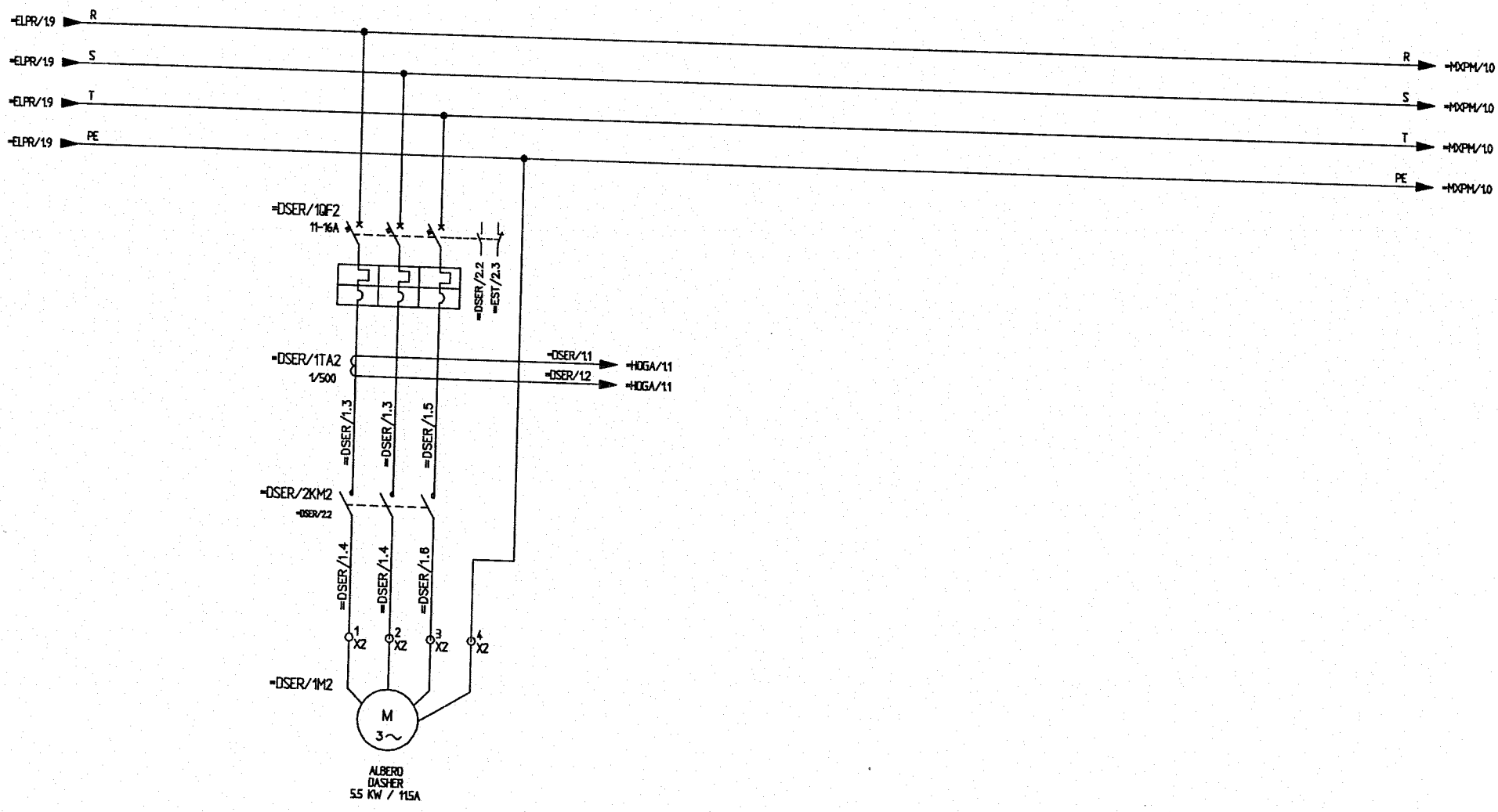
Project FRIGUS 600 SIEMENS	Title RISERVA / *SPARE*	Id/rev. 13020381	Dev.Func. =ELPR
Date 18/03/03 — Sign. MASTER		Location	Global sheet: 16 — Function sheet: 2



Tetra Pak Hoyer

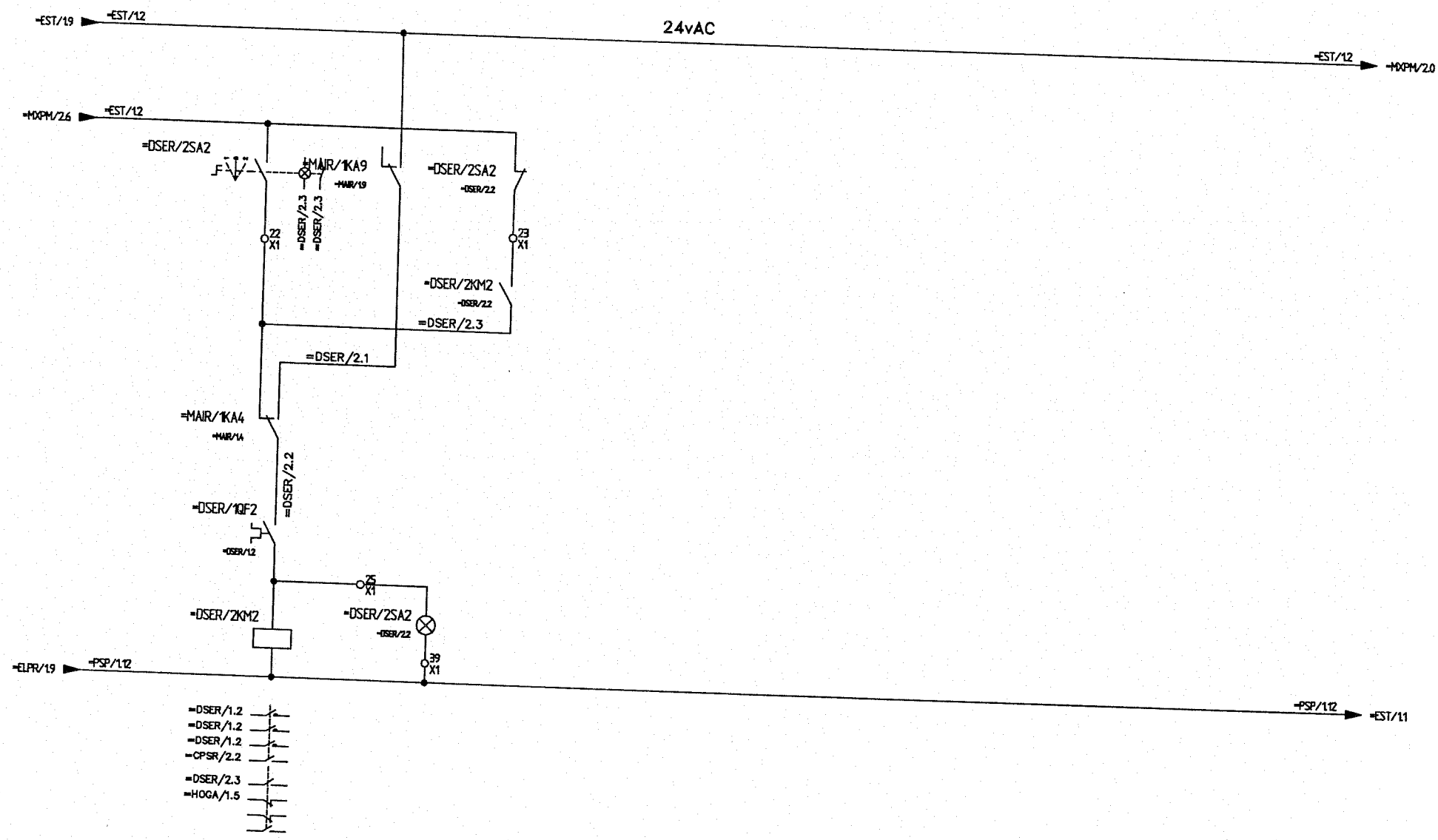
Project: FRIGUS 600 SIEMENS		Title: VENTOLA RAFFREDDAMENTO / COOLING FAN	Id/rev.: 13020381	Dev.Func.: =FAN	
Date: 18/03/03	Sign.: MASTER		Location	Global sheet: 17	Function sheet: 1

Print date : @plotdate



Tetra Pak Hoyer	Project FRIGUS 600 SIEMENS	Title ALBERO (POTENZA) / DASHER (POWER)	Id/rev. 13020381	Dev.Func. =DSER
	Date 18/03/03 Sign. MASTER		Location	Global sheet: 18 Function sheet: 1

Print date : @plotdate



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS		Title: ALBERO (AUSILIARI) / DASHER (AUXILIARY)	Id/rev.: 13020381	Dev.Func.: =DSER	
Date: 18/03/03	Sign.: MASTER		Location	Global sheet: 19	Function sheet: 2

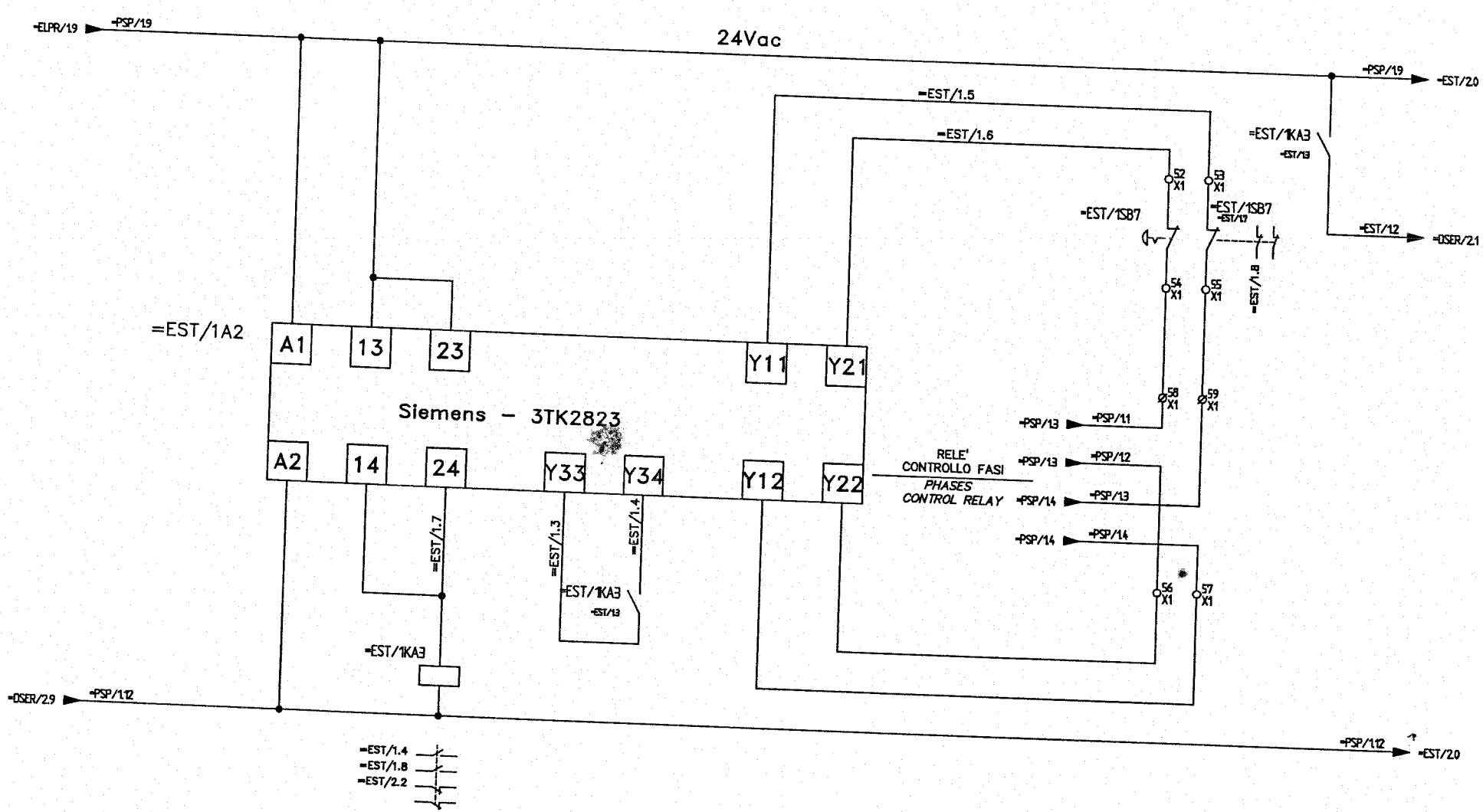
Print date : @plotdate

0 1 2 3 4 5 6 7 8 9

Tetra Pak Hoyer

Project FRIGUS 600 SIEMENS		Title RISERVA *SPARE*	Id/rev. 13020381	Dev.Func. =DSER	
Date 18/03/03	Sign. MASTER		Location	Global sheets 20	Function sheets 3

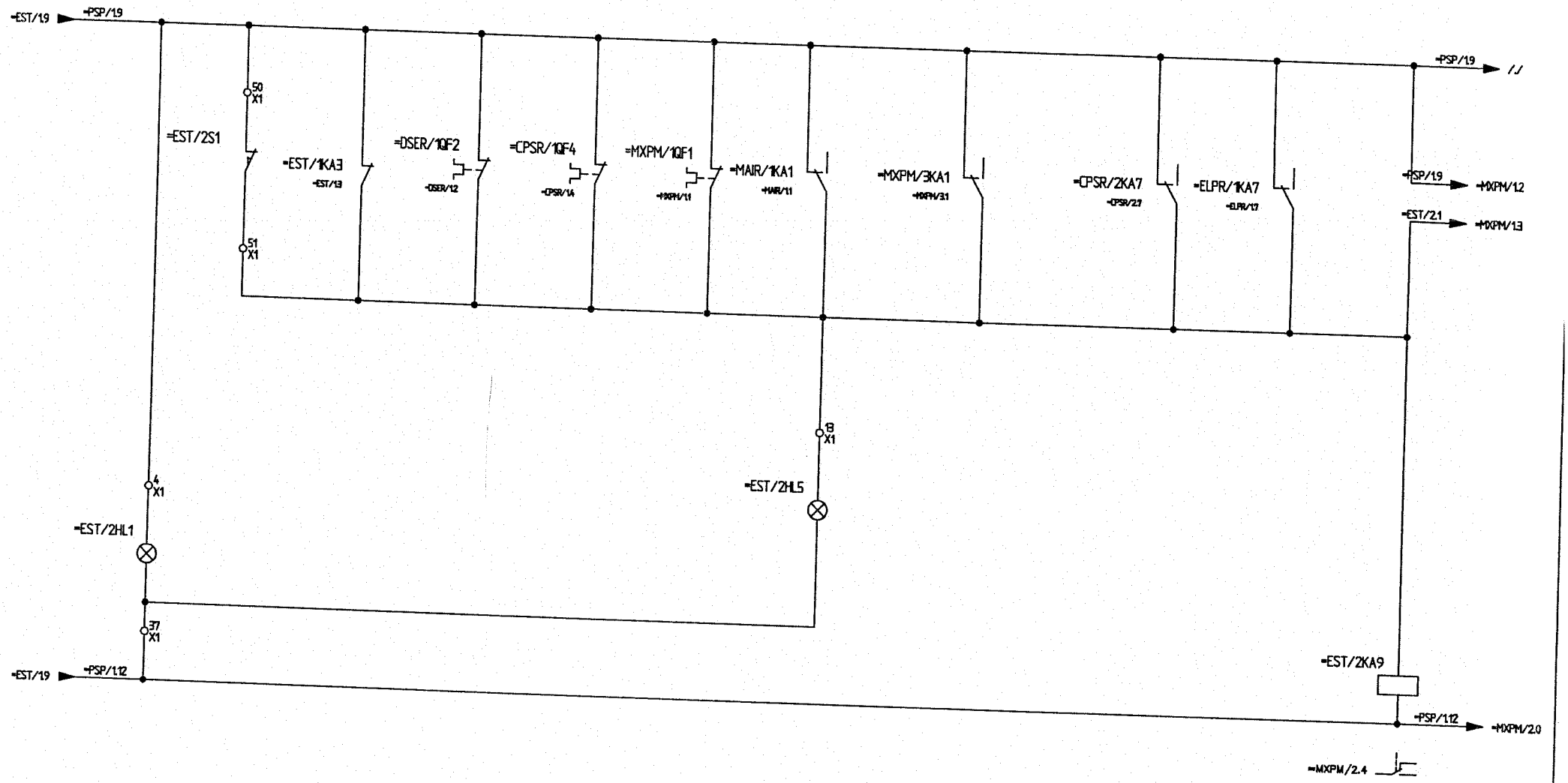
Print date : @plotdate



Tetra Pak Hoyer

Print date : @plotdate

Project: FRIGUS 600 SIEMENS	Title: MODULO DI SICUREZZA / *SAFETY MODULE*	Id/rev.: 13020381	Dev.Func.: =EST
Date: 18/03/03	Sign.: MASTER	Location:	Global sheet: 21 Function sheet: 1



Tetra Pak Hoyer

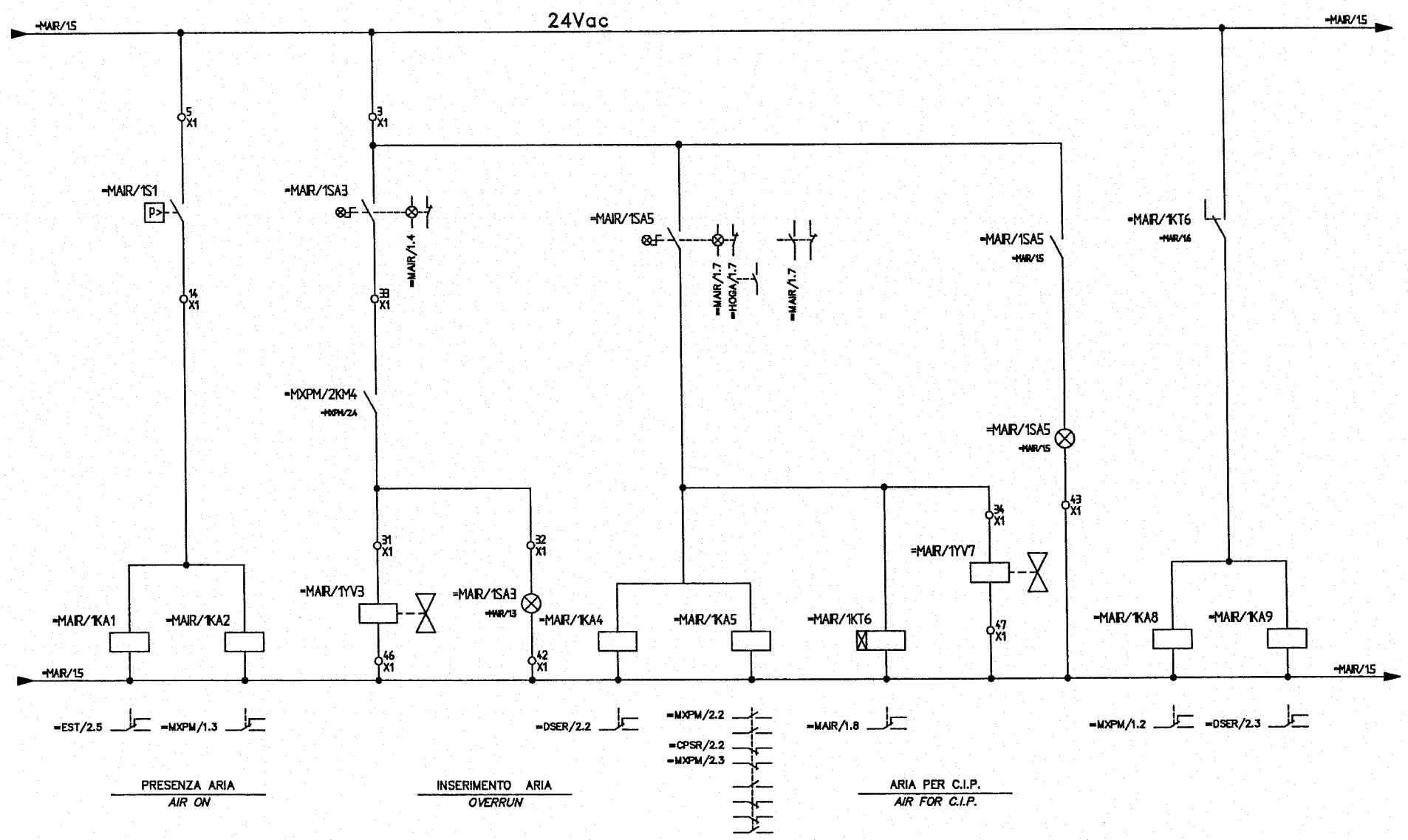
Project: FRIGUS 600 SIEMENS	Title: ALLARMI / *ALARMS*	Id/rev.: 13020381	Dev.Func.: =EST
Date: 18/03/03 — Sign.: MASTER		Location:	Global sheet: 22 — Function sheet: 2

Print date : @plotdate

Tetra Pak Hoyer

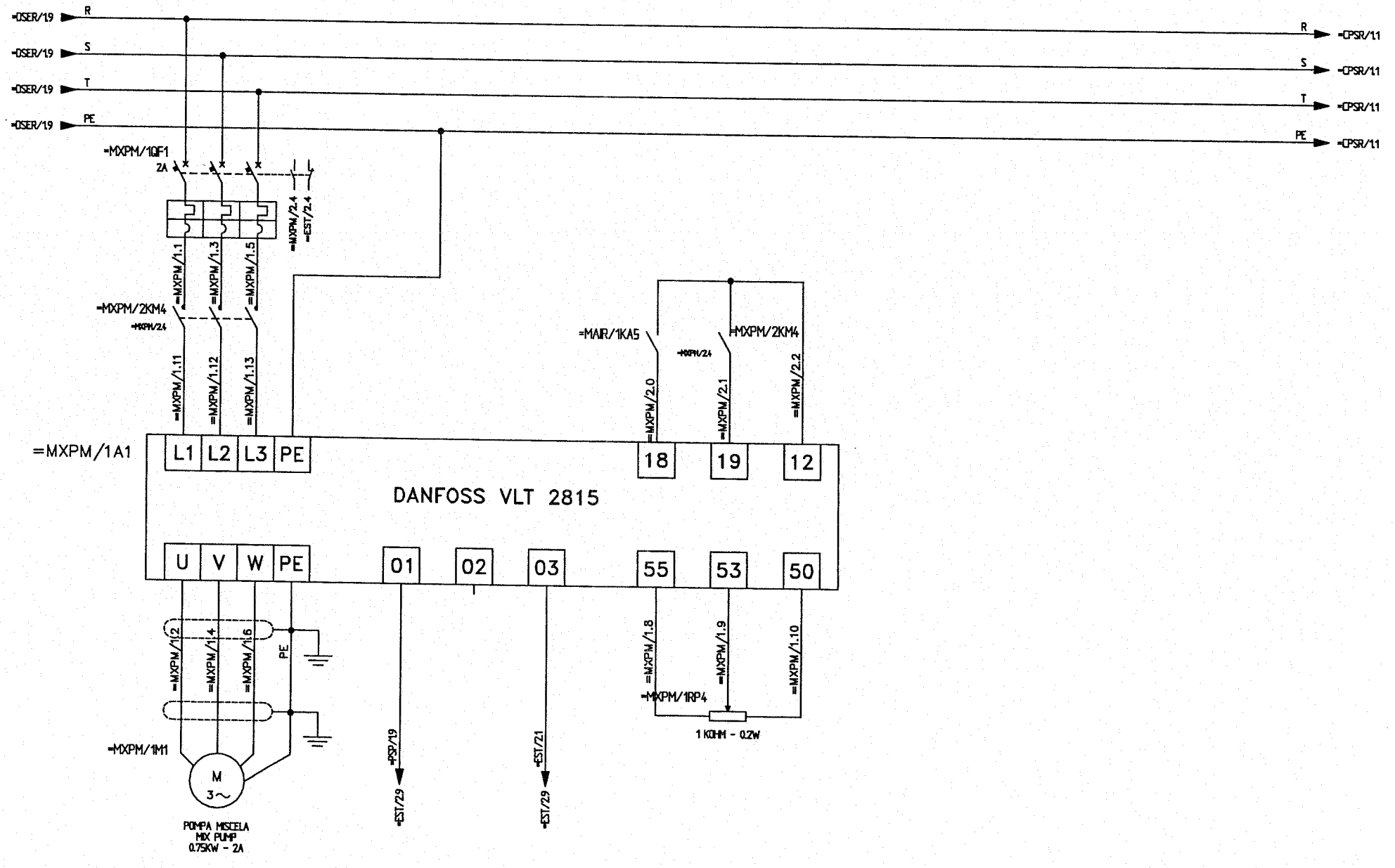
Project FRIGUS 600 SIEMENS		Title RISERVA / *SPARE*	Id/rev. 13020381	Dev.Func. =EST	
Date 18/03/03	Sign. MASTER		Location	Global sheet: 23	Function sheet: 3

Print date : @plotdate



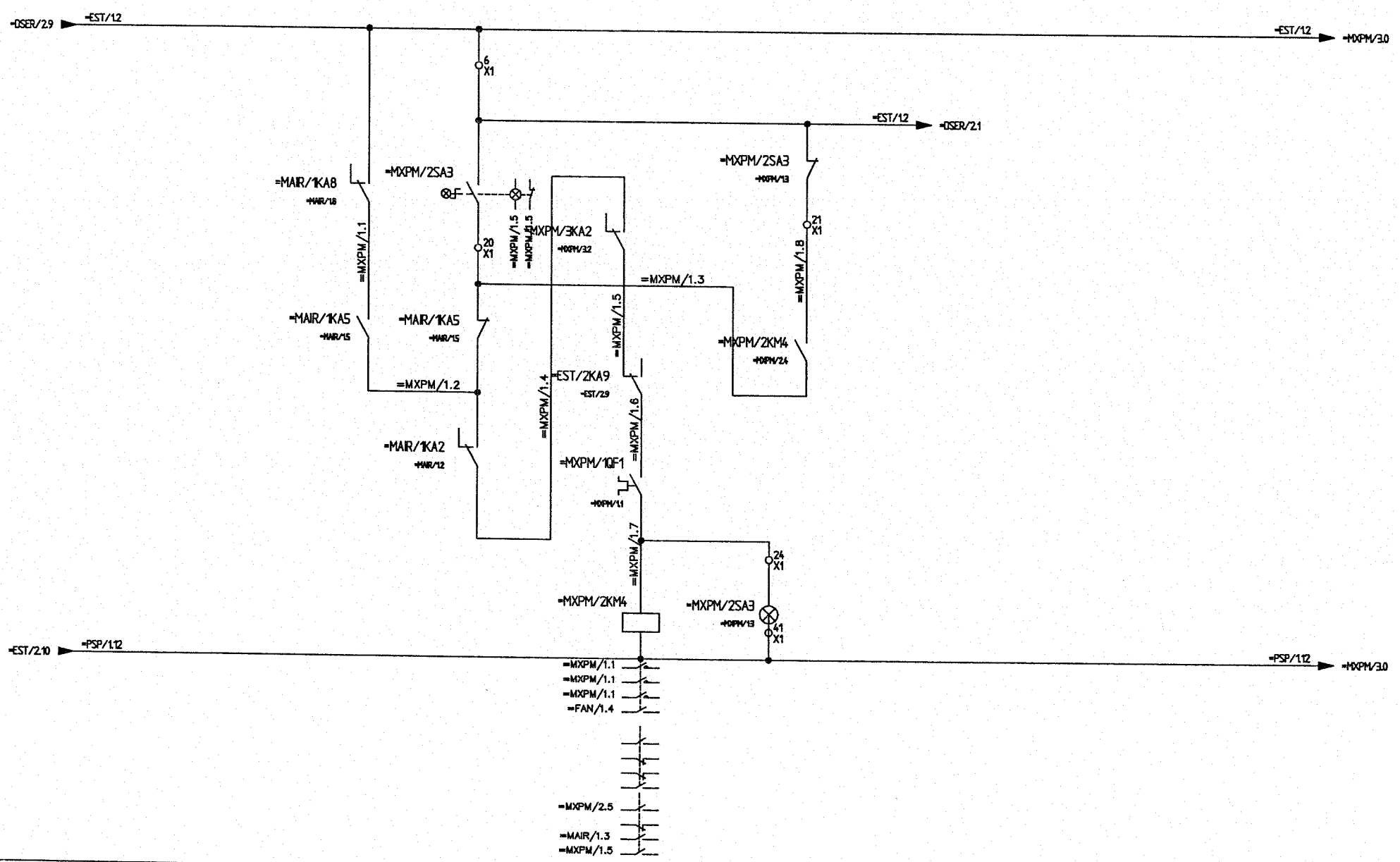
Tetra Pak Hoyer	Project: FRIGUS 600 SIEMENS	Title: ARIA GENERALE / MAIN AIR	Id/rev.: 13020381	Dev.Func.: =MAIR
	Date: 18/03/03 — Sign.: MASTER		Location	Global sheet: 24 — Function sheet: 1

Print date : @plotdate



Tetra Pak Hoyer	Project FRIGUS 600 SIEMENS		Title POMPA MISCELA / MIX PUMP	Id/rev. 13020381	Dev.Func. =MXPM
	Date 18/03/03	Sign. MASTER		Location	Global sheet: 25 Function sheet: 1

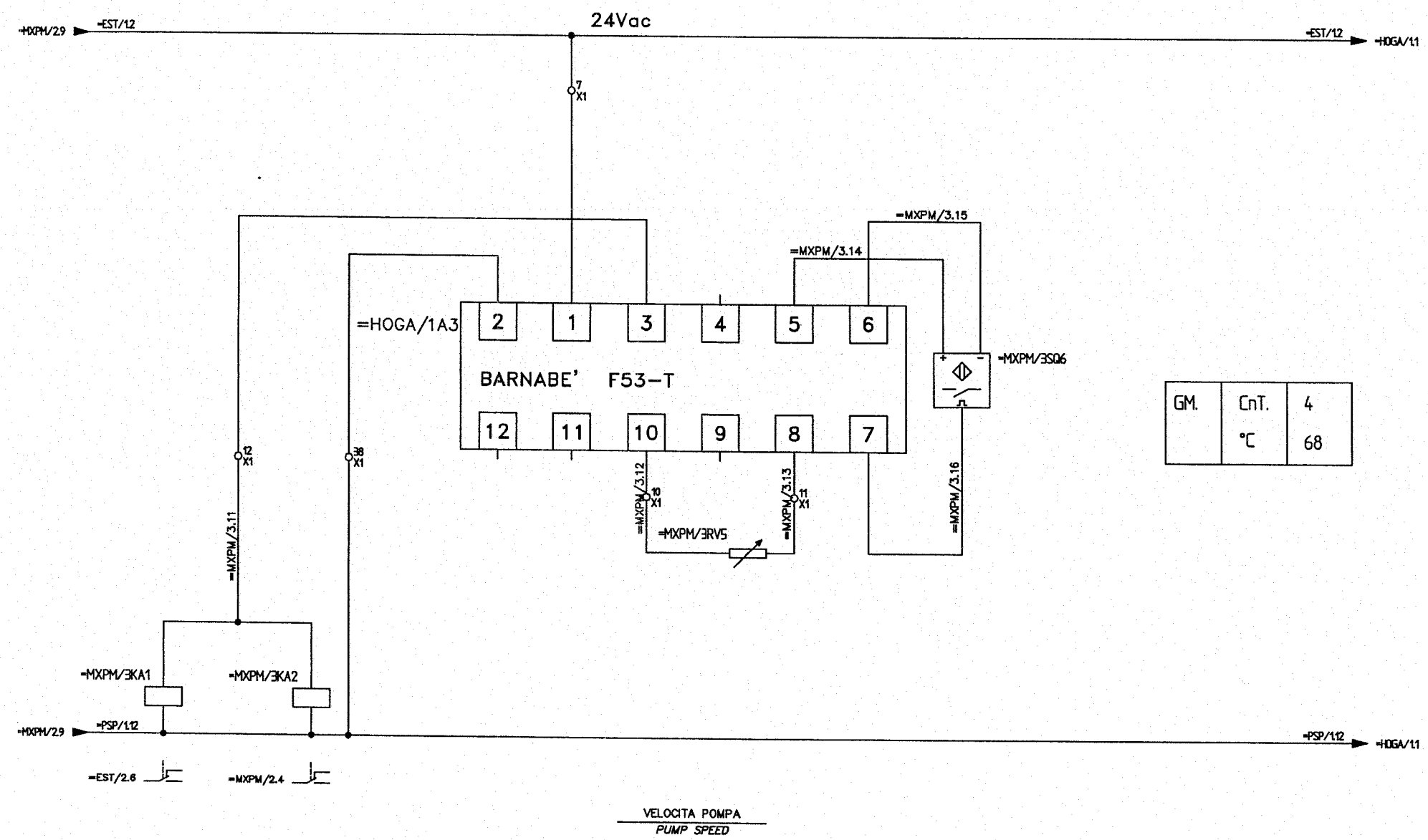
Print date : @plotdate



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: POMPA MISCELA / MIX PUMP	Id/rev.: 13020381	Dev.Func.: =MXPM
Date: 18/03/03	Sign.: MASTER	Location	Global sheet: 26 Function sheet: 2

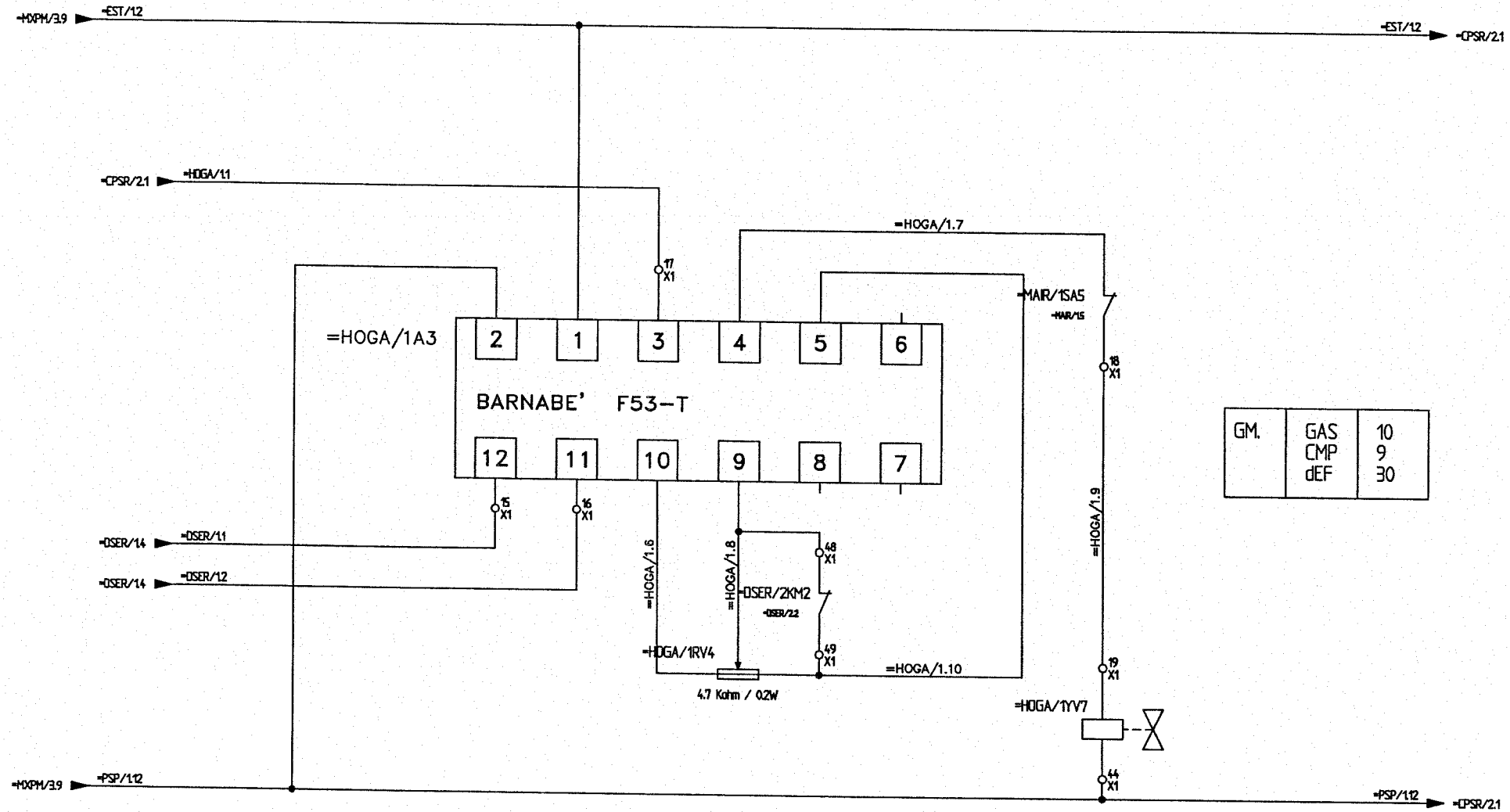
Print date : @plotdate



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: VELOCITA POMPA / PUMP SPEED	Id/rev.: 13020381	Dev.Func.: =MXPM
Date: 18/03/03 — Sign.: MASTER		Location:	Global sheet: 27 — Function sheet: 3

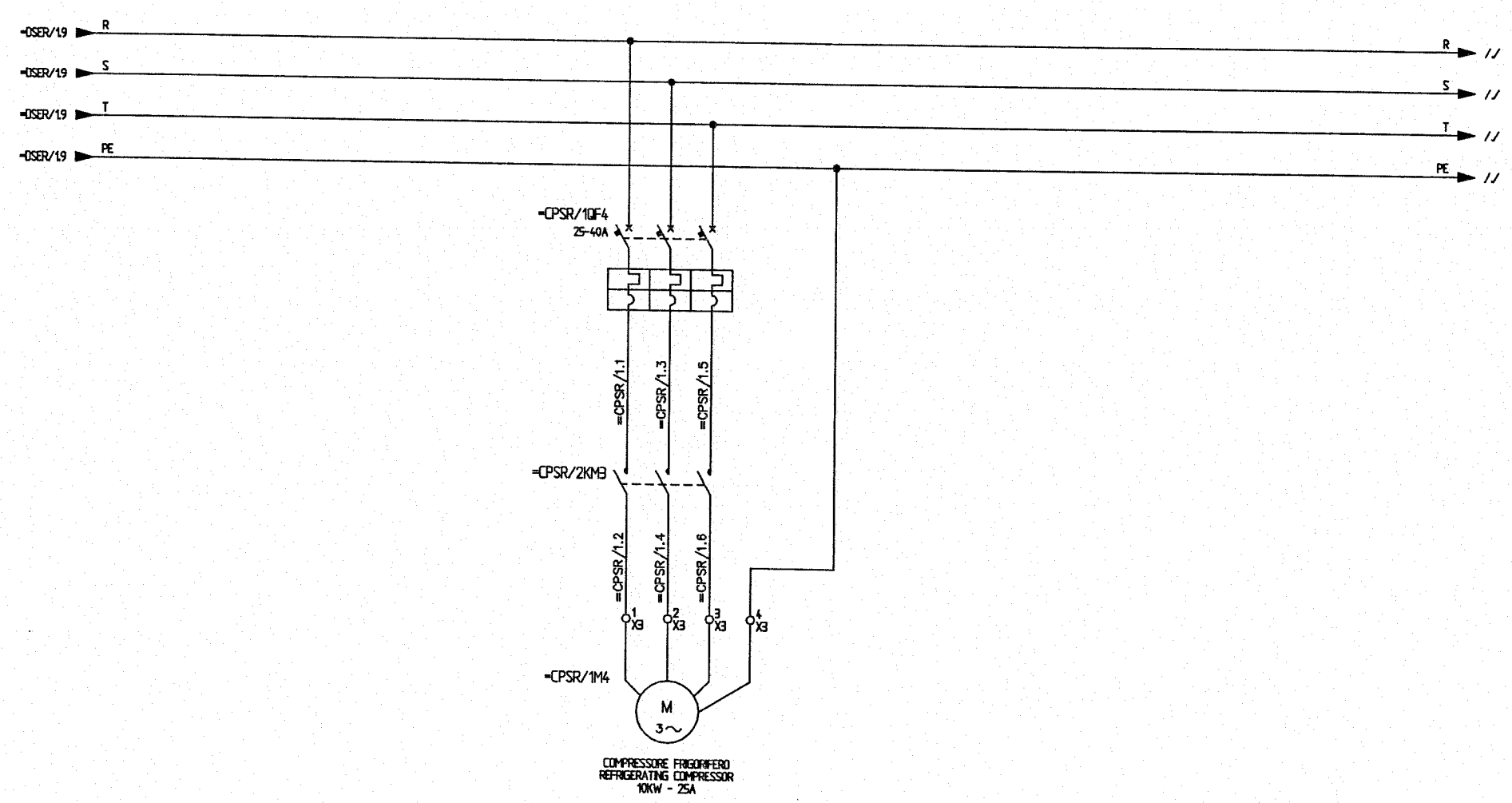
Print date : @plotdate



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: GAS CALDO / HOT GAS	Id/rev.: 13020381	Dev.Func.: =HOGA
Date: 18/03/03 — Sign.: MASTER		Location	Global sheet: 28 — Function sheet: 1

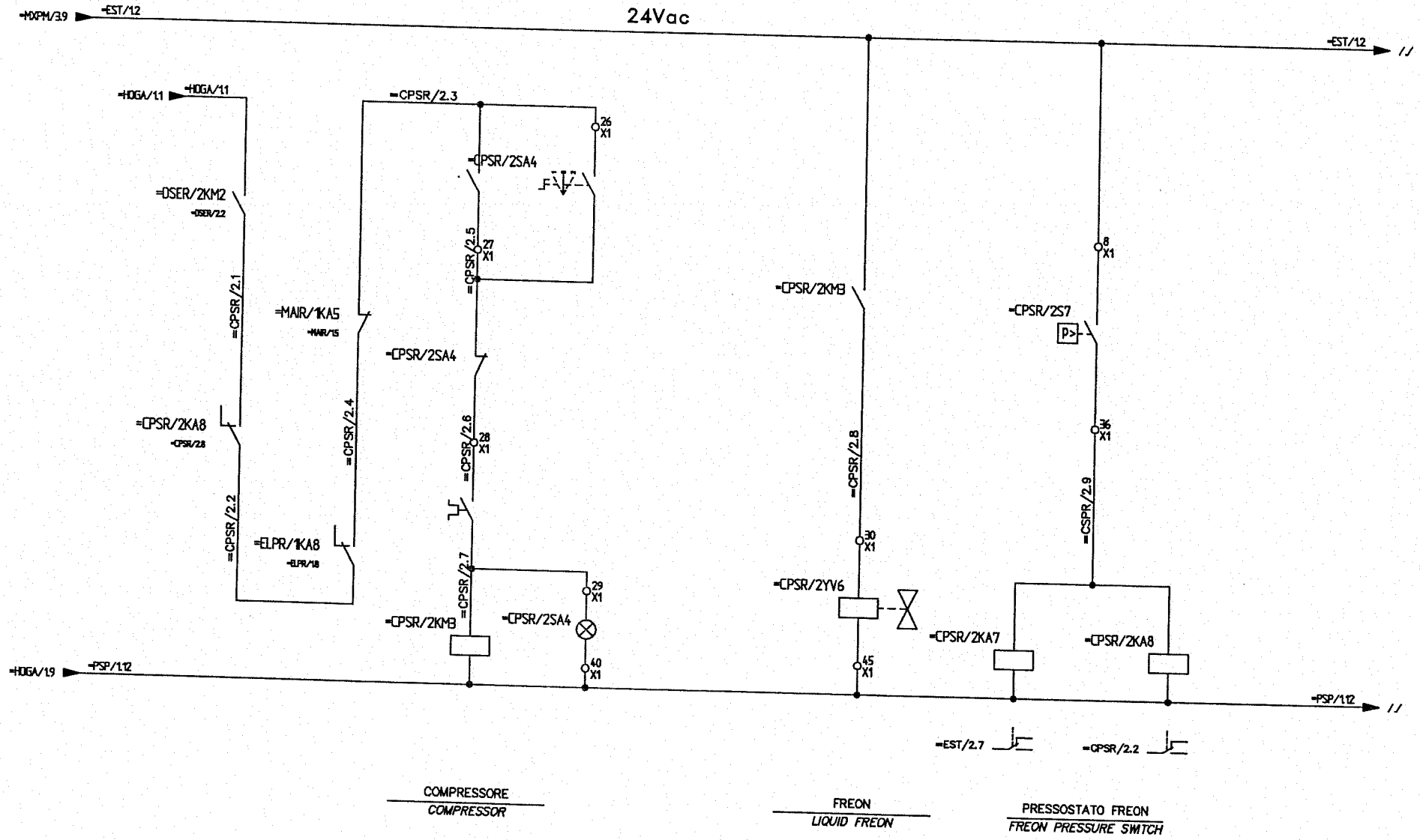
Print date : @plotdate



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: COMPRESSORE FRIGORIFERO / *REFRIGERATING COMPRESSOR*	Id/rev.: 13020381	Dev.Func.: =CPSR
Date: 18/03/03 — Sign.: MASTER		Location	Global sheet: 29 — Function sheet: 1

Print date : @plotdate

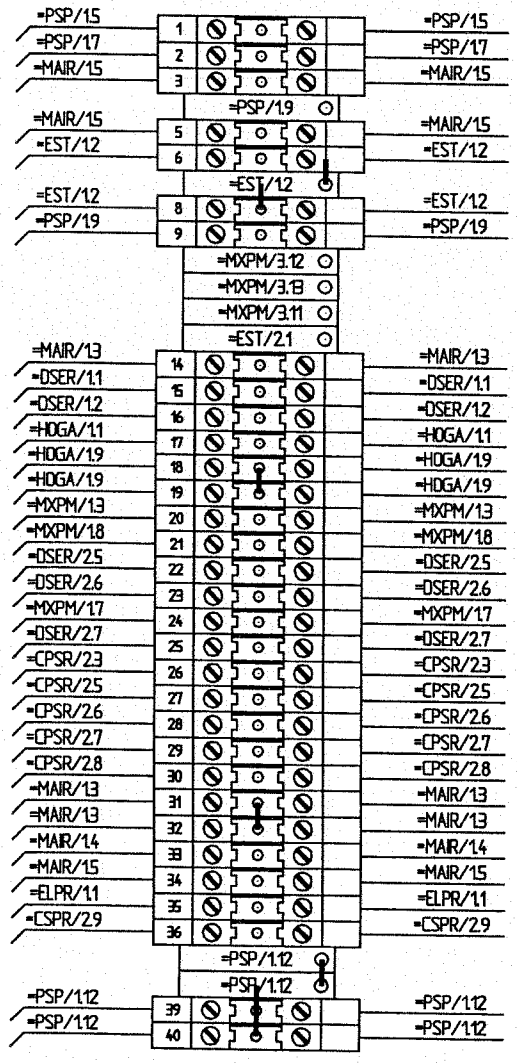


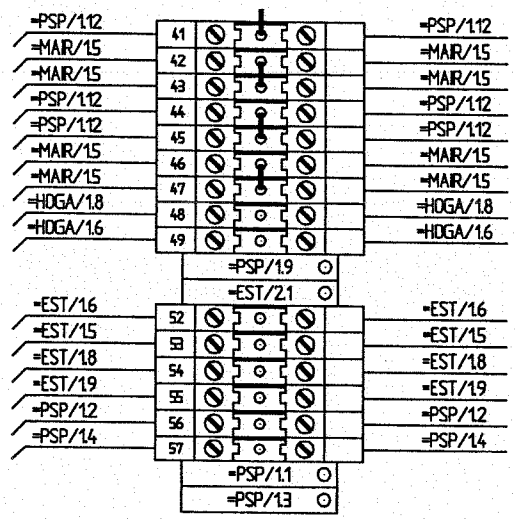
Tetra Pak Hoyer

Print date : @plotdate

Project: FRIGUS 600 SIEMENS	Title: COMPRESSORE FRIGORIFERO / *REFRIGERATING COMPRESSOR*	Id/rev.: 13020381	Dev.Func.: =CPSR
Date: 18/03/03 — Sign.: MASTER		Location:	Global sheet: 30 — Function sheet: 2

QG - X1
MORSETTIERA GENERALE

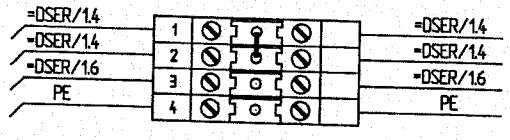




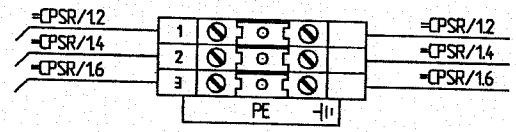
Tetra Pak Hoyer	Project: FRIGUS 600 SIEMENS		Title: MORSETTIERA X1 / *TERMINAL BLOCK X1*	Id/rev.: 13020381	Dev.Func.: =TMBL
	Date: 18/03/03	Sign.: MASTER		Location	Global sheet: 31 Function sheet: 1

Print date : @plotdate

QG - X2
MOTORE ALBERO / DASHER



QG - X3
COMPRESSORE / COMPRESSOR



Tetra Pak Hoyer

Project: FRIGUS 600 SIEMENS	Title: MORSETTIERA X2 X3 / *TERMINAL BLOCK X2 X3*	Id/rev.: 13020381	Dev.Func.: =TMBL
Date: 18/03/03 Sign.: MASTER		Location:	Global sheet: 32 Function sheet: 2

Print date : @plotdate

1 2 3 4 5 6 7 8 9

Tetra Pak Hoyer	Project FRIGUS 600 SIEMENS		Title RISERVA / *SPARE*	Id/rev. 13020381	Dev.Func. =TMBL	
	Date 18/03/03	Sign. MASTER		Location	Global sheet: 33	Function sheet: 3

te : @plotdate

1	2	3	4	5	6	7	8	9

Tetra Pak Hoyer	Project FRIGUS 600 SIEMENS		Title LY OUT *LY OUT*	Id/rev. 13020381	Dev.Func. =LYT
	Date 18/03/03	Sign. MASTER		Location	Global sheet: 34 Function sheet: 1

ate : @plotdate