

# Oil-injected rotary screw compressors



People. Passion. Performance.

**CPVS 200, CPVS 270, CPVS 340**

Instruction book

## **Instruction book**

# **CPVS200, CPVS270, CPVS340**

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This applies in particular to trademarks, model denominations, part numbers and drawings.

This manual is valid for compressors from the serial number BQR123747.

To validate your equipment warranty, visit our website:

<https://www.cp.com/pt-br/compressors/parts-and-services/validacao-da-garantia>  
or access the QR code (image attached)





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## STORAGE, CONSERVATION AND TRANSPORT CONDITIONS

### 1. Introduction

The non-painted surface of all out-of-service compressors, whether installed or waiting installation, is subject to oxidation and corrosion.

The corrosion level ranges according to the environment conditions (temperature, humidity etc.) and the care taken for storing and conserving the unit.

Therefore, it is impossible to establish the period in which the unit can be stored without rust damage.

The higher the humidity and the longer the stopping and/or storage period, the more care must be taken. For CPF compressors, in addition to the precautions for the compressor, specific preventive measures should be taken for the electric motor, according to the manufacturer's instructions.

Compressors are not normally expected to be out of service or stored for long periods, so they are shipped ready for storage for a maximum of 75 days from the date of manufacture. After that, the procedure described in 2 should be followed.

Should the compressor be out of service for more than one week, follow the instructions in item 3.

### 2. Storage and conservation prior to installation

1. Store the compressor in a clean, dry, well-ventilated environment, free of dust and humidity.
2. The entire lower section of the compressor should stand on a flat, vibration-free floor.
3. Ensure that there is no water in the grate, plastic cover or any part of the bodywork or base of the unit.
4. Remove the intake valve and fill the compressor unit with the lubricating oils recommended by Chicago Pneumatic (see note 1).
5. Reinsert the intake valve.
6. Rotate the coupling 10 turns once a month, to change the position of the compressor element bearings balls and rollers. In case there is no access to the motor shaft, remove the rear motor cover for access through the motor fan.
7. Should the compressor be stored for more than 6 months, the oil, oil filter and separator element should be replaced. For engine, check engine manufacturer's instructions on

material delivered (on pendrive) with compressor. Pay attention to the engine resistance connection, if any, to avoid inside the engine.

### 3. Conservation after installation

1. Run the unit at least twice a week, for a minimum of 30 minutes and operate the load/relief system a few times.
2. Stop the unit, close the outlet valve and open the condensate drains (after the air cooler and condensate separator manual). Ensure none of the drains is clogged.
3. Close the drains after 02 minute.

#### NOTES:

1. This oil should be removed prior to the technical start-up of the equipment, otherwise, a "hydrolock" could form, causing irreparable damage to the compressor unit.
2. This instruction does not provide for cases of aggressive environment, which should be analyzed individually.

### 4. Movement and transport

If the unit is to be moved or transported, the original fittings and guards must be reinstalled to immobilize the vibration dampers and the engine and compressor assembly.

The compressor can be handled with a forklift using the openings in the frame. The forklift must have capacity suitable for the sizes and weight of the compressor. The compressor may also be lifted by inserting beams into the openings. Make sure that the beams are properly fixed and equally spaced on both sides of the frame. Ropes/chains must be kept parallel to the bodywork by means of an expander, not touching it in order not to damage the compressor. Lifting equipment should be placed so that the compressor is raised perpendicular, slightly and without twisting.



*"THIS MACHINE IS EQUIPPED FOR CONTINUOUS AND INTERMITTENT OPERATION, HOWEVER TO AVOID OIL CONDENSATION PROBLEMS, CHECK FOR OIL CONDENSATION SIGNS, OBSERVING THE GIVEN INSTRUCTIONS"*

## **WARRANTIES**

Chicago Pneumatic ensures to the Buyer free repair for products, its components or accessories, sold and manufactured by our company that eventually present proven manufacturing defects, for the period and pursuant to the conditions indicated below, provided that such defects do not result from improper use or by fault of the Buyer.

Warranty periods are counted from the date the invoice(s) are issued, considering:

- a. for stationary or portable compressors: for eighteen (18) months after invoice issue or twelve (12) months after technical delivery, whichever occurs first, and twenty-four (24) months for the compressor.
- b. for other equipment: for eighteen (18) months after invoice issue or twelve (12) months after technical delivery, whichever occurs first.

No repair, modification or replacement under the warranty will extend the terms indicated above, whether for the equipment or for its replaced accessories or components.

Warranties provided for this instrument refer only to components manufactured at our facilities. Each manufacturer is solely responsible for the warranties for parts, engines and accessories manufactured them.

Effectiveness of these warranties is conditioned to immediate written communication of the defect verified by the Buyer to Chicago Pneumatic, and any intervention on the product or equipment by the Buyer or third parties must not be done, under penalty of voiding the warranty.

Our products are coated according to ISO 12944 standard; our corrosion class is "C3 medium".

Warranty will become void in case of:

- a. stationary compressors installed or assembled by the Buyer without inspection and approval by Chicago Pneumatic; except for CPM models.
- b. lack of Technical Delivery by Chicago Pneumatic;
- c. inappropriate or incorrect maintenance of equipment or products, including: (i) non-authorized modifications; and (ii) non-compliance with maintenance instructions provided by Chicago Pneumatic, poor or irregular lubrication;
- d. use of non-original parts or accessories, or not approved by Chicago Pneumatic;
- e. inappropriate or incorrect use of equipment or products;
- f. work overload not been previously authorized in written by Chicago Pneumatic;
- g. normal wear and tear of equipment or products;
- h. damage arising from Act of God or force majeure, such those resulting from fires, floods, depredation, strikes, rampage or similar harmful actions, among others;
- i. inappropriate transport, irregular or extended storage periods by the Buyer; and
- j. the Buyer is in arrears or default of payments set in the Purchase and Sale Agreement.

No manufacturing defect shall be considered a fair reason for Buyer non-compliance with the obligations under this instrument and included proposal.

Services related to these warranties will be performed in workshops previously authorized by Chicago Pneumatic; and the Buyer is responsible for delivering and retrieving products at/from these locations, and for the respective transport and insurance expenses. At Chicago Pneumatic's sole discretion, the warranted services may be provided at the Buyer's facilities. In such case, all expenses related to mileage and air tickets, travel time, food and accommodation of technicians and/or mechanics shall be borne by the Buyer.



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"Instructions related to the storage and maintenance of electrical components (converter, soft start switch, electrical panel, electric motors) can be found in the supplier's manuals (in electronic format) provided with the compressor".

# 1 Safety precautions

## 1.1 Safety icons

### Explanation



Danger to life



Warning



Important note

## 1.2 General safety precautions

1. The operator must employ safe working practices and observe all related work safety requirements and regulations.
2. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
3. Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel. The personnel should apply safe working practices by use of personal protection equipment, appropriate tools and defined procedures.
4. The compressor is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
5. Before any maintenance, repair work, adjustment or any other non-routine checks:
  - Stop the machine
  - Press the emergency stop button
  - Switch off the voltage
  - Depressurize the machine
  - Lock Out - Tag Out (LOTO):
    - Open the power isolating switch and lock it with a personal lock.
    - Tag the power isolating switch with the name of the service technician.
  - On units powered by a frequency converter, wait 10 minutes before starting any electrical repair.
  - Never rely on indicator lamps or electrical door locks before maintenance work, always disconnect and check with measuring device.



If the machine is equipped with an automatic restart after voltage failure function and if this

function is active, be aware that the machine will restart automatically when the power is restored if it was running when the power was interrupted!

6. Never play with compressed air. Do not apply the air to your skin or direct an air stream at people. Never use the air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
7. The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
8. It is prohibited to walk or stand on the unit or on its components.
9. The Variable Speed Drive is equipped with a Safe Torque Off function, triggered by the emergency stop button. The Safe Torque Off function has the immediate effect that the drive can not supply any torque-generating energy. The drive is reliably torque-free. This state is monitored internally in the drive.



The Safe Torque Off function does not disconnect the voltage of the main and auxiliary circuits from the drive. Maintenance work on electrical parts of the drive or the motor can only be carried out after isolating the drive system from the main supply!

10. If compressed air is used in the food industry and more specifically for direct food contact, it is recommended, for optimal safety, to use certified Class 0 compressors in combination with appropriate filtration depending on the application. Please contact Chicago Pneumatic for advice on specific filtration.

## 1.3 Safety precautions during installation



All responsibility for any damage or injury resulting from neglecting these precautions, or non observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the Chicago Pneumatic.

### Precautions during installation

1. The machine must only be lifted using suitable equipment in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.



2. The unit is designed for indoor use. If the unit is installed outdoors, special precautions must be taken; consult Chicago Pneumatic.
3. Place the machine where the ambient air is as cool and clean as possible. If necessary, install a suction duct. Never obstruct the air inlet. Care must be taken to minimize the entry of moisture at the inlet air.
4. Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
5. Air hoses must be of correct size and suitable for the working pressure. Never use frayed, damaged or worn hoses. Distribution pipes and connections must be of the correct size and suitable for the working pressure.
6. The aspirated air must be free of flammable fumes, vapors and particles, e.g. paint solvents, that can lead to internal fire or explosion.
7. Arrange the air intake so that loose clothing worn by people cannot be drawn in.
8. Ensure that the discharge pipe from the compressor to the aftercooler or air net is free to expand under heat and that it is not in contact with or close to flammable materials.
9. No external force may be exerted on the air outlet valve; the connected pipe must be free of strain.
10. If remote control is installed, the machine must bear a clear sign stating: DANGER: This machine is remotely controlled and may start without warning.

The operator has to make sure that the machine is stopped and depressurized and that the electrical isolating switch is open, locked and labelled with a temporary warning before any maintenance or repair. As a further safeguard, persons switching on or off remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment.

11. Air-cooled machines must be installed in such a way that an adequate flow of cooling air is available and that the exhausted air does not recirculate to the compressor air inlet or cooling air inlet.
12. The electrical connections must correspond to the applicable codes. The machines must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the compressor.
13. On machines with automatic start/stop system or if the automatic restart function after voltage failure is activated, a sign stating "This machine may start without warning" must be affixed near the instrument panel.

14. In multiple compressor systems, manual valves must be installed to isolate each compressor. Non-return valves (check valves) must not be relied upon for isolating pressure systems.
15. Never remove or tamper with the safety devices, guards or insulation fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure must be protected by a pressure relieving device or devices as required.
16. Piping or other parts with a temperature in excess of 70°C (158°F) and which may be accidentally touched by personnel in normal operation must be guarded or insulated. Other high temperature piping must be clearly marked.
17. For water-cooled machines, the cooling water system installed outside the machine has to be protected by a safety device with set pressure according to the maximum cooling water inlet pressure.
18. If the ground is not level or can be subject to variable inclination, consult Chicago Pneumatic.
19. If the device is a dryer and no free extinguishing system is present in the air net close to the dryer, safety valves must be installed in the vessels of the dryer.



Also consult following safety precautions: Safety precautions during operation and Safety precautions during maintenance. These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

## 1.4 Safety precautions during operation



All responsibility for any damage or injury resulting from neglecting these precautions, or non observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by Chicago Pneumatic.

### Precautions during operation

1. Never touch any piping or components of the machine during operation.
2. Use only the correct type and size of hose end fittings and connections. When blowing through a hose or air line, ensure that the open end is held securely. A free end will whip and may cause injury. Make sure that a hose is



fully depressurized before disconnecting it.

3. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
4. Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapors or particles.
5. Never operate the machine below or in excess of its limit ratings.
6. Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks. Wear ear protectors when opening a door.  
On machines without bodywork, wear ear protection in the vicinity of the machine.
7. People staying in environments or rooms where the sound pressure level reaches or exceeds 80 dB(A) shall wear ear protectors.
8. Periodically check that:
  - All guards are in place and securely fastened
  - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
  - No leaks occur
  - All fasteners are tight
  - All electrical leads are secure and in good order
  - Safety valves and other pressure relief devices are not obstructed by dirt or paint
  - Air outlet valve and air net, i.e. pipes, couplings, manifolds, valves, hoses, etc. are in good repair, free of wear or abuse
  - Air cooling filters of the electrical cabinet are not clogged
9. If warm cooling air from compressors is used in air heating systems, e.g. to warm up a workroom, take precautions against air pollution and possible contamination of the breathing air.
10. On water-cooled compressors using open circuit cooling towers, protective measures must be taken to avoid the growth of harmful bacteria such as Legionella pneumophila bacteria.
11. Do not remove any of, or tamper with, the sound-damping material.
12. Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure relieving device or devices as required.
13. Yearly inspect the air receiver. Minimum wall thickness as specified in the instruction book must be respected.

Local regulations remain applicable if they are more strict.



Also consult following safety precautions:  
Safety precautions during installation and  
Safety precautions during maintenance.  
These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein. Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

## 1.5 Safety precautions during maintenance or repair



All responsibility for any damage or injury resulting from neglecting these precautions, or non observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the Chicago Pneumatic.

### Precautions during maintenance or repair

1. Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
2. Use only the correct tools for maintenance and repair work.
3. Use only genuine spare parts for maintenance or repair. Chicago Pneumatic will disclaim all damage or injuries caused by the use of non-genuine spare parts.
4. All maintenance work shall only be undertaken when the machine has cooled down.
5. A warning sign bearing a legend such as "Work in progress; do not start" shall be attached to the starting equipment.
6. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
7. Close the compressor air outlet valve and depressurize the compressor before connecting or disconnecting a pipe.
8. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure.



9. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
10. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
11. Never weld or perform any operation involving heat near the oil system. Oil tanks must be completely purged, e.g. by steam cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels.
12. Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapor when air is admitted.
13. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
14. Make sure that no tools, loose parts or rags are left in or on the machine.
15. All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
16. Before clearing the machine for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct. Check that all control and shut-down devices are fitted and that they function correctly. If removed, check that the coupling guard of the compressor drive shaft has been reinstalled.
17. Every time the separator element is renewed, examine the discharge pipe and the inside of the oil separator vessel for carbon deposits; if excessive, the deposits should be removed.
18. Protect the motor, air filter, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam cleaning.
19. Make sure that all sound-damping material and vibration dampers, e.g. damping material on the bodywork and in the air inlet and outlet systems of the compressor, is in good condition. If damaged, replace it by genuine material from the manufacturer to prevent the sound pressure level from increasing.
20. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
21. **Only if applicable, the following safety precautions are stressed when handling refrigerant:**
  - Never inhale refrigerant vapors. Check that the

working area is adequately ventilated; if required, use breathing protection.

- Always wear special gloves. In case of refrigerant contact with the skin, rinse the skin with water. If liquid refrigerant contacts the skin through clothing, never tear off or remove the latter; flush abundantly with fresh water over the clothing until all refrigerant is flushed away; then seek medical first aid.



Also consult following safety precautions: Safety precautions during installation and Safety precautions during operation.

These precautions apply to machinery processing or consuming air or inert gas.

Processing of any other gas requires additional safety precautions typical to the application which are not included herein.

Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.

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## 2 General description

### 2.1 Introduction

#### General view



*General view*

#### ***Description***

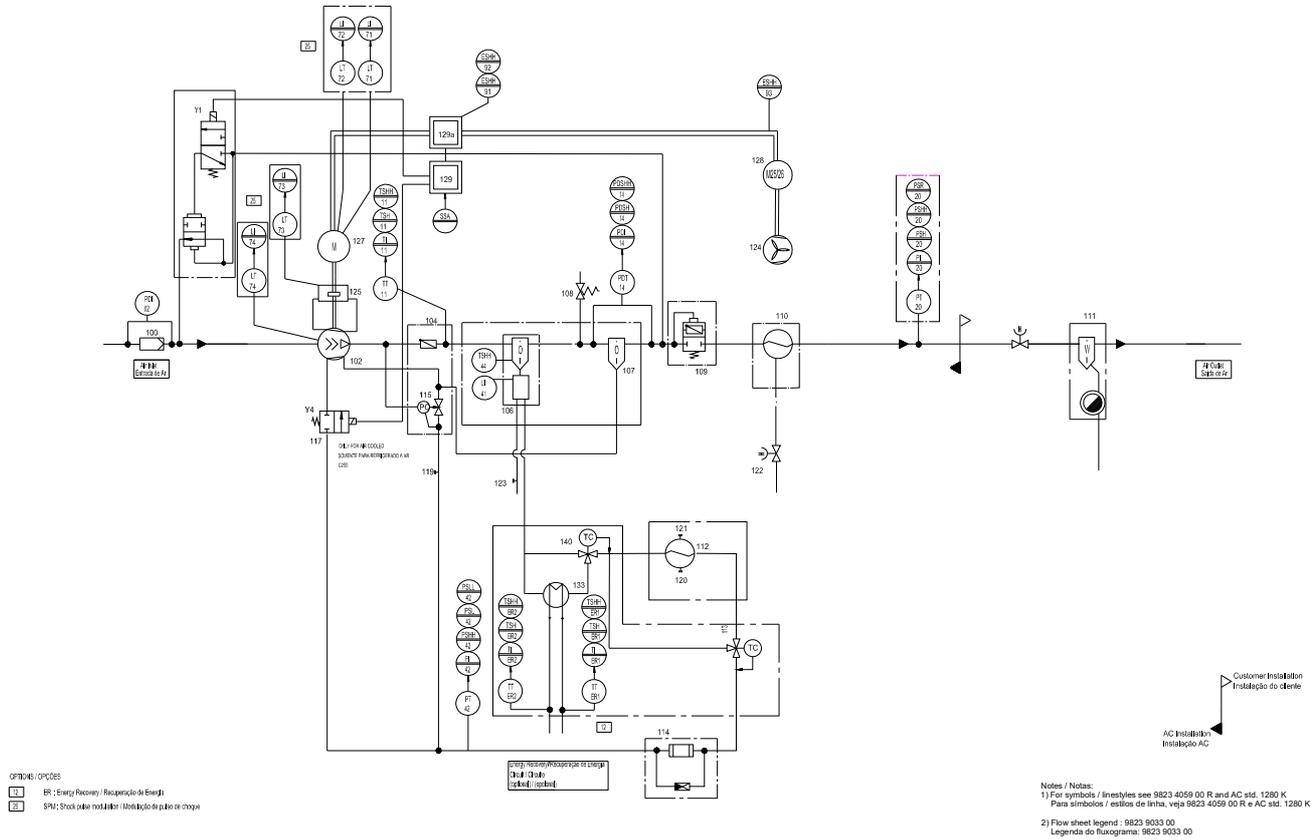
CPVS (Variable Speed Drive) compressors are single-stage, oil-injected screw compressors directly driven by an electric motor.

CPVS compressors are air-cooled.



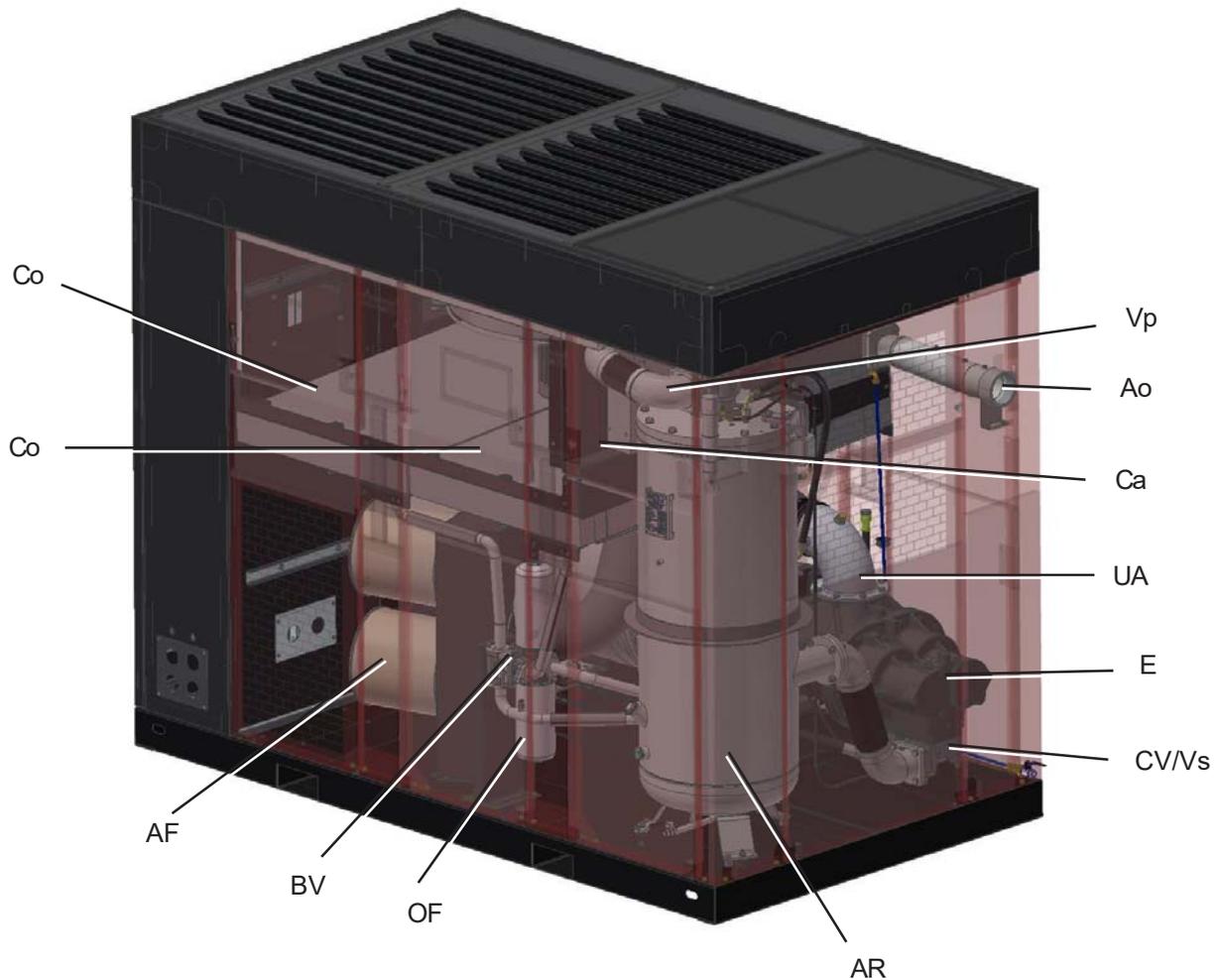
## 2.2 Air and oil system

### Flow diagram



Flow diagram of air-cooled compressor

## Position of components



### Note:

CPVS200 compressor has only an air filter (AF), a cooler (Co) and a fan

### Air flow

Air drawn through filter (AF) and unloader (UA) is compressed in compressor element (E). Compressed air and oil are discharged through check valve (CV) to air receiver/oil separator (AR) where oil is separated from the compressed air. The air is blown through minimum pressure valve (Vp) to air cooler (Ca). On CPVS compressors, the cooled air is discharged through air outlet (AO) towards the air net. Check valve (CV) prevents blow-back of compressed air. Minimum pressure valve (Vp) prevents the receiver pressure from dropping below a minimum pressure. The valve has a built-in check valve.

### Oil system

Air pressure forces the oil from receiver (AR) through oil cooler (Co), filters (OF) and oil stop valve (Vs) to compressor element (E) and the lubrication points. A Oil stop valve (Vs) prevents the compressor elements from flooding with oil when the compressor is stopped. Valve (BV) by-passes oil cooler (Co) when starting the compressor from a cold condition, so ensuring rapid warming of the oil to normal working temperature. In air receiver (AR) most of the oil is removed from the air centrifugally. Almost all of the remaining oil is removed by the separator element.

## 2.3 Cooling system

### Cooling system

Air cooler (Ca) and oil cooler (Co) are cooled by fans.



## 2.4 Regulating system

### Controlling the compressor speed - reducing power consumption

The regulator matches the air delivery to the air consumption keeping the net pressure fluctuations very low.

The regulator will continuously vary the motor speed maintaining the net pressure as close as possible to the programmed pressure setpoint. As the air consumption decreases, the motor speed decreases as well as the power consumption.

### Unloading

If the motor is running at minimum speed and the net pressure rises to a value equal to the sum of the programmed pressure setpoint and the programmed unload offset, the load/no-load valve (TV) will close to unload the compressor.

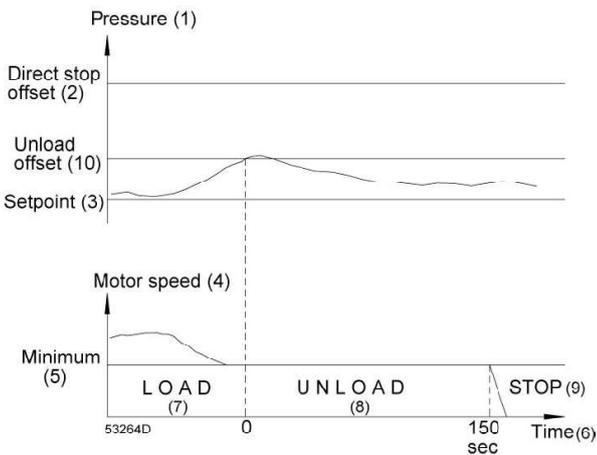
If the compressor remains running unloaded uninterruptedly for 150 seconds, the regulator will stop the motor. The regulator will restart the compressor when the net pressure drops below the pressure setpoint.

Ref	Name
(1)	Pressure
(2)	Direct stop offset
(3)	Setpoint
(4)	Motor speed
(5)	Minimum
(6)	Time
(7)	Load
(8)	Unload
(9)	Stop
(10)	Unload offset

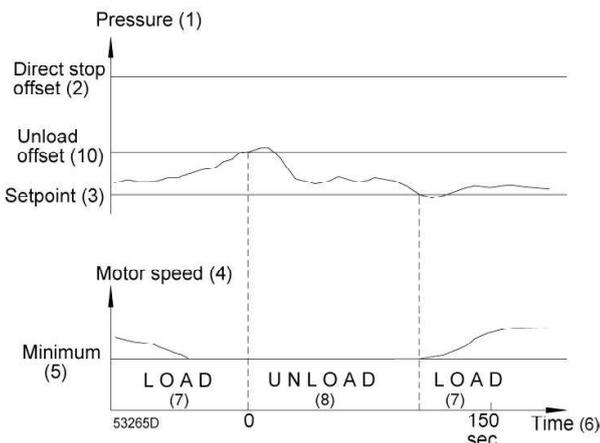
### Direct stopping

In case the net pressure should rise to a value equal to the sum of the programmed pressure setpoint and the programmed direct stop offset, the compressor will be stopped immediately.

The regulator will restart the compressor when the net pressure drops below the pressure setpoint.

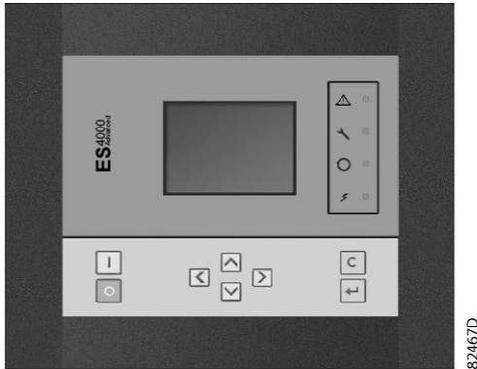


When the net pressure drops below the pressure setpoint within this period of 150 seconds, the load/no load valve will fully open and the motor speed will increase to match the air delivery to the air consumption.



## 3 Graphic controller

### 3.1 Controller



Display of the ES 4000 Graphic controller

#### Introduction

The controller has following functions:

- Controlling the compressor
- Protecting the compressor
- Monitoring components subject to service
- Automatic restart after voltage failure (made inactive)

#### Automatic control of the compressor operation

The controller maintains the net pressure between programmable limits by automatically loading and unloading the compressor (on compressors running at a fixed speed) or by adapting the motor speed (compressors with frequency converter). A number of programmable settings, e.g. the unloading and loading pressures (for fixed speed compressors), the setpoint (for compressors with frequency converter), the minimum stop time and the maximum number of motor starts and several other parameters are hereby taken into account.

The controller stops the compressor whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases. In case the expected unloading period is too short, the compressor is kept running to prevent too short standstill periods.

#### Protecting the compressor

##### Shut-down

If one of the measured signals exceeds the programmed shut-down level, the compressor will be stopped. This situation will be indicated on the controller display. The compressor will also be stopped in case of drive motor overload .

Air-cooled compressors also shut down in case of fan motor overload.



Before remedying, consult the applicable safety precautions.

##### Shut-down warning

A shut-down warning level is a programmable level below the shut-down level.

If one of the measures exceeds the programmed shutdown warning level, this situation will also be indicated, to warn the operator before the shutdown level is reached.

##### Service warning

If the service timer exceeds a programmed value, this situation will be indicated on the display to advise the operator to perform some service actions .

##### Automatic restart after voltage failure

The controller has a built-in function to automatically restart the compressor when the voltage is restored after voltage failure.

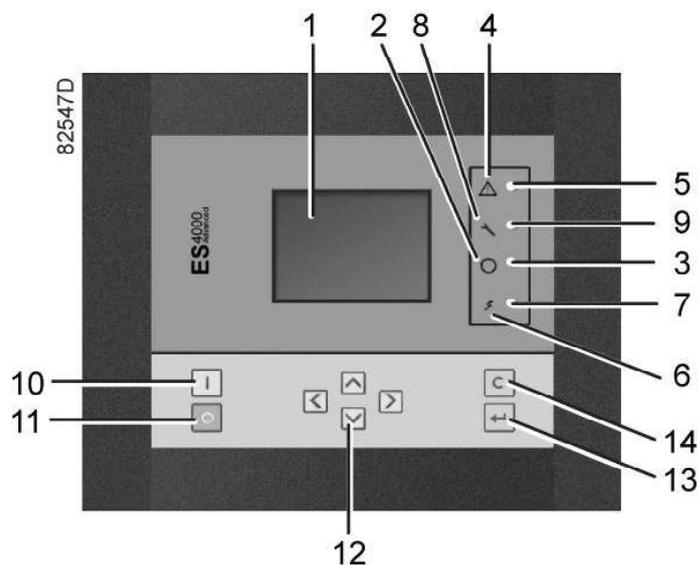


If the function is activated and provided the regulator was in the automatic operation mode, the compressor will automatically restart if the supply voltage to the module is restored.



## 3.2 Control panel

### Detailed description

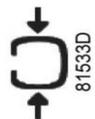
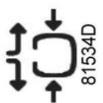
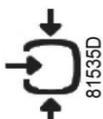


*Controller function buttons*

Reference	Designation	Function
1	Display	Show icons and operating conditions.
2	Automatic operation symbol	
3	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor: the compressor goes on load, goes on relief, stops and starts depending on the air consumption and the limitations programmed in the regulator.
4	Warning symbol	
5	Warning LED	Is lit if a warning condition exists.
6	Voltage symbol	
7	Voltage presence LED	Indicates power is on.
8	Service symbol	
9	Service LED	It is lit when service is required.
10	Start button	This button starts the compressor. The automatic operation LED (3) lights up. Controller is operational.
11	Stop button	This button is used to stop the compressor. The LED automatic operating mode (3) goes out.
12	Scroll keys	Keys to scroll through the menu.
13	Enter key	Use this button to confirm the last action.
14	Escape key	Use this button to go to previous screen or to end the current action.

### 3.3 Icons used

#### Status icons

Function	Icon	Description
Compressor status	 81532D	When the compressor is stopped, the icon stands still. When the compressor is running, the icon is rotating.
	 81533D	Motor stopped
	 81534D	Running unloaded
	 81535D	Running loaded
Machine control mode	 57790F	Local start / stop
	 59161F	
	 57791F	Remote start / stop
	 57792F	Network control
Automatic restart after voltage failure	 57793F	Automatic restart after voltage failure is active
Week timer	 57794F	Week timer is active
Active protection functions	 57795F	Emergency stop
	 57796F	Shutdown
	 57797F	Warning
Service	 57798F	Service required



Main screen display	 59162F	Value lines display icon
	 82196F	Chart display icon
General icons	 81105D	No communication / network problem
	 82418D	Not valid

### Input icons

Icon	Description
 57796F	Pressure
 57800F	Temperature
 57801F	Digital input
 57802F	Special protection

### System icons

Icon	Description
 57803F	Compressor element (LP, HP, ...)
 57804F	Dryer
 57805F	Fan
 57806F	Frequency converter
 57807F	Drain
 57808F	Filter
 57809F	Motor

 57810F	Failure expansion module
 81105D	Network problem
 57812F	General alarm

### Menu icons

Icon	Description
 57813F	Inputs
 57814F	Outputs
 57812F	Alarms (Warnings, shutdowns)
 57815F	Counters
 82641D	Test
 57817F	Settings
 57798F	Service
 57818F	Event history (saved data)
 57819F	Access key / User password
 57792F	Network
 57820F	Setpoint
 57867F	Info
 57794F	Weekly Timer
 82633D	Generalities



## Navigation arrows

Icon	Description
	Up
	Down

## 3.4 Main screen

### Function

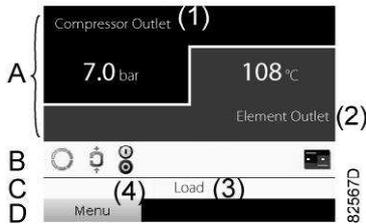
The Main screen is the screen that is shown automatically when the voltage is switched on and one of the keys is pushed. It is switched off automatically after a few minutes when no keys are pushed.

Typically, 5 different main screen views can be chosen:

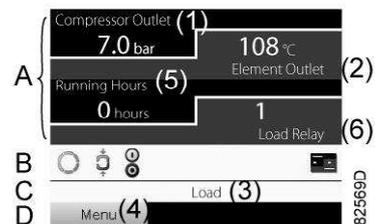
1. Two value lines
2. Four value lines
3. Chart (High resolution)
4. Chart (Medium resolution)
5. Chart (Low resolution)

### Two and four value lines screens

This type of Main screen shows the value of 2 or 4 parameters (see section Inputs menu).



*Typical Main screen (2 value lines), fixed speed compressors*



*Typical Main screen (2 value lines), compressors with frequency converter*

(1)	Compressor Outlet
(2)	Element Outlet (fixed speed compressors) Flow (compressors with frequency converter)
(3)	Load, shutdown, ... (text varies upon the compressors actual condition)
(4)	Menu
(5)	Opening Hours
(6)	Load relay (one of the input signals of fixed speed compressors) Flow (compressors with frequency converter)

- **Section A** shows information regarding the compressor operation (e.g. the outlet pressure or the temperature at the compressor outlet). On compressors with a frequency converter, the load degree (flow) is given in % of the maximum flow.

- **Section B** shows Status icons. Following icon types are shown in this field:
  - Fixed icons  
These icons are always shown in the main screen and cannot be selected by the cursor (e.g. Compressor stopped or running, Compressor status (running, running unloaded or motor stopped)).
  - Optional icons  
These icons are only shown if their corresponding function is activated (e.g. week timer, automatic restart after voltage failure , etc.).
  - Pop up icons  
These icons pop up if an abnormal condition occurs (warnings, shutdowns, service,...).
 To call up more information about the icons shown, select the icon concerned using the scroll keys and press the enter key.
- **Section C** is called the Status bar  
This bar shows the text that corresponds to the selected icon.
- **Section D** shows the Action buttons. These buttons are used:
  - To call up or program settings
  - To reset a motor overload, service message or emergency stop
  - To have access to all data collected by the regulator
 The function of the buttons depends on the displayed menu. The most common functions are:

Designation	Function
Menu	To go to the menu
Modify	To modify programmable settings
Reset	To reset a timer or message

To activate an action button, highlight the button by using the Scroll keys and press the Enter key.

To go back to the previous menu, press the Escape key.

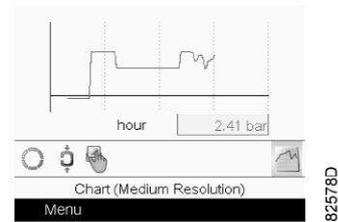
### Chart views

Instead of viewing values, it is also possible to view a graph of one of the input signals (see section Inputs menu) in function of the time.

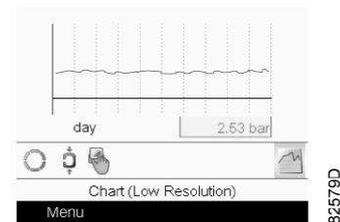


When Chart (High Resolution) is selected, the chart shows the variation of the selected input (in this case the pressure) per minute. Also the instantaneous value is displayed. The screen shows the last 4 minutes.

The switch button (icon) for selecting other screens is changed into a small Chart and is highlighted (active).



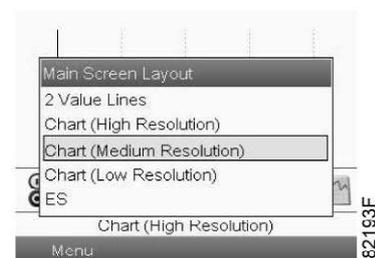
When the Chart (Medium Resolution) is selected, the chart shows the variation of the selected input per hour. The screen shows the last 4 hours.



When the Chart (Low Resolution) is selected, the chart shows the variation of the selected input per day. The screen shows the evolution over the last 10 days.

### Selection of a main screen view

To change between the different screen layouts, select the far right icon in the control icons line (see value lines display icon or chart display icon in section Icons used) and press the Enter key. A screen similar to the one below opens:



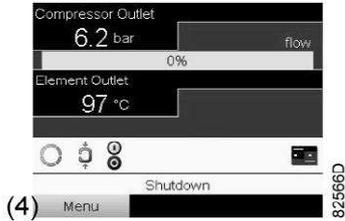
Select the layout required and press the Enter key. See also section Inputs menu.



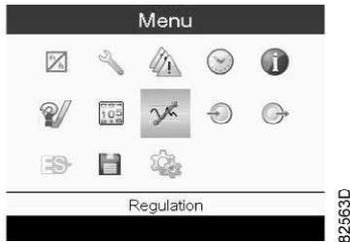
### 3.5 Calling up menus

#### Description

When the voltage is switched on, the main screen is shown automatically (see section Main screen):



- To go to the Menu screen, highlight the Menu button (4), using the Scroll keys.
- Press the Enter key to select the menu. Following screen appears:



- The screen shows a number of icons. Each icon indicates a menu item. By default, the Pressure Settings (Regulation) icon is selected. The status bar shows the name of the menu that corresponds with the selected icon.
- Use the Scroll keys to select an icon.
- Press the Escape key to return to the Main screen.

### 3.6 Inputs menu

#### Menu icon, Inputs



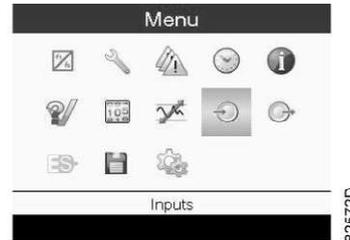
#### Function

- To display the actual value of the measured data (analog inputs) and the status of the digital inputs (e.g. emergency stop contact, motor overload relay, etc.).
- To select the digital input to be shown on the chart in the main screen.

#### Procedure

From the Main Screen (see Main Screen),

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Inputs icon, as shown in the following screen .



- Press the Enter key. A screen similar to the one below appears:



Text on image

(1)	Inputs
(2)	Compressor Outlet
(3)	Element Outlet
(4)	Ambient Air
(5)	Emergency Stop

- The screen shows a list of all inputs with their corresponding icons and readings.
- If an input is in warning or shutdown, the original icon is replaced by the warning or shutdown icon respectively (i.e. the Stop icon and the Warning icon in the screen shown above).

A small chart icon, shown below an item in the list means this input signal is shown on the chart at the main screen. Any analog input can be selected.

### Selecting another input signal as main chart signal

With the Modify button active (light grey background in above screen), press the Enter button on the controller. A screen similar to the one below appears:



(1): : Set as main chart signal

The first item in the list is highlighted. In this example, the Net Pressure is selected (chart icon).

To change, press the Enter button again: a pop-up window opens:



Press Enter again to remove this input from the chart. Another confirmation pop-up opens:



Select Yes to remove or No to quit the current action.

In a similar way, another input signal can be highlighted and selected as Main Chart signal:



### 3.7 Outputs menu

Menu icon, Outputs



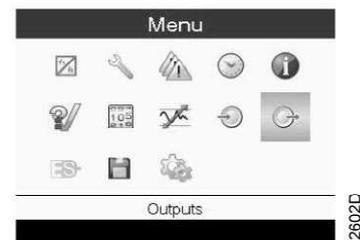
Function

To call up information regarding the actual status of some outputs such as the condition of the Fan overload contact (on air cooled compressors), the Emergency stop contact, etc.

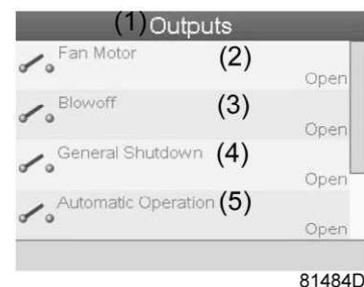
Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Move the cursor to the Outputs icon (see section below).



- Press the Enter key. A screen similar to the one below appears:



Outputs screen (typical)



Text on image

(1)	Outputs
(2)	Fan motor
(3)	Blow-off contact
(4)	General shutdown
(5)	Automatic operation

- The screen shows a list of all outputs with their corresponding icons and readings.

If an output is in warning or shutdown, the original icon is replaced by the warning or shutdown icon respectively.

### 3.8 Counters

#### Menu icon, Counters



#### Function

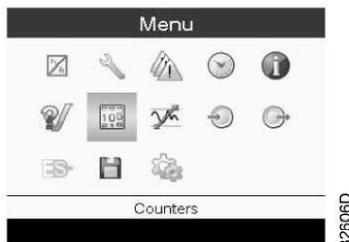
To call up:

- The running hours
- The loaded hours
- The number of motor starts
- The number of hours that the regulator has been powered
- The number of load cycles

#### Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Counters icon (see above, section Menu icon)



- Press the Enter key. Following screen appears:



Text on image

(1)	Counters
(2)	Running hours
(3)	Motor starts
(4)	Load relay
(5)	VSD 1-20 % rpm in % (the percentage of the time during which the motor speed was between 1 and 20 %) (compressors with frequency converter)

The screen shows a list of all counters with their actual readings.

**Note:** the example above is for a frequency converter driven compressor. For a fixed speed compressor, the actual screen will be somewhat different.

### 3.9 Control mode selection

#### Function

To select the control mode, i.e. whether the compressor is in local control, remote control or controlled via a local area network (LAN).

#### Procedure

Starting from the main screen, make sure the button Menu (1) is selected:



Then, use the scroll buttons to access the Status icons (see Main screen) and select the Setting icon (2). When the icon is active it is highlighted with a gray background.

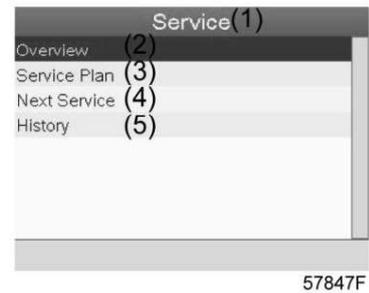
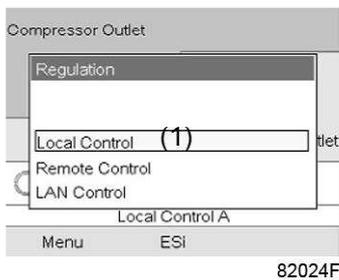
Press the enter button:



There are 3 possibilities:

- Local control
- Remote control
- LAN (network) control

- Press the Enter key. Following screen appears:



After selecting the required regulation mode, press the enter button on the controller to confirm your selection. The new setting is now visible on the main screen. See section Icons used for the meaning of the icons.

Text on image

(1)	Service
(2)	Overview
(3)	Service Plan
(4)	Next Service
(5)	History

### 3.10 Service menu

Menu icon, Service

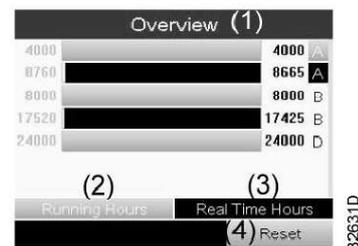


#### Function

- To reset the service plans which are carried out.
- To check when the next service plans are to be carried out.
- To find out which service plans were carried out in the past.
- To modify the programmed service intervals.

- Scroll through the items to select the desired item and press the Enter key to see the details as explained below.

#### Overview



#### Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Service icon (see below).

Text on image

(1)	Overview
(2)	Running Hours
(3)	Real Time Hours
(4)	Reset



Example for service level (A):

The figures at the left are the programmed service intervals. For Service interval A, the programmed number of running hours is 4000 hours (upper row) and the programmed number of real time hours is 8760 hours, which corresponds to one year (second row). This means that the controller will launch a service warning when either 4000 running hours or 8760 real hours are reached, whichever comes first. Note that the real time hours counter keeps counting, also when the controller is not powered.

The figures within the bars are the number of hours to go till the next service intervention. In the example above, the compressor was just started up, which means it still has 4000 running hours or 8299 hours to go before the next Service intervention.

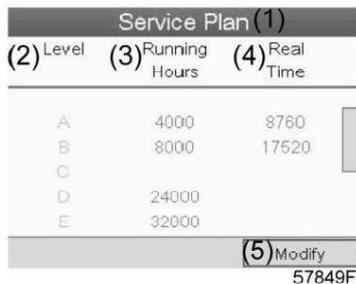
### Service plans

A number of service operations are grouped (called Level A, Level B, etc...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the controller.

When a service plan interval is reached, a message will appear on the screen.

After carrying out the service actions related to the indicated levels, the timers must be reset.

From the Service menu above, select Service plan (3) and press Enter. Following screen appears:

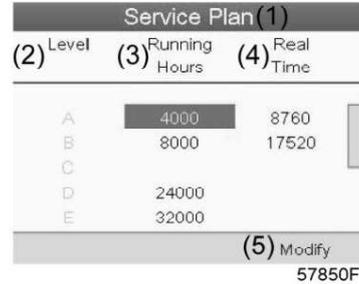


Text on image

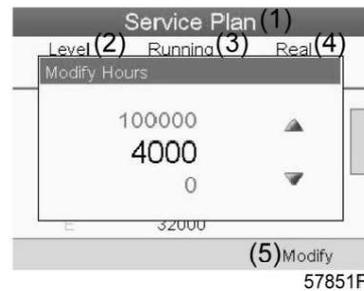
(1)	Service Plan
(2)	Level
(3)	Running Hours
(4)	Real Time (hours)
(5)	Modify

### Modifying a service plan

Dependant on the operating conditions, it can be necessary to modify the service intervals. To do so, use the Scroll keys to select the value to be modified. A screen similar to the one below appears:



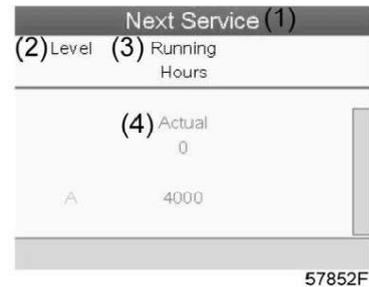
Press the Enter key. Following screen appears:



Modify the value as required using the ↑ or ↓ scroll key and press the Enter key to confirm.

**Note:** Running hours can be modified in steps of 100 hours, real-time hours can be modified in steps of 1 hour.

### Next Service



Text on image

(1)	Next service
(2)	Level
(3)	Running Hours
(4)	Actual

In the example above, the A Service level is programmed at 4000 running hours, of which 0 hours have passed.

## History

The History screen shows a list of all service actions done in the past, sorted by date. The date at the top is the most recent service action. To see the details of a completed service action (e.g. Service level, Running hours or Real time hours), use the Scroll keys to select the desired action and press the Enter key.

## 3.11 Setpoint menu

### Menu icon, Setpoint



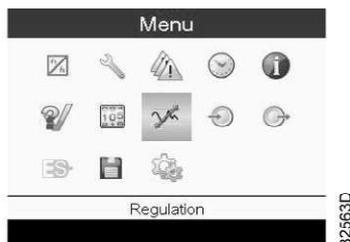
### Function

**On fixed speed compressors**, the operator can program two different pressure bands. This menu is also used to select the active pressure band.

### Procedure

Starting from the Main screen (see section Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Move the cursor to the Setpoint icon (see above, section menu icon) using the Scroll keys.



- Press the Enter key. Following screen appears:

Regulation (1)	
Unloading Pressure 1 (2)	8.0 bar
Loading Pressure 1 (3)	7.4 bar
Unloading Pressure 2 (4)	8.0 bar
Loading Pressure 2 (5)	7.4 bar
(6)	Modify

57833F

Text on image

(1)	Regulation
(2)	Unloading Pressure 1
(3)	Loading Pressure 1
(4)	Unloading Pressure 2
(5)	Loading Pressure 2
(6)	Modify

- The screen shows the actual unloading and loading pressure settings for both pressure bands. To modify the settings, move the cursor to the action button Modify and press the Enter key. Following screen appears:

Regulation (1)	
Unloading Pressure 1 (2)	8.0 bar
Loading Pressure 1 (3)	7.4 bar
Unloading Pressure 2 (4)	8.0 bar
Loading Pressure 2 (5)	7.4 bar
(6)	Modify

57834F

- The first line of the screen is highlighted. Use the Scroll keys to highlight the setting to be modified and press the Enter key. Following screen appears:

Regulation (1)	
Unloading Pressure 1 (2)	8.0 bar
Unloading Pressure 1 (2)	8.5
Unloading Pressure 1 (2)	8.0 bar
Unloading Pressure 1 (2)	7.5
(3)	Modify

57835F

- The upper and lower limit of the setting is shown in grey, the actual setting is shown in black. Use the ↑ or ↓ key of the Scroll keys to modify the settings as required and press the Enter key to accept.

If necessary, change the other settings as required in the same way as described above.

## 3.12 Event history menu

### Menu icon, Event History





**Function**

To call up the last shutdown and last emergency stop data.

**Procedure**

Starting from the Main screen (see section Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Event History icon (see above, section Menu icon).



- Press the Enter key. The list of last shutdown and emergency stop cases is shown.



*Example of Event History screen*

- Scroll through the items to select the desired shutdown or emergency stop event.
- Press the Enter key to find the date, time and other data reflecting the status of the compressor when that shutdown or emergency stop occurred.

**3.13 Week timer menu**

**Menu icon, Week timer**



**Function**

- To program time-based start/stop commands for the compressor

- To program time-based change-over commands for the net pressure band
- Four different week schemes can be programmed.
- A week cycle can be programmed, a week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

**Procedure**

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Use the Scroll buttons to select the Timer icon. (see the section below)



- Press the Enter key on the controller. Following screen appears:



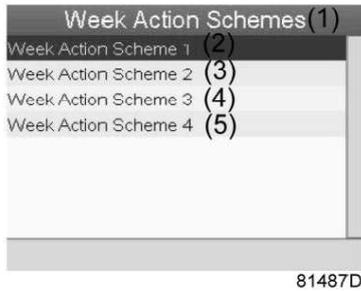
Text on image

(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

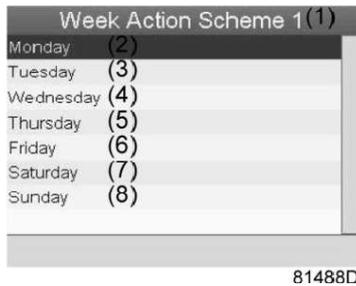
The first item in this list is highlighted in red. Select the item requested and press the Enter key on the controller to modify.

**Programming week schemes**

- Select Week action schemes and press Enter. A new window opens. The first item in the list is highlighted in red. Press the Enter key on the controller to modify Week Action Scheme 1.

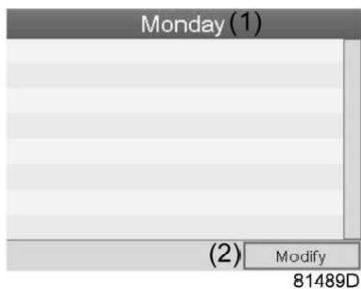


(1)	Week Action Schemes
(2)	Week Action Schemes 1
(3)	Week Action Schemes 2
(4)	Week Action Schemes 3
(5)	Week Action Schemes 4



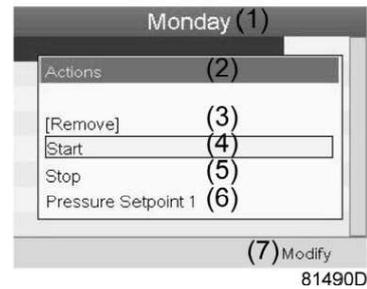
(1)	Week Action Scheme 1
(2)	Monday
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Saturday
(8)	Sunday

- A new window opens. The Modify action button is selected. Press the enter button on the controller to create an action.



(1)	Monday
(2)	Modify

- A new pop-up window opens. Select an action from this list by using the Scroll keys on the controller. When ready press the Enter key to confirm.



(1)	Monday
(2)	Actions
(3)	Remove
(4)	Start
(5)	Stop
(6)	Pressure Setpoint 1
(7)	Modify

- A new window opens. The action is now visible in the first day of the week.



(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

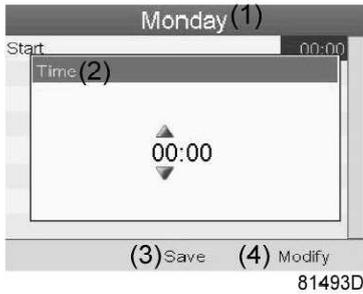
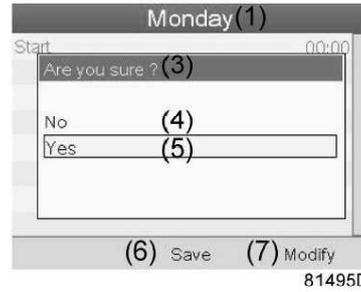
- To adjust the time, use the Scroll keys on the controller and press the Enter key to confirm.





(1)	Monday
(2)	Start
(3)	Save
(4)	Modify

- A pop-up window opens. Use the ↑ or ↓ key of Scroll keys to modify the values of the hours. Use the ← or → Scroll keys to go to the minutes.



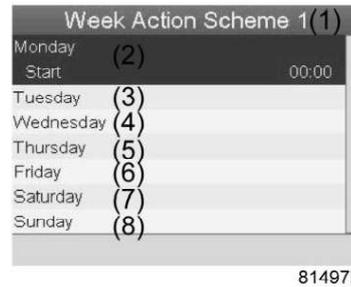
(1)	Monday
(3)	Are you sure?
(4)	No
(5)	Yes
(6)	Save
(7)	Modify

Press the Escape key to leave this window.

- The action is shown below the day the action is planned.

(1)	Monday
(2)	Time
(3)	Save
(4)	Modify

- Press the Escape key on the controller. The action button Modify is selected. Use the Scroll keys to select the action Save.



(1)	Week Action Scheme 1
(2)	Monday - Star
(3)	Tuesday
(4)	Wednesday
(5)	Thursday
(6)	Friday
(7)	Friday
(8)	Sunday



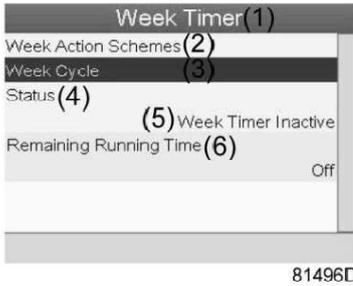
Press the Escape key on the controller to leave this screen.

### Programming the week cycle

A week cycle is a sequence of 10 weeks. For each week in the cycle, one of the four programmed week schemes can be chosen.

- A new pop-up window opens. Use the Scroll keys on the controller to select the correct actions. Press the Enter key to confirm.

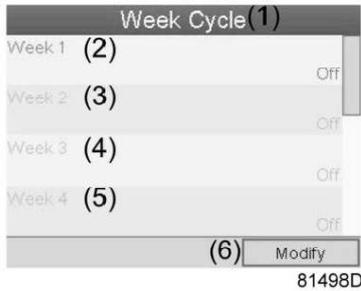
- Select Week Cycle from the main Week Timer menu list.



(1)	Week Cycle
(2)	Week 1
(3)	Week Action Scheme 1
(4)	Week Action Scheme 2
(5)	Week Action Scheme 3
(6)	Modify

(1)	Week Timer
(2)	Week Action Scheme
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

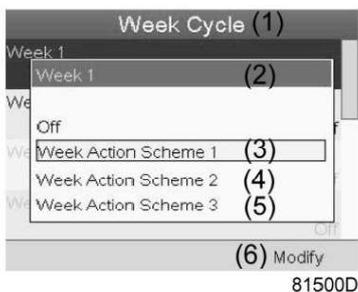
- A list of 10 weeks is shown



(1)	Week Cycle
(2)	Week 1
(3)	Week 2
(4)	Week 3
(5)	Week 4
(6)	Modify

Press twice the Enter key on the controller to modify the first week.

- A new window opens. Select the action, example: Week Action Scheme 1

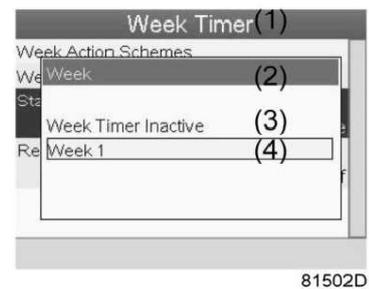


- Check the status of the Week Timer  
Use the Escape key on the controller to go back to the main Week Timer menu. Select the status of the Week Timer.



(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Week Timer Inactive
(6)	Remaining Running Time

- A new window opens. Select Week 1 to set the Week Timer active.



(1)	Week Timer
(2)	Week
(3)	Week Timer Inactive
(4)	Week 1

- Press the Escape key on the controller to leave this window. The status shows that week 1 is active.



(1)	Week Timer
(2)	Week Action Schemes
(3)	Remaining Running Time

### 3.14 Test menu

#### Menu icon, Test



(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

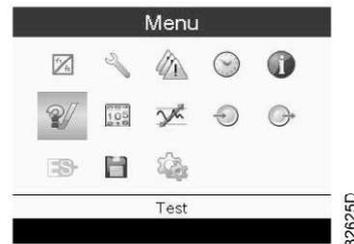
#### Function

- Press the Escape key on the controller to go to the main Week Timer menu. Select Remaining Running Time from the list and press the Enter key on the controller to Modify.

#### Procedure

Starting from the Main screen (see Main screen):

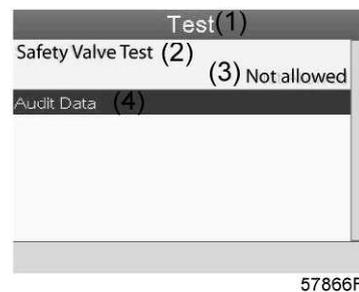
- Move the cursor to the action button Menu and press the Enter key.
- Using the scroll keys (1), move the cursor to the test icon (see the section below).



(1)	Week Timer
(2)	Week Action Schemes
(3)	Week Cycle
(4)	Status
(5)	Remaining Running Time

- Press the enter key, following screen appears:

- This timer is used when the week timer is set and for certain reasons the compressor must continue working, for example, 1 hour, it can be set in this screen. This timer is prior to the Week Timer action.



#### Text on image

(1)	Test
(2)	Safety Valve Test
(3)	Not allowed
(4)	Audit Data



- The safety valve test can only be performed by authorized personnel and is protected by a security code.
- Select the item display test and press the enter key. A screen is shown to inspect the display, at the same time all LED's are lit.

### 3.15 Modifying general settings

#### Menu icon, Settings



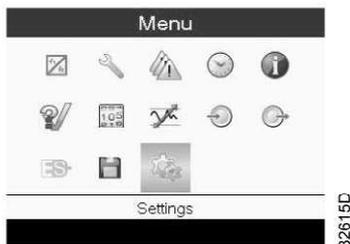
#### Function

To display and modify a number of settings.

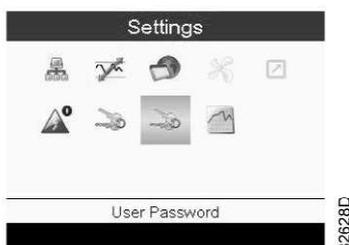
#### Procedure

Starting from the Main screen (see Main screen),

- Move the cursor to the action button Menu and press the Enter key.
- Using the Scroll keys, move the cursor to the Settings icon ((see above, section menu icon).



- Press the Enter key. Following screen appears:



- This screen shows again a number of icons. By default, the User Password icon is selected. The status bar shows the description that corresponds with the selected icon. Each icon covers one or more items.

### 3.16 General Menu

#### Menu icon, General



#### Function

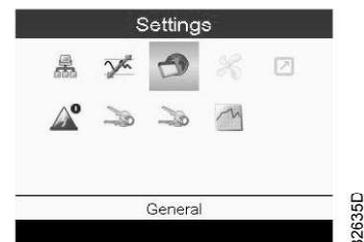
This menu comprises a list of general parameters:

- Language
- Hour
- Date
- Date Format
- Units

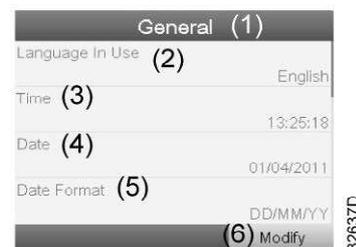
#### Procedure

Starting from the submenu screen (see Changing General Parameters),

- Using the Scroll keys, move the cursor to the General icon (see section below).



- Press the Enter key. Following screen appears:

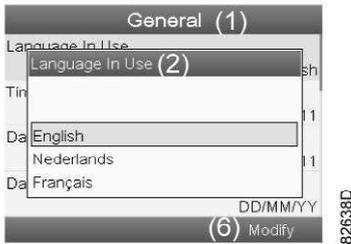


Text on image

(1)	General
(2)	Language in Use
(3)	Time
(4)	Date
(5)	Date Format
(6)	Modify



- A screen similar to the one above is shown, the first item (Language) is highlighted. Use the ↓ key to select of the Scroll keys to select the setting to be modified and press the Enter key.
- To modify, select the Modify button using the Scroll keys and press the Enter key.
- A pop-up screen appears. Use the ↑ or ↓ key to select the required value and press the Enter key to confirm.



### 3.17 User password menu

#### Menu icon, Password



#### Function

The end customer can activate and select a personal password. If the password option is activated, it is impossible for not authorized persons to modify any setting.

#### Procedure

Starting from the submenu screen (see Changing General Parameters),

- Using the Scroll keys, select the Settings icon (see section above)



- Press the Enter key. Following screen appears.



- Select the Activate button and press the Enter key.
- Then fill in the User Password and press the Enter key; a confirmation window is displayed.
- Fill in the password again and press the Enter key to confirm.



Text on image

(1)	User Password
(2)	Inactive
(3)	Activete

### 3.18 Access Key Menu

#### Menu icon, Access Key



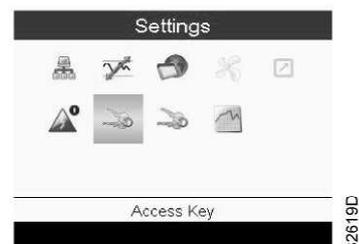
#### Function

The Menu screen has only a few basic icons. Using the Access Key with the appropriate access code allows the user to see more icons or access more parameters.

#### Procedure

Starting from the submenu screen (see Changing General Parameters),

- using the using the Scroll keys, move the cursor to the Access Key icon (see section above)



- There are three levels of access.
- 0: It is possible to view a basic set of parameters, without the need for a password.

- 1: It is possible to modify a basic set of parameters.
- 2: It is possible to view and modify additional parameters.
- Access Level can be changed via the Modify button. A warning window will be activated requesting the introduction of an Access Key.



### 3.19 Programmable settings

#### Parameters: unloading/loading pressures

	Minimum setting	Factory setting	Maximum setting
Unloading/loading pressures	consult Compressor data	consult Compressor data	consult Compressor data

#### Parameters: variable speed drive

		Minimum setting	Factory setting	Maximum setting
Motor running time in star	sec	NA	NA	NA
Load delay time (star-delta)	sec	NA	NA	NA
Number of motor starts	starts/day	NA	NA	NA
Minimum stop time	sec	10	10	30
Programmed stop time	sec	0	3	20
Power recovery time (ARAVF)	sec	30	30	3600
Restart delay	sec	0	0	1200
Communication time-out	sec	10	30	60

#### Protections

		Minimum setting	Factory setting	Maximum setting
Compressor element outlet temperature (shut down warning level)	°C	50	113	119
	°F	122	235	246
Compressor element outlet temperature (shut down level)	°C	111	120	120
	°F	232	248	248



## Service plan

The built-in service timer will give a Service warning message after a preprogrammed time interval has elapsed.

Also see section Preventive maintenance schedule.

Consult Chicago Pneumatic if a timer setting has to be changed. See section Calling up/modifying service timer settings. The intervals must not exceed the nominal intervals and must coincide logically.

## Terminology

<b>Termo</b>	<b>Explicação</b>
ARAVF	Automatic restart after voltage failure. See section Controller.
Power recovery time	Is the period within which the voltage must be restored to have an automatic restart. Is accessible if the automatic restart is activated. To activate the automatic restart function, consult Chicago Pneumatic.
Restart delay	This parameter allows to programme that not all compressors are restarted at the same time after a power failure (ARAVF active).
Compressor element outlet temperature	The regulator does not accept inconsistent settings, e.g. if the warning level is programmed at 95 °C (203 °F), the minimum limit for the shut-down level changes to 96 °C (204 °F). The recommended difference between the warning level and shut-down level is 10 °C (18 °F).
Delay at shut down signal	Is the time for which the signal must exist before the compressor is shut down. If it is required to program this setting to another value, consult Chicago Pneumatic.
Minimum stop time	Once the compressor has automatically stopped, it will remain stopped for the minimum stop time, whatever happens with the net air pressure. Consult Chicago Pneumatic if a setting lower than 20 seconds is required.
Unloading/ Loading pressure	The regulator does not accept illogical settings, e.g. if the unloading pressure is programmed at 7.0 bar(e) (101 psi(g)), the maximum limit for the loading pressure changes to 6.9 bar(e) (100 psi(g)). The recommended minimum pressure difference between loading and unloading is 0.6 bar (9 psi(g)).

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## 4 Installation

### 4.1 Installation remarks

#### General



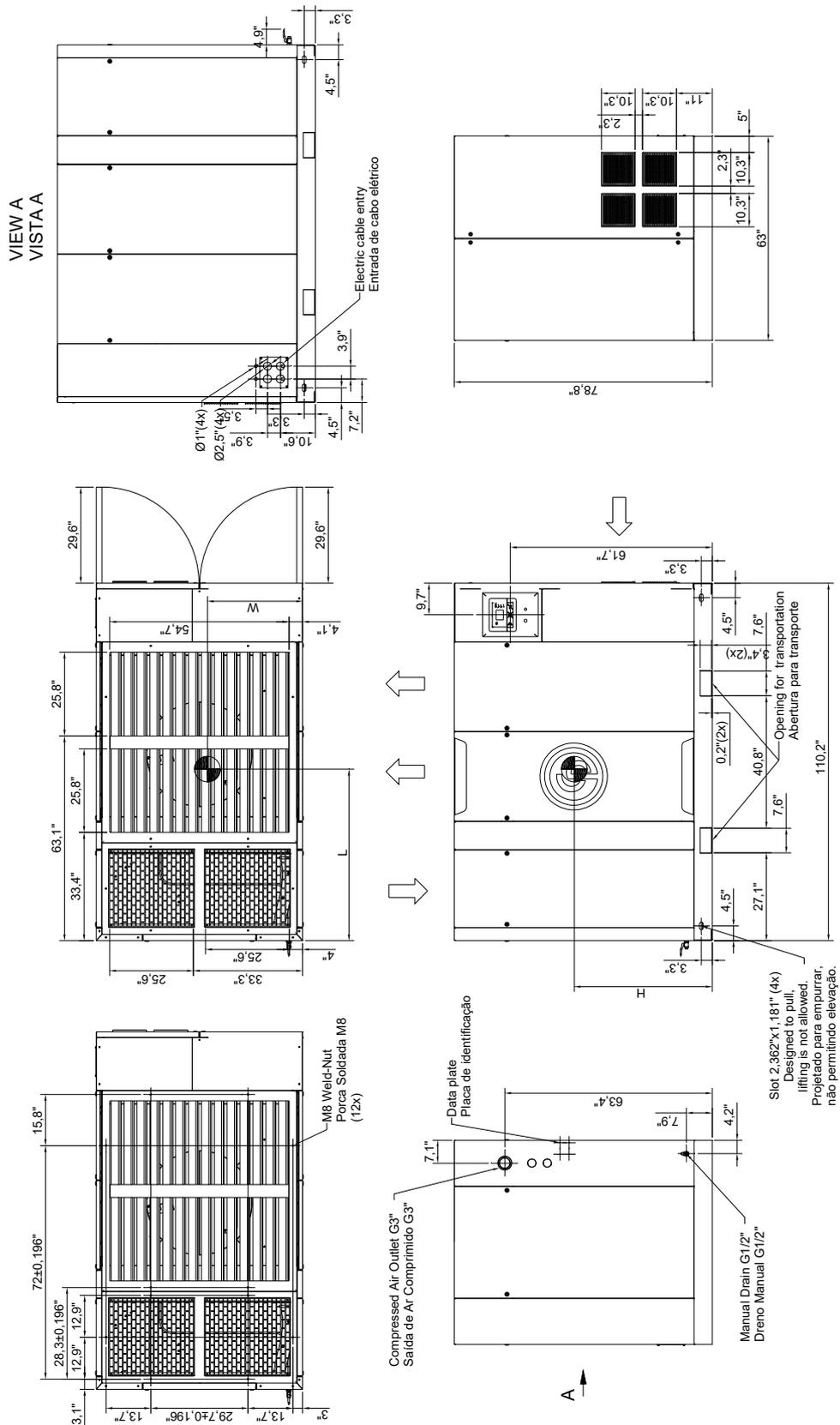
- The compressor is intended for indoor use only.
- Working with machinery controlled by a frequency converter requires special safety precautions, which depend on the type of network (TN, TT or IT). Consult Chicago Pneumatic.

#### Safety precautions for the frequency converter



- This equipment is used in high-voltage installations. During operation, this equipment contains rotating and live, bare parts. For this reason, they could cause severe injury or significant material damage if the required covers are removed or have not been properly maintained.
- When the machines are used in non-industrial areas, the installation location must be protected against unauthorized access (protective fencing, appropriate signs).
- All connection procedures must be carried out with the cabinet de-energized. All the work on the units must be carried out by trained personnel only. Death, serious injury, or substantial material damage can result if these warnings are not taken into account.
- Work on an open device must be carried out with extreme caution because external supply voltages may be present. The power and control terminals may be live even when the motor is not running. Dangerously high voltage levels are still present in the cabinet up to five minutes after it has been disconnected due to the DC link capacitors. For this reason, the cabinet should not be opened until after a reasonable period of time has elapsed.
- The operator is responsible for ensuring that the Power Module and other components are installed and connected in accordance with the recognized technical rules in the country of installation and applicable regional guidelines. Special attention should be paid to cable dimensioning, fuses, grounding, shutdown, disconnection, and overcurrent protection.
- If an item of protecting gear trips in a branch circuit, a leakage current may have been disconnected. To reduce the risk of fire or an electric shock, the current-carrying parts and other components in the cabinet unit should be inspected and damaged parts replaced. When an item of protective gear trips, the cause of tripping must be identified and rectified.
- The storage period should not exceed two years. If the device is stored for more than two years, the DC link capacitors of the devices must be reformed during commissioning. Consult Chicago Pneumatic for the reforming procedure.





Dimension drawing CPVS200, 1028 9235 10-01, imperial units

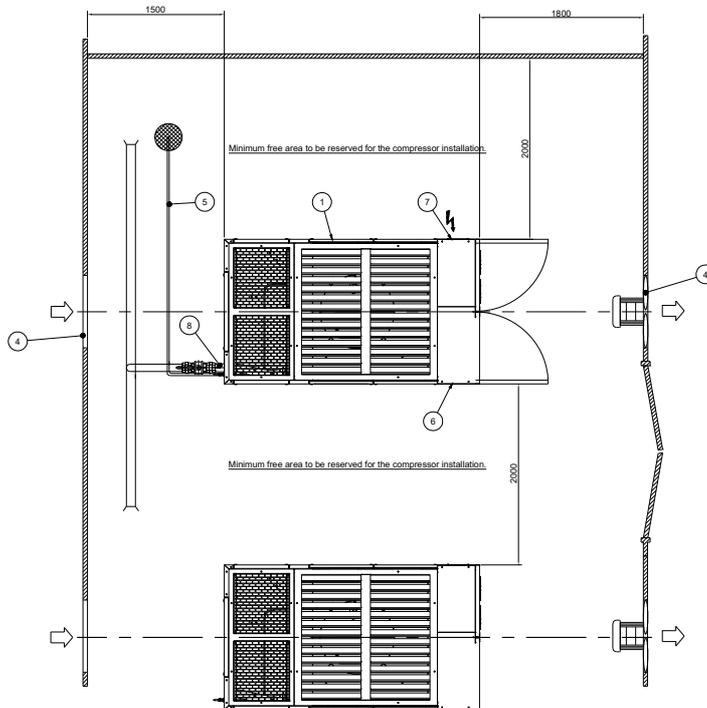
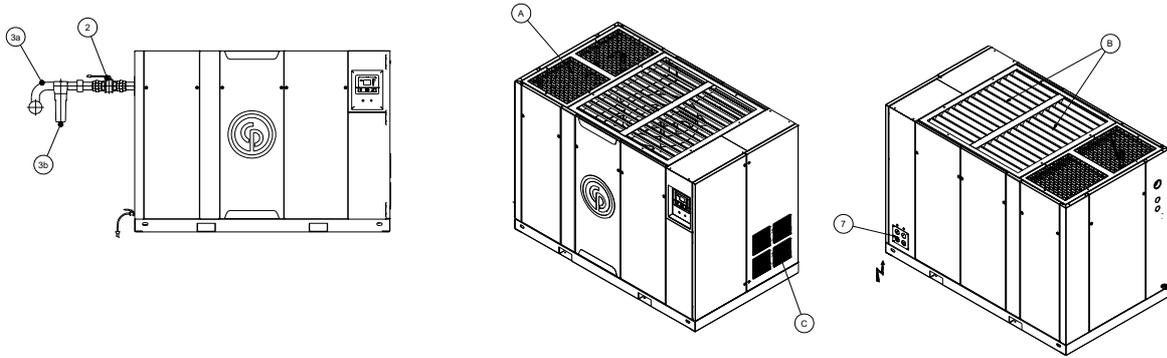






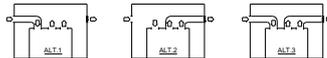
### 4.3 Installation proposal

#### Compressor room example

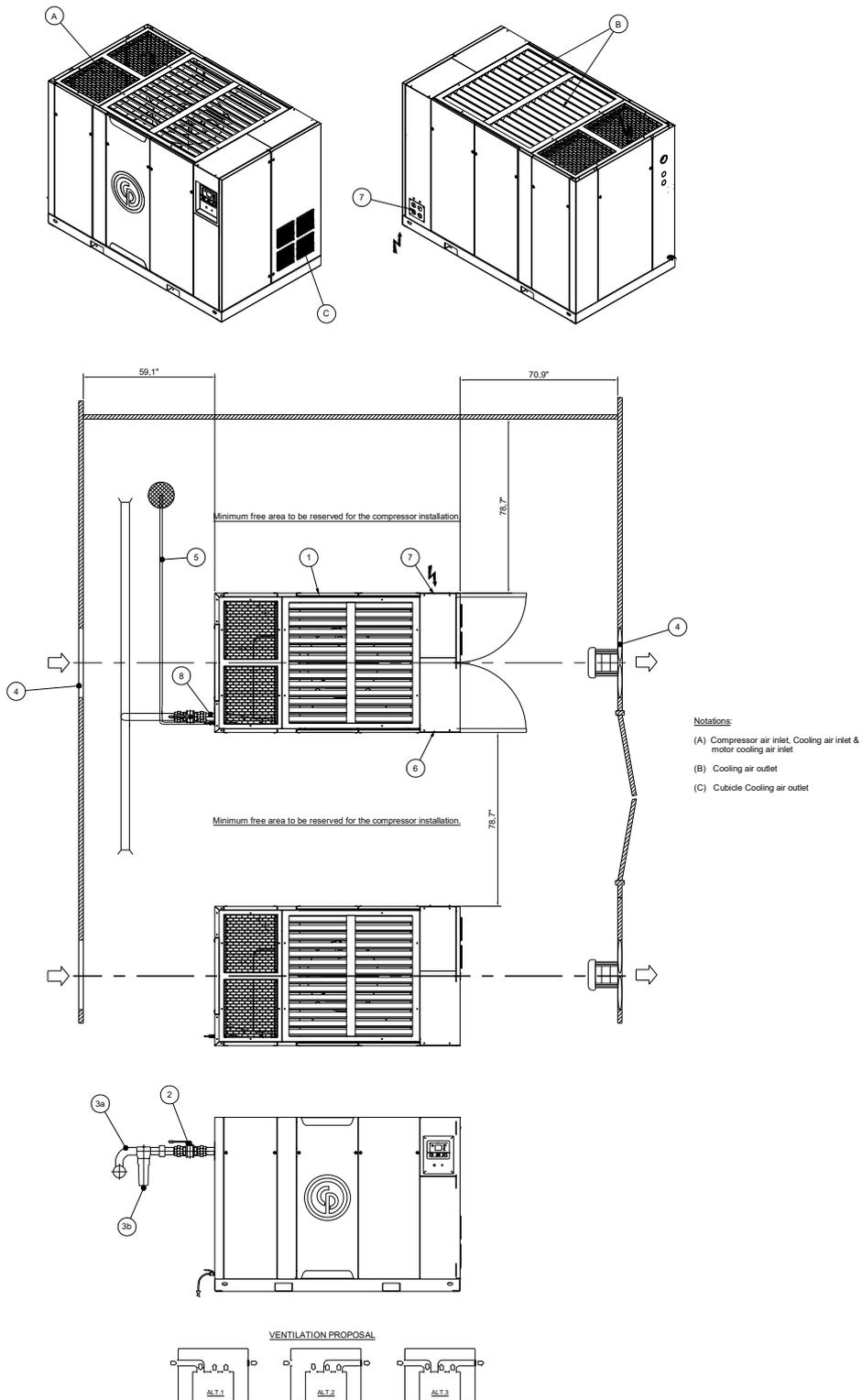


- Notations:**
- (A) Compressor air inlet, Cooling air inlet & motor cooling air inlet
  - (B) Cooling air outlet
  - (C) Cubicle Cooling air outlet

**VENTILATION PROPOSAL**

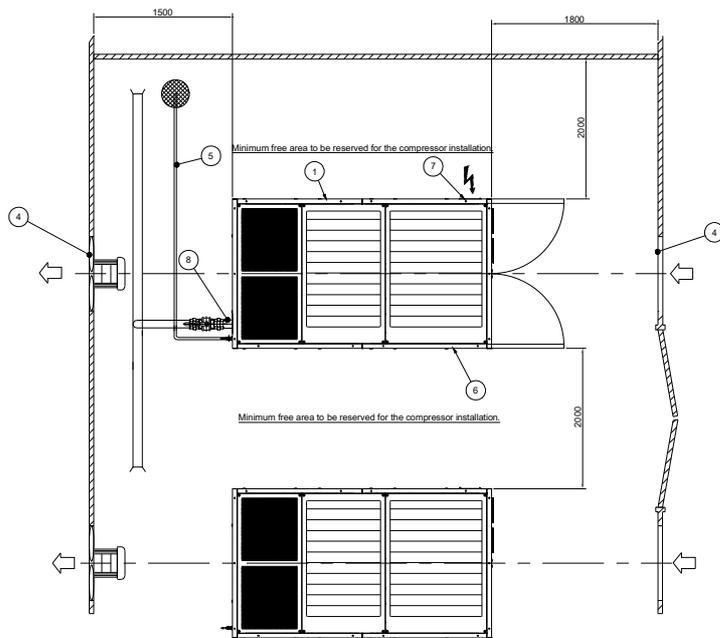
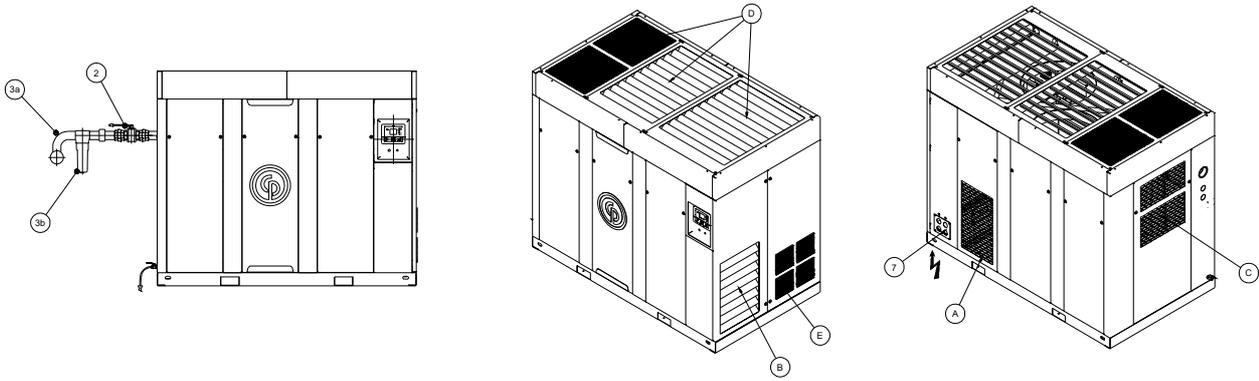


- NOTES:**
- For more information concerning air nets, cooling systems, etc refer to the compressor installation manual.
  - All pipes should be installed stress-free to the compressor unit.
  - For dimensions and air flow directions refer to the AHB dimensions drawings



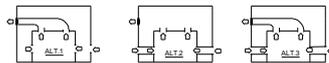
Notations:  
 (A) Compressor air inlet, Cooling air inlet & motor cooling air inlet  
 (B) Cooling air outlet  
 (C) Cubicle Cooling air outlet

**NOTES:**  
 -For more information concerning air nets, cooling systems, etc refer to the compressor installation manual.  
 -All pipes should be installed stress-free to the compressor unit.  
 -For dimensions and air flow directions refer to the AHB dimensions drawings

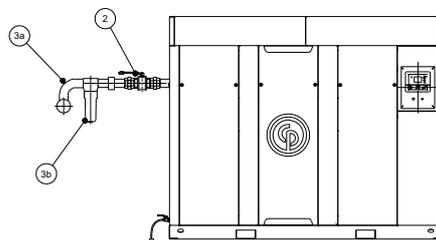
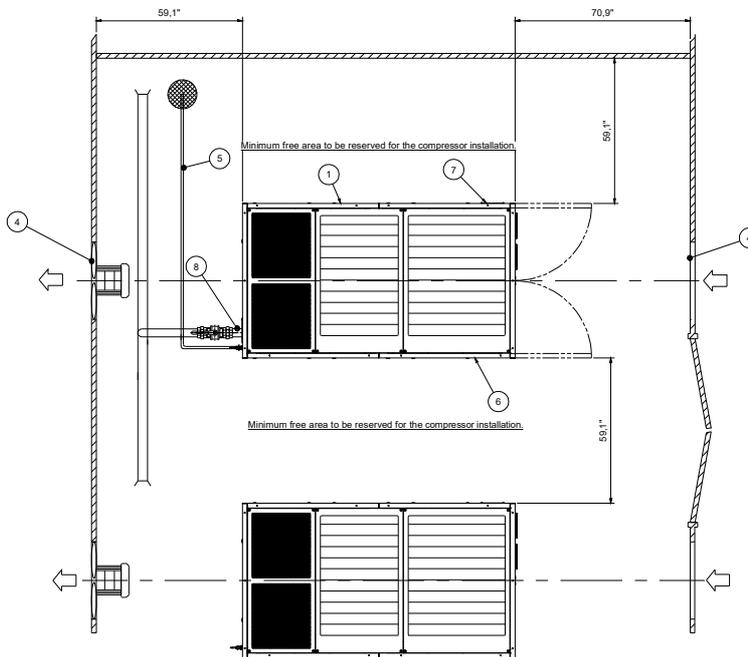
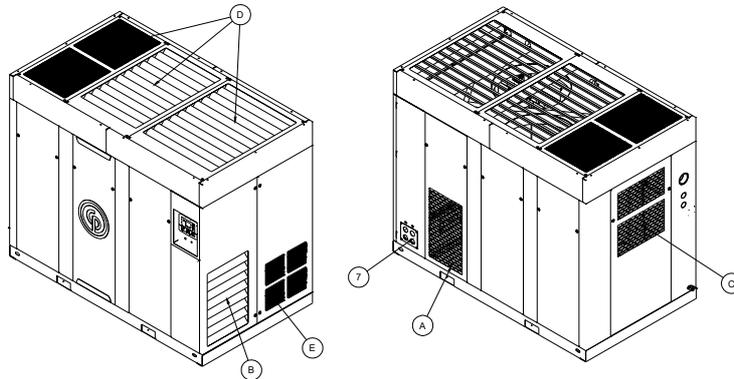


- Notations:**
- A) Compressor air inlet & Cooling air inlet
  - B) Cooling air inlet & motor cooling air inlet
  - C) Cooling air inlet
  - D) Cooling air & motor ventilation outlet
  - E) Cubicle cooling air inlet

**VENTILATION PROPOSALS**



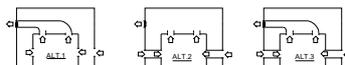
**NOTES:**  
 -For more information concerning air nets, cooling systems, etc refer to the compressor installation manual.  
 -All pipes should be installed stress-free to the compressor unit.  
 -For dimensions and air flow directions refer to the AHB dimensions drawings.



**Notations:**

- A) Compressor air inlet & Cooling air inlet
- B) Cooling air inlet & motor cooling air inlet
- C) Cooling air inlet
- D) Cooling air & motor ventilation outlet
- E) Cubicle cooling air inlet

**VENTILATION PROPOSALS**



**NOTES:**  
 -For more information concerning air nets, cooling systems, etc refer to the compressor installation manual.  
 -All pipes should be installed stress-free to the compressor unit.  
 -For dimensions and air flow directions refer to the AHB dimensions drawings.



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## Phase Description

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**1** Compressor unit:  
The unit should be installed on a level floor capable of taking the weight of the compressor.

**2** Compressed air outlet valve. (not in scope of supply)

**3 (3a)** Delivery pipe:  
The maximum total pipe length can be calculated from:

$$L = (\Delta p \times d^5 \times p) / (450 \times Q_c^{1.85})$$

L is the length of the pipe (m)

$\Delta P$  is the max. allowable pressure drop (recommended 0.1 bar)

d is the inner diameter of the pipe (mm)

P is the absolute pressure at the compressor outlet (bar)

$Q_c$  is the compressor FAD (l/s)

The connection of the compressor air delivery pipe should be made on top of the main air net pipe to minimize carry-over of possible remainder of condensate.

**(3b)** A separate condensate separator is highly recommended. Compressor variants may contain substantial amounts of free water in the compressed air which could damage the customer installation if not anticipated.

**4** Ventilation:  
The inlet grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor is avoided. The air velocity to the grids has to be limited to 5 m/s.

The maximum allowable pressure drop over all cooling air ducts together is 30 Pa.

The maximum air temperature at the compressor intake opening is 40°C; minimum 0°C.

Alternative 1 :

The required ventilation to limit the compressor room temperature can be calculated from

$$Q_v = (0,92 N) / DT$$

$Q_v$  is the required ventilation capacity (m<sup>3</sup>/s)

N is the shaft input of the compressor (kw)

DT is the compressor room temperature over the outdoor temperature (°C)

**5.** Drain pipes to condensate collector. The drain pipes may not enter in the collector.

Individual drain pipes may not be interconnected, to avoid interference.

Compressor condensate contains oil. Depending on local legislation it is recommended to install an oil/water separator consult Chicago Pneumatic.

**6** Control cubicle with monitoring panel.

**7** Mains cable entry.

**8.** Air outlet connection.  
(not in standard scope of supply)

### NOTES:

- For more information concerning air nets, cooling systems, etc refer to the compressor installation manual.
- All pipes should be installed stress-free to the compressor unit.
- For dimensions and air flow directions refer to the AHB dimensions drawings

## 4.4 Electrical connections

The electrical connection diagrams are provided on the pen drive that comes with the equipment in .pdf format as it is illegible if placed inside this manual.

## 4.5 Size of cables, fuses and breaker adjustments

### Warning



Dimensioning performed according to NBR5410 standard for the following conditions:

Local regulations will apply if more stringent than the values proposed below;

Voltage drop cannot exceed 5% of rated voltage. It may be necessary to use cables with a section larger than indicated to fulfill this requirement;

Maximum length of cables = 30 m;

Maximum ambient temperature = 40°C;

MODE	Voltage	I tot	Fusible
CPVS200	380V	352	3x 500A aR
	440V	350	
CPVS270	380V	419	3x 630A aR
	440V	416	
CPVS340	380V	513	3x 800A aR
	440V	511	

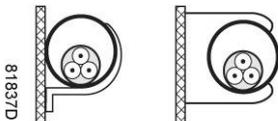
### Note:

\***I tot**: values without factor corrections. Just **I tot** of the equipment.

### Cable dimension according to IEC standard

The following tables indicate the cable energy carrying capacities for 3 most common installation methods, calculated according to 60364-5-52 - electrical installations of buildings, part 5 - selection and construction equipment, and section 52 - energy transport capabilities in cabling systems.

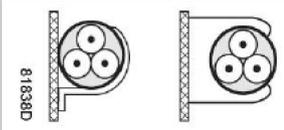
The permissible currents are valid for PVC-insulated cables with three charged copper conductors (maximum conductor temperature: 70 °C),



Installation method B2, according to table B.52.1.  
Multi-axial cable and in conduit on wooden wall

Maximum allowable current as a function of ambient temperature for installation method B2

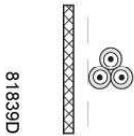
Cable section	Ambient temperature				
	30 °C	40 °C	45 °C	50 °C	55 °C
4 mm <sup>2</sup>	< 27 A	< 23 A	< 21 A	< 19 A	< 16 A
6 mm <sup>2</sup>	< 34 A	< 30 A	< 27 A	< 24 A	< 21 A
10 mm <sup>2</sup>	< 46 A	< 40 A	< 36 A	< 33 A	< 28 A
16 mm <sup>2</sup>	< 62 A	< 54 A	< 49 A	< 44 A	< 38 A
25 mm <sup>2</sup>	< 80 A	< 70 A	< 63 A	< 57 A	< 49 A
35 mm <sup>2</sup>	< 99 A	< 86 A	< 78 A	< 70 A	< 60 A
50 mm <sup>2</sup>	< 118 A	< 103 A	< 93 A	< 84 A	< 72 A
70 mm <sup>2</sup>	< 149 A	< 130 A	< 118 A	< 106 A	< 91 A
95 mm <sup>2</sup>	< 179 A	< 156 A	< 141 A	< 127 A	< 109 A
120 mm <sup>2</sup>	< 206 A	< 179 A	< 163 A	< 146 A	< 126 A



Installation method C, according to table B.52.1.  
Single-conductor or multi-axial cable on wooden wall

Maximum allowable current depending on ambient temperature for installation method C

Cable section	Ambient temperature				
	30 °C	40 °C	45 °C	50 °C	55 °C
4 mm <sup>2</sup>	< 32 A	< 28 A	< 25 A	< 23 A	< 20 A
6 mm <sup>2</sup>	< 41 A	< 36 A	< 32 A	< 29 A	< 25 A
10 mm <sup>2</sup>	< 57 A	< 50 A	< 45 A	< 40 A	< 35 A
16 mm <sup>2</sup>	< 76 A	< 66 A	< 60 A	< 54 A	< 46 A
25 mm <sup>2</sup>	< 96 A	< 84 A	< 76 A	< 68 A	< 59 A
35 mm <sup>2</sup>	< 119 A	< 104 A	< 94 A	< 84 A	< 73 A
50 mm <sup>2</sup>	< 144 A	< 125 A	< 114 A	< 102 A	< 88 A
70 mm <sup>2</sup>	< 184 A	< 160 A	< 145 A	< 131 A	< 112 A
95 mm <sup>2</sup>	< 223 A	< 194 A	< 176 A	< 158 A	< 136 A
120 mm <sup>2</sup>	< 259 A	< 225 A	< 205 A	< 184 A	< 158 A



Installation method F, according to table B.52.1.  
Single-conductor cables, in contact with open air  
Distance from the wall not less than the diameter of a cable

Maximum allowable current in Function of ambient temperature for installation method F

Cable section	Ambient temperature				
	30 °C	40 °C	45 °C	50 °C	55 °C
25 mm <sup>2</sup>	< 110 A	< 96 A	< 87 A	< 78 A	< 67 A
35 mm <sup>2</sup>	< 137 A	< 119 A	< 108 A	< 97 A	< 84 A
50 mm <sup>2</sup>	< 167 A	< 145 A	< 132 A	< 119 A	< 102 A
70 mm <sup>2</sup>	< 216 A	< 188 A	< 171 A	< 153 A	< 132 A
95 mm <sup>2</sup>	< 264 A	< 230 A	< 209 A	< 187 A	< 161 A
120 mm <sup>2</sup>	< 308 A	< 268 A	< 243 A	< 219 A	< 188 A

---

### Calculation method for IEC:

- Single power cables (3 phases + PE - configuration (1)):
  - Add 10% to the total compressor current ( $I_{\text{tot Pack}}$  or  $I_{\text{tot FF}}$  from the tables).
  - Install the recommended fuse in each cable.
- Parallel power cable (2 x 3 phases + PE - configuration (2)):
  - Add 10% to the total compressor current ( $I_{\text{tot Pack}}$  or  $I_{\text{tot FF}}$  from the tables) and divide by 2
  - Multiply the current capacity of the cables by 0.8 (see table A.52.17 (52-E1))
  - Install fuses with half the maximum size recommended for fuses in each cable.
- When using 2 x 3 phases + PE as in (3):
  - Add 10% to the total compressor current ( $I_{\text{tot Pack}}$  or  $I_{\text{tot FF}}$  from the tables) and divide by  $\sqrt{3}$
  - Multiply the current capacity of the cables by 0.8 (see table A.52.17 (52-E1))
  - Fuse Size: The maximum recommended fuse size divided by  $\sqrt{3}$  on each cable.
- Dimension of PE cable:
  - For power cables up to 35 mm<sup>2</sup>: the same dimension as the power cables
  - or power cables larger than 35 mm<sup>2</sup>: half the size of the power cables

Always check the voltage drop along the cable (a value less than 5% of the rated voltage is recommended).

**Example:**  $I_{\text{tot}} = 89 \text{ A}$ , maximum ambient temperature is 45 °C, recommended fuse = 100 A

- Simple power supply cables (3 phases + PE - configuration (1)):
  - $I = 89 \text{ A} + 10\% = 89 \times 1,1 = 97,9 \text{ A}$
  - The table for B2 and ambient temperature = 45 °C allows a maximum current of 93 A for a 50 mm<sup>2</sup> cable. For a 70 mm<sup>2</sup> cable, the maximum allowable current is 118 A, which is sufficient. Therefore, use a 3 x 70 mm<sup>2</sup> + 35 mm<sup>2</sup> cable. If method C is used, 50 mm<sup>2</sup> is enough. (35 mm<sup>2</sup> or method F) => de 3 x 50 mm<sup>2</sup> + 25 mm<sup>2</sup> cable.
- Parallel power cable (2 x 3 phases + PE - configuration (2)):
  - $I = (89 \text{ A} + 10\%) / 2 = (89 \times 1,1) / 2 = 49 \text{ A}$
  - For a 25 mm<sup>2</sup> cable, B2 at 45 °C, the maximum current is 63 A x 0,8 = 50,4 A. Therefore, 2 parallel cables of 3 x 25 mm<sup>2</sup> + 25 mm<sup>2</sup> are sufficient.
  - Install 50 A fuses in each cable instead of 100 A.



## 4.6 Electric connections

### General instruction for the electrical installation of VSD compressors

- Electrical equipment from Chicago Pneumatic Compressor is designed in accordance with the safety regulations described in IEC60204-1 and CENELEC EN60204.
- It is the responsibility of the customer to install the compressor unit according to the safety regulations in order to protect people from electric shocks from direct or indirect contact.
- In drives with frequency converters, leakage currents occur along the RFI filter and the cable capacities, especially during the motor start. Class A leakage detection protections would switch off the machine. Therefore it is not recommended to use class A detection systems on frequency converters.

### Installation instructions for TN, TT, IT

In each network system (TN, TT or IT), the customer has to protect the installation using overcurrent protection by means of fuses or automatic circuit breaker protection.

With respect to the power distribution system, additional installation instructions are given.

#### Network type TN (TN-S, TN-C and TN-C-S)

No additional protections need to be installed. If the customer wishes to or needs to install a leakage detection device, it should be of type B and should comply with IEC755 Amendment 2 "General requirements for residual current-operated protective devices".

Chicago Pneumatic advises customers to install the following earth leakage detection device: BENDER RCMA 470LY with external current transformer: <http://www.bender.org/prod.html>.

#### Network type TT

In the case of TT-systems, safety regulations mostly stipulate the use of an earth leakage circuit breaker (e.l.c.b). In combination with frequency converters, type B residual current-operated protective devices should be used.

Chicago Pneumatic advises customers to install the following earth leakage detection device: BENDER RCMA 470LY with external current transformer: <http://www.bender.org/prod.html>.

#### Network type IT

In IT-network systems, it is permissible for the power supply to continue in the event of an initial earth leakage fault of a motor phase. However, the customer must detect the initial earth leakage fault. The fault must be indicated as an alarm. If this is not the case, the initial earth leakage fault must trigger automatic disconnection of the power supply (EN 60204-1 par.: 6.3). However, the high frequency capacitive leakage currents caused by frequency converters cannot be detected by standard earth leakage detection systems.

Chicago Pneumatic recommends that customers install: BENDER IRDH 275/435 <http://www.bender.org/prod.html>.

Chicago Pneumatic strongly recommends that customers do not connect the neutral conductor from the power supply to the compressor unit. The exposed conductive parts of the installation must be earthed locally. (EN 60204-1 par.: 7.2.3)

### Power distribution systems (TN, TT, IT)

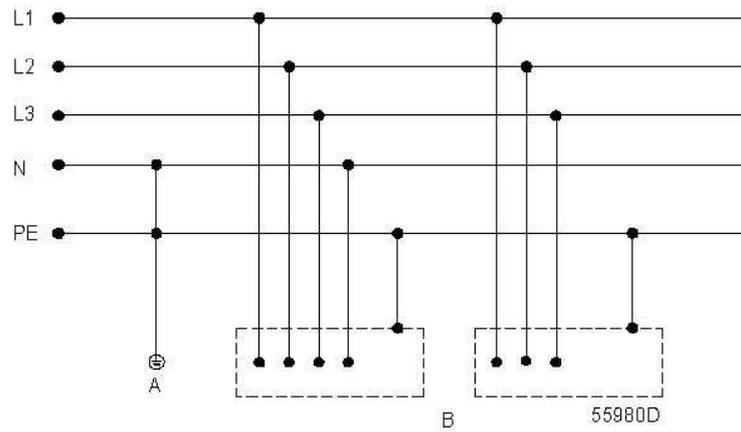
According to IEC 60950, there are three main types of power distribution systems: TN, TT and IT. The electrical installation instructions depend on the type of network of the customer's power supply.

#### Network type TN (Terra Neutral) :

The TN power distribution system provides a direct earth to the exposed conductive parts of the installation. The connection is made through the PEN-conductor. Within the TN power distribution system, there are three sub-types: TN-S, TN-C and TN-C-S, identified according to neutral and protective earth conductors. Nearly 85 % to 90 % of industrial networks are TN type.

#### Network type TN-S (Terra Neutral-Separate) :

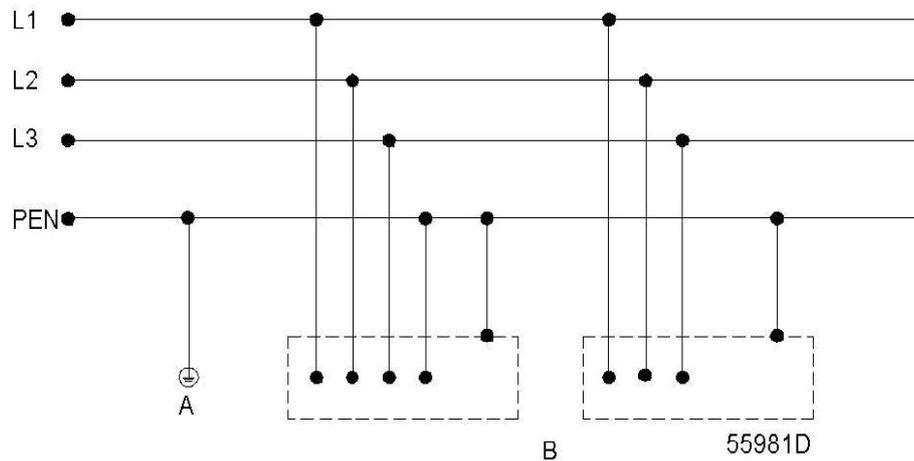
The TN-S power distribution system provides separate neutral and direct earth conductors.



- A Power system earth
- B Exposed conductive parts

**Network type TN-C (Terra Neutral-Combined):**

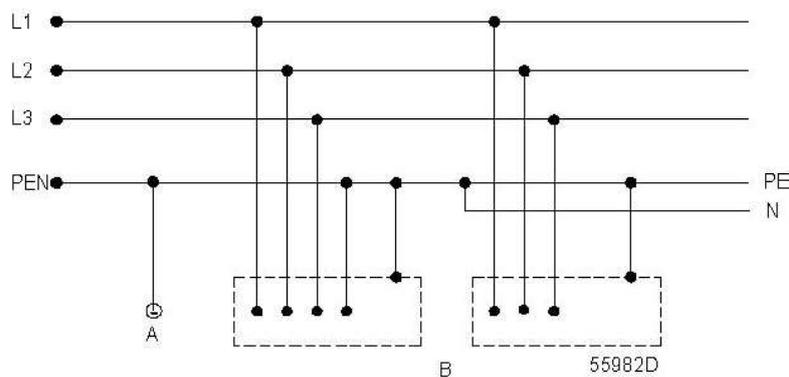
In the TN-C power distribution system, the neutral and the protective earth functions are combined in a single conductor.



- A Power system earth
- B Exposed conductive parts

**Network type TN-C-S (Terra Neutral-Combined-Separate):**

In the TN-C-S power distribution system, the neutral and the protective earth functions are combined to some degree in a single conductor, a direct earth to the exposed conductive parts of the installation exists in part. The connection is achieved through the PEN conductor.

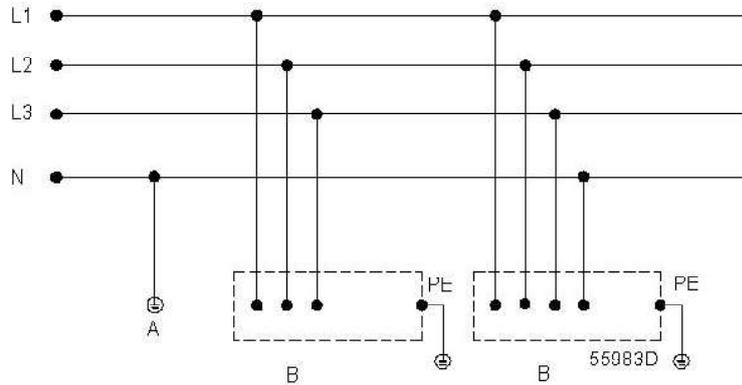


- A Power system earth
- B Exposed conductive parts



### Network type TT (Terra Terra) :

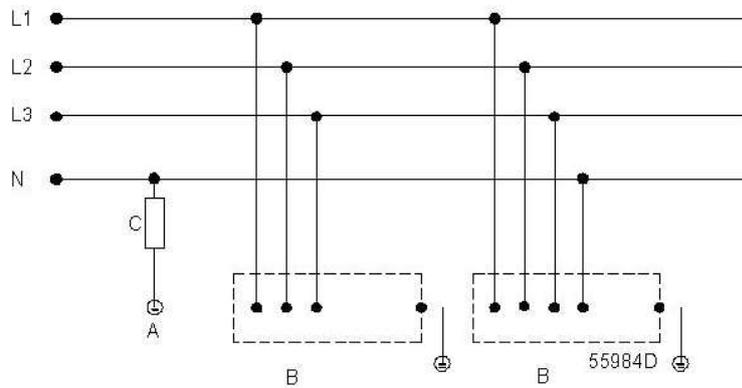
The TT power distribution system has one point that is directly earthed. In addition, the exposed conductive parts of the installation are connected to earth electrodes that are independent from the power system's earth.



- A Power system earth
- B Exposed conductive parts

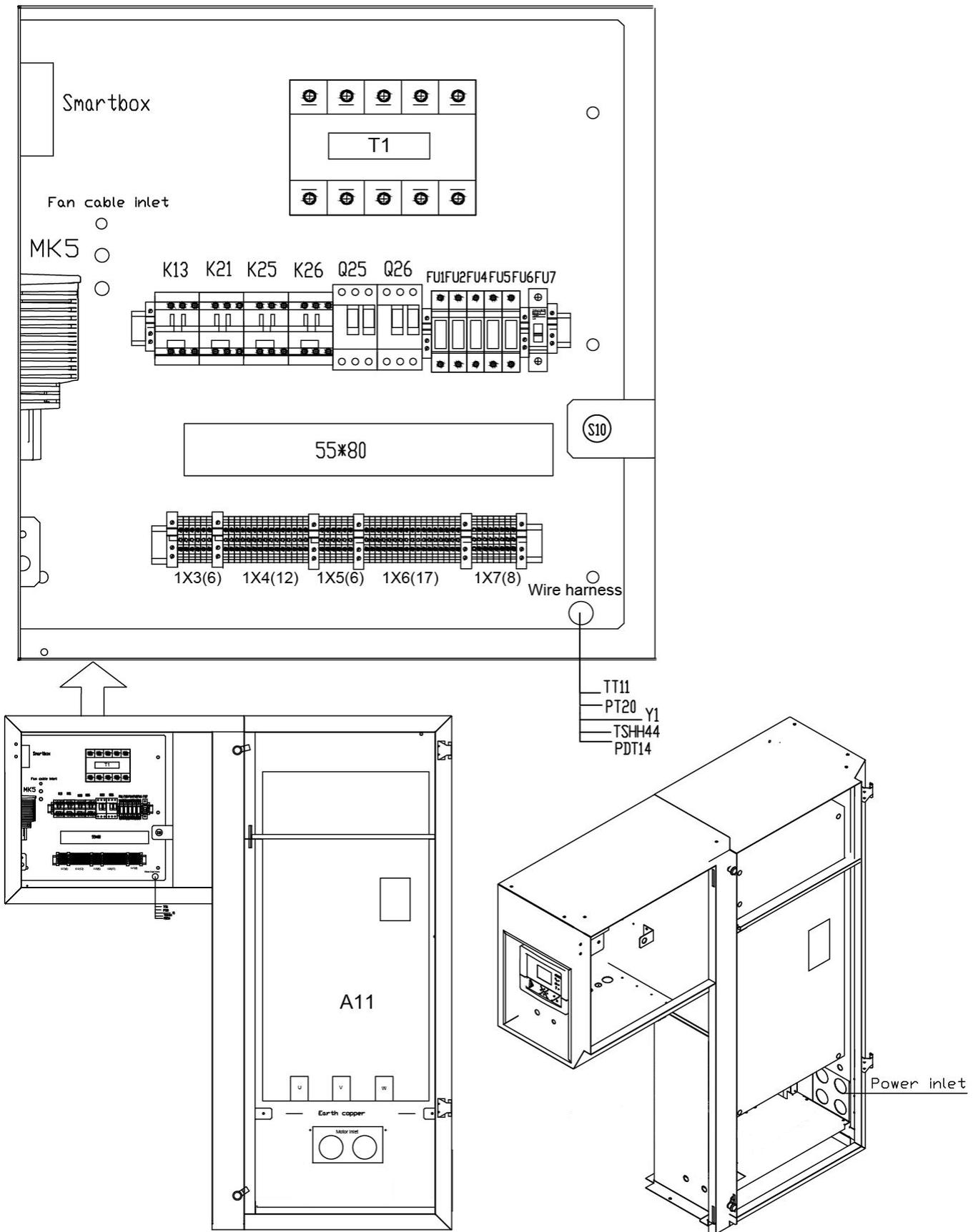
### Network type IT (Impedance Terra):

The IT power distribution system has no direct connection to Protective Earth (PE). It is earthed via a high ohmic impedance, so that the network is effectively behaving like an unearthed floating network. The exposed conductive parts of the installation are directly connected to earth. In the event of an initial earth leakage fault of a motor phase, the power supply continues. However, the customer must detect the initial earth leakage fault. The fault must be indicated as an alarm.



- A Power system earth
- B Exposed conductive parts
- C Impedance

Electric cabinet



Details of electric cabinet of compressor



## Conexões elétricas

The electrical connection diagrams are provided on the pen drive that comes with the equipment in .pdf format as it is illegible if placed inside this manual.

### Electrical cubicle

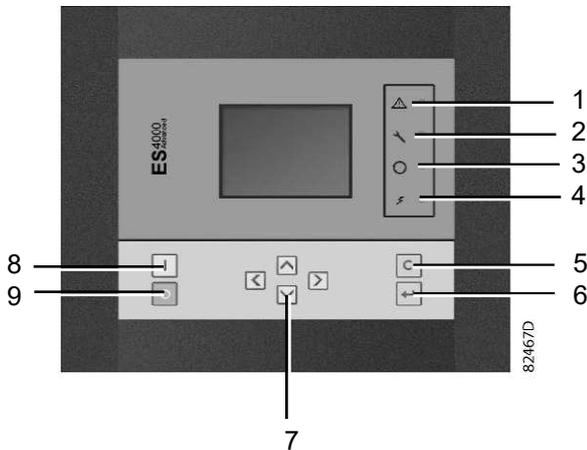
Ref.	Designation
A11	Frequency converter, drive motor
F1/2/4/5/6	Circuit breakers, control circuit
K13	Auxiliary contact, compressor running
M5	Fan in cubicle
F7	Micro circuit breaker, fan in cubicle
Q25	Circuit breaker, fan motor M25
Q26	Circuit breaker, fan motor M26
Q16	Circuit breaker, fan motor M16
K25	Contactors, fan motor M25
K26	Contactors, fan motor M26
K6	Contactors, fan motor M26
S2	Emergency stop
S10	Service switch
T1	Main transformer
1X3	Terminal strip, PE
1X4	Terminal strip, 115V AC
1X5	Terminal strip, 24V CA
1X6	Terminal strip, 24V DA
1X7	Terminal strip, voltage-free contact

### Compressor control Module

Ref.	Designation
E1	ES4000 Graphic regulator
K01	Auxiliary relay, compressor running
K03	Run enable main motor
K04	Auxiliary relay, blow-off
K05	Automatic operation
K06	General warning
K07	General shut-down

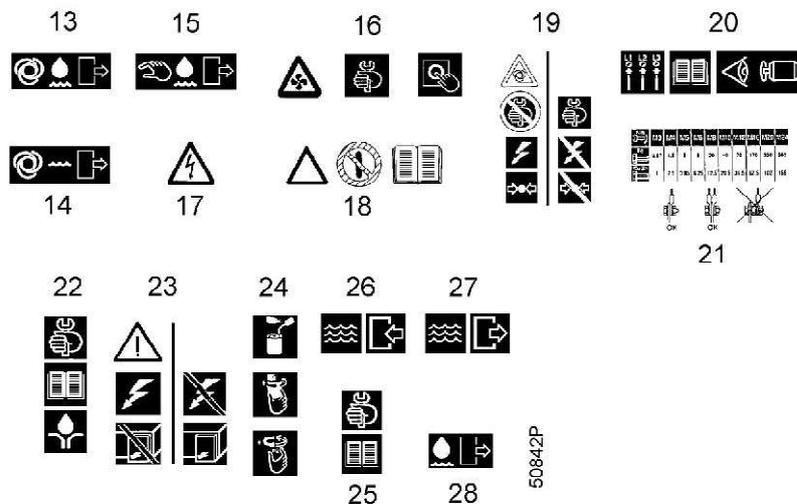
## 4.7 Pictographs

### Control panel of ES4000 Graphic controller



Ref.	Name
1	Alarm
2	Service
3	Automatic operation
4	Voltage on
5	Enter
6	Escape
7	Scroll keys
8	Stop
9	Start

### Other locations



Ref.	Description
13	Automatic condensate drain
14	Automatic condensate drain for optional oil/water separator (type OSD)
15	Manual condensate drain
16	Stop the compressor before maintenance or repair
17	Warning: under tension
18	Read Instruction book before starting the compressor
19	Switch off the voltage and depressurize the compressor before maintenance or repair
20	Before connecting the compressor electrically, consult the Instruction book for the motor rotation direction
21	Torques for steel (Fe) or brass (CuZn) bolts
22	Consult the Instruction book before greasing
23	Switch off the voltage before removing the protecting cover inside the electric cabinet
24	Oil the gaskets, screw on the filters and tighten by hand (approx. one half turn)
25	Consult the Instruction book before maintenance or repair
26	Cooling water inlet
27	Cooling water outlet
28	Oil outlet



## 5 Operating instructions

### 5.1 Introduction



The operator must apply all relevant Safety precautions.

#### Ambient conditions

Consult the section Limits with regard to the ambient conditions and altitude operation.

#### Moving/lifting

The compressor can be moved by a lift truck using the slots in the frame. Make sure that the forks protrude from the other side of the frame. The compressor can also be lifted after inserting beams in the slots. Make sure that the beams cannot slide and that they protrude equally from the frame. The chains must be held parallel to the bodywork by chain spreaders in order to prevent damaging the compressor. The lifting equipment must be placed in such a way that the compressor will be lifted perpendicularly. Lift smoothly and avoid twisting.

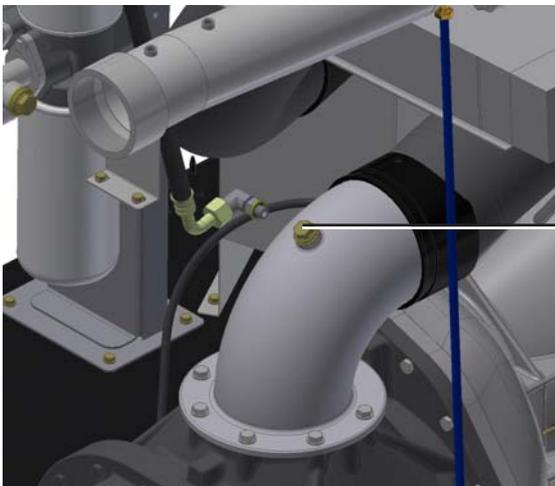
### 5.2 Initial start-up

#### Important



CPVS compressors are intended for indoor use only.

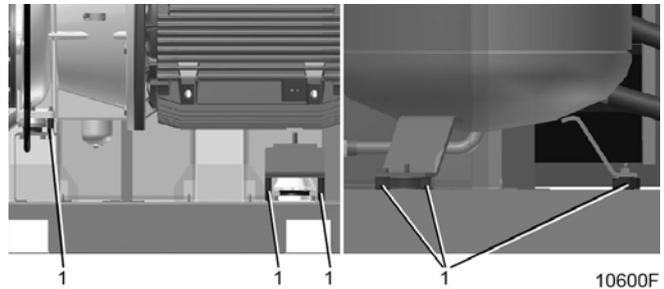
#### General preparations



*Plugs to fill the compressor element at initial start-up*

Step	Action
1	Install the compressor, see the sections Dimension drawing, Installation proposal, Cable size.
2	Affix the sticker, giving brief operating instructions, next to the control panel. <b>Stick labels near the control panel to warn the operator that:</b> <ul style="list-style-type: none"> <li>the compressor may start automatically after a voltage failure</li> <li>the compressor is automatically started and stopped</li> <li>the compressor may be remotely controlled</li> </ul>
3	A number of VCI (Volatile Corrosion Inhibitor) plates are provided inside the bodywork to protect the compressor against corrosion. Remove the plates
4	Remove filler plugs (1). Pour approx. 1 l (0.26 US gal/0.22 Imp gal) of oil into the compressor elements. Refit the plugs.
5	Check that the compressor is filled with oil; the pointer of the oil level indicator should be in the green range (see the section Oil change).

#### Protection during transport



*Transport fixtures*

Step	Action
1	The gear casing supports, motor support and air receiver supports are secured to the frame, immobilizing the vibration dampers during transport.
2	Remove the bushes (1) from the gear casing supports and the motor support.
3	Remove the brackets (1) fitted next to the air receiver supports.

## Electric Action

Step	Action
1	Check that the electrical connections correspond to the local codes. The installation must be earthed and protected by fuses in all phases. An isolating switch must be fitted. Electric cable entry is installed by customer.
2	Check the wires on transformers (T1) for correct connection.
3	Check the setting of the circuit breakers (see the section Circuit breakers and fuse).
4	Switch on the voltage.
5	Start the compressor and stop it immediately. Check for correct direction of rotation while the motor is coasting to a stop. The correct rotation direction is indicated by an arrow on the coupling housing. Consult Chicago Pneumatic if the rotation direction is wrong.
6	Run the compressor for a few minutes and check that it operates normally.

## Water circuit

Step	Action
1	Check that the cooling water drain valves (customer's installation) in the inlet and outlet lines are closed.
2	Check that the water shut-off valves (customer's installation) are open.
3	Open the water regulating valve and check for water flow.

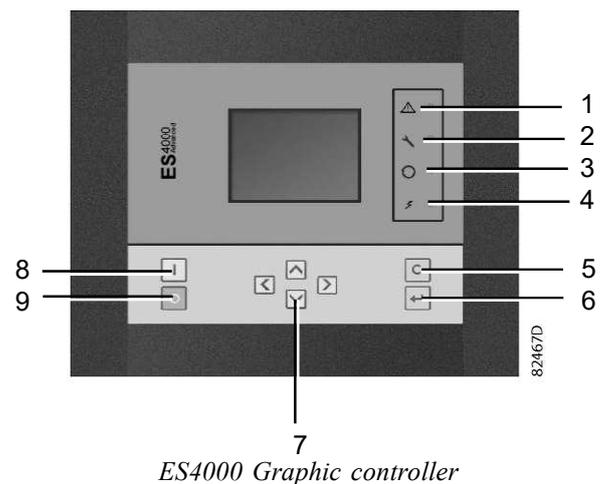
## 5.3 Before starting

### Warning



The operator must apply all relevant safety precautions. See the section Safety precautions. If the water system was drained (see the section Stopping), close the drain valves. Switch off your mobile phone when in the vicinity of a CPVS compressor which is under tension.

### Control panel



ES4000 Graphic controller

Ref.	Name
1	Alarm
2	Service
3	Automatic operation
4	Voltage on
5	Enter
6	Escape
7	Scroll keys
8	Stop
9	Star

### Procedure

Step	Action
1	Switch on the voltage. The voltage-on LED lights up.
2	Close the condensate drain valves.
3	Open the air outlet valve.
4	Check the oil level. The pointer of the oil level gauge should be in the green range or orange range. If the compressor has only just stopped, wait one minute before checking the level.
5	On water-cooled compressors, open the water shut-off valves (customer's installation) and regulating valve (located inside the compressor next to the oil/water coolers) and check for water flow.



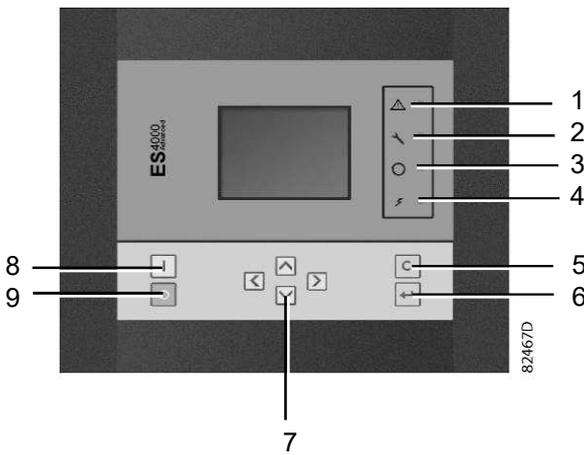
## 5.4 Starting

### Warning



The operator must apply all relevant Safety precautions.

### Control panel



ES4000 Graphic controller

### Procedure

Step	Action
1	Press the start button. The compressor starts running in unloaded condition. The automatic operation LED lights up.
2	Approx. 10 seconds later (programmable), the compressor starts running loaded. On the ES4000 Graphic controller, the status icon on the display changes from the running unloaded icon to the running loaded icon.

## 5.5 During operation

### Warning



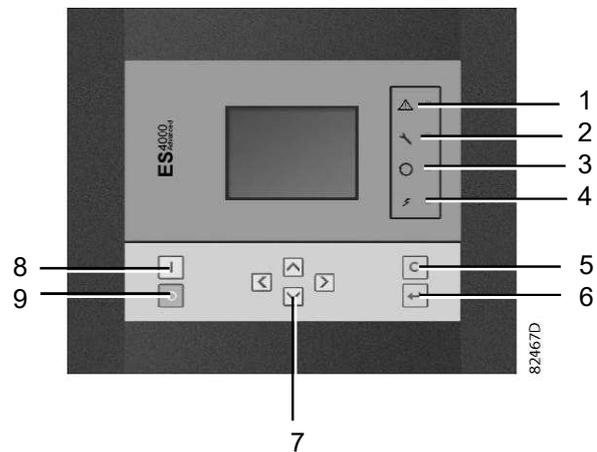
The operator must apply all relevant Safety precautions.

The operator should immediately stop the machine in case of oil leaks internally in the machine as well as externally and consult a competent technician to resolve the cause.

The machine should not be restarted before the problem has been remedied.

The load cycle of the compressor must be limited to maximum two cycles per minute.

### Compressors with ES4000 Graphic controller



ES4000 Graphic controller

Step	Action
1.	Check the readings on display (1).
2.	When reaching the preset unloading pressure, shown on display (1), the compressor will start running unloaded. From now on, the electronic control module will calculate the optimum moment to stop and restart the compressor motor automatically, depending on the maximum permissible number of motor starts and on the air consumption.
3.	To unload the compressor manually, select Unload on the display using the cursor keys and press the Enter key. To put the compressor back into automatic operation, select Load on the display using the cursor keys and press the Enter key.



If the compressor is stopped, it may start automatically.

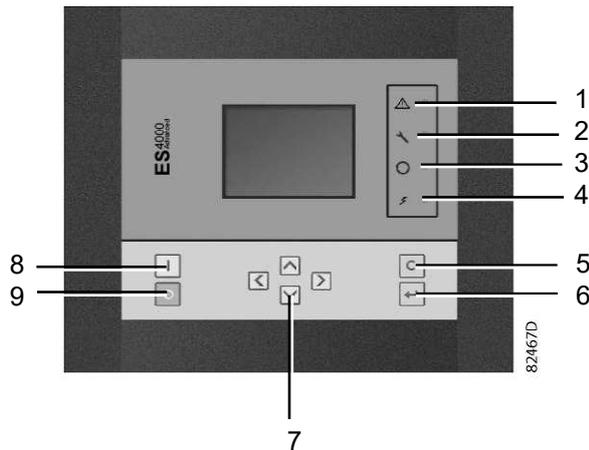
## 5.6 Checking the display

### Warning



Before carrying out any maintenance, repair work or adjustment, stop the compressor, press the emergency stop button and switch off the voltage. Close the air outlet valve and open the manual condensate drain valve.

### ES4000 Graphic controller



ES4000 Graphic controller

Step	Action
1	Regularly check the display for readings and messages. Normally, the main display is shown.
2.	Always check the display and remedy the trouble if alarm LED (1) is alight or blinks.
3.	The display will show a service message if a service plan interval has been exceeded or if a service level for a monitored component has been exceeded. Carry out the service actions of the indicated plans or replace the component and reset the relevant timer.
4.	Regularly check the Inputs and Outputs menus for a quick look at the compressor status.

## 5.7 Stopping

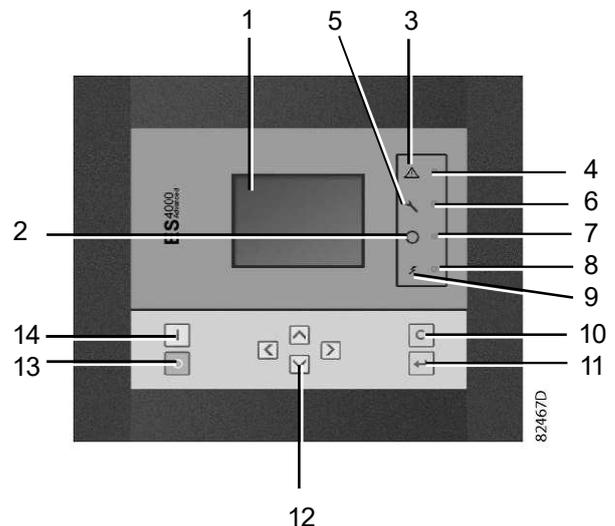
### Important



After pressing the stop button, the compressor will run unloaded for 30 seconds. The compressor stops after this period. A start command during this period is ignored.

After stopping, the compressor is prevented from restarting within a programmable time (20 seconds). A start command given during this minimum stop time will be memorized; the automatic operation LED lights up. The compressor will start when the minimum stop time has elapsed.

### On compressors equipped with an ES4000 Graphic controller



ES4000 Graphic controller

### Procedure



Frequently stopping the compressor using the emergency stop button may damage the compressor. Only use the emergency stop button in case of emergency.

Step	Action
1	Press stop button (13). The compressor will run unloaded for 30 seconds and then stop.
2	To stop the compressor in case of emergency, press the emergency stop button. Alarm LED (4) starts flashing. After remedying the trouble, unlock the emergency stop button by pulling it back.



- 3 Close the air outlet valve.
- 4 Open the condensate drain valves.
- 5 Switch off the voltage.

## 5.8 Taking out of operation

### Disconnecting the compressor

At the end of the service life of the compressor, proceed as follows:

Step	Action
1	Stop the compressor and close the air outlet valve.
2	Switch off the voltage and disconnect the compressor from the mains. On CPVS compressors, wait at least 6 minutes as hazardous high voltage remains on the condensers of the start and speed regulation unit.
3	Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
4	Drain the oil and condensate circuits.
5	Disconnect the compressor condensate piping from the condensate drain net.

## 6 Maintenance

### 6.1 Introduction

#### Warning



Before starting any maintenance or repairs, stop the compressor. Close the air outlet valve and open the manual condensate drain valves.

On compressors equipped with an EWD (Electronic Water Drain), push the test button on top of the EWD.

- Open the isolating switch (customer's installation) to switch off the voltage to the compressor.
- Unscrew the receiver filler plug one turn to depressurize the air system. Tighten the filler plug after repairing.
- Repairs inside the start and speed regulation cabinet may only be carried out by Chicago Pneumatic.

Before starting any maintenance on the start and speed regulation cabinet, consult section Installation remarks for the special safety precautions for frequency converters.

- Wait at least 6 minutes before starting any electrical repairs as hazardous high voltage remains on the condensers of the start and speed regulation unit for 6 minutes after the voltage is switched off.



Apply all relevant Safety precautions.

### 6.2 Preventive maintenance schedule

#### Warranty and product liability

Use only authorized genuine parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

#### Schedule

To ensure safe operation and long service life carry out the following operations at the interval (period or running hours) which comes first. The “longer interval” checks must also include the “shorter interval” checks.

The local Chicago Pneumatic Customer Centre may overrule the maintenance schedule depending on the environmental and working conditions of the compressor.



## Preventive maintenance schedule

Period	Running hours	Operation
Daily	8	Check readings on display.
Daily	8	Check that condensate is discharged during loading.
Daily	8	Check the oil level. Before starting, the level must be in the green or orange range.
Weekly	40	Remove cubicle air filter, clean and inspect. Replace if dirty or damaged.
3-monthly	--	Clean the compressor
3-monthly	--	Check for possible leaks.
3-monthly	--	Check coolers; clean if necessary
3-monthly	500	Remove air filter and inspect. Replace if dirty or damaged.
Yearly	--	Have safety valve tested (NR13).
Yearly	--	Have all flexibles inspected.
Yearly	4000	If Rotair Plus is used, change oil.
Yearly	4000	If CP-46 is used, change oil.*
Yearly	4000	Replace oil filters.**
2-Yearly	4000	Have oil separator element replaced.**
When displayed	--	Carry out the service actions in accordance with the displayed service plans.

### Notes:

- \* For CPVS270-340 replacement interval of 4000 hours.  
For CPVS200 replacement interval of 8000 hours.
- \*\* If CP-46 is used:  
For CPVS270-340 replacement interval of 4000 hours.  
For CPVS200 replacement interval of 8000 hours.

## Service agreements

Chicago Pneumatic Customer Centres have a range of service agreements to suit your needs:

- An Inspection Plan.
- A Preventive Maintenance Plan.
- A Total Responsibility Plan

Contact your Customer Centre to arrange a tailor-made service agreement. It will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

## Service plan

A number of service operations are grouped (called level A, level B, level C, ...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the ES4000 regulator.

When a level is reached, a message will appear on the screen. After carrying out all service actions, reset the interval timers using the "Reset" key in the "Service" menu. Consult your Chicago Pneumatic Customer Centre.

## 6.3 Service kits

### General

Service kits comprise all parts needed for servicing components and offer the benefits of genuine Chicago Pneumatic parts while keeping the maintenance budget low. All service kits are indicated in the relevant Parts Lists.

### Chicago Pneumatic Rotair Plus

Rotair Plus can be ordered in the following quantities:

- 5-litre can: 6215 7144 00
- 20-litre can: 6215 7145 00
- 209-litre drum: 6215 7146 00

See the section Oil specifications.



## 6.4 Motors

### Warning

-  Stop the compressor and switch off the voltage. The operator must apply all relevant Safety precautions.

### Fan motors (fan motor on the main motor)

The bearings of the fan motors are greased for life. Contact Chicago Pneumatic for the replacement interval of the motor bearings.

### Drive motor

Contact Chicago Pneumatic for the recommended grease, the amount of grease to use and the interval for the motor bearings.

-  Never mix greases of different brands or types.

## 6.5 Oil specifications

### Chicago PneumaticROTAIR Plus

" Chicago Pneumatic ROTAIR Plus" - mineral with anti-oxidant, anti-corrosive, anti-foaming additives, etc.

For standard use by Chicago Pneumatic on oil-injected rotary compressors under moderate operating conditions.

For a lifetime of 4000 hours. This oil is long lasting and provides excellent lubrication See Service Kits section.

### Important

-  Never mix oils of different brands or types.

## 6.6 Oil change

### Warning

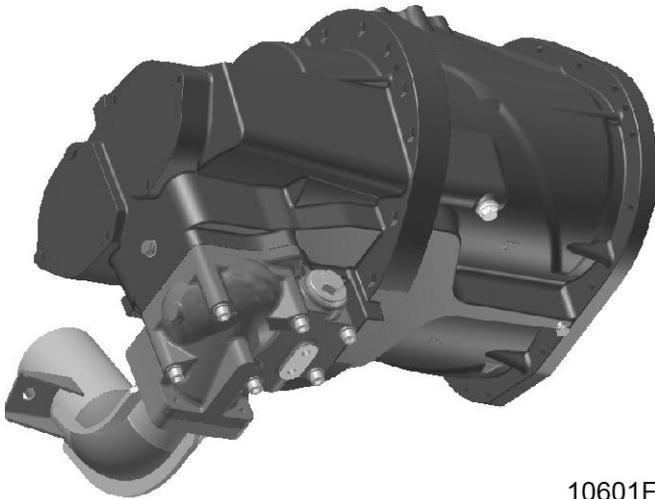
-  The operator must apply all relevant Safety precautions.
-  Practice has proved that if the residual lubricating oil is not completely drained, the operational life of newly injected lubricants will reduce 50%. And the life of the oil separator depends directly on the quality of the oil, so the presence of residual oil will result in shortened oil separator life.

### Interval of Chicago Pneumatic ROTAIR Plus change

Oil change (running hours)	Element temperature (pressure < 10 bar)	Element temperature (pressure >10 bar)	Ambient temperature	Maximal interval
4000 h	90° C		25° C	1 year
3000 h	90–100° C		25–35° C	1 year
2000 h	above 100° C		> 35° C	1 year
2000 h		100° C	35° C	1 year
1000 h		above 100° C	> 35° C	1 year

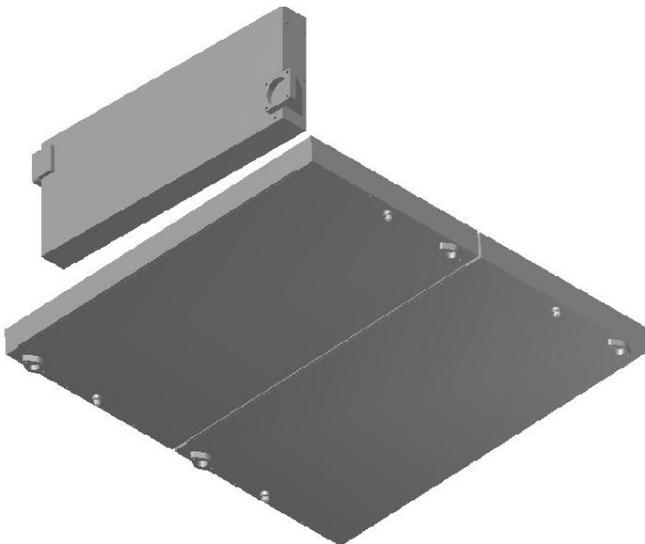
## Vent, filler and drain plugs

## Procedure



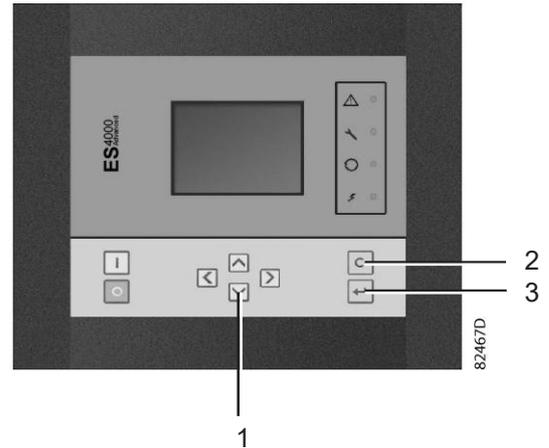
10601F

*Oil drain plugs on compressor elements*



10602F

Vent, filler and drain plugs on compressors



*ES4000 Graphic controller*

Step	Action
1.	<p>Run the compressor until warm.            Stop the compressor.            Close the air outlet valve.            Switch off the voltage.            Wait a few minutes.            Depressurize by unscrewing plug only one turn to permit any pressure in the system to escape.</p>
2.	Loosen vent plugs on top of the oil coolers.
3.	<p>Drain the oil by removing the drain plugs.            Plugs are fitted on the:</p> <ul style="list-style-type: none"> <li>• Air receiver / Oil separator with drain point</li> <li>• Oil stop valve</li> <li>• Check valve</li> <li>• Gearbox</li> <li>• Oil coolers of air-cooled compressors</li> <li>• Oil filter housing</li> </ul> <p>Tighten the plugs after draining.</p>
4.	<p>Remove filler plug.            Fill the air receiver / oil separator with oil until the level reaches the filler opening.            Refit and tighten plug.            Tighten the vent plug of the oil cooler.</p>
5.	<p>Run the compressor loaded for a few minutes to allow the oil cooler by-pass valve to open.            Stop the compressor.            Wait a few minutes.</p>
6.	<p>Depressurize the system by unscrewing plug only one turn to permit any pressure in the system to escape.            Remove the plug.            Fill the air receiver / oil separator with oil until the level reaches the filler opening.            Tighten the filler plug.            Apertar o bujão de abastecimento.</p>
7.	<p>After carrying out all service actions in the relevant “Service Plan”, reset the service warning.</p>



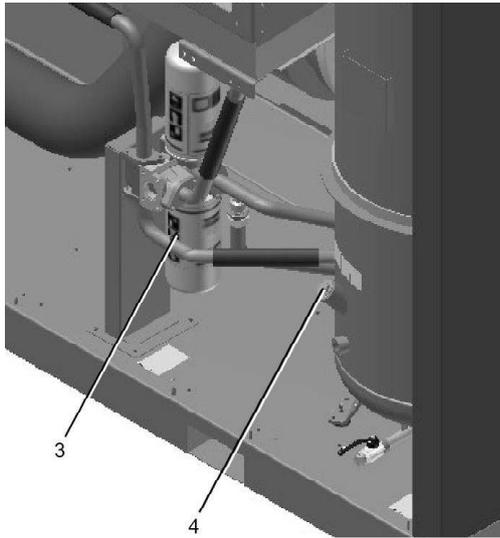
## 6.7 Oil filter change

### Warning



Stop the compressor and switch off the voltage. The operator must apply all relevant Safety precautions.

### Position of oil filters



10604F

*Position of oil filter*

- 2 Use an oil pan to avoid possible oil spillage. Unscrew the oil filters (3) only one turn and wait a few minutes to let the oil of the filter flow back into the oil separator. Remove the oil filters.
- 3 Clean the filter seats on the manifold. Oil the gaskets of the new filters and screw the filters into place until the gaskets contact their seats. Then tighten with a maximum torque of 10 Nm.
- 4 Tighten the oil filler plug (of the air receiver) (4).
- 5 Reset the service warning after carrying out all service actions in the relevant Service Plan. Refer to the Service menu section.

## 6.8 Storage after installation

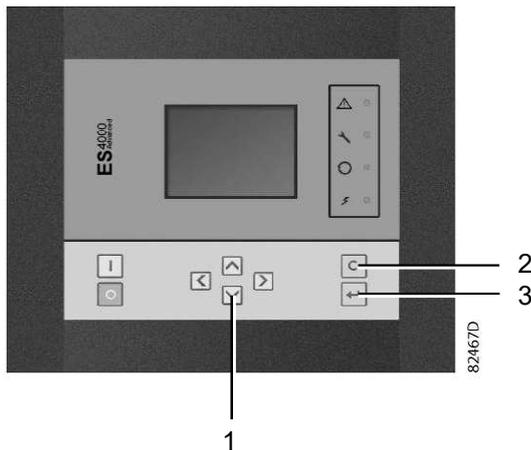
### Procedure

Run the compressor, e.g. twice a week, until warm.



If the compressor is going to be stored without running from time to time, protective measures must be taken. Consult the Chicago Pneumatic Customer Centre.

### Procedure



82467D

Step	Action
1	Stop the compressor, close the air outlet valve and switch off the voltage. Wait a few minutes and depressurize the air receiver by unscrewing the oil filler plug (of the air receiver) (4) only one turn to permit any pressure in the system to escape.

## 7 Adjustments and servicing procedures

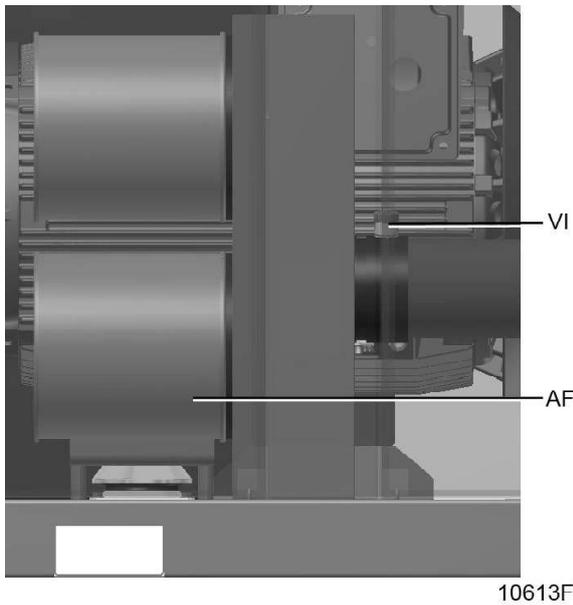
## 7.2 Coolers

### 7.1 Air filters

#### Warning

 Stop the compressor, close the air outlet valve, press the emergency stop button and switch off the voltage. The operator must apply all relevant Safety precautions.

#### Position of air filters



*Position of air filters*

#### Warning

 Never remove the element while the compressor is running.  
For minimum downtime, replace the dirty element by a new one.  
Discard the element when damaged.

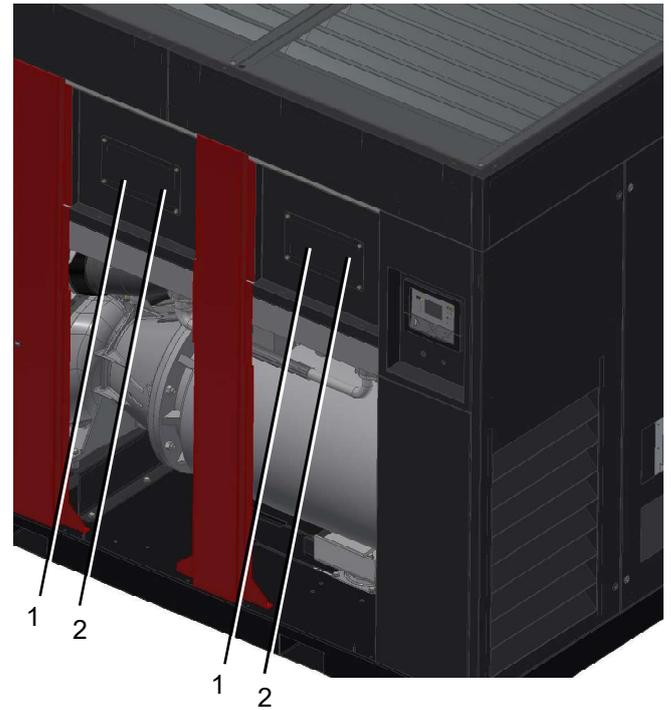
#### Procedure

Step	Action
1	Stop the compressor. Switch off the voltage.
2	Release the snap clips of air filter (AF) and remove the cover and the air filter element. Discard the filter element.
3	Fit the new element and the cover.
4	Reset service indicator (VI) by pushing the knob in the extremity of the body.
5	Reset the air filter service warning. For compressors equipped with an ES4000 Graphic regulator, see section Service menu.

#### Warning

 Stop the compressor, press the emergency stop button and switch off the voltage. The operator must apply all relevant Safety precautions.

#### Procedure



*Cooler block of compressors*

Keep the cooler block clean to maintain the cooling efficiency.

On air-cooled compressors proceed as follows:

Step	Action
1	Unscrew bolts (1) and remove the cover away from the cooler block.
2	Remove any dirt from the coolers with a fibre brush. Brush in the direction of the fins.
3	Clean the coolers with an air jet in the reverse direction to normal flow. Use low pressure air; if necessary, the pressure may be increased up to 6 bar(e) (87 psig).
4	If it is necessary to clean the coolers with a cleaning agent, consult Chicago Pneumatic.
5	Reposition and fix the fan. Make sure that the fan rotates freely.



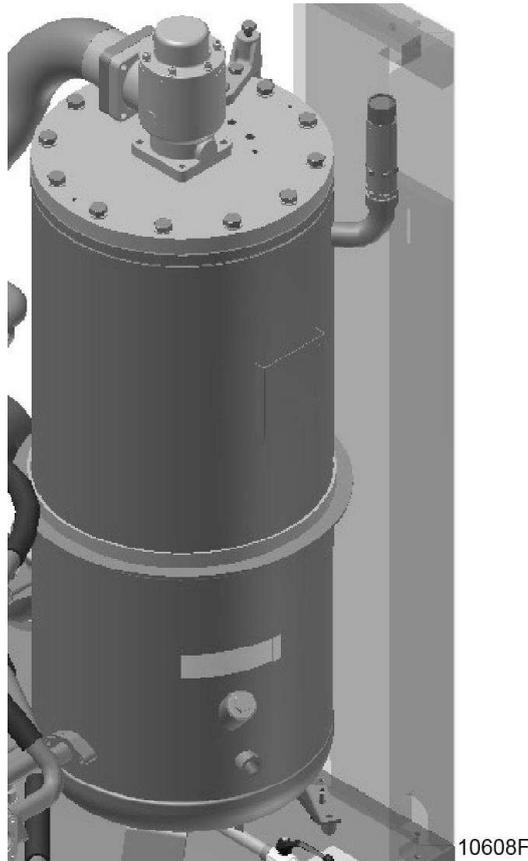
## 7.3 Safety valve

### Warning



Stop the compressor and switch off the voltage. The operator must apply all relevant Safety precautions. Never run the compressor without safety valves. No adjustments are allowed.

### Testing



*Location of safety valve on compressors*

The valve can be tested on a separate compressed air line.

When testing the safety valve, protective measures are needed for the column, to avoid lubricating oil splash the sponge or high-speed air-flow destroy the sponge.

Consult the Chicago Pneumatic Customer Centre if the valve does not open at the correct pressure (see the section Setting of safety valve).

## 8 Problem solving

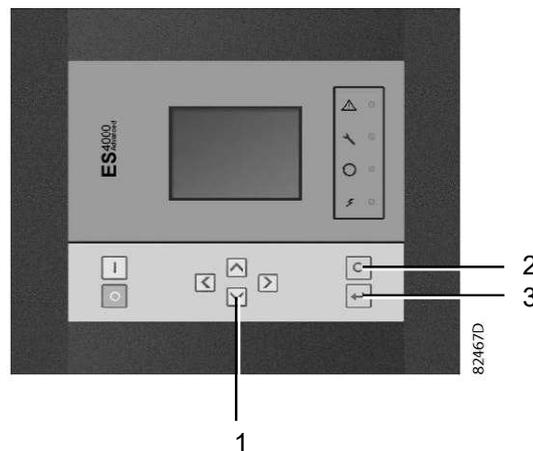
### 8.1 Problem solving

#### Warning



Before carrying out any maintenance, repair work or adjustment, stop the compressor, press the emergency stop button and switch off the voltage. Close the air outlet valve and open the manual condensate drain valves. Open and lock the isolating switch. The operator must apply all relevant Safety precautions..

#### Control panel



#### Faults and remedies

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##### A service message appears on the display

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Stop the compressor and carry out the indicated service actions.  
Reset the message, see Section Service menu.

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##### A shut-down warning message appears on the display

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The alarm LED will light up indicating that the temperature at the outlet of the compressor elements is too high. The message disappears as soon as the cause of the problem is remedied.

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##### Unit is shut down

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The alarm LED will flash indicating either that the outlet temperature is too high or that the motor overload relay has tripped. Remedy the problem.

**On compressors equipped with an ES4000 Graphic controller**, move the cursor to the Menu action button and push the enter key (2). Using the Scroll keys (1), move the cursor to the protections icon. Push the Enter key (2). Move the cursor to the blinking icon and press the Enter key (2). Move the cursor to the reset button and press the enter key again.

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##### Excessive oil consumption

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Have the compressor inspected by the Chicago Pneumatic Customer Centre.

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<b>Condition</b>	<b>Fault</b>	<b>Remedy</b>
Condensate is not discharged from condensate traps during loading.	Discharge pipe of condensate trap clogged.	Check and correct as necessary.
	Float valve of condensate traps malfunctioning.	Remove float valve assembly, clean and check.
	EWD (electronic water drain) malfunctioning.	Consult Chicago Pneumatic

<b>Condition</b>	<b>Fault</b>	<b>Remedy</b>
Compressor air delivery or pressure below normal.	Air consumption exceeds air delivery of compressor.	Check equipment connected.
	Choked air filters.	Replace filters.
	Air leakage.	Check and correc.

<b>Condition</b>	<b>Fault</b>	<b>Remedy</b>
Compressor element outle temperature or delivery air temperature above normal.	Oil level too low.	Check and correct.
	Oil coolers clogged.	Do external cleaning
	Air cooler clogged.	Do external cleaning.
	On air-cooled compressors, insufficient cooling air or cooling air temperature too high.	Check and correct as necessary.

## 9 Principal data

### 9.1 Readings on display

#### Important



The readings are valid when operating under reference conditions. See the section Reference conditions.

**On compressors equipped with an ES4000 Graphic controller**, the main screen is shown, indicating the actual outlet pressure and status of the compressor. To call up other information such as actually measured pressures and temperatures, see the sections Inputs menu and Outputs menu.

#### Important readings

Compressor outlet pressure	bar(e) (psig)	Depends on programmed unloading and loading pressures
Pressure difference over oil separator	bar	Below 0.8
Pressure difference over oil separator	psi	Below 12
Compressor element outlet temperature	°C	Below 105
Compressor element outlet temperature	°F	Below 221

### 9.2 Setting of safety valve

Compressor type	Setting
For CPVS200 compressors with a maximum working pressure of 9.1 or 10.9 bar	11 bar (e)
For CPVS200 compressors with a maximum working pressure of 132 or 158 psi	160 psig
For CPVS270 and CPVS340 compressors with a maximum working pressure of 10 bar	11 bar (e)
For CPVS270 and CPVS340 compressors with a maximum working pressure of 145 psi	160 psig

### 9.3 Setting of circuit breakers

For cooler cooling fan (air-cooled compressors)

Model	Supply voltage (V)	Frequency (Hz)	Circuit breakers	Setting (A)
CPVS200	380	60	Q25/Q26	11
CPVS200	440	60	Q25/Q26	9
CPVS270	380	60	Q25/Q26	11
CPVS270	440	60	Q25/Q26	9
CPVS340	380	60	Q25/Q26	11
CPVS340	440	60	Q25/Q26	9



## 9.4 Reference conditions

### Reference conditions

Absolute inlet pressure	bar(a)	1
Absolute inlet pressure	psi	14.5
Relative air humidity	%	0
Air inlet temperature	°C	20
Air inlet temperature	°F	68
Nominal working pressure		See Compressor data
Cooling medium inlet temperature	°C	20
Cooling medium inlet temperature	°F	68

## 9.5 Limits

### Limits

Maximum air inlet/ambient temperature	°C	40
Maximum air inlet/ambient temperature	°F	104
Minimum air inlet/ambient temperature	°C	1
Minimum air inlet/ambient temperature	°F	34
Maximum cooling air temperature	°C	40
Maximum cooling air temperature	°F	104
Minimum cooling air temperature	°C	1
Minimum cooling air temperature	°F	34
Maximum working pressure		See section Compressor



## 9.6 Compressor data

### Data for 60 Hz compressors

	Units	CPVS200 9,1 bar (132 PSI)					
At pressure set-point	bar(e)	4	5	6	7	8	8.6
At pressure set-point	psig	58	73	87	102	116	125
Maximum motor shaft speed	r/min	1802	1802	1802	1802	1802	1802
Maximum motor shaft speed	r/min	1000	1000	1000	1000	1000	1000
Power input at maximum speed	kW	139.5	146.9	155.1	163.7	172.6	178.0
Power input at maximum speed	hp	187.1	197.0	208.0	219.5	231.5	238.7
Oil capacity	l	90	90	90	90	90	90
Oil capacity	US gal	23.8	23.8	23.8	23.8	23.8	23.8
Oil capacity	Imp gal	19.8	19.8	19.8	19.8	19.8	19.8
Oil capacity	cu.ft	3.2	3.2	3.2	3.2	3.2	3.2
Sound pressure level at maximum speed	dB(A)	80	80	80	80	80	80

	Units	CPVS200 10,9 bar (158 PSI)							
At pressure set-point	bar(e)	4	5	6	7	8	9	10	10.4
At pressure set-point	psig	58	73	87	102	116	125	145	151
Maximum motor shaft speed	r/min	1789	1789	1789	1789	1789	1789	1789	1789
Maximum motor shaft speed	r/min	1000	1000	1000	1000	1000	1000	1000	1000
Power input at maximum speed	kW	127.1	134.2	141.8	149.7	157.9	166.3	174.8	178.2
Power input at maximum speed	hp	170.4	180.0	190.2	200.8	211.7	223.0	234.4	239.0
Oil capacity	l	90	90	90	90	90	90	90	90
Oil capacity	US gal	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Oil capacity	Imp gal	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8
Oil capacity	cu.ft	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Sound pressure level at maximum speed	dB(A)	80	80	80	80	80	80	80	80

	Units	CPVS270 10 bar (145 PSI)			
At pressure set-point	bar(e)	4	7	8	9.5
At pressure set-point	psig	58	102	116	138
Maximum motor shaft speed	r/min	2884	2884	2753	2556
Maximum motor shaft speed	r/min	1000	1000	1000	1000
Power input at maximum speed	kW	188.0	221.2	222.0	221.8
Power input at maximum speed	hp	253.2	296.6	297.7	297.4
Oil capacity	l	102	102	102	102
Oil capacity	US gal	26.9	26.9	26.9	26.9
Oil capacity	Imp gal	22.4	22.4	22.4	22.4
Oil capacity	cu.ft	3.6	3.6	3.6	3.6
Sound pressure level at maximum speed	dB(A)	81	81	81	81

	Units	CPVS340 10 bar (145 PSI)			
At pressure set-point	bar(e)	4	7	8	9,5
At pressure set-point	psig	58	102	116	138
Power input at maximum speed	r/min	3305	3305	3160	2943
Maximum motor shaft speed	r/min	1000	1000	1000	1000
Power input at maximum speed	kW	231.1	268.3	269.1	268.9
Power input at maximum speed	hp	309.9	359.8	360.9	360.6
Oil capacity	l	102	102	102	102
Oil capacity	US gal	26.9	26.9	26.9	26.9
Oil capacity	Imp gal	22.4	22.4	22.4	22.4
Oil capacity	cu.ft	3.6	3.6	3.6	3.6
Sound pressure level at maximum speed	dB(A)	81	81	81	81



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## 10 Instructions for using the air-oil separator vessel

- 1 This vessel may contain pressurized air and may be potentially dangerous if the equipment is misused.
- 2 It should only be used as an air-oil separator and must be operated within the limits specified on the data plate.
- 3 No change must be made to the vessel by welding, drilling or other mechanical methods without the written consent of the manufacturer.
- 4 If the safety valve needs to be replaced, it must follow the manufacturer's specification in full.
- 5 Use only the oil specified by the manufacturer.
- 6 In case of equipment misuse (too low oil temperature or long shut-off interval), certain amount of condensate may build up in the oil separator vessel, which must be properly drained. To do this, disconnect the equipment from the mains, wait until it cools and depressurize. Drain the condensate through the oil drain valve, located at the bottom of the air-oil separator vessel.

The local legislation may require periodic inspection of the air-oil separator vessel.



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## 11 Environmental information

Check the *Environmental Information* file recorded on the manual pendrive provided with the Chicago Pneumatic equipment. This file has guidance on environmental aspects involved in use of Chicago Pneumatic equipment.



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