

Instruction Manual EN

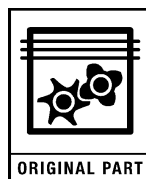
CP COMPRESSOR

Model **CPVS 40 - 50 - 60 - 75**

62 305 258 65 ed00



CPVS 50



The CP Compressors should never be operated beyond its capabilities or in any way which does not comply with the instructions contained in this operating and maintenance guide.

Chicago Pneumatic Compressors will decline any responsibility if these instructions are not respected.

This equipment has been factory tested and satisfies normal operating conditions: they must not be exceeded as this would place the machine under abnormal stress and effort.

INSTALLATION INSTRUCTIONS

For the guarantee to be valid, the unit must be assembled in covered premises with temperatures not exceeding :

Mini: + 36 °F (frost free)

Maxi: + 104 °F

You must also have:

1 meter space around the compressor

low ventilation (fresh air) proportionate to the ventilation flow necessary for the machine and protected from any infiltration of humidity (splashes of water during bad weather) and all pollution

top insulation or extraction to ensure reversal of the flow of warm air and evacuation of the heat to outside the equipment room

a link from the condensation water evacuation pipe to the drain discharger

in dusty environment, pre-filtering the room's air intake and a special filter on the machine's ventilation inlets

TECHNICAL DATA VARIABLE SPEED MACHINES

CPVS Model		40			50			60			75		
VERSION CPVS (as per ISO 1217 ed 1996)													
Nominal pressure at full flow	PSI	58	102	138	58	102	138	58	102	138	58	102	138
Actual flow*	cfm	195.1	194.5	166.4	239.1	234.1	204.4	291.2	280.2	244.7	374.3	342.3	304.8
Motor power	hp	40			50			60			75		
Ø Pressure outlet (F)	NPT	1.5"			1.5"			1.5"			1.5"		
Capacity	gal	5,8			5,8			5,8			5,8		
Carryover	ppm	3			3			3			3		
Noise level at 3,3ft (according to ISO 2157 + 3db(A))	dB(A)	65			66			67			70		
* Suction pressure : 14.5 PSI absolute - Relative humidity : 0 % - Ambient temperature : 68 °F - Effective delivery pressure : 102 PSI, 109 PSI, 138 PSI or 181 PSI (effective)													
Dimensions (in)	L x W x H	75x37,4x69,3			75x37,4x69,3			75x37,4x69,3			75x37,4x69,3		
Approximate weight	lbs	1874			1995			2226			2679		

CPVS Model	40	50	60	75
Motor power (hp)	40	50	60	75
Main Voltage 460 Volt / 3 / 60 Hz				
Nominal current (A)	69	81	89	125
Power supply cable	AWG 4	AWG 3	AWG 1	AWG 0
Fuse protection (Type RK5)	80	100	125	150

Connection of the electric plate to an external control box

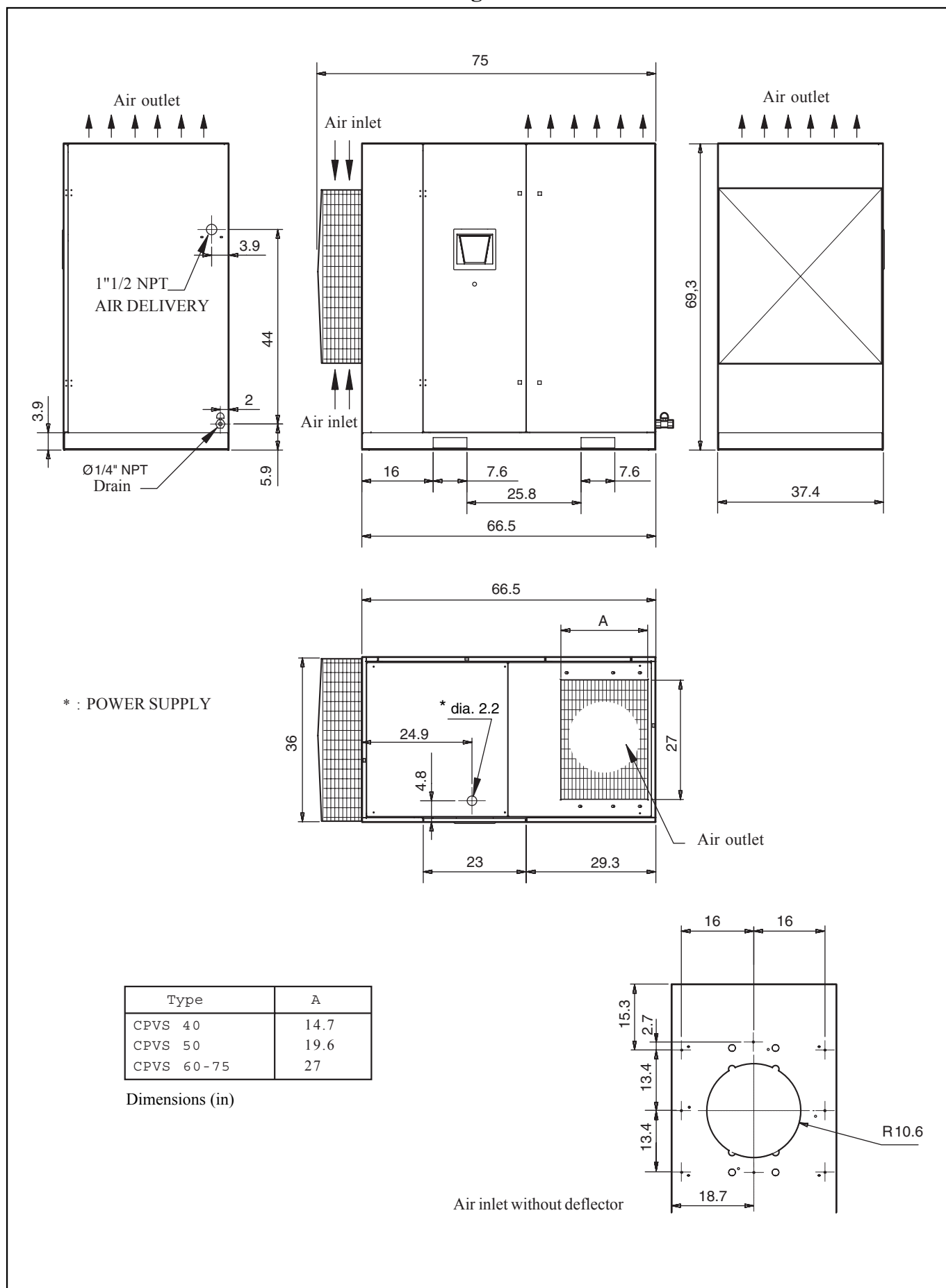
- Install an RC filter on the KM1 coil.
 - Install an RC filter on the KM2 coil.
 - All connections between external parts and the compressor must be carried out using a shielded cable, which must be grounded at one of its ends.
- WARNING: the operation connection cables between the different elements must never follow the same path as the existing power cords. A separate installation from the power cords must be carried out.**
- Install an RC filter on all the relay coils of the external operation units.

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Space requirement and installation diagram : CPVS Model 40-50-60-75
 (see page 2 - installation instructions)

Fig. 1



Section 1 - Description

A - General Information

The Chicago Pneumatic Compressors CP model air compressor is a compressed air unit and is presented as an entire unit completely assembled and tested. It is driven by an electric motor and enclosed in a sound proof cowling which is necessary for proper cooling.

The compression element is a single-stage, oil-refrigerated, rotary screw compressor. The oil is stored in a vertical tank, which is fitted with an oil separator.

The compression element and the motor are fixed to the frame using silent blocks.

B - Respect of the environment and prevention of pollution

1 - Maintenance of the machine

Make sure that the used components of the machine (waste oil, oil and air filters, oil separators, etc...) are disposed of according to national and local regulations.

2 - Condensate bleed pipe

Make sure that the condensates (water, oil) are drained and treated according to national and local regulations.

3 - End of life of the machine

Make sure that the machine as a whole is disposed of according to national and local regulations (See F Section 7 and J Section 8).

C - Standard equipment

In its standard version, the covered unit includes:

- Operating components:

1. A twinned screw-type compressor.
2. An electric motor: 3600 rpm, short-circuit rotor, 230/460V or 575V voltage according to the model.
3. Star delta starting.
4. A direct drive or gearbox drive .
5. Air and oil tank in compliance with applicable legislation ASME
6. "All or nothing" regulation for the aspiration vent.
7. A greasing system using the circuit's differential pressure, thus avoiding the need for an oil pump.
8. An oil separator based oil separation system.
9. A heat discharge system : oil and compressed air radiator with forced ventilation.
10. A dry air filter.
11. An oil filter.
12. A command and control electronic board.

- Safety devices:

1. A safety valve mounted on the oil reservoir.
2. An thermal protection device for the motor, situated in the starting box, to protect the motor from excessive overload.
3. An air temperature sensor that stops the compressor when the temperature rises abnormally or during an oil cooling defect.

- Control devices:

1. A minimum pressure valve located at the oil tank outlet, just beyond the oil separator, which guarantees minimum pressure in the lubrication circuit.
2. Automatic draining allowing the unit to be exposed to the atmosphere when stopping to thus ensure empty start up which relieves the motor,
3. An oil level gauge on the front panel (see fig. 19).
4. An electronic controller including:
 - a control keyboard,
 - the main safety and control indications.
5. The pressure sensor ensures control over the compressed air flow.

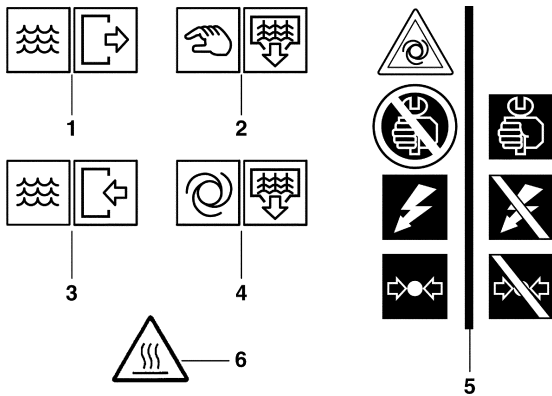
The CP compressed air unit has been designed, produced and tested in accordance with the following recommendations, codes and standards :

- machine safety : European Directive 98/37/CE, 91/368/CEE and 93/68/CEE.
- pressure vessels: European Directive for simple pressure vessels n° 87/404/CEE.
- electrical equipment :
 - electrical equipment : European Directive Low tension 73/23/CEE.
 - electromagnetic compatibility European Directive: 89/336/CEE, 92/31/CEE.
- performance levels: ISO 1217 : 1996.
- noise level : ISO 2157 + 3db(A)
- European Directive 97/23/EC " Pressure Equipment Directive ".

D - Definition of the pictograms

Typical examples of pictograms valid for CP Compressors:

1. Water outlet
2. Manual condensation water draining
3. Water inlet
4. Automatic condensation water draining
5. Unplug and decompress the compressor before maintenance
6. Hot parts



DANGER

This symbol identifies immediate hazards which will result in severe personal injury, death or substantial property damage.



CAUTION

Identifies hazards or unsafe practices which could result in minor personal injury or property damage.



DANGER

This symbol identifies life threatening electrical voltage levels which will result in severe personal injury or death. All electrical work must be performed by a qualified electrician.



CAUTION

This symbol identifies hot surfaces which could result in personal injury or property damage.

E - Electronic board

See the specific instructions for a description of the electronic plate, together with operating instructions :
Notice N° 62 305 169 xx for version CPVS

Section 2 - Installation

A - Handling

The CPVS Compressor must always be handled with care. It may be lifted either with a forklift truck or by means of a travelling crane. In the latter case, precautions must be taken so as not to damage the unit's cowling.

B - Room

The CPVS is designed to operate in a frost-free environment, supplied with air at a temperature of no more than 104 °F. The premises must be well-aired and as close as possible to the place where the compressed air is used. A space must be left around the unit, for cleaning and maintenance purposes. It is very important for the compressor to have an abundant supply of fresh air. (see **page 2**).

If operating the compressor causes the ambient temperature to rise above 104 °F, the warm air leaving the radiator must be discharged outside.

COMMENT

When the atmosphere is contaminated by organic or mineral dust or by corrosive chemical emanations the following precautions must be taken:

1. Provide another air inlet as close as possible to the compressor suction.
2. Use an additional filter. (see options **Section 5**), on the machine's ventilation intakes.

Installation with heat dispersion sleeve

If the operation of the compressor increases the ambient temperature above 104 °F, it is necessary to discharge the hot air leaving the radiator to the exterior by means of the sleeve.

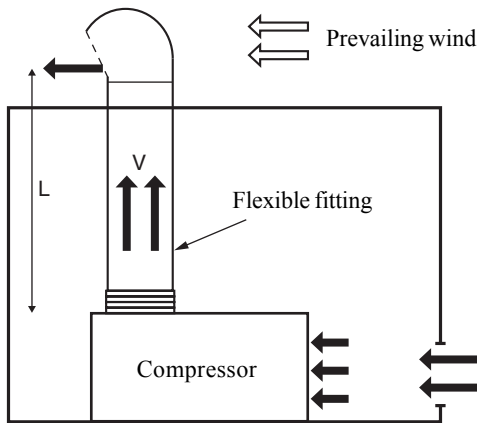


Fig. 2a - Sleeve with roof outlet

	Ventilation flow rate cfm	Duct minimum cross section ($d \leq L \leq 1,6d$) sqf
CPVS 40	2860	2.6
CPVS 50	2860	2.6
CPVS 60	3920	3.6
CPVS 75	5300	4.9

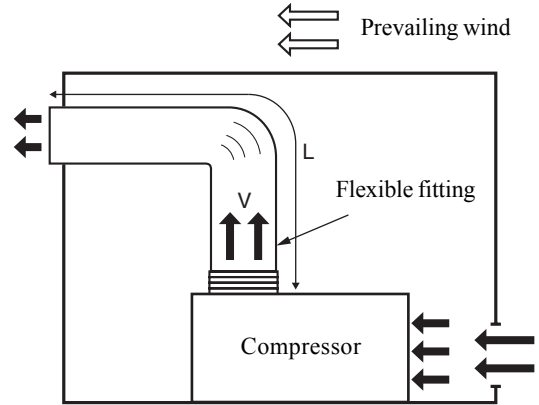


Fig. 2b - Sleeve with an elbow

V maxi = 18.04 ft/s
(Ratio of volume flow rate of the ventilation to the sleeve cross section)

L maxi = 32.8 ft (without mechanical extractor)
Cross section of room air inlet > 2 x Duct outlet cross section
2 elbows accepted with large radius of curve and fluid guidance vanes

Ratio (Length/Width of sleeve) maxi = 1.6

Make sure that no outside air, especially if humid, can be fed back into the machine and damage electric and electronic components or rust metal parts.

The maximum admissible pressure loss of the sleeve should not exceed 30 Pa (0.12 in CE). In case of higher value, provide an additional ventilation (mechanical extractor) with a flow equivalent to that of the machine.

C - Assembly

Put the unit on a stable surface. The CPVS does not need foundations. Any flat surface that can support its weight will be sufficient (industrial floor).

D - Air discharge piping

The diameter of the air discharge pipe must be at least 2"NPT. Current legislation requires that a valve which is lockable in the closed position be installed at the air box outlet, connected to the compressor by a union and flexible line to allow it to be cut off during maintenance.

E - Condensate drain pipes

A separator with automatic solenoid valve drain is provided inside the set (see **Section 5-K**) to remove the condensate at the final cooler outlet and stop the compressor pipe condensate return lines. Connect the discharge pipe to a condensate manifold.(see **B Section 1**)

F - Electric cabling

Each CPVS is wired for a pre-determined voltage, i.e. 460 V.

NEVER OPERATE THE CPVS ON A VOLTAGE OTHER THAN THAT SHOWN ON THE ELECTRIC CABINET.

The electric current supply to the CPVS must comply with the following table :

Type of cable to be used :
Power cable size
(for a maximum 32.8 ft length)

CPVS Model	VOLTAGE
	460 V
40	AWG4
50	AWG3
60	AGW1
75	AWG0

SAFETY REGULATIONS

It should be remembered that safety regulations require :

- An earth socket to be used.
- A manual isolating switch, cutting all three phases ; this switch must be clearly visible near the CPVS unit.
- The electric current must be cut whenever maintenance work is carried out on the machine (except for pressurized oil change)

CPVS Model	Fuses to be used for the isolating switch (RK5 type)
	460 V
40	80
50	100
60	125
75	150

Section 3 - Implementation

A - Preparation for start-up

Before starting the set for the first time, the operator must get to know the different systems. The main locations which have to be examined are shown on the figures.

IMPORTANT

Before start up, make sure that transport red wedges have been effectively removed.

ATTENTION

The power circuit must be turned whenever adjusting electrical equipment or to prevent accidental starting.

Loosening of electrical power cables that may be due to vibrations caused by transport or initial heating entails abnormal heating of contactors, which may even destroy them. Therefore, these cables must be re-tightened at line contactor incoming and outgoing, star and triangle before use.

Before start-up, check the following points :

- 1 - Make sure that the unit is properly grounded.
- 2 - Check the oil level in the tank.
NOTE : the tank has been filled with suitable oil in the factory. See **Section 8 - A** for the quality of oil to be used or for oil renewal conditions.
- 3 - Make sure the oil change valve is properly closed.

ATTENTION

The oil filler cap, the oil change valve and plugs must always remain closed during operation and never be opened before the system has been completely vented to atmospheric pressure (except pressurized oil change : See **Chapitre 8 - A**).

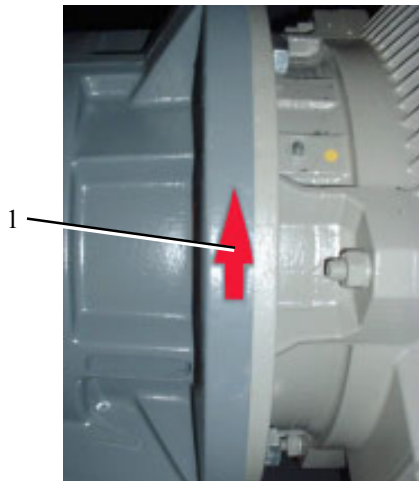


Fig. 3

B - First start-up

Check the voltage between the three phases before using the unit for the first time.

Check the direction of rotation (following the arrow on the coupling housing **rep. 1- Fig. 3**) by pressing the "Start" button, followed immediately by the emergency stop. If it does not spin in the right direction reverse two stages of the power cord. When it rotates in the correct direction, the oil level (**Fig. 19**) should drop after 4 or 5 seconds of operation.

It is also very important to verify the direction of rotation of the fan (indicated on it by an arrow) anti-clockwise seen from inside the machine or clockwise seen from outside the machine).

- 1 - Press the ON button, the motor starts up.
- 2 - Leave it running for a few minutes with the discharge valve slightly open to observe the compressor under load. Ensure that there are no leaks. Reblock the connectors if necessary.
- 3 - Press the OFF button. The motor will stop and the unit will automatically vent to atmospheric pressure.

C -Discharge pressure adjustment

The unit is adjusted in the factory for a MAXIMUM pressure (for the maximum output from the outlet of the central unit) of 100, 125, 150 or 175 PSI . To adjust the backflow pressure setting to a lower value, refer to the manual of the electronic plate (**refer E Section 1**).

D - Parallel compressor assembly

If the CPVS is intended to operate in parallel with other CP or similar compressors, the discharge piping can be linked together.

If the CPVS is intended to operate in parallel with other CP or similar compressors, there must be an air tank common to all the alternative compressors. The pulses emitted by alternative compressors may cause serious damage to the minimum pressure valve and the CPVS oil separator, and disrupt the regulation system. When the rotary compressor is operating in parallel with an alternative compressor, the latter should be adjusted so that the rotary compressor takes the main load. It is cheaper to run this way.

E - Safety

The oil used for cooling the machine is a liquid combustible under the effect of strong heat. In case of fire in the machine, it is essential to respect the regulatory measures on the compressor. The type of fire in a compressor is defined as "class B" and in presence of a live electrical conductor, it is recommended to use a CO2 extinguisher functioning by "smothering" (starvation of oxygen) while observing the user instructions applicable to the model.

Section 4 - Operation

A - Air and oil circuits

1 - Air circuits (see Fig. 4)

The air is sucked into the compressor through a filter (rep. 23). This air passes through the compression element where it is mixed with oil injected during compression. Inside the oil tank, the compressed air is pre-deoiled by shocks, then flows through the oil separator (rep 49). It then passes through the mini pressure valve (rep 34) forming a check valve, the aftercooler (rep 51A), the condensate separator (in option), and lastly the outlet valve (not supplied) to which the distribution pipe is connected.

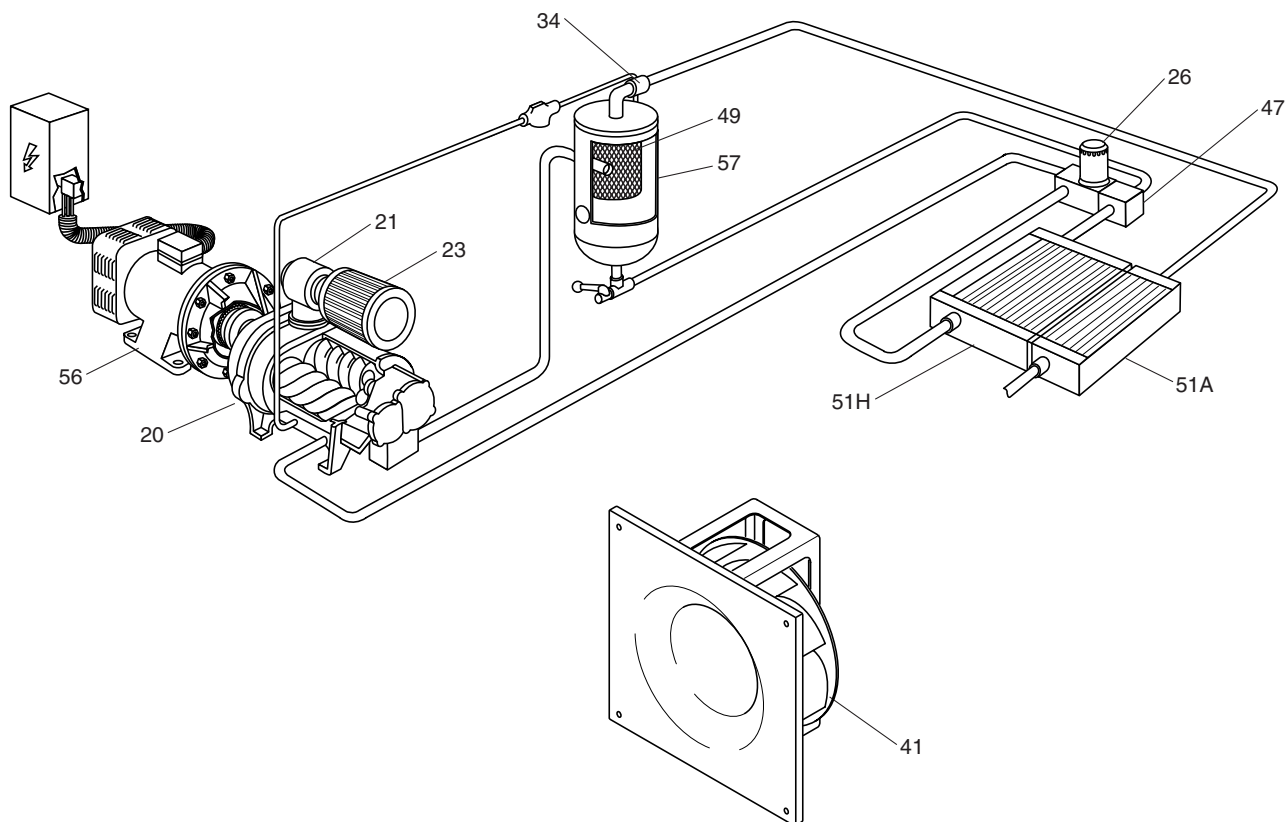
2 - Oil circuit (see Fig. 4)

The oil, under discharge pressure, flows from the bottom of the tank through the cooler (rep. 51H), the oil filter (rep. 26) which retains solid impurities, and then into the compressor (rep. 20). At each cold start, the thermostat valve (rep. 47) short circuits the oil radiator, thus enabling the optimum operating temperature to be attained quickly. When it leaves the compressor, the oil returns to the tank. Part of the oil remains suspended in the air as mist. This mist passes through the oil separator (rep. 49). The remaining oil, which is separated by the last stage of the oil separator, is drawn up by a dip tube and dispatched to the compressor.

Key fig. 4

20	Compressor
21	Suction element
23	Air filter
26	Oil filter
34	Minimum pressure valve
41	Ventilator
47	Thermostat valve
49	Oil separator
51 A	Air cooler
51 H	Oil cooler
56	Main motor
57	Tank

Fig. 4 - Air / oil circuit



Section 5 - Options

A - Level detection bleed valve (Fig. 6)

1 - Description

The BEKOMAT type level detection bleed valve allows all air consumption to be avoided while the compressor is not running.

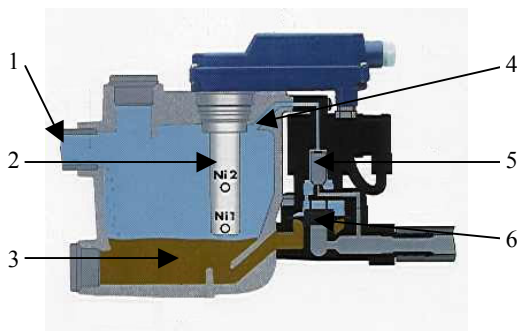
2 - Option overview

- There is no air consumption due to the level detection system : an inductive sensor detects the level of condensation and thus controls the opening of the electric bleed valve. A low level of condensation is also detected in order to close the electric bleed valve and to prevent compressed air from being wasted.

- This type of purge valve does not require any maintenance. The purge valve does not require the use of the metallic intake filter that is usually installed on electronic purge valves to protect the solenoid valve. The solenoid valve will not be damaged.

- Condensate treatment is made easier because it is not evacuated by pressure, which enables easy separation of the water and oil stages.

Fig. 6



- 1 - Condensation intake
- 2 - Capacitive sensor
- 3 - Receiver
- 4 - Main duct
- 5 - Electric valve
- 6 - Membrane

3 - Technical features

- Maximum capacity of the compressor : 706 cfm/min
- Working pressure : 11.6 / 232 PSI
- Operating pressure : 33.8 / + 140°F
- Electric power supply : 115V / 24V
- AC socket in the compressor electric cabinet.

B -Advanced filtration to the compression air inlet (Fig. 7a and 7b)

1 - Description

This system is equipped for "high efficiency" air filtration in order to improve the quality of the air intake and to preserve the compressor's oil and internal filter components.

This option is particularly useful in very dusty surroundings.

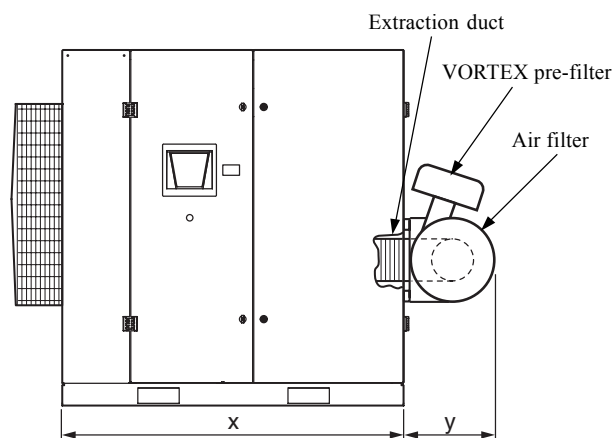
2 - Option overview

- This option is used as a replacement for the standard filter
- Certain atmospheric particles are smaller than 78^{10-6} in, a limiting threshold for traditional paper cartridge filters. The filter increases filtration effectiveness by eliminating 99.97% of particles that are larger than or equal to 118^{10-6} in.
- The quality of the air intake by a compressor is essential. Low quality air creates the following :
 - Quick pollution of the oil thus an increase in draining cycles.
 - Binding of the air / oil separator before 4000 hours thus an increase in maintenance cycles and operation costs.
 - Pollution increases the elements that filter into the air and oil, speeding up the damage to the mechanical components of the compressor, screw element,...

Filters in compliance with standard ISO 5011/2000.

- Exceptional filter longevity, from 18 months to 3 years of continuous service (24 hours a day, 7 days a week), which is a little more than 10,000 hours of operation of the compressor under normal conditions.

- Installation of the filter(s), depending on the model, outside the compressor, for intake of fresh air, hence resulting in a lower oil temperature and more efficient compression (**Fig. 7a and 7b**).



	x	y
CPVS 40-50-60	71 in	11.2 in
CPVS 75	71 in	13.6 in

Fig. 7a

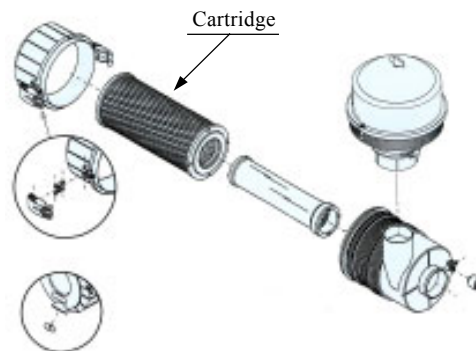


Fig. 7b

3 - Technical features

Operating temperature :

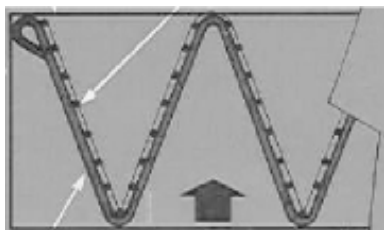
-104 °F to + 194 °F

C - Pre-filtration panels

Fig. 8



Easy to disassemble for rapid cleaning



1 - Description

Installing air filtration panels on the ventilation intakes (machine and built-in dryer) guarantees protection of the compressor's internal components and an increase in air sucked into the compression assembly. This option is recommended if the forced filtration option is installed (see § B).

2 - Option overview

The pre-filtration panels eliminate 90% of the particles normally admitted inside the compressor and considerably decrease internal contamination of the machine.

The high quality of the ventilation air is also essential for protecting internal components of the compressor and, more specifically, the motor and the air / air and air / oil exchangers. Clogging in the exchangers creates an increase in temperature, deterioration of the lubricant and the motor becomes overloaded thus increasing the energy consumed.

The quality of the air drawn in by a compressor is essential. Low quality air results in the following :

- Fast pollution of the oil thus an increase in oil change cycles.
- Increased pollution of the air and oil filtering components that increases the deterioration of the mechanical components in the compressor, screw block, ...

- Binding of the air / oil separator before 6000 Hours thus an increase in maintenance cycles and maintenance costs.

Access to the filtering medium is allowed by removal that does not require any particular tool. The panel frame can be unlocked manually in order to clean the medium.

Exceptional longevity of the medium that is quick to take apart. The medium can be scoured by blowing compressed air in thus increasing the usage term for the filtering medium.

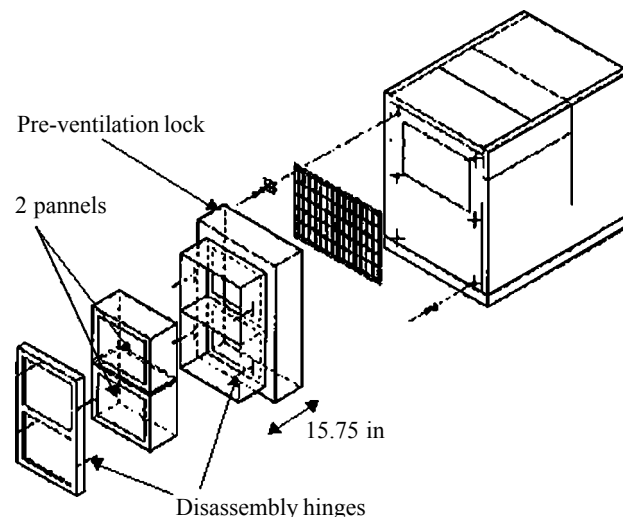
Galvanised steel covered frame.

Flammable medium (belonging to fire protection class M1) made of polyester fibres.

Pleated medium on support grid placed downwards in the direction of the airflow.

Support grid

Fig. 9



3 - Technical features

FILTER MEDIUM :

Degree of filtration :	90% of the dust emitted is filtered.
Total nominal flow :	324893 cfm/h
Filter panel number :	2
Initial charge loss :	75 Pa
Dimensions :	
Width :	24 in
Length :	24 in
Thickness :	7.9 in

D -Automatic restarting

1 - Description

This management system enables the compressor to be restarted automatically after a power outage.

2 - Option overview

Not available in standard version in order to prevent any incident during maintenance operations carried out by an untrained person. This option is proposed in cases where the production of compressed air should suffer only the minimum periods of shutdowns.

The standard microcut time accepted by **AIRLOGIC** is approximately : 250 ms.

However, certain electrical fittings create longer micro cut-offs that will cause a compressor shut down, then a manual restart.

Automatic compressor restarting enables immediate air production after a power outage and thus avoids the time lapse required for manual compressor restarting that would mean a fall in pressure in the air circuit.

Particularly used for industries where air production should not be subject to shut downs that waste the products manufactured or damage the production equipment.

THIS OPERATION REQUIRES THE CONFIGURATION OF MENUS IN THE CONTROLLER, ACCESS RESTRICTED TO TECHNICIANS CERTIFIED BY CHICAGO PNEUMATIC COMPRESSORS.

AN INFORMATIVE INSERT MUST BE PLACED ON THE ELECTRIC CABINET TO WARN THE USER OF THE RISK THAT THE COMPRESSOR MAY AUTOMATICALLY RESTART AT ANY TIME.

3 - Technical features

This option requires configuration of the electronic plate and installation of an informative insert on the door of the compressor electric cabinet.

Every time the compressor stops, it must be secured by opening and locking the electric section switch.

E - Remote starting and stopping

This option allows the compressor to be remotely started and stopped. **However, in all cases, stopping the compressor at the machine itself is essential.** If the compressor is shut down from a distance, it may be restarted from a distance as well. For any intervention to be conducted on the machine, it is essential to activate the emergency stop of the machine in order to ensure safe conditions (**Refer to AIRLOGIC Manual, E Section 1**)

F - Rotation direction indicator - Phase controller

1 - Description

The phase controller option is designed to:

- control the rotation direction of the machine's electric power supply phases.

- check that electric power is supplied to each phase.

These two functions are permanently guaranteed.

2 - Option overview

The advantages of this option are:

- starting the machine with the guarantee that it will work (if this option was factory-installed), the configuration of the rotation direction having been configured during the production tests.

- protecting the motor and the electrical fittings from any loss of power supply (phase cuts, blown fuses, voltage threshold lower than 130 volts).

- protecting the machine (motor and especially the compression assembly) when restarting it following electrical work on the power supply line or when switching from the mains supply to a backup power supply, such as a power generator.

3 - Operation

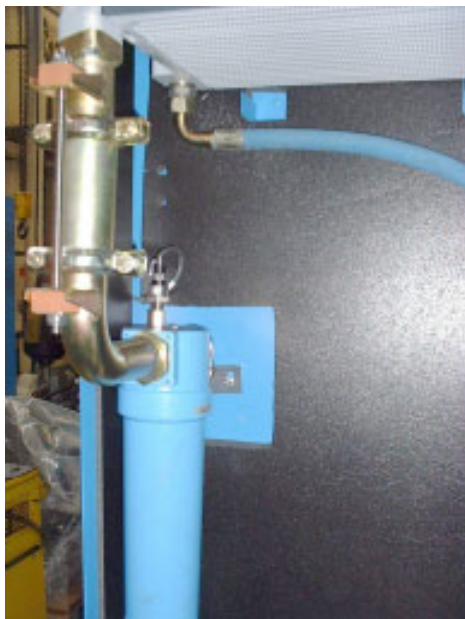
In the event of a phase failure (detectable by this option) or an incorrect rotation direction, the trip switch sets off the machine's safety system (preventing immediate stopping and starting of the machine) and shows the following message on the display of the electronic plate: "**ventilation flaw**".

4 - Features

scanning time / measurement cycle	< 80 ms
minimum operating voltage	200 volts
maximum acceptable voltage between phases	600 volts
power consumption	15 VA

G - Centrifugal separator (See B Section 3)

Fig. 13



1 - Description

This device allows bleeding of the condensates formed in the air cooler.

2 - Description of the option

The cooling of the compressed air allows the suction air to be dried, thus removing the humidity that collects in the bottom of the separator after being condensed in the aftercooler. The condensates are evacuated from the separator through a trap with a solenoid drip valve or a trap with level detector if this option is installed.

Section 6 - Specific information for CPVS 40-50-60-75

Refer also to the chapters concerning the standard machine.

"CPVS" compressors are compliant with the Electromagnetic compatibility in industrial environments Standards 50081-2 and 50082-2

A - Description (cf Section 1)

Standard equipment

A electronic frequency adjusting device replaces the star-delta starter.

A fuse holder section switch completes CP standard's safety devices.

B - Safety

For your safety, please respect the instructions carrying the warning symbols as given below:

SAFETY RULES

The safety rules require:

- The presence of an earth socket
- The existence of a manual switch cutting-off the three phases that should be placed visibly near the CP
- It is necessary to cut out the electric current before any intervention on the machine (except drainage under pressure).



= Dangerous voltage



= Attention

ELECTRICAL INSTALLATIONS MUST ONLY BE CARRIED OUT BY A SPECIALISED AND COMPETENT TECHNICIANS



1 - Warning



1

The internal components and the plates (except the electrically insulated I/O terminals) are at the mains voltage when the inverter is connected to the mains. This voltage is extremely dangerous and can cause severe injuries or even death in case of involuntary contact.



2

When the inverter is connected to the mains, the connection terminals U, V, W of the motor as well as +/- connectors of the braking resistors are under power even if the motor is not running.



3

The I/O control terminals are insulated from the mains, the relay outputs can nevertheless be under power even if the inverter is disconnected. This also applies to other I/O control terminals even if the X4 switch is in OFF position (Stop).



4

The inverter has a load circuit of thermally limited capacitors. Therefore, it is important to allow minimum 5 minutes between two successive power-ons. If this instruction is not respected, the switch and the resistor of the load circuit may be damaged.

2 - Safety instructions



1

No connection work is allowed when the inverter is under power.



2

No measurement work is allowed on the inverter when it is under power.



3

To undertake any work on the inverter, it is necessary to disconnect the equipment from the mains. Wait for the internal ventilation to stop and the indicators to be turned off. Then, wait 5 minutes before opening the cover.



4

No voltage or insulation verification test is allowed on the inverter components.



5

Disconnect the cables from the motor and the inverter before taking measurements on them.



6

Do not touch the integrated circuits, the electrostatic discharges may damage them.



7

Before connecting the inverter, make sure that its cover is properly closed.



8

Make sure that no compensation capacitor of cosine phi is connected to the motor cable.

C - Installation

The "CPVS" must be installed away from a transformer or autotransformer.

(see Section 2 and 3).

The fuses for the section switch are defined as follows

Main Voltage 460 Volt / 3 / 60 Hz				
	40	50	60	75
Nominal current (A)	69	81	100	126
Power supply cable	AWG4	AWG3	AWG1	AWG0
Fuse protection (Type RK5)	80	100	125	150

ATTENTION

Motors and drives can only be guaranteed where the supply voltage does not exceed the rated voltage by more than 10%.

The connection of the power supply to the section switch (so present) requires the use of properly insulated terminals.

D - Commissioning

1 - Preparation for start-up

(See Section 3).

ATTENTION

The power circuit will have to be cut off when adjusting the electrical equipment or if inadvertent start-up is to be avoided.

Before start-up, check the following points:

- 1 - Ensure that the unit has a suitable earth,
- 2 - Check the oil level in the compressor,

NOTE: the tank was filled in the factory with a suitable oil. See **Section 8 - A** for the quality of oil to be used and for the oil renewal conditions.

- 3 - Check that the drainage valve is properly closed.
- 4 - Make sure that the conveyor assembly's blocking lugs (compressor) have been removed from the compressor silentblocks.

ATTENTION

The oil filler plug, the valve and the drainage plugs have always to be closed during operation and must never be opened before the system has reached atmospheric pressure.

2 - Control of rotation direction on start up

This control must be implemented when the machine is put into operation for the first time, after any work has been carried out on the motor and after any changes to the mains supply.

IMPORTANT :

- Check the direction of rotation (as per the arrow shown on the sump) by jogging over with the START button.

If it is incorrect, swap over two of the motor's phase cables under the drive.

When rotating in the right direction, the oil level (**fig. 19**) must drop after 4 to 5 seconds of operation.

- Also check the direction of rotation of the fan for air-cooled plants (counter-clockwise, as seen from inside the casing).

- 1 - Press the START button so that the motor starts.
- 2 - Allow to rotate for several seconds with the discharge valve slightly open to observe the compressor at load.
- 3 - Press the STOP button. The motor stops and the plant automatically returns to atmospheric pressure.

3 - Setting of pressure - machine

(Refer **E Section 1** refer also to the **AIRLOGIC** controller manual)

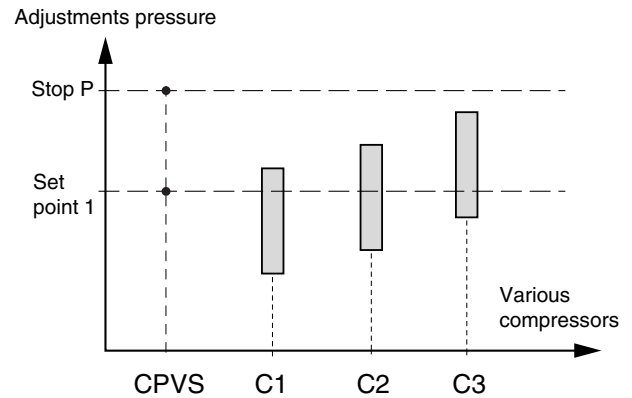
The unit is factory pre-set for a given delivery pressure. As an energy saving measure, it is strongly advised to reduce the pressure to the exact requirement by adjusting the "Set point 1" setting.

The stop pressure "Indirect shutdown" used when running at less than the minimum flow-rate - must be set to 7.25 PSI above that of the "Set point 1". In this way, the current used by the compressor is minimised (see notice **AIRLOGIC**).

Do not set the stop pressure at a level beyond the machine's max P.

4 - Assembly and settings for parallel operation with other compressors

Pressure for the CPVS compressor must be adjusted at a value within the range of adjustment values for the rest of the compressors..



5 - Regulating the pressure by changing the speed

This method of regulating the pressure allows precise adjustment of the compressor's flow-rate at the compressed air demand valve:

The accuracy is of the order of 1.45 PSI when pressure regulation is achieved by changing the speed, provided that the flow-rate lies between the maximum and minimum rates for the machine.

- **The principle of the pressure regulation by changing the speed**

The **AIRLOGIC** controller controls the motor and the compressor as a function of the system pressure as measured by an internal pressure sensor (**fig. 14a**).

- If the mains pressure is weaker than the pressure set point

(user-defined parameter in the **AIRLOGIC**) the motor will accelerate and the pressure will increase (**fig. 14b**)

- If the mains pressure is stronger than the pressure set point, the motor will slow down causing the pressure to drop.

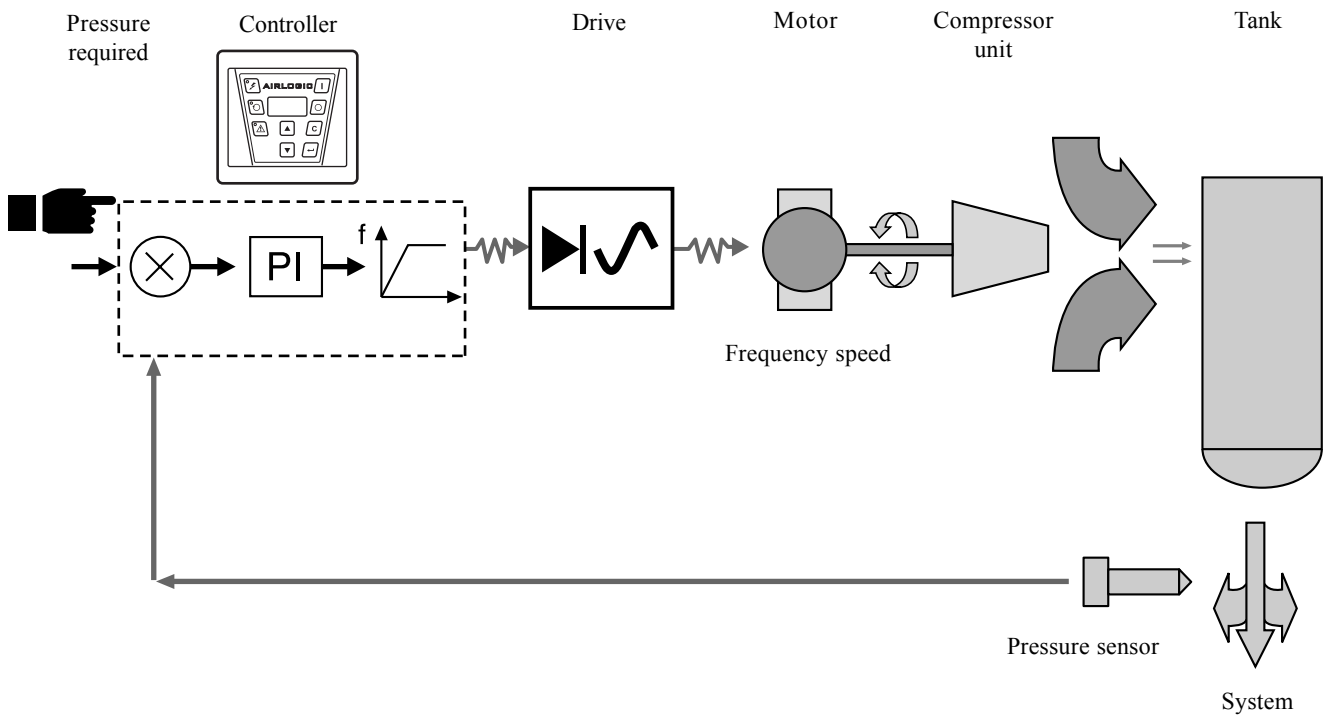
The **AIRLOGIC** provides the compressor control functions and also controls the whole pressure feedback loop. It therefore includes a device to compare the indicated pressure with that from the pressure sensor, associated with a compensating device, Proportional integral control PI (**fig. 14c**).

The drive, a result of the latest developments in power electronics, is one of the smallest in size on the market, thanks to its use of high cut-out frequencies with IGBT transistors.

At the same time, the motor control method known as "open loop vector flux control" provides good stability for the system against disruption.

In this way, the pressure feedback loop is more stable to sudden changes in consumption (changes in the flow-rate).

Fig. 14a
The principle of the pressure regulation by variable speed



• **Pressure regulation for low rates of flow**

For an air consumption rate lower than the minimum rate of flow for the machine, the pressure is adjusted by the machine's time-delayed START/STOP controls.

Since the operation element cannot function below a certain speed (corresponding to the minimum output), the compressor continues to run and compress at the minimum speed until the pressure reaches the limit called "Indirect shutdown".

Once this threshold has been reached, the motor will stop, the machine will go into stand-by mode after a certain period of inactivity and the full drainage process will be carried out. The pressure then drops towards the indicated pressure and, at the end of the minimum time delay (since reaching the no-load pressure), the drive allows the motor to restart. The pressure then rises again and the cycle starts over (**fig. 14 d**).

To avoid pumping the system - frequent stop / start - drainage time may be increased (cf. notice AIRLOGIC).

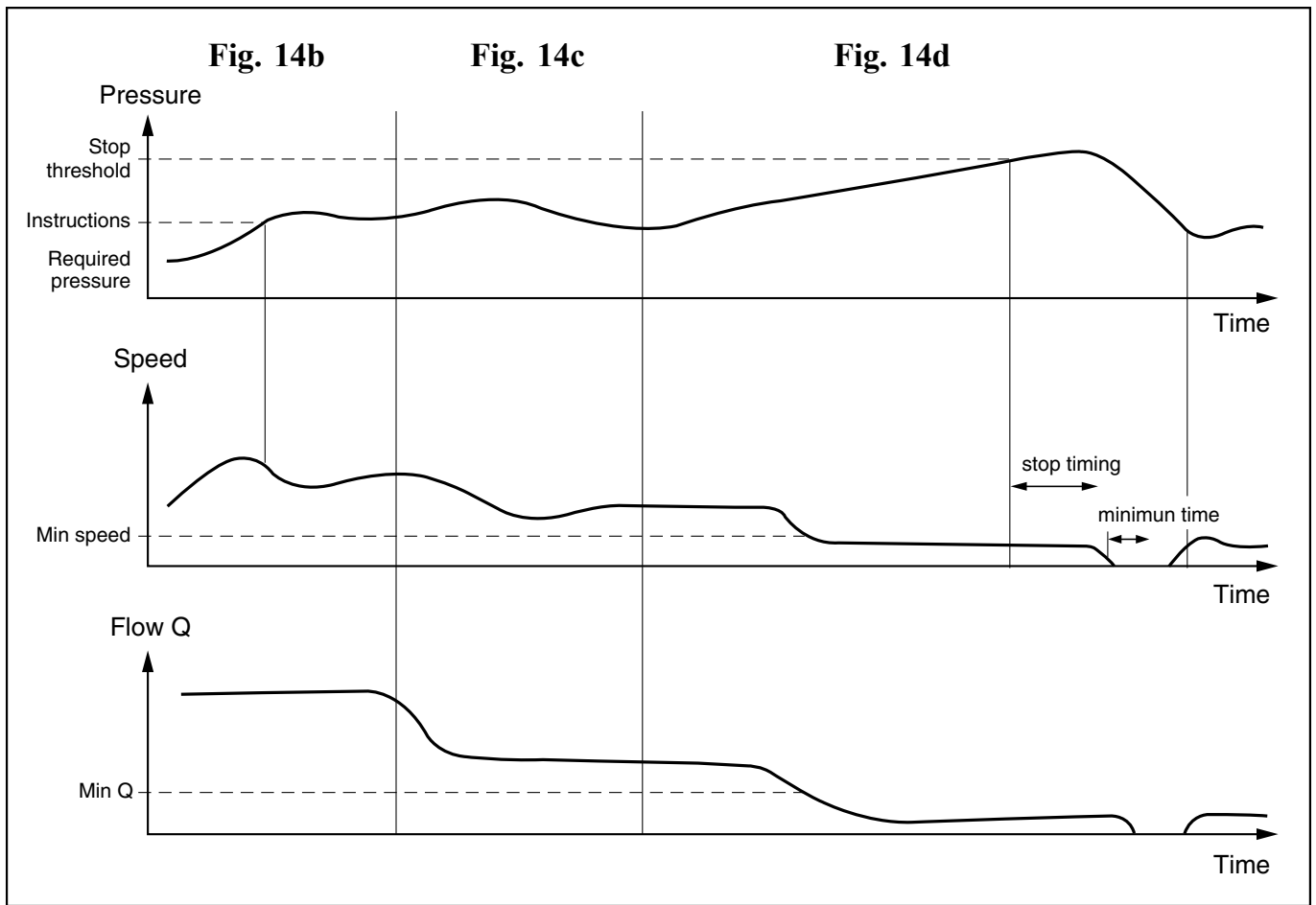
• **Energy saving**

For demand of compressed air within the machine's flow range - min flow to max flow, the frequency converter or the variable speed drive feed the motor in order to ensure that it turns at the speed required to supply air demand both for pressure and flow.

It is used to adjust the power supply to the motor (and thus the machine) to the exact power requirement for the compression of the air, without a drainage stage being necessary.

COMMENT :

Energy savings are increased if machine maintenance is carried out in accordance with the maintenance instructions and frequency.



E - Operating incidents

The staff in charge of maintenance of the CPVS compressor must become fully acquainted with this machine, in order to be able to easily diagnose any anomaly. Under normal operating conditions, the CPVS compressor must provide full satisfaction.

1 - Main incidents

The main incidents likely to occur are listed below, along with the remedies to be applied. The keys to the control lamps relate to the instrument panel (refer to the AIRLOGIC Manual - E Section 1).

Section 7 - Maintenance

The maintenance period is limited to several essential operations. It is strongly recommended that the power supply be cut off during any adjustment or repair.

The summary on the CP instrument panel shows at a glance the type and periodicity of operations to be carried out for the compressor to function correctly.

Parts	Operations to be carried out								Observations
	Daily	Every 500 hr	Every 150 hr	Every 2 000 hr (*) Service A	Every 4 000 hr	Every 6 000 hr Service B	Every 8 000 hr	Every 12 000 hr Service C	
Draining cock	X								Drain the condensates from the cold oil circuit (Section 8 - G)
Oil level	X								Check and top up if necessary (Section 8 - A)
Air filter				X					Replace the filter
Oil tank, Oil change		X					X		Oil change, oil refill with recommended oil (Section 8 - A)
Suction housing						Control cleaning lubrication		Overhaul kit	Renovation of the housing. Use the suction housing kit
Oil return pipe								Overhaul Kits	Check the cleanliness of the oil return pipe and the state of the seal (Section 8 - F)
Oil separator					X				Change the part according to the instrument panel indication (Section 8 - E)
Oil filter		X		X					Filter change
Oil radiator Final coolant			X						Blowing of cooling elements Cleaning (Section 8 - D)
Valve at minimum pressure						Control cleaning lubrication	Overhaul kits		Exchange the accessories supplied with the maintenance kit
Motor for CPVS 40-50-60-75				X					For motors fitted with grease, use Type ESSO UNIREX N3 (0,53 ocs per grease fitting)
Electric cabinet		X		X					Retighten power cable connections.
Safety temperature test				X					Check operation (Section 8 - H)

NOTE : maintenance kits are available (see spare parts list).

(*) or at least every year

CAUTION

When the compressed air cools, part of the moisture sucked in by the compressor condenses. In order to protect the dryer against the risk of an ice plug forming, it is essential to check regularly that the condensate drains are operating properly :

On the compressed air storage reservoir and on the filters :

- With a manual drain, drain regularly according to the moisture content of the ambient air.
- With an automatic drain, set the draining cycle accordingly and check that the drain is in good working condition.

This recommendation is also fundamental in a circuit comprising an absorption dryer (risk of saturation of the alumina).

A - Oil level and change (see fig. 19)

(see B Section 1)

The recommended oil used for the first compressor fill up is a mineral oil with the following properties :

- viscosity: 40 cSt at 104 °F
- viscosity index: 90 minimum
- antioxidant additives
- anti-rust additives
- anti-foam additives

THE FIRST OIL CHANGE MUST BE CARRIED OUT AFTER THE FIRST 500 HOURS OPERATION.

Using a synthetic oil for compressors is also acceptable and means less frequent oil changes: please speak to us about the compatibility and oil change methods.

The oil change and the replacement of oil filter must be carried out when the indication is seen on the electronic controller and when the corresponding time counter reaches "0" (refer to electronic plate manual **Section 1 E**).

Drain the compressor when warm. For this, shut it down taking care to disconnect the power cable. Release pressure in the tank by unscrewing the filler plug by a single turn. Open the purge valve and drain the oil. Do not forget to close the valve after draining the oil.

After maintenance, reset the time counter which tells you how long you have before the next oil change is due, refer to electronic plate manual **Section 1 E**.

OIL LEVEL

When the machine is not running, the MAXIMUM oil level corresponds to the top part of the green area, and the MINIMUM level is represented by the low part of this green area.

CHECKING THE OIL LEVEL MUST BE CARRIED OUT JUST AFTER STOPPING THE MACHINE (THERMOSTAT VALVE OPEN).

DRAINAGE UNDER PRESSURE

So as to carry out a quick and full oil change, your CPVS is equipped with a system that allows low level pressure to be maintained in the oil circuit. This pressure is shown by the pressure gauge situated in the tank. (see Notice **AIRLOGIC - E Section 1**).

Proceed as follows :

- When hot, compressor in load for programming a shutdown under pressure (refer notice **AIRLOGIC § 4.9.3**). The machine is emptied and stops automatically.
- Change the oil by opening the oil change valve very slowly.
- When there is no pressure left in the oil tank, change the oil filter cartridge.
- As soon as the oil is no longer flowing, close the valve and refill with new oil.
- Reinitialise the timers that will warn you when to carry out the next oil change and the next oil filter change (see the **AIRLOGIC Manual - E Section 1**),
- Reseal the filler cap when replacing it and check that all openings are properly closed.
- The machine can be restarted only after pressing the button **C** several times to return to **STATE 0.1**. Check the clamping of connections.
- After restarting, check that there are no oil leaks.

NOTE

If the oil is in a bad state ; that is a pungent smell or contains particles or varnish or other solid matter, the system will have to be rinsed : pour about 50% of the normal contents of clean oil and operate the unit for 3 hours and carefully change the oil. During rinsing, leave the old oil filter cartridge in the machine.

B - Air filter

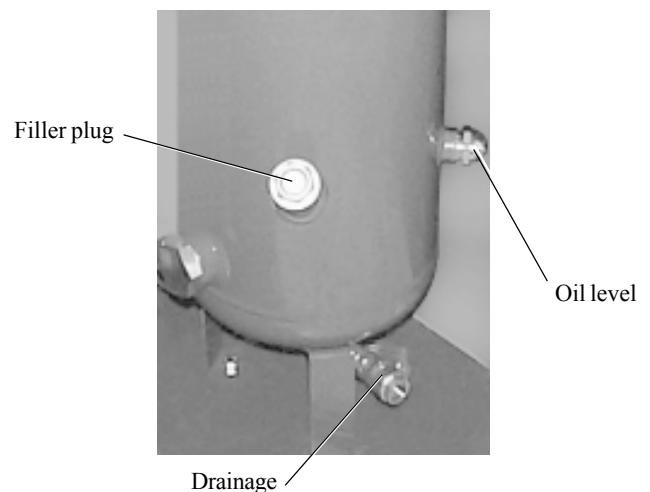
(see B Section 1)

The air filter is of the dry, encapsulated type. Change the cartridge every 2,000 hours. Check the cleanliness of the filter every week and change it if necessary. (see notice on the electronic plate for resetting the time).

ATTENTION :

If you do not replace the filtering element when needed, permanent dirt-build-up will result. This reduces the air inflow to the compressor and could damage the oil separator and the compressor.

Fig. 19 - Oil level



C - Turbine

Replacement of the complete fan is recommended if one or more blades are deformed or broken. If replaced, check the fan rotation direction reversal of the rotation direction will reduce machine cooling and damage the motor in time.

D - Oil and air cooler

The aluminium oil and air cooler is a vital part in the CPVS system. Please take care of this element. To prevent the nest of tubes from being deformed or damaged, when assembling or disassembling the radiator unions and hoses, the radiator sleeves' must be kept rotating by means of a wrench. The outer surface of the nest of tubes must always be kept clean in order to enable proper heat transfer. In the event of a leak, the source of the leak must be detected. In order to do this:

- Stop the CPVS.
- Clean the greasy areas.
- Look for leaks using conventional means (soap solution, ...).

Pressurized shutdown retains the pressure in the machine circuit for a few moments so that any leak can be more easily located.

E - Oil separator (see B Section 1)

The oil separator's lifespan depends on the cleanliness of the air coming into the compressor, on regular oil filter changes, on the quality of the oil used, on the attention with which the oil tank condensate drains are carried out and on the ambient temperature of the room. (see notice on the electronic plate for resetting the time).

Check the cleanliness of the pipe that returns the oil to be aspirated (transparent) to prevent the injector from becoming blocked and to ensure that the oil recovered can pass through easily.

Excessive oil consumption

The presence of excess oil in the discharge air, a rapid drop in level show a probable deterioration in the oil separator that must be changed.

The unit must first be checked to make sure that there is no oil loss and that the oil return is working properly.

Changing the oil separator

Dismantle all the piping connected to the tank's upper flange (air discharge, regulation system supply, and oil return). Undo the screws that hold the tank cover and remove it.

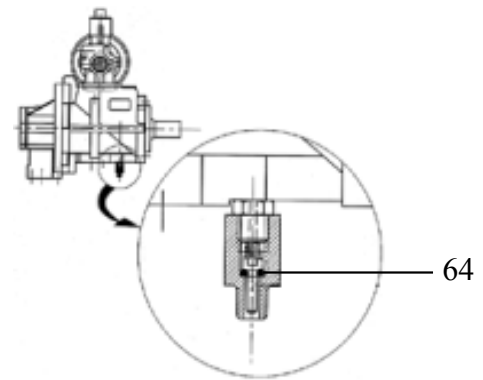
- If the old oil separator must be remounted, use new seals.
- Be very careful during installation of the oil separator so as to avoid possible damage.
- The new oil separator is delivered with its two seals on either side of the flange.
- Slight undulations in the flange will flatten out when the screws are tightened.
- Apply a 6 mkg torque.
- Replace the oil return tube correctly so it touches the bottom of the oil separator.

F - Oil return pipe (see fig. 20)

Placed under the compressor

- Dismantle the body of the anti-oil return pipe.
- Lift the anti-oil return pipe.
- Check the state of the o-ring (**rep. 64**).
- Reassemble.

Fig. 20 - Oil return pipe



G - Draining condensation water (see B Section 1)

Condensation water prevents proper lubrication. The resulting substantial wear leads to a reduction in the lifespan of the CPVS. It is therefore essential to drain condensation water.

Draining of condensates in the oil circuit (see fig. 19) :

Draining will only take place at least 12 hours after the CPVS has been shut down. It can be carried out for example on the morning of the start-up.

To do this :

- Slowly open the oil change tap and let the water escape.
- When the oil appears, close the valve immediately to avoid any loss.
- Refill with oil if necessary.

H - Temperature safety tests

(See instructions electronic board).

IF THE SENSOR IS NOT WORKING, IT MUST BE CHANGED.

I - Refastening electric connections

A loosening of the electric power cables leads to the contactors over-heating which can lead to their destruction.

Periodic refastening is therefore necessary at the star and triangle line contactor arrivals and departures. (see Maintenance Table).

All electric power supply to the machine must be cut off before opening the electric cabinet.

J - Decommissioning the compressor at the end of its useful life (see B Section 1)

1. Stop the compressor and close the air outlet valve.
2. Unplug the compressor from the electric supply.
3. Decompress the compressor : unplug the 4/6 piping on the oil separator cover.
4. Close and decompress the section of the air network which is linked to the exit valve. Disconnect from the compressed air exit pipe from the air network.
5. Empty the circuits of oil and condensates.
6. Disconnect the compressor condensate piping from the condensate draining system.

Section 8 - Operating incidents

The staff in charge of maintenance of the CP Compressor must become fully acquainted with this machine, in order to be able to easily diagnose any anomaly. Under normal operating conditions, the CP compressor must provide full satisfaction.

A - Main incidents

The main incidents likely to occur are listed below, along with the remedies to be applied. The markers of the indicator lights relate to the control panel.

Observed defects	Possible causes	Solutions
1. THE COMPRESSOR DOES NOT START	<ul style="list-style-type: none"> a) Main switch open. b) Phase missing. c) Fuse. d) Insufficient voltage at motor terminals. e) Compressor under pressure. 	<ul style="list-style-type: none"> a) Close the switch. b) Check the circuits. c) Replace. d) Check the voltage and the connections. e) Check the vacuum device and change if necessary. Check the water-tightness of the minimum pressure valve.
2. THE COMPRESSOR OVERHEATS	<ul style="list-style-type: none"> a) Ambient temperature too high. b) Obstruction of the passage of cooling through the oil radiator. c) Oil level too low. d) Oil circuit blocked. 	<ul style="list-style-type: none"> a) Make openings or install ducts to evacuate the hot air (see Section 2). b) Clean the radiator (see Section 8). c) Check and top-up oil level. d) Check that the oil filter is clean. Drain. Replace the cartridge. Check the tightness of connections.
3. THE COMPRESSOR STOPS WHEN THE MOTOR PROTECTION UNIT TRIPS	<ul style="list-style-type: none"> a) Compressor motor overload. 	<ul style="list-style-type: none"> a) Check it is connected and the electric connections are tight. Check the pressure of the compressed air and the pressure switch settings.
4. OPENING OF SAFETY VALVE	<ul style="list-style-type: none"> a) To clean de-oiling cartridge. b) Valve of suction box out of use or not closed. c) Faulty pressure switch, sensor or solenoid valve. d) Working pressure too high 	<ul style="list-style-type: none"> a) Change the de-oiling cartridge. b) Check valve, piston and joints of suction box. c) Check that the pressure switch and electrovalve and sensor pressure are in good working order.
5. EXCESSIVE OIL CONSUMPTION	<ul style="list-style-type: none"> a) Blocked oil retainer. b) Oil leaks in the CPVS compressor. c) Faulty oil separator element 	<ul style="list-style-type: none"> a) Check the oil return pipes. b) Look for oil leaks and rectify. c) Replace the de-oiling cartridge. (see Section 8-E)
6. DELIVERY PRESSURE TOO LOW	<ul style="list-style-type: none"> a) Incorrect pressure settings. b) The desired output is higher than that of the compressor. c) Closed suction valve. d) Release nozzle incorrectly adjusted (progressive adjustment option). 	<ul style="list-style-type: none"> a) Adjust the pressure (see Section 3). b) Check consumption and possible leaks. c) Check electrovalve, pressure switch, valve. d) Check setting.
7. COMPRESSED AIR OUTPUT TOO LOW	<ul style="list-style-type: none"> a) Blocked air filter. b) Adjusting electrovalve not working. 	<ul style="list-style-type: none"> a) Clean filter. b) Check setting.
8. EXCESSIVE NOISE OF UNIT	<ul style="list-style-type: none"> a) Fixing bolts of compressor or motor have come loose. b) Soundproof panels incorrectly closed. c) Transport retainer blocks (red parts) not removed. 	<ul style="list-style-type: none"> a) Tighten. b) Check that they are closed. c) Remove retainer blocks.
9. THE COMPRESSOR STOPS UNTIMELY OR CREATES NON-EXISTING FAULTS	<ul style="list-style-type: none"> a) Electromagnetic disturbance on the Airlogic controller. 	<ul style="list-style-type: none"> a) Add an interference suppression kit (contact the after sales department)

support

support@CPcompressor.com

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CP Compressors

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