



## CPVS 20 – 30 PRODUCT DESCRIPTION

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The CHICAGO PNEUMATIC CPVS 20-30 compressor is a quiet, complete and ready-for-use unit for the production of compressed air for light and medium industrial applications.

### OVERVIEW

The CHICAGO PNEUMATIC CPVS 20-30 consists of a single-stage screw rotary compressor with oil injection technology, standard low-sound enclosure, ES3000 microprocessor with VSD operation, totally-enclosed fan-cooled (TEFC) motor with soft start and reliable belt-drive transmission. Maximum operating pressure is 190 psig. The CHICAGO PNEUMATIC CPVS 20-30 is designed for indoor installation and carries a standard 1 year warranty. Upon satisfactory commissioning, the warranty shall be extended to a CP SECURE 5 Year Warranty (see warranty policy for details).

### MAJOR COMPONENTS

1. Dry air suction filter. Before being ingested, the atmospheric air is filtered by a panel pre-filter placed on the cabinet of the machine. The air is then filtered again by the 2 micron air filter element at the inlet of the compressor
2. Inlet assembly equipped with intake regulator and solenoid valve for idle or discharge operation, able to avoid oil backups due to eventual and sudden stops under load
3. 5 on 6 lobe rotary screw compressor airend that assures:
  - Maximum yield and maximum efficiency in any condition of operation
  - Low noise level
  - Low air losses and/or blow-by
4. Asynchronous, 460V, three-phase electric motor, 2 pole, class F insulation, top-mounted junction box and TEFC protection which provides resistance to dust, debris and liquids, increasing motor and compressor life
5. Efficient cooling system with forced ventilation and air flows via dedicated turbine or axial fan for optimum heat transference to package ambient
6. The drive transmission from the electric motor to the compression unit is performed by means of V-belts. Multiple belts permit the dissipation of heat, increasing their longevity and decreasing downtime.
7. Oil filter to hold eventual solid particles in suspension in the oil helping to prevent contamination into the airend and compressed air.
8. High efficiency air/oil separator element to ensure the best separation of oil from the compressed air. Separation shall take place through at least three methods,



including but not limited to: impact separation, gravitational separation and centripetal separation. The receiver tank collects and recycles the lubricant for distribution throughout the fluid circuit. Lubricant carryover with new components is 3ppm.

9. Integrated air/oil cooling blocks of industrial-grade, treated aluminum with finned pack for the cooling of application air and lubricating oil before injection into the compression chamber.
10. Filtering panel for pre-filtration of all the air incoming in the machine.
11. Full cabinet enclosure which is aesthetically pleasing, primed and powder-coated with UV resistant epoxy paint to a minimum of 2 mils. Cabinet is formed from varnished steel sheet and lined internally with acoustic insulating material.
12. VACON variable speed drive
  - Integrated line reactor to smooth voltage fluctuations
  - Allows continuous duty operation with turndown as low as 20% of full load capacity while maintaining a pressure band of +/- 2 psig
  - Provides soft start capability
    - Reduces inrush currents
    - Lowers motor power consumption

#### **ELECTRICAL PANEL**

- Electrical control panel in a metallic enclosure with keyed entry in compliance with the safety standards in force featuring:

- NEMA 1 electromechanical protection
- Automatic soft start operation
- Thermal protection for the electric motor
- Single-phase safety transformer with protection upstream and downstream by means of circuit breakers
- Power fail circuitry and ES3000 microprocessor

- Disconnecting switch with two positions:

- At position "0" allows the opening of the control panel
- At position "1" allows the starting of the machine

- Identification label indicating the serial number, the model and the identification data of the compressor

#### **ES3000 CONTROLLER**

The CHICAGO PNEUMATIC CPVS 20-30 is managed by the ES3000, an electronic control unit programmed for energy saving operation with intelligent shut-down.

- Controls all operations related to the use of the compressor: loading, idling, stop and restart of the compressor

- Performs the control and the regulation of the machine

- Signals any eventual malfunction in progress
- Stops the compressor due to alarm in progress
- Displays the information on the machine maintenance program
- Connections for facilitating communications and networking
  - 8 digital inputs
  - 4 analogical inputs
  - 14 digital outputs for field controls
  - 1 analogical output device
  - 1 interface port for the eventual enabling of a remote control
  - 1 serial port for connection to a PC in order to access the programming functions
  - Networking capability for 6 compressors
    - At least 3 must be equipped with ES3000
    - A maximum of 3 can be other microprocessor based controllers
- Display
  - Upper display: displays the compressor pressure
  - Lower display: displays the temperature, the total hours, load hours
  - Tab to go to the next field of the screen on the display
  - Buttons on each menu allow programming of the controller
  - Series of green LEDs indicating the normal operation phases of the compressor
  - Series of yellow LEDs (blinking in the forewarning phase) signaling the maintenance period time
  - Series of red LEDs (blinking in the prealarm phase) signaling the intervention of a safety device
  - Start, stop, reset, test push buttons and compressor idling LEDs





### **ENERGY SAVINGS DURING UNLOADED OPERATION**

The CHICAGO PNEUMATIC CPVS 20-30 does not idle and therefore consumes no power during unloaded operation.

### **SAFETY DEVICES**

#### **High Pressure Sensor**

- This protects the compressor against any abnormal rise in delivery pressure

#### **Safety Valve**

- Exhausts air if compressor runs over maximum working pressure
- Protects the compressor and down stream equipment from potential damage

#### **Automatic Blow-Down Valve**

- De-pressurizes compressor when compressor stops
- Prevents accidental starting of the compressor under load

#### **Minimum Pressure Valve**

- Ensures optimum internal pressure for oil circulation before producing compressed air
- Prevents potential airend failure and optimum oil separation

#### **Thermostatic Bypass Valve**

- Ensures oil reaches optimum temperature before passing through the cooler
- Prevents thermal overload on the main motor during start up on cold days.

#### **Non-Return Valve**

- Stops reverse rotation of airend/motor
- Ensures no air/oil mixture exhausts through the air inlet filter on shutdown

#### **High Temperature Thermostat**

- Stops the compressor when air/oil temperature exceeds design parameters
- Reduces risk of airend failure

#### **Motor Thermal Overload**

Thermal overloads are fitted to both the main and fan motors to prevent burn outs and expensive rewinds.



### **CONTROL DEVICES**

- Minimum pressure check-valve
- Rapid discharge for quick, automatic depressurization system to ensure a reliable idle restart without foaming the lubricant or damaging components
- Visible oil level via sight glass on the separator tank
- Gauge for the reading of the air-oil separator pressure
- Pressure transducer for the setting and the reading of the operation pressure
- Thermal probe for the control and the reading of the temperature value of the air/oil mixture delivered to the airend

### **LUBRICATING SYSTEM**

The CHICAGO PNEUMATIC CPVS 20-30 is supplied with an 8,000 synthetic blend lubricant. Within the compression unit, the air and lubricating oil are mixed together and sent to the oil/air separation system in order to reduce the oil carryover in suspension. The oil and the compressed air are separately cooled by means of a final air and oil cooler. It is kept in constant transit by the pressure difference of the compressed air circuit, thereby avoiding the use of power consuming oil pumps. Proper filtration and effective cooling ensure optimal operating conditions for the oil and grant performance longevity of the compressor. The oil has three main functions:

- Lubrication of the airend and reduction of frictional losses
- Cooling of the airend by transmitting heat from the compression elements
- To provide a seal between the rotors of the airend

### **THE LATEST EVOLUTION OF THE ASSYMETRICAL PROFILE AIREND**

Combining proven technology with advanced materials and production methods, we have developed a new airend that sets the standard for efficiency and reliability. The oil flooded asymmetrical screw type element ensures peak performance with no loss in efficiency throughout the life of the compression element.

### **COOLING AIR**

Cooling air is drawn in at high level to ensure the minimum amount of dust contamination enters the package. The inlet baffles optimize the air flow entering in the unit allow the compressor to be installed next to a wall which lowers the installation space required and saves on maintenance costs. The baffles also minimize the velocity of cooling air entering the package which prevents pre-filters air particulates. A large turbine fan gives the benefits of increased cooling efficiency, reduced noise levels and reduced power consumption. The aftercooler reduces the compressed air temperature to approximately 18°F above ambient temperature where approximately 70% of the water vapor in the air condenses into water droplets and can be removed via drain or moisture separator. This protects down stream equipment from water contamination, increasing the reliability of pneumatic equipment and reducing product contamination.

### **TEFC MOTOR**

The TEFC motor is protected from dust and water which increases the lifespan of the motor. With superior cooling efficiency from the turbine fan, optimum cooling of the



motor and the compressor is achieved. The TEFC motor ensures motor efficiency for the life of the compressor.

### **INLET BAFFLES**

The inlet baffles reduce inlet air velocity, allow the compressor to be installed next to a wall which reduces the levels of airborne contamination entering the package and lowers overall maintenance costs.

### **EASY MAINTENANCE**

The CHICAGO PNEUMATIC CPVS 20-30 is designed so that all the major internal parts are easily accessible for rapid maintenance operations. For the replacement and/or the tightening of the belts, only the fixed protection has to be removed. To replace the suction filter just remove the cover and replace the filter element. The particular construction of the cover allows this operation even if a warm air duct is installed, without removing any other component. The external filter panel can be easily removed from its position for period cleaning. For the discharge of the condensate of the oil separator, the topping off of the oil and/or replacement of oil, only the front panel needs to be removed. For the replacement of the oil filter and of the air-oil separator filter only the cover and the front panel should be removed.

### **AIR DUCTING**

The CHICAGO PNEUMATIC CPVS 20-30 is designed to allow easy installation of both the incoming and the outgoing via ductwork. The incoming air can be conveyed on the right side of the machine without creating any interference with any component of the compressor. The outgoing air can be conveyed by the upper side of the machine and this does not interfere with the normal maintenance operation of the machine.

### **HANDLING**

- THREE points accessible for the handling
- Possibility to use both a hand pallet as well as a forklift
- Distribution of the lifting points is in line with the center of gravity
- Lifting points provide easy handling after removal from the transport pallet

### **INSTALLATION**

The compressor-motor assembly is assembled on the frame of the machine by means of flexible supports which allow the installation of the compression unit to be directly onto a stable, flat surface without need of further anti-vibration provisions.

The self-supporting cabinet does not request any floor fastening bolt or device, although it is recommend that the compressor be mounted to a stable fixture to reduce vibration transmission.

For the installation, only the following connections need to be performed:

- Connection to the electric network:
- Connection to the compressed air use network



## CPVS 40-250 PRODUCT DESCRIPTION

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The CHICAGO PNEUMATIC CPVS 40-250 compressor is a quiet, complete and ready-for-use unit for the production of compressed air in industrial applications.

### OVERVIEW

The CHICAGO PNEUMATIC CPVS 40-250 consists of a single-stage screw rotary compressor with oil injection technology, variable speed operation, standard low-sound enclosure, AIRLOGIC microprocessor, totally-enclosed fan-cooled (TEFC) motor with reduced voltage “soft” starting and efficient gear-drive transmission. Maximum operating pressure is 140 psig. The CHICAGO PNEUMATIC CPVS 40-250 is designed for indoor installation and carries a standard 1 year warranty. Upon satisfactory commissioning, the warranty shall be extended to a CP SECURE 5 Year Warranty (see warranty policy for details).

### MAJOR COMPONENTS

1. Dry air suction filter. Before being ingested, the atmospheric air is filtered by a panel pre-filter placed on the cabinet of the machine. The air is then filtered again by the 2 micron air filter element at the inlet of the compressor
2. Inlet assembly equipped with intake regulator and solenoid valve for idle or discharge operation, able to avoid oil backups due to eventual and sudden stops under load
3. 5 on 6 lobe rotary screw compressor airend that assures:
  - Maximum yield and maximum efficiency in any condition of operation
  - Low noise level
  - Low air losses and/or blow-by
4. Asynchronous, 460V, three-phase electric motor, 2 pole, class F insulation, top-mounted junction box and TEFC protection which provides resistance to dust, debris and liquids, increasing motor and compressor life
5. Efficient cooling system with forced ventilation and air flows via dedicated turbine or axial fan for optimum heat transference to package ambient
6. The drive transmission from the electric motor to the compression unit is performed via a set of high efficiency gears.
7. Oil filter to hold eventual solid particles in suspension in the oil helping to prevent contamination into the airend and compressed air.
8. High efficiency air/oil separator element to ensure the best separation of oil from the compressed air. Separation shall take place through at least three methods, including but not limited to: impact separation, gravitational separation and centripetal separation. The receiver tank collects and recycles the lubricant for



distribution throughout the fluid circuit. Lubricant carryover with new components is 3ppm.

9. Integrated air/oil cooling blocks of industrial-grade, treated aluminum with finned pack for the cooling of application air and lubricating oil before injection into the compression chamber.
10. Filtering panel for pre-filtration of all the air incoming in the machine.
11. Full cabinet enclosure which is aesthetically pleasing, primed and powder-coated with UV resistant epoxy paint to a minimum of 2 mils. Cabinet is formed from varnished steel sheet and lined internally with acoustic insulating material.
12. Rugged, industrial quality Vacon variable speed drive with integrated line reactor for smoothing voltage fluctuations

### **ELECTRICAL PANEL**

- Electrical control panel in a metallic enclosure with keyed entry in compliance with the safety standards in force featuring:

- NEMA 1 electromechanical protection
- Automatic reduced voltage “soft” starter
- Thermal protection for the electric motor
- Single-phase safety transformer with protection upstream and downstream by means of circuit breakers
- Power fail circuitry and AIRLOGIC microprocessor

- Identification label indicating the serial number, the model and the identification data of the compressor





## **CONTROL SYSTEM**

The AIRLOGIC is an intelligent electronic controller that offers a 4 line x 16 character digital display and the opportunity to choose 3 of 25 languages. Navigation is simple and logical which facilitates entry of new parameters and access to compressor information. This controller has many standard features:

- Weekly programming
- Selection of 2 pressure bands
- Password protection of functional parameters
- Remote control and monitoring
- Running time percentage
- Regulates pressure band within a minimum of 3 psi.
- Manages the reduced voltage “soft” starting transition
- Controls all operations related to the use of the compressor: loading, idling, stop and restart of the compressor
- Performs the control and the regulation of the machine
- Signals any eventual malfunction in progress
- Stops the compressor due to alarm in progress
- Displays the information on the machine maintenance program
- Networking capability for 4 compressors

The AIRLOGIC has a number of built-in safety features to protect the compressor's operation:

- Rotation detection
- Air loss detection through oil separator
- Limitation on the number of motor restarts
- Protection against starting under pressure and at low temperature
- Auto restart is not possible after a certain laps of time
- Protection against overpressure in the oil vessel and against high oil temperature
- Test of input/output
- Recording history, up to ten events, of fault parameters that can help a technical diagnosis

The CHICAGO PNEUMATIC CPVS 40-250 ensures that no energy is wasted by generating pressure that is not required. The regulation system will automatically change its method of control as air usage patterns change, ensuring maximum energy efficiency at all times.

## **Standard Operating Method**

The CHICAGO PNEUMATIC CPVS 40-250 runs in variable speed operation, unloading when the target pressure is reached and shutting down to save energy until the cut-in pressure is reached. This kind of regulation is most efficient when air consumption is variable and includes long periods of low air demand. This system is based on a load period that will pressurize a receiver tank and then prevents wasted power consumption while the compressor runs idle until the pressure drops below the minimum level. The compressor is regulated through a pressure sensor whose pressure range is set on the AIRLOGIC.



### **Maintenance Indication**

The CHICAGO PNEUMATIC CPVS 40-250 compressors are equipped with a service monitoring system that provides a countdown indication of when maintenance is due, allowing service work to be booked in advance, and a flashing maintenance indicator if the service period is exceeded.

### **Outlet and Free Contact**

An outlet for serial port connection is available. The combination of 2 AIRLOGIC becomes a permutation system which manages the priority sequence and the operation programming. Two free contacts for remote start and general fault remote are available.

### **SAFETY DEVICES**

#### **High Pressure Sensor**

- This protects the compressor against any abnormal rise in delivery pressure

#### **Safety Valve**

- Exhausts air if compressor runs over maximum working pressure
- Protects the compressor and down stream equipment from potential damage

#### **Automatic Blow-Down Valve**

- De-pressurizes compressor when compressor stops
- Prevents accidental starting of the compressor under load

#### **Minimum Pressure Valve**

- Ensures optimum internal pressure for oil circulation before producing compressed air
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#### **Thermostatic Bypass Valve**

- Ensures oil reaches optimum temperature before passing through the cooler
- Prevents thermal overload on the main motor during start up on cold days.

#### **Non-Return Valve**

- Stops reverse rotation of airend/motor
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#### **High Temperature Thermostat**

- Stops the compressor when air/oil temperature exceeds design parameters
- Reduces risk of airend failure

#### **Motor Thermal Overload**

Thermal overloads are fitted to both the main and fan motors to prevent burn outs and expensive rewinds.



### **CONTROL DEVICES**

- Minimum pressure check-valve
- Rapid discharge for quick, automatic depressurization system to ensure a reliable idle restart without foaming the lubricant or damaging components
- Visible oil level via sight glass on the separator tank
- Gauge for the reading of the air-oil separator pressure
- Pressure transducer for the setting and the reading of the operation pressure
- Thermal probe for the control and the reading of the temperature value of the air/oil mixture delivered to the airend

### **LUBRICATING SYSTEM**

The CHICAGO PNEUMATIC CPVS 40-250 is supplied with an 8,000 synthetic blend lubricant. Within the compression unit, the air and lubricating oil are mixed together and sent to the oil/air separation system in order to reduce the oil carryover in suspension. The oil and the compressed air are separately cooled by means of a final air and oil cooler. It is kept in constant transit by the pressure difference of the compressed air circuit, thereby avoiding the use of power consuming oil pumps. Proper filtration and effective cooling ensure optimal operating conditions for the oil and grant performance longevity of the compressor. The oil has three main functions:

- Lubrication of the airend and reduction of frictional losses
- Cooling of the airend by transmitting heat from the compression elements
- To provide a seal between the rotors of the airend

### **DRIVE COUPLING**

The gear drive used on the CHICAGO PNEUMATIC CPVS 40-250 compressors requires no maintenance and no periodic change. A rigid housing is fitted to guarantee perfect alignment between the motor and the airend, this combined with the flexible coupling reduces vibration and extends the life of the compressor. The coupling is also a sacrificial piece that provides added protection to the airend and motor. Should the airend lock-up for any reason, the coupling will break, thereby preventing the motor from burning-up.

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### **COOLING AIR**

Cooling air is drawn in at high level to ensure the minimum amount of dust contamination enters the package. The inlet baffles optimize the air flow entering in the unit allow the compressor to be installed next to a wall which lowers the installation space required and saves on maintenance costs. The baffles also minimize the velocity of cooling air entering the package which prevents pre-filters air



particulates. A large turbine fan gives the benefits of increased cooling efficiency, reduced noise levels and reduced power consumption. The aftercooler reduces the compressed air temperature to approximately 18°F above ambient temperature where approximately 70% of the water vapor in the air condenses into water droplets and can be removed via drain or moisture separator. This protects down stream equipment from water contamination, increasing the reliability of pneumatic equipment and reducing product contamination.

#### **TEFC MOTOR**

The TEFC motor is protected from dust and water which increases the lifespan of the motor. With superior cooling efficiency from the turbine fan, optimum cooling of the motor and the compressor is achieved. The TEFC motor ensures motor efficiency for the life of the compressor.

#### **INLET BAFFLES**

The inlet baffles reduce inlet air velocity, allow the compressor to be installed next to a wall which reduces the levels of airborne contamination entering the package and lowers overall maintenance costs.

#### **EASY MAINTENANCE**

The CHICAGO PNEUMATIC CPVS 40-250 is designed so that all the major internal parts are easily accessible for rapid maintenance operations. To replace the suction filter just remove the cover and replace the filter element. The particular construction of the cover allows this operation even if a warm air duct is installed, without removing any other component. The external filter panel can be easily removed from its position for period cleaning. For the discharge of the condensate of the oil separator, the topping off of the oil and/or replacement of oil, only the front panel needs to be removed. For the replacement of the oil filter and of the air-oil separator filter only the cover and the front panel should be removed.

#### **AIR DUCTING**

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### **HANDLING**

- THREE points accessible for the handling
- Possibility to use both a hand pallet as well as a forklift
- Distribution of the lifting points is in line with the center of gravity
- Lifting points provide easy handling after removal from the transport pallet

### **INSTALLATION**

The compressor-motor assembly is assembled on the frame of the machine by means of flexible supports which allow the installation of the compression unit to be directly onto a stable, flat surface without need of further anti-vibration provisions.

The self-supporting cabinet does not request any floor fastening bolt or device, although it is recommend that the compressor be mounted to a stable fixture to reduce vibration transmission.

For the installation, only the following connections need to be performed:

- Connection to the electric network:
- Connection to the compressed air use network