



## ***Pneutech Heavy Duty High Efficiency Direct & Belt Driven Air Compressors PRS Series 5.5 – 630kw***

Pneutech PRS Series Rotary Screw Compressors are leading edge industrial machines resulting from a continuing focus on quality engineering, quality manufacture and energy saving technology. These Compressors offer an energy efficient solution to industrial air compressor requirements from 5.5 to 630 kW. Available with pressure options from 3 to 600 bar the PRS Series screw compressor range is designed and built to provide efficient and reliable delivery of compressed air over a long service life in the most demanding environments.



### **Features:**

- **Advanced Technology Air End** featuring advanced high precision 5/6 lobe design. The optimized profile and seal line of this design are conducive to high efficiency and durability and ultimately minimise leakage to give improved volumetric efficiency. Large diameter rotors with low rotary speed and optimum aspect ratio ensure high output, lower power consumption, low noise levels and longer service life.
- **High Efficiency Electric Motors:** These motors conform to Minimum Energy Performance Standards, have low rotation speed for lower vibration and noise emission and have IP55 protection with F-grade insulation for longer service life.
- **Patented Internal Layout:** The internal layout of the compressors is divided into Hot and Cold Cells which are thermally isolated from each other to enhance heat dissipation and keep ancillary components cool for extended working life. This feature is patented.
- **Integrated Base Structure:** PRS Series compressors do not require special foundations at site due to their heavy duty base structure allowing greater flexibility in handling and installation.
- **Full Sound Enclosure:** Full enclosure of the compressors by means of removable panels lined with sound-retarding insulation reduces overall sound levels and yet gives maximum accessibility to all

components. Careful layout of components also adds to the convenience of keeping the machine clean for maximum reliability.

- **Integrated Oil Filter and Thermostat Valve:** This design decreases the number of installed pipes and connections thus reducing pressure losses and leakage points and resulting in energy savings. It also eliminates points where accidents can occur when connections have to be undone and resealed.
- **Combined Aftercooler and Moisture Separator:** By mounting the aftercooler and moisture separator together this clever design saves space and reduces costs by eliminating components and saving energy through improved air flow and reduced leakage. A further effect of the improved airflow is that the efficiency of the separator is increased resulting in further energy savings.
- **Combination Oil Cut-off and Exhaust Valve:** The combination of these two valves simplifies mounting and facilitates connection. It also allows reduced load motor starting thereby saving energy and increasing the overall service life of the motor. This unique design removes any dead start issues under shut down and/or at low-temperatures and enables the compressor to operate reliably under a wider range of environmental conditions.
- **High Efficiency Oil Separator:** The separator is fitted with a fine secondary element to improve oil separation and enhance output air quality. The unique seating and earthing of the separator element reduces the chance of fire caused by oil leakage and static electricity build-up.
- **Energy Saving Air Inlet Control System:** This latest design integrates the air inlet and air discharge of the compressor to reduce the control pipeline to a minimum thus minimising response times and saving energy. The check valve is installed in the air flow control system and closes automatically when the compressor shuts down or the air supply is stopped suddenly. This prevents the compressed air from back-flowing and causing oil overflow with consequent pollution risks. Pneutech PRS compressors have three air flow adjustment modes:
  - Two point air flow control (ON/OFF)
  - Infinite air flow control (60%-100%)
  - Delayed automatic shutdown/start-up

All of these modes are controlled by the inlet valve, EPC control system and pressure sensors. Using these options the compressors can be set up to provide the best energy solutions for various users

- **Heavy Duty High Efficiency Air Inlet Filter:** Fitted with high efficiency filter elements specifically designed for the mechanical ventilation industry these filters provide the best possible protection for workings of the compressors, have an extended service life and require no maintenance. Other features of the inlet filter system on the PRS compressors are:
  - Reduced pressure drop due to straight through design
  - Up to 3% more energy efficient than conventional air filters
  - Larger filter area for extended element life
  - High efficiency filter elements down to 1 micron.
- **Multi-purpose Moisture Separator:** Embodying German technology this separator effectively removes the condensate from the compressed air after it has passed through the aftercooler. Once the condensate in the separator reaches a certain level the auto drain is activated automatically to drain the condensate away, thus preventing clogging of the separator. Up to 70% of the moisture in the

compressed air is removed by this means greatly improving the overall quality of the compressed air. Condensate build-up can also be drained manually during maintenance by using the manual drain valve at the base of the separator.

- **High Quality Thermostatic Valve:** Sourced from AMOT in England this highly reliable valve ensures the stable operation of the compressor by controlling oil temperature. The mounting of this valve in the bottom of the oil filter decreases pressure loss, allows closer control of the oil temperature and reduces the chance of leakage by eliminating linking pipework and connections.
- **Reliable Direct Action Solenoid Valve;** Of quality German manufacture, the Burkert direct action solenoid valve is more sensitive and more reliable than traditional pilot operated solenoid valves making the control system more accurate and responsive.
- **Reputable Electrical Components:** All major electrical components in the PRS Series compressors are manufactured by either SIEMENS of Germany or ABB of U.S.A.
- **Quality Air Filter Elements:** Manufactured by the Donaldson Company of U.S.A. the air filter elements have special Nano-coating which ensures a constant flow direction thus reducing pressure losses and saving energy. This coating also increases filter life and filter efficiency.
- **Quality Oil Filter Elements:** Also manufactured by Donaldson, these elements embody durability and efficiency designed to maximum operational consistency.
- **Core Air/Oil Separator.Element:** Of European OEM manufacture, these elements are designed so that the interaction of the oil tank, the core element and the oil-return device ensure the resultant oil quality is  $\leq 2\text{ppm}$ .
- **EPC Electronic Control System:** Pneutech PRS Series Air Compressors are equipped with an EPC intelligent control system to guarantee optimised fully automatic operation. The discharge pressure is controlled between upper and lower limits by the operation of the inlet valve based on temperature and pressure data processed by the EPC controller. This results in a very stable compressor output pressure.  
The system will shut down automatically when the compressor is not required for a set period of time and then re-start upon detection of a pressure drop approaching the lower set point. This maintains output pressure stability whilst, at the same time, saving energy.  
The EPC intelligent control system is also capable of promptly detecting and diagnosing various malfunctions in the compressor during operation. This helps to eliminate damage fallout from the malfunction and therefore prolongs the service life of the compressor.
- **Local Controls:** Local control settings within the overall compressed air system have the following features:
  - Easy to read displays, feather-touch controls, simple logic and convenient menu selection.
  - Star/delta, start-up, loading and shut-down timers and overpressure cut-out can all be set and controlled during operation.
  - Detection and rectification of various faults or malfunctions can easily be done on site.
  - Type and time of occurrence of all operational faults are recorded for subsequence reference.
  - Inbuilt Service Calendar showing correct times of service intervals etc.

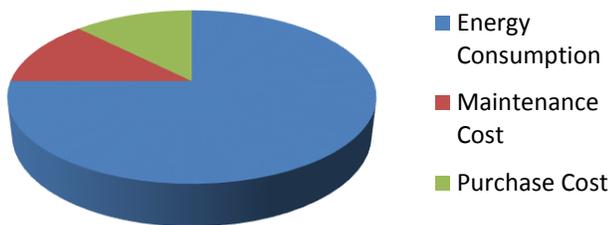
- Accumulative recording over extended periods of run hours, loaded hours, un-loaded hours and overall service hours of various filters and other consumables.
  - Preset parameters and accumulated hours can be checked at any time during operation.
  - Parameters can be revised and re-set by client.
- **Linked Multiple Compressors:** Using the standard EPC intelligent controller built into every PRS Series screw compressor, up to four compressors can be linked together to run sequentially. One compressor can be set as the main machine and the rest as auxiliary or standby machines. With special additional control components up to 16 compressors can be linked in this way. Such set-ups can be optimised to guarantee a stable and economic air supply. Furthermore, the start/up and shut-down sequences of the compressors can be automatically adjusted and the accumulated working hours of each compressor can be balanced by the EPC Electronic Control System to give maximum energy saving.
  - **Remote Control Operation:** Compressor start-up, shutdown, performance and fault development can be monitored and controlled remotely via an optional central control board (DCS) through passive dry contact terminals built into each machine.
  - **Host Computer Control:** More than two compressors can be linked to and controlled by a host computer which collects, displays and processes data from each compressor to provide optimised co-ordinated control of the overall compressed air facility. By setting the overall system parameters in the host computer the user can control all aspects of his compressed air supply over a chosen time frame to optimise his energy consumption and achieve maximum cost savings. Advantages of the host computer control are:
    - Obtain and display site data.
    - Vivid graphical display.
    - Monitoring of equipment operation status.
    - Data is recorded in a central and accessible database.
    - Data history report forms can be automatically generated for inquiry.
    - Setting of operating parameters for the air compressor controller.
    - Display of trend curve parameters of pressure , temperature etc
    - Actual and history alarm timing.
    - Important operation information accessible.
    - Single air compressor testing.
    - Automatic reminders for maintenance and/or replacement of parts.
    - Customized PLC central control solutions to facilitate the human-computer interface by IPC, LCD, DCS and configuration software to achieve remote monitoring and control.
  - **Less Connections:** As a result of simplifying component sub-assemblies to minimise leakage due to pipe connections Pneutech PRS Series compressors have up to 30% less pipework than similar products. A direct result of these simplifications is energy savings due to improved air flow and, in the longer term, due to the elimination of leakage points.
  - **Variable Frequency Drive:** Pneutech PRS Series screw compressors can be supplied with Variable Frequency Drive (VFD) which utilises a special electric motor capable of delivering constant torque over a wide range of speeds when coupled with a voltage stabiliser. The motor speed of VFD compressors

varies with air demand to maintain a constant supply of compressed air within a single tight pressure band. In this way these compressors use no more energy than the minimum required to maintain the set pressure and considerable energy savings are achieved. Features of Pneutech PRS Series VFD compressors are:

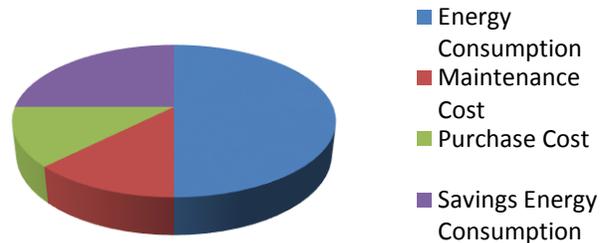
- Constant discharge pressure (+/- 0.1bar)
- Exceptional energy efficiency due to optimum control
- Prolonged life span due to lower operating speed with partial load
- Increased service life due to smooth operation
- Low noise output due to soft start and steady run
- Current spike on starting eliminated by slow acceleration
- Inter-usable on both 50Hz and 60Hz supply
- Special unload function offers maximum versatility

**Cost Comparison:** Because Pneutech PRS Series VFD screw compressors only supply the minimum amount of compressed air required to meet customers’ demands, substantial energy savings are achieved and in fact the accumulated cost savings reaped from these economies often exceed the initial cost of the VFD compressor. The following graphs give a comparison between the operating costs of a standard screw compressor and a VFD screw compressor.

**Cost structure of standard air compressor**

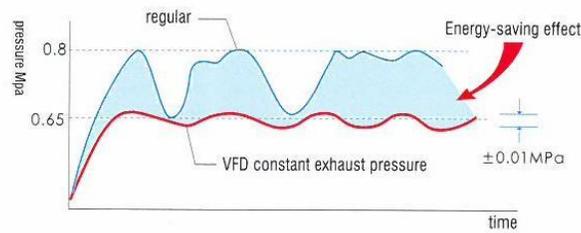


**Cost structure of VFD air compressor**



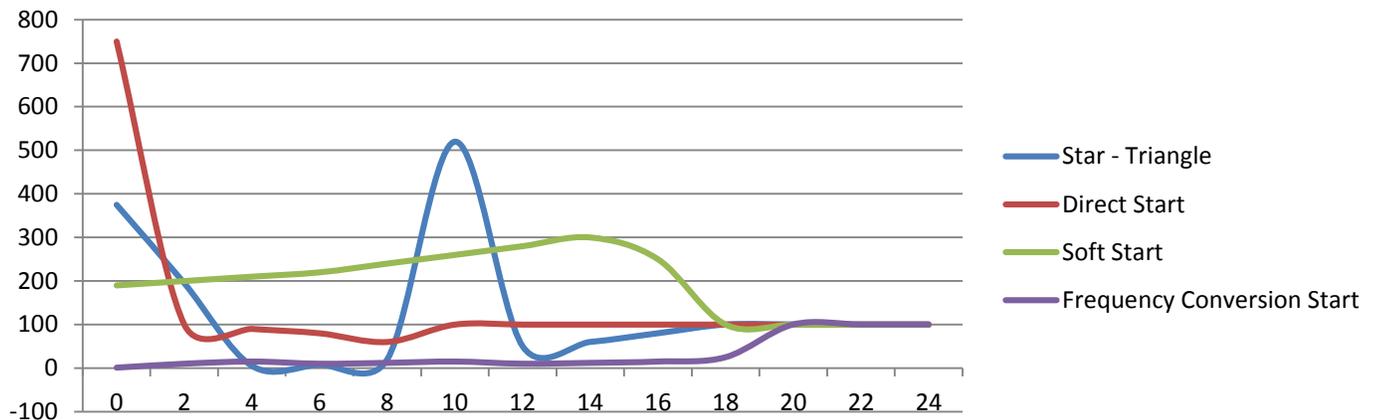
**Constant Voltage and Power Savings:** The following graph shows the operating pressures of a standard model Pneutech PRS Series screw compressor and a Pneutech PRS Series VFD screw compressor over the same period of time. In the case of the standard compressor, the loading and unloading of the compressor between its set points takes its operating pressure from 6.5 bar to 8.0 bar which is a differential of 1.5 bar. This amounts to 10.5% of the machine’s power consumption (7% of additional power is consumed with each 1 bar increase in the pressure differential). In addition, 45% of this compressor’s power energy is being consumed while it is operating unloaded when no compressed air is being produced. This differential power consumption of the standard compressor is to be compared with that of the VFD compressor which operates within the close pressure band of 0.2 bar and compresses are continually with no period running unloaded.

Other benefits reaped from the VFD compressors are increased service life due to the elimination of wear caused by constant loading and unloading and a much more consistent pressure in the air supply delivered to the customer.



Note: The difference between the two lines in graph is the energy saving effect. Also the VFD fluctuation is only  $\pm 0.01$  Mpa.

**Start-up and Running:** The following graph gives a comparison of several start-up modes used in the operation of air compressors. It can be seen that the variable frequency drive uses a slow acceleration start which is more stable than the soft start and avoids the current spikes of the D.O.L. and Star / Delta starts. The variable frequency drive actually comes into operation after its start-up is complete and then runs according to the set pressure by infinitely varying the motor speed. By this means no current spikes are imposed on the power supply and a virtually constant pressure air supply is delivered to the customer without wasted power consumption and without the wear on the compressor caused by constant loading and unloading.

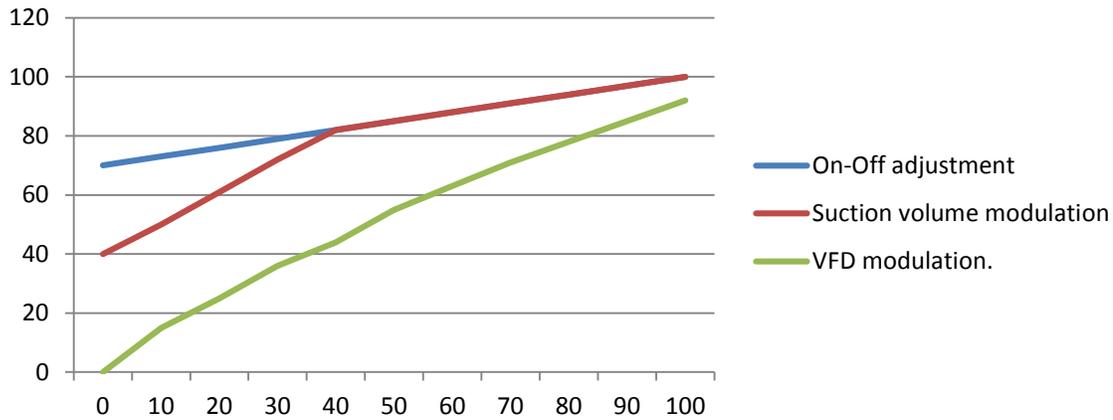


Note: Vertical measurement is Full Load Current %, Horizontal measurement is Start-up time (in seconds).

**Power Saving Example:** Typically, the power consumed by a standard 250kW air compressor with 50% utilisation and running for 6000hours per annum, is approximately 1350000kWh. By comparison, a VFD 250kW compressor can reduce the above annual power consumption by up to 42% which is a saving of 567000kWh over the year,

Putting the cost of power at \$0.20 per kWh this energy saving becomes 567000kWh x \$0.20 /kWh = \$113400 per annum.

Note: These figures are indicative only as operating efficiencies, usage cycles and electricity tariffs vary with every installation.



Note: Vertical measurement is Energy Consumption % and Horizontal is Flow Volume %.