



L-SR

Technical Information Sheet

Air Cooled

TISL45SR/20

Dec-99

Technical Description

GENERAL DESCRIPTION

An enclosed, air cooled, high efficiency constant pressure, variable speed regulated, rotary screw air compressor. The package includes a switched reluctance type variable speed motor and drive control unit, a high efficiency CompAir air end, oil separation vessel with air/oil separator element, combined air/oil cooler and a 'SureScan' electronic control and monitoring unit, all mounted in an acoustically lined epoxy coated steel enclosure with quick release panels and a hinged service maintenance access door.

MAIN MOTOR AND DRIVE UNIT

Electronically controlled and monitored, high efficiency 'SR' (switched reluctance) type variable speed drive, housed in an IP54 enclosure with lockable hinged access door, incorporating IGBT semiconductor drive technology with torque control and voltage/current monitoring providing optimum drive performance under all operational conditions. The drive motor is high efficiency 'SR' type variable speed DC drive unit, IP21 through ventilated, fan cooled, motor enclosure design with Class H internal insulation to US MIL M17060E, or equivalent, providing protection against accumulation of dust, debris and condensate.

COMPRESSION ELEMENT (AIR END)

The high efficiency air end has two precision machined rotors: the male having four lobes of advanced asymmetric design, the female with five corresponding flutes. The rotors are supported by heavy duty roller bearings for maximum service life and reliability.

Radial drive loads are carried by parallel roller bearings at the air inlet end which allow for expansion of the rotors, and taper roller bearings at the air delivery end which support the axial loads. All bearings are positively lubricated. The mounting arrangement of the air delivery end bearings ensures high compressor output by maintaining a fine clearance between rotor ends and casing.

The air end is fitted with four monitoring points to facilitate 'Shock Pulse Monitoring' (SPM) of air end bearing condition, a useful aid in preventative maintenance. This service can be offered by CompAir authorised distributors using specialist monitoring equipment.

REGULATION SYSTEM

The compressor is equipped with a 'SureScan' electronic control and monitoring system which continuously monitors package delivery pressure, to a high degree of accuracy, using an electronic pressure sensor. Regulation is achieved by air system pressure to speed integration providing variable air delivery, exactly matching air demand, at a constant delivery pressure. The compressor's digital control and regulation system is able to respond instantly to small variations in air system pressure by altering the speed for the drive motor. When air demand reduces, air system pressure naturally begins to rise and the control system instantly responds by decreasing drive motor speed until pressure stabilises at the set target pressure. When air demand increases, air system pressure will naturally begin to fall and the control system will instantly respond by increasing drive motor speed until pressure stabilises at the set target pressure.

In this manner the control system is able to accurately maintain air system pressure while increasing, or decreasing, air delivery output.

In order maintain satisfactory regulation under all operational conditions the air system / receiver vessel capacity must be minimum of 875 Litres/30 Ft³ for the L45SR and 2050/72ft³ for the L75 SR.

A combined minimum pressure and non return valve is fitted to maintain a minimum pressure in the unit, during motor starting and stopping, and to prevent air from the air distribution system flowing back through the compressor when the unit is stopped.

When the drive motor stops a blowdown valve releases pressure within the compressor ensuring an unloaded start condition.

CONTROL SYSTEM

SureScan microprocessor based electronic control system with high legibility LED delivery pressure display, 2 line by 24 character back-lit LCD text display, mimic diagram with LED indicators and tactile membrane switches providing the following facilities:-

- Power on indicator
- Remote control active indicator
- Power failure auto re-start active indicator
- Emergency stop button
- Compressor status text display :
 - Total hours run
 - Hours run on-load (at 20% step load conditions)
 - Hours remaining until next service due
 - Service due alarm
 - Air-end delivery temperature alarm / trip
 - Temperature sensor failure trip
 - Excess pressure trip
 - Pressure sensor failure trip
 - Drive motor trip
 - Motor drive unit trip
 - Air filter blockage alarm
 - Remote load/unload or start/stop control facility
 - Power failure auto-restart facility
 - Remote group fault output option
 - Remote compressor available output option

COOLING SYSTEM

To assist with ease of installation, the combined air/oil cooler is mounted horizontally within the package with vertical cooling air discharge. Cooling air is supplied by an axial fan and fan motor mounted on the underside of the cooler assembly. Cooler performance and internal plant cleanliness is maintained by washable enclosure pre-filtration installed in the cooling air intake grills.

LUBRICATING SYSTEM

Lubricant is circulated by pressure in the separator vessel and passes from the vessel to the air blast oil cooler and spin-on 10 micron oil filter on the L45, or dual spin on filters on the L75 before being injected into the air end. The oil cooler incorporates a thermostatic valve which enables oil to by-pass the cooler until optimum operating temperature is achieved, the valve then modulates to maintain operational temperature. Lubricant provides a constant film on the rotors, sealing clearances and preventing contact and wear as well as acting as a cooling medium during air compression, reducing air discharge temperature.

In the L45 the air/oil mixture is discharged from the air end into a cyclonic separation vessel, and then into two spin on air/oil separator elements, where in excess of 99.9% of the oil is separated from the compressed air. The air then passes through an air blast cooler, reducing air temperature, before exiting the compressor package. Separated oil collected in the separator elements is removed, by pressure differential, via scavenge pipes connected to the low pressure side of the air end.

In the L75 the air/oil mixture is discharged from the air end into a cyclonic separation vessel, incorporating an air/oil separator filtration element, where in excess of 99.9% of the oil is separated from the compressed air. The air then passes through an air blast cooler, reducing air temperature, through a cyclonic condensate vessel, where condensate is collected and expelled from the package via a timed condensate drain solenoid valve, before exiting the compressor package. Separated oil collected in the separator filtration element is removed, by pressure differential, via a scavenge pipe connected to the low pressure side of the air end.

The compressor package is supplied factory filled with high performance 4000 hour oil which allows for extended oil change periods and separator element life.

PROTECTION & SAFETY EQUIPMENT

Compressors comply with the requirements of the EC Machine Directive as standard.

The 'SureScan' control and monitoring system features motor drive voltage and current, oil separator vessel and package delivery pressure, and air end discharge temperature, detection which will stop the compressor in the event of a fault condition being detected.

In addition, the motor drive components, pressure sensor and temperature sensor are also separately monitored and the compressor will stop if a fault condition is detected.

A safety valve is fitted to the separator vessel to further guard against excess pressurisation of the unit. The 'SureScan' separator vessel pressure switch facility is set to operate at a lower pressure than the safety valve setting to prevent oil being blown into the enclosure in the event of an internal excess pressure condition.

The motor drive unit and high voltage circuits are housed in an IP54 enclosure and are protected by fuses, drive motor voltage / current and drive system component monitoring devices. The control circuits operate on a 24V system for maximum user safety.

GENERAL

The drive motor, air end and drive coupling housing form a sub-assembly which is mounted, via anti vibration mountings, together with the oil separator vessel and motor drive unit on the compressor base frame. The combined air/oil cooler and fan motor assemblies are support horizontally above the drive motor unit allowing vertical cooling air discharge from the top of the compressor canopy.

To simplify maintenance procedures on the L45, the majority of regular service items, oil filter and the oil separator elements and oil fill and drain points) are located in a grouped service area accessible by a hinged, and removable maintenance access door.

To simplify maintenance procedures on the L75, all regular service items (the two stage 3 micron air filter, oil filters and the oil separator vessel incorporating the separator filtration element and oil fill and drain points) are located in a grouped service area accessible by a hinged, and removable maintenance access door.

A pressurised oil drain system means oil changes are quick and clean keeping maintenance down time to a minimum.

Each compressor unit is supplied with the following as standard:-

- Air end
- High efficiency 'SR' variable speed motor and drive
- 'SR' drive control and monitoring system
- Cooling air fan
- Combined Air cooler/Oil cooler (L75 only)
- Oil cooler (L45 only)
- Air cooler (L45 only)
- Compressor enclosure pre-filtration
- Air intake filter - 3 micron
- Oil filters - 10 micron
- Oil separator vessel
- Air/Oil separator filtration element (L75 only)
- Air/Oil separator elements (L45 only)
- Air/Oil separator differential pressure indicator
- Oil level indicator
- Non return valve
- Excess pressure safety valve
- Condensate drain solenoid (L75 only)
- SPM connection points for air end bearing condition monitoring
- 'SureScan' control and monitoring system (see above for details)
- Acoustic enclosure

Optional Extras:-

Factory fill with CompAir FG food grade lubricant

'Remote Module' for additional remote control and monitoring facilities