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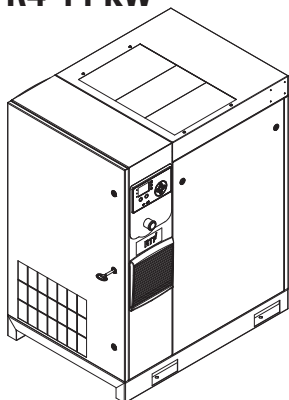
Revision D

May 2021



Contact-Cooled Rotary Screw Air Compressor

R4-11 kW



Product Maintenance Information

PORTLAND
COMPRESSOR
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800-542-8300



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ABOUT THIS MANUAL

The purpose of this manual is to provide maintenance and troubleshooting guidelines for the compressor.

For supporting documentation refer to Table 1.

Table 1: Product Manuals

Publication	Product	Part/Document Number by Region		
		Americas	EMEA *	Asia Pacific
Safety Information Manual	R4-160kW	80446313	80446156	80446321
Maintenance Manual	R4-11kW	80448517	80448525	80448533
Product Manual	R4-11kW	80448483	80448491	80448509
Parts Information Manual	R4-11kW	80448541		

* Europe, Middle East and Africa

Product specification sheets and reference drawings are also available.

PERSONNEL

Proper use, inspections and maintenance increases the life and usefulness of the compressor. It is extremely important that anyone involved with maintaining the compressor be familiar with the servicing procedures of these compressors and be physically capable of conducting the procedures. These personnel shall have skills that include:

1. Proper and safe use and application of mechanics common hand tools as well as special **Ingersoll Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Some maintenance procedures are technical in nature and require specialized tools, equipment, training and experience to accomplish correctly. In such situations, only allow **Ingersoll Rand** trained technicians to perform maintenance on this compressor. Service or inspections beyond the procedures given in this manual shall not be attempted by operating personnel.

For additional information contact the **Ingersoll Rand** factory or the nearest service provider.

SAFETY

Before undertaking any work on the compressor, ensure that the electrical supply has been isolated, locked off, tagged and the compressor has been relieved of all pressure. For VSD units, ensure the compressor is electrically isolated for at least 15 minutes before commencing any maintenance work. Ensure the compressor's remote start/stop feature has been switched off prior to any maintenance. See the Safety Information manual for additional information.

Ingersoll Rand cannot know of or provide all the procedures by which repairs may be conducted and the hazards and/or results of each method. If maintenance procedures not specifically recommended by the manufacturer are conducted, ensure that safety is not endangered by the actions taken.

If you are unsure of a maintenance procedure or step, place the compressor in a safe condition before consulting technical assistance.

The use of other than genuine **Ingersoll Rand** replacement parts may result in safety hazards, decreased performance and increased maintenance and may invalidate all warranties.

For additional information contact the **Ingersoll Rand** factory or the nearest service provider.

AIR COMPRESSOR MAINTENANCE

■ Maintenance Prompts

The service warning and flashing LED will appear at intervals dependent on the service level selected. Refer to the Product Information manual for information about service level settings.

■ Maintenance Chart

Maintenance should be performed per the recommendations below in the following priority: (1) Perform maintenance when indicated by the controller; (2) Perform maintenance through either hourly intervals or scheduled maintenance intervals, or (3) Annually.

Table 2: Maintenance Chart

Period	Action	Maintenance Item
First 150 hours	Replace	Factory installed coolant filter element
Daily	Check	Connections and hoses for leaks
	Check	Coolant level
	Check	Condensate drain operation
	Check	Controller for service indicators
	Check	Package pre-filter for blockage
Weekly	Check	Dryer condensate drain/ screen (if applicable)
Monthly	Inspect	Air-cooled combination cooling system for blockage
	Inspect	Starter box power drive element (PDM) filter element (if applicable)
	Clean	Dryer condenser with compressed air (if applicable)
	Check	Drive belt tension
Every 1000 hours	Inspect	Air filter element
	Analysis	Food-grade Lubricant (Ultra FG)
Every 2000 hours or 3 months	Inspect	Starter box power drive element (PDM) filter element (if applicable)
	Inspect	Drive belt
	Inspect	Airend/Pressure System/Receiver
	Inspect	Inspect and test pressure relief valve
	Replace	Air filter element
	Replace	Package pre-filter element
	Replace	Separator element
	Replace	Coolant filter element
	Analysis	Shock pulse bearing
	Analysis	Premium Coolant (Ultra/Ultra EL)
Every 4000 hours or 6 months	Inspect	Scavenge tubes/orifice and blowdown system (blowdown valve and orifices) for blockage
	Replace	Starter box power drive element (PDM) filter element (if applicable)
	Clean	Air-cooled combination cooling system
	Calibrate	Pressure transducers (only applies to compressors equipped with Xe-70M controller)
	Replace	Dryer filter elements (if applicable)
Every 6000 hours	Replace	Food-grade Lubricant (Ultra FG)
Every 8000 hours or annually	Replace	Premium Coolant (Ultra) [8000 hours or every 2 years]
	Replace	Minimum pressure check valve (MPCV)
	Check	Condensate drain lines and replace if necessary
16000 hours or 2 years	Replace	Drive belts
	Replace	Extended Life Premium Coolant (Ultra EL) [16000 hours or every 3 years]
	Replace	Rubber Hoses
24000 hours or 3 years	Replace	Contact tips
40000 hours or 5 years	Replace	Stainless Steel/PTFE Hoses

NOTICE

Inspect and replace air filtration, coolant and separator elements more frequently in dirty operating environments

■ Routine Maintenance

This section refers to the various components which require periodic maintenance and replacement.

Refer to safety information and maintenance procedures prior to carrying out any of the maintenance in the following sections.

■ Checking Coolant Level

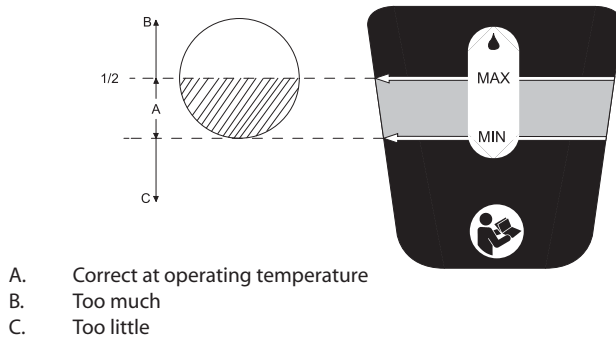


Figure 1: Coolant Level in Sight Glass

The coolant level should be checked daily. A coolant level sight glass is located on the front of the sump. While the compressor is running loaded at operating temperature (ten minutes running loaded), coolant should fill the sight glass half-way (See Figure 1). Do not allow the coolant levels to go beyond the centerline of the sight glass or increased carryover may occur. The compressor includes a coolant level decal which shows the proper coolant level range appropriate for operation. When the coolant level is visible in the sight glass at the level indicated by the green area on the decal, then the compressor has the proper quantity of coolant. If the coolant level is in the red area above the green, then the compressor is over filled. If the coolant level is in the red area below the green, the compressor is under filled.

When the unit is shut down, coolant will usually fill up the sight glass. Do not adjust level based on level at shutdown. Proper level is always set for running unit at operating temperature.

■ Adding Coolant

If it is determined that coolant must be added, follow the steps below:

1. Stop the compressor.
2. Isolate the compressor from the external air system.
3. Press the emergency stop to vent the separator tank and airend. Fixed speed compressors can take more than two minutes to fully de-pressurize once stopped.
4. Ensure the main power disconnect is locked off and tagged.
5. Slowly unscrew the coolant fill plug to verify all pressure has been released.
6. Add coolant.
7. Replace the coolant fill plug and restart the compressor.
8. Recheck the coolant level.
9. Repeat the above steps until the coolant level is visible within the specified range, as explained above.

NOTICE

Do not add coolant through the intake of the compressor, as this can result in overfilling, saturation of the separator filter element, and coolant carry-over downstream.

■ Draining Coolant

It is recommended to drain the coolant immediately after the compressor has been operating as the coolant will drain faster and any contaminant will still be in suspension.

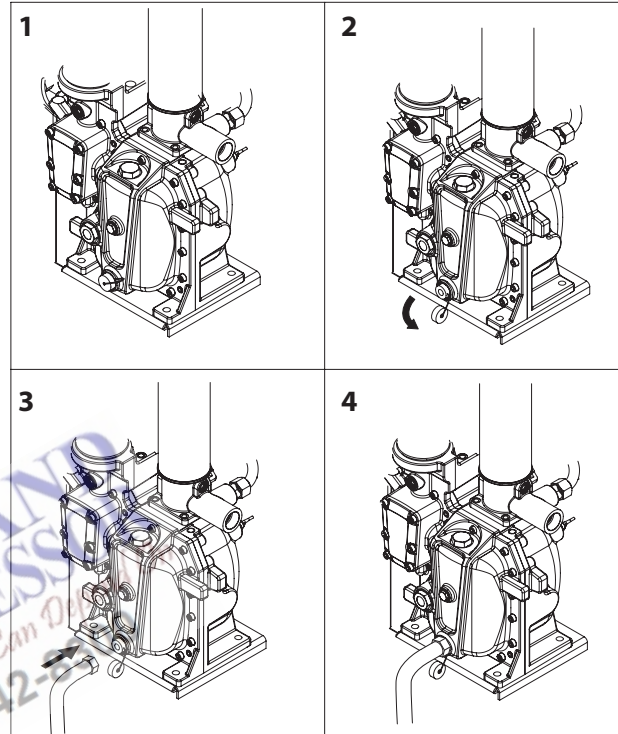


Figure 2: Coolant Drain location

See Figure 2.

1. Slowly unscrew the coolant drain cap.
2. Screw drain hose (24096984) onto the drain valve. As you do so, the drain valve will open, causing coolant to drain out through the hose.
3. Allow the coolant to flow into a suitable container.
4. After drainage, remove the drain hose and replace drain valve cap.
5. Dispose of waste coolant in accordance with local and governmental regulations.

NOTICE

Coolant should be drained from the cooler and coolant scavenge tube.

NOTICE

Shorter coolant change intervals may be necessary if the compressor is operated in adverse conditions.

■ Sampling Coolant

1. Bring the compressor up to operating temperature.
2. Stop the compressor.
3. Isolate the compressor from the external air system.
4. Press the emergency stop to vent the separator tank and airend. Fixed speed compressors can take more than two minutes to fully de-pressurize once stopped.
5. Draw a sample from the sump fill port. DO NOT draw a sample from the drain port or coolant filter port.

Use a new hose on the pump for each sample. Failure to do this can give false readings.

See Figure 3.

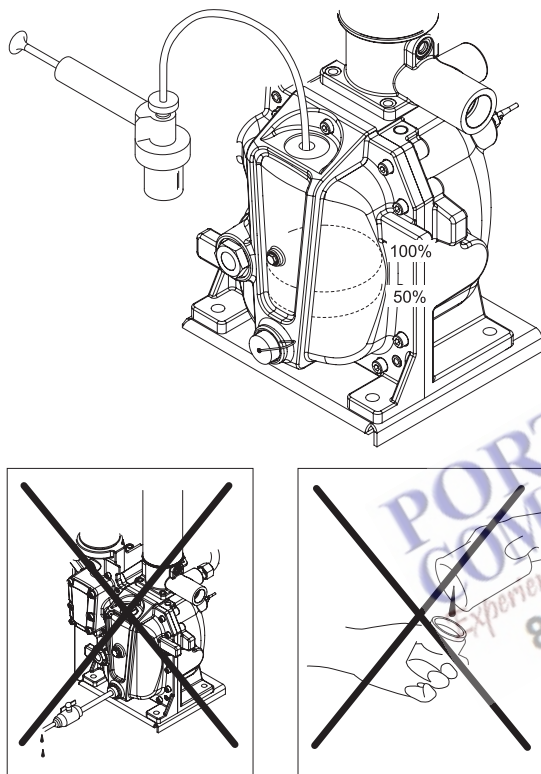


Figure 3: Coolant Sampling

■ Changing Coolant Filter Element

1. Stop the machine, electrically isolate and vent all trapped pressure.
2. Loosen filter element with the correct tool.
3. Remove the filter element from the housing.
4. Place the old filter element in a sealed bag and dispose of in a safe way.
5. Clean the mating face of the housing, taking care to avoid any particles entering the machine.
6. Remove the new **Ingersoll Rand** replacement filter element from its protective package.
7. Apply a small amount of lubricant to the filter seal.
8. Screw the new filter element down until the seal makes contact with the housing, then hand tighten a further 1/2 turn.
9. Start the compressor and check for leaks.

■ Checking Separator Element

Feature available only on machines equipped with Xe-70 controller.

With the compressor running on load, check the separator differential pressure via the controller. It will be necessary to change the element if the differential pressure equals zero or exceeds 1 bar (15 psig).

■ Changing Separator Element

1. Stop the machine, electrically isolate and vent all trapped pressure.
2. Loosen element with the correct tool.
3. Remove the element from the housing.
4. Place the old element in a sealed bag and dispose of in a safe way.
5. Clean the mating face of the housing, taking care to avoid any particles entering the machine. When changing the separator element, inspect the internal components and surfaces. Any suspect parts shall be replaced before the compressor is put back into service.
6. Remove the new **Ingersoll Rand** replacement element from its protective package.
7. Apply a small amount of lubricant to the element seal.
8. Screw the new element down until the seal makes contact with the housing, then hand tighten a further 1/4 turn.
9. Start the compressor and check for leaks.

■ Inspecting Airend/Pressure System/ Receiver

At regular intervals, inspect the external surfaces of the airend including all fittings, for visible signs of impact damage, excessive corrosion and abrasions.

The receiver (if applicable) should also be tested and inspected in accordance with any national or local codes that may exist.

■ Cleaning/ Checking Scavenge Orifice

The orifice is similar in appearance to a straight tubing connector and will be located between the 6 mm (0.25 in) O.D. scavenge line tubing and the integrated separator/MPCV manifold.

The main body is made from 17 mm hexagon shaped metal and the diameter of the orifice and a direction-of-flow arrow is stamped in flat areas of the hexagon. The orifice should be examined and cleaned as recommended in maintenance schedule.

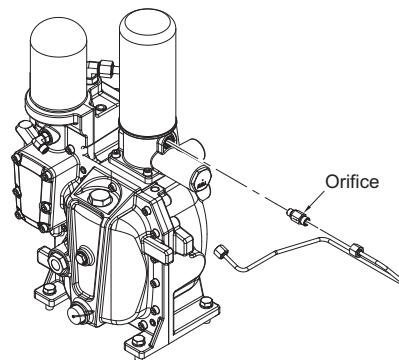


Figure 4: Scavenge Orifice

To remove the scavenge orifice:

1. Stop the machine, electrically isolate and vent all trapped pressure.
2. Disconnect the scavenge line tubing from end and unscrew from integrated separator/ MPCV manifold.
3. Inspect orifice and tubing for clogging and clean prior to re-installation. If there is any scaling or O-ring damage identified, the scavenge orifice will need to be replaced before the compressor is put back into service.
4. When the assembly is installed, confirm the direction of flow to be correct. Observe the small arrow stamped in the center section and ensure the direction of flow to be from the separator tank to the airend.

■ Cleaning / Checking Blowdown Orifice

The blowdown system is used to pneumatically control package loading. This system should be examined and cleaned as recommended in the maintenance schedule. Within this system, there is a diverter orifice, blowdown valve, and controls tubing. Prior to examining the blowdown system: stop the machine, electrically isolate and vent all trapped pressure.

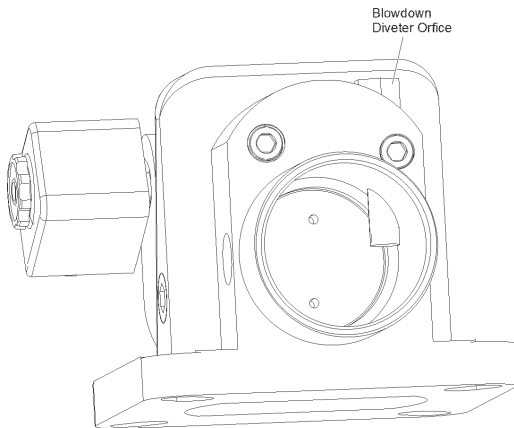


Figure 5: Blowdown Diverter Orifice

The blowdown diverter orifice is integrated into the inlet snout of the inlet valve (see figure 5). To examine the blowdown diverter orifice: Remove inlet filter to expose inlet snout.

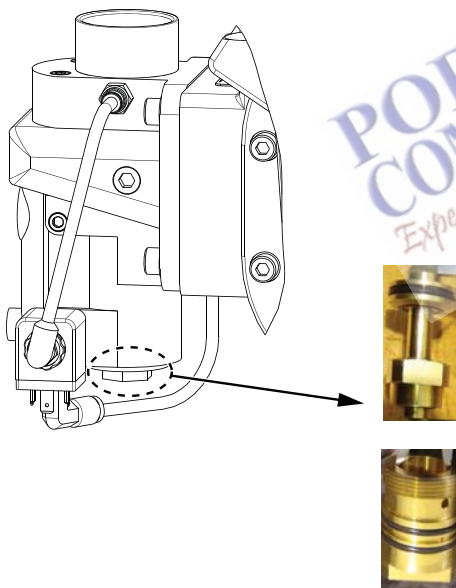


Figure 6: Blowdown Valve

The blowdown valve is integrated into the inlet valve assembly. To remove and inspect:

1. Disconnect the Synflex tubing from the elbow fitting at bottom of inlet valve.
2. Remove elbow fitting, then unscrew blowdown inlet fitting from bottom of inlet valve.
3. Remove blowdown spool and inspect.
4. Inspect / clean spool and all orifice features of blowdown fitting.
5. Install spool in correct orientation (O-ring seal up), then install blowdown inlet fitting. Do not over torque.
6. Secure blowdown inlet fitting while installing elbow fitting.
7. Connect Synflex tubing, make sure tube is fully inserted back into push-connect elbow fitting.

■ Replacing Coolant Hoses

The flexible hoses that carry coolant through the cooling system may become brittle with age and will require replacement. Replace them as recommended.

1. Depending on the location of the hose, it may contain compressor coolant. It is recommended to drain the coolant into a clean container. Cover the container to prevent contamination. If the coolant is contaminated, replace with new coolant.
2. Remove the hose.
3. Install the new hose and refill the compressor with coolant.
4. Start the compressor, check for leaks and check coolant level. Refill as necessary.

■ Checking Minimum Pressure Check Valve (MPCV)

The minimum pressure check valve (MPCV) shall be frequently tested and regularly maintained. Verify that the valve opens at 60 psi and that the valve fully seals in the reverse flow direction. If operating conditions are particularly severe, the frequency of testing and maintenance shall be increased accordingly. The user shall establish the frequency of such tests as it is influenced by such factors as the severity of the operating environment.

■ Changing Air Filter Element

1. Check the retaining cap for dirt and debris and wipe clean.
2. Unscrew the retaining cap and withdraw the old element.
3. Fit the new element and refit the retaining cap.

■ Cleaning Air Cooled Combination Cooling System

Air compressor operating temperatures will be higher than normal if the external passages between the fins of the cooler cores become restricted with foreign material. Regular cleaning of the cooler surfaces will support the reliable operation of the air compressor system, improve the life of the compressor coolant and improve overall compressor efficiency. When performed frequently as determined by site conditions and airborne contamination, more significant cleaning or replacement may not be necessary.

1. Stop the compressor.
2. Isolate the compressor from the system and vent all pressure. For TAS compressors, isolate the compressor from the receiver by using the ball valve located between the dryer discharge and the receiver inlet. For non-TAS, receiver-mounted compressors, evacuate all air from the receiver.
3. Press the emergency stop to vent the separator tank and airend. Fixed speed compressors can take more than two minutes to fully de-pressurized once stopped.
4. Ensure the main power disconnect switch is locked off and tagged.

NOTICE

For any required lifting of air compressor parts or required tools, always use the proper certified lifting equipment, and employ sound working principles.

5. Visually check the outside of the cooler core to determine the appropriate cleaning method detailed as follows:
 - a. For loose dirt, dust and other light foreign material, gently blow compressed air across the cooler surface from the top of the machine. Remove the blower fan and cowl, then use a vacuum hose with a soft brush to clean the exposed face of the cooler. Repeat the process until the cooler is sufficiently clean. Replace the blower fan and cowl before returning the compressor to service.
 - b. For thick, packed dirt, coolant or grease, or other heavy material, the cooler will need to be removed from the compressor for pressure washing. **Ingersoll Rand** does not support the act of pressure washing coolers when they are installed in the compressor due to the dangers of spraying water in or around potential electrical power sources. Follow the steps below for cooler removal.

■ Removing / Installing Air Cooled Cooler

To remove:

1. Stop the compressor.
2. Isolate the compressor from the system.
3. Press the emergency stop to vent the separator tank and airend.
Fixed speed compressors can take more than two minutes to fully de-pressurize once stopped.
4. Ensure the main power disconnect switch is locked off and tagged.

NOTICE

For any required lifting of air compressor parts or required tools, always use the proper certified lifting equipment, and employ sound working principles.

5. Remove front and back access panels.
6. Disconnect aftercooler discharge tube or hose.
7. Remove top assembly by removing eight bolts while supporting assembly properly.
8. Disconnect hoses from cooler.
9. Disconnect grounding cable from cooler.
10. Carefully remove cooler from cooler shroud.

To install:

1. Stop the compressor.
2. Isolate the compressor from the system.
3. Press the emergency stop to vent the separator tank and airend.
Fixed speed compressors can take more than two minutes to fully de-pressurize once stopped.
4. Ensure that the main power disconnect switch is locked off and tagged.

NOTICE

For any required lifting of air compressor parts or required tools, always use the proper certified lifting equipment, and employ sound working principles.

5. Carefully place cooler in its proper location.
6. Connect grounding cable to cooler.
7. Connect hoses to cooler and properly torque all connections.
8. While supporting the top assembly, fasten the eight bolts into the opposing sides of the package to hold the top assembly in place.
9. Reconnect the aftercooler discharge tube or hose and properly torque connections.
10. Refill the compressor with coolant to the proper level, following the process outlined in the "Adding Coolant" procedure.
11. Run the machine and inspect for leaks.
12. Replace the access panels on the front and back of the machine.

■ Checking High Airend Temperature Sensor

It is recommended that the discharge temperature sensor (2ATT) is checked regularly (2000 hours) by stopping the cooling fan by opening the fan/ fan motor circuit breaker (QF4). The compressor should trip at 109C (228F). A trip warning will appear on the controller display.

■ Cleaning Motor Cowl

1. Ensure the compressor is electrically isolated for at least 15 minutes before commencing any maintenance work.
2. Remove the panels from the compressor.
3. Using a clean dry cloth, remove dust from the surface of the motor cowl and ensure all ventilation slots are free of obstructions.
4. Replace the panels.

■ Removing / Replacing Starter Box Power Drive Element (PDM) Filter Element (For VSD Only)

See Figure 7.

1. Ensure compressor is electrically isolated for at least 15 minutes before commencing any maintenance work.
2. Unclip the front grill of the starter box filter housing.
3. Remove the filter element from the housing and replace with a new filter element.
4. Replace the front grill.

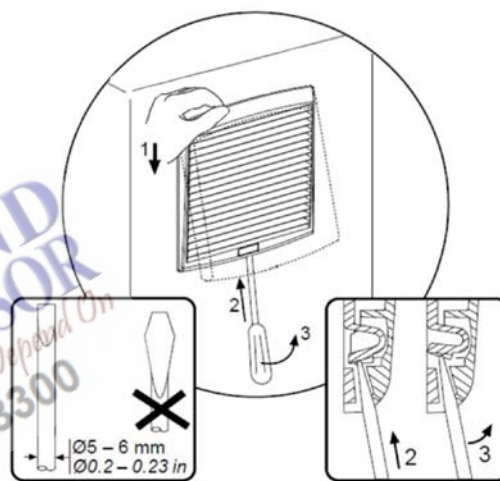


Figure 7: Open Power Drive Element (PDM) to Replace Filter Element.

■ Cleaning / Checking Condensate Drain

1. Ensure the compressor is electrically isolated for at least 15 minutes, before commencing any maintenance work.
2. Isolate the compressor from the system and fully discharge the compressed air within the compressor.
3. Remove tubes from drain assembly.
4. Remove screen from drain assembly.
5. Carefully clean screen of debris.
6. Reinstall screen and reattach tubes to drain assembly.

■ Cleaning / Installing Package Pre-Filter

1. Ensure compressor is electrically isolated for at least 15 minutes before commencing any maintenance work.
2. Open starter box door.
3. Remove elastic band from bolts.
4. Remove pre-filter from bolts.
5. Line the new pre-filter over the mounting bolts.
6. Push pre-filter down over bolts.
7. Reinstall elastic band over bolts to secure pre-filter.
8. Replace nuts on bolts.
9. Close the panel and latch.

■ **Monitoring Fluid and Performing Shock Pulse Bearing Analysis**

Ingersoll Rand recommends incorporating predictive maintenance, specifically the use of coolant and shock pulse bearing analysis, into all preventative maintenance programs. Contact **Ingersoll Rand** for details.

■ **Aftermarket Kits**

Ingersoll Rand may offer aftermarket kits to the customer which will augment characteristics of the compressor. No aftermarket kit is available which converts a non-tank-mounted compressor into a tank-mounted compressor.

■ **Changing Pulleys / Belts**

Check belt tension regularly, especially if looseness is suspected. A belt tension measurement device can be used to determine the tension of the belt. The belt should be re-tensioned after primary run (within the first hour of use).

1. Stop the compressor.
2. Isolate the compressor from the system.
3. Press the emergency stop to vent the separator tank and airend.
Fixed speed compressors can take more than two minutes to fully de-pressurize once stopped.
4. Ensure the main power disconnect switch is locked off and tagged.

NOTICE

For any required lifting of air compressor parts or required tools, always use the proper certified lifting equipment, and employ sound working principles.

NOTICE

Always remain aware of nip points, pinch points and other associated hazards caused by weighted and/or moving parts. Do not remove guard at back (non-drive end) of motor. Do not insert anything between the motor support plate and the airend support. See Figure 8

5. Remove the outer belt guard from the airend support by removing the nut and washer from the threaded stud, two bolts and washers from the airend support, and remove the clips between the guards.
6. Loosen the four motor support plate bolts to allow the plate to pivot.
7. Loosen the nut on the belt tensioning (carriage) bolt.
8. Locate the jack bolt which is found on the motor support plate towards the non-drive end of the motor.
9. Screw the jack bolt down into the motor plate to raise the assembly.
10. Replace the old belt with a new belt as called out in the Parts Manual.
11. After belt is in place, use the jack bolt to slowly lower the motor support plate.
12. Locate the tensioning bolt, which is the carriage bolt coming from underneath the motor support plate below the airend.
13. Use the nut/washer from the tensioning bolt along with loosening the jack bolt to correctly tension the belt. Proper belt tension frequencies are found in table 3 below.
14. Once belt is aligned and tensioned, replace the front belt guard.
15. Make sure that the pulleys and shafts are properly aligned and that all points are fixed properly prior to restarting the compressor.

Table 3: Belt tension chart

Production and Field Service Installation - HZ & Deflection Methods						
HP/kW	Compressor PSI/Barg	Hz Method		Deflection Method		
		IR NEW Belt Tension Spec (Hz)	IR USED Belt Tension Spec (Hz)	Deflection in/mm	New Belt Deflection Force (lbs)	Used Belt Deflection Force (lbs)
5 hp only	110/7.5	97 ± 3 Hz	88 ± 3 Hz	0.262/6.65	149	123
	125/8.5	97 ± 3 Hz	88 ± 3 Hz	0.256/6.50	149	123
	145/10	97 ± 3 Hz	88 ± 3 Hz	0.259/6.58	149	123
7.5 hp 5.5 kw	110/7.5	97 ± 3 Hz	88 ± 3 Hz	0.230/5.84	149	123
	125/8.5	97 ± 3 Hz	88 ± 3 Hz	0.237/6.02	149	123
	145/10	97 ± 3 Hz	88 ± 3 Hz	0.262/6.65	149	123
	200/14	97 ± 3 Hz	88 ± 3 Hz	0.262/6.65	149	123
10 hp 7.5 kw	110/7.5	97 ± 3 Hz	88 ± 3 Hz	0.256/6.50	149	123
	125/8.5	97 ± 3 Hz	88 ± 3 Hz	0.262/6.65	149	123
	145/10	97 ± 3 Hz	88 ± 3 Hz	0.258/6.55	149	123
	200/14	97 ± 3 Hz	88 ± 3 Hz	0.260/6.60	149	123
15 hp 11 kw	110/7.5	104 ± 3 Hz	95 ± 3 Hz	0.261/6.63	241	201
	125/8.5	104 ± 3 Hz	95 ± 3 Hz	0.259/6.58	241	201
	145/10	104 ± 3 Hz	95 ± 3 Hz	0.256/6.50	241	201
	200/14	104 ± 3 Hz	95 ± 3 Hz	0.260/6.60	241	201

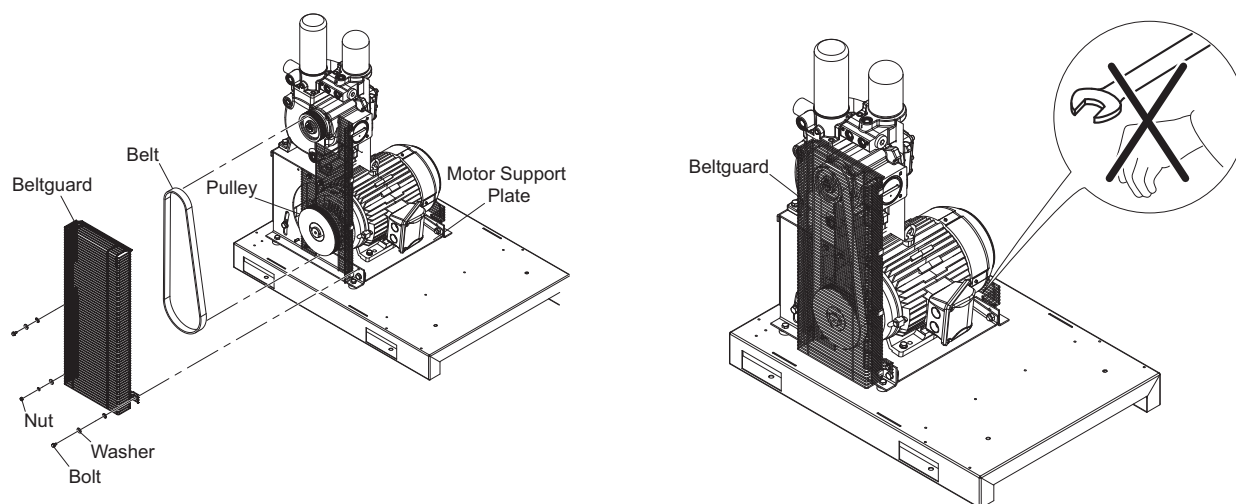


Figure 8: Do not insert anything between motor support plate and airend support.

■ **Pressure Relief Valves**

All pressure relief valves (located on airend and receiver tank) should be checked regularly for correct operation. To test, operate the pressure relief valve manually to verify that the mechanism is functioning correctly and that a small amount of air is released.

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TROUBLESHOOTING

This section provides basic troubleshooting information. Determination of specific causes to problems is best identified by thorough inspections performed by personnel instructed in safety, operation and maintenance of this equipment. The chart below provides a brief guide to common symptoms, probable causes and remedies.

Table 4: General Faults

SYMPTOM	CAUSE	REMEDY
Compressor will not start.	No power supply to compressor.	Check supply is switched on. If so, contact a qualified electrician.
	Controller failure.	Check supply to controller. Replace controller.
	Starter failure.	Isolate supply, lock off and tag. Replace failed component or contact your local Ingersoll Rand representative.
Compressor stops and will not restart.	Drive controller has tripped.	See Tables 5 and 6.
	Controller has tripped the compressor.	See Tables 5 and 6.
	Exceeded the maximum number of starts per hour (6 starts).	Must wait 1 hour before attempting to restart. Contact your local Ingersoll Rand representative if the problem continues.
Compressor is stopped and will not restart.	Controller has tripped the compressor and has not been reset.	See Tables 5 and 6.
	Emergency stop has been pressed and not released.	Identify reason why, repair fault, disengage button and reset controller.
	Emergency stop has been pressed and released but controller has not been reset.	Repair fault and reset controller.
Compressor will not meet pressure required by system.	Compressor not sized to meet system requirements or requirements have been changed.	Contact your local Ingersoll Rand representative.
	Air loss due to pipe, hose, joint or seal failure.	Repair or replace.
	Air loss due to blowdown valve stuck open.	Repair or replace.
	Air loss through pressure relief valve not seating or set incorrectly.	Repair or replace.
	Air loss due to moisture separator drain trap stuck open.	Repair or replace.
	Motor speed too low caused by drive incorrectly set.	Contact your local Ingersoll Rand representative.
	Motor speed too low caused by fault in drive settings.	See Table 6.
	Controller fault.	Repair or replace.
	Drive motor fault.	See Table 6.
	Pressure transducer faulty, incorrectly calibrated or EMF interference.	Recalibrate or replace.
	Incorrect controller settings.	Check and modify settings.
	Inlet grill or ducting is blocked.	Check and clean.
	Air filter dirty or collapsed.	Replace.
	Inlet valve not opening fully.	Repair or replace.
	Separator element dirty or collapsed.	Replace.
	Pipe / Hoses blocked or collapsed.	Clean or replace.
	Cooler core blocked.	Clean or replace.
	Minimum pressure check valve not functioning correctly.	Repair or replace.
	Equipment between compressor and customer measuring point causing pressure drop / pressure loss.	Review system requirements.
Pressure produced by compressor is too high due to speed not reducing as demand reduces.	Controller set incorrectly.	Check and modify settings.
	Pressure transducer may be faulty, incorrectly calibrated or not receiving pressure signal.	Recalibrate or replace.
	Drive settings fault.	Contact your local Ingersoll Rand representative.
Compressor discharge air too hot.	High ambient temperature.	Review installation and system parameters.
	Insufficient cooling air.	Check ducting and cooling air path, check direction of blower rotation.
	Dirty, blocked aftercooler (cooling air side).	Clean or replace.

Table 4: General Faults (cont.)

SYMPTOM	CAUSE	REMEDY
Compressor package produces excessive noise.	Panels or doors are not closed properly.	Rectify fault.
	Air leaks from internal pipework / components.	Replace seals, torque properly or replace part.
	Fan or fan motor bearings worn.	Repair or replace.
	Loose debris impacting on fan during rotation.	Remove and rectify any damage.
	Blowdown valve stuck open.	Repair or replace.
	Pressure relief valve not seating correctly.	Repair or replace.
	Vibration due to motor, airend or fan imbalance.	Repair or replace.
	Belt slipping	Retension belt and make sure pulley is aligned properly.
	Airend requires repair.	Contact your local Ingersoll Rand representative.
Discharge air is contaminated with coolant.	Scavenge pipe is blocked, broken or O-ring is not sealing.	Clean or replace.
	Separator element is punctured, or incorrect, or requires changing, or not sealing correctly.	Replace.
	Incorrect coolant has been added.	Drain system, check for damage. Clean, refill with correct coolant.
	System has been overfilled with coolant.	Check for damage, drain excess.
Discharge air is contaminated with condensate.	Aftercooler not functioning correctly or may be dirty.	Clean or replace.
	Moisture separator drain trap faulty.	Repair or replace.
	Continuous low speed / low ambient operation causing condensate build up.	Review system requirements and contact your local Ingersoll Rand representative.
	Screen blocked	Clean or replace.
Compressor package draws too much current.	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
	Separator filter element dirty or blocked.	Replace.
	Voltage supply is low or unbalanced.	Contact your local Ingersoll Rand representative or a qualified electrician.
	Airend is damaged.	Contact your local Ingersoll Rand representative.
Excessive coolant consumption.	Coolant system leak.	Repair or replace.
	See also 'discharge air is contaminated with coolant'.	See above.
High dewpoint.	Refrigeration compressor not supplied power.	Check incoming power supply.
		Check the dryer protection fuse.
		Check auxiliary contact on main motor contactor.
	Condensate system malfunction.	Check operation of drain valve. Check operation of condensate check valves.
	Condenser dirty.	Clean condenser and replace panel filter element.
Ice formation in dryer.	Low evaporator pressure.	Check hot gas valve setting.
Solenoid condensate valve will not close	Debris in solenoid valve prevents diaphragm from seating.	Remove solenoid valve, disassemble, clean and reassemble.
	Short in electrical component.	Check and replace power cord or timer as needed.
Machine stops with no controller message (Xe-50 only)	Controller power supply lost.	Check controller power supply fuses and breakers.
Machine stop with the following controller messages: (Xe-70 only) Blower fault 4APT failure	Controller power supply lost.	Check controller power supply fuses and breakers.
Shaft seal leaking	Defective shaft seal.	Replace with new shaft seal kit.
Pressure relief valve opening	Minimum pressure valve defective.	Examine and replace if necessary.
	Blowdown valve defective.	Examine and replace if necessary.
	Inlet valve malfunction.	Examine inlet valve and controls tubing. Clean and/or replace if necessary.
	Pressure relief valve defective.	Check the pressure setting and replace if necessary.
Black residue near belt	Drive belt slipping.	Retension belt and replace if necessary.
	Pulleys misaligned.	Align pulleys properly.
	Worn pulleys.	Replace pulleys and belt.

Table 4: General Faults (cont.)

SYMPTOM	CAUSE	REMEDY
Inlet valve will not actuate and load package.	Blowdown valve not functioning.	Examine and clean/ replace if necessary.
	Contamination/ liquid in controls tubing.	Examine and clean/ replace if necessary.
	Either orifice is contaminated.	Examine and clean/ replace if necessary.

Table 5: Controller Faults (indicated on the controller)

	Xe-50 DISPLAY	MEANING	CAUSE	REMEDY
Warnings	A:2040	Freeze Warning (Dryer Package Only)	Dryer low temperature warning.	This serves as a log that the compressor is running in low-ambient conditions.
	A:2050	Dryer High Pressure (Dryer Pressure Only)	Dryer high pressure warning.	This is a locking switch and the dryer high pressure switch must be reset (contact closed) before this warning can be reset.
	A:2118	High Airend Discharge Pressure	Discharge pressure is greater than offline pressure by 1.45 psi for a period of 3 seconds or longer	Discharge pressure must fall to the rated pressure value before the unit is available for reload.
	A:2128	High Airend Discharge Temperature (above 105°C)	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
			Low coolant level.	Check for leaks. See also if discharge air is contaminated with coolant. Top off coolant.
			High ambient temperature.	Review installation and system parameters.
			Insufficient cooling air.	Check ducting and cooling air path.
			Dirty, blocked coolant cooler (cooling air side).	Clean or replace.
			Fan motor direction of rotation incorrect.	Wire correctly.
	A:2816	Power Failure Detected	If power supply to controller is inconsistent.	Check power supply.
	A:4804	Service Due	Service interval hours counter has reduced to zero	Service compressor.
Trips	E:0010	Emergency Stop	24Vac input not being detected on terminal R1C (emergency stop button pressed)	Identify reason why, repair fault, disengage button (if pressed) and reset controller.
	E:0020	Main or Blower Motor Overload	Will occur if the fan or main motor overload relays open for three seconds. Fan is blocked, damaged or blower fan is faulty.	Remove blockage, repair or replace damaged components.
	E:0115	Pressure Sensor Fault	4-20mA signal out-of-range (<3.8mA or >20.8mA)	Install, repair or replace faulty sensor.
	E:0119	High Airend Discharge Pressure	Discharge pressure is greater than offline pressure by 4.35 psi	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
	E:0125	Temperature Sensor Fault	Signal out of range (<-50°C or >250°C)	Install, repair or replace faulty sensor.
	E:0129	Excess Temperature	Shutdown limit exceeded	Can be reset only when airend discharge temperature is lower than 107°C.
	E:0866	Power Supply 24V DC Low	24V DC power supply to controller is low.	Check controller power supply and call your local Ingersoll Rand representative.
	E:0821	Power Supply Analog Inputs Low	Analog input power supply to controller is low.	Check controller power supply and call your local Ingersoll Rand representative.
Start Inhibit	A:3129	High Airend Discharge Temperature (above 103°C)	Airend discharge temperature above 103°C.	Abnormal operating condition which is self-clearing.
	A:3123	Run Inhibited	Temperature is below set low temperature run inhibit limit.	Will self-reset when temperature increases above the temperature limit; cannot be manually reset.
	A:3423	Load Inhibited	Temperature is below set low temperature load inhibit limit.	Will self-reset when temperature increases above the temperature limit; cannot be manually reset.

Table 5: Controller Faults (indicated on the controller) (cont.)

	Xe-50 DISPLAY	MEANING	CAUSE	REMEDY
Warning	High A/E Disch T	High Airend Discharge Temperature	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
			Low coolant level.	Check for leaks. See also if discharge air is contaminated with coolant. Top off coolant.
			High ambient temperature.	Review installation and system parameters.
			Insufficient cooling air.	Check ducting and cooling air path.
			Dirty, blocked coolant cooler (cooling air side).	Clean or replace.
			Fan motor direction of rotation incorrect.	Wire correctly.
	SVC Required	Service Level 1: Service required	Service timer has alarmed.	Service machine and reset warning.
	"100 hours to SVC SVC Required Service Alarm"	"Service Level 2: 100 hours till service required Service required 100 hours after service requirement"	"Preliminary service timer has alarmed. Service timer has alarmed. Late service timer has alarmed."	"Plan machine service and reset warning. Service machine and reset warning. Service machine and set the service complete factory set point."
	High Disch Pres	High Discharge Pressure	Will occur if the unit is using a remote sensor or is under the control of an external device, such as an X81, is loaded, and the discharge pressure (4APT) is greater than the maximum offline pressure. If occurs for longer than 3 seconds, the compressor will automatically unload.	Discharge pressure must fall to the rated pressure value before the unit is available for reload.
	High VSD Amb T	High VSD Ambient Temperature	VSD ambient temperature reaches 52.4°C for three seconds.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
Trips	Dryer Temp	Dryer Temp Warning	Dewpoint temperature exceeds 14.5°C for 6 minutes or longer. Or if the temperature probe in the dryer fails.	Install, repair or replace faulty sensor. Contact your local Ingersoll Rand representative.
	Dryer High Pres	Dryer High Pressure	Will occur if the dryer high pressure switch opens for at least 3 seconds while the dryer is running. This is a locking switch and the dryer high pressure switch must be reset (contact closed) before this warning can be reset.	This is a locking switch and the dryer high pressure switch must be reset (contact closed) before this warning can be reset.
	Invalid Cal	Invalid Calibration	Calibration done with pressure in compressor.	Depressurize and recalibrate with pressure pipe to sensor disconnected. If fault still exists, replace pressure transducer.
	High A/E Disch T	High Airend Discharge Temperature (above 109°C)	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
			Low coolant level.	Check for leaks. See also if discharge air is contaminated with coolant. Top off coolant.
			High ambient temperature.	Review installation and system parameters.
			Insufficient cooling air.	Check ducting and cooling air path.
			Dirty, blocked coolant cooler (cooling air side).	Clean or replace.
			Fan motor direction of rotation incorrect.	Wire correctly.
	Ck Motor Rot	Check Motor Rotation	Drive system fault.	Contact your local Ingersoll Rand representative.
	Overload	Fan Motor Overload	Will occur if the fan or main motor overload relays open for three seconds. Fan is blocked, damaged or blower fan is faulty.	Remove blockage, repair or replace damaged components.
	Main Motor OL	Main Motor Overload	Will occur the current transformers indicate that the motor amp draw is excessive. Trip only applicable for compressors with current transformers installed.	R4-11kW units typically do not have current transformers installed.

Table 5: Controller Faults (indicated on the controller) (cont.)

	Xe-50 DISPLAY	MEANING	CAUSE	REMEDY
Trips	Rem Start Fail	Remote Start Failure	Remote start button is pressed after compressor is running or remote start button remains closed.	Check operation of buttons or operating procedures.
	Rem Stop Fail	Remote Stop Failure	Remote stop button remains open and either start button is pressed.	Check operation of buttons or operating procedures.
	4APT Failure 2ATT Failure	Sensor Failure	Sensor is missing or faulty	Install, repair or replace faulty sensor.
	VSD Fault "X"	VSD Fault	The compressor's variable speed drive is reporting a fault.	Refer to Table 6.
	VSD Comm Fail	VSE Communication Failure	Controller does not receive a response from the VSD when requesting information.	Contact your local Ingersoll Rand representative.
	Drive Init Error	VSD Initialization Fault	Controller is unable to properly setup the drive after boot or after a reset.	Contact your local Ingersoll Rand representative.
	VSD Comm Except	VSD Initialization Fault	Controller receives invalid communications from VSD.	Refer to Table 6.
	Stop Failure	Stop Failure	Occurs when compressor should be stopped, but motor speed has not dropped below minimum motor speed set point for 4 seconds.	Usually indication that run delay (K1) did not open when de-energized; due to this, the isolation contact should open when this fault occurs. The isolation contact can close when fault is cleared.
	Emergency Stop	Emergency Stop	Emergency stop button has been pressed.	Identify reason why, repair fault, disengage button and reset controller.
	Unit Too Cold	Unit Too Cold to Start	Airend discharge temperature (2ATT) is less than 35°F, and the operator attempts to start compressor.	Reset and start compressor if desired. Will be logged that compressor is being used in low ambient conditions.
Start Inhibit	High A/E Disch T	High Airend Discharge Temperature	Will occur if 2ATT is greater than 103°C	Abnormal operating condition which is self-clearing.
	VSD Initializing	VSD Initialization	This will occur if the compressor VSD has not responded to the initial communications from the controller.	Abnormal operating condition which is self-clearing.

The drive controller is directly linked to the controller. Faults in the drive controller will be displayed on the controller as "VSD fault 0, VSD fault 1" etc.

The following VSD faults may be investigated and remedied at source. For all other VSD faults, contact your local **Ingersoll Rand** customer support representative.

Table 6: Drive Faults (indicated on the controller)

FAULT	CAUSE	ACTION
High VSD Ambient Temperature	VSD ambient temperature gets within 5% of the shutdown value (55°C)	Check machine ambient temperature. Check PDM filters, replace if necessary. Check drive cooling fan(s).
Chk Motor Rot	Main motor reverse rotation	Check main motor rotation Contact your local Ingersoll Rand representative.
VSD Comm Fail	Communication wiring faulty.	Check and replace if required.
	Drive faulty.	Contact your local Ingersoll Rand representative.
	Controller faulty.	Contact your local Ingersoll Rand representative.
Wrong VSD Type	Wrong VSD type	Contact your local Ingersoll Rand representative.
Stop Failure	Run relay or wiring fault	Check run relay Contact your local Ingersoll Rand representative.
Drive Init Error	Communication wiring faulty.	Check and replace if required.
	Drive faulty.	Contact your local Ingersoll Rand representative.
	Controller faulty.	Contact your local Ingersoll Rand representative.
VSD Fault Internal Fault 24V Supply Low 1.8V Supply Low Speed Limit Dangerous Fail	Drive faulty.	Contact your local Ingersoll Rand representative.
No Motor Phase U Missing Phase V Missing Phase W Missing	Motor connection lost	Check drive/motor connection
Line Phase Loss DC Voltage High DC Voltage Low DC Overvoltage DC Undervoltage Voltage Limit Mains Failure	Problem with incoming power network	Check incoming power leads, voltage
Short Circuit	There is short-circuiting in the motor or motor wiring.	Check the motor, repair or change.
Internal Fan Fault External Fan Fault Fans Error	Drive fans not working properly	Check for proper fan operation. Contact your local Ingersoll Rand representative.
Motor Ther Over	Motor overheated	Check ambient conditions, get the motor cooled down
Over Current	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
	Separator filter element dirty or blocked.	blocked. Replace.
	Voltage supply is low or unbalanced.	Contact your local Ingersoll Rand representative or a qualified electrician.
	Airend is damaged.	Contact your local Ingersoll Rand representative.
Ground Fault	Earth (ground) fault on start-up.	Check for proper earthing (grounding) and loose connections.
Heatsink Temp	VSD heatsink temp too high	Check ambient temp PDM filters dirty or heatsink dirty Check VSD heatsink fan operation
Inrush Fault	Too many power ups	Let the unit cool down
Torque Limit Current Limit	Compressor operating above rated pressure.	Check and modify settings. Review system requirements and contact your local Ingersoll Rand representative.
	Airend is damaged.	Contact your local Ingersoll Rand representative.
Heatsink Temp Lo	The frequency converter is too cold to operate.	Check the ambient temp

R4-11 INTEGRATED DRYER MAINTENANCE

■ Maintenance Chart

For optimum performance from your dryer, follow the periodic maintenance schedule described below. Review the Information Manual for details on dryer operation.

Table 7: Maintenance Chart

Period	Maintenance Item
Weekly	<ul style="list-style-type: none"> * Verify the temperature on the control panel display is acceptable. * Visually check if condensate is drained regularly.
Monthly	<ul style="list-style-type: none"> * Clean condenser with compressed air, do not damage fins. * Check condition of any filters and replace if necessary. * Check if dryer is working properly after above procedures.
Yearly	<ul style="list-style-type: none"> * Check condition of flexible tube used for condensate drainage and replace if necessary. * Check if all connecting pipes are properly tightened and fixed. * Check if dryer is working properly after above procedures.

■ Troubleshooting

NOTICE

The following behaviors are normal characteristics of operation and not troubles:

- Variable speed of the fan (Mod D12IN-A ÷ D600IN-A)
- Display of message ESA and ES2 in case of operation without load or low load.
- A 2 minute delay for dryer to start after pressing the on/off switch.




* Check condition of flexible tube used for condensate drainage and replace if necessary.






* Check if all connecting pipes are properly tightened and fixed.

* Check if dryer is working properly after above procedures.

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Table 8: General Faults (Dryer)

TROUBLE	DISPLAY	POSSIBLE CAUSE	REMEDY
WATER IN THE SYSTEM	Control panel display is blank	No power in the line.	Restore the power in the line.
		Problems with cabling.	Check cabling; if the trouble persists, replace it.
		Problems with the electronic control board.	Check the electronic control board; if the trouble persists, replace it.
		The dryer is off.	Check the remote ON/OFF contact.
		Dryer in stand-by.	Wait 2 minutes after the dryer is switched on.
		Compressed air inlet/outlet inverted.	Check if the compressed air inlet/outlet is connected properly.
		The flow rate and/or temperature of the air entering the dryer are higher than the nominal values.	Restore the nominal conditions.
		The condenser is dirty.	Restore the nominal conditions.
		Condensate drain is not functioning. See Figure 9.	Clean the condenser.
			Replace the coil of the drainage solenoid valve if burned.
			Clean or replace the drainage solenoid valve if clogged/jammed.
			Check the C8 and C9 parameters of the electronic control board; if the trouble persists, replace it.
		The temperature control probe is positioned improperly or faulty.	Check the probe; if the trouble persists, replace it.
		Problems with cabling or with the electronic control board.	Check the cabling and the electronic control board, if the trouble persists, replace them.
		Activation of compressor's internal thermal protection.	Wait one hour and check again. If the fault persists: stop dryer and call your local Ingersoll Rand distributor.
	 	Problems with the electrical components of the compressor.	Check the electrical components of the compressor.
		Defective compressor.	Replace the compressor.
		The flow rate and/or temperature of the air entering the dryer are higher than the nominal values.	Restore the nominal conditions.
		The ambient temperature is higher than the nominal values.	Restore the nominal conditions.
		The condenser is dirty.	Clean the condenser.
		The temperature control probe is positioned improperly or faulty.	Check the probe; if the trouble persists, replace it.
		Fan pressure switch defective or burned out (if present).	Turn off the dryer and call your local Ingersoll Rand distributor.
		High pressure switch defective or burned out (if present).	Turn off the dryer and call your local Ingersoll Rand distributor.
		Gas leakage in the refrigerating circuit	Turn off the dryer and call your local Ingersoll Rand distributor.
		Defective fan.	Replace the fan.
		Protection fuse burned out (if present).	Replace the fuse.
		The temperature control probe is positioned improperly or faulty.	Check the probe; if the trouble persists, replace it.
		Gas leakage in the refrigerating circuit without load.	Turn off the dryer and call your local Ingersoll Rand distributor.
	 	The temperature control probe is positioned improperly or faulty.	Check the probe; if the trouble persists, replace it.
		Series of alarms very close to each other.	Call your local Ingersoll Rand distributor.

TROUBLE	DISPLAY	POSSIBLE CAUSE	REMEDY
LOW PRESSURE IN THE LINE	  	Ice formation in the evaporator.	Check the probe; if the trouble persists, replace it.
			Check the electronic control board; if the trouble persists, replace it.
			Contact our Service Centre to check the gas charge.
		Clog.	Check if the compressed air inlet/outlet is connected properly.
			Check if the connecting tubing is clogged; in case proceed accordingly.
			Check if any valves are closed.
		Air flows continuously through the condensate drainage.	Check the condition of any filter.
			Drainage solenoid valve jammed, clean or replace it.
			Verify the condensate drainage times set on the electronic control board (C8 and C9).
			Check the signal from the control board: if it is continuous, replace the control board.

■ Disassembly of the Integrated Dryer

NOTICE

The dryer shall be disassembled, charged or repaired by a refrigerant specialist.

Refrigerant liquid and lubricating oil inside the refrigeration circuit shall be recovered in compliance with current norm in the country where the dryer is installed.

NOTICE

Refrigerant leaks may be identified by tripping of the refrigeration overload protector.

If a leak is detected in the refrigerant circuit, seek technical assistance.

If a refrigerant leak occurs, thoroughly air the room before commencing work.

NOTICE

In normal temperature and pressure conditions, the R134a refrigerant is a colorless, class A1/A1 gas with TVL value of 1000 ppm (ASHRAE classification).

NOTICE

The temperature control probe is extremely delicate. Do not remove the probe from its position. In case of any kind of problem, please contact your local Ingersoll Rand distributor.

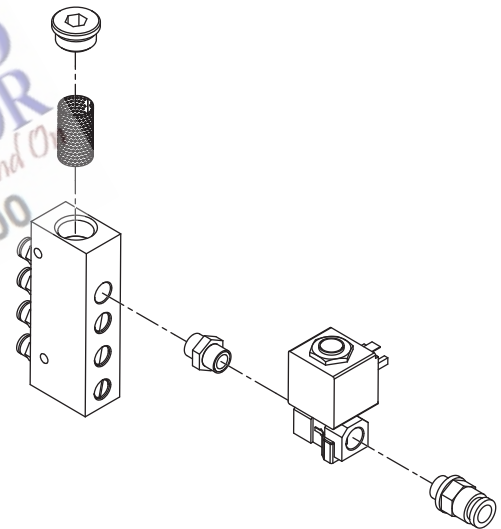


Figure 9: Cleaning of Drain Solenoid Valve

■ Decommissioning the Integrated Dryer

Decommission the dryer and the relevant packaging in compliance with the rules locally in force.

Pay particular attention to the refrigerant, as it contains part of the refrigerating compressor lubricating oil. Always contact a waste disposal and recycling utility.

Table 9: Recycling Disassembly

RECYCLING DISASSEMBLY	
Frame and panels	Steel / epoxy resin polyester
Heat exchanger (cooler)	Stainless steel / aluminum
Pipes	Copper
Insulation	Gum synthetic/polystyrene
Compressor	Steel / copper / aluminum / oil
Condenser	Copper/aluminum/steel
Refrigerant	R-134a
Valve	Brass

■ Filter Element Replacement

1. Close all air inlets and depressurize the filter housing. Filter housing is under pressure and must be depressurized.
2. Turn carefully the bowl in counter-clockwise direction.
3. Unscrew the bowl completely from the filter head and pull it off.
4. To remove the exhausted element unscrew from the filter head.
5. Clean the O-ring seat of the head where you insert the element, the threads of the head, the bowl and the inside of the bowl.
6. Insert the new element on the filter head taking care not to damage the O-ring.
7. Screw the bowl on to the filter head again and let the arrows match vertically.
8. Gently reopen the valves and let the air flow through the system.
9. Exhausted filter elements must be sent to the institutions qualified for its disposal, in accordance to local regulations.
10. It is advisable to have the O-rings changed as well as any element replacement.

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