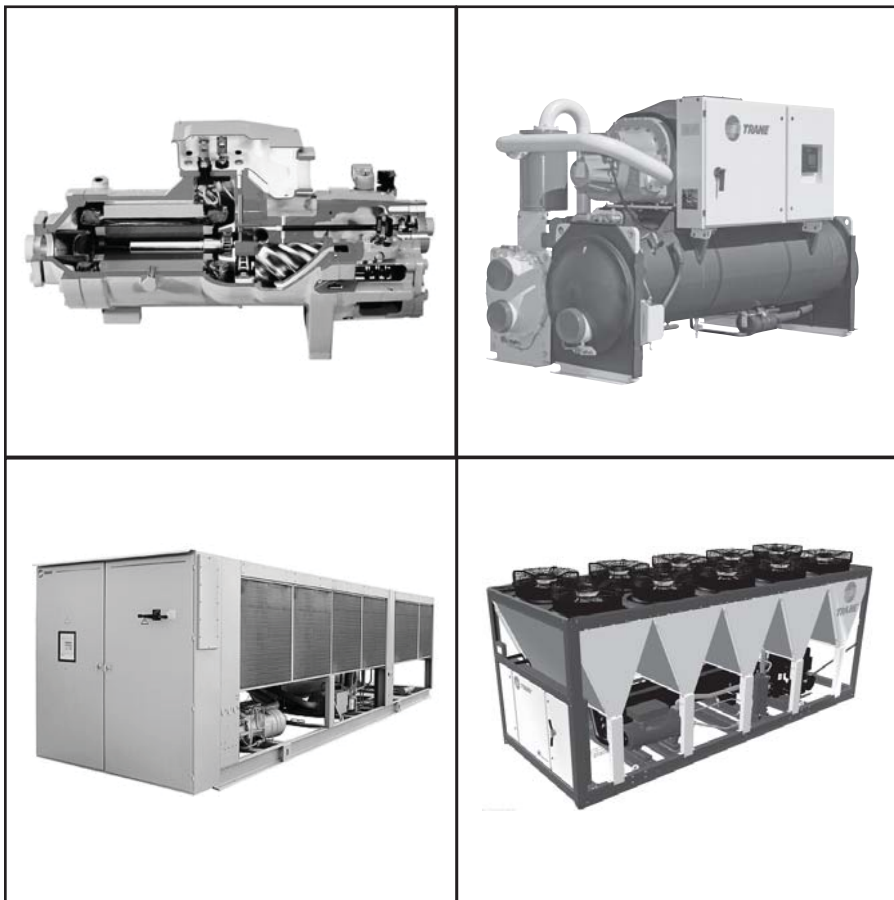




Maintenance manual

Screw Chillers





Dear customer,

Thank you for your confidence **in choosing TRANE**

The commissioning of your TRANE equipment has been completed in accordance with our standard start-up procedures.

We confirm that the machine run log has been completed and registered with our factory under our **ISO 9001** Quality Management System.

The first stage of your warranty has been validated

To keep your TRANE equipment operating at peak efficiency during the warranty period and to extend its life we recommend that regular maintenance procedures as detailed in the timetable contained within this maintenance guide must be carried out.

To guarantee that the service you receive is efficient, reliable and carried out by technically competent factory trained technicians certificated to the refrigerant handling standard, we strongly recommend that you enroll in one of our Maintenance Programs.

As a commitment to our customers, we have created a wide service network staffed with experienced factory-authorized technicians. At **Trane** we offer all the benefits of after sales service direct from the manufacturer and we are committed to our mission statement to provide efficient customer Care.

We would be delighted to discuss your individual requirement with you. For further information regarding Trane maintenance agreements please contact your local **TRANE sales office**.

Warning and Caution

Important - Read This First!

This manual is intended for experienced service personnel familiar with the proper use of electrical diagnostic instruments and all personal safety procedures when working on live electrical circuits. This Manual is not intended for individuals who have not been properly trained in handling live electrical circuits.

Important - Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants— including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. European regulations set forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some countries or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

WARNING!

Contains Refrigerant!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.



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Recommended yearly service routine frequencies

Year	Commis- sioning	Inspec- tion visit	Seasonal shut down	Season- nal start up	Oil analysis (2)	Vibration analysis (3)	Annual mainte- nance	Preven- tive mainte- nance	Tube analysis (1)	Com- pressor R'newal (4)
1	x	x	x	x		x		xx		
2			x	x	x		x	xxx		
3			x	x	x		x	xxx		
4			x	x	x		x	xxx		
5			x	x	x	x	x	xxx	x	
6			x	x	x	x	x	xxx		
7			x	x	x	x	x	xxx		
8			x	x	x	x	x	xxx		
9			x	x	x	x	x	xxx		
10			x	x	x	x	x	xxx	x	
over 10			every year	every year	every year (2)	x	every year	3 every year	every 3 years	40000 h

This timetable is applicable to units operating in normal conditions with an average of 4000 hours per year. If operating conditions are abnormally severe, an individual timetable must be made for that unit.

- (1) Tube testing required if aggressive water conditions exist. Applies to condensers only on water cooled units.
- (2) Schedule as per previous analysis result or at least once a year
- (3) Year 1 to define equipment baseline. Subsequent year based on oil analysis results or schedule as per vibration analysis
- (4) Recommended at 40000 run hours or to be done depending on results from oil analysis / vibration analysis.

Seasonnal start up and shutdown are mainly recommended for Comfort Air Conditioning and annual and preventive maintenance are mainly recommended for Process application.

Maintenance routine

Start-up

- Check installation of equipment/pre-commission
- Check water flows and interlocks
- Configure unit control module
- Calibrate controls
- Check operational set points and performance
- Check operation of all safety devices
- Megger the motor compressor windings
- Check unit operation
- Record operating pressures, amperages and voltage
- Carry out leak test
- Fill out the start up log sheet and review with the operator.

Inspection Visit

(Visit at the end of running in period)

- Replace line drier cores on each circuit (if applicable)
- Carry out oil analysis
- Change the oil as required based upon results of the oil analysis
- Replace oil filter on each unit
- Carry out leak test
- Inspect contacts and tighten terminals
- Record operating pressures, amperages and voltage
- Check operation of machines/compare conditions of operation against original commissioning data
- Fill out the inspection visits log sheet and review with the operator.

Seasonal shut down

- Record operating pressures, amperages and voltage
- Carry out leak test
- Carry out oil analysis
- Record operating pressures, amperages and voltage
- Check operation of machines/compare conditions of operation against original commissioning data
- Fill out the seasonal shut down visits log sheet and review with the operator.

Maintenance routine

Seasonal start-up

- Check water flows and interlocks
- Check operational set points and performance
- Calibrate controls
- Check operation of all safety devices
- Inspect contacts and tighten terminals
- Meg the motor compressor
- Record operating pressures, amperages and voltage
- Carry out leak test
- Check configuration of unit control module
- Replace oil filter on each unit (if applicable)
- Carry out oil analysis (if applicable)
- Change the oil as required based upon results of the oil analysis
- Replace line drier cores on each circuit (if applicable)
- Lubricate motors/dampers/bearing (where applicable)
- Check operation of machines/compare conditions of operation against original commissioning data
- Fill out the seasonal start up visit log sheet and review with the operator.

Preventive maintenance

- Carry out leak test
- Record operating pressures, amperages and voltage
- Check operation of machines/compare conditions of operation against original commissioning data
- Complete maintenance check sheet
- Fill out the inspection visits log sheet and review with the operator.

Annual Maintenance

Inspection visit plus:

- Check water flows and interlocks
- Check operational set points and performance
- Calibrate controls
- Check operation of all safety devices
- Check configurations of unit control module
- Inspect contacts and tighten terminals
- Meg the motor compressor
- Record operating pressures, amperages and voltage
- Carry out oil analysis
- Change the oil as required based upon results of the oil analysis
- Replace oil filter on each unit
- Carry out leak test
- Replace line drier cores on each circuit (if applicable)
- Lubricate motors/dampers/bearings (where applicable)
- Check operation of machines/compare conditions of operation against original commissioning data
- Fill the maintenance visit log sheet and review with the operator.

Oil analysis

Trane Oil Analysis is a predictive tool used to detect minor issues before they become major problems. It also reduces failure detection time and allows planning for appropriate maintenance. Oil changes can be reduced by half resulting in lower operating costs and a lower impact on the environment.

Vibration analysis

Vibration analysis is required when oil analysis reveals the presence of wear indicating the start of possible bearing or motor failure. Trane oil analysis has the ability to identify the type of metallic particles in the oil which, when combined with the vibration analysis, will clearly point out the failing components.

Vibration analysis should be performed on a regular basis to build a vibration trend of the equipment and avoid unplanned downtime and costs.

Compressor R'newal

To ensure a long lifetime for Trane compressors, system oil and vibration are regularly analyzed. These tests build a detailed picture of the condition of internal system components. Over time, they also help build a 'wear trend' of the equipment. This informs our service experts whether your compressor is due for minor maintenance or a complete overhaul.



Additional services

System upgrade

This Service provides a consulting service. Upgrading your equipment will increase the unit reliability and can reduce the operating costs by optimizing the controls. A list of solutions / recommendations to the system will be explained to the customer. Actual upgrade for the system will be costed separately.

Operator training

This service includes training for the system operators or building engineers for the unit on site. They will gain overall an understanding and improve their ability to operate and maintain the chiller.

Water treatment

This Service provides all of the necessary chemicals to properly treat each water system for the period designated. The inspections will be conducted at agreed upon intervals and Trane Service First will submit a written report to the customer after each inspection. These reports will indicate any corrosion, scaling, and alga growth in the system.

Refrigerant analysis

This Service includes a thorough analysis for contamination and solution upgrade. It is recommended that this analysis be performed every six months.

Annual cooling tower maintenance

This Service includes the inspection and maintenance of the cooling tower at least once a year. This involves checking the motor.

24 hours duty

This service includes emergency calls outside of the office normal working hours. This Service is only available with a Maintenance Contract, where available.

Additional services

Training

Our Trane Training Center is able to support all your training needs

Refrigeration, theoretical, practical, general and specific training is carried out on a variety of our units

This training can be done in our Training Center or in an area defined by you.

Tube cleaning/coil cleaning This Service includes mechanical or chemical cleaning of the tubes or coils.

Trane Select Agreements

Trane Select Agreements are programs tailored to your needs, your business and your application. They offer four different levels of coverage. From preventive maintenance plans to fully comprehensive solutions, you have the option of selecting the coverage that best suits your requirements.

5 years motor-compressor warranty

This Service will provide a 5 years part and labor warranty for the motor compressor only.

This Service is only available for units covered by a 5 years Maintenance Contract.

Tube analysis

- Eddy Current Tube Testing for prediction of tube failure/ wear
- Frequency-every 5 years for first 10 years (depending on the water quality), then every 3 years thereafter.

Energy enhancement.

With Trane Care Services you can now explore cost effective ways to optimize the energy efficiency of your existing system and generate immediate savings. Energy management solutions are not only for new systems or buildings. Trane Care offers solutions designed to unlock energy savings in your existing system.

Scope of Trane Select Agreements

	Level 1	Level 2	Level 3	Level 4
LIABILITY				
24 hrs/day, 7 days/week	X	X	X	X
MAINTENANCE				
PREVENTIVE				
Inspection visits	X	X	X	X
Annual maintenance	X	X	X	X
PREDICTIVE				
Oil analysis	X	X	X	X
Coil cleaning		X	X	X
Tube testing			X	X
COVERAGE				
Compressor	X	X	X	X
All parts		X	X	X
Fully comprehensive (parts/labor/refrigerant)			X	X
LIFE CYCLE MANAGEMENT				
Supply replacement unit				X

Scope of coverage

Description	Startup	Inspection visit	Seasonal shut-down	Seasonal start up	Preventive maintenance	Annual maintenance
Check installation of equipment / pre-commission						
Check water flows and interlocks						
Carry out leak test						
Configure unit control module						
Calibrate Controls						
Check configuration and functions of unit control module						
Check operational set points and performance						
Check operation of all safety devices and interlocks						
Inspect Contacts & Tighten Terminals						
Megger the compressor motor windings						
Carry out spectrometric oil analysis or oil replacement						
Replace oil filter (where applicable).						
Replace line drier cores each circuit (where applicable).						
Lubricate motor/dampers/bearings (where applicable)						
Check unit operation						
Record operating pressures, amperages and voltage.						
Compare operation against original commissioning data						
Complete start up visit procedure check sheet and review with operator						
Complete inspection visit procedure check sheet and review with operator						
Complete seasonal shut down visit procedure check sheet and review with operator						
Complete seasonal start up visit procedure check sheet and review with operator						
Complete inspection visit procedure check sheet						
Complete maintenance visit procedure check sheet and review with operator						

Yearly service routine record

Year	Commis- sioning	Inspec- tion visit	Seasonal shut down	Season- nal start up	Oil analysis	Vibration analysis	Annual mainte- nance	Preven- tive mainte- nance	Tube analysis	Com- pressor R'newal
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
over 10										

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Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services and parts. For more information visit www.Trane.com

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