



Installation Operation Maintenance

**Adaptive Frequency Drive for RTAC / RTAD /
RTWD / RTUD / RTWB / RTUB / RTAF**

SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment

June 2020

SRV-SVX007E-GB

TRANE
TECHNOLOGIES

Table of Contents

Introduction	3
Foreword	3
Warranty	3
Reception.....	3
General Information	3
General Features.....	3
Documentation	3
Parts list.....	4
Unit without AdaptiView™ (RTAD / RTWB / RTUB / RTWD / RTUD).....	4
Unit with AdaptiView™ (RTAC / RTAF).....	5
Kits components details.....	6
Oil	6
Electrical kit	6
Additional material.....	9
Recommended parts list	9
Mechanical installation	10
Lifting and moving instructions.....	10
Lifting weight and dimensions	10
Oil change.....	12
Temperature sensors.....	12
Pressure transducer.....	12
Electrical installation	13
Wiring diagram	13
On site connection.....	13
Power wiring	14
Control wiring	14
Bus wiring	15
Wiring installation instructions.....	15
Control card connection (RTWD chiller only)	17
Control connection between TR200 and UC800.....	17
Commissioning.....	18
RTAD/RTWB/RTWD Commissioning	18
RTAC / RTAF Commissioning	18
Acoustic and vibration	19
Chiller operation with Adaptive Frequency Drive	23
Chiller operating map.....	23
Specific installation	23

Introduction

Foreword

These instructions are given as a guide to good practice in the installation and maintenance of the Trane Adaptive Frequency Drive retrofit kit. They do not contain the full service procedures necessary for the continued successful operation of this equipment. The services of a qualified service technician should be employed, through the medium of a maintenance contract with a reputable service company.

Warranty

Warranty is based on the general terms and conditions of the constructor. The warranty is void if the equipment is modified or repaired without the written approval of the constructor, if the operating limits are exceeded, or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance, or failure to comply with the manufacturer's instructions, is not covered by the warranty obligation. If the user does not conform to the instructions given in this document, it may entail cancellation of warranty and liabilities by the constructor.

Reception

On arrival, inspect the parts before signing the delivery note. Specify any damage on the delivery note, and send a registered letter of protest to the last carrier of the goods within 72 hours of delivery. Notify the local Trane sales office at the same time. The parts should be totally inspected within 7 days of delivery. If any concealed damage is discovered, send a registered letter of protest to the carrier within 7 days of delivery and notify the local Trane sales office.

Important notice: No shipping claims will be accepted by Trane if the above mentioned procedure is not respected.

Note: More stringent national rules may apply in some countries. For more information, refer to the general sales conditions of your local Trane sales office.

General Information

Cautions appear at appropriate places in this instruction manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel

General Features

This document describes the material required and the procedure to install on site Adaptive Frequency Drive on RTAC, RTAD and RTWD units. Support of a qualified Trane technician is required to install and commission the Adaptive Frequency Drive.

Documentation

This document is intended to guide Trane technicians to retrofit a RTAC, RTAD or RTWD chiller with Adaptive Frequency Drive.

Refer to official Trane documentation concerning operation and maintenance of the chillers.

WARNING!

Hazardous Voltage!

Disconnect all electric power before servicing.

Failure to disconnect power before servicing can result in severe personal injury or death caused by electrocution.

WARNING!

Capacitors inside. Wait for 30 minutes after switching off power before servicing the chiller or the Adaptive Frequency Drive.

Parts list

The parts list below does not mention all parts. Only the kit main components are listed in the document.

Unit without AdaptiView™ (RTAD / RTWB / RTUB / RTWD / RTUD)

For all units, you will need:

- ANL0006E: 2 pieces

- OIL00317: 2 pieces

In addition to these parts, you need the AFD kit as mentioned in the below tables.

Table 1 - Part list RTAD

Unit	Electrical kit for 45°C ambient		Electrical kit for 52°C ambient	
RTAD	Part number	Qty	Part number	Qty
85	KIT1791E	1	KIT1792E	1
100	KIT1792E	1	KIT1793E	1
115	KIT1794E	1	KIT1795E	1
125	KIT1795E	1	KIT1796E	1
145	KIT1797E	1	KIT1798E	1
150	KIT1799E	1	KIT1800E	1
165	KIT1801E	1	not available	1
180	KIT1802E	1	not available	1

Table 2 - Part list RTWB

Unit	Electrical kit	
RTWB	Part number	Qty
207	KIT1823E	1
208	KIT1824E	1
210	KIT1791E	1
211	KIT1825E	1
212	KIT1792E	1
214	KIT1826E	1
216	KIT1827E	1
217	KIT1795E	1
218	KIT1797E	1
220	KIT1799E	1
222	KIT1801E	1
224	KIT1802E	1

Table 3 - Part list RTWD

Unit	Electrical kit for LoVi compressor		Electrical kit for HiVi compressor	
RTWD	Part number	Qty	Part number	Qty
60	KIT1750E	1	KIT1751E	1
70	KIT1750E	1	KIT1752E	1
80	KIT1753E	1	KIT1754E	1
90	KIT1751E	1	KIT1755E	1
100	KIT1756E	1	KIT1757E	1
110	KIT1758E	1	KIT1759E	1
120	KIT1760E	1	KIT1761E++ / KIT1762E+	1
130	KIT1763E	1	KIT1764E	1
140	KIT1765E	1	KIT1766E	1
160 SE	KIT1767E	1	KIT1803E+ / KIT1768E++	1
160 HE & Pr	KIT1769E	1	KIT1770E	1
170	KIT1771E	1	KIT1772E	1
180	KIT1767E	1	KIT1803E+ / KIT1768E++	1
190	KIT1773E	1	KIT1774E	1
200	KIT1775E* / KIT1771E**	1	KIT1776E* / KIT1772E**	1
220	KIT1773E	1	KIT1774E	1
250	KIT1775E	1	KIT1776E	1

* Standard efficiency units

** High and premium efficiency units

+ Standard evap temperature (>5°C) - High condenser (>35°C)

++ Low evap temperature (<5°C) - Standard condenser (<35°C)

Note: Kit for RTUD are the same as for RTWD with HiVi compressor

Parts list

Unit with AdaptiView™ (RTAC / RTAF)

For all unit,s you will need:

- ANL0006E: 2 pieces
- OIL00317:
 - 2 compressor units = 2 pieces
 - 3 compressor units = 3 pieces
 - 4 compressor units = 4 pieces
- SEN02133: 2 pieces
- RLY0129E: 4 pieces
- BAS0018E: 4 pieces

For RTAC units, you need the AdaptiView conversion kit

- KIT2033E: 1 piece

In addition to these parts, you need the AFD kit as mentioned in the below tables.

Table 4 - Part list RTAC

Unit	Electrical kit for 45°C ambient		Electrical kit for 52°C ambient	
RTAC	Part number	Qty	Part number	Qty
120	KIT2036E	1	KIT2037E	1
130	KIT2039E	1	KIT2040E	1
140	KIT2041E	1	KIT2042E	1
155	KIT2045E	1	KIT2046E	1
170	KIT2047E	1	KIT2048E	1
175	KIT2051E	1	KIT2052E	1
185	KIT2053E	1	KIT2054E	1
200	KIT2055E	1	KIT2055E	1
240	KIT2043E	1	KIT2044E	1
250	KIT2043E	1	KIT2044E	1
255	KIT2043E	1	KIT2044E	1
275	KIT2049E	1	KIT2050E	1
300	KIT2055E	1	KIT2055E	1
350	KIT2047E	1	KIT2048E	1
355	KIT2051E	1	KIT2052E	1
375	KIT2053E	1	KIT2054E	1
400	KIT2055E	1	KIT2055E	1

Table 5 - Part list RTAF

Unit	Electrical kit for 45°C ambient		Unit	Electrical kit for 45°C ambient	
RTAF	Part number	Qty	RTAF HFO	Part number	Qty
90	KIT2035E	1	90	KIT2036E	1
105	KIT2036E	1	100	KIT2039E	1
125	KIT2039E	1	110	KIT2041E	1
140	KIT2041E	1	120	KIT2045E	1
145	KIT2041E	1	130	KIT2047E	1
150	KIT2045E	1	145	KIT2053E	1
155	KIT2045E	1	155	KIT2055E	1
170	KIT2047E	1	185	KIT2055E	1
175	KIT2051E	1	210	KIT2047E	1
185	KIT2053E	1	230	KIT2055E	1
190	KIT2053E	1	265	KIT2055E	1
200	KIT2055E	1	285	KIT2047E	1
205	KIT2055E	1	305	KIT2055E	1
245	KIT2055E	1	340	KIT2055E	1
250	KIT2045E	1			
280	KIT2047E	1			
310	KIT2055E	1			
350	KIT2047E	1			
355	KIT2055E	1			
380	KIT2047E	1			
410	KIT2055E	1			
415	KIT2055E	1			
450	KIT2055E	1			

Parts list

Kits components details

Oil

Here is a description of oil currently used (existing oil) and oil to be replaced when using Adaptive Frequency Drive (New oil).

Table 6 - Oil changeover

		Existing oil	New oil
Part number		OILO23E	OIL00317
Type		Ester	Ester
Viscosity at 40°C	Centistoke	69	124.9
Density at 20°C	Kg/dm ³	0.98	0.94
Appearance		Clear to yellow	Gray to yellow
Flash point		268 °C	262 °C
Weight for 1pail	kg	20	20
Oil volume / pail	L	18.9	18.9

Electrical kit

Table 7 - Electrical kit description

Material	Quantity	Unit
AFD	2	#
Control panel	1	#
Fuses (when required)	6	#
Standard Power wiring	2 X 10	m
Shielded Power wiring	2 X 10	m
Control wiring	included	
Bus cable	included	
Temperature sensors	2	#
Pressure transducers (when required)	2	#
Terminal lug	20	#
EMC cable gland	8	#

Note: This panel is not mounted on AFD kit for RTAF and RTAC as AFD and main control are linked through modbus communication.

Panel design

Figure 1 - RTAD/RTWB panel

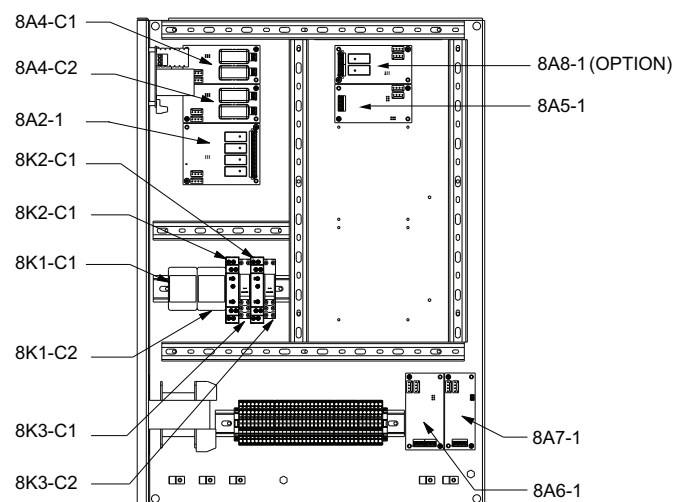
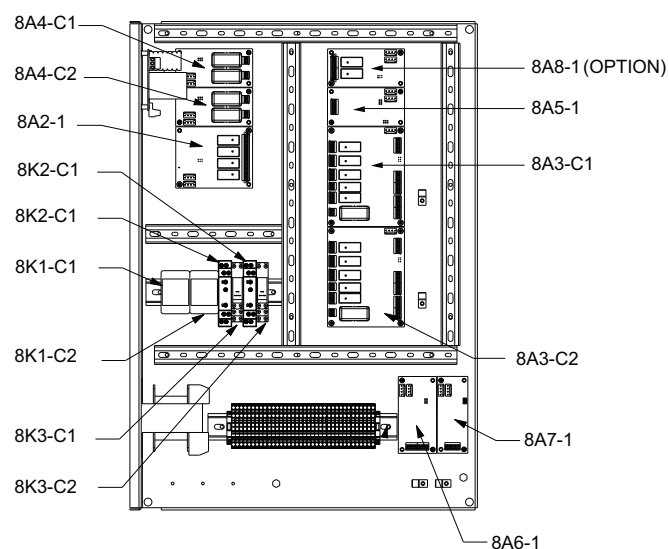


Figure 2 - RTWD panel



Parts list

Fuses

The large sizes of Adaptive Frequency Drive (110 kW to 132 kW) are mounted with high speed fuses (gG type). Other AFD (30 kW to 90 kW) do not have fuses.

Therefore existing fuses must be changed on units using smaller AFD (sizes 30 kW to 90 kW).

Adaptive Frequency Drive

Caution! Different data for RTWD using HiVi or LoVi compressors

- HiVi compressors used when digit 15 = B / C or digit 21 = 2/3
- LoVi compressors used when digit 15 = A or digit 21 = 1

Table 8 - RTWD AFD selection

Unit	Hi Vi Compressor		AFD	
RTWD	Circuit 1	Circuit 2	Circuit 1	Circuit 2
60	K1	K1	37 kW	37 kW
70	K2	K2	45 kW	45 kW
80	K2	L1	45 kW	55 kW
90	L1	L1	55 kW	55 kW
100	L1	L2	55 kW	75 kW
110	L2	L2	75 kW	75 kW
120	L2	M1	75 kW	75 kW
130	M1	M1	75 kW	75 kW
140	M1	M2	75 kW	90 kW
160 SE	M2	N1	90 kW	110 kW
160 HE & Pr	M2	M2	90 kW	90 kW
170	N1	N1	110 kW	110 kW
180	M2	N1	90 kW	110 kW
190	N1	N2	110 kW	132 kW
200 SE	N2	N2	132 kW	132 kW
200 HE & Pr	N1	N1	110 kW	110 kW
220	N1	N2	110 kW	132 kW
250	N2	N2	132 kW	132 kW

Unit	LoVi Compressor		AFD	
RTWD	Circuit 1	Circuit 2	Circuit 1	Circuit 2
60	K1	K1	30 kW	30 kW
70	K2	K2	30 kW	30 kW
80	K2	L1	30 kW	37 kW
90	L1	L1	37 kW	37 kW
100	L1	L2	37 kW	45 kW
110	L2	L2	45 kW	45 kW
120	L2	M1	45 kW	55 kW
130	M1	M1	55 kW	55 kW
140	M1	M2	55 kW	75 kW
160 SE	M2	N1	75 kW	90 kW
160 HE & Pr	M2	M2	75 kW	75 kW
170	N1	N1	90 kW	90 kW
180	M2	N1	75 kW	90 kW
190	N1	N2	90 kW	110 kW
200 SE	N2	N2	110 kW	110 kW
200 HE & Pr	N1	N1	90 kW	90 kW
220	N1	N2	90 kW	110 kW
250	N2	N2	110 kW	110 kW

Parts list

Table 9 - RTAD / RTAC / RTWB AFD selection

Unit				Compressor type		AFD	
RTWB	RTAD	RTAC	RTAF	Circuit 1	Circuit 2	Circuit 1	Circuit 2
207				K1	K1	37 kW	37 kW
208				K2	K2	45 kW	45 kW
210	85		90	L1	L1	55 kW	55 kW
211				L2	L1	75 kW	55 kW
212	100		105	L2	L2	75 kW	75 kW
214	115	120		M1	M1	75 kW	75 kW
		130	125	M2	M1	90 kW	75 kW
216				M1	M2	75 kW	90 kW
217	125	140	140/145	M2	M2	90 kW	90 kW
218	145	155	155/250	N1	M2	110 kW	90 kW
220	150	170	170/280/350/380	N1	N1	110 kW	110 kW
		175/240/250	175	N2	M2	132 kW	90 kW
222	165	185/275/375	185/190	N2	N1	132 kW	110 kW
224	180	200/300/400	200/205/310/410	N2	N2	132 kW	132 kW

Parts list

Wiring

Each electrical kit is provided with appropriate power wiring to connect electrical kit to the unit. 10 m of standard power wiring and 10m of shielded power wiring are provided for each circuit.

Figure 3 - Standard and shielded power wiring

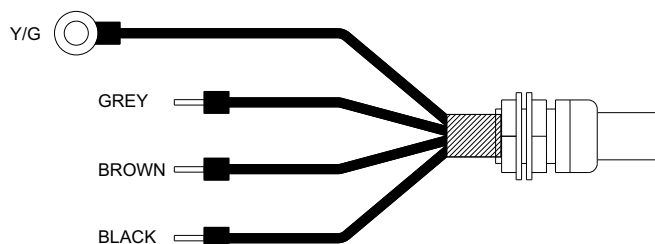


Figure 4 - Control wiring

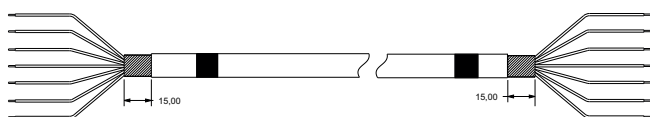


Figure 5 - Bus Wiring



Additional material

The following material is not provided within Trane kit and has to be locally supplied:

- Cable tray
- Fitting accessories for AFD panel

Tools

- Cable cutter for large section wiring
- Crimping tool to connect terminal lug to power wiring
- Drill or knock out tool to adapt cable glands holes into compressor terminal box
- 2 pipe wrench to lock cable glands
- Female lugs (faston) to connect control card
- Grinder to remove paint from terminal box
- Rover converter (RS485). Switch position = half duplex (2 wire) without echo
 - o S1: ON
 - o S2: OFF
 - o S3: OFF
 - o S4: OFF

Connection from AFD control card (8A5-1) to Rover converter: J2-3 to terminal 2 / J2-4 to terminal 1

Recommended parts list

Table 10 - Recommended parts list (for any kits except RTAF and RTAC)

Part number	Description	item	RTAC/RTWD	RTAD/RTWB
BRD02102	Power supply module	8A1-1	X	X
BRD04879	Quad relay output module	8A2-1	X	X
BRD04876	Dual triac output module	8A4-C*	X	X
MOD0209E	Communication card module	8A5-1	X	X
BRD04875	Dual analog input/output	8A6-1	X	X
BRD04873	Dual low input voltage	8A7-1	X	X
SEN02133	Temperature sensor	8B1-C*	X	X
TRD0025E	Pressure transducer	8B3-C*		X
BRD04877	Starter card	8A3-C*	X	

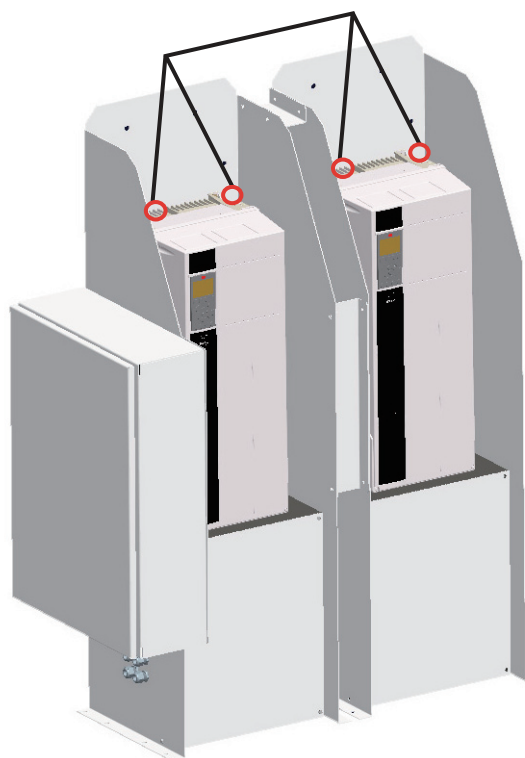
Mechanical installation

Lifting and moving instructions

Trane recommends the following lifting method for the Adaptive Frequency Drive retrofit kit:

- The kit is delivered on a skid
- The minimum lifting capacity of material used must be higher than the tabulated kit shipping weight
- CAUTION! Lift and handle with care. Avoid shocks while handling.
- Lifting rings are available on each drive. Use these rings to lift the AFD kit as per drawing below.

Figure 6 - AFD kit lifting



Lifting weight and dimensions

Table 11 - Delivered material weight and dimensions

Unit model				Kit weight (kg)		Total weight (kg)
RTAD	RTAC	RTWD	RTWB	RTAF	AFD + panel	
		60	207		216	416
		70	208		216	426
		80			216	426
85		90	210	90	216	431
		100	211		236	456
100		110	212	105	256	481
		120	214		256	486
115	120	130			256	491
	130	140	216	125	256	496
125	140	160	217	140/155	256	501
145	155	180	218	155/250	253	503
150	170	200	220	170/280/350/380	250	505
	175/240/250			175	253	513
165	185/275/375	220	222	185/190	250	515
180	200/300/400	250	224	200/205/310/410	250	520

External dimensions of the kit are:

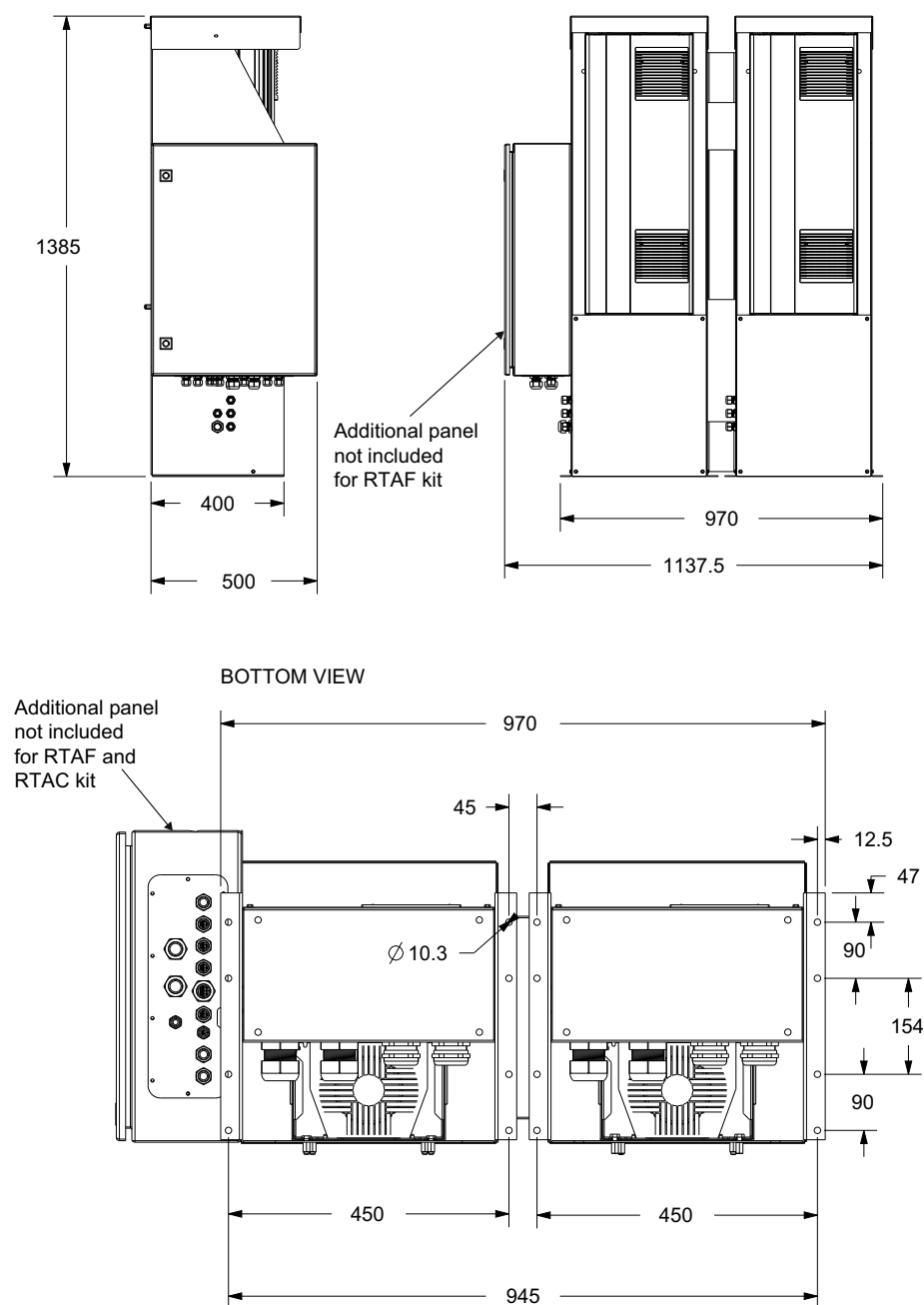
Height = 1385 mm

Width = 1137.5 mm

Depth = 500 mm

Mechanical installation

Figure 7 - AFD kit external dimensions



Mechanical installation

Oil change

Change oil prior to electrical change.

Compressor oil can be changed without removing the refrigerant. It is required to drain the maximum oil and replace by the new oil supplied with the kit. Respect the following steps when changing oil:

Step 1: Run the unit for 30 min

Step 2: Drain the oil

Step 3: Measure the volume of the old oil recovered

Step 4: Fill the tank with the same volume of new oil as measured in step 3.

It is authorized to have a mix of old and new oil. Tolerance limit of old oil is set at 20%.

When doing an AFD retrofit, two oil changes (drain/refill) are required to ensure proper oil viscosity. We recommend doing an oil analysis to check oil viscosity after each oil change and after running the unit during 30 minutes.

CAUTION!: Compressor longevity

In each chiller circuit, oil viscosity must be above 100 cSt at 40°C for AFD application.

Temperature sensors

Two temperature sensors are supplied within the kit. They must be mounted on the chiller and connected to the retrofit kit control panel.

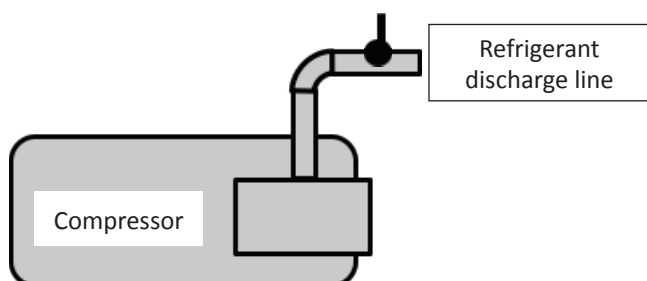
Mounting instructions:

- Use thermal paste
- Mount sensor on thermal paste
- Maintain sensor with cable tie
- Cover sensor with thermal insulation

RTAC, RTAD and RTWB

One temperature sensor must be mounted on each circuit discharge line. The temperature sensor must be mounted as close as possible to the compressor as per picture below.

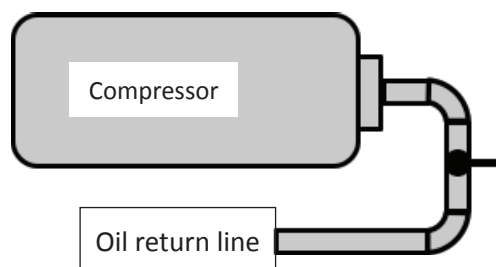
Figure 8 - Refrigerant temperature sensor mounting on RTAC / RTAD / RTWB units



RTWD

One temperature sensor must be mounted on each oil line. The temperature sensor must be mounted as close as possible to the compressor between oil separator (or oil cooler when available) and compressor.

Figure 9 - Oil temperature sensor mounting on RTWD units



Pressure transducer

RTAD and RTWB units

Pressure transducers are provided and required for RTAD units only. They have to be mounted on the Schraeder valve of each oil separator.

Electrical installation

Wiring diagram

The kit wiring diagram (including wire type and location) is available in pdf and AutoCAD formats.

- RTAC: 23113535
- RTAD: 23113536
- RTWB: 23113966
- RTUB: 23113967

Wiring diagrams for the chiller retrofit are available as pdf and AutoCAD formats:

- RTAC: 23113532
- RTAD: 23113534
- RTWB: 23113968

Wiring diagrams for RTAF with AFD are available on litweb.

On site connection



New parts
Existing parts

Figure 10 - Installation schematics for RTAC units

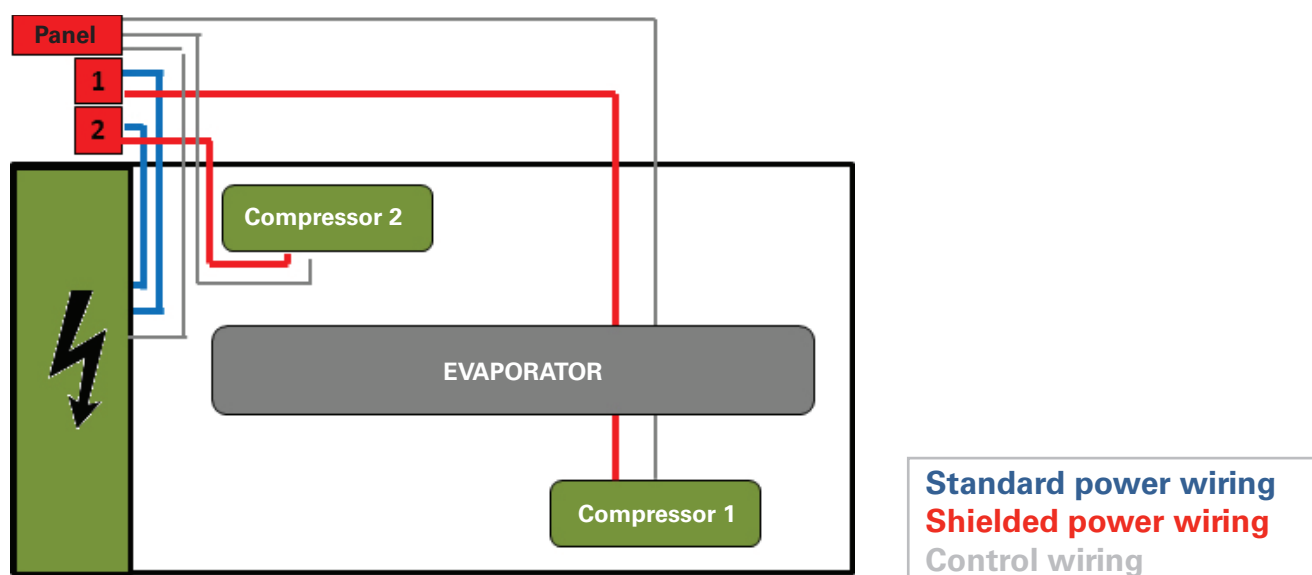
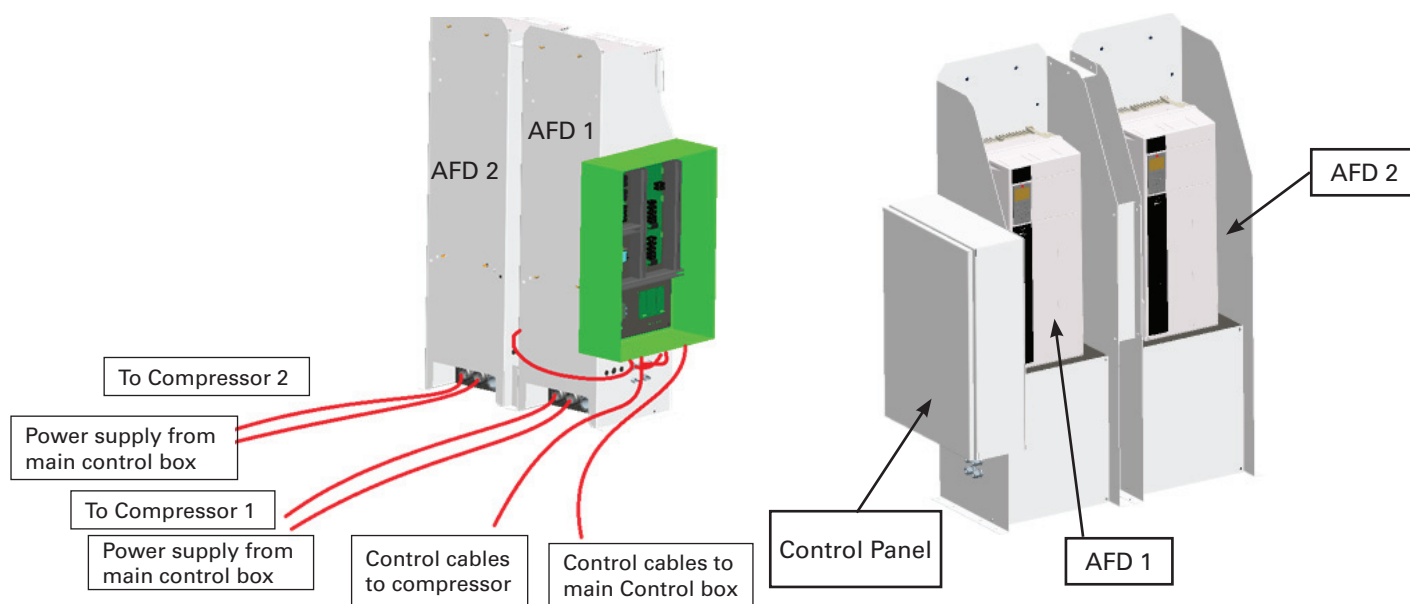


Figure 11 - Wiring connection for AFD kits



Power wiring

10m standard power wiring and 10m shielded power wiring are supplied for each circuit within the kits:

- Standard power wiring to be installed from the main electrical panel to the AFD.
- Shielded power wiring to be installed from the AFD to the compressor.

Caution!: when tightening the screw terminal lug. Respect fastening torque:

- K & L compressor: 11.3 Nm
- M & N compressor: 27.1 Nm

Control wiring



EMC compatibility

Control wiring and power wiring must be separated by **30cm minimum** and positioned in separated cable trays.

Figure 12 - Wiring installation



Bus wiring

The bus leaving the kit panel must be connected to the existing bus on the chiller. A "Y" connector is provided within the kit to ensure such connection.

Connect temperature and pressure sensors on the auxiliary bus. The bus cable is provided within the kit.

Wiring installation instructions

It is required to have wires follow a straight line as much as possible and being as short as possible. The cable must be placed as close to the unit metallic frame as possible.

Installing EMC cable gland



Shield continuity

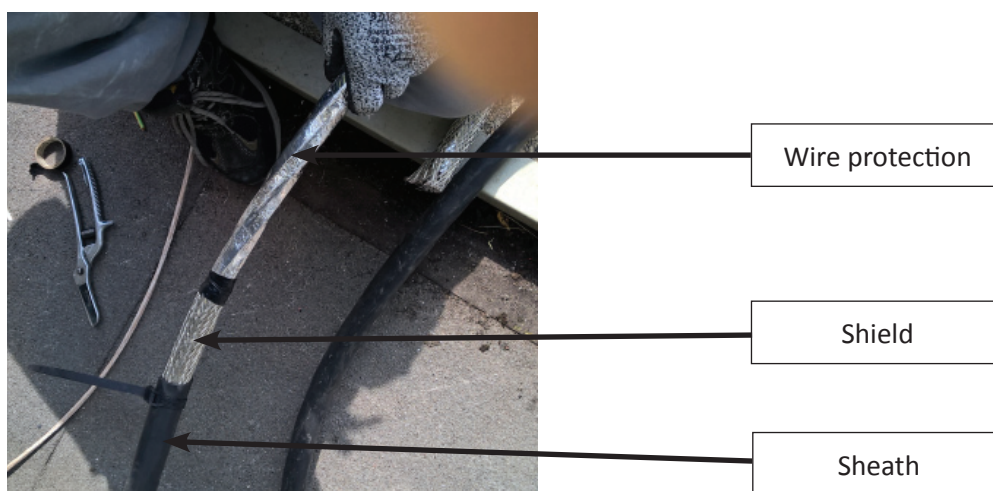
When using the reducer after the EMC cable gland, make sure shielding is connected to the cable gland.

Figures 13 - Shielded power wiring installation into EMC cable gland

STEP 1: Remove the sheath without damaging the shield and maintain remaining sheath



STEP 2: Leave only 10 cm of shield and maintain it with tape. It will be easier to place cable gland afterwards.



STEP 3: Place the cable gland. Ensure the shield is connected to the cable gland.

Warning!: Do not damage the shield.



Shield

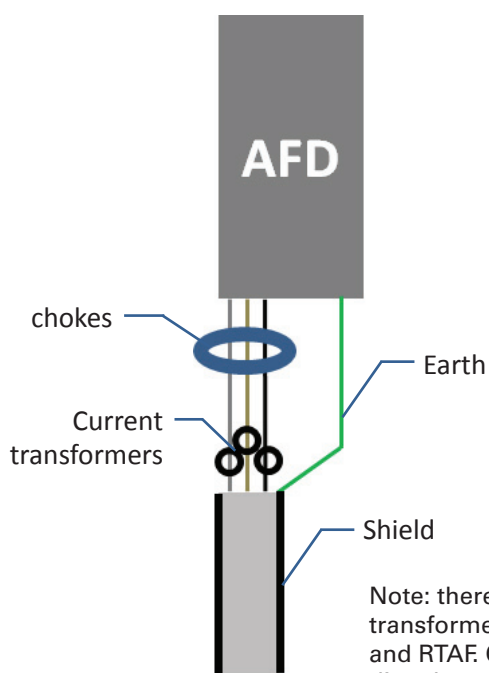
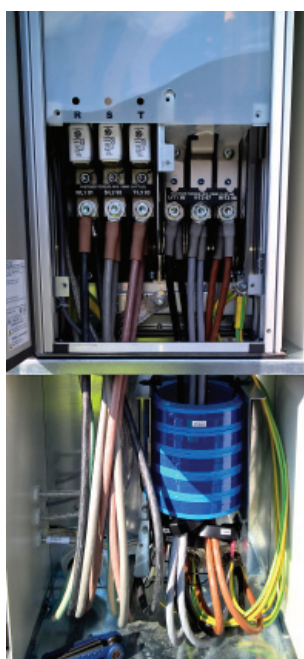
Wiring installation to the AFD



Chiller operation

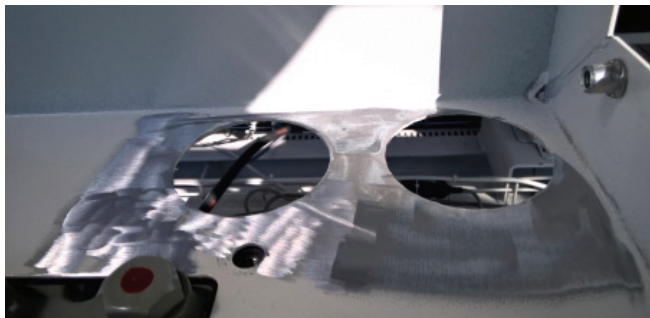
The shield must be removed and connected to cable glands prior going through the current transformer and chokes.

Figure 14 - Wiring connection to AFD



Figures 15 - Installing EMC cable gland to compressor terminal box

STEP 1: Scratch paint around holes into the terminal box



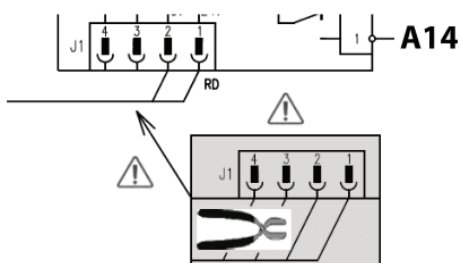
STEP 2: Install adaptive plate provided within the kit and drill at appropriate diameter (according to cable glands dimensions)



**Control card connection (RTWD chiller only)
RTAC**

It is required to cut the "COM" part of the control board A14-1 and A14-2 as per drawing below and as shown on wiring diagram 23113532.

Figure 16 - Starter card adaptation



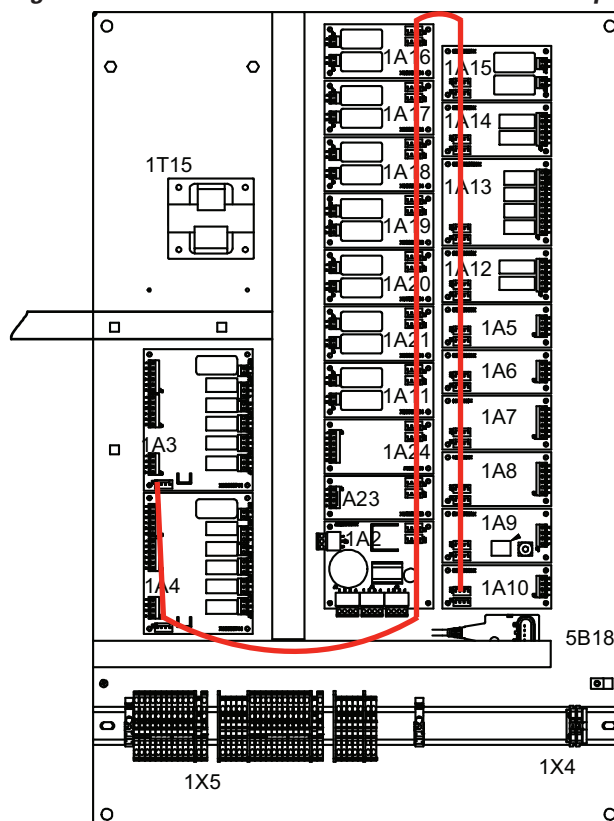
Therefore Control card A14-1 and A14-2 must be at the end of bus daisy chain as per drawing below.

RTWD

It is required to cut the "COM" part of the control board 1A3 and 1A4 as per drawing below and as shown on wiring diagram 23113531.

Therefore caxrd 1A3 and 1A4 must be placed at one end of the bus daisy chain as per drawing below.

Figure 17 - New bus connection into RTWD control panel



Control connection between TR200 and UC800

- High pressure switch to be connected to TR200. The unit shall stop when HP switch is open. HP switch to be relayed and connected to TR200 terminals 13 & 19.
- Compressor run information relayed on TR 200 terminals 1 & 2.
- Modbus connection between UC800 and TR200 is made on terminals 68 & 69. Make sure you have panduit connector (2 connectors required).

Commissioning

RTAD/RTWB/RTWD Commissioning

Unit configuration (with black box)

Change main module configuration (CH530 or UCM-CLD) as per table below

Table 12 - Unit configuration change using Techview or Kestrelview

RTWD	RTAD/RTWB
<ul style="list-style-type: none"> Select Across the line starter type Disable starter integrity test Disable phase unbalance protection Disable phase reversal protection 	<ul style="list-style-type: none"> Disable Starter current reduction Disable phase unbalance protection Disable phase reversal protection

New control (black box)

The latest application is factory installed into the controller card (8A5-1). The application software update is available on the [Technical Service SharePoint](#) if required.

Use [GP2 VFD software](#)

Configuration loading

Use [GP2 VFD software](#)

Binding

Starter Card

Binding using Techview or Kestrelview.

Additional card binding

Control binding should be made using GP2 VFD software available from the Control Engineering sharepoint

AFD configuration

Configurations are to be made using MCT10 software. Configurations are available on the Technical Control Engineering sharepoint

RTAC / RTAF Commissioning

RTAF unit configuration (with UC800)

RTAF is controlled through UC800 which has AFD control capability. Therefore, no additional black box control is required for RTAF.

Before changing the unit configuration, record the current configuration and parameters (compressors run hours and start, setpoint,...)

Proceed with a clean install and restart a configuration after clean install.

When upgrading to the latest software version, consider a HSS or HSE version according to the unit on site:

SE => HSS

HE or XE => HSE

Pay specific attention to:

- Oil cooler presence
- Fan type
- Starter type compressor.

RTAC unit configuration (with UC800)

UC800 and TD7 display need to be installed in place of Dynaview. Prior to disconnect Dynaview, record the current configuration and parameters (compressors run hours and start, setpoint, diagnostics,...). Once information is recorded, disconnect and remove the Dynaview.

Once UC800 and TD7 are installed, proceed with unit configuration.

Important notice: UC800 comes without any configuration. Select the appropriate unit, compressor type and compressor starter.

AFD configuration

AFD configurations are available from the Control Engineering sharepoint.

For RTAC, consider equivalent RTAF units (equivalent compressor size).

Modbus communication settings between UC800 and TR200:

- 8.30 Protocol -> Modbus RTU (Can be changed only manually on the TR200 display)
- 8.31 Address -> circuit 1: 3; circuit 2: 4
- 8.32 Speed -> 115200 Bauds

UC800 starter configuration

Contactor Integrity Test Disable
Phase Unbalance Detect Disable
Phase Reversal Detect Disable
Under/Over Voltage Protection Enable

UC800 fan configuration

Fan speed at each step needs to be implemented manually. In addition, when unit has low ambient option (VFD on one fan of each circuit), step 4 must be 0 l/s.

Air flow for 1 fan = 3568 liters/sec

Consider the number of fans and how the fans are grouped to implement the correct airflow.

Example of RTAC 140 HE with 6 fans / circuit

Number of inverter	1
Air flow variable speed fan	3568 l/s
Airflow step 1	3568 l/s
Airflow step 2	7136 l/s
Airflow step 3	0 l/s
Airflow step 4	0 l/s

Acoustic and vibration

Once the chiller has been commissioned, a frequency sweep must be performed to detect any excessive vibration liable to damage the chiller. The below guidelines must be followed to avoid any risk.

Methodology

- Detect vibration location: Perform a frequency sweep from 30Hz to 50Hz and examine piping (suction and discharge line) to detect any important vibration or disturbing noise issues. In case of any abnormal operation record the location and frequency where vibrations are prevalent.
- Vibration measurement: Take vibration velocity measurement, compare it to the design criteria and examine the characteristics. Identify the types of piping vibration:
 - Directly excited by the compressor's harmonics are:
 - Harmonic 1 (30Hz 50Hz)
 - Harmonic 2 (60Hz to 100 Hz)
 - Harmonic 5 (150Hz to 250Hz)
 - harmonic 10 (300Hz to 500Hz)
 - Identify by the hammer test (FRF test) as structural resonance of the piping
 - Compare to appropriate screening criteria
- Evaluate potential solutions: Once the frequency is well defined, you can apply an AFD frequency skip.

Once the cause of the resonance frequency is well identified, you can apply a line weight on the piping to shift down the resonance frequency and to reduce the vibration level.

Measurement device requirement for resonance determination

To measure the vibrations velocity and determine if there is some level above the design criteria and examine the characteristics, the below devices should be used.

- Vibration acquisition system with (FFT analyzer)
 - 4 to 8 channels measurements
 - Minimum bandwidth from 0 Hz to 1000 Hz with $\Delta f=1\text{Hz}$
 - Ramp up or ramp down measurement function (no stationary measurements)
 - Hit test function (FRF)
 - Tachometric channel for speed compressor measurement (optional)
- Sensors
 - Accelerometers 3 axis or mono axis with at least a sensibility of 10 mV/g, 50 mV/ or 100 mV/g,
 - Hammer test with frequency excitation from 10 Hz to 1000 Hz with 0.2 mV/N with a weight of 1 kg. (Example PCB 086D05).
- Unit
 - Vibration velocity measurement must be in mm/s RMS
 - Vibration displacement measurement must in mm peak to peak

Figure 18 - Operational vibration velocity (mm/s) example

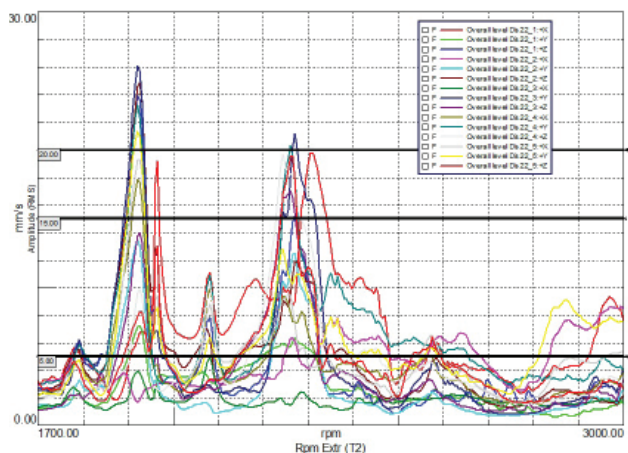
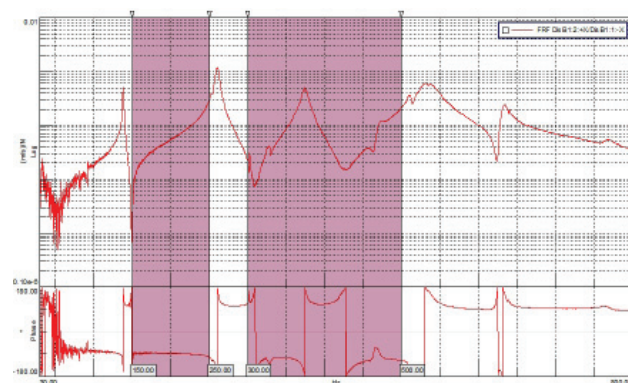


Figure 19 - Frequency response function of the discharge line (hit test) In g/N or m/s²/N example



Measurement points location

Below are point location recommendations for RTAD and RTAC units. If vibration areas are noticed in other locations, measurement levels at these locations should be performed.

Figure 20 - RTAD 085 SE - points locations

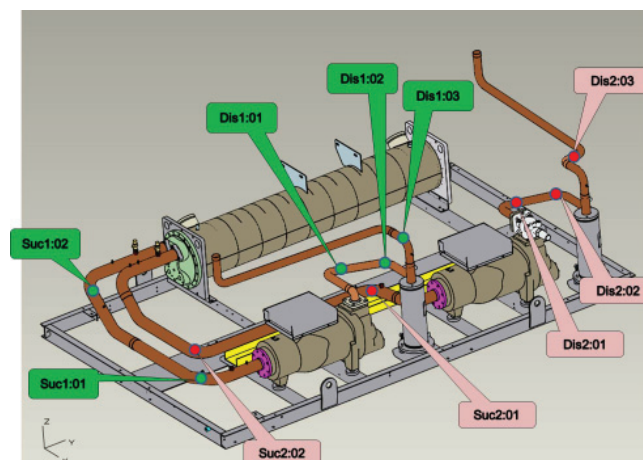
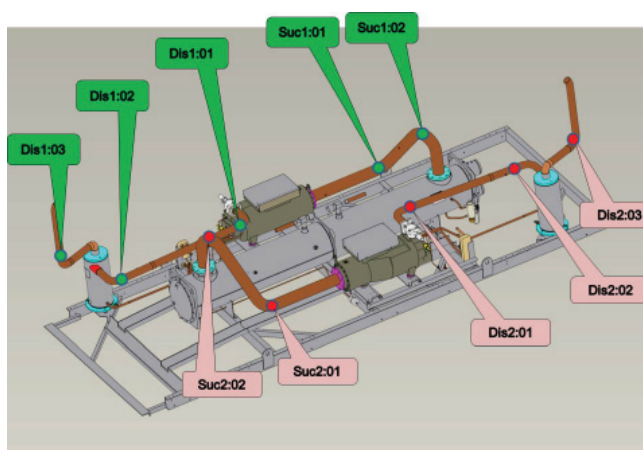




Figure 21 - RTAC 200 - points locations



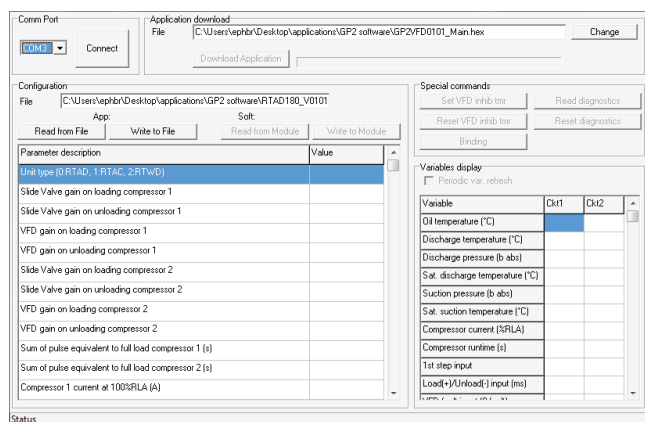
-  Accelerometer location on circuit 1
-  Accelerometer location on circuit 2

Frequency sweep

Before performing a frequency sweep it is recommended to:

- Check that the load is high (slide valve must be at full load, set point at leaving temperature not reachable).
- Check that load is constant on the system.
- Make a ramp down from 50 Hz to 30 Hz on a 10 min period.

Figure 22 - Select “Set VFD inhibit timer” in the AFD tool



From the AFD operator display:

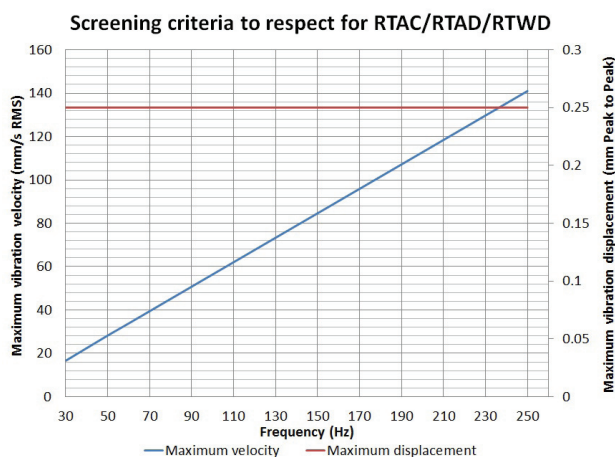
- Select ‘Hand On’ key on AFD
- Select ‘Main Menu’
- Select Parameter ‘342’ (Ramp 1 Ramp-down time) and set at 600 s for example
- Select ‘Status’
- Come back to Auto menu once trial is done.

Screening criteria

Trane developed general vibration level criteria to check piping stress level. Stress level is defined as a maximum displacement level measurement in peak to peak.

The general vibration level criteria are defined at 10 Mils Peak-to-Peak which is equivalent to 0.2 mm (peak to peak).

Figure 23 - Screening criteria for RTAC/RTAD/RTWD



If vibration levels are measured above the criteria:

- Skip the frequency range where there is high vibration level
- And/or place a line weight on the line. This action requires additional measurement:
 - Hit test on the line to make sure there is no resonance frequency a few hertz lower.
 - Operation vibration measurement to make sure vibration criterion is respected from 30 Hz to 50 Hz.

Important note: The vibration criteria are related to the risks of failure of the piping due to a resonance. They are not related to the noise. It is possible to respect criteria and have an important noise occurrence related to a piping resonance.

Vibration displacements in general are linked to low frequency mode (<250 Hz) whereas occurrences of acoustic noise resonance are linked to higher frequency mode (>250 Hz).

Skip frequency procedure

There are two methods to skip frequency (maximum 2 hz):

- Using MCT10 software
 - Select menu ‘all parameters’
 - Select sub menu ‘4-** Limits/Warning’
 - Select ‘4-6 speed bypass’
 - Bypass disturbing frequencies

It is recommended to bypass frequencies instead of speed.

- Set parameters in the AFD display
 - Select ‘Main Menu’ button
 - Select menu ‘4-** Limits/warning’
 - Select ‘4-6 speed bypass’

It is possible to set up to 4 frequency jumps in specifying the starting and ending frequency (in Hz) - parameters 461-0 to 461-3 (start from ...) and 463-0 to 462-3 (end to ...)



The AFD will bypass the speed or frequency during loading or unloading phases.


Adding a line weight

Table 13 - Line weight to be used to solve vibration or noise issues

Part number	Line diameter
MAS0008E	2"5/8
MAS0020E	3"1/8
MAS0002E	2"1/8

Typically line weight can be located as shown in figures 25 and 26.

 Durand spa / snc DURAND	ENSEMBLE LIGNE REFOULEMENT 25-02-05	RTAC 120 A 200	C 5709-2727 A6 
---	--	----------------	---



Technical drawing of the RTAC 120 A 200 pump assembly. The drawing shows a vertical pump unit with a horizontal discharge pipe. Key components are labeled as follows:

- H304**: Vertical discharge pipe.
- H303**: Coupling or elbow connecting the vertical pipe to the horizontal pipe.
- H302**: Horizontal discharge pipe.
- H309**: Coupling or elbow connecting the horizontal pipe to the pump unit.
- H308**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H319**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H305**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H306**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H316**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H340**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H714**: Coupling or elbow connecting the pump unit to the horizontal pipe.
- H315**: Coupling or elbow connecting the pump unit to the horizontal pipe.

AVEC VANNE DE REFOULEMENT

CIRCUIT B

CIRCUIT A

SANS VANNE DE REFOULEMENT

CIRCUIT B

CIRCUIT A

Chiller operation with Adaptive Frequency Drive

Adding an Adaptive Frequency Drive might change the operating parameters of the chiller. Information available in the original Maintenance guide and User guide are still valid. This document should be considered as an addendum to original unit documentation.

Table 14 - Original document references

	User guide	Maintenance guide
RTAC	SVU01B	SVX02G
RTAD	SVU02F	SVX01F
RTWD	SVU05A	SVX14F
RTWB	SVU02A	SVN01B

Chiller operating map

The chiller operating maps do not change when operating with Adaptive Frequency Drive. However it is recommended to select the appropriate kit according to the maximum ambient temperature at your location (Refer to Table 1).

Specific installation

Neutral connection

CAUTION! Units must not be linked to the neutral wiring of the installation. Units are compatible with the following neutral operating conditions.

TNS	IT	TNC	TT
OK	Special	Special	OK

- The first letter indicates the neutral connection type
T: Direct connection to Earth
I: Isolated from Earth
- The second letter indicates the mass connection
T: connection to earth
N: connection to neutral

RTAD Total Heat Recovery and hydraulic module

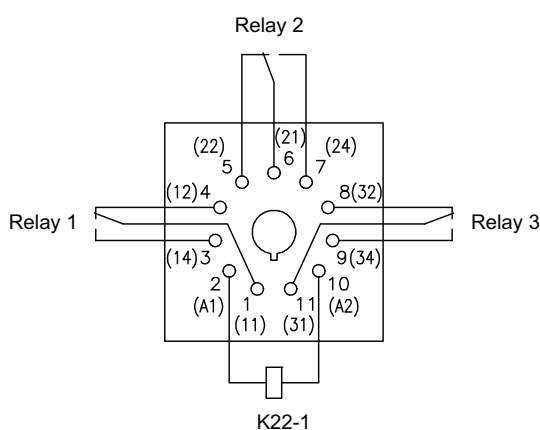
Table 15 - Additional material to be supplied by local Trane offices

Reference	Description	Part #	Qty
K22-1 & K22-2	Relay SKR 115-110V AV	RLY0129E	2
	Chassis for relay	BAS0018E	2
1 mm ² cable and accessories			

Table 16 - Connection to be made on each circuit

Coil	Terminal A1 from K22-1 connected to Terminal X2-20 (terminal block)
	Terminal A2 from K22-1 connected to Terminal X2-2 (terminal block)
Relay 1 (contact NO)	Terminal 11 from K22-1 connected to X2-1 (terminal block)
	Terminal 14 from K22-1 connected to X2-25 (terminal block)
Relay 2 (contact NO)	Terminal 21 from K22-1 connected to X2-30 (terminal block)
	Terminal 24 from K22-1 connected to module A71, J5, Terminal 1D1

Figure 26 - New relay connections



RTWD power meter

The power meter feature is disabled with AFD.

Trane - by Trane Technologies (NYSE:TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.