TRANE

Installation
Operation
Maintenance

RTAF SE/HE/XE/HSS/HSE
Air-cooled
Helical-rotary chillers
300 - 1600 kW

EcoWise™

Sintesis chillers are part of the Ingersoll Rand EcoWise™ portfolio of products that are designed to lower their environmental impact with next-generation, low global warming potential (GWP) refrigerants and high efficiency operation.

SINTESIS

RLC-SVX19C-GB
Original instructions

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Introduction

Foreword

These instructions are given as a guide to good practice in the installation, start-up, operation, and maintenance by the user, of Trane RTAF chillers, manufactured in France. A separate manual is available for the use and maintenance of the unit's control, Tracer™ UC800. They do not contain full service procedures necessary for the continued successful operation of this equipment. The services of a qualified technician should be employed through the medium of a maintenance contract with a reputable service company. Read this manual thoroughly before unit start-up.

Units are assembled, pressure tested, dehydrated, charged and tested in accordance with factory standard before shipment.

Warnings and Cautions

Warnings and Cautions appear at appropriate sections throughout this 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.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or for equipment or property-damage-only accidents.

Safety Recommendations

To avoid death, injury, equipment or property damage, the following recommendations should be observed during maintenance and service visits:

1. The maximum allowable pressures for system leak testing on low and high pressure side are given in the chapter "Installation". Insure to do not exceed test pressure by using appropriate device.

2. Disconnect the main power supply before any servicing on the unit.

3. Service work on the refrigeration system and the electrical system should be carried out only by qualified and experienced personnel.

4. To avoid any risk, it is recommended to place the unit on an area with limited access.

Reception

On arrival, inspect the unit before signing the delivery note. Specify any visible damage on the delivery note, and send a registered letter of protest to the last carrier of the goods within 7 days of delivery.

Notify the local TRANE sales office at the same time. The delivery note must be clearly signed and countersigned by the driver.

Any concealed damage shall be notified by a registered letter of protest to the last carrier of the goods within 7 days of delivery. Notify the local TRANE sales office at the same time.

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

For more information, refer to the general sales conditions of your local TRANE sales office.

Note: Unit inspection in France. Delay to send registered letter in case of visible and concealed damage is only 72 hours.

Loose Parts Inventory

Check all the accessories and loose parts that are shipped with the unit against the shipping list. Included in these items will be the water vessel drain plugs, rigging and electrical diagrams, service literature, which are placed inside the control panel and/or starter panel for shipment.
If optional elastomeric isolators are ordered with the unit (model number digit 42 =1) they are shipped mounted on the horizontal support frame of the chiller. The isolators' location and distribution weight diagram is placed with the service literature inside the starter/ control panel.

Warranty

Warranty is based on the general terms and conditions of the manufacturer. The warranty is void if the equipment is repaired or modified without the written approval of the manufacturer, 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 or recommendations is not covered by the warranty obligation. If the user does not conform to the rules of this manual, it may entail cancellation of warranty and liabilities by the manufacturer.

Unit Description

The Sintesis RTAF units are helical-rotary type, air-cooled chillers designed for outdoor installation. The refrigerant circuits are factory-piped, leak tested and dehydrated. Every unit is electrically tested for proper control operation before shipment.
Chilled water inlet and outlet openings are covered for shipment. The Sintesis RTAF features Trane's exclusive Adaptive Control™ logic, which monitors the control variables that govern the operation of the chiller unit. Adaptive control logic can adjust capacity variables to avoid chiller shutdown when necessary, and keep producing chilled water. The units feature two independent refrigerant circuits. On the HSE HSS version, 1 compressor per circuit is controlled by a dedicated variable speed Adaptive Frequency Drive. Each refrigerant circuit is provided with filter, sight glass, electronic expansion valve, and charging valves. The shell-and-tube CHIL™ (Compact-High performance-Integrated design-Low charge) evaporator is manufactured in accordance with the Pressure Equipment Directive (PED) code. Each evaporator is fully insulated and equipped with water drain and vent connection.
Units are shipped with full oil and refrigerant charge.

Unit Model Number Description

Digit 1, 2, 3, 4 – Unit model
RTAF = Air-Cooled Chiller

Digit 5 to 7 - Nominal Tonnage
090 = 90 tons
105 = 105 tons
125 = 125 tons
145 = 145 tons
155 = 155 tons
175 = 175 tons
190 = 190 tons
205 = 205 tons
245 = 245 tons
250 = 250 tons
280 = 280 tons
310 = 310 tons
350 = 350 tons
380 = 380 tons
410 = 410 tons
450 = 450 tons

Digit 8 – Unit voltage
D = 400V/50Hz/3ph

Digit 9 – Manufacturing Location
E = Europe

Digit 10, 11 – Design sequence
A0 = Factory assigned

Digit 12 - Efficiency
N = Standard Efficiency
H = High Efficiency
A = Extra Efficiency
U = High Seasonal Short (HSS)
V = High Seasonal Efficiency

Digit 13 – Agency listing
C = CE Marking

Digit 14 – Pressure vessel code
2 = PED (Pressure equipment directive)

Digit 15 – Acoustic level
X = Standard noise (SN)
L = Low noise (LN)
Q = Low Noise with Night Noise SetBack (NNSB)
E = Extra Low Noise (XLN)

Digit 16 – Operating map : airside
X = Standard ambient
L = Low ambient
H = High ambient

Digit 17 – Relief valve option
L = Single relief valve high & low Pressure side
D = Dual relief valve with 3 way valve high pressure & low pressure side

Digit 18 – Water connection
X = Grooved pipe connection
W = Grooved pipe with coupling and pipe stub

Digit 19 – Operating map water side
N = Comfort cooling (above 4.4°C)
P = Process cooling (below 4.4°C)
C = Ice Making (-7°C to 20°C)

Digit 20 – Evaporator Configurations
2 = Standard pass evaporator
T = Standard Pass Evaporator + Turbulators

Digit 21 – Thermal Insulation
N = Standard
H = High performance
X = None

Digit 22 – Condenser Coating
N = Aluminum Micro Channel
C = E-Coated Micro Channel (Free Cooling excluded)

Digit 23 - Heat Recovery
X = No Heat Recovery
P = Partial Heat Recovery
T = Total Heat Recovery

Digit 24 – Hydraulic module
X = Pump signal On/Off
1 = Dual pump standard pressure
3 = Dual pump high pressure

Digit 25 - Free Cooling
X = No Free Cooling
F = Total Free-Cooling Direct
G = Partial Free-cooling Direct
H = Total Free Cooling Glycol Free
J = Partial Free Cooling Glycol Free

Digit 26 – Disconnect switch
F = With Fuse
B = With circuit breaker

Digit 27 – Under/Over Voltage
X = None
1 = Included
2 = Included with ground fault protection

Unit Model Number Description

Digit 28 – Human Interface language
C = Spanish
D = German
E = English
F = French
H = Dutch
I = Italian
M = Swedish
P = Polish
R = Russian
T = Czech
U = Greek
V = Portuguese
2 = Romanian
6 = Hungarian
8 = Turkish

Digit 29 – Smart com protocol
X = None
B = Bacnet interface
M = Modbus interface
L = LonTalk interface

Digit 30 – Communication customer
X = None
A = External set point & capacity outputs

Digit 31 – Flow switch
X = None
F = Field installed flow switch

Digit 32 – Electrical Panel Protection
X = Enclosure with deadfront protection
1 = Enclosure with IP 20 internal protection

Digit 33 – Master Slave
X = Open for Future Use

Digit 34 – Unit User Interface
L = Standard, Local UI supplied (TD7)

Digit 35 – Energy meter
X = No energy meter
M = Energy meter installed

Digit 36 – Open for future use = X

Digit 37 – Variable Primary Flow
X = None
F = Constant Speed Pump -VFD Adjustment
P = Variable Speed Pump - Constant delta P
T = Variable Speed Pump - Constant delta T

Digit 38 – Open for future use = X

Digit 39 – Open for future use = X

Digit 40 – Power socket
X = None
P = Included (230V - 100W)

Digit 41 – Factory tests
X = No final performances test
B = Test A+Visual Inspection
E = Performance test w/o customer

Digit 42 – Installation accessory
X = None
1 = Neoprene Isolators
4 = Neoprene pads

Digit 43 – Literature language
B = Bulgarian
C = Spanish
D = German
E = English
F = French
H = Dutch
I = Italian
K = Finnish
L = Danish
M = Swedish
N = Norvegian
P = Polish
R = Russian
T = Czech
U = Greek
V = Portuguese
Z = Slovenian
2 = Romanian
3 = Serbian
4 = Slovak
5 = Croatian
6 = Hungarian
8 = Turkish

Digit 44 – Shipping package
X = Standard protection
A = Containerization package

Digit 45 – Refrigerant
1 = R134a
3 = R513A

Digit 46 – Open for future use = X

Digit 47 – Open for future use = X

Digit 48 – Design special
X = none
S = special

General Data

Table 1 – General Data RTAF 090 - 205 Standard Efficiency - Standard and low Noise

		RTAF 090 SE-SN	RTAF 105 SE-SN	RTAF 125 SE-SN	RTAF 145 SE-SN	RTAF 155 SE-SN	RTAF 175 SE-SN	RTAF 190 SE-SN	RTAF 205 SE-SN
Cooling Capacity (1)	(kW)	326	375	440	522	564	615	675	732
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	136.8	158.0	186.2	218.2	240.6	263.5	289.7	312.6
Unit rated amps (Max compr +Fan+Control)	(A)	229	267	309	358	397	434	481	518
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	276	331	442	491	554	567	638	638
Unit Power factor		0.87	0.86	0.88	0.89	0.88	0.88	0.87	0.85
Max power cable cross section	(mm^2)	1x240	1x240	1x240	2x300	2x300	2x300	2x300	2x300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	60/60	71/71	99/71	99/99	121/99	144/99	144/121	144/144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	97/97	116/116	158/116	158/158	197/158	234/158	234/197	234/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	144/144	180/180	291/180	291/291	354/291	354/291	354/354	354/354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250C
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	109
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	16.2
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	60.3
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	13.5
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	54.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	140	128	142	119	177	173	154	143
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.0	14.0	21.0	21.0	21.0	21.0
High head pressure pump option									
Available Head Pressure (1)	(kPa)	252	239	223	244	235	231	264	254
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	21.0	21.0	21.0	28.0	28.0	28.0	35.0	35.0
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Fixed speed - AC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	932	932	932	932	932	932	932	932

Table 1 – General Data RTAF 090 - 205 Standard Efficiency - Standard and low Noise (continued)

		RTAF 090 SE-SN	RTAF 105 SE-SN	RTAF 125 SE-SN	RTAF 145 SE-SN	RTAF 155 SE-SN	RTAF 175 SE-SN	RTAF 190 SE-SN	RTAF 205 SE-SN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910	910	910
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		AC	AC	AC	AC	AC	AC	AC	AC
Power per Motor	(kW)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Motor RPM	(rpm)	930	930	930	930	930	930	930	930
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	7	7	7	9	9	9	11	11
Fan quantity	#	8	8	8	10	10	10	12	12
Nominal water flow	(L/s)	16.3	18.6	21.6	26.0	28.0	30.3	33.6	36.2
Winter Pressure drop	(kPa)	173	199	229	216	236	243	236	251
Summer Pressure drop	(kPa)	78	92	106	86	94	98	120	127
Free Cooling weight (without water)	(kg)	502	502	502	648	663	694	782	779
Water content	(L)	183	183	185	231	231	262	301	301
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	4	4	4	5	5	6	6	6
Nominal water flow	(L/s)	8.2	9.3	10.7	13.0	13.9	15.1	16.7	18.1
Winter Pressure drop	(kPa)	142	161	179	159	171	178	204	215
Summer Pressure drop	(kPa)	79	93	107	87	96	99	122	129
Additional Free Cooling weight (without water)	(kg)	393	393	395	548	548	584	580	580
Water content	(L)	134	134	135	183	183	216	214	214
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	41 / 39	40 / 38	42 / 38	45 / 43	47 / 41	57 / 43	59 / 53	63 / 59
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL048E or OIL023E							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 2 – General Data RTAF 090 - 205 Standard Efficiency - Extra Low Noise

		RTAF 090 SE-XLN	RTAF 105 SE-XLN	RTAF 125 SE-XLN	RTAF 145 SE-XLN	RTAF 155 SE-XLN	RTAF 175 SE-XLN	RTAF 190 SE-XLN	RTAF 205 SE-XLN
Cooling Capacity (1)	(kW)	326	376	440	522	564	616	676	732
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	142	164	192	225	248	270	298	321
Unit rated amps (Max compr +Fan+Control)	(A)	229	267	309	358	397	434	481	518
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	276	331	442	491	554	567	638	638
Unit Power factor		0.91	0.89	0.90	0.91	0.90	0.90	0.90	0.90
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	60/60	71/71	99/71	99/99	121/99	144/99	144/121	144/144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	97/97	116/116	158/116	158/158	197/158	234/158	234/197	234/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	144/144	180/180	291/180	291/291	354/291	354/291	354/354	354/354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250C
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	109
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	16.2
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	60.3
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	13.5
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	54.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	141	130	146	124	181	178	158	148
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.0	14.0	21.0	21.0	21.0	21.0
High head pressure pump option									
Available Head Pressure (1)	(kPa)	253	242	227	247	238	235	268	259
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	21.0	21.0	21.0	28.0	28.0	28.0	35.0	35.0
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860	860

Table 2 – General Data RTAF 090 - 205 Standard Efficiency - Extra Low Noise (continued)

		RTAF 090 SE-XLN	RTAF 105 SE-XLN	RTAF 125 SE-XLN	RTAF 145 SE-XLN	RTAF 155 SE-XLN	RTAF 175 SE-XLN	RTAF 190 SE-XLN	RTAF 205 SE-XLN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860	860
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	7	7	7	9	9	9	11	11
Fan quantity	#	8	8	8	10	10	10	12	12
Nominal water flow	(L/s)	16.3	18.5	21.4	25.9	27.8	30.1	33.5	36.0
Winter Pressure drop	(kPa)	173	199	229	216	235	243	236	251
Summer Pressure drop	(kPa)	78	92	105	85	94	97	120	127
Free Cooling weight (without water)	(kg)	502	502	502	648	653	694	782	779
Water content	(L)	183	183	185	231	231	262	301	301
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	4	4	4	5	5	6	6	6
Nominal water flow	(L/s)	8.1	9.3	10.6	12.9	13.8	15.0	16.6	18.0
Winter Pressure drop	(kPa)	142.3	160.4	178.6	158.6	170.5	177.4	203.9	214.5
Summer Pressure drop	(kPa)	79.2	92.8	106.9	87.1	95.6	99.0	121.5	129.0
Additional Free Cooling weight (without water)	(kg)	393	393	395	548	548	584	580	580
Water content	(L)	134	134	135	183	183	216	214	214
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	41 / 39	40 / 38	42 / 38	45 / 43	47 / 41	57 / 43	59 / 53	63 / 59
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL048E or OIL023E							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 3 – General Data RTAF 090 - 205 High Efficiency - Standard and Low Noise

		RTAF 090 HE-SN	RTAF 105 HE-SN	RTAF 125 HE-SN	RTAF 145 HE-SN	RTAF 155 HE-SN	RTAF 175 HE-SN	RTAF 190 HE-SN	RTAF 205 HE-SN
Cooling Capacity (1)	(kW)	331	383	452	532	577	632	689	751
Unit electrical data (2) (3) (7)									
Total Power input in cooling	(kW)	140.6	161.8	190.0	222.0	244.4	267.3	293.5	316.4
Unit rated amps (Max compr +Fan+Control)	(A)	236	274	316	366	405	442	489	526
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	283	338	449	499	562	575	646	646
Unit Power factor		0.87	0.86	0.87	0.88	0.88	0.88	0.87	0.87
Max power cable cross section	(mm²)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	60/60	71/71	99/71	99/99	121/99	144/99	144/121	144/144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	97/97	116/116	158/116	158/158	197/158	234/158	234/197	234/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	144/144	180/180	291/180	291/291	354/291	354/291	354/354	354/354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250B
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	118
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	17.9
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	66.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	14.9
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	59.7
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	139	126	137	115	174	169	150	144
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.0	14.0	21.0	21.0	21.0	21.0
High head pressure pump option									
Available Head Pressure (1)	(kPa)	250	237	219	242	232	226	261	256
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	21.0	21.0	21.0	28.0	28.0	28.0	35.0	35.0
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Fixed speed - AC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	932	932	932	932	932	932	932	932

Table 3 – General Data RTAF 090 - 205 High Efficiency - Standard and Low Noise (continued)

		RTAF 090 HE-SN	RTAF 105 HE-SN	RTAF 125 HE-SN	RTAF 145 HE-SN	RTAF 155 HE-SN	RTAF 175 HE-SN	RTAF 190 HE-SN	RTAF 205 HE-SN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860	860
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		AC	AC	AC	AC	AC	AC	AC	AC
Power per Motor	(kW)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Motor RPM	(rpm)	930	930	930	930	930	930	930	930
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	9	9	9	11	11	11	13	13
Fan quantity	#	10	10	10	12	12	12	14	14
Nominal water flow	(L/s)	16.7	19.2	22.5	26.7	28.9	31.5	34.6	37.3
Winter Pressure drop	(kPa)	149	171	179	191	209	214	215	219
Summer Pressure drop	(kPa)	81	97	63	90	100	104	126	126
Free Cooling weight (without water)	(kg)	607	607	655	742	742	782	862	869
Water content	(L)	223	223	231	270	270	301	338	338
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	5	5	5	6	6	7	7	7
Nominal water flow	(L/s)	8.3	9.6	11.1	13.4	14.4	15.7	17.2	18.6
Winter Pressure drop	(kPa)	145.4	165.7	186.4	163.6	177.0	185.0	210.6	213.6
Summer Pressure drop	(kPa)	81.8	97.5	63.2	91.2	101.1	105.5	127.3	127.3
Additional Free Cooling weight (without water)	(kg)	397	397	435	540	544	580	577	577
Water content	(L)	136.7	136.7	140.4	180.8	180.8	214.4	218.1	218.1
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	43 / 41	42 / 40	45 / 41	48 / 46	50 / 44	60 / 46	62 / 56	66 / 62
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL048E or OIL023E							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 4 – General Data RTAF 090 - 205 Extra Efficiency - Standard and Low Noise

		RTAF 090 XE-SN	RTAF 105 XE-SN	RTAF 125 XE-SN	RTAF 145 XE-SN	RTAF 155 XE-SN	RTAF 175 XE-SN	RTAF 190 XE-SN	RTAF 205 XE-SN
Cooling Capacity (1)	(kW)	326	380	447	526	569	633	690	752
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	147.6	168.8	197.0	230.4	252.8	275.7	303.3	326.2
Unit rated amps (Max compr +Fan+Control)	(A)	236.4	274.4	316.4	366.2	405.2	442.2	489.0	526.0
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	283	338	449	499	562	575	646	646
Unit Power factor		0.91	0.89	0.90	0.91	0.90	0.90	0.90	0.90
Max power cable cross section	(mm²)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	60/60	71/71	99/71	99/99	121/99	144/99	144/121	144/144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	97/97	116/116	158/116	158/158	197/158	234/158	234/197	234/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	144/144	180/180	291/180	291/291	354/291	354/291	354/354	354/354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250B
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	118
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	17.9
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	66.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	14.9
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	59.7
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	141	128	142	121	179	172	153	149
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.4	14.4	20.8	20.8	20.8	20.8
High head pressure pump option									
Available Head Pressure (1)	(kPa)	253	239	224	245	237	230	264	260
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	710	810	810	810	810	910	910	910

Table 4 – General Data RTAF 090 - 205 Extra Efficiency - Standard and Low Noise (continued)

		RTAF 090 XE-SN	RTAF 105 XE-SN	RTAF 125 XE-SN	RTAF 145 XE-SN	RTAF 155 XE-SN	RTAF 175 XE-SN	RTAF 190 XE-SN	RTAF 205 XE-SN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	710	810	810	810	810	910	910	910
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		EC	EC	EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Motor RPM	(rpm)	910	910	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	9	9	9	11	11	11	13	13
Fan quantity	#	10	10	10	12	12	12	14	14
Nominal water flow	(L/s)	16.1	18.8	21.9	26.1	28.1	31.3	34.4	37.1
Winter Pressure drop	(kPa)	143	168	175	187	203	213	214	219
Summer Pressure drop	(kPa)	78	94	60	87	96	104	126	126
Free Cooling weight (without water)	(kg)	607	607	655	742	742	782	862	869
Water content	(L)	223	223	231	270	270	301	338	338
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	5	5	5	6	6	7	7	7
Nominal water flow	(L/s)	8.1	9.4	10.8	13.1	13.9	15.6	17.1	18.6
Winter Pressure drop	(kPa)	141	163	182	160	173	185	210	214
Summer Pressure drop	(kPa)	79	95	61	89	98	105	127	127
Additional Free Cooling weight (without water)	(kg)	397	397	435	540	544	580	577	577
Water content	(L)	136.7	136.7	140.4	180.8	180.8	214.4	218.1	218.1
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	43 / 41	42 / 40	45 / 41	48 / 46	50 / 44	60 / 46	62 / 56	66 / 62
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL048E or OIL023E							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 5 – General Data RTAF 090 - 205 Extra Efficiency - Extra Low Noise

		RTAF 090 XE-XLN	RTAF 105 XE-XLN	RTAF 125 XE-XLN	RTAF 145 XE-XLN	RTAF 155 XE-XLN	RTAF 175 XE-XLN	RTAF 190 XE-XLN	RTAF 205 XE-XLN
Cooling Capacity (1)	(kW)	326	380	447	526	569	633	689	752
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	147.6	168.8	197.0	230.4	252.8	275.7	303.3	326.2
Unit rated amps (Max compr +Fan+Control)	(A)	236	274	316	366	405	442	489	526
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	283	338	449	499	562	575	646	646
Unit Power factor		0.91	0.89	0.90	0.91	0.90	0.90	0.90	0.90
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	60/60	71/71	99/71	99/99	121/99	144/99	144/121	144/144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	97/97	116/116	158/116	158/158	197/158	234/158	234/197	234/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	144/144	180/180	291/180	291/291	354/291	354/291	354/354	354/354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250B
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	118
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	17.9
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	66.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	14.9
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	59.7
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	142	128	143	122	179	172	153	149
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.4	14.4	20.8	20.8	20.8	20.8
High head pressure pump option									
Available Head Pressure (1)	(kPa)	253	240	224	245	237	230	264	260
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	660	760	760	760	760	860	860	860

Table 5 – General Data RTAF 090 - 205 Extra Efficiency - Extra Low Noise (continued)

		RTAF 090 XE-XLN	RTAF 105 XE-XLN	RTAF 125 XE-XLN	RTAF 145 XE-XLN	RTAF 155 XE-XLN	RTAF 175 XE-XLN	RTAF 190 XE-XLN	RTAF 205 XE-XLN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	660	760	760	760	760	860	860	860
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	4 - 100	5 - 125	5-125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	9	9	9	11	11	11	13	13
Fan quantity	#	10	10	10	12	12	12	14	14
Nominal water flow	(L/s)	16.1	18.8	21.8	26.1	28.1	31.3	34.4	37.1
Winter Pressure drop	(kPa)	143	168	174	186	203	213	214	219
Summer Pressure drop	(kPa)	77	94	60	87	96	104	126	126
Free Cooling weight (without water)	(kg)	607	607	655	742	742	782	862	869
Water content	(L)	223	223	231	270	270	301	338	338
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	5	5	5	6	6	7	7	7
Nominal water flow	(L/s)	8.0	9.4	10.8	13.0	13.9	15.6	17.1	18.6
Winter Pressure drop	(kPa)	141	163	182	160	172	185	210	214
Summer Pressure drop	(kPa)	79	95	61	88	97	105	127	127
Additional Free Cooling weight (without water)	(kg)	397	397	435	540	544	580	577	577
Water content	(L)	137	137	140	181	181	214	218	218
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	43 / 41	42 / 40	45 / 41	48 / 46	50 / 44	60 / 46	62 / 56	66 / 62
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL048E or OIL023E							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 6 – General Data RTAF 090 - 205 High Seasonal Efficiency - Standard and Low Noise

		RTAF 090 HSE-SN	RTAF 105 HSE-SN	RTAF 125 HSE-SN	RTAF 145 HSE-SN	RTAF 155 HSE-SN	RTAF 175 HSE-SN	RTAF 190 HSE-SN	RTAF 205 HSE-SN	RTAF 245 HSE-SN
Cooling Capacity (1)	(kW)	330	383	452	534	576	638	695	755	875
Unit electrical data (2) (3) (7)										
Maximum Power input in cooling	(kW)	150.0	171.6	200.4	234.4	257.3	280.6	308.7	332.0	351.6
Unit rated amps (Max compr +Fan+Control)	(A)	229	262	305	357	392	427	470	505	535
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	229	262	305	357	392	427	470	505	535
Unit Power factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800	800
Compressor										
Quantity	#	2	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100	120/120
Max Compr Power input Circuit 1/Circuit 2	kW	61/61	72/72	101/72	101/101	124/101	147/101	147/124	147/147	157/157
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224	238/238
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224	238/238
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator										
Quantity	#	1	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger								
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250B	250B
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	118	118
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040	2040
Two pass evaporator										
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	17.9	17.9
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	66.5	66.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator										
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	14.9	14.9
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	59.7	59.7
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150	6" - 150
Hydraulic Module Components										
Standard head pressure pump option										
Available Head Pressure (1)	(kPa)	141	128	142	121	179	172	153	149	149
Max Motor Power input	(kW)	4.9	5.1	6.5	6.9	9.3	9.6	9.8	10.0	10.0
Max Amps	(A)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0	11.0
High head pressure pump option		**11**	**11**	**14**	**14**	**21**	**21**	**21**	**21**	**21**
Available Head Pressure (1)	(kPa)	253	239	224	245	237	230	264	260	260
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840	840
Condenser										
Type		Full aluminum Micro channel heat exchanger								
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7	7/7
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan										
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7	7/7
Diameter	(mm)	800	800	800	800	800	800	800	800	800
Standard / High ambient fan option										
Fan / motor Type		Propeller fan / Variable speed - EC motor								
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	710	810	810	810	810	910	910	910	910

Table 6 – General Data RTAF 090 - 205 High Seasonal Efficiency - Standard and Low Noise (continued)

		RTAF 090 HSE-SN	RTAF 105 HSE-SN	RTAF 125 HSE-SN	RTAF 145 HSE-SN	RTAF 155 HSE-SN	RTAF 175 HSE-SN	RTAF 190 HSE-SN	RTAF 205 HSE-SN	RTAF 245 HSE-SN
Low ambient fan option										
Fan / motor Type		Propeller fan / Variable speed - EC motor								
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	710	810	810	810	810	910	910	910	910
Partial Heat recovery (PHR) option										
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger								
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3	12.3
Free cooling option										
Heat-Exchanger Type		Aluminum heat exchanger								
Fan type		EC	EC	EC	EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Motor RPM	(rpm)	910	910	910	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150	6 - 150
Total Free Cooling Option										
Coils quantity	#	9	9	9	11	11	11	13	13	13
Fan quantity	#	10	10	10	12	12	12	14	14	14
Nominal water flow	(L/s)	16.8	19.5	23.0	27.4	29.5	32.7	35.7	38.6	45.0
Winter Pressure drop	(kPa)	146	170	177	191	207	216	217	221	276
Summer Pressure drop	(kPa)	80	96	62	90	98	106	128	127	174
Free Cooling weight (without water)	(kg)	607	607	655	742	742	782	862	869	869
Water content	(L)	223	223	231	270	270	301	338	338	338
Partial Free Cooling Option										
Coils quantity	#	4	4	4	6	6	6	6	6	6
Fan quantity	#	5	5	5	6	6	7	7	7	7
Nominal water flow	(L/s)	8.4	9.8	11.5	13.7	14.8	16.3	17.8	19.3	22.5
Winter Pressure drop	(kPa)	144	165	185	163	175	187	213	215	268
Summer Pressure drop	(kPa)	81	97	62	91	100	107	129	129	176
Additional Free Cooling weight (without water)	(kg)	397	397	435	540	544	580	577	577	577
Water content	(L)	136.7	136.7	140.4	180.8	180.8	214.4	218.1	218.1	218.1
System data (7)										
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30	30
Standard unit										
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	43 / 41	42 / 40	45 / 41	48 / 46	50 / 44	60 / 46	62 / 56	66 / 62	66 / 62
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8	8 / 8
POE Oil type		OIL00317 or OIL00311								

(1) Indicative performance at Evaporator water temperature : 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 7 – General Data RTAF 090 - 205 High Seasonal Efficiency - Extra Low Noise

		RTAF 090 HSE-XLN	RTAF 105 HSE-XLN	RTAF 125 HSE-XLN	RTAF 145 HSE-XLN	RTAF 155 HSE-XLN	RTAF 175 HSE-XLN	RTAF 190 HSE-XLN	RTAF 205 HSE-XLN	RTAF 245 HSE-XLN
Cooling Capacity (1)	(kW)	330	383	451	533	575	638	694	755	875
Unit electrical data (2) (3) (7)										
Maximum Power input in cooling	(kW)	150	172	200	234	257	281	309	332	352
Unit rated amps (Max compr +Fan+Control)	(A)	229	262	305	357	392	427	470	505	535
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	229	262	305	357	392	427	470	505	535
Unit Power factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800	800
Compressor										
Quantity	#	2	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100	120/120
Max Compr Power input Circuit 1/Circuit 2	kW	61/61	72/72	101/72	101/101	124/101	147/101	147/124	147/147	157/157
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224	238/238
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224	238/238
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator										
Quantity	#	1	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger								
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250B	250B
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	118	118
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040	2040
Two pass evaporator										
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	17.9	17.9
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	66.5	66.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator										
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	14.9	14.9
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	59.7	59.7
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150	6" - 150
Hydraulic Module Components										
Standard head pressure pump option										
Available Head Pressure (1)	(kPa)	142	128	143	122	179	172	153	149	149
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.4	14.4	20.8	20.8	20.8	20.8	20.8
High head pressure pump option										
Available Head Pressure (1)	(kPa)	253	240	224	245	237	230	264	260	260
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840	840
Condenser										
Type		Full aluminum Micro channel heat exchanger								
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7	7/7
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan										
Quantity	#	5/5	5/5	5/5	6/6	6/6	7/5	7/7	7/7	7/7
Diameter	(mm)	800	800	800	800	800	800	800	800	800
Standard / High ambient fan option										
Fan / motor Type		Propeller fan / Variable speed - EC motor								
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	660	760	760	760	760	860	860	860	860

Table 7 – General Data RTAF 090 - 205 High Seasonal Efficiency - Extra Low Noise (continued)

		RTAF 090 HSE-XLN	RTAF 105 HSE-XLN	RTAF 125 HSE-XLN	RTAF 145 HSE-XLN	RTAF 155 HSE-XLN	RTAF 175 HSE-XLN	RTAF 190 HSE-XLN	RTAF 205 HSE-XLN	RTAF 245 HSE-XLN
Low ambient fan option										
Fan / motor Type		Propeller fan / Variable speed - EC motor								
Airflow per Fan	(m3/h)	15000	17400	17400	17400	17400	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	660	760	760	760	760	860	860	860	860
Partial Heat recovery (PHR) option										
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger								
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3	12.3
Free cooling option										
Heat-Exchanger Type		Aluminum heat exchanger								
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150	6 - 150
Total Free Cooling Option										
Coils quantity	#	9	9	9	11	11	11	13	13	13
Fan quantity	#	10	10	10	12	12	12	14	14	14
Nominal water flow	(L/s)	16.8	19.5	22.9	27.3	29.5	32.7	35.7	38.6	45.0
Winter Pressure drop	(kPa)	146	170	177	190	206	216	217	221	276
Summer Pressure drop	(kPa)	79	96	61	89	98	106	128	127	174
Free Cooling weight (without water)	(kg)	607	607	655	742	742	782	862	869	869
Water content	(L)	223	223	231	270	270	301	338	338	338
Partial Free Cooling Option										
Coils quantity	#	4	4	4	6	6	6	6	6	6
Fan quantity	#	5	5	5	6	6	7	7	7	7
Nominal water flow	(L/s)	8.4	9.8	11.5	13.7	14.8	16.3	17.8	19.3	22.5
Winter Pressure drop	(kPa)	143	165	185	163	175	187	213	215	268
Summer Pressure drop	(kPa)	81	97	62	91	100	107	129	129	176
Additional Free Cooling weight (without water)	(kg)	397	397	435	540	544	580	577	577	577
Water content	(L)	136.7	136.7	140.4	180.8	180.8	214.4	218.1	218.1	218.1
System data (7)										
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30	30
Standard unit										
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	43 / 41	42 / 40	45 / 41	48 / 46	50 / 44	60 / 46	62 / 56	66 / 62	66 / 62
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8	8 / 8
POE Oil type		OIL00317 or OIL00311								

(1) Indicative performance at Evaporator water temperature : 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 8 – General Data RTAF 090 - 205 High Seasonal Efficiency short - Standard and Low Noise

		RTAF 090 HSS-SN	RTAF 105 HSS-SN	RTAF 125 HSS-SN	RTAF 145 HSS-SN	RTAF 155 HSS-SN	RTAF 175 HSS-SN	RTAF 190 HSS-SN	RTAF 205 HSS-SN
Cooling Capacity (1)	(kW)	330	378	445	529	571	621	681	736
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	144.8	166.4	195.2	229.2	252.1	275.4	303.5	326.8
Unit rated amps (Max compr +Fan+Control)	(A)	221	254	298	349	384	419	462	497
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	221	254	298	349	384	419	462	497
Unit Power factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	61/61	72/72	101/72	101/101	124/101	147/101	147/124	147/147
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250C
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	109
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	16.2
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	60.3
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	13.5
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	54.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	141	128	142	121	179	172	153	148
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.4	14.4	20.8	20.8	20.8	20.8
High head pressure pump option									
Available Head Pressure (1)	(kPa)	253	239	224	245	237	230	264	259
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910	910	910

Table 8 – General Data RTAF 090 - 205 High Seasonal Efficiency short - Standard and Low Noise (continued)

		RTAF 090 HSS-SN	RTAF 105 HSS-SN	RTAF 125 HSS-SN	RTAF 145 HSS-SN	RTAF 155 HSS-SN	RTAF 175 HSS-SN	RTAF 190 HSS-SN	RTAF 205 HSS-SN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910	910	910
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		EC	EC	EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Motor RPM	(rpm)	910	910	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	7	7	7	9	9	9	11	11
Fan quantity	#	8	8	8	10	10	10	12	12
Nominal water flow	(L/s)	16.8	19.3	22.6	27.1	29.3	31.8	35.0	37.7
Winter Pressure drop	(kPa)	176	201	232	220	239	245	238	252
Summer Pressure drop	(kPa)	80	93	108	88	96	99	122	128
Free Cooling weight (without water)	(kg)	502	502	502	648	653	694	782	779
Water content	(L)	183	183	185	231	231	262	301	301
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	4	4	4	5	5	6	6	6
Nominal water flow	(L/s)	8.4	9.6	11.3	13.6	14.6	15.9	17.5	18.9
Winter Pressure drop	(kPa)	145	162	181	162	173	180	206	216
Summer Pressure drop	(kPa)	81	94	109	90	98	101	123	130
Additional Free Cooling weight (without water)	(kg)	393	393	395	548	548	584	580	580
Water content	(L)	134.2	134.2	135.1	182.6	182.6	216.3	214.4	214.4
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	41 / 39	40 / 38	42 / 38	45 / 43	47 / 41	57 / 43	59 / 53	63 / 59
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL00317 or OIL00311							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 9 – General Data RTAF 090 - 205 High Seasonal Efficiency short - Extra Low Noise

		RTAF 090 HSS-XLN	RTAF 105 HSS-XLN	RTAF 125 HSS-XLN	RTAF 145 HSS-XLN	RTAF 155 HSS-XLN	RTAF 175 HSS-XLN	RTAF 190 HSS-XLN	RTAF 205 HSS-XLN
Cooling Capacity (1)	(kW)	330	378	445	529	570	621	681	735
Unit electrical data (2) (3) (7)									
Maximum Power input in cooling	(kW)	145	166	195	229	252	275	303	327
Unit rated amps (Max compr +Fan+Control)	(A)	221	254	298	349	384	419	462	497
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	221	254	298	349	384	419	462	497
Unit Power factor		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Max power cable cross section	(mm^2)	240	240	240	2*300	2*300	2*300	2*300	2*300
Disconnect switch size	(A)	400	400	500	630	630	630	800	800
Compressor									
Quantity	#	2	2	2	2	2	2	2	2
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		45/45	50/50	70/50	70/70	85/70	100/70	100/85	100/100
Max Compr Power input Circuit 1/Circuit 2	kW	61/61	72/72	101/72	101/101	124/101	147/101	147/124	147/147
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	93/93	110/110	153/110	153/153	188/153	224/153	224/188	224/224
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	150/150	150/150	150/150	150/150	150/150	150/150	150/150	150/150
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger							
Evaporator model		115B	115A	165B	165B	165A	200B	200B	250C
Evaporator Water Content volume	(l)	51	58	74	74	78	99	99	109
Antifreeze Heater	(W)	1640	1640	1640	1640	1640	2040	2040	2040
Two pass evaporator									
Evap. Water Flow rate - Minimum	(l/s)	8.0	9.4	11.6	11.6	12.4	14.2	14.2	16.2
Evap. Water Flow rate - Maximum	(l/s)	29.6	34.7	43.1	43.1	46.0	52.6	52.6	60.3
Nominal water connection size (Grooved coupling)	(in) - (DN)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Two pass with turbulator evaporator									
Evap. Water Flow rate - Minimum (8)	(l/s)	6.6	7.8	9.7	9.7	10.3	11.8	11.8	13.5
Evap. Water Flow rate - Maximum	(l/s)	26.6	31.2	38.7	38.7	41.3	47.2	47.2	54.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	4" - 100	4" - 100	5" - 125	5" - 125	5" - 125	6" - 150	6" - 150	6" - 150
Hydraulic Module Components									
Standard head pressure pump option									
Available Head Pressure (1)	(kPa)	142	128	143	122	179	172	153	148
Max Motor Power input	(kW)	5.5	5.5	7.5	7.5	11.0	11.0	11.0	11.0
Max Amps	(A)	11.0	11.0	14.4	14.4	20.8	20.8	20.8	20.8
High head pressure pump option									
Available Head Pressure (1)	(kPa)	253	240	224	245	237	230	264	259
Max Motor Power input	(kW)	11.0	11.0	11.0	15.0	15.0	15.0	18.5	18.5
Max Amps	(A)	20.8	20.8	20.8	28.0	28.0	28.0	34.5	34.5
Expansion Tank Volume	(l)	80	80	80	80	80	80	80	80
Max User water loop Volume for factory mounted expansion tank (1)	(l)	6000	6000	6000	6000	6000	6000	6000	6000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	840	840	840	840	840	840	840	840
Condenser									
Type		Full aluminum Micro channel heat exchanger							
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan									
Quantity	#	4/4	4/4	4/4	5/5	5/5	6/4	6/6	6/6
Diameter	(mm)	800	800	800	800	800	800	800	800
Standard / High ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860	860

Table 9 – General Data RTAF 090 - 205 High Seasonal Efficiency short - Extra Low Noise (continued)

		RTAF 090 HSS-XLN	RTAF 105 HSS-XLN	RTAF 125 HSS-XLN	RTAF 145 HSS-XLN	RTAF 155 HSS-XLN	RTAF 175 HSS-XLN	RTAF 190 HSS-XLN	RTAF 205 HSS-XLN
Low ambient fan option									
Fan / motor Type		Propeller fan / Variable speed - EC motor							
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860	860
Partial Heat recovery (PHR) option									
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger							
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	9.7	9.7	9.7	9.7	12.3	12.3	12.3	12.3
Free cooling option									
Heat-Exchanger Type		Aluminum heat exchanger							
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Output water connection size (Grooved coupling)	(in) - (DN)	4 - 100	4 - 100	5 - 125	5 - 125	5 - 125	6 - 150	6 - 150	6 - 150
Total Free Cooling Option									
Coils quantity	#	7	7	7	9	9	9	11	11
Fan quantity	#	8	8	8	10	10	10	12	12
Nominal water flow	(L/s)	16.8	19.3	22.6	27.1	29.3	31.8	35.0	37.7
Winter Pressure drop	(kPa)	176	201	232	220	239	245	238	252
Summer Pressure drop	(kPa)	80	93	108	88	96	99	122	128
Free Cooling weight (without water)	(kg)	502	502	502	648	653	694	782	779
Water content	(L)	183	183	185	231	231	262	301	301
Partial Free Cooling Option									
Coils quantity	#	4	4	4	6	6	6	6	6
Fan quantity	#	4	4	4	5	5	6	6	6
Nominal water flow	(L/s)	8.4	9.6	11.3	13.6	14.6	15.9	17.5	18.9
Winter Pressure drop	(kPa)	145	162	181	162	173	180	206	216
Summer Pressure drop	(kPa)	81	94	109	90	98	101	123	130
Additional Free Cooling weight (without water)	(kg)	393	393	395	548	548	584	580	580
Water content	(L)	134.2	134.2	135.1	182.6	182.6	216.3	214.4	214.4
System data (7)									
Nb of refrigerant circuit	#	2	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	30	30	30	30	30	30	30	30
Standard unit									
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	41 / 39	40 / 38	42 / 38	45 / 43	47 / 41	57 / 43	59 / 53	63 / 59
Oil charge Circuit 1 / Circuit 2 (10)	(l)	6 / 6	6 / 6	6 / 6	6 / 6	7 / 6	7 / 6	7 / 7	8 / 8
POE Oil type		OIL00317 or OIL00311							

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 10 – General Data RTAF 250 - 410 Standard Efficiency - Standard and low Noise

		RTAF 250 SE-SN	RTAF 280 SE-SN	RTAF 310 SE-SN	RTAF 350 SE-SN	RTAF 380 SE-SN	RTAF 410 SE-SN
Cooling Capacity (1)	(kW)	859	972	1074	1194	1322	1446
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	369	419	464	525	570	620
Unit rated amps (Max compr +Fan+Control)	(A)	610	694	768	869	943	1025
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	767	851	888	1026	1100	1145
Unit Power factor		0.88	0.88	0.88	0.88	0.88	0.88
Max power cable cross section	(mm²)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	121-121/99	121-144/121	144-144/144	121-121/ 121-121	121-144/ 121-144	144-144/ 144-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	197-197/158	197-234/197	234-234/234	197-197/ 197-197	197-234/ 197-234	234-234/ 234-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	354-354/291	354-354/354	354-354/354	354-354/ 354-354	354-354/ 354-354	354-354/ 354-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	167	118	95	146	134	120
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	223	229	193	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Diameter	(mm)	800	800	800	800	800	800

Table 10 – General Data RTAF 250 - 410 Standard Efficiency - Standard and low Noise (continued)

		RTAF 250 SE-SN	RTAF 280 SE-SN	RTAF 310 SE-SN	RTAF 350 SE-SN	RTAF 380 SE-SN	RTAF 410 SE-SN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Fixed speed - AC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	1.9	1.9	1.9	1.9	1.9	1.9
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	932	932	932	932	932	932
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		AC	AC	AC	AC	AC	AC
Power per Motor	(kW)	1.8	1.8	1.8	1.8	1.8	1.8
Motor RPM	(rpm)	930	930	930	930	930	930
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	14	16	16	18	20	22
Fan quantity	#	14	16	16	18	20	22
Nominal water flow	(L/s)	43.9	49.7	54.9	61.1	67.6	73.9
Winter Pressure drop	(kPa)	238	245	270	242	247	251
Summer Pressure drop	(kPa)	96	111	122	100	113	127
Free Cooling weight (without water)	(kg)	1090	1239	1373	1425	1522	1629
Water content	(L)	602	663	663	765	829	892
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	10	10	10	10	10	12
Nominal water flow	(L/s)	22.0	24.9	27.4	30.5	33.8	37.0
Winter Pressure drop	(kPa)	194	218	196	217	240	226
Summer Pressure drop	(kPa)	97	111	123	103	115	130
Additional Free Cooling weight (without water)	(kg)	786	807	1084	993	1049	1086
Water content	(L)	413	416	479	518	532	578
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	15	15	15	15	15	15
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	108/47	111/55	113/56	110/103	114/113	125/118
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL048E or OIL023E					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 11 – General Data RTAF 250 - 410 standard efficiency Extra Low Noise

		RTAF 250 SE-XLN	RTAF 280 SE-XLN	RTAF 310 SE-XLN	RTAF 350 SE-XLN	RTAF 380 SE-XLN	RTAF 410 SE-XLN
Cooling Capacity (1)	(kW)	860	973	1075	1195	1324	1447
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	369	419	464	525	570	620
Unit rated amps (Max compr +Fan+Control)	(A)	610	694	768	869	943	1025
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	767	851	888	1026	1100	1145
Unit Power factor		0.90	0.90	0.90	0.90	0.90	0.90
Max power cable cross section	(mm²)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	121-121/99	121-144/121	144-144/144	121-121/ 121-121	121-144/ 121-144	144-144/ 144-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	197-197/158	197-234/197	234-234/234	197-197/ 197-197	197-234/ 197-234	234-234/ 234-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	354-354/291	354-354/354	354-354/354	354-354/ 354-354	354-354/ 354-354	354-354/ 354-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	'300/150	'300/150	'300/300	'300/300	'300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	167	118	95	146	134	120
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	223	229	193	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Diameter	(mm)	800	800	800	800	800	800

Table 11 – General Data RTAF 250 - 410 standard efficiency Extra Low Noise (continued)

		RTAF 250 SE-XLN	RTAF 280 SE-XLN	RTAF 310 SE-XLN	RTAF 350 SE-XLN	RTAF 380 SE-XLN	RTAF 410 SE-XLN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	14	16	16	18	20	22
Fan quantity	#	14	16	16	18	20	22
Nominal water flow	(L/s)	44.0	49.8	54.9	61.1	67.7	74.0
Winter Pressure drop	(kPa)	237	245	270	242	247	251
Summer Pressure drop	(kPa)	96	110	121	100	113	127
Free Cooling weight (without water)	(kg)	1090	1239	1373	1425	1522	1629
Water content	(L)	602	663	663	765	829	892
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	10	10	10	10	10	12
Nominal water flow	(L/s)	22.0	24.9	27.5	30.6	33.8	37.0
Winter Pressure drop	(kPa)	194	218	196	217	240	226
Summer Pressure drop	(kPa)	97	111	123	103	115	130
Additional Free Cooling weight (without water)	(kg)	786	807	1084	993	1049	1086
Water content	(L)	413	416	479	518	532	578
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	15	15	15	15	15	15
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	108/47	111/55	113/56	110/103	114/113	125/118
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL048E or OIL023E					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 12 – General Data RTAF 250 - 410 High Efficiency - Standard and Low Noise

		RTAF 250 HE-SN- LN	RTAF 280 HE-SN- LN	RTAF 310 HE-SN- LN	RTAF 350 HE-SN- LN	RTAF 380 HE-SN- LN	RTAF 410 HE-SN- LN
Cooling Capacity (1)	(kW)	875	992	1113	1238	1362	1469
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	373	422	468	528	578	624
Unit rated amps (Max compr +Fan+Control)	(A)	618	702	776	877	959	1033
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	776	860	897	1035	1117	1154
Unit Power factor		0.88	0.87	0.88	0.87	0.87	0.88
Max power cable cross section	(mm²)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	121-121/99	121-144/121	144-144/144	121-121/ 121-121	121-144/ 121-144	144-144/ 144-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	197-197/158	197-234/197	234-234/234	197-197/ 197-197	197-234/ 197-234	234-234/ 234-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	354-354/291	354-354/354	354-354/354	354-354/ 354-354	354-354/ 354-354	354-354/ 354-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	160	106	115	139	127	116
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	216	220	174	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Diameter	(mm)	800	800	800	800	800	800

Table 12 – General Data RTAF 250 - 410 High Efficiency - Standard and Low Noise (continued)

		RTAF 250 HE-SN- LN	RTAF 280 HE-SN- LN	RTAF 310 HE-SN- LN	RTAF 350 HE-SN- LN	RTAF 380 HE-SN- LN	RTAF 410 HE-SN- LN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Fixed speed - AC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	1.9	1.9	1.9	1.9	1.9	1.9
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	932	932	932	932	932	932
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		AC	AC	AC	AC	AC	AC
Power per Motor	(kW)	1.8	1.8	1.8	1.8	1.8	1.8
Motor RPM	(rpm)	930	930	930	930	930	930
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	16	18	20	22	24	24
Fan quantity	#	16	18	20	22	24	24
Nominal water flow	(L/s)	44.8	50.8	57.0	63.3	69.7	75.1
Winter Pressure drop	(kPa)	221	232	244	218	224	240
Summer Pressure drop	(kPa)	101	116	133	109	122	132
Free Cooling weight (without water)	(kg)	1239	1350	1596	1627	1757	1760
Water content	(L)	663	726	787	892	956	956
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	12	12	14	12	12	12
Nominal water flow	(L/s)	22.4	25.4	28.5	31.7	34.8	37.6
Winter Pressure drop	(kPa)	200	225	208	229	251	231
Summer Pressure drop	(kPa)	102	117	134	111	123	134
Additional Free Cooling weight (without water)	(kg)	807	804	1081	993	1049	1112
Water content	(L)	416	413	476	518	532	582
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	15	15	15	15	15	15
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	113/47	116/55	122/56	114/107	118/117	125/122
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL048E or OIL023E					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 13 – General Data RTAF 250 - 410 Extra Efficiency - Standard and Low Noise

		RTAF 250 XE-SN -LN	RTAF 280 XE-SN -LN	RTAF 310 XE-SN -LN	RTAF 350 XE-SN -LN	RTAF 380 XE-SN -LN	RTAF 410 XE-SN -LN
Cooling Capacity (1)	(kW)	876	993	1114	1238	1364	1471
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	384.5	435.0	480.8	543.8	594.8	640.6
Unit rated amps (Max compr +Fan+Control)	(A)	617.8	701.6	775.6	877.2	959.0	1033.0
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	775.8	859.6	896.6	1035.2	1117.0	1154.0
Unit Power factor		0.90	0.90	0.90	0.90	0.90	0.90
Max power cable cross section	(mm^2)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	121-121/99	121-144/121	144-144/144	121-121/ 121-121	121-144/ 121-144	144-144/ 144-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	197-197/158	197-234/197	234-234/234	197-197/ 197-197	197-234/ 197-234	234-234/ 234-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	354-354/291	354-354/354	354-354/354	354-354/ 354-354	354-354/ 354-354	354-354/ 354-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	'300/150	'300/150	'300/300	'300/300	'300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	160	106	115	139	127	116
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	216	220	174	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Diameter	(mm)	800	800	800	800	800	800

Table 13 – General Data RTAF 250 - 410 Extra Efficiency - Standard and Low Noise (continued)

		RTAF 250 XE-SN -LN	RTAF 280 XE-SN -LN	RTAF 310 XE-SN -LN	RTAF 350 XE-SN -LN	RTAF 380 XE-SN -LN	RTAF 410 XE-SN -LN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.4	1.4	1.4	1.4	1.4	1.4
Motor RPM	(rpm)	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	14	16	16	18	20	22
Fan quantity	#	14	16	16	18	20	22
Nominal water flow	(L/s)	44.8	50.8	57.0	63.3	69.8	75.2
Winter Pressure drop	(kPa)	221	232	244	217	224	240
Summer Pressure drop	(kPa)	100	116	133	109	122	132
Free Cooling weight (without water)	(kg)	1239	1350	1596	1627	1757	1760
Water content	(L)	663	726	787	892	956	956
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	12	12	14	12	12	12
Nominal water flow	(L/s)	22.4	25.4	28.5	31.7	34.9	37.6
Winter Pressure drop	(kPa)	200	225	208	229	251	231
Summer Pressure drop	(kPa)	101	117	134	111	123	134
Additional Free Cooling weight (without water)	(kg)	807	804	1081	993	1049	1112
Water content	(L)	416	413	476	518	532	582
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	15	15	15	15	15	15
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	113/47	116/55	122/56	114/107	118/117	125/122
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL048E or OIL023E					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 14 – General Data RTAF 250 - 410 Extra Efficiency - Extra Low Noise

		RTAF 250 XE-XLN	RTAF 280 XE-XLN	RTAF 310 XE-XLN	RTAF 350 XE-XLN	RTAF 380 XE-XLN	RTAF 410 XE-XLN
Cooling Capacity (1)	(kW)	876	993	1114	1237	1363	1470
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	384	435	481	544	595	641
Unit rated amps (Max compr +Fan+Control)	(A)	618	702	776	877	959	1033
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	776	860	897	1035	1117	1154
Unit Power factor		0.90	0.90	0.90	0.90	0.90	0.90
Max power cable cross section	(mm²)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	121-121/99	121-144/121	144-144/144	121-121/ 121-121	121-144/ 121-144	144-144/ 144-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	197-197/158	197-234/197	234-234/234	197-197/ 197-197	197-234/ 197-234	234-234/ 234-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	354-354/291	354-354/354	354-354/354	354-354/ 354-354	354-354/ 354-354	354-354/ 354-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	160	106	115	139	127	116
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	216	220	174	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Face area per coil	(m²)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12
Diameter	(mm)	800	800	800	800	800	800

Table 14 – General Data RTAF 250 - 410 Extra Efficiency - Extra Low Noise (continued)

		RTAF 250 XE-XLN	RTAF 280 XE-XLN	RTAF 310 XE-XLN	RTAF 350 XE-XLN	RTAF 380 XE-XLN	RTAF 410 XE-XLN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Fixed speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	16	18	20	22	24	24
Fan quantity	#	16	18	20	22	24	24
Nominal water flow	(L/s)	44.8	50.8	57.0	63.3	69.8	75.2
Winter Pressure drop	(kPa)	221	232	244	217	224	240
Summer Pressure drop	(kPa)	100	116	133	109	122	132
Free Cooling weight (without water)	(kg)	1239	1350	1596	1627	1757	1760
Water content	(L)	663	726	787	892	956	956
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	12	12	14	12	12	12
Nominal water flow	(L/s)	22.4	25.4	28.5	31.7	34.9	37.6
Winter Pressure drop	(kPa)	200	225	208	229	251	231
Summer Pressure drop	(kPa)	101	117	134	111	123	134
Additional Free Cooling weight (without water)	(kg)	807	804	1081	993	1049	1112
Water content	(L)	416	413	476	518	532	582
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	15	15	15	15	15	15
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	113/47	116/55	122/56	114/107	118/117	125/122
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL048E or OIL023E					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 15 – General Data RTAF 250 - 410 High Seasonal Efficiency Short - Standard and Low Noise

		RTAF 250 HSS-SN-LN	RTAF 280 HSS-SN-LN	RTAF 310 HSS-SN-LN	RTAF 350 HSS-SN-LN	RTAF 380 HSS-SN-LN	RTAF 410 HSS-SN-LN
Cooling Capacity (1)	(kW)	866	979	1077	1200	1330	1450
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	383.8	434.7	481.4	543.5	589.3	641.2
Unit rated amps (Max compr +Fan+Control)	(A)	596.4	675.9	746.9	851.5	925.5	1004.3
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	754.4	796.9	867.9	1009.5	1046.5	1125.3
Unit Power factor		0.93	0.93	0.93	0.92	0.92	0.92
Max power cable cross section	(mm^2)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	124-121/101	124-144/124	147-144/147	124-121/ 124-121	124-144/ 121-144	147-144/ 147-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-197/153	188-234/188	224-234/224	188-197/ 188-197	188-234/ 188-234	224-234/ 224-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-354/153	188-354/188	224-354/224	188-354/ 188-354	188-354/ 188-354	224-354/ 224-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	167	118	95	146	134	120
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	223	229	193	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Diameter	(mm)	800	800	800	800	800	800

Table 15 – General Data RTAF 250 - 410 High Seasonal Efficiency Short - Standard and Low Noise (continued)

		RTAF 250 HSS-SN-LN	RTAF 280 HSS-SN-LN	RTAF 310 HSS-SN-LN	RTAF 350 HSS-SN-LN	RTAF 380 HSS-SN-LN	RTAF 410 HSS-SN-LN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.4	1.4	1.4	1.4	1.4	1.4
Motor RPM	(rpm)	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	14	16	16	18	20	22
Fan quantity	#	14	16	16	18	20	22
Nominal water flow	(L/s)	44.3	50.1	55.1	61.4	68.0	74.2
Winter Pressure drop	(kPa)	240	247	271	243	248	252
Summer Pressure drop	(kPa)	97	111	122	100	114	128
Free Cooling weight (without water)	(kg)	1090	1239	1373	1425	1522	1629
Water content	(L)	602	663	663	765	829	892
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	10	10	10	10	10	12
Nominal water flow	(L/s)	22.2	25.0	27.5	30.7	34.0	37.1
Winter Pressure drop	(kPa)	196	219	196	218	241	227
Summer Pressure drop	(kPa)	98	112	123	103	116	130
Additional Free Cooling weight (without water)	(kg)	786	807	1084	993	1049	1086
Water content	(L)	413	416	479	518	532	578
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	10	10	10	10	10	10
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	108/47	111/55	113/56	110/103	114/113	125/118
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL00317 or OIL00311					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 16 – General Data RTAF 250 - 410 High Seasonal Efficiency Short - Extra Low Noise

		RTAF 250 HSS-XLN	RTAF 280 HSS-XLN	RTAF 310 HSS-XLN	RTAF 350 HSS-XLN	RTAF 380 HSS-XLN	RTAF 410 HSS-XLN
Cooling Capacity (1)	(kW)	866	979	1076	1199	1329	1450
Unit electrical data (2) (3) (7)							
Maximum Power input in cooling	(kW)	383.8	434.7	481.4	543.5	589.3	641.2
Unit rated amps (Max compr +Fan+Control)	(A)	596.4	675.9	746.9	851.5	925.5	1004.3
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	754.4	796.9	867.9	1009.5	1046.5	1125.3
Unit Power factor		0.93	0.93	0.93	0.92	0.92	0.92
Max power cable cross section	(mm^2)	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250
Compressor							
Quantity	#	3	3	3	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100
Max Compr Power input Circuit 1/Circuit 2	kW	124-121/101	124-144/124	147-144/147	124-121/ 124-121	124-144/ 121-144	147-144/ 147-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-197/153	188-234/188	224-234/224	188-197/ 188-197	188-234/ 188-234	224-234/ 224-234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-354/153	188-354/188	224-354/224	188-354/ 188-354	188-354/ 188-354	224-354/ 224-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		Flooded shell and tube heat exchanger					
Evaporator model		300D	300B	300A	500D	500C	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440
One pass evaporator							
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator							
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200
Hydraulic Module Components							
Standard head pressure pump option							
Available Head Pressure (1)	(kPa)	167	118	95	146	134	120
Max Motor Power input	(kW)	15	15	15	22	22	22
Max Amps	(A)	28	28	28	39.7	39.7	39.7
High head pressure pump option							
Available Head Pressure (1)	(kPa)	223	229	193	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060
Condenser							
Type		Full aluminum Micro channel heat exchanger					
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan							
Quantity	#	10/4	10/6	10/6	10/8	10/10	12/10
Diameter	(mm)	800	800	800	800	800	800

Table 16 – General Data RTAF 250 - 410 High Seasonal Efficiency Short - Extra Low Noise (continued)

		RTAF 250 HSS-XLN	RTAF 280 HSS-XLN	RTAF 310 HSS-XLN	RTAF 350 HSS-XLN	RTAF 380 HSS-XLN	RTAF 410 HSS-XLN
Standard / High ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Low ambient fan option							
Fan / motor Type		Propeller fan / Variable speed - EC motor					
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860
Partial Heat recovery (PHR) option							
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger					
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8
Free cooling option							
Heat-Exchanger Type		Aluminum heat exchanger					
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200
Total Free Cooling Option							
Coils quantity	#	14	16	16	18	20	22
Fan quantity	#	14	16	16	18	20	22
Nominal water flow	(L/s)	44.3	50.1	55.0	61.4	68.0	74.1
Winter Pressure drop	(kPa)	240	247	270	243	248	252
Summer Pressure drop	(kPa)	97	111	122	100	114	128
Free Cooling weight (without water)	(kg)	1090	1239	1373	1425	1522	1629
Water content	(L)	602	663	663	765	829	892
Partial Free Cooling Option							
Coils quantity	#	8	8	10	10	10	12
Fan quantity	#	10	10	10	10	10	12
Nominal water flow	(L/s)	22.1	25.0	27.5	30.7	34.0	37.1
Winter Pressure drop	(kPa)	196	219	196	218	241	227
Summer Pressure drop	(kPa)	98	112	123	103	116	130
Additional Free Cooling weight (without water)	(kg)	786	807	1084	993	1049	1086
Water content	(L)	413	416	479	518	532	578
System data (7)							
Nb of refrigerant circuit	#	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	10	10	10	10	10	10
Standard unit							
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	108/47	111/55	113/56	110/103	114/113	125/118
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16
POE Oil type		OIL00317 or OIL00311					

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 17 – General Data RTAF 250 - 450 High Seasonal Efficiency - Standard Noise and Low Noise

		RTAF 250 HSE-SN -LN	RTAF 280 HSE-SN -LN	RTAF 310 HSE-SN -LN	RTAF 350 HSE-SN -LN	RTAF 380 HSE-SN -LN	RTAF 410 HSE-SN -LN	RTAF 450 HSE-SN -LN
Cooling Capacity (1)	(kW)	882	999	1118	1243	1369	1473	1586
Unit electrical data (2) (3) (7)								
Maximum Power input in cooling	(kW)	389.0	439.9	486.6	548.7	599.7	646.4	666.0
Unit rated amps (Max compr +Fan+Control)	(A)	604.2	683.7	754.7	859.3	941.1	1012.1	1041.9
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	762.2	804.7	875.7	1017.3	1062.1	1133.1	1162.9
Unit Power factor		0.93	0.93	0.93	0.92	0.92	0.92	0.92
Max power cable cross section	(mm^2)	4*300	4*300	4*300	4*300	4*300	4*300	4*300
Disconnect switch size	(A)	1250	1250	1250	1250	1250	1250	1600
Compressor								
Quantity	#	3	3	3	4	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100	120-100/ 120-100
Max Compr Power input Circuit 1/Circuit 2	kW	124-121/101	124-144/124	147-144/147	124-121/ 124-121	124-144/ 121-144	147-144/ 147-144	157-144/ 157-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-197/153	188-234/188	224-234/224	188-197/ 188-197	188-234/ 188-234	224-234/ 224-234	238-234/ 238/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-354/153	188-354/188	224-354/224	188-354/ 188-354	188-354/ 188-354	224-354/ 224-354	238-354/ 238-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300	300/300
Evaporator								
Quantity	#	1	1	1	1	1	1	
Type		Flooded shell and tube heat exchanger						
Evaporator model		300D	300B	300A	500D	500C	500B	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440	2440
One pass evaporator								
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator								
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200	8" - 200
Hydraulic Module Components								
Standard head pressure pump option								
Available Head Pressure (1)	(kPa)	160	106	115	139	127	116	100
Max Motor Power input	(kW)	15	15	15	22	22	22	30.0
Max Amps	(A)	28	28	28	39.7	39.7	39.7	54.1
High head pressure pump option								
Available Head Pressure (1)	(kPa)	216	220	174	N/A	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060	1060
Condenser								
Type		Full aluminum Micro channel heat exchanger						
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12	12/12
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan								
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12	12/12
Diameter	(mm)	800	800	800	800	800	800	800

Table 17 – General Data RTAF 250 - 450 High Seasonal Efficiency - Standard Noise and Low Noise (continued)

		RTAF 250 HSE-SN -LN	RTAF 280 HSE-SN -LN	RTAF 310 HSE-SN -LN	RTAF 350 HSE-SN -LN	RTAF 380 HSE-SN -LN	RTAF 410 HSE-SN -LN	RTAF 450 HSE-SN -LN
Standard / High ambient fan option								
Fan / motor Type		Propeller fan / Variable speed - EC motor						
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910	910
Low ambient fan option								
Fan / motor Type		Propeller fan / Variable speed - EC motor						
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	910	910	910	910	910	910	910
Partial Heat recovery (PHR) option								
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger						
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8	31.8
Free cooling option								
Heat-Exchanger Type		Aluminum heat exchanger						
Fan type		EC	EC	EC	EC	EC	EC	EC
Power per Motor	(kW)	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Motor RPM	(rpm)	910	910	910	910	910	910	910
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200	8-200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200	8-200
Total Free Cooling Option								
Coils quantity	#	16	18	20	22	24	24	24
Fan quantity	#	16	18	20	22	24	24	24
Nominal water flow	(L/s)	45.1	51.1	57.2	63.6	70.1	75.4	81.4
Winter Pressure drop	(kPa)	223	234	245	219	225	241	269
Summer Pressure drop	(kPa)	102	117	134	110	123	133	155
Free Cooling weight (without water)	(kg)	1239	1350	1596	1627	1757	1760	1760
Water content	(L)	663	726	787	892	956	956	956
Partial Free Cooling Option								
Coils quantity	#	8	8	10	10	10	12	12
Fan quantity	#	12	12	14	12	12	12	12
Nominal water flow	(L/s)	22.6	25.6	28.6	31.8	35.0	37.7	40.7
Winter Pressure drop	(kPa)	202	227	210	230	253	232	259
Summer Pressure drop	(kPa)	103	118	135	112	124	135	157
Additional Free Cooling weight (without water)	(kg)	807	804	1081	993	1049	1112	1112
Water content	(L)	416	413	476	518	532	582	582
System data (7)								
Nb of refrigerant circuit	#	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	10	10	10	10	10	10	10
Standard unit								
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	113/47	116/55	122/56	114/107	118/117	125/122	125/122
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16	16/16
POE Oil type		OIL00317 or OIL00311						

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

General Data

Table 18 – General Data RTAF 250 - 450 High Seasonal Efficiency - Extra Low Noise

		RTAF 250 HSE-XLN	RTAF 280 HSE-XLN	RTAF 310 HSE-XLN	RTAF 350 HSE-XLN	RTAF 380 HSE-XLN	RTAF 410 HSE-XLN	RTAF 450 HSE-XLN
Cooling Capacity (1)	(kW)	882	999	1117	1243	1369	1472	1585
Unit electrical data (2) (3) (7)								
Maximum Power input in cooling	(kW)	389.0	439.9	486.6	548.7	599.7	646.4	666.0
Unit rated amps (Max compr +Fan+Control)	(A)	604.2	683.7	754.7	859.3	941.1	1012.1	1041.9
Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)	(A)	762.2	804.7	875.7	1017.3	1062.1	1133.1	1162.9
Unit Power factor		0.93	0.93	0.93	0.92	0.92	0.92	0.92
Max power cable cross section	(mm^2)							
Disconnect switch size	(A)							
Compressor								
Quantity	#	3	3	3	4	4	4	4
Type		Screw	Screw	Screw	Screw	Screw	Screw	Screw
Model (11)		85-85/70	85-100/85	100-100/100	85-85/85-85	85-100/ 85-100	100-100/ 100-100	120-100/ 120-100
Max Compr Power input Circuit 1/Circuit 2	kW	124-121/101	124-144/124	147-144/147	124-121/ 124-121	124-144/ 121-144	147-144/ 147-144	157-144/ 157-144
Max Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-197/153	188-234/188	224-234/224	188-197/ 188-197	188-234/ 188-234	224-234/ 224-234	238-234/ 238/234
Start up Amps Circuit1 / Circuit 2 (3) (7)	(A)	188-354/153	188-354/188	224-354/224	188-354/ 188-354	188-354/ 188-354	224-354/ 224-354	238-354/ 238-354
Motor RPM	(rpm)	3000	3000	3000	3000	3000	3000	3000
Oil sump heater Circuit1 / Circuit 2	(W)	300/150	300/150	300/150	300/300	300/300	300/300	300/300
Evaporator								
Quantity	#	1	1	1	1	1	1	
Type		Flooded shell and tube heat exchanger						
Evaporator model		300D	300B	300A	500D	500C	500B	500B
Evaporator Water Content volume	(l)	97	108	120	146	159	170	170
Antifreeze Heater	(W)	2240	2240	2240	2440	2440	2440	2440
One pass evaporator								
Evap. Water Flow rate - Minimum	(l/s)	17.7	20.1	22.8	25.0	27.8	30.3	30.3
Evap. Water Flow rate - Maximum	(l/s)	65.8	74.5	84.8	92.8	103.0	112.5	112.5
Nominal water connection size (Grooved coupling)	(in) - (DN)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200	8" - 200
One pass with turbulator evaporator								
Evap. Water Flow rate - Minimum (8)	(l/s)	14.8	16.7	19.0	20.8	23.1	25.3	25.3
Evap. Water Flow rate - Maximum	(l/s)	59.1	66.9	76.1	83.4	92.5	101.1	101.1
Nominal water connection size (Grooved coupling)	(in) - (mm)	6" - 150	6" - 150	6" - 150	8" - 200	8" - 200	8" - 200	8" - 200
Hydraulic Module Components								
Standard head pressure pump option								
Available Head Pressure (1)	(kPa)	160	106	115	139	127	116	100
Max Motor Power input	(kW)	15	15	15	22	22	22	30.0
Max Amps	(A)	28	28	28	39.7	39.7	39.7	54.1
High head pressure pump option								
Available Head Pressure (1)	(kPa)	216	220	174	N/A	N/A	N/A	N/A
Max Motor Power input	(kW)	18.5	22	22	N/A	N/A	N/A	N/A
Max Amps	(A)	34.5	39.7	39.7	N/A	N/A	N/A	N/A
Expansion Tank Volume	(l)	80	160	160	160	160	160	160
Max User water loop Volume for factory mounted expansion tank (1)	(l)	4000	8000	8000	8000	8000	8000	8000
Max. Water-side Operating Pressure without pump package	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with pump package	(kPa)	450	450	450	450	450	450	450
Antifreeze Heater with pump package	(W)	1060	1060	1060	1060	1060	1060	1060
Condenser								
Type		Full aluminum Micro channel heat exchanger						
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12	12/12
Face area per coil	(m^2)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Condenser Fan								
Quantity	#	12/4	12/6	14/6	12/10	12/12	12/12	12/12
Diameter	(mm)	800	800	800	800	800	800	800

Table 18 – General Data RTAF 250 - 450 High Seasonal Efficiency - Extra Low Noise (continued)

		RTAF 250 HSE-XLN	RTAF 280 HSE-XLN	RTAF 310 HSE-XLN	RTAF 350 HSE-XLN	RTAF 380 HSE-XLN	RTAF 410 HSE-XLN	RTAF 450 HSE-XLN
Standard / High ambient fan option								
Fan / motor Type		Propeller fan / Variable speed - EC motor						
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860
Low ambient fan option								
Fan / motor Type		Propeller fan / Variable speed - EC motor						
Airflow per Fan	(m3/h)	20000	20000	20000	20000	20000	20000	20000
Max Power input per Motor	(kW)	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Max Amps per Motor	(A)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Rated motor RPM	(rpm)	860	860	860	860	860	860	860
Partial Heat recovery (PHR) option								
Heat-Exchanger Type		Stainless steel Copper Brazed plate Heat exchanger						
Nominal water connection size (Grooved coupling)	(in) - (DN)	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50	2" - DN50
Water content volume	(l)	28.7	28.7	28.7	31.8	31.8	31.8	31.8
Free cooling option								
Heat-Exchanger Type		Aluminum heat exchanger						
Fan type		ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN	ECXLN
Power per Motor	(kW)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Motor RPM	(rpm)	860	860	860	860	860	860	860
Input water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200	8-200
Output water connection size (Grooved coupling)	(in) - (DN)	6 - 150	6 - 150	6 - 150	8 - 200	8 - 200	8 - 200	8-200
Total Free Cooling Option								
Coils quantity	#	16	18	20	22	24	24	24
Fan quantity	#	16	18	20	22	24	24	24
Nominal water flow	(L/s)	45.1	51.1	57.2	63.6	70.0	75.4	81.3
Winter Pressure drop	(kPa)	223	234	245	219	225	241	269
Summer Pressure drop	(kPa)	102	117	134	110	123	133	155
Free Cooling weight (without water)	(kg)	1239	1350	1596	1627	1757	1760	1760
Water content	(L)	663	726	787	892	956	956	956
Partial Free Cooling Option								
Coils quantity	#	8	8	10	10	10	12	12
Fan quantity	#	12	12	14	12	12	12	12
Nominal water flow	(L/s)	22.6	25.6	28.6	31.8	35.0	37.7	40.7
Winter Pressure drop	(kPa)	202	227	209	230	253	232	259
Summer Pressure drop	(kPa)	103	118	135	112	124	135	157
Additional Free Cooling weight (without water)	(kg)	807	804	1081	993	1049	1112	1112
Water content	(L)	416	413	476	518	532	582	582
System data (7)								
Nb of refrigerant circuit	#	2	2	2	2	2	2	2
Minimum cooling load % (4) (9)	%	10	10	10	10	10	10	10
Standard unit								
R134a/R513A refrigerant charge Circuit1 / Circuit 2 (7)	(kg)	113/47	116/55	122/56	114/107	118/117	125/122	125/122
Oil charge Circuit 1 / Circuit 2 (10)	(l)	16/8	16/8	16/8	16/16	16/16	16/16	16/16
POE Oil type		OIL00317 or OIL00311						

(1) Indicative performance at Evaporator water temperature: 12°C / 7°C - Condenser air temperature 35°C - for detailed performances consult Order Write Up.
(2) Under 400V/3/50Hz.
(3) Rated Condition without Pump Package.
(4) Percent minimum load may be adjusted according to operating conditions by local sales office.
(5) Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.
(6) Maximum ambient operation is for unit at 12°C / 7°C.
(7) Electrical & system data are indicative and subject to change without notice. Please refer to unit nameplate data.
(8) Not applicable for Glycol application - see tables with Minimum Flow with Glycol.
(9) Max speed - range is 60% to 100% of max speed.
(10) Refrigerant charge may vary according to option - for instance +20% for process (digit 19=P). For real value refer to unit nameplate
(11) Data containing information on two circuits shown as follows: ckt1/ckt2

Operating Map

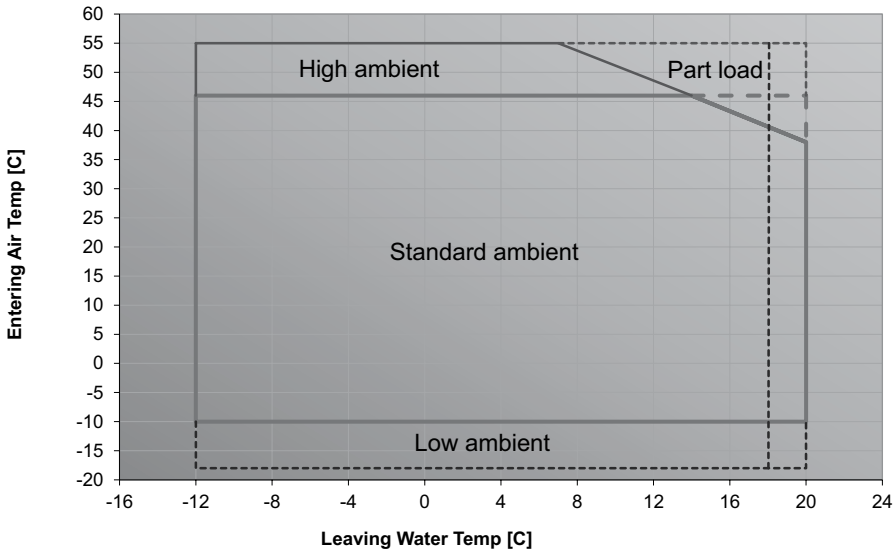
RTAF Operating Map

To check unit configuration versus ambient, refer to operating map figure below: Standard ambient, High ambient or Low ambient.

– Standard ambient units:
  -10°C ≤ Air temperature ≤ 46°C
– Low ambient units:
  -20°C ≤ Air temperature ≤ 46°C
– High ambient units:
  -10°C ≤ Air temperature ≤ 55°C

Note: It is not possible to have a unit operating low and high ambient. For specific application with wide ambient contact Trane sales office.

Figure 1 – RTAF Operating Map



Note: for RTAF 250 to 450 with a single pass evaporator Leaving Water Temperature cannot exceed 18.3°C.

Installation Requirements

Installation Responsibilities

Generally contractor must do the following items when installing an RTAF unit:

1. Install the unit on a flat foundation strong enough to support unit loading and level (within 5 mm across the length and width of the unit).
2. Install the units as per instructions contained in this manual.
3. Where specified, provide and install valves in the water piping upstream and downstream of the evaporator water connections, to isolate the evaporator for maintenance, and to balance and trim the system.
4. Furnish and install a water flow prove device and/or auxiliary contacts to prove chiller water flow.
5. Furnish and install water pressure gauges in the inlet and outlet of the evaporator water box.
6. Supply and install an air vent cock to the top of the evaporator water box.
7. Furnish and install strainers ahead of all pumps and automatic modulating valves.
8. Provide and install field wiring according to schematics provided in the control panel.
9. Install heat tape and insulate the chilled water lines and any other portion of the system, as required, to prevent sweating under normal operating conditions or freezing during low ambient temperature conditions.
10. Ensure that the compressor and oil separator heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.
11. Start the unit under supervision of a qualified service technician.

Nameplates

The RTAF outdoor unit nameplates are applied to the exterior of the control panel. A compressor nameplate is located on each compressor.

Outdoor Unit Nameplate

The outdoor unit nameplate provides the following information:

- Unit model and size description
- Unit serial number
- Identifies unit electrical requirements
- Lists correct operating charges of R-134a and refrigerant oil
- Lists unit test pressures

Compressor Nameplate

The compressor nameplate provides following information:

- Compressor model number.
- Compressor serial number.
- Compressor electrical characteristics.
- Utilization range
- Recommended refrigerant

Storage

Extended storage of the unit prior to the installation requires the following precautions:

1. Store the unit in a secured area, to avoid intentional damages.
2. Close the suction, discharge and liquid-line isolation valves.
3. At least every three months, connect a gauge and manually check the pressure in the refrigerant circuit. If the refrigerant pressure is below 13 Bar at 20°C (or 10 Bar at 10°C), call a qualified service organization and the appropriate Trane sales office.

Note: if the unit is stored before servicing near a construction site it is highly recommended to protect micro channel coils from any concrete and iron element. Failure to do so may considerably reduce reliablity of the unit.

Lifting and Moving Instructions

A specific lifting method is recommended, which can be described as follow:

1. Lifting points are built into the unit, see lifting instruction label on the unit.
2. Slings and spreader bar must be provided by crane operator and attached on the lifting points.
3. Use the 4 or 8 rigging points (according to unit size) which are built into the unit.
4. The minimum lifting capacity of each sling as well as the spreader bar must be higher than the tabulated unit shipping weight.
5. CAUTION! Lift and handle with care. Avoid shocks while handling.

Installation Requirements

Figure 2a – Lifting RTAF 090 – 205

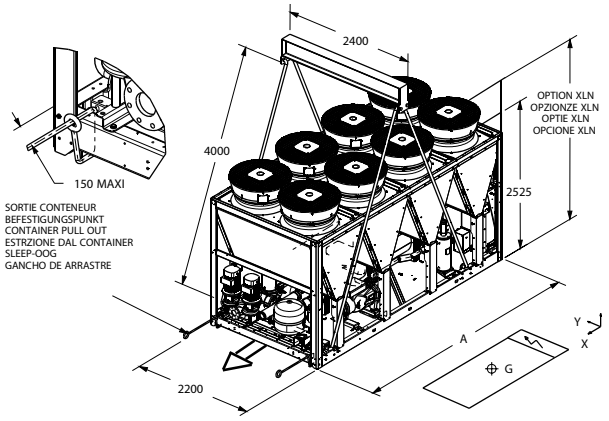
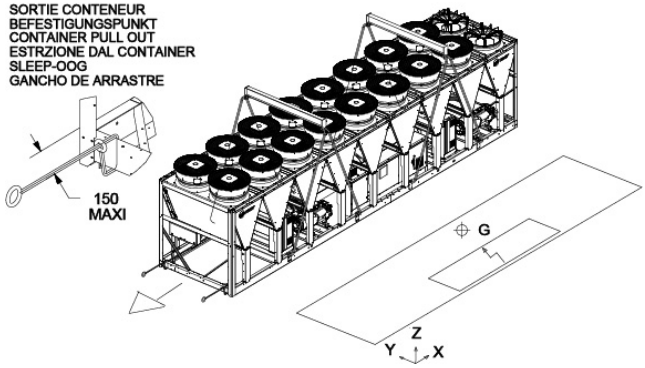


Figure 2b – Lifting RTAF 250 – 450



Dimension and Weights

See lifting weight on the submittal on the unit for complete information.

Center of Gravity

See instructions on lifting drawings available on request.

WARNING! Heavy Objects!
Ensure that all the lifting equipment used is properly rated for weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of unit. Lifting cables (chains or slings) may not be the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury.

WARNING! Improper Unit Lift!
Test lift unit approximately 10 cm to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property- only damage.

Clearances

When installing the unit, provide enough space around the unit to allow the installation and maintenance personnel unrestricted access to all service points.
Unobstructed flow of condenser air is essential to maintain chiller capacity and operating efficiency. When determining unit placement, give careful consideration to ensuring a sufficient air flow across the condenser coils heat-transfer surface.
In case of enclosure around the unit, the height of the enclosure must not be higher than the unit itself. If the enclosure is higher than the unit, restrictive airflow louvers should be fitted to ensure fresh air supply.

Unit Isolation and Leveling

Provide a foundation with sufficient strength and mass to support the unit operating weight (that is, including completed piping, full operating charges of refrigerant and oil, and water). Refer to unit operating weights. The unit must be leveled within 5 mm over its length and width. Use shims as necessary to level the unit. For additional reduction of sound and vibration, install the optional elastomeric isolators.

Sound consideration

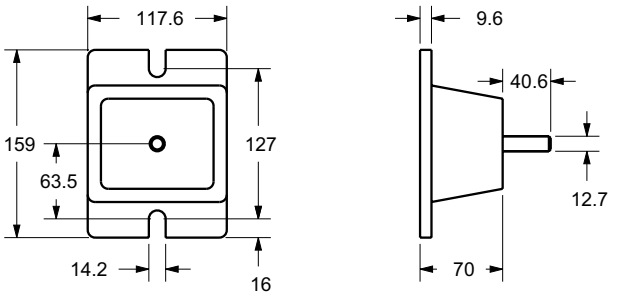
The most effective form of acoustical isolation is to locate the unit away from any sound sensitive area. Structurally transmitted sound can be reduced by elastomeric vibration eliminators. Spring isolators are not recommended. Consult an acoustical engineer in critical sound applications.
For maximum isolation effect, isolate water lines and electrical conduit. Rubber isolated piping hangers can be used to reduce the sound transmitted through water piping. To reduce sound transmitted through electrical conduit, use flexible electrical conduit.
EU and Local Regulations codes on sound emissions should always be considered. Since the environment in which a sound source is located affects the sound pressure, unit placement must be carefully evaluated.

Elastomeric Isolators Installation (Optional)

Isolators are ready to install. Mountings have to be placed on a rigid and level foundation. External equipment should not transmit additional vibration to the chiller. The position of elastomeric isolator and weight per point are given in the Neoprene isolators installation drawing which is supplied with the chiller. Wrong placement along the unit may result in excessive deflection.

1. Secure the isolators to the mounting surface using the mounting slots in the isolator's base plate. Do NOT fully tighten the isolators mounting bolts at this time. See the isolators submittals for isolators location, maximum weights, and isolators diagrams.
2. Align the mounting holes in the base of the unit with the threaded positioning pins on the top of the isolators.
3. Install the unit on the isolators and secure the isolators to the unit with a nut. The maximum isolators deflection should be 13 mm.
4. Level the unit carefully. Fully tighten the isolator mounting bolts.

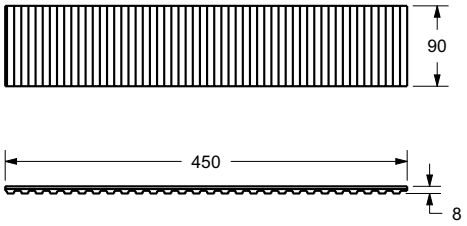
Figure 3 – Elastomeric Isolator



Isolator Pads Installation (Optional)

Isolators are ready to install. Mountings have to be placed on a rigid and level foundation. External equipment should not transmit additional vibration to the chiller. The position of pads isolator is given in the pad isolators installation or selection drawing which is supplied with the chiller.

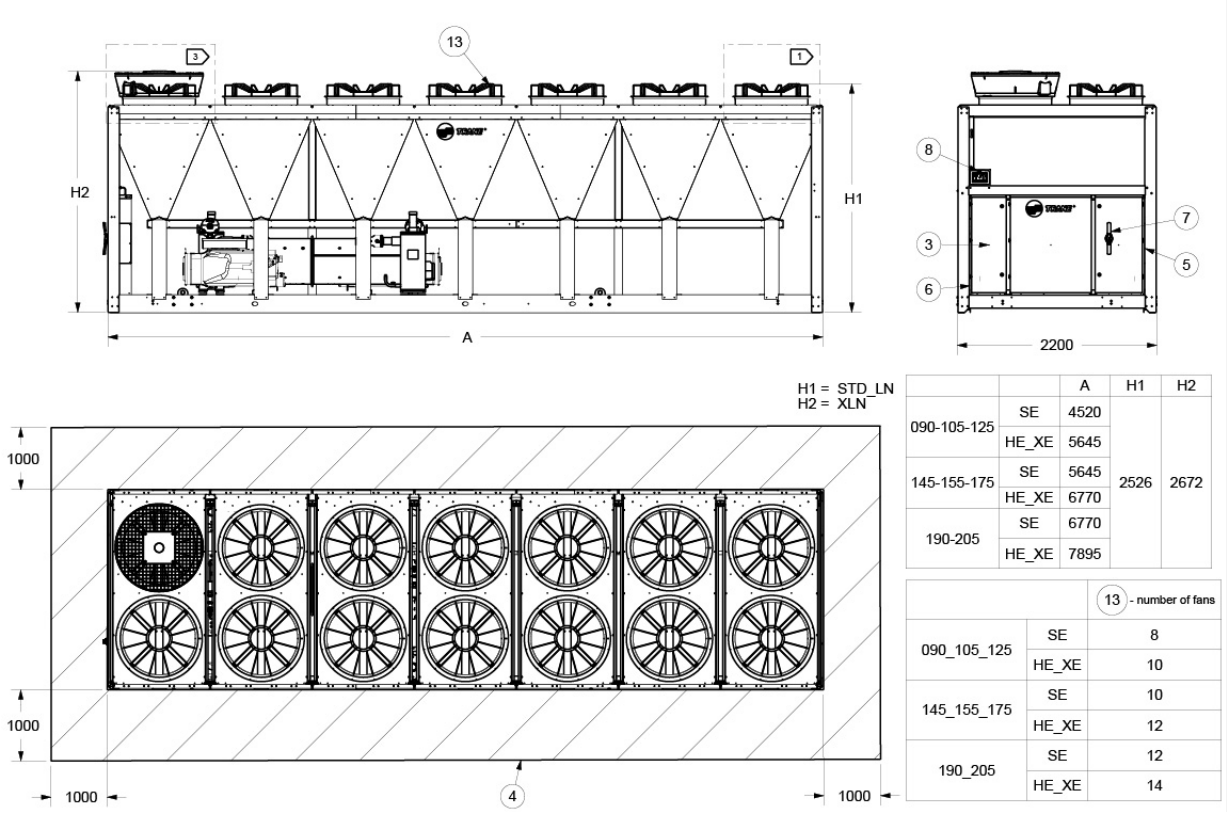
Figure 4 – Isolator pads



Dimensional Data

For dimensions details, dimensions of hydraulic connections, electrical connections isolator positioning and specific features for heat recovery and free cooling are included in submitalls and diagrams.
All Submitals and diagrams are supplied with every order.
If the installation includes several units or if units are close to walls, contact your local Trane Sales Office for additional requirements.

Figure 5 – Units RTAF 090 to 205 SE HE XE



		A	H1	H2
090-105-125	SE	4520	2526	2672
	HE_XE	5645		
145-155-175	SE	5645		
	HE_XE	6770		
190-205	SE	6770		
	HE_XE	7895		

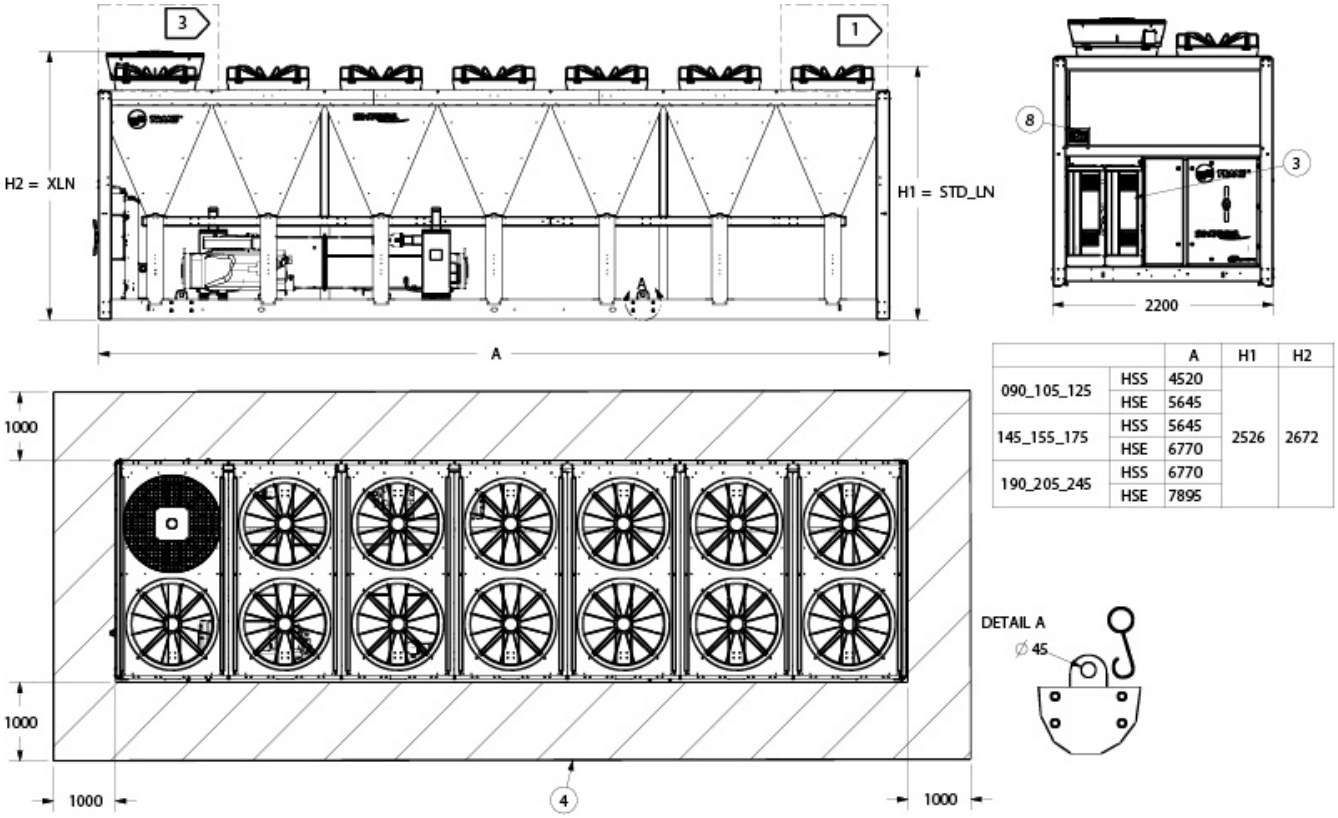
		13 - number of fans
090_105_125	SE	8
	HE_XE	10
145_155_175	SE	10
	HE_XE	12
190_205	SE	12
	HE_XE	14

Operating weight (kg)									
		090	105	125	145	155	175	190	205
SN LN unit	SE	3295	3330	3510	3970	4240	4400	4820	4845
	HE_XE	3595	3630	3810	4220	4485	4640	5075	5210
Hydraulic module DPSP	SE	3645	3690	3910	4410	4780	4945	5365	5390
	HE_XE	3975	4020	4240	4660	5025	5180	5615	5750
Hydraulic module DPHP	SE	3730	3760	3955	4575	4840	4995	5420	5445
	HE_XE	4055	4090	4285	4820	5090	5240	5680	5810
XLN unit	SE	+80	+80	+80	+100	+100	+100	+120	+120
	XE	+100	+100	+100	+120	+120	+120	+140	+140
Hydraulic module VPF	SE-HE-XE	+70							

DPSP: Dual Pump Standard Pressure
DPHP: Dual Pump High Pressure

Important! Additional space is required to remove evaporator tubes.
For RTAF 090 to 245: 2.5 m in front of the unit (evaporator side).

Figure 6 – Units RTAF 090 to 245 HSE HSS



		A	H1	H2
090_105_125	HSS	4520	2526	2672
	HSE	5645		
145_155_175	HSS	5645		
	HSE	6770		
190_205_245	HSS	6770		
	HSE	7895		

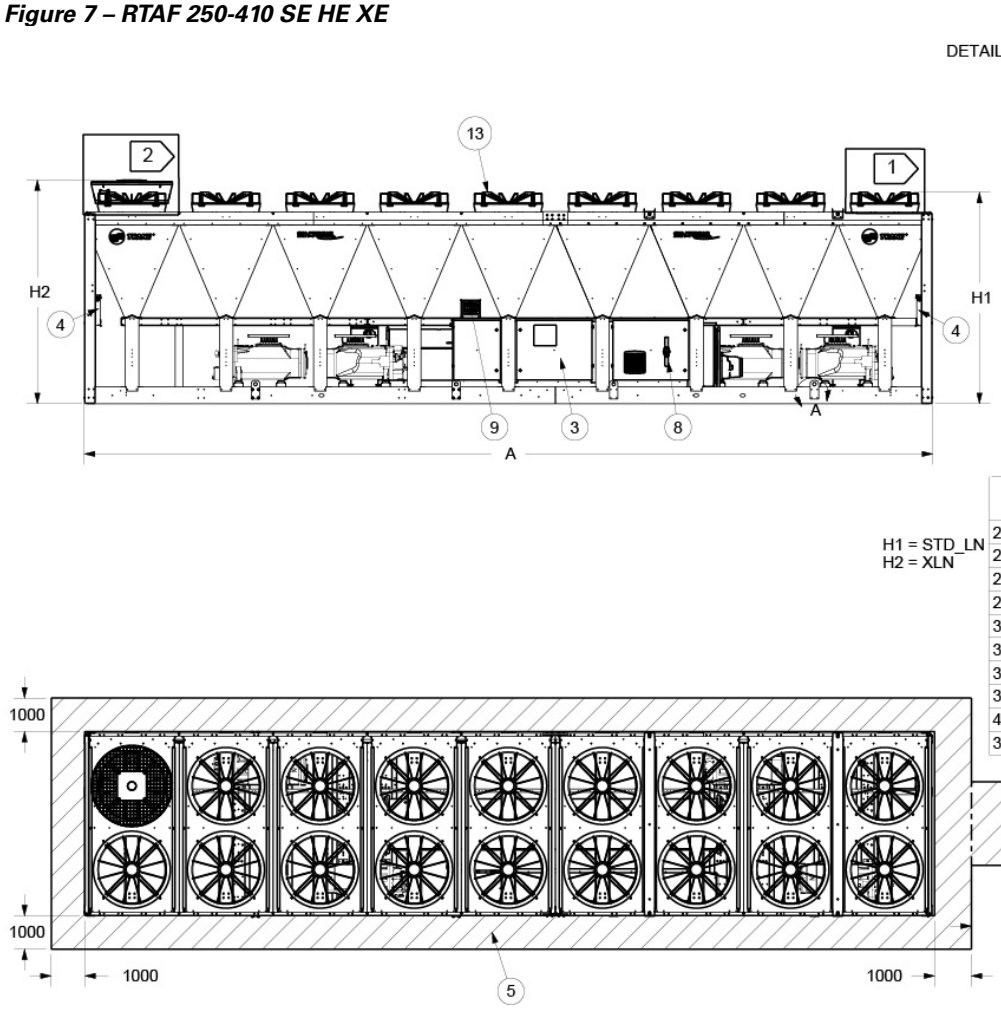
Operating weight (kg)										
		090	105	125	145	155	175	190	205	245
SN LN unit	HSS	3400	3435	3615	4075	4340	4610	5070	5100	5205
	HSE	3700	3735	3915	4320	4585	4850	5325	5460	5460
Hydraulic module DPSP	HSS	3750	3795	4015	4515	4885	5160	5620	5645	5755
	HSE	4080	4125	4345	4760	5125	5390	5865	6000	6000
Hydraulic module DPHP	HSS	3835	3865	4060	4680	4945	5210	5675	5700	5810
	HSE	4160	4195	4390	4925	5190	5450	5930	6060	6060
XLN unit	HSS	+ 80	+80	+80	+100	+100	+100	+120	+ 120	+120
	HSE	+ 100	+100	+100	+120	+120	+120	+140	+140	+140
Hydraulic module VPF	+70									

DPSP: Dual Pump Standard Pressure
DPHP: Dual Pump High Pressure

Important! Additional space is required to remove evaporator tubes.
For RTAF 090 to 245: 2.5 m in front of the unit (evaporator side).

Dimensional Data

Figure 7 – RTAF 250-410 SE HE XE



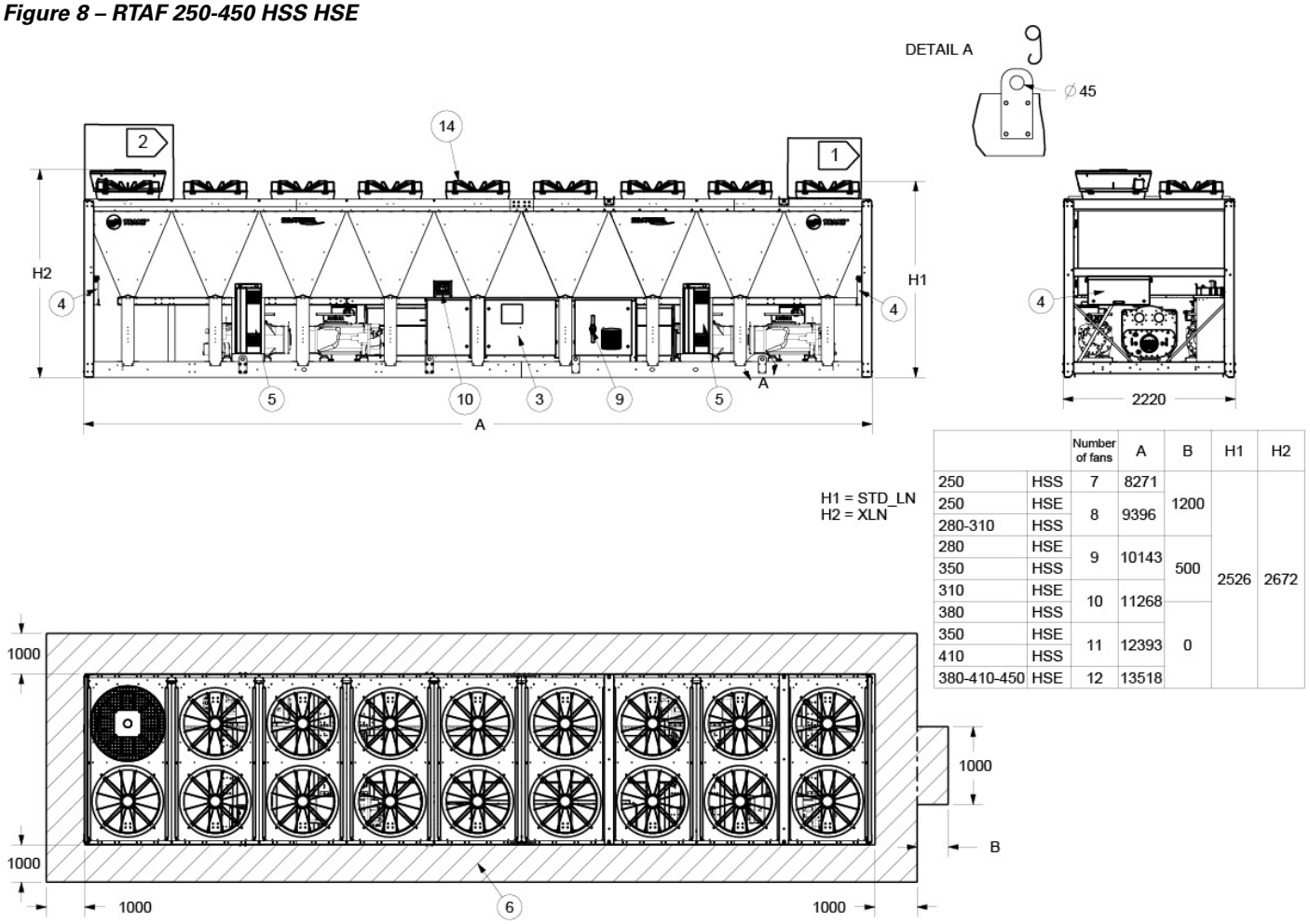
H1 = STD_LN
H2 = XLN

		Number of fans	A	B	H1	H2
250	SE	7	8271	1200	2526	2672
250	HE-XE	8	9396			
280-310	SE					
280	HE-XE	9	10143	500		
350	SE					
310	HE-XE	10	11268			
380	SE			0		
350	HE-XE	11	12393			
410	SE					
380-410	HE-XE	12	13518			

Operating weight (kg)								
		250	280	310	350	380	410	450
SN-LN unit	HSS	6685	7275	7325	8700	9070	9425	-----
	HSE	7005	7575	7945	9345	9650	9715	9715
Option XLN	HSS	+140	+160	+160	+180	+200	+220	-----
	HSE	+160	+180	+200	+220	+240	+240	+240
Hydraulic Module DPSP	HSS	7354	8264	8314	9929	10299	10654	-----
	HSE	7678	8564	8934	10574	10879	10944	10944
Hydraulic Module DPHP	HSS	7379	8053	8103	-----	-----	-----	-----
	HSE	7703	8353	8103	-----	-----	-----	-----
Hydraulic Module VPF	HSS_HSE	+70						

Important! Additional space is required to remove evaporator tubes.
For RTAF sizes 250 to 450 : 4.5 meter in front of the unit (evaporator outlet side at the right of the electrical panel).

Figure 8 – RTAF 250-450 HSS HSE



		Number of fans	A	B	H1	H2
250	HSS	7	8271	1200	2526	2672
250	HSE	8	9396			
280-310	HSS					
280	HSE	9	10143	500		
350	HSS					
310	HSE	10	11268			
380	HSS			0		
350	HSE	11	12393			
410	HSS					
380-410-450	HSE	12	13518			

Operating weight (kg)								
		250	280	310	350	380	410	450
SN LN unit	HSS	6685	7275	7325	8700	9070	9425	----
	HSE	7005	7575	7945	9345	9650	9715	9715
Hydraulic module	HSS	+140	+160	+160	+180	+200	+220	----
	HSE	+160	+180	+200	+220	+240	+240	+240

Important! Additional space is required to remove evaporator tubes.
For RTAF sizes 250 to 450 : 4.5 meter in front of the unit (evaporator outlet side at the right of the electrical panel).

Chilled Water Piping Recommendations

Drainage

A large capacity drain must be provided for water vessel drain-down during shutdown or repair. The evaporator is provided with drain connections. An air vent on top of the evaporator water box prevents vacuum by removing air from evaporator for complete drainage.

Water Treatment

In the evaporator the following material are in contact with water:

- Water boxes are made of cast iron (GJL250 EN-code)
- Tube plates are made of steel (P265GH code)
- Tubes are made of copper
- Turbulators when present in evaporator tubes are made of phosphorous brass.

When the unit is supplied with hydraulic module, the following additional materials are in contact with water:

- Pump frame and connections are made of cast iron
- Water pipes are made of iron
- Pipe sealings are made of EPDM rubber (ethylene propylene diene monomer rubber)
- Pump sealings are made of silicon carbide
- Strainer is made of stainless steel

Dirt, scale, products of corrosion, and other foreign material will adversely affect heat transfer between the water and system components. Foreign matter in the chilled-water system can also increase pressure drop and consequently, reduce water flow. Proper water treatment must be determined locally, depending on the type of system and local water characteristics.

Neither salt nor brackish water is recommended for use in Trane air-cooled chillers. Use of either will lead to an unpredictably shorter life cycle. Trane encourages the employment of a reputable water treatment specialist, familiar with local water conditions, to assist in this determination and in the establishment of a proper water treatment program.

CAUTION! If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to internal components of the evaporator. Trane assumes no responsibility for equipment failures which results from untreated or improperly treated water or saline or brackish water. If calcium chloride is used for water treatment, an applicable corrosion inhibitor must also be used. Failure to do so may result in damage to system components. Do not use untreated or improperly treated water. Equipment damage may occur.

Evaporator Piping

Evaporator water connections are grooved. Thoroughly flush all water piping to the unit before making the final piping connections to the unit. Components and layout will vary slightly, depending on the location of connections and the water sources.

An air vent is located on top of the evaporator at the chiller water outlet. Be sure to provide additional air vents at the highest points in the piping to remove air from the chilled water system. Install necessary pressure gauges to monitor the entering and leaving chilled water pressure.

Provide shut off valves in lines to the gauges to isolate them from the system when they are not in use. Use rubber vibration eliminators to prevent vibration transmission through the water lines.

If desired, install thermometers in the lines to monitor entering and leaving water line to control water flow balance. Install shutoff valves on both the entering and leaving water lines so that the evaporator can be isolated for service.

CAUTION! The chilled-water connections to the evaporator are to be “grooved pipe” type connections. Do not attempt to weld these connections, because the heat generated from welding can cause microscopic and macroscopic fractures on the cast iron water boxes that can lead to premature failure of the water box. An optional grooved pipe stub and coupling is available for welding on flanges.

To prevent damage to chilled-water components, do not allow evaporator pressure (maximum working pressure) to exceed 10 Bar.

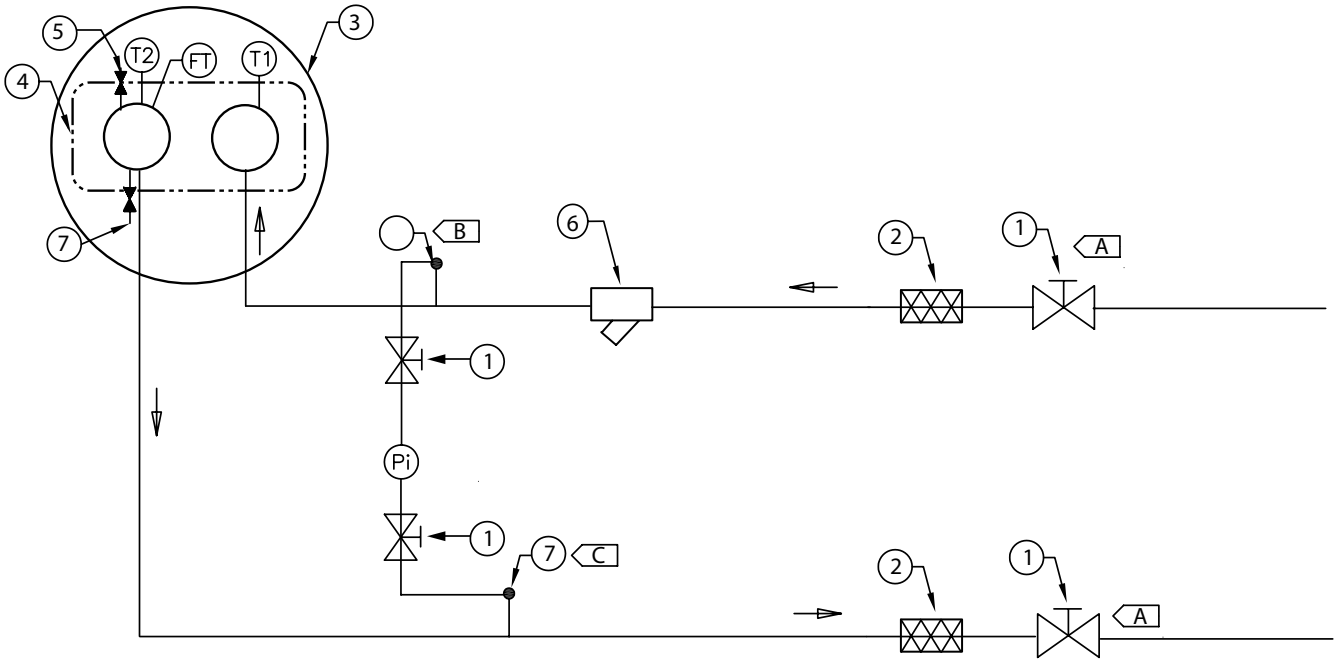
A pipe strainer must be installed in the entering water line. Failure to do so can allow waterborne debris to enter the evaporator.

Evaporator Piping

Evaporator Piping Components

Piping components include all devices and controls used to provide proper water system operation and unit operating safety. A typical RTAF evaporator piping is shown below.

Figure 9 – Typical RTAF evaporator water piping



1 = Isolation valve
2 = Vibration isolators
3 = Evaporator – End view (2-pass)
4 = Evaporator Waterbox
5 = Vent
6 = Strainer
7 = Drain

Pi = Pressure gauge
FT = Water Flow Switch
T1 = Evaporator Water Inlet Temperature Sensor
T2 = Evaporator Water Outlet Temperature Sensor
A = Isolate unit for initial water loop cleaning
B = Vent must be installed at the high point of the line
C = Drain must be installed at the low point of the line

Entering Chilled Water Piping

- Air vents to bleed the air from the system (to be placed on the highest point)
- Water pressure gauges with shutoff valves
- Vibration eliminators
- Shutoff (isolation) valves
- Thermometers if desired (temperature readings available on chiller controller display)
- Clean-out tees
- Pipe strainer

Note: Maximum evaporator water pressure is 10 bars.

Leaving Chilled Water Piping

- Air vents to bleed the air from the system (to be placed on the highest point)
- Water pressure gauges with shut off valves
- Vibration eliminators
- Shutoff (isolation) valves
- Thermometers (temperature readings available on the chiller controller display)
- Clean-out tees
- Balancing valve
- Flow Proving Device

Drains

RTAF chillers are equipped with 2 drain connections with valves: one located on the input box and the other on the back box of evaporator.

Figure 10 – Drain and vent position on evaporator

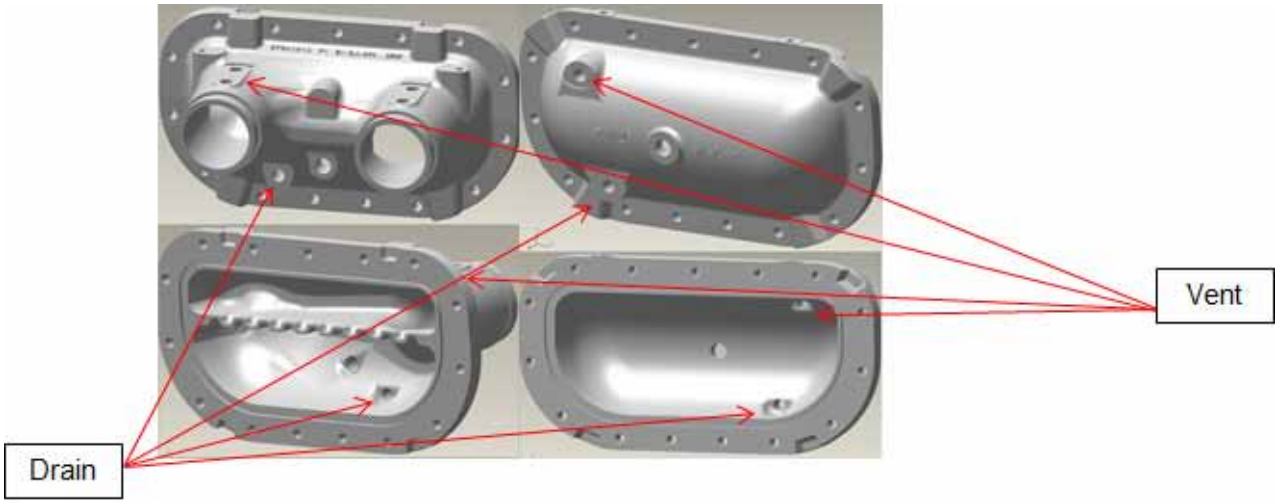
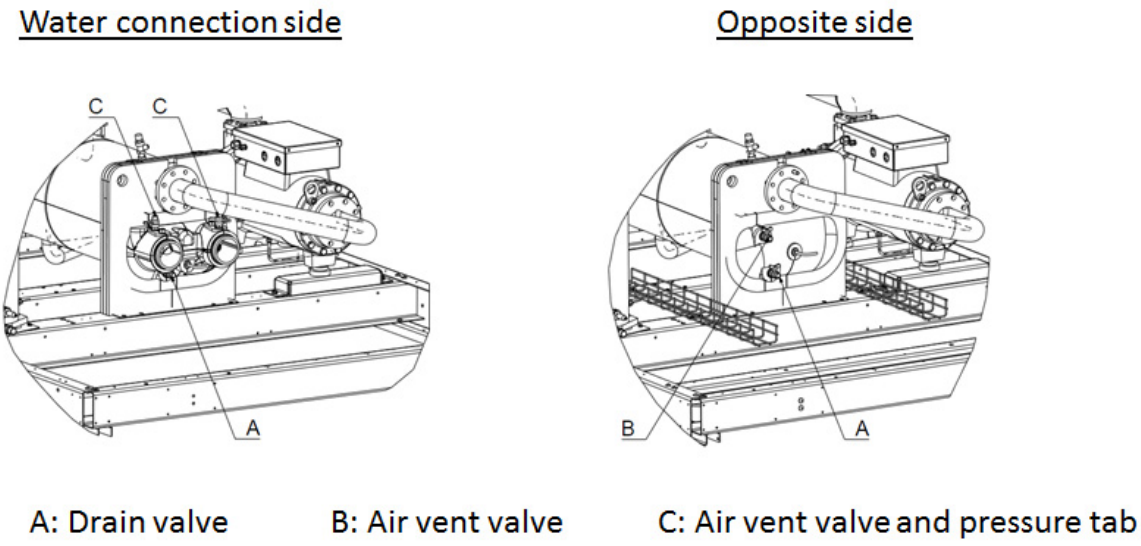


Figure 11 – Drain and air vent fitting location on the evaporator water side



In case of winter water drainage for freeze protection, it is mandatory to disconnect the evaporator's heaters to protect them from burning due to overheat. It is also mandatory to fulfill the drainage, using pressurized air, and ensure that no water stay in the evaporator during winter season. This operation needs to be performed also on unit just delivered by factory.

Evaporator Piping

Pressure Gauges

Install field-supplied pressure components as shown in Figure 6. Locate pressure gauges or taps in a straight run of pipe; avoid placing them near elbow (at least at 10 pipe diameter from discontinuity).
To read manifold pressure gauges, open one valve and close the other (depending on the side of the desired reading), this eliminate errors resulting from differently calibrated gauges installed at unmatched elevations.

Pressure Relief Valves

Install a water pressure relief valve in the evaporator inlet piping between evaporator and the inlet shutoff valve. Water vessels with close-coupled shutoff valves have high potential for hydrostatic pressure buildup on a water temperature increase. Refer to applicable local codes for relief valve installation.

Evaporator Flow Switch

Specific connection and schematic wiring diagram are shipped within the unit. Some piping and control schemes, particularly those using a single water pump for both chilled and hot water, must be analyzed to determine how and/or if a flow sensing device will provide the desired operation.

Flow Switch Installation – Typical Requirements

1. Mount the switch upright, with a minimum of 5 pipes diameters of straight horizontal run on each side. Do not install close to elbows, orifices, or valves. The arrow on the switch must point in the direction of the flow.
2. To prevent switch fluttering, remove all air from the water system. Tracer UC800 provides a 6 second time delay after a "loss-of-flow" diagnostic before shutting the unit down. Contact a Trane service representative if nuisance machine shutdowns persist.
3. Adjust the switch to open when water flow falls below nominal values. Evaporator data is given on the General Information Section. Flow Switch contacts are closed on proof of water flow.
4. Install a pipe strainer in the entering evaporator-water line to protect components.

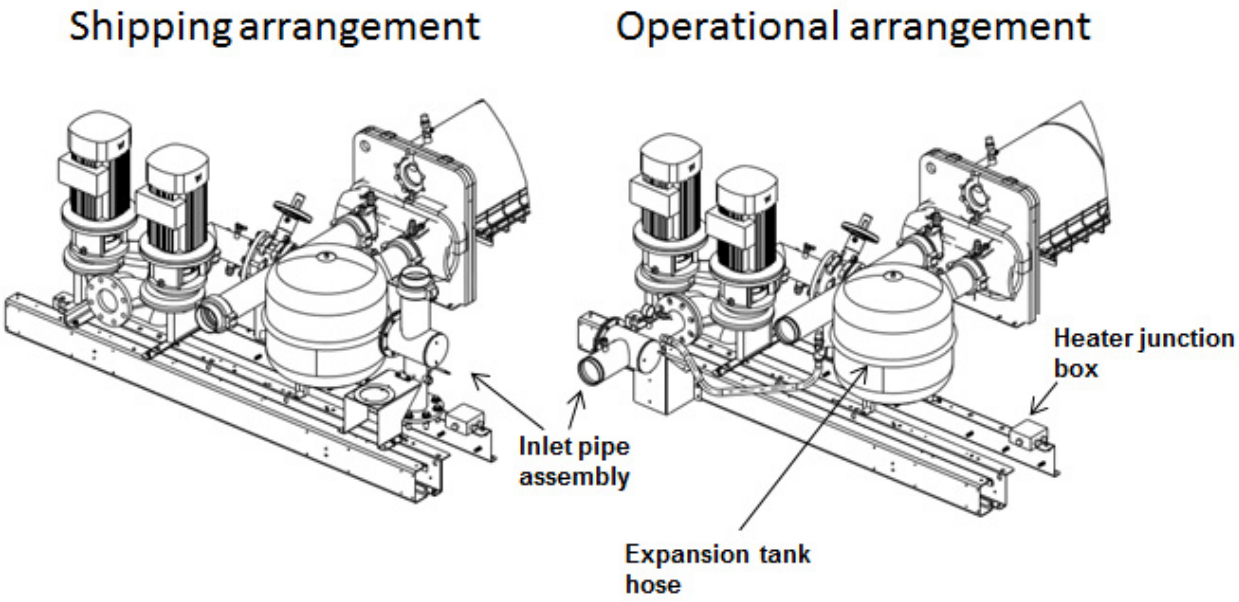
CAUTION! Control voltage from the chiller to the flow proving device is 110V AC.

Installation – Mechanical

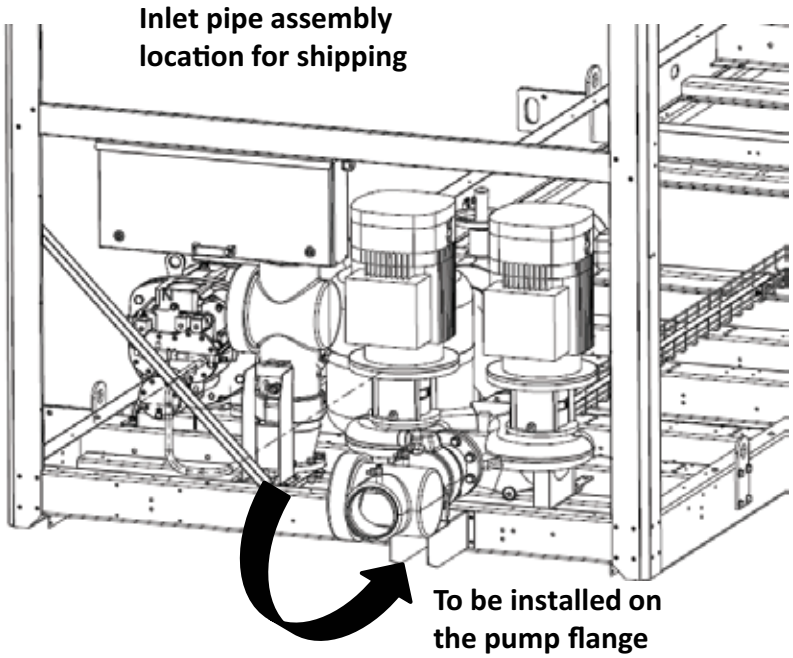
On chiller sizes 090, 105, 125 and 250 standard efficiency; the suction pipe is not installed on the pump flange for shipping purpose. This operation will have to be done once the chiller is delivered on job site according to the following figure. Fasteners and gaskets are fixed to the pipe assembly.

Figure 12 – Shipping arrangement and Operational arrangement

Unit size 090-125



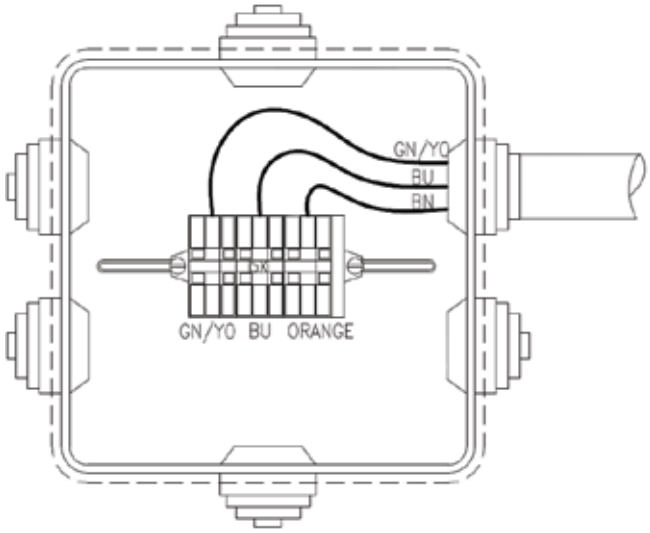
Unit size 250



The heater cable will be routed along the frame cross member to be connected to the heater terminal block located inside the junction box according to the following figure.

Optional Integrated Pump Package

Figure 13 – The junction box

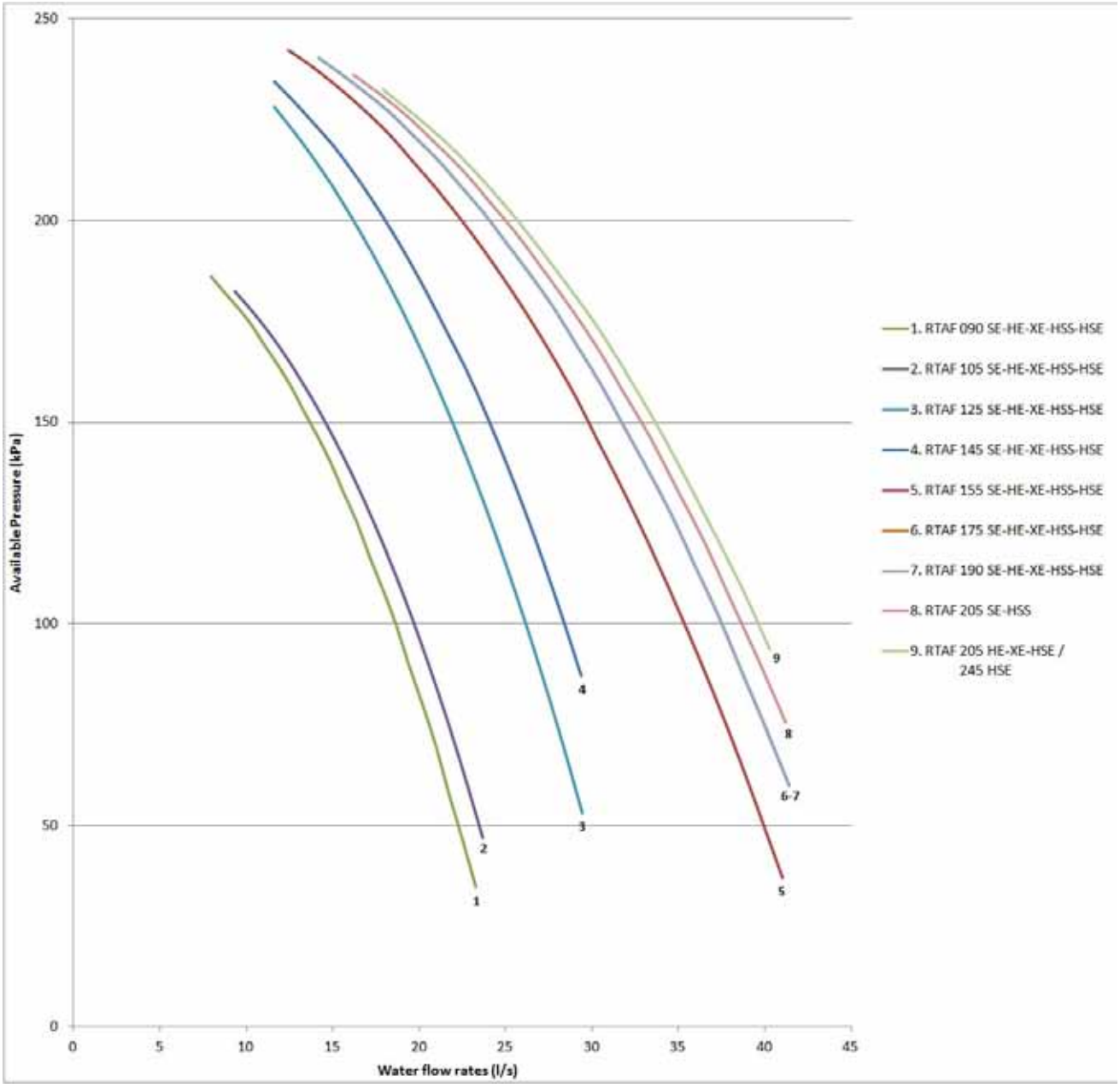


Pump Curves

In the figures below are described Pump Curves with a combination of Standard Head - High Head with standard tubes and turbulators inside the evaporator for the whole unit range, sizes 090 to 245 and sizes 250 to 450.

Figure 14 – Pump Curve - Sizes 090-245 - Standard Head - Standard Tube

Standard Tube - Standard Head



Optional Integrated Pump Package

Figure 15 – Pump Curve - Sizes 090-245 - High Head - Standard Tube

Standard Tube - High Head

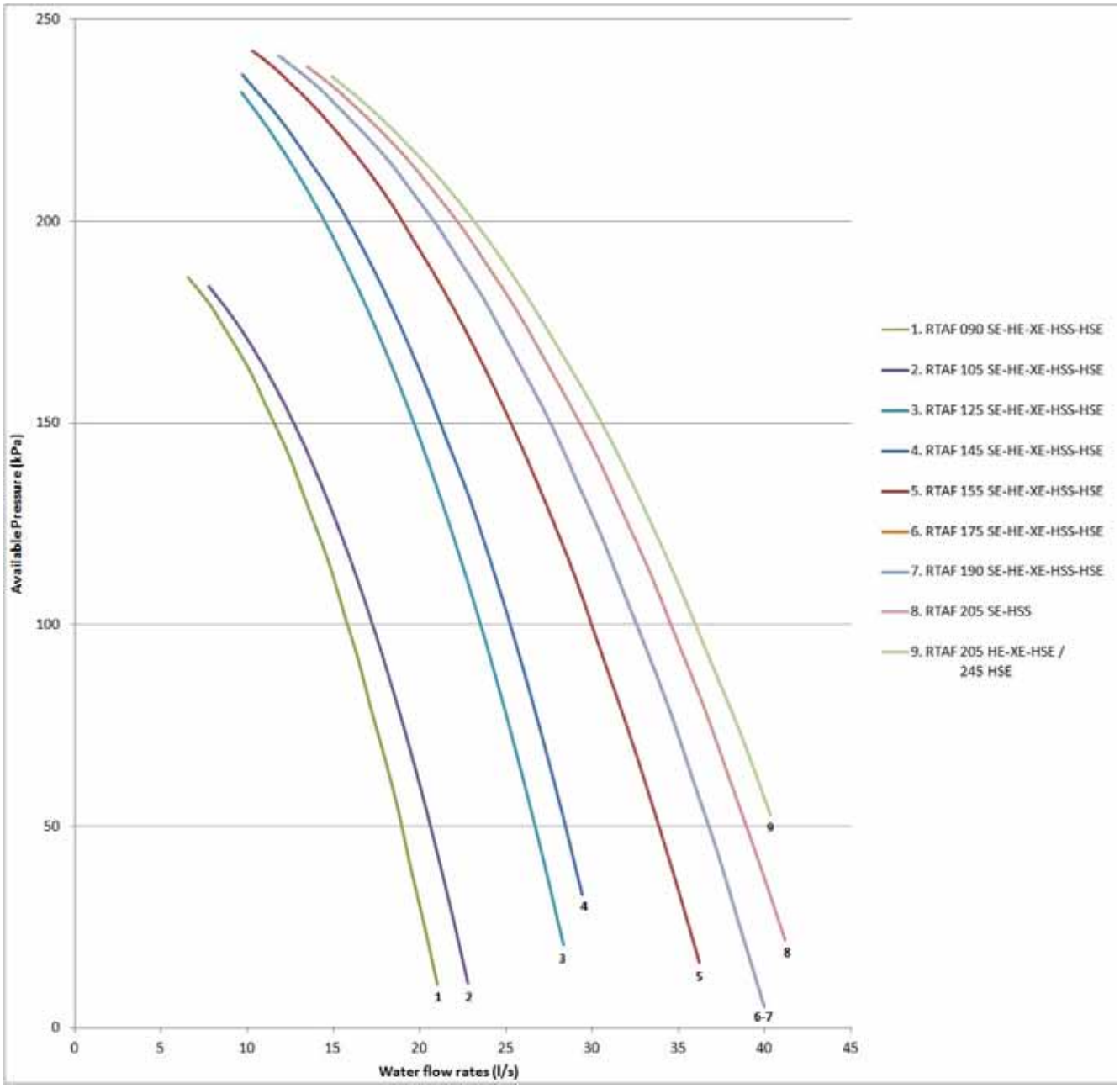
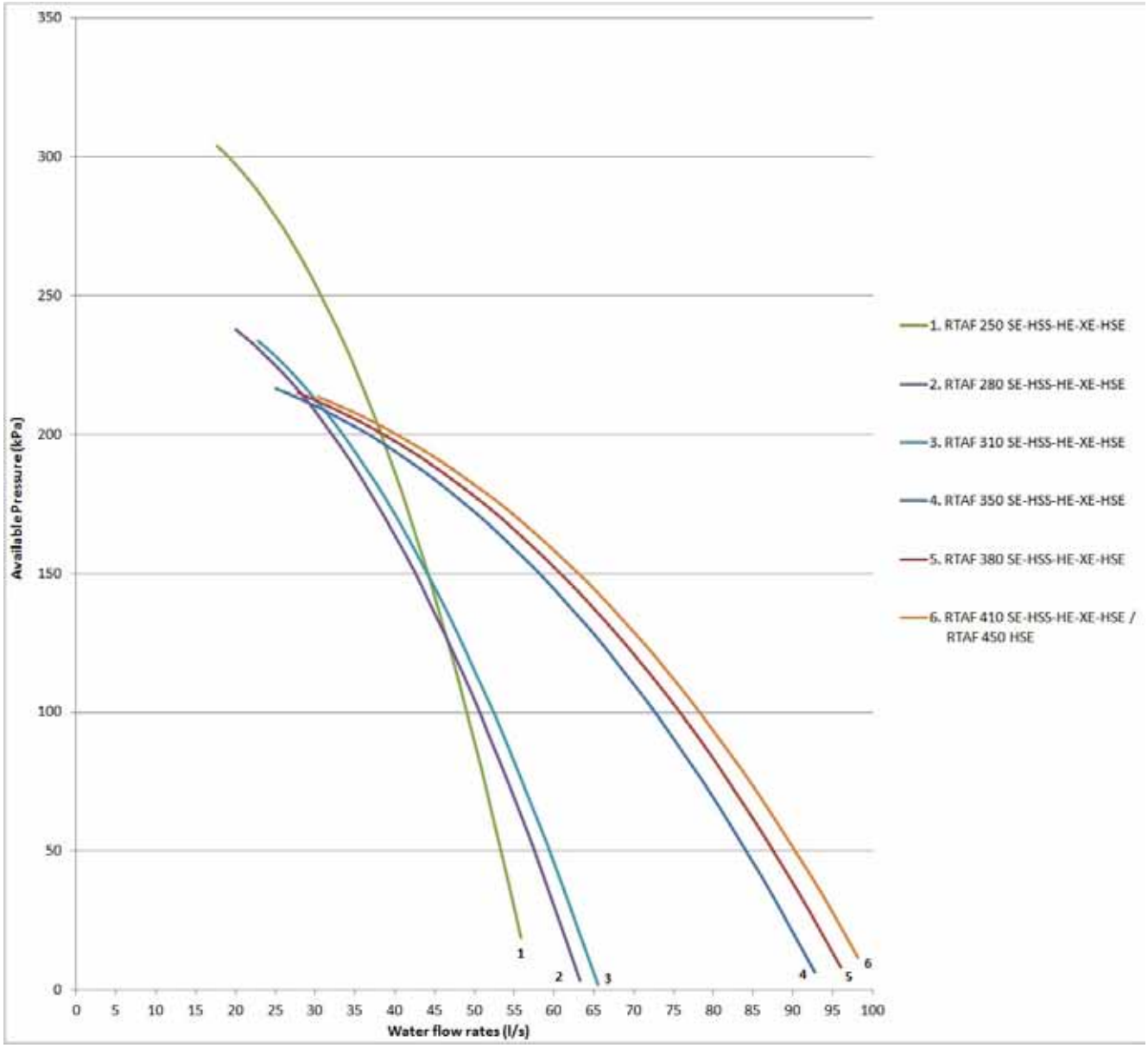


Fig 16 – Pump Curve - sizes 250 - 450 - Standard Head - Standard Tubes

Standard Tube - Standard Head



Optional Integrated Pump Package

Figure 17 – Pump Curve sizes - 250 - 450 - High Head - Standard Tubes

Standard Tube - High Head

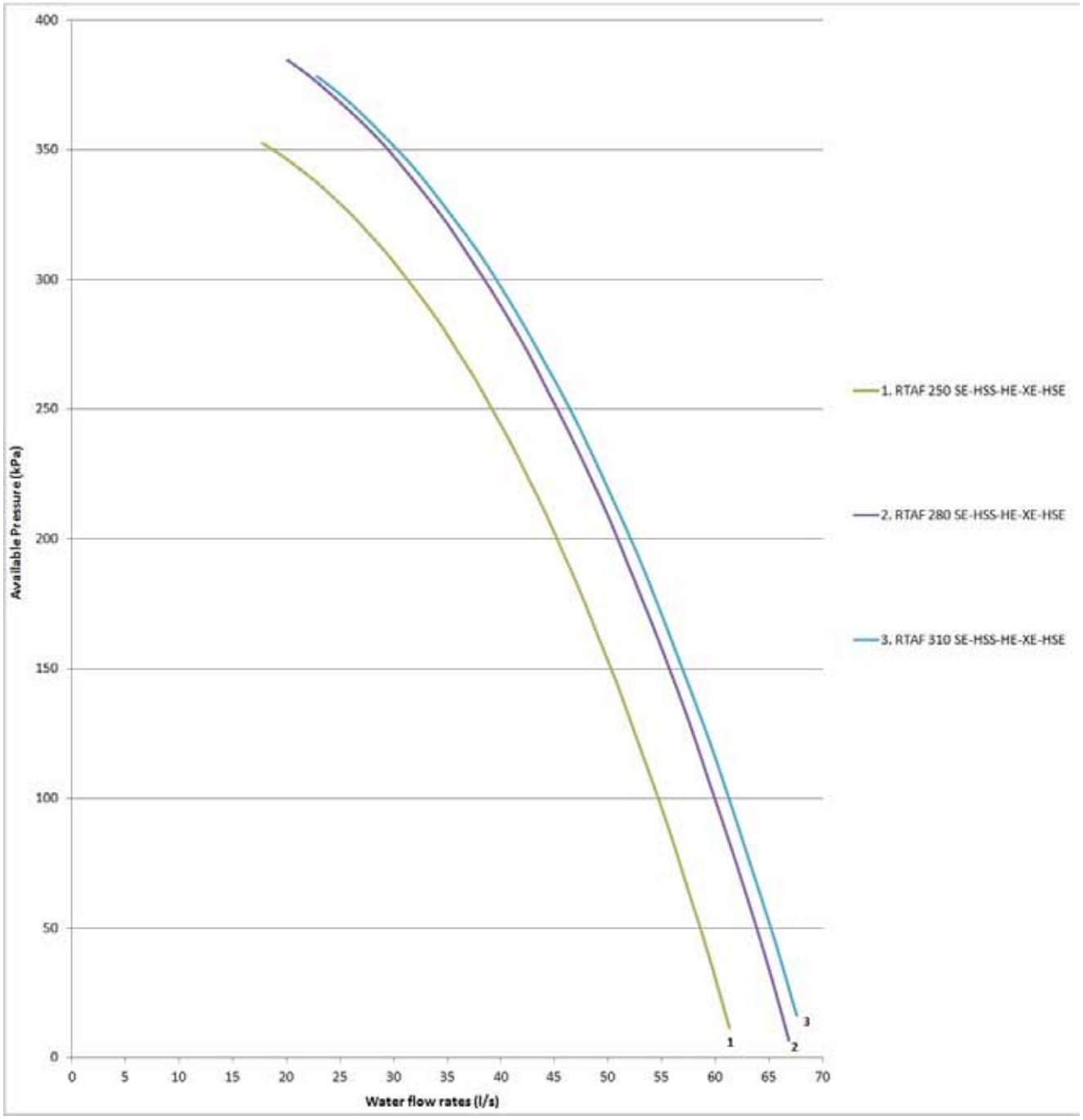
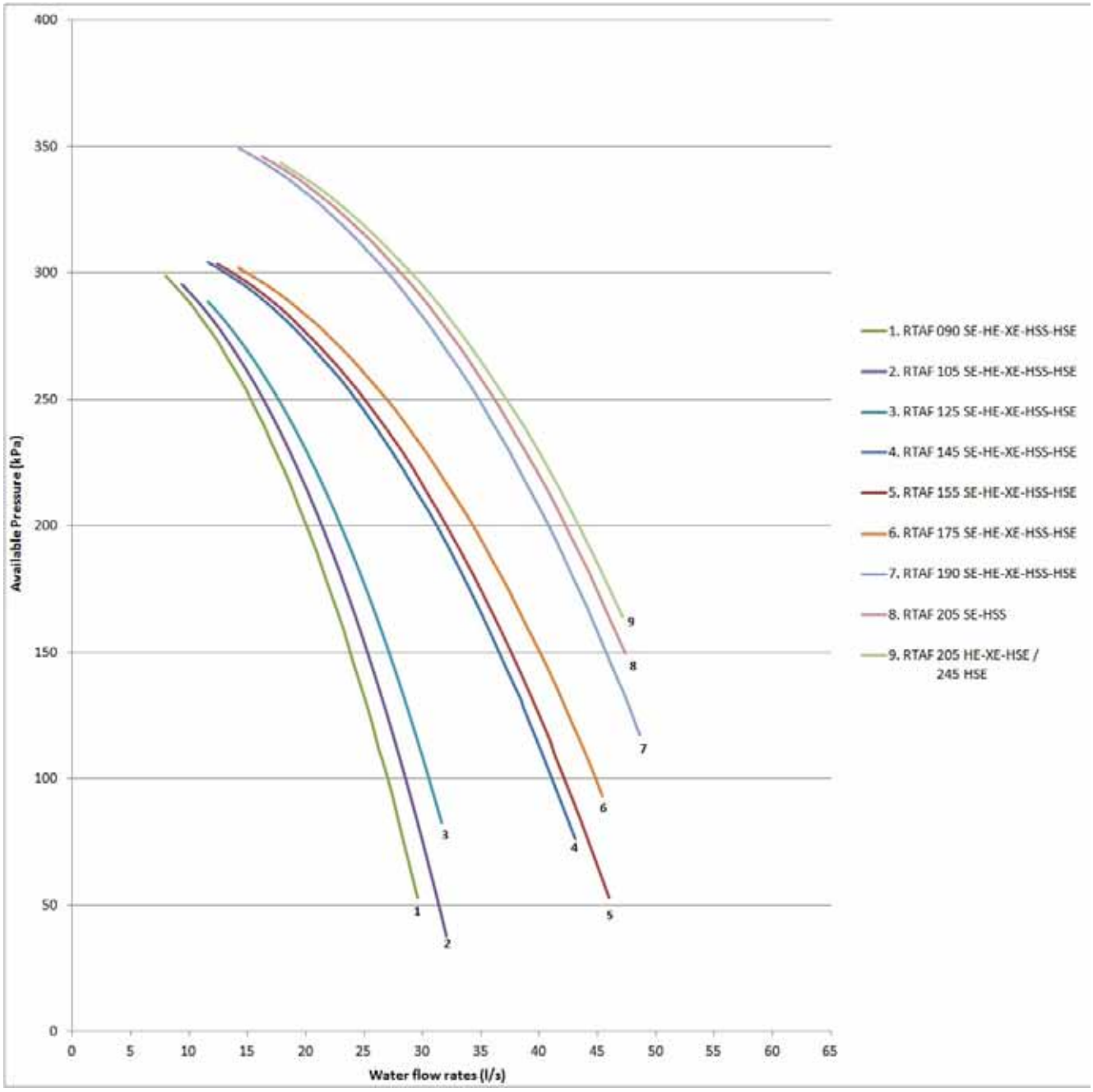


Figure 18 – Pump Curve - Sizes 090-245 - Standard Head - Tube with Turbulators

Tubulator Tube - Standard Head



Optional Integrated Pump Package

Figure 19 – Pump Curve - Sizes 090-245 - High Head - Tube with Turbulators

Tubulator Tube - High Head

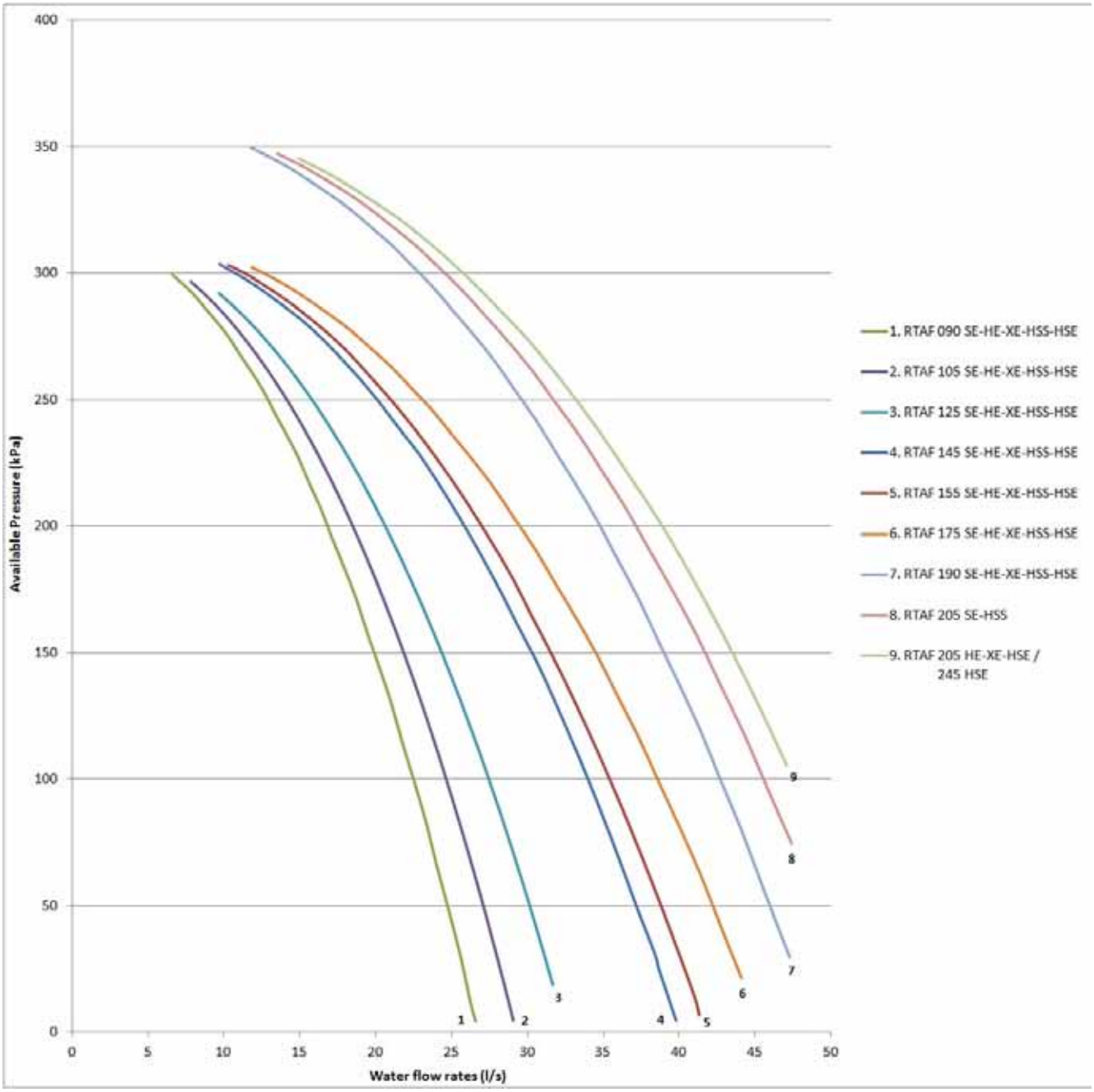
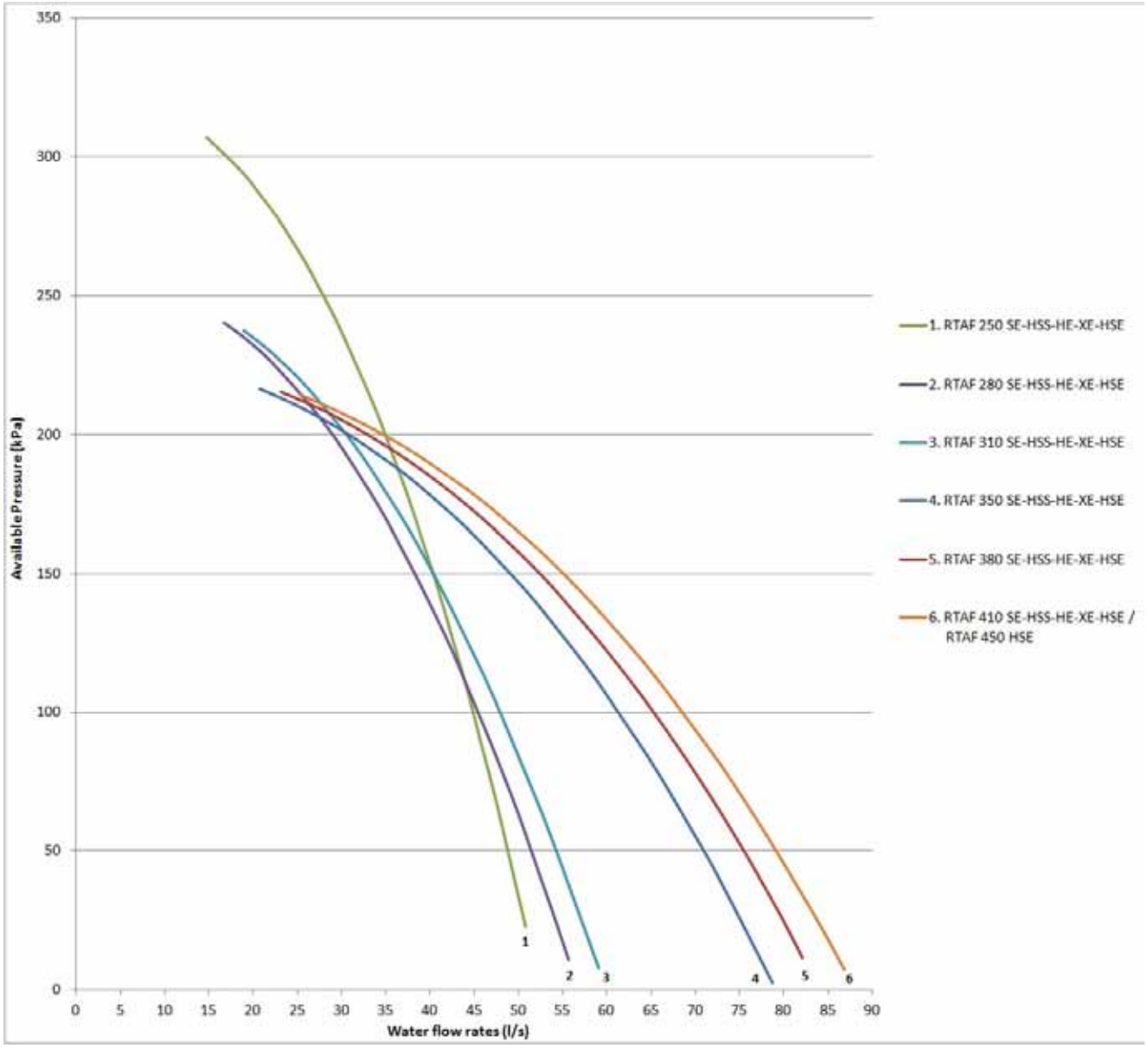


Figure 20 – Pump Curve - sizes 250 - 450 - Standard Head - Tubes with Turbulators

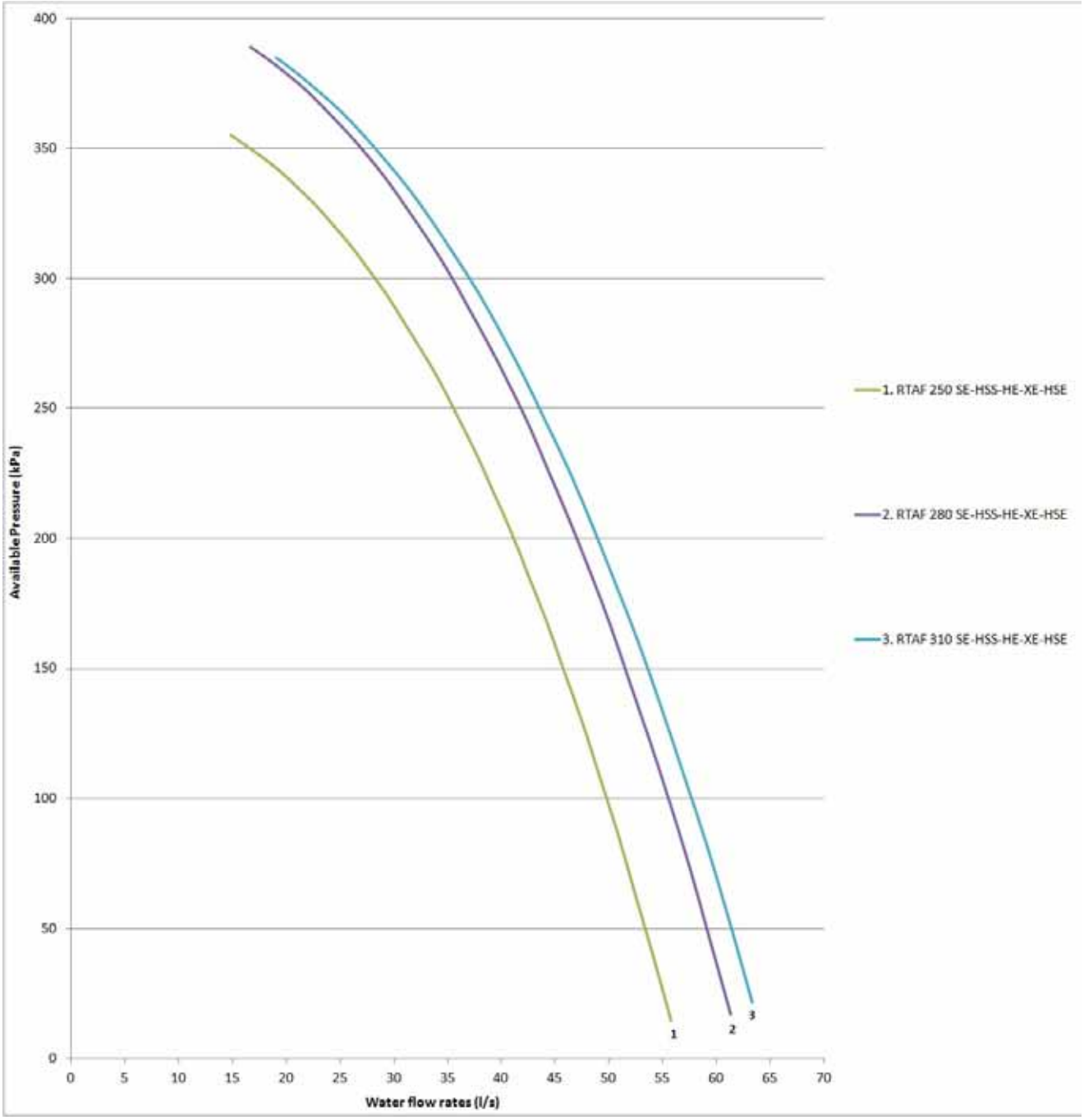
Tubulator Tube - Standard Head



Optional Integrated Pump Package

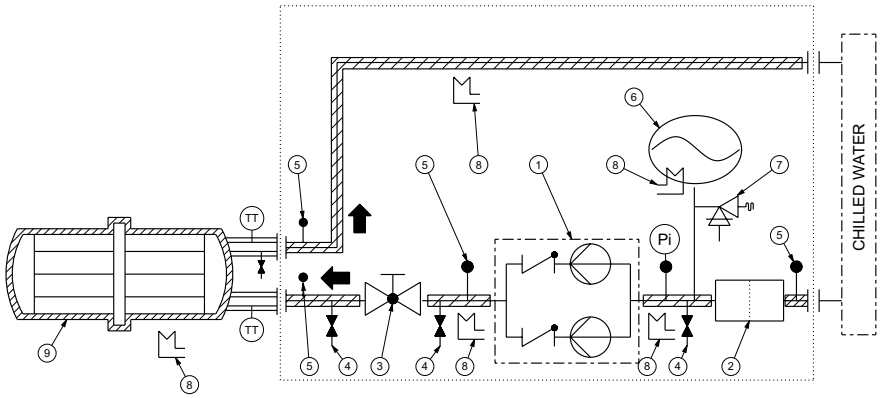
Figure 21 – Pump Curve sizes - 250 - 450 - High Head - Standard Tubes

Tubulator Tube - High Head



Optional Integrated Pump Package

Figure 22 – Hydraulic module water chart



1 = Twin centrifugal pump
2 = Water strainer
3 = Balancing valve
4 = Drain valve
5 = Valve for pressure point
6 = Expansion tank
7 = Pressure relief valve
8 = Antifreeze protection
9 = Evaporator
Pi = Gauge
TT = Temperature sensor

Chiller can be ordered with an optional integrated hydraulic module. In this case, chiller will be provided with the following components factory mounted and tested:

- Twin centrifugal water pump, Low pressure or High pressure (option)
- Water strainer to protect the pump against impurities in the circuit
- Expansion module with expansion vessel and pressure relief valve sufficient to ensure the expansion of the water loop ability
- Thermal insulation for antifreeze protection
- Balancing valve for equilibrate the flow of water circuit
- Drain valve
- Temperature sensor

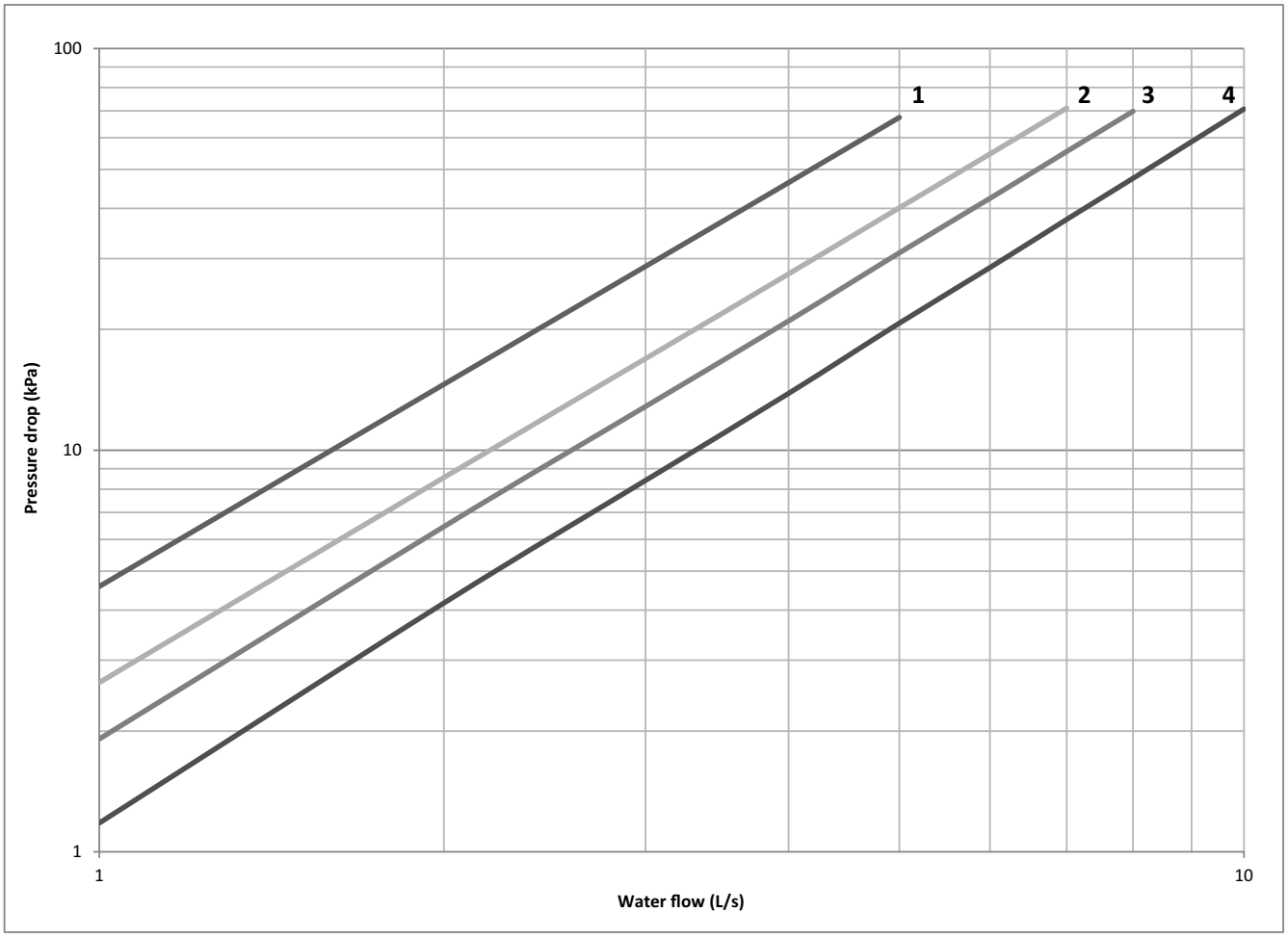
Note: A pressure switch device to detect lack of water is not included in the pump package. Installation of this type of device is highly recommended to avoid sealing damage due to operation of pump without enough water.

Partial Heat Recovery

Heat recovery option is made with a plate heat exchanger in series with the air-cooled condenser. This heat exchanger benefits the discharge gas superheat as well as a part of the condensing gas heat to be transferred to hot water system.

All Submittals, lifting diagrams, neoprene pads positioning and wiring diagrams have been supplied with the chiller order.

Figure 23 – Water pressure drop - heat recovery heat exchanger



1 = RTAF 090-105-125-145

2 = RTAF 155-175-190-205-245

3 = RTAF 250-280-310

4 = RTAF 350-380-410-450

Chiller integrated free-cooling operation mode

The power of chiller integrated free-cooling relies on the chiller control to maximize the use of free-cooling when outdoor temperatures are favorable. The choice between compressor refrigeration and Free-Cooling refrigeration will be made and activated depending on three temperature measurements:

- The ambient air temperature
- The evaporator entering and leaving temperature
- The chilled water set point

Free-cooling coils are fit in series with the evaporator, and a set of water regulation valves allows the coils to be by-passed when they are no longer needed due to outdoor temperatures which are favorable for free-cooling.

Three operating modes can be differentiated:

1. Summer operation or Compressor refrigeration mode

In this operation mode, ambient temperature is higher than the temperature of the fluid entering the evaporator. Free-cooling is not activated, compressors are running, and control is done in function of the fan/compressor logic of operation.

2. Mid-season operation or combined refrigeration + Free-cooling mode

In this operation mode, free-cooling will be enabled whenever the outdoor temperature is below the evaporator entering water temperature. The operating logic is described below. The free-cooling system operates combined with the mechanical compressor refrigeration. Most of the time, free-cooling will only partially cover the required cooling duty. In other words, mechanical refrigeration will complete what has already been delivered by free-cooling.

3. Winter operation or Full free-cooling mode

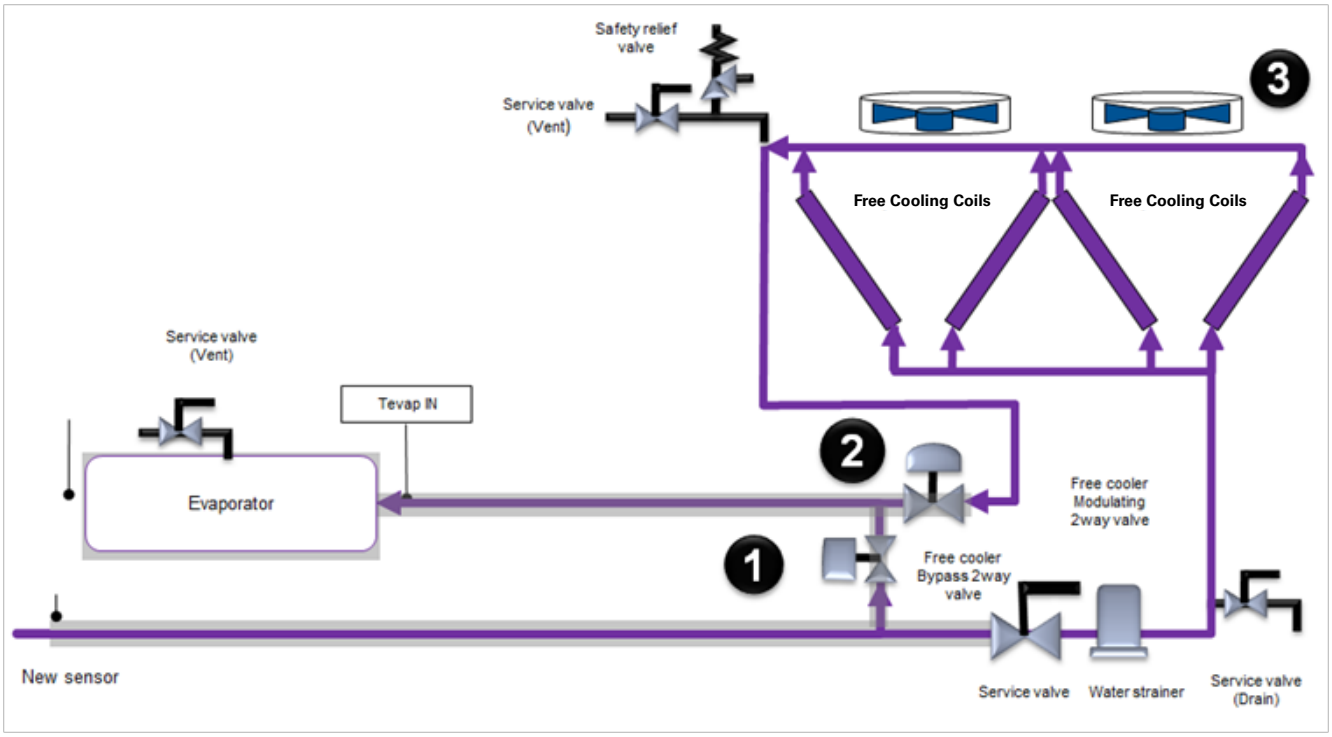
Below a certain ambient temperature, and depending on the chilled water set point requested, the entire cooling duty is delivered by the free-cooling system. Compressors do not operate, since the free-cooling coils will be able to deliver the requested chilled water temperature. The regulation of the capacity is described in the next section. In this mode, only fans are running.

General information

The chiller integrated free-cooling system fluid based consist in a set of “Macro-channels” or “Radiators” coils, fit in the same frame than the MCHE condenser coils of the chiller refrigerant circuit. Free-cooling coils will be full aluminum, flat radiator design type, with low air pressure drop to avoid fan performances degradation.

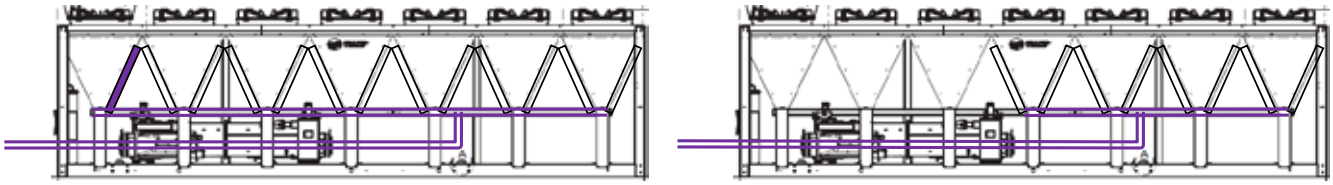
Free-cooling coils are fit in series with the evaporator, and a set of water regulation valves ensures the system to reach the required free-cooling capacity.

Figure 24 – Flow chart – Free-Cooling – Direct free cooling version



Optional Free-Cooling

Figure 25 – Total and Partial Free-Cooling option



If there is a need to get a definition for partial heat recovery coil distribution, please contact the Trane Sales office.

Free-Cooling Enabling Conditions

To get the free cooling active, condition is to have unit in active cooling mode and that Outdoor temperature low enough according to Figure 26.

The free cooling function is enabled when outdoor air temperature is below Active chilled water cooling set point minus FC_offset.

A hysteresis should also apply to avoid short cycling of Free Cooling enabling logic. The Free Cooling offset is an adjustable parameter to make free cooling active.

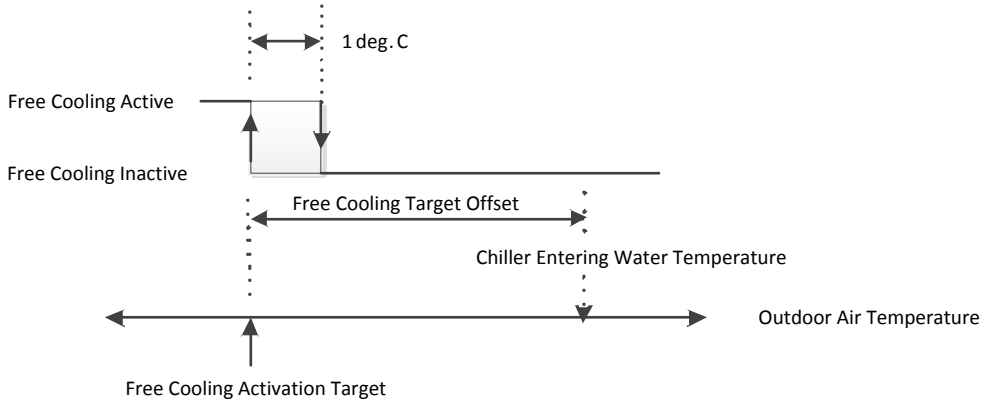
If free cooling function is enabled, free cooling becomes the 1st stage of cooling. Free cooling is the first stage to engage for cooling capacity loading and the last stage to consider in capacity unloading.

In order to maximize tandem operation of free cooling with compressor the following logic is applied:

When unit is configured in "Partial free cooling", when free cooling reaches its full capacity and there is a call for compressor start, then the first circuit to start shall be circuit 2 (if available). This also means compressor balancing function is disabled in these conditions.

Note: UC800 will not lockout compressor below free cooling change over point, but the compressor are lockout when outdoor air is below "low ambient limit" set at -10°C. So FC will be the only source of cooling below -10°C.

Figure 26 – Free-cooling enabling conditions



Free-Cooling Modulating Sequence

	FC disabled	FC 1st step	FC 2nd step
Bypass Valve	100%	100% ▶ 0% for TFC 100% ▶ 30% mechanically set for PFC	0% for TFC 30% for PFC
FC valve	CLOSE	0% ▶ 100% (modulating)	EC fans ➔ 100% AC fans ➔ 0% ▶ 100% (modulating)
Condenser fan airflow	Follow compressor fan sequence	10% (adjustable from 10% to 100%) or follow compressor fan sequence if compressor are still running	EC fans 0% ▶ 100% AC fans 100% or follow compressor fan sequence if compressor are still running
FC pump	OFF	ON	ON

Note for installation

All Free-cooling units must be freeze-protected with 30% Ethylene Glycol in the cooling loop circuit which is the most convenient percentage in order to protect the unit against freezing.

Protection coverage with 30% Ethylene Glycol:

- Freezing point without burst effect = -13°C
- Freezing point with burst effect = -50°C.

IMPORTANT – WATER QUALITY

Glycol or brine must be carefully chosen with the help of a reputable water treatment specialist. The additional materials to the evaporator circuit are made with Carbon Steel, Copper, Zinc, Synthetic rubber, Aluminum AA3102, AA3003, and AA4045. Water should be free from foreign solid particules.

All Submittal, lifting diagram, neoprene pads positioning and wiring diagrams have been supplied with chiller order.

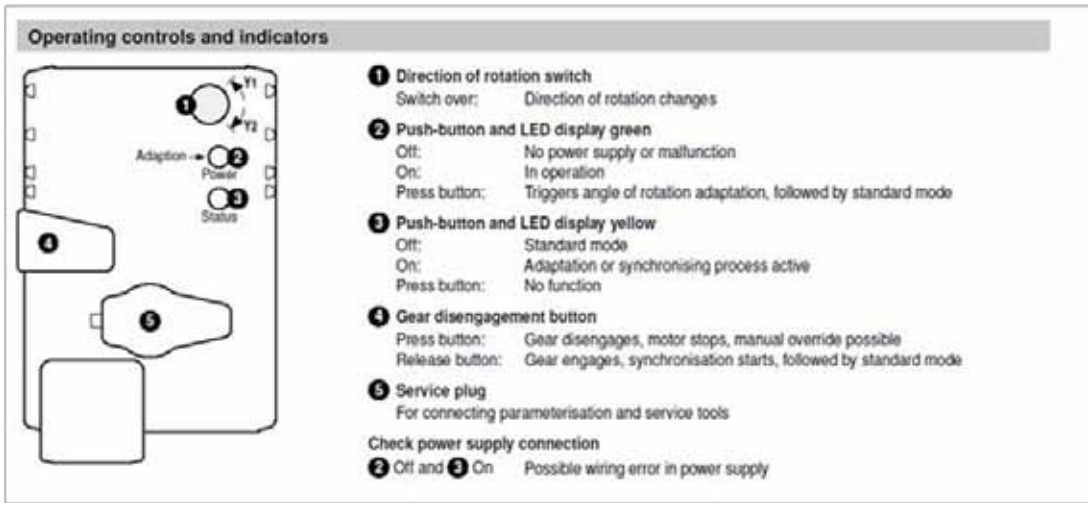
Free cooler by-pass valve adjustment

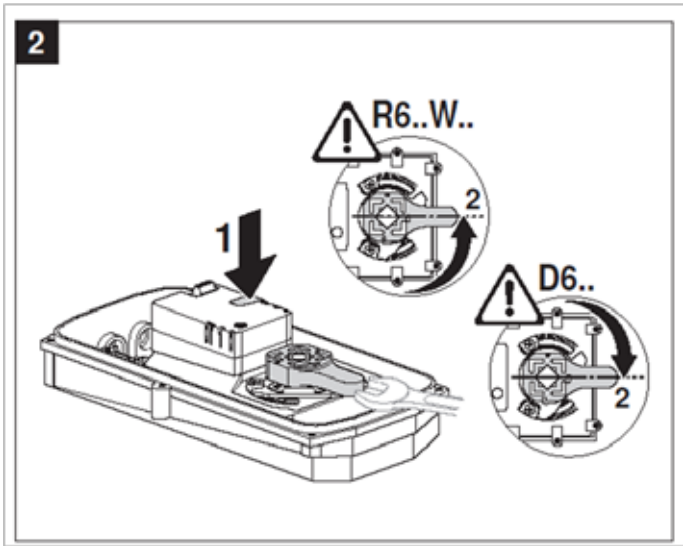
For intervention on free cooler by-pass valve it is recommended to consult the valve service literature.

For every new referencing of the motor end travel, an adaptation of the motor should be done by pushing button 2

To change the bypass percentage follows below procedure:

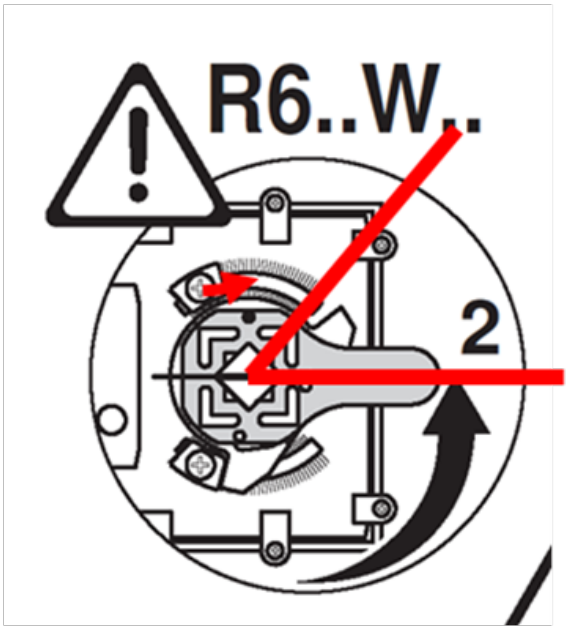
- No tuning is needed on free cooling valve which always stays on full opening/closure.
- For bypass valve Belimo, minimum opening can be adjusted by pushing the release button (4) and by turning handle 5 to 50% opening for instance (45°)





Optional Free-Cooling

With a Phillips screwdriver, move the end of travel. Fix it to always keep an opening between 100% and the minimum desired (50%) in example below.

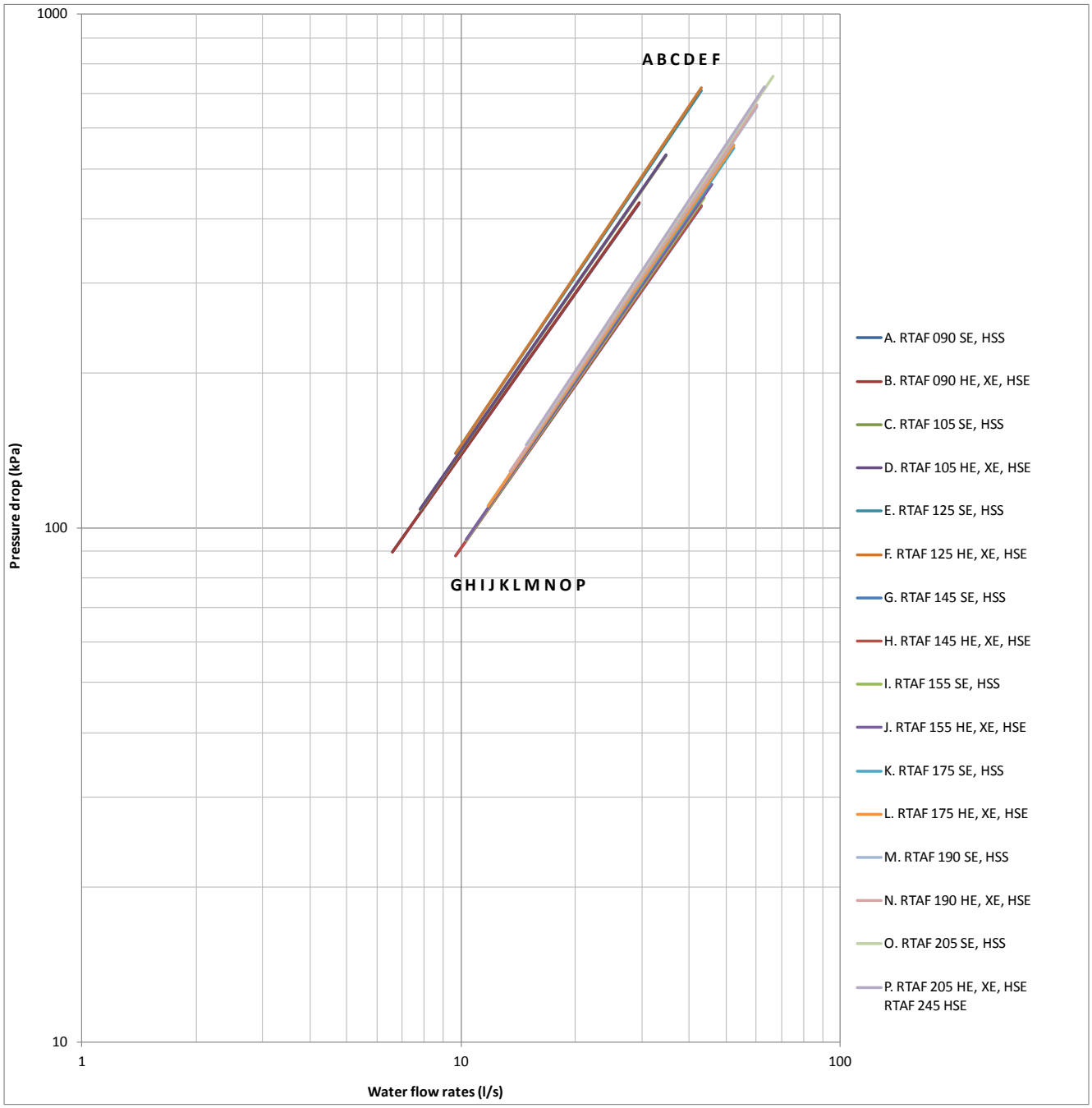


If the minimum opening is modified after the first powering, motor re-calibration is needed to validate the new operating range. When motor is powered, push green led button (2). Motor memorizes the new reference of end of travel position on its signal (2...10 VDC)

Water Pressure Drops - Coils

The free cooling water pressure drops given in charts below (coil + valve) should be added to evaporator pressure drop to get full unit pressure drop.

Figure 27 – Water pressure drop - Partial Free-Cooling sizes 090-245



Optional Free-Cooling

Figure 28 – Water pressure drop - Partial Free-Cooling sizes 250-450

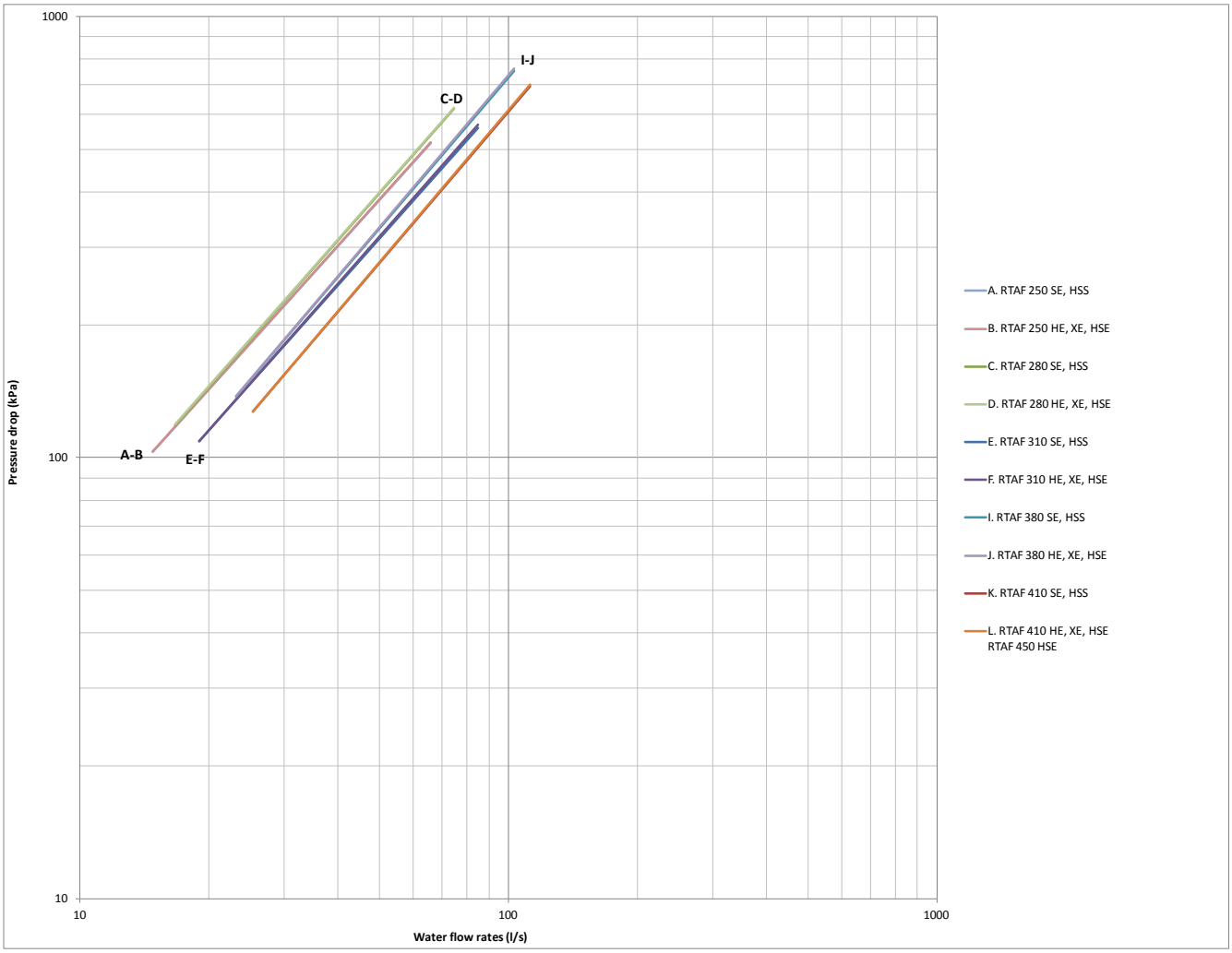
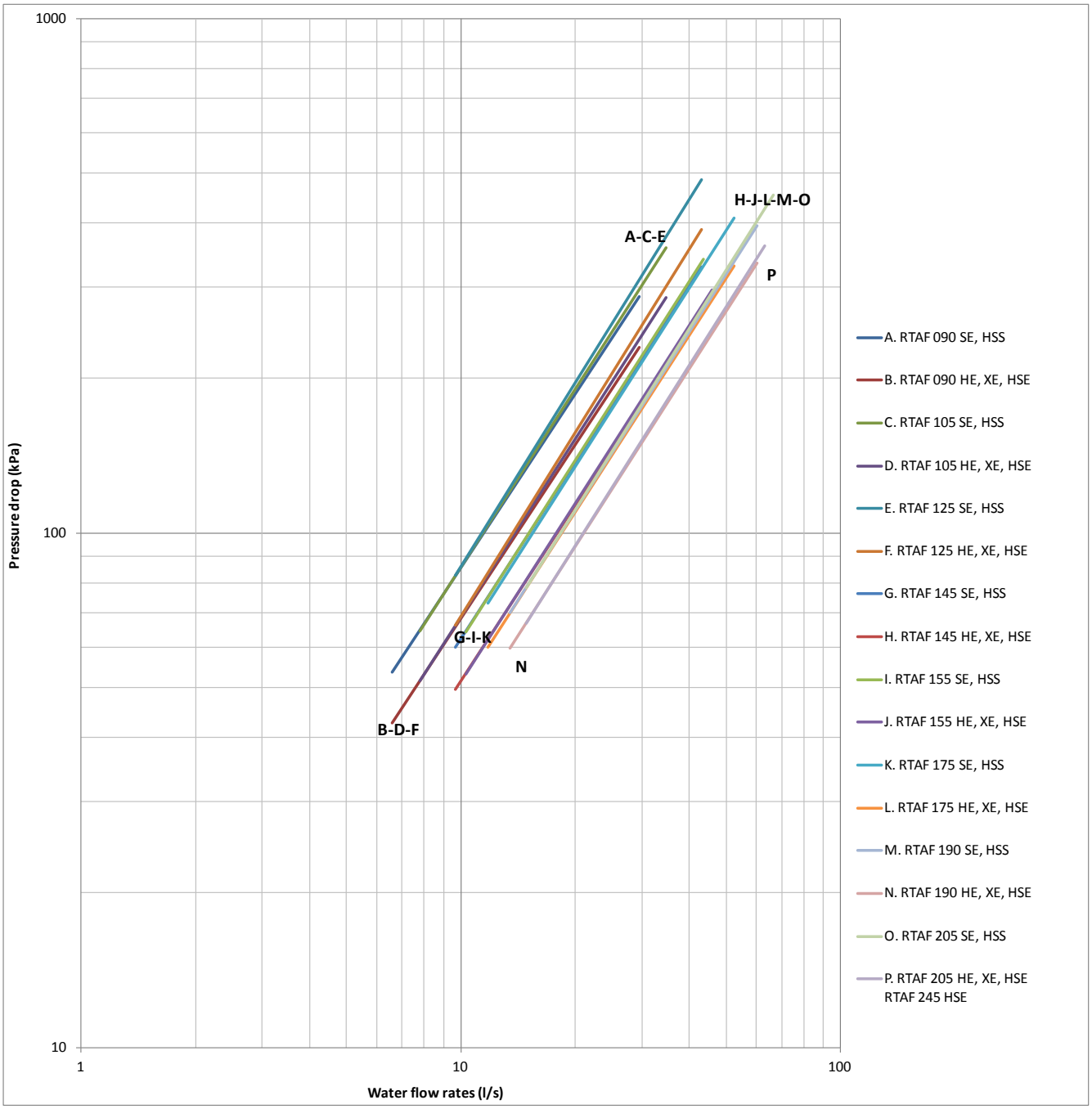


Figure 29 – Water pressure drop - Total Free Cooling sizes 090-245



Optional Free-Cooling

Figure 30 – Water pressure drop - Total Free Cooling sizes 250-450

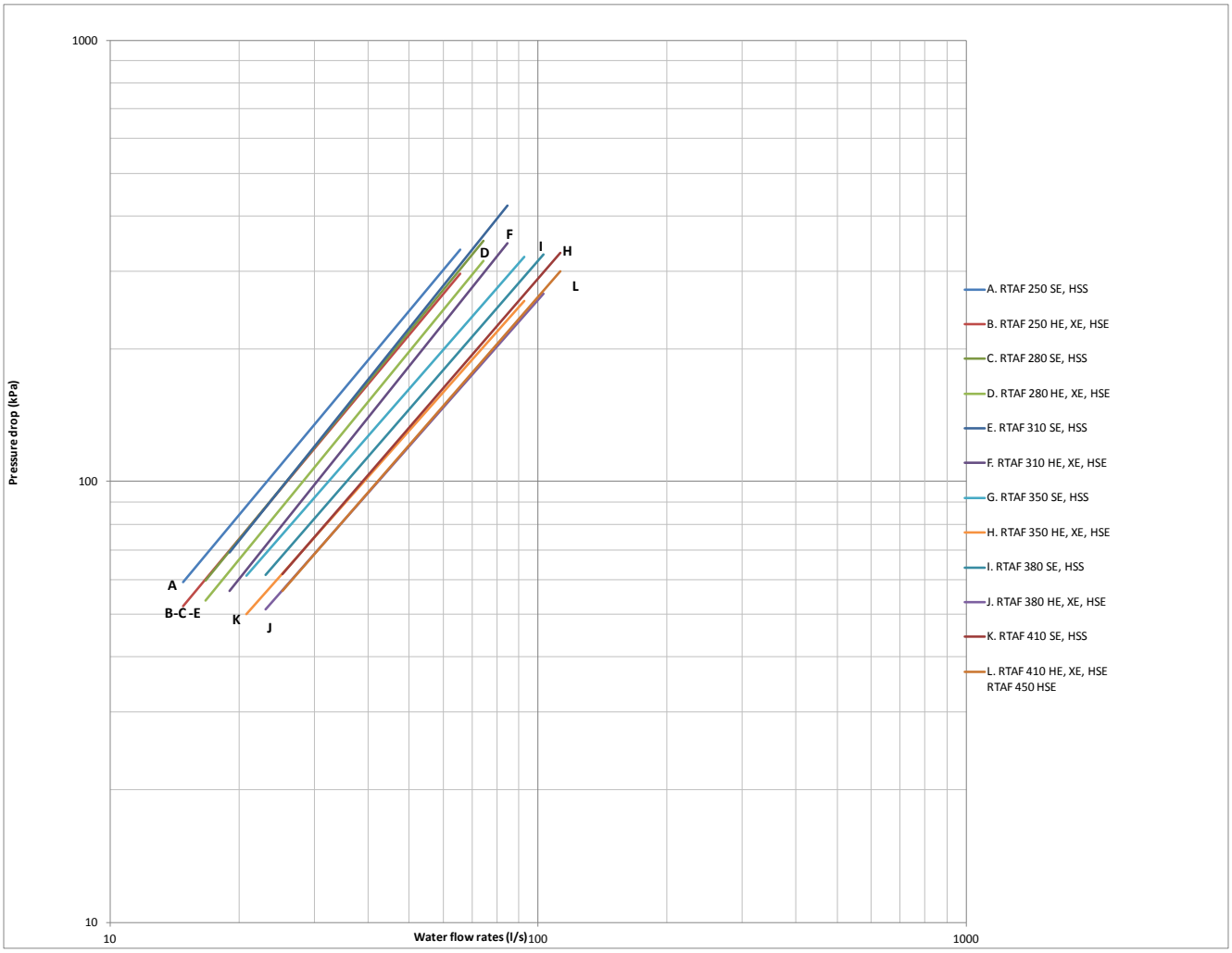
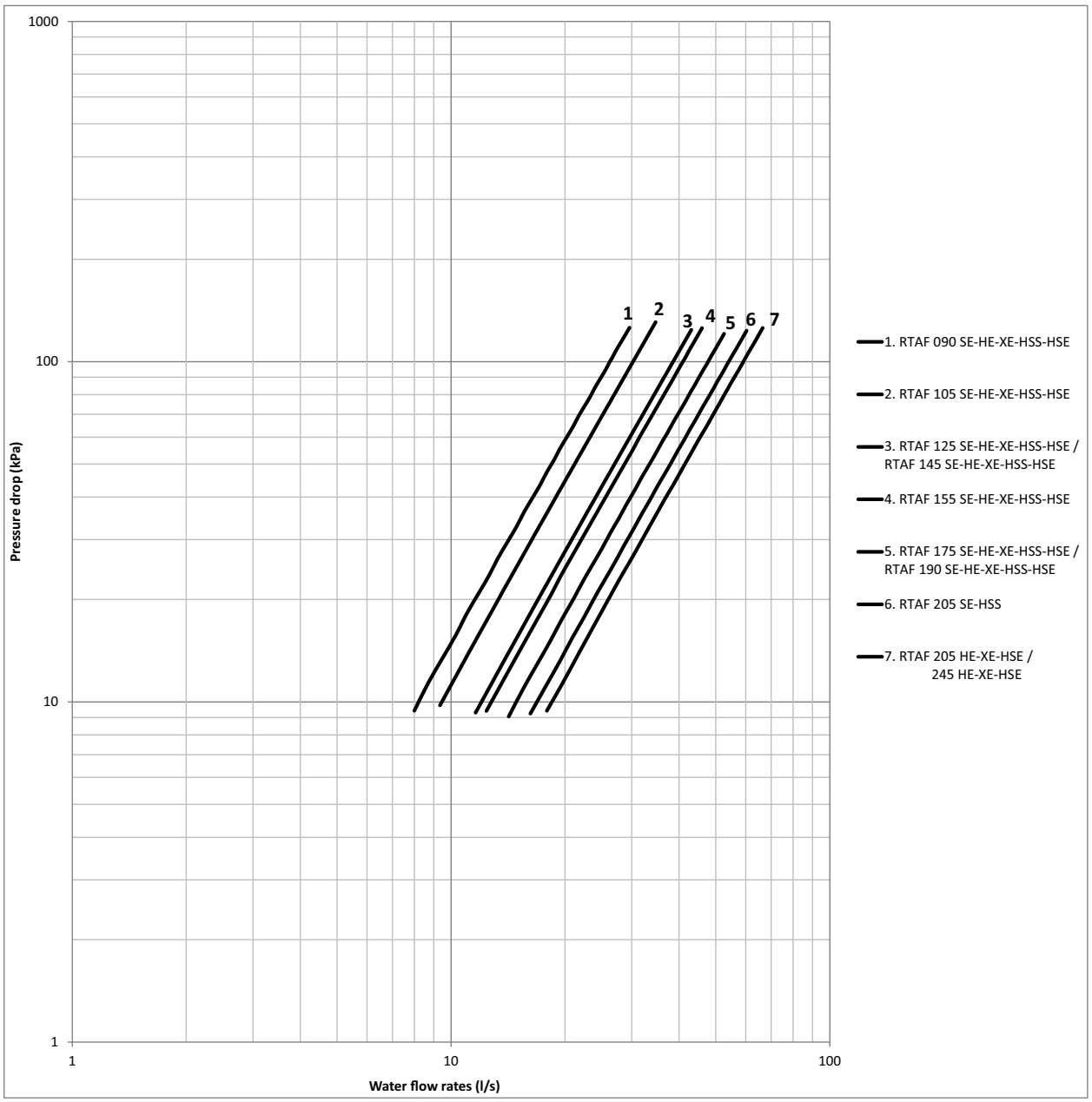


Figure 31a – Evaporator water pressure drop with standard tubes, sizes 090-450



Evaporator Waterside

Figure 31b – Evaporator water pressure drop with standard tubes, sizes 090-450 (continued)

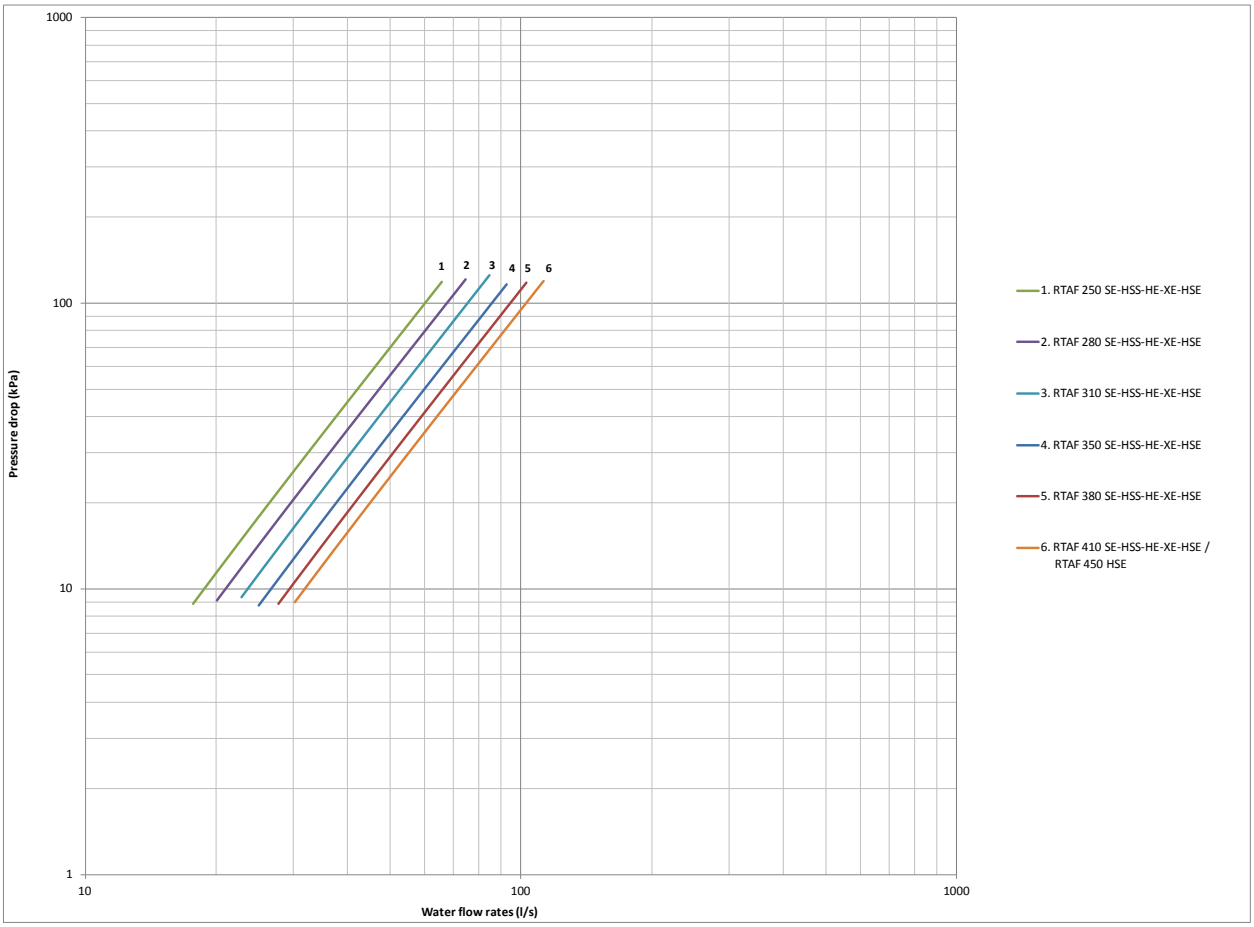
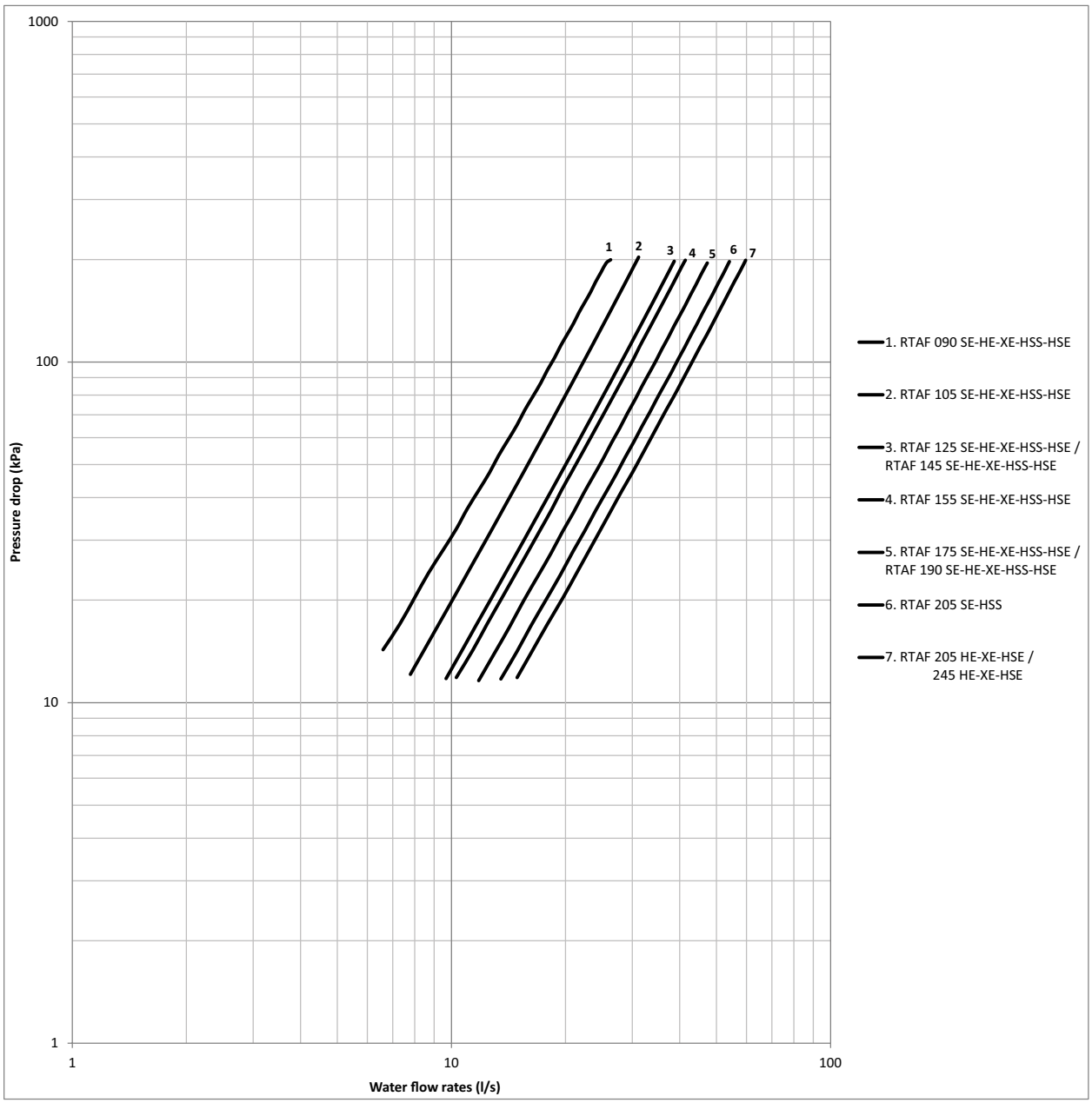
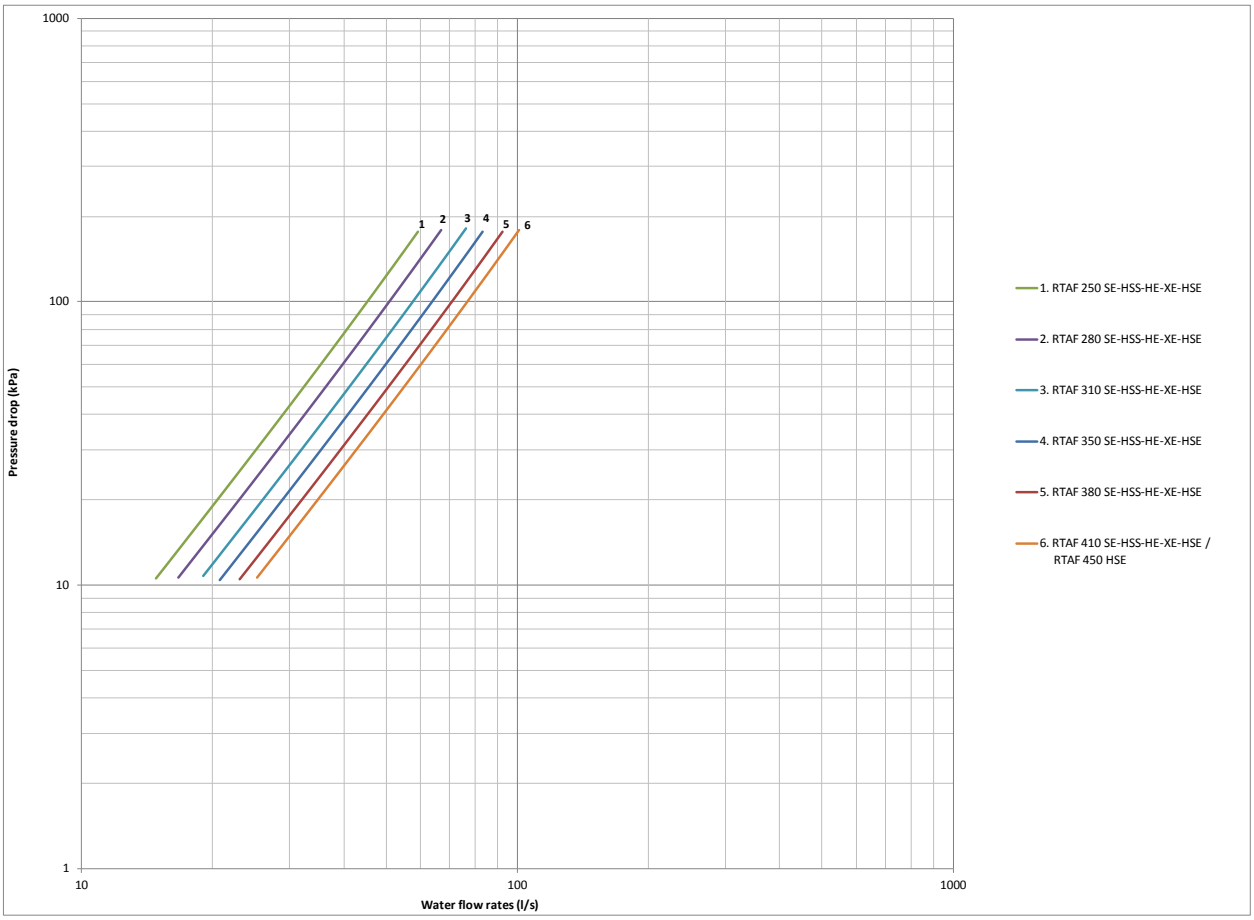


Figure 32a – Evaporator water pressure drop with Turbulators, sizes 090-450



Evaporator Waterside

Figure 32b – Evaporator water pressure drop with Turbulators, sizes 090-450 (continued)



Freeze Protection

Depending on the ambient temperature the unit may be exposed to freeze, there are multiple options for freeze protection. They are listed in order of highest ambient (least freeze protection) to the lowest ambient (most freeze protection).

For all chiller running with water under cold ambient temperature (below 0°C), it is extremely important to keep full water flow in the evaporator for an extended time after last compressor stops. This will protect evaporator tube from freezing by refrigerant migration. This is why evaporator water pump output relay must be used to control the chilled water pump. This is not mandatory if glycol is used with protection down to lowest ambient expected.

1. Water pump and heaters

a. Heaters are factory installed on water boxes and evaporator shell. They will protect it from freezing in ambient temperatures down to -20°C. Heaters are installed on the water piping and on the pumps of units equipped with hydraulic module.
b. Install heat tape on all water piping, pumps, and other components that may be damaged if exposed to freezing temperatures. Heat tape must be designed for low ambient temperature applications. Heat tape selection should be based on the lowest expected ambient temperature.
c. Tracer™ UC800 controller can start the pump(s) when freezing conditions are detected. For this option the pumps must be controlled by the RTAF unit and this function validated on the chiller controller.
d. Water circuit valves need to stay open at all times.

Note: *Water pump control and heater combination will protect the evaporator down to any ambient temperature provided power is available to the pump and the UC800 controller. This option will NOT protect the evaporator in the event of power failure to the chiller unless backup power is supplied to the necessary components.*

Note: *When no chiller operation is possible and the pump is already off, UC800 pump control function for freeze protection will command the pump to turn on:*

- *ON if the average of the evaporator entering water temperature, evaporator leaving temperature, and the evaporator refrigerant pool temperature is less than Low Evaporator Refrigerant Temperature Cutout (LERTC) + 2.2°C for a period of time*
- *OFF again if the evaporator refrigerant pool temperature rise above LERTC + 3.3°C for a period of time*

Note: *The period of time referenced for ON and OFF conditions above described is dependent on past running conditions and present temperature measured.*

- *ON if entering OR leaving water temperature < LWTC for 16.2°C-sec*
- *OFF again if water temperature > LWTC for 30 min*

OR

2. Freeze inhibitor

a. Freeze protection can be accomplished by adding sufficient glycol to protect against freezing down to the lowest ambient expected.
b. See “evaporator glycol requirement” section for guidance on determining the glycol concentration.

Note: *Use of glycol type antifreeze reduces the cooling capacity of the unit and must be considered in the design of the system specifications.*

OR

3. Drain water circuit

For ambient temperatures below -20°C and for those installation not including either option 1 or 2 above described
a. Shut off power supply to unit and to all heaters.
b. Purge the water circuit
c. Blow out the evaporator to ensure that no liquid is left inside the evaporator and the water lines. Drain the pump.

CAUTION! Evaporator damage!
If insufficient concentration or no glycol is used, the evaporator water pumps must be controlled by the UC800 to avoid severe damage to the evaporator due to freezing. A power loss of 15 minutes during freezing can damage the evaporator. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls. Please consult the table named “Recommended Low Evaporator Refrigerant Cutout (LRTC) and % Glycol for RTAF chillers”.
With factory-fitted disconnect switch option, evaporator trace heating is taken from the live side of the isolator. As a consequence, the heaters are energized as long as the main switch is closed. Supply voltage to the heating tapes is 400V.

The warranty will be void, in case of freezing due to the lack of use of either of these protections.

Evaporator Waterside

Evaporator Glycol Requirement

Table 19 – Leaving water temperature cutout & glycol mass percent recommended for RTAF chillers with Standard tubes

Unit type		Ethylene Glycol													
		HE/XE/HSE Units													
ΔT evaporator coolant (K)		2	3	4	5	6	7	8	2	3	4	5	6	7	8
LWT (°C)	LWTC (°C)	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol
4	1.2	-	4	4	4	4	4	5	13	4	4	4	4	4	5
2	-0.8	-	8	8	9	10	12	-	18	8	8	9	10	12	-
0	-2.8	13	13	13	15	19	-	-	22	13	13	15	19	-	-
-2	-4.8	18	18	19	-	-	-	-	24	18	19	-	-	-	-
-4	-6.8	22	22	-	-	-	-	-	25	22	-	-	-	-	-
-5	-7.8	24	25	-	-	-	-	-	27	25	-	-	-	-	-
-6	-8.8	25	29	-	-	-	-	-	29	29	-	-	-	-	-
-7	-9.8	27	-	-	-	-	-	-	31	-	-	-	-	-	-
-8	-10.8	29	-	-	-	-	-	-	-	-	-	-	-	-	-
-9	-11.8	31	-	-	-	-	-	-	-	-	-	-	-	-	-
-10	-12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-11	-13.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-12	-14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 20 – Leaving water temperature cutout & glycol mass percent recommended for RTAF chillers with Standard tubes

Unit type		Monopropylene Glycol													
		SE/HSS Units							HE/XE/HSE Units						
ΔT evaporator coolant (K)		2	3	4	5	6	7	8	2	3	4	5	6	7	8
LWT (°C)	LWTC (°C)	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol	%wt Glycol
4	1.2	-	4	4	4	4	5	-	-	4	4	4	4	5	-
2	-0.8	10	9	10	12	-	-	-	10	9	10	12	-	-	-
0	-2.8	15	16	21	-	-	-	-	15	16	21	-	-	-	-
-2	-4.8	20	-	-	-	-	-	-	20	-	-	-	-	-	-
-4	-6.8	27	-	-	-	-	-	-	27	-	-	-	-	-	-
-5	-7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-6	-8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-7	-9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-8	-10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The table above is for RTAF sizes 090 to 245. For RTAF sizes 250 to 450, please consult your local Trane Sales Office.

Table 21 – Leaving water temperature cutout & glycol mass percent recommended for RTAF chillers with Turbulators

Ethylene Glycol															
Unit type		**SE/HSS Units**							**HE/XE/HSE Units**						
ΔT evaporator coolant (K)		**2**	**3**	**4**	**5**	**6**	**7**	**8**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
LWT (°C)	**LWTC (°C)**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**
4	1.2	-	3	3	3	3	4	4	-	3	3	3	3	4	4
2	-0.8	-	8	8	9	9	10	11	-	8	8	9	9	10	11
0	-2.8	-	13	13	14	15	15	16	-	13	13	14	15	15	16
-2	-4.8	17	18	19	19	19	20	-	18	18	19	19	19	20	-
-4	-6.8	21	22	22	24	23	24	-	21	22	23	23	23	24	-
-5	-7.8	23	24	24	25	25	-	-	23	24	24	25	25	-	-
-6	-8.8	25	26	26	27	27	-	-	25	26	26	27	27	-	-
-7	-9.8	27	27	28	28	29	-	-	27	27	28	28	29	-	-
-8	-10.8	28	29	29	30	31	-	-	28	29	29	30	31	-	-
-9	-11.8	30	30	31	32	-	-	-	30	30	31	32	-	-	-
-10	-12.8	31	32	33	34	-	-	-	31	32	33	34	-	-	-
-11	-13.8	33	33	35	-	-	-	-	33	33	35	36	-	-	-
-12	-14.8	34	35	-	-	-	-	-	34	35	-	-	-	-	-

Table 22 – Leaving water temperature cutout & Ethylene Glycol mass percent recommended for RTAF chillers with standard tubes with turbulators

Monopropylene Glycol															
Unit type		**SE/HSS Units**							**HE/XE/HSE Units**						
ΔT evaporator coolant (K)		**2**	**3**	**4**	**5**	**6**	**7**	**8**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
LWT (°C)	**LWTC (°C)**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**	**%wt Glycol**
4	1.2	-	3	3	3	4	4	6	-	3	3	3	4	4	6
2	-0.8	-	9	10	11	12	13	13	-	9	10	11	12	13	13
0	-2.8	-	16	17	18	18	19	20	-	16	17	18	18	19	-
-2	-4.8	20	22	22	23	24	25	-	20	22	22	23	24	25	-
-4	-6.8	25	26	27	28	30	-	-	25	26	27	28	30	-	-
-5	-7.8	27	28	29	31	-	-	-	27	28	29	31	-	-	-
-6	-8.8	29	30	32	-	-	-	-	29	30	32	-	-	-	-
-7	-9.8	31	32	-	-	-	-	-	31	32	-	-	-	-	-
-8	-10.8	32	34	-	-	-	-	-	33	34	-	-	-	-	-

The table above is for RTAF sizes 090 to 245. For RTAF sizes 250 to 450, please consult your local Trane Sales Office.

Evaporator Waterside

Evaporator Minimum Flow with Glycol application

Table 23 – RTAF 90 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 90 SE/HSS/HE/XE/HSE 115B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	16	19	23	28	34
2	17	21	25	31	38
0	19	23	28	34	42
-2	22	26	31	38	48
-4	25	29	35	43	54
-6	28	33	40	49	61
-8		38	46	56	70
-10			53	64	80
-12			61	74	93

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	12	14	16	18	21
2	13	15	17	20	23
0	14	16	18	21	25
-2	15	17	20	23	27
-4	16	19	22	25	29
-6	18	20	24	27	32
-8	19	22	26	30	35
-10		24	28	33	39
-12			31	37	43

Table 24 – RTAF 105 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 105 SE/HSS/HE/XE/HSE 115A Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	18	22	26	32	40
2	20	24	29	36	45
0	23	27	33	40	50
-2	26	30	37	45	56
-4	29	34	41	51	63
-6	33	39	47	57	72
-8		45	54	65	82
-10			62	75	94
-12			72	87	109

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	14	16	18	21	24
2	15	17	20	23	26
0	16	19	22	25	29
-2	18	20	23	27	31
-4	19	22	25	29	34
-6	21	24	28	32	38
-8	22	26	30	35	41
-10		29	33	39	46
-12			37	43	50

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Table 25 – RTAF 125 SE/HSS/HE/XE/HSE - RTAF 145 SE/HE/XE/HSS/HSE

SIZE EVAP AWT (°C)	RTAF 125 SE/HE/XE/HSS/HSE RTAF 145 SE/HE/XE/HSS/HSE 165B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	23	27	33	40	50
2	25	30	36	45	55
0	28	33	40	50	62
-2	32	38	45	56	69
-4	36	43	51	63	78
-6	42	48	58	71	89
-8		56	67	81	102
-10			77	93	117
-12			89	108	135

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	17	20	23	26	30
2	19	21	25	28	33
0	20	23	27	31	36
-2	22	25	29	34	39
-4	24	27	32	37	43
-6	26	30	34	40	47
-8	28	32	38	44	51
-10		36	41	48	57
-12			46	53	63

Table 26 – RTAF 155 SE/HSS/HE/XE/HSE

SIZE EVAP AWT (°C)	RTAF 155 SE/HE/XE/HSS/HSE 165A Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	24	29	35	43	53
2	27	32	39	48	59
0	30	36	43	53	66
-2	34	40	48	59	74
-4	39	45	55	67	84
-6	44	52	62	76	95
-8		60	71	87	108
-10			82	100	125
-12			95	116	144

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	19	21	24	28	32
2	20	23	26	30	35
0	21	25	29	33	38
-2	23	27	31	36	42
-4	25	29	34	39	45
-6	27	32	37	43	50
-8	30	35	40	47	55
-10		38	44	52	60
-12			49	57	67

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Evaporator Waterside

Table 27 – RTAF 175 SE/HSS/HE/XE/HSE - RTAF 190 SE/HSS/HE/XE/HSE

SIZE EVAP AWT (°C)	RTAF 175 SE/HE/XE/HSS/HSE RTAF 190 SE/HE/XE/HSS/HSE 200B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	28	33	40	49	61
2	31	37	44	54	67
0	34	41	49	61	75
-2	39	46	55	68	85
-4	44	52	62	77	96
-6	51	59	71	87	109
-8		68	81	99	124
-10			94	114	142
-12			109	132	165

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	21	24	28	32	37
2	23	26	30	35	40
0	25	28	33	38	44
-2	27	31	35	41	47
-4	29	33	39	45	52
-6	31	36	42	49	57
-8	34	40	46	54	63
-10		43	51	59	69
-12			56	65	76

Table 28 – RTAF 205 SE/HSS

SIZE EVAP AWT (°C)	RTAF 205 SE/HSS 250C Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	32	38	46	56	69
2	35	42	51	62	77
0	39	47	57	70	86
-2	44	53	63	78	97
-4	50	59	72	88	110
-6	58	68	81	100	124
-8		78	93	114	142
-10			107	131	163
-12			125	151	189

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	24	28	32	37	42
2	26	30	35	40	46
0	28	32	37	43	50
-2	30	35	41	47	54
-4	33	38	44	51	59
-6	36	42	48	56	65
-8	39	45	53	61	72
-10		50	58	68	79
-12			64	75	87

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Table 29 – RTAF205 HE/XE/HSE - RTAF 245

SIZE EVAP AWT (°C)	RTAF 205 HE/XE/HSE RTAF 245 HE/XE/HSE 250B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	35	42	51	62	77
2	39	46	56	69	85
0	43	52	62	77	95
-2	49	58	70	86	107
-4	56	66	79	97	121
-6	64	75	90	110	137
-8		86	103	125	157
-10			118	144	180
-12			138	167	208

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	27	31	35	41	47
2	29	33	38	44	51
0	31	36	41	48	55
-2	34	39	45	52	60
-4	36	42	49	56	66
-6	40	46	53	62	72
-8	43	50	58	68	79
-10		55	64	75	87
-12			70	82	96

Table 30 – RTAF 250 SE/HSS/HE/XE/HSE

SIZE EVAP AWT (°C)	RTAF 250 SE/HE/XE/HSS/HSE 300D Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	35	41	50	61	76
2	38	46	55	68	84
0	43	51	62	76	94
-2	48	57	69	85	106
-4	55	65	78	96	120
-6	63	74	89	109	136
-8		85	101	124	155
-10			117	143	178
-12			136	165	206

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	26	30	35	40	46
2	28	33	38	43	50
0	31	35	41	47	54
-2	33	38	44	51	59
-4	36	42	48	56	65
-6	39	45	53	61	71
-8	43	49	58	67	78
-10		54	63	74	86
-12			70	81	95

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Evaporator Waterside

Table 31 – RTAF 280 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 280 SE/HE/XE/HSS/HSE 300B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	39	47	57	70	86
2	43	52	63	77	96
0	49	58	70	86	107
-2	55	65	78	96	120
-4	62	73	88	109	135
-6	72	84	100	123	154
-8		96	115	141	176
-10			133	162	202
-12			154	187	233

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	30	34	40	45	52
2	32	37	43	49	57
0	35	40	46	53	62
-2	38	43	50	58	67
-4	41	47	55	63	74
-6	44	51	60	69	81
-8	48	56	65	76	89
-10		61	72	84	98
-12			79	92	108

Table 32 – RTAF310 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 310 SE/HE/XE/HSS/HSE 300A Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	45	53	65	79	98
2	49	59	72	88	109
0	55	66	80	98	121
-2	62	74	89	110	136
-4	71	84	101	124	154
-6	82	95	114	140	175
-8		110	131	160	200
-10			151	184	229
-12			175	213	265

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	34	39	45	52	60
2	37	42	49	56	65
0	40	46	53	61	70
-2	43	49	57	66	77
-4	46	54	62	72	84
-6	50	58	68	79	92
-8	55	64	74	86	101
-10		70	81	95	111
-12			90	105	123

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Table 33 – RTAF 350 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 350 SE/HE/XE/HSS/HSE 500D Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	49	58	71	87	107
2	54	65	78	96	119
0	61	72	87	107	133
-2	68	81	98	120	149
-4	78	91	110	135	169
-6	89	104	125	153	192
-8		120	143	175	219
-10			165	201	251
-12			192	233	290

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	37	43	49	57	65
2	40	46	53	61	71
0	43	50	58	66	77
-2	47	54	62	72	84
-4	51	59	68	79	92
-6	55	64	74	86	100
-8	60	70	81	95	110
-10		76	89	104	122
-12			98	115	135

Table 34 – RTAF 380 SE/HSS/HE/XE/HSE

SIZE EVAP / AWT (°C)	RTAF 380 SE/HE/XE/HSS/HSE 500C Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	54	65	79	96	119
2	60	72	87	107	132
0	67	80	97	119	148
-2	76	90	108	133	166
-4	86	102	122	150	187
-6	99	116	139	170	213
-8		133	159	194	243
-10			183	223	279
-12			213	259	322

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	41	48	55	63	72
2	45	51	59	68	78
0	48	55	64	74	85
-2	52	60	69	80	93
-4	56	65	75	88	102
-6	61	71	82	96	111
-8	67	77	90	105	123
-10		85	99	116	135
-12			109	127	150

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Evaporator Waterside

Table 35 – RTAF410 SE/HSS/HE/XE/HSE - 450 HSE

SIZE EVAP AWT (°C)	RTAF 410 SE/HE/XE/HSS/HSE RTAF 450 HSE 500B Min Coolant Flow (m³/h) %Wt Mono Propylene Glycol				
	20%	25%	30%	35%	40%
4	59	71	86	105	130
2	66	78	95	116	144
0	73	87	106	130	161
-2	83	98	118	145	181
-4	94	111	134	164	205
-6	108	127	152	186	232
-8		146	174	212	265
-10			200	244	305
-12			233	282	352

AWT (°C)	%Wt Ethylene Glycol				
	20%	25%	30%	35%	40%
4	45	52	60	69	79
2	49	56	64	74	86
0	53	61	70	81	93
-2	57	66	76	88	102
-4	62	71	82	96	111
-6	67	78	90	105	122
-8	73	85	98	115	134
-10		93	108	126	148
-12			119	139	163

AWT: Average Water Temperature which is the average of Leaving Water Temperature and Entering Water Temperature.

Table 36 – Recommended Low Evaporator Refrigerant Cutout (LRTC) and % Glycol for RTAF chillers size 090 to 245

	Ethylene Glycol			Mono Propylene Glycol		
Glycol Percentage (weight %)	Solution Freeze Point (°C)	Low refrigerant temperature Cutout LRTC (°C)	Minimum Recommended LWTC (°C)	Solution Freeze Point (°C)	Low refrigerant temperature Cutout LRTC (°C)	Minimum Recommended LWTC (°C)
0	0	-1.9	1.7	0	-1.9	1.7
2	-0.6	-2.4	1.1	-0.6	-2.4	1.1
4	-1.3	-3.2	0.4	-1.2	-3.1	0.5
5	-1.7	-3.6	0	-1.5	-3.4	0.2
6	-2.1	-3.9	-0.4	-1.8	-3.7	-0.2
8	-2.8	-4.7	-1.2	-2.4	-4.3	-0.8
10	-3.6	-5.5	-1.9	-3.1	-5	-1.4
12	-4.5	-6.4	-2.8	-3.8	-5.7	-2.2
14	-5.4	-7.3	-3.7	-4.6	-6.4	-2.9
15	-5.8	-7.7	-4.2	-4.9	-6.8	-3.3
16	-6.3	-8.2	-4.7	-5.3	-7.2	-3.7
18	-7.4	-9.3	-5.7	-6.2	-8.1	-4.5
20	-8.4	-10.3	-6.8	-7.1	-8.9	-5.4
22	-9.6	-11.5	-7.9	-8	-9.9	-6.3
24	-10.8	-12.7	-9.2	-9.1	-10.9	-7.4
25	-11.4	-13.3	-9.8	-9.6	-11.4	-7.9
26	-12.1	-14	-10.4	-10.1	-12	-8.4
28	-13.5	-15.4	-11.8	-11.3	-13.2	-9.7
30	-14.9	-16.8	-13.3	-12.6	-14.5	-10.9
32	-16.5	-18.4	-14.8	-14	-15.9	-12.3
34	-18.2	-20.1	-15	-15.5	-17.4	-13.8
35	-19.1	-20.6	-15	-16.3	-18.2	-14.6
36	-19.9	-20.6	-15	-17.1	-18.9	-15
38	-21.8	-20.6	-15	-18.8	-20.6	-15
40	-23.8	-20.6	-15	-20.7	-20.6	-15
42	-25.9	-20.6	-15	-22.7	-20.6	-15
44	-28.1	-20.6	-15	-24.8	-20.6	-15
45	-29.3	-20.6	-15	-25.9	-20.6	-15
46	-30.5	-20.6	-15	-27.1	-20.6	-15
48	-32.9	-20.6	-15	-29.5	-20.6	-15
50	-35.6	-20.6	-15	-32.1	-20.6	-15

CAUTION!

1. Additional glycol beyond the recommendations will adversely affect unit performance. The unit efficiency will be reduced and the saturated evaporator temperature will be reduced. For some operating conditions this effect can be significant.
2. If additional glycol is used, then use the actual % glycol to establish the low refrigerant cutout set point.
3. The minimum low refrigerant cutout set point allowed is - 20.6°C. This minimum is established by the solubility limits of the oil in the refrigerant.
4. With glycol application, ensure that there is no fluctuation of brine flow versus Order Write Up value, as a reduction of flow will adversely affect unit performance and behaviour.

Evaporator Waterside

Table 37 – Recommended Low Evaporator Refrigerant Cutout (LRTC) and % Glycol for RTAF chillers size 245 to 450

	Ethylene Glycol			Mono Propylene Glycol		
Glycol Percentage (weight %)	Solution Freeze Point (°C)	Minimum Recommended LRTC (°C)	Minimum Recommended LWTC (°C)	Solution Freeze Point (°C)	Minimum Recommended LRTC (°C)	Minimum Recommended LWTC (°C)
0	0.0	0.0	2.8	0.0	0.0	2.8
2	-0.6	-1.4	2.2	-0.6	-1.4	2.2
4	-1.3	-2.1	1.5	-1.2	-2.0	1.6
5	-1.7	-2.5	1.1	-1.5	-2.3	1.3
6	-2.0	-2.9	0.7	-1.8	-2.6	1.0
8	-2.8	-3.6	0.0	-2.5	-3.3	0.3
10	-3.6	-4.5	-0.8	-3.1	-4.0	-0.4
12	-4.5	-5.3	-1.7	-3.8	-4.7	-1.1
14	-5.4	-6.2	-2.6	-4.6	-5.4	-1.8
15	-5.9	-6.7	-3.1	-5.0	-5.8	-2.2
16	-6.3	-7.2	-3.6	-5.4	-6.2	-2.6
18	-7.4	-8.2	-4.6	-6.2	-7.0	-3.4
20	-8.4	-9.3	-5.7	-7.1	-7.9	-4.3
22	-9.6	-10.4	-6.8	-8.0	-8.8	-5.2
24	-10.8	-11.6	-8.0	-9.0	-9.9	-6.3
25	-11.4	-12.3	-8.7	-9.6	-10.4	-6.8
26	-12.1	-12.9	-9.3	-10.1	-11.0	-7.4
28	-13.5	-14.3	-10.7	-11.3	-12.2	-8.5
30	-15.0	-15.8	-12.2	-12.6	-13.4	-9.8
32	-16.5	-17.3	-13.7	-14.0	-14.8	-11.2
34	-18.2	-19.0	-15.0	-15.5	-16.3	-12.7
35	-19.0	-19.9	-15.0	-16.3	-17.1	-13.5
36	-19.9	-20.6	-15.0	-17.1	-17.9	-14.3
38	-21.8	-20.6	-15.0	-18.8	-19.6	-15.0
40	-23.8	-20.6	-15.0	-20.7	-20.6	-15.0
42	-25.9	-20.6	-15.0	-22.6	-20.6	-15.0
44	-28.1	-20.6	-15.0	-24.8	-20.6	-15.0
45	-29.3	-20.6	-15.0	-25.9	-20.6	-15.0
46	-30.5	-20.6	-15.0	-27.1	-20.6	-15.0
48	-33.0	-20.6	-15.0	-29.5	-20.6	-15.0
50	-35.6	-20.6	-15.0	-32.1	-20.6	-15.0

CAUTION!

1. Additional glycol beyond the recommendations will adversely affect unit performance. The unit efficiency will be reduced and the saturated evaporator temperature will be reduced. For some operating conditions this effect can be significant.
2. If additional glycol is used, then use the actual % glycol to establish the low refrigerant cutout set point.
3. The minimum low refrigerant cutout set point allowed is - 20.6°C. This minimum is established by the solubility limits of the oil in the refrigerant.
4. With glycol application, ensure that there is no fluctuation of brine flow versus Order Write Up value, as a reduction of flow will adversely affect unit performance and behaviour.

General Electrical Recommendations

Electrical Parts

When reviewing this manual keep in mind.

- All field-installed wiring must be in accordance with local regulations and CE directives and guidelines. Be sure to satisfy proper equipment grounding requirements according CE
- The following standardized values - Maximum Amps - Short Circuit Amps - Starting Amps are displayed on unit nameplate.
- All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

Note: *always refer to wiring diagrams shipped with chiller or unit submittal for specific electrical schematic and connection information.*
Important: *to prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30 volts.*

WARNING! Hazardous Voltage with Capacitor!
Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency TM Drive) capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

- For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharges capacitors. Verify with an appropriate voltmeter that all capacitors have discharged
- DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized

After disconnecting input power, wait five (5) minutes for units which are equipped with EC fans and wait twenty (20) minutes for units which are equipped with variable frequency drive (0V DC) before touching any internal components.

Failure to follow these instructions could result death or serious injury

For additional information regarding the safe discharge of capacitors, see "Adaptive Frequency™ Drive (AFD3) Capacitor Discharge" and BAS-SVX19B-E4.

Hazardous Voltage – Pressurized Burning Fluid!
Before removing compressor terminal box cover for servicing, or servicing power side of control panel, CLOSE COMPRESSOR DISCHARGE SERVICE VALVE and disconnect all electric power including remote disconnects. Discharge all motor start/run capacitors. Follow lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

Do not operate compressor without terminal box cover in place.

Failure to follow all electrical safety precautions could result in death or seriously injure.

CAUTION! To avoid corrosion, overheating or general damage, at terminal connections, unit is designed for copper mono-conductors only. In case of multiconductor cable, an intermediate connection box must be added. For cable with alternative material, bi-material connecting devices are mandatory. Cable routing inside control panel should be made case by case by installer. Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring. To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30V.

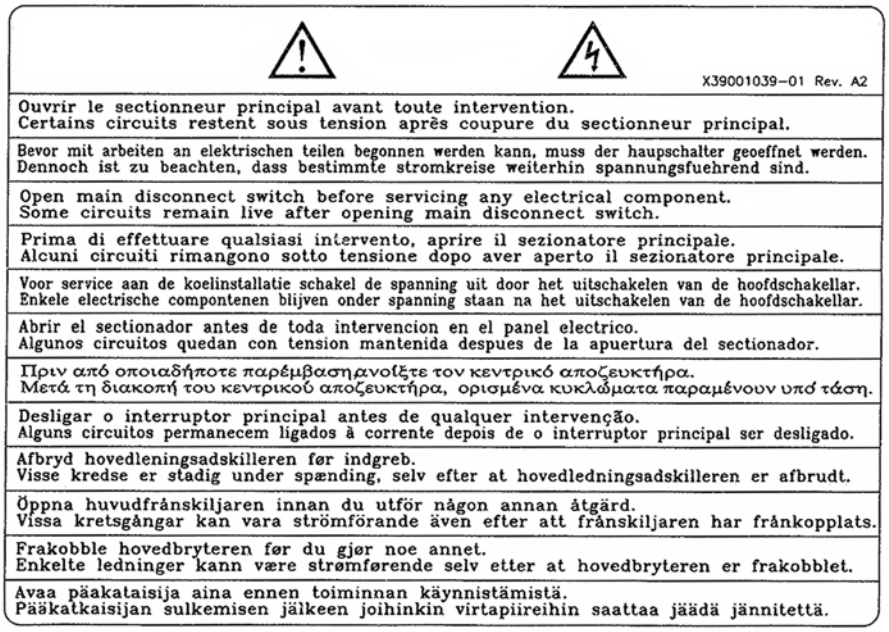
WARNING!
The Warning Label shown in Figure 19 is displayed on the equipment and shown on wiring diagrams and schematics. Strict adherence to these warnings must be observed. Failure to do so may result in personal injury or death.
CAUTION! Units must not be linked to the neutral wiring of the installation. Units are compatible with the following neutral operating conditions:

TNS	IT	TNC	TT
Standard	Special	Special	Standard*

* Differential protection should be suited for industrial machinery with current leak which can be higher than 500 mA (several motors and frequency drives).

General Electrical Recommendations

Figure 33 – Warning Label



Electrical data

To get the following electrical data details: Refer to General Data tables for each unit configuration and size.

- Maximum Power input (kW)
- Unit rated amps (Max compr +Fan+Control)
- Unit start up amps (Starting Amps of the largest compr+RLA of 2nd compr+RLA of all fans+ control)
- Compressor Power factor
- Disconnect switch size (A)
- Short Circuit Rating for all sizes =35 kA

For the control of every unit

- Max power input is 1.4 kW
- Max Amps is 3.4 A

Fan data

Standard Noise level/Low noise level

- Max Power Input (kW) 1.9
- Max Amps (A) 3.9

Extra Low Noise Level

- Max Power Input (kW) 2.6
- Max Amps (A) 3.9

Wiring diagrams are shipped with unit and can be found in the unit control panel.

Note : Rating is made for 400 V, 3 phases, 50 Hz power supply.

Installer-Supplied Components

Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

- Power supply wiring (in conduit) for all field-wired connections
- All control (interconnecting) wiring (in conduit) for field supplied devices
- Fused-disconnect switches

Power Supply Wiring

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with standard EN 60204. All wiring must comply with local codes. The installing (or electrical) contractor must provide and install the system interconnecting wiring, as well as-the power supply wiring. It must be properly sized and equipped with the appropriate fused-disconnect switches. The type and installation location(s) of the fused-disconnect switches must comply with all applicable codes.

Cut holes into the sides of the control panel for the appropriately-sized power wiring conduits. The wiring is passed through these conduits and connected to the terminal blocks.

To provide proper phasing of 3 phase input, make connections as shown in field wiring diagrams and as stated on the yellow WARNING label in the starter panel. Proper equipment grounds must be provided to each ground connection in the panel

CAUTION! Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit.

WARNING! To prevent injury or death, disconnect all electrical power sources before completing wiring connections to the unit.

CAUTION! The use of copper mono-conductors is the preferred solution to avoid corrosion and overheating at terminal connections.

Control Power Supply

Chiller is provided with control power transformer, it is not necessary to provide additional control power voltage to the unit.

Heater Power Supply

The evaporator shell is insulated from ambient air and protected from freezing for temperature down to -20°C by two thermostatically-controlled immersion heaters combined with evaporator pumps activation through Tracer UC800. Whenever the ambient temperature drops below 0°C the thermostat energizes the heaters and the Tracer UC800 activates the pumps. If ambient temperatures below -20°C are expected, contact your Trane local office.

CAUTION! The control panel main processor does not check for loss of power to the heat tape nor does it verify thermostat operation. A qualified technician must frequently verify power to the heat tape and confirm operation of the heat tape thermostat, to avoid catastrophic damage to the evaporator.

CAUTION! With factory-fitted disconnect switch, trace heating is taken from the live side of the isolator so power remains on. Supply voltage to the heating tapes is 400V.
In case of winter water drainage for freeze protection, it is compulsory to disconnect the evaporator heaters to protect them from burning due to overheat.

Water Pump Power Supply

Provide power-supply wiring with fused disconnect switch(es) for the chilled water pump(s).

Interconnecting Wiring

Chilled-Water Flow (Pump) Interlock

RTAF requires a field-supplied, control-voltage contact input through a flow proving switch (6S51) and an auxiliary contact (6K51). Connect the proving switch and auxiliary contact to terminal 2 connector J2 cards (1A14). Refer to the field wiring diagram for details.

Chilled-Water Pump Control

An evaporator water-pump output relay closes when the chiller is given a signal to go into the AUTO mode of operation from any source. The contact is opened to turn off the pump in the event of most machine-level diagnostics, to prevent the buildup of pump heat.

CAUTION! The evaporator water pump output relay must be used to control the chilled water pump and to benefit from the water pump timer function at startup and shutdown of the chiller. This is required when the chiller is in operation under freezing conditions, especially if the chilled water loop does not contain glycol.

CAUTION! Refer to Freeze Protection section for information about the evaporator circulating pump.

Installer-Supplied Components

The relay output from (1A11) is required to operate the evaporator water-pump (CHWP) contactor. Contacts should be compatible with a 115/230V (ac) control circuit. The CHWP relay operates in different modes depending on Tracer UC800 or Tracer BMS commands, if available, or service pumpdown (see maintenance section). Normally, the CHWP relay follows the AUTO mode of the chiller. Whenever the chiller has no diagnostics and is in the AUTO mode, regardless of where the auto command is coming from, the normally-open relay is energized. When the chiller exits the AUTO mode, the relay is timed open for an adjustable (using TU) 0 to 30 minutes. The non-AUTO modes in which the pump is stopped include Reset (88), Stop (00), External Stop (100), Remote Display Stop (600), Stopped by Tracer (300), Low-Ambient Run Inhibit (200), and Ice Building complete (101).

Table 38 – Pump Relay Operations

Chiller mode	Relay Operation
Auto	Instant close
Ice building	Instant close
Tracer Override	Timed Open
Stop	Timed Open
Ice Complete	Instant Open
Diagnostics	Instant Open*

- Exceptions noted in paragraphs following

When going from STOP to AUTO the CHWP relay is energized immediately. If evaporator water flow is not established in 4 minutes and 15 seconds, the Tracer UC800 de-energizes the CHWP relay and generates a non-latching diagnostic. If flow returns (i.e. other system controlling the pump), the diagnostic is cleared, the CHWP is re-energized, and normal control is resumed.

If evaporator water flow is lost after it has been established, the CHWP relay remains energized, the CHWP relay remains energized and a non-latching diagnostic is generated. If flow returns, the diagnostic is cleared and the chiller returns to normal operation.

In general, when there is either a non-latching or latching diagnostic, the CHWP relay is turned off as though there was a zero-time delay. Exceptions where the relay continues to be energized occur with:

1. A low Chilled-Water Temperature diagnostic (non-latching) (unless also accompanied by an Evaporator Leaving-Water Temperature Sensor Diagnostic)

   OR

2. A starter-contactor interrupt-failure diagnostic, in which a compressor continues to draw current even after commanded to shut down.

   OR

3. A Loss of Evaporator Water Flow diagnostic (non-latching) and the unit in the AUTO mode, after initially having proven evaporator water flow.

Alarm and Status Relay Outputs (Programmable Relays)

See RTAF **User Guide** for alarm and status relay outputs.

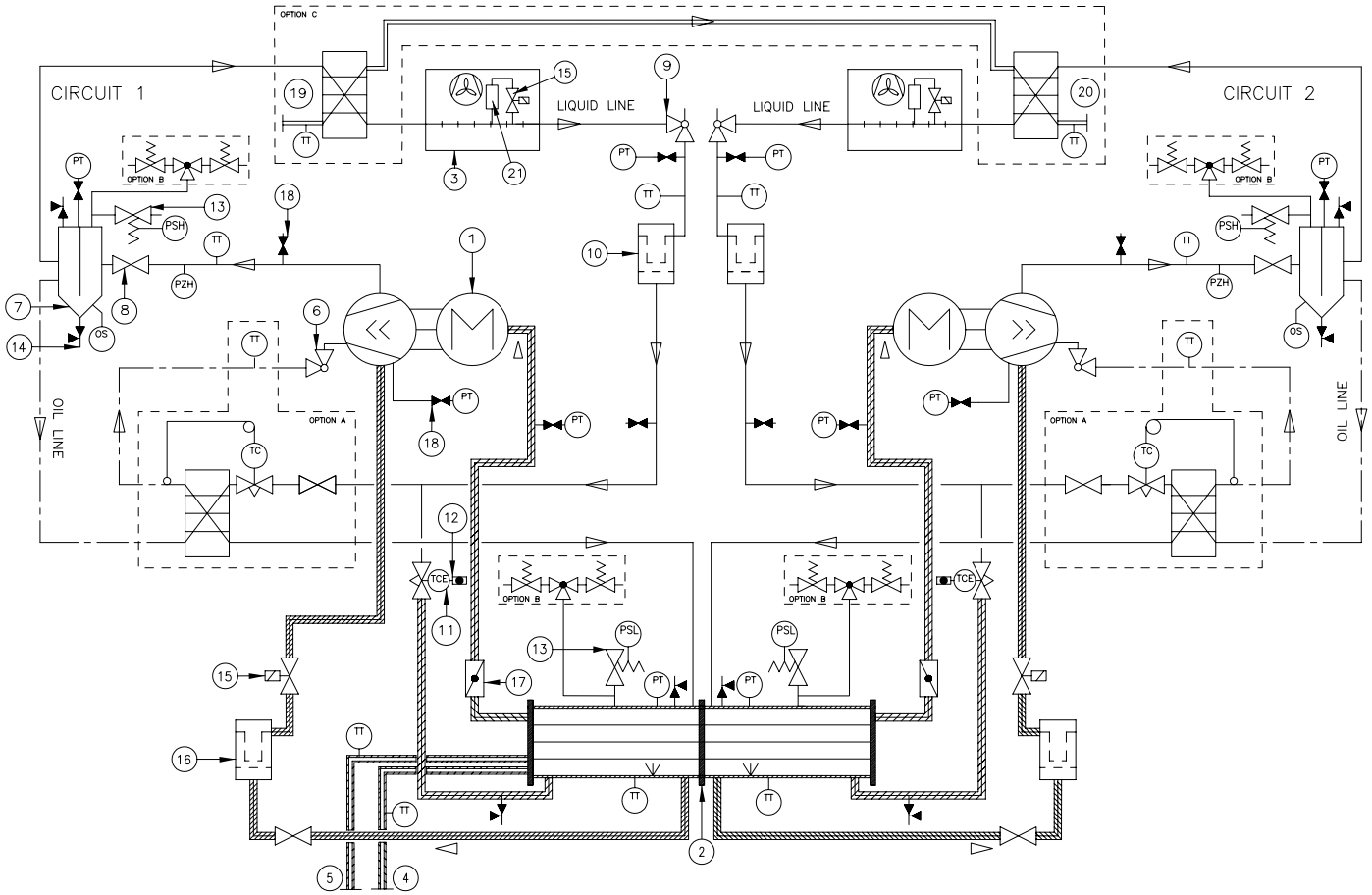
EDLS and ECWS Analog Input Signal Wiring Details

See RTAF **User Guide** for EDLS and ECWS.

Operating Principles

This section describes the overall operating principle of the RTAF design.

Figure 34 – Example of Typical Refrigerant System Schematic & Oil Lube Circuit Schematic



1 = Screw compressor
2 = Evaporator
3 = Air-cooled condenser
4 = Evaporator water inlet connection
5 = Evaporator water outlet connection
6 = Oil service valve
7 = Oil separator
8 = Discharge service valve
9 = Liquid shut off valve
10 = Filter drier
11 = Electronic expansion valve
12 = Sight glass
13 = Relief valve
14 = Service valve
15 = Oil line solenoid valve
16 = Oil filter
17 = Suction service valve
18 = Schraeder valve
19 = PHR water inlet connection
20 = PHR water outlet connection
21 = Refrigerant tank

PT = Pressure transducer
PSH = High pressure relief valve
PSL = Low pressure relief valve
PZH = High pressure switch
TT = Temperature sensor
TCE = Electronic expansion valve
TC = Expansion valve
OS = Optical sensor

Operating Principles

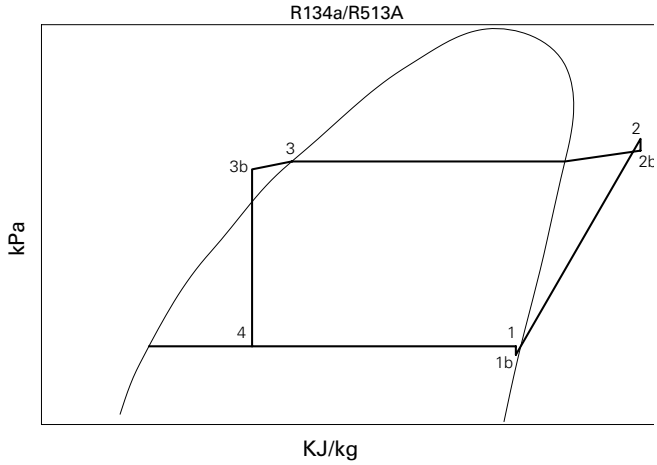
Refrigerant Circuit

Each unit has two refrigerant circuits, with one or two rotary screw per circuit. Each refrigerant circuit includes a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and electronic expansion valve. Fully modulating compressors and electronic expansion valve provide variable capacity modulation over the entire operating range.

Refrigerant Cycle

Typical refrigerant cycle on the RTAF is represented on the pressure enthalpy diagram shown in the figure below. Key state points are indicated on the figure. The cycle for the full load design point is represented in the plot.

Figure 35 – Pressure enthalpy (P-h) diagram



The RTAF chiller uses a shell and tube evaporator design with refrigerant evaporating on the shell side and water flowing inside tubes having enhanced surfaces (states 4 to 1). The suction lines are designed to minimize pressure drop (states 1 to 1b) the compressor is a twin-rotor helical rotary compressor designed similarly to the compressors offered in other Trane screw compressor based chiller (states 1b to 2). The discharge lines include a highly efficient oil separation system that removes 99,8% of the oil from the refrigerant stream going to the heat exchangers (states 2 to 2b). De-superheating, condensing and sub-cooling are accomplished in a microchannel cooled heat exchanger where refrigerant is condensed inside the microchannel (states 2b to 3b). Refrigerant flow through the system is balanced by an electronic expansion valve (states 3b to 4).

Refrigerant and Oil

RTAF use R134a or R513A, 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 properly qualified. All local and UE regulations in what handling, reclaiming, recovering and recycling, must be followed. R134a/R513A is a medium pressure refrigerant. It may not be used in any condition that would cause the chiller to operate in vacuum without a purge system. RTAF is not equipped with a purge system. Therefore RTAF must not be operated in a condition that would result in a saturated condition in the chiller of -26°C or lower. R134a/R513A requires the use of specific POE oils as designated on the unit nameplate. Use only R134a, Trane Oil 00048E in RTAF SE HE and XE chillers and Trane OIL 00317 in RTAF HSE/HSS chillers.

Compressor and Lube Oil System

The rotary screw compressor is semi-hermetic, direct drive with capacity control via a slide valve on SE, HE and XE versions and combined action of slide valve and variable frequency driver on the HSE/HSS version.
The motor is a suction gas cooled hermetically sealed, induction squirrel cage motor. Oil separator is provided separately from the compressor. Check valve in the compressor discharge and lube oil system are also provided.

Condenser and Fans

The air cooled Microchannel condenser coils use all aluminum brazed fin construction.
The coil is composed of three components: the flat microchannel tube, the fins located between the microchannel tubes, and two refrigerant manifolds. Coils can be cleaned with high pressure water (see Condenser Coils MCHE maintenance for instructions).
The condenser coil has an integral subcooling circuit. The maximum allowable working pressure of the condenser is 25.0 bars. Condensers are factory proof and leak tested at 45 bars.
Direct-drive vertical-discharge airfoil condenser fans are dynamically balanced.

Evaporator

The evaporator is a shell and tube heat exchanger design constructed from carbon steel shells and tube sheets with internally and externally finned seamless copper tubes mechanically expanded into the tube sheets. Tubes are cleanable with dismountable water boxes. Tubes diameter exterior is 19mm. Each tube is individually replaceable.
The evaporator is designed, tested and stamped in accordance with PED 97/23/CE Pressure Vessel Code for a refrigerant side working pressure of 14 bars. The evaporator is designed for a water side working pressure of 10 Bar. Standard water connections are grooved for Victaulic style pipe couplings. Water boxes are available in 1 or 2 passes configurations according to unit size and include an air vent, a drain and fittings for temperature control sensors. Evaporator is insulated with closed cell insulation.

Controls/Tracer TD7 Operator Interface

Controls Overview

Sintesis RTAF units use the following control/interface components:

- Tracer™ UC800 Controller
- Tracer TD7 Operator Interface

Communication Interfaces

There are four connections on the UC800 that support the communication interface. See RTAF User Guide to locate the following ports: “Wiring and Ports Description” section.

- BACnet MS/TP
- MODBUS Slave
- LonTalk using LCI-C (from the IPC3 bus)

See chiller User Guide for information on communication interface.

Tracer TD7 Operator Interface

Operator Interface

Information is tailored to operators, service technicians and owners. When operating a chiller, there is specific information you need on a day-to-day basis, like setpoints, limits, diagnostic information, and reports.

Day-to-day operational information is presented at the display. Logically organized groups of information-chiller mode of operation, active diagnostics, settings and reports put information conveniently at your fingertips.

Tracer™ TU

The TD7 operator interface allows for daily operation tasks and setpoint changes. However to adequately service Sintesis RTAF chillers, Tracer™ TU service tool is required (Non-Trane personnel, contact your local Trane office for software purchase information). Tracer TU adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime. This portable PC-based service-tool software supports service and maintenance tasks.

Pre-Start Checkout

Installation Checklist

Complete this checklist as the unit is installed, and verify that all recommended procedures are accomplished before the unit is started. This checklist does not replace the detailed instructions given in the "Installation Mechanical" and "Installation Electrical" sections of this manual. Read both sections completely, to become familiar with the installation procedures, prior beginning the work.

General

When installation is complete, before starting the unit, the following prestart procedures must be reviewed and verified:

1. Inspect all wiring connections in the compressor power circuits (disconnects, terminal block, contactors, compressor junction box terminals and so forth) to ensure they are clean and tight.
2. Open all refrigerant valves in the discharge, liquid, and oil return lines.
3. Check the power-supply voltage to the unit at the main-power fused-disconnect switch. Voltage must be within the voltage use range and also stamped on the unit nameplate. Voltage fluctuation must not exceed 10%. Voltage imbalance must not exceed 2%
4. Check the unit power phasing L1-L2-L3 in the starter to ensure that it has been installed in a "A-B-C" phase sequence.
5. Fill the evaporator chilled-water circuit. Vent the system while it is being filled. Open the vents on the top of the evaporator water box while filling and close when filling is completed.
6. Close the fused-disconnect switch(es) that supplies power to the chilled-water pump starter.
7. Start the chilled-water pump to begin circulation of the water. Inspect all piping for leakage and make any necessary repairs.
8. With water circulating through the system, adjust the water flow and check the water pressure drop through the evaporator.
9. Adjust the chilled-water flow switch for proper operation.
10. Reapply power to complete the procedures
11. Prove all Interlock and Interconnecting Wiring Interlock and External as described in the Electrical Installation section.
12. Check and set, as required, all UC800 TD7 menu items.
13. Stop the chilled-water pump.
14. Energize the compressor and oil separator heaters 24 hours, prior to unit start up.

Unit Voltage Power Supply

Unit voltage must meet the criteria given in the installation Electrical Section. Measure each lead of the supply voltage at the main power fused-disconnect switch for the unit. If the measured voltage on any lead is not within the specified range, notify the supplier of the power and correct the situation before operating the unit.

Unit Voltage Imbalance

Excessive voltage imbalance between the phases of a three-phase system can cause motors to overheat and eventually fail. The maximum allowable unbalance is 2%. Voltage imbalance is determined using the following calculations:

% Imbalance = [(Vx – Vave) x 100/Vave]

Vave = (V1 + V2 + V3)/3

Vx = phase with greatest difference from Vave (without regard to the sign)

Unit Voltage Phasing

It is important that proper rotation of the compressors be established before the unit is started. Proper motor rotation requires confirmation of the electrical phase sequence of the power supply. The motor is internally connected for clockwise rotation with the incoming power supply phases A-B-C.

When rotation is clockwise, the phase sequence is usually called "ABC", when counterclockwise "CBA"

This direction may be reversed by interchanging any two of the line wires.

1. Stop the unit from TD7/UC800.
2. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block(s) in the starter panel (or to the unit mounted disconnect).
3. Connect the phase-sequence indicator leads to the line power terminal block as follows;

Phase Sequence Lead	Terminal
Black (Phase A)	L1
Red (Phase B)	L2
Yellow (Phase C)	L3

4. Turn power on by closing the unit supply-power fused-disconnect switch.
5. Read the phase sequence on the indicator. The ABC LED of the phase indicator will glow.

WARNING! It is imperative that L1, L2, and L3 in the starter be connected in the A-BC phase sequence to prevent equipment damage due to reverse rotation.

WARNING! To prevent injury or death due to electrocution, take extreme care when performing service procedures with electrical power energized.

CAUTION! Do not interchange any load leads that are from the unit contactors or the motor terminals. Doing so may damage the equipment.

Water System Flow Rates

Establish a balanced chilled-water flow through the evaporator. The flow rates should be between the minimum and maximum values given on the pressure drop curves.

Water System Pressure Drop

Measure the water-pressure drop through the evaporator on the field installed pressure taps on the system water piping. Use the same gauge for each measurement. Do not include valves, strainers, or fittings in the pressure drop readings.

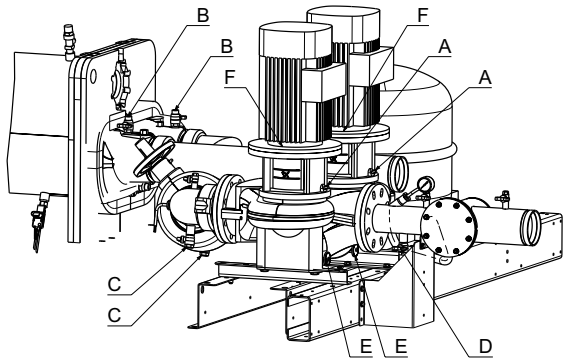
Integrated Pump Package (Optional)

Before starting up the pump, the pipe system must be thoroughly cleaned, flushed and filled with clean water. Do not start the pump until it has been vented. To ensure correct venting, open the vent screw located on the pump housing on the suction side (see next figure).

CAUTION! When using freeze inhibitor, never fill the system with pure glycol; this will damage the shaft seal. Always fill the system with diluted solution. Maximum concentration of glycol is 45% for unit with pump package.

If the chiller is installed in a humid environment or a location with high air humidity, the bottom drain hole on the pump motor should be opened. The enclosure class of the motor is then changed from IP55 to IP44. The function of the drain holes is to drain off water which has entered the stator housing with air humidity.

Figure 36 – Pump Package



A = Pump vent screw
B = Air vent valve
C = Drain valve
D= Drain and fill valve
E = Pump drain plug
F = Motor drain hole plug

Expansion Tank (Pump Package Option)

The factory installed expansion tank initial pressure should be adjusted about 0.5 bars higher than the static pressure applied to the chiller water inlet. The static pressure is given by the maximum water circuit height compare to chiller location: example: the chiller is at ground level and the circuit loop goes from basement (at -4m compare to chiller) to third floor at 10 metres above ground, the static pressure to use is 10 metres of water (1 Bar) and the expansion tank initial pressure should be 1.5 bars.

The expansion tank volume has been selected for typical loop volume. The following table summarizes the maximum volume of the chilled water loop that can be supported by the expansion tank at different conditions. If this maximum volume versus the required volume of the installation is not enough, it will be necessary to add an additional expansion tank located on the low pressure side of the installation.

Table 39 – Maximum water loop volume in function of static pressure

RTAF 090 - 250

Static pressure	1 Bar	2 Bar	3 Bar
Pure water (l)	6342	3996	1370
Ethylene glycol 20% (l)	3409	2148	736
Ethylene glycol 30% (l)	2273	1432	491
Ethylene glycol 45% (l)	1515	955	327

RTAF 280 - 450

Static pressure	1 Bar	2 Bar	3 Bar
Pure water (l)	9292	5854	2007
Ethylene glycol 20% (l)	5689	3584	1229
Ethylene glycol 30% (l)	4912	3095	1061
Ethylene glycol 45% (l)	4073	2566	880

Tracer UC800 Set-Up

Using Tracer TU service tool, adjust the settings. Refer to Tracer TU manual and UC800 user guide for instruction on settings.

CAUTION! To prevent compressor damage, do not operate the unit until all refrigerant valves and oil-line service valves are opened.

IMPORTANT! A clear sight glass alone does not mean that the system is properly charged. Also check system discharge superheat, approach temperature and unit operating pressures.

Unit Start Up Procedures

Daily Unit Start Up

The timeline for the sequence of operation begins with a power-up of the main power to the chiller. The sequence assumes 2 circuits, 2 compressors, Sintesis air cooled RTAF chiller with no diagnostics or malfunctioning components. External events such as the operator placing the chiller in AUTO or STOP, chilled water flow through the evaporator, and application of load to the chilled-water loop causing loop water-temperature increases, are depicted and the chiller responses to those events are shown, with appropriate delays noted. The effects of diagnostics, and other external interlocks other than evaporator water-flow proving, are not considered. Note: unless the UC800 TD7 and building automation system are controlling the chilled-water pump, the manual unit start sequence is as follows. Operator actions are noted.

General

If the present checkout, as discussed above, has been completed, the unit is ready to start.

1. Press the STOP key on the TD7 display.
2. As necessary, adjust the set point values on the TD7 menus using Tracer TU.
3. Close the fused-disconnect switch for the chilled-water pump. Energize the pump(s) to start water circulation
4. Check the service valves on the discharge line, suction line, oil line, and liquid line for each circuit. These valves must be open (back seated) before starting the compressors.
5. Verify that chilled-water pump runs for at least one minute after the chiller is commanded to stop (for normal chilled-water systems).
6. Press the AUTO key. If the chiller control calls for cooling, and all safety interlocks are closed, the unit will start. The compressor(s) will load and unload in response to the leaving chilled – water temperature;

After the system has been operating for approximately 30 minutes and has become stabilized, complete the remaining start up procedures, as follows:

1. Check the evaporator refrigerant pressure and the condenser refrigerant pressure under Refrigerant Report on the TD7.
2. Check the EXV sight glasses after enough time has elapsed to stabilize the chiller. The refrigerant flow through the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line, or an expansion valve that is stuck open. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost will often form on the line at this point. Proper refrigerant charges are shown in the General Information Section;
3. Measure the system discharge superheat.
4. Clean the air filter located on the door of the control panel of AFD only on following unit type:
   - RTAF HSE sizes 155 and 175 on circuit 1
   - RTAF HSE sizes 190 and 205 on each circuit

Seasonal Unit Startup Procedure

1. Close all valves and reinstall the drain plugs in the evaporator.
2. Service the auxiliary equipment according to the startup and maintenance instructions provided by the respective equipment manufacturers.
3. Close the vents in the evaporator chilled-water circuits.
4. Open all the valves in the evaporator chilled-water circuits.
5. Open all refrigerant valves.
6. If the evaporator was previously drained, vent and fill the evaporator and chilled-water circuit. When all air is removed from the system (including each pass), install the vent plugs in the evaporator water boxes.
7. Check the adjustment and operation of each safety and operating control.
8. Close all disconnect switches.
9. Refer to the sequence for daily unit start up for the remainder of the seasonal start up.

CAUTION! Ensure that the compressor and oil separator heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.

System Restart after Extended Shutdown

1. Verify that the liquid-line service valves, oil line, compressor discharge service valves, and optional suction service valves are open (back seated)
2. Check the oil separator oil level (see Maintenance procedures section)
3. Fill the evaporator water circuit. Vent the system while it is being filled. Open the vent on the top of the evaporator while filling, and close it when filling is completed.
4. Close the fused-disconnect switches that provide power to the chilled-water pump.
5. Start the evaporator water pump and, while water is circulating, inspect all piping for leakage. Make any necessary repairs before starting the unit.
6. While the water is circulating, adjust the water flow and check the water pressure drops through the evaporator. Refer to “water-system flow rates” and “water-system pressure drop”
7. Adjust the flow switch on the evaporator piping for proper operation
8. Stop the water pump. The unit is now ready for startup as described “Startup procedures”

CAUTION! To prevent damage to the compressor, ensure that all refrigerant valves are open before starting the unit. Do not use untreated or improperly treated water. Equipment damage may occur.

Temporary Shutdown and Restart

Temporary Shutdown is used for control operation, maintenance or to repair the unit typically less than one week.

To shut the unit down for a short time, use the following procedure:

1. Press the STOP key on the TD7. The compressors will continue to operate and, after unloading for 20 seconds, will stop when the compressor contactors de-energize.
2. Stop the water circulation by turning off the chilled water pump at least one minute after the stop of the compressors.

To restart the unit after a temporary shutdown, enable the chilled-water pump and press the AUTO key.

The unit will start normally, provided the following conditions exist:

- The UC800 receives a call for cooling and the differential-to-start is above the set point
- All system operating interlocks and safety circuits are satisfied

CAUTION! Under freezing conditions, the chilled water pump must remain in operation during the full shutdown period of the chiller if the chilled water loop does not contain glycol, to prevent any risk of evaporator freeze-up. Refer to charts 1 and 2.

Extended Shutdown Procedure

The following procedure is to be followed if the system is to be taken out of service for an extended period of time (i.e. seasonal shutdown):

1. Test the unit for refrigerant leaks and repair as necessary
2. Open the electrical disconnect switches for the chilled-water pump. Lock the switches in the “OPEN” position.
3. Close all chilled-water supply valves. Drain the water from the evaporator.
4. Open the unit main electrical disconnect and unit-mounted disconnect (if installed) and lock in the “OPEN” position.
5. At least every three months (quarterly), check the refrigerant pressure in the unit to verify the refrigerant charge integrity.

CAUTION! Lock the chilled-water pump disconnects open to prevent pump damage. Lock the disconnect switch in the “OPEN” position to prevent accidental startup and damage to the system when it has been set up for extended shutdown.

During an extended shutdown period, especially over the winter season, the evaporator must be drained of water, if the chilled water loop does not contain glycol, to prevent any risk of evaporator freeze-up.

Periodic Maintenance

General

Perform all maintenance procedures and inspections at the recommended intervals. This will increase the life of the chiller and minimize the possibility of costly failures.

Weekly Maintenance

After the unit has been operating for approximately 30 minutes and the system has stabilized, check the operating conditions and complete the procedures below:

1. Check on the TD7 pressure for evaporator, condenser, and intermediate oil.
2. Inspect the entire system for unusual conditions and inspect the condenser coils for dirt and debris. If the coils are dirty, refer to coil cleaning.

Monthly Maintenance

1. Perform all weekly maintenance procedures.
2. Record the system subcooling.
3. Record the system superheat.
4. Make any repairs necessary.

Annual Maintenance

1. Perform all weekly and monthly procedures
2. Check the oil sump oil level while the unit is off.

Note: *Routine changing of the oil is not required. Make an oil analysis to determine the condition of the oil.*

1. Have Trane or another qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level. This analysis is a valuable diagnostic tool.
2. Contact a qualified service organization to leak-test the chiller, to check operating and safety controls, and to inspect electrical components for deficiencies
3. Inspect all piping components for leakage and damage.
4. Clean and repaint any areas that show signs of corrosion.
5. Clean the condenser coils.
6. Clean the air filter located on the door of the control panel of AFD only on following unit type:
   - RTAF HSE sizes 155 and 175 on circuit 1
   - RTAF HSE sizes 190 and 205 on each circuit
7. Check and tighten all electrical connections as necessary.

CAUTION! A clear sight glass alone does not mean that the system is properly charged. Also check the rest of the system operating conditions.
WARNING! Position all electrical disconnects in the "Open" position and lock them to prevent injury or death due to electrical shock.

Refrigerant Emission Control

Conservation and emission reduction can be accomplished by following recommended Trane operation, maintenance, and service procedures, with specific attention to the following:

1. Refrigerant used in any type of air-conditioning or refrigerating equipment should be recovered and/or recycled for reuse, reprocessed (reclaimed). Never release refrigerant into the atmosphere.
2. Always determine possible recycle or reclaim requirements of the recovered refrigerant before beginning recovery by any method.
3. Use approved containment vessels and safety standards. Comply with all applicable transportation standards when shipping refrigerant containers.
4. To minimize emissions while recovering refrigerant, use recycling equipment. Always attempt to use methods that will pull the lowest possible vacuum while recovering and condensing refrigerant into containment.
5. Refrigerant-system cleanup methods that use filters and dryers are preferred. Do not use solvents that have ozone depletion factors. Properly dispose of used materials.
6. Take extra care to properly maintain all service equipment that directly supports refrigeration service work, such as gauges, hoses, vacuum pumps, and recycling equipment.
7. Stay aware of unit enhancements, conversion refrigerants, compatible parts, and manufacturer's recommendations that will reduce refrigerant emissions and increase equipment operating efficiencies. Follow the manufacturer's specific guidelines for conversion of existing system.
8. In order to assist in reducing power-generation emissions, always attempt to improve equipment performances with improved maintenance and operations that will help conserve energy resources.

Refrigerant and Oil-charge Management

Proper oil and refrigerant charge is essential for proper unit operation, unit performances, and environmental protection. Only trained and licensed service personnel should service the chiller.

Some of the symptoms of a refrigerant under-charged unit:

• Larger-than-normal evaporator approach temperatures (leaving water temperature – saturated evaporator temperature). If the refrigerant charge is correct the approch temperature is between 1°C and 1.5°C on circuit 1 and between 2°C and 2.5°C on circuit 2. These values are given for units running at full load and with water without antifreeze

• Low Evaporator-refrigerant temperature limit

• Low Refrigerant-Temperature cutout diagnostic

• Fully-open expansion valve

• Possible whistling sound coming from liquid line (due to high vapor velocity)

- Possible low discharge superheat at high loads
- High condenser + Subcooler pressure drop

Some of the symptoms of a refrigerant over-charged unit

- Condenser Pressure Limit
- High –Pressure Cutout diagnostic
- More-than-normal number of fans running
- Erratic fan control
- Higher-than-normal compressor power
- Very low discharge superheat at start up if the refrigerant charge is correct the discharge superheat is between 10°C and 15°C when the unit is running at full load
- Compressor rattle or grinding sound at start up

Some of the symptoms of an oil over-charged unit

- Larger-than-normal evaporator approach temperatures (Leaving-water-temperature – Saturated Evaporator Temperature)
- Low Evaporator-refrigerant Temperature limit
- Low Refrigerant – Temperature Cutout diagnostic
- Low unit capacity
- Low discharge superheat (specially at high loads)
- Compressor rattle or grinding sound
- High oil-sump level after normal shutdown

Some of the symptoms of an oil under-charged unit

- Compressor rattling or grinding sound
- Lower-than-normal pressure drop through oil system
- Seized or Welded compressors
- Low oil-sump level after normal shutdown
- Lower-than-normal oil concentrations in the evaporator

R134a/R513A Field – Charging Procedure

This procedure should be followed when the unit is empty of all refrigerant and under vacuum. Add the charge through the evaporator service valve.

1. Respect refrigerant type on the nameplate and do not mix R134a with R513A
2. Note the weight of the amount of charge removed. Compare it to the nameplate value. A difference in charge may indicate a leak.
3. Attach the charging hose to the evaporator service valve (9mm [3/8inch] flare). Open the service valve.
4. Add charge to the evaporator to bring the total circuit charge up to the level indicated in the unit nameplate.
5. Close the service valve and disconnect the charging hose.

Chiller settings

Prior starting refrigerant charge optimization, the technician must insure the following chiller conditions:

- Constant water flow on a air purged circuit is strictly necessary during the whole operation (water fl ow to be within allowed operating range)
- A fully loaded chiller is highly recommended for a successful operation. In case the technician is not able to ensure a 2 circuit fully loaded chiller then he must lockout one circuit and perform charge optimization for 1 circuit at a time
- When the refrigerant charge optimization is done per circuit the chiller load must not be lower than 60%

This procedure should be followed when adding refrigerant to an undercharged unit:

1. Attach the charging hose to the evaporator service valve (9mm [3/8inch] flare). Open the service valve.
2. Fix the leaving water set point (water temperature to be steady as much as possible).
3. Adjust water flow within operating range and keep it steady.
   a) Note approach temperature T1
   b) Add 2kg of R134a or R513A refrigerant
   c) Note approach temperature T2
   d) If Tn -Tn+1 < 0.2 (with n=1 → charge addition count) then charge is good and optimization is done
   e) If Tn -Tn+1 > 0.2 (with n=1 → charge addition count) then perform steps b) to e) if needed

This procedure should be followed when removing refrigerant to an overcharged unit:

1. Fix the leaving water set point (water temperature to be steady as much as possible)
2. Adjust water flow within operating range and keep it steady
   a) Note approach temperature T1
   b) Add 2kg of R134a or R513A refrigerant
   c) Note approach temperature T2
   d) Keep performing step b until Tm+1 -Tm > 0.5 (with m = 1 > charge removal count)
   e) Once step d) is confirmed add 4kg of R134a or R513A refrigerant and note T3
   f) If T1-Tn < 0.2 (with n = 3 → charge addition count) then charge is good and optimization is done
   g) If T1-Tn > (with n = 3 → charge addition count) then perform step e) to f) if needed

Isolation of the Refrigerant Charge on the Low side of the System

By closing the suction-line service valve, refrigerant charge can be isolated in the evaporator for maintenance on the compressor.

Returning the unit to running conditions:

1. Open all the valves.
2. Manually Open EXV for 15 minutes to allow the refrigerant drain to the evaporator by gravity.
3. Let the unit sit with heaters on to drive refrigerant out of the oil and warm up the compressor bearings. Depending upon ambient conditions, this may take up to 24 hours.
4. After the oil level has returned to normal, the unit can be put back into operation.

Periodic Maintenance

Low side Charge-isolation Procedure

After normal shutdown, most of the charge resides in the evaporator. Running cold water through the evaporator may also drive much of the refrigerant to the evaporator.

1. Make sure the circuit is off.
2. Close the suction-line isolation valve.
3. Close the liquid line service valve.
4. Close the liquid line service valve
5. Manually open the EXV
6. Use a liquid pump or vacuum pump to move refrigerant from the condenser to the evaporator. The liquid pump will only be effective if there is a lot of charge in the condenser. It may be connected to the condenser drain port on the liquid-line isolation valve.

Note: If a pump is to be used, connect it before closing this valve. This port is only isolated when the valve is back seated. If a vacuum pump is used, then connect it to the discharge-line service valve near to the oil separator. A vacuum pump will be required for part of the procedure.

The evaporator is large enough to hold all the charge, for any unit, below the centerline of the shell. Therefore, no special precautions are required to restart the unit after isolating the charge in the evaporator.

Refrigerant Filter Replacement – Changing Procedures

A dirty filter is indicated by a temperature gradient across the filter, corresponding to a pressure drop. If the temperature downstream of the filter is 4,4°C lower than the upstream temperature, the filter should be replaced. A temperature drop can also indicate that the unit is undercharged.

1. With the unit off, verify that the EXV is closed. Close the liquid-line isolation valve.
2. Attach the vacuum hose to the service port o the liquid-line filter flange.
3. Evacuate the refrigerant from the liquid-line and store.
4. Remove the vacuum hose.
5. Depress the Schrader valve to equalize pressure in the liquid line with atmospheric pressure.
6. Remove the bolts that retain the filter flange.
7. Remove the old filter element.
8. Inspect the replacement filter element and lubricate the o-ring with Trane OIL00048E for RTAF SE, HE and XE and with Trane OIL00317 for RTAF HSE and HSS.
9. Install the new filter element in the filter housing.
10. Inspect the flange gasket and replace it with a new one if damaged.
11. Install the flange and torque the bolts to 19-22 Nm (14-16 lb-ft).
12. Attach the vacuum hose and vacuum the liquid line.
13. Remove the vacuum hose from the liquid and attach the charging hose.
14. Replace the stored charge in the liquid line.
15. Remove the charging hose.
16. Open the liquid-line isolation valve.

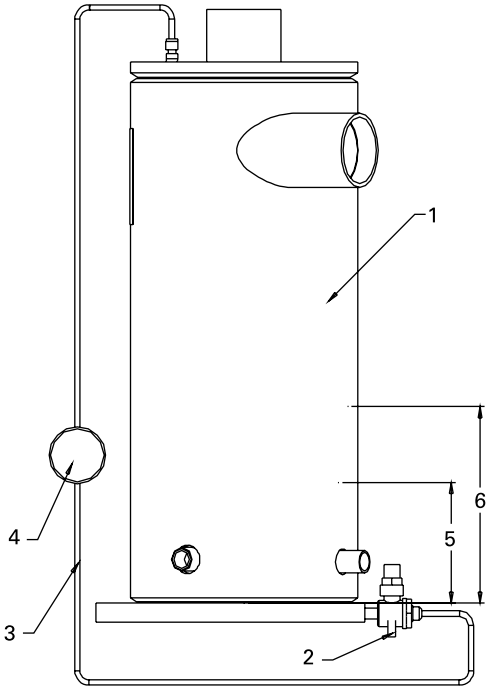
Lubrication System

The lubrication system has been designed to keep most of the oil lines filled with oil as long as there is a proper oil level in the oil sump.
The total oil charge can be removed by draining the oil system, the oil return line from the evaporator, the evaporator, and the compressor. Very small quantities of oil may be found in other components.
Proper charging of the oil system is critical to the reliability of the compressor and chiller. Too little oil can cause the compressor to run hot and inefficiently. When taken to an extreme, low oil level may result in instant failure of the compressor. Too much oil will result in high oil-circulation rates, which will foul the condenser and evaporator performances. This will result in inefficient operation of the chiller. Taken to an extreme, high oil levels may result in erratic expansion-valve control or shut down of the chiller due to evaporator low evaporator refrigerant temperature. Too much oil may contribute to long term bearing wear. Additionally, excessive compressor wear is probable when the compressor is started with the oil lines dry.

- Oil system consists of the following components:
- Compressor
- Oil separator
- Discharge line with service valve
- Oil line from separator to compressor
- Oil line drain (lowest point of the system)
- Oil cooler (with HA & Low temperature brine option)
- Oil temperature sensor
- Oil line shutoff valve with flare service connection
- Oil filter (internal to compressor) with flare-fitting service connection and Schrader valve
- Oil flow-control valve (internal to the compressor after the filter)
- Oil return line from evaporator with shutoff valve, oil filter, and solenoid control valve (for the manifold compressor circuits only)

Oil charging data.
The oil quantity is written on the nameplate of the unit.

Figure 37 – Oil system schematic: Oil level measurement.



1 = Oil separator
2 = Valve
3 = 1/4" refrigeration hose
4 = Sight glass
5 = Minimum oil level
6 = Maximum oil level

How to measure the ***oil level:***

1. Use the oil drain valve on the oil line and the service valve on the oil separator (bottom side). This measurement can be made, when the circuit is not running. Note: the bottom plate of the oil separator is approximately 25mm thick.
2. The initial oil charge should be approximately at the level in of the above chart. This is the approximate oil level if all the oil is in the oil lines, filter, and oil sump, and the unit is in vacuum so that there is no refrigerant dissolved in the oil.
3. After the unit has run for a while, the oil level in the sump can vary greatly. However, if the unit has run at "normal" conditions for a long time, the level should resemble the level in the above chart: Minimum level should be 50 mm, maximum should be 115 on 8" oil separators (compressors type M or L), 140 mm on 10" oil separators (compressor typ N) and 147 mm on 12" oil separators. However excessive oil in the system will deteriorate the evaporator approach temperature.

The field charging procedure depends on the circumstances that resulted in the need for oil charge.

1. Some services procedures may result in loss of small quantities of oil that must be replaced (oil analysis, compressor filter replacement, re-tubing the evaporator, and so forth).
2. Additionally, some maintenance procedures may result in virtually all the oil being removed (compressor motor burn or total removal of the charge to trouble shoot a unit).
3. Finally, leaks may result in a loss of oil that must be replaced.

Prelubrication

Prior to the oil charging procedure, a small amount of oil shall be injected in the port labeled "1" on Figure 26 Oil pushed into this location drains into the discharge port, which allows the oil to effectively cover the rotor end faces and rotor tips.

The only issue is that if the schraeder is not present on this port, the 7/16 o-ring boss plug normally in this location will have to be replaced by a 7/16-schraeder fitting (Trane part number VAL07306).

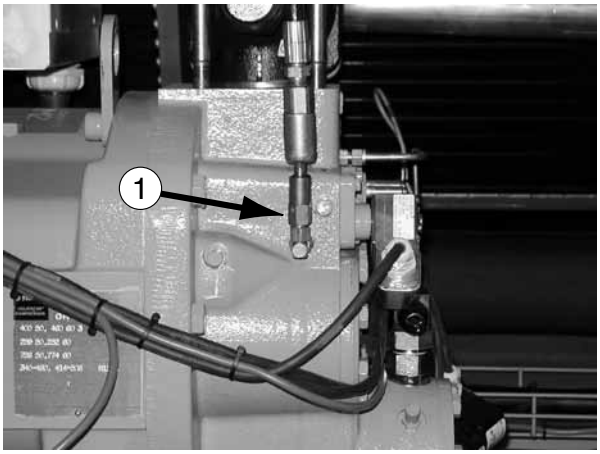
If this part is not available quickly, schraeder fitting 2 or 3 (Figure 26) could be removed and put in location 1. The plug would then replace the removed schraeder fitting.

1. Add 7/16 schraeder port where plug is today (Figure 26).
2. Pull compressor and unit into Vacuum.
3. Connect oil line to port (Figure 25).
4. Let vacuum draw in ½ litre of oil.

Option: pump in ½ litre of oil. In any case, never complete the entire oil charge by this port. This could lead to drastic damages for the compressor. Oil injected should be preheated.

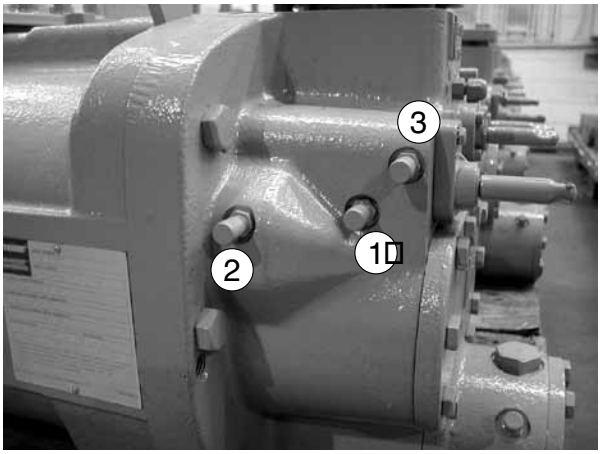
5. Remove the oil line.

Figure 38



Periodic Maintenance

Figure 39



Remaining Oil Charge

1. Add 0.95 litres (0.9kg) of oil to the motor cavity or suction line prior to installing the compressor into the chiller.
2. If the unit is not equipped with suction-line isolation valves, it should contain no charge. If it has isolation valves, then the charge may be trapped in the evaporator. In either case, the high side of the system should not be pressurized.
3. The oil-line shutoff valve must be open to allow the oil to pass into the oil lines and the oil separator.
4. The oil charging port is a 6mm (¼") flare fitting with a schraeder valve that is on the side of the oil filter housing. This is the port that must be used to add oil into the compressor so that the filter and lines are full at the first start of the compressor.
5. On single-compressor circuits, all the oil should be put into the circuit through the oil-charging port on the compressor filter housing. On two-compressor circuits, put approximately ½ of the oil into the unit through each of the two oil-charging ports on the two compressors.
6. Oil may be put into the unit using either of two methods:

    - Have the unit in vacuum. Note that the vacuum connection should be made on the unit at the service valve that is on the discharge line. Hook up one end of the oil-charging fitting and immerse the other end into the oil container. Let the vacuum draw the required amount of oil into the unit

    - Have the unit at the same pressure as the oil. Hook up one end of the oil-charging hose to the oil charging fitting and the other end to an oil pump. Use the pump to the draw oil out of the oil container and push the required amount of oil into the unit

Note: *the compressor filter has an internal shutoff valve that will prevent oil from entering the compressor while the compressor is not running. Therefore, there is no concern about flooding the compressor with oil.*

CAUTION! Use only Trane Oil 00048E in RTAF SE HE and XE chillers and Trane OIL 00317 for HSE version in the RTAF units to avoid any catastrophic damage to the compressor or unit. Deduct from final charge, all charge added for prelubrification to avoid over-charging.

Field Oil-Charging Procedure

Use the initial charging procedure under the following circumstances;

- When virtually all of the oil has been removed

- If the oil charge is removed from the compressor and oil system only, and the unit has been run for more than 15 minutes

- If the oil charge is removed from the compressor and oil system only, and the unit has been run for more than 15 minutes. However, reduce the amount of oil added to the unit by the normal quantity of oil in the refrigeration system

Note: *this procedure can be followed event with the refrigerant charge isolated in the evaporating section of the unit.*

If small quantities of oil were removed to service refrigeration components, such as the evaporator, replace the oil that was removed back into the serviced component prior to vacuum and recharge of the refrigerant.

If oil was removed to service a compressor or change the filter follow this procedure:

1. If the compressor is a new compressor or has been removed from the system and reworked, add 0.95 litre (0.90kg) of oil to the motor cavity prior to installing the compressor into the chiller.
2. Install the compressor in the system. Make sure that the filter shutoff valve is closed. Other compressor isolation valves may also be closed depending upon the service that was completed. For example, changing the oil filter would require the compressor to be isolated and pulled into vacuum.
   Note: *Ensure that the compressor is not pressurized.*
3. Open the flare fitting on the oil-line shutoff valve.
4. Open the flare fitting on the filter housing. This is the port that must be used to put oil into the compressor.
5. Install one end of the charging hose on the oil charging port (with the Schrader valve) and the other on the oil canister.
6. Lift the oil canister, or use a pump, to pour oil into the filter housing.
7. When oil comes out of the flare fitting on the oil-line shutoff valve, the filter is full. Stop adding oil.
8. Put the cap on the flare on the oil-line shutoff valve, remove the charging hose, and put the cap back on the flare on the filter housing.

9. Vacuum the compressor (low side) and prepare it for inclusion in the system. There is a service valve on the suction line and on the evaporator. Use these valves to vacuum the compressor.
10. Open the oil-line shutoff valve. Sever damage to the compressor can result if the oil-line shutoff valve is closed when the compressor is started.
11. Open the other compressor isolation valves.

Note: this procedure assumes that the oil that is put into the filter housing does not have contaminants such as non-condensable gases. The oil forces these gases out of the filter and oil-line shutoff valve, without the need to pull a vacuum on this small volume. If the oil has been in an open container or is otherwise contaminated, then this small volume must be subject to vacuum as well. However, the filter cavity is full of oil. Therefore, be sure to use a flash tank in line with the vacuum pump to ensure that the oil that is pulled out of the filter cavity does not slug the vacuum pump.

WARNING! Catastrophic damage to the compressor will occur if the oil-line shutoff valve or the isolation valves are left closed on unit startup.

Condenser Coils MCHE Maintenance

Cleaning Procedures

- It is mandatory to clean regularly the coils for a proper unit operation. Eliminate pollution and other residual material help to extend the life of the coils and the unit

CAUTION! Equipment Damage! Do not use coil cleaning agents to clean uncoated RTAF coils. Use clean water only. Use of coil cleaning agents on uncoated RTAF coils could cause damage to coils.

- Regular coil maintenance, including annual cleaning-enhances the unit's operating efficiency by minimizing compressor head pressure and amperage draw. The condenser coil should be cleaned at least once each year or more if the unit is located in a "dirty" or corrosive environment. Cleaning with cleansers or detergents is strongly discouraged due to the all-aluminum construction; straight water should prove sufficient. Any breach in the tubes can result in refrigerant leaks

WARNING! Hazardous Voltage!
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Disconnect Power to the unit.

CAUTION! Personal Protective Equipment (PPE) Required!
ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. If it becomes necessary to use cleaning agent, refer to the manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in minor to moderate injury.

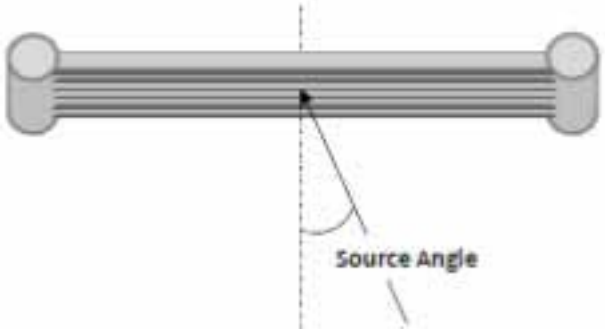
2. Wear proper personal protection equipment such as a face shield, gloves and waterproof clothing.
3. Remove enough panels from the unit to gain safe access to the microchannel coil.

Note: It is better to clean the coil from the opposite direction of normal air flow (inside of unit out) because this allows the debris to be pushed out rather than forced further into the coil.

WARNING! No Step Surface!
Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury. Important: Bridging between the main supports required before attempting to enter the unit. Bridging may consist of multiple 2 by 12 boards or sheet metal grating.

4. Use a soft brush or vacuum to remove base debris or surface loaded fibers from both sides of the coil.
5. Using a sprayer and water ONLY, clean the coil following the guidelines below.
   a. Sprayer nozzle pressure should not exceed 40 bars.
   b. The maximum source angle should not exceed 25 degrees (Figure 27) to the face of the coil. For best results spray the microchannel perpendicular to face of the coil.
   c. Spray nozzle should be approximately 5 to 10 cm from the coil surface.
   d. Use at least a 15° fan type of spray nozzle.

Figure 40 – Sprayer source angle



To avoid damage from the spray wand contacting the coil, make sure the 90° attachment does not come in contact with the tube and fin as abrasion to the coil could result.

Repair/Replacement of Microchannel Coil

Microchannel coils are considerably more robust in design than tube and fin condenser coils, however they are not indestructible. When damage or a leak occurs in the field, it is possible to temporarily repair the coil until another coil can be ordered.

If the leak is found to be within the tube area of the coil, a field repair kit (KIT16112) is available through your local Trane parts center. Because of the all-aluminum construction and aluminum's high thermal expansion rate, a leak located at or on the header assembly cannot be repaired.

Integrated Pump Maintenance (Optional with Pump Package)

Water Pump Maintenance

CAUTION! The lifting eyebolts of the motor are suitable for the weight of the motor only. It is not allowed to carry the complete pump on the lifting eyebolts of the motor.

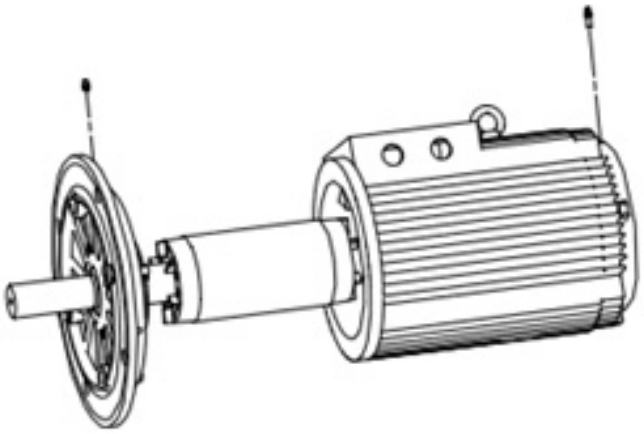
Lubrication

The bearings of motors 5.5kW and 7.5kW are greased for life and require no lubrication. The pump shaft seal does not require any special maintenance. Visual leakage check are however required. Distinctly visible leakage will require an exchange of the seal.

The bearing of motors 11kW and up must be greased every 4000 hours. The required grease quantity is 10g per bearing. The motor must run during lubrication.

Use lithium-based grease.

Figure 41 – Motor bearings



Log Check Sheet

The operator log sheet are included for use as appropriate, for installation completion verification before Trane Start-up is scheduled, and for reference during the Trane Start-up.

Operator Log				
Sintesis RTAF chiller with UC800 Controller - Tracer AdaptiView Reports - Log Sheet				
	Start	**15 minutes**	**30 minutes**	**1 hour**
Evaporator				
Active Chilled Water Setpoint				
Entering Water Temperature				
Leaving Water Temperature				
Ckt 1				
Saturated Refrigerant Temperature (°C)				
Refrigerant Pressure (kPa)				
Approach Temperature (°C)				
Water flow Status				
EXV % Open				
Ckt 2				
Saturated Refrigerant Temperature (°C)				
Refrigerant Pressure (psia)				
Approach Temperature (°C)				
Water flow Status				
EXV % Open				
Condenser				
Outdoor Temperature				
Ckt 1				
Air flow (%)				
Saturated Refrigerant Temperature (°C)				
Refrigerant Pressure (kPa)				
Subcooling in °C				
Ckt 2				
Air flow (%)				
Saturated Refrigerant Temperature (°C)				
Refrigerant Pressure (kPa)				
Subcooling in °C				
Compressor 1A				
Running Status				
Starts				
Running Time (Hr:min)				
Oil Pressure (kPa)				
Compressor 1B				
Running Status				
Starts				
Running Time (Hr:min)				
Oil Pressure (kPa)				
Motor 1A				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Current (Amps)				
AFD Average Input Voltage (Volts)				
AFD Input Power (KW)				
AFD Output Power (KW)				
AFD Speed (rpm)				
Motor 1B				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Current (Amps)				
AFD Average Input Voltage (Volts)				
AFD Input Power (KW)				
AFD Output Power (KW)				
AFD Speed (rpm)				
Compressor 2A				
Running Status				
Starts				
Running Time (Hr:min)				
Oil Pressure (psia)				
Compressor 2B				
Running Status				
Starts				
Running Time (Hr:min)				
Oil Pressure (psia)				
Motor 2A				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Current (Amps)				
AFD Average Input Voltage (Volts)				
AFD Input Power (KW)				
AFD Output Power (KW)				
AFD Speed (rpm)				
Motor 2B				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Current (Amps)				
AFD Average Input Voltage (Volts)				
AFD Input Power (KW)				
AFD Output Power (KW)				
AFD Speed (rpm)				

Date:
Technician:
Owner:

Notes

Notes

Notes

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