

Tranquility® (TRL) Series

Submittal Data

Models TRL 006-015 60Hz - HFC-410A



LC317

Rev.: February 24, 2023



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THE TRANQUILITY® TRL SERIES

The Tranquility TRL Series introduces the next generation in technology of commercial water source heat pumps. Its unmatched low-profile height allows it to be installed in ceiling spaces as low as 12" in height. This space saving solution gives architects greater freedom when designing buildings. When compared to other horizontal water source heat pumps on the market, the TRL series allows building owners the ability to reduce floor to floor slab height saving money in construction materials.

Available in horizontal configuration with sizes from 1/2-ton (1.76kW) through 1 ¼-ton (4.4kW) the Tranquility TRL Series exceeds ASHRAE 90.1 efficiencies and is eligible for LEED (Leadership in Energy and Environmental Design) points. Integrated water control options save system watts by preventing over pumping both when the unit is in operation and when its not. ECM fan motors maximize the systems airflow movement efficiency. Advanced communicating controls offer reduced startup and commissioning time by providing an easy to read gateway into the systems operating conditions. The low-profile product series design is paired with industry exclusive serviceability features along with many options for increased application flexibility and system efficiency.

The TRL series products are offered in a 9" height cabinet. This allows water source heat pump systems to be installed in mechanical ceiling spaces previously only serviced by other technologies. System design engineers now have greater flexibility when choosing highly efficient HVAC systems.

Braze plate heat exchangers increase heat transfer over a smaller area. They are light weight and compact when compared to traditional coaxial heat exchangers. The technology reduces the space required for the unit heat exchanger inside the product allowing for a feature driven compact design. An easy to access internally mounted water strainer helps protect the heat exchanger from contaminants that may get in the water loop and a water flow safety switch provides protection to the heat exchanger against no water/low water flow conditions.

ClimateMaster's double isolation compressor mounting system paired with the industry's first ever unit integrated sound attenuation box makes the Tranquility® TRL one of the quietest units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to heavy gauge mounting rails, which are then further isolated from the cabinet base with rubber grommets for maximized compressor sound attenuation. With the unit integrated sound attenuator the blower motor is mounted on a heavy gauge plate which is then isolated internally in the unit from the supply air duct work removing the hard connection between the two system components greatly reducing air flow sound transmission.

TRL products introduce industry first innovation in water source heat pump access and serviceability. Unit controls, electrical components, water components/circuit, refrigeration components/circuit, optional power disconnect, service tool connection, drain pan, air coil, air filter, water strainer, and blower motor assembly can all be accessed from the bottom of the unit. An internally framed construction design allows the unit to stay rigid even when access panels are removed. The unique design of the TRL cabinet construction also allows it to be serviced in may traditional ways as well. Unit controls can swivel to be accessed from the bottom, front, or top (tabletop service) of the unit. Service panels located below and around the unit allow access to water, electrical, refrigerant, and blower system components. This greatly increases the installer and service technicians' ability to access and interface the water source heat pump while it is installed in the ceiling.

iGate® 2 technology provides technicians an interface into the operation of the system in real time without the need for hard tooling. On board advanced controls communicate the key operating system temperatures enabling technicians to start-up, commission, and service the equipment remotely by smart phone or website via the cloud. Communication can also be done at the unit via a communicating thermostat or handheld service tool. Not only does iGate 2 monitor current performance, it also allows the functionality to make system adjustments and captures operating conditions at time of fault. All this information is displayed in an easy to read format maximizing the usability of the experience.

The TRL bottom blower access design is an industry first innovation and changes how users interact with the product. The complete blower assembly can be slid down from the bottom of the unit. A built in safety latch allows the blower assembly to be removed after the access panel is removed. The assembly slides down to rest on a service rail where the technician can service the motor or remove the whole assembly by disconnecting one electrical quick connector.

When working on horizontally installed products reaching the drain pan for servicing can be difficult without removing duct work or dropping the unit. The TRL design rethinks the way technicians access drain pans. The drain pan can be accessed/cleaned through a bottom access panel and can be removed/replaced from the bottom of the unit without removing any duct work or dropping the unit.

The Tranquility® TRL Series Water-Source Heat Pump introduces new technology into the market that is unmatched by others. The serviceability features set a new standard that contractors will come to expect from the worlds leading supplier of water source heat pumps. The TRL Series is designed to meet the challenges of today's HVAC demands with one of the most innovative products available on the market.

Features, Options and Accessories

FEATURES

- Sizes 006 (1/2 ton, 1.76 kW) through 015 (1 1/4 tons, 4.4 kW)
- All sizes are a low 9" (22.9) in height
- EarthPure® HFC-410A refrigerant
- Exceeds ASHRAE 90.1 efficiencies
- Bottom access unit controls, electrical components, water components/circuit, refrigeration components/circuit, power disconnect (optional), service tool connection, drain pan, air coil, air filter, water strainer, and blower motor assembly
- Constant Torque (CT) high efficient ECM fan motor
- Brazed Plate Heat Exchanger
- iGate® 2 Communicating Controls Powered by CXM2
 - Multiple communication pathways,
 - o Cloud-based connectivity via iGate 2 Wi-Fi communicating color touch screen thermostat for remote monitoring, access, and diagnosis. Including the new functionality for contractors/building engineers to monitor and make mass changes on multi-unit systems
 - o Connect directly to the system with use of a handheld service tool
 - Provides real-time unit operating conditions
 - Reduces start-up, commissioning, and service time by removing the need for hard tooling to take temperature measurements
 - Captures operating conditions in the event of a safety shutdown
- Unit Performance Sentinel performance monitoring system
- Nine standard safeties including water flow confirmation switch
- Field configurable controls access from the bottom, front or top of the unit
- Robust service tool connection located on the unit outside corner post
- Internally framed galvanized steel construction
- Integrally designed sound reducing attenuator box
- Unique double isolation compressor mounting for quiet operation
- Insulated divider and separate compressor/air handler compartments
- TXV metering device
- 20 mesh water strainer
- Easy to clean rust prohibitive stainless steel drain pans with condensate overflow sensor
- Field configurable supply air opening(s)

OPTIONS

- Industry leading Ultra-Quiet sound attenuation package
- Auto flow regulators that limit water flow to the unit preventing system over pumping
- Two-way motorized water valve that prevents water flow through the unit when it is not in operation increasing system pumping efficiency
- Corrosive resistant Tin-plated or E-coated air coils
- Internally mounted water pump for single pipe systems
- Robust high pressure flow switch for system loop pressure designs above 160 psi
- BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Bottom access unit integrated power disconnect
- 2" filter frames to support higher indoor air quality filters
- Factory configured supply air opening(s)
- Extended range insulation for geothermal applications

ACCESSORIES

- Stainless steel braided hose kits
- Selection of thermostats including programmable, Wi-Fi, and color touch screen
- Filters - 1" (Merv 8) or 2" (Merv 11 & 13)

iGate[®] 2 Communicating Controls Powered by CXM2

iGate[®] 2 Communication – Cloud connected, web-enabled information gateway to monitor, control, and diagnose your system



Tranquility[®] (TRL) Series is equipped with industry-first, iGate[®] 2 communication information gateway that allows users to interact with their water-source system in easy to read clear language.

Monitor/Configure – Installers can configure from the myUplink PRO website, mobile app, iGate 2

Communicating (AWC) Thermostat, or diagnostic tool, including: Unit family, size, accessory configuration, and demand reduction (optional, to limit unit operation during peak times). Users can look up the current system status: temperature sensor readings and operational status of the blower.

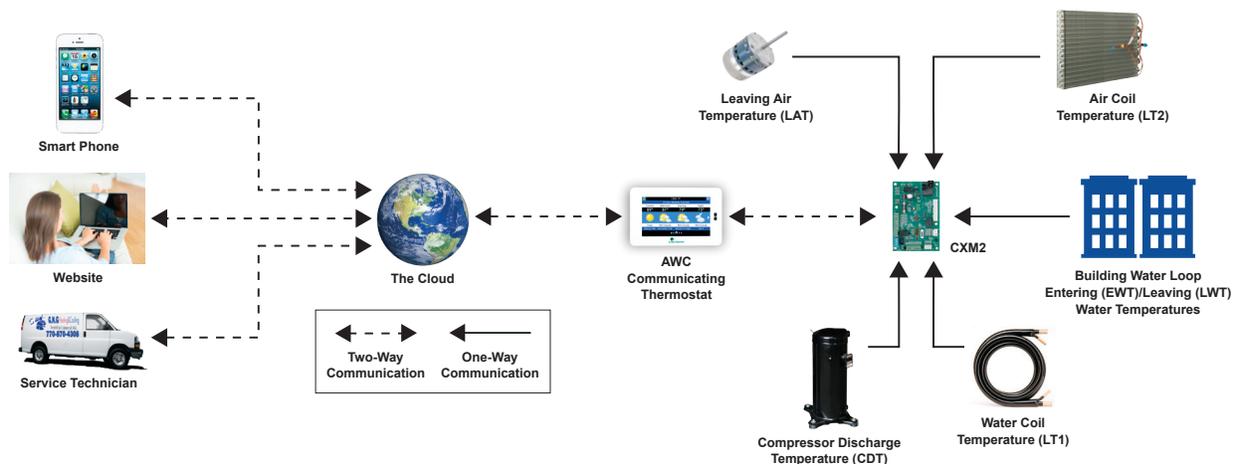
Precise Control – The new CXM2 board enables intelligent, 2-way communication between the CXM2 board and smart components like the communicating thermostat and diagnostic tool. The advanced CXM2 board uses information received from the temperature sensors to precisely control operation to deliver high efficiency, reliability and increased comfort.

Diagnostics – iGate 2 takes diagnosing water source heat pump units to a next level of simplicity, by providing a dashboard of system and fault information, in clear language, on the AWC Communicating Thermostat, handheld service tool and the web portal/mobile app on the internet.

iGate 2 Thermostat Service Warnings notify the homeowner and contractor of a fault and displays fault descriptions by app notifications/email with possible causes. Additionally, the current system status can be viewed graphically on the web portal and mobile app.

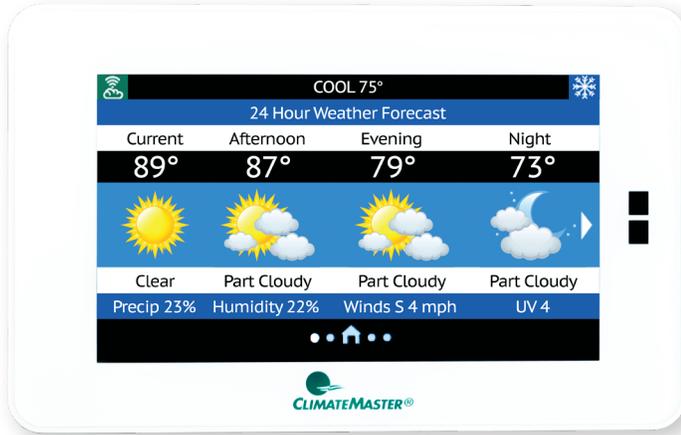
In iGate 2 Service Mode, the service personnel can access fault description, possible causes and most importantly, the conditions (temp, flow, i/o conditions, configuration) at the time of the fault. Manual Operation mode allows the service personnel to manually command operation for any of the thermostat outputs, blower speed, to help troubleshoot specific components. This operation can either be conducted at the unit with a communicating thermostat/diagnostic tool or remotely with mobile app/website when the AWC Communicating Thermostat controls are used.

With an iGate 2 communicating system, users and contractors have a web-enabled gateway to system information never before available and exclusive to ClimateMaster products.



iGate® 2 Communicating (AWC) Thermostat

iGate® 2 Communication – Cloud connected, web-enabled information gateway to monitor, control, and diagnose your system



The iGate® 2 Communicating (AWC) Thermostat is innovating the future of comfort technology, one building at a time. The inspired design of the touch screen interface allows you to see real-time data for the efficiency and health of your system, with early warnings for potential system faults. The cloud based information gateway allows technicians to remotely diagnose system issues before occupants even know there is a problem. Control and monitor the system in your home or business from anywhere in the world with an easy to use app on your phone.

Features with Efficiency in Mind



Touch Screen Interface

A brilliantly customizable touch screen monitor for simple control.



Seamless Integration

Between your iGate® 2 Communicating (AWC) Thermostat and Tranquility comfort system.



(Mobile) Remote System Control

Control temperature and schedule from anywhere in the world.



Early Fault Warnings

Alerts you and your contractor of potential system faults in the future.



Remote Diagnostics

Enable the contractor to remotely diagnose system issues, adjust system settings, and reset faults.



Real-Time Operations Data & System Schematics

Access simply via the myUplink Pro Account and web portal to view system diagrams with current operating temperatures.

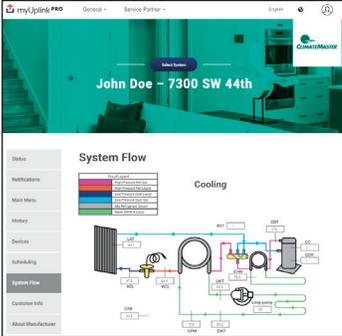


Revenue Stream

HVAC professionals can offer owners service contracts with remote monitoring and diagnosis capabilities without the large expense of a building management system.



HVAC Professional | User Experience



The iGate® 2 is more than just a smart thermostat for your residential or commercial customer, it's a business opportunity. Our new thermostat works with your customers' Tranquility comfort systems to provide the most efficient link between their system and

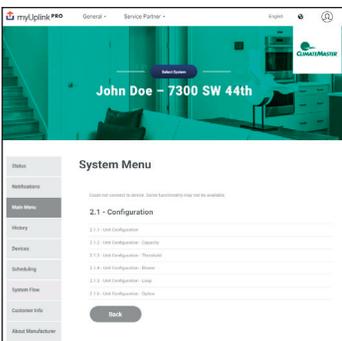
your services. The customization of monitoring from the myUplink PRO web portal or phone app account allows for continuous system monitoring, analysis, repair recognition, and early warnings for potential system faults that are sent to you and your customer.



Benefits

- Remote login from anywhere, anytime from any internet connected device
- View system fault history with possible root causes
- Information is available for contractors to troubleshoot and diagnosis systems remotely
- Secure internet connection keeps homeowner information private
- Access thermostat(s) through Android and iPhone mobile apps

Homeowner | User Experience



The iGate® 2 combines a Wi-Fi thermostat and advanced unit controls to communicate the systems operation information to the cloud. From any internet connected device or smart phone, homeowners can control and monitor their systems from anywhere in the

world. iGate 2 offers homeowners peace of mind their systems are operating at peak performance with advanced operational performance issue notifications. HVAC professionals get notifications when systems are operating out of range. They can log in remotely to check system faults, review current operating conditions, and diagnosis issues remotely. This gives the HVAC technician the upper hand when showing up to perform service, saving time which in turn saves money.



Benefits

- Communicates personal settings and reminders through the iGate 2 communication system
- Easy-to-use, full-color, high-resolution interface
- Sleek, intuitive button control
- Secure internet connection keeps your information private
- Contains unit model, serial number and your HVAC professionals contact information
- System monitoring automatically contacts HVAC system providers when service is needed

Selection Procedure

Reference Calculations

HEATING	
$LWT = EWT - \frac{HE}{GPM \times 500}$	
$LAT = EAT + \frac{HC}{CFM \times 1.08}$	

COOLING	
$LWT = EWT + \frac{HR}{GPM \times 500}$	$LC = TC - SC$
$LAT (DB) = EAT (DB) - \frac{SC}{CFM \times 1.08}$	$S/T = \frac{SC}{TC}$

Conversion Table - to convert inch-pound (English) to S-I (Metric)

Airflow	Water Flow	Est Static Pressure	Water Pressure Drop
Airflow (L/s) = CFM x 0.472	Water Flow (L/s) = gpm x 0.0631	ESP (Pa) = ESP (in of wg) x 249	PD (kPa) = PD (ft of hd) x 2.99

Legend and Glossary of Abbreviations

Abbreviations	Descriptions
BTUH	BTU (British Thermal Unit) per hour
CDT	Compressor discharge temperature
CFM	Airflow, cubic feet per minute
COP	Coefficient of performance = BTUH output/BTUH input
CT ECM	Electronic commutated constant torque fan motor
CV ECM	Electronic commutated constant volume fan motor
DB	Dry bulb temperature, °F
EAT	Entering air temperature
EER	Energy efficient ratio = BTUH output/Watt input
ESP	External static pressure, inches w.g.
EWT	Entering water temperature
FPT	Female pipe thread
GPM	Water flow in U.S., gallons per minute
HC	Air heating capacity, BTUH
HE	Total heat of extraction, BTUH
HR	Total heat of rejection, BTUH
HWC	Hot water generator (desuperheater) capacity, Mbtuh
KW	Total power unit input, kilowatts
LAT	Leaving air temperature, °F
LC	Latent cooling capacity, BTUH
LOC	Loss of charge
LWT	Leaving water temperature, °F
MBTUH	1,000 BTU per hour
MPT	Male pipe thread
MWV	Motorized water valve
PSC	Permanent split capacitor
SC	Sensible cooling capacity, BTUH
S/T	Sensible to total cooling ratio
TC	Total cooling capacity, BTUH
TD or delta T	Temperature differential
VFD	Variable frequency drive
WB	Wet bulb temperature, °F
WPD	Waterside pressure drop, psi or feet of head
WSE	Waterside economizer

Selection Procedure

- Step 1** Determine the actual heating and cooling loads at the desired dry bulb and wet bulb conditions.
- Step 2** Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 450 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.
- Step 3** Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.
- Step 4** Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (Note: interpolation is permissible, extrapolation is not).
- Step 5** Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for water-source heat pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.
- Step 6** Determine the correction factors associated with the variable factors of dry bulb and wet bulb.

$$\text{Corrected Total Cooling} = \text{tabulated total cooling} \times \text{wet bulb correction.}$$

$$\text{Corrected Sensible Cooling} = \text{tabulated sensible cooling} \times \text{wet/dry bulb correction.}$$
- Step 7** Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.
- Step 8** When completed, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Example Equipment Selection For Cooling Step 1 Load Determination:

Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows:

Total Cooling 12,000 BTUH
 Sensible Cooling..... 7,500 BTUH
 Entering Air Temp..... 75°F Dry Bulb / 65°F Wet Bulb

Step 2 Design Conditions:

Similarly, we have also obtained the following design parameters:

Entering Water Temp 80°F
 Water Flow (Based upon 10°F rise in temp.)..... 3.0 GPM
 Air Flow 300 CFM

Step 3, 4 & 5 HP Selection:

After making our preliminary selection (TR012), we enter the tables at design water flow and water temperature and read Total Cooling, Sens. Cooling and Heat of Rej. capacities:

Total Cooling 12,700 BTUH
 Sensible Cooling..... 9,500 BTUH
 Heat of Rejection..... 15,500 BTUH

Steps 6 & 7 Entering Air and Airflow Corrections:

Next, we determine our correction factors.

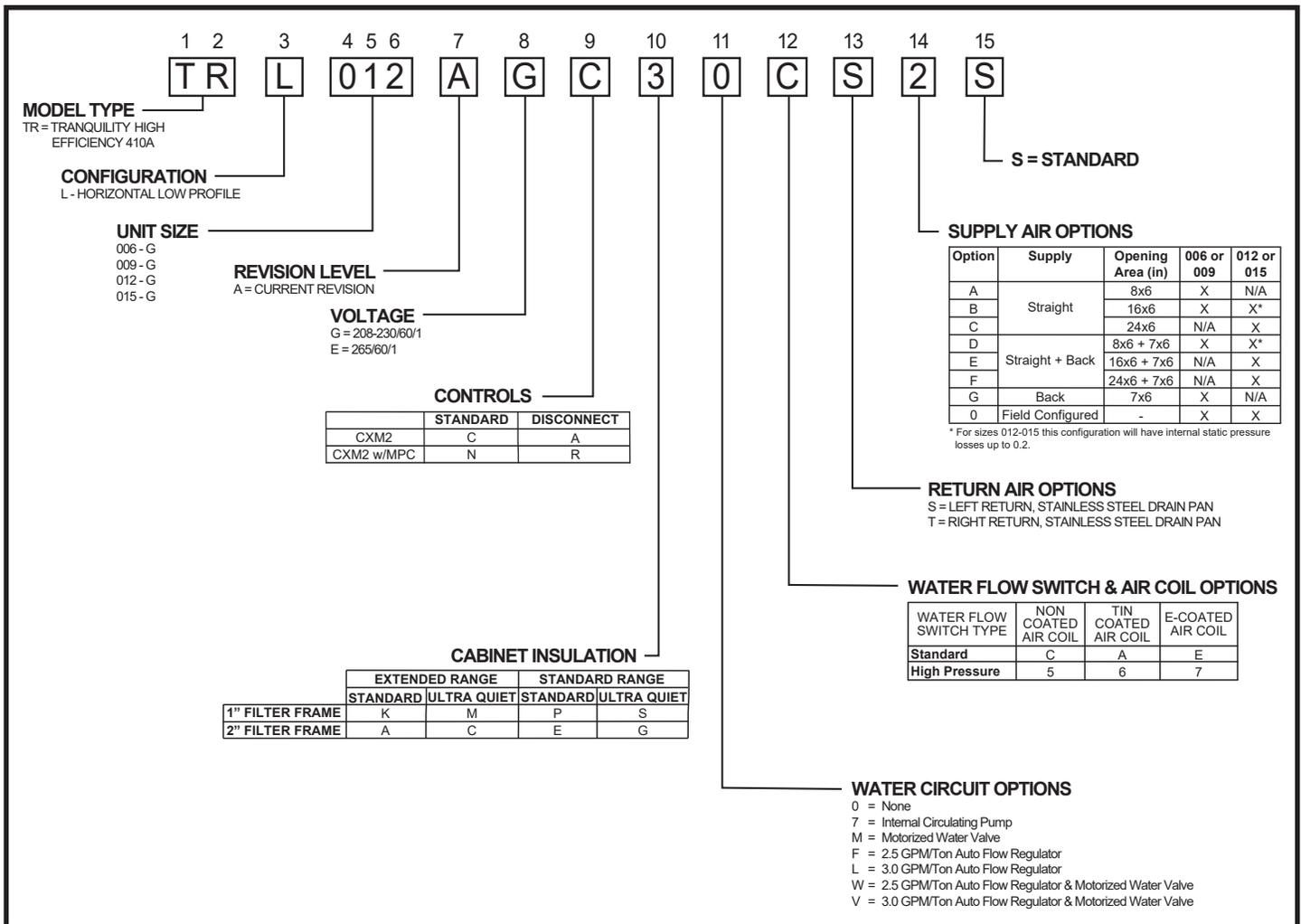
	Table	Ent Air	Air Flow	Corrected
Corrected Total Cooling	= 12,700	x 0.96	x 0.93	= 11,339
Corrected Sens Cooling	= 9,500	x 0.91	x 0.84	= 7,262
Corrected Heat of Reject	= 15,500	x 0.98	x 0.97	= 14,734

Step 8 Water Temperature Rise Calculation and Assessment:

Actual Temperature Rise..... 9.8°F

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +/- 10% of our sensible load requirement. Furthermore, we see that our Corrected Total Cooling figure is within 1,000 Btuh the actual indicated load.

TRL Series Nomenclature



Note: Above model nomenclature is a general reference. Not all configurations are available on all models. Consult selection software for detailed information.

Performance Data – AHRI/ASHRAE/ISO 13256-1

AHRI/ASHRAE/ISO 13256-1. English (I-P) Units

Model	Water Loop Heat Pump				Ground Loop Heat Pump			
	Cooling 86°F		Heating 68°F		Cooling 77°F		Heating 32°F	
	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
TRL006	6400	15.5	7400	4.6	6700	19.0	4700	3.3
TRL009	9200	15.5	10300	4.5	9500	18.5	7000	3.4
TRL012	12100	15.0	14000	4.5	12800	17.0	9400	3.3
TRL015	14100	14.7	15500	4.5	14800	16.7	10600	3.4

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature
 Heating capacities based upon 68°F DB, 59°F WB entering air temperature
 All ratings based upon operation at lower voltage of dual voltage rated models

AHRI/ASHRAE/ISO 13256-1. Metric (S-I) Units

Model	Water Loop Heat Pump				Ground Loop Heat Pump			
	Cooling 30°C		Heating 20°C		Cooling 77°F		Heating 32°F	
	Capacity kW	EER W/W	Capacity kW	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
TRL006	1.9	4.5	2.2	4.6	2.0	5.6	1.4	3.3
TRL009	2.7	4.5	3.0	4.5	2.8	5.4	2.1	3.4
TRL012	3.5	4.4	4.1	4.5	3.8	5.0	2.8	3.3
TRL015	4.1	4.3	4.5	4.5	4.3	4.9	3.1	3.4

Cooling capacities based upon 27°C DB, 19°C WB entering air temperature
 Heating capacities based upon 20°C DB, 15°C WB entering air temperature
 All ratings based upon operation at lower voltage of dual voltage rated models

Performance Data – Selection Notes

For operation in the shaded area when water is used in lieu of an antifreeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F [4.4°C] when the JW3 jumper is not clipped (see example below). Otherwise, appropriate levels of a proper antifreeze solution should be used in systems with leaving water temperatures of 40°F [4.4°C] or below, the JW3 jumper should be clipped, and the product should be selected with the extended range package. This is due to the potential of the refrigerant temperature being as low as 32°F [0°C] with 40°F [4.4°C] LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. **JW3 should never be clipped for standard range equipment or systems without antifreeze.**

Example:

At 50°F EWT (Entering Water Temperature) and 3 GPM/ton, a 1 ton unit has an HE of 8,600 Btuh. To calculate LWT, rearrange the formula for HE as follows:

$HE = TD \times GPM \times 500$, where HE = Heat of Extraction (Btuh);
 TD = temperature difference (EWT - LWT) and GPM = U.S. Gallons per Minute.

$$TD = HE / (GPM \times 500)$$

$$TD = 8,600 / (4.5 \times 500)$$

$$TD = 6^\circ\text{F}$$

$$LWT = EWT - TD$$

$$LWT = 50 - 6 = 44^\circ\text{F}$$

In this example, as long as the EWT does not fall below 50°F, the system will operate as designed. For EWTs below 50°F, higher flow rates will be required.

		HEATING- EAT 70°F					
	HR	EER	HC	kW	HE	LAT	COP
	14.2	32.5	7.7	0.8	4.9	85.9	2.8
5	15.7	31.6	8.9	0.82	6.1	88.5	3.2
4	15.5	31.8	9.1	0.83	6.2	88.9	3.2
43	15.3	32.3	9.2	0.84	6.3	89.2	3.2
51	16.1	28.2	10.2	0.85	7.3	91.5	3.5
49	16.0	29.4	10.4	0.86	7.5	92.0	3.5
8	15.8	30.0	10.5	0.87	7.6	92.3	3.5
8	16.2	24.7	11.4	0.88	8.4	94.3	3.8
	16.2	26.0	11.6	0.88	8.6	94.9	3.9
	16.2	27.0	11.7	0.88	8.7	95.3	3.9
	16.1	20.9	12.5	0.90	9.5	97.0	4.1
		22.2	12.8	0.90	9.7	97.5	4.2
		23.6	12.9	0.90	9.8	97.9	4.2
		25.0	13.6	0.91	10.5	99.0	4.5

Performance Data – TRL 006

225 CFM Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM/ TON	Airflow CFM/ TON	WPD		COOLING - EAT 80/67 °F						HEATING- EAT 70°F				
			PSI	FT	TC	SC	Sens/ Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	2.25	225	3.7	8.6	6.6	5.1	0.80	0.20	7.2	33.0	3.9	0.43	2.3	83.9	2.6
30	1.5	225	1.4	3.2	7.5	5.4	0.70	0.20	8.1	37.5	4.6	0.44	3.1	87.1	3.1
	1.88	225	2.0	4.5	7.4	5.3	0.70	0.20	8.0	37.0	4.6	0.44	3.1	87.4	3.1
	2.25	225	2.5	5.7	7.2	5.3	0.70	0.20	7.9	36.0	4.8	0.45	3.2	87.7	3.1
40	1.5	225	0.9	2.0	7.7	5.5	0.70	0.23	8.5	33.5	5.5	0.46	3.9	90.6	3.5
	1.88	225	1.3	2.8	7.7	5.5	0.70	0.20	8.4	38.5	5.6	0.46	3.9	90.9	3.5
	2.25	225	1.6	3.6	7.5	5.6	0.70	0.20	8.3	37.5	5.7	0.47	4.0	91.3	3.6
50	1.5	225	0.6	1.3	7.7	5.5	0.70	0.27	8.7	28.5	6.3	0.47	4.7	93.8	3.9
	1.88	225	0.9	1.9	7.7	5.5	0.70	0.30	8.7	25.7	6.4	0.47	4.7	94.2	3.9
	2.25	225	1.1	2.4	7.5	5.6	0.70	0.30	8.7	25.0	6.6	0.47	4.8	94.6	4.1
60	1.5	225	0.4	1.0	7.6	5.5	0.70	0.31	8.6	24.5	7.0	0.48	5.4	96.8	4.3
	1.88	225	0.6	1.4	7.6	5.5	0.70	0.30	8.6	25.3	7.1	0.50	5.5	97.2	4.2
	2.25	225	0.8	1.9	7.4	5.6	0.70	0.30	8.6	24.7	7.3	0.50	5.5	97.6	4.3
70	1.5	225	0.4	0.9	7.3	5.4	0.70	0.36	8.5	20.3	7.7	0.49	6.0	99.6	4.6
	1.88	225	0.6	1.3	7.3	5.4	0.70	0.40	8.6	18.3	7.8	0.50	6.0	100.0	4.6
	2.25	225	0.8	1.7	7.3	5.5	0.80	0.30	8.7	24.3	8.0	0.50	6.0	100.4	4.7
80	1.5	225	0.4	1.0	6.9	5.2	0.80	0.40	8.3	17.3	8.3	0.50	6.6	102.3	4.9
	1.88	225	0.6	1.4	6.9	5.2	0.70	0.40	8.4	17.3	8.4	0.50	6.6	102.8	4.9
	2.25	225	0.8	1.9	6.9	5.3	0.80	0.40	8.5	17.3	8.6	0.50	6.6	103.2	5.0
85	1.5	225	0.4	1.0	6.6	5.1	0.80	0.43	8.1	15.3	8.6	0.51	6.9	103.5	4.9
	1.88	225	0.6	1.4	6.6	5.1	0.80	0.40	8.2	16.5	8.7	0.50	6.9	104.0	5.1
	2.25	225	0.8	1.9	6.6	5.2	0.80	0.40	8.3	16.5	8.9	0.50	6.9	104.5	5.2
90	1.5	225	0.5	1.1	6.4	5.0	0.80	0.46	8.0	13.9	8.9	0.51	7.2	104.7	5.1
	1.88	225	0.7	1.6	6.4	5.0	0.80	0.50	8.1	12.8	9.0	0.50	7.2	105.2	5.3
	2.25	225	1.0	2.1	6.4	5.1	0.80	0.40	8.2	16.0	9.3	0.50	7.2	105.7	5.4
100	1.5	225	0.5	1.1	5.9	4.8	0.80	0.51	7.7	11.6	Operation Not Recommended				
	1.88	225	0.7	1.6	5.9	4.8	0.80	0.50	7.8	11.8					
	2.25	225	1.0	2.1	5.9	4.8	0.80	0.50	7.9	11.8					
110	1.5	225	0.4	0.9	5.4	4.6	0.90	0.57	7.4	9.5					
	1.88	225	0.6	1.3	5.4	4.6	0.80	0.60	7.5	9.0					
	2.25	225	0.8	1.8	5.4	4.6	0.90	0.60	7.5	9.0					
120	1.5	225	0.2	0.5	5.0	4.4	0.90	0.63	7.1	7.9					
	1.88	225	0.3	0.7	5.0	4.4	0.90	0.60	7.2	8.3					
	2.25	225	0.4	1.0	4.9	4.5	0.90	0.60	7.2	8.2					

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.

Table does not reflect fan or pump power corrections for AHR/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

Operation below 40°F EWT is based upon a 20% methanol antifreeze solution.

Operation below 60°F EWT requires optional insulated water/refrigerant circuit.

See performance correction tables for operating conditions other than those listed above.

See Performance Data Selection Notes for operation in the shaded areas.

Performance Data – TRL 009

325 CFM Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM/ TON	Airflow CFM/ TON	WPD		COOLING - EAT 80/67 °F						HEATING- EAT 70°F				
			PSI	FT	TC	SC	Sens/ Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	2.8	325	4.6	10.6	10.1	6.8	0.67	0.24	10.3	42.1	5.6	0.55	3.7	85.0	3.0
30	1.69	325	1.9	4.4	11.0	7.4	0.67	0.28	11.3	39.1	6.5	0.57	4.5	86.0	3.3
	2.25	325	2.9	6.8	10.8	7.4	0.68	0.26	11.1	41.3	6.6	0.57	4.6	87.0	3.4
	2.8	325	4.0	9.5	10.7	7.2	0.68	0.25	11.0	42.5	6.7	0.58	4.6	88.0	3.4
40	1.69	325	1.6	3.8	11.1	7.5	0.67	0.32	11.6	34.5	7.5	0.59	5.4	89.0	3.7
	2.25	325	2.6	6.1	11.1	7.5	0.67	0.30	11.5	36.8	7.7	0.60	5.5	90.0	3.7
	2.8	325	3.7	8.6	11.1	7.5	0.67	0.29	11.4	38.1	7.8	0.61	5.6	91.0	3.7
50	1.69	325	1.4	3.3	11.0	7.5	0.68	0.37	11.6	29.6	8.5	0.61	6.3	92.0	4.1
	2.25	325	2.5	5.7	11.0	7.5	0.68	0.35	11.6	31.3	8.7	0.62	6.4	93.0	4.1
	2.8	325	3.6	8.1	11.0	7.5	0.68	0.34	11.6	32.2	8.8	0.62	6.5	94.0	4.1
60	1.69	325	1.3	3.1	10.7	7.2	0.68	0.43	11.5	24.7	9.4	0.63	7.1	95.0	4.4
	2.25	325	2.3	5.4	10.8	7.4	0.68	0.41	11.6	26.2	9.6	0.64	7.3	96.0	4.4
	2.8	325	3.3	7.7	10.8	7.4	0.68	0.40	11.6	26.8	9.7	0.64	7.4	97.0	4.4
70	1.69	325	1.3	3.0	10.1	7.1	0.71	0.49	11.3	20.6	10.3	0.65	8.0	98.0	4.6
	2.25	325	2.3	5.3	10.3	7.1	0.69	0.47	11.4	21.9	10.5	0.65	8.2	99.0	4.7
	2.8	325	3.3	7.6	10.3	7.1	0.69	0.46	11.5	22.4	10.6	0.65	8.2	100.0	4.8
80	1.69	325	1.3	2.9	9.5	6.8	0.72	0.56	10.9	16.9	11.0	0.66	8.7	101.0	4.9
	2.25	325	2.3	5.2	9.7	6.9	0.72	0.54	11.1	17.9	11.2	0.66	8.9	102.0	5.0
	2.8	325	3.3	7.5	9.7	6.9	0.72	0.53	11.2	18.2	11.3	0.66	8.9	103.0	5.0
85	1.69	325	1.3	2.9	9.2	6.7	0.73	0.60	10.7	15.2	11.4	0.67	9.0	104.0	5.0
	2.25	325	2.3	5.2	9.4	6.8	0.73	0.57	10.9	16.4	11.6	0.67	9.2	105.0	5.1
	2.8	325	3.3	7.5	9.4	6.8	0.73	0.56	11.0	16.7	11.7	0.67	9.2	106.0	5.1
90	1.69	325	1.3	2.9	8.8	6.6	0.75	0.63	10.5	14.0	11.7	0.67	9.3	107.0	5.1
	2.25	325	2.3	5.2	9.1	6.7	0.74	0.61	10.7	14.8	11.9	0.67	9.5	108.0	5.2
	2.8	325	3.3	7.5	9.1	6.7	0.74	0.60	10.8	15.1	12.0	0.67	9.5	109.0	5.3
100	1.69	325	1.3	2.9	8.1	6.3	0.78	0.71	10.1	11.4	Operation Not Recommended				
	2.25	325	2.2	5.2	8.3	6.4	0.77	0.69	10.2	12.0					
	2.8	325	3.2	7.6	8.3	6.4	0.77	0.68	10.3	12.2					
110	1.69	325	1.2	2.8	7.3	6.1	0.83	0.79	9.7	9.3					
	2.25	325	2.2	5.0	7.6	6.2	0.82	0.76	9.8	9.9					
	2.8	325	3.2	7.3	7.6	6.2	0.82	0.75	9.9	10.1					
120	1.69	325	1.1	2.6	6.6	5.9	0.89	0.86	9.3	7.7					
	2.25	325	2.1	4.8	6.8	5.9	0.86	0.84	9.4	8.1					
	2.8	325	3.1	7.1	6.8	6.0	0.88	0.84	9.5	8.1					

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.

Table does not reflect fan or pump power corrections for AHR/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

Operation below 40°F EWT is based upon a 20% methanol antifreeze solution.

Operation below 60°F EWT requires optional insulated water/refrigerant circuit.

See performance correction tables for operating conditions other than those listed above.

See Performance Data Selection Notes for operation in the shaded areas.

Performance Data – TRL 012

400 CFM Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM/ TON	Airflow CFM/ TON	WPD		COOLING - EAT 80/67 °F						HEATING- EAT 70°F				
			PSI	FT	TC	SC	Sens/ Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP
20	3.75	400	6.4	14.6	13.0	9.2	0.71	0.40	14.2	32.5	7.7	0.8	4.9	85.9	2.8
30	2.25	400	2.6	6.0	14.2	10.0	0.70	0.45	15.7	31.6	8.9	0.82	6.1	88.5	3.2
	3	400	4.3	9.8	14.0	9.8	0.70	0.44	15.5	31.8	9.1	0.83	6.2	88.9	3.2
	3.75	400	6.0	13.7	13.9	9.7	0.70	0.43	15.3	32.3	9.2	0.84	6.3	89.2	3.2
40	2.25	400	2.4	5.4	14.4	10.1	0.70	0.51	16.1	28.2	10.2	0.85	7.3	91.5	3.5
	3	400	4.0	9.2	14.4	10.1	0.70	0.49	16.0	29.4	10.4	0.86	7.5	92.0	3.5
	3.75	400	5.6	13.0	14.4	10.1	0.70	0.48	15.8	30.0	10.5	0.87	7.6	92.3	3.5
50	2.25	400	2.2	5.0	14.3	10.1	0.71	0.58	16.2	24.7	11.4	0.88	8.4	94.3	3.8
	3	400	3.8	8.7	14.3	10.1	0.71	0.55	16.2	26.0	11.6	0.88	8.6	94.9	3.9
	3.75	400	5.4	12.4	14.3	10.1	0.71	0.53	16.2	27.0	11.7	0.88	8.7	95.3	3.9
60	2.25	400	2.1	4.8	13.8	10.0	0.72	0.66	16.1	20.9	12.5	0.90	9.5	97.0	4.1
	3	400	3.6	8.4	14.0	10.0	0.72	0.63	16.2	22.2	12.8	0.90	9.7	97.5	4.2
	3.75	400	5.2	12.0	14.0	10.0	0.71	0.62	16.2	22.6	12.9	0.90	9.8	97.9	4.2
70	2.25	400	2.0	4.6	13.2	9.7	0.74	0.74	15.7	17.8	13.6	0.91	10.5	99.5	4.4
	3	400	3.5	8.2	13.4	9.8	0.73	0.71	15.9	18.9	13.9	0.92	10.8	100.1	4.4
	3.75	400	5.0	11.8	13.5	9.8	0.73	0.70	16.1	19.3	14.0	0.92	10.8	100.5	4.5
80	2.25	400	1.9	4.4	12.4	9.4	0.75	0.84	15.3	14.8	14.7	0.93	11.5	101.9	4.6
	3	400	3.5	8.0	12.7	9.5	0.75	0.81	15.5	15.7	14.9	0.93	11.8	102.5	4.7
	3.75	400	5.1	11.6	12.8	9.5	0.74	0.79	15.7	16.2	15.0	0.93	11.8	103.0	4.7
85	2.25	400	1.9	4.4	12.0	9.2	0.77	0.89	15.0	13.5	15.2	0.93	12.0	103.0	4.8
	3	400	3.4	7.9	12.3	9.3	0.76	0.85	15.2	14.5	15.5	0.94	12.3	103.7	4.8
	3.75	400	4.9	11.4	12.4	9.3	0.75	0.83	15.4	14.9	15.7	0.94	12.3	104.2	4.9
90	2.25	400	1.9	4.3	11.6	9.0	0.78	0.94	14.8	12.3	15.7	0.94	12.5	104.2	4.9
	3	400	3.4	7.8	11.9	9.1	0.77	0.90	14.9	13.2	16.0	0.95	12.8	104.9	4.9
	3.75	400	4.9	11.3	12.0	9.1	0.76	0.88	15.0	13.6	16.2	0.95	12.8	105.4	5.0
100	2.25	400	1.8	4.2	10.7	8.6	0.81	1.03	14.2	10.4	Operation Not Recommended				
	3	400	3.3	7.7	11.0	8.7	0.80	1.00	14.4	11.0					
	3.75	400	4.8	11.2	11.1	8.7	0.79	0.99	14.5	11.2					
110	2.25	400	1.7	4.0	9.8	8.2	0.84	1.13	13.7	8.7					
	3	400	3.3	7.5	10.1	8.3	0.83	1.10	13.8	9.2					
	3.75	400	4.8	11.0	10.2	8.3	0.82	1.09	13.9	9.4					
120	2.25	400	1.7	3.8	9.0	7.9	0.88	1.23	13.2	7.3					
	3	400	3.2	7.3	9.2	8.0	0.87	1.20	13.3	7.7					
	3.75	400	4.7	10.8	9.2	8.1	0.88	1.20	13.4	7.7					

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

Operation below 40°F EWT is based upon a 20% methanol antifreeze solution.

Operation below 60°F EWT requires optional insulated water/refrigerant circuit.

See performance correction tables for operating conditions other than those listed above.

See Performance Data Selection Notes for operation in the shaded areas.

Performance Data – TRL 015

500 CFM Airflow

Performance capacities shown in thousands of Btuh

EWT °F	GPM/ TON	Airflow CFM/ TON	WPD		COOLING - EAT 80/67 °F						HEATING- EAT 70°F					
			PSI	FT	TC	SC	Sens/ Tot Ratio	kW	HR	EER	HC	kW	HE	LAT	COP	
20	4.7	500	8.3	19.2	16.3	11.3	0.69	0.50	17.9	32.6	9.6	0.93	6.4	85.8	3.0	
30	2.8	500	3.3	7.6	17.2	12.1	0.70	0.50	19.0	34.4	10.9	0.95	7.7	88.2	3.4	
	3.75	500	5.6	12.9	17.1	11.9	0.70	0.50	18.9	34.2	11.2	0.96	7.9	88.6	3.4	
	4.7	500	7.8	18.0	16.9	11.8	0.70	0.50	18.7	33.8	11.3	0.97	8.0	88.9	3.4	
40	2.8	500	3.0	6.8	17.3	12.2	0.71	0.60	19.2	28.8	12.5	0.98	9.1	91.0	3.7	
	3.75	500	5.3	12.2	17.3	12.2	0.71	0.60	19.2	28.8	12.7	0.99	9.3	91.5	3.8	
	4.7	500	7.5	17.2	17.3	12.2	0.71	0.50	19.0	34.6	12.8	1.00	9.4	91.8	3.8	
50	2.8	500	2.7	6.3	17.1	12.2	0.72	0.60	19.3	28.5	13.9	1.01	10.4	93.6	4.0	
	3.75	500	5.0	11.6	17.2	12.3	0.71	0.60	19.3	28.7	14.1	1.01	10.7	94.1	4.1	
	4.7	500	7.1	16.5	17.2	12.3	0.72	0.60	19.3	28.7	14.2	1.02	10.8	94.5	4.1	
60	2.8	500	2.6	6.0	16.6	12.1	0.73	0.70	19.1	23.7	15.2	1.03	11.6	96.0	4.3	
	3.75	500	4.9	11.3	16.8	12.1	0.72	0.70	19.2	24.0	15.4	1.03	11.9	96.5	4.4	
	4.7	500	7.0	16.2	16.8	12.1	0.72	0.70	19.2	24.0	15.6	1.04	12.0	96.9	4.4	
70	2.8	500	2.5	5.8	16.0	11.8	0.74	0.80	18.7	20.0	16.3	1.05	12.7	98.1	4.5	
	3.75	500	4.8	11.1	16.2	11.9	0.73	0.80	18.9	20.3	16.6	1.05	13.0	98.6	4.6	
	4.7	500	6.9	16.0	16.3	11.9	0.73	0.80	19.1	20.4	16.8	1.06	13.0	99.0	4.6	
80	2.8	500	2.5	5.7	15.1	11.4	0.76	0.90	18.3	16.8	17.3	1.06	13.7	100.0	4.8	
	3.75	500	4.8	11.0	15.4	11.6	0.75	0.90	18.5	17.1	17.6	1.06	13.9	100.5	4.9	
	4.7	500	6.9	15.9	15.5	11.6	0.75	0.90	18.7	17.2	17.8	1.07	13.9	101.0	4.9	
85	2.8	500	2.5	5.7	14.7	11.2	0.77	1.00	18.0	14.7	17.8	1.07	14.1	100.9	4.9	
	3.75	500	4.8	11.0	15.0	11.4	0.76	0.90	18.2	16.7	18.0	1.07	14.4	101.3	4.9	
	4.7	500	7.0	15.9	15.1	11.4	0.76	0.90	18.4	16.8	18.2	1.08	14.4	101.8	4.9	
90	2.8	500	2.5	5.7	14.2	11.0	0.78	1.00	17.7	14.2	18.2	1.07	14.5	101.6	5.0	
	3.75	500	4.7	11.0	14.5	11.2	0.77	1.00	17.9	14.5	18.4	1.08	14.7	102.0	5.0	
	4.7	500	6.8	16.0	14.6	11.2	0.77	1.00	18.1	14.6	18.6	1.09	14.7	102.5	5.0	
100	2.8	500	2.5	5.7	13.1	10.6	0.81	1.20	17.1	10.9	Operation Not Recommended					
	3.75	500	4.7	10.8	13.5	10.7	0.80	1.10	17.3	12.3						
	4.7	500	6.8	15.7	13.6	10.7	0.79	1.10	17.5	12.4						
110	2.8	500	2.4	5.6	12.0	10.1	0.84	1.30	16.4	9.2						
	3.75	500	4.6	10.6	12.4	10.3	0.83	1.30	16.6	9.5						
	4.7	500	6.7	15.5	12.5	10.3	0.83	1.20	16.8	10.4						
120	2.8	500	2.3	5.3	10.8	9.6	0.89	1.40	15.7	7.7						
	3.75	500	4.5	10.3	11.2	9.8	0.88	1.40	15.9	8.0						
	4.7	500	6.6	15.2	11.2	9.9	0.88	1.40	16.1	8.0						

Interpolation is permissible; extrapolation is not.

All entering air conditions are 80°F DB and 67°F WB in cooling, and 70°F DB in heating.

Table does not reflect fan or pump power corrections for AHRI/ISO conditions.

All performance is based upon the lower voltage of dual voltage rated units.

Performance stated is at the rated power supply; performance may vary as the power supply varies from the rated.

Operation below 40°F EWT is based upon a 20% methanol antifreeze solution.

Operation below 60°F EWT requires optional insulated water/refrigerant circuit.

See performance correction tables for operating conditions other than those listed above.

See Performance Data Selection Notes for operation in the shaded areas.

Correction Tables

Entering Air Temperature

Cooling Corrections												
Ent Air WB °F	Total Clg Cap	Sens Clg Cap Multipliers- Entering DB F									Power	Heat of Rej
		60	65	70	75	80	80.6	85	90	95		
50	0.61	0.8	1.03	*	*	*	*	*	*	*	1.00	0.76
55	0.72	0.64	0.87	1.06	*	*	*	*	*	*	1.00	0.83
60	0.84		0.7	0.89	1.09	*	*	*	*	*	1.00	0.90
65	0.96			0.71	0.91	1.06	1.12	1.29	*	*	1.00	0.98
66.2	0.99			0.67	0.86	1.02	1.08	1.24	*	*	1.00	0.99
67	1.00			0.64	0.83	1.00	1.05	1.21	1.4	*	1.00	1.00
70	1.07				0.72	0.87	0.93	1.09	1.28	1.48	1.00	1.05
75	1.19					0.68	0.74	0.9	1.07	1.27	1.00	1.12

* Sensible capacity equals total capacity.

AHRI/ISO/ASHRAE 13256-1 uses entering air conditions of Cooling - 80.6°F DB/ 66.2°F WB, and Heating - 68°F DB/ 59°F WB entering air temperature.

Entering Air Temperature

Ent Air DB F	Heating Corrections		
	Htg Cap	Power	Heat of Ext
45	1.05	0.78	1.13
50	1.05	0.82	1.12
55	1.04	0.86	1.1
60	1.03	0.91	1.07
65	1.02	0.96	1.03
68	1.01	0.99	1.01
70	1.00	1.00	1.00
75	0.98	1.06	0.95
80	0.95	1.11	0.9

Motorized Water Valve Option Corrections

Model	Flow Coefficient (2Way) Cv	Max. Close-Off Pressure (MOPD)	WPD Adders		
			GPM	PSI	FT
TRL006	4.9	0 - 125 psi	1.50	0.09	0.21
			1.88	0.15	0.35
			2.25	0.21	0.49
TRL009			1.69	0.12	0.28
			2.25	0.21	0.49
			2.81	0.33	0.76
TRL012			2.25	0.21	0.49
			3.00	0.37	0.85
			3.75	0.59	1.36
TRL015			2.81	0.33	0.76
			3.75	0.59	1.36
			4.69	0.92	2.13

Airflow Correction Table

Airflow % of Rating	Heating			Cooling				
	Htg Cap	Power	Heat of Ext	Total Cap	Sens Cap	S/T	Power	Heat of Rej
62.5	0.84	1.12	0.89	0.87	0.76	0.88	1.00	0.94
68.75	0.88	1.10	0.91	0.90	0.80	0.90	1.00	0.96
75	0.91	1.08	0.93	0.93	0.84	0.91	1.00	0.97
81.25	0.93	1.05	0.95	0.96	0.88	0.93	1.00	0.98
87.5	0.96	1.03	0.97	0.99	0.92	0.95	1.00	0.98
93.75	0.98	1.01	0.98	1.01	0.96	0.97	1.00	0.99
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
106.25	1.02	0.98	1.02	1.06	1.04	1.01	1.00	1.01
112.5	1.03	0.96	1.03	1.08	1.08	1.03	1.00	1.02
118.75	1.05	0.95	1.05	1.10	1.12	1.05	1.00	1.02
125	1.06	0.93	1.06	1.12	1.15	1.07	1.00	1.03
131.25	1.07	0.92	1.07	1.14	1.19	1.09	1.00	1.03

Antifreeze Correction Table

EWT	Antifreeze Type	Antifreeze %	Cooling			Heating		WPD
			Total Cap	Sensible Cap	Watts	Total Cap	Watts	
90	Water	0%	1	1	1	1	1	1
	Ethanol	5%	0.998	0.998	1.002	0.996	0.999	1.025
		10%	0.996	0.996	1.003	0.991	0.997	1.048
		15%	0.994	0.994	1.005	0.987	0.996	1.098
		20%	0.991	0.991	1.006	0.982	0.994	1.142
		25%	0.986	0.986	1.009	0.972	0.991	1.207
		30%	0.981	0.981	1.012	0.962	0.988	1.265
		35%	0.977	0.977	1.015	0.953	0.985	1.312
		40%	0.972	0.972	1.018	0.943	0.982	1.37
		45%	0.966	0.966	1.023	0.931	0.978	1.431
	50%	0.959	0.959	1.027	0.918	0.974	1.494	
	Ethylene Glycol	5%	0.998	0.998	1.002	0.996	0.999	1.021
		10%	0.996	0.996	1.003	0.991	0.997	1.04
		15%	0.994	0.994	1.004	0.987	0.996	1.079
		20%	0.991	0.991	1.005	0.982	0.995	1.114
		25%	0.988	0.988	1.008	0.976	0.993	1.146
		30%	0.985	0.985	1.01	0.969	0.99	1.175
		35%	0.982	0.982	1.012	0.963	0.988	1.208
		40%	0.979	0.979	1.014	0.956	0.986	1.243
		45%	0.976	0.976	1.016	0.95	0.984	1.278
	50%	0.972	0.972	1.018	0.943	0.982	1.314	
	Methanol	5%	0.997	0.997	1.002	0.993	0.998	1.039
		10%	0.993	0.993	1.004	0.986	0.996	1.075
		15%	0.99	0.99	1.007	0.979	0.994	1.116
		20%	0.986	0.986	1.009	0.972	0.991	1.154
		25%	0.982	0.982	1.012	0.964	0.989	1.189
		30%	0.978	0.978	1.014	0.955	0.986	1.221
		35%	0.974	0.974	1.017	0.947	0.984	1.267
		40%	0.97	0.97	1.02	0.939	0.981	1.31
		45%	0.966	0.966	1.023	0.93	0.978	1.353
	50%	0.961	0.961	1.026	0.92	0.975	1.398	
	Propylene Glycol	5%	0.995	0.995	1.003	0.99	0.997	1.065
		10%	0.99	0.99	1.006	0.98	0.994	1.119
		15%	0.986	0.986	1.009	0.971	0.991	1.152
		20%	0.981	0.981	1.012	0.962	0.988	1.182
		25%	0.978	0.978	1.014	0.956	0.986	1.227
		30%	0.975	0.975	1.016	0.95	0.984	1.267
		35%	0.972	0.972	1.018	0.944	0.982	1.312
		40%	0.969	0.969	1.02	0.938	0.98	1.356
		45%	0.965	0.965	1.023	0.929	0.977	1.402
	50%	0.96	0.96	1.026	0.919	0.974	1.45	

Table Continued on Next Page

Antifreeze Correction Table

Table Continued from Previous Page

EWT	Antifreeze Type	Antifreeze %	Cooling			Heating		WPD
			Total Cap	Sensible Cap	Watts	Total Cap	Watts	
30	Water	0%	1	1	1	1	1	1
	Ethanol	5%	0.991	0.991	1.006	0.981	0.994	1.14
		10%	0.981	0.981	1.012	0.961	0.988	1.242
		15%	0.973	0.973	1.018	0.944	0.983	1.295
		20%	0.964	0.964	1.024	0.927	0.977	1.343
		25%	0.959	0.959	1.028	0.917	0.974	1.363
		30%	0.954	0.954	1.031	0.907	0.97	1.383
		35%	0.949	0.949	1.035	0.897	0.967	1.468
		40%	0.944	0.944	1.038	0.887	0.964	1.523
		45%	0.94	0.94	1.041	0.88	0.962	1.58
		50%	0.936	0.936	1.043	0.872	0.959	1.639
	Ethylene Glycol	5%	0.997	0.997	1.002	0.993	0.998	1.04
		10%	0.993	0.993	1.004	0.986	0.996	1.075
		15%	0.99	0.99	1.006	0.98	0.994	1.122
		20%	0.987	0.987	1.008	0.973	0.992	1.163
		25%	0.983	0.983	1.011	0.966	0.99	1.195
		30%	0.979	0.979	1.013	0.958	0.987	1.225
		35%	0.976	0.976	1.016	0.951	0.985	1.279
		40%	0.972	0.972	1.018	0.943	0.982	1.324
		45%	0.969	0.969	1.021	0.937	0.98	1.371
		50%	0.966	0.966	1.023	0.93	0.978	1.419
	Methanol	5%	0.995	0.995	1.004	0.989	0.997	1.069
		10%	0.989	0.989	1.007	0.978	0.993	1.127
		15%	0.984	0.984	1.011	0.968	0.99	1.164
		20%	0.979	0.979	1.014	0.957	0.986	1.197
		25%	0.975	0.975	1.017	0.949	0.984	1.216
		30%	0.971	0.971	1.019	0.941	0.981	1.235
		35%	0.967	0.967	1.022	0.933	0.979	1.286
		40%	0.963	0.963	1.025	0.924	0.976	1.323
		45%	0.959	0.959	1.028	0.917	0.974	1.36
		50%	0.955	0.955	1.03	0.91	0.971	1.399
	Propylene Glycol	5%	0.995	0.995	1.004	0.989	0.997	1.071
		10%	0.989	0.989	1.007	0.978	0.993	1.13
		15%	0.985	0.985	1.01	0.968	0.99	1.206
		20%	0.98	0.98	1.013	0.958	0.987	1.27
		25%	0.974	0.974	1.017	0.947	0.983	1.359
		30%	0.968	0.968	1.021	0.935	0.979	1.433
		35%	0.963	0.963	1.025	0.924	0.976	1.522
		40%	0.957	0.957	1.029	0.913	0.972	1.614
		45%	0.949	0.949	1.034	0.898	0.967	1.712
		50%	0.941	0.941	1.039	0.882	0.962	1.816

Blower Performance Data

Size	Rated CFM	Max CFM	Min CFM	Motor Speed Tap	Value	External Static Pressure (in. wg)											
						0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50			
006	225	275	150	1	Power (W)	24	25	27	28	30	31	31					
					CFM	230	216	202	188	174	164	153					
					Power/CFM	0.1	0.12	0.13	0.15	0.17	0.19	0.2					
				2	Power (W)	32	33	34	36	38	40	42	43	43			
					CFM	268	258	247	233	220	208	197	188	179			
					Power/CFM	0.12	0.13	0.14	0.16	0.17	0.19	0.21	0.23	0.24			
				3	Power (W)						48	50	52	54	56		
					CFM						263	253	242	232	223		
					Power/CFM						0.18	0.2	0.21	0.23	0.25		
				4	Power (W)								62	65	67		
					CFM								275	266	257		
					Power/CFM								0.23	0.24	0.26		
009	325	425	200	1	Power (W)	34	35	35	37	39	42	45	46	47			
					CFM	300	290	279	265	251	235	219	212	206			
					Power/CFM	0.11	0.12	0.13	0.14	0.16	0.18	0.21	0.22	0.23			
				2	Power (W)	55	56	57	58	59	62	64	66	68			
					CFM	376	366	355	345	335	321	307	295	283			
					Power/CFM	0.15	0.15	0.16	0.17	0.18	0.19	0.21	0.22	0.24			
				3	Power (W)			79	81	82	83	84	86	87	89		
					CFM			422	412	403	394	386	378	363	348		
					Power/CFM			0.19	0.2	0.2	0.21	0.22	0.23	0.24	0.26		
				4	Power (W)								104	101	97	92	
					CFM								428	412	391	370	
					Power/CFM								0.24	0.25	0.25	0.25	
012	400	500	300	1	Power (W)	61	64	67	69	72	75	78					
					CFM	406	387	368	352	335	326	317					
					Power/CFM	0.15	0.17	0.18	0.2	0.21	0.23	0.24					
				2	Power (W)	71	73	75	77	79	82	85	88	91			
					CFM	451	432	413	393	374	354	333	323	313			
					Power/CFM	0.16	0.17	0.18	0.2	0.21	0.23	0.25	0.27	0.29			
				3	Power (W)			96	98	100	102	104	107	110	113		
					CFM			495	478	461	443	426	408	389	369		
					Power/CFM			0.19	0.21	0.22	0.23	0.25	0.26	0.28	0.31		
				4	Power (W)								127	129	131	133	134
					CFM								503	487	471	450	430
					Power/CFM								0.25	0.27	0.28	0.3	0.31
015	500	575	375	1	Power (W)	75	77	79	80	81	83						
					CFM	450	432	413	397	380	363						
					Power/CFM	0.17	0.18	0.19	0.2	0.21	0.23						
				2	Power (W)	99	101	103	104	106	108						
					CFM	517	500	483	467	451	435						
					Power/CFM	0.19	0.2	0.21	0.22	0.24	0.25						
				3	Power (W)	125	127	129	130	132	133						
					CFM	567	555	543	528	512	495						
					Power/CFM	0.22	0.23	0.24	0.25	0.26	0.27						
				4	Power (W)			140	142	144	145	146					
					CFM			578	562	550	538	521					
					Power/CFM			0.24	0.25	0.26	0.27	0.28					

Black areas denote ESP where operation is not recommended.
 CT ECM: Units factory shipped on Speed Tap 2 for Fan-Only and Speed Tap 3 for Heating/Cooling.
 All airflow is rated and shown above at the lower voltage if unit is dual voltage rated, e.g. 208V for 208-230V units.
 Performance stated is at the rated power supply. Performance may vary as the power supply varies from the rated.
 All data is shown wet coil with clean 1" filter.
 All data is ran at 80 °F DB and 67 °F WB.
 CFM Tolerance is +/-10%.
 Watt Tolerance +/-10%.
 Blower performance tested with a 8" x 6" side discharge supply air opening for sizes 006 and 009.
 Blower performance tested with a 24" x 6" side discharge supply air opening for sizes 012 and 015.

Physical Data

Model	TRL006	TRL009	TRL012	TRL015
Factory Charge R410A - (oz.)	19	19	26	28
Motor & Blower				
ECM Constant Torque (HP) [W]	0.25 [186]			
Blower Wheel Size (Dia x W)	5.7 x 7.98 (1pc)		5.7 x 7.98 (2pc)	
Water Connection Size				
Water volume (gal)*	0.037	0.042	0.049	
FPT - All Other	1/2" FPT			
Horizontal				
Filter Standard - 1" Throwaway	8.5 x 28 x 1			
Filter Standard - 2" Throwaway	8.5 x 28 x 2			
Weight - Operating (lbs.)	145	146	152	159
Weight - Packaged (lbs.)	185	186	192	199

*Volume for BPHE only

Unit Maximum Water Working Pressure	Max Pressure PSIG [kPa]
Base Unit	500 [3447]
Internal Secondary Pump (ISP)	200 [1379]
Internal Motorized Water Valve (MWV)	300 [2068]
Internal Auto Flow Valve	300 [2068]
20 Mesh Y Strainer Valve	600 [4137]
Flow switch - Low Pressure System	160 [1103]
Flow switch - High Pressure System	360 [2482]

TRL – Horizontal Dimensional Data

Model		Overall Cabinet (in)		
		Width	Depth	Height
		A	B	C
TRL	006	22.5	53	9
	009			
	012			
	015			

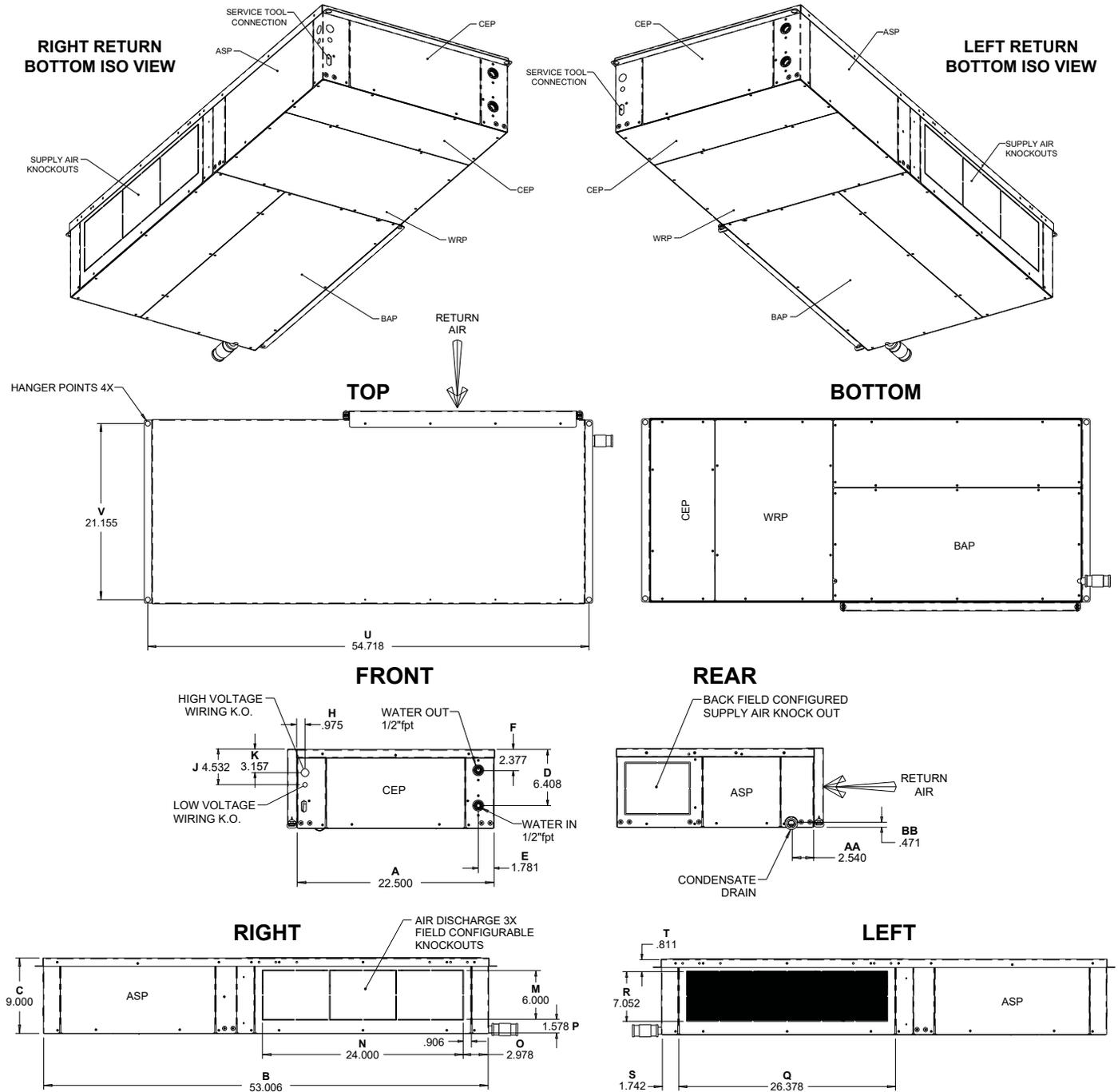
Water Connections (in)						
Water In		Water Out		Water In/ Out	Cond. 1/2" MPT OR 3/4" PVC	
D	E	F	E		AA	BB
6.4	1.8	2.4	1.8	1/2" FPT	2.5	0.5

Electrical Knockouts (in)		
H	Low Voltage	High Voltage
	J KO 1/2"	K KO 3/4"
1.0	4.5	3.2

Discharge Connection Duct Flange Installed (in)				Return Connection Using Return Air Opening (in)			
Supply Height	Supply Width	O	P	Return Width	Return Height	S	T
M	N			Q	R		
6.0	24.0	3.0	1.6	26.4	7.1	1.7	0.8

Unit Hanger Detail (in)	
U	V
54.7	21.2

TRL – Horizontal Dimensional Drawing



Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Units shipped with filter frames with duct mounting collar for connection to return air air duct connection.
3. Hanger brackets are designed into the top panel of the unit.
4. Units are provided with a 1/2" MPT condensate connection. There is also a condensate connection kit provided in the unit which contains a flexible coupling that can be used to connect to 3/4" PVC or 1" Copper.
5. Blower service access can be from the bottom, side, or top.
6. Bottom blower access allows blower assembly to be dropped, disconnected, and removed for servicing.

Legend:

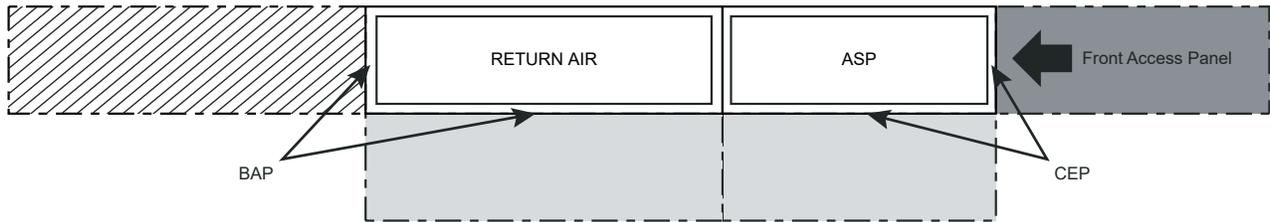
CEP = Controls & Electrical Service Panel
 BAP = Blower, Air Coil & Drain Pan Service Panel
 WRP = Water & Refrigerant Service Panel
 *ASP = Additional Service Panel (not required)

Note:

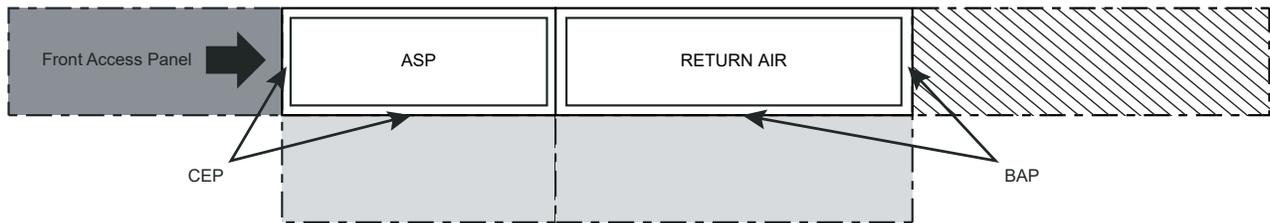
*ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CEP, WRP, or BAP panels.

TRL – Horizontal Service Access

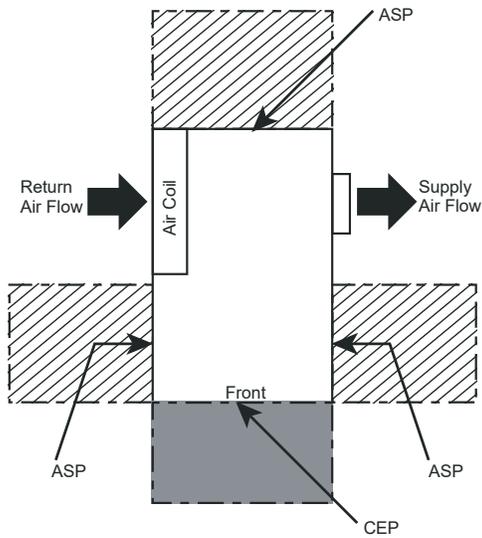
Ceiling Hung - Left Return Straight Discharge



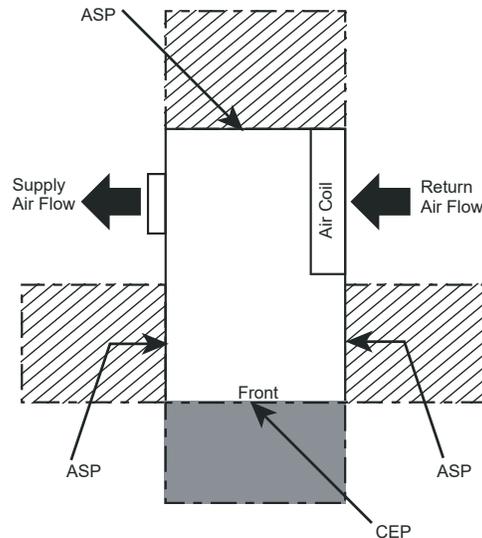
Ceiling Hung - Right Return Straight Discharge



Top View - Left Return Straight Discharge



Top View - Right Return Straight Discharge



= Mandatory 1' Service Access (front access service should be increased if external pumps, valves, etc. are applied)

= Mandatory 3' Service Access

= Optional 2' Service Access

Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. CEP and BAP requires 2' bottom service access. CEP requires 2' front service access as well. Ceiling mounted service access doors are acceptable. BAP side service access is optional.
3. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CEP and BSP panels.
4. For back discharge configurations, supply air is delivered to the back of the unit (side opposite of the controls) and all blower service access is from the bottom. Not all sizes available in back discharge only. Please see the Supply Air Openings section for details.
5. For back and straight combined discharge configurations, all blower service access is from the bottom.

Legend:

CEP = Controls & Electrical Service Panel
 BAP = Blower, Air Coil, & Drain Pan Service Panel
 WRP = Water & Refrigerant Service Panel
 ASP = Additional Service Panel (not required)

Supply Air Openings

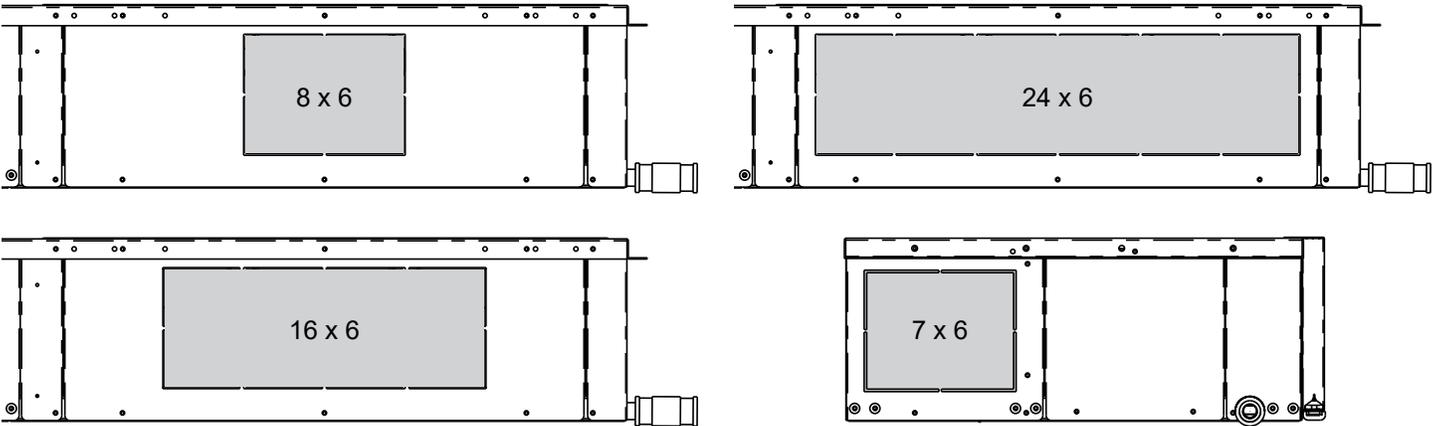
TRL products can be supplied with factory or field configured supply air openings. If factory configured supply air openings are desired, the configurations can be either left or right return air with right or left supply air. Back supply air can also be selected as field or factory configured but must be paired with left or right supply air openings on sizes 12 and 15. Please refer to Tables 1, 2, and 3 for minimum and maximum supply air openings by size.

Flanges for connection to the supply air are provided when factory configured supply air openings are ordered. When field configured supply air openings are selected, supply air

flanges are integrated into the cabinet design. Perforated supply air openings are knocked out and then the supply air flanges are bent back for connection to supply air plenum or duct work.

NOTES: Only TRL sizes 006-009 can be applied as back discharge supply air only. Sizes 012-015 must be applied as side discharge supply air with the option to be combined with back discharge supply air. Return air configurations can not be converted in the field.

Supply Air Openings



Supply Air (SA) Opening Dimensional Data

Size	Right/Left SA Opening Sizes	Back SA Opening
006-009	8 x 6 or 16 x 6	7 x 6
012-015	16 x 6 or 24 x 6	7 x 6

All dimensions shown in inches.

Supply Air (SA) Square Inches

Size	Number of Openings	Minimum Sq. in. Opening*	Maximum Sq. in. Opening	Recommended Sq. in. Opening
006-009	1 or 2	42	96	48
012-015	1 or 2	90	186	144

All dimensions shown in inches.

* Less than minimum SA open area will cause unit to trip on safeties.

Supply Air Options

Supply	Opening Area (in)	006 or 009	012 or 015
Straight	8x6	X	
	16x6	X	X*
	24x6		X
Straight + Back	8x6 + 7x6	X	X*
	16x6 + 7x6		X
	24x6 + 7x6		X
Back	7X6	X	
Field Configured	-	X	X

* For sizes 012-015 this configuration will have internal static pressure losses up to 0.2 depending on certain applications. ClimateMaster recommends field wiring to motor speed tap four for highest fan motor CFM performance.

TRL - Horizontal Corner Weights

Total Weight (lb)	Corner weights (lb)			
	Left-Front	Right-Front	Left-Back	Right-Back
145	42.3	37	35	30.6
146	42.6	37.3	35.3	30.9
152	44.4	38.8	36.7	32.1
159	46.4	40.6	38.4	33.6

*Front is water loop connection end.

Electrical Data

Standard Unit

Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			ECM FLA	Total Unit FLA	Min Circ AMP	Max Fuse AMP	Max Fuse/HACR
				MCC	RLA	LRA					
TRL006	G	208-230/60/1	187.2 / 253	5.2	2.5	17.7	2.3	4.8	5.4	7.9	15A
	E	265/60/1	238.5 / 291.5	3.6	2.2	10.5	2.3	4.6	5.2	7.5	15A
TRL009	G	208-230/60/1	187.2 / 253	7.0	3.6	22.2	2.3	6.8	7.9	12.4	15A
	E	265/60/1	238.5 / 291.5	5.1	3.1	13.5	2.3	5.6	6.5	9.8	15A
TRL012	G	208-230/60/1	187.2 / 253	7.9	5.6	32.5	2.3	9.0	10.7	17.4	15A
	E	265/60/1	238.5 / 291.5	5.9	4.0	23.0	2.3	6.1	7.0	10.8	15A
TRL015	G	208-230/60/1	187.2 / 253	10.3	5.6	29.0	2.3	8.9	10.5	17.1	15A
	E	265/60/1	238.5 / 291.5	7.5	4.6	20.0	2.3	7.1	8.3	13.1	15A

With Optional Internal Secondary Pump

Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			ECM FLA	ISP Pump FLA	Total Unit FLA	Min Circ AMP	Max Fuse AMP	Max Fuse/HACR
				MCC	RLA	LRA						
TRL006	G	208-230/60/1	187.2 / 253	5.2	2.5	17.7	2.3	0.39	5.2	5.8	8.3	15A
	E	265/60/1	238.5 / 291.5	3.6	2.2	10.5	2.3	0.22	4.8	5.4	7.7	15A
TRL009	G	208-230/60/1	187.2 / 253	7.0	3.6	22.2	2.3	0.39	7.2	8.3	12.8	15A
	E	265/60/1	238.5 / 291.5	5.1	3.1	13.5	2.3	0.22	5.9	6.7	10.0	15A
TRL012	G	208-230/60/1	187.2 / 253	7.9	5.6	32.5	2.3	0.51	9.5	11.2	17.9	15A
	E	265/60/1	238.5 / 291.5	5.9	4.0	23.0	2.3	0.33	6.4	7.4	11.1	15A
TRL015	G	208-230/60/1	187.2 / 253	10.3	5.6	29.0	2.3	0.51	9.4	11.1	17.6	15A
	E	265/60/1	238.5 / 291.5	7.5	4.6	20.0	2.3	0.33	7.4	8.6	13.4	15A

TRL Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial Professional'.

1. Click 'Products' in the main navigation
2. Select 'Small Packaged Units'
3. Select the TRL product series
4. Click the Wire Diagrams tab in the middle of the page
5. Select your voltage and controls

Control Type	Blower Type	TRL 006-015
		Wiring Diagram Part Number
CXM2	Constant Torque	96B1001N01
CXM2/MPC	ECM	96B1001N02

Tranquility® (TRL) Series Engineering Specifications – Page 1

General:

Furnish and install ClimateMaster Tranquility® “TRL” Water-Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 40° to 120°F (4.4° to 43.3°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute / International Standards Organization (AHRI / ISO 13256-1) with a minimum EER of 14.0. All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI / ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform factory acceptance test via computer. A detailed report card from the factory acceptance test shall ship with each unit. **(Note: If unit fails the factory acceptance test, it shall not be allowed to ship. Unit serial number shall be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.)**

Basic Construction:

Units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left). Left Inlet/Back Discharge; Right Inlet/Back Discharge (limited to sizes 6 & 9 only). Left Inlet/Straight (Right) & Back Discharge; Right Inlet/Straight (Left) & Back Discharge as shown on the plans. Unit hanger brackets to be integrally designed into the top panel with rubber isolation grommets packaged separately.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units must have a minimum of three access panels for serviceability of compressor compartment. **Units having only one or two access panels to compressor/heat exchangers/expansion device/refrigerant piping or do not have bottom access panel shall not be acceptable.**

All cabinets shall have supply air knockouts on side opposite of the return air and in the back. Field shall configure cabinets by removing factory knockouts and bending back integrally designed supply air duct flanges per model configuration shown on plans. For air noise attenuation purposes, there shall be a unit integrated sound attenuation box that helps reduce air flow noise transmission. Units not having supply air noise attenuation boxes are not acceptable.

The heat pumps shall be fabricated from heavy gauge galvanized steel. Compressor section interior surfaces shall be lined with 1/2 inch (12.7 mm) thick, 1-1/2 lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 inch (12.7 mm) thick, 1-1/2 lb/ft³ (24 kg/m³) foil-faced fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. **Units without foil-faced insulation in the air handling section will not be accepted.**

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Tranquility® (TRL) Series Engineering Specifications – Page 2

All units to have supply are knock outs with integrally designed 1" supply air duct collars, 1 inch (25.4 mm) bottom access filter frames with 1 inch (25.4 mm) filters factory installed. **If units with these factory-installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their sub-contractor to install these provisions.**

All units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the air stream are not acceptable. Units shall have factory installed 1 inch (25.4mm) wide filter frames for filter removal from the bottom. Units shall have a 1 inch (25.4mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper FPT fittings. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. **Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature.** Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: Factory configured supply air openings.

Option: The unit will be supplied with optional factory installed 2 inch air filter frames with filter access door and return air duct flanges (typically used for ducted return installation).
A corresponding 2 inch throwaway type glass filter will ship with the factory installed frame.

Option: UltraQuiet package shall consist of additional sound insulation applied to the base pan, removable panels and blower housing.

Option: The unit shall be supplied with extended range insulation which adds closed cell insulation to internal water lines and provides insulation on suction side of refrigerant tubing including the refrigerant to water braze plate heat exchanger.

Fan and Motor Assembly:

Fan and motor assembly shall be attached on a slide down fan deck assembly that can be access and removed from the bottom of the unit when it is installed. In service mode, the blower assembly shall hang below the unit resting on a service rail and be provided with quick electrical disconnecting means to facilitate easy field servicing and removal. The fan deck assembly shall be mechanically designed to prevent from dropping without first removing safety screw and then pulling back a safety release latch. The fan motor shall be multi-speed, permanently lubricated, ECM type, with internal thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service. The fan motor shall include a torsionally flexible motor mounting system or saddle mount system with resilient rings to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The airflow rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil and/or no filter shall NOT be acceptable.**

Water and Refrigerant Circuits:

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, braze plate refrigerant to water heat exchanger, and safety controls including a water flow switch, high pressure switch, low pressure (loss of charge) switch, water coil low temperature sensor, and air

Tranquility® (TRL) Series Engineering Specifications – Page 3

coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

Hermetic compressors shall be internally sprung. The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to heavy gauge compressor mounting rails, which are then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner plates stacked and brazed together allowing separate water and refrigerant flow pathways, rated to withstand 650 PSIG (4482 kPa) working refrigerant and water pressure.

Option: The unit will be supplied with internally factory mounted two-way motorized water valve (MWV) for variable speed loop pumping requirements. Valve to be normally closed type.

Option: The unit will be supplied with internally factory mounted automatic water flow (AFR) regulators.

Option: High pressure water flow switches for water loop applications with designed pressures between 161 to 300 PSI.

Option: The unit will be supplied with internally mounted secondary pump for primary/secondary applications, including single-pipe systems.

Option: The refrigerant to air heat exchanger shall be E-coated.

Option: The refrigerant to air heat exchanger shall be Tin-plated.

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced type with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 40° to 120°F (4.4° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Drain Pan:

The drain pan shall be constructed of 304 stainless steel. Drain pan shall be fully insulated. Drain outlet shall be located at pan as to allow unobstructed drainage of condensate. Drain outlet shall be connected from pan directly to a MPT connection or a coupling will be provided for connection to a non-threaded 3/4 inch PVC or 1 inch Copper coupling fitting. **No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.** Drain pan to be accessed and removed from the bottom of the unit. **Units without bottom removable drain pans shall not be accepted.** The unit as standard will be supplied with solid-state electronic condensate overflow protection. **Mechanical float switches will NOT be accepted.**

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Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 2 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. The entire control box shall be capable of rotating 120 degrees, allowing access to the electrical section from the front, bottom, or top (table top service requires unit top panel to be removed) of the unit. **Units without front, bottom, and top access will not be accepted.** Low voltage wires shall enter the box through a hole in the lower left side and high voltage wires shall enter the box through a hole in the upper left side. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat or sensor.

Enhanced Solid State Control System (CXM2):

This control system is a communicating controller.

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature.
- g. Condensate overflow electronic protection.
- h. Option to reset unit at thermostat or disconnect.
- i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur. **(NOTE: This is not applicable for all fault codes. LWT and LT1 will shut down the unit as soon as it goes below temperature and it will lock out.)**
- j. Ability to defeat time delays for servicing.
- k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
- l. 24V output to cycle a motorized water valve or other device with compressor contactor.
- m. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
- n. Water coil low temperature sensing (selectable for water or anti-freeze).
- o. Low water flow cut out switch ensures water flow through the braze plate heat exchanger protecting the equipment from low or no flow scenarios.
- p. Automatic time-based reset for flow switch. If flow is re-established within 60 seconds after flow being interrupted, the unit will restart the compressor after the 5 minutes anti short cycle.

NOTE: Units not providing the 9 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, water flow verification switch, and condensate overflow protection will not be accepted.

When CXM2 is connected to AWC99U01 thermostat or handheld service tool, the installer/service technician can; check DIP switch S2 settings; run operation modes manually; check all physical inputs from thermostat and refrigerant pressure switches status, (Y1, Y2, W, O, G, H, ESD, NSB, OR, HP switch, and LOC switch); current or at time of fault the following temperatures - water coil (LT1), air coil (LT2), compressor discharge, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults. When the AWC99U01 communicating thermostat is used this same functionality can be viewed and adjusted remotely in the web portal or mobile app. **Systems not providing remote access, diagnosis, and adjustment functionality will not be accepted.**

Tranquility® (TRL) Series Engineering Specifications – Page 5

Remote Service Sentinel (CXM2):

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. The test button on the controller is pressed to display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc.

Units that do not provide this remote service sentinel shall not be acceptable.

Warranty:

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM2 control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units shall be connected with hoses. The hoses shall be braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, FPT connections.
- b. Ball valve with memory stop and PT port.
- c. "Y" strainer with blowdown valve; bronze material, FPT connections.
- d. Motorized water valve; slow acting, 24v, FPT connections.

Hose Kit Assemblies:

The following assemblies ship with the valves already assembled to the hose described:

- a. Supply and return hoses having ball valve with PT port.
- b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve with PT ports, and ball valve.
- c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator with PT ports, and ball valve.
- d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

Tranquility® (TRL) Series Engineering Specifications – Page 6

Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type thermostat as selected below with the described features:

a. Thermostat (Communicating) (AWC99U01)

An electronic communicating web-enabled touchscreen thermostat shall be provided. The thermostat shall offer three stages of heating and two stages of cooling with precise temperature control and have a four-wire connection to the unit. The thermostat shall be capable of manual or automatic change-over operation and shall operate in standard or programmable mode. An integrated humidity control feature shall be included to control a humidifier and/or a dehumidifier. The thermostat shall include a utility demand reduction feature to be initiated by an independent time program or an external input.

The thermostat shall provide access to via the web portal or mobile application to include temperature adjustment, schedule adjustment including occupied/unoccupied, entering water temperature, leaving water temperature, water coil temperature, air coil temperature, leaving air temperature, and compressor discharge temperature. A graphical system layout to be provided with real-time operating mode information of the temperature sensors for easy diagnostics.

The thermostat shall display system faults with probable cause and troubleshooting guidance. The system shall provide in clear language last five faults, time of faults, operating temps at time of fault, and possible reasons for the fault. The thermostat shall provide access for immediate manual control of all outputs via the web portal/mobile application for rapid troubleshooting.

b. Single-Stage Digital Auto or Manual Changeover (ATA11U01)

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and setpoint(s) in °F or °C. The Thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.

c. Multi-stage Manual Changeover Programmable 5/2 Day (ATP21W02)

Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. Thermostat shall provide convenient override feature to temporarily change setpoint.

d. Multi-stage Automatic or Manual Changeover Programmable 7 Day (ATP32U03C)

Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM2 or DXM2.5 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

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e. Multistage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)

Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat dehumidification mode to operate with ClimaDry® II reheat or with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM2 or DXM2.5 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

f. CM100 - Multi-stage Automatic or Manual Changeover digital thermostat (ATA32V01)

Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a green backlit LED display with temperature, setpoints, mode, and status indication via a green (cooling) or red(heating) LED. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring. Thermostat navigation shall be accomplished via four buttons (Mode/fan/down/up) with menu-driven selections for ease of use and programming.

g. CM300 – Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V02C)

Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, night time control of display backlight, bi-color LED indicates a heating or cooling demand, keypad lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on.

h. CM500 – Color Touchscreen Display, Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V03C)

Thermostat shall have color resistive touchscreen display with space temperature, relative humidity, setpoints, mode, status indication and local weather (if connected to Wi-Fi). Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, customizable screen saver and background displays, indicator on display indicates a heating or cooling demand, set-point lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on the display. Capable of being monitored by 3rd party software. Compatible with AST014 Wi-Fi remote sensor. Configurator mobile app or web portal for easy

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setup. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12- or 24-hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide access to a web portal and mobile app for installer setup for configuring options. Thermostat shall have menu-driven selections for ease of use and programming.

NOTICE! This product specification document is furnished as a means to copy and paste ClimateMaster product information into project specification. It is not intended to be a complete list of product requirements. This document is an excerpt from the product submittal and must not be used without consulting the complete product submittal. For complete product installation and application requirements, please consult the complete product submittal. ClimateMaster is not responsible for misuse of this document or a failure to adequately review specific requirements in the product submittal.

Performance Sheet

SUBMITTAL DATA - I-P UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ Btuh

EER: _____

Heating Capacity: _____ Btuh

COP: _____

Ambient Air Temp: _____ °F

Entering Water Temp (Clg): _____ °F

Entering Air Temp (Clg): _____ °F

Entering Water Temp (Htg): _____ °F

Entering Air Temp (Htg): _____ °F

Airflow: _____ CFM

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (lb)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

SUBMITTAL DATA - S-I UNITS

Unit Designation: _____

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

PERFORMANCE DATA

Cooling Capacity: _____ kW

EER: _____

Heating Capacity: _____ kW

COP: _____

Ambient Air Temp: _____ °C

Entering Water Temp (Clg): _____ °C

Entering Air Temp (Clg): _____ °C

Entering Water Temp (Htg): _____ °C

Entering Air Temp (Htg): _____ °C

Airflow: _____ l/s

Fan Speed or Motor/RPM/Turns: _____

Operating Weight: _____ (kg)

ELECTRICAL DATA

Power Supply: _____ Volts

_____ Phase _____ Hz

Minimum Circuit Ampacity: _____

Maximum Overcurrent Protection: _____

Notes:

Revision History

Date:	Description:	Page #:
02/24/23	Introduced iGate® 2 Communicating (AWC) Thermostat	All
07/12/22	Added 265v "E" voltage option. Updated AHR ratings table. Expanded electrical table to include the new voltage	All
03/04/22	Updated Max Fuse Amp size for sizes 12 & 15	Page 25
11/11/21	Created Document	All



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