MEPNN Supplier Scouting Opportunity Synopsis

Section 1: General Information

Scouting Number	2024-287
Item to be Scouted	Unit Heaters and Cabinet Unit Heaters
Days to be scouted	30
Response Due By	10/18/2024

Description	For the construction of the new Energy and Minerals Research Facility (EMRF) for the U. S. Geological Survey (USGS) at the Colorado School of Mines (Mines), 1000 18th Street, Golden, Colorado 80401, provide packaged Unit Heaters and Cabinet Unit Heaters (CUH) delivered to the EMRF construction site. This project is federally funded by the President Joe Biden's Bipartisan Infrastructure Law (BIL). Therefore, the material used for construction is required to be compliant with the Build America, Buy America Act (BABAA). This NIST MEP Supplier Report seeks BABAA compliant equipment that meets or exceeds the basis of design. The basis of design are Zehnder Rittling Unit Heaters and CUHs, described herein (including additional information). The basis of design equipment meets or exceeds the design requirements including the strict technical requirements, maximum size requirements, maximum delivery schedule, and the maximum cost parameters enclosed. See also the requirements stated in the enclosed specifications, drawings, dimension and performance requirements, and other documents including warranty requirements. Provide unit heaters and CUH from the same manufacturer. Packaged VFDs and associated components and accessories include, but are not limited to, the following: HOT-WATER CABINET UNIT HEATERS 1. Provide a factory-assembled and -tested unit complying with ARI 440. 2. Coil Section Insulation: Comply with NFPA 90A or NFPA 90B. Unicellular polyethylene thermal plastic, preformed sheet insulation complying with ASTM C 534, Type II, except for density. See the specifications for additional insulation requirements. 3. Cabinet: 18-Gauge steel chasis with baked-enamel finish with manufacturer's standard paint colors, in color selected by Architect. See the specifications for additional cabinet requirements. 4. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2. Pleated: 1-inch thick flat panel throw-away type MERV 8A. 5. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 300 PSIG and a maximum entering-water temperature of 200 degrees F. Include manual air vent and drain. 6. Fan and Motor Board: Removable. See the specifications for additional requirements. 7. See the specifications for additional requirements. HOT-WATER PROPELLER UNIT HEATERS 1. Description: An assembly including casing, coil, fan, and motor in vertical discharge configuration with adjustable discharge louvers. 2. Cabinet: 20-Gauge Steel. Removable panels for maintenance access to controls. 3. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping. 4. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units. 5. General Coil Requirements: Test and rate hot-water propeller unit heater coils according to ASHRAE 33. 6. Hot-Water Coil: Copper tube, minimum 0.025-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 PSIG and a maximum entering-water temperature of 325 degrees F, with manual air vent. Test for leaks to 250 PSIG underwater. 7. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi. OSHA compliant fan guard. 8. See specifications for additional requirements.
Notify Requester Immediately	
State item to be used in	Colorado

Section 2: Technical Information

Type of supplier being sought	Manufacturer

Reason	BABA
Describe the manufacturing processes (elaborate to provide as much detail as possible)	Electronic and mechanical assembly.
Provide dimensions / size / tolerances / performance specifications for the item	See information provided.
List required materials needed to make the product, including materials of product components	Various, see information provided.
Are there applicable certification requirements?	Yes
Details	See enclosed specifications for additional reference standards, regulations, and certifications required including, but not limited to, NFPA, ARI, and ASHRAE.
Are there applicable regulations?	No
Are there any other stndards, requirements, etc.?	Yes
Details	See above. See the enclosed specification requirements including spare parts, warranty, manufacturer qualifications, delivery, storage, and handling.
NAICS 1	333414 Heating equipment (excluding warm air furnaces) manufacturing
NAICS 2	
Additional Technical Comments	See enclosed specification section and the basis of design information Zehnder Rittling Unit Heaters and CUHs.

Section 4: Business Information

Estimated potential business volume	Limited to one set of equipment. The quantities for each type of equipment is included in the information provided.
Estimated target price / unit cost information (if unavailable explain)	Total combined cost is a maximum of $42,210. This includes a total of 15 CUHs and 1 Unit Heater, shipping, start up services including commissioning and coordinating with Building Automation System, and required minimum manufacturer's warranty (see specifications). Costs also include providing approved submittal paperwork, filters, disconnect, thermostat, and spare parts required in the specifications.
When is it needed by?	CUHs and Unit Heater lead time is 12 weeks but shipped to, and on-site, no later than 9/19/2025, 2:00 pm local time. If the schedule has delivery prior to the date above, the cost of holding equipment until the project can receive the equipment will not be permitted. Provide written manufacturer's submittal at least 90 days before they are required by manufacturer for review and approval.
Describe packaging requirements	Crate and package equipment and components for secure and undamaged transportation and delivery.
Where will this item be shipped?	Shipping will be to Golden, Colorado 80401, at the construction site address listed above.

Additional Comments

Is there other information you would like to include?	This project is federally funded by the President Joe Biden's Bipartisan Infrastructure Law (BIL). Therefore, the material used for construction is required to be compliant with the Build America, Buy America Act (BABAA). This NIST MEP Supplier Report seeks BABAA compliant equipment that meets or exceeds the basis of design. Point of Contact information for questions including BABA/Buy American compliance: The Energy and Minerals Research Facility (EMRF) facility for the U. S. Geological Survey (USGS) is at the Colorado School of Mines (Mines) Robert Lee ralee@mines.edu Please copy scouting@nist.gov on all correspondence.

EMRF Cabinet Unit Heaters and Unit Heater
NIST MEP Submittal

Products: Zehnder Rittling Cabinet Unit Heaters and Unit Heater. Company based in Buffalo, NY, manufactured in China.

Performance Criteria: Models and performance as specified, see attached documentation.

Dimensions: Vary per unit, see attached.

Model

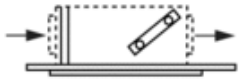
RFRC-430-06

Tag: **CUH-001**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
1	**2-row**	**120/60/1**	**DUCT IN, DUCT OUT**

General Information

Air Flow:	**557**	CFM
Fan Speed:	**High**	
ESP:	**0.40**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	



RFRC-430 - RECESSED, BACK DUCT IN, FRONT DUCT OUT

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.85**

Hot Water Heat

Capacity:	**31.2**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**123.0**	°F
Fluid Flow:	**1.2**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**124.9**	°F
Fluid ΔT:	**55.1**	°F
Fluid Pressure Drop:	**0.7**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**155**	lbs.
Unit Length:	**62.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

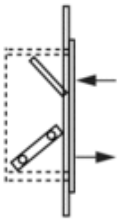
* Weight is base unit only, does not include any options or accessories selected

Model

RFRWI-350-12

Tag: **CUH-101**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
1	**2-row**	**120/60/1**	**LVR IN, LVR OUT**



RFRWI-350 - RECESSED, FRONT IN, FRONT OUT

General Information

Air Flow:	**1180**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.26**
120/60/1	**1/5**	**1.26**

Hot Water Heat

Capacity:	**49.8**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**107.5**	°F
Fluid Flow:	**1.9**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**124.4**	°F
Fluid ΔT:	**55.6**	°F
Fluid Pressure Drop:	**0.2**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**215**	lbs.
Unit Length:	**86.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected

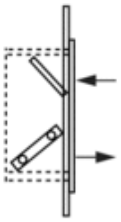
zehnder Rittling

Model

RFRWI-350-08

Tag: **CUH**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
3	**2-row**	**120/60/1**	**LVR IN, LVR OUT**



RFRWI-350 - RECESSED, FRONT IN, FRONT OUT

General Information

Air Flow:	**810**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.18**
120/60/1	**1/5**	**1.18**

Hot Water Heat

Capacity:	**33.1**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**105.9**	°F
Fluid Flow:	**1.4**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**130.0**	°F
Fluid ΔT:	**50.0**	°F
Fluid Pressure Drop:	**0.1**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**170**	lbs.
Unit Length:	**68.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected

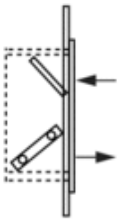
zehnder Rittling

Model

RFRWI-350-06

Tag: **CUH**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
2	**2-row**	**120/60/1**	**LVR IN, LVR OUT**



RFRWI-350 - RECESSED, FRONT IN, FRONT OUT

General Information

Air Flow:	**620**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.1**

Hot Water Heat

Capacity:	**27.3**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**109.6**	°F
Fluid Flow:	**0.9**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**115.5**	°F
Fluid ΔT:	**64.5**	°F
Fluid Pressure Drop:	**0.3**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**155**	lbs.
Unit Length:	**62.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected

Model

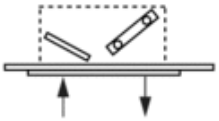
RFRC-420-04

Tag: **CUH-302**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
1	**2-row**	**120/60/1**	**LVR IN, LVR OUT**

General Information

Air Flow:	**420**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	



RFRC-420 - RECESSED, BOTTOM IN, BOTTOM OUT

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**0.58**

Hot Water Heat

Capacity:	**22.0**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**118.9**	°F
Fluid Flow:	**0.9**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**128.2**	°F
Fluid ΔT:	**51.8**	°F
Fluid Pressure Drop:	**0.3**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**125**	lbs.
Unit Length:	**50.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

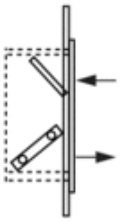
* Weight is base unit only, does not include any options or accessories selected

Model

RFRWI-350-12

Tag: **CUH-303**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
1	**2-row**	**120/60/1**	**LVR IN, LVR OUT**



RFRWI-350 - RECESSED, FRONT IN, FRONT OUT

General Information

Air Flow:	**1180**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.26**
120/60/1	**1/5**	**1.26**

Hot Water Heat

Capacity:	**49.8**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**107.5**	°F
Fluid Flow:	**1.9**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**124.4**	°F
Fluid ΔT:	**55.6**	°F
Fluid Pressure Drop:	**0.2**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**215**	lbs.
Unit Length:	**86.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected

Model

RC-390-08

Tag: **CUH-**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
3	**2-row**	**120/60/1**	**LVR IN, LVR OUT**

General Information

Air Flow:	**810**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.18**
120/60/1	**1/5**	**1.18**

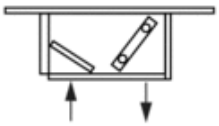
Hot Water Heat

Capacity:	**33.1**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**105.9**	°F
Fluid Flow:	**1.4**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**130.0**	°F
Fluid ΔT:	**50.0**	°F
Fluid Pressure Drop:	**0.1**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**170**	lbs.
Unit Length:	**68.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected



RC-390 - BOTTOM IN, BOTTOM OUT

Model

RC-390-06

Tag: **CUH-**

Qty	Coil Config	Unit Voltage	Inlet/Outlet
3	**2-row**	**120/60/1**	**LVR IN, LVR OUT**

General Information

Air Flow:	**620**	CFM
Fan Speed:	**High**	
ESP:	**0**	in. H2O
Altitude:	**5800**	Feet
Filter:	**1" merv 8 pleated filter**	

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
120/60/1	**1/5**	**1.1**

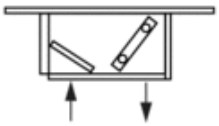
Hot Water Heat

Capacity:	**27.3**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**109.6**	°F
Fluid Flow:	**0.9**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**115.5**	°F
Fluid ΔT:	**64.5**	°F
Fluid Pressure Drop:	**0.3**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
Rows / FPI:	**2/12**	

Unit Information

Shipping Weight*:	**155**	lbs.
Unit Length:	**62.2**	inches
Unit Width:	**10**	inches
Unit Height:	**24**	inches

* Weight is base unit only, does not include any options or accessories selected



RC-390 - BOTTOM IN, BOTTOM OUT

Qty: 15 Tags: CUH-001, CUH-101, CUH-303, CUH, CUH, CUH-302, CUH-, CUH-

Standard unit features

Summary of all features, some features may not be specific to every project.

Construction
- All units
  - Galvannealed steel construction
  - Integral 1" throwaway filter
- Exposed units
  - Stamped louver supply grille
  - Durable epoxy powder coat paint
  - 8" end pockets with removable front panel
  - 16-gauge exterior panel construction

Coils
- 1 row hot water or steam
- 1/2" nominal O.D. seamless copper tubes
- 0.016" tube wall thickness
- High efficiency aluminum fins, 12 FPI
- Left or right hand, same end connections
- Manual air vents

Fan assemblies
- Forward curved, DWDI centrifugal type
- 115 volt, single phase, three speed PSC motors
- Removable for service

Electrical
- $_{C}$ETL$_{US}$ listed for safety compliance
- Electrical junction box for field wiring terminations
- Unit or remote mounted three speed fan switch

Cabinet Unit Heater Submittal Data

English, IP Units

☐ Optional unit features

Summary of all features, some features may not be specific to every project.

Construction
- All units
  - 1/2" thick fiberglass insulation on front panel
  - 1/2" thick fiberglass insulation on front panel and chassis
  - 0-25% manual and motorized outside air dampers (RF, RS only)
  - Spare 1" throwaway filters
  - 1" MERV 8 pleated filters
  - Leveling legs (RF, RS only)
- Exposed units
  - Anodized aluminum bar grille
  - 14-gauge front panel
  - 14-gauge cabinet
  - Return air louver grille (RF, RS only)
  - 6" extended end pockets
  - Tamper proof fasteners
  - Wall seal (RFRW, RFRWI, RRW, RRWI, RFRC, RRC only)

Coils
- Automatic air vents
- 2 row coil
- 3 row coil
- 4 row coil

Fan assemblies
- Motor quick connect
- EC motor (Electronically commutated motors)
  - 208-230 & 277 volt, 60 Hz and 220 volt
  - High-efficiency, programmable, brushless DC motors that utilize a permanent magnet rotor and built-in inverter.
  - Provide low operating cost and ultra-quiet operation.

Electrical
- Fan relay packages
- Toggle disconnect switch
- Manual motor starter with thermal overload protection

Piping packages
- Factory assembled, shipped loose for field installation
- 1/2", 2-way and 3-way normally closed, two position electric motorized valves
- Isolation ball valves
- Fixed and adjustable flow control devices
- Unions and P/T ports

Controls
- Analog
- Unit and remote mounted, with integral three speed fan switch
- Remote temperature sensor
- Aquastat, pipe mounted, shipped loose
- Return air thermostat

Qty: 9 Tags: CUH-001, CUH-302, CUH-101, CUH-303, CUH, CUH

Cabinet Unit Heater Submittal Data

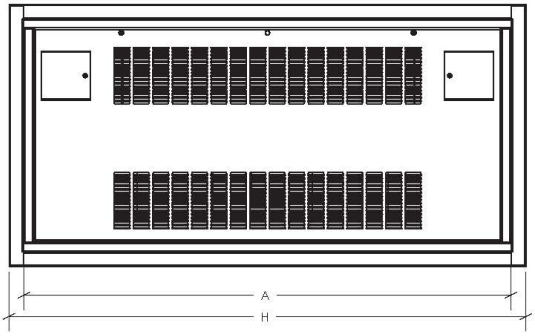
English, IP Units

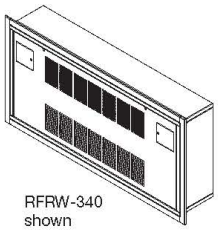
☐ **Dimensions and data**

Wall seal kit

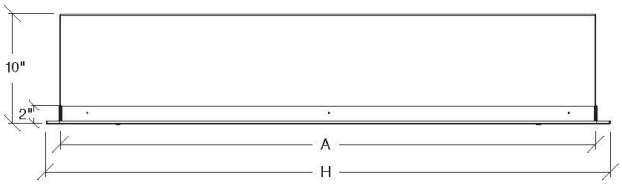
Ships loose for field mounting

Front view





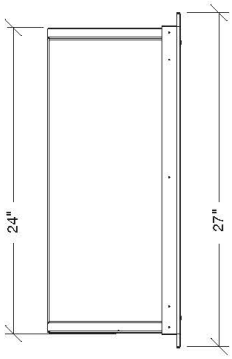
Top view



Dimensional data

Unit size	A	H
02	38-3/16	41-3/16
03	44-3/16	47-3/16
04	50-3/16	53-3/16
06	62-3/16	65-3/16
08	68-3/16	71-3/16
10	76-3/16	79-3/16
12	86-3/16	89-3/16

Side view



Notes:

- For fully recessed units locate frame flush with front
- For partially recessed units locate frame as needed
- Use sheet metal screws (by others) to secure trimframe to the unit.

Revised June 2018. Zehnder periodically makes changes to the design and/or specifications of its products. As a result, the design and specifications of each product at the time of order may be different than as described herein. Please contact Zehnder's Sales Support staff at 844-934-6337 for specific information on current design and specifications. Designs, specifications and other information contained herein are not express warranties, which are only as expressly set forth by Zehnder in its terms and conditions of sale. The latest version of this document is available at www.zehnder-rittling.com.

Cabinet Unit Heater Submittal Set: 11 Page ____ of ____

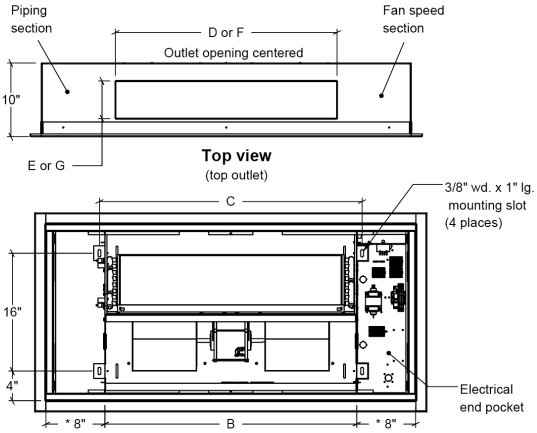
10/6/2020

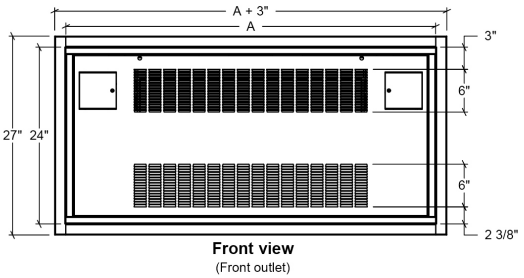
Qty: 9 Tags: CUH-302, CUH-001, CUH, CUH-101, CUH-303, CUH

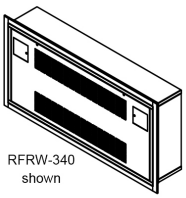
Rittling Cabinet Unit Heater Submittal Data

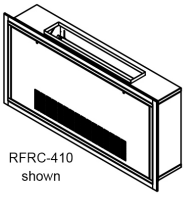
☐ Dimensions and data

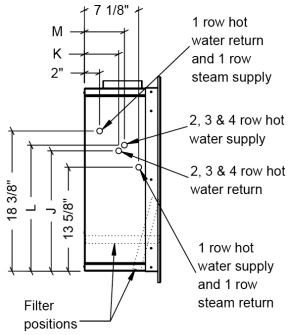
Models RRW, RFRW, RRC, RFRC, RRWI & RFRWI









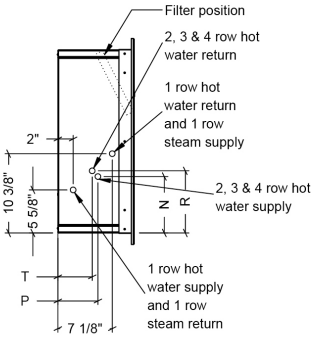


Side view: Model RRW, RFRW, RRC and RFRC

Dimensional data

Unit size	A			B	C	Louvers		Duct opening		H		
	Std.	6" Ext.	6" Ext. x2			D	E	F	G	Std.	6" Ext.	6" Ext. x2
02	38-3/16	44-3/16	50-3/16	22-3/16	24	20	6	18-3/8	5-1/8	41-3/16	47-3/16	53-3/16
03	44-3/16	50-3/16	56-3/16	28-3/16	30	26	6	24-3/16	5-1/8	47-3/16	53-3/16	59-3/16
04	50-3/16	56-3/16	62-3/16	34-3/16	36	32	6	30-3/16	5-1/8	53-3/16	59-3/16	65-3/16
06	62-3/16	68-3/16	74-3/16	46-3/16	48	44	6	42-3/16	5-1/8	65-3/16	71-3/16	77-3/16
08	68-3/16	74-3/16	80-3/16	52-3/16	54	50	6	48-3/16	5-1/8	71-3/16	77-3/16	83-3/16
10	76-3/16	82-3/16	88-3/16	60-3/16	62	58	6	56-3/16	5-1/8	79-3/16	85-3/16	91-3/16
12	86-3/16	92-3/16	98-3/16	70-3/16	72	68	6	66-3/16	5-1/8	89-3/16	95-3/16	101-3/16

Coil	J	K	L	M	N	P	R	T
2 Row	15-3/4	4-7/16	16-9/16	5-3/16	7-7/16	5-3/16	8-1/4	4-7/16
3 Row	16-9/16	3-1/16	17-1/8	4-13/16	6-1/8	4-13/16	4-13/16	3-1/16
4 Row	16-9/16	3-1/16	17-1/8	4-13/16	6-1/8	4-13/16	4-13/16	3-1/16



Side view: Model RRWI and RFRWI

Notes:

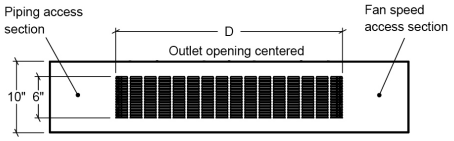
- 1 and 2 row coil supply and return 1/2" nominal (5/8" OD) all sizes
- Unit shown with left hand piping connections and right hand electrical connections as standard
- Right hand piping connections with left hand electrical connections available as an option
- Piping hand determined when facing the air outlet
- All listed dimensions are approximate and are subject to change without notice
- Modifications to the product specifications must be accepted by Zehnder at its base office
- See www.zehnder-rittling.com for any recent updates or changes

10/6/2020

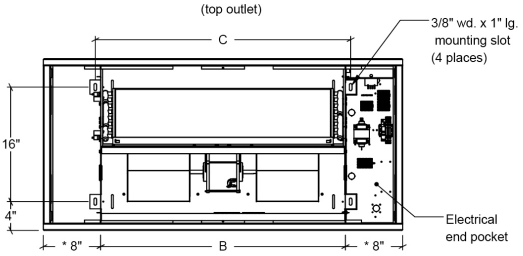
Qty: 6 Tags: CUH-, CUH-

Rittling Cabinet Unit Heater Submittal Data

Dimensions and data

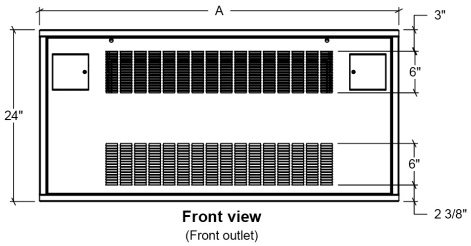


Top view
(top outlet)



Front view
(less front panel)

* Add 6" per extended end selection. See chart for details.



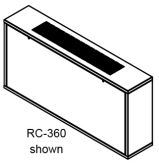
Front view
(Front outlet)

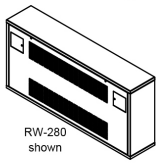
Dimensional data

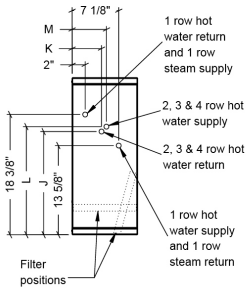
Unit size	A			B	C	Louvers		Ducted opening	
	Std.	6" Ext.	6" Ext. x2			D	E	F	G
02	38-3/16	44-3/16	50-3/16	22-3/16	24	20	6	18-3/8	5-1/8
03	44-3/16	50-3/16	56-3/16	28-3/16	30	26	6	24-3/16	5-1/8
04	50-3/16	56-3/16	62-3/16	34-3/16	36	32	6	30-3/16	5-1/8
06	62-3/16	68-3/16	74-3/16	46-3/16	48	44	6	42-3/16	5-1/8
08	68-3/16	74-3/16	80-3/16	52-3/16	54	50	6	48-3/16	5-1/8
10	76-3/16	82-3/16	88-3/16	60-3/16	62	58	6	56-3/16	5-1/8
12	86-3/16	92-3/16	98-3/16	70-3/16	72	68	6	66-3/16	5-1/8

Coil	J	K	L	M	N	P	R	T
2 Row	15-3/4	4-7/16	16-9/16	5-3/16	7-7/16	5-3/16	8-1/4	4-7/16
3 Row	16-9/16	3-1/16	17-1/8	4-13/16	6-1/8	4-13/16	4-13/16	3-1/16
4 Row	16-9/16	3-1/16	17-1/8	4-13/16	6-1/8	4-13/16	4-13/16	3-1/16

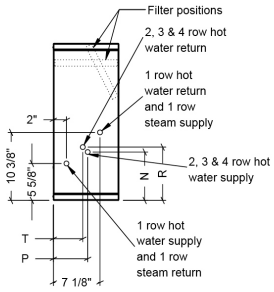
Model RW, RWI and RC







Side view: Model RW and RC



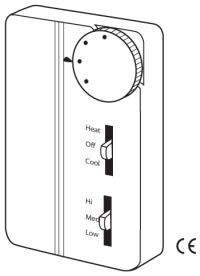
Side view: Model RWI

Notes:
- 1 and 2 row coil supply and return 1/2" nominal (5/8" OD) all sizes
- Inlet grill optional
- Unit shown with left hand piping connections and right hand electrical connections as standard
- Right hand piping connections with left hand electrical connections available as an option
- Piping hand determined when facing the air outlet
- All listed dimensions are approximate and are subject to change without notice
- Modifications to the product specifications must be accepted by Zehnder at its base office
- See www.zehnder-rittling.com for any recent updates or changes

Qty: 15 Tags: CUH-001, CUH-101, CUH, CUH, CUH-302, CUH-303, CUH-, CUH-

☐ Non-digital thermostat

Application



The non-digital thermostat provides on/off control for low voltage and line voltage valves, relays and fan motors.

Features

- Manual or automatic changeover models
- Line voltage 3-speed fan control
- Continuous or cycling fan operation (cycling fan operation requires additional relay or relays)
- Remote sensor capability for seasonal changeover
- Handles all supply voltages from 24 to 277 Vac at 50/60 Hz (fan and system voltage must be the same)

Theory of operation

All non-digital models are electronic thermostats. A variable resistance device called a thermistor senses the room termperature and sends a resistance value to the thermostat. For example: in heat mode, the thermostat measures the temperature represented by the resistance value of the onboard thermistor (or remote thermistor if used). If the sensed temperature value drops 1 °F (0.6 °C) or more below the set point the heating output will be powered. A valve or damper opens to heat the space. When the temperature reaches the set point the heating output will be turned off, closing the valve or damper. The thermostats maintain temperatures with a 1 °F (0.6 °C) differential in both heating and cooling.

Specifications

Inputs

- Power input: 24 to 277 Vac @ 50/60 Hz
- Power consumption: 0.88 watts at maximum
- Connections
  Power: up to 14 AWG wire
  Control: Up to 14 AWG wire

Outputs

- Electrical; heat/cool output rating: Pilot duty, 10 VA at 24 Vac, 20 VA at 120-277 Vac
- Fan switch: Refer to Table 1

Control

- Deadband: 4 °F (2.2 °C)
  Auto changeover models only
- Operating differential: 1 °F (0.6 °C)
- Setpoint adjustment range: 50 to 90 °F

Enclosure

- Material: Rigid vinyl
- Finish: Cool gray

Environment

- **Temperature limits**
  Shipping and storage: -30 to 130 °F (-34 to 55 °C)
  Operating: 32 to 130 °F (0 to 55 °C)
- Shipping weight: 0.31 lbs. (140 g.)
- Location: NEMA type 1

Agency listings

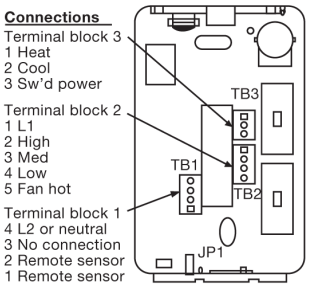
- CE: Compliant

Table 1: Fan switch current ratings (amps)[a]

Voltage	Inductive		Resistive amps	Pilot duty
	FLA	LRA		
24	N/A	N/A	N/A	24 VA
120	5.8	34.8	6.0	125 VA
240	2.9	17.4	5.0	125 VA
277	2.4	14.4	4.2	125 VA

[a] Fan and system must share the same voltage

Terminal description



Dimensional data

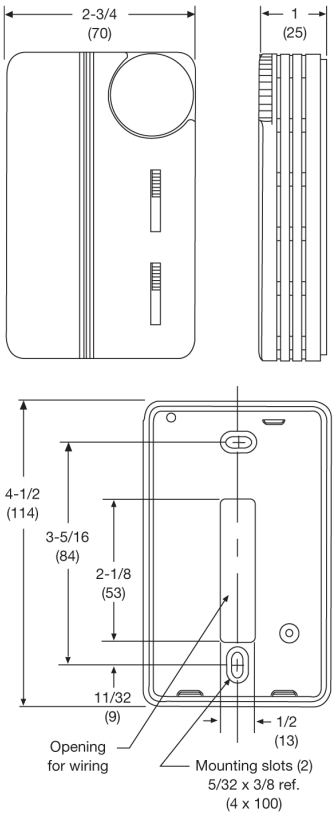


Table 2: Model chart

Model	Outputs	Changeover	Fan control	System switches
11100000180A	Dual	Manual	High-medium-low	Heat-off-cool
11100000181A	Dual	Automatic[a]	High-medium-low	On-off
11100000182A	Single	N/A	High-medium-low	On-off

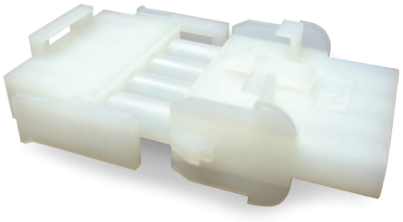
[a] Automatic changeover models have a 4 °F deadband between heating and cooling

Qty: 15 Tags: CUH-001, CUH-101, CUH, CUH, CUH-302, CUH-303, CUH-, CUH-

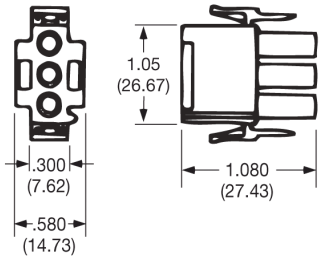
Quick connect

- Positive polarization
- Rear cavity identification
- Pin or socket contact can be hot
- Positive locking housings
- Insulation capability to 0.200" (5.08 mm) diameter
- Removable, crimp snap-in contacts
- Low-contact mating force
- Contacts are on 0.250" (6.35 mm) centerline spacing
- UL recognized file no. E28476
- CSA certified file no. LR 7189
- Rated for 600 VAC or VDC
- Dual locking lances provide optimum contact stability

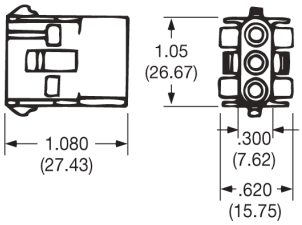
Universal pins and sockets
Can be used in either plug or cap housings. Pin diameter: 0.084" (2.13 mm)



Plug



Cap



Pre-tinned brass

Style	AWG	Ins. dia. range (in.)
Pin	20-14	0.06-0.13
Socket		

Qty: 15 Tags: CUH-, CUH-, CUH-001, CUH-302, CUH-101, CUH-303, CUH, CUH

1" MERV 8 pleated filter Cabinet Unit Heater

General

The MERV 8 economy pleated filter features a filtering medium that is more efficient and ecologically friendly. Made entirely from recycled materials, this medium achieves MERV 8 efficiency with low resistance to airflow. It is also unaffected by high humidity and is hydrophobic (non-moisture absorbing).

All MERV 8 economy pleated filters are 20-25% efficient by ASHRAE 52.1-92 and MERV 8 per ASHRAE 52.2-99.

Physical data

- Frame: moisture-resistant clay coated frame made with recycled material
- Media: 100% non-woven synthetic media manufactured from recycled material
- Media support: diamond-shaped expanded metal
- Pleat design: V-pleat
- Pleat count: 13

Pressure drop

- 0.2" w.g. @ 300 fpm
- 0.35" w.g. @ 500 fpm

Features

- Ecologically advanced filtration medium made entirely from recycled materials
- Media maximizing V-pleat design
- Expanded metal grid prevents media flutter while in operation
- Diagonal and horizontal support members provide frame strength
- Filter media pack is sealed to eliminate air bypass
- Average ASHRAE efficiency is 25-30%
- Average arrestance is 90-92%

Dimensions

Model	02	03	04	06	08	10	12
RF, RS	7-1/4" x 22"	7-1/4" x 28"	7-1/4" x 34"	7-1/4" x 46"	7-1/4" x 52"	7-1/4" x 60"	7-1/4" x 70"
RFI, RSI, RW, RWI RRW, RRWI RFRW, RFRWI RC, RFRC, RRC	9-3/4" x 22"	9-3/4" x 28"	9-3/4" x 34"	9-3/4" x 46"	9-3/4" x 52"	9-3/4" x 60"	9-3/4" x 70"

- All dimensions ±1/8"

Zehnder Rittling · 100 Rittling Blvd. · Buffalo, NY USA 14220
T 716-827-6510 · F 716-218-2805 · sales@zehnder-rittling.com · www.zehnder-rittling.com

Closed cell insulation

Flexible, elastomeric thermal insulation, black in color. It is furnished with a smooth skin on one side which forms the outer exposed insulation surface. It is manufactured without the use of CFC's, HCFC's, or HFC's. It is also formaldehyde-free, low VOCs, dust free, fiber free and resists mold and mildew.

Factory mutual (FM) approvals

Thermal conductivity

- 0.25 BTU=in/hr. ft² °F

Water vapor transmission:

- 0.05 perm-inch

Fire rating

- Will not contribute significantly to fire (simulated end use testing)

As tested by ASTM E 84 "Method of Test for Surface Burning Characteristics for Building Materials" and CAN/ULC S-102, has a flame-spread index of less than 25 and a smoke-developed index of less than 50.

Note: Numerical flammability ratings alone may not define the performance of products under actual fire conditions. They are provided only for use in the selection of products to meet limits specified.

Uses

The recommended temperature usage range is -70 °F to 220 °F (-57 °C to 105 °C) according to method of application. With full adhesive coverage attachment, the surface to which it is applied may operate to a limit of 180°F (82 °C).

Conforms to NFPA 90A and NFPA 90B requirements.

Resistance to moisture vapor flow

The closed-cell structure of the insulation prevents moisture from wicking and makes it an efficient insulation.

Specification compliance

Insulation developed to meet:

- ASTM C 534, Type II – Sheet Grade 1
- ASTM C 1534
- ASTM E 84
- NFPA 255
- UL 723
- CAN/ULC S-102
- UL 94 5V-A, V-0, File E55798
- NFPA 90A, 90B
- UL 181
- ASTM G21/C1338
- ASTM G22
- ASTM D 1056, 2B1
- MIL-P-15280J, FORM S
- MIL-C-3133C (MIL STD 670B), Grade SBE 3
- MEA 107-89M
- City of Los Angeles – RR 7642

Physical data

Physical properties		Test methods
Thermal conductivity Btu • in./h • ft2 • °F (W/mK) ■ 75 °F mean temperature (24 °C) ■ 90 °F mean temperature (32 °C)	0.25 (0.036) 0.256 (0.037)	ASTM C 177 or C 518
Water vapor permeability Perm-in. [Kg/(s•m•Pa)]	0.05 (0.725 x 10–13)	ASTM E 96, Procedure A
Flame spread and smoke developed index through 1" (25 mm)[1]	25/50	ASTM E 84 CAN/ULC S102
Mold growth Fungi resistance Bacterial resistance	UL181 ASTM G21/C1338 ASTM G22	Meets requirements Meets requirements Meets requirements
Water absorption, % by volume	0.2%	ASTM C 209
Upper use limit	180/220 °F (82/105 °C)	
Lower use limit[2]	-297 °F (-183 °C)	
Ozone resistance	Good	
Density, typical range[2]	3.0 to 6.0 lbs./ft³	ASTM D 1622 D 1667

Performance approved through continuing supervision by Factory Mutual (FM) approvals.

[1] At temperatures below -20 °F (-29 °C), elastomeric insulation starts to become less flexible. However, this characteristic does not affect thermal efficiency or water vapor permeability of the insulation.

[2] Reference ONLY.

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Warranty

Zehnder guarantees its products to be free from defects in material and workmanship for a period of two years from date of shipment from our factory.

Should there be any defects in the good(s), the purchaser should promptly notify Zehnder. Upon receipt of written consent from Zehnder, the purchaser shall return the defective good(s) to the factory for inspection with freight prepaid. If inspection shows the goods to be defective, Zehnder will at its discretion repair or replace the said item(s).

Defects arising from damage due to shipment, improper installation, negligence or misuse by others are not covered by this warranty.

This warranty is extended only to the original purchaser from Zehnder.

Model

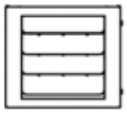
RH-33 US-made

Tag: **UH-101**

Qty	Coil Config	Unit Voltage
1	**Hot Water**	**115/60/1**

General Information

Air Flow:	**630**	CFM
Fan Speed:	**High**	
Altitude:	**5800**	Feet



HORIZONTAL UNIT HEATERS - US

Motors

Motor Voltage	HP (ea.)	FLA (ea.)
115/60/1	**1/15**	**0.72**

Hot Water Heat

Capacity:	**16.0**	MBH
Entering Air Temperature:	**60.0**	°F
Leaving Air Temperature:	**82.9**	°F
Fluid Flow:	**1.7**	GPM
Entering Fluid Temperature:	**180.0**	°F
Leaving Fluid Temperature:	**161.2**	°F
Fluid ΔT:	**18.8**	°F
Fluid Pressure Drop:	**0.1**	ft. H2O
Fluid Type:	**Propylene Glycol**	
Glycol %:	**30**	
FPI:	**12**	

Unit Information

Shipping Weight*:	**48**	lbs.
Unit Length:	**12.3**	inches
Unit Width:	**19.8**	inches
Unit Height:	**19**	inches

* Weight is base unit only, does not include any options or accessories selected

Qty: 1 Tags: UH-101

Standard unit features

Summary of all features, some features may not be specific to every project.

Construction
- All units
  - 18-gauge exterior steel panel construction
  - Durable epoxy powder coat paint
  - Top casing furnished with threaded hanger connections for suspension of unit
  - Die-formed fan venturi

Coils
- 1 row hot water or steam
- 1/2" nominal O.D. seamless copper tubes
- 0.028" tube wall thickness
- High efficiency aluminum fins, 12 FPI
- 0.010" minimum fin thickness
- Tubes are mechanically bonded to the fins
- Vertical coils have steel header tubes with external threaded NPT connections
- CRN pressure vessel certification for Ontario and Quebec provinces

Fan assemblies
- Propeller type
- 115 volt, single phase, two speed PSC motors
- Thermal overload protection with the exception of three phase motors
- Non-conducting aluminum fan blades with steel hub
- Balanced fan blade
- Standard finger-proof steel fan guard

Electrical
- $_{C}ETL_{US}$ listed for safety compliance
- Electrical junction box for field wiring terminations

Optional unit features

Summary of all features, some features may not be specific to every project.

Construction
- Vertical air diffuser blades for horizontal units
- Field installed air outlet accessories for vertical units
  - Cone-jet
  - Truncone
  - One-way louver
  - Two-way louver
  - 3-cone anemostat
  - 4-cone anemostat
- Pipe hanging kit

Fan assemblies
- 208-230 single phase, 230/460 three phase and 115/208-230 single phase explosion proof motors

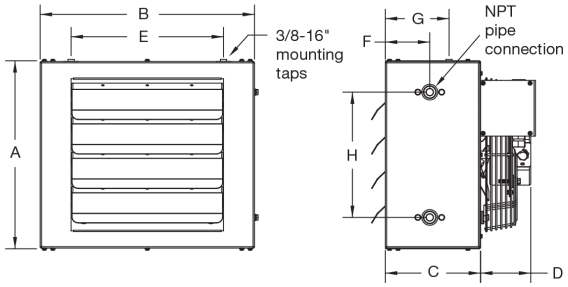
Electrical
- Toggle disconnect switch
- Variable speed controller
- Manual motor starter with thermal overload protection

Thermostats
- Analog
- Explosion proof
- Unit and remote mounted
- Thermostat guard: clear plastic with lock and keys
- Aquastat, pipe mounted, shipped loose

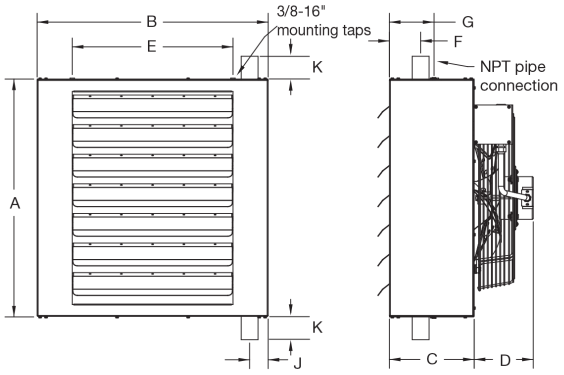
Qty: 1 Tags: UH-101

Dimensions and data — Model RH

RH-18 through RH-86



RH-108 through RH-340



Dimensional data

Model	A	B	C	D	E	F	G	H	J	K	NPT connections	Fan diameter	Approximate shipping weight (lb)
RH-18	15	16-7/8	7-1/2	4-1/2	12	3-1/2	5	10	–	–	3/4	9	37
RH-24	15	16-7/8	7-1/2	4-1/2	12	3-1/2	5	10	–	–	3/4	9	39
RH-33	19	19-3/4	7-1/2	4-3/4	12	3-1/2	5	14	–	–	3/4	12	48
RH-47	19	19-3/4	7-1/2	4-3/4	12	3-1/2	5	14	–	–	3/4	12	50
RH-63	19	25-3/4	8-1/2	4-3/4	18	3-1/2	5	14	–	–	3/4	14	61
RH-86	19	25-3/4	8-1/2	4-3/4	18	3-1/2	5	14	–	–	3/4	14	63
RH-108	27	25-7/8	9-1/2	6-1/4	18	3-1/2	5-1/4	–	2	3	1-1/2	18	88
RH-121	27	25-7/8	9-1/2	6-1/4	18	3-1/2	5-1/4	–	2	3	1-1/2	18	90
RH-165	27	31-7/8	10	6-1/4	24-7/8	3-1/2	6-1/4	–	2	3	1-1/2	20	110
RH-193	27	31-7/8	10	8-3/8	24-7/8	3-1/2	6-1/4	–	2	3	1-1/2	20	115
RH-258	33	40-13/16	11	8-3/8	32-7/8	3-1/2	6-1/4	–	2-1/4	3	2	22	162
RH-290	33	40-13/16	11	8-3/8	32-7/8	3-1/2	6-1/4	–	2-1/4	3	2	22	164
RH-340	39	40-13/16	12	8-3/8	32-7/8	3-1/2	7-1/4	–	2-1/4	3	2	24	210

Notes:

- All dimensions in inches unless otherwise noted
- RH-18 through RH-86 have side female NPT pipe connections
- RH-108 through RH-340 have top and bottom male NPT pipe connections
- Units should be mounted a minimum of 5" from wall

Maximum mounting height

Model	200 °F EWT and 60 °F EAT		2 lbs. steam and 60 °F EAT	
	Height	Spread	Height	Spread
RH-18	9'	18'	9'	17'
RH-24	10'	20'	9'	18'
RH-33	11'	22'	10'	20'
RH-47	13'	26'	12'	25'
RH-63	15'	30'	14'	29'
RH-86	16'	31'	15'	31'
RH-108	16'	33'	15'	32'
RH-121	17'	36'	16'	33'
RH-165	18'	38'	17'	34'
RH-193	19'	40'	18'	37'
RH-258	20'	42'	19'	40'
RH-290	21'	46'	20'	44'
RH-340	22'	50'	20'	46'

11/5/2020

Qty: 1 Tags: UH-101

Wall thermostat

Features and benefits

- Convenient temperature display
  - View comfort level at-a-glance
- Bimetal temperature sensing
  - For improved thermal performance
- Mercury-free
  - No leveling or special disposal required
- J-box compatible
  - Not only will it meet code, but it speeds up installation
- Positive-off
  - Assured shutdown of HVAC system
- Universal replacement
  - Can retrofit most existing electric heat thermostats

Specifications

- **Heating switch action:** DPST
- **Electrical rating:**
  - 25 AMP at 250 VAC Res.
  - 18 AMP at 277 VAC Res.
  - 1 HP at 125 VAC
  - 2 HP at 250 VAC
  - 125 VA pilot duty
- **Temperature control range:** 50 °F to 90 °F (10 °C to 30 °C)
- **Accuracy:** ±2 °F
- **Shipping, retail ctn.:** 3.18" W x 5" H x 2.87" L

Zehnder Rittling · 100 Rittling Blvd. · Buffalo, NY USA 14220
T 844-934-6337 (844-ZEHNDER) · F 716-218-2805 · sales@zehnder-rittling.com · www.zehnder-rittling.com

Qty: 1 Tags: UH-101

Disconnect switch

☐ **120V, 15A**

Single pole switch with grounded terminals, has a thermoplastic toggle and frame. It has a smooth, quiet toggle action and is made with high-impact resistant construction.

Features

- Side wire #12 and #14 AWG
- Push wire #14 AWG
- Tri-drive ground, terminal, and mounting screws
- Easy-access green hex head ground screw

Specifications

General

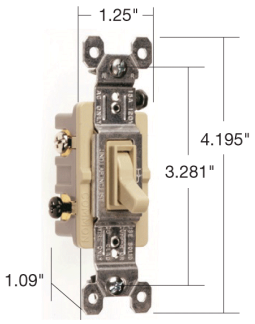
- Type: toggle
- Number of poles: 1-way
- Special features: self-grounding

3rd party compliance

- CSA listing info: C22.2 111
- CSA standard: yes
- UL listing no: 20
- UL Standard: yes
- U N SPS C: 39121406

Technical information

- Amps: 15 Amp
- Volts: 120VAC



☐ **208/230/277V, 15A**

Features

- One-piece brass alloy contact arm for reliable electrical performance
- One-piece steel strap with integral ground is plated for corrosion resistance
- High strength thermoplastic polycarbonate toggle resists breaking and chipping under heavy abuse
- Heavy-duty toggle bumpers for smooth and quiet operation
- Back body made of glass-reinforced nylon
- Locking support provides resistance to face and back body separation
- Available with side wire or external screw-pressure-plate back and side wire models capable of accepting #14 – #10 AWG copper or copper-clad wire
- Cam designed for fast make with positive break action to minimize arcing and prolong switch life
- Oversized silver alloy contacts for longer dependable switch life
- Tri-drive terminal and mounting screws

Specifications

General

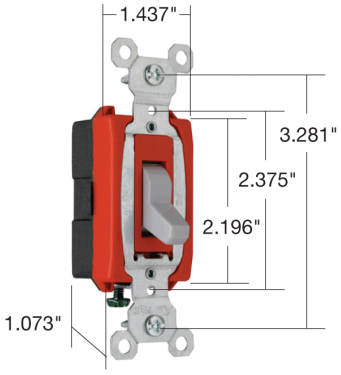
- Type: toggle
- Double pole

3rd party compliance

- CSA listing info: C22.2 111
- CSA standard: yes
- UL listing no: 20
- UL Standard: yes
- FSUL WS896

Technical information

- Amps: 15 Amp
- Volts: 120/277VAC



Warranty

Zehnder Rittling guarantees its products to be free from defects in material and workmanship for a period of two years from date of shipment from our factory.

Should there be any defects in the good(s), the purchaser should promptly notify Zehnder Rittling. Upon receipt of written consent from Zehnder Rittling, the purchaser shall return the defective good(s) to the factory for inspection with freight prepaid. If inspection shows the goods to be defective, Zehnder Rittling will at its discretion repair or replace the said item(s).

Defects arising from damage due to shipment, improper installation, negligence or misuse by others are not covered by this warranty.

This warranty is extended only to the original purchaser from Zehnder Rittling.

SECTION 23 82 39
UNIT HEATERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cabinet unit heaters with centrifugal fans and hot-water coils.
B. Propeller unit heaters with hot-water coils.

1.2 RELATED REQUIREMENTS

A. Drawings, all other Sections of Division 23 and General Provisions of the Contract, including General and Supplementary Conditions, as well as Division 01 Specification Sections, apply to this Section.
B. All materials, equipment, fabrication and installation shall meet and comply with all adopted current codes, regulations, standards, etc. as applicable to the product(s) specified in the section, as scheduled on the drawings as well as Division 01 and Division 23 related documents whether called for or not.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.
B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
   2. Wiring Diagrams: Power, signal, and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
C. Field quality-control test reports.
D. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver units wrapped in factory-fabricated containers. Avoid crushing or bending and prevent dirt and debris from entering and settling in boxes.

B. Store units in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.2 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Cabinet Unit Heater Filters: Furnish one spare filter(s) for each filter installed.

PART 2 - PRODUCTS

2.1 HOT-WATER CABINET UNIT HEATERS

A. Manufacturers: The manufacturers listed are subject to compliance of all the requirements within the contract documents; provide the product indicated on Drawings or a comparable product by one of the following:
   1. Airtherm; a Mestek Company.
   2. Dunham-Bush, Inc.
   3. Trane.
   4. Zehnder-Rittling.

B. Capacities and characteristics: Refer to scheduled information on drawings for configuration and options/accessories.

C. Description: A factory-assembled and -tested unit complying with ARI 440.

D. Coil Section Insulation: Comply with NFPA 90A or NFPA 90B. Unicellular polyethylene thermal plastic, preformed sheet insulation complying with ASTM C 534, Type II, except for density.
   1. Thickness: Minimum 1/2 inch thick.
   2. Thermal Conductivity (k-Value): 0.24 Btu x in./h x sq. ft. at 75 degrees F mean temperature.
   3. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM C 411.
   4. Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

E. Cabinet: 18-Gauge steel chasis with baked-enamel finish with manufacturer's standard paint colors, in color selected by Architect.
   1. Vertical Unit, Exposed Front Panels: Minimum 16-Gauge- thick, galvanized, sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
   2. Horizontal Unit, Exposed Bottom Panels: Minimum 18-Gauge- thick, galvanized, sheet steel, removable panels secured with tamperproof cam fasteners and safety chain.

3. Integral Inlet/Outlet Grilles: Steel Bar Grille.
4. Recessing Flanges: Steel, finished to match cabinet.
5. Control Access Door: Key operated tamper-proof.
6. Base: Minimum 0.0528-inch- thick steel, finished to match cabinet, 4 inches high with leveling bolts.
7. Extended Piping Compartment: 8-inch-wide piping end pocket.
8. False Back: Minimum 0.0428-inch- thick steel, finished to match cabinet.

F. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
1. Pleated: 1-inch thick flat panel throw-away type MERV 8A.

G. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 300 PSIG and a maximum entering-water temperature of 200 degrees F. Include manual air vent and drain.

H. Fan and Motor Board: Removable.
1. Fan: Forward curved, high static, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
2. Motor: Fan motors shall be electronically commutated with thermal overload protection. All motors to be installed, factory programmed and wired to the control panel. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
3. Wiring Terminations: Connect motor to chassis wiring with plug connection.

I. Control devices and operational sequences are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

J. Electrical Connection: Factory wire motors and controls for a single field connection.

2.2 HOT-WATER PROPELLER UNIT HEATERS

A. Manufacturers: The manufacturers listed are subject to compliance of all the requirements within the contract documents; provide the product indicated on Drawings or a comparable product by one of the following:
1. Airtherm; a Mestek Company.
2. McQuay International.
3. Trane.
4. Zehnder-Rittling.

B. Description: An assembly including casing, coil, fan, and motor in vertical discharge configuration with adjustable discharge louvers.

C. Cabinet: 20-Gauge Steel. Removable panels for maintenance access to controls.

D. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.

E. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.
F. General Coil Requirements: Test and rate hot-water propeller unit heater coils according to ASHRAE 33.
G. Hot-Water Coil: Copper tube, minimum 0.025-inch wall thickness, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 PSIG and a maximum entering-water temperature of 325 degrees F, with manual air vent. Test for leaks to 250 PSIG underwater.
H. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.
    1. OSHA compliant fan guard.
I. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
    1. Motor Type: Permanently lubricated, multispeed.
J. Control Devices:
    1. Wall-mounting thermostat.
K. Electrical Connection: Factory wire motors and controls for a single field connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wall boxes in finished wall assembly; seal and weatherproof. Joint-sealant materials and applications are specified in Division 07 Section "Joint Sealants."
B. Install cabinet unit heaters to comply with NFPA 90A.
C. Install propeller unit heaters level and plumb.
D. Suspend cabinet unit heaters from structure with vibration hangers as identified in the Vibration Isolation Schedule. Vibration isolators are specified in Division 23 Section "Vibration Controls for HVAC Piping and Equipment."
E. Suspend propeller unit heaters from structure with all-thread hanger rods and attachments to structure are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers as identified in the Vibration Isolation Schedule. Vibration isolators are specified in Division 23 Section "Vibration Controls for HVAC Piping and Equipment."
F. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.
G. Install new filters in each cabinet unit heater unit within two weeks of Substantial Completion.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
   1. Install piping adjacent to machine to allow service and maintenance.

B. Connect supply and return ducts to cabinet unit heaters with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."

C. Cabinet unit heaters with hot-water coils shall comply with safety requirements in UL 1995.

D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.4 ADJUSTING

A. Adjust initial temperature set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to one visit to Project during other-than-normal occupancy hours for this purpose.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain cabinet unit heaters. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION