

# **MULTISTACK**<sup>®</sup>



## **Water-Cooled Modular Chillers Product Data Catalog**



**Standard and Total Access™ Modules**  
MS010X, MS015X, MS020X, MS030X, MS040X, MS050X,  
MS070X, MS085X

**Variable Speed Total Access Modules**  
MS010W, MS020W, MS030W, MS050W  
MS010V, MS020V, MS030V, MS050V

**R-410A Refrigerant**



# Multistack Modular Chillers—Now with True Variable Speed Scroll Compressors

- Available on 10–, 20–, 30–, and 50– ton Total Access™ modules
- 20 Percent improvement in IPLV versus fixed speed modules
- Dual, true variable speed scroll compressors with dual refrigeration circuits
- Leaving water temperature control
- Two-way chilled water valves available as option
- Modulating condenser water valves available as option
- 10-Inch touch-screen display available as option



**Multistack Modular Chiller Array with Variable Speed Compressors and Total Access™ Configuration**

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**HIGHLY DEPENDABLE**

- Multiple independent systems for redundancy
- Comprehensive computer monitoring of operations
- Automatic diagnostic recording of fault conditions
- Rotates lead compressor every 24 hours

**SIMPLE TO OPERATE**

- Large LCD screen displays information in plain English
- Simple keypad provides control of unit operations

**EASY TO INSTALL**

- Compact modules fit through standard doorways and into elevators
- Modules interconnect easily and quickly
- All refrigeration systems are factory charged and run tested

**PROGRAMMABLE LOGIC CONTROLLER (PLC) SYSTEM**

- Manual switch allows redundancy control as each module has a processor allowing it to run even if master controller fails
- Optional Fail-To-Run software
- Display at each module
- Remote display option

**DESIGN FLEXIBILITY**

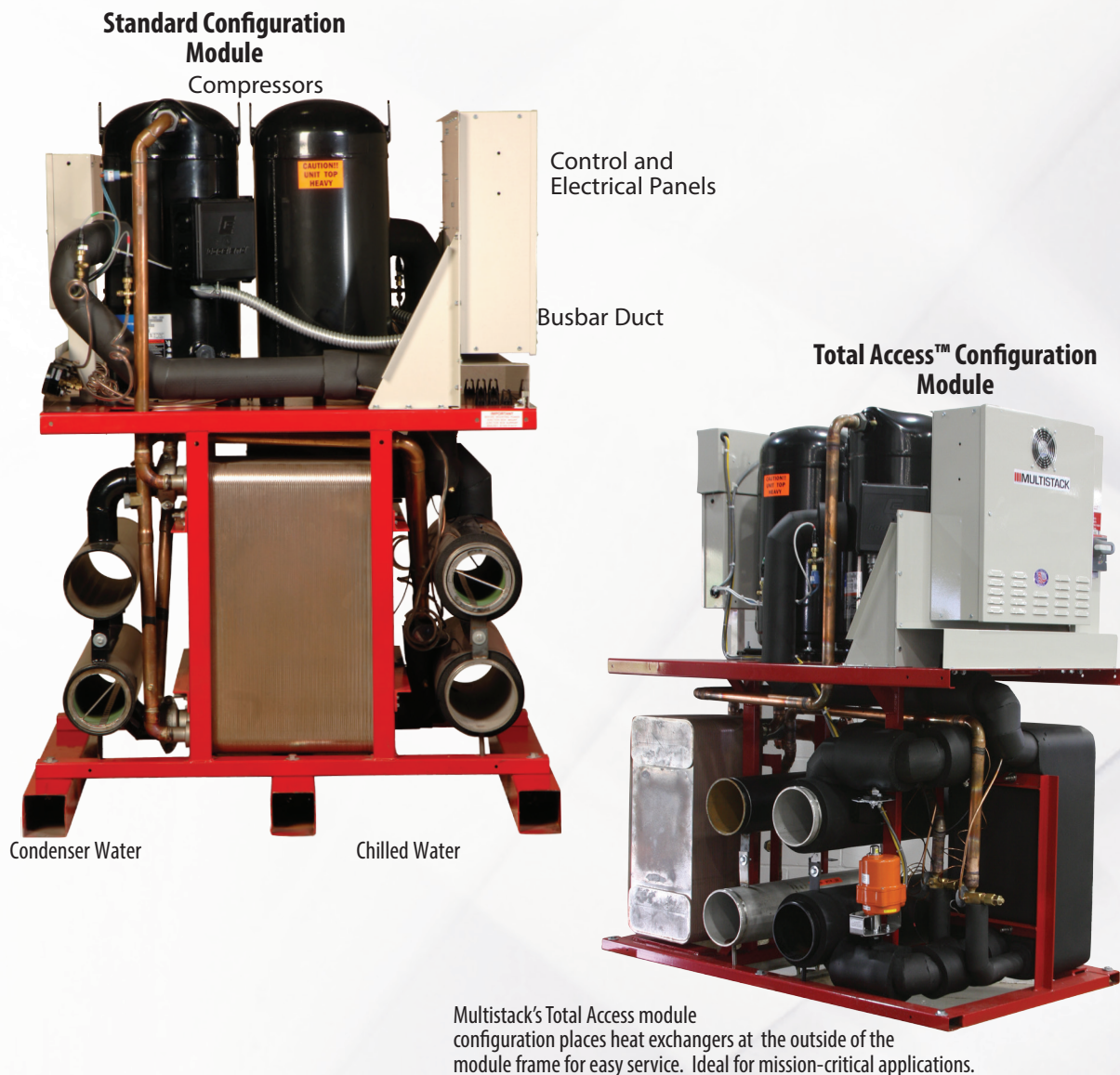
- Wide array of module combinations
- Install only the capacity required at the time

**SIMPLE TO SERVICE**

- Service can often be performed on a convenient, non-emergency basis
- Most components are standard, off the shelf design

**TOTAL ACCESS™ CONFIGURATION**

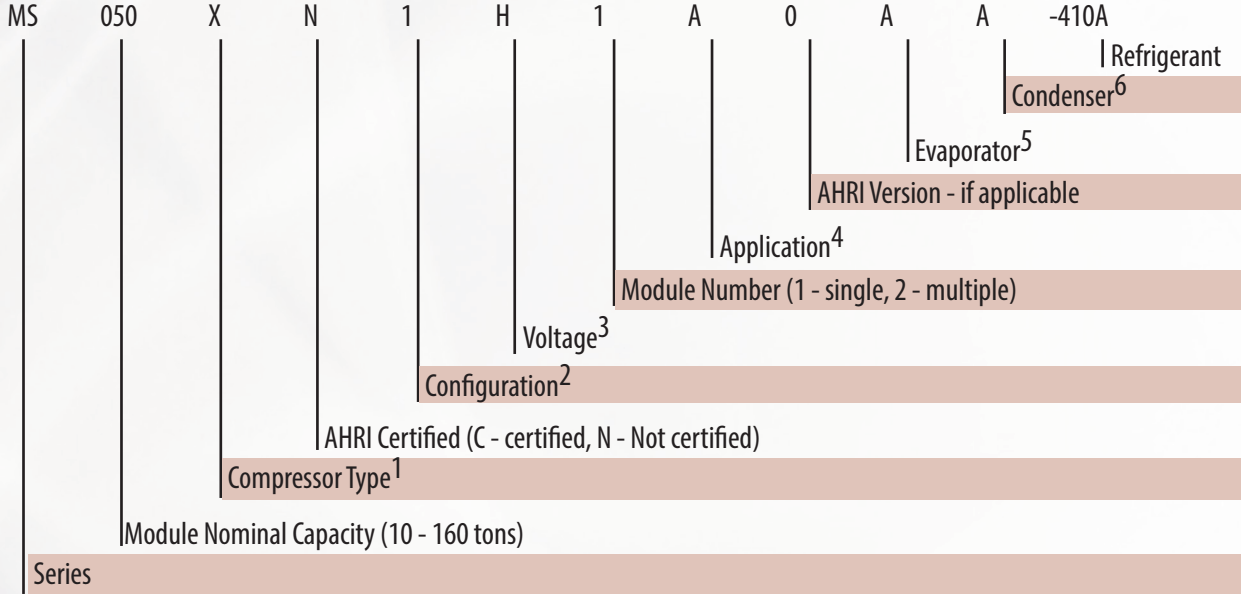
- Total Access configuration modules now available with true variable speed compressors
- With Total Access, heat exchangers are on outer edges of frame for easy serviceability and a small footprint.
- The ability to clean or replace a heat exchanger with the chiller running makes Total Access ideal for mission critical applications



Multistack's Total Access module configuration places heat exchangers at the outside of the module frame for easy service. Ideal for mission-critical applications.

**Model Number Description**

**Model Number Nomenclature**



<sup>1</sup> B: Bristol, C: Trane Cornerstone, R: Bitzer Screw, S: Trane Scroll, T: Danfoss Turbocor, Z: Copeland scroll (old elec), X: Copeland Scroll (ZP), A: Copeland Scroll (ZR), W: with one (1) Copeland variable speed & one (1) fixed speed compressor, V: two (2) Copeland variable speed. Variable speed compressors in 10-, 20-, 30- and 50-ton sizes only.  
<sup>2</sup> 1- Standard, 2- Total access, 3 - Evap extended headers, 4 - Cond extended headers, 5 - Both extended headers, V - others  
<sup>3</sup> A - 208/3/60, L - 230/3/60, H - 460/3/60, C - 575/3/60, D - 200/3/50, E - 400/3/50, F - 380/3/60, S - 220/230/1/60, V - other  
<sup>4</sup> C - Single module temp controller, A-Air Cooled split, D - Cond unit, F - Fluid cooler (high temp),H - Heat recovery, R - Heat pump, W - Water cooled  
<sup>5</sup> A - Brazed SS, B - Brazed SMO, C- S&T copper, D - S&T cu-Ni, V - Other  
<sup>6</sup> A - Brazed SS, B - Brazed SMO, C- S&T copper, D - S&T cu-Ni, E - Double wall brazed, V - Other

**Multistack has a policy of continual improvement and reserves the right to change product design, literature and specifications without notice. For more information on this and other Multistack products, contact your nearest Multistack dealer.**

## General Data - Fixed Speed Compressors

	MS010X	MS015X	MS020X	MS030X	MS040X	MS050X	MS070X	MS085X
Compressor Type	Scroll							
Dry Weight (lbs. each)	89	135	135	146	280	293	390	419
Normal Capacity (tons each)	5	7.5	10	15	20	25	30	40
Compressor Quantity/Module	2	2	2	2	2	2	2	2
Oil Charge (pints per compressor)	3.5	6.9	6.9	6.9	9.5	9.5	13.3	13.3
Evaporator (Braze Plate)	Braze Plate							
Weight (lbs.)	50	70	70	90	180	180	220	300
Water Storage (gal.)	1.0	1.6	1.6	2.2	5.5	5.5	7.3	10.1
Circuit Configuration	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual
Quantity	1	1	1	1	1	1	1	1
Header System (gal.)	7	7	7	7	7	7	7	14
Condenser	Braze Plate							
Weight (lbs. each)	50	80	80	100	200	200	290	340
Water Storage (gal.)	1.1	2.2	2.2	2.9	6.6	6.6	10.1	12.3
Circuit Configuration	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual
Quantity	1	1	1	1	1	1	1	1
Header System (gal.)	7	7	7	7	7	7	7	14
Refrigerant Type	R410A							
Charge (lbs./circuit)	6.5	6.5	6.5	10	18	20	23	28
Number of Circuits	2	2	2	2	2	2	2	2
Total Water Volume - gal./module	16.1	17.8	17.8	19.1	26.1	26.1	31.4	50.3
Operating Weight (lbs.)	1,490 (1,620)	1,510 (1,640)	1,510 (1,640)	1,610 (1,740)	1,970 (2,100)	1,970 (2,100)	2,060 (2,210)	2,350 (2,680)
Shipping Weight (lbs.)	1,330 (1,470)	1,350 (1,490)	1,350 (1,490)	1,450 (1,590)	1,800 (1,930)	1,800 (1,990)	1,890 (2,060)	2,050 (2,380)

**NOTES:** Figures in parentheses ( ) apply to Total Access™ configuration modules.

Add 75 lbs. per module if equipped with enclosure panels.

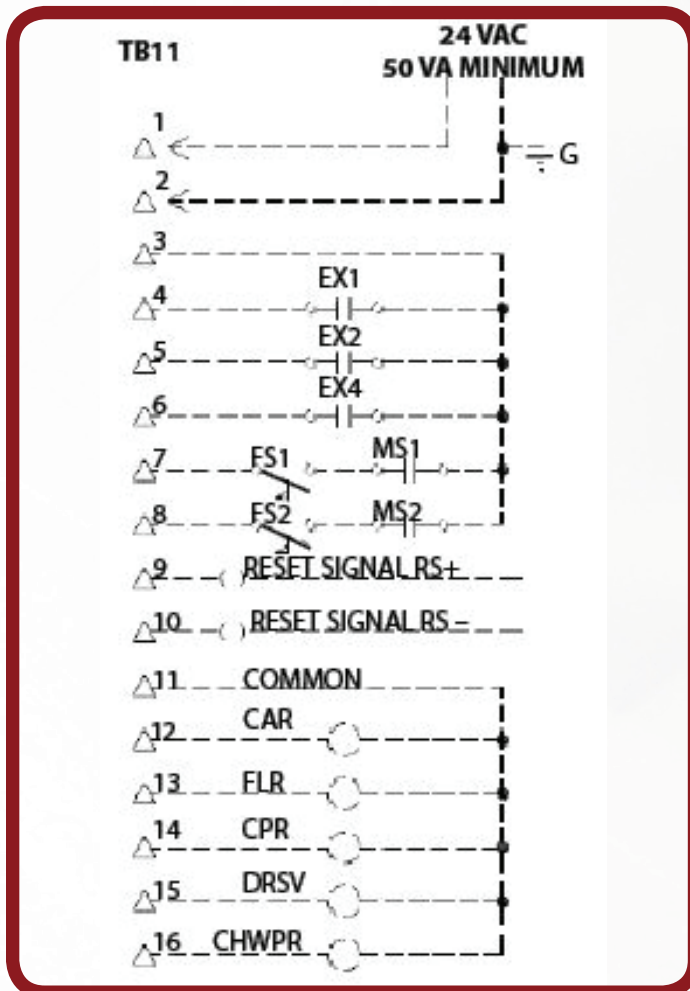
For modules with one set of extended headers, add 30 lbs. to shipping weight and 35 lbs. to operating weight.

For modules with two sets of extended headers, add 60 lbs. to shipping weight and 70 lbs. to operating weight.

<b>General Data - Variable Speed Compressors</b>				
	<b>MS010</b>	<b>MS020</b>	<b>MS030</b>	<b>MS050</b>
Compressor Type	Variable Speed Scroll			
Dry Weight (lbs. each)	89	135	146	293
Normal Capacity (tons each)	5	10	15	25
Compressor Quantity/Module	2	2	2	2
Oil Charge (pints per compressor)	3.5	6.9	6.9	9.5
Evaporator (Braze Plate)	Braze Plate			
Weight (lbs.)	50	70	90	180
Water Storage (gal.)	1.0	1.6	2.2	5.5
Circuit Configuration	Dual	Dual	Dual	Dual
Quantity	1	1	1	1
Header System (gal.)	7	7	7	7
Condenser	Braze Plate			
Weight (lbs. each)	50	80	100	200
Water Storage (gal.)	1.1	2.2	2.9	6.6
Circuit Configuration	Dual	Dual	Dual	Dual
Quantity	1	1	1	1
Header System (gal.)	7	7	7	7
Refrigerant Type	R410A			
Charge (lbs./circuit)	6.5	6.5	10	20
Number of Circuits	2	2	2	2
Total Water Volume - gal./module	16.1	17.8	19.1	26.1
Operating Weight (lbs.)	1,490 (1,620)	1,510 (1,640)	1,610 (1,740)	1,970 (2,100)
Shipping Weight (lbs.)	1,330 (1,470)	1,350 (1,490)	1,450 (1,590)	1,800 (1,990)



## External Input/Output Connections



## LEGEND

- COMPONENTS AND WIRING BY OTHERS (18 AWG MIN. WIRE)
- INPUTS TO TERMINALS 4 THRU 5 MUST BE WIRED CLOSED IF NOT USED.
- EXTERNAL INPUTS - CLOSED TO OPERATE  
EX1 - REQUIRES MANUAL RESET TO RESUME OPERATION  
EX2 - AUTO RESET (REMOTE START/STOP)  
EX4 - AUTO RESET (POWER PHASE MONITOR INPUT)  
FS1 - FLOW SWITCH (CHILLED WATER)  
FS2 - FLOW SWITCH (CONDENSER WATER)  
MS1 - AUX. INTERLOCK (CHILLED WATER PUMP STARTER)  
MS2 - AUX. INTERLOCK (CONDENSER WATER PUMP STARTER)  
RS+ - RESET SIGNAL (SOFTWARE SELECTABLE 0-10 VDC, 4-20 mA)  
RS- - RESET SIGNAL (SOFTWARE SELECTABLE 0-10 VDC, 4-20 mA)
- EXTERNAL OUTPUTS  
CAR - CUSTOMER ALARM RELAY (24 VAC, 5 VA MAX.)  
FLR - FULL LOAD RELAY (24 VAC, 5 VA MAX.)  
CHWPR - CHILLED WATER PUMP RELAY (24 VAC, 5 VA MAX.)  
DRSV - DEBRIS REMOVAL SOLENOID VALVE (24 VAC, 6W, 16 VA).  
MAX OF TWO (2) DRSV IN THIS CIRCUIT.

## System Wire &amp; Fuse Sizing Specifications

(Applicable codes may require different wire sizing)

- Compressor Rated Load Amps (RLA) and Locked Rotor Amps (LRA)  
Data: RLA/LRA

VOLTAGE	208	230	460	575
MS010X	15/123	14/123	6.8/62	5.5/50
MS015X	25.3/225	22.8/225	11.4/114	8.8/80
MS020X	29.8/239	27/239	13.5/125	10.8/80
MS030X	49.8/340	45/340	22.5/173	18/132
MS040X	54/538	49/538	23.5/229	19.5/180
MS050X	67/605	60/605	30/272	24/215
MS070X	89/599	80/599	40/310	32/239
MS085X	112.8/943	102/943	51/408	37.6/375

- Wiring Sizing: Minimum Circuit Ampacity  
(MCA)  $MCA = (1.25 \times RLA1) + RLA2 + RLA3$

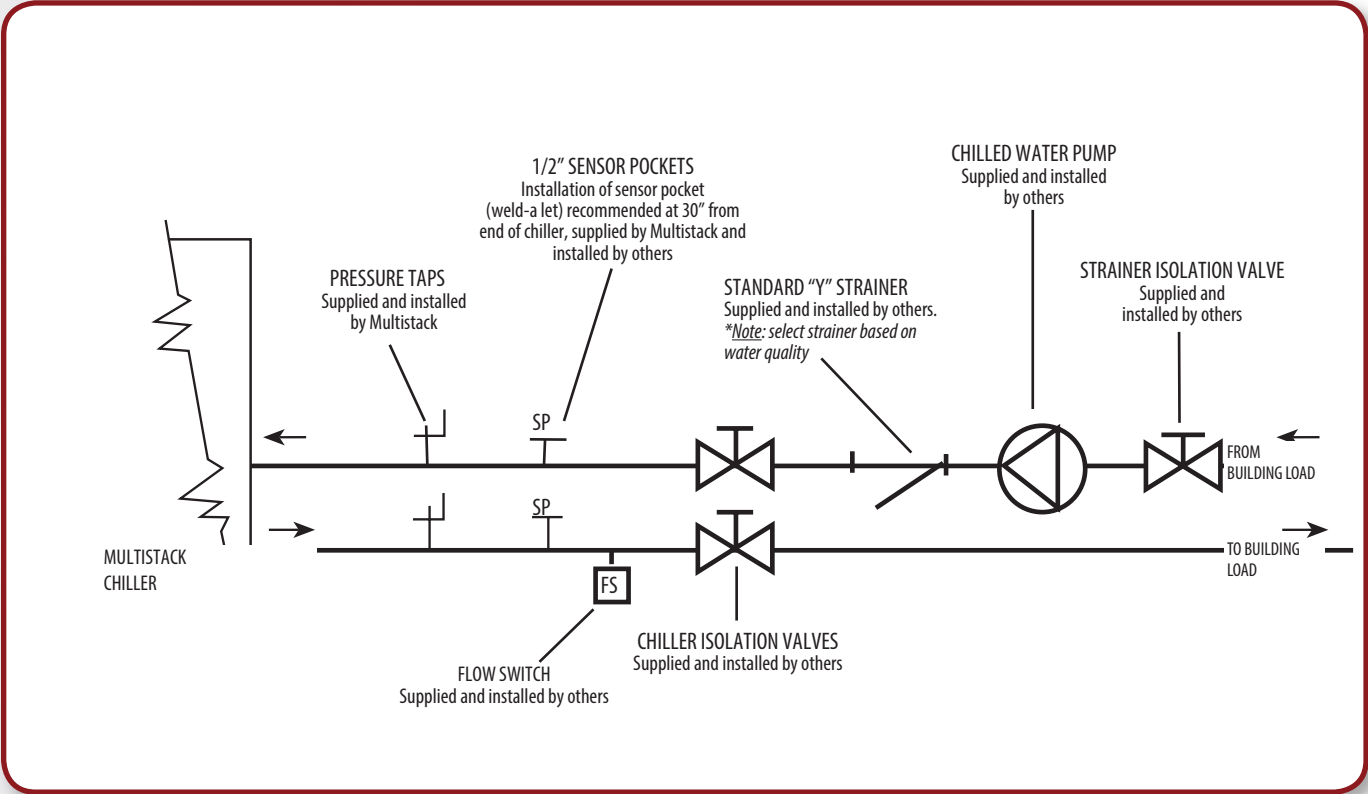
MCA	3 CONDUCTORS 1 CONDUIT	6 CONDUCTORS 2 CONDUIT
50	8	—
65	6	—
85	4	—
100	3	—
115	2	—
130	1	—
150	1/0	—
175	2/0	—
200	3/0	—
230	4/0	—
255	250 MCM	—
285	300 MCM	1/0
300	—	1/0
350	—	2/0
400	—	3/0
460	—	4/0
500	—	250 MCM

- Fuse Sizing: Maximum Fuse (MF), Type RK5 Fuse  
 $MF = (2.25 \times RLA1) + RLA2 + RLA3$   
Where the MF does not equal a standard size fuse, the next larger size should be used.

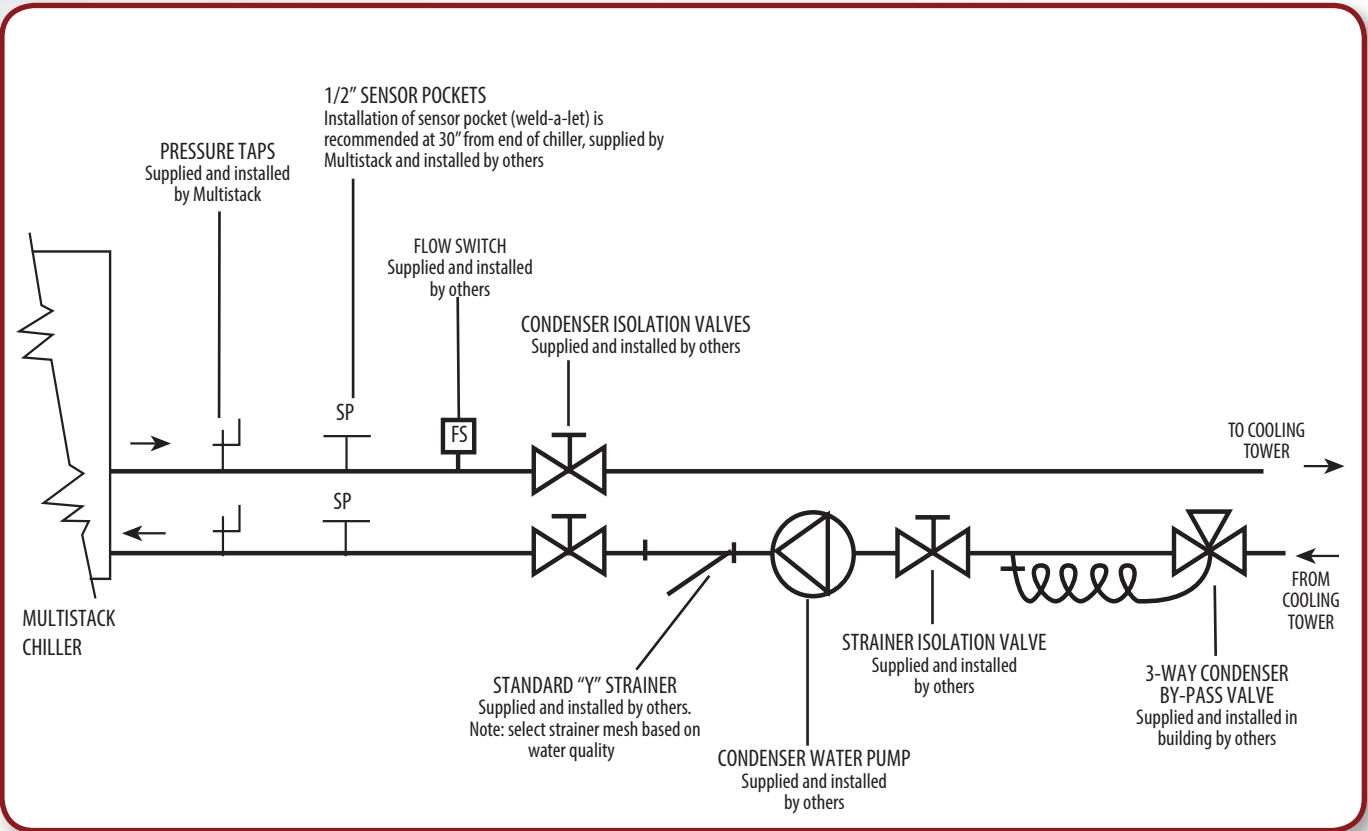
## NOTES:

- RLA1 = RLA of the largest compressor in the system.  
RLA2 & RLA3 = RLA of the other compressors in the system.
- The total system Minimum Circuit Ampacity (MCA) shall not exceed 500A.
- Wire sizing is based on the Nat. Electrical. Code (NEC) rating for 75°C copper wire, with 3 wires per conduit.
- Wiring Distance from branch circuit shall not exceed 100 ft..

### Required Chilled Water Piping



### Condenser Schematic with Head Pressure Control



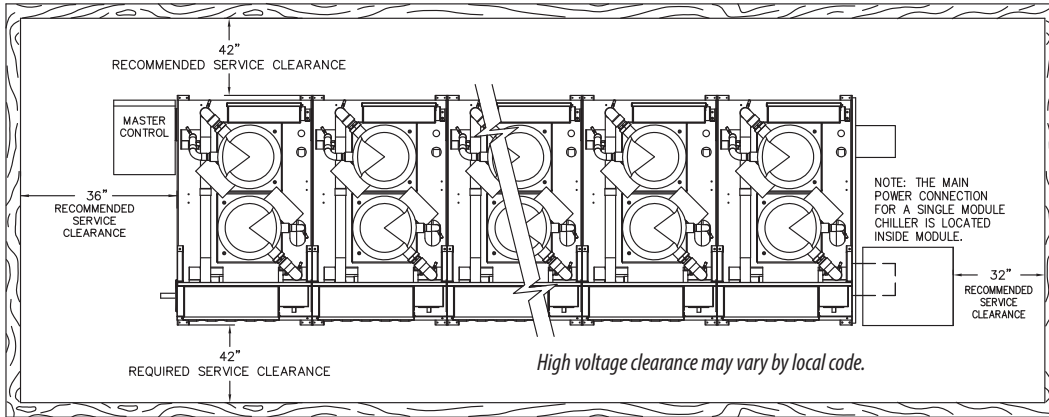


## Standard Modules (Constant Flow Design)

\*Standardized drawing of sample customer installation

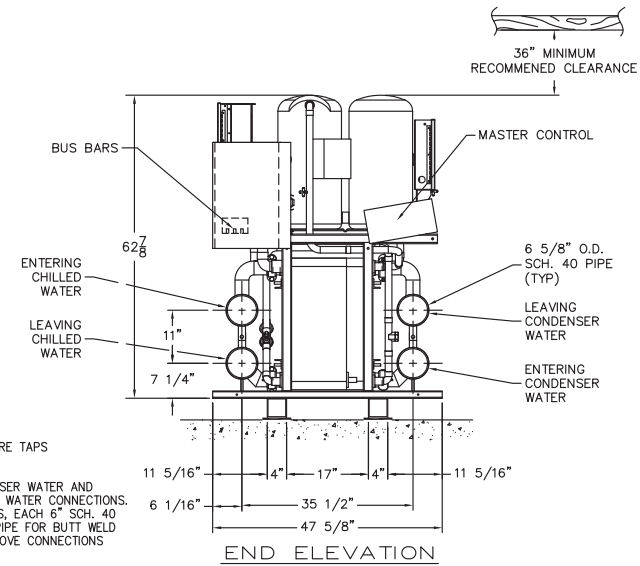
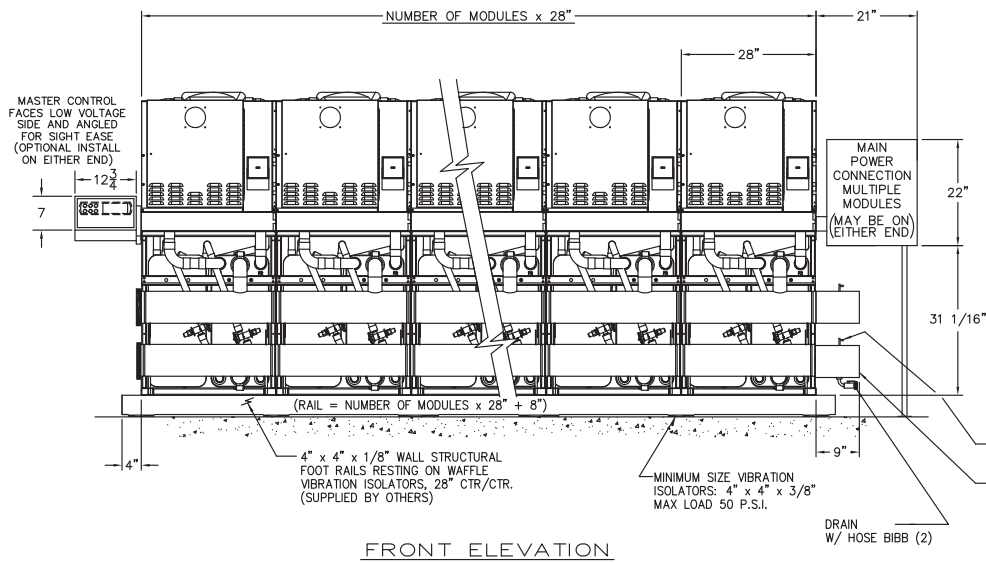
\*\*Panels are optional

PLAN VIEW



### Dimensions (No Panels)

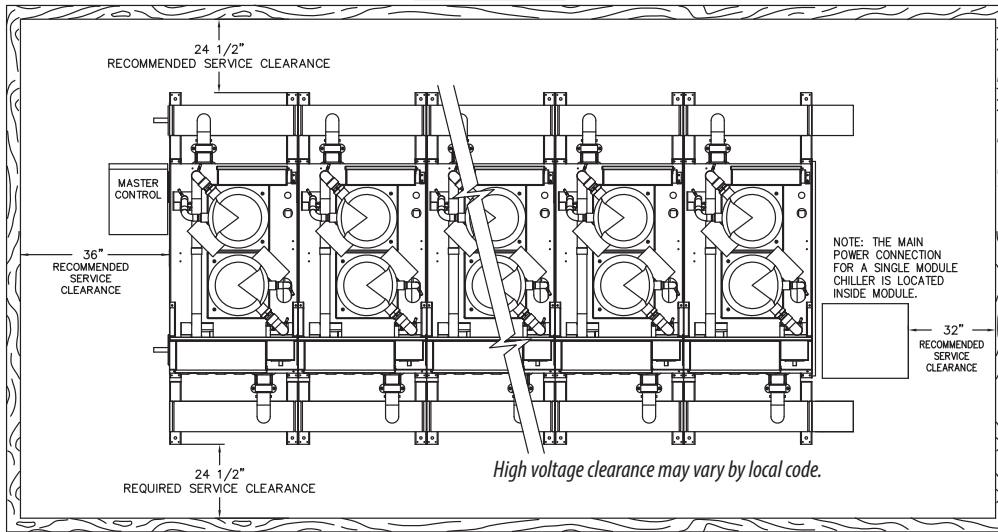
	Width (A)	Depth (B)	Height (C)
Standard	28"	47 5/8"	64"
Total Access (MS010--050)	32"	56"	67"
Total Access (MS070)	34"	56"	67"
Extended Headers (1)	28"	62 1/8"	64"
Extended Headers (2)	28"	76 5/8"	64"



## Variable Flow Design for Chilled and Hot Water- Extended Headers on Evaporators and Condensers

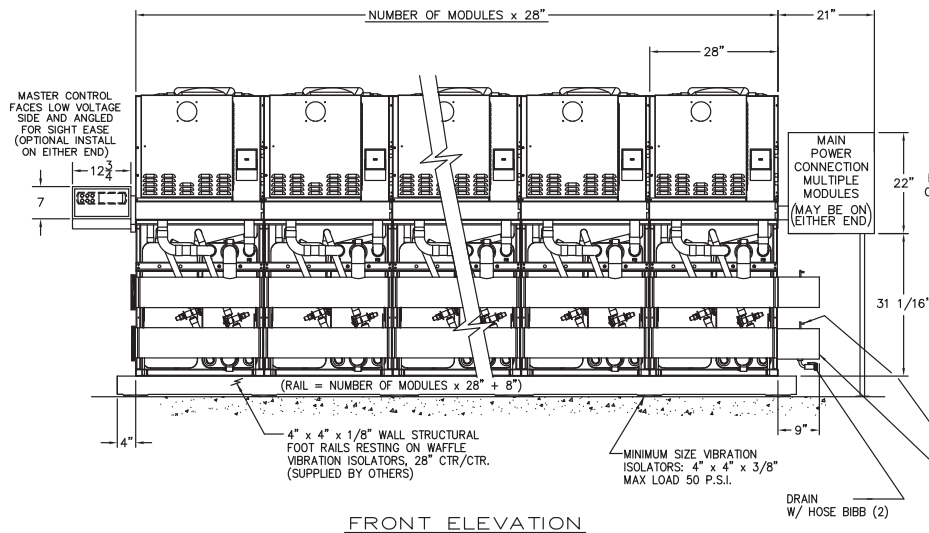
\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW

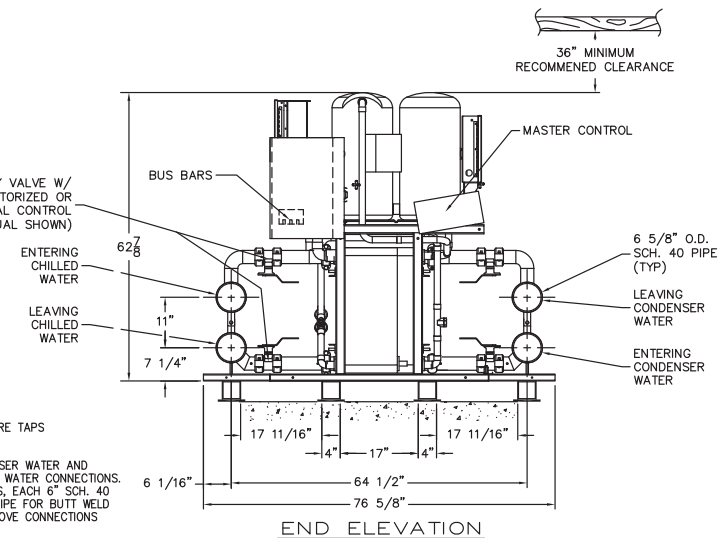


Dimensions (No Panels)

	Width (A)	Depth (B)	Height (C)
Standard	28"	47 5/8"	64"
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FRONT ELEVATION



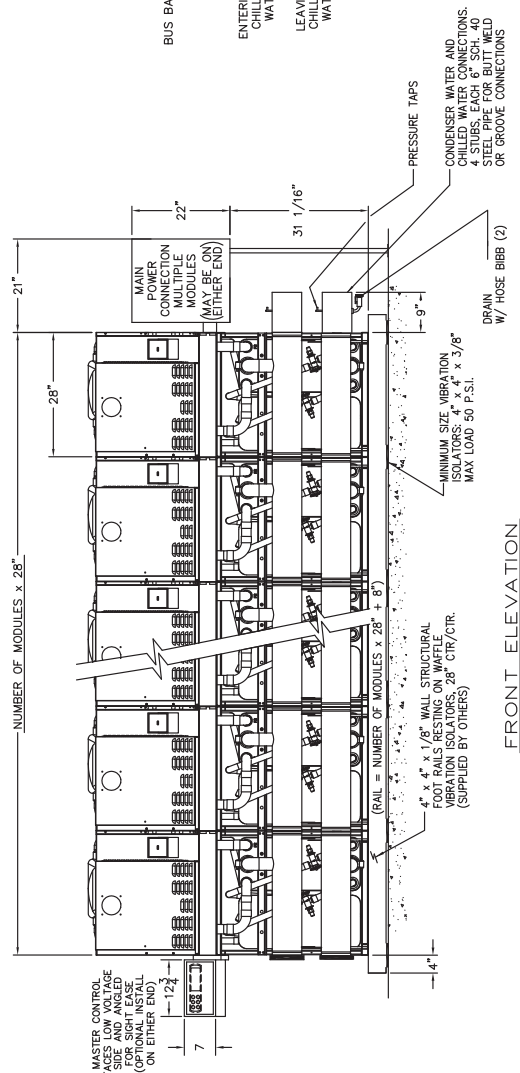
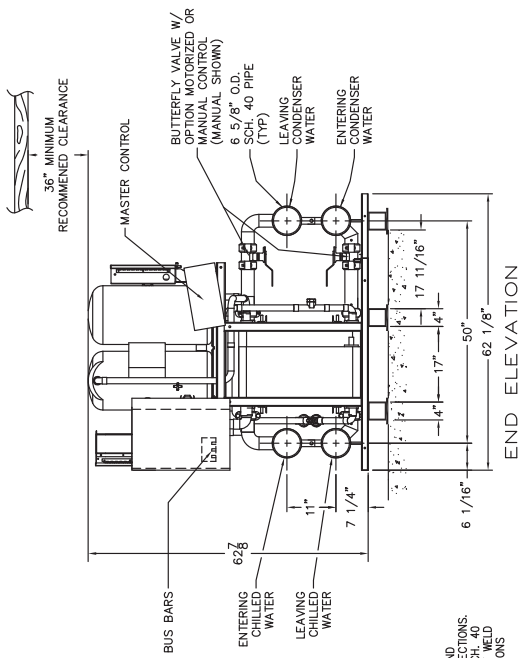
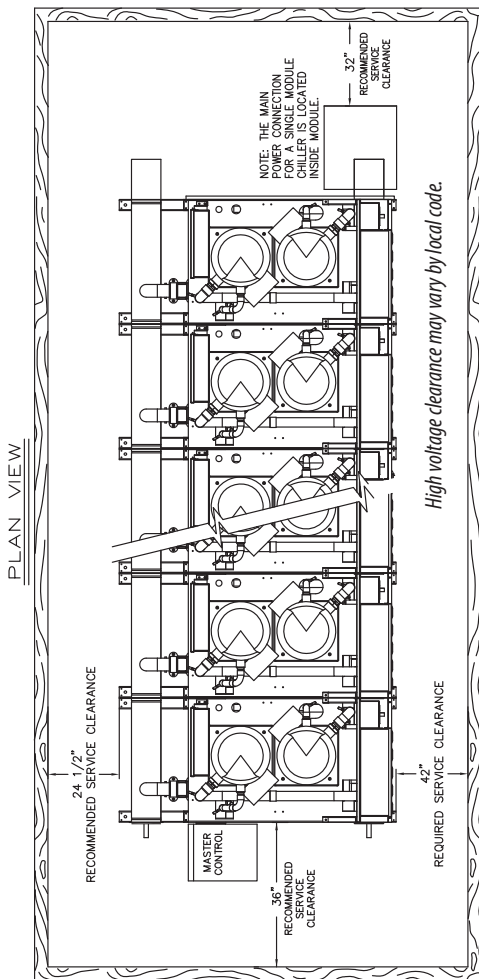
END ELEVATION

# Variable Flow Design for Hot Water, Constant Flow for Chilled Water Extended Headers on Condensers

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

**Dimensions (No Panels)**

	Width (A)	Depth (B)	Height (C)
Standard	28"	47 5/8"	64"
Total Access (MS010-050)	32"	56"	67"
Total Access (MS070)	34"	56"	67"
Extended Headers (1)	28"	62 1/8"	64"
Extended Headers (2)	28"	76 5/8"	64"

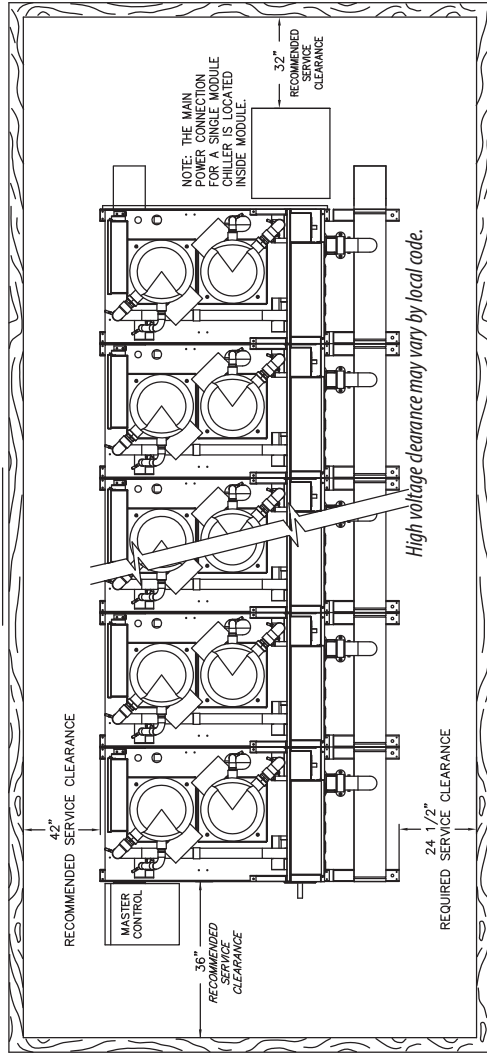




# Variable Flow Design for Chilled Water, Constant Flow for Condenser Water Extended Headers on Evaporators

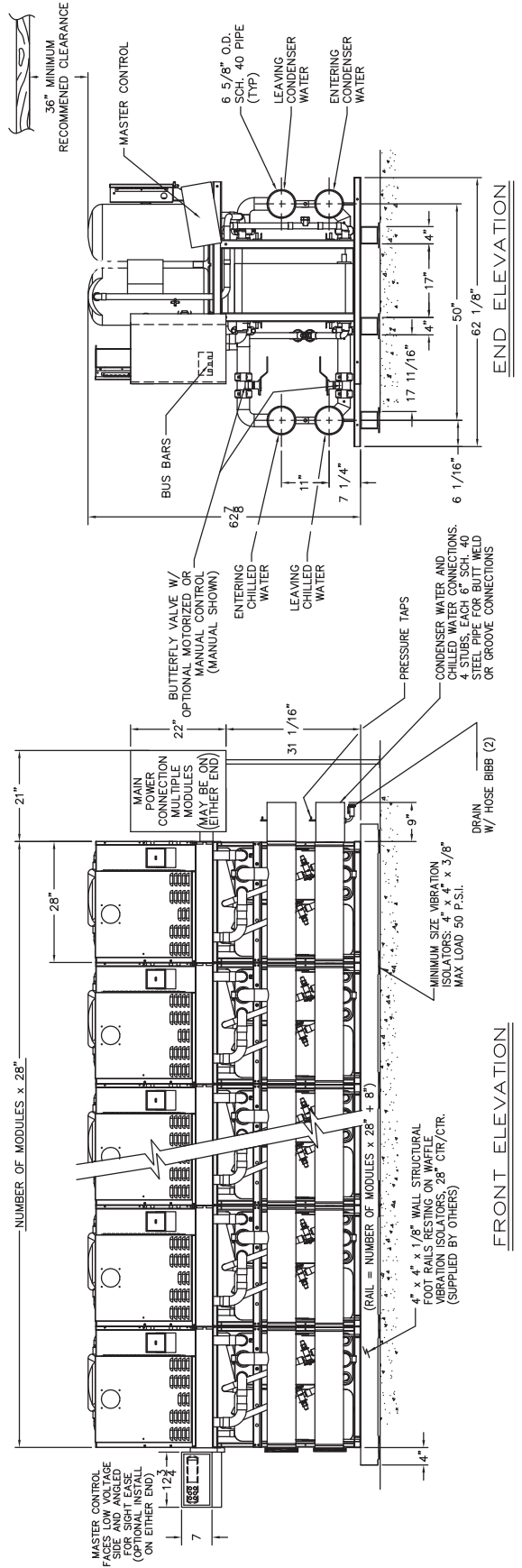
\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



Dimensions (No Panels)

	Width (A)	Depth (B)	Height (C)
Standard	28"	47 5/8"	64"
Total Access (MS010--050)	32"	56"	67"
Total Access (MS070)	34"	56"	67"
Extended Headers (1)	28"	62 1/8"	64"
Extended Headers (2)	28"	76 5/8"	64"

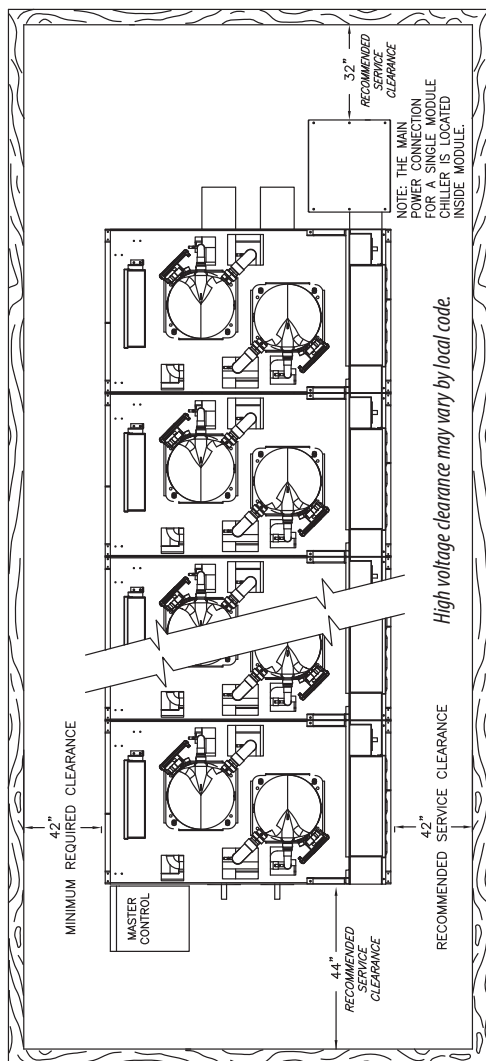


Dimensions

**Total Access Design with or without Variable Flow**

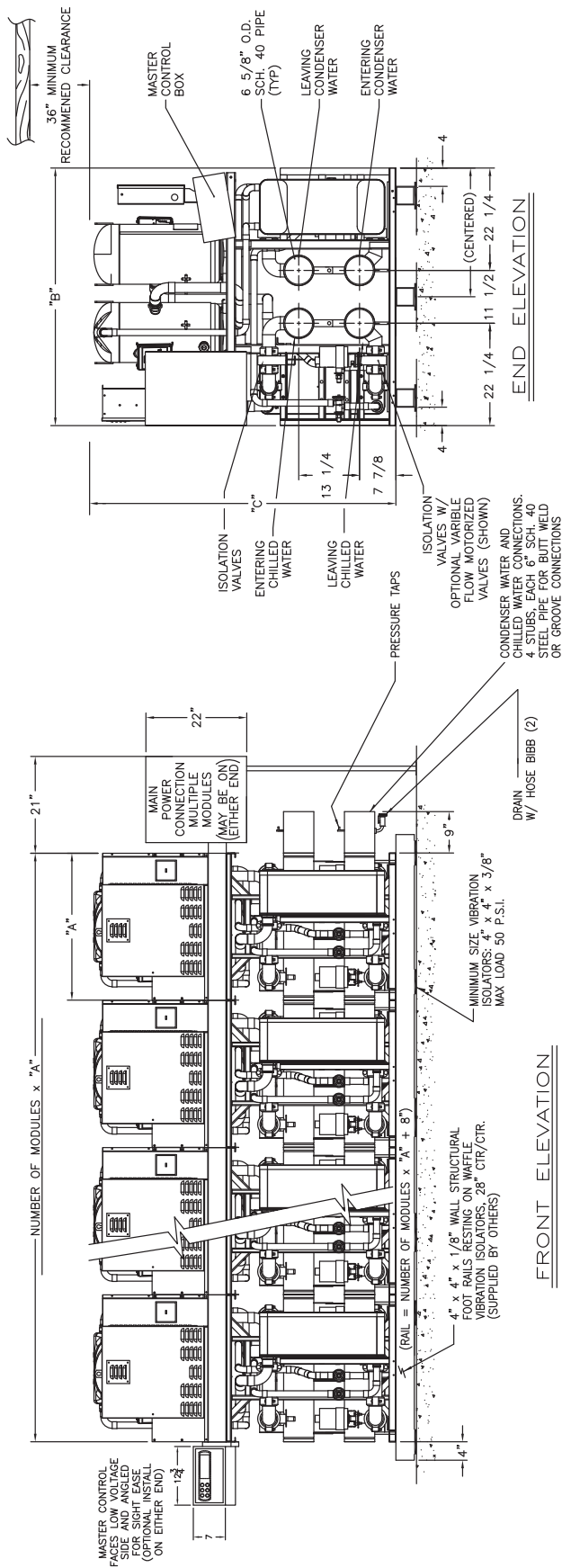
\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



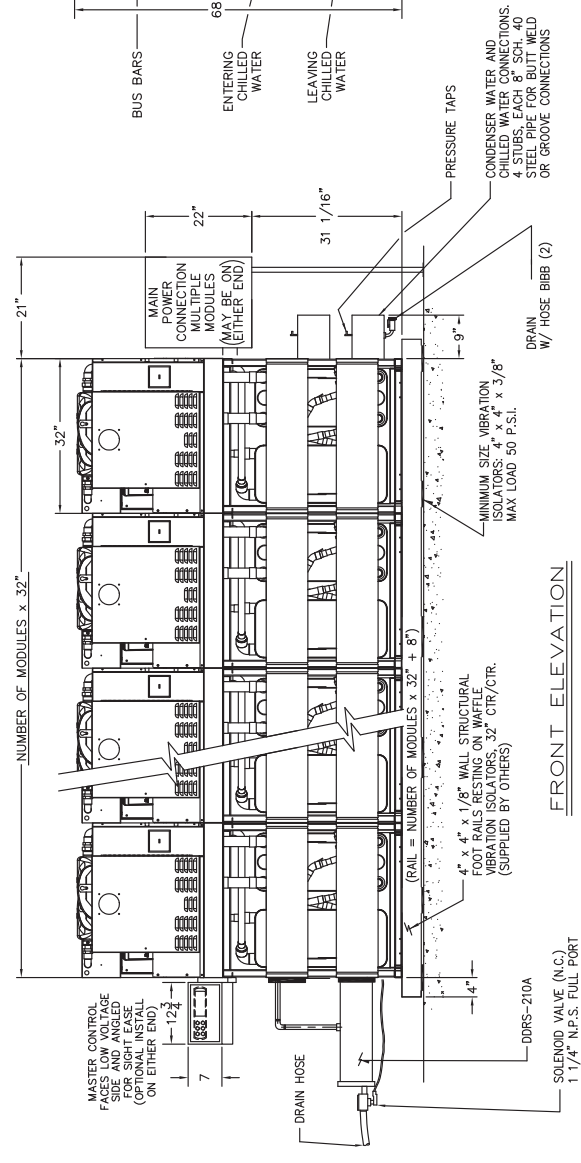
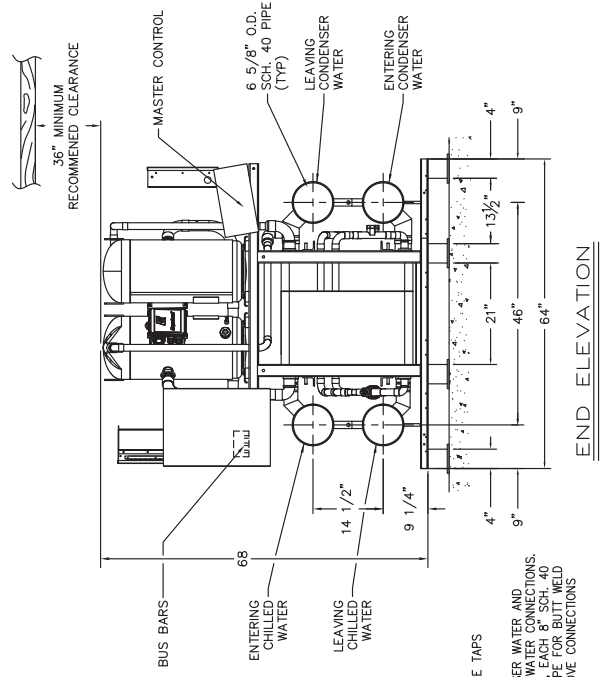
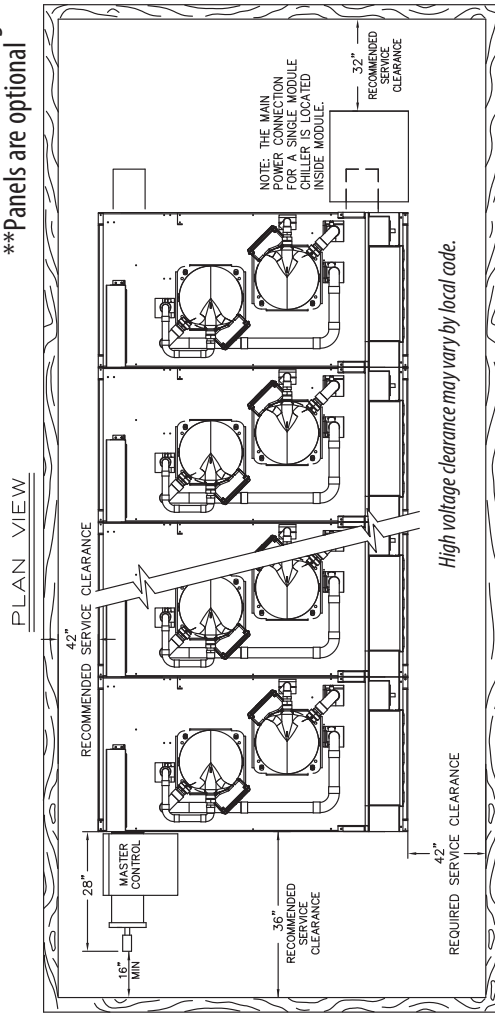
**Dimensions (No Panels)**

	Width (A)	Depth (B)	Height (C)
Standard	28"	47 5/8"	64"
Total Access (MS010--050)	32"	56"	67"
Total Access (MS070)	34"	56"	67"
Extended Headers (1)	28"	62 1/8"	64"
Extended Headers (2)	28"	76 5/8"	64"



# Variable Flow Design for Chilled and Hot Water - Standard Drawing

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

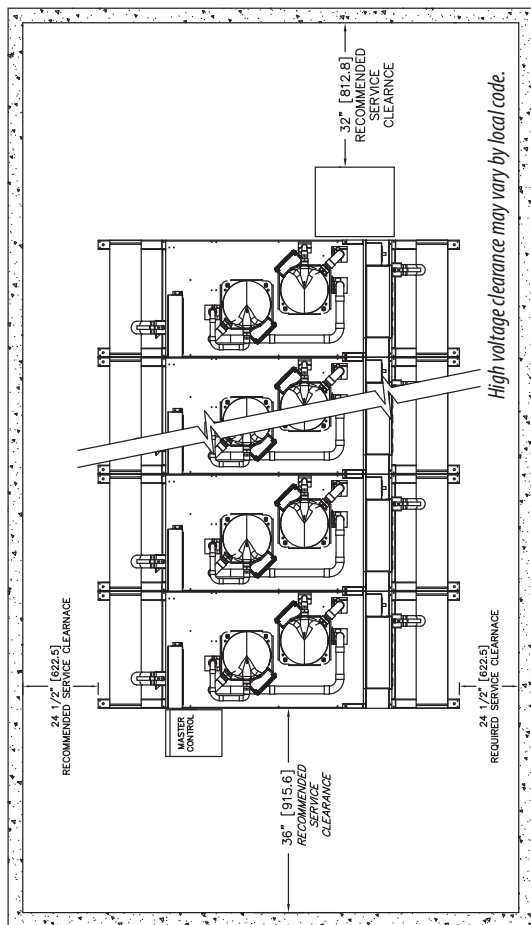




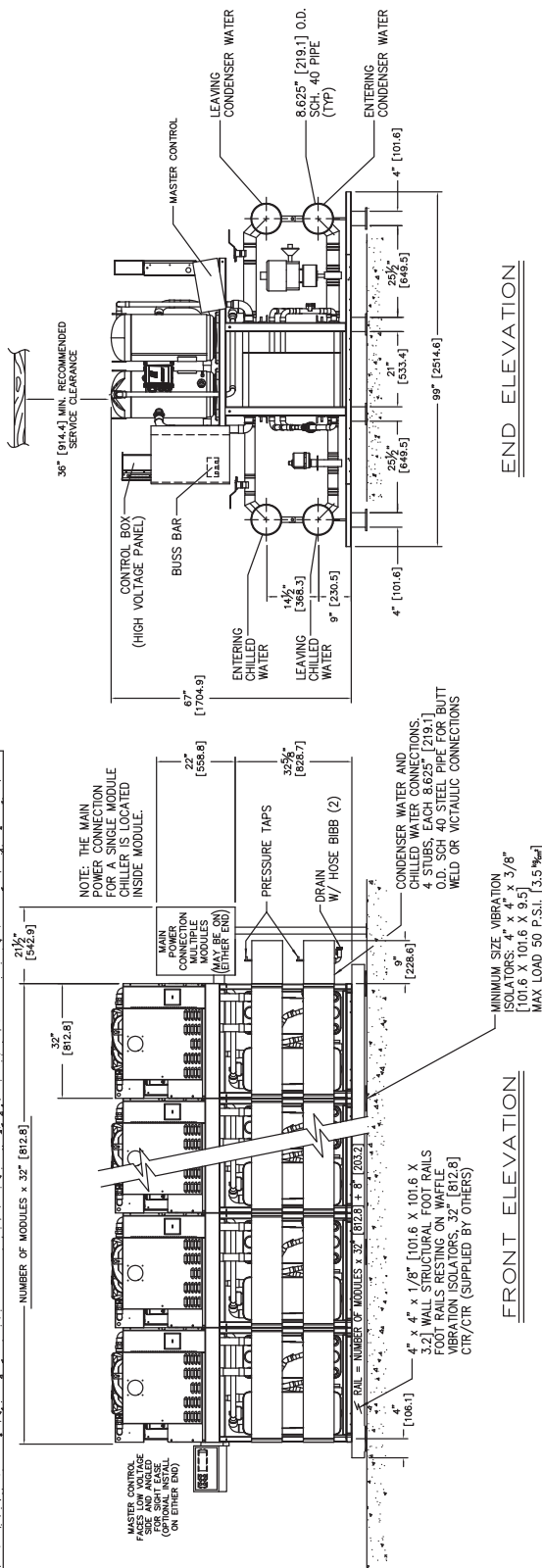
# Variable Flow Design for Chilled and Hot Water-Extended Headers on Evaporators and Condensers

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



High voltage clearance may vary by local code.



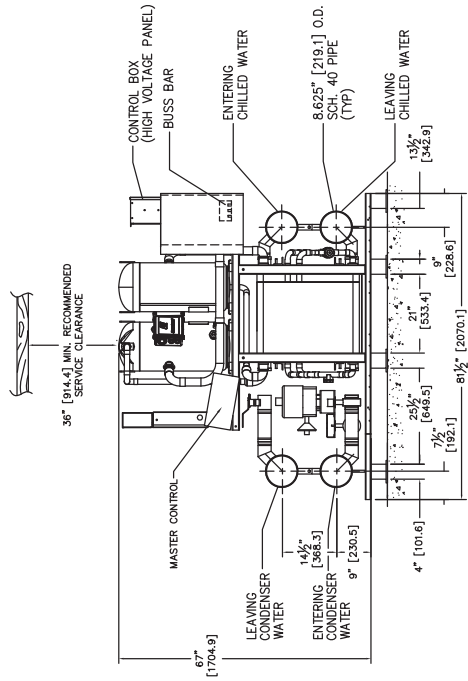
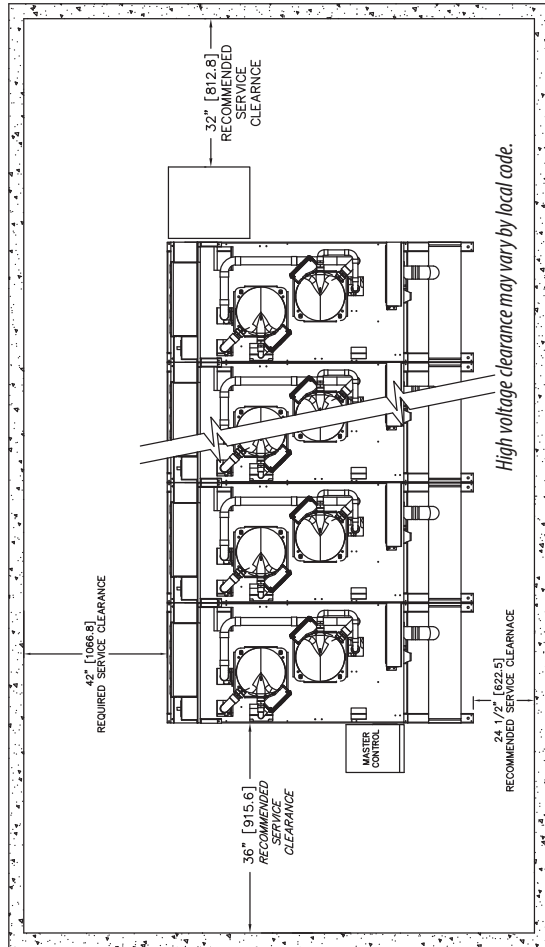
FRONT ELEVATION

END ELEVATION

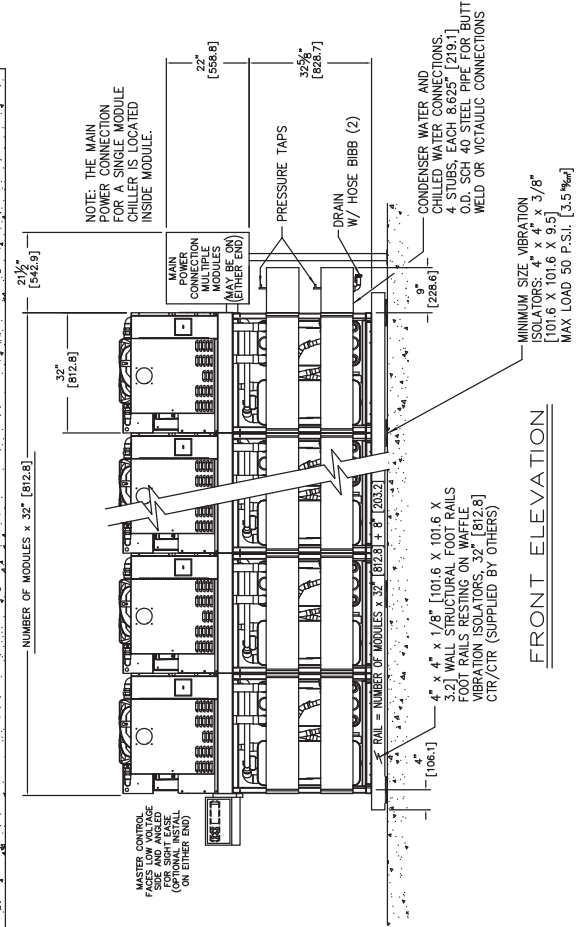
# Variable Flow Design for Hot Water, Constant Flow for Chilled Water Extended Headers on Condensers

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



END ELEVATION



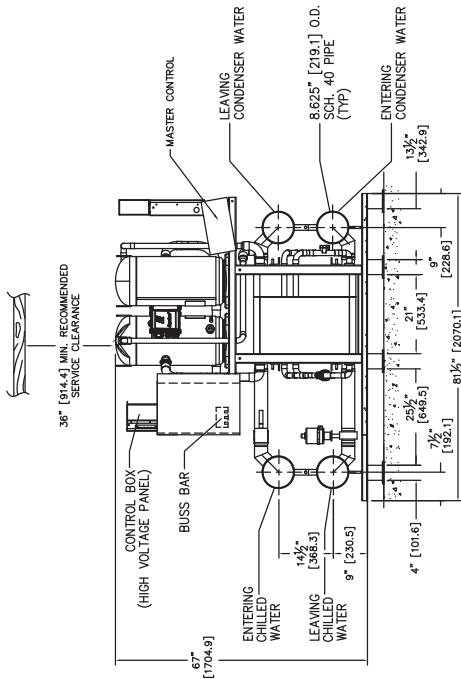
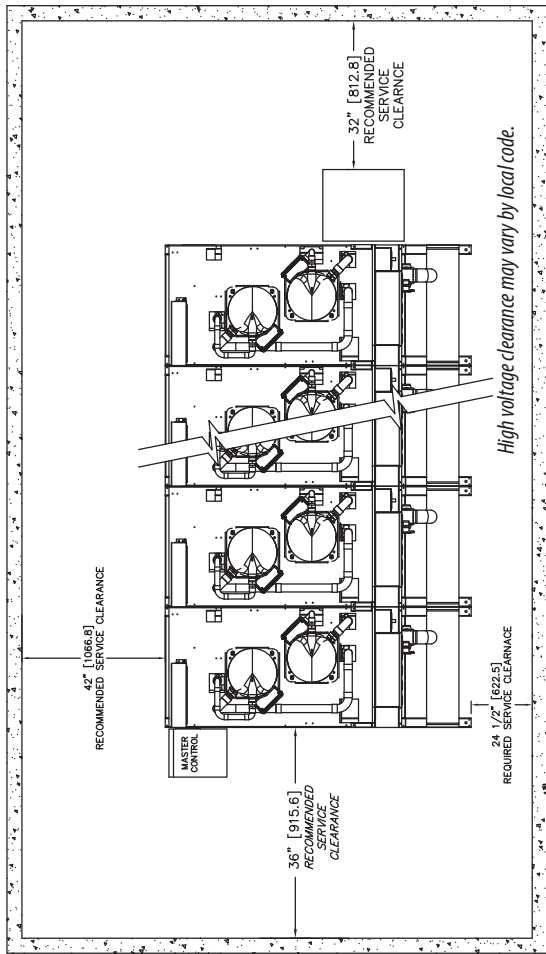
FRONT ELEVATION

Dimensions

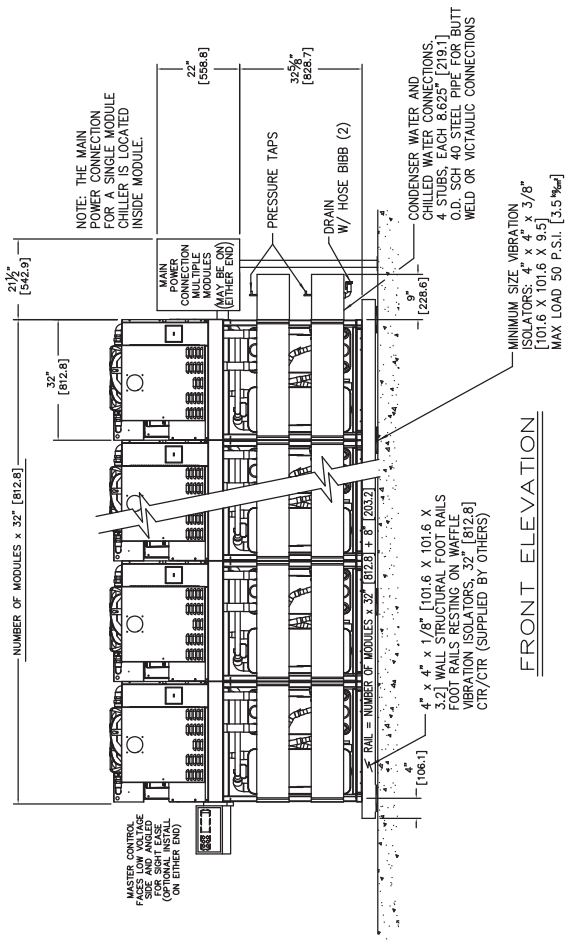
# Variable Flow Design for Chilled Water, Constant Flow for Condenser Water Extended Headers on Evaporators

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



END ELEVATION



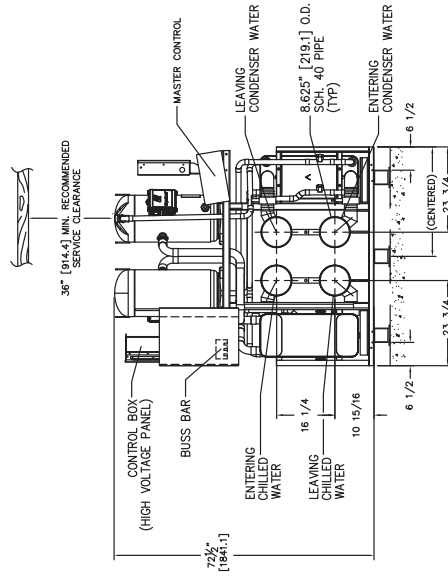
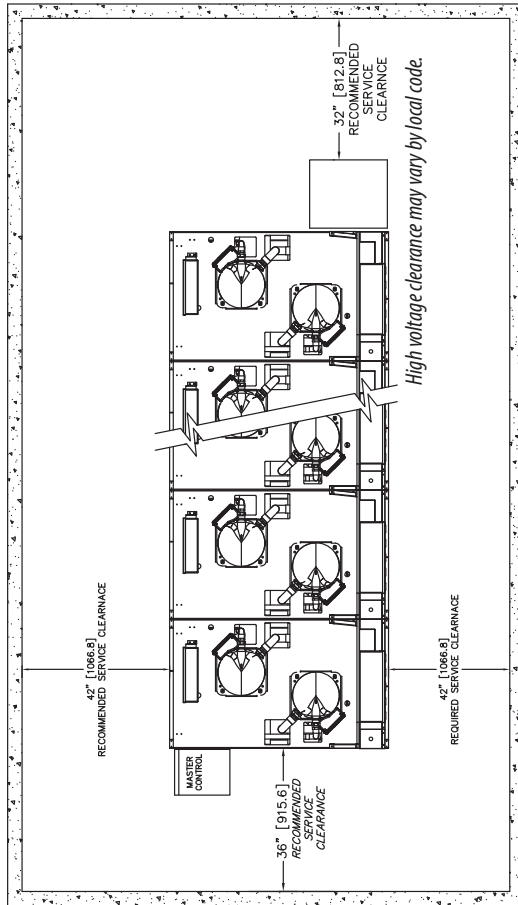
FRONT ELEVATION



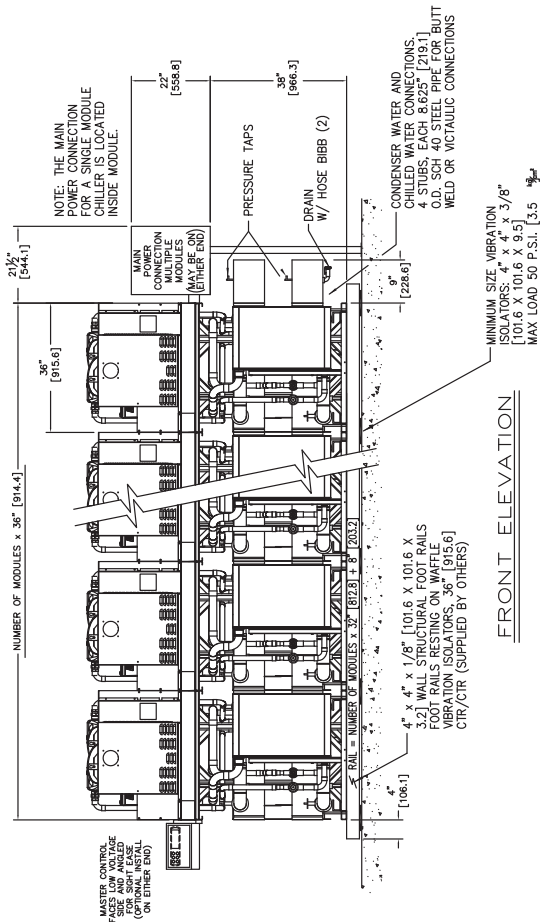
## Total Access Design with or without Variable Flow

\*Standardized drawing of sample customer installation  
 \*\*Panels are optional

PLAN VIEW



END ELEVATION



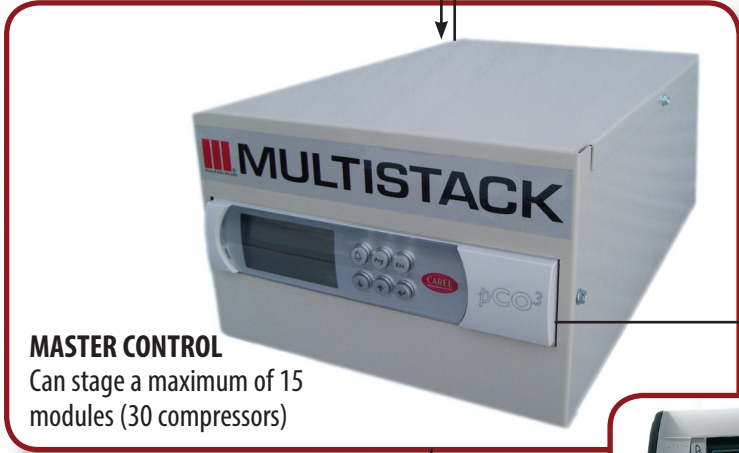
FRONT ELEVATION

**Controller Information**

**Chiller Data**

- ENT. CHILLED WATER TEMP. →
- LVG. CHILLED WATER TEMP. →
- VERIFY CHILLED WATER FLOW →
- ENT. COND. WATER TEMP. →
- LVG. COND. WATER TEMP. →
- VERIFY COND. WATER FLOW →
- CUSTOMER INTERLOCKS →
- CHILLED WATER RESET INPUT/  
LOAD LIMIT RESET INPUT →

- CHILLED WATER PUMP OPERATION
- CONDENSER WATER PUMP OPERATION
- FAULT NOTIFICATION
- FULL LOAD RELAY
- MULTIFLUSH OUTPUT



**MASTER CONTROL**  
Can stage a maximum of 15 modules (30 compressors)



REMOTE DISPLAY (optional)

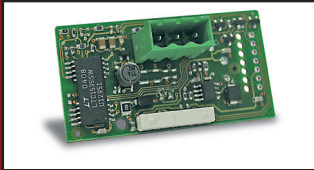
**Module Data**

**MODULE CONTROL PANEL**

- |   |   |
|---|---|
| <p><b>DATA FROM REFRIGERATION SYSTEM A</b></p> <ul style="list-style-type: none"> <li>HIGH PRESSURE TRANSDUCER</li> <li>HIGH PRESSURE SWITCH</li> <li>LOW PRESSURE TRANSDUCER</li> <li>COMPRESSOR MOTOR PROTECTION</li> <li>SUCTION TEMPERATURE</li> <li>LEAVING CHILLED WATER TEMP</li> <li>CIRCUIT FAULT CONDITION</li> </ul> | <p><b>DATA FROM REFRIGERATION SYSTEM B</b></p> <ul style="list-style-type: none"> <li>HIGH PRESSURE TRANSDUCER</li> <li>HIGH PRESSURE SWITCH</li> <li>LOW PRESSURE TRANSDUCER</li> <li>COMPRESSOR MOTOR PROTECTION</li> <li>SUCTION TEMPERATURE</li> <li>LEAVING CHILLED WATER TEMP</li> <li>CIRCUIT FAULT CONDITION</li> </ul> <p><b>HIGH VOLTAGE CONTROL PANEL</b></p> <ul style="list-style-type: none"> <li>CIRCUIT A COMPRESSOR CONTACTOR</li> <li>CIRCUIT B COMPRESSOR CONTACTOR</li> </ul> |
|---|---|

**BUILDING AUTOMATION SOLUTIONS**

**INTEROPERABILITY PORTALS**



RS485 Serial Card



PCO Net RS485 Interface Board



PCO Web Ethernet Interface Board

**BACNET™**

- MSTP
- ETHERNET
- TCP/IP

**MODBUS™ (RTU)**

**SNMP PROTOCOL**

**LONMARK™**

## Mechanical Specifications

### General

Modules are ETL listed in accordance with UL standard 1995 and are CSA certified per standard C22.2 #236 on all heat exchangers.

Modules ship wired and charged with refrigerant and oil, ready for installation. All modules are factory run tested prior to shipment.

Compressors, heat exchangers, piping and controls are mounted on a heavy gauge steel frame. Electrical controls, contactors, and relays for each module, are mounted within that module.

### Chilled and Condensed Water Mains

Each module includes supply and return mains for both chilled and condensed water. Grooved end connections are provided for interconnection to 6-inch U.S. standard (6.625 outside diameter) customer piping with grooved couplings. (MS-085 units use 8-inch piping.) Standard units include 30 mesh in-line strainers in the condenser and evaporator supply headers. Also standard is the Multiflush™ automatic debris removal system.

### Evaporators and Condensers

Each evaporator and condenser is a brazed plate heat exchanger constructed of 316 stainless steel; designed, tested and stamped for a 650 psig working pressure.

### Compressors

Each module contains two separate refrigeration systems. The hermetic compressor in each system is mounted to the frame with rubber-in-shear isolators. Each system also includes high discharge pressure and low suction pressure cutouts.

### Originators...

Multistack invented the modular water chiller. It started with a radically simple idea: chiller modules that could be brought into the equipment room one at a time, through standard doorways and down elevators, to form a fully integrated chiller system. The idea launched a revolution and transformed Multistack into a leader in the commercial water-chiller industry.

### Innovators...

Multistack perfected the modular chiller and leads the industry in innovative and environmentally friendly modular solutions. Since founding in the late 1980s, Multistack has engineered, manufactured, and distributed an impressive array of modular air conditioning firsts: the first on-board strainer, the first modular automatic blow-down device, the first modular chiller for variable flow, the first modular chiller-heater (heat pump), the first modular heat-recovery chiller, the first modular air-to-water heat pump, the first modular chiller to utilize MagLev™ compressor technology, and the first modular chiller to utilize R-410A.

### Never the Imitators...

Multistack sets the standard in the industry for superior customer service, fast and on time shipment, superior product quality, and new product development. Our pioneering leadership in environmental issues is well documented. If you want the best, be sure to specify the original – Multistack®.

### Central Control System

Scheduling of the various compressors is performed by the microprocessor control. Compressors operating schedules are sequenced every 24 hours to assure distribution of run time. This microprocessor monitors the following on each refrigeration system:

- Discharge pressure cut-out
- Suction pressure cut-out
- Compressor motor protector
- Suction temperature
- Evaporator entering and leaving chilled water temperature

A fault condition from these controls or sensors will cause a shutdown of that compressor with the transfer of load requirements to another available compressor. When a fault occurs, the microprocessor records the reading of conditions at the time and stores the data for recall by operating personnel. This information can be recalled using the keys and displayed on the LCD screen. A running history of the fault occurrence conditions is maintained (up to the last 20 occurrences) should it be required for trouble shooting.

Individual monitoring of leaving chilled water temperature from each refrigeration system is designed to protect against freeze-up.

The control system monitors entering and leaving chilled water temperatures to determine system load and selects the number of compressors required. Response time and set points are adjustable.

### Options

- Variable Flow
- Total Access™ Design
- Pump Options
- Lifting Frame Options
- Dry Cooler Options

 **MULTISTACK**<sup>®</sup>  
Originators. Innovators. Never the Imitators.

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