WCSHP Series 50Hz

Water To Water Heatpump With Scroll Compressors

Heating Capacity: 11 to 74 TR (39 to 260 kW)

*the shown unit is with optional Shell & Tube evaporator

R134a

R407C

DUNHAM-BUSH

Products that perform...By people who care

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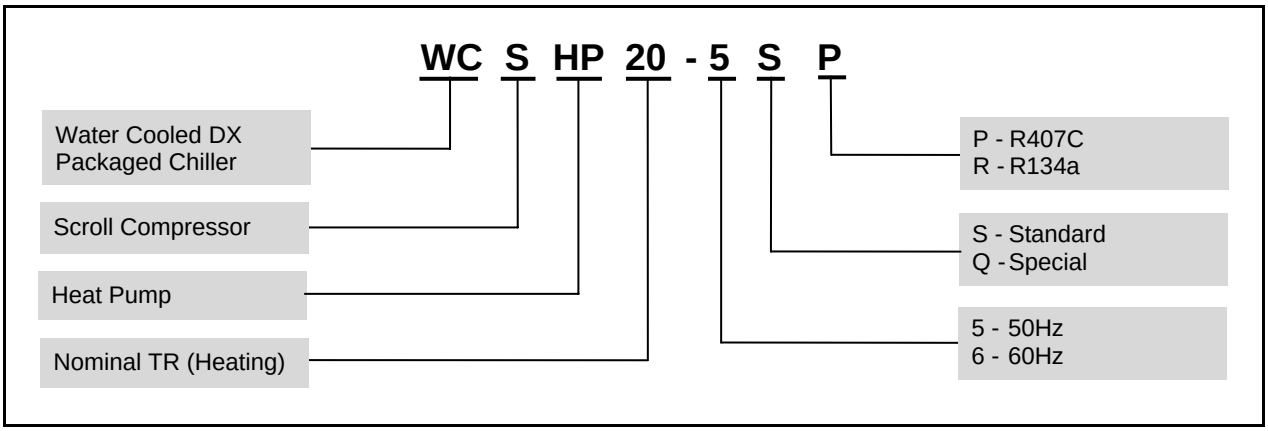
NOMENCLATURE



STANDARD FEATURES

Compressor

- Scroll hermetic type operating at 2950 RPM (50Hz).
- High EER, low sound power level and high reliability.
- Controlled orbit with floating seals and advanced scroll geometry.
- No-contact scroll design and 100% motor cooled by suction gas.
- Thermostat fitted to prevent thermal overload.
- Capability of 50% tandem unloading.

Evaporator

- Uses Brazed Plate Heat Exchangers (BPHEs) for optimum performance reliability.
- Holds approvals from PED (Europe) and UL (America).
- Smaller size compared to traditional Shell and Tube.
- Optional Shell & Tube evaporator.

Condenser

- Vessels constructed in accordance to ASME CODES Sections Vlll Division I for unfired pressure vessels.
- Removable heads and interchangeable end-for-end for job flexibility.
- 3/4" [19mm] OD seamless, extended surface copper tubes.
- 300psig [21bar] on refrigerant side design pressure.
- 150psig [10bar] on water side design pressure.
- Approval Stamp available from JKKP (Malaysia) and PED (Europe).

Electrical/Control

- Reliable microprocessor based controller with electromechanical system is standard for all models.

OPERATING BENEFITS

FIGURE 1 : SCROLL COMPRESSOR

1. **DELIVERING THE HIGHEST EFFICIENCY**
   Scroll compressor gives efficiencies 10% higher than any competitive compressor on the market today – at the right conditions.

2. **DELIVERING THE QUIETEST OPERATION**
   Scroll technology gives you compressor operation that is many times quieter than other technologies.

3. **DELIVERING THE INDUSTRY'S BEST VALUE**
   Scroll compressor clearly delivers more system value because of its high efficiency, fewer required components, increased reliability and quieter operation.

4. **DELIVERING FOR THE FUTURE**
   Scroll compressor is by far the most advanced products in the industry today for air conditioning, refrigeration and heat pump applications.

FIGURE 2: PRINCIPLE OF SCROLL COMPRESSION

The scroll is a simple compression concept first patented in 1905. A scroll is an involute spiral which, when matched with a mating scroll form as shown above, generates a series of crescent-shaped gas pockets between the two members. During compression, one scroll remains stationary (fixed-scroll) while the other form (orbiting scroll) is allowed to orbit (but not rotate) around the first form. As this motion occurs, the pockets between the two forms are slowly pushed to the center of the two scrolls while simultaneously being reduced in volume. When the pocket reaches the center of the scroll form, the gas, which is now at a high pressure, is discharged out of a port located at the center. During compression, several pockets are being compressed simultaneously, resulting in a very smooth process. Both the suction process (outer portion of the scroll members) and the discharge process (inner portion) are continuous.

Compression in the scroll is created by the interaction of an orbiting spiral and a stationary spiral. Gas enters the outer openings as one of the spirals orbits.

The open passages are sealed off as gas is drawn into the spiral.

As the spiral continues to orbit, the gas is compressed into two increasingly smaller pockets.

By the time the gas arrives at the center port, discharge pressure has been reached.

Actually, during operation, all six gas passages are in various stages of compression at all times, resulting in nearly continuous suction and discharge.

SYSTEM CONTROL

CAPACITY CONTROL

The standard system capacity control operates as follows:

- As the chiller load initially drops, the suction of the compressor(s) starts dropping proportionately, thus balancing minor load variations.
- Variation of unit capacity in response to system load requirements is controlled by an operating thermostat, which monitors the return water temperature.
- On multiple compressor units, capacity is controlled by compressor staging.

ELECTRICAL CONTROLS

MCCB/ MCB - Main Circuit Breaker

This is an automatic, calibrated, ambient compensated, magnetic trip circuit breaker, which provides both direct line-break compressor branch circuit. short circuit locked rotor and overload protection. It has a manually operable handle for compressor circuit disconnect.

M - Contactor

The Contactor, operated by the control circuit, provides power individually to the compressors. Contactors are used in single across-the-line start. This device is amp rated to handle both rated load amp and locked rotor amps.

CR - Relays (Miscellaneous Control)

These relays provide the necessary circuit logic for lock-in, lock -out and control functions.

HTR - Crankcase Heater

Energized continuously as long as control circuit power disconnect switch (not supplied with the unit) is closed and compressor is off. This heater maintains crankcase temperature above the system temperature during the compressor off cycle, preventing refrigerant migration into the crankcase and consequent cause compressor damage.

SOL - Liquid Line Solenoid Valve

Closes when the compressor(s) is off to prevent any liquid refrigerant from accumulating in the chiller during the off cycle.

OL - Motor Overload (Manual Reset)

The compressors are protected by thermal overload relays. The overload relays are manually reset.

PCR or UVR - Phase Control Relay (Optional)

Protects the unit from the following electric supply malfunctions: Under voltage, phase reversal, phase loss and phase imbalance. If the PCR or UVR trips, a control relay will de-energize and open the control circuit. A red LED trip light, located on the PCR or UVR, will indicate a supply malfunction. Tile PCR or UVR is a Auto reset control device.

PHYSICAL SPECIFICATIONS

R134a

Model	WCSHP	12-5SR	15-5SR	20-5SR	25-5SR	30-5SR	40-5SR	50-5SR
Heating Capacity	kW	41.22	53.92	73.05	87.85	107.83	146.08	175.71
Power Input	kW	10.78	14.11	17.84	21.56	28.22	35.67	43.12
Energy Efficiency	EER [kW/kW]	13.05	13.04	13.97	13.90	13.04	13.97	13.90
	COP	3.82	3.82	4.10	4.07	3.82	4.10	4.07
Refrigerant		R134a						
No. Of Circuit		2						
Compressor								
Model (Qty)		CS94 (2)	CS125 (2)	CS160 (2)	CS190 (2)	CS125 (4)	CS160 (4)	CS190 (4)
Method Start		Factory Packaged DOL Starter						
RLA, Each		11.3	13.8	18.5	23.5	13.8	18.5	23.5
LRA, Each		95	118	140	174	118	140	174
Evaporator								
Model (Qty)		16B18-PHE (2)	16B26-PHE (2)	16B34-PHE (2)	16B42-PHE (2)	16B44-PHE (2)	80V56-PHE (2)	80V64-PHE (2)
Fluid Type		100% Water						
Entering Fluid Temp	°F [°C]	92.4°F [33.6]						
Leaving Fluid Temperature	°F [°C]	82.4°F [28.0]						
Flow Rate	Us gpm [l/s]	10.25 [0.65]	13.5 [0.85]	18.51 [1.17]	22.26 [1.4]	26.74 [1.69]	37.27 [2.35]	44.53 [2.81]
Pressure Drop max	ft.w.g [kPa]	16.72 [21.67]						
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.0001 [0.018]						
Condenser								
Model (Qty)		E8R14-DX (1)	E8R18-DX (1)	F8R25-DX (1)	H8R30-DX (1)	H8R37-DX (1)	J8R49-DX (1)	J8R59-DX (1)
Fluid Type		100% Water						
Entering Fluid Temp	°F [°C]	131.0°F [55.0]						
Leaving Fluid Temperature	°F [°C]	140.0°F [60.0]						
No. Of Passes		2						
Flow Rate	USgpm [l/s]	31.71 [2]	41.45 [2.62]	56.21 [3.55]	67.72 [4.27]	83.31 [5.26]	112.83 [7.12]	135.54 [8.55]
Pressure Drop max	ft.w.g [kPa]	37.7 [112.7]	54.5 [162.8]	17.9 [53.5]	13.6 [40.8]	14.6 [43.7]	13.5 [40.5]	14.2 [42.4]
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.00025 [0.044]						
Electrical Data								
Power Supply	Voltage/Phase/Hz	400/3/50						
Unit Data	RLA	22.6	27.6	37.0	47.0	55.2	74.0	94.0
	MCA	25	31	42	53	59	79	100
	MFS	32	40	60	75	75	100	125
Dimensions								
Length	inch[mm]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]
Width	inch[mm]	50 [1270]	50 [1270]	50 [1270]	50 [1270]	50 [1270]	50 [1270]	50 [1270]
Height	inch[mm]	53 [1346]	55 [1397]	57 [1448]	59 [1499]	58 [1473]	61 [1549]	61 [1549]
General Information								
Shipping Weight	lbs[kg]	1345 [610]	1373 [623]	1449 [657]	1678 [761]	2415 [1095]	2898 [1315]	3218 [1460]
Operating Weight	lbs[kg]	1407 [638]	1433 [650]	1521 [690]	1772 [804]	2533 [1149]	3056 [1386]	3405 [1544]
Approx. Refrig. Charge	lbs[kg]	26 [12]	34 [15]	46 [21]	55 [25]	68 [31]	92 [42]	110 [50]

PHYSICAL SPECIFICATIONS

R407C

Model	WCSHP	20-5SP	25-5SP	30-5SP	35-5SP
Heating Capacity	kW	66.59	87.55	110.27	130.10
Power Input	kW	16.46	21.56	27.24	32.54
Energy Efficiency	EER [kW/kW]	13.80	13.86	13.81	13.64
	COP	4.04	4.06	4.05	4.00
Refrigerant		R407C			
No. Of Circuit		2			
Compressor					
Model (Qty)		CS94 (2)	CS125 (2)	CS160 (2)	CS190 (2)
Method Start		Factory Packaged DOL Starter			
RLA, Each		14.7	18.7	23.8	30.1
LRA, Each		95	118	140	174
Evaporator					
Model (Qty)		25TB28-PHE (2)	80B30-PHE (2)	80B36-PHE (2)	80B42-PHE (2)
Fluid Type		100% Water			
Entering Fluid Temp	°F [°C]	92.4°F [33.6]			
Leaving Fluid Temperature	°F [°C]	82.4°F [28.0]			
Flow Rate	Us gpm [l/s]	16.76 [1.06]	22.26 [1.4]	28.02 [1.77]	32.71 [2.06]
Pressure Drop max	ft.w.g [kPa]	16.72 [21.67]			
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.0001 [0.018]			
Condenser					
Model (Qty)		J8P64-DX (1)	J8P81-DX (1)	L8P87-DX (1)	L8P99-DX (1)
Fluid Type		100% Water			
Entering Fluid Temp	°F [°C]	131.0°F [55.0]			
Leaving Fluid Temperature	°F [°C]	140.0°F [60.0]			
No. Of Passes		2			
Flow Rate	USgpm [l/s]	51.22 [3.23]	67.4 [4.25]	84.82 [5.35]	100.29 [6.33]
Pressure Drop max	ft.w.g [kPa]	14.5 [43.3]	16.1 [48.1]	16.7 [49.9]	18.1 [54]
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.00025 [0.044]			
Electrical Data					
Power Supply	Voltage/Phase/Hz	400/3/50			
Unit Data	RLA	29.4	37.4	47.6	60.2
	MCA	33	42	54	68
	MFS	40	60	75	100
Dimensions					
Length	inch[mm]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]
Width	inch[mm]	60 [1524]	60 [1524]	60 [1524]	60 [1524]
Height	inch[mm]	58 [1473]	60 [1524]	63 [1600]	63 [1600]
General Information					
Shipping Weight	lbs[kg]	1547 [702]	1579 [716]	1666 [756]	1930 [875]
Operating Weight	lbs[kg]	1618 [734]	1648 [747]	1749 [793]	2038 [924]
Approx. Refrig. Charge	lbs[kg]	42 [19]	55 [25]	69 [31]	82 [37]

PHYSICAL SPECIFICATIONS

R407C

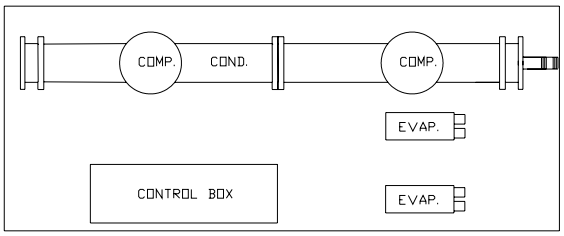
Model	WCSHP	40-5SP	50-5SP	60-5SP	70-5SP
Heating Capacity	kW	138.54	175.10	220.55	260.20
Power Input	kW	34.10	43.12	54.49	65.07
Energy Efficiency	EER [kW/kW]	13.86	13.86	13.81	13.64
	COP	4.06	4.06	4.05	4.00
Refrigerant		R407C			
No. Of Circuit		2			
Compressor					
Model (Qty)		CS108 (2) CS190 (1)	CS125 (4)	CS160 (4)	CS190 (4)
Method Start		Factory Packaged DOL Starter			
RLA, Each		15.9(2) 30.1(1)	18.7	23.8	30.1
LRA, Each		111(2) 174(1)	118	140	174
Evaporator					
Model (Qty)		80V50-PHE (2)	80V60-PHE (2)	80V76-PHE (2)	80V90-PHE (2)
Fluid Type		100% Water			
Entering Fluid Temp	°F [°C]	92.4°F [33.6]			
Leaving Fluid Temperature	°F [°C]	82.4°F [28.0]			
Flow Rate	Us gpm [l/s]	38.03 [2.4]	44.53 [2.81]	55.78 [3.52]	65.43 [4.13]
Pressure Drop max	ft.w.g [kPa]	16.72 [21.67]			
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.0001 [0.018]			
Condenser					
Model (Qty)		L8P107-DX (1)	N8P132-DX (1)	P8P166-DX (1)	P8P191-DX (1)
Fluid Type		100% Water			
Entering Fluid Temp	°F [°C]	131.0°F [55.0]			
Leaving Fluid Temperature	°F [°C]	140.0°F [60.0]			
No. Of Passes		2			
Flow Rate	USgpm [l/s]	106.7 [6.73]	134.91 [8.51]	170.16 [10.74]	200.36 [12.64]
Pressure Drop max	ft.w.g [kPa]	19.1 [57]	16.3 [48.7]	15.3 [45.6]	16.3 [48.9]
Fouling Factor	hr.ft^2.°F/Btu [m^2.°K/kW]	0.00025 [0.044]			
Electrical Data					
Power Supply	Voltage/Phase/Hz	400/3/50			
Unit Data	RLA	61.9	74.8	95.2	120.4
	MCA	69	79	101	128
	MFS	100	100	125	150
Dimensions					
Length	inch[mm]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]	96 1/4 [2445]
Width	inch[mm]	60 [1524]	60 [1524]	60 [1524]	60 [1524]
Height	inch[mm]	63 [1600]	64 [1626]	67 [1702]	67 [1702]
General Information					
Shipping Weight	lbs[kg]	2445 [1109]	2777 [1260]	3333 [1512]	3701 [1679]
Operating Weight	lbs[kg]	2573 [1167]	2913 [1321]	3514 [1594]	3916 [1776]
Approx. Refrig. Charge	lbs[kg]	87 [39]	110 [50]	138 [63]	163 [74]

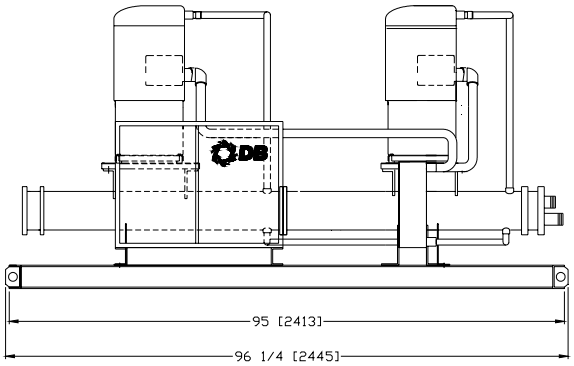
DIMENSIONAL DATA

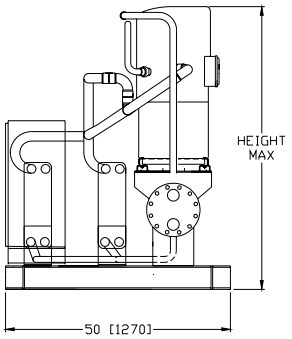
R134a

WCSHP 12-5SR, 15-5SR, 20-5SR, 25-5SR

MODEL	HEIGHT
WCSHP 12-5SR	53 [1346]
WCSHP 15-5SR	55 [1397]
WCSHP 20-5SR	57 [1448]
WCSHP 25-5SR	59 [1499]

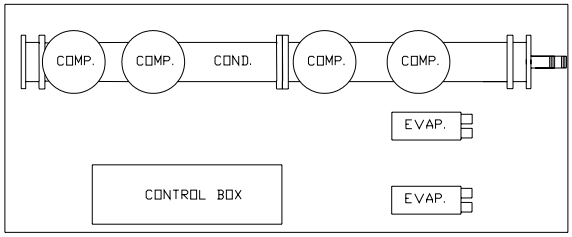


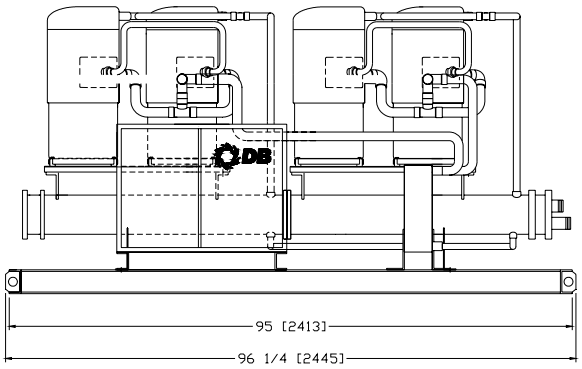


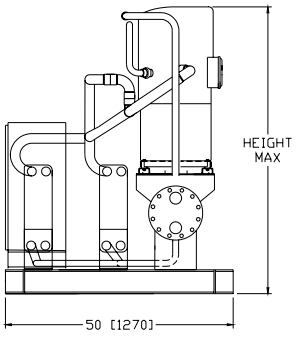


WCSHP 30-5SR, 40-5SR, 50-5SR

MODEL	HEIGHT
WCSHP 30-5SR	58 [1473]
WCSHP 40-5SR	61 [1549]
WCSHP 50-5SR	61 [1549]





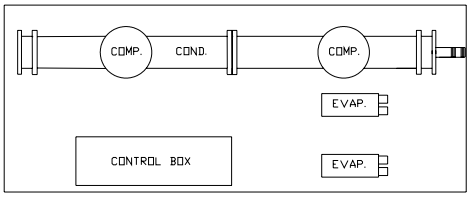


Note: All dimensions are in inches[mm].

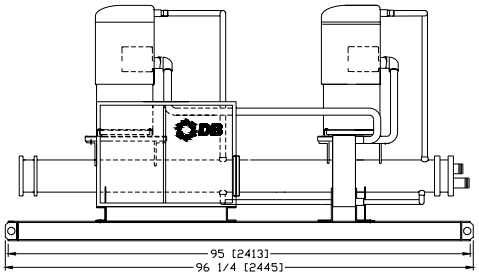
DIMENSIONAL DATA

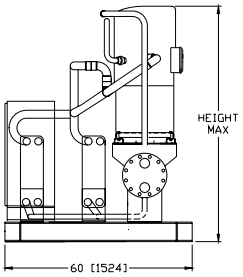
R407C

WCSHP 20-5SP, 25-5SP, 30-5SP, 35-5SP



MODEL	HEIGHT
WCSHP 20-5SP	58 [1473]
WCSHP 25-5SP	60 [1524]
WCSHP 30-5SP	63 [1600]
WCSHP 35-5SP	63 [1600]





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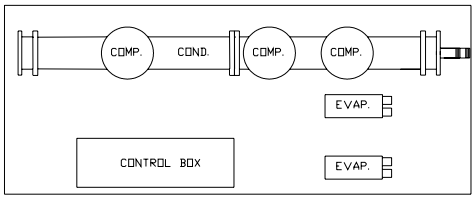
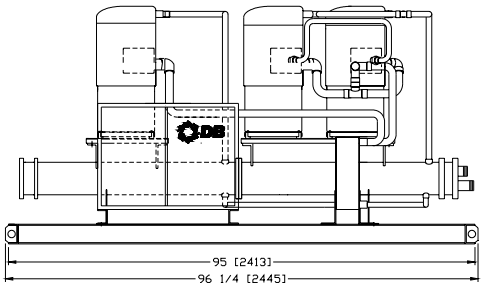
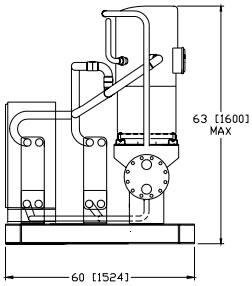
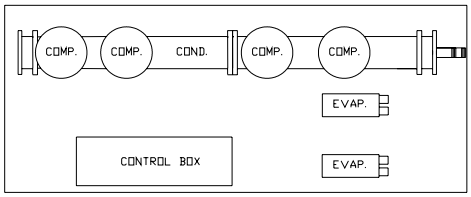


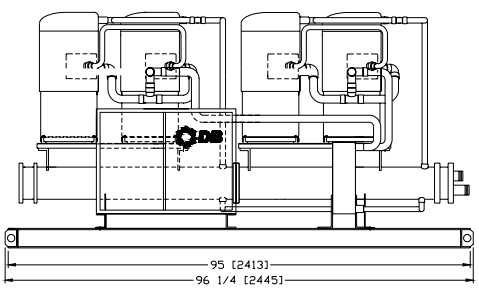


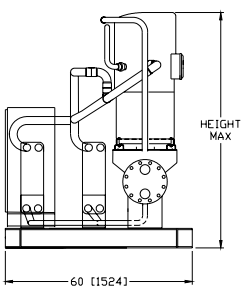


WCSHP 50-5SP, 60-5SP, 70-5SP



MODEL	HEIGHT
WCSHP 50-5SP	64 [1626]
WCSHP 60-5SP	67 [1702]
WCSHP 70-5SP	67 [1702]

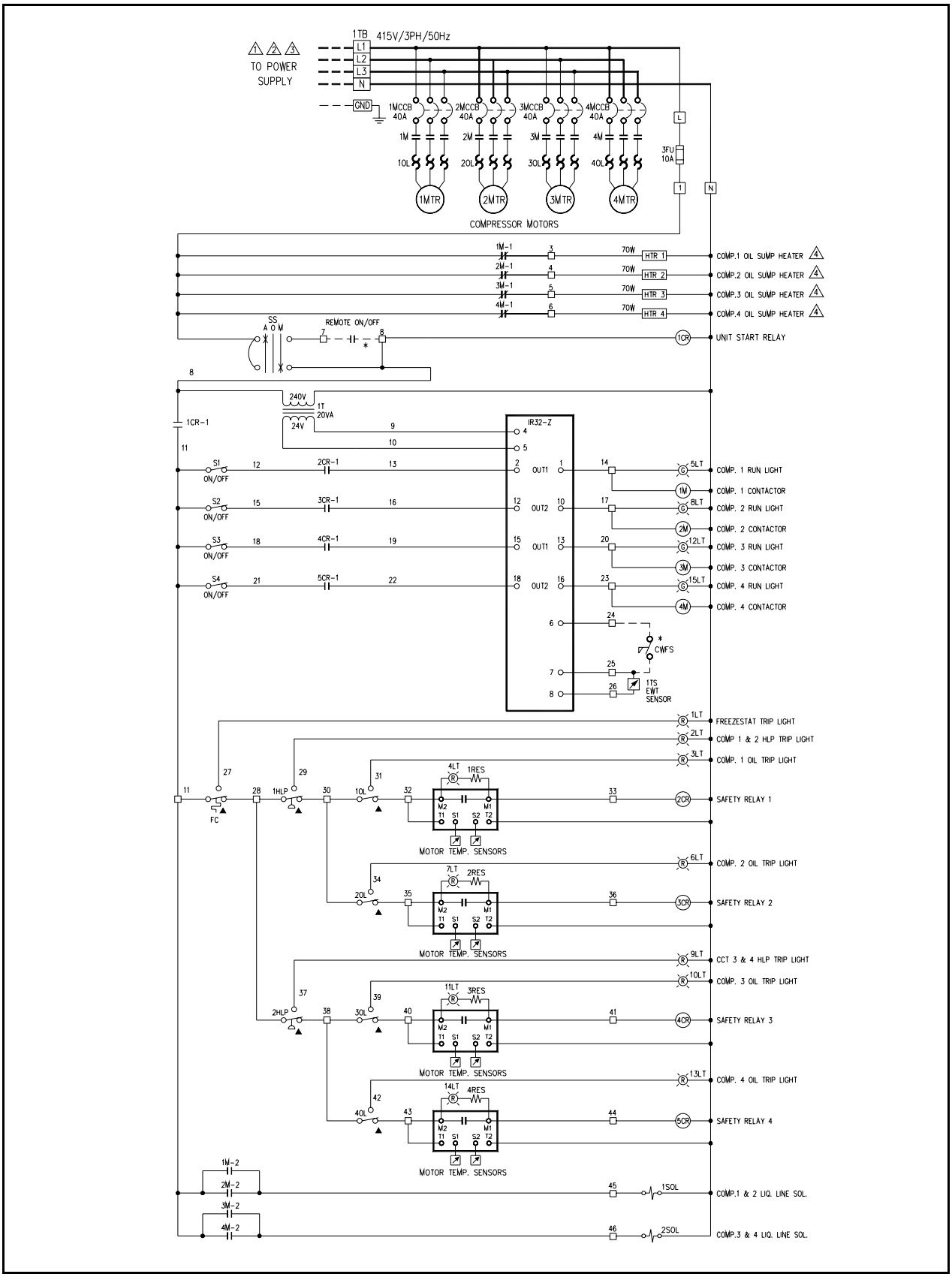




Note: All dimensions are in inches[mm].

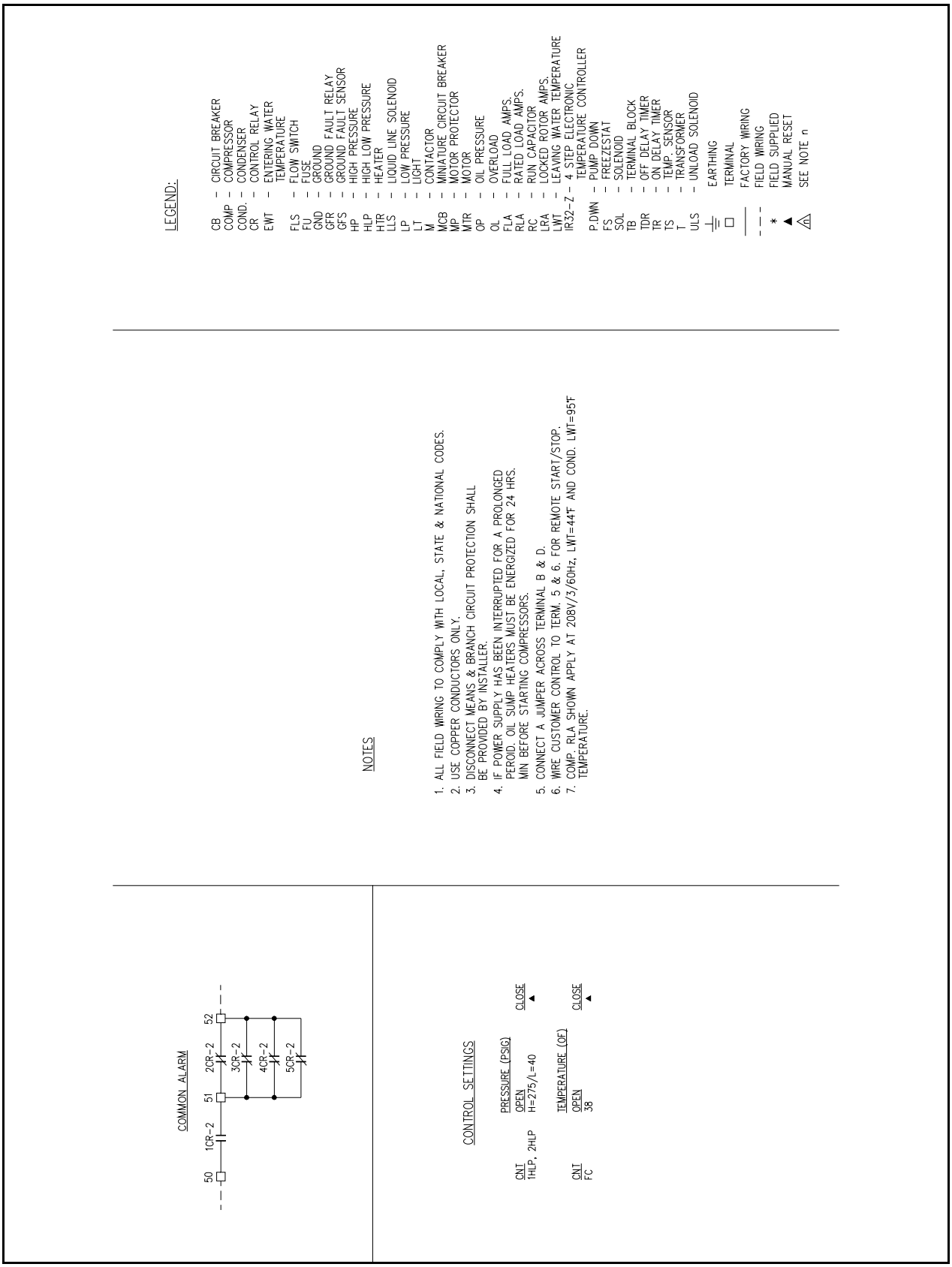
TYPICAL WIRING DIAGRAM

2 TANDEM COMPRESSOR



TYPICAL WIRING DIAGRAM

2 TANDEM COMPRESSOR



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