



## 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

**R<sub>134a</sub>**  
**R<sub>407C</sub>**

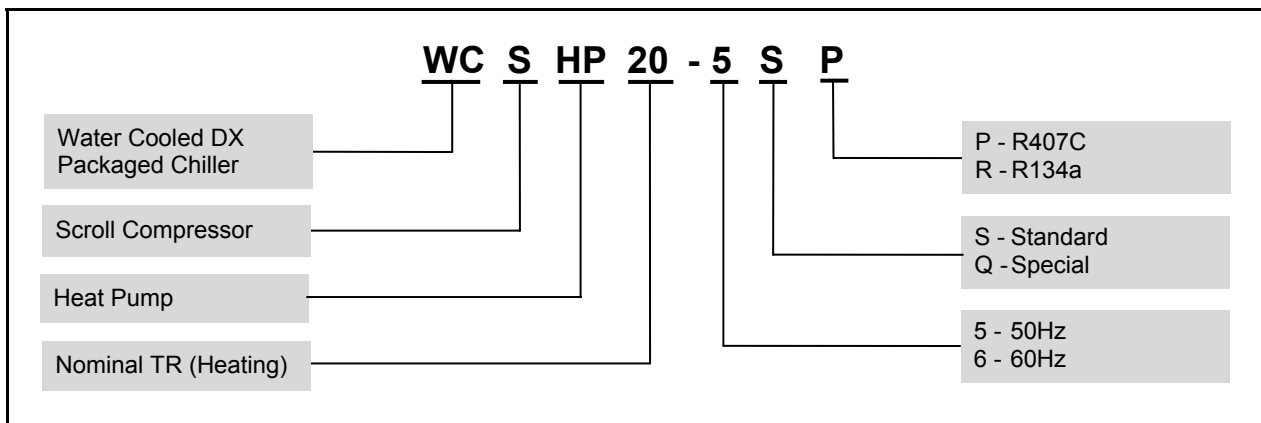
# DUNHAM-BUSH

Products that perform...By people who care

# TABLE OF CONTENTS

	Page No
Nomenclature .....	2
Standard Features .....	2
Operating Benefits .....	3
System Control.....	4
Physical Specifications.....	5
Dimensional Data .....	7
Typical Wiring Diagram .....	9

## 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 Braze 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 VIII 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

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## 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							
<b>Compressor</b>								
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
<b>Evaporator</b>								
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 <sup>2</sup> .°F/Btu [m <sup>2</sup> .°K/kW]	0.0001 [0.018]						
<b>Condenser</b>								
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 <sup>2</sup> .°F/Btu [m <sup>2</sup> .°K/kW]	0.00025 [0.044]						
<b>Electrical Data</b>								
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
<b>Dimensions</b>								
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]
<b>General Information</b>								
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

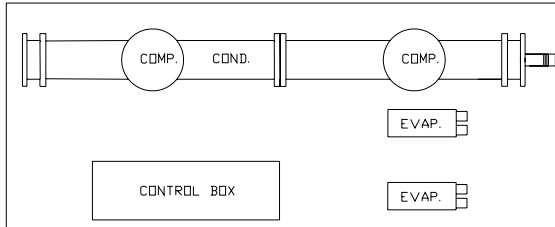
## R407C

Model	WCSHP	20-5SP	25-5SP	30-5SP	35-5SP	40-5SP	50-5SP	60-5SP	70-5SP
Heating Capacity	kW	66.59	87.55	110.27	130.10	138.54	175.10	220.55	260.20
Power Input	kW	16.46	21.56	27.24	32.54	34.10	43.12	54.49	65.07
Energy Efficiency	EER [kW/kW]	13.80	13.86	13.81	13.64	13.86	13.86	13.81	13.64
	COP	4.04	4.06	4.05	4.00	4.06	4.06	4.05	4.00
Refrigerant	R407C								
No. Of Circuit	2								
<b>Compressor</b>									
Model (Qty)		CS94 (2)	CS125 (2)	CS160 (2)	CS190 (2)	CS108 (2) CS190 (1)	CS125 (4)	CS160 (4)	CS190 (4)
Method Start	Factory Packaged DOL Starter								
RLA, Each		14.7	18.7	23.8	30.1	15.9(2) 30.1(1)	18.7	23.8	30.1
LRA, Each		95	118	140	174	111(2) 174(1)	118	140	174
<b>Evaporator</b>									
Model (Qty)		25TB28-PHE (2)	80B30-PHE (2)	80B36-PHE (2)	80B42-PHE (2)	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]	16.76 [1.06]	22.26 [1.4]	28.02 [1.77]	32.71 [2.06]	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 <sup>2</sup> .°F/Btu [m <sup>2</sup> .°K/kW]	0.0001 [0.018]							
<b>Condenser</b>									
Model (Qty)		J8P64-DX (1)	J8P81-DX (1)	L8P87-DX (1)	L8P99-DX (1)	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]	51.22 [3.23]	67.4 [4.25]	84.82 [5.35]	100.29 [6.33]	106.7 [6.73]	134.91 [8.51]	170.16 [10.74]	200.36 [12.64]
Pressure Drop max	ft.w.g [kPa]	14.5 [43.3]	16.1 [48.1]	16.7 [49.9]	18.1 [54]	19.1 [57]	16.3 [48.7]	15.3 [45.6]	16.3 [48.9]
Fouling Factor	hr.ft <sup>2</sup> .°F/Btu [m <sup>2</sup> .°K/kW]	0.00025 [0.044]							
<b>Electrical Data</b>									
Power Supply	Voltage/Phase/Hz	400/3/50							
Unit Data	RLA	29.4	37.4	47.6	60.2	61.9	74.8	95.2	120.4
	MCA	33	42	54	68	69	79	101	128
	MFS	40	60	75	100	100	100	125	150
<b>Dimensions</b>									
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]	96 1/4 [2445]
Width	inch[mm]	60 [1524]	60 [1524]	60 [1524]	60 [1524]	60 [1524]	60 [1524]	60 [1524]	60 [1524]
Height	inch[mm]	58 [1473]	60 [1524]	63 [1600]	63 [1600]	63 [1600]	64 [1626]	67 [1702]	67 [1702]
<b>General Information</b>									
Shipping Weight	lbs[kg]	1547 [702]	1579 [716]	1666 [756]	1930 [875]	2445 [1109]	2777 [1260]	3333 [1512]	3701 [1679]
Operating Weight	lbs[kg]	1618 [734]	1648 [747]	1749 [793]	2038 [924]	2573 [1167]	2913 [1321]	3514 [1594]	3916 [1776]
Approx. Refrig. Charge	lbs[kg]	42 [19]	55 [25]	69 [31]	82 [37]	87 [39]	110 [50]	138 [63]	163 [74]

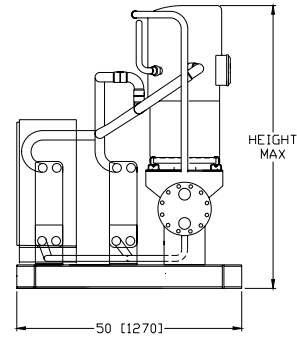
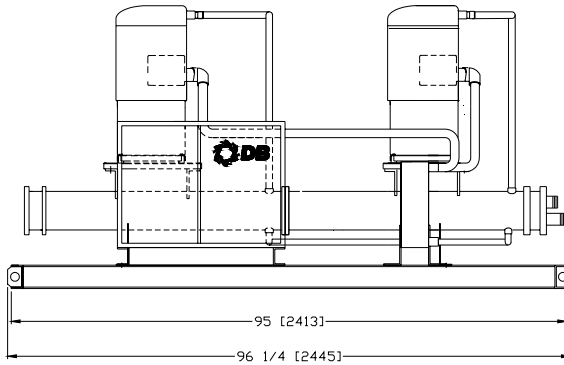
# DIMENSIONAL DATA

R134a

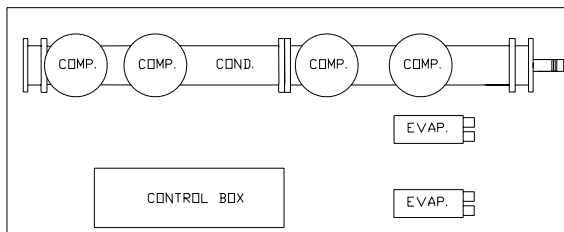
## WCSHP 12-5SR, 15-5SR, 20-5SR, 25-5SR



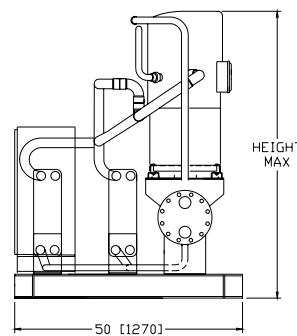
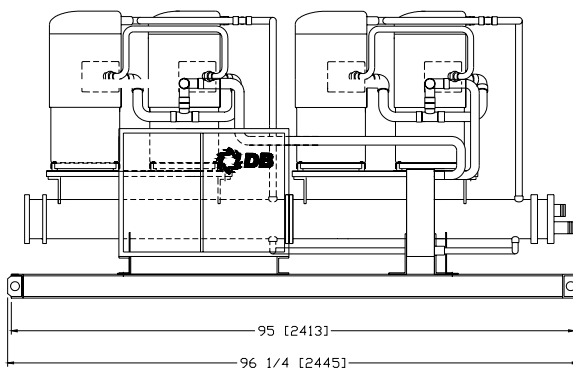
MODEL	HEIGHT
WCSHP 12-5SR	53 [1346]
WCSHP 15-5SR	55 [1397]
WCSHP 20-5SR	57 [1448]
WCSHP 25-5SR	59 [1499]



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



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

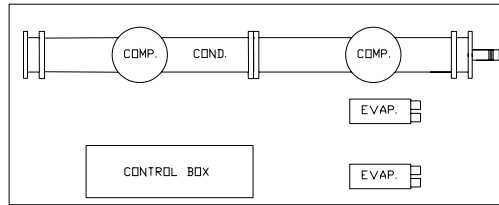


Note: All dimensions are in inches[mm].

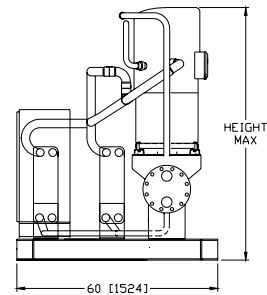
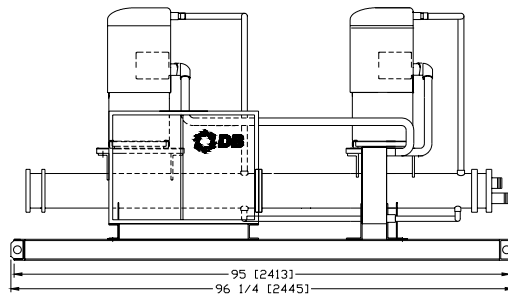
# DIMENSIONAL DATA

## R407C

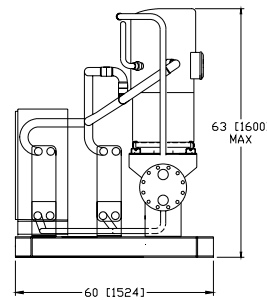
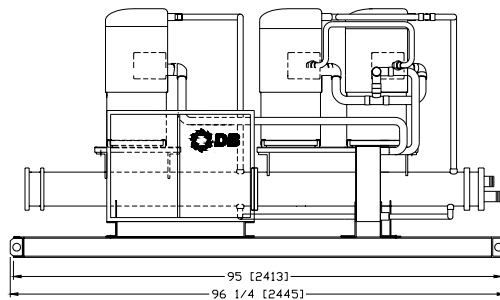
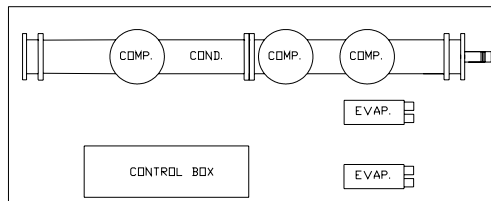
### WCSHP 20-5SP, 25-5SP, 30-5SP, 35-5SP



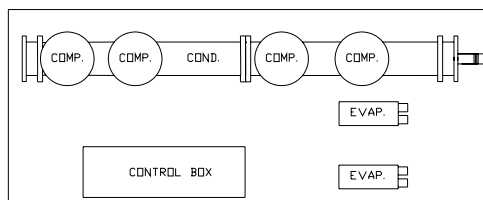
MODEL	HEIGHT
WCSHP 20-5SP	58 [1473]
WCSHP 25-5SP	60 [1524]
WCSHP 30-5SP	63 [1600]
WCSHP 35-5SP	63 [1600]



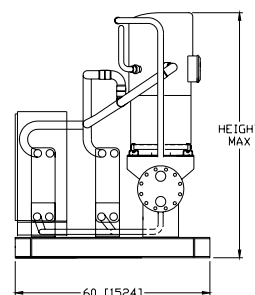
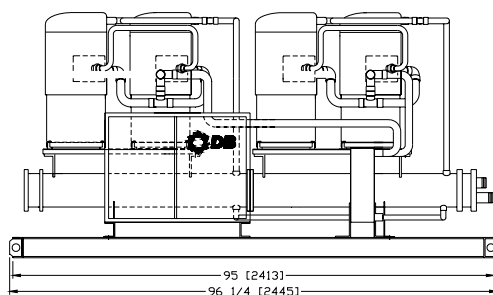
### WCSHP 40-5SP



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



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

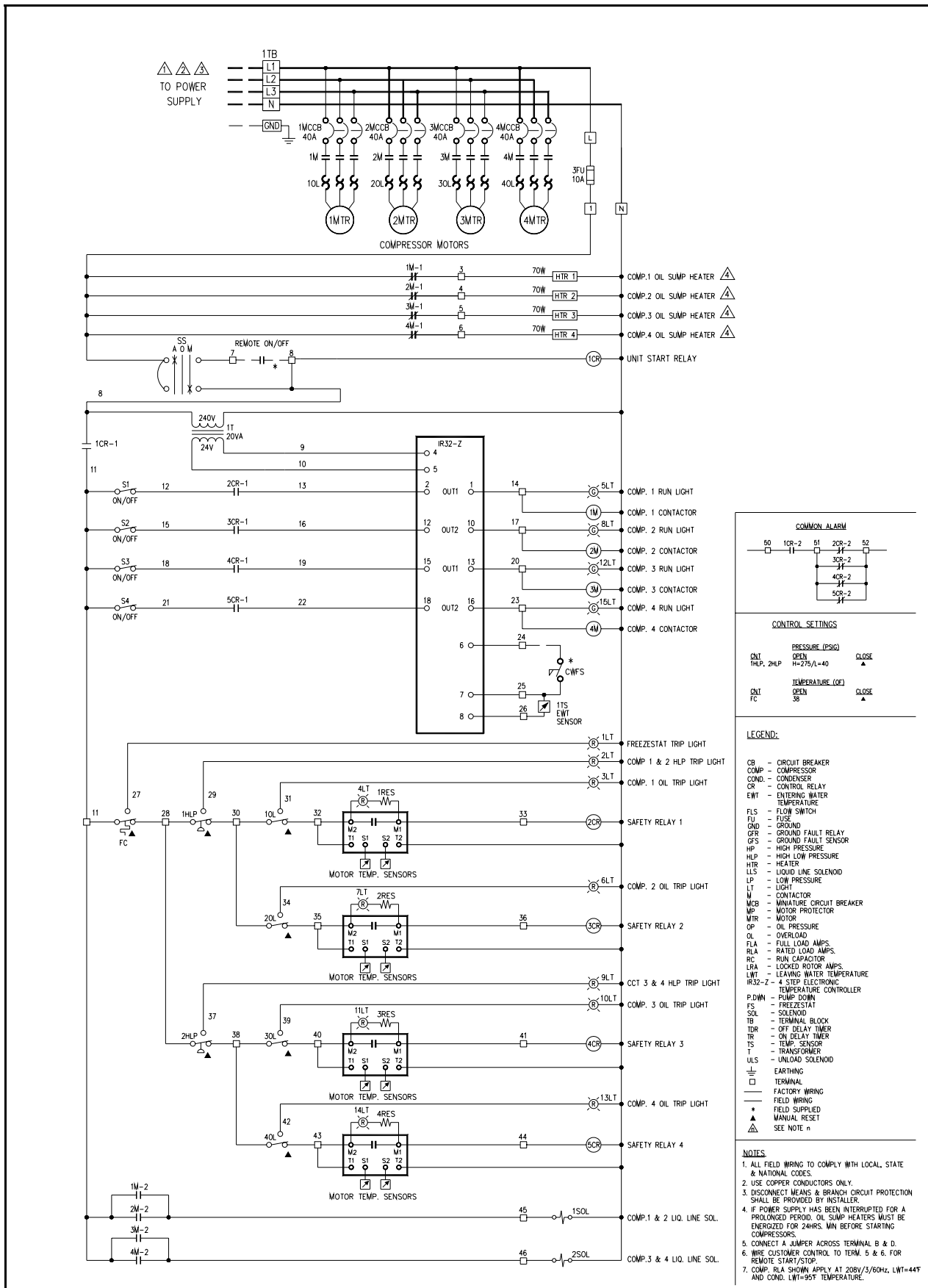


Note: All dimensions are in inches[mm].



# TYPICAL WIRING DIAGRAM

## 2 TANDEM COMPRESSOR





#### **Malaysia**

Lot 5755-6, Kidamai Industrial Park,  
Bukit Angkat,  
43000 Kajang,  
Selangor Darul Ehsan,  
Malaysia

Tel: 603-8924 9000  
Fax: 603-8739 5020

#### **China**

No. 1 Dunham-Bush Road,  
Laishan District,  
Yantai,  
Shandong Province,  
China 264003

Tel: 86-535-658 8999  
Fax: 86-535-658 1999

#### **Europe**

##### **United Kingdom**

8 Downley Road,  
Havant, Hampshire,  
England PO9 2JD

Tel: 44-23-9247 7700  
Fax: 44-23-9245 0396

#### **Middle East & North Africa**

##### **United Arab Emirates**

Al Murad Tower, Office 506  
Al-Barsha 1,  
P. O. Box #30922,  
Dubai, UAE

Tel: 971-4-451 9899  
Fax: 971-4-451 9881

#### **Asia**

##### **Singapore**

2, Kallang Pudding Road #07-07,  
Mactech Industrial Building,  
Singapore 349307

Tel: 65-6842 2012  
Fax: 65-6842 2013

#### **Africa**

##### **South Africa**

No. 57 Sovereign Drive  
Route 21 Corporate Park  
Irene, Pretoria  
South Africa

Tel: 27-12-345 4202  
Fax: 27-12-345 4203



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info@dunham-bush.com  
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