COMMERCIAL CONDENSING UNITS
INSTALLATION MANUAL

V3

V3 FUSION & FUSION SCROLL
Commercial Condensing Units

Medium & Low Temperature Applications

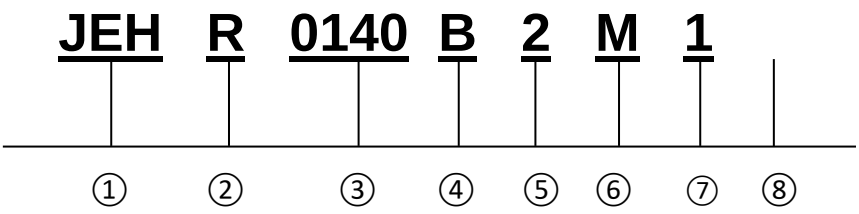
ISSUE: 01.07.2020

CE

J&E Hall International

Contents

Nomenclature



①	J & E Hall International	⑤	Unit Series
②	R: Reciprocating S: Scroll	⑥	M: Medium Temperature L: Low Temperature
③	Approximate HP (0140 = 1.4hp)	⑦	Power Supply: 1: 230V / 1Ph / 50Hz 3: 400V / 3Ph / 50Hz
④	Unit Generation	⑧	EVI: Vapour Injection Unit

Specifications

	Unit Model	Series	COP / (SEPR)						Compressor			Oil Sep. Charge	Oil Type	Electrical Data					Coil Volume	Liquid Receiver	Airflow	Connections		Dimensions		Unit Dry Weight	SPL @ 10m [d]
														Compressor			Fan Motors										
			R134a	R407A	R407F	R448A	R449A	R452A	Type	Swept Volume	Oil Charge			NC [a]	MCC [b]	LRC [c]	No.	FLC				Liquid	Suction	Unit (W x D x H)	Mounting (W x D)		
										(m³/h)	(Litres)	(Litres)		(A)	(A)	(A)		(A)	(Litres)	(Litres)	(m³/h)	(inch)	(inch)	(mm)	(mm)	(kgs)	dB(A)
Medium Temperature	JEHR-0050-B1-M-1	1	n/c	1.59	1.77	1.66	1.66	1.67	AE4460Z-FZ1C	1.80	0.28	-	A	3.4	5.9	19.4	1	0.2	0.44	2.4	1250	1/4	3/8	876 x 430 x 606	545 x 400	49	28
	JEHR-0067-B1-M-1		n/c	1.62	1.76	1.64	1.64	1.67	CAJ9480Z	2.64	0.48	-		3.1	6.7	24.1	1	0.2	0.44	2.4	1250	3/8	1/2			56	28
	JEHR-0100-B1-M-1		n/c	1.66	1.77	1.64	1.64	1.68	CAJ9510Z	3.18	0.48	-		3.9	8.4	29.5	1	0.2	0.44	2.4	1250	3/8	1/2			57	28
	JEHR-0113-B1-M-1		n/c	1.78	1.85	1.71	1.71	1.73	CAJ9513Z	4.21	0.48	-		4.9	11.3	33.5	1	0.2	0.44	2.4	1250	3/8	1/2			58	28
	JEHR-0140-B2-M-1	2	n/c	1.74	1.93	2.09	2.09	1.92	CAJ4517Z	4.52	0.48	-		5.3	12.7	38.5	1	0.6	0.51	4.5	2700	3/8	1/2	1101 x 444 x 662	703 x 408	67	34
	JEHR-0140-B2-M-3		n/c	1.66	1.85	2.00	2.00	1.83	TAJ4517Z	4.52	0.48	-		2.3	4.0	18.0	1	0.6	0.51	4.5	2700	3/8	1/2			67	34
	JEHR-0150-B2-M-1		1.61	1.80	1.80	1.97	1.97	1.93	MTZ18-5VM	5.26	0.95	-	B	6.5	10.0	40.0	1	0.6	0.51	4.5	2700	3/8	5/8			68	37
	JEHR-0150-B2-M-3		1.77	1.86	1.86	1.95	1.95	1.87	MTZ18-4VM	5.26	0.95	-		2.6	5.0	20.0	1	0.6	0.51	4.5	2700	3/8	5/8			68	37
	JEHS-0200-B2-M-1	2	1.92	2.18	1.92	2.02	2.02	n/c	ZB15KQE-PFJ	5.90	1.30	-	C	7.3	18.5	58.0	1	0.6	0.51	4.5	2700	3/8	3/4	1101 x 444 x 662	703 x 408	70	33
	JEHS-0200-B2-M-3		2.19	2.12	1.88	2.02	2.02	n/c	ZB15KQE-TFD	5.90	1.30	-		2.9	7.0	26.0	1	0.6	0.51	4.5	2700	3/8	3/4			70	33
	JEHS-0250-B2-M-1		n/a	2.06	1.83	1.93	1.93	n/c	ZB19KQE-PFJ	6.80	1.30	-		9.3	20.5	61.0	1	0.6	0.51	4.5	2700	3/8	3/4			72	34
	JEHS-0250-B2-M-3		n/a	1.99	1.83	1.93	1.93	n/c	ZB19KQE-TFD	6.80	1.30	-		4.2	7.0	32.0	1	0.6	0.51	4.5	2700	3/8	3/4			72	34
	JEHS-0300-B2-M-1		n/a	n/a	1.74	1.85	1.85	n/c	ZB21KQE-PFJ	8.60	1.45	-		12.2	21.5	82.0	1	0.6	0.51	4.5	2700	3/8	3/4			74	36
	JEHS-0300-B2-M-3		n/a	1.92	1.69	1.85	1.85	n/c	ZB21KQE-TFD	8.60	1.45	-		4.4	10.3	40.0	1	0.6	0.51	4.5	2700	3/8	3/4			74	36
	JEHS-0350-B2-M-1		1.86	n/a	n/a	(2.72)	(2.72)	n/c	ZB26KQE-PFJ	9.90	1.50	-		14.8	25.0	97.0	1	0.6	0.51	4.5	2700	3/8	3/4			74	39
	JEHS-0350-B2-M-3		2.08	n/a	n/a	(2.72)	(2.72)	n/c	ZB26KQE-TFD	9.90	1.50	-		5.8	9.0	46.0	1	0.6	0.51	4.5	2700	3/8	3/4			74	39
	JEHS-0350-B3-M-1	3	2.13	(3.43)	(3.16)	(3.02)	(3.02)	n/c	ZB26KQE-PFJ	9.90	1.50	-		13.9	25.0	97.0	1	0.9	4.42	7.6	4250	1/2	3/4	1353 x 575 x 872	945 x 500	112	37
	JEHS-0350-B3-M-3		2.36	(3.48)	(3.22)	(3.02)	(3.02)	n/c	ZB26KQE-TFD	9.90	1.50	-		5.9	9.0	46.0	1	0.9	4.42	7.6	4250	1/2	3/4			112	37
	JEHS-0400-B3-M-1		n/a	(3.61)	(3.54)	(3.13)	(3.13)	n/c	ZB29KQE-PFJ	11.40	1.36	-		16.1	28.0	114.0	1	0.9	4.42	7.6	4250	1/2	7/8			119	37
	JEHS-0400-B3-M-3		2.36	(3.79)	(3.49)	(3.13)	(3.13)	n/c	ZB29KQE-TFD	11.40	1.36	-		7.3	11.0	50.0	1	0.9	4.42	7.6	4250	1/2	7/8			119	37
	JEHS-0500-B3-M-3		n/a	(3.21)	(3.07)	(2.97)	(2.97)	n/c	ZB38KQE-TFD	14.40	2.07	-		8.2	13.5	65.5	1	0.9	4.42	7.6	4250	1/2	7/8			123	38
	JEHS-0600-B3-M-3		n/a	(3.19)	(3.12)	(3.22)	(3.22)	n/c	ZB45KQE-TFD	17.10	1.89	-		8.7	14.2	74.0	1	0.9	6.89	7.6	4100	1/2	1 1/8			125	40
	JEHS-0680-B3-M-3		n/a	(2.96)	n/a	(2.96)	(2.96)	n/c	ZB48KQE-TFD	18.80	1.80	-		11.4	19.1	101.0	1	0.9	6.89	7.6	4100	1/2	1 1/8			126	40
	JEHS-0800-B4-M-3	4	(3.10)	(3.12)	(2.95)	(2.88)	(2.88)	n/c	ZB57KCE-TFD	21.40	1.89	-		9.6	21.3	102.0	2	1.8	8.73	13.6	8500	3/4	1 1/8	1348 x 612 x 1727	940 x 560	204	43
	JEHS-1000-B4-M-3		(3.37)	n/a	n/a	(2.83)	(2.83)	n/c	ZB76KCE-TFD	29.10	3.20	-		14.4	28.0	118.0	2	1.8	8.73	13.6	8500	3/4	1 3/8			226	43
	JEHS-1300-B4-M-3		(3.09)	n/a	n/a	(2.97)	(2.97)	n/c	ZB95K5E-TFD	36.40	3.37	0.60		20.2	34.0	140.0	2	1.8	12.84	13.6	8200	3/4	1 3/8			238	46
	JEHS-1500-B6-M-3	6	(2.96)	n/a	n/a	(2.94)	(2.94)	n/c	ZB114K5E-TFD	43.40	3.37	0.60		24.0	38.0	174.0	2	3.4	19.00	18.0	11340	3/4	1 3/8	1735 x 854 x 1727	1240 x 808	332	48
Low Temperature	JEHR-0115-B1-L-1	1	n/c	n/c	n/c	n/a	n/a	1.05	CAJ2446Z	4.55	0.48	-	A	2.8	8.2	30.0	1	0.2	0.44	2.4	1250	3/8	1/2	876 x 430 x 606	545 x 400	59	27
	JEHR-0135-B1-L-1		n/c	n/c	n/c	n/a	n/a	0.98	CAJ2464Z	6.00	0.48	-		4.6	10.0	40.0	1	0.2	0.44	2.4	1250	3/8	1/2			61	27
	JEHR-0175-B2-L-1	2	n/c	n/c	n/c	n/c	n/c	1.07	NTZ048-5VM (B)	8.40	0.95	0.50	D	4.5	11.0	37.0	1	0.6	0.51	4.5	2700	3/8	5/8	1101 x 444 x 662	703 x 408	73	37
	JEHR-0175-B2-L-3		n/c	n/c	n/c	n/c	n/c	1.12	NTZ048-4VM (B)	8.40	0.95	0.50		2.1	4.8	16.0	1	0.6	0.51	4.5	2700	3/8	5/8			72	37
	JEHR-0225-B2-L-1		n/c	n/c	n/c	n/c	n/c	0.98	NTZ068-5VM (B)	11.80	0.95	0.50		9.2	17.0	53.0	1	0.6	0.51	4.5	2700	3/8	5/8			75	40
	JEHR-0225-B2-L-3		n/c	n/c	n/c	n/c	n/c	1.12	NTZ068-4VM (B)	11.80	0.95	0.5		3.5	8.4	25.0	1	0.6	0.51	4.5	2700	3/8	5/8			74	40
	JEHS-0300-B2-L-3	2	n/c	n/a	n/a	0.97	0.97	n/c	ZF09KQE-TFD	8.00	1.50	0.50	C	3.8	6.5	40.0	1	0.6	0.51	4.5	2700	3/8	3/4	1101 x 444 x 662	703 x 408	78	33
	JEHS-0400-B3-L-3	3	n/c	(1.67)	(1.65)	(1.67)	(1.67)	n/c	ZF13KQE-TFD	11.80	1.90	0.60		4.9	10.0	51.5	1	0.9	4.42	7.6	4250	1/2	7/8	1353 x 575 x 872	945 x 500	132	37
	JEHS-0500-B3-L-3		n/c	(1.67)	(1.64)	n/a	n/a	n/c	ZF15KQE-TFD	14.50	1.90	0.60		6.7	12.0	64.0	1	0.9	4.42	7.6	4250	1/2	7/8			132	39
	JEHS-0600-B3-L-3		n/c	(1.64)	n/a	-1.64	(1.64)	n/c	ZF18KQE-TFD	17.10	1.90	0.60		7.6	12.5	74.0	1	0.9	4.42	7.6	4250	1/2	7/8			133	41
	JEHS-0750-B4-L-3	4	n/c	n/a	n/a	(1.64)	(1.64)	n/c	ZF25K5E-TFD	21.40	1.90	0.60		6.9	16.6	102.0	2	1.2	4.14	13.6	5750	1/2	1 1/8	1348 x 612 x 1727	940 x 560	203	41
	JEHS-0950-B4-L-3 EVI		n/c	(1.76)	(1.63)	(1.76)	(1.76)	n/c	ZF18KVE-TFD	17.10	1.90	0.60		7.3	13.0	74.0	2	1.2	8.73	13.6	5870	1/2	7/8			200	37
	JEHS-1150-B4-L-3 EVI		n/c	(1.68)	(1.78)	(1.71)	(1.71)	n/c	ZFI36KQE-TFD	21.40	1.90	0.60		8.9	20.5	102.0	2	1.8	8.73	13.6	8500	1/2	1 1/8			211	42

Oil Type A = Uniqema Emkarate RL32CF / **Oil Type B** = Maneurop Ester 160PZ / **Oil Type C** = Polyolester Oil - (Copeland Ultra 22 CC, Copeland Ultra 32 CC, Copeland Ultra 32-3MAF, Mobil EAL Arctic 22CC, Uniqema Emkarate RL32CF)

Oil Type D = Maneurop Ester 175PZ (New 'B' range NTZ compressors)

COP/SEPR according to Ecodesign conditions. n/c = not compatible with this refrigerant n/a = compatible with this refrigerant but no data available at Ecodesign condition or does not meet Ecodesign requirement

[a] NC = Nominal Current @ condition -10°Cte / +32°Cta MT and -35°Cte / +32°Cta LT with R448A refrigerant

[b] MCC = Maximum Continuous Current

[c] LRC = Locked Rotor Current

[d] Sound Pressure Level measured in an anechoic room (-10/+32°C) MT & (-25/+32°C) LT conditions. Alternative conditions may produce different results

Health and Safety

Important Note:

Only qualified personnel, who are familiar with refrigeration systems and components including all controls, should perform the installation and start-up of the system. To avoid potential injury, use care when working around coil surfaces or sharp edges of metal cabinets. All piping and electrical wiring should be installed in accordance with all applicable codes, ordinances and local by-laws.

Before Installation

- Ensure the units received are the correct models for the intended application.
- Ensure the refrigerant, voltage and MWP are all suitable for the proposed application.
- Check there is no damage to the units. Any damage should be advised to the supplier immediately.
- Check that the proposed equipment locations are suitable and provide adequate support for the weight of the units.

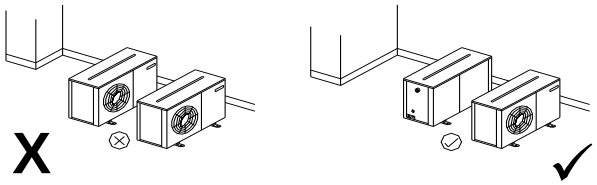
During Installation and subsequent maintenance

- Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.
- If lifting equipment is required, ensure that it is suitable for purpose, certificated and that the operatives are qualified to use it.
- Safe working methods are identified and operatives have suitable Personal Protective Equipment (PPE).
- Ensure the working area has adequate ventilation during brazing procedures.
- The units contain moving machinery and electrical power hazards, which may cause severe injury or death. Disconnect and shut off power before installation or service of the equipment.
- Refrigerant release into the atmosphere is illegal. Proper evacuation, recovery, handling and leak testing procedures must be observed at all times.
- Units must be earthed and no maintenance work should be attempted prior to disconnecting the electrical supply.
- The electrical covers and fan guards must remain fitted at all times.
- Use of the units outside of the design conditions and the application for which the units were intended may be unsafe and be detrimental to the units, regardless of short or long-term operation.
- The units are not designed to withstand loads or stresses from other equipment or personnel. Such extraneous loads or stress may cause failure/leak/injury.

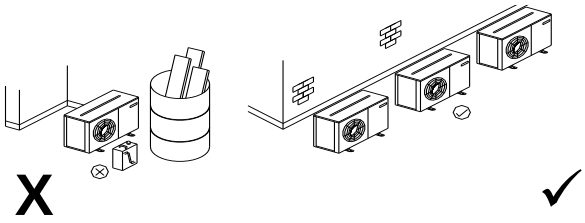
Installation

Unit location

- In order to achieve maximum cooling capacity, the installation location for the condensing unit should be carefully selected.
- Install the condensing unit in such a way so that hot air ejected by the condensing unit cannot be drawn in again (short circuit of hot discharge air). Allow sufficient space for maintenance around the unit.



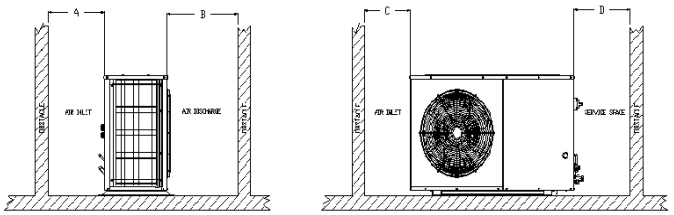
- Ensure that there is no obstruction to air flow into or out of the unit. Remove obstacles which block air intake or discharge.



- The location must be well ventilated, so the unit can draw in and distribute plenty of air thus lowering the condensing temperature.
- To optimize the unit running conditions, the condenser coil must be cleaned at regular intervals.
- The unit must be level in all directions.

Installation clearances

- The installation location should allow sufficient space for air flow and maintenance around the unit.



ALL MODELS	A	B	C	D
Minimum Distance	300 mm	1000 mm	300 mm	500 mm

Installation

Field piping

Important Note:

Pipe sizing should only be determined by qualified personnel. All local codes of practice must be observed in the installation of refrigerant piping.

To ensure satisfactory operation and performance, the following points should be noted for field piping arrangements:

- Pipework routes must be as simple and as short as possible.
- Avoid low points on pipework where oil can accumulate.
- Suction gas velocity must be sufficient to ensure good oil return.
- Use only clean, dehydrated refrigeration grade copper tube with long radius bends.
- Avoid flare type connections and take great care when brazing. Use only silver alloy rods.
- Run braze without over filling to ensure there is no leakage into the tube.
- To prevent oxidation, blow oxygen free nitrogen through pipework when brazing.
- Install insulation on all suction lines and on all pipes penetrating walls or passing through hot areas.
- Adequately support all pipe work at a maximum of 2 metre intervals.
- Where the condensing unit is situated below the indoor unit (coldroom evaporator / display case), the height difference between the two units should be no more than 6 metres.
- In vertical pipework, the use of U-trap and double suction risers is often required. These suction risers must always be fitted with a U-trap at the bottom and a P-trap at the top and never be higher than 4m unless a second U-trap system is fitted.
- Additional oil may be required if piping length exceeds 20m or multiple oil traps are fitted. Check the oil level closely during commissioning and add oil as necessary. Add oil in small amounts. Do not overfill the compressor!
- When installing a single compressor condensing unit with multiple evaporators connected which operate independently, care should be taken to ensure that the evaporating pressure/temperature does not fall outside the compressor operating limit at minimum load. If there is a potential for this scenario, consider multiple evaporators fed by a single solenoid valve or separate condensing units.
- Suction pipework should slope gently back towards the unit to assist oil return to the compressor. A fall of approximately 2cm per metre of pipework is acceptable.
- Liquid lines should be sized to ensure a full supply of liquid refrigerant to the expansion device. Careful attention should be paid to sizing of liquid lines on large risers (maximum 6m).
- In some circumstances, a suction accumulator (not supplied) may be required. It offers protection against refrigerant flood back during operation and also against off-cycle migration by adding internal free volume to the low side of the system.
- Tests must be conducted to ensure the amount of off-cycle migration to the compressor does not exceed the compressor's charge limit.
- Wherever possible the system should be installed to utilize a pump down configuration.
- An MOP expansion valve is recommended for all Low Temperature installations.
- Maximum recommended pipe length is 25m for Reciprocating units and 50m for Scroll units.

Correct line sizing will minimize the pressure drop and maintain sufficient gas velocity for proper oil return.

Important Note:

One of the main factors affecting equipment reliability and compressor service life is refrigeration circuit contamination. During installation, circuit contamination can be caused by:

- Brazing & Welding Oxides
- Filings & Particles from de-burring pipework
- Brazing Flux
- Moisture & Air

Pipe size selection (For EVI units only)

Sizing of liquid and suction lines for EVI model will be different from standard scroll models. Piping sizes of this model need to follow the recommended correction coefficient of cooling capacity. This is vital as if the pipework selected is oversized, especially for the suction pipe, the gas velocity will be decreased at low mass flow rate / low evaporating temperature, causing oil return problems. Undersized suction lines will also cause decreased capacity due to increased pressure drop.

The correction factor of refrigerant R407A is shown as below table:

Ta \ Te	(Watts)	-40	-35	-30	-25	-20
27	CF	0.73	0.73	0.73	0.73	0.73
32	CF	0.68	0.69	0.69	0.70	0.70
35	CF	0.65	0.66	0.67	0.67	0.68
38	CF	0.62	0.63	0.64	0.65	0.66
43	CF	0.57	0.58	0.60	0.61	0.63

For instance,

At condition of Te -35°C, Ta +32°C
Refrigerant R407A
Published cooling capacity = 4.88kW.

Cooling capacity = Correction factor x Published cooling capacity
= 0.69 x 4.88 kW
= **3.367kW**

Therefore, the pipe sizes should be selected against the **corrected** capacity of 3.37kW.

Installation

The correction factor of refrigerant R407F is shown as below table:

Ta \ Te	(Watts)	-40	-35	-30	-25	-20
27	CF	0.72	0.73	0.73	0.73	0.72
32	CF	0.68	0.68	0.69	0.69	0.69
35	CF	0.65	0.66	0.66	0.67	0.67
38	CF	0.62	0.63	0.64	0.65	0.65
43	CF	0.57	0.58	0.60	0.61	0.62

The correction factor of refrigerant R448A/R449A is shown as below table:

Ta \ Te	(Watts)	-40	-35	-30	-25	-20
27	CF	0.71	0.72	0.71	0.72	0.72
32	CF	0.67	0.68	0.68	0.68	0.69
35	CF	0.65	0.65	0.65	0.66	0.67
38	CF	0.62	0.63	0.63	0.64	0.65
43	CF	0.58	0.59	0.59	0.60	0.61

Insulation selection (For EVI units only)

The liquid pipe connecting CCU service valve to the evaporator must be well insulated with recommended wall thickness of minimum ¾''.

Expansion valve selection (For EVI units only)

The lower liquid temperature of the EVI units can increase evaporator expansion valve capacities**.** Selection of the expansion valve needs to be done based on the expected amount of sub-cooling shown in below tables:

(A.) **R407A**

Amount of Sub-cooling (K)					
Ta\Te	**-40**	**-35**	**-30**	**-25**	**-20**
27	33.1	32.8	32.4	32.1	31.8
32	38.0	37.0	35.9	34.9	33.8
35	41.0	39.5	38.0	36.5	35.0
38	43.9	42.0	40.1	38.1	36.2
43	48.9	46.2	43.5	40.9	38.2

(B.) **R407F**

Amount of Sub-cooling (K)					
Ta\Te	**-40**	**-35**	**-30**	**-25**	**-20**
27	33.8	33.5	33.1	32.8	32.5
32	38.8	37.8	36.7	35.7	34.6
35	41.9	40.4	38.8	37.3	35.8
38	44.9	42.9	41.0	38.9	37.0
43	50.0	47.2	44.5	41.8	39.0

(C.) **R448A/R449A**

Amount of Sub-cooling (K)					
Ta\Te	**-40**	**-35**	**-30**	**-25**	**-20**
27	33.1	32.8	32.4	32.1	31.8
32	37.9	36.9	35.8	34.8	33.8
35	40.9	39.4	37.9	36.4	34.9
38	43.8	41.9	40.0	38.0	36.1
43	48.8	46.1	43.4	40.8	38.1

Pressure testing

The condensing units are pressure tested in the factory prior to dispatch. All units come with a holding charge of oxygen free nitrogen. Remove the holding charge indication tag which is tied to service valve before installation.

Once the pipework installation is complete, it should be pressure tested prior to evacuation to test for leaks.
A pressure leak test should be carried out using oxygen free nitrogen (OFN). NEVER USE OXYGEN FOR PRESSURE TESTING SYSTEMS. A calibrated nitrogen pressure regulator must always be used. Before starting any pressure testing, ensure the area surrounding the system is safe, inform relevant personnel and fit warning signs indicating high pressure testing. Also, use correct PPE as required.

Always pressurize the system slowly, preferably in stages up to the maximum required pressure. Maximum test pressures applicable to the unit are as follows:

Test pressure	
High side	**Low side**
28 barG (405 psiG)	**19 barG (275 psiG)**

Listen for any possible leaks and check all joints with bubble spray. If any leaks are discovered, release pressure slowly from system until empty, repair leak and then restart pressure testing procedure. Never attempt to repair a leak on a pressurized system. A strength test should also be incorporated (to installed pipework only) according to local regulations.
Once testing has been completed satisfactorily, release the pressure from the system gradually and safely to external atmosphere.

Installation

Evacuation & Charging

Important Note:

Moisture prevents proper functioning of the compressor and the refrigeration system. Ensure that a good quality vacuum pump is used to pull a minimum vacuum of 250 microns (0.25 torr).

Once pressure testing has been completed, the system can now be evacuated to remove air and any moisture from the piping. This can be done as follows:

- Ensure any nitrogen charge is safely released from the system.
- Connect a gauge manifold to the connections on the service valves on the condensing unit.
- Connect a vacuum pump and vacuum gauge to the system.
- Ensure all gauge manifold and service valves are open as required.
- Evacuate the system until vacuum is below 250 microns (0.25 torr).

Note: A triple evacuation procedure is recommended for all new systems or where moisture is suspected

Once the system is isolated and the vacuum pump is switched off, any rise in pressure indicates that either there may be a leak in the system or moisture is still present. In this case, recheck the system for leaks, repair as necessary, and then restart the evacuation procedure. Once completed satisfactorily, the vacuum pump and vacuum gauge can be removed.

At this point, the refrigerant charge can be added to the system as required. Refrigerants must be charged in the liquid phase. **Charging of liquid into the suction side of the system should ONLY be done with a metering device.** Use calibrated weighing scales to record the amount of refrigerant added to the system.

Electrical

Important Note:

The mains electrical supply to the condensing unit must be via a suitable motor rated circuit breaker or fuse. A mains isolator is fitted to all condensing units therefore an additional isolator is not required unless site conditions or regulations dictate differently.

J & E Hall Fusion condensing units require either a 230 volt / 1 phase / 50Hz supply or a 400 volt / 3 phase / 50Hz supply, both of which must include a Neutral and an Earth. These systems are not suitable for any other supply voltages (other than a deviation of +/- 10% of the above values) and are not suitable for 60Hz supplies.

When utilizing a three phase supply, ensure that the compressor motor rotates in the correct direction (Fusion Scroll models only). Please see note on page 8.

Mains cable type and sizing must be selected for the particular application and the electrical installation should conform to the current local standards.

- Cables to the condensing unit should wherever possible be routed through the cable glands supplied on the rear of the units.
- Connect the mains supply to the units as per the wiring diagrams on pages 13–20.

To gain access to the electrical box, turn the mains isolator switch on the end of the unit to the OFF position, remove the screws from the end cover panel and remove panel. The electrical box is located behind the panel. Remove the screws in the electrical box cover to access components.

Important Note:

There must be no more than 10 compressor starts per hour. A higher number reduces the service life of the compressor. There is no minimum off time for scroll compressors, as they start unloaded. However, consideration should be given to ensuring an adequate minimum run time to ensure proper oil return. A minimum runtime of 3 minutes after each compressor start and a minimum idle time of 3 minutes after each stop are recommended. Only during the pump down cycle may the compressor run for shorter intervals.

Commissioning

Pre startup checks

Before starting the condensing unit, the following checks should be carried out as a minimum:

- Check electrical supply is correct and all connections are sound.
- All moving parts are free and guards fitted.
- Compressor oil level satisfactory.
- Initial settings for safety switches and fan speed control.
- Overload set correctly.
- All valves in correct operating position.
- Initial refrigerant charge.
- Crankcase heater energized for a minimum of 12 hours before compressor start-up.
- Gauge manifold connected to both low and high sides of system.

Running the unit

- Run the unit and check compressor and condenser fan operation.
- Check system pressures and temperatures, gas charge and running currents of motors to ensure correct operation.

Commissioning

- Check compressor suction superheat. This should be between 10K and 20K at normal operating conditions.
- Final adjustment of safety switch settings and fan speed control.
- Allow the system to run for 3 – 4 hours. Check compressor oil level and top up with the correct oil type as required (see page 3). Recheck the compressor oil level again after 24 hours operation.
- Carry out final leak test and ensure all panels/covers are fitted and screws tightened.
- Log all information along with the system model and serial numbers for future reference.
- Ensure that the customer / responsible person are provided with basic operating instructions and where electrical isolators are situated in case of emergency.

Compressor operation

Scroll compressor motors are designed to run only in one direction. This is not an issue with single phase compressors as they will always run in the correct direction. The correct rotation of a three phase compressor motor depends on the connection of the three incoming phases to the unit. Correct rotation can be determined by a drop in suction pressure and a rise in discharge pressure when the compressor is energized. Running the compressor for a short period of time in reverse direction will have no negative impact but prolonged running in reverse direction may cause premature failure. ***To reverse the rotation of a three phase scroll compressor, shut off the incoming power supply to the unit, swap connection of any two of the three incoming phases at the unit isolator, reapply power to the unit and following compressor restart, recheck operating pressures.***

Compressor rotalock connections

The rotalock connections as used on some compressor models are sealed with Loctite 554 thread sealant. The connections should be leak tested at commissioning and during service/maintenance visits. For further information including recommended torque tightening values, please refer to Service & Maintenance section on pages 21-22.

Vacuum operation

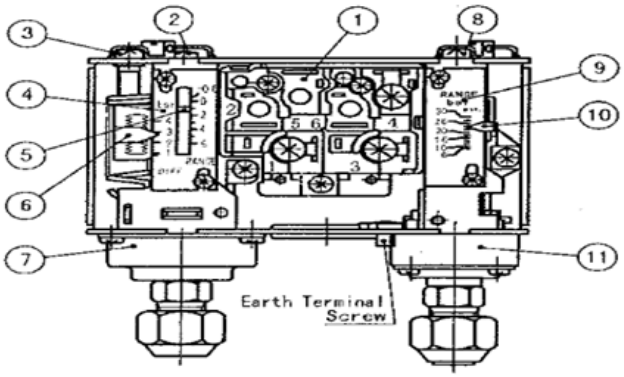
Do not operate scroll compressors in a vacuum condition, as this will cause the scrolls to overheat very quickly causing premature failure.

System charge

Ensure an adequate liquid charge has been introduced to the high side of the system before starting to ensure a minimum operating pressure on the suction side of 0.5 bar is maintained, otherwise overheating of the scrolls and subsequent damage may occur.

Dual Pressure Switch

The pressure switches fitted to condensing units with auto reset for low pressure and manual reset for high pressure are **NOT** factory preset.



Setting Procedure for Dual Pressure Switch

High Pressure side

Turning the adjusting screw (8) clockwise will increase the cut-out pressure setting. Turning the adjusting screw anti-clockwise will decrease the cut-out pressure setting. The differential setting is fixed so the cut-in will vary with the cut-out setting. Lock the spindle with locking plate after setting.

Low pressure side

Range: Turning the range adjusting screw (2) clockwise will decrease the cut-in pressure setting. Turning the range adjusting screw anti-clockwise will increase the cut-in pressure setting.

Differential: Turning the differential adjusting screw (3) clockwise will increase the differential pressure setting. Turning the differential adjusting screw anti-clockwise will decrease the differential pressure setting.
Lock the spindle with locking plate after setting.

Safety pressure switch settings

The Saginomiya dual pressure switch fitted to all JEH model condensing units with auto reset for low pressure and manual reset for high pressure is **NOT** factory preset. **BOTH THE LP AND HP SWITCH SETTINGS MUST BE ADJUSTED TO SUIT THE APPLICATION BEFORE STARTING THE UNIT.** Be sure that the high pressure setting does not exceed the receiver's maximum service pressure.

Commissioning

High pressure safety

The high pressure safety switch is required to stop the compressor should the discharge pressure exceed the values shown in the following table. The high pressure switch can be set to lower values depending on the application and ambient conditions.

Unit Series	Compressor	AE/CAJ/TAJ		
	Refrigerant	R407A/R407F/R448A/R449A/R452A		
S1/S2	Max. HP Set	27 bar		
Unit Series	Compressor	MTZ	NTZ	MTZ
	Refrigerant	R407A/R407F/R448A/R449A/R452A	R452A	R134a
S2	Max. HP Set	27 bar		18 bar
Unit Series	Compressor	ZB/ZF/ZFI		ZB
	Refrigerant	R407A/R407F/R448A/R449A		R134a
S2/S3/S4/S6	Max. HP Set	27 bar		18 bar

Low pressure safety

The low pressure safety switch protects the compressor against deep vacuum operation, a potential cause of failure due to internal arcing and also operation outside the compressor limits.

The low pressure safety cut out should never be set below the settings as shown in the following table. For systems without pump-down the LP switch signal contact shall be used to energize a low pressure safety alarm.

Compressor Model	AE/CAJ/TAJ	MTZ		ZB		CAJ	NTZ	ZF/ZFI
Unit Series	1 & 2	2		2 & 3 & 4 & 6		1&2		2 & 3 & 4
Refrigerant	R407A R407F R448A R449A R452A	R407A R407F R448A R449A R452A	R134a	R407A R407F R448A R449A	R134a	R448A R449A R452A	R452A	R407A R407F R448A R449A
Application	M*					L*		
Min. Cut Out (barG)	1.5	1	0.6	2	0.6	0.1		0.3
Min. Cut Out (psi)	22	15	9	30	9	2		5

Compressor operating pressures

Compressor operating pressures should be kept within the following limits:

Recommended compressor working pressure range

Compressor Model	AE/CAJ/TAJ	MTZ		ZB		CAJ	NTZ	ZF/ZFI
Unit Series	1 & 2	2		2 &3 & 4 & 6		1&2		2 & 3 & 4
Refrigerant	R407A R407F R448A R449A R452A	R407A R407F R448A R449A R452A	R134a	R407A R407F R448A R449A	R134a	R448A R449A R452A	R452A	R407A R407F R448A R449A
Application	M*					L*		
High Side (barG)	13.2 ~ 27.7	13.2 ~ 27.7	7.9 ~ 15.8	7.1 ~ 27.7	6.6 ~ 15.8	13.2 ~ 27.7		13.2 ~ 27.7
Low Side (barG)	1.5 ~ 8.3	1.0 ~ 7.2	0.6 ~ 4.7	2.0 ~ 7.1	0.6 ~ 3.8	0.1 ~ 3.3		0.1 ~ 3.3

M* Medium Temperature L* Low Temperature

XGE Fan Speed Controller (Series 2 & 3 & 4 & 6 Units)

The fan speed controller is factory set to 19 bar for operation with R4*** series refrigerant to ensure compressor always operates within envelope at all declared working condition. If operate with R134a, the fan speed controller setting need to be set to 13bar.

This can be adjusted to suit site conditions / application or alternative refrigerants. The XGE controls are set to stop fan at Pmin.

Recommended settings to gain higher energy efficiency as published in the Ecodesign data sheets are as follows:

Medium Temperature

Refrigerant	R407A/R407F/R448A/R449A/R452A		R134a
Setting	Series 2 - except JEHS-0350-B2-M-1/3	19	13
	Series 2 - JEHS-0350-B2-M-1/3 only	10	13
	Series 3	10	13
	Series 4	10	10
	Series 6	10	10

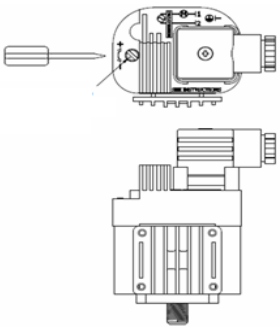
Low Temperature

Refrigerant	R407A/R407F/R448A/R449A/R452A	
Setting	JEHR Models- Series 2	19
	JEHS Models- Series 2 & 3 & 4 (except EVI)	10
	JEHS Models- EVI unit	17

Clockwise: Increase pressure set point
Anticlockwise: Decrease pressure set point

360 ^{0} = 1 turn

Approx. 1.5 barG



Fan control switch (Series 1 LT units only)

The high energy efficiency as shown in eco-design sheet can be obtained with the setting shown in below table.

For model in Series 1 LT:

Refrigerant	R448A R452A R449A
Setting (bar) Cut in	16*
Setting (bar)	7*

* default factory setting

Discharge Thermostat

Model JEHS-0750-B4-L-3, JEHS-1300-B4-M-3, JEHS-1500-B6-M-3 and all EVI units are mounted with discharge thermostat (cut off = 125^{o}C, cut in = 90^{o}C) to protect the compressor. For other unit models, it is recommended to install the discharge thermostat if operating in extreme condition (low evaporating and high ambient temperature).

Commissioning

Units with microchannel condenser coils

Care must be taken during charging a unit with refrigerant when a microchannel condenser coil is fitted. Because the microchannel coils hold less refrigerant than traditional fin/tube coils, it is easier to overcharge, especially if the system is commissioned during winter time when the ambient temperature is colder. If too much refrigerant is added, this may cause tripping of the high pressure switch in warmer weather. Always check that the amount of condenser sub cooling is not excessive which may indicate refrigerant overcharge.

System operation

Once the system is correctly charged with refrigerant and the operating condition is stable, check that the compressor suction superheat is between 10K and 20K and that the compressor discharge temperature is between 50°C and 90°C. A suction superheat that is too low may indicate liquid refrigerant return to the compressor, whereas a suction superheat that is too high will not provide enough cooling effect for the compressor and will also cause high discharge temperatures. In either case, it is likely that compressor damage/failure will occur.

For JEHS-1300-B4-M-3 and JEHS-1500-B6-M-3 Units Only

Phase Protection Module – MG73BF

The electrical control box of model JEHS-1300-B4-M-3 and JEHS-1500-B6-M-3 units are mounted with the phase protection module MG73BF to monitor the input power supply. The output relay of the phase protection module will be energize after the set operate time and will be de-energize during the following situation:

- Supply phase exceed over voltage or under voltage trip level setting
- Any supply phase failure
- Line interruption
- Phase reverse occur
- Neutral failure

The LED indication for each condition can be refer to table below:

LED (ON/OFF) / Condition	ON	UV	OV	BLINK: ASY, ON: REV
Power ON	ON	OFF	OFF	OFF
Phase reverse	ON	OFF	OFF	ON
Asymmetry	ON	OFF	OFF	BLINK
Under voltage	ON	ON	OFF	OFF
Over voltage	ON	OFF	ON	OFF
Phase Fail	BLINK	OFF	OFF	OFF
Phase Fail when I/P voltages lower than UV set point and below asymmetry	BLINK	ON	OFF	BLINK
Neutral Fail	ON	BLINK	BLINK	BLINK

For EVI Units Only:

Controller EXD-HP1

The controller EXD-HP1 used in the Series 4 EVI units operates as an economizer control. The setting of controller is preset by the factory and is password protected. Users are not allowed to change any settings in the controller.

Safety Instructions:

1. Read installation instruction carefully. Failure to comply can result in device failure, system damage or personal injury.
2. Only person having appropriate knowledge and skill are allowed to manipulate the controller.
3. Disconnect all voltages from system before installation.

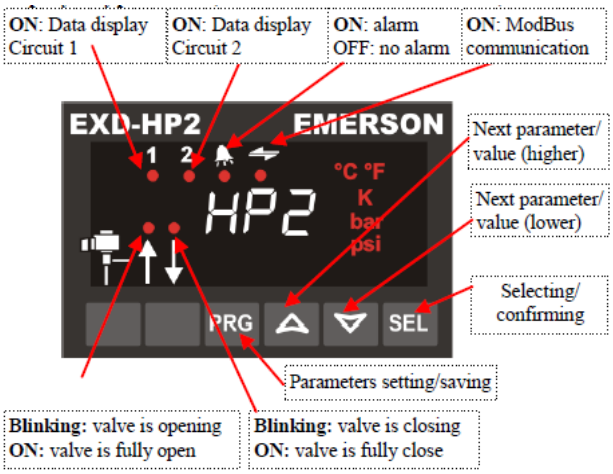
Electrical Installation

- Do not operate system before all cable connections are completed.
- Refer to wiring diagram for electrical connections.
- Class II category transformer is required for 24VAC power supply
- Do not connect any EXD-HP1 input to main voltage as it will permanently damage the controller.
- When connecting wires of expansion valve and pressure sensor, consider color coding as follow:

1.EXM : BR: BROWN; BL: BLUE, OR: ORANGE; YE: YELLOW; WH: WHITE

2.PT5 : BN: BROWN; WH: WHITE

Display/ keypad unit (LEDs and button functions)



Commissioning

- In standard mode the superheat is shown at the display. In case of liquid injection and economizer function this changes to discharge temperature.
- To display other data of EXD-HP1 press "SEL" button for 1 second until index number according to below table appears. Release "SEL" button and the next variable data will appears. By repeating the procedure variable data can be displayed in sequence as measured superheat (K) → Measured suction pressure (bar) → valve position (%) → Measured suction gas temperature (°C) → Calculated saturated temperature (°C) → Measured discharge temperature (°C) → REPEATING

Variable data	Controller EXD-HP1
Default Superheat, K	1 0
Suction pressure, bar	1 1
Valve position, %	1 2
Suction gas temperature, °C	1 3
Saturation temperature, °C	1 4
Discharge temperature, °C	1 5

Digital input Di1/Di2

- The digital input Di1 is the interface between controller EXD-HP1 and system controller if Modbus communication has not been used.
- The digital status is dependent to operation of system's compressor or demand.

Operating Condition	Digital input status
Compressor starts	Closed (Start)
Compressor stops	Open (Stop)

Manual mode operation

Warning: All alarms are disabled during manual control. We do not recommend unattended operation of system during manual control.

- Press PRG and ▼ together for 5 seconds to access to manual mode operation.
- List of parameters in scrolling sequence by pressing ▼ button

Code	*Parameter description and choices*	*Min*	*Max*	*Factory setting*	*Field setting*
1Ho	Manual mode operation; circuit 1 0 = disabled; 1 = Enabled	0	1	0	
1HP	Valve opening (%)	0	100	0	
2Ho	Manual mode operation; circuit 2 0 = disabled; 1 = Enabled	0	1	0	
2HP	Valve opening (%)	0	100	0	

Manual alarm reset clearing functional alarms (except hardware error)

- **Press PRG and SEL together for 5 seconds. When the clearing is done, "CL" message appears for 2 seconds.**

Commissioning

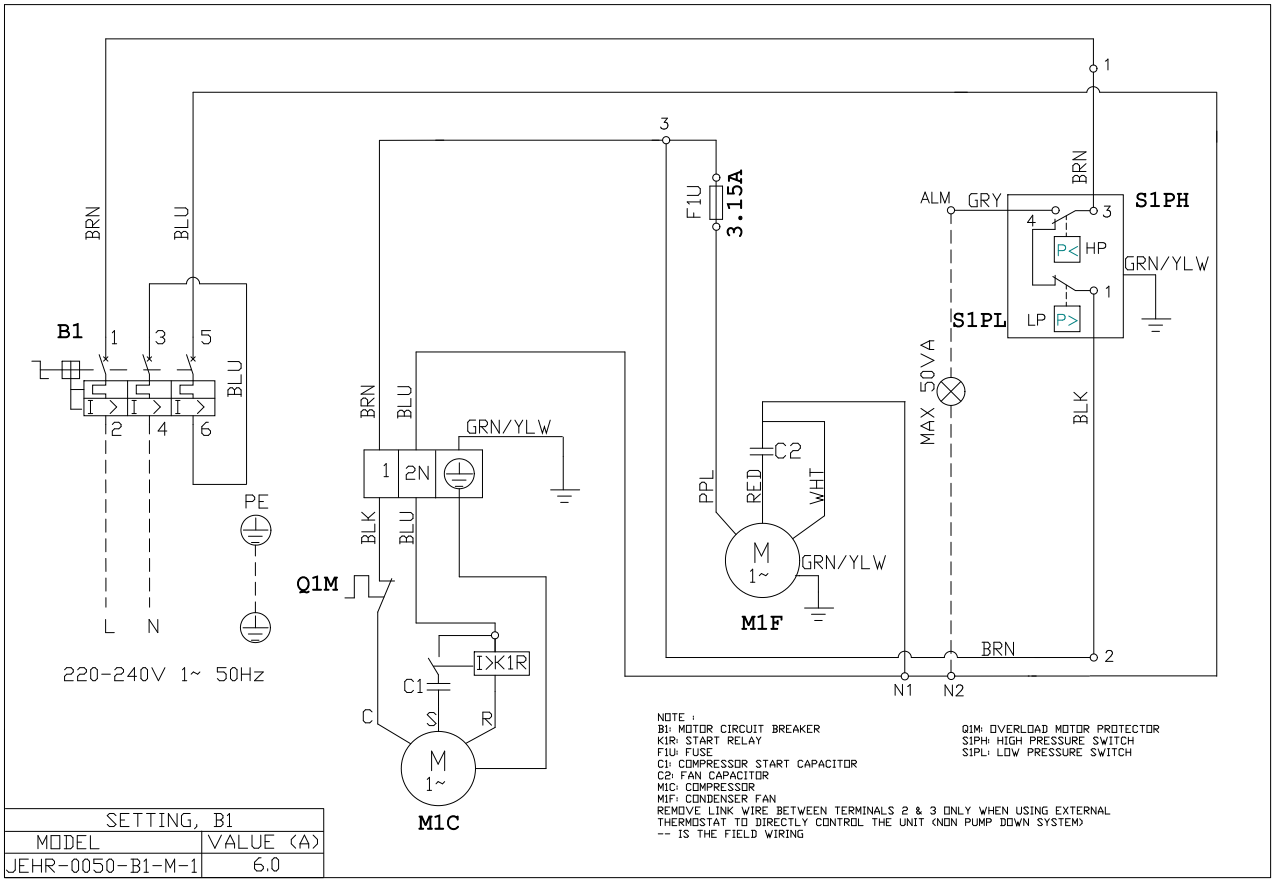
EXD – HP1 Error/ Alarm handling

Alarm code	Description	Related parameter	Valve	What to do?	Requires manual reset after resolving alarm
1E0/2E0	Pressure sensor 1/2 error	-	Fully close	Check wiring connection and measure the signal 4 to 20 mA	No
1E1/2E0	Temperature sensor 1/2 error	-	Fully close	Check wiring connection and measure the resistance of sensor	No
1Ed	Discharge hot gas temperature sensor 3 error	-	Operating	Check wiring connection and measure the resistance of sensor	No
1AII/2AII	EXM/EXL electrical connection error	-	-	Check wiring connection and measure the resistance of winding	No
1Ad	Discharge hot gas temperature above limit		Operating	Check valve opening/ check liquid flow for flash gas free/check discharge hot gas temperature sensor	No
AF	Freeze protection	1P4/2P4: 1	Fully close	Check the system for cause of low pressure such as insufficient load on evaporator	No
AF blinking		1P4/2P4: 2	Fully close		Yes
AL	Low superheat (<0.5K)	1uL/2uL: 1	Fully close	Check wiring connection and operation of valve	No
AL blinking		1uL/2uL: 2	Fully close		Yes
AH	High superheat	1uH/2uH: 1	Operating	Check the system	No
AP	Low pressure	1P9/2P9: 1	Operating	Check the system for cause of low pressure such as refrigerant loss	No
AP blinking		1P9/2P9: 2	Operating		Yes

Note: When multiple alarms occur, the highest priority alarm is displayed until being cleared. Then the next highest alarm is displayed until all alarms are cleared.
Only then will parameters will be shown again

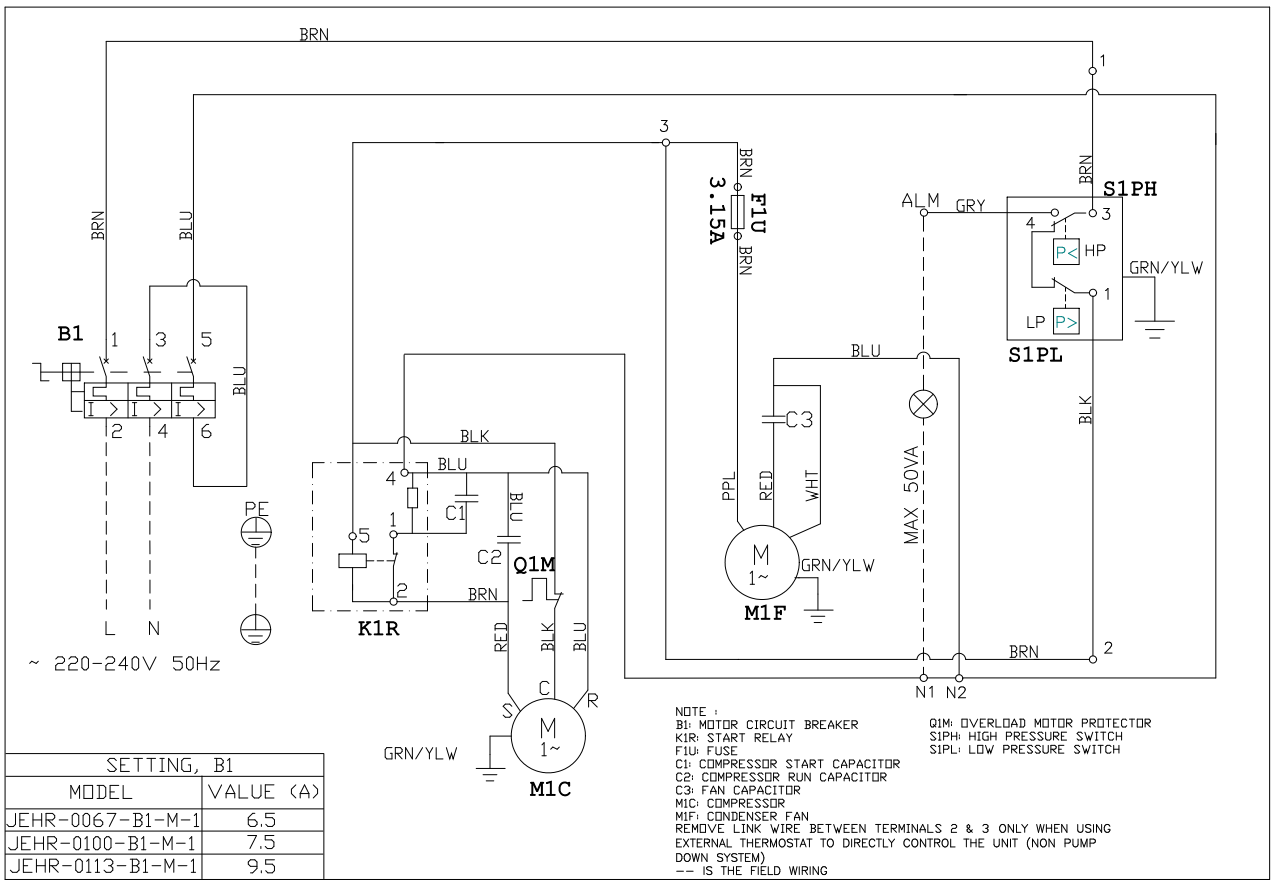
Wiring Diagrams

JEHR-0050-B1-M-1



SETTING, B1	
MODEL	VALUE (A)
JEHR-0050-B1-M-1	6.0

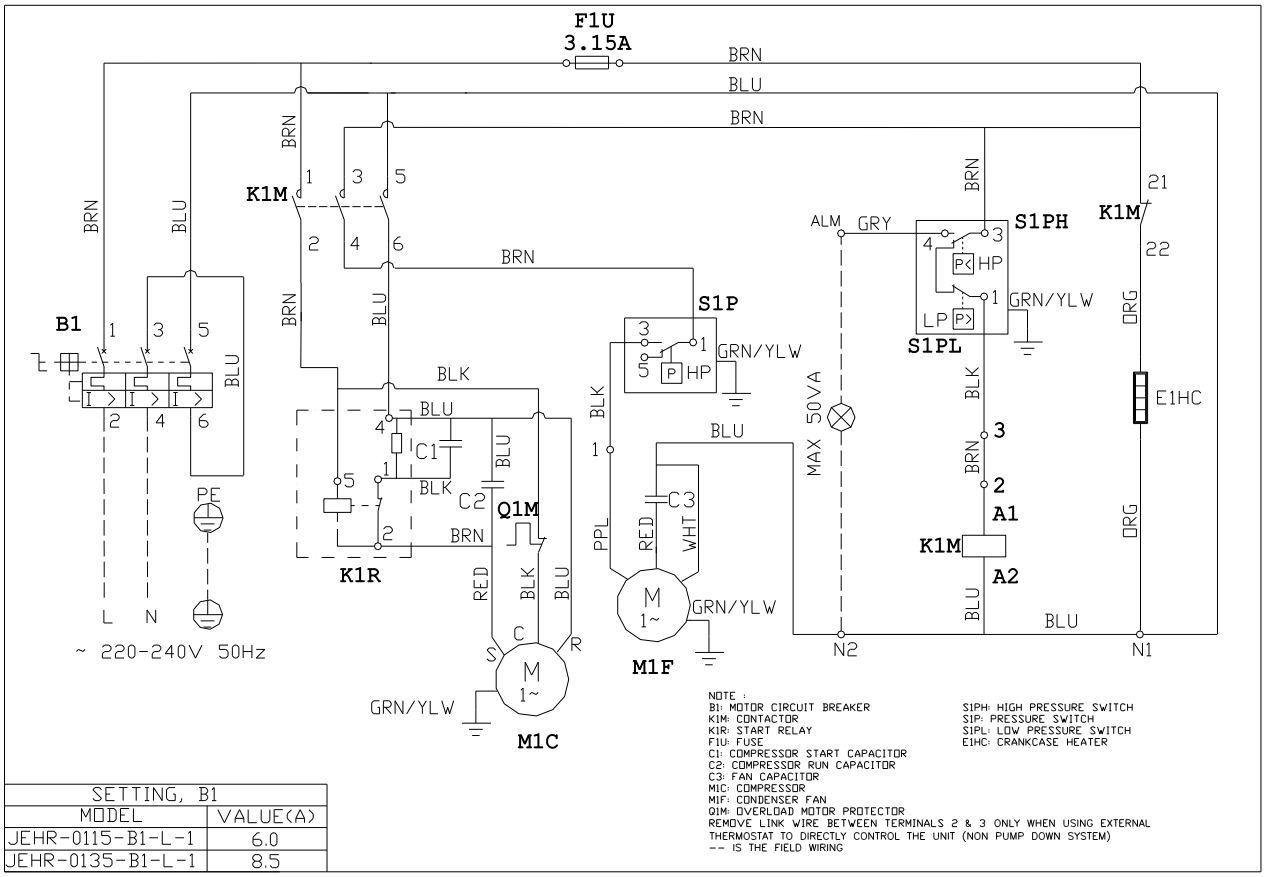
JEHR-0067-B1-M-1, JEHR-0100-B1-M-1, JEHR-0113-B1-M-1



SETTING, B1	
MODEL	VALUE (A)
JEHR-0067-B1-M-1	6.5
JEHR-0100-B1-M-1	7.5
JEHR-0113-B1-M-1	9.5

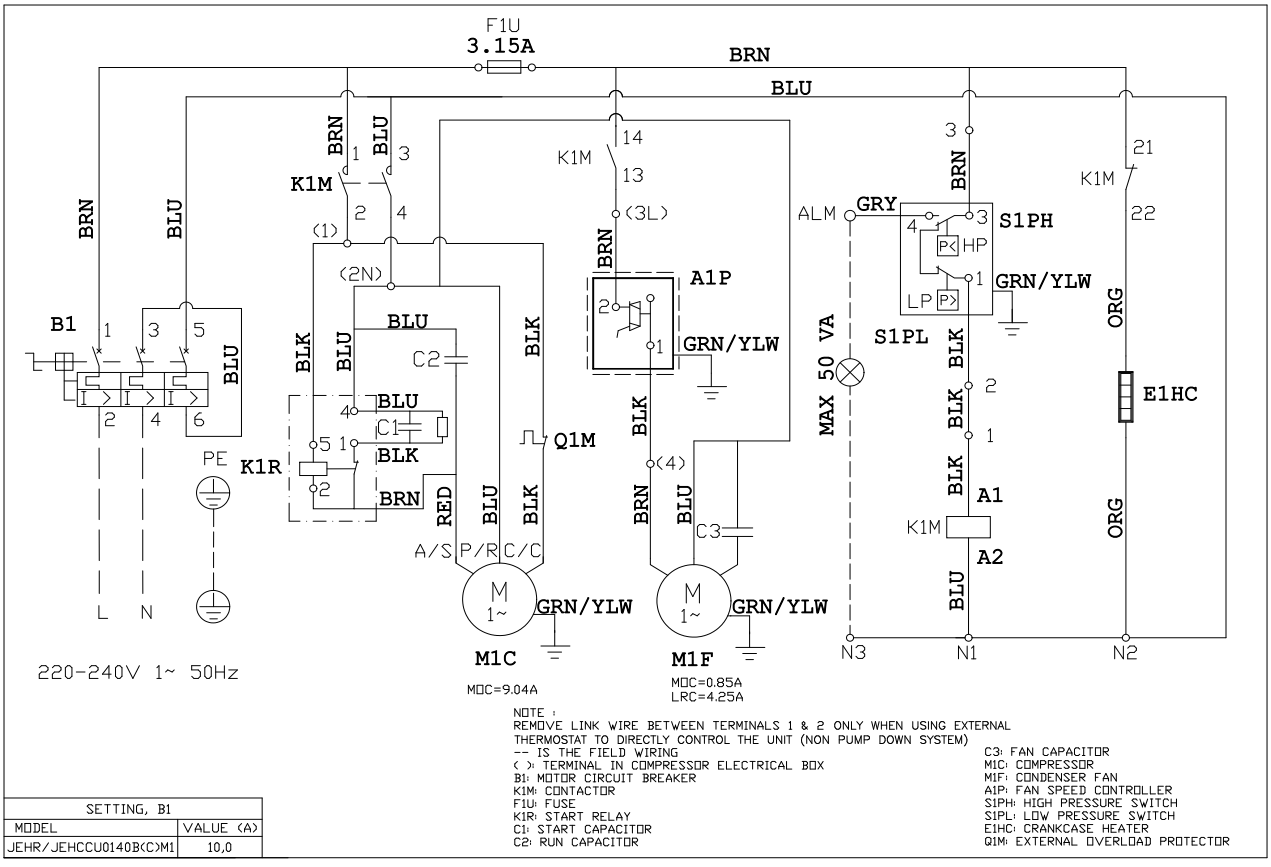
Wiring Diagrams

JEHR-0115-B1-L-1, JEHR-0135-B1-L-1



SETTING, B1	
MODEL	VALUE(A)
JEHR-0115-B1-L-1	6.0
JEHR-0135-B1-L-1	8.5

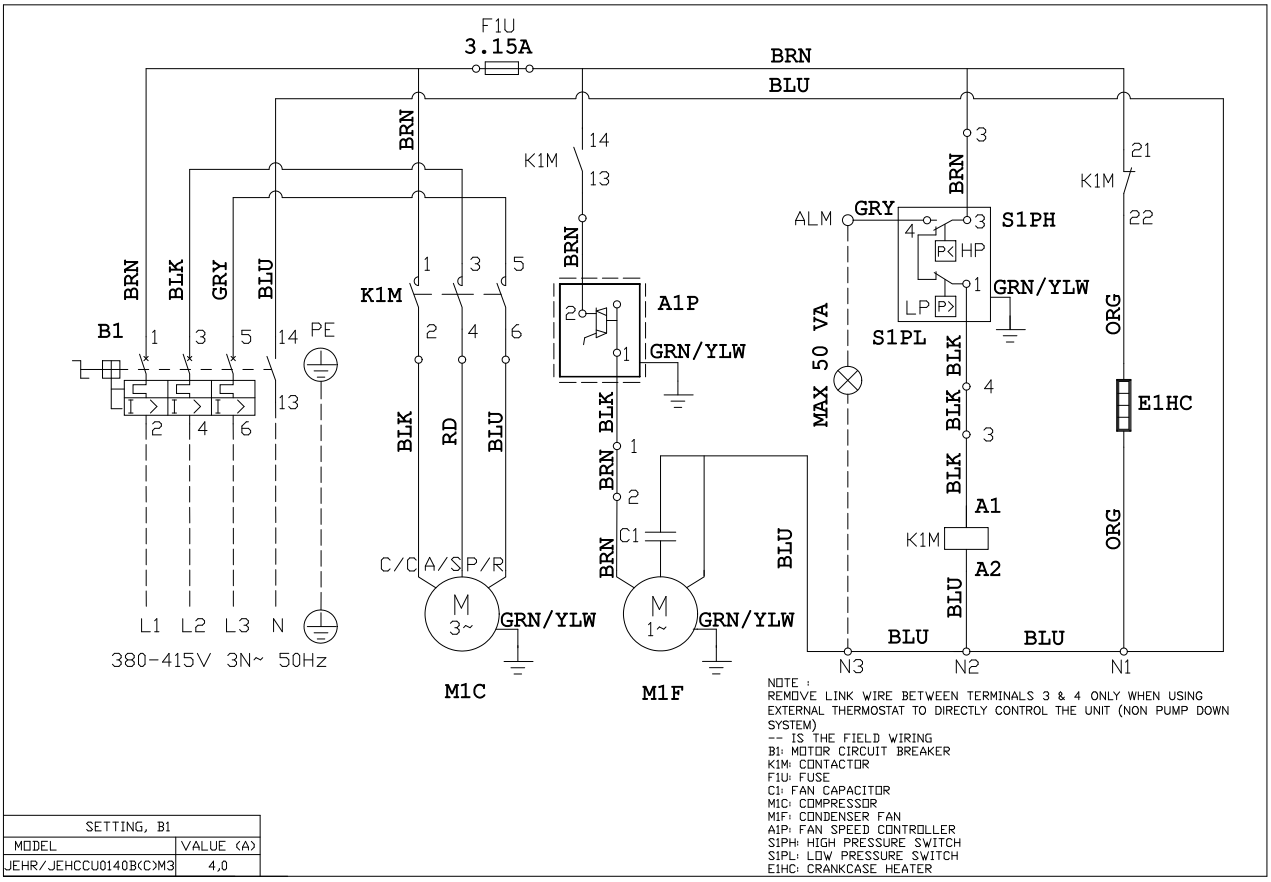
JEHR-0140-B2-M-1



SETTING, B1	
MODEL	VALUE (A)
JEHR/JEHCCU0140B(C)M1	10,0

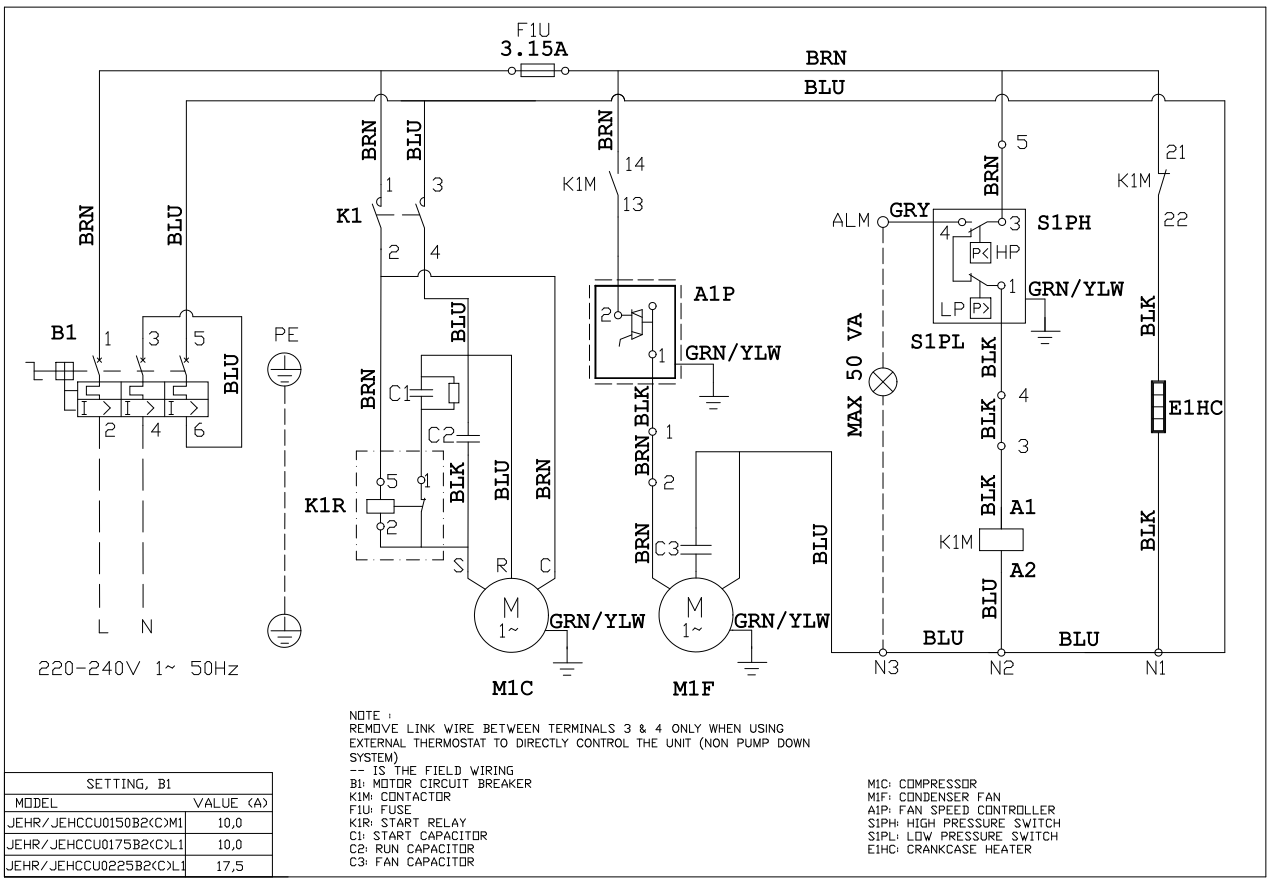
Wiring Diagrams

JEHR-0140-B2-M-3



SETTING, B1	
MODEL	VALUE (A)
JEHR/JEHCCU0140B(C)M3	4,0

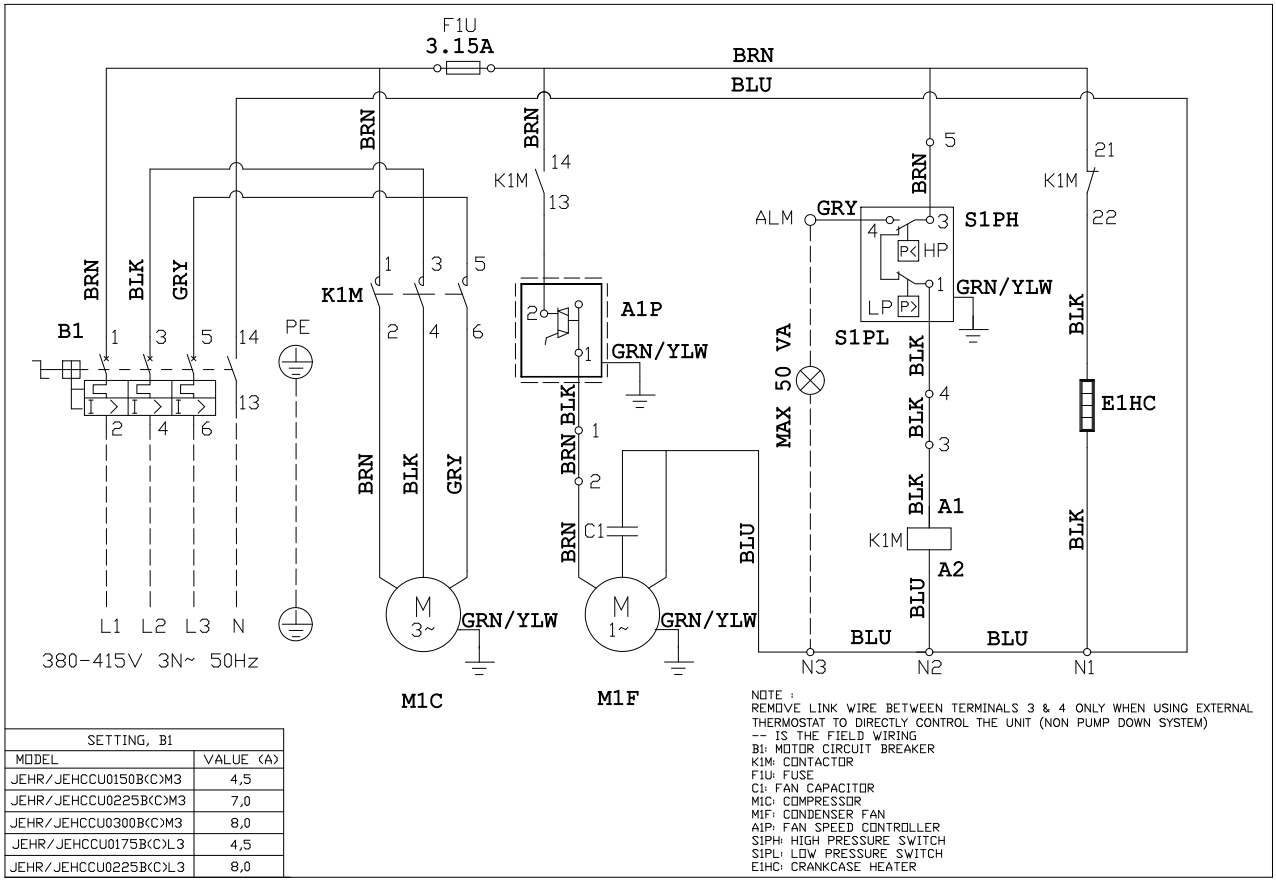
JEHR-0150-B2-M-1, JEHR-0175-B2-L-1, JEHR-0225-B2-L-1



SETTING, B1	
MODEL	VALUE (A)
JEHR/JEHCCU0150B2(C)M1	10,0
JEHR/JEHCCU0175B2(C)L1	10,0
JEHR/JEHCCU0225B2(C)L1	17,5

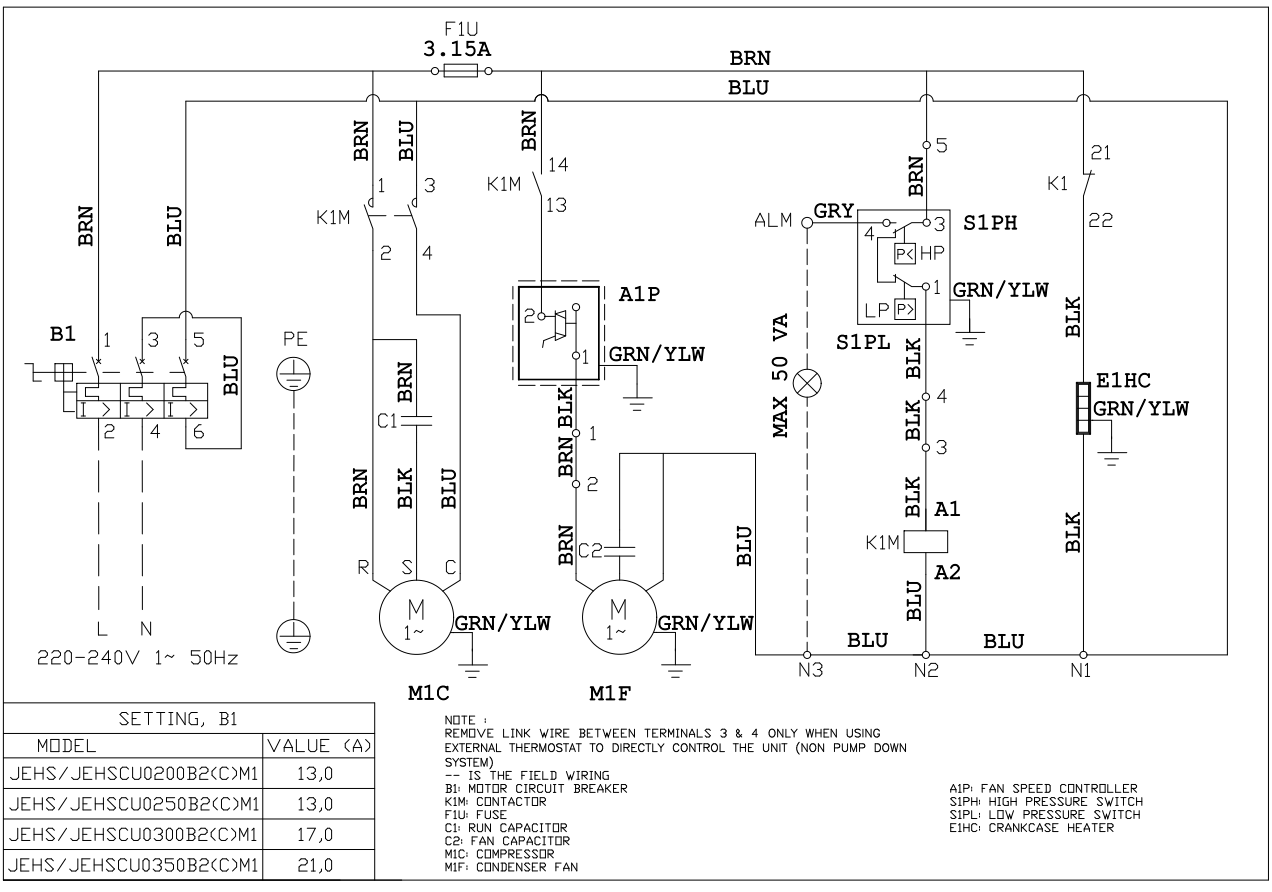
Wiring Diagrams

JEHR-0150-B2-M-3, JEHR-0175-B2-L-3, JEHR-0225-B2-L-3



SETTING, B1	
MODEL	VALUE (A)
JEHR/JEHCCU0150B(C)M3	4,5
JEHR/JEHCCU0225B(C)M3	7,0
JEHR/JEHCCU0300B(C)M3	8,0
JEHR/JEHCCU0175B(C)L3	4,5
JEHR/JEHCCU0225B(C)L3	8,0

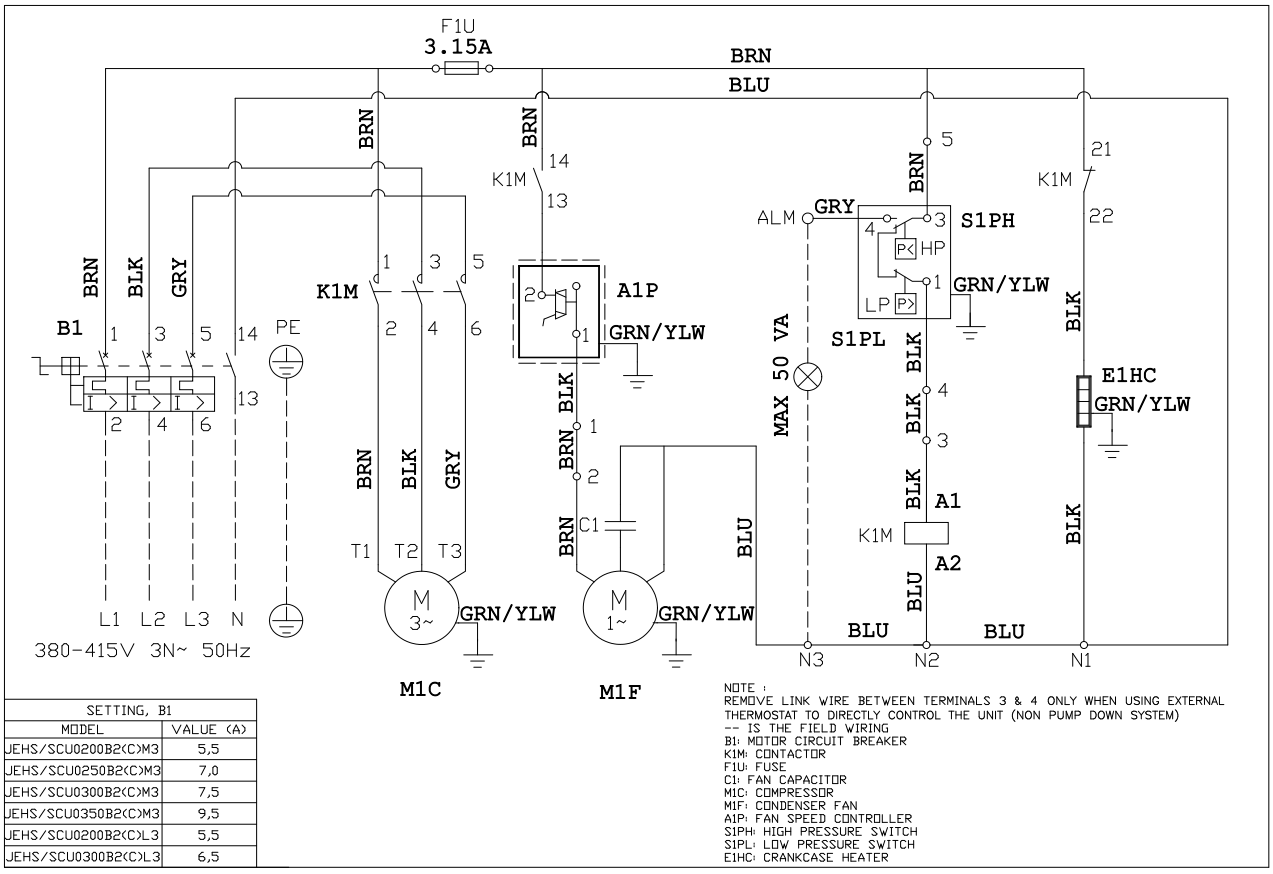
JEHS-0200-B2-M-1, JEHS-0250-B2-M-1, JEHS-0300-B2-M-1, JEHS-0350-B2-M-1



SETTING, B1	
MODEL	VALUE (A)
JEHS/JEHSCU0200B2(C)M1	13,0
JEHS/JEHSCU0250B2(C)M1	13,0
JEHS/JEHSCU0300B2(C)M1	17,0
JEHS/JEHSCU0350B2(C)M1	21,0

Wiring Diagrams

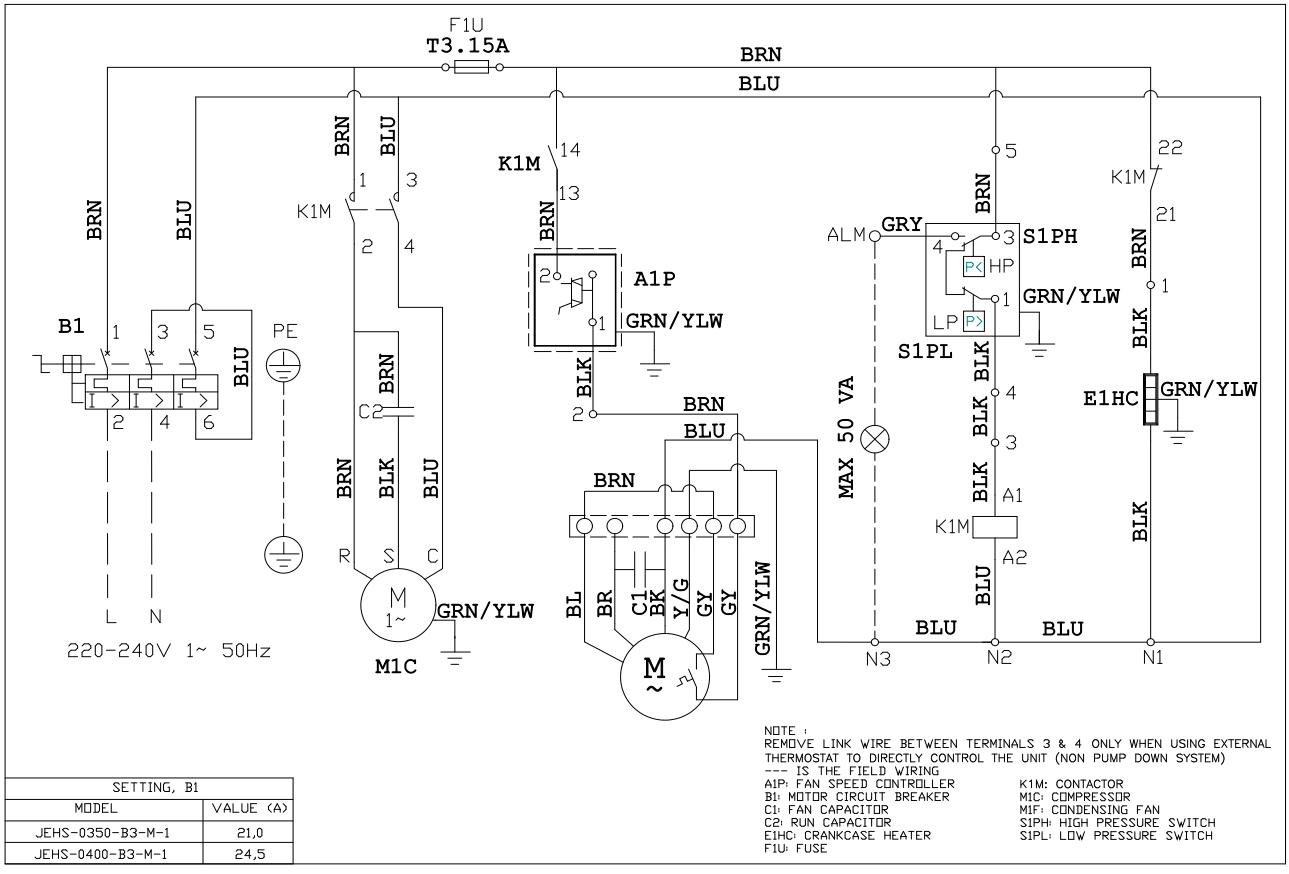
JEHS-0200-B2-M-3, JEHS-0250-B2-M-3, JEHS-0300-B2-M-3, JEHS-0350-B2-M-3, JEHS-0300-B2-L-3



SETTING, B1	
MODEL	VALUE (A)
JEHS/SCU0200B2(C)M3	5,5
JEHS/SCU0250B2(C)M3	7,0
JEHS/SCU0300B2(C)M3	7,5
JEHS/SCU0350B2(C)M3	9,5
JEHS/SCU0200B2(C)L3	5,5
JEHS/SCU0300B2(C)L3	6,5

NOTE :
REMOVE LINK WIRE BETWEEN TERMINALS 3 & 4 ONLY WHEN USING EXTERNAL THERMOSTAT TO DIRECTLY CONTROL THE UNIT (NON PUMP DOWN SYSTEM)
-- IS THE FIELD WIRING
B1: MOTOR CIRCUIT BREAKER
K1M: CONTACTOR
F1U: FUSE
C1: FAN CAPACITOR
M1C: COMPRESSOR
M1F: CONDENSER FAN
A1P: FAN SPEED CONTROLLER
S1PH: HIGH PRESSURE SWITCH
S1PL: LOW PRESSURE SWITCH
E1HC: CRANKCASE HEATER

JEHS-0350-B3-M-1, JEHS-0400-B3-M-1

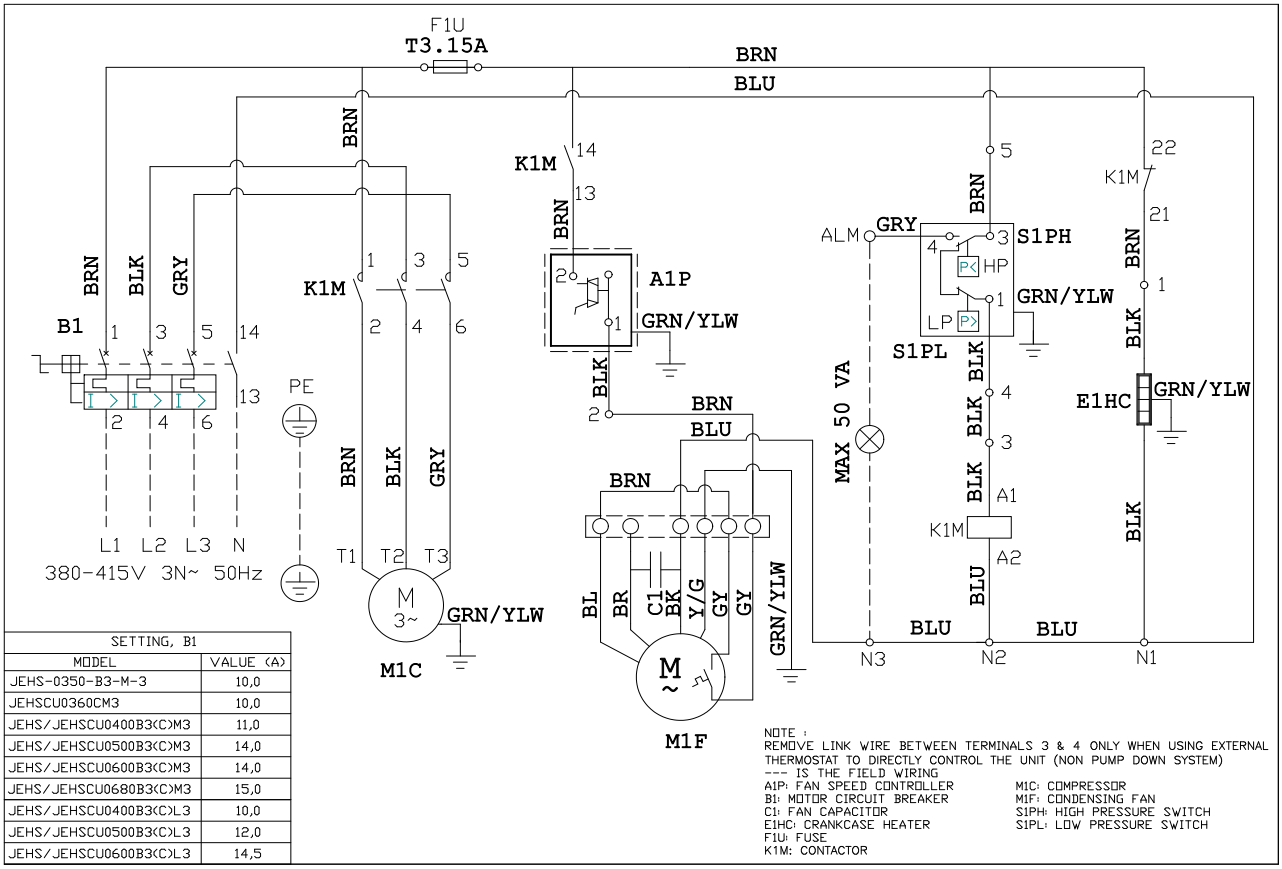


SETTING, B1	
MODEL	VALUE (A)
JEHS-0350-B3-M-1	21,0
JEHS-0400-B3-M-1	24,5

NOTE :
REMOVE LINK WIRE BETWEEN TERMINALS 3 & 4 ONLY WHEN USING EXTERNAL THERMOSTAT TO DIRECTLY CONTROL THE UNIT (NON PUMP DOWN SYSTEM)
--- IS THE FIELD WIRING
A1P: FAN SPEED CONTROLLER
B1: MOTOR CIRCUIT BREAKER
C1: FAN CAPACITOR
C2: RUN CAPACITOR
E1HC: CRANKCASE HEATER
F1U: FUSE
K1M: CONTACTOR
M1C: COMPRESSOR
M1F: CONDENSING FAN
S1PH: HIGH PRESSURE SWITCH
S1PL: LOW PRESSURE SWITCH

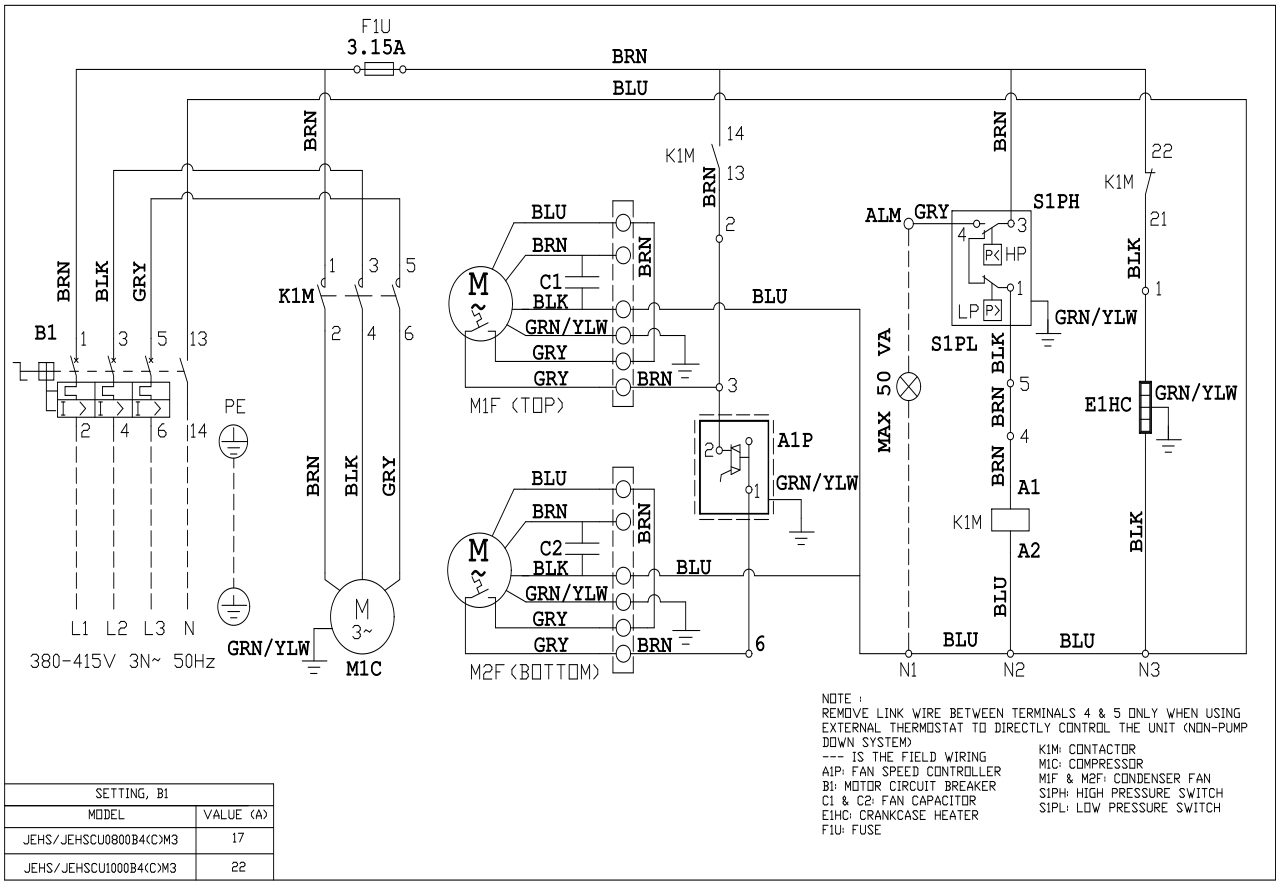
Wiring Diagrams

JEHS-0350-B3-M-3, JEHS-0400-B3-M-3, JEHS-0500-B3-M-4, JEHS-0600-B3-M-3, JEHS-0680-B3-M-4, JEHS-0400-B3-L-3, JEHS-0500-B3-L-3, JEHS-0600-B3-L-3



SETTING, B1	
MODEL	VALUE (A)
JEHS-0350-B3-M-3	10,0
JEHSCU0360CM3	10,0
JEHS/JEHSCU0400B3(C)M3	11,0
JEHS/JEHSCU0500B3(C)M3	14,0
JEHS/JEHSCU0600B3(C)M3	14,0
JEHS/JEHSCU0680B3(C)M3	15,0
JEHS/JEHSCU0400B3(C)L3	10,0
JEHS/JEHSCU0500B3(C)L3	12,0
JEHS/JEHSCU0600B3(C)L3	14,5

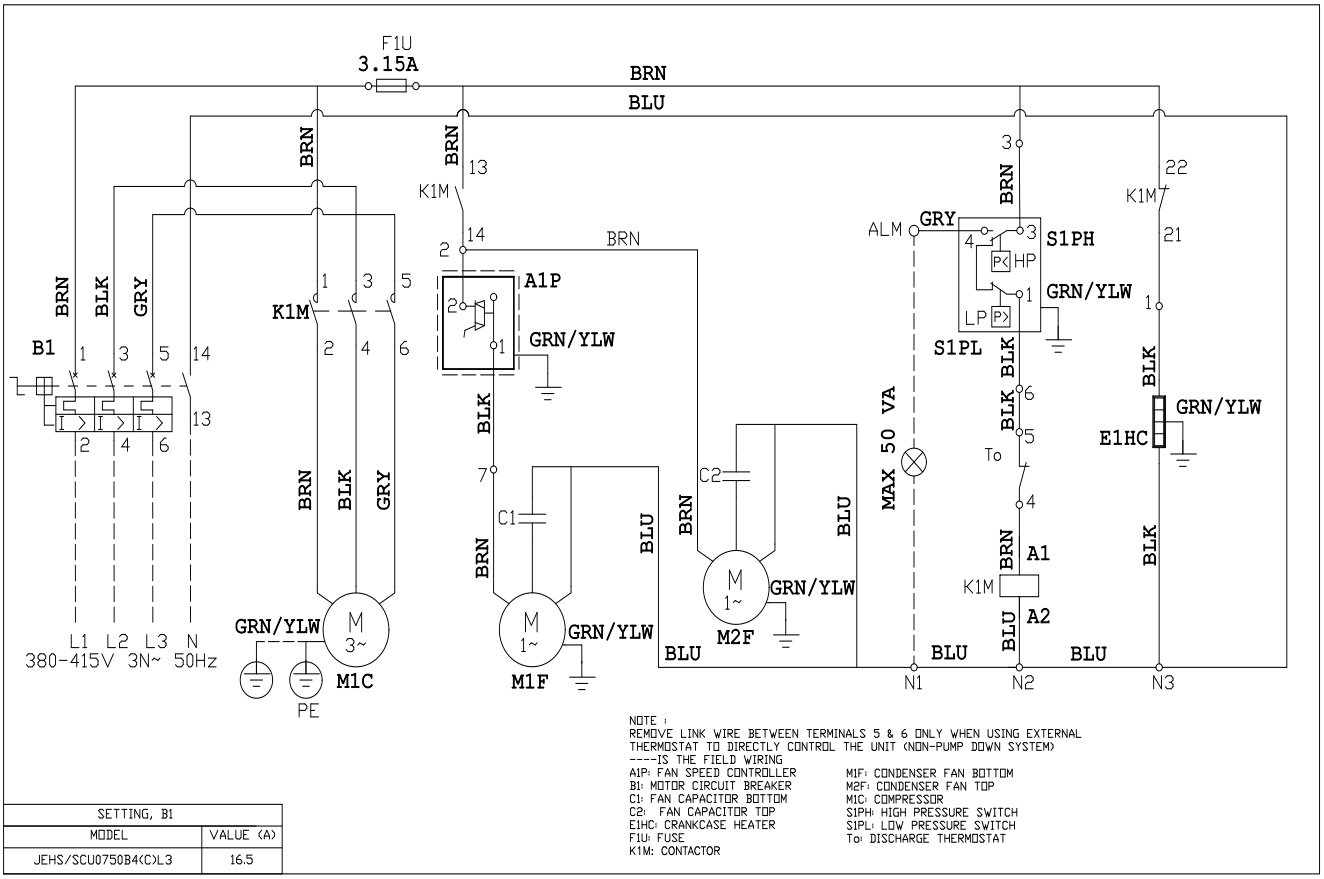
JEHS-0800-B4-M-3, JEHS-1000-B4-M-3



SETTING, B1	
MODEL	VALUE (A)
JEHS/JEHSCU0800B4(C)M3	17
JEHS/JEHSCU1000B4(C)M3	22

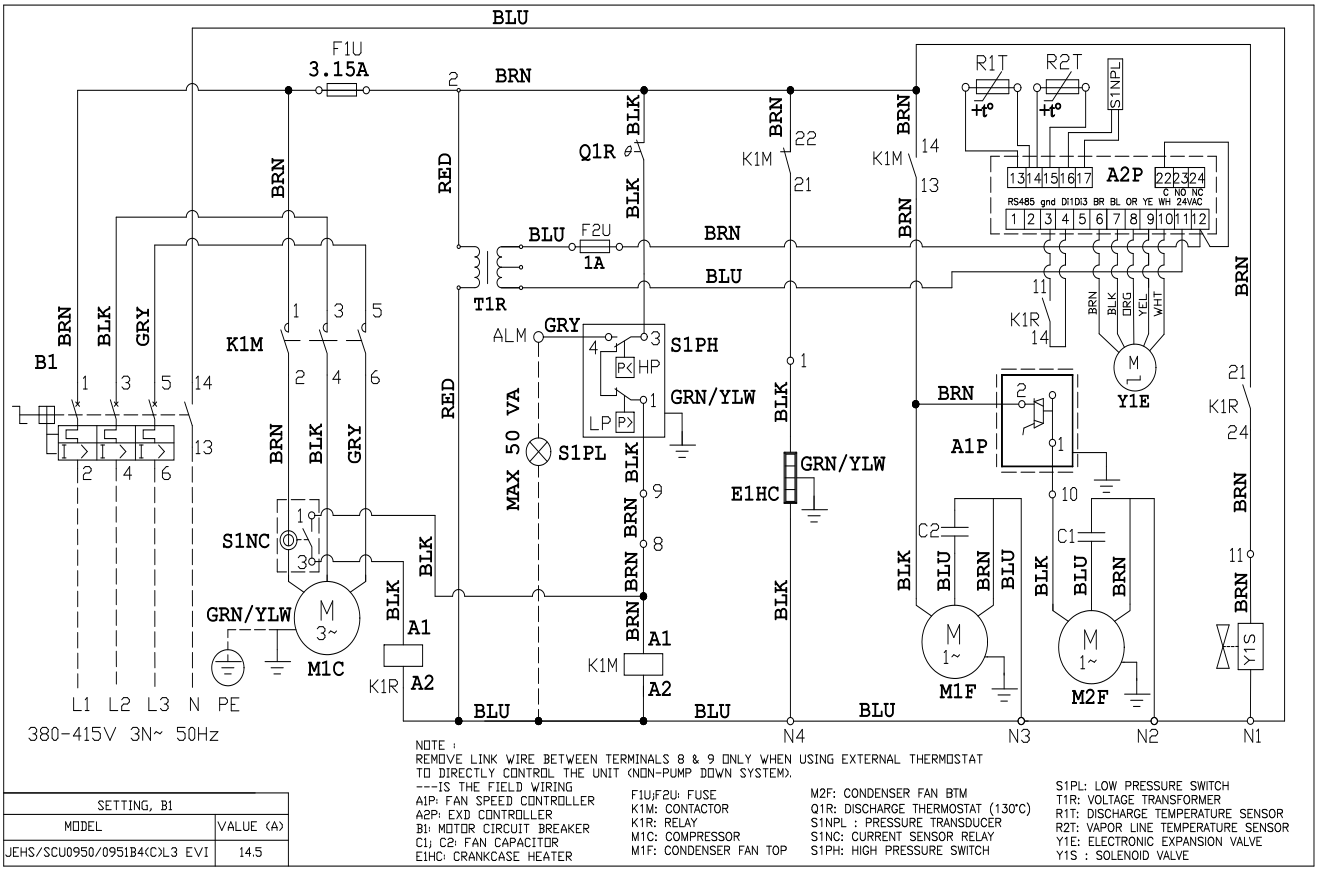
Wiring Diagrams

JEHS-0750-B4-L-3



SETTING, B1	
MODEL	VALUE (A)
JEHS/SCU0750B4(C)L3	16.5

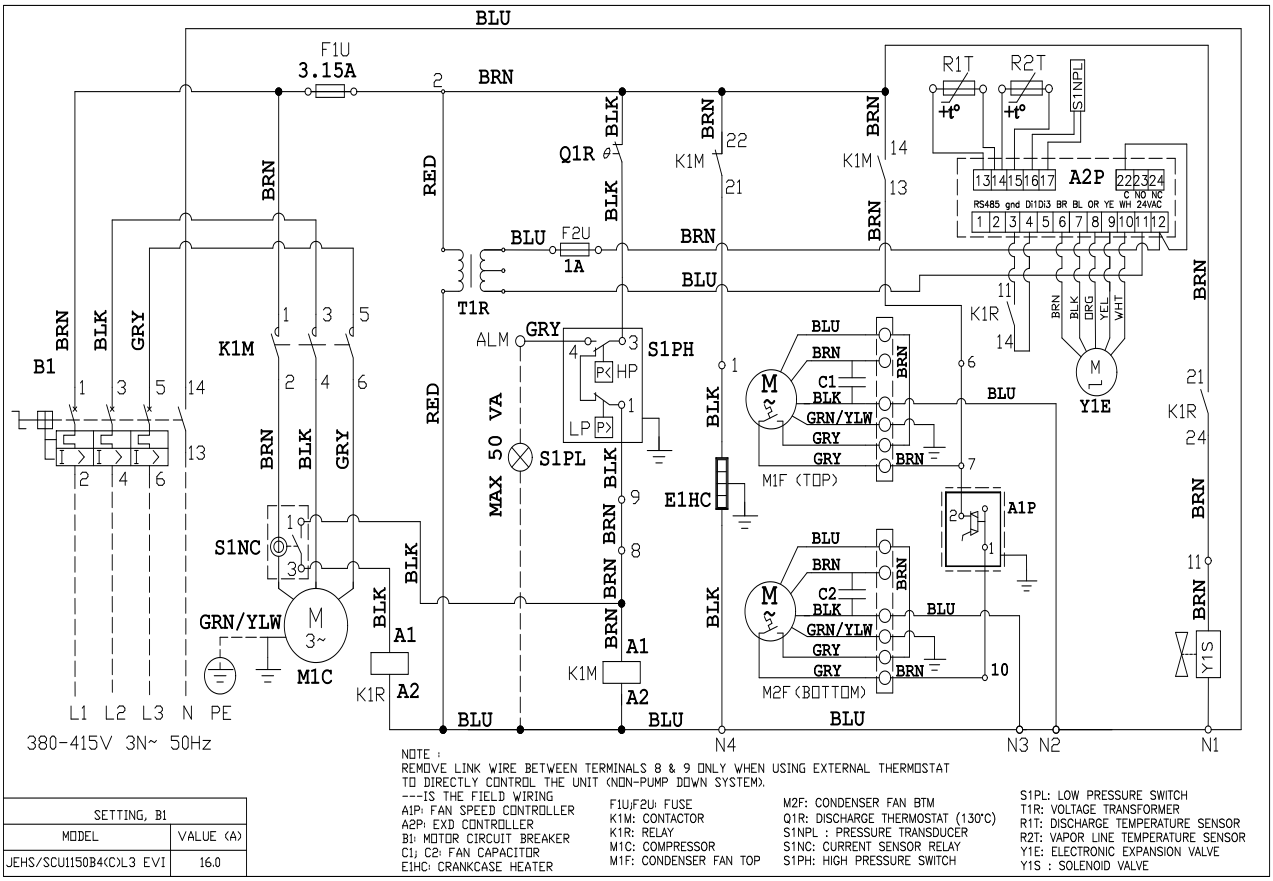
JEHS-0950-B4-L-3 EVI



SETTING, B1	
MODEL	VALUE (A)
JEHS/SCU0950/0951B4(C)L3 EVI	14.5

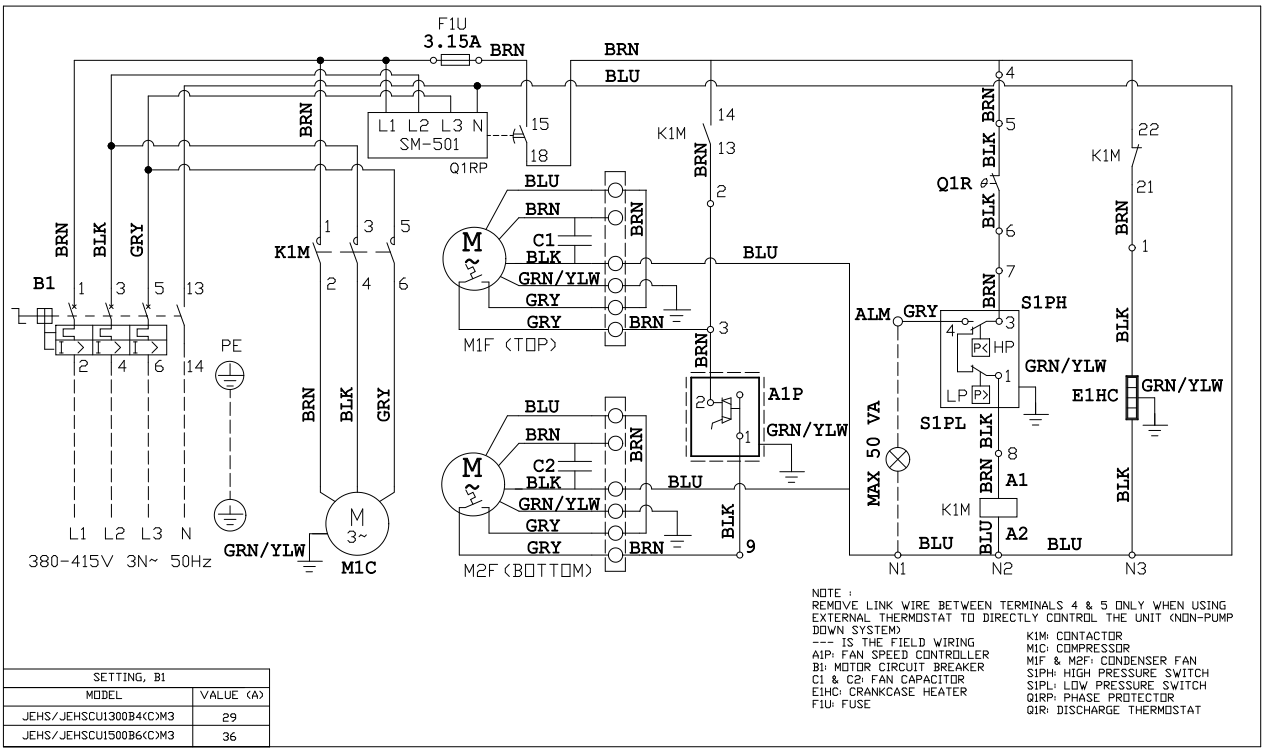
Wiring Diagrams

JEHS-1150-B4-L-3 EVI



SETTING, B1	
MODEL	VALUE (A)
JEHS/SCU1150B4(C)L3 EVI	16.0

JEHS-1300-B4-M-3, JEHS-1500-B6-M-3



SETTING, B1	
MODEL	VALUE (A)
JEHS/JEHSCU1300B4(C)M3	29
JEHS/JEHSCU1500B6(C)M3	36

Service & Maintenance

Important Note:

Warning! – Disconnect the mains electrical supply before servicing or opening the unit.

The condensing units are designed to give long life operation with minimum maintenance. However, they should be routinely checked and the following service schedule is recommended under normal circumstances:

The removal of the top, side and front panels ensures that all parts are accessible.

1. Compressor – Inspect at regular intervals

- Check for refrigerant leaks on all joints and fittings.
- Check mountings for tightness and wear.
- Check operation of crankcase heater.
- Check electrical connections.
- Ensure that no abnormal noise or vibration is detected during test run.
- Check the compressor oil levels and top up if required. The oil level should be ½ to ¾ way up the sight glass (where fitted).

2. Condenser Fan Motor & Blade – Clean and inspect at regular intervals

- Check for abnormal noise, vibration and fan imbalance.
- Ensure that the fan motor is clean and spins freely.
- Check that the condenser fan blade is clean and free from restriction and damage/imbalance.
- **Note:** The fan motor is pre-lubricated and factory sealed so no maintenance is necessary.

3. Microchannel Condenser Coil – Clean and inspect at regular intervals.

- Remove surface dirt, leaves etc. with a vacuum cleaner (preferably with a brush or other soft attachment rather than a metal tube), compressed air blown from the inside out, and/or a soft bristle (not wire!) brush. Do not impact or scrape the coil with the vacuum tube, air nozzle, etc.
- Do not use any chemicals (including those advertised as coil cleaners) to wash micro channel heat exchangers. They can cause corrosion. **Rinse only.** Hose the MCHE off gently, preferably from the inside out and top to bottom, running the water thru every fin passage until it comes out clean. Micro channels fins are stronger than traditional tube & fin coil fins but still need to be handled with care. Do not bang the hose into the coil. We recommend putting your thumb over the end of the hose rather than using a nozzle end because the resulting spray is gentler and the possibility for impact damage is less.
- Micro channel heat exchangers, because of their fin geometry, tend to retain water more than traditional fin & tube coils. Depending on the specific design and installation of your coil, it may be beneficial to blow or vacuum out the rinse water from your unit to speed drying and prevent pooling.

4. Compact Brazed Heat Exchanger (BPHE)

**** For EVI Units ONLY**

- Any soldering process done on the heat exchanger needs to be brazed with minimum 45% silver solder at maximum 450°C (840°F) when soft soldering and 450-800°C (840-1470°F) when hard soldering.
- Do not direct flame at BPHE and use wet rag to avoid overheating of BPHE.

5. Controls

- Check settings and operation of pressure switches.
- Check overload setting.
- Check fan speed control setting and operation.

6. Power Supply – Inspect at regular intervals.

- Check the running current and voltage for the condensing unit.
- Check the electrical wiring and tighten the wires onto the terminal blocks if necessary.

7. Refrigerant Charge

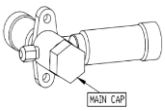
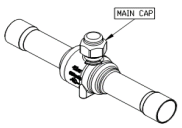
- Check the refrigerant charge by ensuring that the system is operating correctly, the pressures are as expected and that the liquid line sight glass shows a full bore of liquid refrigerant.
- Carry out a full leak test.

8. Compressor replacement (rotalock connections)

- The rotalock connections as used on some compressor models are factory sealed with Loctite 554 thread sealant. If the rotalock connections need to be disassembled (e.g. compressor change), then they should be thoroughly cleaned and Loctite 554 reapplied before reassembly. In case of difficulty undoing the connections due to the sealant, apply heat to the rotalock using a heat gun for several minutes and then loosen using hand tools whilst hot. Replacement of the 'O' ring seal may be required. Please see recommended torque tightening values on page 22.

Service & Maintenance

Torque tightening values

	Model	Series	COMPRESSOR	Rotolock (Suction) Thread: Tightening Torque (Nm)	Rotolock (Discharge) Thread: Toghtening Torque (Nm)	Thread/Size: Tightening Torque (Nm)					
						Service Valves		Liquid Receiver	Shrader Valve 1/4" SAE, Gomex Hose and HL Pressure Switch	Ball Valve	
						Liquid	Suction			Discharge	Liquid
						Main Cap	Main Cap	Rotalock Nut	Hexagonal Cap	Main Cap	Main Cap
Medium temperature	JEHR-0050-B1-M-1		AE4460Z-FZ1C	Not Applicable (Brazed Connection)		M18*1.0mm (25-30 Nm)	M16*1.0mm (20-25 Nm)	N/A	7/16" - 20UNF (14-16 Nm)	N/A	M14*1.5mm (25-30Nm)
	JEHR-0067-B1-M-1	1	CAJ9480Z			M16*1.0mm (20-25 Nm)	M18*1.0mm (25-30 Nm)				
	JEHR-0100-B1-M-1		CAJ9510Z								
	JEHR-0113-B1-M-1		CAJ9513Z								
	JEHR-0140-B2-M-1		CAJ4517Z								
	JEHR-0140-B2-M-3	2	TAJ4517Z								
	JEHR-0150-B2-M-1		MTZ018-5VM	1"-14 UNS (70-80 Nm)			M22*1.0mm (30-35 Nm)				
	JEHR-0150-B2-M-3		MTZ018-4VM								
	JEHS-0200-B2-M-1		ZB15 KQE-PFJ-558	Not Applicable (Brazed Connection)			M25*1.0mm (42-47 Nm)			M16*1.5mm (40-45Nm)	
	JEHS-0200-B2-M-3		ZB15 KQE-TFD-558								
	JEHS-0250-B2-M-1		ZB19 KQE-PFJ-558								
	JEHS-0250-B2-M-3		ZB19 KQE-TFD-558								
	JEHS-0300-B2-M-1		ZB21 KQE-PFJ-558								
	JEHS-0300-B2-M-3		ZB21 KQE-TFD-558								
	JEHS-0350-B2-M-1		ZB26 KQE-PFJ-558								
	JEHS-0350-B2-M-3		ZB26 KQE-TFD-558								
	JEHS-0350-B3-M-1	3	ZB26 KQE-PFJ-558			M18*1.0mm (25-30 Nm)	M33*1.5mm (42-47Nm)				N/A
	JEHS-0350-B3-M-3		ZB26 KQE-TFD-558								
	JEHS-0400-B3-M-1		ZB29 KQE-PFJ-558							N/A	
	JEHS-0400-B3-M-3		ZB29 KQE-TFD-558								
	JEHS-0500-B3-M-3		ZB38 KQE-TFD-558								
	JEHS-0600-B3-M-3		ZB45 KQE-TFD-558				M38*1.5mm (42-47Nm)				
	JEHS-0680-B3-M-3		ZB48 KQE-TFD-558								
	JEHS-0800-B4-M-3	4	ZB57 KCE-TFD-591	1-1/4''-12UNF (110-135 Nm)	1-1/4''-12UNF (110-135 Nm)	M25*1.0mm (42-47Nm)					
	JEHS-1000-B4-M-3		ZB76 KCE-TFD-551	1-3/4''-12UNF (135-160 Nm)							
	JEHS-1300-B4-M-3		ZB95 K5E-TFD-567								
	JEHS-1500-B6-M-3	6	ZB114K5E-TFD-567					1-1/4''-12UNF (110-135 Nm)			M18*1.5mm (10-15 Nm)
Low temperature	JEHR-0115-B1-L-1	1	CAJ2446Z	Not Applicable (Brazed Connection)			M18*1.0mm (25-30 Nm)	N/A	7/16" - 20UNF (14-16 Nm)	N/A	
	JEHR-0135-B1-L-1		CAJ2464Z								
	JEHR-0175-B2-L-1	2	NTZ048-5VM (B)	1-1/4"-12UNF (110-135 Nm)	1"-14 UNS (70-80 Nm)	M16*1.0mm (20-25 Nm)	M22*1.0mm (30-35 Nm)				M14*1.5mm (25-30Nm)
	JEHR-0175-B2-L-3		NTZ048-4VM (B)								
	JEHR-0225-B2-L-1		NTZ068-5VM (B)	1-1/4"-12UNF (110-135 Nm)							
	JEHR-0225-B2-L-3		NTZ068-4VM (B)								
	JEHS-0300-B2-L-3		ZF09 KQE-TFD-551		1"-14 UNS (70-80 Nm)		M25*1.0mm (42-47Nm)				
	JEHS-0400-B3-L-3	3	ZF13 KQE-TFD-551			M18*1.0mm (25-30 Nm)	M33*1.5mm (42-47Nm)				N/A
	JEHS-0500-B3-L-3		ZF15 KQE-TFD-551								
	JEHS-0600-B3-L-3		ZF18 KQE-TFD-551								
	JEHS-0750-B4-L-3	4	ZF25K5E-TFD-567		1-1/4''-12UNF (110-135 Nm)		M38*1.5mm (42-47Nm)				
	JEHS-0950-B4-L-3 EVI		ZF18KVE-TFD-551		1''-14 UNS (70-80 Nm)		M33*1.5mm (42-47Nm)				
	JEHS-1150-B4-L-3 EVI		ZFI36KQE-TFD-552		1-1/4''-12UNF (110-135 Nm)		M38*1.5mm (42-47Nm)				
	REMARKS	-	-	-	-			-	-		

9. Unit decommissioning and disposal

- At the end of the unit's useful life, a suitably qualified engineer should decommission it. The refrigerant and compressor oil are classed as hazardous waste and as such must be reclaimed and disposed of in the correct manner, including completion of waste transfer paperwork. The unit components must be disposed of or recycled as appropriate in the correct manner.

NOTICE

Disposal requirement

Your refrigeration product is marked with this symbol. This means that electrical and electronic products shall not be mixed with unsorted household waste. Do not try to dismantle the system yourself: the dismantling of the refrigeration system, treatment of the refrigerant, of oil and of other parts must be done by a qualified installer in accordance with relevant local and national legislation. Refrigeration equipment must be treated at a specialized treatment facility for re-use, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. Please contact the installer or local authority for more information.

Batteries must be removed from the controller and disposed of separately in accordance with relevant local and national legislation.

10. Warranty

- The warranty as provided by J & E Hall on its products is subject to correct application, siting and installation procedures together with subsequent recorded maintenance/servicing carried out in accordance with our recommendations. Failure to do so could result in the withdrawal of our warranty. Please go to our website for our detailed warranty terms and conditions: www.jehall.co.uk

F-Gas Information

From 1/1/2015, F-Gas Regulation EU 517/2014 came into force replacing the old Regulation EC 842/2006. This affects system labelling, information supplied within documentation and also the way in which thresholds for frequency of leak testing refrigeration systems are calculated. Please be aware of the following:

- The models of equipment covered in this Technical Manual rely on fluorinated greenhouse gases for their functioning.
- All unit models come from the factory pressurized with OFN (Oxygen Free Nitrogen) only.
- The GWP (Global Warming Potential) values of refrigerants which are specified for use along with the three new thresholds for leak testing requirements based on TCO_2Eq (Tonnes CO_2 Equivalent) are as follows:

		Refrigerant Charge - kg		
		5T	50T	500T
Refrigerant	GWP	CO_2Eq	CO_2Eq	CO_2Eq
R134a	1430	3.5	35	350
R407A	2107	2.4	23.7	237
R407F	1825	2.7	27.4	274
R448A	1387	3.6	36.0	360
R449A	1397	3.6	35.8	358
R452A	2140	2.3	23.4	234

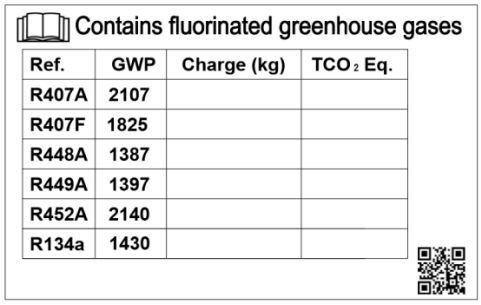
- Changes to leak testing requirements are as follows:

OLD LEGISLATION	NEW LEGISLATION	LEAK CHECKING FREQUENCY
3-30 kgs	5-50 TCO_2Eq	Every 12 months but can be increased to 24 months if fitted with a fixed leak detection system.
30-300 kgs	50-500 TCO_2Eq	Every 6 months but can be increased to 12 months if fitted with a fixed leak detection system.
300+ kgs	500+ TCO_2Eq	Every 6 months - however automatic leak detection system is mandatory which requires servicing every 12 months

To calculate TCO_2Eq value: $\frac{\text{Refrigerant charge (kgs) x Refrigerant GWP}}{1000}$

Please note: From 1st January 2017, the new legislation applies to systems which previously were exempt from leak testing under the 'below 3kg' charge limit.

A refrigerant charge label is supplied with each unit (inside the electrical box) manufactured from January 2015. The total refrigerant charge for the system and the TCO_2Eq value must be entered on the label with indelible ink and must be adhered in the proximity of the product charging port. The label supplied will represent the refrigerants approved for use with that particular unit. Examples of the unit labels are as follows:


Contains fluorinated greenhouse gases

Ref.	GWP	Charge (kg)	TCO_2 Eq.
R407A	2107		
R407F	1825		
R448A	1387		
R449A	1397		
R452A	2140		
R134a	1430		

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