COMMERCIAL CONDENSING UNITS
TECHNICAL MANUAL

A2L

V3 FUSION & FUSION SCROLL
A2L Commercial Condensing Units

Medium Temperature Applications

ISSUE: 01.03.2024

UK CA CE

J&E Hall International

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This guideline is intended for users to ensure safe installation, operation, and maintenance of J & E Hall Fusion and Fusion Scroll A2L condensing units. This guideline is not intended to replace the system expertise available from the system manufacturers.

This equipment is a relatively complicated apparatus and is designed to use with A2L refrigerant which is mildly flammable. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

 WARNING	Warning! Risk of serious injury or death to person!
 CAUTION	Caution! Danger which can lead to serious damages!
 NOTICE	Notice! Risk of damage to equipment!

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 J & E Hall for more information.

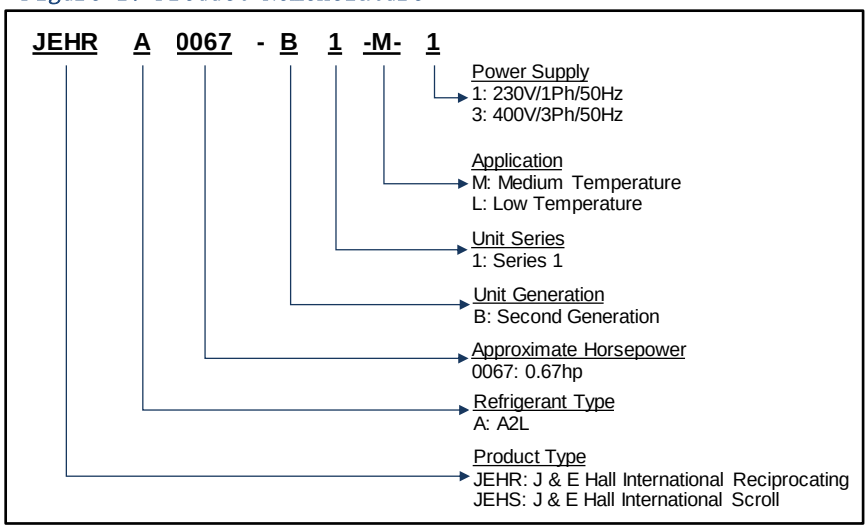
Batteries must be removed from the controller and disposed of separately in accordance with relevant local and national legislation.

***J & E Hall can accept no responsibility for possible errors in catalogue, brochures, and other printed material. J & E Hall reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specification already agreed.*

Contents

Nomenclature

Figure 1: Product Nomenclature



Product Features

J & E Hall V3 Fusion and Fusion Scroll A2L condensing unit adopt fix speed compressor in a flexible plug and play package, for medium refrigeration application.

Standard features for all medium temperature model:

- Tecumseh A2L reciprocating compressor
- Copeland A2L scroll compressor
- Microchannel condenser coil in -B1 and -B2 units
- Liquid receiver prefixed with pressure relief valve.
- Fitted liquid line drier and sight glass
- Dual LP/HP Pressure control
- Flexible pressure hoses
- External service valves
- IP rated enclosure
- Combined mains isolator with short circuit / overload protection
- Fuse protection to fan and control circuit
- Fan speed control
- Crankcase heater on compressor
- Alarm output available from HP switch and LP pressure switch
- Acoustic insulation to compressor compartment
- Timer control on fan motor

Specifications

Table 1: Unit Electrical and Physical Data

Unit Model	Compressor			Electrical Data					Volume		Connections	
				Compressor			Fan Motor		Coil	Liquid Receiver		
	Type	Swept Volume	Oil Charge	NC	MCC	LRC	No.	FLC			Liquid	Suction
		(m³/h)	(L)	(A)	(A)	(A)		(A)	(L)	(L)	(inch)	(inch)
JEHRA-0067-B1-M-1	AJ4480P-FZ	2.64	0.48	2.7	5.9	24.1	1	0.2	0.44	2.4	3/8	1/2
JEHRA-0110-B2-M-1	AJ4513P-FZ	4.21	0.48	4.1	10.0	33.0	1	0.6	0.51	2.4	3/8	1/2
JEHRA-0150-B2-M-1	AJ4519P-FZ	6.00	0.48	6.5	16.3	48.0	1	0.6	0.51	2.4	3/8	1/2
JEHSA-0200-B2-M-3	YB12K1E-TFMN	5.76	1.30	2.8	5.9	26.0	1	0.6	0.51	2.4	3/8	3/4
JEHSA-0300-B2-M-3	YB17K1E-TFMN	8.00	1.50	3.5	6.9	32.0	1	0.6	0.51	2.4	3/8	3/4

- **Compressor oil:** Uniqema Emkarate RL32CF
- NC: Nominal current rated at condition (-10°C Te / +32°C Ta) with R455A refrigerant.
- MCC: Maximum continuous current
- LRC: Locked rotor current
- FLC: Full load current of fan

Table 2: Unit Performance and Dimension

Unit Model	COP / (SEPR) RGT 20°C					SPL @ 10m	Airflow	Dimensions		Weight	
	R448A	R449A	R455A	R454A	R454C			Unit (W x D x H)	Mounting (W x D)	Unit	Packing
						dB(A)	(m³/h)	(mm)	(mm)	(kgs)	(kgs)
JEHRA-0067-B1-M-1	1.83	1.83	1.80	n/c	1.80	29	1250	876 x 430 x 606	545 x 400	56	76
JEHRA-0110-B2-M-1	2.15	2.15	1.90	n/c	1.89	31	2700	1101 x 444 x 662	703 x 408	69	96
JEHRA-0150-B2-M-1	1.97	1.97	1.81	n/c	1.85	34	2700			69	97
JEHSA-0200-B2-M-3	2.30	2.30	2.03	2.22	2.20	36	2700	1101 x 444 x 662	703 x 408	71	98
JEHSA-0300-B2-M-3	2.22	2.22	2.05	(3.28)	2.22	36	2700			74	101

- COP/SEPR according to Ecodesign **evaporating mean temperature** conditions EN13215 at return gas temperature 20°C.
- n/c: not compatible with this refrigerant
- SPL @10m: Sound Pressure Level measured 10m from unit, in an anechoic room rated at (-10°C Te / +32°C Ta). Alternative conditions may produce different results.

Performance Data

The performance data shown in ***Table 3 to 7*** has the following criteria:

- Te: Evaporating **Dew** Temperature
- Ta: Ambient Temperature
- CC: Cooling Capacity (Watts)
- PC: Power Consumption (Watts)
- SH: Suction Superheat 10K
- SC: Subcooling 0K
- COP: Coefficient of Performance

Table 3: R448A

MODEL	Te / Ta		-20	-15	-10	-5	0	5	10
JEHRA-0067-B1-M-1	27	CC	749	964	1215	1508	1851	2253	2723
	27	PC	534	586	638	689	737	782	820
	27	COP	1.40	1.65	1.90	2.19	2.51	2.88	3.32
	32	CC	688	890	1123	1394	1709	2077	2506
	32	PC	542	599	657	715	771	824	872
	32	COP	1.27	1.48	1.71	1.95	2.22	2.52	2.87
	35	CC	651	845	1068	1325	1624	1972	2377
	35	PC	546	607	668	730	791	850	904
	35	COP	1.19	1.39	1.60	1.82	2.05	2.32	2.63
	38	CC		800	1013	1257	1540	1868	2249
	38	PC		613	678	745	811	875	935
	38	COP		1.30	1.49	1.69	1.90	2.14	2.41
JEHRA-0110-B2-M-1	27	CC	1246	1631	2081	2599	3190	3861	4616
	27	PC	771	848	925	1002	1079	1156	1232
	27	COP	1.62	1.92	2.25	2.59	2.96	3.34	3.75
	32	CC	1135	1500	1922	2407	2959	3581	4281
	32	PC	786	871	956	1042	1128	1214	1301
	32	COP	1.44	1.72	2.01	2.31	2.62	2.95	3.29
	35	CC	1068	1420	1827	2292	2820	3415	4081
	35	PC	793	884	974	1065	1157	1250	1343
	35	COP	1.35	1.61	1.88	2.15	2.44	2.73	3.04
	38	CC		1340	1732	2177	2682	3249	3883
	38	PC		895	992	1089	1187	1286	1386
	38	COP		1.50	1.75	2.00	2.26	2.53	2.80
JEHRA-0150-B2-M-1	27	CC	1732	2243	2815	3458	4181	4999	5927
	27	PC	1125	1242	1364	1490	1622	1757	1894
	27	COP	1.54	1.81	2.06	2.32	2.58	2.85	3.13
	32	CC	1594	2079	2618	3219	3894	4658	5526
	32	PC	1148	1275	1408	1547	1693	1843	1997
	32	COP	1.39	1.63	1.86	2.08	2.30	2.53	2.77
	35	CC	1509	1978	2496	3073	3719	4449	5281
	35	PC	1161	1293	1433	1580	1734	1894	2058
	35	COP	1.30	1.53	1.74	1.95	2.14	2.35	2.57
	38	CC		1875	2373	2925	3541	4238	5034
	38	PC		1311	1457	1612	1775	1944	2118
	38	COP		1.43	1.63	1.81	2.00	2.18	2.38
JEHSA-0200-B2-M-3	27	CC	2324	2873	3503	4224	5048	5987	7055
	27	PC	1272	1358	1450	1548	1649	1752	1856
	27	COP	1.83	2.12	2.42	2.73	3.06	3.42	3.80
	32	CC	2202	2722	3318	3998	4775	5659	6664
	32	PC	1358	1451	1550	1655	1765	1877	1990
	32	COP	1.62	1.88	2.14	2.42	2.71	3.02	3.35
	35	CC	2128	2630	3205	3862	4609	5460	6427
	35	PC	1412	1509	1613	1723	1837	1955	2074
	35	COP	1.51	1.74	1.99	2.24	2.51	2.79	3.10
	38	CC	2054	2538	3092	3724	4442	5259	
	38	PC	1468	1569	1678	1792	1912	2035	
	38	COP	1.40	1.62	1.84	2.08	2.32	2.58	
JEHSA-0300-B2-M-3	27	CC	3127	3840	4657	5589	6649	7854	9225
	27	PC	1774	1887	2016	2160	2319	2491	2676
	27	COP	1.76	2.04	2.31	2.59	2.87	3.15	3.45
	32	CC	2982	3656	4425	5300	6292	7416	8691
	32	PC	1892	2013	2151	2307	2481	2671	2875
	32	COP	1.58	1.82	2.06	2.30	2.54	2.78	3.02
	35	CC	2894	3544	4284	5124	6075	7150	8368
	35	PC	1968	2094	2239	2402	2585	2786	3003
	35	COP	1.47	1.69	1.91	2.13	2.35	2.57	2.79
	38	CC	2805	3431	4142	4947	5856	6882	
	38	PC	2048	2179	2331	2502	2695	2907	
	38	COP	1.37	1.57	1.78	1.98	2.17	2.37	

Table 4: R449A

MODEL	Te / Ta		-20	-15	-10	-5	0	5	10
JEHRA-0067-B1-M-1	27	CC	749	964	1215	1508	1851	2253	2723
	27	PC	534	586	638	689	737	782	820
	27	COP	1.40	1.65	1.90	2.19	2.51	2.88	3.32
	32	CC	688	890	1123	1394	1709	2077	2506
	32	PC	542	599	657	715	771	824	872
	32	COP	1.27	1.48	1.71	1.95	2.22	2.52	2.87
	35	CC	651	845	1068	1325	1624	1972	2377
	35	PC	546	607	668	730	791	850	904
	35	COP	1.19	1.39	1.60	1.82	2.05	2.32	2.63
	38	CC		800	1013	1257	1540	1868	2249
	38	PC		613	678	745	811	875	935
	38	COP		1.30	1.49	1.69	1.90	2.14	2.41
JEHRA-0110-B2-M-1	27	CC	1246	1631	2081	2599	3190	3861	4616
	27	PC	771	848	925	1002	1079	1156	1232
	27	COP	1.62	1.92	2.25	2.59	2.96	3.34	3.75
	32	CC	1135	1500	1922	2407	2959	3581	4281
	32	PC	786	871	956	1042	1128	1214	1301
	32	COP	1.44	1.72	2.01	2.31	2.62	2.95	3.29
	35	CC	1068	1420	1827	2292	2820	3415	4081
	35	PC	793	884	974	1065	1157	1250	1343
	35	COP	1.35	1.61	1.88	2.15	2.44	2.73	3.04
	38	CC		1340	1732	2177	2682	3249	3883
	38	PC		895	992	1089	1187	1286	1386
	38	COP		1.50	1.75	2.00	2.26	2.53	2.80
JEHRA-0150-B2-M-1	27	CC	1732	2243	2815	3458	4181	4999	5927
	27	PC	1125	1242	1364	1490	1622	1757	1894
	27	COP	1.54	1.81	2.06	2.32	2.58	2.85	3.13
	32	CC	1594	2079	2618	3219	3894	4658	5526
	32	PC	1148	1275	1408	1547	1693	1843	1997
	32	COP	1.39	1.63	1.86	2.08	2.30	2.53	2.77
	35	CC	1509	1978	2496	3073	3719	4449	5281
	35	PC	1161	1293	1433	1580	1734	1894	2058
	35	COP	1.30	1.53	1.74	1.95	2.14	2.35	2.57
	38	CC		1875	2373	2925	3541	4238	5034
	38	PC		1311	1457	1612	1775	1944	2118
	38	COP		1.43	1.63	1.81	2.00	2.18	2.38
JEHSA-0200-B2-M-3	27	CC	2324	2873	3503	4224	5048	5987	7055
	27	PC	1272	1358	1450	1548	1649	1752	1856
	27	COP	1.83	2.12	2.42	2.73	3.06	3.42	3.80
	32	CC	2202	2722	3318	3998	4775	5659	6664
	32	PC	1358	1451	1550	1655	1765	1877	1990
	32	COP	1.62	1.88	2.14	2.42	2.71	3.02	3.35
	35	CC	2128	2630	3205	3862	4609	5460	6427
	35	PC	1412	1509	1613	1723	1837	1955	2074
	35	COP	1.51	1.74	1.99	2.24	2.51	2.79	3.10
	38	CC	2054	2538	3092	3724	4442	5259	
	38	PC	1468	1569	1678	1792	1912	2035	
	38	COP	1.40	1.62	1.84	2.08	2.32	2.58	
JEHSA-0300-B2-M-3	27	CC	3127	3840	4657	5589	6649	7854	9225
	27	PC	1774	1887	2016	2160	2319	2491	2676
	27	COP	1.76	2.04	2.31	2.59	2.87	3.15	3.45
	32	CC	2982	3656	4425	5300	6292	7416	8691
	32	PC	1892	2013	2151	2307	2481	2671	2875
	32	COP	1.58	1.82	2.06	2.30	2.54	2.78	3.02
	35	CC	2894	3544	4284	5124	6075	7150	8368
	35	PC	1968	2094	2239	2402	2585	2786	3003
	35	COP	1.47	1.69	1.91	2.13	2.35	2.57	2.79
	38	CC	2805	3431	4142	4947	5856	6882	
	38	PC	2048	2179	2331	2502	2695	2907	
	38	COP	1.37	1.57	1.78	1.98	2.17	2.37	

Table 5: R455A

MODEL	Te / Ta		-20	-15	-10	-5	0	5	10
JEHRA-0067-B1-M-1	27	CC	633	834	1072	1354	1658	2024	2454
	27	PC	504	557	608	657	709	754	793
	27	COP	1.25	1.50	1.76	2.06	2.34	2.68	3.09
	32	CC	579	771	995	1259	1540	1884	2288
	32	PC	506	564	621	676	734	786	832
	32	COP	1.14	1.37	1.60	1.86	2.10	2.40	2.75
	35	CC	547	732	947	1201	1468	1798	2187
	35	PC	506	567	627	687	749	805	856
	35	COP	1.08	1.29	1.51	1.75	1.96	2.23	2.56
	38	CC		693	900	1142	1395	1712	2086
	38	PC		568	633	696	763	823	878
	38	COP		1.22	1.42	1.64	1.83	2.08	2.37
JEHRA-0110-B2-M-1	27	CC	1036	1362	1743	2189	2714	3331	4057
	27	PC	768	850	931	1010	1086	1158	1223
	27	COP	1.35	1.60	1.87	2.17	2.50	2.88	3.32
	32	CC	942	1249	1605	2022	2510	3086	3765
	32	PC	775	864	953	1042	1128	1211	1288
	32	COP	1.22	1.45	1.68	1.94	2.22	2.55	2.92
	35	CC	886	1181	1523	1921	2388	2938	3588
	35	PC	776	871	965	1059	1152	1241	1325
	35	COP	1.14	1.36	1.58	1.81	2.07	2.37	2.71
	38	CC		1113	1440	1820	2265	2791	3412
	38	PC		876	976	1076	1175	1271	1361
	38	COP		1.27	1.48	1.69	1.93	2.20	2.51
JEHRA-0150-B2-M-1	27	CC	1406	1823	2302	2858	3506	4264	5154
	27	PC	1061	1169	1287	1413	1545	1680	1812
	27	COP	1.33	1.56	1.79	2.02	2.27	2.54	2.84
	32	CC	1296	1689	2139	2658	3261	3968	4799
	32	PC	1075	1187	1310	1444	1585	1731	1878
	32	COP	1.20	1.42	1.63	1.84	2.06	2.29	2.56
	35	CC	1228	1609	2040	2537	3113	3788	4583
	35	PC	1084	1197	1323	1461	1608	1761	1915
	35	COP	1.13	1.34	1.54	1.74	1.94	2.15	2.39
	38	CC		1527	1941	2415	2964	3607	4366
	38	PC		1207	1336	1478	1630	1789	1951
	38	COP		1.27	1.45	1.63	1.82	2.02	2.24
JEHSA-0200-B2-M-3	27	CC	2083	2542	3070	3672	4355	5126	5990
	27	PC	1275	1377	1481	1584	1688	1791	1894
	27	COP	1.63	1.85	2.07	2.32	2.58	2.86	3.16
	32	CC	1984	2416	2911	3474	4112	4830	5635
	32	PC	1349	1459	1570	1682	1793	1905	2016
	32	COP	1.47	1.66	1.85	2.07	2.29	2.54	2.80
	35	CC	1906	2322	2799	3343	3961	4658	5442
	35	PC	1411	1523	1636	1748	1861	1972	2083
	35	COP	1.35	1.52	1.71	1.91	2.13	2.36	2.61
	38	CC	1818	2218	2677	3203	3803	4483	5252
	38	PC	1484	1597	1710	1822	1933	2043	2151
	38	COP	1.23	1.39	1.57	1.76	1.97	2.19	2.44
JEHSA-0300-B2-M-3	27	CC	2887	3510	4227	5048	5983	7041	8233
	27	PC	1754	1868	1990	2123	2266	2421	2590
	27	COP	1.65	1.88	2.12	2.38	2.64	2.91	3.18
	32	CC	2737	3321	3991	4758	5630	6619	7733
	32	PC	1884	2005	2136	2277	2430	2597	2778
	32	COP	1.45	1.66	1.87	2.09	2.32	2.55	2.78
	35	CC	2644	3205	3847	4580	5415	6361	7429
	35	PC	1969	2095	2231	2378	2538	2711	2900
	35	COP	1.34	1.53	1.72	1.93	2.13	2.35	2.56
	38	CC	2550	3087	3700	4400	5196	6100	
	38	PC	2060	2191	2332	2485	2652	2833	
	38	COP	1.24	1.41	1.59	1.77	1.96	2.15	

Table 6: R454C

MODEL	Te / Ta		-20	-15	-10	-5	0	5	10
JEHRA-0067-B1-M-1	27	CC	592	791	1028	1296	1591	1953	2363
	27	PC	487	533	575	616	657	691	722
	27	COP	1.22	1.48	1.79	2.11	2.42	2.83	3.27
	32	CC	541	729	951	1209	1485	1827	2213
	32	PC	490	542	590	635	682	721	757
	32	COP	1.10	1.35	1.61	1.90	2.18	2.53	2.92
	35	CC	509	690	903	1157	1421	1748	2119
	35	PC	490	546	598	646	696	739	779
	35	COP	1.04	1.26	1.51	1.79	2.04	2.36	2.72
	38	CC		651	855	1105	1356	1669	2025
	38	PC		549	605	656	710	758	801
	38	COP		1.19	1.41	1.68	1.91	2.20	2.53
JEHRA-0110-B2-M-1	27	CC	933	1262	1655	2108	2621	3252	3966
	27	PC	733	806	873	938	1002	1054	1103
	27	COP	1.27	1.57	1.90	2.25	2.62	3.09	3.60
	32	CC	841	1149	1514	1948	2432	3023	3694
	32	PC	741	823	900	971	1044	1106	1165
	32	COP	1.14	1.40	1.68	2.01	2.33	2.73	3.17
	35	CC	785	1079	1428	1841	2316	2883	3526
	35	PC	743	831	914	992	1068	1136	1201
	35	COP	1.06	1.30	1.56	1.86	2.17	2.54	2.93
	38	CC	730	1010	1341	1733	2200	2742	3358
	38	PC	744	837	927	1012	1091	1165	1237
	38	COP	0.98	1.21	1.45	1.71	2.02	2.35	2.71
JEHRA-0150-B2-M-1	27	CC	1388	1812	2304	2859	3496	4238	5121
	27	PC	1023	1130	1236	1344	1454	1562	1662
	27	COP	1.36	1.60	1.86	2.13	2.40	2.71	3.08
	32	CC	1270	1673	2136	2672	3258	3970	4796
	32	PC	1037	1153	1269	1384	1506	1621	1733
	32	COP	1.23	1.45	1.68	1.93	2.16	2.45	2.77
	35	CC	1196	1586	2031	2544	3122	3800	4596
	35	PC	1043	1165	1287	1409	1533	1656	1774
	35	COP	1.15	1.36	1.58	1.81	2.04	2.29	2.59
	38	CC		1497	1924	2414	2984	3628	4393
	38	PC		1176	1304	1432	1560	1690	1815
	38	COP		1.27	1.48	1.69	1.91	2.15	2.42
JEHSA-0200-B2-M-3	27	CC	1995	2463	3006	3633	4352	5172	6102
	27	PC	1183	1253	1324	1397	1472	1550	1630
	27	COP	1.69	1.97	2.27	2.60	2.96	3.34	3.74
	32	CC	1887	2327	2836	3422	4094	4859	5726
	32	PC	1255	1331	1410	1491	1575	1663	1753
	32	COP	1.50	1.75	2.01	2.29	2.60	2.92	3.27
	35	CC	1801	2224	2715	3281	3931	4673	5516
	35	PC	1314	1392	1473	1557	1643	1732	1825
	35	COP	1.37	1.60	1.84	2.11	2.39	2.70	3.02
	38	CC	1704	2111	2583	3130	3759	4480	5302
	38	PC	1382	1462	1545	1629	1717	1807	1900
	38	COP	1.23	1.44	1.67	1.92	2.19	2.48	2.79
JEHSA-0300-B2-M-3	27	CC	2737	3371	4113	4976	5975	7123	8432
	27	PC	1623	1695	1774	1860	1954	2058	2172
	27	COP	1.69	1.99	2.32	2.68	3.06	3.46	3.88
	32	CC	2581	3173	3864	4669	5600	6670	7893
	32	PC	1748	1825	1911	2005	2110	2226	2354
	32	COP	1.48	1.74	2.02	2.33	2.65	3.00	3.35
	35	CC	2484	3050	3710	4479	5368	6391	7561
	35	PC	1829	1911	2002	2102	2215	2339	2477
	35	COP	1.36	1.60	1.85	2.13	2.42	2.73	3.05
	38	CC	2384	2924	3552	4283	5129	6103	7219
	38	PC	1916	2002	2099	2208	2328	2463	2612
	38	COP	1.24	1.46	1.69	1.94	2.20	2.48	2.76

Table 7: R454A

MODEL	Te / Ta		-20	-15	-10	-5	0	5	10
JEHSA-0200-B2-M-3	27	CC	2417	2969	3611	4344	5189	6140	7216
	27	PC	1377	1460	1544	1633	1720	1814	1910
	27	COP	1.76	2.03	2.34	2.66	3.02	3.38	3.78
	32	CC	2290	2808	3404	4092	4870	5761	6759
	32	PC	1469	1562	1658	1755	1857	1959	2067
	32	COP	1.56	1.80	2.05	2.33	2.62	2.94	3.27
	35	CC	2189	2686	3260	3919	4672	5529	6493
	35	PC	1545	1641	1740	1840	1944	2050	2160
	35	COP	1.42	1.64	1.87	2.13	2.40	2.70	3.01
	38	CC	2076	2552	3104	3736	4466	5291	6228
	38	PC	1632	1732	1831	1934	2037	2145	2255
	38	COP	1.27	1.47	1.70	1.93	2.19	2.47	2.76
JEHSA-0300-B2-M-3	27	CC	3294	4038	4912	5919	7091	8420	9936
	27	PC	1898	1989	2084	2192	2304	2433	2572
	27	COP	1.74	2.03	2.36	2.70	3.08	3.46	3.86
	32	CC	3107	3801	4608	5551	6629	7879	9292
	32	PC	2052	2151	2260	2375	2506	2644	2799
	32	COP	1.51	1.77	2.04	2.34	2.65	2.98	3.32
	35	CC	2991	3652	4422	5317	6348	7534	8880
	35	PC	2155	2261	2376	2501	2638	2788	2955
	35	COP	1.39	1.61	1.86	2.13	2.41	2.70	3.00
	38	CC	2872	3500	4233	5079	6063	7183	8461
	38	PC	2266	2379	2500	2635	2780	2944	3123
	38	COP	1.27	1.47	1.69	1.93	2.18	2.44	2.71

Note:
R454A is not approved for reciprocating compressor models.

Application Guidelines

NOTICE

It should ensure that the refrigeration system which adopts this condensing unit, wherever possible to integrate pump down features. This is to avoid liquid compression which could damage the compressor.

CAUTION

Ensure that new compressors are not subjected to liquid abuse. Turn the crankcase heater on 12 hours before starting the compressor to avoid oil dilution and bearing malfunction.

Table 8: Operating Limit

Operating Limits	Recommendation
Maximum discharge gas temperature	Fusion: 120^{0}C Fusion scroll: 130^{0}C
Low pressure side	Minimum 0.7barg; Maximum 20barg
High pressure side	Maximum 26barg
Evaporator outlet superheat	Above 6K (to avoid liquid flood back)
Suction gas superheat at compressor inlet	Not more than 20K
Voltage supply	1phase: Min: 207V, Max: 253V 3phase: Min: 360V, Max: 440V
Phase asymmetry	+/- 2%
Frequency	50Hz +/- 1%
Outdoor ambient	Min: -20^{0}C, Max: 43^{0}C
Maximum pipe run	25m

Suction line shall be insulated to avoid:

- High superheat during high ambient condition can create high discharge temperature.
- Too low superheat during low ambient condition that can condense refrigerant inside suction line.

Health and Safety

Before Installation

- Ensure the units received are the correct models for the intended application.
- Ensure the selected couple indoor units have qualified and been certified for A2L refrigerant and suitable for the proposed application.
- Ensure the refrigerant, voltage and MWP are all suitable for the proposed application.
- Check there is no damage to the units. If there is any damage, the supplier should be advised immediately.
- Check that the proposed equipment locations are well ventilated, at least 3m away from any possible ignition source (temperature, spark etc), and provide adequate support for the weight of the units.
- Carry out full risk assessment on the equipment location, installation, and application to ensure a safe environment is maintained according to The Dangerous Substances and Explosive Atmosphere Regulations (DSEAR).

During Installation and subsequent maintenance

- Only certified and qualified personnel who are familiar with local codes, regulations, and are experienced in handling mildly flammable (A2L) refrigerant system equipment could perform the installation and maintenance.
- If lifting equipment is required, ensure that it is suitable for purpose, certificated and that the operators are qualified to use it.
- Ensure that there is not any ignition source present during installation and maintenance.
- Ensure the working area has adequate ventilation whether by natural ventilation or forced ventilation. If forced ventilation is required, make sure the equipment used for ventilation is A2L compatible, non-sparking or ATEX rated.
- Secure the work area using a warning sign and make sure that a suitable fire extinguisher is nearby when performing installation or maintenance.
- Use ATEX certified or A2L compatible equipment and wear appropriate personal protective equipment (PPE) when performing unit installation and maintenance.
- If the unit is installed inside an enclosed area, at least one leak detector which purpose is to trigger the alarm system if the refrigerant concentration has reached 25% of the Lower Flammable Limit or 50% of the Acute Toxicity Exposure Limit/Oxygen Deprivation Limit must be installed in the enclosed area. The alarm system shall warn audibly (15dBA above background level) and visibly.
- Ensure no refrigerant can migrate to other rooms inside the building and there is not any ignition source near to the ventilation passage.
- The units contain moving machinery, electrical power hazards and fire hazards, which may cause severe injury or death. Disconnect and shut off power before installation or service of the equipment.
- Units must be grounded, and no maintenance work should be attempted prior to disconnecting the electrical supply.
- The electrical covers and fan guards must remain all the time.
- Ensure there is not any refrigerant throughout the pipeline when carrying out any brazing or “hot works” on the refrigerant circuit.
- Refrigerant release into the atmosphere is illegal. Proper evacuation, recovery, handling, and leak testing procedures must be observed all the time.
- Whenever a leak of refrigerant has been discovered, do not energize or de-energize any electrical component until the environment has been ensured to be safe.
- 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.
- It is strictly restricted to replacing any faulty components or parts which are not approved by J & E Hall. All new components used to replace faulty parts must meet the same safety standard and marking as original component.
- The units are not designed to withstand loads or stress from other equipment or personnel. Such extraneous loads or stress may cause failure/leak/injury.

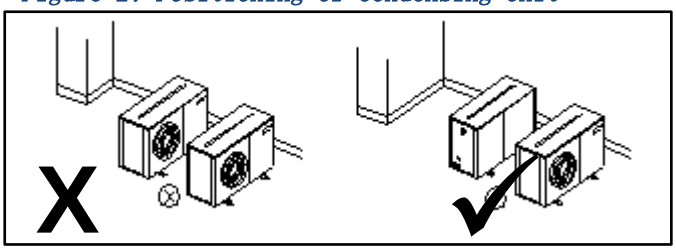
- The units are not designed to operate with any restrictions such as heavy snowfall around them. Additional measures (such as shielding of the units) shall be implemented as required.
- The installer must fix the unit securely on installation using the M8 bolt holes in the unit feet to prevent instability from accidental contact or from exposure to the elements (e.g. wind).
- Ensure correct rotation of scroll compressor. If there is no compression, shut off the incoming power supply and swap connection of any two of the three incoming phases at the condensing unit's motor rated circuit breaker.

Installation

Unit location

- To achieve maximum cooling capacity and safety, 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.

Figure 2: Positioning of Condensing Unit



- Ensure that there is no obstruction to air flow into or out of the unit. Remove obstacles which block air intake or discharge. Do not expose directly to strong wind.

Figure 3: Air Circulation for Condenser

- The location must be well ventilated, so the unit can draw in and distribute plenty of air thus lowering the condensing temperature and concentrations of refrigerant that may accumulate inside the unit in the unlikely event of leakage.
- Ensure there are not any possible ignition sources located near to the unit. All possible ignition sources must be more than 3m away from the unit location.
- For the unit located inside an enclosed area, the warning sign must be present to alert other personnel.
- To optimize the unit running conditions, the condenser coil must be cleaned at regular intervals.
- The unit must be level in all directions.
- It is recommended to install the unit on rubber grommet or vibration dampers.
- All the models are suitable for both ground and wall mounting on brackets.

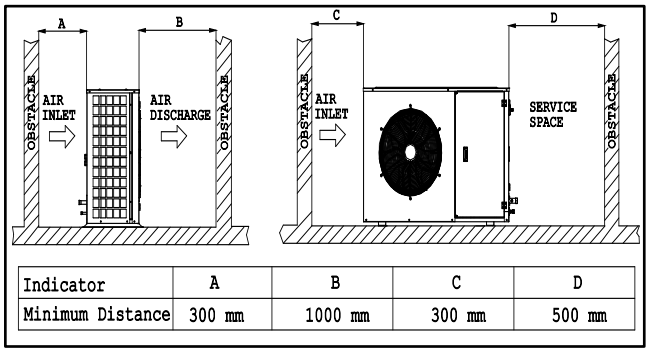
NOTICE

Special attention should be given if unit installed near to the sea as this can reduce unit lifespan due to corrosion of metal parts.

Installation clearances

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

Figure 4: Installation Clearance



Indicator	A	B	C	D
Minimum Distance	300 mm	1000 mm	300 mm	500 mm

Field Piping

NOTICE

Pipe sizing should only be determined by qualified personnel. Correct line sizing will minimize the pressure drop and maintain sufficient gas velocity for proper oil return. All applicable standards must be observed, and risk assessment must be conducted in the installation of refrigerant piping.

WARNING

Never perform brazing when there is refrigerant inside the pipeline.

To ensure safety and 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.
- Pipes with removable joints must not be used in areas with human traffic.
- Avoid flare type connections and take great care when brazing. Use brazing filler alloys containing phosphorus such as BCuP-7 without flux for joining copper tubes.
- Dissimilar metals such as copper and brass shall be joined using an appropriate flux with high silver content filler material such as BAg-34. Apply flux sparingly to the clean tube only and in a manner to avoid leaving any excess inside of completed joints.
- Use only clean, dehydrated refrigeration grade copper tube with long radius bends.
- To prevent oxidation, purge pipework with oxygen free nitrogen when brazing.
- Install insulation on all suction lines and all pipes penetrating walls. Try to avoid running the pipes through hot areas.

- In vertical pipework, the use of a U-trap and double suction risers are 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.
- Adequately support all pipework at a maximum of 2m intervals.
- Suction gas velocity must be sufficient to ensure good oil return.
- Suction pipework should slope gently back towards the unit to assist oil return to the compressor. A fall of approximately 2cm per meter of pipework is acceptable.
- Avoid low points on pipework where oil can accumulate.
- 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).
- 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.
- Wherever the condensing unit is located below the indoor unit (coldroom evaporator / display case), the difference in height between the two units should not be more than 6m.
- 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.
- A leak inspection must be carried out directly after installation.
- The maximum allowable pipe length is 25m.
- No valves and detachable joints shall be in areas accessible to the public except when they comply with EN 16084.
- Field piping for outdoor unit located below indoor unit: Inverted P-trap is necessary when pump down is not used (***Figure 6***). To prevent refrigerant from draining into the compressor during off-cycle.

NOTICE

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

Figure 5: Piping Layout for Outdoor Above Indoor

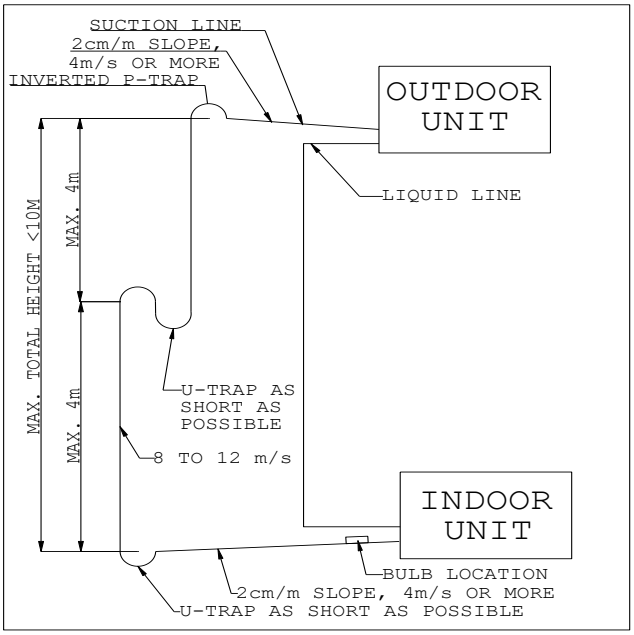
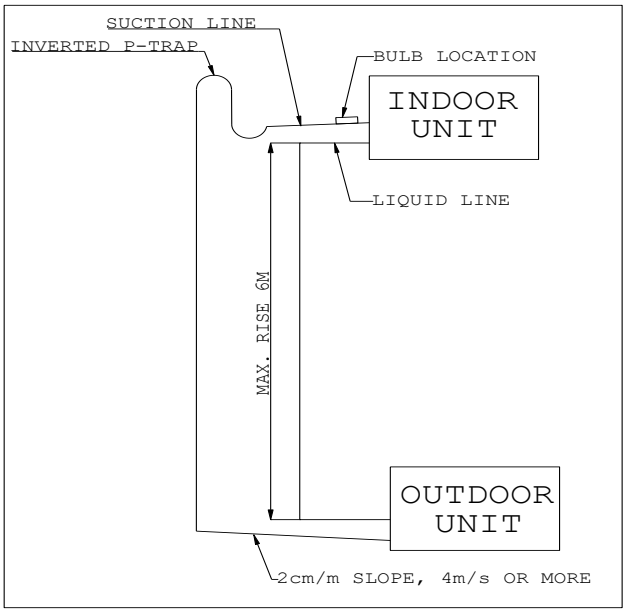


Figure 6: Piping Layout for Outdoor Below Indoor



Pressure Testing


CAUTION

- **Never use oxygen, dry air, or acetylene for pressure testing systems as these may form an inflammable mixture.**

- 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 and indication tag prior to pipework installation using the service valve or regulator with pressure gauges and hoses.
- Once the pipework installation is complete, it should be pressure tested for leak prior to evacuation.
- A pressure leak test should be carried out using oxygen free nitrogen (OFN). 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 Personal Protection Equipment (PPE) as required.
- Always pressurize the system slowly, preferably in stages up to the maximum required pressure. Never exceed maximum test pressures shown in below table. Failure to obey the limit will cause premature failure on the pressure safety device.

Table 9: Test Pressure

High Side, barg (psig)	Low Side, barg (psig)
26 (377)	20 (290)

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

Evacuation and Charging


NOTICE

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) measured at refrigeration system, and not at the vacuum pump gauge.

Once pressure testing has been completed, the system can now be evacuated to remove 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 in open position.
- 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 repeat the evacuation procedure.
- Once evacuation is 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. **Only A2L compatible equipment is allowed to be used for the charging process**. Ensure the refrigerant type is correct as shown on the product nameplate.
- Refrigerant blend must be charged in liquid form to avoid change of chemical properties. **Charging 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.
- **DO NOT exceed the maximum allowable quantity of refrigerant charge or overcharge the system and DO NOT mix with other refrigerant types**. Always use suitable personnel protective equipment when charging the system.
- Ensure an adequate liquid charge (4~5barg) has been introduced to the high side of the system via schrader port of liquid receiver before starting the compressor.
- The remaining charge is slowly throttled into suction side until the installation has reached a level of stable nominal condition during operation. Charging liquid into the suction side of the system should ONLY be done with a metering device. Ensure a minimum operating pressure 0.5barg is maintained when add refrigerant to the suction side, otherwise overheating of the scroll may occur. Use calibrated weighing scales to record the amount of refrigerant added to the system.
- Stop the filling once obtain sufficient suction superheat and liquid subcooling, remove the cylinder from circuit.


NOTICE

Refrigerant charge by judging the liquid sight glass does not guarantee as 100% correct way.

Risk Assessment

It is important to ensure that sufficient free space is allowed around the indoor evaporator to ensure that the flammable mixture is not created during the event of refrigerant leakage. Ensure the cold room size is enough for the refrigerant charge of the system by the following steps:

1. Determine the duty required based on the cold room size.

2. Select suitable evaporator and condensing unit based on the required duty.

3. Calculate the pipe run and total system refrigerant charge and needed.

4. Calculate the acceptable minimum room size based on EN378 as below:

$$\text{Min Room Size (m3)} = \frac{Total\ Ref\ Charge\ (kg)}{LFL\ x\ 0.2}$$

5. Check whether the cold room size is larger than the minimum room size calculated, try the following options if the cold room size is smaller.
   (a) Reduce the length of pipe run in the system.
   (b) Split into 2 smaller systems instead of 1 larger system.

6. Contact your equipment wholesaler for a DSEAR free volume assessment based on EN 60079-10-1:2015 to ensure the volume within the cold room is sufficient to prevent flammable atmosphere will not be formed.

Electrical

NOTICE

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. A motor residue current protector is recommended to be installed outside the condensing unit.

J & E Hall Fusion & Fusion Scroll A2L condensing units require power supply single or three phases which include Neutral and an Earth. These systems are not suitable for any other supply voltages (other than specified in ***Table 8***).

- Mains supply cable type and size must be selected to suit the 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.
- All cables connected to the electrical box must be a **multicore cable**.
- Connect the mains supply to the units as per the wiring diagrams.
- Ensure that the power supply corresponds to the unit and that the power supply is stable.
- Connect power supply according to the present norm and legal requirement. Ensure that the unit is properly connected to the ground.
- 3phase scroll compressor: live wires need correctly terminated at motor rated circuit breaker for the compressor to rotate in correct direction (compression).
- The unit is equipped with a motor circuit breaker with thermal overload and magnetic trip short circuit protection for the unit. It was preset from factory and never set value higher than set current on wiring diagram.
- Ensure all the cable glands are fully tightened and no cable glands are left open or untightened. If any cable glands were left unused, fit a 50mm cut multicore cable to the cable gland and tighten the cable gland with torque as stated in ***Table 15*** to ensure no refrigerant was allowed to ingress into the electrical box.
- Before access to the electrical box, ensure the environment is safe from flammable refrigerant leakage with the use of a suitable leak detector. **DO NOT energize or de-energize any electrical components until a safe environment is ensured.** To gain access to the electrical box, turn the mains isolator switch on the service panel of the unit to the OFF position, remove the screws from the service panel and remove panel. The electrical box is located behind the panel. Remove the screws in the electrical box cover to access components. Make sure the hole for extension rod of the main isolator is perfectly sealed by the rubber bush on the electrical box cover afterwards.

Reverse Rotation Protection and Voltage Unbalance

The condensing unit does not include phase protector. Thus, it is necessary to ensure correct scroll compressor rotation and incoming line voltage variance within +/-2% during commissioning.

CAUTION

3 phase scroll compressors require proper phase sequence to secure right rotation and therefore compression.

- **Do not use a megohmmeter nor apply power to the compressor while the system under vacuum as this may cause internal damage to the compressor.**

- **Never start the compressor under vacuum (do not operate the compressor with the low-pressure cut-out bypassing), as this will cause the rotating part to overheat very quickly causing premature failure.**

- **There must be no more than 10 compressor's start per hour. A higher number reduces the service life of the compressor. There is no minimum off time for the compressors. Adequate minimum run time of 3 minutes is required to ensure proper oil return.**

Commissioning

To gain access to the electrical box, turn the motor rated circuit breaker on the side of the unit to the OFF position and loosen the screws on the left-hand side of the door. The electrical box is located behind the door. Remove the screws in the electrical box cover to access components.

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 cable glands are fully tightened and fitted with cable.
- The hole for the main isolator extension rod in the electric box cover had fully sealed by rubber bush.
- All moving parts rotate freely, and guards fitted.
- Initial settings for safety switches and fan speed control are correct.
- Overload set correctly.
- The timer is set correctly.
- All valves are in correct operating position.
- Initial refrigerant charge is correct.
- Crankcase heater energized for a minimum of 12 hours before compressor start-up.
- Gauge manifold connected to both low and high sides of system.
- There are not any refrigerant leaks.

Running the unit

- Run the unit and check compressor and condenser fan operation. The condenser fan must start promptly and then the compressor starts after 30 seconds of time delay for pre ventilation.
- Check system pressures and temperatures, gas charge and running currents of motors to ensure correct operation.
- 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.
- Carry out final leak test and ensure all panels/covers are fitted and screws tightened.
- Ensure the electrical box is fully sealed.
- Log all information along with the system model and serial numbers for future reference.
- Ensure that the customer / responsible person is provided with basic operating instructions and given information of the location of electrical isolators, in case of emergency.

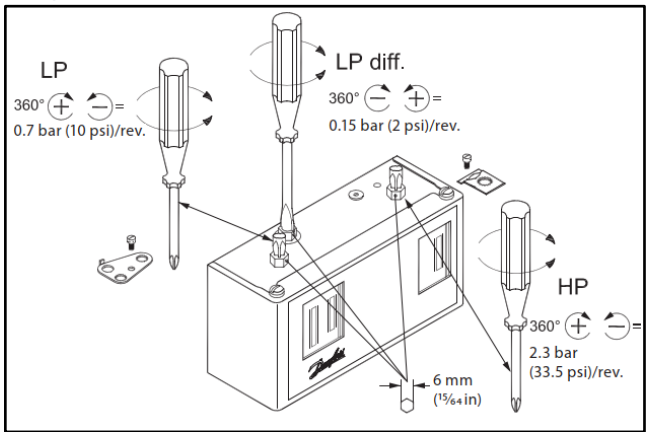
Scroll Compressor Operation

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 motor rated circuit breaker, reapply power to the unit and following compressor restart, recheck operating pressures.***

Dual Pressure Switch

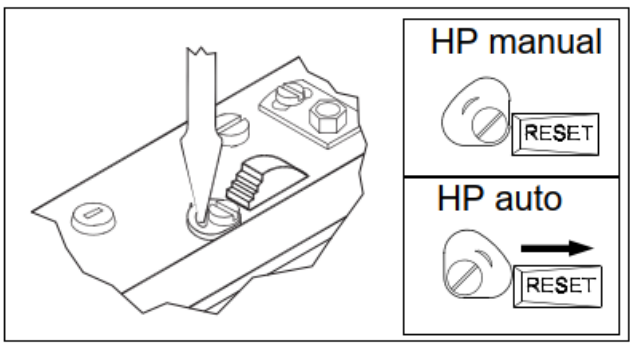
The dual pressure switch fitted to condensing units is auto reset for low pressure side and manual reset for high pressure (fixed differential) are **NOT factory preset for application.**

Figure 7: Adjustment on **Danfoss KP17WB**



KP17WB has high pressure convertible reset feature. Insert screwdriver into the slot on the lock disc and turn it to the desired reset configuration as shown in ***Figure 8***.
Do not turn the screw on the lock disc as it may damage the convertible reset mechanism.

Figure 8: **KP17WB: High Pressure Reset Option**



When high pressure trip is changed to auto reset on KP17WB, the compressor is ready to turn ON when discharge pressure drops below the setting value of (Cut Out – Fixed Differential).

NOTICE

When HP switch cut out mode is changed from Manual to Auto operation, the fitting of an ART (anti-recycle timer) is recommended to protect the compressor.

Table 10: Dual Pressure Switch Manufacturer Setting

Model	High (barg)		Low (barg)	
	Cut Out	Diff. (Fixed)	Cut In	Diff (adj)
KP17WB	18	4	3	2

Both the LP and HP switch settings must be adjusted to suit application before starting the unit. Ensure that the high-pressure setting does not exceed the value shown in ***Table 11***.

High pressure safety

- The high-pressure safety switch is required to stop the compressor should the discharge pressure exceed the compressor's high side operating pressure.
- The high-pressure switch can be set to lower values depending on the application and ambient conditions.

Low pressure protection

- The low-pressure protection cut out switch protects the compressor against deep vacuum operation, a potential cause of failure due to internal arcing and operating outside the compressor limits.
- The low-pressure protection cutout should never be set lower than the min. LP cut out value in **Table 11**. For systems without pump-down integrated, the LP switch signal contact shall be used to energize a low-pressure safety alarm.
- If a thermostat is used for room temperature control, and a pump down feature is not integrated, a low-pressure control of the manual reset type should be wired in series with the thermostat to serve as a protection cut-off in the event of loss of refrigerant charge or other abnormal conditions which resulting in low suction pressures.
- When used for low temperature operational control, the low-pressure control should be provided with a low differential for accurate control. For accuracy, refrigeration gauges must be used in setting cut-in and cut-out points, since the indicator on the face of the pressure switch is not sufficiently accurate for control purposes.
- Compressor operating pressures should be kept within the range specified in ***Table 11***.

Table 11: Compressor Operating Pressures (barg)

Series	AJ		YB		
Ref.	R455A	R454C	R455A	R454A	R454C
Min. LP Cut Out	0.9	0.7	0.9	1.2	0.7
Max. HP Cut Out	26				
LP Range	0.9~5.7	0.7~4.2	0.9~5.7	1.2~6.5	0.7~4.2
HP Range	10.9~24.3	9.2~21.6	5.7~24.3	6.5~26.9	4.2~22.7

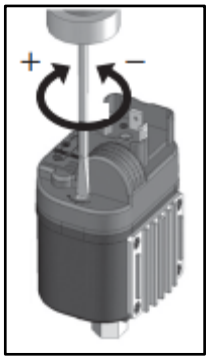
Crankcase Heaters

Crankcase heater should remain energized during the compressor off cycles. The initial start in the field is a very critical period for any new compressor because all load-bearing surfaces are new and require a short break-in period to carry high loads under adverse conditions. Thus, the crankcase heater must be turned on a minimum of 12 hours before the first-time start, to prevent oil dilution and bearing stress on initial start-up.

Fan Speed Controller XGE-4C

The fan speed controller is factory set to 19barg (maximum speed) and cut off when drop below 13barg, for operation with R4*** series refrigerant to ensure compressor always operates within the unit operating envelope.

Figure 9: Full Voltage Adjustment on XGE-4C



1 Turn	~1.5bar
Full voltage adjusting range	10~25barg
Full voltage set point (factory setting)	19barg full speed, mode: cut off at Pmin.
Effective proportional band	6 barg (fixed)

- The FSC is set according to ***Table 12*** to gain higher energy efficiency as published in the Ecodesign data sheets.

Table 12: FSC Settings to Obtain Ecodesign Data

Model	FSC settings (barg, full speed)
	R455A, R454A, R454C
S1; S2	16

Electronic Timer Series Micon 175™ 12ODT4

The electrical control box of all models is mounted with an on delay electronic timer - 12ODT4 to control the condenser fan for the purpose of pre ventilation for 30 seconds (factory setting) each time the compressor is asked to operate. **Do not reduce the setting to below 30 seconds.**

The electronic timer will start to countdown as soon as the supply voltage is applied, and this is indicated by a flashing Green LED. After the set time has been reached, the output relay of the timer is then energized and both Red and Green LED light will be ON, **not** flashing. The time set (Ts) is the product of the Range preset (T) and Timing preset (t) on the timer.

Discharge Thermostat

(Applicable to JEHSA-0200-B2-M-3; JEHSA-0300-B2-M-3)

Only scroll models specified above are equipped with discharge thermostat with specification (cut out = 125±4°C, cut in = 95±5°C). The thermostat is connected in series to dual pressure switches, to disconnect all three phases at contactor in case of overtemperature.
Overheating could be due to compressor working at high compression ratio (low evaporating and high condensing pressure); loss/ inadequate charge; or condenser fan not working. Time must be allowed for the compressor to cool down before the thermostat auto reset.

For scroll compressors with motor protection code "F", an internal line break motor protector is located at the center of the Y of the motor windings (motor located in low pressure dome), to disconnect all three phases in case overcurrent or overtemperature condition. The protector is the automatic reset device containing snap action bimetal switch which reacts to a combination of motor current and motor windings temperature. When the internal motor protector has tripped, it will take 30 to 40 minutes to reset and then the compressor will restart.

On a field application, when the internal motor protector has tripped, the compressor will stop while each of 3 terminals is still energized, to which either the customer or serviceman may regard the compressor as fail down. Therefore, the above-mentioned situation should be taken into consideration.

Units with microchannel condenser

- Care must be taken during charging a unit where a microchannel condenser coil is fitted.
- The microchannel coils hold less refrigerant than traditional fin/tube coils, it is easier to be overcharged, especially if the system is commissioned during wintertime which 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~20K and that the compressor discharge temperature is between 50°C~ 90°C.
- A compressor 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 cause high discharge temperatures. In either case, it is likely that compressor damage/failure will occur.

Service and Maintenance

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 the test run.

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 through 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. **Electrical box – Inspect at regular intervals.**

- Check for the EPDM rubber sealing around the electrical cover. Make sure the EPDM rubber sealing is fully attached and in good condition.
- Check for the rubber bush sealing on the main isolator extension rod.

5. **Controls**

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

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. **Tightness of component – Inspect at regular intervals.**

- All the valves and cable glands shall be inspected for tightness to ensure no leakage which might cause the risk of fire. Refer Table 15 for the recommended tightening torque.

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.

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

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.

In F-Gas Regulation EU 517/2014, the requirement for leak testing on the system is based on the charge size in tonnes of CO_2 equivalent. Which means systems with higher GWP refrigerants will need to be leak tested more frequently than those with the same charge weight of a lower GWP refrigerant.

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:

Table 13: Tonnes CO_2 Equivalent

		Refrigerant Charge - kg
Refrigerant	**GWP**	**5T CO_2Eq**
R455A	148	33.8
R454A	239	20.9
sR454C	148	33.8
R448A	1387	3.6
R449A	1397	3.6

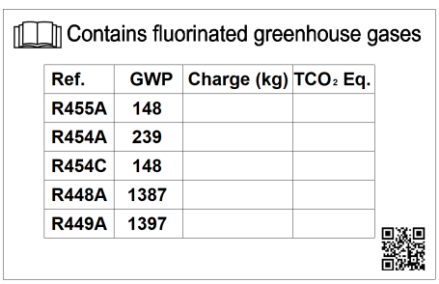
Starting 1st January 2017, the requirement for leak detection and maintaining system logs changes from 3kg HFC to $5TCO_2Eq$.

Table 14: Leak Inspection Frequency

System Charge (TCO_2 Eq)	Leak Inspection Frequency
e.g. 33.8 to 337.8 kg R455A 5 to < 50	• At least once every year. • At least once every 2 years if a fixed leak detection system is fitted.

$$TCO_2\ Eq\ value = \frac{Refrigerant\ Charge\ (kgs) \times Refrigerant\ GWP}{1000}$$

A refrigerant charge label is supplied with each unit (inside the electrical box). The total refrigerant charge for the system and the TCO_2 Eq 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 unit. An example of the unit label is as follows:



Appendix

Figure 10: Outline Drawing JEHRA-0067-B1-M-1

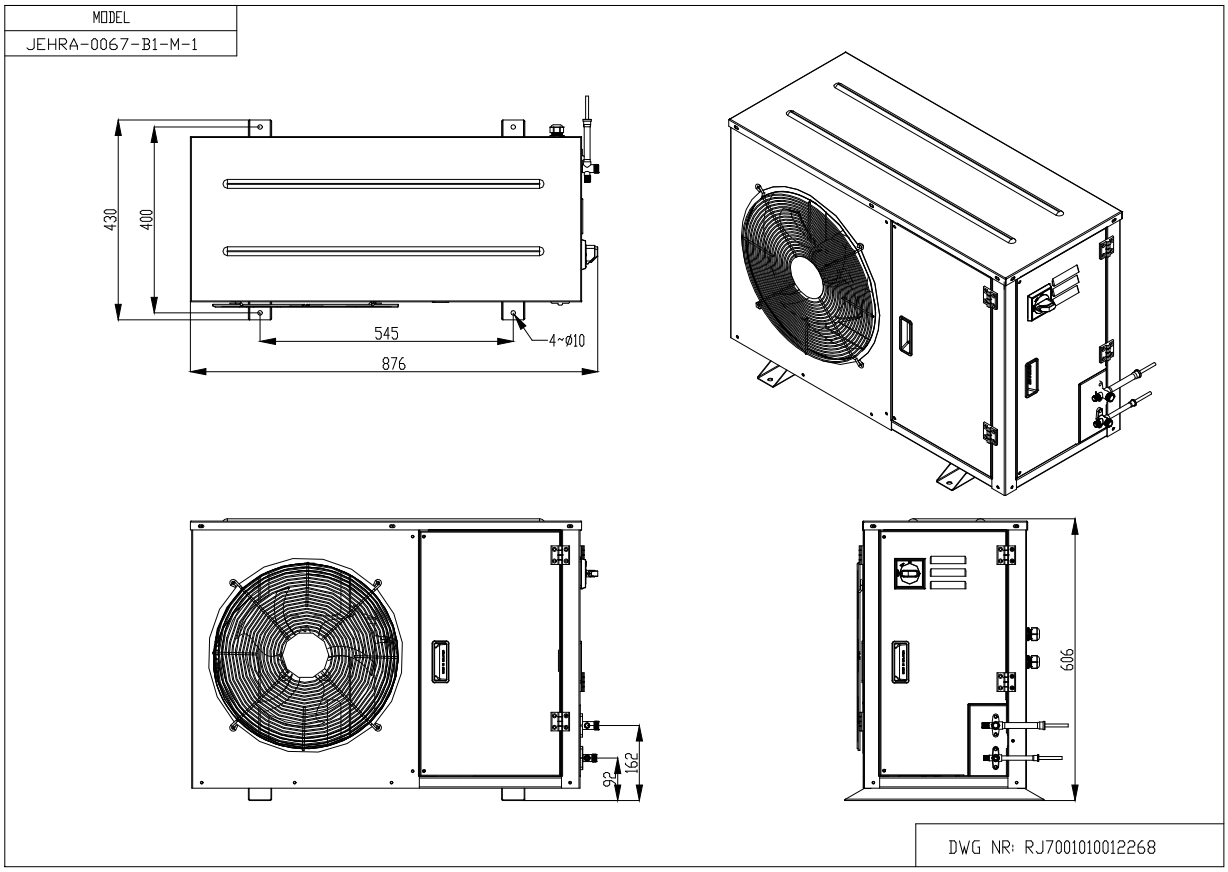


Figure 11: Outline Drawing JEHRA-0110~0150-B2-M-1, JEHSA-0200~0300-B2-M-3

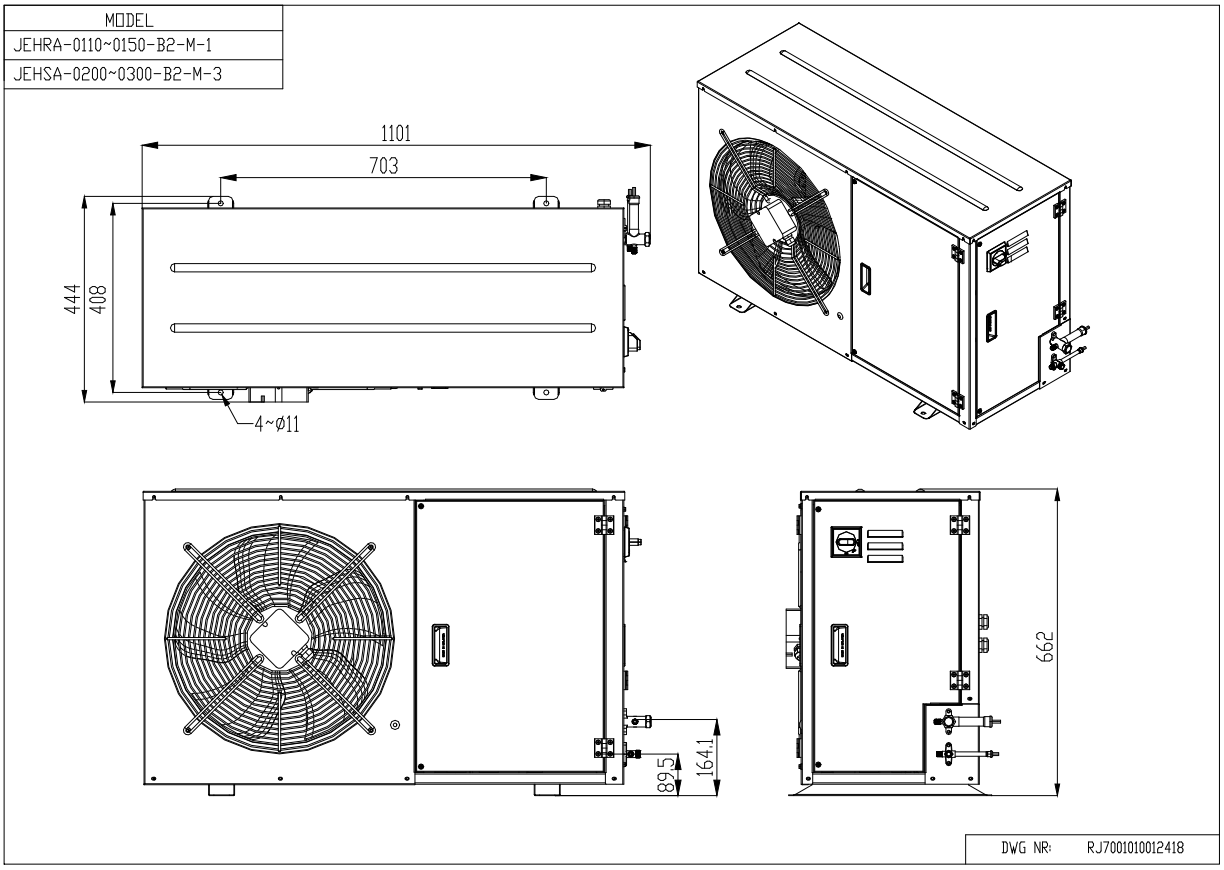
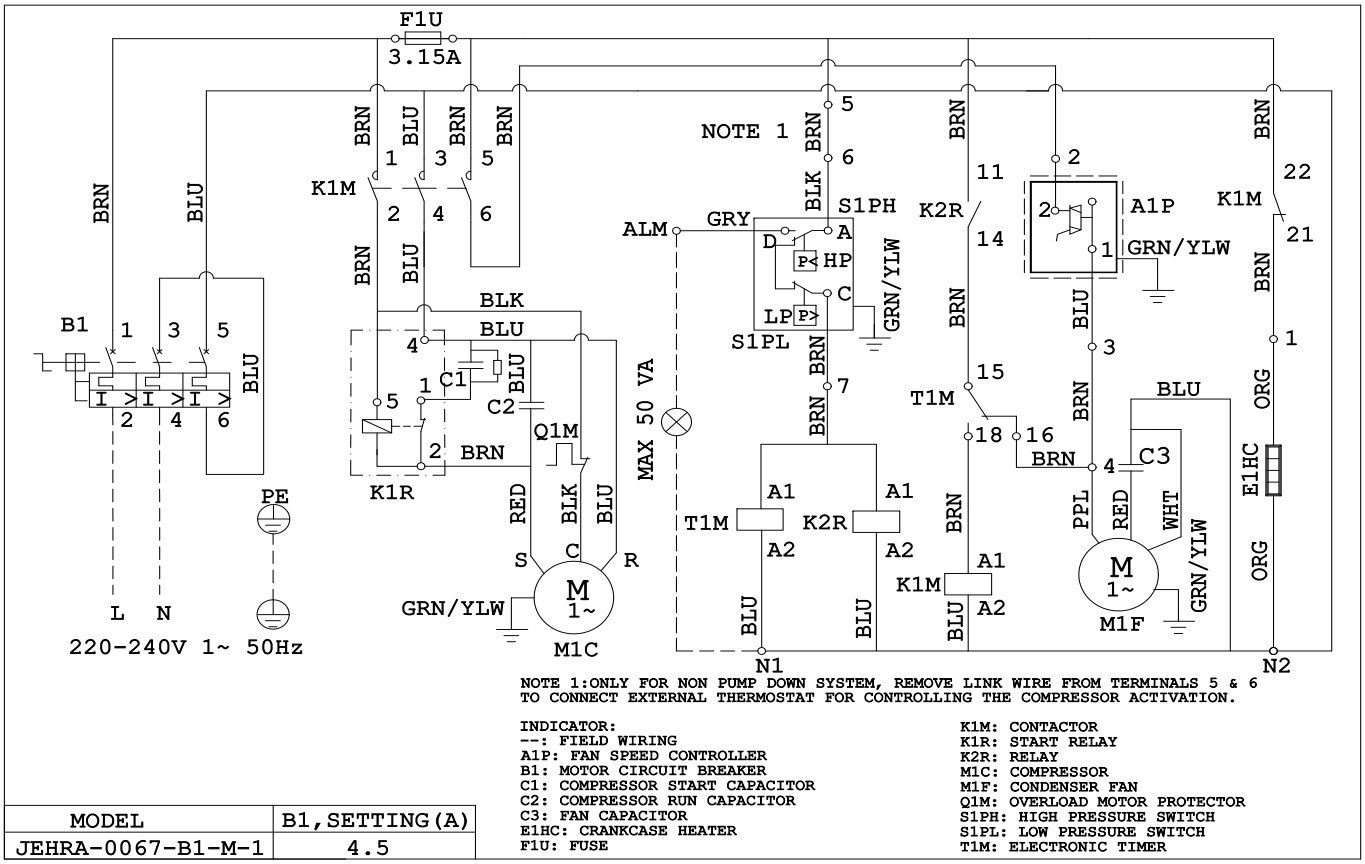
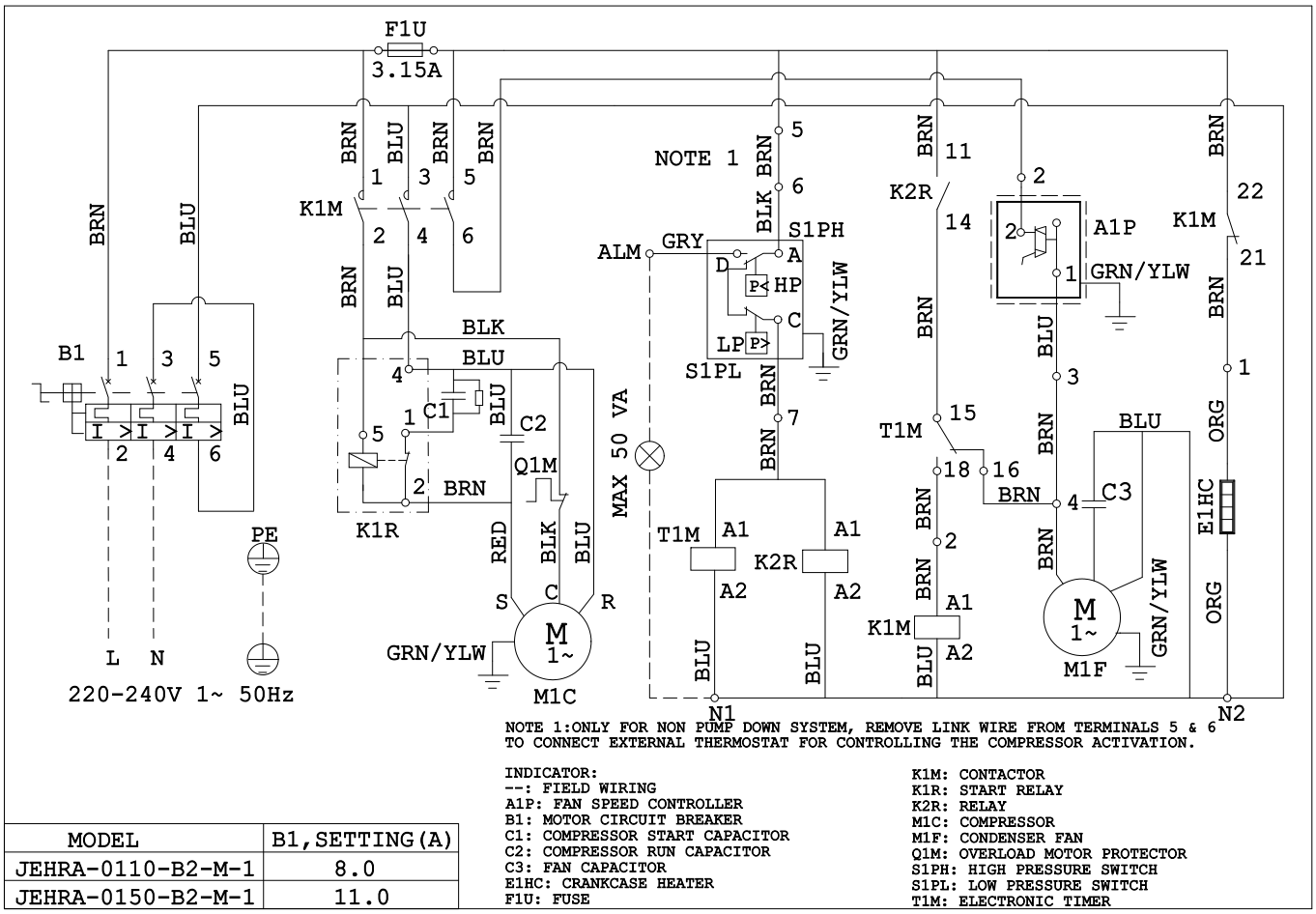


Figure 12: Wiring Diagram JEHRA-0067-B1-M-1



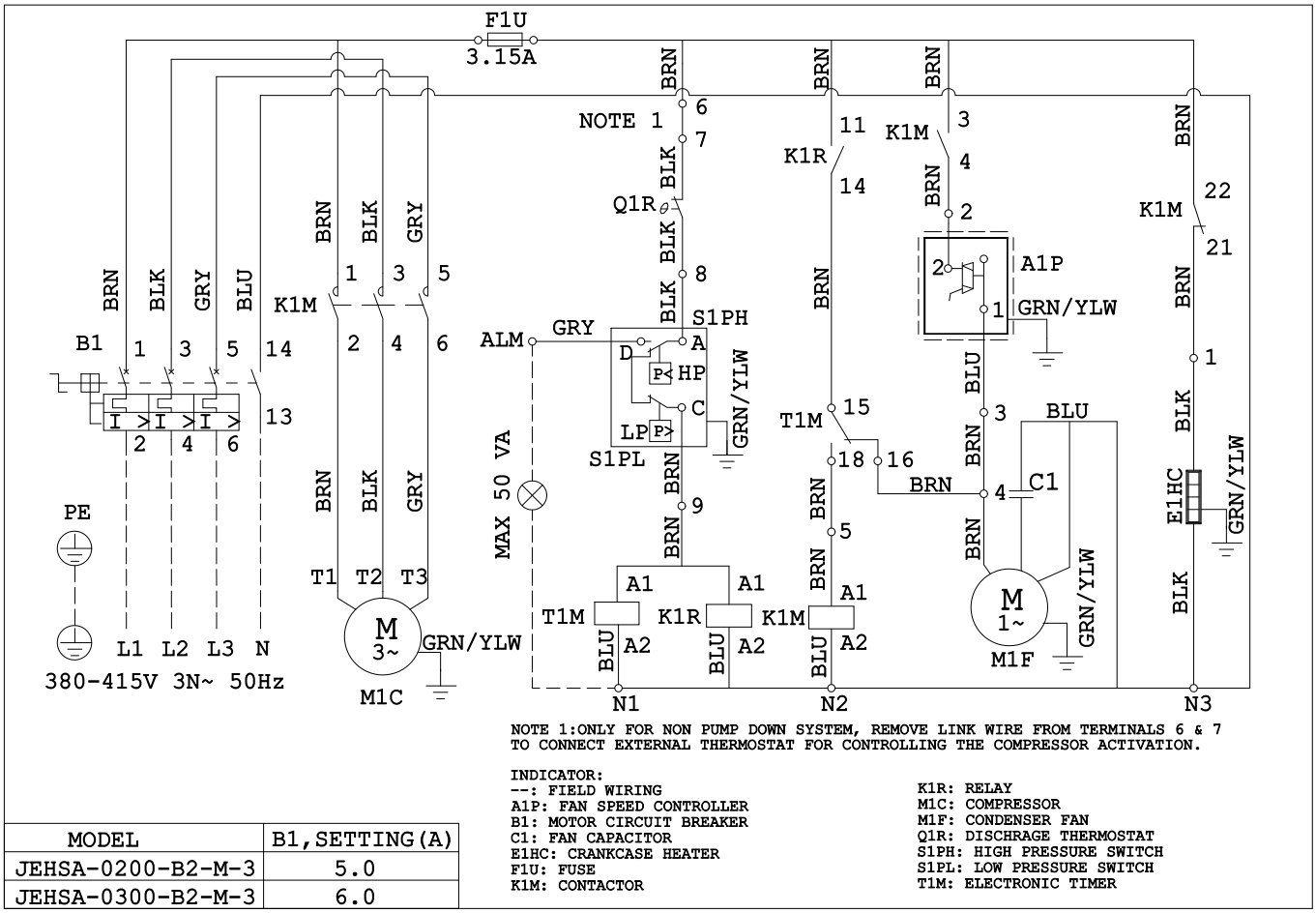
MODEL	B1,SETTING(A)
JEHRA-0067-B1-M-1	4.5

Figure 13: Wiring Diagram JEHRA-0110-B1-M-1, JEHRA-0150-B1-M-1



MODEL	B1,SETTING(A)
JEHRA-0110-B2-M-1	8.0
JEHRA-0150-B2-M-1	11.0

Figure 14: Wiring Diagram JEHSA-0200-B2-M-3, JEHSA-0300-B2-M-3



MODEL	B1,SETTING(A)
JEHSA-0200-B2-M-3	5.0
JEHSA-0300-B2-M-3	6.0

Table 15: Recommended Tightening Torque

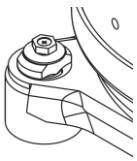
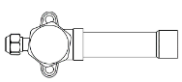
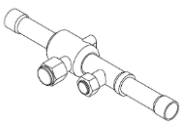
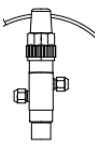
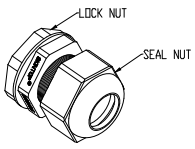
Model	Tightening Torque (Nm)								
	Compressor Mounting	Service Valves		Ball Valve		Liquid Receiver	Schrader Valve; Charging Port	Cable Glands (Seal Nut and Lock Nut)	
		Liquid	Suction	Discharge	Liquid			M12	M20
JEHRA-0067-B1-M-1	M8 (13 Nm)	M16*1.0mm (20-25 Nm)	M16*1.0mm (20-25 Nm)	N/A	M14*1.5mm (25-30Nm)	NPT Brazed Connection Plug 3/8"NPT(18-22Nm)	7/16" - 20UNF (14-16 Nm)	M12*1.5mm (1.5 Nm)	M20*1.5mm (6 Nm)
JEHRA-0110-B2-M-1			M18*1.0mm (25-30 Nm)						
JEHRA-0150-B2-M-1									
JEHSA-0200-B2-M-3			M25*1.0mm (42-47 Nm)	M16*1.5mm (40-45Nm)					
JEHSA-0300-B2-M-3									
Graphic Presentation							N/A		

Table 16: Trouble Shooting

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
COMPRESSOR			
Compressor will not start	Power supply	Phase(s) and neutral present?	Check/rectify
		Voltage within tolerance?	Check/rectify
		Is isolator switched on?	If not - switch on
	Compressor contactor not pulled in (where fitted)	Is there correct voltage to contactor coil?	If yes - coil faulty. Replace contactor/coil
			If no - check for break in control circuit or blown control fuse.
		Has a safety switch tripped out?	Check cause and reset
	Compressor contactor pulled in but compressor not running	Is voltage being switched across contactor?	If yes - check voltage at compressor terminals and compressor wiring
			If no - Replace the faulty contactor
	Safety switch tripped (LP, HP, Overload)	Low and High pressure conditions and current draw on overload. Check settings of safety switches are correct.	Reset and rectify any abnormal conditions or adjust switch settings if not set correctly
	Compressor internal overload tripped	Is the correct voltage at compressor terminals?	Compressor has overheated - allow time for reset (up to 3 hours) and rectify cause
	Control fuse blown in panel		Replace fuse and test - rectify fault
	Starting kit faulty (single phase units only)	Check relay operation and contacts and inspect start/run capacitors	Replace as necessary
	Motor windings faulty	Check resistances of windings against manufacturer values	Windings that show open circuit could be due to internal overload trip. Wait for reset and recheck. If continually open circuit - motor faulty. Replace compressor.
	Compressor seized	Does compressor attempt to start but does not run correctly (makes humming sound)? Are amps equivalent to LRC rating?	If all electrical checks on components as above are OK - Change compressor
Compressor runs but no effect on suction/discharge pressures	Mechanical failure	Are compressor motor amps lower than expected? If so - potentially valve reeds damaged or other internal wear/damage	Try pump test on compressor. If test fails - replace compressor.
	(For three-phase scroll compressors only)	The compressor may be running backwards - the compressor will also be noisier than normal	Swap any two of the incoming phases to the isolator switch and recheck.
Compressor starts and stops too quickly	Operating on safety switches	Check LP & HP settings - is the LP differential too small or the HP setting too low?	Check and adjust switch settings. Check all valves are in open position
	Refrigerant levels	Is there too little refrigerant in the system causing rapid LP tripping or too much refrigerant in the system causing HP tripping?	Check refrigerant level and adjust accordingly
	Faulty contactor (if fitted)	Are the contacts chattering on the contactor?	Contacts may be dirty or worn. Check and replace contactor as necessary
	Loose / broken wiring connection		Make sure all electrical connections are sound
Compressor is noisy	Vibration	Rubber feet mountings worn or bolts are loose/missing	Replace mountings and tighten/replace bolts as necessary
	Liquid refrigerant	Does compressor 'knock' when starting up or running? Liquid refrigerant may be present in oil and compression chambers	Identify cause of liquid return to compressor and rectify
	Overloaded	Are suction and discharge pressures too high? There may be too much load on the compressor.	Identify cause of increased load and rectify
	High discharge pressure	Blocked condenser / faulty condenser fan	Check and rectify

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
		Refrigerant overcharge	Check and rectify
		Non-condensable in system	Reclaim refrigerant, evacuate & recharge
	Internal wear / damage	Noise is always present even if all operating conditions are OK?	Replace compressor
Compressor body too hot	System load too high	Are suction and discharge pressures high?	Reduce load at evaporator
	High discharge pressure	Blocked condenser / faulty condenser fan	Check and rectify
	Lack of compressor cooling	Suction superheat too high	Check refrigerant charge correct
			Check TEV superheat setting correct
			Is suction line correctly insulated?
	Compressor starting too frequently	Are controls set correctly - is the differential on thermostat or LP switch too small?	Check and adjust
		Is the liquid line solenoid valve allowing refrigerant to pass when closed?	Check valve and clean seat or replace as necessary if damaged
	Discharge gas bleeding into suction side	Does suction pressure rise abnormally when compressor stops or compressor fails to pump down correctly?	Compressor valve reeds may be damaged - replace compressor
CONDENSER FAN			
Condenser fan will not run	Power supply	See compressor will not start section	See compressor will not start section
	Compressor contactor not pulled in	See compressor will not start section	See compressor will not start section
	Compressor contactor pulled in	Is voltage being switched across contactor?	If yes - check voltage to FSC and to fan motor. If correct voltage present at motor - fan faulty. Replace fan
			If no. Replace faulty contactor
	Being controlled by FSC (if fitted)	Is system operating pressure below FSC setting?	If yes - all OK (check fan operates when pressure rises)
	Fan capacitor fault	Check visual condition of capacitor and check capacitance reading with capacitor meter.	Replace capacitor if required
	Motor fault	If FSC fitted - bypass FSC to test motor. If motor still does not run - motor is faulty	Replace motor
Condenser fan runs but only slowly	Is fan being controlled by FSC?	Is head pressure under control (~14/15 bar) and fan speed increases as head pressure rises?	All OK
		Is head pressure above 16 bar?	Check setting of FSC. Adjust if necessary.
	FSC faulty	If fan runs slowly even after adjusting FSC with head pressure rising - FSC may be faulty	Change FSC
SYSTEM			
Insufficient cooling	Lack of refrigerant	Is sight glass flashing continuously?	Leak test system and top up with refrigerant
	Condenser coil dirty	Visual check of coil condition	Clean condenser coil
	Lack of ventilation to unit	Any obstructions around unit?	Clear same to ensure good ventilation
	Compressor not pumping efficiently	Carry out pump test on compressor	Replace compressor if fails pump test
	System settings	Controls (including thermostat) set correctly?	Adjust as necessary
		T.E.V. Superheat	Adjust as necessary
	Service valves do not open correctly	Are valves fully open?	Adjust as necessary
	Restriction in piping/component	Is the filter drier blocked? Sweating/frosting on outlet of drier indicates a blockage	Replace filter drier

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
		Damage to piping	Replace piping as required
Head pressure too high	Condenser coil dirty	Visual check of coil condition	Clean condenser coil
	System overcharged with refrigerant	Is head pressure high but liquid line cool to touch?	Reclaim refrigerant/recharge correctly
	Condenser fan not running	See above (fan will not run)	See above
	FSC (if fitted) not set correctly	Check setting against gauge pressure	Adjust as necessary
	Lack of ventilation to unit	Any obstructions around unit?	Clear same to ensure good ventilation
	System load too high (overstocked, door open on cold-room)		Reduce loading

Figure 15: Declaration of Conformity

Declaration of Conformity

According to SI 2016 No. 1105 SCHEDULE 11, SI 2010 No. 2617 SCHEDULE 1

J&E Hall International

We:	J & E Hall Limited Trading as J & E Hall International
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Declare under sole responsibility that	
The Product:	Refrigeration Condensing Unit
Model Designations:	JEHRA-0067-B1-M-1 JEHRA-0110-B2-M-1 JEHRA-0150-B2-M-1 JEHSA-0200-B2-M-3 JEHSA-0300-B2-M-3
Description:	Fusion / Fusion Scroll Commercial Condensing Units for Medium Temperature Applications
SI 2016 No. 1105 Conformity Assessment Procedure Followed:	Module A2

Description of the pressure equipment constituting the assembly:

Part description	Conformity assessment followed
Pressure switch	Module B + D
Pressure Relief Valve	Module B + D
Compressor	Module A2 / D1
Liquid receiver	Module A2 / H1
Filter drier	SEP
Condenser	SEP
Sight glass & Valves	SEP
Flexible hose, System piping & Pressure accessories	SEP

The object of the declaration described above is in conformity with the following statutory requirements and implementing measures:

SI 2016 No. 1105 :	The Pressure Equipment (Safety) Regulations.
Commission Regulation (EU) 2015/1095 :	Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units, and process chillers.

It has been designed and manufactured to the following designated standards and technical specifications:

BS EN 13215 :	Condensing units for refrigeration. Rating conditions, tolerances, and presentation of manufacturer's performance data.
BS EN 378-2 :	Refrigerating systems and heat pumps – Safety and environmental requirements Part 2: Design, construction, testing, marking and documentation.

SI 2016 No. 1105 conformity assessment was carried out by Hartford Steam Boiler UK Limited (Approved Body Number: 2561), Chancery Place, 50 Brown Street Manchester M2 2JT England with Marking Permission HSB UK-23-10-003 issued.

Signed:	
Name:	Andrew Bowden
Position:	Managing Director
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Date:	31-01-2024.

Figure 16: Declaration of Incorporation

Declaration of Incorporation

According to SI 2008 No. 1597 Annex II

J&E Hall International

We:	J & E Hall Limited Trading as J & E Hall International
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Declare that for below	
Product	Refrigeration Condensing Unit
Model Designations:	JEHRA-0067-B1-M-1 JEHRA-0110-B2-M-1 JEHRA-0150-B2-M-1 JEHSA-0200-B2-M-3 JEHSA-0300-B2-M-3
Description:	Fusion / Fusion Scroll Commercial Condensing Units for Medium Temperature Applications

The following essential health and safety requirements of The Supply of Machinery (Safety) Regulations 2008 (SI 2008 No. 1597) are applied and fulfilled:

1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.2.1 - 1.2.6 - 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.6 – 1.5.7 – 1.5.13 –1.7.1.1 – 1.7.2 – 1.7.3 – 1.7.4

The relevant technical documentation has been compiled in accordance with Annex VII (PART 7 of SCHEDULE 2) part B of SI 2008 No. 1597.

The partly completed machinery is also in conformity with below enactments:

SI 2016 No. 1105 :	The Pressure Equipment (Safety) Regulations
Commission Regulation (EU) 2015/1095 :	Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers

The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of these Regulations, where appropriate.

The legal representative authorised to compile the relevant technical documentation is J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom.

Signed:	
Name:	Andrew Bowden
Position:	Managing Director
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Date:	18/01/2024

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Figure 17: EU Declaration of Conformity

EU Declaration of Conformity

According to DIRECTIVE 2014/68/EU ANNEX IV, DIRECTIVE 2009/125/EC ANNEX VI

J&E Hall International

We:	J & E Hall Limited Trading as J & E Hall International
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Declare under sole responsibility that	
The Product:	Refrigeration Condensing Unit
Model Designations:	JEHRA-0067-B1-M-1 JEHRA-0110-B2-M-1 JEHRA-0150-B2-M-1 JEHSA-0200-B2-M-3 JEHSA-0300-B2-M-3
Description:	Fusion / Fusion Scroll Commercial Condensing Units for Medium Temperature Applications
DIRECTIVE 2014/68/EU Conformity Assessment Procedure Followed:	Module A2

Description of the pressure equipment constituting the assembly:

Part description	Conformity assessment followed
Pressure switch	Module B + D
Pressure Relief Valve	Module B + D
Compressor	Module A2 / D1
Liquid receiver	Module A2 / H1
Filter drier	SEP
Condenser	SEP
Sight glass & Valves	SEP
Flexible hose, System piping & Pressure accessories	SEP

The object of the declaration described above is in conformity with the following Union harmonisation legislation:

DIRECTIVE 2014/68/EU :	On the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment.
Commission Regulation (EU) 2015/1095 :	Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units, and process chillers.

It has been designed and manufactured to the following harmonised standards and technical specifications:

BS EN 13215 :	Condensing units for refrigeration. Rating conditions, tolerances, and presentation of manufacturer's performance data.
BS EN 378-2 :	Refrigerating systems and heat pumps – Safety and environmental requirements Part 2: Design, construction, testing, marking and documentation.

DIRECTIVE 2014/68/EU conformity assessment was caried out by Hartford Steam Boiler Ireland Limited (Notified Body number: 2833) 28 Windsor Place, Lower Pembroke Street, Dublin 2, D02 H328, Ireland with Marking Permission HSB IE 23-10-004 issued.

Signed:	
Name:	Andrew Bowden
Position:	Managing Director
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Date:	11/12/2023

Figure 18: EU Declaration of Incorporation

Declaration of Incorporation

According to DIRECTIVE 2006/42/EC Annex II

J&E Hall International

We:	J & E Hall Limited Trading as J & E Hall International
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Declare that for below	
Product	Refrigeration Condensing Unit
Model Designations:	JEHRA-0067-B1-M-1 JEHRA-0110-B2-M-1 JEHRA-0150-B2-M-1 JEHSA-0200-B2-M-3 JEHSA-0300-B2-M-3
Description:	Fusion / Fusion Scroll Commercial Condensing Units for Medium Temperature Applications

The following essential health and safety requirements of the Machinery Directive (DIRECTIVE 2006/42/EC) are applied and fulfilled:

1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.2.1 - 1.2.6 - 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.6 – 1.5.7 – 1.5.13 –1.7.1.1 – 1.7.2 – 1.7.3 – 1.7.4

The relevant technical documentation has been compiled in accordance with part B of Annex VII of DIRECTIVE 2006/42/EC.

The partly completed machinery is also in conformity with below Directives and Regulations:

DIRECTIVE 2014/68/EU :	On the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment.
Commission Regulation (EU) 2015/1095 :	Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for professional refrigerated storage cabinets, blast cabinets, condensing units, and process chillers.

The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of DIRECTIVE 2006/42/EC, where appropriate.

The legal representative authorised to compile the relevant technical documentation is TEWIS SMART SYSTEMS, S.L.U, Auguste y Louis Lumière, 26 Parque tecnológico, Paterna, Valencia, Spain.

Signed:	
Name:	Andrew Bowden
Position:	Managing Director
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU, United Kingdom
Date:	18|01|2024

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Issue: 01.03.2024