



**SEES**

**AIR COOLED  
SPLIT COMMERCIAL  
CONDENSING UNIT**

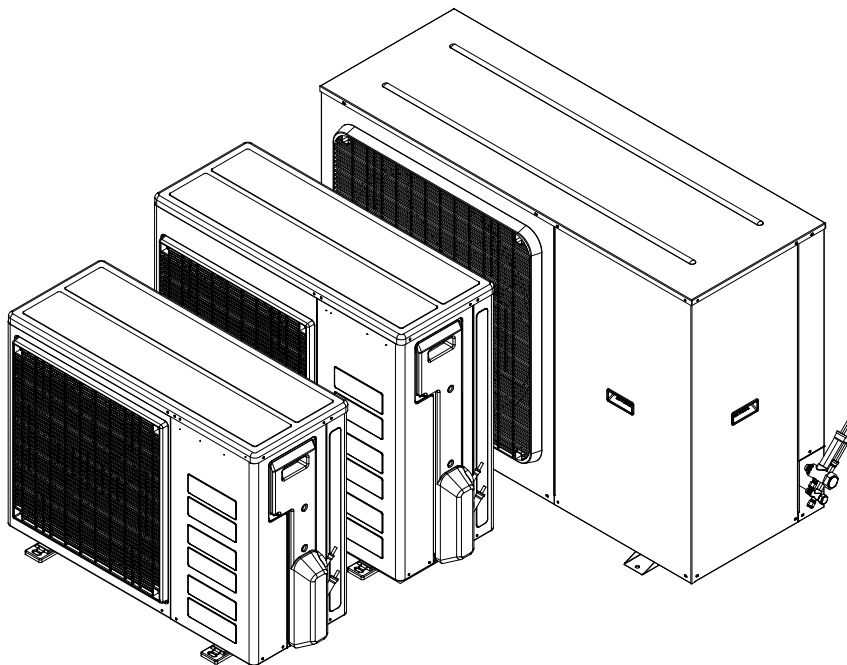
**TECHNICAL MANUAL**

**NO: T-CU11-JAN25-4**

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## Medium & Low Temperature

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# IMPORTANT!

## READ BEFORE PROCEEDING!

### GENERAL SAFETY GUIDELINES

This guideline is intended for users to ensure safe installation, operation, and maintenance of DAIKIN SEES condensing units. This guideline is not intended to replace the system expertise available from the system manufacturers.

This equipment is a relatively complicated apparatus. 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!



NOTICE

Notice! Risk of damage to equipment!



CAUTION

Caution! Danger which can lead to serious damages!

### DISPOSAL

At the end of the system's useful life, a suitably qualified engineer or serviceman should decommission it. The refrigerant and lubricant are classed as hazardous waste and as such must be reclaimed and disposed of in the correct manner. The system components to be disposed or recycled as appropriate in the correct manner.

### CHANGEABILITY OF THIS DOCUMENT

In complying with Daikin's policy for continuous product improvement, the information contained in this document is subject to change without notice. Daikin makes no commitment to update or provide current information automatically to the manual owner. Updated manuals, if applicable, can be obtained by contacting the nearest Daikin Service office.

Operating/service personnel maintain responsibility for the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, the technician should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the equipment.

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## Product Features

SEES condensing unit is a partly completed machinery which needs to be paired with indoors, to provide cooling for refrigerated goods. The unit comprises of a fixed speed compressor and condenser in a fully enclosed powder coated housing.

### Standard features for all medium and low temperature models:

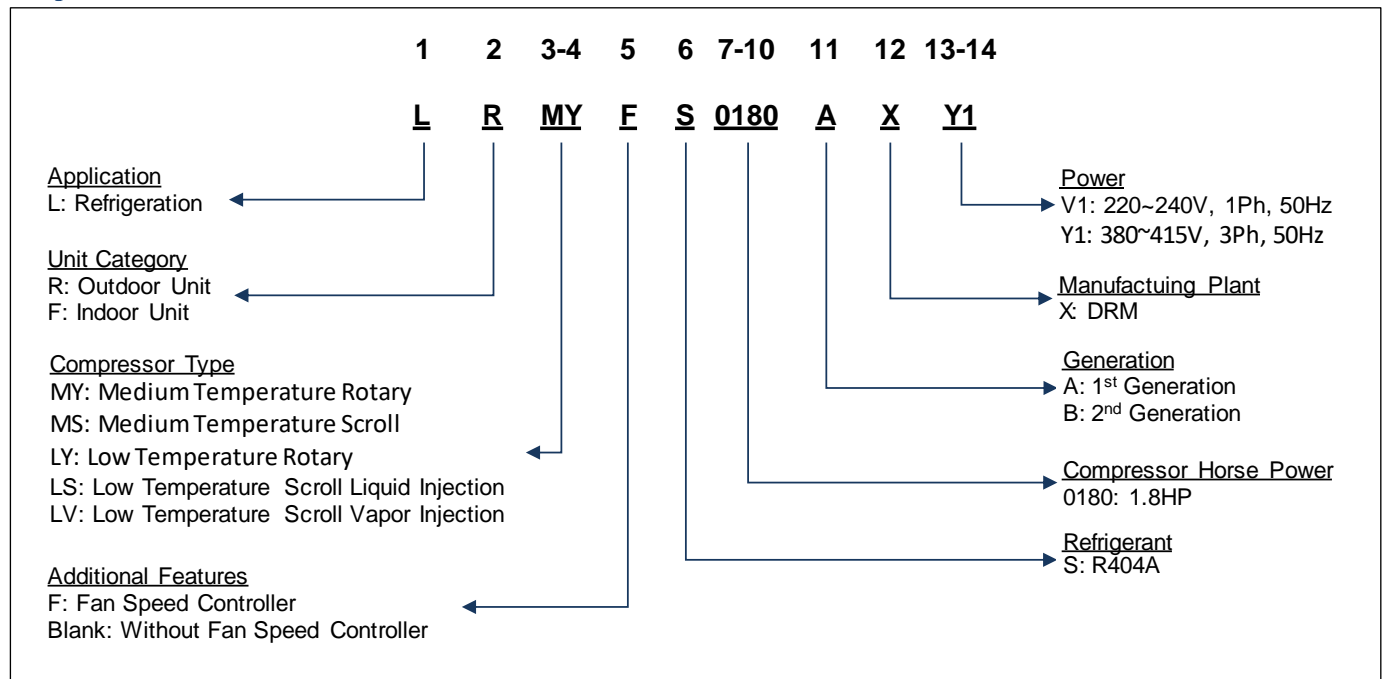
- Panasonic rotary/scroll compressor
- Bare aluminium with inner grove copper hairpin condenser coil
- Liquid receiver fitted with plug 3/8" NPT
- Brazed type liquid line drier and sight glass
- Low pressure switch (adjustable) – default: auto reset
- High pressure safety switch (manual reset cartridge type)
- External liquid and suction services valves
- Fuse protection for control circuit
- Overload protection
- Delay timer (default: 3 minutes) for compressor short cycling protection
- Phase loss, phase sequence, under/over voltage protection (Only for three phase model)
- Acoustic insulation
- IPX4 rated control box.
- Robust weatherproof housing
- Approved refrigerants: R404A

### Additional features on all low temperature models:

- Oil separator and crankcase heater (except model LRLYS0180AXY1 and LRLYS0251AXY1)
- Liquid injection solenoid valve
- Liquid injection thermostat

## Model Name

Figure 1: Nomenclature



## Exploded Views

Table 1: Exploded View Indicator

Item	Description	Item	Description
1	COMPRESSOR	12	FUSE
2	COMPRESSOR OIL	13	FUSE HOLDER
3	LIQ. RECEIVER	14	TERMINAL BLOCK
4	CONDENSER	15	CONTACTOR
5	FAN PROPELLER	16	OVERLOAD RELAY
6	FAN MOTOR	17	VALVE SERVICE
7	FAN GUARD	18	FILTER DRIER
8	FAN CAPACITOR	19	SIGHT GLASS
9	PRESSURE SWITCH LOW	20	BRACKET SERVICE VALVE
10	LOW PRESSURE TAPPING	21	BRACKET FAN MOTOR
11	PRESSURE SWITCH HIGH	22	PANEL BASE
		23	PANEL TOP

24	PANEL FAN	36	COMPRESSOR START CAP
25	PANEL LEFT - REAR	37	COMP. START RELAY
26	PANEL RIGHT - REAR	38	TIMER DELAY
27	PANEL FRONT - RIGHT	39	PHASE MONITOR DEVICE
28	VALVE COVER ASSEMBLY	40	LI. SOLENOID VALVE
29	COMPRESSOR JACKET	41	LI. SOLENOID COIL
30	HANDLE	42	LI. CAPILLARY TUBE
31	FOAM EPS COIL TOP	43	LI. THERMOSTAT
32	BRACKET LIQUID PIPE	44	DISCHARGE THERMOSTAT
33	BRACKET CTRL BOX	45	OIL SEPARATOR
34	PANEL PARTITION	46	AUX CONTACTOR
35	COMPRESSOR RUN CAP	47	CRANKCASE HEATER

Figure 2: Exploded View LRMYS0130AXV1

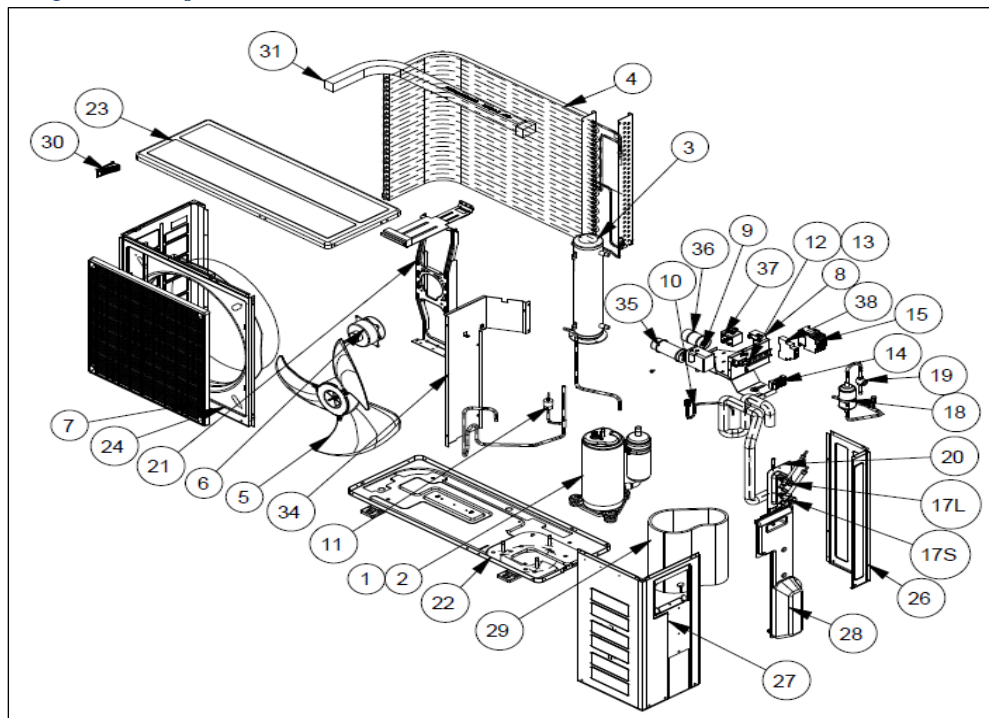


Figure 3: Exploded View LRMYS0180AXV1

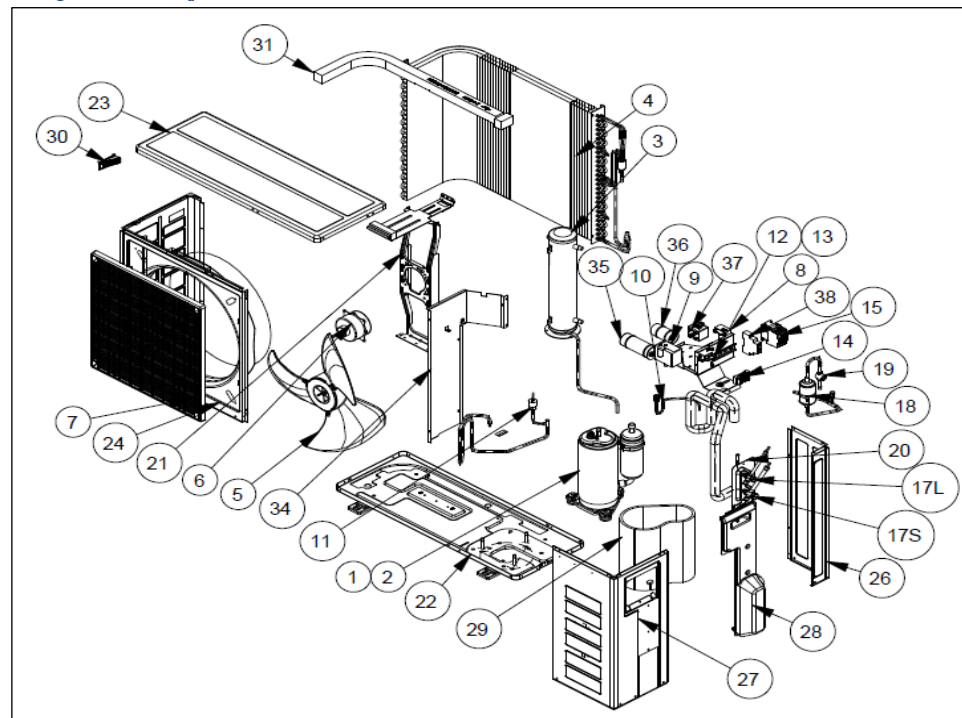


Figure 4: Exploded View LRMY0250AXV1

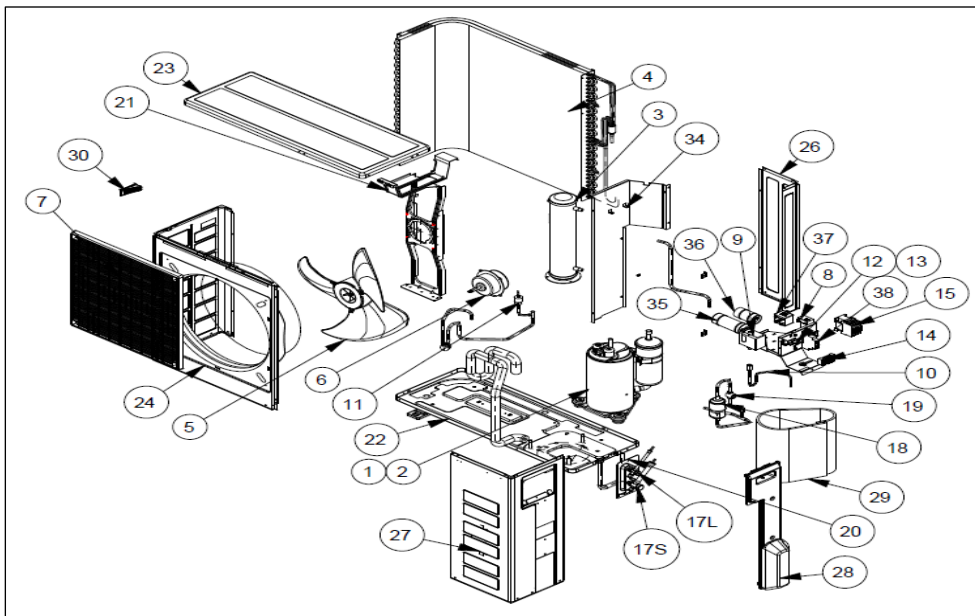


Figure 6: Exploded View LRMY0250AXY1

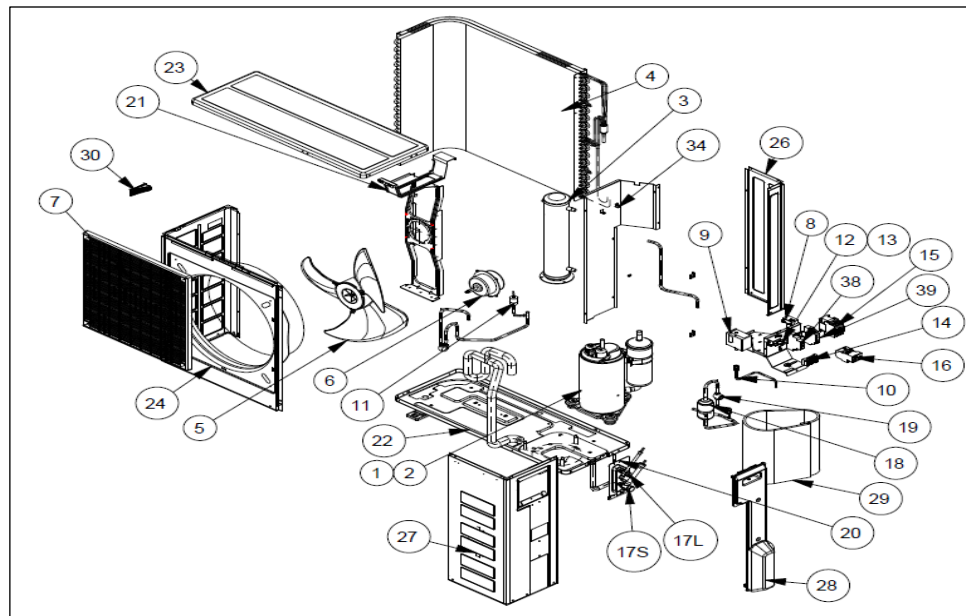


Figure 5: Exploded View LRMY0180AXY1

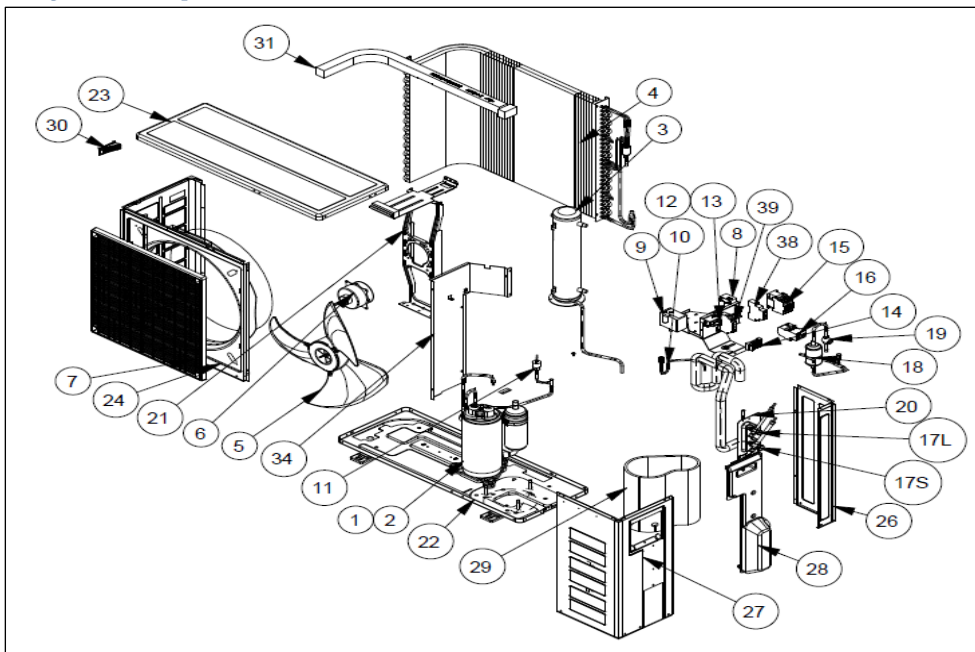


Figure 7: Exploded View LRMS0400FXY1; LRMS0500FXY1; LRMS0600FXY1

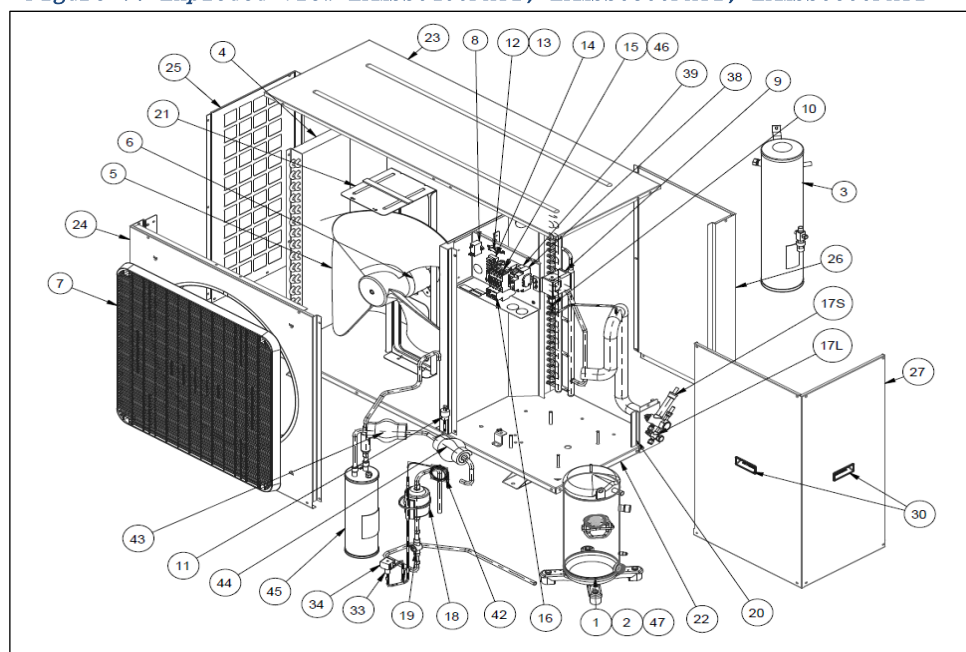




Figure 8: Exploded View LRLYS0180AXY1

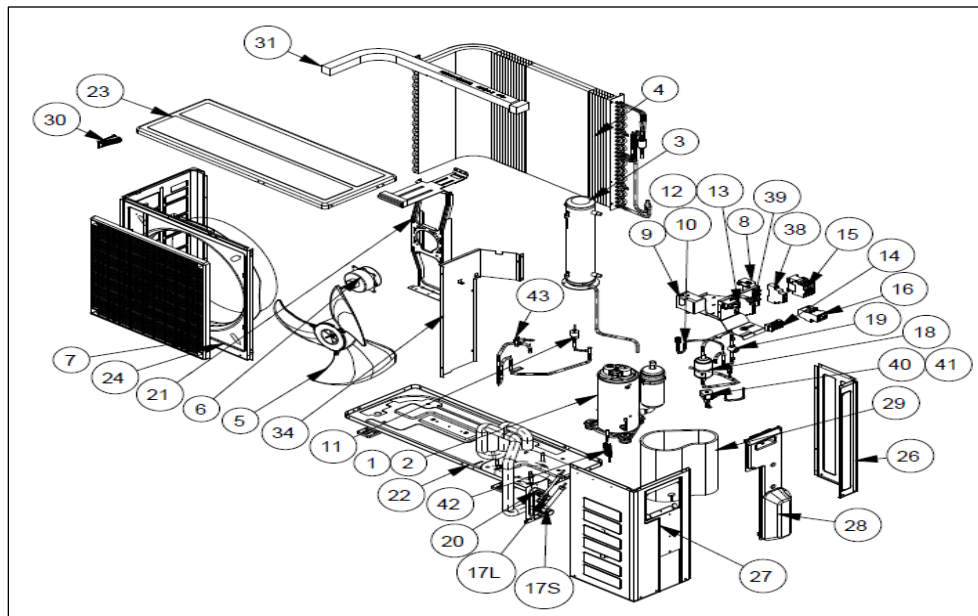


Figure 10: Exploded View LRLSS0351FXY1; LRLSS0401FXY1; LRLSS0501FXY1

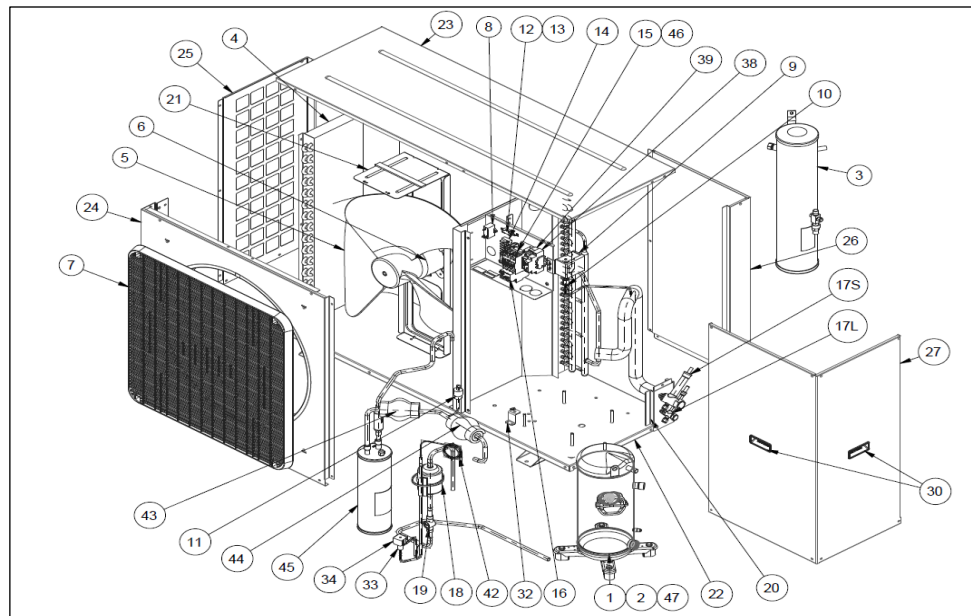
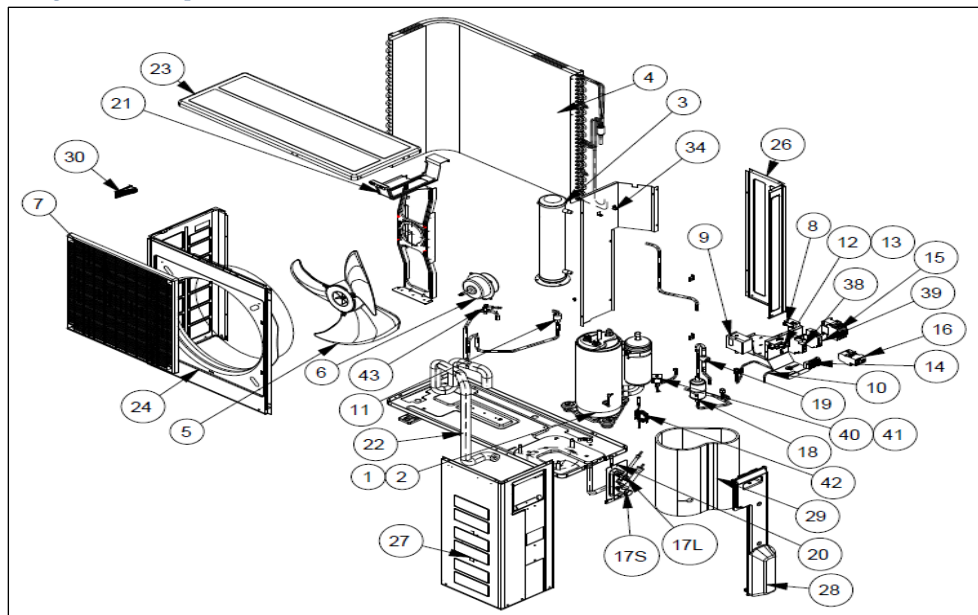


Figure 9: Exploded View LRLYS0251AXY1



## Specifications

Table 2: Unit Data

Casing	Model	Compressor					Electrical Data						Connections		Liquid Receiver	Coil Volume	Air flow
		Model	Displacement	Charge Limit	Oil Type	Oil charge	Compressor				Fan		Liquid	Suction			
			(cm <sup>3</sup> /rev)	(kg)			NC (A)	MOC (A)	MCC (A)	LRC (A)	Qty.	FLC (A)	Inch	Inch			
2	LRMYS0130AXV1	KSVB18D	18.4	1.25	FV68S	0.6	3.9	6.0	6.0	29	1	0.4	3/8"	1/2"	2.4	0.81	2070
	LRMYS0180AXV1	KSVB28D	28.2	1.25		0.7	6.5	10.7	10.7	35	1	0.4	3/8"	1/2"	2.4	1.62	1874
	LRMYS0180AXY1	KSVB28P	28.2	1.25		0.7	2.9	5.0	5.0	18	1	0.4	3/8"	1/2"	2.4	1.62	1874
	LRMYS0250AXV1	JSVB39D	38.6	2.1		1.1	7.9	14.2	14.2	43	1	0.5	3/8"	5/8"	2.4	1.97	2548
	LRMYS0250AXY1	JSVB39P	38.6	2.1		1.1	3.8	6.5	6.5	24	1	0.5	3/8"	5/8"	2.4	1.97	2548
3	LRMSS0400FXV1	3CB067SA0M	66.8	4.8		1.7	5.9	8.8	11.8	48	1	1.0	1/2"	7/8"	7.6	4.2	4280
	LRMSS0500FXV1	3CB084SA0M	84.4	4.8		1.7	7.1	10.2	15.3	61	1	1.0	1/2"	7/8"	7.6	4.2	4280
	LRMSS0600FXV1	3CB100SA0M	99.8	4.8		1.7	8.2	11.7	16.1	67	1	1.0	1/2"	7/8"	7.6	4.07	3910
2	LRLYS0180AXY1	KSVL28P	28.2	1.25		0.7	2.9	5.0	5.0	18	1	0.4	3/8"	5/8"	2.4	1.62	1874
	LRLYS0251AXY1	JDVL51P	51.4	2.1		1.3	4.4	6.8	6.8	30	1	0.5	3/8"	3/4"	2.4	1.97	2548
3	LRLSS0351FXV1	C-SBN303L8A	66.8	4.6	FV32S	1.7	5.6	8.5	10.2	60	1	1.0	1/2"	7/8"	7.6	4.2	4280
	LRLSS0401FXV1	C-SBN373L8A	83.2	4.6		1.7	7.3	11.5	13.8	72	1	1.0	1/2"	7/8"	7.6	4.2	4280
	LRLSS0501FXV1	C-SBN453L8A	96.2	4.6		1.7	8.8	13.5	16.2	73	1	1.0	1/2"	7/8"	7.6	4.2	4280

Table 3: Unit Sound Data and Dimension

Model	SPL, dB(A)	Overall Dimensions (mm)			Mounting Dimensions (mm)		Dry Weight	Gross Weight
		Width	Depth	Height	Width	Depth	(kgs)	(kgs)
LRMYS0130AXV1	27	855	328	651	603	362	43	47
LRMYS0180AXV1	30						46	50
LRMYS0180AXY1	28						45	49
LRMYS0250AXV1	34			753			57	61
LRMYS0250AXY1	34						55	59
LRMSS0400FXV1	36	1349	544	870	945	500	104	126
LRMSS0500FXV1	37						106	128
LRMSS0600FXV1	37						112	134
LRLYS0180AXY1	28	855	328	651	603	362	47	50
LRLYS0251AXY1	34			753			61	65
LRLSS0351FXV1	36	1349	544	870	945	500	115	137
LRLSS0401FXV1	37						117	139
LRLSS0501FXV1	37						121	143

### Indicator:

- NC = Nominal Current of compressor with R404A rated at +32°C Ta, MT: -10°C Te; LT: -25°C Te
- MOC = Maximum Operating Current
- MCC = Maximum Continuous Current (current drawn by compressor before internal protector trip)
- LRC = Lock Rotor Current
- FLC = Full Load Current
- SPL = Sound Pressure Level @10m from front of unit measured in an anechoic room ambient +32°C. MT: -10°C Te; LT: -25°C Te. Alternative conditions may produce different results.



# Specifications

## Performance Data

The performance data shown in **Table 4 and 5** is rated at suction superheat 10K, sub cooling 0K. Different rating conditions will produce different cooling capacities.

- Te: Evaporating Temperature (°C)
- Ta: Ambient Temperature (°C)
- CC: Cooling Capacity (W)
- PC: Power Consumed (W)
- COP: Coefficient of Performance (W/W)
- Data presented in accordance with BS EN13215:2016

*Table 4: R404A Medium Temperature*

MODEL	Ta \ Te		-20	-15	-10	-5	0	5	10
LRMYS0130AXV1	27	CC	1346	1767	2188	2609	3029	3450	3871
	27	PC	890	907	923	940	957	973	990
	27	COP	1.51	1.95	2.37	2.78	3.17	3.54	3.91
	32	CC	1149	1562	1975	2388	2801	3214	3627
	32	PC	944	962	980	998	1016	1034	1053
	32	COP	1.22	1.62	2.02	2.39	2.76	3.11	3.45
	38	CC	1063	1442	1820	2199	2578	2956	3335
	38	PC	965	992	1019	1046	1073	1100	1128
	38	COP	1.10	1.45	1.79	2.10	2.40	2.69	2.96
	43	CC		1320	1674	2029	2383	2737	3091
	43	PC		1023	1057	1090	1123	1157	1190
	43	COP		1.29	1.58	1.86	2.12	2.37	2.60
	46	CC		1226	1570	1914	2257	2601	
	46	PC		1048	1084	1120	1156	1192	
	46	COP		1.17	1.45	1.71	1.95	2.18	
LRMYS0180AXV1	27	CC	2021	2651	3281	3912	4542	5172	5802
	27	PC	1310	1367	1423	1480	1537	1593	1650
	27	COP	1.54	1.94	2.31	2.64	2.96	3.25	3.52
	32	CC	1536	2174	2812	3450	4088	4726	5364
	32	PC	1475	1523	1570	1617	1665	1712	1759
	32	COP	1.04	1.43	1.79	2.13	2.46	2.76	3.05
	38	CC	1390	1964	2539	3114	3689	4264	4839
	38	PC	1460	1532	1604	1675	1747	1819	1891
	38	COP	0.95	1.28	1.58	1.86	2.11	2.34	2.56
	43	CC		1692	2234	2775	3317	3859	4401
	43	PC		1588	1670	1753	1835	1918	2000
	43	COP		1.07	1.34	1.58	1.81	2.01	2.20
	46	CC		1581	2075	2569	3062	3556	
	46	PC		1580	1698	1815	1933	2050	
	46	COP		1.00	1.22	1.42	1.58	1.73	
LRMYS0180AXY1	27	CC	1646	2373	3100	3828	4555	5283	6010
	27	PC	1208	1260	1312	1364	1416	1468	1520
	27	COP	1.36	1.88	2.36	2.81	3.22	3.60	3.95
	32	CC	1461	2091	2720	3350	3979	4609	5238
	32	PC	1362	1410	1458	1506	1554	1602	1650
	32	COP	1.07	1.48	1.87	2.22	2.56	2.88	3.17
	38	CC	1394	1951	2507	3064	3621	4177	4734
	38	PC	1384	1458	1531	1605	1679	1753	1826
	38	COP	1.01	1.34	1.64	1.91	2.16	2.38	2.59
	43	CC	1293	1777	2261	2746	3230	3715	4199
	43	PC	1430	1520	1610	1700	1790	1880	1970
	43	COP	0.90	1.17	1.40	1.62	1.80	1.98	2.13
	46	CC		1658	2095	2532	2968	3405	
	46	PC		1579	1674	1769	1863	1958	
	46	COP		1.05	1.25	1.43	1.59	1.74	

MODEL	Ta / Te		-20	-15	-10	-5	0	5	10
LRMYS0250AXV1	27	CC	2743	3670	4598	5526	6454	7382	8310
	27	PC	1645	1720	1795	1870	1945	2020	2095
	27	COP	1.67	2.13	2.56	2.96	3.32	3.65	3.97
	32	CC	2420	3308	4196	5084	5973	6861	7749
	32	PC	1733	1827	1921	2015	2109	2202	2296
	32	COP	1.40	1.81	2.18	2.52	2.83	3.12	3.37
	38	CC	2258	3054	3849	4645	5441	6236	7032
	38	PC	1839	1955	2071	2188	2304	2420	2536
	38	COP	1.23	1.56	1.86	2.12	2.36	2.58	2.77
	43	CC	2070	2799	3528	4257	4986	5715	6443
	43	PC	1927	2062	2197	2332	2467	2602	2737
	43	COP	1.07	1.36	1.61	1.83	2.02	2.20	2.35
	46	CC		2605	3304	4004	4703	5403	
	46	PC		2126	2272	2419	2565	2711	
	46	COP		1.23	1.45	1.66	1.83	1.99	
LRMYS0250AXY1	27	CC	2462	3459	4455	5452	6448	7445	8442
	27	PC	1611	1684	1756	1829	1901	1974	2046
	27	COP	1.53	2.05	2.54	2.98	3.39	3.77	4.13
	32	CC	2347	3255	4164	5072	5980	6888	7796
	32	PC	1716	1804	1892	1979	2067	2155	2242
	32	COP	1.37	1.80	2.20	2.56	2.89	3.20	3.48
	38	CC	2209	3011	3814	4616	5418	6220	7022
	38	PC	1840	1943	2046	2149	2251	2354	2457
	38	COP	1.20	1.55	1.86	2.15	2.41	2.64	2.86
	43	CC	2094	2808	3522	4236	4949	5663	6377
	43	PC	1940	2050	2160	2270	2380	2490	2600
	43	COP	1.08	1.37	1.63	1.87	2.08	2.27	2.45
	46	CC		2686	3347	4007	4668	5329	
	46	PC		2140	2270	2400	2530	2660	
	46	COP		1.26	1.47	1.67	1.85	2.00	
LRMSS0400FXV1	27	CC	5801	6791	7943	9291	10876	12745	14952
	27	PC	2797	2931	3077	3234	3400	3572	3747
	27	COP	2.07	2.32	2.58	2.87	3.20	3.57	3.99
	32	CC	5301	6214	7270	8507	9965	11692	13739
	32	PC	3033	3178	3335	3503	3679	3862	4048
	32	COP	1.75	1.96	2.18	2.43	2.71	3.03	3.39
	38	CC	4747	5584	6543	7661	8980	10548	12417
	38	PC	3346	3504	3674	3855	4044	4238	4436
	38	COP	1.42	1.59	1.78	1.99	2.22	2.49	2.80
	43	CC		5113	6003	7035	8250	9696	
	43	PC		3800	3981	4172	4371	4576	
	43	COP		1.35	1.51	1.69	1.89	2.12	
	46	CC		4853	5709	6694	7851		
	46	PC		3988	4176	4373	4578		
	46	COP		1.22	1.37	1.53	1.71		
LRMSS0500FXV1	27	CC	7157	8296	9580	11003	12564	14268	16122
	27	PC	3237	3516	3807	4101	4389	4664	4921
	27	COP	2.21	2.36	2.52	2.68	2.86	3.06	3.28
	32	CC	6488	7557	8792	10181	11721	13410	15253
	32	PC	3643	3907	4177	4444	4704	4950	5179
	32	COP	1.78	1.93	2.10	2.29	2.49	2.71	2.94
	38	CC	5759	6759	7939	9286	10791	12453	14270
	38	PC	4201	4433	4665	4892	5110	5315	5507
	38	COP	1.37	1.52	1.70	1.90	2.11	2.34	2.59
	43	CC		6169	7307	8615	10085		
	43	PC		4919	5109	5294	5472		
	43	COP		1.25	1.43	1.63	1.84		
	46	CC		5847	6961	8245	9692		
	46	PC		5230	5392	5549	5700		
	46	COP		1.12	1.29	1.49	1.70		

MODEL	Ta \ Te		-20	-15	-10	-5	0	5	10
LRMSS0600FX1	27	CC	8185	9497	11125	13024	15164	17529	20114
	27	PC	3967	4251	4545	4842	5131	5403	5653
	27	COP	2.06	2.23	2.45	2.69	2.96	3.24	3.56
	32	CC	7511	8758	10298	12086	14092	16296	18692
	32	PC	4417	4697	4986	5275	5555	5818	6060
	32	COP	1.70	1.86	2.07	2.29	2.54	2.80	3.08
	38	CC	6762	7952	9399	11065	12917	14936	17110
	38	PC	5023	5293	5568	5842	6105	6353	6582
	38	COP	1.35	1.50	1.69	1.89	2.12	2.35	2.60
	43	CC		7346	8729	10301	12032		
	43	PC		5839	6098	6353	6599		
	43	COP		1.26	1.43	1.62	1.82		
	46	CC		7012	8361	9881			
	46	PC		6189	6435	6678			
	46	COP		1.13	1.30	1.48			

Table 5: R404A Low Temperature

MODEL	Ta \ Te		-40	-35	-30	-25	-20	-15
LRLYS0180AXY1	27	CC	873	1169	1467	1764	2062	2359
	27	PC	1019	1076	1133	1190	1248	1305
	27	COP	0.86	1.09	1.29	1.48	1.65	1.81
	32	CC	681	979	1277	1575	1873	2171
	32	PC	1086	1143	1200	1257	1314	1371
	32	COP	0.63	0.86	1.06	1.25	1.42	1.58
	38	CC		881	1159	1438	1717	1996
	38	PC		1283	1336	1390	1443	1496
	38	COP		0.69	0.87	1.03	1.19	1.33
	43	CC		763	1032	1300	1568	1837
	43	PC		1383	1434	1486	1537	1589
	43	COP		0.55	0.72	0.88	1.02	1.16
	46	CC			964	1224	1485	1745
	46	PC			1498	1548	1598	1648
	46	COP			0.64	0.79	0.93	1.06
LRLYS0251AXY1	27	CC	1562	2075	2586	3099	3611	4123
	27	PC	1667	1790	1914	2038	2162	2286
	27	COP	0.94	1.16	1.35	1.52	1.67	1.80
	32	CC	1346	1834	2321	2808	3296	3783
	32	PC	1788	1924	2060	2197	2333	2470
	32	COP	0.75	0.95	1.13	1.28	1.41	1.53
	38	CC		1631	2067	2505	2942	3379
	38	PC		2083	2222	2362	2501	2641
	38	COP		0.78	0.93	1.06	1.18	1.28
	43	CC		1509	1924	2339	2754	3168
	43	PC		2219	2360	2500	2641	2781
	43	COP		0.68	0.82	0.94	1.04	1.14
	46	CC		1369	1758	2146	2534	2922
	46	PC		2295	2443	2590	2738	2886
	46	COP		0.60	0.72	0.83	0.93	1.01

MODEL	Ta / Te		-40	-35	-30	-25	-20	-15
LRLSS0351FXY1	27	CC	2011	2584	3318	4258	5460	
	27	PC	2208	2250	2291	2332	2374	
	27	COP	0.91	1.15	1.45	1.83	2.30	
	32	CC	1867	2364	2993	3788	4796	
	32	PC	2657	2743	2831	2924	3019	
	32	COP	0.70	0.86	1.06	1.30	1.59	
	38	CC	1697	2101	2602	3225	3999	
	38	PC	3196	3335	3481	3633	3793	
	38	COP	0.53	0.63	0.75	0.89	1.05	
	43	CC	1555	1881	2277	2756	3335	
	43	PC	3646	3829	4021	4225	4438	
	43	COP	0.43	0.49	0.57	0.65	0.75	
LRLSS0401FXY1	27	CC	2571	3276	4169	5303	6738	
	27	PC	2869	3024	3189	3363	3548	
	27	COP	0.90	1.08	1.31	1.58	1.90	
	32	CC	2451	3071	3848	4822	6043	
	32	PC	3384	3552	3730	3917	4114	
	32	COP	0.72	0.86	1.03	1.23	1.47	
	38	CC	2305	2824	3462	4245	5208	
	38	PC	4002	4186	4379	4582	4795	
	38	COP	0.58	0.67	0.79	0.93	1.09	
	43	CC	2184	2619	3140	3764	4514	
	43	PC	4517	4714	4921	5136	5362	
	43	COP	0.48	0.56	0.64	0.73	0.84	
LRLSS0501FXY1	27	CC	3415	4166	5082	6201	7564	
	27	PC	3289	3417	3551	3691	3836	
	27	COP	1.04	1.22	1.43	1.68	1.97	
	32	CC	3020	3699	4531	5549	6797	
	32	PC	3814	3971	4135	4307	4486	
	32	COP	0.79	0.93	1.10	1.29	1.52	
	38	CC	2546	3139	3868	4767	5877	
	38	PC	4445	4636	4837	5046	5265	
	38	COP	0.57	0.68	0.80	0.94	1.12	
	43	CC	2153	2672	3316	4116	5109	
	43	PC	4970	5190	5421	5662	5914	
	43	COP	0.43	0.51	0.61	0.73	0.86	

## Application Guidelines



NOTICE

It should ensure that the refrigeration system which adopt this condensing unit **MUST** integrated with pump down features (solenoid valve installed at condensing unit liquid line outlet and energized by room thermostat). Failure to fulfill this requirement causes liquid compression and as a result reduces the lifespan of 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 6: Operating Limit

Operating Limits	Recommendation
Maximum discharge gas temperature	Rotary compressor: 105°C Scroll compressor: 120°C
Low pressure side	Minimum 0.1barg; Maximum 19barg
High pressure side	Maximum 28barg
Evaporator outlet superheat	Above 6K (to avoid liquid flood back)
Suction gas superheat at compressor inlet	Not more than 20K
Voltage supply	1 phase: Min: 207V, Max: 253V 3phase: Min: 350V, Max: 460V
Phase asymmetry	+/- 2%
Frequency	50Hz +/- 1%
Outdoor ambient	Min: 20°C, Max: Refer Performance Data (For ambient below 20°C, a head pressure control is required to avoid erratic TEV operation).
Maximum Pipe Run	Rotary compressor: 25m Scroll compressor: 50m

Suction line shall be insulated to avoid:

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

## Health and Safety



CAUTION

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 standards and local by-laws.

### General Information

#### Before Installation


- Ensure the units received are the correct models for the intended application.

- Ensure the refrigerant, electrical supply, and maximum working pressure (MWP) are all suitable for the proposed application.
- Check there is no damage to the units. Any damage should be reported to the supplier immediately.
- Check that the proposed equipment locations are suitable and provide adequate support for the weight of the units.

#### Offloading and Lifting

- Whenever a condensing unit is lifted, it should be from the base and, where possible, all packing and protection is kept in position.
- If lifting equipment is required, ensure that it is suitable, certificated, and that the operators are qualified to use it.
- When using a fork-lift or pallet truck to lift the unit, the two support points should be sufficiently apart to give stability when lifting and suitably placed to distribute the load on the forks.
- If slings are used, care should be taken to ensure that the slings do not crush the casework or coil.
- When lifting by crane, use spreader bars to prevent compressing the top of the equipment.
- Do not drop the unit. Should this inadvertently happen, it should be immediately unpacked and inspected for damage.
- Use the appropriate spreader bars/lifting sling with the holes and lugs provided.

#### 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.
- Safe working methods are identified, and operators should/must 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 and wait until the rotating blades stop 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 all the time.
- Units must be **grounded to the screw terminal labelled** 
- No maintenance work should be attempted prior to disconnecting the electrical supply.
- The panel covers and fan guards must remain always fitted when put under operation.
- 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 term or long-term operation.
- 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 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 (example: wind).

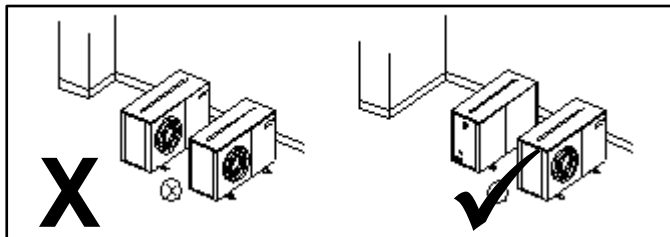
- The units are not designed to operate with any restrictions such as heavy snowfall around them. Additional measures (such as shielding the units) shall be implemented as required.
- When the scroll compressor operates under stabilized conditions, the oil level must be visible in the sight glass. Foam filling the oil sight glass indicates presence of large concentration of liquid to the compressor.
- No additional oil is required for installation with good oil returns, line runs up to 25m. Additional oil might be required if lines exceeded 25m, with minimum oil level must not lower than 1/4 of sight glass (not applicable to compressor without sight glass). Top-up the oil while the compressor is idle, via suction schrader connector with a suitable pump.

## Installation

### Unit location

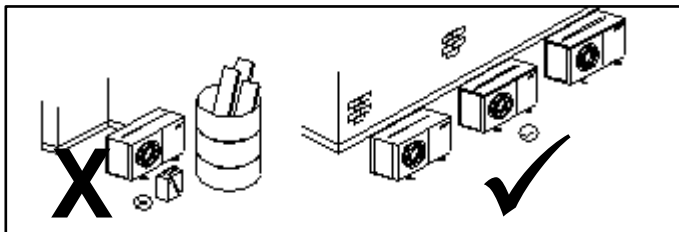
- To achieve maximum cooling capacity, the installation location for the condensing unit should be carefully selected.
- Install the condensing unit in such a way so that hot air ejected by the condensing unit cannot be drawn in again (short circuit of hot discharge air). Allow sufficient space for maintenance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

*Figure 11: 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.

*Figure 12: 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.
- Air leaving the condenser should avoid facing prevailing wind, which impedes air flow and thus causes high 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.
- It is recommended to install the unit on rubber grommet or vibration dampers.
- Wall mounting on brackets is suitable for models with single condensing fans.



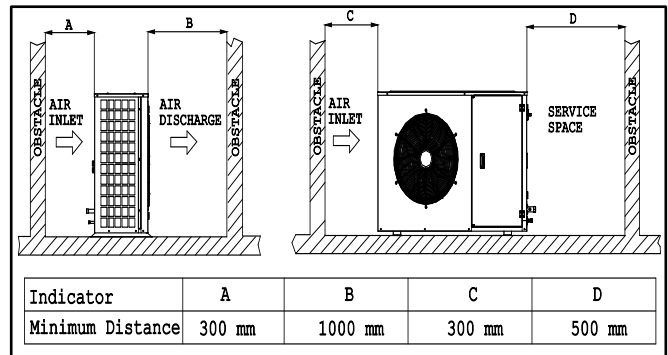
NOTICE

**Special attention should be given if the unit is 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 13: Installation Clearance*



### 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 in the installation of refrigerant piping.**

To ensure satisfactory operation and performance, the following points should be noted:

- 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 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.
- 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.
- To prevent condensation on the pipe surface, 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-meter intervals.
- Where the condensing unit is situated below the indoor unit (cold room evaporator / display case), the height difference between the two units should be no more than 6 meters. To ensure compressor ability to handle pressure drop.



- 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 25m 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!
- Suction pipework should slope gently back towards the unit to assist oil return to the compressor. A fall of approximately 2 cm per meter 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 for sizing of liquid lines on large risers (maximum rise 6m).
- On systems with a large refrigerant charge and without pump down cycle, or on any system where liquid flood back is likely to occur, a suction accumulator (not supplied) is strongly required. It offers protection against liquid refrigerant flow back during operation and against off-cycle migration by adding internal free volume to the suction side of the system.
- Wherever possible the system should be installed to utilize a pump down configuration. To avoid liquid refrigerant back to compressor during off period.
- Off cycle refrigerant migration test must be conducted if the compressor's charge limit is exceeded. Flooded start is identified as oil foaming persisted on the oil level after more than 3 minutes running and/or change of oil color.
- Maximum recommended pipe length is 25m for rotary unit; 50m for scroll unit from the closest indoors.
- In case of fire incidence, pressure increases due to the temperature increasing at receiver. Hence it is very important to install the Pressure Relief Valve to replace the 3/8" NPT blank plug on the receiver.
- 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. To prevent refrigerant from draining into the compressor during off-cycle.



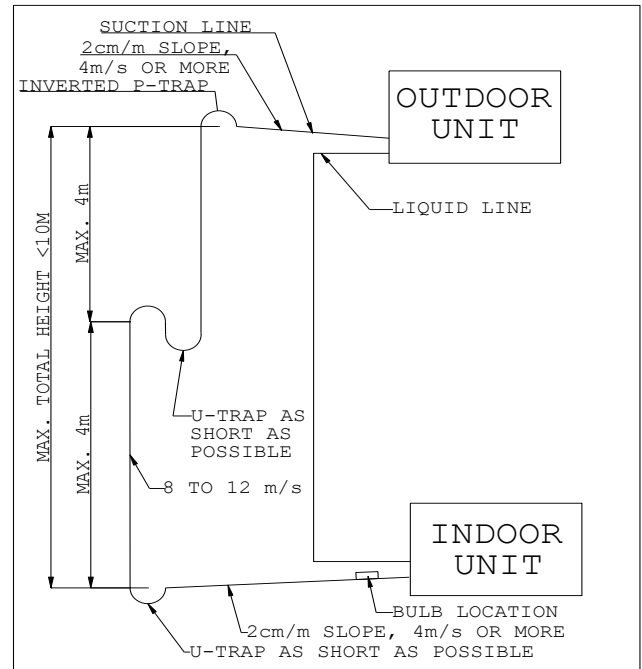
**One of the main factors affecting equipment reliability and compressor service life is refrigeration circuit contamination.**

NOTICE

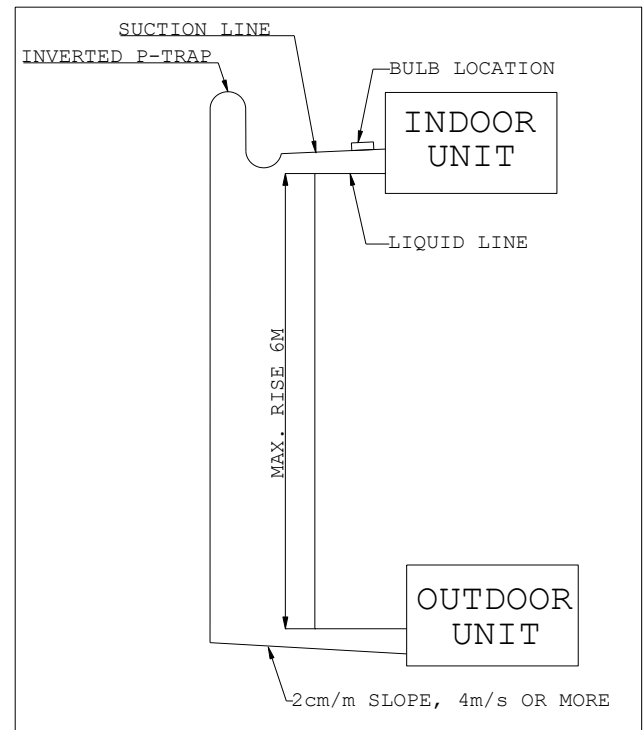
During installation, circuit contamination can be caused by:

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

*Figure 14: Piping Layout for Outdoor Above Indoor*



*Figure 15: Piping Layout for Outdoor Below Indoor*



## System Cleanliness

The presence of non-condensable substances and contaminants such as metal shavings, solders, and flux in the system, has a negative impact on compressor service life. Contaminants which are small enough to pass through the mesh screen could cause considerable damage within bearing assembly. The use of **highly hygroscopic PVE oil** in the compressor requires that the oil be exposed to the atmosphere just as little as possible.

## Pressure Testing



CAUTION

**Leak detection must be carried out using oxygen free nitrogen (OFN), or a mixture of nitrogen and refrigerant or nitrogen and helium. Never use other gases such as oxygen, dry air or acetylene 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 ~2barg. Remove the holding charge indication tag which is tied to service valve before installation.
- Once the pipework installation is completed, pressure tested for leak is required 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 PPE as required.
- Always pressurize the system on high pressure side first then only on low pressure side, preferably in stages up to the maximum required pressure. Never exceed maximum test pressures shown in **Table 7**. Failure to obey the limit will cause premature failure on the pressure safety device.

*Table 7: Maximum Working Pressure*

High Side, barg (psig)	Low Side, barg (psig)
28 (405)	19 (275)

- 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 air and any moisture from the piping. It is recommended to evacuate on both high- and low-pressure side to achieve fast and uniform vacuum in the entire system. 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 the vacuum level 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 liquid refrigerant could be charged into the high-pressure side to the extent possible, with the compressor in OFF condition and external service valves must be closed.
- The service port on the receiver outlet rotalock valve (liquid line) can be used for initial charge.
- Ensure an adequate liquid charge (4~5barg) has been introduced to the system and all service valves turned to OPEN position, before starting the compressor.
- With compressor operating, 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 0.5 barg is maintained when adding refrigerant to the suction side, otherwise overheating of the compressor may occur. Use calibrated weighing scales to record the amount of refrigerant added to the system.
- Charge system until reaching suction superheat 6~12K at desired evaporating temperature. Suction superheat, suction, and condensing pressures (temperatures) should be monitored. While optimizing charging, ensure oil sight glass doesn't start foaming.
- Stop the filling once obtain sufficient suction superheat and liquid subcooling, remove the cylinder from circuit.
- A proper refrigerant charge should secure stable conditions at minimum and maximum heat load within the limits of the condensing unit's application envelope.
- Minimum heat load conditions, which occur during low ambient. Condenser should not be flooded by liquid refrigerant, receiver and liquid line should be able to contain remaining charge at this condition.
- Maximum heat load conditions, which occurred during summer. All evaporators are working with maximum air/liquid flow via evaporators and refrigerant charge should be enough to feed all evaporators.
- When the compressor operates under stabilized conditions, the oil level must be visible in the sight glass. Foam filling the oil sight glass indicates presence of large concentration of liquid to the compressor.
- No additional oil is required for installation with good oil returns, line runs up to 25m. Additional oil might be required if lines exceeded 25m, with minimum oil level must not lower than 1/4 of sight glass. Top-up the oil while the compressor is idle, via suction schrader connector with a suitable pump.
- Never install a system in the field and leave it unattended with no charge, or with the service valves

closed without securely locking out the system. This will prevent unauthorized personnel from accidentally operating the system and potentially running the compressor by operating the compressor without charge.



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

**NOTICE**

- **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 compressor and subsequent damage may occur. Refrigerant blend must be charged in liquid form to avoid change of chemical properties.**
- **System maximum charge is approximated = (Receiver Volume + Internal volume of Liquid Line) \* 0.9**

*Table 8: Internal Volume of Liquid Line*

Liquid Line Diameter			Liquid Line (Volume)
OD (inch)	OD (mm)	ID (mm)	Liter/meter
3/8	9.5	7.9	0.05
1/2	12.7	10.7	0.09
5/8	15.9	13.5	0.14
3/4	19.1	16.7	0.22

## Electrical



**The mains electrical supply to the condensing unit MUST be fitted via a suitable motor rated circuit breaker or fuse, to provide short circuit protection to the condensing unit. A mains isolator MUST also be fitted to all condensing units unless site conditions or regulations dictate differently.**

**NOTICE**

SEES 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 6**).

- **Table 9** is just a guideline for power supply cable sizes to the condensing unit for maximum length up to 30m. Installer might specify cable size different from this guideline, depending on the wire material and length, system design, ambient temperature, etc.
- Connect the mains supply to the units as per the wiring diagrams.
- Protect the condensing unit from short-circuit with the suggested fuse rating.
- 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.
- Cables to the condensing unit should wherever possible be routed through the designated access (wire bush/valve cover) on the rear-right panel and the termination at control panel should be stress relieved by tie the incoming supply cable with the provided push releasable tie.

*Table 9: Power Supply Cable and Fuse*

Model	Cable size, mm <sup>2</sup> (from network to unit)	Suggested Fuse Rating (A)
LRMYS0130AXV1	3C2.5	10
LRMYS0180AXV1	3C2.5	20
LRMYS0250AXV1	3C4.0	25
LRMYS0180AXY1	4C2.5	10
LRMYS0250AXY1	4C2.5	16
LRMSS0400FXY1	4C2.5	20
LRMSS0500FXY1	4C2.5	20
LRMSS0600FXY1	4C2.5	25
LRLYS0180AXY1	4C2.5	10
LRLYS0251AXY1	4C2.5	16
LRLSS0351FXY1	4C2.5	20
LRLSS0401FXY1	4C2.5	25
LRLSS0501FXY1	4C4.0	25



**CAUTION**

**3 phase rotary/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. A minimum 3 minutes runtime after each start of the compressor and a 3 minutes idle time after each stop are recommended. Only during the pump down cycle may the compressor run for much shorter intervals.**

## Commissioning

To gain access to the electrical box, turn the remote motor rated circuit breaker to "OFF" position and loosen the screws from the service panel. The electrical box is located behind the service panel.

### 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 are fitted.
- Check all mechanical connections for tightness.
- Compressor oil level satisfactory for model with oil sight glass.
- Thermal overload relay set correctly follow the wiring diagram.
- All valves are in the correct operating position.
- Initial refrigerant charge.
- Initial settings for low pressure switch – default settings from factory specified in *Error! Reference source not found.*
- Crankcase heater energized for a minimum of 12 hours before compressor first 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, liquid line sight glass, 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 low-pressure switch.
- Allow the system to run for 3 – 4 hours. Check the compressor oil level and top up with the correct oil type as required, see **Table 2: Unit Data**. 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 is provided with basic operating instructions and where electrical isolators are situated in case of emergency.

## System Operation

Once the system is correctly charged with refrigerant and the operating condition is stable, check that the compressor suction superheat is between 10~20K and that the compressor discharge temperature is between 50°C ~ 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.

## Compressor



**Rotary compressor inside SEES condensing unit is a high-pressure dome compressor, with 2 poles 3phase AC motor. The pressure inside the compressor is a high (discharge) pressure and has high temperature. Care must be taken when orientating the power supply cables to the compressor. Never touch the power supply cable to the body of compressor, unless heat resistant with insulation 120°C cables are used.**

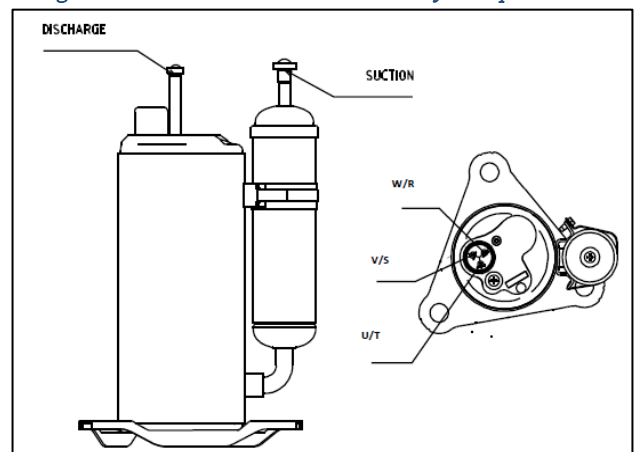
Three phase scroll and rotary compressor motors are designed to run only in one direction. The correct rotation of a three-phase compressor motor depends on the connection of the three incoming phases to the unit. Correct rotation can be determined via voltage monitoring device or identified by a drop 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.

When replace the rotary compressor, follow sequence below for removing seal caps from the compressor:

- Place the compressor in a vertical position.
- Remove seal cap from discharge tube, follow by
- Remove the seal cap from the suction tube.

*Figure 16: Connection on Rotary Compressor*



## Voltage Monitoring Device

All 3phase models are equipped with a phase protector model **MG21D2**, to protect the compressor from overheating as result of working out of the electrical limit.

*Table 10: LED Alarm Indication*

LED	RV	UV	OV	AS
Condition				
Healthy	ON	OFF	OFF	OFF
Phase reverse	BLINK	OFF	OFF	OFF
Over voltage	ON	OFF	ON	OFF
Under voltage	ON	ON	OFF	OFF
Unbalance	ON	OFF	OFF	ON
Phase Fail	OFF	OFF	OFF	OFF

The protector will turn the system “OFF” at fixed parameter:

- Phase asymmetry 10% fixed
- Overvoltage trip level 460Vac
- Under voltage trip level 350Vac



To reset alarm triggered by phase reverse, shut off the incoming power supply to the unit, swap connection of any two of the three incoming phases at the unit's terminal block, reapply power to the unit and following compressor restart, recheck operating pressures.

For other alarms, measure the voltage across the live terminal to identify the root cause. Isolate power to the unit prior to correctives action.

## Motor Overload Protector

All 3phase models supplied with external motor overload relay, to disconnect all phases at contactor in case of overload/overcurrent.

Rotary and low temperature scroll compressors are built in with internal motor protector, which wired in series to control circuit to protect compressor from overheating. 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.

When the internal motor protector has tripped, it might take up to 3 hours to reset automatically and then the compressor will restart.

On a field application, when the internal motor protector has tripped, the compressor will stop while each of the 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.

## Discharge Thermostat

The discharge temperature will rise rapidly if the compressor is running under the overload conditions or lack of refrigerant.

Only scroll low temperature model is equipped with discharge thermostat, with opening and closing temperature specified in wiring diagram. The discharge thermostat is connected in series to dual pressure switches, to disconnect all three phases at contactor in case of high discharge temperature.

For scroll medium temperature models, the internal motor protector cannot protect the compressor against all the possible failures. Thus, it is recommended to install an external discharge thermostat located on the discharge line within 100mm (4") of the compressor shell with cut out temperature **not more than which specified in Table 66**. The discharge thermostat should be installed on the top side

of the discharge tube, and it is also important to be well insulated.

## Liquid Injection

All low temperature models are equipped with liquid injection thermostat and normally closed solenoid valve for discharge temperature control.

When the discharge temperature is higher than 95°C, liquid injection line solenoid valve is energized to open, allowing liquid refrigerant flow through capillary tube to cool down the motor.



NOTICE

**Liquid injection solenoid valve is closed when system is off. For air tightness test and vacuuming along liquid injection line, it is necessary to manually pull up the shaft of solenoid valve using magnet core.**

## Over Pressure Protection

All SEES condensing units are fitted with adjustable auto reset low pressure switch and manual reset cartridge type high pressure switch.

### *Low Pressure Switch*

The low-pressure safety switch protects the compressor against deep vacuum operation or loss of refrigerant conditions, to avoid internal arcing at the electric terminal and the damage of compressor.

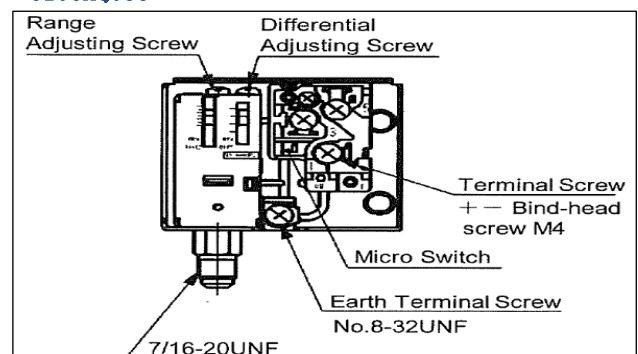
When low pressure occurs outside of compressor limit, the temperature in the compressor motor will rise rapidly. Sometimes, the low-pressure switch will react in priority to the action of the discharge thermostat or motor overload protector when huge amounts of refrigerant leak in short time.

The low-pressure safety cut out should never be set below the settings as shown in **Table 11** and **THE SETTINGS MUST BE ADJUSTED TO SUIT THE APPLICATION BEFORE STARTING THE UNIT.**

Setting Procedure for Single Pressure Switch:

- Cut in range: Turning the range adjusting screw clockwise will decrease the cut-in pressure setting and vice versa.
- Differential range: Turning the differential adjusting screw clockwise will increase the differential pressure setting and vice versa.

*Figure 17: Adjustment Spindle of SNS-C106XQ035*





### High Pressure Switch

Manual reset cartridge type high-pressure switch is integrated in the condensing unit to protect the compressor during blocked condenser or fan failure conditions.

If high pressure switch is tripped, it is required to remove the fault and wait till high side pressure drops below 22barg. Reset by pressing the red button of the high-pressure switch to bridge connectivity.

**Table 11: High-Low Pressure Switch Settings**

Application	Low Pressure, bar(g) Adjustable - Auto Reset					High Pressure, bar(g) Manual Reset	
	Min Cut Out	Factory Default		Pump Down System (Suggested)		Cut In	Cut Out
		Cut In	Diff.	Cut In	Diff.		
MT	1.5	3.0	1.0	4.0	2.5	22	28
LT	0.1			2.0	1.0		

### Crankcase Heaters

The refrigerant usually accumulates in coldest point within the system during OFF cycle and the compressor might become the right one where most of liquid refrigerant centralized.

Crankcase heater is required when the system charge exceeds charge limit and requires remain energized during the compressor off cycles. The initial start in the field is a very critical period for any 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 starts, to prevent oil dilution and the bearings stress on initial start-up.

A 35W/240Vac crankcase heater is recommended for scroll medium temperature compressor model and should be well attached to the compressor shell bottom portion.

### Suction Accumulator

An accumulator is required if repeated flooded start could occur, diluting the oil in the compressor causing inadequate lubrication and bearing wear.

A suction accumulator **MUST** added at suction line near to compressor for:

- System with charge exceeds compressor limit.
- Systems with defrost schemes or transient operations that allow prolonged, uncontrolled liquid return to the compressor.

Suction accumulator may not be required for system with room thermostat control with pump down (solenoid valve installed at liquid line), with the condition suction header of sufficient volume is made to prevent liquid migration to the compressor during off cycle.

### Pump Down

Pump down is strongly recommended to be integrated into the system with high charge amount. It can be used on all thermostatic expansion valve systems with the addition of a liquid line solenoid valve.

By closing a liquid line solenoid valve, the refrigerant can be pumped into the condenser and receiver, and the compressor operation controlled by means of a low-pressure control. The refrigerant can thus be isolated during periods when the compressor is not in operation, and migration of refrigerant to the compressor crankcase is prevented.

During off cycle, a minor leakage through compressor is normal for system pressure equalization. This will trigger low pressure switch to cut in compressor. If the low-pressure switch differential pressure is too narrow, the possibility of short cycling will increase. Refer **Table 11** for the suggested settings to limit the short cycling to an acceptable level.

### Short Cycling Delay Timer

Short cycling delay timer model **1CVDT9** is prewired in all models, to limit the compressor short cycling to an acceptable level. Default settings from factory (mode G, 3minutes).



The default wiring and settings in the unit as such, whenever the system is power ON:

- If both high and low-pressure switches are healthy, then compressor will switch ON.
- If any of the low-pressure switch or high-pressure switch becomes unhealthy, timer will switch the contact, and compressor will switch off immediately and timer will start counting its delay (3 mins). Timer will not allow compressor to switch ON during these 3 minutes. Once 3 minutes delay is completed, if both pressure switch are healthy, compressor will switch ON.



NOTICE

**Isolate power to the timer before changing time settings. Failure to obey the instruction will cause premature failure on the timer.**

- Red LED blinking: timer under counting mode.**
- When cold room temperature not met and frequent compressor cycling off, investigate for loss of refrigerant charge or correct setting of room temperature.**



## Service and Maintenance



**Disconnect the mains electrical supply before servicing or opening the unit.**

### WARNING

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 and side panels ensures that all parts are accessible.

#### 1. Compressor – Inspect at regular intervals

- Check for refrigerant leaks on all joints and fittings. Retighten the valve cap according to **Table 12**.
- Check for refrigerant leaks on all joints and fittings.
- Check mountings for tightness and wear.
- Check operation of crankcase heater.
- Check electrical connections for tightness.
- Ensure that no abnormal noise or vibration is detected during the test run.
- Check the compressor oil levels and top up if required. The oil level should be  $\frac{1}{4}$  to  $\frac{3}{4}$  way up the sight glass (where fitted).

#### 2. Condenser Fan Motor and fan 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. 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.

#### 4. Controls

- Check settings and operation of pressure switch.
- Check the overload relay setting.

#### 5. 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.

#### 6. 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.

#### 7. Tightening of valves and fittings

- Refer **Table 12** to retighten the service valves cap and charging port. Liquid receiver is installed with blanking

plug 3/8" NPT with Loctite 558 sealed around the thread. To replace the blanking plug with pressure relief valve, clean the residues on the thread side, before applying PTFE tape around the thread, then tightening back at recommended torque 35+/-3 Nm.

#### 8. 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.

#### 9. Warranty

- The warranty as provided by Daikin on its products is subjected 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.daikin.com.my](http://www.daikin.com.my)

Appendix

Figure 18: Outline Drawing Casing 2

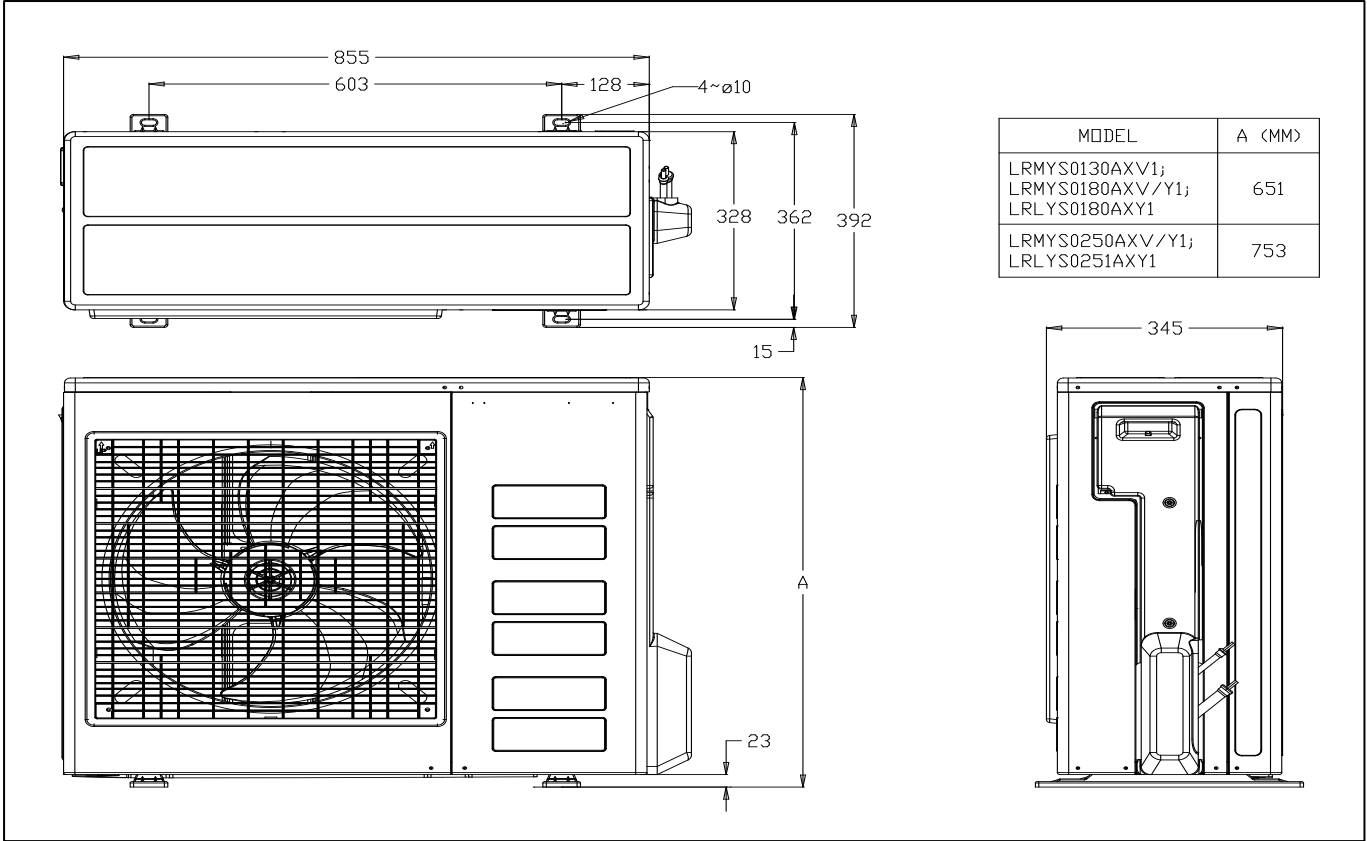


Figure 19: Outline Drawing Casing 3

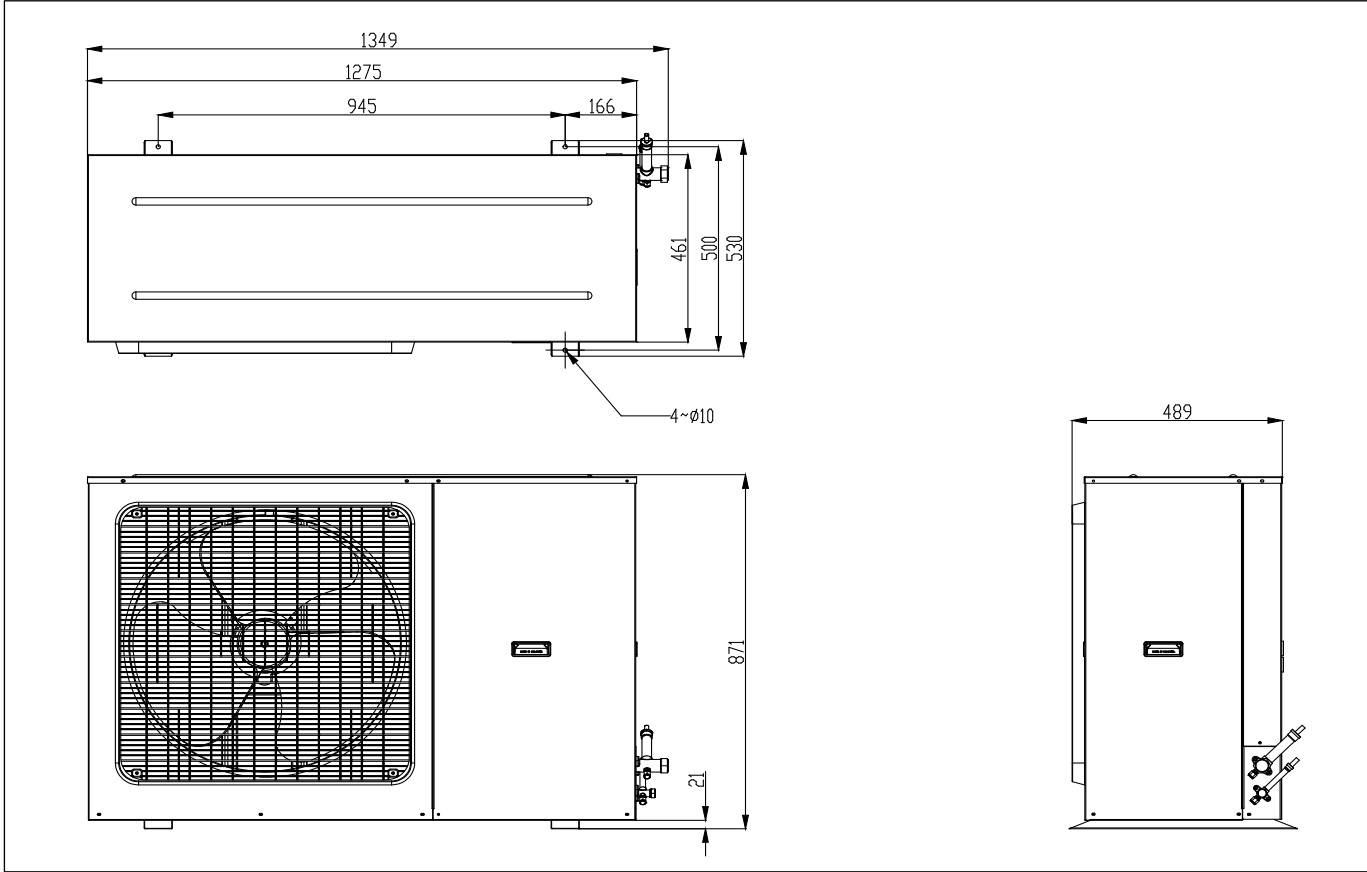


Figure 20: Wiring Diagram LRMYS0130AXV1; LRMYS0180AXV1; LRMYS0250AXV1

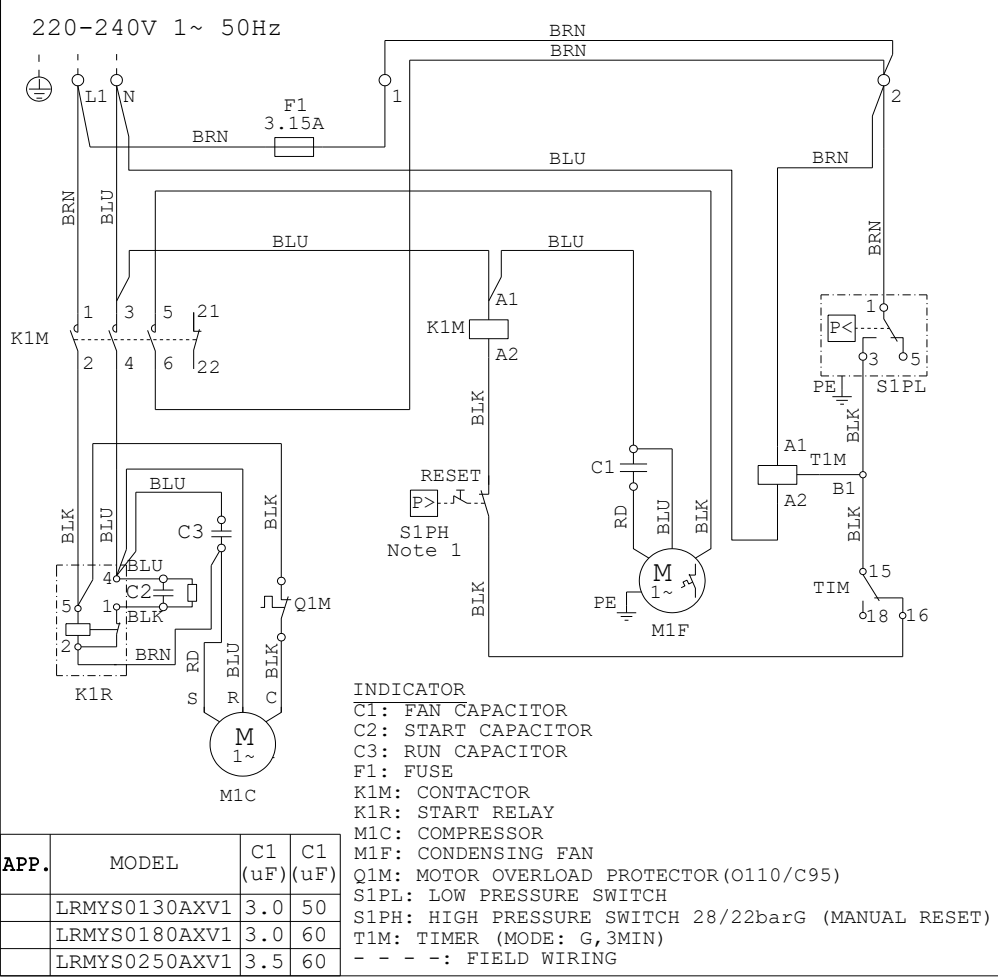


Figure 21: Wiring Diagram LRMYS0180AXY1; LRMYS0250AXY1; LRLYS0180AXY1; LRLYS0251AXY1

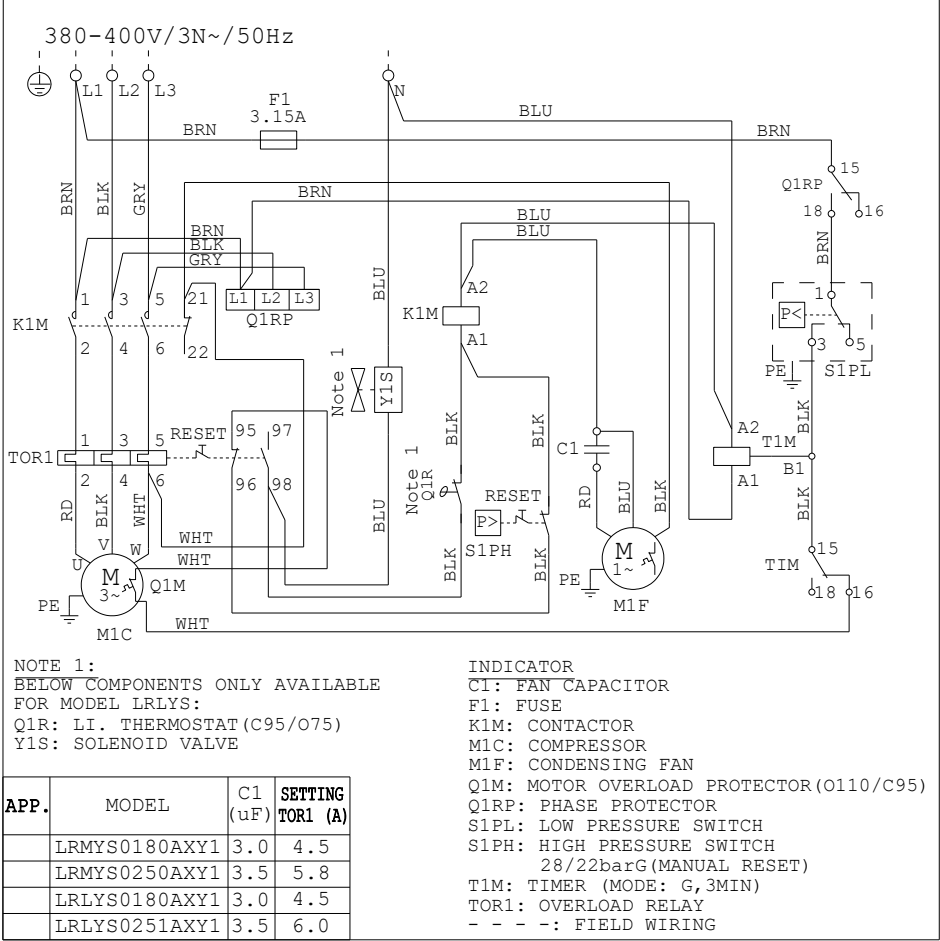


Figure 22: Wiring Diagram LRMSS0400FX1; LRMSS0500FX1; LRMSS0600FX1

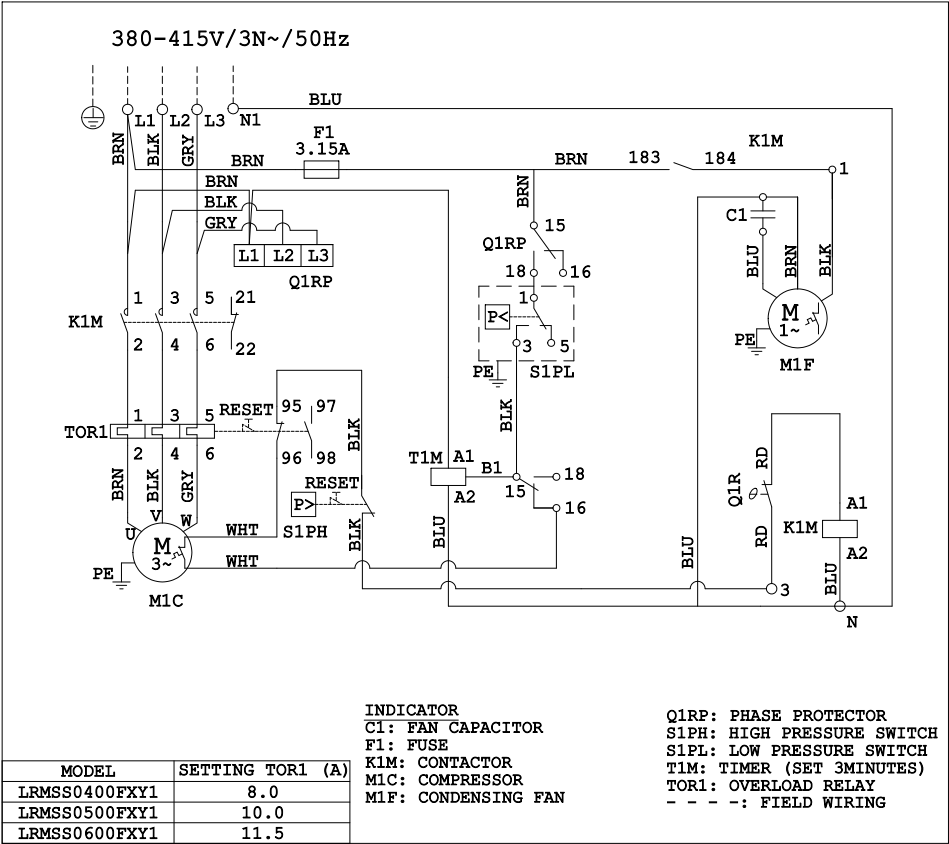


Figure 23: Wiring Diagram LRLSS0351FX1; LRLSS0401FX1; LRLSS0501FX1

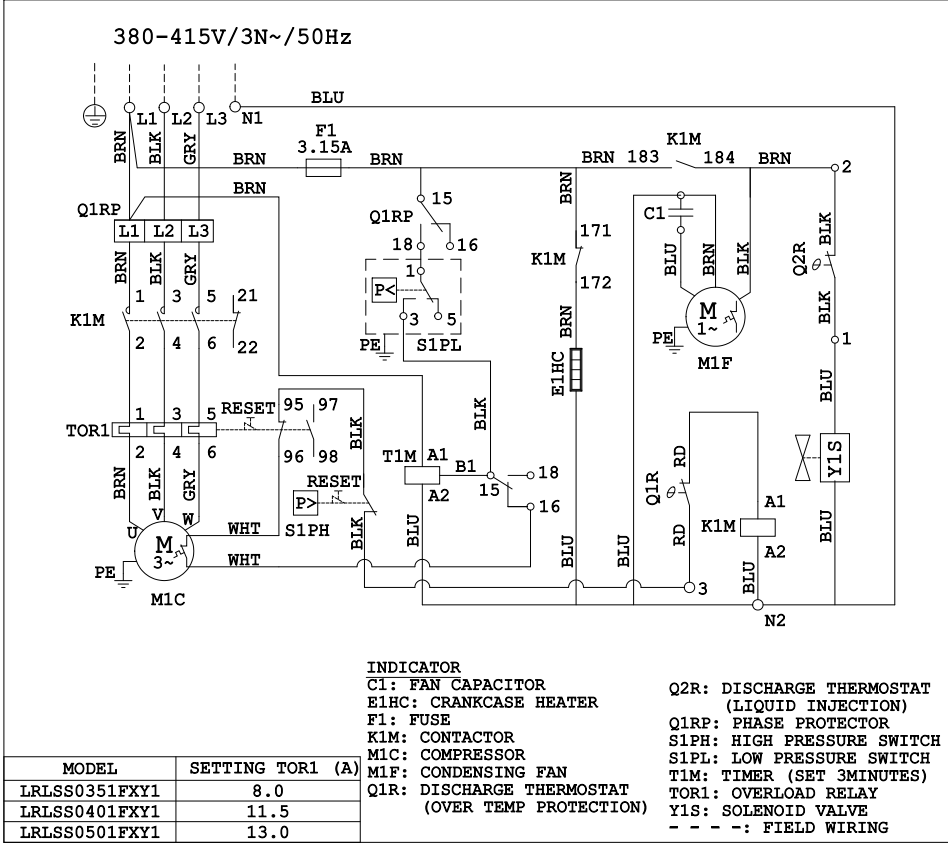


Figure 24: MT Piping Diagram with Pump Down Configuration

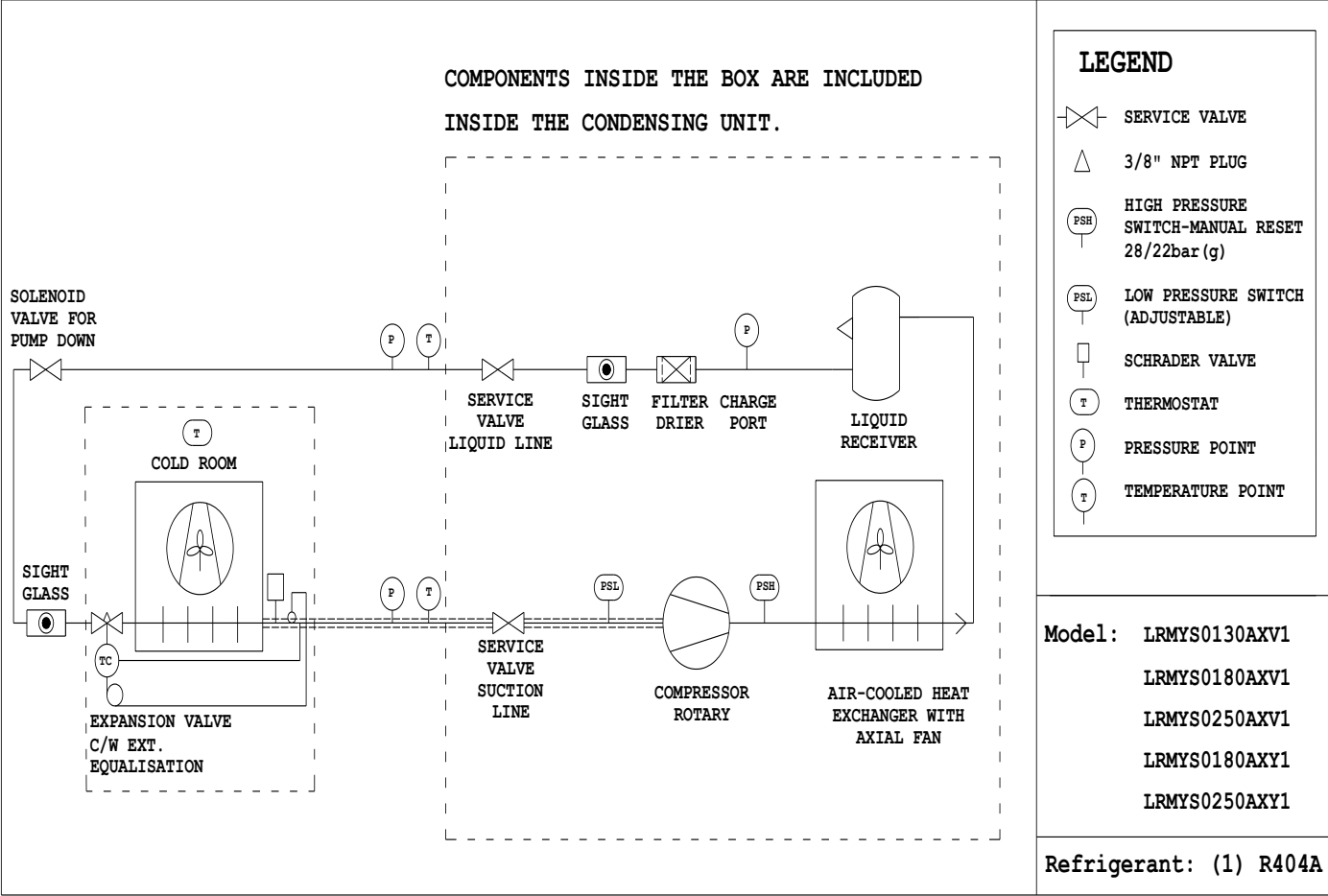


Figure 25: LT Piping Diagram with Pump Down Configuration

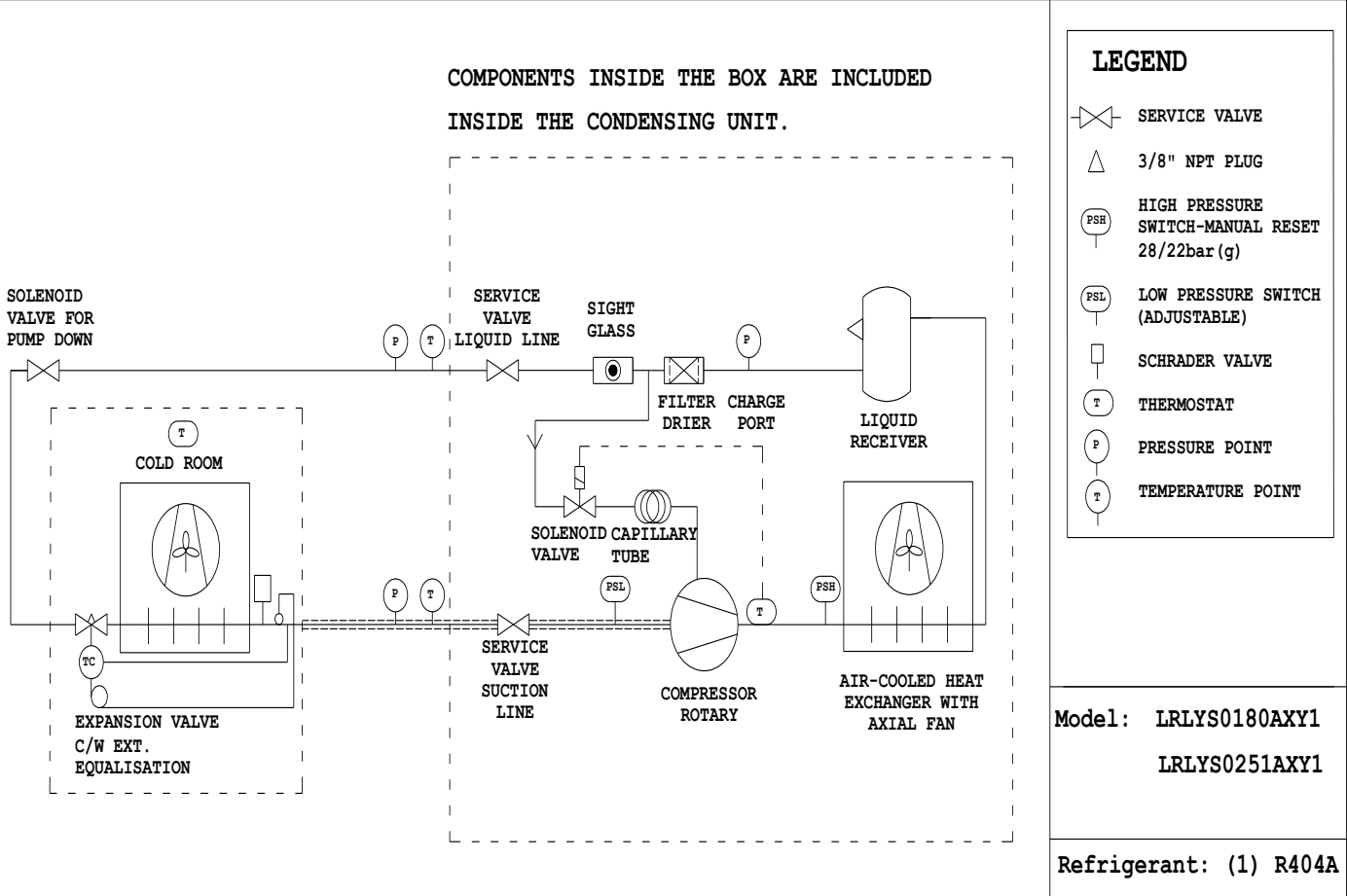


Table 12: Torque Tightening

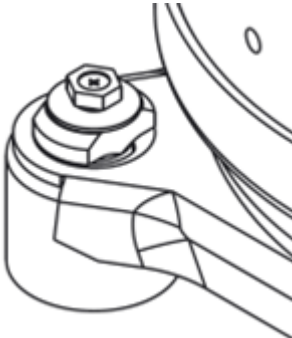
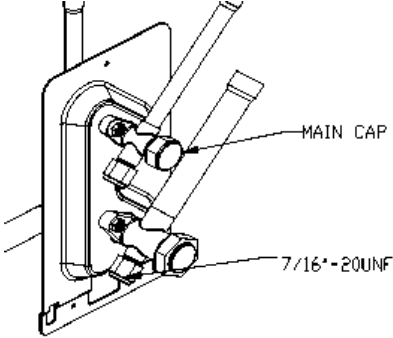
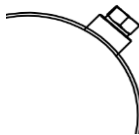
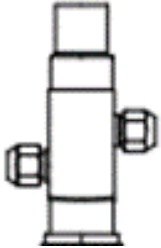
Model	Thread/Size (Tightening Torque)				
	Compressor Mounting	Service Valve (Main Cap)		Liquid Receiver	Schrader Valve, Charging Port; Low Pressure Switch Connection, Service Cap
		Suction	Liquid		
LRMYS0130AXV1	M8 (13Nm)	M18*1.0mm (25-30 Nm)	M16*1.0mm (20-25 Nm)	Brazed Connection	7/16" - 20UNF (14-16 Nm)
LRMYS0180AXV/Y1		M22*1.5mm (30-35 Nm)			
LRMYS0250AXV/Y1					
LRLYS0180AXY1		M33*1.5mm (42-47Nm)	M18*1.0mm (25-30 Nm)		
LRLYS0251AXY1					
LRMSS0400FXY1					
LRMSS0500FXY1					
LRMSS0600FXY1					
LRLSS0351FXY1					
LRLSS0401FXY1					
LRLSS0501FXY1					
Graphic Presentation					



Table 13: Trouble Shooting

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
<b>COMPRESSOR</b>			
<b>Compressor does not start</b>	Power supply	Phase(s) and neutral present?	Check/rectify
		Voltage within tolerance?	Check/rectify
		For 3 phase models only, any LED alarms triggered on phase monitoring device?	If yes, remove fault to rectify
		Is the remote isolator switched on?	If not - switch on
	Compressor contactor not pulled in (where fitted)	Is there correct voltage across terminal A1 and A2 of contactor coil?	If yes - coil faulty. Replace contactor/coil
			If no - check for break in control circuit or blown control fuse.
		Has timer set in correct mode?	If no – Correct to mode G
		For 3 phase model only, has motor overload relay tripped out?	If yes – check current setting and all wiring connection are sound, follow wiring diagram and reset (default mode from factory: manual reset)
		For 3 phase model only, has LED alarm indicated on phase monitoring device?	If yes – rectify accordingly: <ul style="list-style-type: none"> <li>LED RV blink. Isolate power and swap any two of the incoming phases to the terminal block and recheck.</li> <li>If no LED lit. Check wire tightness/phase loss of power supply.</li> </ul>
		Has a high-pressure switch tripped out?	Check cause and wait for high pressure to drop below 22barg to reset.
		For all 3-phase models except scroll MT, has compressor built in motor overload tripped?	If no continuity - Compressor has overheated. Allow time for compressor cool down for auto reset (up to 3 hours) and rectify cause
	Compressor contactor pulled in but compressor not running	Is voltage being switched across contactor?	If yes – check supply voltage at compressor terminals and wiring tightness.
			If not - Replace the faulty contactor
	For 1 phase model only, compressor external integrated motor overload tripped	Is the correct voltage at compressor supply terminals?	If there is voltage across power terminal with all wiring connection is tight; and no continuity across motor overload protector - Compressor has overheated. Allow time for compressor cool down for auto reset (up to 3 hours) and rectify cause
	Control fuse blown	Check for any component short circuit.	Rectify fault. Replace fuse and test.
	Starting kit faulty (single phase units only)	Compressors draw locked rotor ampere for more than 2 seconds. Check potential relay operations and contacts; and inspect capacitance of 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 auto reset and recheck. If continually open circuit - motor faulty. Replace compressor.

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
	Compressor seized	Does compressor draw equivalent to lock rotor ampere and does not run and humming/noisy sound is audible?	If wire tightness had been secured and voltage to compressor is normal. Potentially compressor internal damage – Replace compressor
<b>Compressor runs but no effect on suction/discharge pressures</b>	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 the test fails - replace compressor.
<b>Compressor continuously runs in short time and stopped by timer</b>	Operating on low pressure switch	Check LP switch settings - is the LP differential too small?	If LP differential too narrow – Power off before adjust switch settings. If LP differential is correct - <ul style="list-style-type: none"> <li>• Check all valves are in open position</li> <li>• Check the refrigerant level and inspect leakage</li> </ul>
	High pressure switch tripping	Is there too much refrigerant in the system?	Check the refrigerant level and adjust accordingly
	Faulty contactor	Are the contacts chattering on the contactor?	Contacts may be dirty or worn. Check and replace the contactor as necessary
<b>Compressor is noisy</b>	Vibration	Worn of the rubber mounting of condensing unit/compressor, or bolts are loose/missing	Replace mountings and tighten/replace bolts as necessary
	Lack of oil	Applicable to scroll model only: Check oil sight glass to see if level below recommended level	Top up with oil as necessary
	Too much oil	Check oil sight glass to see if level above recommended level	Remove oil overcharge
	Liquid refrigerant	Does compressor 'knock' when starting up or running? Liquid refrigerant may be present in compression chambers with continuously oil foaming viewed from oil sight glass	Identify cause of liquid return to compressor and rectify
	Overloaded (high compression ratio)	Is the ratio of discharge to suction pressures too high?	If yes, 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
		Refrigerant overcharge	Check and rectify
		Non-condensable (moisture) present in system	Reclaim refrigerant, evacuate and recharge
	Internal wear / damage	Is noise always present even if all operating conditions are normal?	If yes, compressor mechanical failure, to replace compressor
<b>Compressor body too hot</b>	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 for correct refrigerant charge
			Check for correct TEV superheat setting
			Check sight glass for oil colour and ensure sufficient oil level for proper compressor lubrication.
			Is suction line correctly insulated?

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
	Compressor starting too frequently	Are controls set correctly - is the differential on room thermostat or LP switch too small? Is delay time set correctly?	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
<b>CONDENSER FAN</b>			
<b>Condenser fan does not run</b>	Power supply	See section of compressor does not start	See section of compressor does not start
	Contactors not pulled in		
	Contactors pulled in	Is voltage being switched across contactor's termination of fan motor?	If yes - check voltage to fan motor. If correct voltage present at motor - fan faulty. Replace fan If no. Replace faulty contactor
	Being controlled by fan speed controller (if fitted) *FSC: fan speed controller	Is the system operate below FSC cut in pressure setting?	If yes - all OK (check fan operation when pressure rises)
	Motor fault	If FSC fitted - bypass FSC to test motor.	If motor still does not run - motor is faulty and to replace motor
<b>Condenser fan runs but only slowly</b>	Is fan being controlled by FSC?	Is head pressure under control 14~15 barg?	It is normal if fan speed is slow at lower head pressure 14~15barg and speed increased when head pressure rises
	Fan capacitor fault	Check visual condition of capacitor and check capacitance reading with capacitor meter.	Replace capacitor if required
<b>SYSTEM</b>			
<b>Insufficient cooling</b>	Lack of refrigerant	Is liquid 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 room thermostat) set correctly?	Adjust as necessary
		T.E.V. Superheat	Adjust as necessary
	Service valves do not open correctly	Are valves fully opened?	Adjust as necessary
	Restriction in piping/component	Is the liquid line filter drier blocked? Sweating/frosting on outlet of drier indicates a blockage	Replace filter drier
		Damage to piping	Replace piping as required
<b>Head pressure too high</b>	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 section: condenser fan does not run	See section: condenser fan does not run
	FSC (if fitted) not set correctly	Check setting against gauge pressure	Adjust as necessary
	Lack of ventilation to unit	Any obstructions around unit?	Clear obstacles to ensure good ventilation
	System load too high (overstocked, door open on cold-room)	Is the air on coil temperature high?	If yes, reduce loading

*Table 14: Checklist Before Start-up*

No.	Description	Check
1	Is the unit in good condition with holding gas and without any visible damage?	
2	Has the unit been transported in upward position?	
3	Is the crankcase oil level between 1/4 and 3/4 of the compressor sight glass (only applicable to scroll compressor)?	
4	Is the power supply on site in line with the unit specification?	
5	Is air short circuit and/or air blockage avoided?	
6	Is the installation location well ventilated?	
7	Is there sufficient space for air flow and maintenance?	
8	Is all the pre-charged nitrogen released before the field pipe connection started?	
9	Has nitrogen been blown through the pipes during brazing?	
10	Is there only 1 indoor unit connected to 1 outdoor unit?	
11	Is solenoid valve for pump down installed along the liquid line of condensing unit (compulsory for all model to ensure no liquid compression)?	
12	Does the field piping has the same diameter as the pipes coming from the CDU?	
13	Is the suction pipe insulated?	
14	Does the piping bends have enough bending radius?	
15	Is the total pipe length less than 25m?	
16	Is the height difference between indoor and outdoor unit within the specifications?	
17	Are the oil traps in the vertical suction line correctly positioned?	
18	Does the CDU capacity matches the indoor unit capacity?	
19	Does the TXV capacity matches the indoor unit capacity?	
20	Did the TXV sensing bulb positioned on horizontal pipe at 4, 8 or 12 o'clock and wrapped with copper strip and insulated?	
21	Is the Maximum Operating Pressure (MOP) type expansion valve being installed?	
22	Was inert, dry gas (e.g. Nitrogen) used for pressure testing?	
23	Could the leak test pressures be reached?	
24	Did the air tight maintained after at least 24 hours?	
25	Could the vacuum condition (< -0.1 barg for 2 hours) be reached?	
26	Did the pressure stayed stable for at least 1 hour, when turning off the vacuum pump?	
27	Is the low pressure switch set correctly?	
28	Is the overload relay for compressor set correctly (only applicable to 3phase mdoel)?	
29	Is there an earth connection foreseen?	
30	Are all electrical terminal connections tight connected?	
31	Is the crankcase heater been energized for minimum 12 hours before initial start up?	
32	Is the refrigerant type correct for the intended use?	
33	Is adequate liquid charge to high side introduced into the system before starting compressor?	

Remarks: The system may only be started up if all questions can be answered with "Yes".

*Table 15: Checklist During Commissioning*

No.	Description	Check
1	Is the suction pressure decreasing and the discharge pressure increasing?	
2	Is the compressor rotation correct (no abnormal noise and with compression)?	
3	Is the crankcase oil level between 1/4 and 3/4 of the scroll compressor sight glass? (after 3 or 4 hours of operation)	
4	Is the discharge temperature within the limits (between 50 °C and 90 °C)?	
5	Is the suction superheat within the limits (between 5K and 20K) during normal operation?	
6	Is the suction superheat within the limits (between 5K and 20K) after defrost operation?	
7	Is the running current below the maximum operating current which printed on unit specification label?	
8	Is warm air blowing out from the condenser fan?	
9	Is the compressor On/Off cycle within the acceptable level?	

Remarks: The system may only be handed over to user/owner if all questions can be answered with “Yes”.

Additional advice:

- Do not leave the system unattended until the system has reached its normal operating condition, and the oil charge has properly adjusted itself to maintain the proper level in the sight glass.
- Check periodically the compressor performance and all the moving components during the first day of operation.
- Check the liquid line sight glass and expansion valve operation. If there is an indication that the system is low on refrigerant, thoroughly check the system for leaks before adding refrigerant.

*Table 16: Site Records*

<b>Customer name:</b>		
<b>Installer name:</b>		
<b>Installation date:</b>		
<b>Refrigerant</b>	Type:	
	Charge Amount (kg):	
<b>Outdoor ambient temperature:</b>		
<b>Room thermostat setting:</b>		
<b>Outdoor</b>	Model:	
	Serial Number:	
<b>Indoor</b>	Model:	
	Quantity coupled to 1 outdoor	
	Serial Number:	
<b>Defrost Method</b>		Electrical heater/ timer
<b>Metering Device (TEV)</b>	Model:	
<b>Liquid solenoid valve (pump down)</b>	Model:	
<b>Field Piping</b>	Pipe Length (m):	
	Gas line OD (mm):	
	Liquid line OD (mm):	
	Position of outdoor:	Above / below indoor unit
	Height Differentiate:	
<b>Low pressure switch settings</b>	Cut In (barg):	
	Differential (barg):	
<b>Suction Line</b>	Temperature, Ts (°C):	
	Pressure, Ps (barg):	
<b>Liquid line</b>	Temperature, Tc (°C):	
	Pressure, Pc (barg):	
<b>Compressor Current</b>	Before Defrost (A):	
	After Defrost (A):	
<b>Suction Superheat</b>	Normal Operation (°C):	
	After Defrost (lowest) (°C):	
<b>Subcool before TXV (°C):</b>		



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**DAIKIN REFRIGERATION MALAYSIA SDN. BHD.** (34543-w)

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