MARSTAIR
REFRIGERATION AND SPECIALIST AIR CONDITIONING

A2LCABINETMATCH WITH RECIEVER TECHNICAL MANUAL

CONTENTS

1 – GENERAL INFORMATION

1A GENERAL INFORMATION

Installation must be carried out in accordance with the Marstair installation manual, EN 378 and national codes and guidance.

1. Installation work on this equipment to be completed by F Gas certified Technicians who are fully conversant with the appropriate Refrigeration and Electrical practices and have sound knowledge of current Industrial Safe Working practices. It is also advisable that technicians hold the ACRIB Understanding the properties of flammable refrigerants (A2L, A2 and A3) qualification.

   NOTE: it is the responsibility of the operator to ensure the technician is certified to the correct standard (EN13313 or equivalent).

2. These units are supplied with a holding charge of oxygen free nitrogen and polyolester oil. Do not mix oils or refrigerants.

3. These units when installed contain live electrical components, moving parts and refrigerant under pressure. Always site out of reach of children and protect from vandalism.

4. The data plate only gives information for the individual indoor or outdoor unit. For system details add input power and current of indoor and outdoor unit, including any heater load.

5. The refrigerant used should be identified by locating a refrigerant label on the unit case

6. A suitable risk assessment of the installation must be carried out. This ensures a safe working environment is maintained in accordance with The Dangerous Substances and Explosive Atmosphere Regulations and the Management of Health and Safety at Work Regulations. A step by step guidance template is provided within these instructions.

7. The condensing unit must be installed outside.

8. Systems uses R454C refrigerant which is classed as an A2L flammable gas

1B GENERAL INSTALLATION PROCEDURE

- Carry out “step by step” or full risk assessment
- Ensure that no sources of ignition are present during installation
- Only certified natural persons should be present during the installation
- Correct selection of tools and equipment compatible with A2L refrigerants. This should include the following:
  - Flammable gas leak detector placed at a low level next to the service valves of the condensing unit.
  - If adequate natural ventilation is not present throughout the installation process, then forced ventilation should be employed via an A2L compatible or ATEX rated fan and motor.
  - When pressure testing through a refrigerant manifold, ensure that it is suitable for the pressure (no sight glass fitted).
  - A2L compatible 2 stage vacuum pump, exhausted to a safe well ventilated area and away from any source of ignition (check exhaust fumes with flammable gas leak detector).
  - R454C bottle adaptor (left handed female and right handed male connections DIN477-1 21.8mm LH, External, 14 T.P.I).
  - All refrigerant hoses should be as short as possible and have self-closing or ball valve connections in accordance with BS EN 378.
  - If additional refrigerant is to be added, charge in liquid state and ensure a flammable gas leak detector is positioned at a low level near the connections. (If the flammable gas leak detector indicates the presence of a flammable atmosphere, do not energise or de-energise any electrical components until a safe environment has been ensured.)
- Leak checking the system in accordance with EN 1516/2017 directly after installation.
- If a leak is discovered, energise the flammable gas leak detector and place at a low level near connections to the recovery machine and cylinder. Connect an A2L compatible recovery machine and recover into a suitable recovery cylinder (red painted cylinder valve guard and shoulder) in accordance with BS EN 378.

2 - SMC CONDENSING UNITS

2A SPECIFICATION.

SME		15	20	30	40	45	50	80	90	100	150
Nominal cooling capacity (-10°C evaporating temp & 32°C ambient temp) R454C	kW	1.24	1.53	1.78	2.26	2.96	4.17	5.26	5.95	7.45	8.83
1 Ph (230V 50Hz) compressor load only (at nominal cooling capacity)											
Power (nominal)	kW	0.72	0.83	0.98	1.23	1.4	1.8	2.2	2.5	N/A	N/A
Starting current LRA	A	29.5	33	42.2	48	61	76	97	114	N/A	N/A
Nominal current FLA	A	5.4	5.8	6.4	10.3	11.4	16.2	20.6	23.5	N/A	N/A
3Ph (400v 50Hz) compressor load only (at nominal cooling capacity)											
Power (nominal)	kW	N/A	N/A	N/A	1.23	1.36	1.75	2.18	2.47	2.84	3.34
Starting current LRA	A	N/A	N/A	N/A	23	26	32	46	50	64	74
Nominal current FLA	A	N/A	N/A	N/A	3.8	4.2	5.5	6.8	7.8	10.1	11.8
Sound Pressure Levels (SPL) at 10m distance in free field conditions @ 27°C external ambient.											
dBA		34	34	34	34	33	33	34	37	38	37
NR		28	28	28	28	27	27	27	30	31	30
Condenser fan (1Ph 230V 50Hz)											
Airflow (max speed)	m^3/s	0.323	0.323	0.713	0.713	0.713	0.713	0.713	0.713	1.85	1.85
Airflow motor rating	kW	0.065	0.065	0.13	0.13	0.13	0.13	0.13	0.13	2x0.13	2x0.13
Nominal current FLA	A	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.6	2x0.6	2x0.6
Fans: No. x diameter	#x mm	1x350	1x350	1x457	1x457	1x457	1x457	1x457	1x457	2x457	2x457
Fans max speed	r.p.m	940	940	940	940	940	940	940	940	940	940

2B PERFORMANCE DATA.

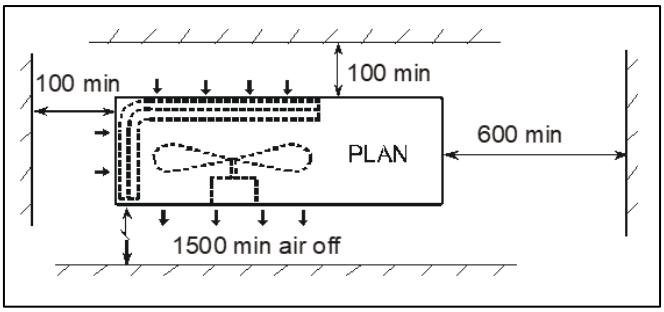
		Evaporating temperature				
	Ambient temperature	-20	-15	-10	-5	0
SMC 15	27	0.77	1.01	1.37	1.64	2.09
	30	0.73	0.95	1.29	1.54	1.98
	32	0.70	0.92	1.24	1.49	1.90
	35	0.66	0.86	1.17	1.40	1.79
	38	0.62	0.81	1.11	1.32	1.69
	40	0.60	0.78	1.06	1.27	1.62
SMC 20	27	0.95	1.25	1.69	2.02	2.59
	30	0.90	1.18	1.60	1.91	2.44
	32	0.86	1.13	1.54	1.84	2.35
	35	0.81	1.07	1.45	1.73	2.22
	38	0.77	1.01	1.37	1.63	2.09
	40	0.74	0.97	1.31	1.57	2.01
SMC 30	27	1.10	1.44	1.96	2.34	3.00
	30	1.04	1.36	1.85	2.21	2.83
	32	1.00	1.31	1.78	2.13	2.72
	35	0.94	1.24	1.68	2.00	2.57
	38	0.89	1.16	1.58	1.89	2.42
	40	0.85	1.12	1.52	1.81	2.32
SMC 40	27	1.40	1.84	2.49	2.97	3.81
	30	1.32	1.73	2.35	2.81	3.60
	32	1.27	1.67	2.26	2.70	3.46
	35	1.20	1.57	2.13	2.55	3.26
	38	1.13	1.48	2.01	2.40	3.07
	40	1.09	1.42	1.93	2.31	2.95
SMC 45	27	2.03	2.55	3.16	3.88	4.72
	30	1.95	2.45	3.04	3.74	4.55
	32	1.90	2.38	2.96	3.64	4.44
	35	1.81	2.28	2.84	3.50	4.26
	38	1.72	2.18	2.71	3.35	4.09
	40	1.67	2.11	2.63	3.25	3.97
SMC 50	27	2.86	3.60	4.46	5.47	6.66
	30	2.75	3.46	4.29	5.28	6.42
	32	2.68	3.36	4.18	5.13	6.26
	35	2.55	3.22	4.01	4.94	6.01
	38	2.43	3.08	3.82	4.73	5.77
	40	2.36	2.98	3.71	4.58	5.60
SMC 80	27	3.61	4.53	5.62	6.90	8.39
	30	3.47	4.36	5.41	6.65	8.09
	32	3.38	4.23	5.26	6.47	7.90
	35	3.22	4.05	5.05	6.22	7.58
	38	3.06	3.88	4.82	5.96	7.27
	40	2.97	3.75	4.68	5.78	7.06
SMC 90	27	4.09	5.13	6.36	7.81	9.50
	30	3.92	4.93	6.12	7.53	9.16
	32	3.82	4.79	5.96	7.33	8.94
	35	3.64	4.59	5.72	7.04	8.57
	38	3.46	4.39	5.45	6.74	8.23
	40	3.36	4.25	5.29	6.54	7.99
SMC 100	27	5.11	6.42	7.95	9.76	11.88
	30	4.91	6.17	7.65	9.41	11.45
	32	4.78	5.99	7.45	9.16	11.17
	35	4.55	5.74	7.15	8.81	10.72
	38	4.33	5.49	6.82	8.43	10.29
	40	4.20	5.31	6.62	8.18	9.99
SMC 150	27	6.06	7.61	9.43	11.58	14.09
	30	5.82	7.31	9.07	11.16	13.58
	32	5.67	7.10	8.84	10.86	13.25
	35	5.40	6.81	8.48	10.45	12.72
	38	5.13	6.51	8.09	10.00	12.21
	40	4.98	6.30	7.85	9.70	11.85

2C MOUNTING, DIMENSIONS & WEIGHTS.

These units are designed to stand on a flat surface. If the unit is to be wall mounted the following kits are available.

KIT	MRC+ 15-80	MRC+ 90-180
Mounting Bracket	55021100	55021101

Whether floor or wall mounted, it is essential that the mounting surface is capable of supporting the unit weight**.** Leave space around the unit for air circulation and access for installation and maintenance.

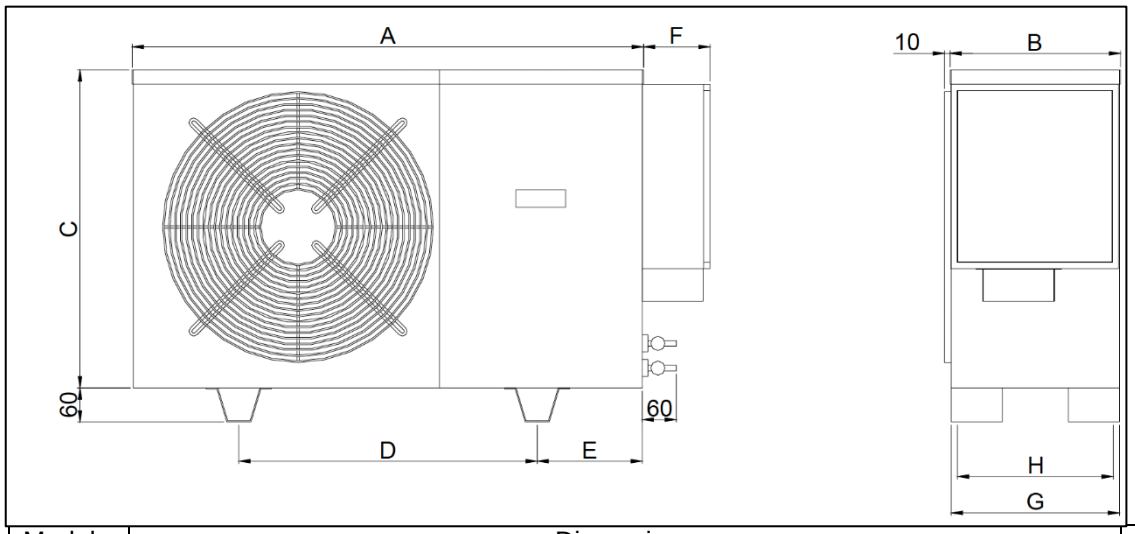


Dimensions in mm.

Condensing unit to be installed outside and not in an enclosed area.
Smoking and naked flames should be prohibited around the area around the condensing unit.

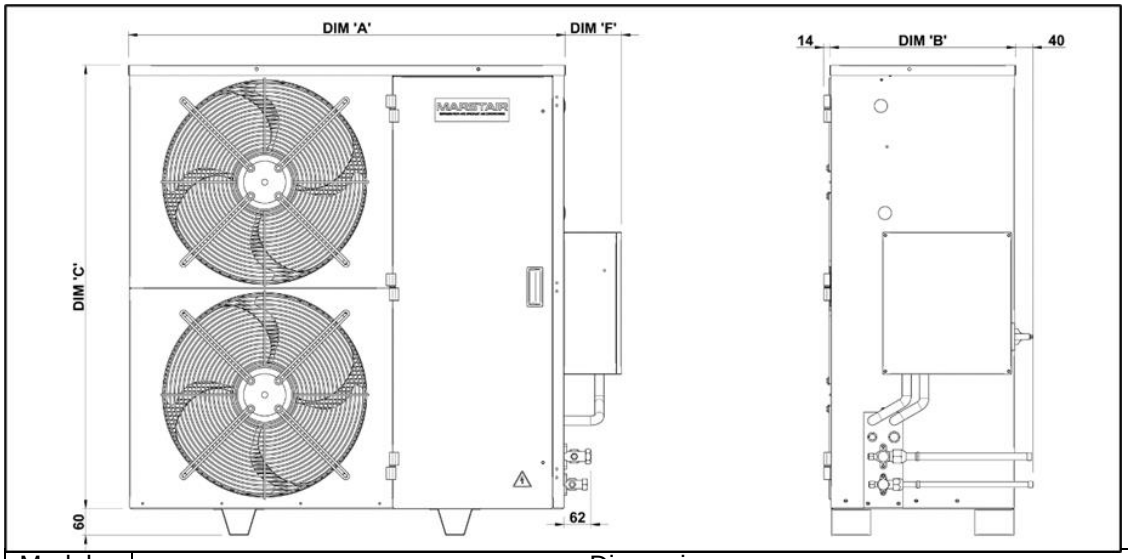
Packed weights					
Model	Dimensions			Weight	
SMC	Width	Depth	Height	1ph	3ph
15	1060	340	620	48	
20	1060	340	620	49	
30	1060	340	620	50	
40	1060	340	620	55	55
45	1160	390	720	63	63
50	1160	390	720	66	66
80	1160	390	720	68	68
90	1160	390	820	78	78
100	1160	465	1080		92
150	1160	465	1080		94

SMC 15-90 (Dimensions in mm.)



Model	Dimensions								Weight	
SMC	A	B	C	D	E	F	G	H	1ph	3ph
15	900	300	560	525	185	117	296	274	46	
20	900	300	560	525	185	117	296	274	47	
30	900	300	560	525	185	117	296	274	48	
40	900	300	560	525	185	117	296	274	53	53
45	1000	350	660	495	250	117	346	324	61	61
50	1000	350	660	495	250	117	346	324	64	64
80	1000	350	660	495	250	117	346	324	66	66
90	1000	350	760	495	250	117	346	324	76	76

SMC 100-150 (Dimensions in mm.)



Model	Dimensions								Weight	
SMC	A	B	C	D	E	F	G	H	1ph	3ph
100	1000	425	760	495	250	117	417	397		90
150	1000	425	760	495	250	117	417	397		92

2D GENERAL.

Supplied Sweat connections										
Model	SMC									
Size	15	20	30	40	45	50	80	90	100	150
Expansion	3/8	3/8	3/8	3/8	3/8	1/2	1/2	1/2	1/2	1/2
Suction	3/8	1/2	1/2	1/2	1/2	1/2	5/8	5/8	3/4	3/4

The installation section of the risk assessment template or equivalent should be carried out before commencing installation.
When installing a split refrigeration system, all interconnecting refrigeration pipework must be manufactured, jointed, tested, insulated and installed in such a way as to ensure that damage cannot occur during normal, service and maintenance operations that may cause a rupture and subsequent leakage.
It is advisable, wherever possible, that brazed or permanent mechanical joints are used when jointing refrigeration pipework designed for an A2L refrigerant.

CALCULATING EQUIVALENT LENGTHS

The effects of bends and fittings must be taken into account.
Pipe sizes are based on:
Minimum of 2.5 m/s (500 fpm) suction gas velocity for horizontal or downflow.
Minimum of 5.0 m/s (1000 fpm) suction gas velocity for upflow.
Maximum of 20.0 m/s (4000 fpm) suction gas.
Where vertical risers exceed 3m, oil traps must be formed in the pipe. This will help ensure that oil returns to the compressor. Typically fit an oil trap every 3m with a trap at the bottom of the riser.

GOOD PRACTICE

Keep pipe runs as short as possible.
Avoid sharp bends
Fully insulate both suction and expansion lines including mechanical connections
Try to avoid running pipes through hot areas.

Connecting the pipework:

a. Release the nitrogen holding charge by slowly opening the valves using a 5mm or 8mm allen key.
b. Ensure the suction line is fully insulated.
c. Connect the pipework between the units. Do not leave pipes ends, valves etc open to the atmosphere.
d. Use a protective shield to avoid scorching the side panel.

2D3 – MULTI SPLIT SYSTEMS RUNNING ON LIQUID LINES WITH RECEIVER FITTED AND NO EEV IN CONDENSING UNIT.

MAXIMUM PIPE RUNS

45m maximum including 6m lift. There will be no significant loss of capacity for extended pipe runs provided pipes are correctly sized.

Main line											
SMC	Suction pipe size						Liquid pipe size				
	3/8"	1/2"	5/8"	3/4"	7/8"	1-1/8"	1/4"	3/8"	1/2"	5/8"	3/4"
15	7.5	30	45					45			
20	7.5	23	45					45			
30		15	45					45			
40		10	36	45				7.5	45		
45		10	36	45				7.5	45		
50		7.5	18	45				7.5	45		
80			11	30	45				45		
90			10	25	45				20	45	
100			7.5	22	45				15	45	
150				12	27	45			8	45	
180				7.5	16	45			7.5	45	

Split Line											
SMC	Suction pipe size						Liquid pipe size				
	3/8"	1/2"	5/8"	3/4"	7/8"	1-1/8"	1/4"	3/8"	1/2"	5/8"	3/4"
45	7.5	23	45					45			
50		15	45					45			
80		10	36	45				7.5	45		
90		10	36	45				7.5	45		
100		7.5	18	45				7.5	45		
150			11	30	45				45		
180			10	25	45				20	45	

2E PRESSURE TESTING

The pressure testing section of the risk assessment template or equivalent should be carried out before commencing pressure testing.

Pressure and leak testing of the system should be completed in accordance with EN 378.

Note for split systems with receiver in the condensing unit and EEV before cabinet evaporator: Interconnecting lines are high pressure

The maximum allowable pressure of the cabinet needs to be assessed when determining the testing pressure.

The condensing unit is fitted with a high-pressure limiting device
SMC15-40 = 23Bar
SMC45-100 = 26Bar

The condensing unit has a pressure relief valve is set to 29.5Bar which is equal to the condensing unit maximum allowable pressure do not exceed this pressure if testing the condensing unit.

2F EVACUATING

The Evacuation section of the risk assessment template or equivalent should be carried out before commencing Evacuation.
With the valves open, connect a vacuum pump to the service ports on the outdoor unit valves. Evacuate the interconnecting pipework and indoor unit to 1000 microns (1 Torr) or better. Allow this to be held for a minimum of 15 minutes.

2G ELECTRICAL & FUSES

The installer supplies mains, control and interconnecting cables: equipment must be earthed.
Wiring must be carried out in accordance with local and national codes.
Mains supply cables must be size compatible with the recommended fuse.
Cable clamps for use with stranded cables are supplied in units 15 - 100 and should be used to secure incoming/outgoing cables. Installers must supply a method of securing solid sheathed cables.

THREE PHASE UNITS WITH SCROLL COMPRESSORS:
On 3 Ph units sizes it is possible for the scroll compressor to run backwards.
This becomes obvious on start up - the compressor will not develop a normal running pressure differential and the top will not become warm: it may be excessively noisy. If this happens, switch off the mains power and exchange the two supply phases **not** connected to the indoor unit. This will correct the rotation.
FUSES: The system and its supply/interconnecting wiring must be protected by fuses, preferably High Rupture Current (HRC) motor rated types (to BS EN60269) or miniature circuit breakers to (BS EN60898) or local codes having similar time lag characteristics, that allow starting of the compressor yet still afford close overcurrent protection under running conditions. The ratings below are for HRC motor rated fuses.

1PH Fuse								
SMC	15	20	30	40	45	50	80	80
Fuse	16	16	16	20	16	20	25	32

3PH Fuse							
SMC	40	45	50	80	90	100	150
Fuse	10	10	10	10	16	16	20

The ratings are for the outdoor unit only. Currents for the indoor units including heaters if applicable should be noted and the fuse size increased pro-rata if using same supply.

2H REFRIGERANT
Charging the system

The charging of refrigerant section of the risk assessment template or equivalent should be carried out before commencing refrigerant charging.

1. Evacuate the system and interconnecting pipework ensuring the service valves are fully open.
2. Allow the evacuated system to draw in the majority of the refrigerant charge.

3. The final charge should be adjusted with the system running.

4. All units are fitted with head pressure control. The link wire across the orange terminals allows the fan to operate at full speed. **THIS SHOULD BE REMOVED AFTER CHARGING**

5. A random start delay of up to 1 minute occurs when mains is first applied. A 3 minute delay occurs between successive compressor operations on all systems.

6. Refrigerant and polyolester oil should be introduced through the Schrader valve the service port on the suction service valve on the outdoor unit. **Ensure the refrigerant is the correct type, as shown on the rating plate**. R454C must always be added in the liquid state.

7. Run the system for a few minutes to allow it to stabilize. Check suction and head pressures.

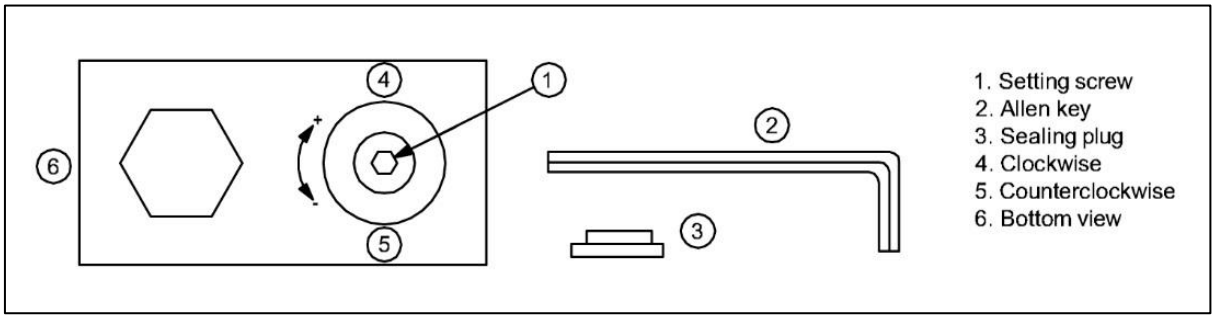
8. Systems should not be overcharged, to avoid liquid return to the compressor

9. HEAD PRESSURE CONTROL ALCO (FSY-42S) & SAGINOMIYA (XGE-4C)
The head pressure controller is factory set to suit the refrigerant. It may be necessary to adjust this to suit site conditions, to raise or lower the nominal head pressure.

ALCO (FSY-42S)
a. With the system switched off, connect a high pressure gauge to the liquid line service valve.

b. Switch on the system and run for a few minutes to stabilise.

c. The head pressure should be approximately:
R454C: 210-220 psig (14.0-15.2barg) to achieve this remove sealing plug and insert 2mm or 5/64”
allen key into setting screw. Turn allen key clockwise (+) or counter clockwise (-) to readjust the setting.



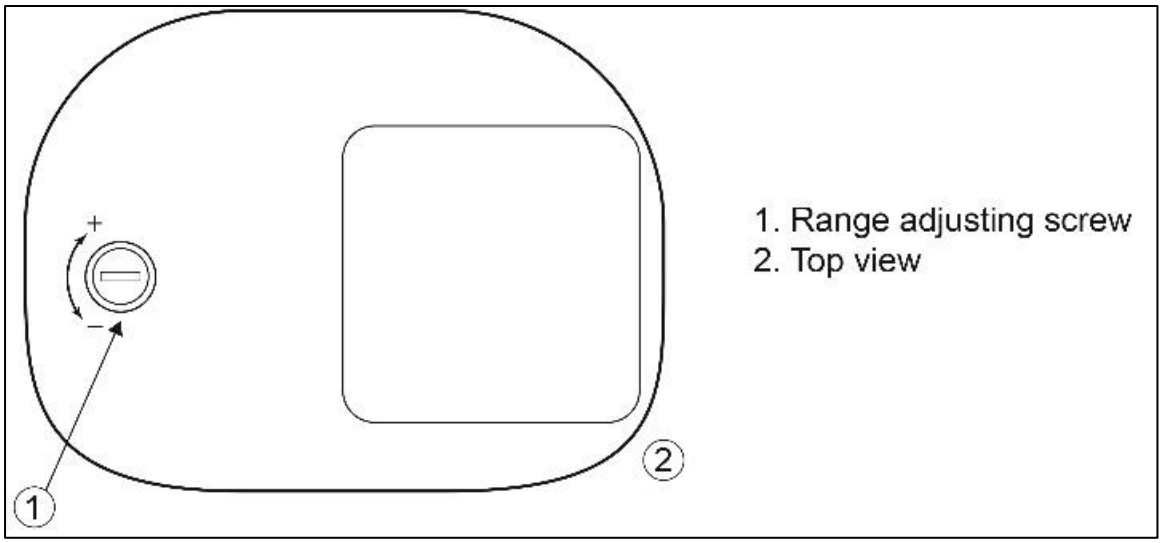
NOTE: The condenser fan may stop if the operating pressure drops below 200 psig (13.8 barg)
Do not turn setting screw **more than 3 turns clockwise** (+3).

Pressure changes per turn of adjusting screw:
Pressure change: 9.2 … 21.2 bar:
Clockwise ~ +2,5 bar, counter clockwise ~ -2,5 bar

After adjustment, re-insert sealing plug and make sure that it is properly fitted. IP65 protection requires firmly sealed plug

NOTES:
Tolerances for condensing temperatures setpoint: ±2K

SAGINOMIYA (XGE-4C)



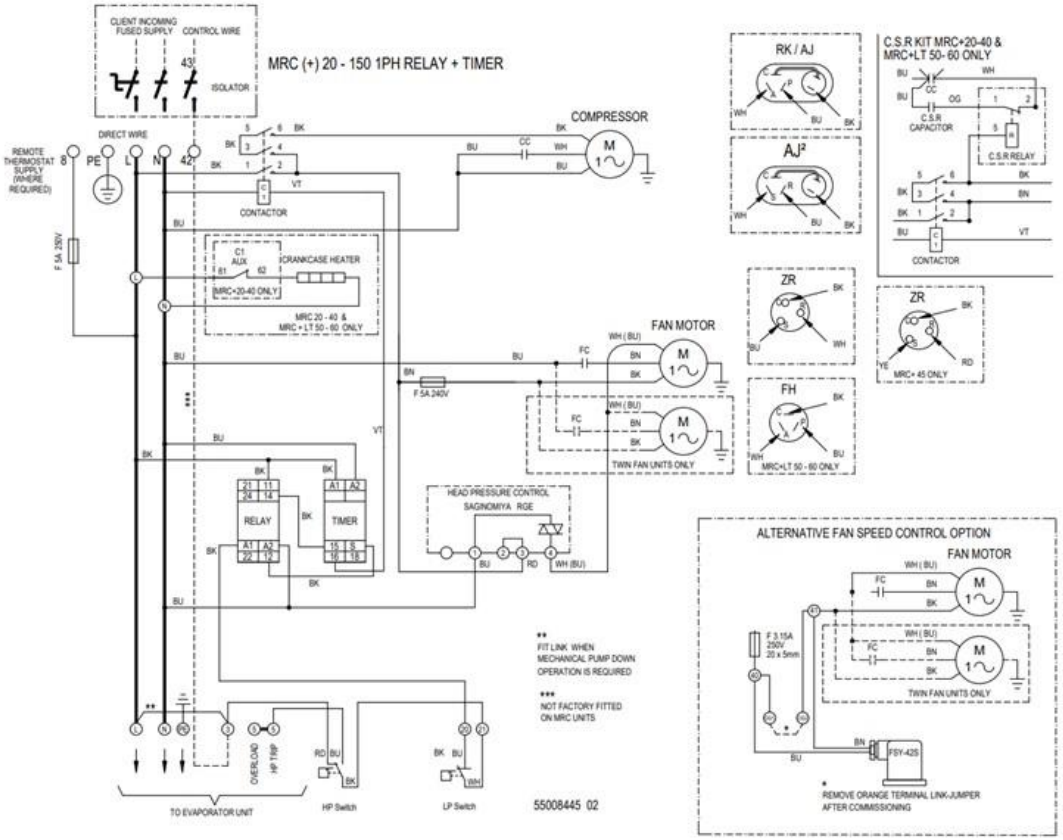
R454C: 210-220 psig (14.0-15.2barg) to achieve this turn the range adjusting screw clockwise (+) for increasing the setting value or counter clockwise (-) for decreasing the setting value.

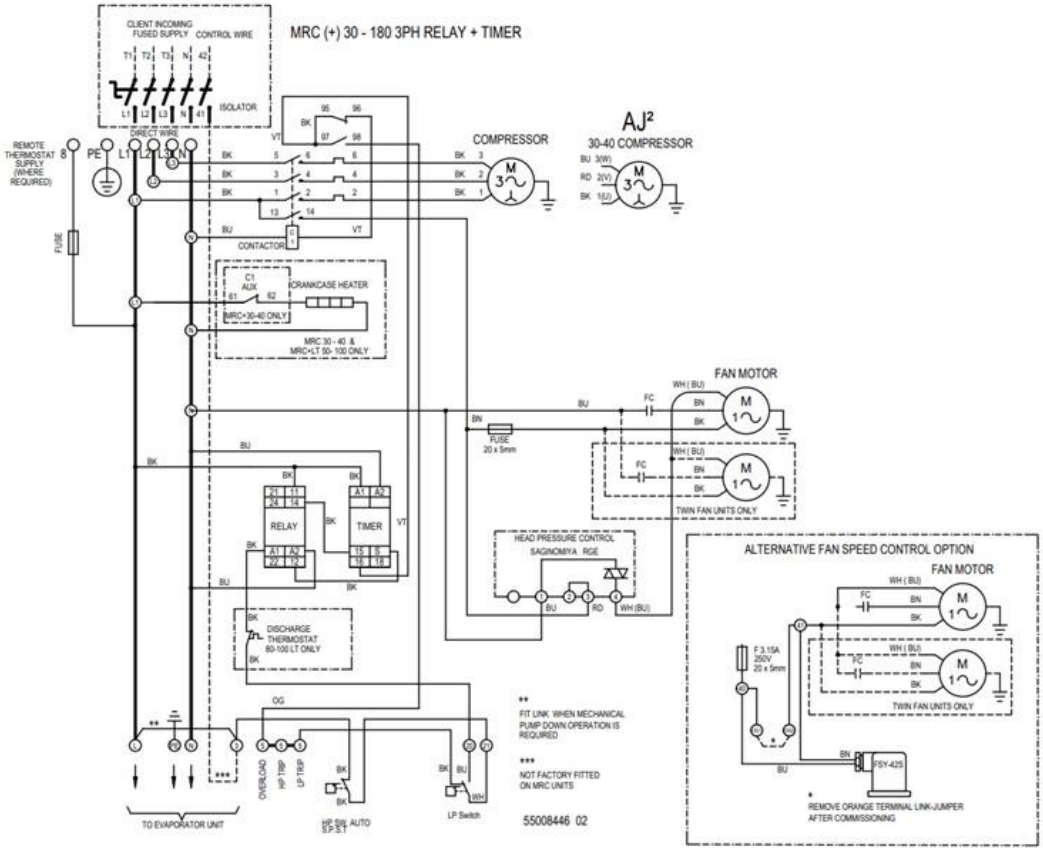
Pressure changes per 1 turn of adjusting screw:

Pressure change: 10 … 25bar:

Clockwise ~ +1.5 bar, counter clockwise ~ -1.5 ba

2I CONDENSING UNIT WIRING DIAGRAMS





2J ECO DESIGN INFORMATION TABLES

Model(s): SMC 15 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	1.24	kW
Rated power input	D_A	0.72	kW
Rated COP	COP_A	**1.73**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	1.41	kW
Power input	D_2	0.68	kW
Rated COP	COP_2	**2.07**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 20 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	1.53	kW
Rated power input	D_A	0.83	kW
Rated COP	COP_A	**1.84**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	1.75	kW
Power input	D_2	0.79	kW
Rated COP	COP_2	**2.22**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 30 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	1.78	kW
Rated power input	D_A	0.98	kW
Rated COP	COP_A	**1.82**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	1.97	kW
Power input	D_2	0.93	kW
Rated COP	COP_2	**2.12**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 40 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	2.26	kW
Rated power input	D_A	1.23	kW
Rated COP	COP_A	**1.84**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	2.50	kW
Power input	D_2	1.17	kW
Rated COP	COP_2	**2.14**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 40 3/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	2.26	kW
Rated power input	D_A	1.23	kW
Rated COP	COP_A	**1.84**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	2.50	kW
Power input	D_2	1.17	kW
Rated COP	COP_2	**2.14**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 45 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	2.96	kW
Rated power input	D_A	1.36	kW
Rated COP	COP_A	**2.18**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	3.20	kW
Power input	D_2	1.24	kW
Rated COP	COP_2	**2.58**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 50 S/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Parameters at full load and ambient temperature 32°C			
Rated cooling capacity	P_A	4.17	kW
Rated power input	D_A	1.75	kW
Rated COP	COP_A	**2.38**	
Parameters at full load and ambient temperature 25°C			
Cooling capacity	P_2	4.49	kW
Power input	D_2	1.60	kW
Rated COP	COP_2	**2.81**	
Other items			
Capacity control		Fixed	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

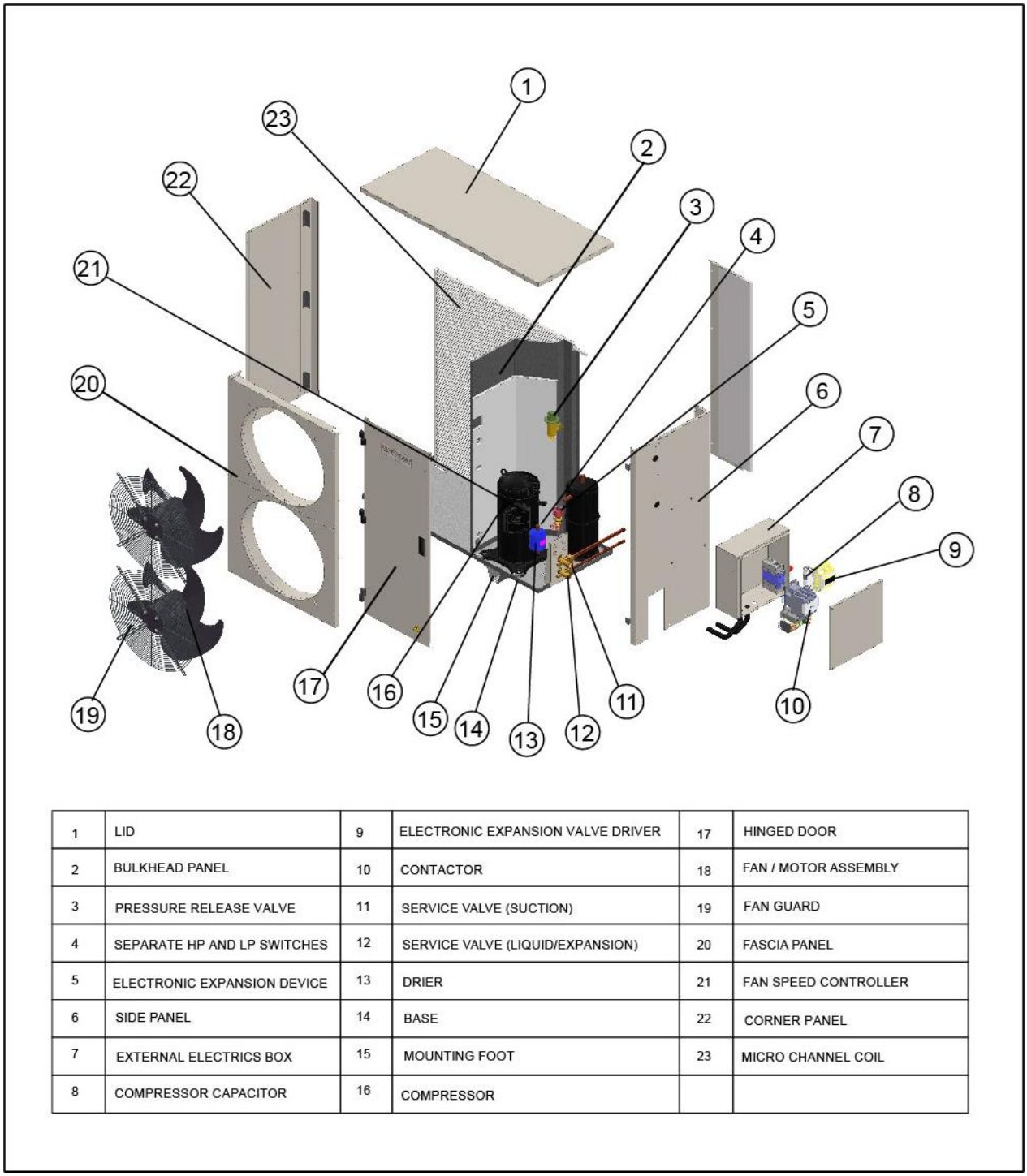
Model(s): SMC 80 3/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Annual electricty consumption	*Q*	9757	kWh/a
Seasonal engery performance ratio	*SEPR*	3.34	
Parameters at full load and ambient temperature 32°C (Point A)			
Rated cooling capacity	P_A	5.300	kW
Rated power input	D_A	2.180	kW
Rated COP	COP_A	**2.43**	
Parameters at part load and ambient temperature 25°C (Point B)			
Declared cooling capacity	P_B	5.73	kW
Declared power input	D_B	1.98	kW
Rated COP	COP_B	**2.89**	
Parameters at part load and ambient temperature 15°C (Point C)			
Declared cooling capacity	P_C	6.32	kW
Declared power input	D_C	1.75	kW
Rated COP	COP_C	**3.61**	
Parameters at part load and ambient temperature 5°C (Point D)			
Declared cooling capacity	P_D	6.86	kW
Declared power input	D_D	1.58	kW
Rated COP	COP_D	**4.34**	
Other items			
Capacity control		Fixed	
Degradation coefficient for fixed and staged capacity units	*Cdc*	0.25	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SMC 90 3/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Annual electricty consumption	*Q*	11029	kWh/a
Seasonal engery performance ratio	*SEPR*	3.32	
Parameters at full load and ambient temperature 32°C (Point A)			
Rated cooling capacity	P_A	5.950	kW
Rated power input	D_A	2.470	kW
Rated COP	COP_A	**2.41**	
Parameters at part load and ambient temperature 25°C (Point B)			
Declared cooling capacity	P_B	6.41	kW
Declared power input	D_B	2.24	kW
Rated COP	COP_B	**2.86**	
Parameters at part load and ambient temperature 15°C (Point C)			
Declared cooling capacity	P_C	7.08	kW
Declared power input	D_C	1.97	kW
Rated COP	COP_C	**3.59**	
Parameters at part load and ambient temperature 5°C (Point D)			
Declared cooling capacity	P_D	7.71	kW
Declared power input	D_D	1.79	kW
Rated COP	COP_D	**4.31**	
Other items			
Capacity control		Fixed	
Degradation coefficient for fixed and staged capacity units	*Cdc*	0.25	
Contact details		TEV Limited Armytage Road Brighouse HD61QF	

Model(s): SME 100 3/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Annual electricty consumption	*Q*	13982	kWh/a
Seasonal engery performance ratio	*SEPR*	3.28	
Parameters at full load and ambient temperature 32°C (Point A)			
Rated cooling capacity	P_A	7.450	kW
Rated power input	D_A	3.100	kW
Rated COP	COP_A	**2.40**	
Parameters at part load and ambient temperature 25°C (Point B)			
Declared cooling capacity	P_B	8.03	kW
Declared power input	D_B	2.83	kW
Rated COP	COP_B	**2.84**	
Parameters at part load and ambient temperature 15°C (Point C)			
Declared cooling capacity	P_C	8.86	kW
Declared power input	D_C	2.50	kW
Rated COP	COP_C	**3.54**	
Parameters at part load and ambient temperature 5°C (Point D)			
Declared cooling capacity	P_D	9.64	kW
Declared power input	D_D	2.27	kW
Rated COP	COP_D	**4.25**	
Other items			
Capacity control		Fixed	
Degradation coefficient for fixed and staged capacity units	*Cdc*	0.25	
Contact details	TEV Limited Armytage Road Brighouse HD61QF		

Model(s): SME 150 3/P			
Refrigerant fluid(s): R454C			
Item	**Symbol**	**Value**	**Unit**
Evaporating temperature	*t*	-10°C	°C
Annual electricty consumption	*Q*	16278	kWh/a
Seasonal engery performance ratio	*SEPR*	3.33	
Parameters at full load and ambient temperature 32°C (Point A)			
Rated cooling capacity	P_A	8.830	kW
Rated power input	D_A	3.600	kW
Rated COP	COP_A	**2.45**	
Parameters at part load and ambient temperature 25°C (Point B)			
Declared cooling capacity	P_B	9.52	kW
Declared power input	D_B	3.29	kW
Rated COP	COP_B	**2.89**	
Parameters at part load and ambient temperature 15°C (Point C)			
Declared cooling capacity	P_C	10.50	kW
Declared power input	D_C	2.91	kW
Rated COP	COP_C	**3.61**	
Parameters at part load and ambient temperature 5°C (Point D)			
Declared cooling capacity	P_D	11.45	kW
Declared power input	D_D	2.65	kW
Rated COP	COP_D	**4.32**	
Other items			
Capacity control		Fixed	
Degradation coefficient for fixed and staged capacity units	*Cdc*	0.25	
Contact details	TEV Limited Armytage Road Brighouse HD61QF		

2K COMPONENT IDENTIFICATION SMC+



1	LID	9	ELECTRONIC EXPANSION VALVE DRIVER	17	HINGED DOOR
2	BULKHEAD PANEL	10	CONTACTOR	18	FAN / MOTOR ASSEMBLY
3	PRESSURE RELEASE VALVE	11	SERVICE VALVE (SUCTION)	19	FAN GUARD
4	SEPARATE HP AND LP SWITCHES	12	SERVICE VALVE (LIQUID/EXPANSION)	20	FASCIA PANEL
5	ELECTRONIC EXPANSION DEVICE	13	DRIER	21	FAN SPEED CONTROLLER
6	SIDE PANEL	14	BASE	22	CORNER PANEL
7	EXTERNAL ELECTRICS BOX	15	MOUNTING FOOT	23	MICRO CHANNEL COIL
8	COMPRESSOR CAPACITOR	16	COMPRESSOR		

2L CONDENSING UNIT MAINTENANCE

The refrigerant recovery section of the risk assessment template or equivalent should be carried out before commencing refrigerant recovery.

Before engaging in any maintenance or repairs ensure

- Use of trained certified natural persons*.
- Well ventilated working environment.
- Use of a flammable gas leak detector.
- Correct selection of tools and equipment compatible with A2L refrigerants.
- Recovery of remaining refrigerant.
- Purging pipework with a suitable inert gas, prior to, during and for a suitable period after carrying out flame brazing to ensure that a flammable mixture cannot be formed.
- Adequate fire watch.
- Pressure testing of repair in accordance with EN378.
- Evacuation and dehydration in accordance with EN 378.
- Charging of the system in accordance with EN 378.
- Leak checking of the repair and system in accordance with EN 1516/2017.

Any other information identified within the site-specific risk assessment is available and taking into account.

***NOTE: it is the responsibility of the operator to ensure the technician is certified to the correct standard (EN13313 or equivalent).**

IMPORTANT
ISOLATE THE UNIT PRIOR TO COMMENCING ANY MAINTENANCE OR REPAIR WORK

GENERAL

1. Ensure unit is not blocked or enclosed and there is adequate free airflow in and round the condensing unit.
2. Visually inspect the unit for wear and tear.
3. Remove the access panels (retain the screws).
4. Clean the base and insides of the unit.
5. Check all electrical connections are secure.
6. Check the face of the coil for cleanliness. Comb the fins if necessary.
7. Check the tightness of the compressor fixing bolts.
8. Check the fan rotates freely.
9. Check the pipework insulation condition.
10. Suction and discharge pressure.
11. Operation of head pressure control.
12. Visually check for oil patches.
13. Check safety labels are clear

3 – REFRIGERATED DISPLAY CABINET

3A GENERAL

Ensure a Cabinet suitable for flammable refrigerants is used. Instructions for use with that cabinet must be followed, paying special attention the requirements of leak detection, alarms, and the procedures to follow should such a leak event occur.
If the leak is identified as occurring outside the cold room, but inside a building or enclosure ensure adequate ventilation. No source of ignition shall be energised or brought into the area until the environment is proven to be safe.
Smoking and naked flames should be prohibited in area around the condensing (outdoor) unit.

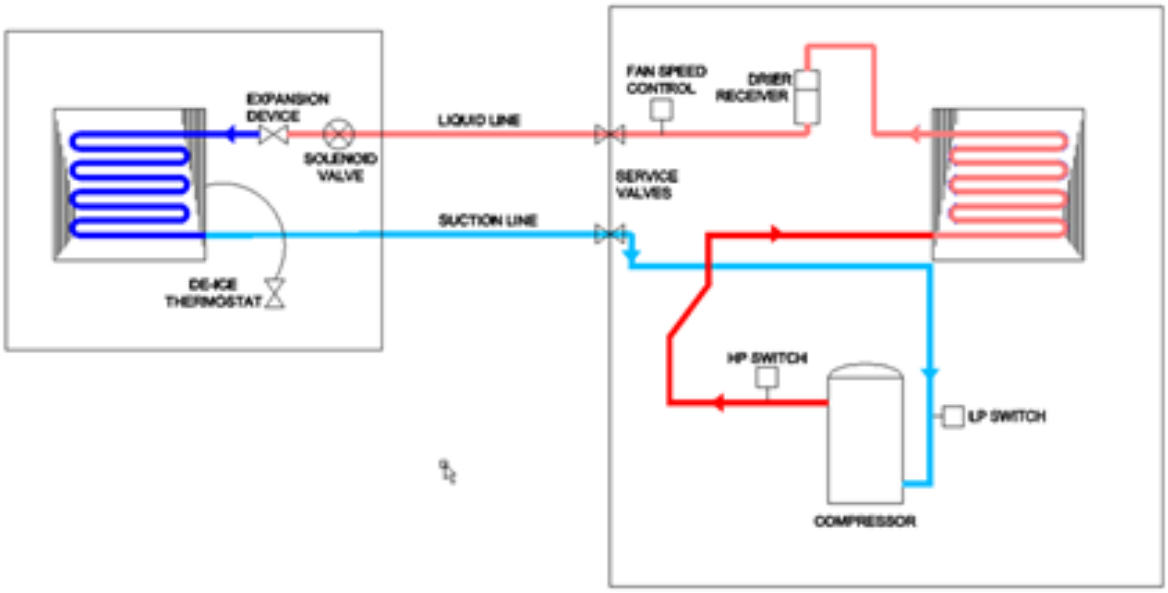
3B MAINTENANCE

The refrigerant recovery section of the risk assessment template or equivalent should be carried out before commencing refrigerant recovery.
Before engaging in any maintenance or repairs ensure

o Use of trained certified natural persons*.
o Well ventilated working environment.
o Use of a flammable gas leak detector.
o Correct selection of tools and equipment compatible with A2L refrigerants.
o Recovery of remaining refrigerant.
o Purging pipework with a suitable inert gas, prior to, during and for a suitable period after carrying out flame brazing to ensure that a flammable mixture cannot be formed.
o Adequate fire watch.
o Pressure testing of repair in accordance with EN378.
o Evacuation and dehydration in accordance with EN 378.
o Charging of the system in accordance with EN 378.
o Leak checking of the repair and system in accordance with EN 1516/2017.

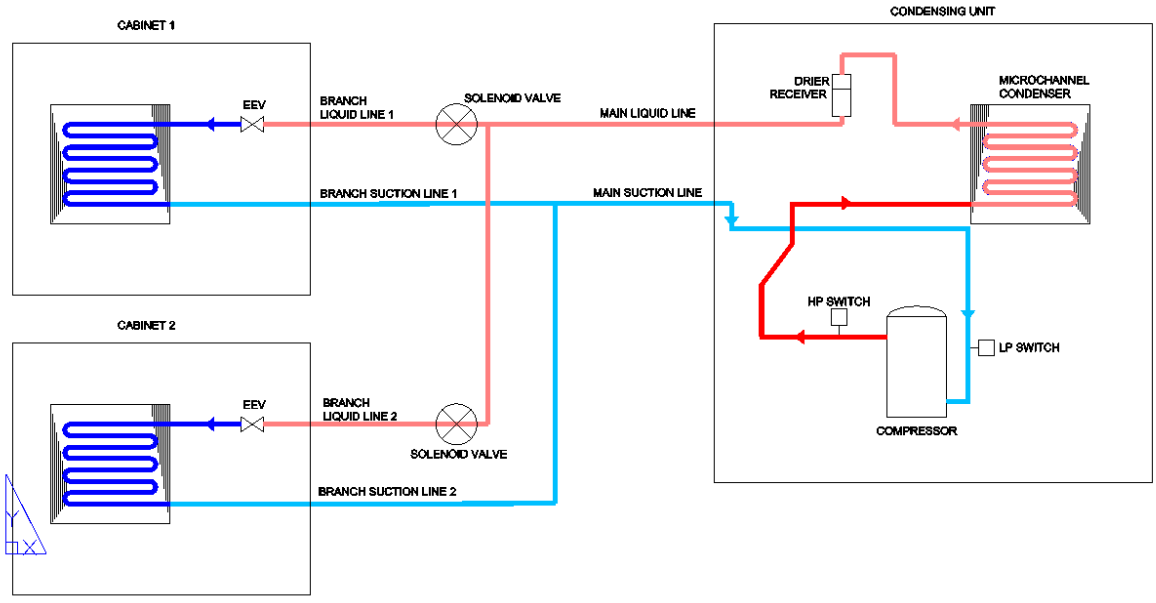
Any other information identified within the site specific risk assessment is available and taking into account.
***NOTE: it is the responsibility of the operator to ensure the technician is certified to the correct standard (EN13313 or equivalent).**
System is to be switched off and isolated during any repairs.

3C REFRIGERANT SYSTEM SCHEMATIC DIAGRAMS
Single Split Match



Run on Expansion line, Use SMC+ units with fitted EEV and no Receiver.

Multi - Split Match



Run on liquid lines, USE SMC+ unit with receiver and no fitted EEV.

4 – SYSTEM SELECTION PROCESS

For exact system matches please contact us with your cabinet coil volume (DM^3) and we will match to a suitable SMC+ unit from our range.
Marstair
01484 405 666 | sales@marstair.com

5 – SPARES

Products for spare parts, please ensure the use of official Marstair spares. Any spare parts taken from other companies, Marstair will not be responsible in case of any damage and will be out of warranty.

6 – END OF LIFE REQUIRMENTS

Refrigerant must be recovered by a certificated technician before the plant is dismantled. Modern refrigerant recovery machines should be able to remove well over 95% of the refrigerant in an old system.
All recovered refrigerants can either be:
a) Sent for destruction by incineration at a licenced waste facility

b) Sent to a specialist plant that can re-process the old refrigerant into a gas with properties identical to virgin refrigerant, to create “reclaimed refrigerant”

c) Given a basic cleaning process, to create “recycled refrigerant”

Given the refrigerant supply shortage that will be created by the phase down process, it is worth trying to send the old refrigerant for reclamation as it may have a good residual value. If the old refrigerant is too contaminated it cannot be reclaimed and must be sent for destruction. It is important not to mix different gases in the same recovery cylinder – as this would render them unsuitable for reclamation.
Reclaimed refrigerant can be used in any refrigeration equipment. Recycled refrigerant must always be used with care as it may be contaminated or of unknown composition.

7 – INSTALLATION RISK ASSESSMENT

Installation of an A2L Split Cabinet Match System
Prior to installation, it is important to ensure that the location is suitable for this type of system and that the instructions have been followed with regard to the minimum room volume for the maximum charge weight. This assessment process is designed to augment a detailed risk assessment not replace it.

The A2L DSEAR Assessment has identified that if a Cabinet split system (typically less than 3kg refrigerant charge), is located correctly in accordance with the instructions, then the most likely point of leakage is a flare connection on the condensing unit, which will be located in free air outside. This will result in Zone 2 NE.

BS EN 60079-10-1 states that this zone may be treated as non-hazardous. Such a zone implies that an explosion, if it takes place, will have negligible consequences.
The following step by step assessment assumes that the site in which you are working has no specific risks or hazards. If this is not the case, a full assessment will be required

INSTALLATION

Question	N/A	YES	NO	Comments
1. Has correct PPE been selected?				If yes go to question 2 If no stop assessment
2. Are suitable first aid facilities available?				If yes go to question 3 If no stop assessment
3. Has the electrical supply been suitably isolated?				If yes go to question 4 If no rectify and reassess
4. Are hot works required for jointing of the refrigeration pipework?				If yes go to question 7 If no go to question 5
5. Are permanent mechanical joints required?				If yes go to question 20 If no go to question 6
6. Have the flare connections been made to a suitable standard?				If yes go to question 20 If no rectify and reassess
7. Are you competent to carry out brazing tasks?				If yes go to question 8 If no stop assessment
8. Brazing certificate number				
9. Has a suitable fire extinguisher been selected and a hot work permit been issued?				If yes go to question 10 If no stop assessment
10. Is the area adequately ventilated?				If yes go to question 11 If no stop assessment
11. Are the pressure regulators in date?				If yes go to question 12 If no rectify and reassess
12. Are the flash back arrestors in date?				If yes go to question 13 If no rectify and reassess
13. Has the oxyfuel equipment been leak tested?				If yes go to question 14 If no rectify and reassess
14. Has the Oxygen Free Nitrogen equipment been leak tested?				If yes go to question 15 If no rectify and reassess
15. Are all the cylinders upright and secure?				If yes go to question 16 If no rectify and reassess
16. Is Oxygen Free Nitrogen purging at the correct flow rate through the pipework?				If yes go to question 17 If no rectify and reassess
17. Has a full shutdown of equipment been completed upon conclusion of hot works				If yes go to question 18 If no rectify and reassess
18. Is a fire watch to be undertaken?				If yes go to question 19 If no rectify and reassess
19. Duration of fire watch				

PRESSURE TESTING

20. F Gas certificate number		

21. Is the system to be pressure tested with Oxygen Free Nitrogen?				If yes go to question 22 If no rectify and reassess
22. What is the required strength pressure test?				
23. What is the required tightness pressure test?				
24. Has the pressure been incrementally increased in a safe manner?				If yes go to question 25 If no rectify and reassess
25. Has the system passed the strength test?				If yes go to question 26 If no rectify and reassess
26. Has the system passed the tightness test?				If yes go to question 27 If no rectify and reassess
27. What was the duration of the tightness test?				
28. Has the system been safely de-pressurised into a well ventilated environment?				If yes go to question 29 If no rectify and reassess

EVACUATION

29. Has a flammable gas leak detector been energised and placed in a suitable location?				If yes go to question 30 If no rectify and reassess
30. Have all possible ignition sources been removed from the work area?				If yes go to question 31 If no rectify and reassess
31. Has a suitable vacuum pump been fitted to the system?				If yes go to question 32 If no rectify and reassess
32. Is the oil level satisfactory?				If yes go to question 33 If no rectify and reassess
33. Is the exhaust able to be discharged into a safe environment away from ignition source?				If yes go to question 34 If no rectify and reassess
34. Has a vacuum gauge been connected to the system?				If yes go to question 35 If no rectify and reassess
35. Has a suitable vacuum been achieved and held for a suitable period of time?				If yes go to question 36 If no rectify and reassess

CHARGING OF REFRIGERANT

36. Is additional refrigerant charge required?				If yes go to question 37 If no go to question 44
37. Is a suitable charging cylinder available fitted with the correct bottle adaptor?				If yes go to question 38 If no rectify and reassess
38. Have you selected a calibrated weighing platform?				If yes go to question 39 If no rectify and reassess
39. Calibration certificate number				
40. Has the charging hose been evacuated of air?				If yes go to question 41 If no rectify and reassess
41. Will the system be charged in liquid or vapour form?				

42. Has the correct additional charge been added in accordance with the manufacturers instructions?				If yes go to question 43 If no rectify and reassess
43. Can the equipment be energised to remove refrigerant from the charging hoses?				If yes go to question 44 If no rectify and reassess
44. Have the isolation valves been opened correctly?				If yes go to question 45 If no rectify and reassess
45. Has the system been leak checked with a suitable leak detector for A2L refrigerant?				If yes go to question 46 If no rectify and reassess
46. Have the running conditions of the system been checked/recorded?				If yes go to question 47 If no rectify and reassess
47. Have the charging hoses been removed safely and with minimum loss of refrigerant?				If yes go to question 48 If no rectify and reassess
48. Is the service valve leak free and cap replaced?				If yes go to question 49 If no go to question 50

REFRIGERANT RECOVERY

49. Have all of the tools, refrigerant and equipment been removed from site?				If yes end assessment If no rectify and reassess
50. Is the area adequately ventilated?				If yes go to question 51 If no rectify and reassess
51. Has a suitable flammable gas leak detector been energised and placed at a low level?				If yes go to question 52 If no rectify and reassess
52. Has a suitable recovery unit been fitted?				If yes go to question 53 If no rectify and reassess
53. Do you have a suitable recovery cylinder with adequate capacity?				If yes go to question 54 If no rectify and reassess
54. Have you placed it on to a suitable calibrated weighing platform?				If yes go to question 55 If no rectify and reassess
55. Calibration certificate number				
56. Have you documented the amount of refrigerant recovered and filled out the appropriate paperwork?				If yes go to question 57 If no rectify and reassess
57. Identify source of leakage and recommence assessment procedure.				

This information is to be given to the end user along with the Marstair internal free volume assessment, and any other risks identified.