CDL
Cool Designs Ltd

Air Conditioning Design & Distribution

Pocket Quick Reference Guide on the TOSHIBA

Calculating the Refrigerant charge for R410A - Heat Pump VRF System

SMMS e
SUPER MODULAR MULTI SYSTEM

Cool Designs Ltd
Raising the Standards in Air Conditioning Distribution
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Refrigerant charge for VRF equipment is critical to obtain optimum performance.
In 2016 Toshiba air conditioning introduced a new multi award winning 2 pipe heat pump VRF system,

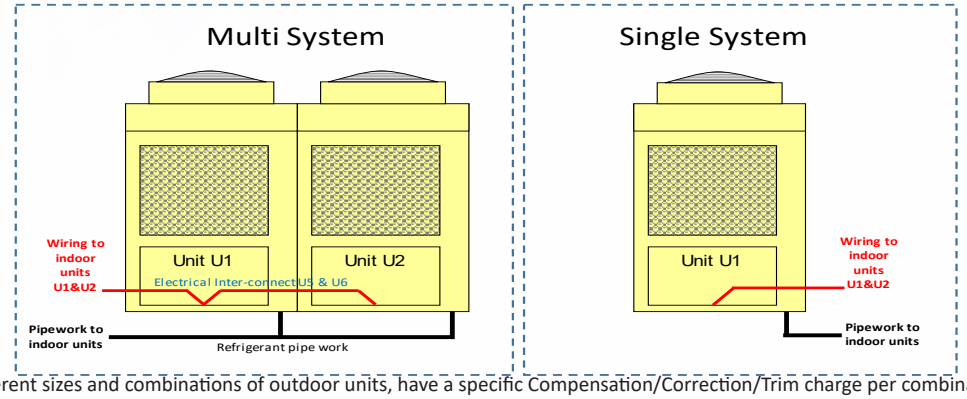
SMMS e
SUPER MODULAR MULTI SYSTEM

This pocket guide will take you through the step by step guidance in calculating the correct refrigerant charge for your SMMSe system.

Working out the correct refrigerant charge requires;

1) The outdoor equipment, quantity and size, (Compensation/Correction/Trim Charge).

(Units have to be in the same system i.e. joined by pipe and cable with another unit,forming a modularized system)



Different sizes and combinations of outdoor units, have a specific Compensation/Correction/Trim charge per combination

2) The quantity and size of indoor units installed.

(Qty and size of Standard indoor units, Air to Air Heat Exchangers, Fresh Air Units)

Additional refrigerant charge amount indoor units	Standard Indoor Unit	Fresh Air Intake Indoor Units	Air to Air Heat Ex-changer with DX Coil
Addition kg/HP	0.4	0.2	0.2

3) The lengths and sizes of the liquid line installed.

(Linear length only, i.e. straight pipes only, do not count bends or fittings.)

Pipe dia. Liquid Line	inch	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"
Additional refrigerant amount per m	kg/m	0.025	0.055	0.105	0.160	0.250	0.350

Above multiplied by SMMSe Factor of 1.2

With the above information it is easy to calculate the additional refrigerant charge for each system.

This guide will break the formula down to easy steps, using data from the supplied charts.

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1) The outdoor equipment, quantity and size, (Compensation/Correction/Trim Charge).

Individual outdoor units can be joined together via pipes and electrics, forming a modularized system, there is a specific correction/trim charge for each combination of units, firstly identify the individual units which are forming the system.

Example 1. **1 x MMY-MAP2206HT8-PE + 2 x MMY-MAP 1606HT8-PE = 54HP system which has a Compensation/Correction/Trim charge of -0.5kg.**

Using the chart below identify the combination of units and utilise the Compensation/Correction/Trim charge in the left hand column.

	System	Combination			Charged refrigerant	Compensation by System HP
	HP	HP			kg	kg
Standard model	8	8	-	-	11.5	-3.5
	10	10	-	-	11.5	-3.5
	12	12	-	-	11.5	-1.5
	14	14	-	-	11.5	-1.0
	16	16	-	-	11.5	-0.5
	18	18	-	-	11.5	1.5
	20	20	-	-	11.5	1.5
	22	22	-	-	11.5	1.5
	24	12	12	-	23	-3.0
	26	14	12	-	23	-2.5
	28	16	12	-	23	-2.0
	30	16	14	-	23	-1.5
	32	16	16	-	23	-1.0
	34	18	16	-	23	1.0
	36	20	16	-	23	1.0
	38	22	16	-	23	1.0
	40	20	20	-	23	3.0
	42	22	20	-	23	3.0
	44	22	22	-	23	3.0
	46	16	16	14	34.5	-6.5
	48	16	16	16	34.5	-6.5
	50	18	16	16	34.5	-0.5
	52	20	16	16	34.5	-0.5
	54	22	16	16	34.5	-0.5
	56	20	20	16	34.5	2.5
	58	22	20	16	34.5	2.5
	60	22	22	16	34.5	2.5
High efficiency model	20	10	10	-	23	-7.0
	22	12	10	-	23	-7.0
	36	12	12	12	34.5	-12.5
	38	14	12	12	34.5	-10.5
	40	14	14	12	34.5	-8.5
	42	14	14	14	34.5	-4.5
	44	16	14	14	34.5	-4.5
	54	20	20	14	34.5	1.5

Table 1

Please note;

There are two types of modularized systems, Standard and High Efficiency, the example above is for a Standard system, if the units combined where;

Example 2. **2 x MMY-MAP2006HT8-PE + 1 x MMY-MAP1406HT8-PE = 54HP system which has a Compensation/Correction/Trim charge of +1.5kg.**

This would be a High efficiency system and the compensation/correction/trim charge is different from that of a standard system.

2) The quantity and size of indoor units installed.

(Qty and size of Standard indoor units, Air to Air Heat Exchangers, Fresh Air Units)

Additional refrigerant is added to the system for each indoor unit connected in the system, this is worked out dependant on the type of indoor unit installed;

Fresh Air Intake Units, MMD-AP0481/0721/0961HFE - 0.2kg/HP

Air to Air Heat Exchanger, MMD-VN502/802/1002HEXE - 0.2kg/HP

Standard Units, MMK, MMU (MH,HP,WH,YH), MMC, MMD (SPH, BH, H), MML (BH, H, NH), MMF - 0.4kg/HP

Additional refrigerant charge amount indoor units	Standard Indoor Unit	Fresh Air Intake Indoor Units	Air to Air Heat Exchanger with DX Coil
Addition kg/HP	0.4	0.2	0.2

Table 2

Standard Units	
Model	HP
005*	0.6
007*	0.8
009*	1
012*	1.25
015*	1.7
018*	2
024*	2.5
027*	**3** *
030*	3.2
036*	4
048*	5
056*	6
072*	8
096*	10

Table 3

Air to Air Heat Exchanger with DX Coil	
Model	HP
050*	1.7
080*	**2.5** *
100*	3.2
096*	10

Table 4

Fresh Air Intake Units	
Model	HP
048*	5
056*	8
096*	10
096*	10

Table 5

Identify the quantity and respective HP for all the Standard units, Air to Air Heat Exchangers with DX Coils and Fresh Air Intake Units installed within the system being charged.

Multiply the quantity of units by the HP of each unit (Table 3), by the relavent factor (Table 2)

Example 3. 10 x MMY-MMUAP0274HP-E (10 x 3 x 0.4 = 12kg) + 2 x MMD-VNM802HEXE (Heat Exchanger with DX Coil) (2 x 2.5 x 0.2 = 1kg) TOTAL 12+1 = 13kg

3) The lengths and sizes of the liquid line installed.

(Linear length only, i.e. straight pipes only, do not count bends or fittings.)

Pipe dia. Liquid Line	inch	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"
Additional refrigerant amount per m	kg/m	0.025	0.055	0.105	0.160	0.250	0.350

Table 6

Measure the lengths of Liquid Line pipes installed, **STRAIGHT PIPE ONLY (Linear), DO NOT CALCULATE FOR BENDS OR FITTINGS**, multiply by the corresponding kg/m (Table 6) and multiply by 1.2 (The factor for SMMSe)

Example 4, 20 metres of 1/4" = 0.5kg + 30 metres of 1/2" = 3.15kg + 50 metres of 3/4" = 12.5kg (0.5 + 3.15 + 12.5) X 1.2 = 19.38kg

Utilizing the examples within this publication;

1) **Example 1.** 1 x MMY-MAP2206HT8-PE + 2 x MMY-MAP 1606HT8-PE = 54HP system which has a Compensation/Correction/Trim charge of -0.5kg.

2) **Example 3.** 10 x MMY-MMUAP0274HP-E (10 x 3 x 0.4 = 12kg) + 2 x MMD-VNM802HEXE (Heat Exchanger with DX Coil) (2 x 2.5 x 0.2 = 1kg) TOTAL 12+1 = 13kg

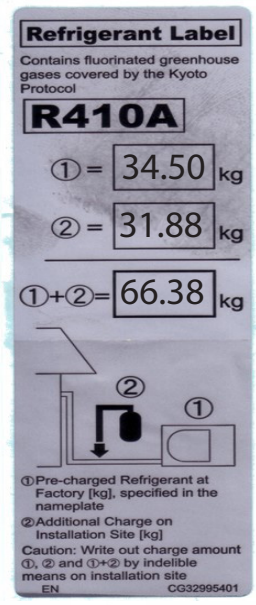
3) **Example 4,** 20 metres of 1/4" = 0.5kg + 30 metres of 1/2" = 3.15kg + 50 metres of 3/4" = 12.5kg (0.5 + 3.15 + 12.5) X 1.2 = 19.38kg

The additional refrigerant charge for this system would be;

-0.5 +13 + 19.38 = 31.88kg

In compliance with current F-Gas regulations a label should be attached to the outdoor unit adjacent to the Service Valves, with Factory Charge plus Additional Charge this would be **34.5 + 31.88 = 66.38kg**

(A label is provided within the installation manual which accompanies the outdoor unit)



Notes

Notes

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