DAIKIN R32 PRODUCT

Comparisons & Precautions

Inverter Brief History

R22 AC INVERTER

MULTI SPLIT

MSV25/35A

2004

2005

R410A DC INVERTER

SINGLE SPLIT

5WMX10/15/20/25G

& MULTI SPLIT

5MSX20/25/30

2003

R410A DC INVERTER

SINGLE SPLIT

5SLX10/15C

Moving towards DC Inverter technology

Inverter Brief History (continued)

Full range DC Inverter For Residential

2006
R410A DC INVERTER
5CKX/5CCX/5CEX

2009
R410A DC INVERTER
SINGLE SPLIT
5WMY10/15J

2010
R410A DC INVERTER
SINGLE SPLIT
5WMY20/25J

2012
R410A DC INVERTER
MULTI SPLIT
5MSY20/25/30B

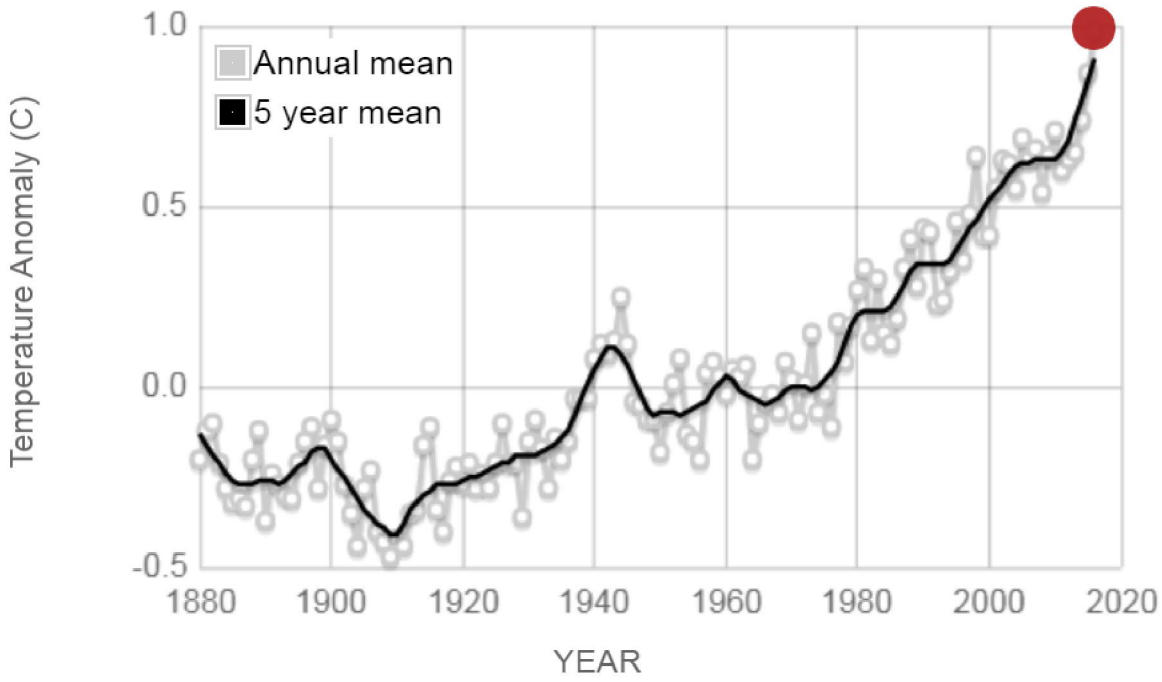
2014
R410A DC INVERTER
SINGLE & MULTI SPLIT
DC FAN MOTOR

2017
R32 DC INVERTER

Influence of Global Warming

GLOBAL LAND-OCEAN TEMPERATURE INDEX

Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS

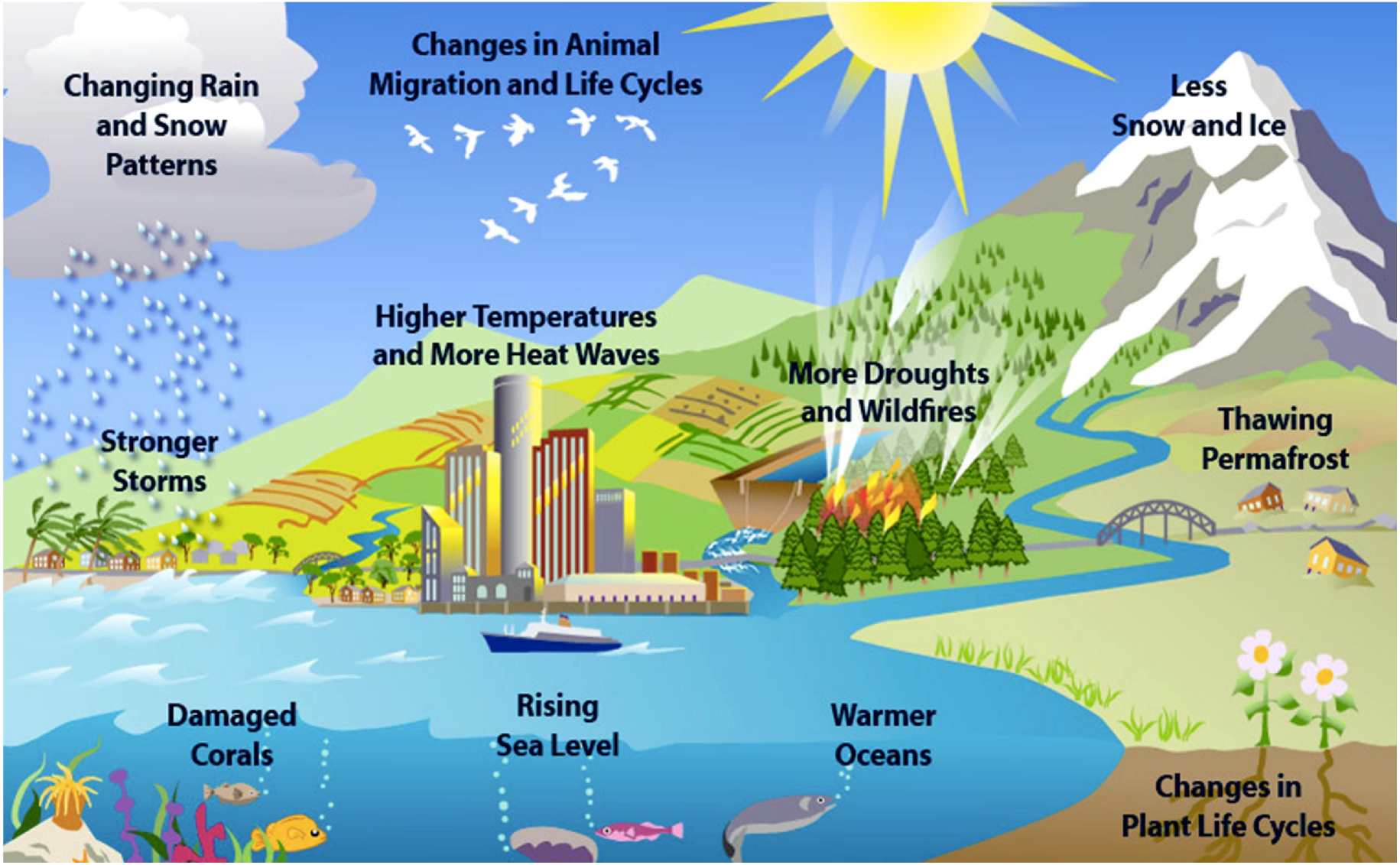


Global Temperature

LATEST ANNUAL AVERAGE: 2016

0.99 °C

Effects of Global Warming



Candidates of Low GWP Refrigerant

Current (High GWP)

No Ozone depletion but high GWP

- R407C (GWP 1770)
- R410A (GWP 2090)

Solution (Low GWP)

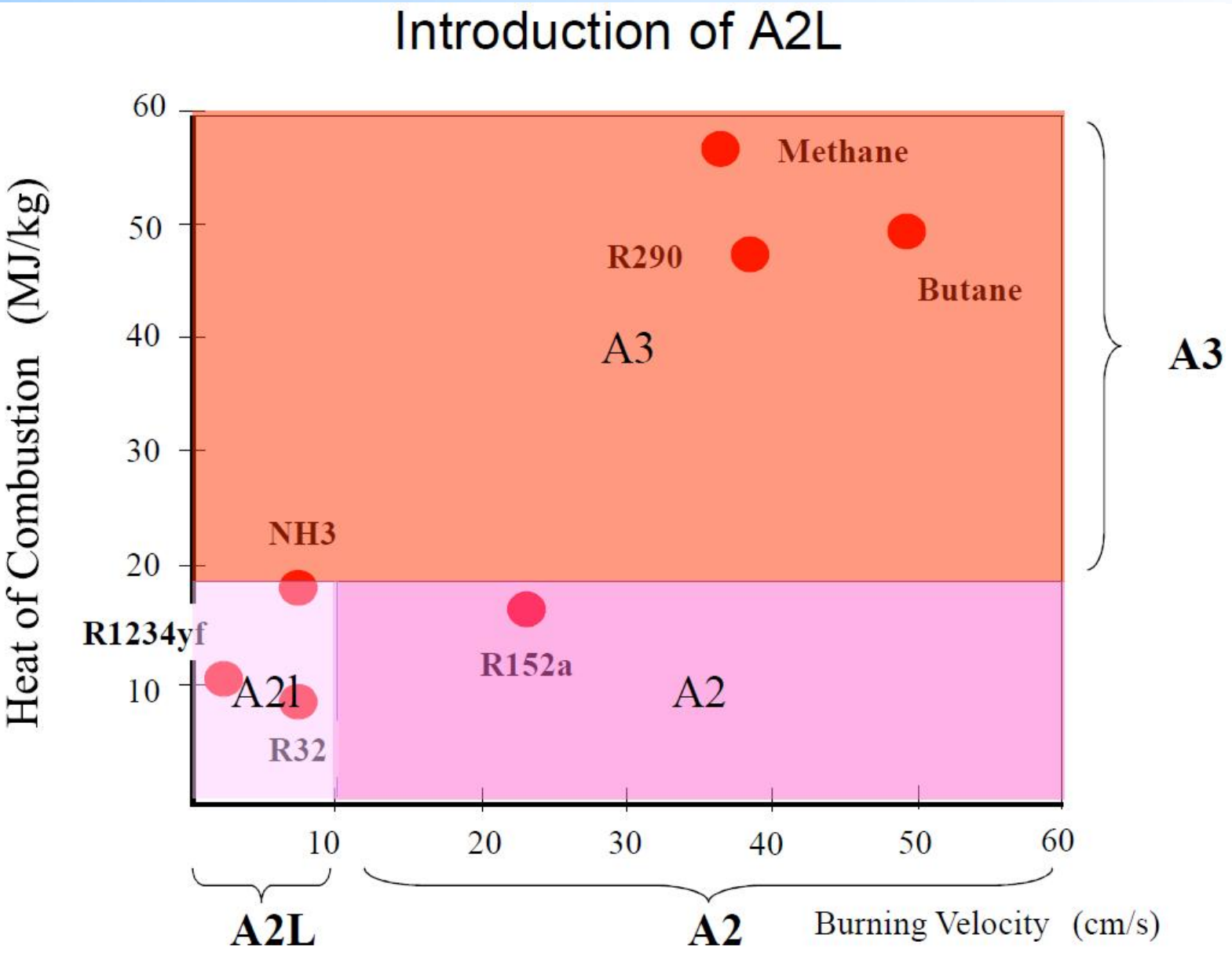
- R32 (GWP : 675)
- R1234yf (GWP : 4)
- Propane (GWP : <3)

Selection of R32

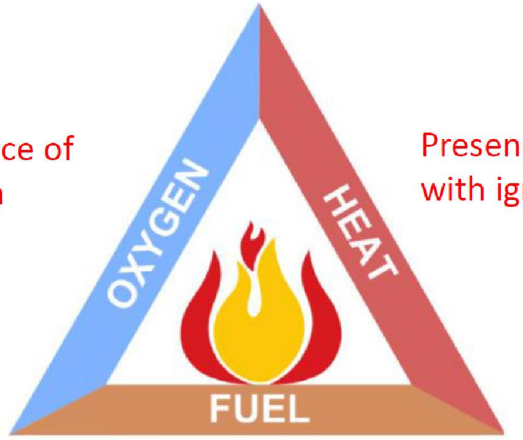
		Composition	Ozone depletion potential (ODP)	Global warming potential (GWP)	Flammability	Cooling Capacity	Theoretical COP	P cond (Mpa)
	R22	Single	0.05	1810	No	100	100	1.7
HFC	R410A (R32＋R125)	Azeotrope -Like	0	2090	No	141	91	2.7
HFC	★ R32	Single	0	675	※Slightly flammable	160	96	2.8
Non-HFC	Propane (R290)	Single	0	＜3	Highly Flammable	83	97	1.5
Non-HFC	CO2 (R744)	Single	0	1	No	256	41	10.0
Non-HFC	R1234yf	Single	0	4	※Slightly flammable	56	92	1.2

※Special condition at laboratory test

Flammability



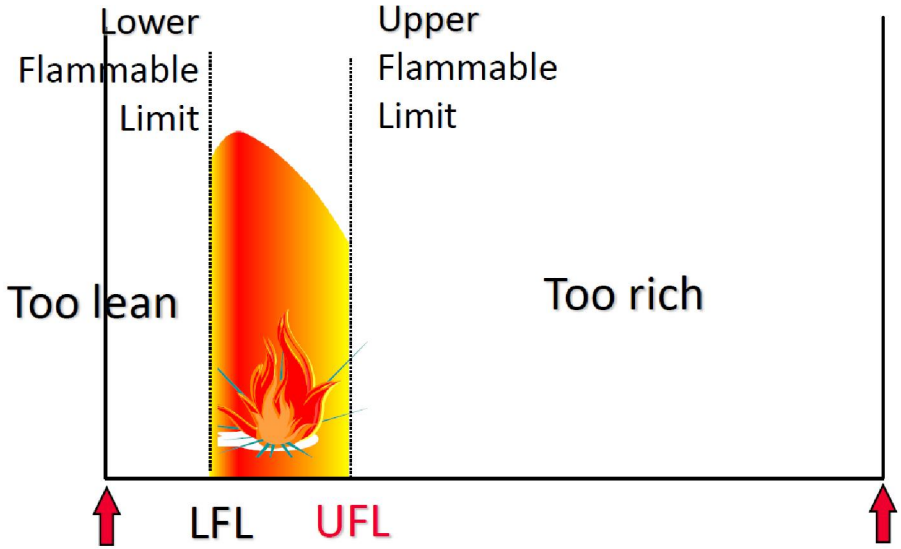
Flammability (continued)



Presence of oxygen

Presence /contact with ignition source

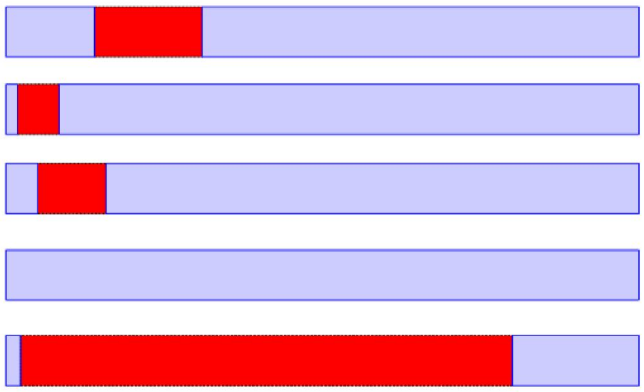
Occurrence of refrigerant leakage



Minimum ignition temperature of R32 compared to that of other gasses ..... Higher the number the better.

50 x more energy required to ignite than Natural Gas

GAS	MIE (J)
R32	**0.015 - 0.100**
Iso-Butane	0.00025
Natural Gas	0.00028
R22	na
410A	na
Acetylene	0.00017
Hydrogen	0.00011



GAS	LFL-UFL
R32	14-31
Iso-butane	1,8-8,4
Natural gas	5-15,8
R410A	/
Acetylene	2,3->80

Flammability (continued)

[How R32 Burns (Flame Propagation)]

When R32 is ignited

When propane is ignited

	Burning speed (Unit: cm/s)
R32	**6.7**
Propane	46.4

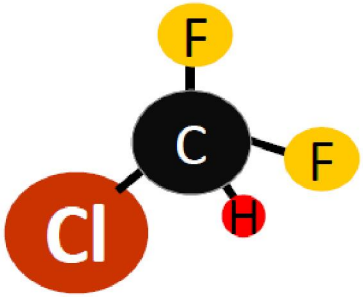
Even if R32 gets ignited, the risk of pressure rise (= explosive force) is low due to its slow flame propagation (slow burning).

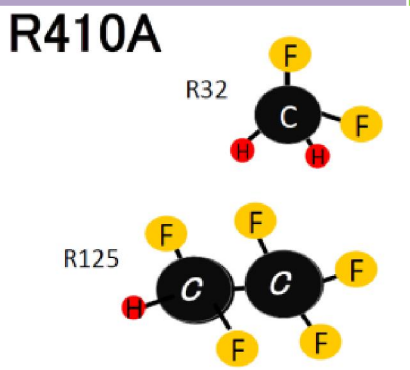
[Change of Flame When There is R32 Leakage]

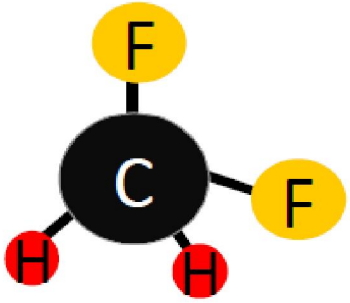
When leakage occurs, an area of concentration forms immediately below the leaking part and up to a certain height above the floor in the vicinity of the leak.
The picture shows the change in the flames (flame propagation).

Comparison with other refrigerants (Operation)

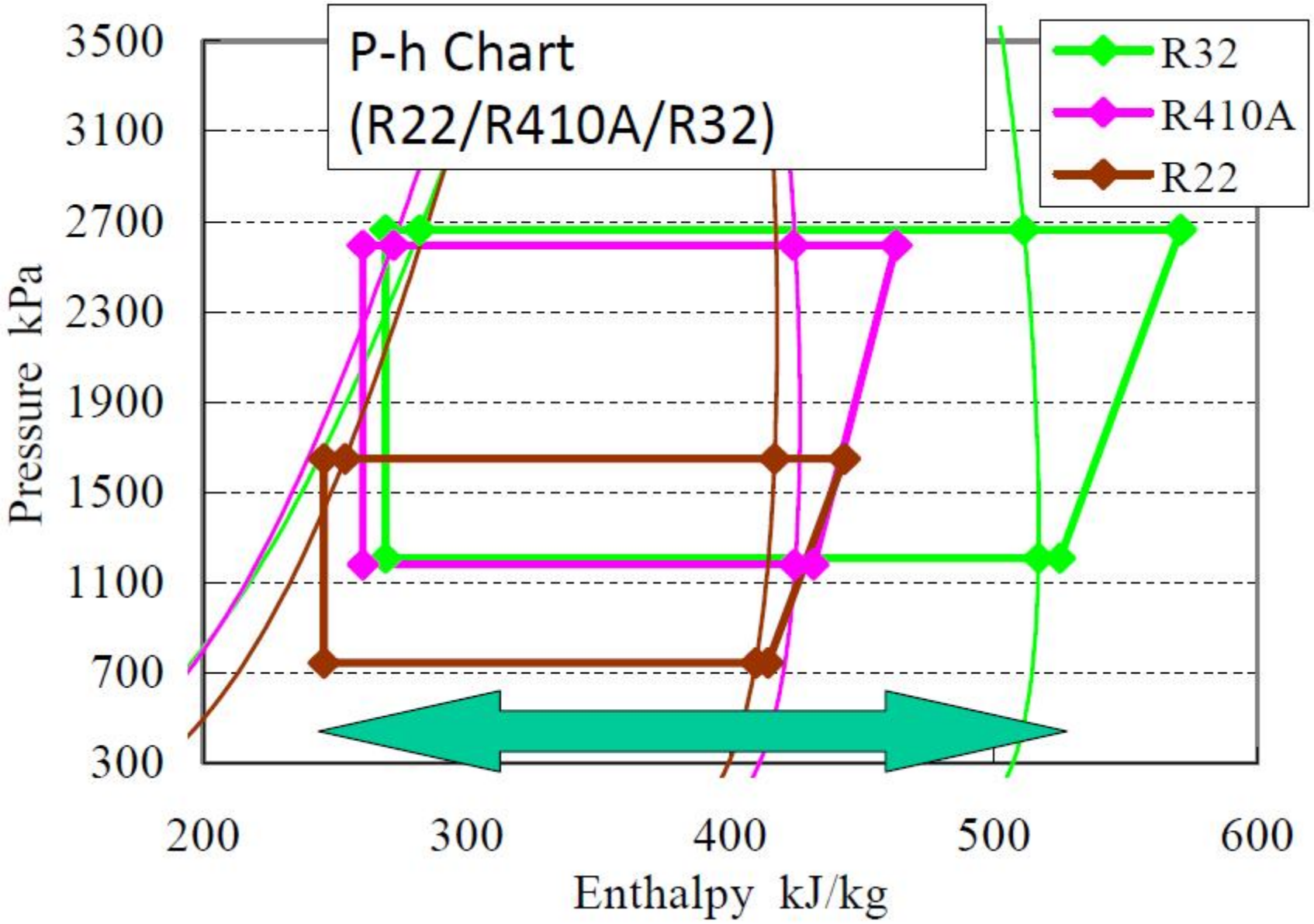
Item	R22 System	R410A System	R32 System
Composing Substances	Single-component refrigerant	Quasi-Azeotropic Mixture (R32:R125 = 50:50 wt%)	Single-component refrigerant
Compressor	R22 Compressor	R410A Compressor	R32 Compressor
Compressor Oil	Mineral Suniso Oil (4GS)	Synthetic Ether Oil (FV50K)	Synthetic Ether Oil (FW68A)
Operating Pressure low side (psig)	70	130	130
Operating Pressure High side (after expansion, psig)	100 (1-2.5hp)	150 (1-2.5hp)	150 (1-2.5hp)





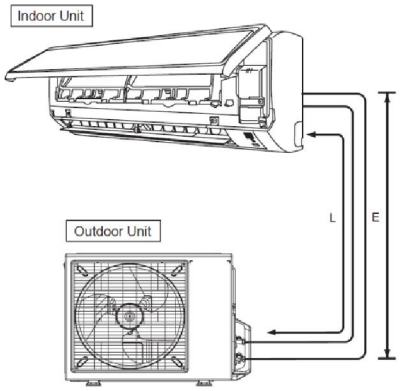


Comparison with other refrigerants (Performance)



Daikin Premium R32 Refrigerant

Maximum Piping Length & Height



Model	Indoor / Outdoor	1.0 HP	1.5 HP	2.0 HP	2.5 HP
Min. Allowable Length (L), m		3			
Max. Allowable Length (L), m		20		30	
Additional Charge of Refrigerant (g/m)		17			
Max. Allowable Elevation (E), m		15 ↑			
Gas Pipe Size, mm/(in)		9.50 (3/8")	9.50 (3/8")	12.70 (1/2")	12.70 (1/2")
Liquid Pipe Size, mm/(in)		6.35 (1/4")			

Equivalent length for various fitting (meter)

Pipe Size	L joint	Trap bend
3/8" (OD9.52mm)	0.18	1.3
1/2" (OD12.7mm)	0.20	1.5
5/8" (OD15.9mm)	0.25	2.0
3/4" (OD19.1mm)	0.35	2.4
7/8" (OD22.2mm)	0.40	3.0
1" (OD25.4mm)	0.45	3.4
1 1/8" (OD28.6mm)	0.50	3.7
1 3/8" (OD34.9mm)	0.60	4.4

Notes:

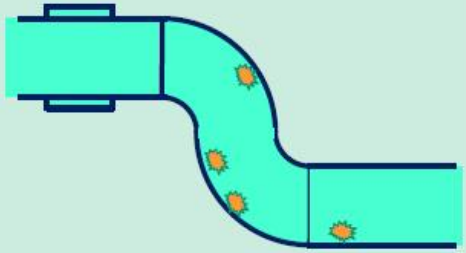
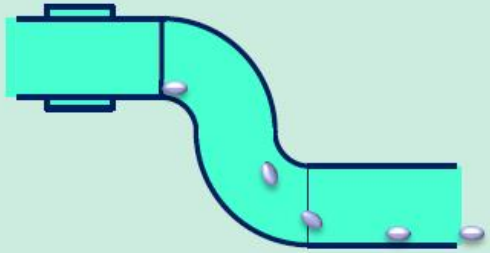
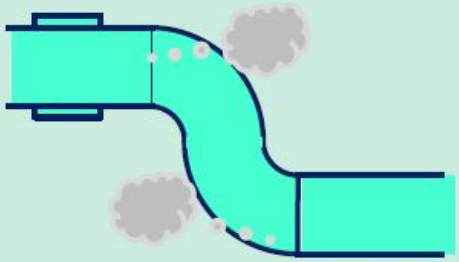
1. Equivalent piping length is obtained with actual length of gas piping.
2. 90° bend of piping is quivalent to L joint.

Required Piping Thickness

- **Thickness of inter-connecting copper pipe must be at least 0.61 mm (1.0 – 1.5 HP).**
- **No corrosion on copper piping.**
- **Copper Specification must be ASTM B280 or equivalent.**
- **Copper pipe tensile strength not less than 205 N/mm^2.**

Pipe Size	Φ1/4 inch	Φ3/8 inch	Φ1/2 inch	Φ5/8 inch
Thickness (mm)	0.61	0.61	0.71	0.81
Bending Radius (Using pipe bender)	≥ 15 mm	≥ 25 mm	≥ 25 mm	≥ 35 mm

Required Piping Conditions

	Clean No contamination	Dry No moisture	Tight No Leakage
PHENOMINON			
CAUSES	• Oxidized film by brazing • Entering of foreign items such as dust, particles and oil from outside.	• Rain drop infiltration at poor transportation quality. • Moisture condensation inside the pipe.	• Insufficient brazing • Inadequate flaring or insufficient tightening torque. • Inadequate tightening of flange connection.
PROBLEM	• Clogging of expansion valve, capillary tube, etc. • Poor performance of cooling or heating. • Degradation of refrigerant lubricant oil. • Malfunction of compressor.		• Gas shortage • Higher Temperature of discharge gas.

Vacuum Drying

Vacuum drying is a method of drying the inside of a pipe by converting moisture (liquid) inside the pipe into steam (vapor) and removing it from the pipe by using a vacuum pump.

At one atmospheric pressure (760 mmHg), the boiling point (evaporation temperature) of water is 100℃. When a vacuum pump is used to reduce the pressure inside the pipe to achieve a near-vacuum condition, the boiling point lowers. When the boiling point drops below the outside air temperature, water evaporates.

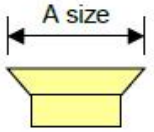
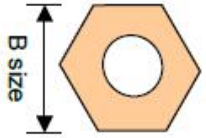
Boiling point of water (°C)	Pressure	
	mmHg (gauge)	Pa (absolute)
40	-705	7333
30	-724	4800
26.7	-735	3333
24.4	-738	3066
22.2	-740	2666
20.6	-742	2400
17.8	-745	2000
15.0	-747	1733
11.7	-750	1333
7.2	-752	1066
0	-755	667

Tools Compatibility

Tool	R32	R410A	R22
Gauge manifold	Sharable		
Charge hose	Sharable		
Weighing instrument	Sharable		
Pipe bender	Sharable		
Pipe cutter	Sharable		
Flaring tool	Sharable *1		
Torque wrench	Sharable *2		
Cylinder cap	Sharable		
Vacuum pump	Sharable *3		
Refrigerant recovery system			
Refrigerant recovery cylinder			
Electric gas leak detector	Sharable *4		

*1: R22 type can be used for R32 & R410A by changing the work process.
*2: Dimension of width across flats of flare nut is different between R32 & R410A and R22 (4/8" and 5/8" only. Other flare nuts can be shared.)
*3: When using an R22 type for R32 & R410A, use with a reverse flow preventive adapter.
*4: Even if a detector supports R22, if detector does not support HFC (R32, R410A), it cannot be shared.

Tools Compatibility

Tool	Information
Gauge manifold 	●Supports R32 (R410A) pressure - If the gauge manifold supports R410A, it can also be used with R32. - High-pressure gauge: -0.1 to 5.3 MPa Low-pressure gauge: -0.1 to 3.8 MPa ●Bore of connecting portion uses 5/16" flare screw
Charge hose 	●Supports R32 (R410A) pressure - If the charge hose supports R410A, it can also be used with R32. ●Bore of connecting portion uses 5/16" flare screw
Weighing instrument 	●Used for measuring of weight, the weighing instrument can be shared with HFCs (R32, R410A) and conventional refrigerants (R22, etc.)
Pipe bender 	●Can be shared between R32, R410A, and conventional refrigerants (R22, etc.)
Pipe cutter 	●Can be shared between R32, R410A, and conventional refrigerants (R22, etc.)
Flaring tool 	●Supports flare size (A size) for R32 (R410A) - If the flaring tool supports R410A, it can also be used for R32. - Flare size is different between R22 and R32 (R410A) 
Torque wrench 	●Supports flare nut width across flats (B size) for R32 (R410A) - If the torque wrench supports R410A, it can also be used for R32. - Width across flats is different between R22 and R32 (R410A) for 4/8" and 5/8" - No change in tightening torque value. 

Tools Compatibility

Vacuum pump 	●Equipped with oil backflow prevention function (In the case of using a vacuum pump without reverse flow preventive function, use only after connecting it to a reverse flow preventive vacuum adapter.)
Refrigerant recovery system 	●Supports R32 (R410A) pressure - If the system supports R410A and has been certified for use with R32, it can also be used with R32.
Refrigerant recovery cylinder 	●For R32 (R410A), only the recovery cylinders with pressure resistance specification FC3 can be used.
Electric gas leak detector 	●Can be used with R32, R410A, and conventional refrigerants (R22, etc.) • Check what types of refrigerant the detector can be used with. • Detectors that can be used with R410A can also be used for R32. • **Even if a detector supports conventional refrigerants (R22, etc.), it cannot be used for R32 and R410A if it does not support use with HFCs.** • **Torch type models CANNOT be used.**

Precautions with R32

- If an R32 units was charged with R22:
  - The chlorine content in the R22 damages the refrigerant oil.
  - Degradation of refrigerant oil reduces lubricity and can therefore cause the compressor to be damaged.

- If an R22 unit was charged with R32:
  - R32 has higher pressure than R22; therefore, in terms of pressure resistance of the machine, incorrect refrigerant charge can cause a very dangerous situation.
  - Lack of compatibility between R32 and mineral oil (SUNISO oil) reduces oil return performance, on top of R32 and the oil separating into two layers inside the compressor hindering proper oil supply to the bearing, which causes poor lubricity. This can result in the compressor burning out.

- If an R32 unit was charged with R410A or vice versus:
  - R32 units and R410A units are optimized to their respective refrigerant properties; therefore charging them with the unintended refrigerant prevents proper operation.
  - Both the R32 and R410A units use ether oil as refrigerant oil, but due to the some differences in specifications, sharing refrigerant oil can cause malfunction of the compressor.

Handling of R32

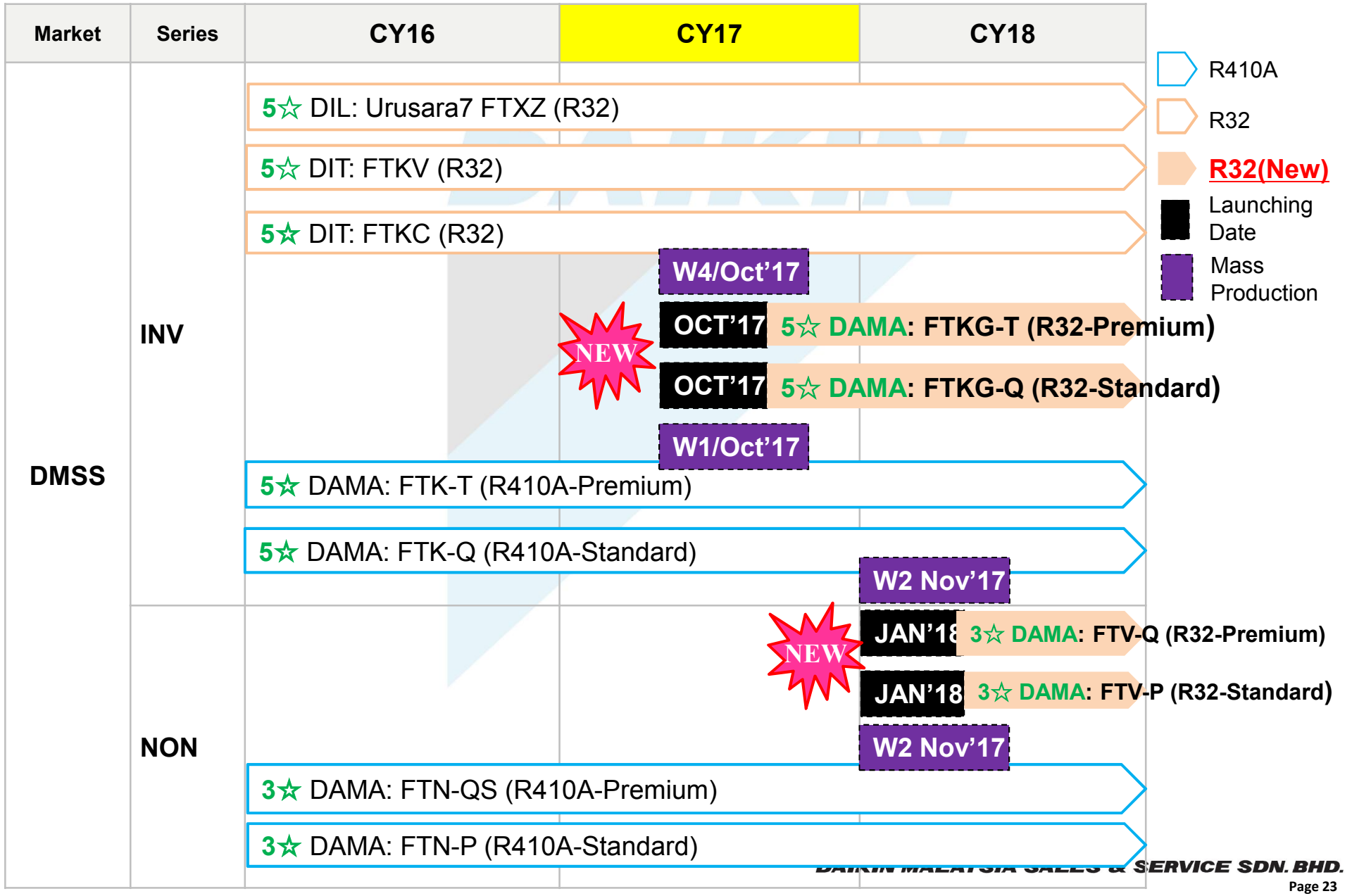
- R32 (and other CFCs) is heavier than air, and therefore it's inclined to be settle near floor surface.
  - If the gas fills up the room or the bottom part of a room, it may also cause oxygen deficiency in people.
  - In the case of R32, it may reach it's combustion concentration.
  - Keep the room well-ventilated for a healthy work environment.
  - If a refrigerant leak is confirmed in a room or an inadequately ventilated location, do not use flame until the area has been ventilated appropriately and the work environment has been improved.

- In the case of brazing, ensure appropriate ventilation to prevent oxygen deficiency and R32 combustion. Check that there are no dangerous or combustible items nearby, and ensure a fire extinguisher is close at hand.

- If the gas comes into contact with open flame or metal (or other material) heated to over 300 to 400°C, it will cause thermal decomposition, possibly producing toxic gas. Do not allow the gas to come into contact with such objects. (Toxic gas generation is the same with R410A, R22, etc., and not limited to R32.)

- If installing air-conditioning equipment in the same room as gas-burning equipment or an electric heater, keep at least 2 m away from R32 and switch off the gas-burning equipment/electric heater in the event of a refrigerant leak from the indoor unit.

DMSS WM Product Line Up (CY17/18)



NEW R32 INVERTER WALL MOUNTED SERIES

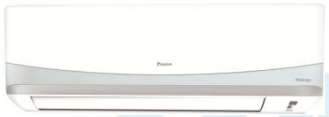
Powered by INNOVAIRE Technology

Product Line Up

Capacity (HP)	1.0	1.5	2.0	2.5
Premium Model    Wall Mounted FTKG-T Series	●	●	●	●
NEW **Standard Model**     Wall Mounted FTKG-Q Series Option	●	●	●	●

Specification- R32 WM (CY17/18)

R410A Inverter



Premium: FTK-T / Standard: FTK-Q

Model	1.0hp	1.5hp	2.0hp	2.5hp
Cooling Capacity (Btu/hr)	9,500 (4,400-10,200)	12,100 (4,400-13,000)	18,500 (4,700-21,200)	22,000 (5,800-23,000)
EER (Btu/hr/W)	12.18	11.26	12.33	11.83
Star	5	5	5	5
Indoor SPL (H)	40	41	40	43
Ref Control	EXV			

R32 Inverter

Premium: FTKG-T / Standard: FTKG-Q

Model	1.0 hp	1.5hp*	2.0hp	2.5hp
Cooling Capacity (Btu/hr)	9,500 (4,400-10,200)	12,100 (4,400-13,000)	19000 (4,700-21,200)	22,500 (5,800-23,500)
EER (Btu/hr/W)	11.73	11.30	12.88	12.23
Star	5	5	5	5
Indoor SPL (H)	40	41	40	43
Ref Control	Cap tube	Cap tube	EXV	EXV

RKG 28/35

RKG 50

RKG 60

Carton Box Labelling - R32 WM (Indoor)

R410A Non-Inverter

R410A Non-Inverter

R32 Non-Inverter

R410A Inverter

R410A Inverter

R32 Inverter

Carton Box Labelling - R32 WM (Outdoor)

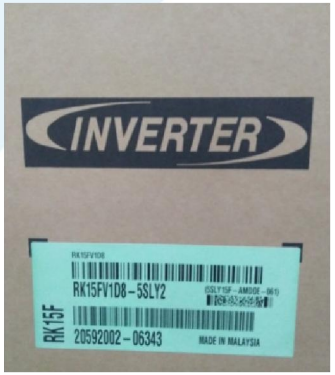
R410A *Non-Inverter*

R410A Non-Inverter

R32 Non-Inverter

R410A *Inverter*

R410A Inverter

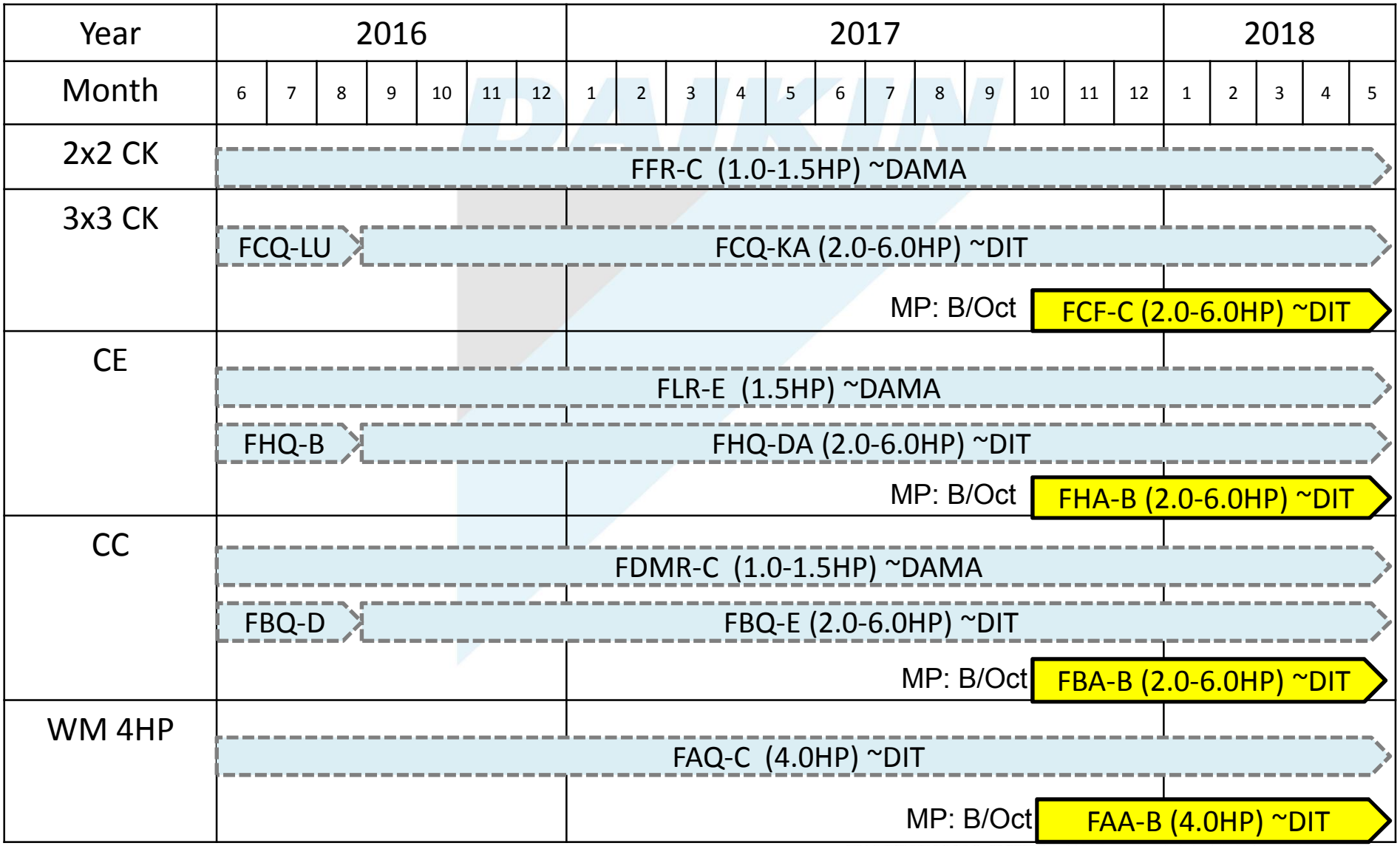


R32 Inverter

Inverter SkyAir Line Up

R410A

R32



Thank You Very Much!