

# AIRSTAGE

## Single Skin Roof Top Packaged Units with Scroll Compressors



FUJITSU GENERAL (AUST.) PTY LIMITED

## 2 | Range Overview

The AIRSTAGE range of Single Skin Roof Top Packaged Units are all equipped with Danfoss componentry and includes options such as highly efficient and reliable EC Inverter Plug Fans. The fan design enables dimensions to be kept to a minimum while delivering the highest efficiency. The EC Inverter Plug Fan can also be accessorised with an automatic air flow regulator that modulates the fans speed to adapt the air flow to system pressure drops. Designed with a simple aesthetic and powder coated, these single skin units offer flexible installation options with the supply and return locations able to be customised to accommodate new or existing duct layout design.

### COMPACT SOLUTION

The AIRSTAGE Standard and Premium Single Skin range of compact Roof Top Packaged Units (RTPU) for outdoor installation are ideal for cooling and heating small and medium-sized buildings for comfort cooling applications. Units feature R410A refrigerant, Danfoss Scroll Compressors and Direct Digital Controllers (DDC), G4 Filters, Black Epoxy Corrosion Protection Coating, Axial Condenser Fans and Automatic Circuit Breakers. The Premium model also features Acoustic Compressor Insulation for low noise operation, and EC Plug Fans (in lieu of the Standard models belt driven fan).

The range includes 9 sizes with cooling capacities from 13.3 to 89.4kW TON and features 400V power supply / 50 Hz frequency.

#### Versions:

- Standard RTPU: Heat pump with belt driven radial fan
- Premium RTPU: Heat pump with EC Inverter Plug Fans

#### Configurations:

- Base unit: fully recirculated airflow
- Available FREE-COOLING ECONOMISER option



*Scroll Compressors*



*R410A Refrigerant*



*Single Skin*



*EC INVERTER Plug Fan*



### HIGH EFFICIENCY, EASY INSTALLATION AND CONFIGURATION ARE THE KEY BENEFITS OF THE AIRSTAGE RANGE.

#### **EC INVERTER PLUG FANS**

Premium Single Skin Roof Top Packaged Units with high efficiency, acoustic compressor insulation for low noise operation and EC Inverter Plug Fans.

EC INVERTER Plug Fans can be found on both the delivery and intake fans on the air treatment section. The EC Inverter control electronically modulates the air flow, thus varying the overall power output and power consumption in proportion to the required load. In addition, the starting current is lowered and the noise level is reduced when operating at partial load.

#### **High efficiency**

The panels feature a thick insulation layer single-skin structure, in order to keep the energy consumption to minimum levels.

#### **Wide range of optional accessories**

The AIRSTAGE range of Roof Top Packaged Units include a range of optional accessories, some of which include:

- Economiser
- Acoustic compressor sound insulation (included in Premium Single Skin model)
- Condensing control down to -20°C
- EC axial fans on condensing section
- Room controller
- Wide range of communication protocols
- Remote display

Ideal comfort is achieved by controlling both the temperature and humidity. For this reason, an external humidifier can be controlled via 0-10 V signal (with Enthalpic Control accessory only).



*Efficiency*



*Easy Customisation*



*Compact Dimensions*



### EC INVERTER PLUG FANS

#### High part load efficiency and increased energy savings

- Available on supply fan of air treatment section
- The EC Inverter modulates the air flow electronically
- The operating air flow is set during the installation

#### Maximum flexibility

- Air flow regulation and available static pressure controls

#### Optional EC Fan add ons

##### AT – CONSTANT AIR FLOW REGULATION CONTROL

- Electronic system with control sensors on EC Plug Fans
- It maintains a constant air flow rate by adjusting the fan speed, in relation to the system pressure drops
- The accessory helps compensate for progressive fouling of filters
- The flow rate is pre-set, but it can be changed after the installation

##### AT/P – CONSTANT AVAILABLE STATIC PRESSURE REGULATION CONTROL

- Electronic system with pressure sensors
- It maintains a constant available static pressure by adjusting the fan speed, in relation to the system pressure drops
- The accessory helps compensate for progressive fouling of filters
- Operation set-point set during unit start-up



*EC INVERTER  
Plug Fan*



### ROBUST STRUCTURE WITH MAXIMUM FLEXIBILITY

#### Robust structure

The AIRSTAGE range of Roof Top Packaged Units feature a robust structure to resist any weather conditions over time and to allow easy installation and maintenance.

- **The perimeter base structure** is composed of elements in **passivated and press-bent galvanised sheet**
- The frame is realised with extruded aluminium alloy sections (37 x 25mm) coupled by 3-way joints
- The **perimeter panels**, in prepainted metal sheet, can be easily removed and allow access inside the unit for maintenance operations

#### Easy installation

The installation is particularly easy and quick thanks to the section connection by means of assembling conic stirrups.

#### Easy maintenance

Easy access to internal sections enables maintenance and cleaning operations to be undertaken simply and safely.

#### Maximum protection

**TXKC Condensing coil with black epoxy treatment.**

- Additional protection against corrosion

#### High air quality level

All units are equipped with G4 filters. Custom solutions with additional filters are also possible.



*Robust*



*Easy Customization*



*Easy Installation*



*Easy Maintenance*



## BENEFITS

- Extremely compact structure to limit the occupied space
- Adjust airflow direction both on air delivery and intake
- Flat top design and high structure strength
- Many options make the flexibility a key element of RAQ/K/WP range



*Benefits*

### DANFOSS UNIT CONTROL



#### EC Inverter Plug Fans on AIR TREATMENT SECTION (EC version)

- The EC Inverter control electronically modulates the airflow
- The operating air flow rate is set during installation





### SL – Unit silencing

- Acoustic Compressors Insulation: compressors are equipped with sound-absorbing covering.



### ECA – EC axial fans on CONDENSING SECTION (option)

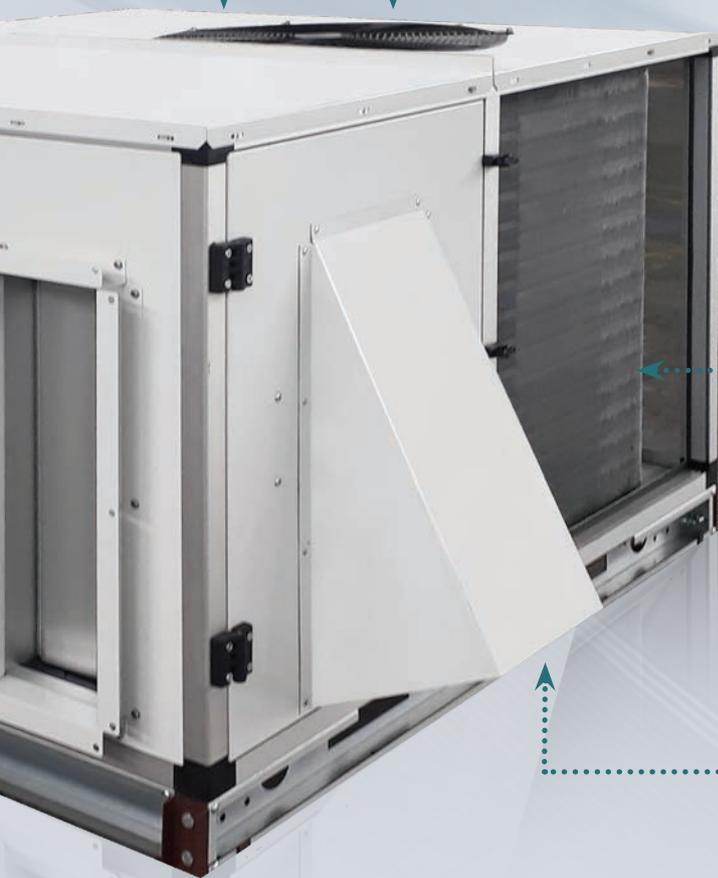
- Fans are electronically controlled by EC MOTORS (Electronically Commutated Motors) which modulate the airflow regulating the fans speed proportionally to the required cooling load and according to external air temperature.
- N.B.: With EC Inverter fans the pressure transducer and condensation control (CC) accessory are always included.

### TXKC and TXKE – Condensing coil with black epoxy treatment

- Additional protection against corrosion on condensing coils

### CS - DAMPERS RAIN HOOD (option).

- Additional external rain protection for dampers.



## INTEGRATED UNIT CONTROL

All units are equipped with an integrated unit control with a built-in Modbus RS485 Interface.



*Integrated Unit Control*

### Option BACnet/Modbus Interface

The unit controller is available with a complete range of communication protocols

- Modbus TCP/IP protocol, with Ethernet port
- BACnet MSTP protocol, with RS485 serial interface
- BACnet TCP/IP protocol, with Ethernet port
- Simple Network Management Protocol (SNMP), with Ethernet port

Thanks to these communication protocols it is possible to monitor different variables such as:

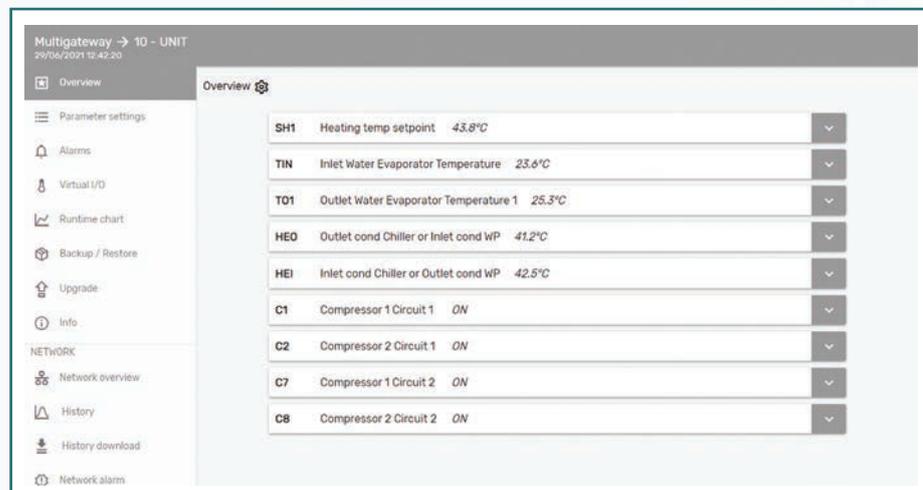
- Parameters (set point, unit ON/OFF, ...)
- Status variables
- I/Os
- Alarms

### Built-in WEB server and e-mail notification are also available

- It involves displaying Web pages
- I/Os
- Alarms
- Parameters (same menu of MMI display)
- Status of variables
- Deals with data logging and trends

### E-mail notification to multiple recipients

- At start and end of alarm
- For the general alarm of the unit and for specific types of alarms (e.g. high pressure)



### ROOM CONTROLLER

#### CR – REMOTE CONTROL PANEL

- Remote display for visualisation and unit control
- Interface through LCD display 64x128 pixel
- Connections between unit and remote control panel (CR) take place via CAN Bus connections

#### Available functions

- Start/status/working hours of compressors
- Unit status graphical visualisation
- Input/output visualisation
- Password (user – manufacturer – administrator)
- Alarms history (label, description, date, time)
- Weekly scheduler - command ON-OFF (option on request)

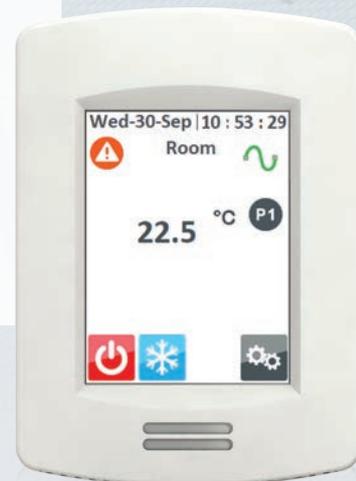


#### CDT – REMOTE CONTROL PANEL WITH TOUCH SCREEN ROOM THERMOSTAT

A Room Controller with the following functions is also available:

- On/Off switch
- Weekly scheduler
- Mode setting

The CDT also includes an air temperature sensor.



## THE HIGHEST AIR QUALITY

### OPTIONAL ECONOMISER

The AIRSTAGE Roof Top Packaged Units with the additional ECONOMISER SECTION (Free-Cooling with 2 dampers logic) enables high energy saving since it utilises the outdoor air for cooling or warming the internal air.

Based on Free-Cooling technology, the unit is provided with three dampers intelligently managed by an electronic control that constantly monitors the internal and external air temperatures. If the system requires cooling and the external temperature is below the set temperature, the compressors are deactivated and the cooling will be obtained just by the fans activity. The result is an extremely lower energy consumption in the geographical areas where seasonality produces cold months with low ambient temperature.

It ensures significant energy saving in both Free-Cooling and Free-Heating.



## THE HIGHEST AIR QUALITY

### Free-Cooling with two dampers logic available:

- It mixes part of the internal air with external air
- Dampers opening is electronically managed by the microprocessor
- Operation in both Free-cooling and Free-heating
- Return air damper with 24V modulating actuators (0-10V signal)
- External air damper with 24V modulating actuators (0-10V signal)



*Air Quality*

## EXCEPTIONAL TECHNICAL AND AFTER SALES SUPPORT

Fujitsu General Australia strives to consistently provide high quality, energy efficient, reliable products. Fujitsu General trained technicians attend every commercial and industrial AIRSTAGE installation to assist with the controls commissioning of the units and ensure seamless operation.

## PEACE OF MIND

Fujitsu believes in the quality and reliability of every air conditioner we sell, providing a 2 year parts and labour warranty plus an additional 1 year parts only warranty on the AIRSTAGE Roof Top Packaged Units (RTPUs).

The Fujitsu General AIRSTAGE applied range of products is manufactured in Italy and Malaysia.

## OPTIONAL ACCESSORIES

### FACTORY FITTED ACCESSORIES

ECO	Free-cooling economiser section with aluminium dampers managed by electrical motor
SL	Unit silencing
CC	Condensing control down to -20°C
ECA	EC axial fan on condensing section
FT M5	Plate filters efficiency M5
AT	Constant air flow regulation control
AT/P	Constant available static pressure regulation control
CH	Enthalpic control (ECO only)
SQ	Air quality probe: VOC values (ECO only)
SQO	Air quality probe: CO <sub>2</sub> values (ECO only)
SQV	Air quality probe: VOC and CO <sub>2</sub> values (ECO only)
PF	Filters control differential pressure switch
IS	Modbus RTU protocol, RS485 serial interface
IST	Modbus TCP/IP protocol, Ethernet port
ISB	BACnet MSTP protocol, RS485 serial interface
ISBT	BACnet TCP/IP, Ethernet port
ISS	SNMP protocol, Ethernet port
MN	High and low pressure gauges
CS	Dampers rain hood
RP	Coil protection metallic guards

### LOOSE ACCESSORIES

CR	Remote control panel
CDT	Remote control panel with touch screen room thermostat
AG	Rubber shock absorbers

### AIRSTAGE SINGLE SKIN RANGE

The AIRSTAGE range includes a Standard Single Skin Roof Top Packaged Unit with a belt driven radial fan as well as a Premium Single Skin Roof Top Packaged Unit with an EC Inverter Plug Fan. The range features 400V power supply / 50Hz frequency.



Standard



Premium

	REFRIGERANT R410A	RAQ/K/WP	RAQ/K/WP/EC
<b>VERSIONS</b>			
Reversible Heat Pump		✓	✓
<b>AIR TREATMENT SECTION</b>			
Full recirculation		✓	✓
Economiser		Option	Option
Fan type		Radial	EC Inverter Plug Fan
<b>KEY FEATURES</b>			
Number of models		9	9
Cooling TON (kW)		3.9 - 26.5 (13.8-93.1)	3.9 - 26.5 (13.8-93.1)
Heating TON (kW)		4.0 - 27.1 (14.0-95.3)	4.0 - 27.1 (14.0-95.3)
Key features		<b>AS/NZS DIRECTIVES</b>	<b>AS/NZS DIRECTIVES</b>
Variable speed / Variable input power		---	✓
Possibility of air flow modulation		---	✓
Constant air flow regulation control		---	Option
Constant available static pressure regulation control		---	Option
Compensation for progressive fouling of filters		---	✓

# 14 | Standard Single Skin Range



**RAQ/K/WP**  
Standard Single Skin Roof Top Packaged Units  
with Scroll compressors and radial fan.



Scroll Compressors



Radial Fan



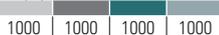
Single Skin

RAQ/K/WP			15	17	110	112	115	118	224	230	236
Cooling (AS/NZS3823.1.2)	Cooling capacity (1)	kW	3.8 13.3	5.1 17.9	6.9 24.4	9.0 31.7	10.3 36.1	12.3 43.3	17.2 60.5	19.6 68.8	25.4 89.4
	Absorbed power (1)	kW	4.2	5.6	7.8	10.1	11.5	14.8	20.7	23.4	30.7
	EER (1)	-	3.17	3.20	3.13	3.14	3.14	2.93	2.92	2.94	2.91
Heating (AS/NZS3823.1.2)	Heating capacity (2)	kW	3.8 13.5	5.3 18.5	7.1 24.8	9.1 32.1	10.3 36.2	12.4 43.6	17.9 63.0	20.4 71.6	26.0 91.6
	Absorbed power (2)	kW	4.2	5.5	7.7	9.8	11.0	13.4	20.1	22.3	28.3
	COP (2)	-	3.21	3.36	3.22	3.28	3.29	3.25	3.13	3.21	3.24
Air treatment section	Air flow	cfm m <sup>3</sup> /s	1821 0.86	1991 0.94	2648 1.25	3346 1.58	4003 1.89	4998 2.36	6672 3.15	8324 3.93	9997 4.72
	Available static pressure	in WG Pa	0.24 60	0.24 60	0.60 150	0.60 150	0.60 150	0.60 150	0.84 210	0.84 210	0.84 210
	Fans	n°	1	1	1	1	1	1	1	1	1
	Filters	-	G4	G4	G4						
	Air flow	cfm m <sup>3</sup> /s	3961 1.87	3834 1.81	6036 2.85	5888 2.78	9404 4.44	9404 4.44	18829 8.89	18829 8.89	18829 8.89
Condensing section	Compressors	n°	1	1	1	1	1	1	2	2	2
	Refrigerant circuits	n°	1	1	1	1	1	1	2	2	2
	Capacity steps	%	0-100						0-50-100		
Sound pressure	STD version (3)	dB(A)	66	66	65	66	67	70	71	72	71
	SL accessory (3)	dB(A)	63	63	62	63	64	67	68	69	68
Weights	Transport weight	kg	480	525	570	655	670	770	1130	1190	1295
	Operating weight	kg	465	510	555	640	655	755	1115	1175	1280

DIMENSIONS		15	17	110	112	115	118	224	230	236
L	mm	1200	1450	1600	1800	2000	2140	2100	2210	2330
W	mm	1200	1300	1200	1450	1450	1750	1900	1900	1900
H	mm	1180	1210	1425	1425	1430	1490	1970	1970	2325

### CLEARANCE AREA (mm)

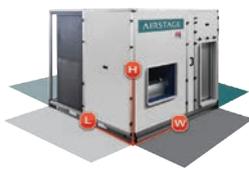
RAQ/K/WP 51-181



RAQ/K/WP 242-362



Electrical board side



### NOTES

1. Evaporator inlet air temperature 27°C d.b. / 19°C w.b., ambient air temperature 35°C.
2. Condenser inlet air temperature 20°C, ambient air temperature 7°C d.b. / 6°C w.b.
3. Sound pressure level measured in free field conditions at 1m from the unit. According to ISO 3744.



### RAQ/K/WP/EC

Premium Single Skin Roof Top Packaged Units  
with Scroll compressors and EC Inverter Plug Fan.



Scroll Compressors



EC Inverter Plug Fan



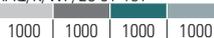
Single Skin

RAQ/K/WP/EC			15	17	110	112	115	118	224	230	236
Cooling (AS/NZS3823.1.2)	Cooling capacity (1)	kW	3.9 13.6	5.1 18.1	7.0 24.5	9.0 31.8	10.3 36.2	12.3 43.4	17.2 60.6	19.6 68.9	25.7 90.4
	Absorbed power (1)	kW	3.9	5.4	7.7	10.0	11.4	14.7	20.6	23.3	29.7
	EER (1)	-	3.49	3.35	3.18	3.18	3.18	2.95	2.94	2.96	3.04
Heating (AS/NZS3823.1.2)	Heating capacity (2)	kW	3.9 13.8	5.3 18.7	7.1 24.9	9.2 32.2	10.3 36.3	12.4 43.7	17.9 63.1	20.4 71.7	26.3 92.6
	Absorbed power (2)	kW	3.9	5.3	7.6	9.7	10.9	13.3	20.0	22.2	27.3
	COP (2)	-	3.54	3.53	3.28	3.32	3.33	3.29	3.16	3.23	3.39
Air treatment section	Air flow	cfm	1821	1991	2648	3346	4003	4998	6672	8324	9997
		m <sup>3</sup> /s	0.86	0.94	1.25	1.58	1.89	2.36	3.15	3.93	4.72
	Available static pressure	in WG	0.24	0.24	0.60	0.60	0.60	0.60	0.84	0.84	0.84
		Pa	60	60	150	150	150	150	210	210	210
	Fans	n°	1	1	1	1	1	1	1	1	1
	Filters	-	G4	G4	G4	G4	G4	G4	G4	G4	G4
Condensing section	Air flow	cfm	3961	3834	6036	5888	9404	9404	18829	18829	18829
		m <sup>3</sup> /s	1.87	1.81	2.85	2.78	4.44	4.44	8.89	8.89	8.89
	Compressors	n°	1	1	1	1	1	1	2	2	2
	Refrigerant circuits	n°	1	1	1	1	1	1	2	2	2
	Capacity steps	%	0-100						0-50-100		
Sound pressure	EC version (3)	dB(A)	66	66	65	66	67	70	71	72	71
	SL accessory (3)	dB(A)	63	63	62	63	64	67	68	69	68
Weights	Transport weight	kg	495	560	610	695	715	820	1210	1270	1415
	Operating weight	kg	480	545	595	680	700	805	1195	1255	1400

DIMENSIONS		15	17	110	112	115	118	224	230	236
L	mm	1200	1450	1600	1800	2000	2140	2100	2210	2330
W	mm	1200	1300	1200	1450	1450	1750	1900	1900	1900
H	mm	1180	1210	1425	1425	1430	1490	1970	1970	2325

#### CLEARANCE AREA (mm)

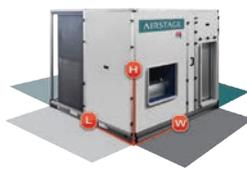
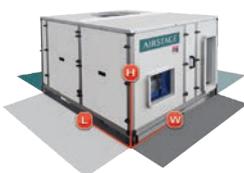
RAQ/K/WP/EC 51-181



RAQ/K/WP/EC 242-362



Electrical board side



#### NOTES

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2. Condenser inlet air temperature 20°C, ambient air temperature 7°C d.b. / 6°C w.b.
3. Sound pressure level measured in free field conditions at 1m from the unit. According to ISO 3744.

## CASE STUDY - MCDONALDS

### Background

Working with franchisees, suppliers and producers, McDonalds is working to cut greenhouse gas (GHG) emissions associated with its restaurants and offices by 36 per cent by 2030, while also being committed to a net zero emissions target by 2050. Initiatives to achieve this have included refurbishing its restaurants to consume less energy by updating everything from energy management systems for lighting, heating and air conditioning (HVAC), to more efficient kitchen equipment. Since its 2015 base year, the global organisation has reduced absolute emissions from its restaurants and offices by 8.5 per cent<sup>1</sup>.

### The Project

Located on the corner of Burwood Highway and Scott Grove, Burwood, Victoria, the 24-hour McDonald's restaurant was undergoing a refurbishment. This included modifying the interior layout and replacing the air conditioning with a system that could provide the latest technology and control options to minimise the restaurant's power usage, while also providing usage reports that arm the franchisee with information to make informed business decisions.

### Challenges

While the interior layout of the restaurant was being modified, the roof would remain the same. The new heating, ventilation, and air conditioning (HVAC)



system had to use the existing duct layout and no new penetrations could be made.

### Outcome

Following Fujitsu General's assessment of the engineering brief, the installation included: two 66kW AIRSTAGE™ Roof Top Packaged Units; (with Economiser; De-Super Heater); anywAiR® iO controls; and a variable refrigerant flow (VRF) system.

[1] <https://corporate.mcdonalds.com/corpmcd/our-purpose-and-impact/our-planet/climate-action.html>

# AIRSTAGE

Case Study | 17



## CASE STUDY - MCDONALDS

The two 66kW Roof Top Packaged Units would deliver the indoor comfort the staff was accustomed to, with the latest technology suited for a commercial installation of this size. One Roof Top Packaged Unit was installed for the kitchen area, and another for the dining area.

Regardless of the outdoor temperature, a restaurant kitchen can become unbearable if not managed effectively. The Economiser option enables high energy-saving operation as the outdoor air is used for cooling or warming the internal air. Based on free-cooling technology, the unit features three dampers intelligently managed by an electronic control that constantly monitors the internal and external air temperatures. The Economiser easily integrates with the Danfoss DDC control built into the AIRSTAGE Roof Top Packaged Unit.

The engineering brief specified a De-Super Heater be connected to the hot water system. The De-Super Heater captures and transfers the heat energies from the refrigeration cycle to the hot-water loop via a heat-exchanger rather than rejecting the heat energies through the de-super heating and condensation process on the condenser side into the atmosphere. Incorporating a De-Super Heater in the project would provide the restaurant with an additional smart power saving solution.



For remote control capability, Fujitsu General installed anywAiR iO with wireless sensors. This lets the franchisee: monitor the wattage being consumed; manage the system operation; and remotely change the set temperature. The system also lets the franchisee connect with and manage other restaurant locations from one convenient dashboard, in the office or via mobile phone.

The variable refrigerant flow (VRF) system was installed for a smaller room that had previously been an outdoor space and was being enclosed as an all-weather party room.



### PROJECT / PRODUCT OVERVIEW

Completion date: December 2020

Application: Restaurant

Installer/contractor: Metro Air

### Products

- Outdoor units:
  - AOTG24LATC 7.1kW Inverter Outdoor
  - SET-ASTG09KMTC 2.5kW R32 KMTC Series Wall Mounted
  - AJT040LCLAH 12.1kW VRF J-IIS Series Compact VRF System
  - RAQ/K/WP/ECO422-DS 66kW Single Skin RTPU Incl De-Super Heater
  - RAQ/K/WP/ECO422 66kW Single Skin RTPU
- Indoor units:
  - AUTG24LVLC 7.1kW R410A Inverter Cassette Indoor
  - AUXK034GLEH VRF Circular Flow Cassette Large Type Indoor
- Other:
  - UTY-TWRXZ2 Communication kit
  - UTG-UFYD-W Grille to suit AUTG Inverter Compact Cassette
  - UTY-RNRYZ3 Wired Remote Controller
  - UTG-UKYA-B Cassette Grille Black
  - 1 x Rubix Compute with LoRa and RS485
  - HLI Modbus connection to 3 x package AC units
  - HLI Modbus connection to 3 x Electrical meters
  - 1 x Edge iO28 for low level enable of 3 x package AC units
  - Supply of IoT-ready enclosure with din rail, power supply, circuit protection & plug base

Quantity of outdoor units: 5 Outdoor Units

Quantity of indoor units: 3 Indoor Units

Total capacity: 153.7kW

# AIRSTAGE

Imported by

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