



YANMAR NATURAL GAS-POWERED VRF SYSTEMS

www.yanmarenergysystems.com

SERVING MANKIND AND CONSERVING FUEL SINCE 1912

OUR MISSION

We strive to provide sustainable solutions for needs which are essential to human life. We focus on the challenges our customers face in food production and harnessing power, thereby enriching people's lives for all our tomorrows.



At **YANMAR**, we pride ourselves on staying true to our mission for more than 100 years. We began in Japan and have since expanded into the global market, always remaining focused on providing sustainable, innovative solutions aimed at serving mankind and conserving fuel. Our dedication to efficiency and the environment has also led to substantial long-term savings for

our customers. YANMAR Energy Systems has created energy-responsible systems, including our VRF, combined heat and power (CHP), power generation and drive systems. These systems work independently or can be integrated with each other and your current systems, creating even greater efficiency and cost savings.

MORE THAN SOLUTIONS

We are experts at providing creative solutions to challenges our customers face by using a combination of our superior products, exceptional customer service and our continually innovative engineering and technology. Together, we will find the best solution to meet the needs of both you and the environment.



YANMAR'S NATURAL GAS VRF SYSTEM

MAXIMUM EFFICIENCY = DRAMATICALLY LOWER OVERALL COSTS

YANMAR's natural gas-powered Variable Refrigerant Flow (VRF) heat pump units provide high efficiency heating and cooling for commercial buildings. By using a natural gas-powered engine and reversible air-source technology, these world-class engines deliver low operating costs, reduce CO₂ emissions and use minimal electricity. While our VRF technology has been a preferred alternative to electric systems for 30 years, YANMAR's innovations continue to refine VRF to its highest potential.

LIFECYCLE COST - CONSIDERING FULL COSTS OF OWNERSHIP

With lower operating and infrastructure costs and greater efficiency, the YANMAR VRF system offers substantially lower system lifecycle costs compared to electric systems on the market today. In fact, our VRF system reduces overall operating costs by 30-70% depending on local utility costs. And while an electric unit needs to be checked for maintenance twice a year, a YANMAR VRF runs maintenance-free for 10,000 hours or as long as five years!

REDUCED ELECTRICAL INFRASTRUCTURE

The YANMAR VRF consumes around 90% less electricity than a similar electric condenser, and operates on single-phase power, dramatically reducing electrical infrastructure and associated costs. No additional building upgrades required. If your site has limited power or you'd like to lower upgrade expenses, our modular systems can reduce the overall capital cost of the project, as well as required floor space, and keep saving you money as you use them.

GREATER EFFICIENCY

Our system was designed from the ground up to increase efficiency and lower operating costs. Some features that exemplify this include:

- // Engine Heat Recovery technology allows for faster heating than with electric systems. In low ambient temperatures, YANMAR VRF provides more efficient heating performance by using waste heat energy.
- // A modular system means heating and/or cooling only the zones that need it.

REDUCED PEAK DEMAND

The use of air-conditioning continues to grow at a rapid rate globally, creating a steep rise in demand for power, fears of shortages during peak usage and regulations that penalize high-energy use. YANMAR's VRF systems help avoid peak demand charges, which can make up over 50% of the overall cost of air conditioning, thereby significantly reducing operating costs. Lowering demand profiles in this way can help customers negotiate competitive rates from their electricity supplier.

DURABILITY

- // Factory-backed VRF warranty coverage.
- // Proven technology with more than 300,000 gas engine VRF units installed worldwide over the past 30 years.
- // The outdoor unit's packaging design protects critical unit components from the environment.

ADAPTABLE TO ANY ENVIRONMENT

Unlike conventional ductwork systems, YANMAR's indoor fan coil units are completely modular allowing for many design options, regardless of whether you're installing for the first time or upgrading an outdated system. Using a centralized thermostat, indoor fan coil units can be placed where they make sense for your business, rather than following the constraints of an existing duct system.

Our systems are also a fit for any geographic setting. All YANMAR outdoor units come with a special coil coating, making them resistant to

corrosion and able to take what any outdoor environment can dish out—including the salty air of coastal areas.

IDEAL FOR RETROFITTING

YANMAR's VRF units offer a remarkably flexible solution, even for older buildings. While the cost of replacing a heat pump or air conditioning system with a traditional electric system would be insurmountable for some businesses, our natural gas-powered systems can be added on to what you already have, saving you in energy and installation costs over the lifetime of the product.

VERSATILE FOR ALL ENVIRONMENTS



SUPERIOR PERFORMANCE

Using a natural gas-powered engine, YANMAR's VRF outdoor units can maintain powerful heating performance, even with low outdoor temperatures, by capturing heat off the unit's engine to increase efficiency—a technology we've perfected.

Electric units, on the other hand, have a defrost cycle during cold weather that requires strip heating, which is expensive. The colder it gets outside, the less energy efficient an electric unit becomes. But, YANMAR's heat recovery technology loves the cold, and can effortlessly provide heat in the freezing cold. The unit is not afraid of extreme heat either, easily cooling a building during warmer months.

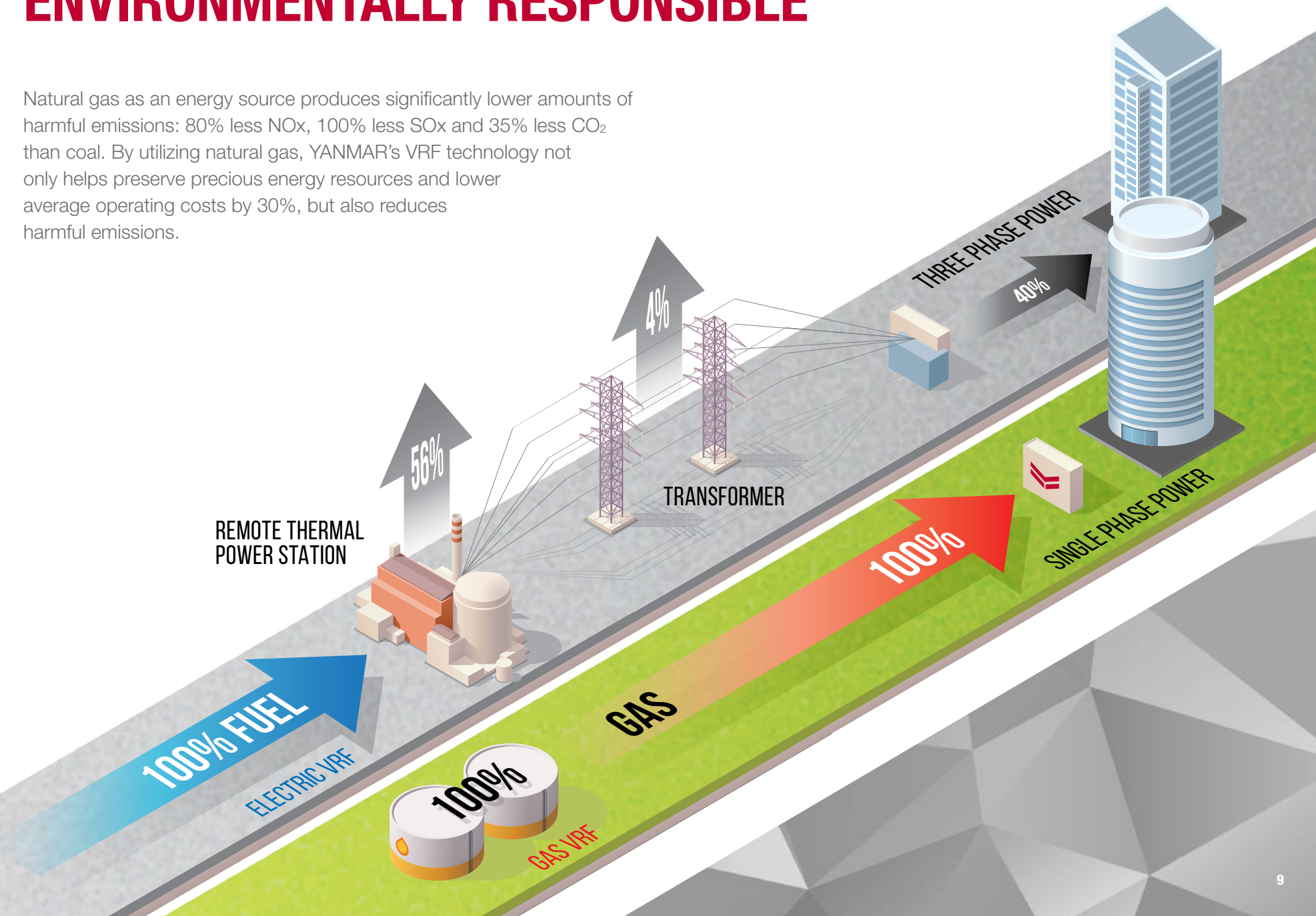
Not only do our VRF outdoor units withstand some of the toughest temperatures Mother Nature can deliver, they do it with supreme efficiency. The cost of operating the compressor in our units is 1/10 the cost of that of a standard electric system. The result is hundreds to thousands of dollars of savings in electricity costs.

YANMAR's VRF outdoor units are designed to operate quietly. The leading edge of the fan blade is serrated to provide high performance fan volume and airflow with minimal sound. The low sound level allows these outdoor condensing units to be installed on balconies and near windows and rooftop amenities, maximizing your building's usable space without disrupting its ambiance.



ENVIRONMENTALLY RESPONSIBLE

Natural gas as an energy source produces significantly lower amounts of harmful emissions: 80% less NO_x, 100% less SO_x and 35% less CO₂ than coal. By utilizing natural gas, YANMAR's VRF technology not only helps preserve precious energy resources and lower average operating costs by 30%, but also reduces harmful emissions.

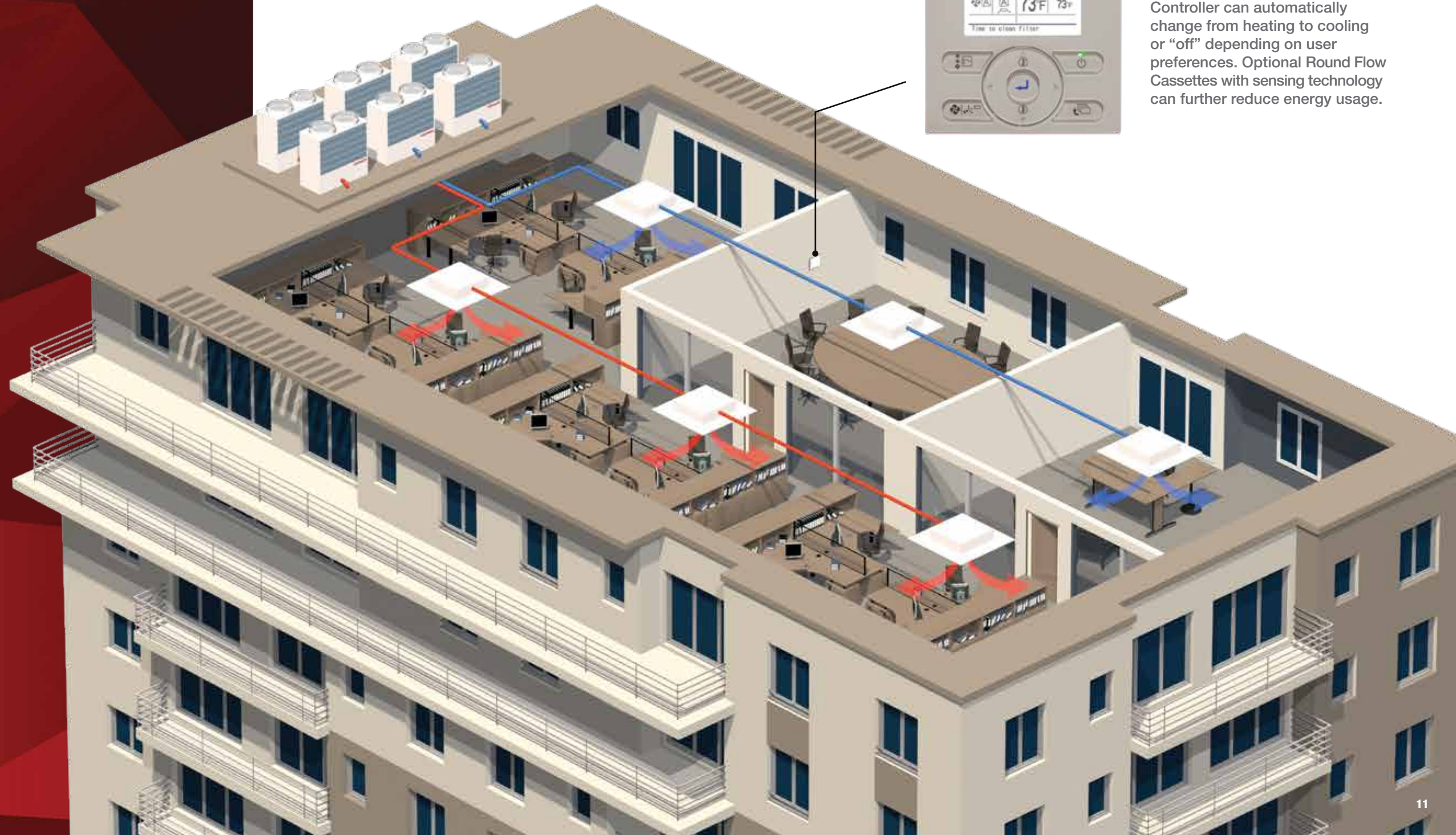


ZONED COMFORT

The YANMAR VRF system allows users to create zoned comfort depending on the location and needs of a building's occupants. Our cost-saving configuration options allow for individual control of up to 29 zones on one piping network. This means that individual employees can manage their own thermostat comfort levels, and that unoccupied areas can have their own appropriate temperature settings, too.

In fact, the thermostats are so smart that they can be programmed to take into account room occupancy and how much sunlight a space receives, assuring that the occupants' comfort level reflects real-world factors. System managers can set zones to automatically shut off during holidays, weekends or other times for further efficiency and cost savings.

YANMAR's heat recovery (3 pipe) technology even allows for different zones on the same piping network to be heated and cooled simultaneously for greater system flexibility.



No matter how many people occupy a room, the Navigation Controller can automatically change from heating to cooling or "off" depending on user preferences. Optional Round Flow Cassettes with sensing technology can further reduce energy usage.

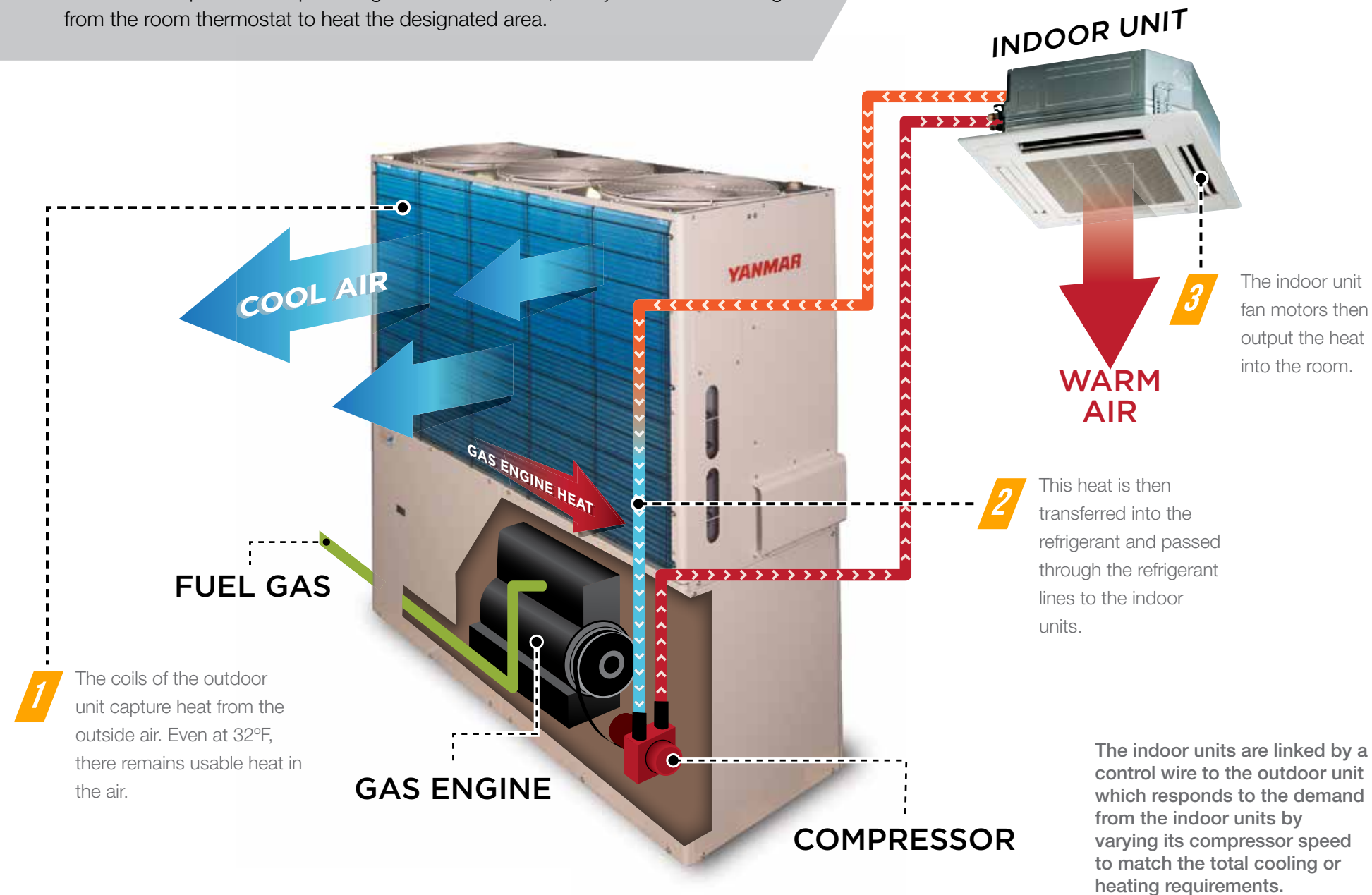
WHAT IS VARIABLE REFRIGERANT FLOW (VRF)?

VRF is a HVAC technology that uses refrigerant as the cooling and heating medium. The refrigerant is conditioned by an outdoor condensing unit and circulated within the building to multiple indoor fan coil units where heat or cool air is distributed. Unlike traditional HVAC, VRF systems can be configured in ducted or non-ducted applications, so indoor fan coil units may be installed in any space. Another VRF advantage is the ability for each zone to be controlled by its own thermostat. This enables different zones to have varying temperatures at the same time, and for heating and cooling to occur in different zones simultaneously.



HEATING CYCLE

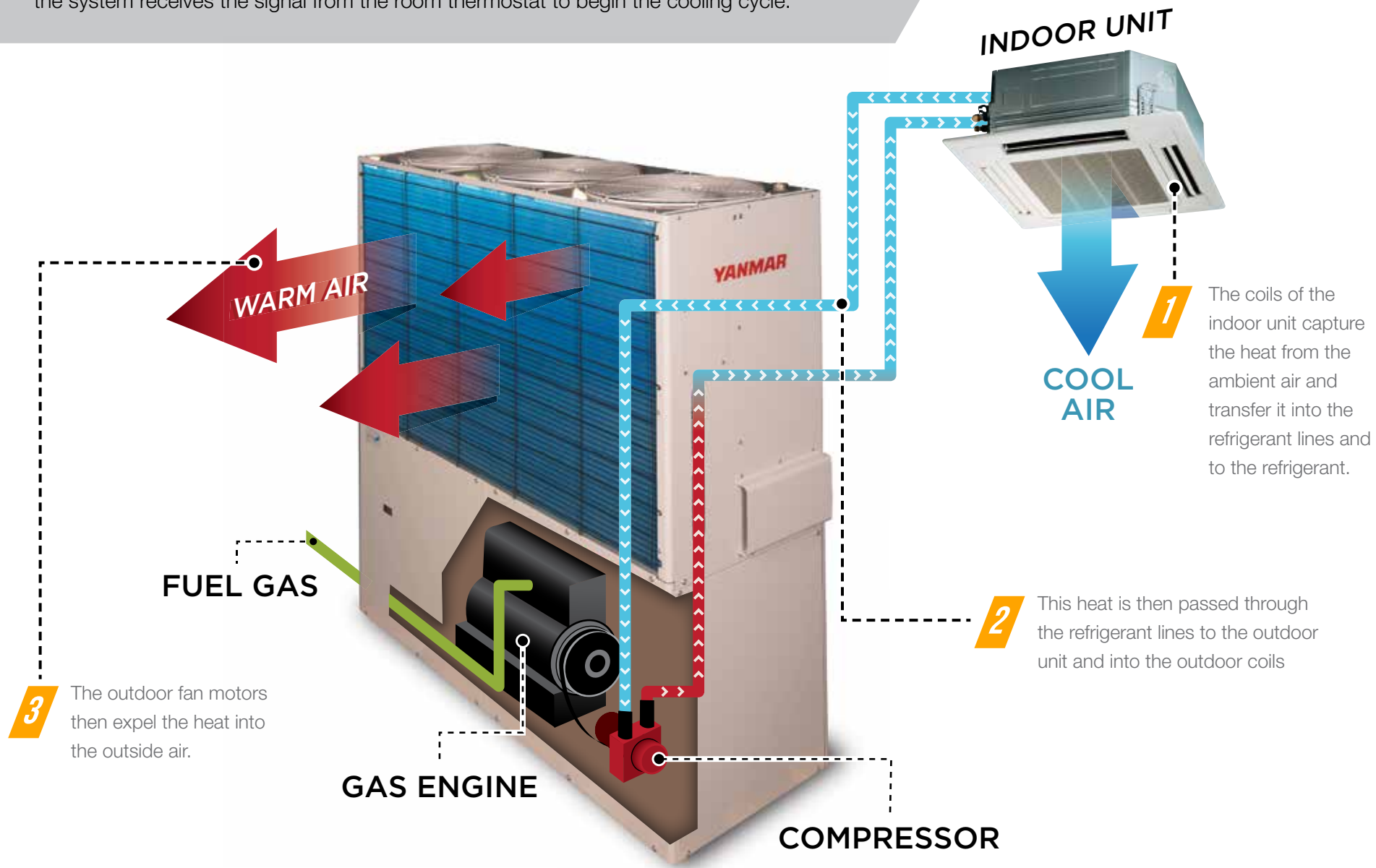
When the temperature drops during the winter months, the system receives a signal from the room thermostat to heat the designated area.



As temperatures reach or drop below 0°F, the heat created by the engine itself is also captured and cycled into the refrigerant circuit, effectively reducing energy consumption and costs.

COOLING CYCLE

During the summer months when the room warms above the set point temperature, the system receives the signal from the room thermostat to begin the cooling cycle:

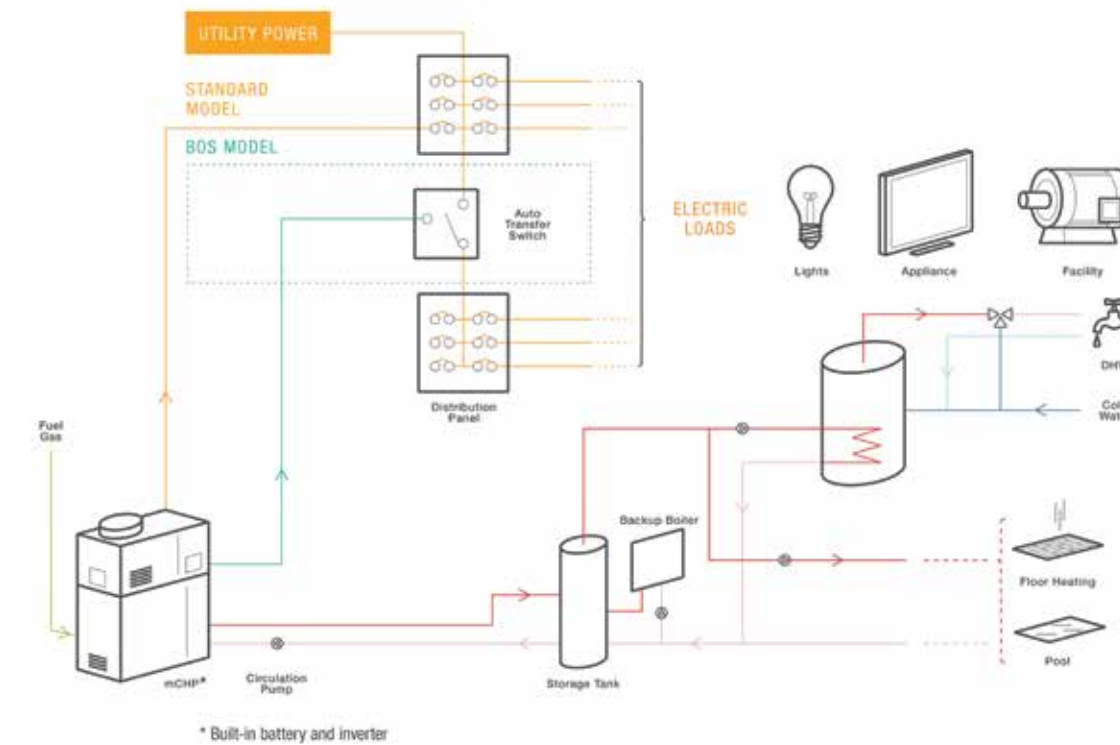


Learn more at www.yanmarenergysystems.com.

ENHANCING BUILDING PERFORMANCE

By combining YANMAR'S VRF and Combined Heat and Power (CHP) products, building owners can:

- // Use natural gas for onsite distributed generation that produces useful heat and electricity to lower energy costs.
- // Choose the CHP Blackout Start (BOS) option for grid independence; buildings can retain power for heating, cooling, lighting and other uses even when the grid fails.
- // Further reduce the building's carbon footprint by as much as 50 percent.
- // Produce up to 100 percent of the domestic hot water needed for the facility.



NOTE: These examples are for illustrative purposes. There are many ways to integrate YANMAR CHP, including BOS (Black Out Start), Multiple Unit Operation, Load Following, Reverse Power Protection, etc. Please consult with your YANMAR CHP representative to discuss integration options that work for your specific application and site requirements.



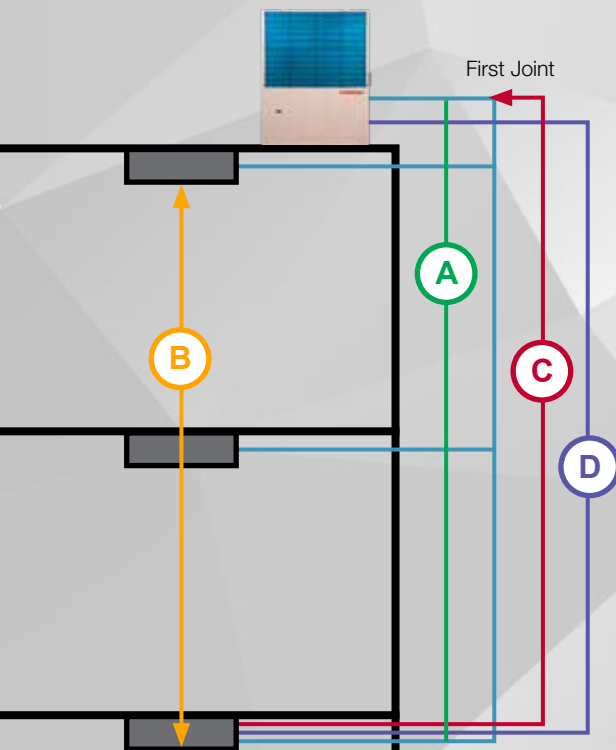
CP35D
 Rated Output: 35 kW
 Voltage, Frequency: 208V, 60Hz
 Rated Recovered Heat: 204,040 BTU/h
 Rated Hot Water Temp. Outlet: 176°F (80°C)

DESIGN FLEXIBILITY

A major advantage of the YANMAR VRF system is the flexibility provided by the product offering's diversity; multiple types and sizes of indoor fan coil units are available to complement any application.

The figure on page 17 provides a basic view of how a three pipe (heat recovery) or two pipe system integrates controls and various indoor fan coil unit types to provide comfortable heating and/or cooling.

YANMAR's piping capabilities deliver application flexibility provided by VRF technology.



Important considerations when reviewing piping capabilities are:

- // The maximum elevation difference between the highest and lowest indoor units in a single system.
- // The linear length from the outdoor unit to the farthest indoor unit in the system.

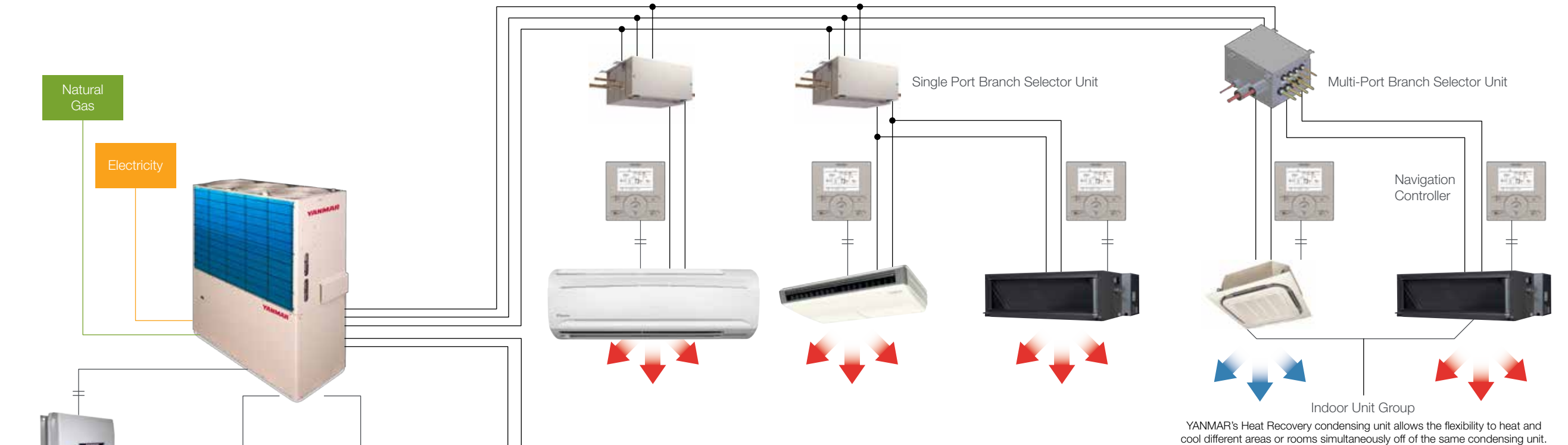
Please contact your authorized YANMAR Energy Systems Consultant with your design parameter questions.

	Max. Piping Distance (ft.)	2 or 3 pipe
A	Vertical Drop	164
B	Between Highest to Lowest IDU	49
C	From 1st Joint	295
D	Linear Length	558
Max. total one-way piping length		2,100

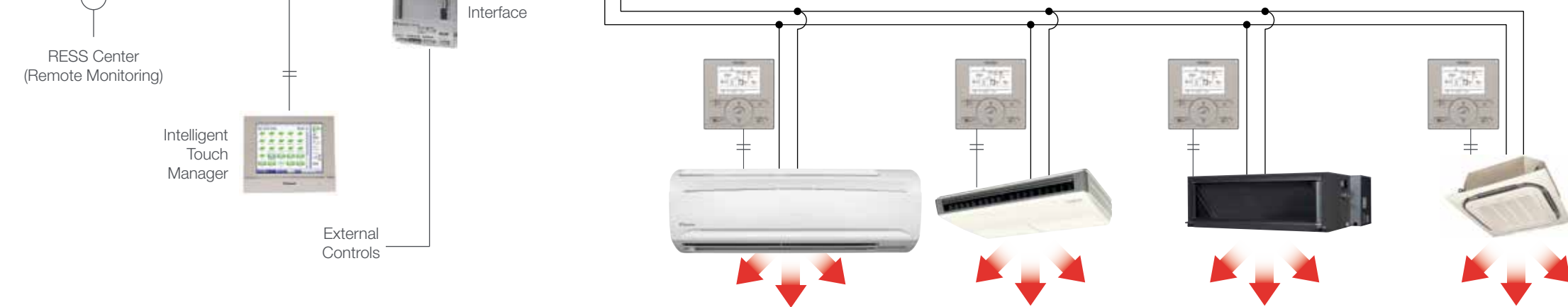
Refrigerant Piping

Outdoor units may also be installed outside the building on the ground level.

VRF THREE PIPE (HEAT RECOVERY)



VRF TWO PIPE



INDOOR FAN COIL UNITS

YANMAR + DAIKIN = COMPREHENSIVE VRF SOLUTIONS

YANMAR proudly partners with Daikin, an industry leader in HVAC technology, to offer an integrated air conditioning and heating system that provides efficiency, comfortable individual user control and reliability in one flexible package. This solution leverages the VRF technology built in to YANMAR's outdoor units and integrates it with Daikin's complete line of sleek and sophisticated indoor fan coil units and controls.

Together, our combined solution offers zoning flexibility and comfort control for almost any application.

The Daikin indoor fan coil unit range is one of the most extensive on the market, offering 10 stylish and elegant indoor fan coil unit types in 57 different models—all created to maximize comfort, minimize operating sound and simplify installation and servicing.

DUCTED INDOOR UNITS



Ideal for small to large spaces such as offices, restaurants, shops, classrooms and hotel common areas requiring a powerful, compact concealed system.



Built to complement existing concealed ceiling unit options. With its low profile and low sound level, this unit can be installed into limited ceiling void, bulkhead or soffit space.



Designed for upflow, horizontal-left horizontal-right and downflow installation possibilities. Ranging from .75 to 5 tons, the multi position air handling unit will take your residential or light commercial installation above and beyond your expectations.



Optimal for larger open space floor plans usually found in offices, retail, hotels or education facilities requiring a concealed system. Performs well across multiple spaces that can benefit from the same mode of operation, limiting equipment and installation cost.



Space-saving unit can be freestanding or wall-mounted, concealed or exposed. The air distribution provides the right balance for classrooms, hospital rooms, office hallways or similar spaces.

NON-DUCTED INDOOR UNITS



Made for open plan applications where adaptive comfort control is preferred. The unit provides an excellent comfort level, energy efficiency and the potential to reduce maintenance costs by equipping it with an optional self-cleaning filter panel that performs automatic air cleaning up to once per day.



Allows for a simpler installation into architectural ceiling grids by fitting flush into the grid without cutting ceiling tiles. It is ideal for spaces with false ceilings as it leaves maximum floor and wall space. Airflow can be sent in any of four directions, and the user has the ability to close off one or two sides, so it can be easily installed in a corner.



Slim, elegant design makes it a great fit for any light commercial space. Wide air openings provide a comfortable airflow, and a silent stream fan ensures quiet operation, making it ideal for retail stores, restaurants, classrooms and conference rooms.













Ideal for cooling or heating smaller zones such as hotel rooms, stores, computer rooms and restaurants. The compact, stylish design lets the unit blend discreetly into any interior design, and airflow can be sent in any of five different directions and programmed via remote control.





Designed for under-window installation, this space-saving unit may be freestanding or wall-mounted. It comes fitted with a washable long-life filter, and is available with remote control options.

DAIKIN INDOOR FAN COIL UNIT RANGE

	MODEL	FEATURES	PRODUCT IMAGE
DUCTED	DC Ducted Concealed Ceiling Unit	FXMQ <ul style="list-style-type: none"> Energy efficient due to the DC fan motor Modeled to use together with the optional Daikin zoning kit, DZK Enhanced indoor air quality and LEED ready with MERV 13 filter options Flexible ductwork design with ESP capabilities up to 0.8" W.G. Installation flexibility with a low profile, compact design at less than 12" in height 	
	Slim Duct Built-In Concealed Ceiling Unit	FXDQ <ul style="list-style-type: none"> Slim height at only 7-7/8" Washable filter included Low sound level Factory shipped for rear air inlet —field convertible to bottom air inlet Condensate pump with vertical lift of up to 21-5/8" included as standard 	
	Multi Position Air Handling Unit	FXTQ <ul style="list-style-type: none"> Upflow, horizontal-right, horizontal-left and downflow installation is permitted Cool Dry, Auto, Heat and Fan operation modes Auto fan speed automatically adjusts fan speed in relation to the space temperature and set point Compact footprint fits tight spaces 	
	Concealed Ceiling Unit (Medium Static)	FXMQ-MV <ul style="list-style-type: none"> Design flexibility with a capacity range up to 96 MBH Improved ductwork and filtration flexibility with high CFM and ESP capabilities Low profile design of less than 19" high reduces required installation space Great for hotels, schools and retail Efficient Sirocco type fan 	
	Concealed Floor Standing Unit	FXNQ <ul style="list-style-type: none"> Ideal for installation beneath a window Requires minimal installation space Fitted with a washable, long-life filter Remote control options available Space-saving unit can be freestanding or wall-mounted 	
NON-DUCTED	Round Flow Sensing Cassette	FXFQ <ul style="list-style-type: none"> True 360° airflow and three room sensors enable optimized occupant comfort Energy efficient with DC fan motor and auto-logic that adjusts fan speed Optional self-cleaning filter panel to further increase efficiency and reduce maintenance Increased indoor air quality with high efficiency filter options and ventilation connection kit Very flexible with 18 different possible airflow patterns 	
	2' x 2' 4-Way Ceiling Cassette	FXZQ <ul style="list-style-type: none"> Fits in a standard 2' x 2' ceiling grid Sound pressure levels are as low as 29 dB(A) Space-saving depth of units requires only 11.6" of ceiling space Easy-to-clean grille, and a washable, long-life filter Simple installation with an easy-to-fit decoration panel 	
	Ceiling Suspended Unit	FXHQ <ul style="list-style-type: none"> One of the slimmest indoor fan coil units, less than 8" Wide air discharge outlet distributes a comfortable airflow throughout the entire space Innovative stream fan technology keeps sound pressure levels low Smooth flat louver design makes cleaning simple Long-life filter is standard 	
	Wall Mounted Unit	FXAQ <ul style="list-style-type: none"> Auto-swing mechanism ensures efficient air distribution via louvers Wide air discharge outlet distributes a comfortable airflow throughout the entire space Horizontal louvers and front panel can be easily removed for cleaning Drain pipe can be easily hidden from sight Compact and stylish design 	
	Floor Standing Unit	FXLQ <ul style="list-style-type: none"> Ideal for installation beneath a window Unit requires minimal installation space Fitted with a washable, long-life filter Remote control options available Space-saving unit can be freestanding or wall-mounted 	

DAIKIN CONTROLS

PROJECT REQUIREMENTS	DAIKIN CONTROLS	
		
	Navigation Controller	Intelligent Touch Manager
Individual zone control	●	
Independent cooling and heating set points	●	●
Individual zone control with weekly programmable scheduling	●	●
Basic central point on/off control of all air handling units		●
Advanced multi-zone control of small to medium sized projects		●
Advanced multi-zone control of large commercial projects		●
Advanced multi-zone control with scheduling logic and calendar		●
Automatic cooling/heating changeover for heat pump systems	●	●
Single input batch shutdown for all connected air handlers		●
Web browser control and monitoring via Intranet and Internet**		●
E-mail notification of system alarms and equipment malfunctions		●
Multiple tenant power billing for shared condenser applications		●
Temperature set-point range restrictions	●	●
Graphical user interface with floor plan layout		●
Start/stop control of ancillary building systems*		●
Daikin integration with BACnet® based automation systems**		●
Daikin integration with LonWorks® based automation systems**		●

● Native application or feature for this device

* Requires one or more DEC102A51-US2 Digital Input/Output units or WAGO DO module (for use with ITM only). | ** Requires additional optional equipment or software.

Optimized for VRF technology, Daikin controls provide highly scalable solutions for all applications and budgets. Daikin offers a range of solutions to meet your project needs from individually controlling zones with local controllers to centrally controlling the building with Centralized Controllers and/or interfacing with Building Management Systems (BMS) for comfort control in an easily managed and operated system.

Daikin's Open Protocol Interface devices give you the freedom to integrate your YANMAR VRF system with the two leading Building Management Systems (BMS), BACnet® and LonWorks®. This means you can integrate new YANMAR outdoor units with Daikin indoor fan coil units and control hardware into your existing infrastructure; you can also take advantage of the advanced functionality and reporting available through these dedicated BMS platforms.

For more details on our control systems, please visit www.yanmarenergysystems.com.

YANMAR VRF STANDARD LIMITED WARRANTY

YANMAR America Corporation offers the following YANMAR VRF Condensing Unit Limited Warranty from the date of commissioning*:



- // 5 Years / 20k Hours Parts** (excludes compressor)
- // 1 Year / 4k Hours Labor**
- // 7 Years / 28k Hours Compressor**

* Provided that all scheduled maintenance is completed according to the VRF System's Limited Warranty statement.
 ** Whichever comes first.

YANMAR America Corporation offers the following Fan Coil Unit & Indoor Unit Accessory Limited Warranty from the date of commissioning:

- // 1 Year Parts

YANMAR ADVANTAGES

From day one, we have been dedicated to ensuring that our engines and VRF systems are the best in the industry, which means precise control over research, development, engineering, manufacturing, sales, distribution and service. If you want a VRF system that you know is truly supported inside and out by the company who designed and built it, choose YANMAR.

- // Fully transferable standard and extended warranties, even if the building/home changes owners.
- // Warranty administration handled by YANMAR experts, and not a claims adjuster at a insurance company.
- // No monetary value cap restricting warranty coverage.
- // Non-declining coverage means that the product protection on the last day of the warranty period is the same as the first day of coverage.
- // YANMAR Energy Systems and its Dealers are staffed with highly trained and certified technicians.

The information in this document is intended to provide only a brief description of the benefits of YANMAR America's Limited Warranty for VRF Systems. This YANMAR America Limited Warranty also has exclusions and limitations that apply to the benefits discussed in this document. For complete details as provided in the Limited Warranty Statement (including "what is not covered"), please see your authorized YANMAR VRF representative.



MANUFACTURER / MODEL			YANMAR NNCP096J	YANMAR NNCP120J	YANMAR NNCP144J	YANMAR NNCP168J	YANMAR NFZP168J	
PERFORMANCE	Capacity	Nominal Tons	8	10	12	14	14	
		kW	28	35	42	49	49	
		Heating Capacity	BTU/Hr.	106,000	134,000	156,000	189,000	189,000
			kW	31	39	46	55	55
		Low Temp / Cold Temp Heating	BTU/Hr.	106,000	137,000	164,000	178,000	178,000
			kW	31	40	48	52	52

OUTDOOR UNIT DETAILS								
Outdoor Unit	Number of Pipes	#	2	2	2	2	3	
	IDU Total Capacity	%Min - %Max	80-130	70-130	60-130	60-130	60-130	
Indoor Unit (IDU) Connections	Max Number of Connectable IDU	-	16	20	24	29	29	
	Power Supply Voltage (Frequency)	V (Hz)	208V / 230V / 240V (60Hz) Single phase	208V / 230V / 240V (60Hz) Single phase	208V / 230V / 240V (60Hz) Single phase	208V / 230V / 240V (60Hz) Single phase	208V / 230V / 240V (60Hz) Single phase	
Electrical	Operating Current for Cooling / Heating	A / A	4.00 / 3.70	4.44 / 4.13	3.98 / 3.53	4.53 / 4.21	6.43 / 6.04	
	Power Consumption for Cooling / Heating	kW / kW	0.89 / 0.79	0.89 / 0.79	0.89 / 0.79	0.86 / 0.95	0.86 / 0.95	
	Natural Gas for Cooling	BTU/Hr. (kW)	63,000 (18.5)	93,000 (27.2)	119,000 (34.9)	168,000 (49.2)	168,000 (49.2)	
Fuel Consumption HHV	Natural Gas for Heating	BTU/Hr. (kW)	68,000 (19.9)	96,000 (28.1)	117,000 (34.3)	147,000 (43.1)	147,000 (43.1)	
	Sound Level	Normal Mode / Quiet Mode	dB(A)	57 / 54	57 / 54	57 / 54	58 / 55	
Fans	Number of Units	-	2	2	2	2		
	Rated Air Flow	CFM (m3 / min)	12,713 (360)	12,713 (360)	12,713 (360)	13,420 (380)	13,420 (380)	
Pipe Size Data	Refrigerant Suction Line	in (mm)	7/8 (22.2)	1 (25.4)	1 1/8 (28.6)	1 1/8 (28.6)	1 1/8 (28.6)	
	Refrigerant Liquid Line	in (mm)	3/8 (9.5)	1/2 (12.7)	1/2 (12.7)	5/8 (15.9)	5/8 (15.9)	
	Natural Gas Fuel Pipe Thread & Size	NPT	3/4	3/4	3/4	3/4	3/4	
	Exhaust Vent / Exhaust Drain Pipe	in (mm)	21 13/23 (60.5)	21 13/23 (60.5)	21 13/23 (60.5)	21 13/23 (60.5)	21 13/23 (60.5)	
Dimensions	Height	in (mm)	85 7/16 (2170)	85 7/16 (2170)	85 7/16 (2170)	85 7/16 (2170)	85 7/16 (2170)	
	Width	in (mm)	66 9/16 (1690)	66 9/16 (1690)	66 9/16 (1690)	66 9/16 (1690)	66 9/16 (1690)	
	Depth	in (mm)	31 1/2 (800)	31 1/2 (800)	31 1/2 (800)	31 1/2 (800)	31 1/2 (800)	
	Weight	lbs (kg)	1,896 (860)	1,896 (860)	1,896 (860)	1,940 (880)	1,962 (890)	

SYSTEM DETAILS							
Refrigerant	Type	-	R410A	R410A	R410A	R410A	R410A
	Charge	lbs (kg)	26 (11.8) of R410A	26 (11.8) of R410A	26 (11.8) of R410A	26 (11.8) of R410A	26 (11.8) of R410A
Operating Range	Cooling Operating Range	°F (°C)	14 to 115 (-10 to 46.1)	14 to 115 (-10 to 46.1)	14 to 115 (-10 to 46.1)	14 to 115 (-10 to 46.1)	14 to 115 (-10 to 46.1)
	Heating Operating Range	°F (°C)	-4 to 95 (-20 to 35)	-4 to 95 (-20 to 35)	-4 to 95 (-20 to 35)	-4 to 95 (-20 to 35)	-4 to 95 (-20 to 35)

WARRANTY						
Standard Limited Warranty	Condensing Unit*	-	5 Years / 20,000 Hours Parts (Excludes Compressor) 1 Year / 4,000 Hours Labor 7 Years / 28,000 Hours Compressor			
	Fan Coil Unit and Indoor Accessories	-	1 Year Parts			

* Provided that all scheduled maintenance is completed according to the VRF Condensing Unit's Limited Warranty Statement. Offerings based on years or hours, whichever comes first.

Due to YANMAR's ongoing commitment to quality, specifications, ratings and dimensions, specifications are subject to change without notice. Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury. Installation and service must be in accordance with current specifications, ratings and dimensions and be performed by a qualified installer and servicing agency.

For complete specifications, please visit www.yanmarenergysystems.com.



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