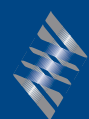


Copeland
EazyCool™

Network Condensing Units
with Digital Modulation
for Multi-Evaporator
Refrigeration Systems



A Unique Concept for
Refrigeration Applications



EMERSON
Climate Technologies

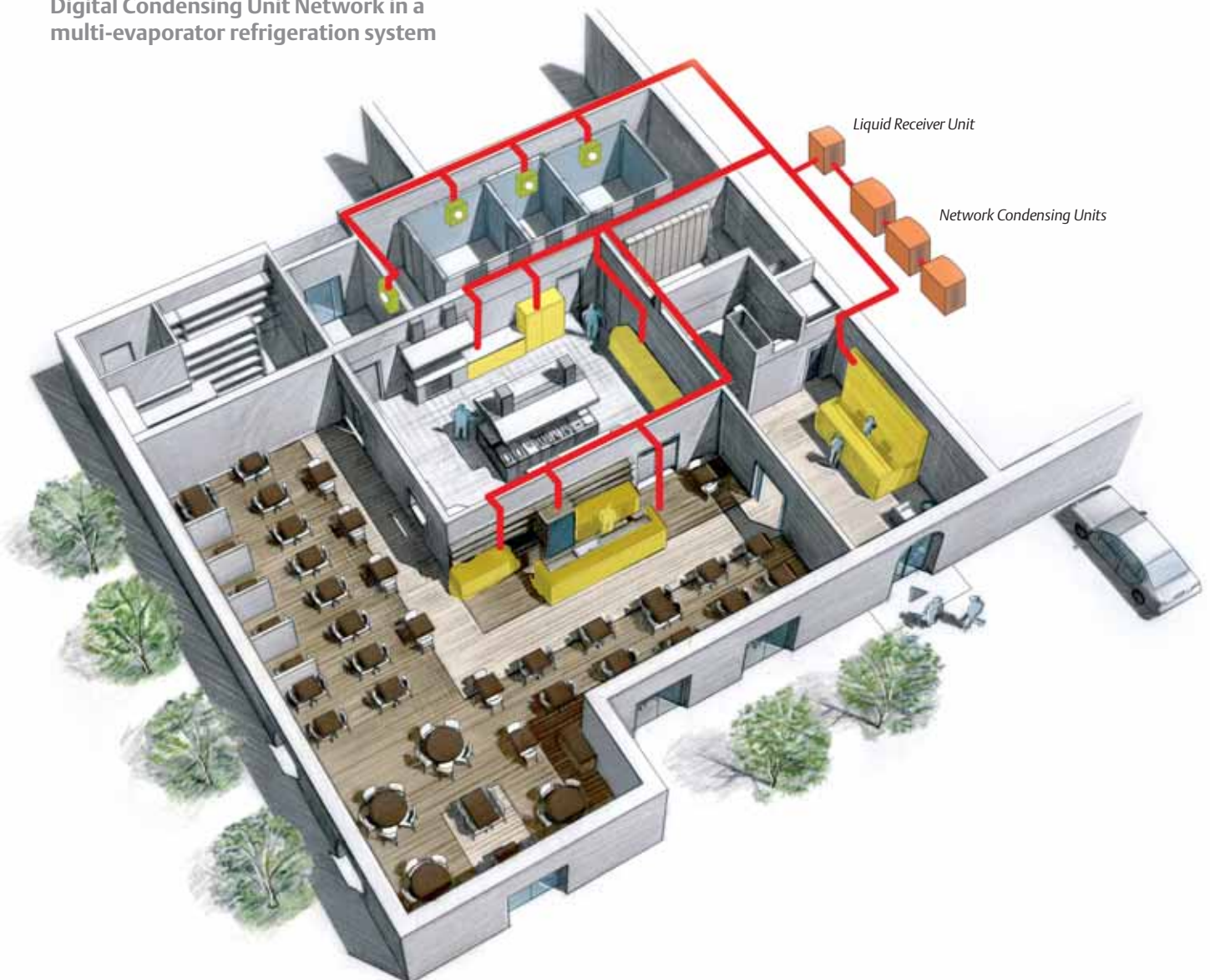
Emerson Climate Technologies is revolutionizing the commercial refrigeration sector with a groundbreaking concept never used before in condensing unit installations.

The two outstanding features of this innovation are the capability to connect several units (minimum 2, maximum 4) in one single refrigerant loop ("Network") and use Copeland Scroll Digital™ technology to provide modulation for distributed systems that have varying capacity requirements, for example a Network with 2 units has a range of 2.5% - 100% system capacity modulation.



Refrigeration According to Emerson Climate Technologies

Example: Restaurant application of a Digital Condensing Unit Network in a multi-evaporator refrigeration system



This new concept is defined as “Digital Network” for applications with installed refrigeration capacities up to 90 kW for medium temperature and up to 56 kW for low temperature applications. Aiming for simplicity and speed above all, Emerson Climate Technologies has used technical innovation to reduce not only installation but also operating costs, resulting in complete mastery of energy consumption.

Modularity, adaptability and reliability are the three pillars of the Digital Network. Perfect refrigeration capacity management is provided by Copeland EazyCool™ condensing units with Copeland Scroll Digital™ technology.

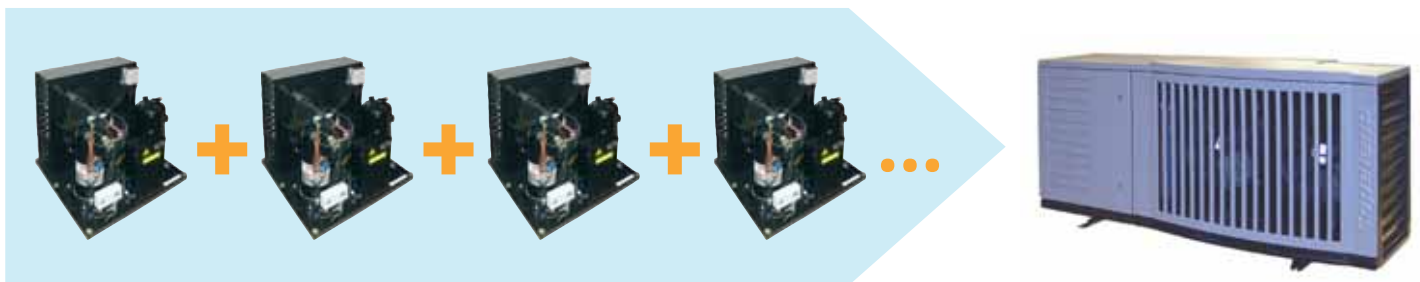
Modularity and Space Optimization with Network Configuration

Copeland Eazycool™ Digital, whether as a singular stand alone or as Network, provides an effective solution for installations that normally use several small condensing units with their own refrigeration circuits.

Copeland Eazycool™ removes the environmental constraint involved in requiring a whole set of unsightly machinery that often takes up a great deal of room around or inside buildings.

Taking advantage of the fact that in a multi-evaporator installation not all evaporators are normally working simultaneously, it is often possible to reduce by 20 % the installed refrigeration capacity of a Digital Network in comparison with the total power from all the small independent units.

Significant reduction of footprint



The Copeland EazyCool™ condensing unit replaces a number of small condensing units to serve numerous evaporators.

Available refrigeration capacities:
- 1 to 90 kW at -10°C evaporating temp.
- 2 to 56 kW at -35°C evaporating temp.
Refrigerant R404A – Ambient air +32°C



Exceptional Modularity for All Types of Commercial Refrigeration

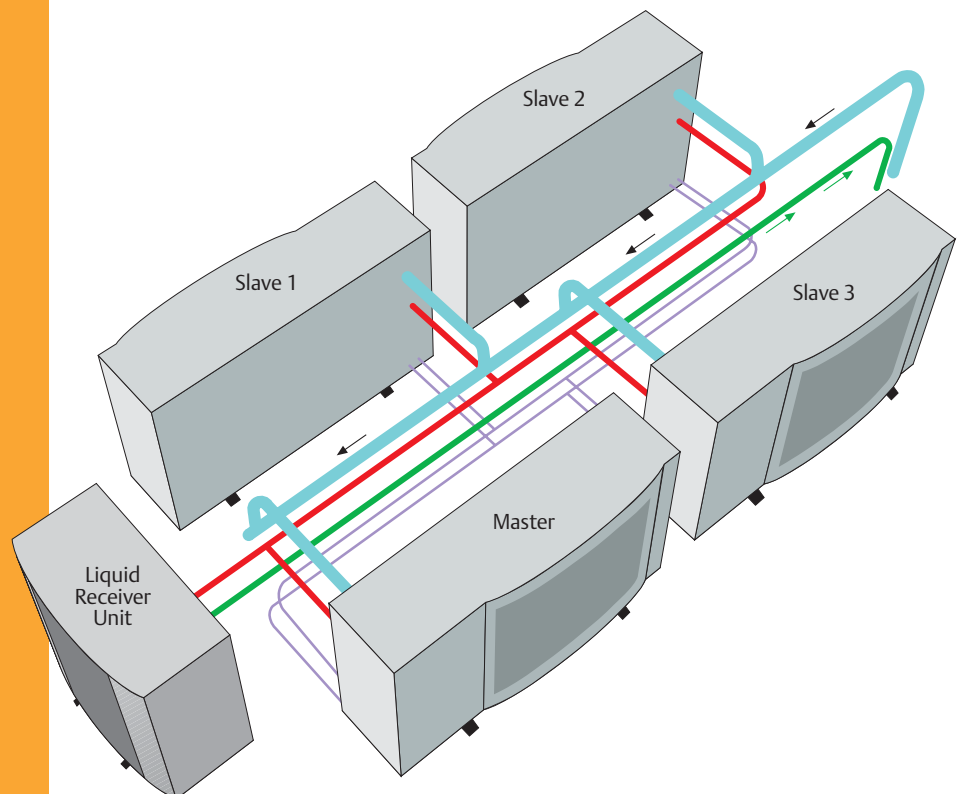
Until now most refrigeration installations using standard technology consisted simply of one condensing unit connected to a single, remote evaporator. When installing a Copeland Eazycool™ Digital Network system the number and capacity of the evaporators connected to the refrigerant loop in no way constitute such a technical constraint.

It is possible to combine condensing units with totally different capacities, as long as there are no more than four condensing units on any one circuit. A Master/Slave configuration should be included in the regulation in order to optimize compressor and fan cycles.

Benefits:

- Simplicity and speed of the installation
- Modularity, adaptability and reliability
- No need for a proliferation of units on one site
- Reduced installed capacity (cumulative effect through Network installation)
- Lower installation costs

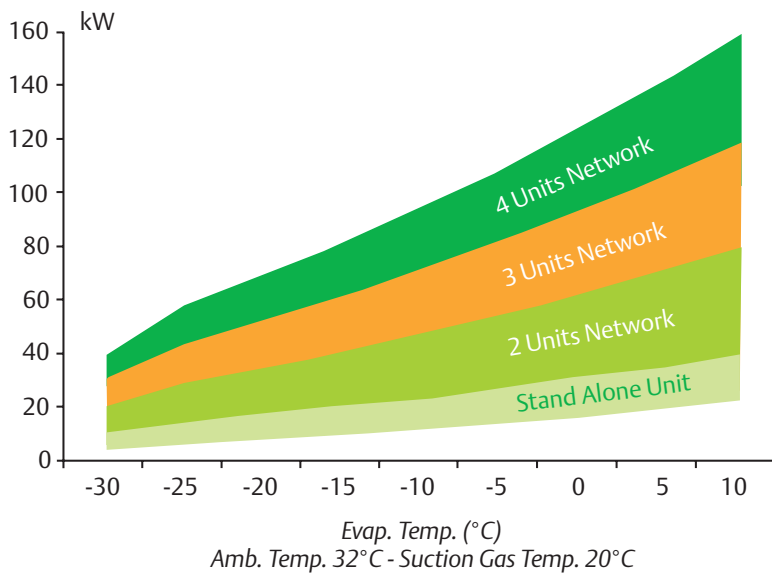
Example: Copeland Eazycool™ Network installation



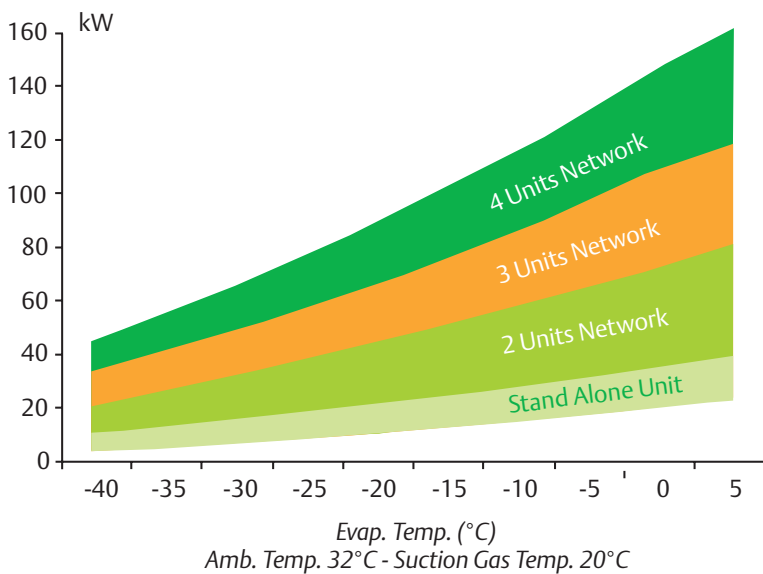
This new condensing unit network concept has already been proven by winning prestigious industry awards where efficient, high-performance refrigeration of quality was required: large-scale catering (Sports Stadiums, National Health Service and private hospitals etc.), the food trade and other shops (bakers, butchers, fishmongers, florists) and small and medium-sized food businesses (seafood processing facilities, dairies, small warehouses etc.).



Outdoor condensing unit for medium temperature / capacity per configuration



Outdoor condensing unit for low temperature / capacity per configuration



Benefits:

- Optimized compressor and fan operating cycles
- First in / first out starting logic
- Secured Master / Slave concept
- Independent, decentralized regulation

At the Heart of the System: Copeland Scroll Digital™

Unique in the refrigeration market, the Copeland Scroll Digital™ compressor stands out through its flexibility of use for whenever a refrigeration installation requires perfect temperature stability and absolute control of evaporating pressure.

In comparison with variable speed systems, whose complexity lies in the perfect determination of piping diameters, the design of installations with the Copeland Scroll Digital™ compressor has no such constraints.

The technology used in Copeland Scroll Digital™ compressors eliminates the need for inverter control and any potential issues caused by electromagnetic interference. Therefore the Digital Scroll™ concept is extremely simple, whilst providing the ultimate in reliability.

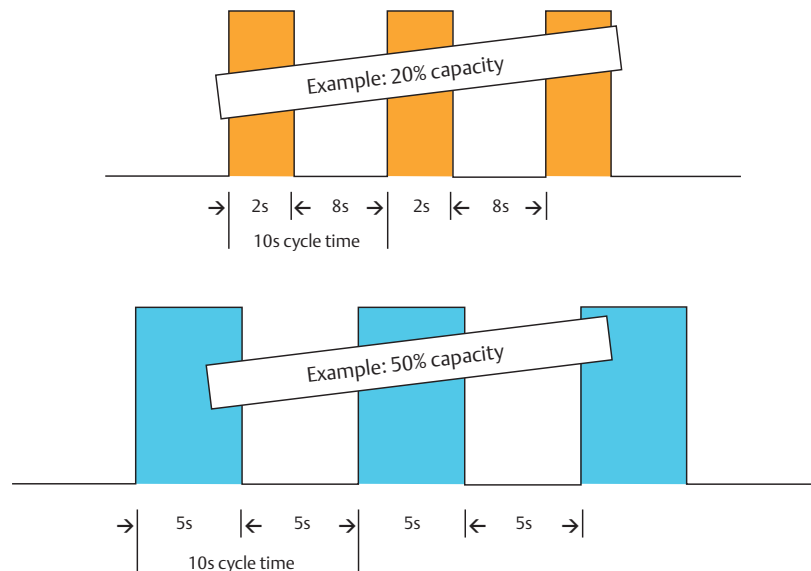


Compressor Capacity Control From 10 to 100%

Taking into account a number of evaporators, the embedded electronics will detect any variation of evaporation pressure. These pressure variations are then converted into an open and closing cycle for a solenoid valve fitted to the compressor. The solenoid pulse valve cycle will allow either separation or engagement of the scroll set.

The on/off cycles provide, over a specific period, 10 to 100% linear variation in the refrigeration capacity of the Digital Scroll™ compressor.

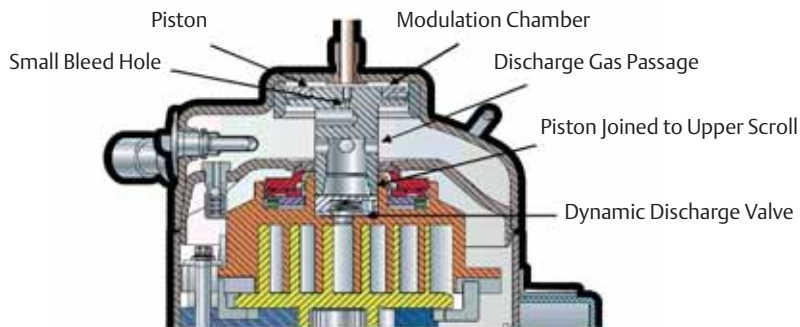
Digital Scroll™ on/off time



Low Consumption During Capacity Reduction

The cycle time of the solenoid is one element in determining the compressor's energy consumption. When the compressor is working off load (solenoid open), its capacity never exceeds 10 % of the motor's nominal capacity. It is therefore evident that energy consumption will vary between 10 and 100 %, in proportion to the refrigeration capacity supplied by the compressor.

Digital Scroll™ Modulation Mechanism



A simple piston in the top cap which is an integral part of the upper scroll is operated by a solenoid valve mounted between the modulation chamber and the compressor suction port.

When the valve is closed the high-pressure gas in the modulation chamber holds the piston down. The scrolls are engaged "in loaded mode" and compression occurs. When the solenoid valve opens the small high-pressure gas volume in the modulation chamber is bled to the suction resulting in the piston to lift, the scrolls are in "unloaded mode" and no compression occurs.

The solenoid valve is regulated by the electronic controller based on cycle time as illustrated in graph on page 6.



Benefits:

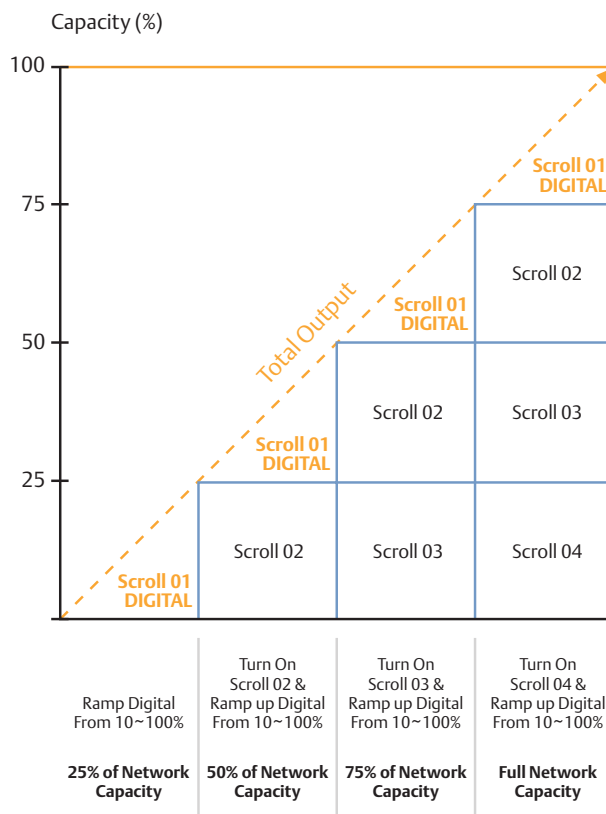
- Flexible use
- Stable temperatures
- Control of evaporation pressure
- No oil return constraint
- No electromagnetic interference
- Simple electronics



Optimized Control Logic

The advantage of this Network-based system lies in Copeland Scroll Digital™ compressor modulation which optimizes on/off compressor cycling of each Slave condensing unit.

Example of Network with 2 units



The Emerson EC2 controller monitors the variations in suction pressure and modulates the Digital Scroll™ capacity accordingly. The Network system is modulated by the master controller based upon "First in / Last out" logic for Digital Scroll™ compressor of master unit and "First in / First out" logic for the standard compressor (Master & Slaves).

The Master / Slave concept is failsafe as each unit becomes completely autonomous in the event of the failure of the Master unit or if inter-unit communication is lost.

Reliable Electronic Connections

In order to standardize our products, the same type of Emerson EC2 electronic controller is fitted on all condensing units. It manages both data transfer and inter-unit communication. Its logic enables to control and optimize compressor and fan operating modes.

LON (Local Operating Network) communication and the control of operating parameters, plus the alarms, can be centralized onto a PC with a USB key for the LON connection.



A Simple Yet Efficient Control Unit



The control centre of a Network-based system is the Emerson EC2-551 controller installed in each condensing unit. It has all the logic required to ensure optimization of the installation when commissioned.

Each unit can be set as Master or Slave, resulting in automatic self-detection of the operating priority selected during commissioning. Operating parameters are set by simply defining temperature and/or pressure on the "Master" controller. As for the Slave unit controller, they follow the operating logic laid down by the Master through the communication cable connecting all the controllers installed in the condensing unit network.



In order to keep electricity consumption to a minimum, Copeland EazyCool™ units use "floating" condensing pressure regulation. An electronic variable speed drive from Alco Controls, FSP150, connected to a pressure transmitter, monitors and adjusts the fan speed to keep it at the minimum required for each unit. Energy saving is the result of maintaining a precise condensing pressure, at the minimum value set via the EC2-551 controller.

The pressure transmitters (PT4 by Emerson) generate an electrical signal proportional to the pressure values recorded in the refrigeration circuit. They supply the EC2-551 controller with the low-pressure and high-pressure data necessary to adapt compressor and fan operation to the requirements of the installation with the utmost precision.

Benefits:

- Master/Slave mode regulation
- Standardized, interchangeable controllers
- Easy-to set-parameters, simple commissioning
- Automatic change to autonomous mode in the event of Master controller failure
- Master and Slave self-addressing when installation commissioned

Absolute Simplicity of Oil Return and Maximum Reliability



For centralized refrigeration installations with several compressors working in parallel, oil return is sometimes difficult to control completely, especially when the suction-gas velocity goes below a certain value, which is influenced by the pipes design (diameter & special configuration, vertical or horizontal). The same constraint is found on installations using compressors with variable-speed control.

Benefits:

- Simple connections using Schrader couplings
- Total control of oil return
- Identical oil separator on each unit
- Secured oil injection on each compressor
- Electronic level control and oil injection by Traxoil OM3

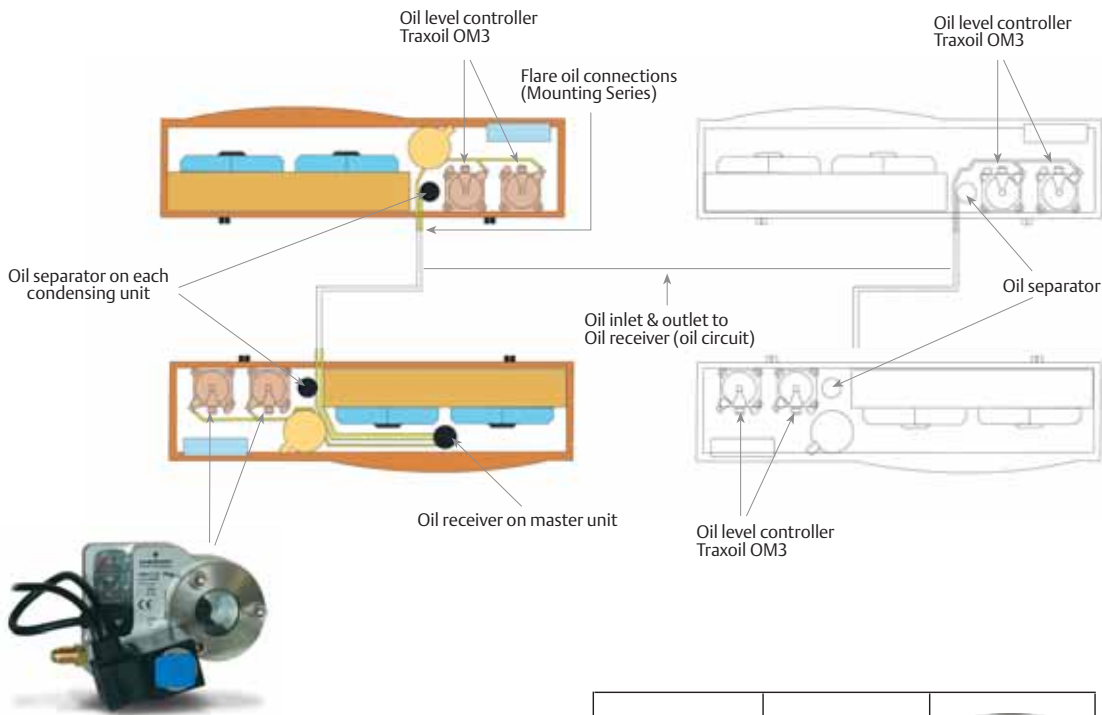


A Copeland Eazycool™ Network has a built-in oil management system. Each condensing unit has its own Alco Controls oil separator, thus limiting the transfer of oil to the system, and each compressor is fitted with a Traxoil electronic level control. The distribution of oil between the units is achieved by a set of piping connected to the oil outlet and return valves on each installed unit. An oil reservoir is also provided within the Master unit.

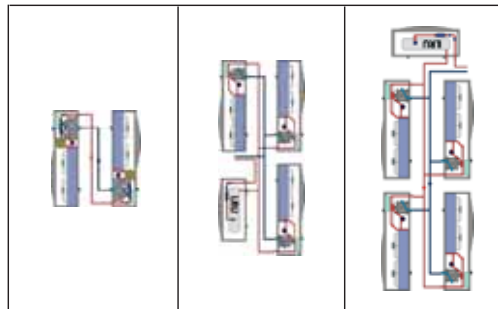
No other refrigeration connection is required, apart from connections to the installation's suction and liquid line manifolds.

A Wide Range of Both Medium and Low Temperature Capacities

Condensing Unit Network Oil Management System



Oil level controller Traxoil OM3
Oil injection to each compressor



Condensing Unit Network Configurations

Model	Depth / Width mm	Height mm	Sound Pressure level Db ^a **	2 Units Network Q _o (kW)	3 Units Network Q _o (kW)	4 Units Network Q _o (kW)
Rating conditions: EN 13215 MT Conditions (-10°C/32°C - RGT 20°C) @ 50 Hz - R404A						
OMQ-56-N*	670/2100	950	44	23,0	34,5	46,0
OMTQ-60-N*	670/2100	950	43	26,1	39,2	52,2
OMTQ-60D-N*	670/2100	950	43	26,7	40,1	53,4
OMTQ-76-N*	670/2100	950	44	30,2	45,3	60,4
OMQ-75-N*	670/2100	950	45	30,5	45,8	61,0
OMTQ-90-N*	670/2100	950	45	39,7	59,6	79,4
OMTQ-90D-N*	670/2100	950	45	39,9	59,8	79,8
OMQ-92-N*	670/2100	950	46	41,0	61,5	82,1
OMQ-110-N*	670/2100	950	47	47,4	71,1	94,8

Model	Depth / Width mm	Height mm	Sound Pressure level Db ^a **	2 Units Network Q _o (kW)	3 Units Network Q _o (kW)	4 Units Network Q _o (kW)
Rating conditions: EN 13215 LT Conditions (-35°C/32°C - RGT 20°C) @ 50 Hz - R404A						
OLQ-24V-N*	670/2100	950	44	14,4	21,6	28,8
OLTQ-26V-N*	670/2100	950	44	16,0	24,0	32,0
OLQ-33V-N*	670/2100	950	45	19,4	29,1	38,8
OLTQ-36V-N*	670/2100	950	45	23,7	35,6	47,4
OLQ-40V-N*	670/2100	950	46	23,8	35,7	47,6
OLQ-48V-N*	670/2100	950	47	29,4	44,1	58,9

Note: For uneven unit configuration please refer to your Emerson Climate Technologies sales office
 * NLO Master, NL Slave for 2 units network NO Master, N Slave for 3 & 4 units network
 ** sound pressure level averaged over measurement surface @ 10 Meters- Reference ISO 3744

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