Copeland QR15M1-TFD-501 compressor

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Copeland QR15M1-TFD-501 compressor: technical profile, applications and selection guide

For HVAC professionals, the Copeland QR15M1-TFD-501 stands out as a low-sound, high-capacity hermetic reciprocating compressor designed for demanding commercial air-conditioning and refrigeration systems. This article explores its key specifications, strengths, and how to integrate it correctly into new projects or retrofit jobs.

Main technical specifications

The QR15M1-TFD-501 belongs to the Copeland QR low-sound series, a four-cylinder hermetic reciprocating platform engineered for reduced vibration and noise in packaged and split systems. It is typically rated at around **12–12.5 HP**, giving contractors solid capacity for medium- to high-temperature applications such as

rooftop units, air-cooled chillers and large ducted systems.
Key data that installers usually look for include:

- Refrigerant: R22, with mineral-oil lubrication as standard on QR “R” family models.
- Nominal cooling capacity: up to about 142 000 Btu/h (≈ 41.6 kW) at 60 Hz, covering a wide range of evaporating conditions.
- Power supply: 3-phase 380–420 V / 50 Hz and 460 V / 60 Hz, matching most commercial electrical grids worldwide.
- Cylinders: 4-cylinder design with a double scotch-yoke mechanism, improving balance and running smoothness versus conventional rod-and-piston sets.
- Typical operating envelope: medium- and high-temperature commercial air-conditioning duty.

Construction and performance advantages

Copeland’s QR series is built around a rugged, compact shell with internal suspension, which helps to isolate mechanical vibrations and minimize structure-borne noise when the compressor is bolted to the base frame. The forged steel crankshaft and precision bearings are designed for high-speed operation, giving good reliability in systems that cycle frequently or run long duty hours.
Inside the compressor, pistons, yokes and slide blocks are cast from special alloy aluminium, while piston rings use cast iron to maintain sealing and durability over long runtimes. A low-foaming mineral oil is specified to stabilize lubrication under fluctuating load conditions, supported by a crankcase heater that reduces refrigerant migration during off-cycles.

Electrical and protection features

The QR15M1-TFD-501 uses a three-phase suction-gas-cooled motor, which takes advantage of return gas to remove heat from the windings and improve overall motor life. On TFD models, internal inherent line-break protection is provided, cutting power if winding temperature or current rises beyond design limits, and some QR variants complement this with an external solid-state protection module.
Standard rotalock or stub-tube connections simplify brazing and servicing, and many units ship with an oil level test valve plus ports positioned for easy access to service gauges. These details may seem minor, but in a tight plant room or rooftop installation, better port layout can save significant time during commissioning and troubleshooting.

Typical applications and selection tips

Because of its power rating and low-sound design, the QR15M1-TFD-501 is often selected for:

- Commercial air-conditioning units such as rooftop packages, air handlers and split systems.

- Medium-temperature refrigeration where low noise is important, including supermarkets, cold rooms near occupied spaces or hotels.
- Retrofit projects replacing older R22 compressors of similar capacity, where matching voltage, displacement and oil type is critical.

When selecting this model, technicians usually:

- Check that the system is still legally allowed to operate with R22 in their region, or confirm compatibility with any approved drop-in refrigerant if permitted by manufacturer guidelines.
- Compare duty-point capacity (evaporating and condensing temperatures) against Copeland QR performance tables rather than relying only on nominal HP ratings.
- Ensure correct crankcase heater control and suction line sizing to protect the compressor from liquid slugging on start-up.

QR15M1-TFD-501 essential data table

Specification	Typical value / description
Compressor family	Copeland QR low-sound hermetic reciprocating, 4-cylinder.
Model	QR15M1-TFD-501.
Nominal power	About 12–12.5 HP.
Refrigerant	R22, mineral-oil lubrication.
Cooling capacity (60 Hz)	Up to ≈ 142 000 Btu/h (≈ 41.6 kW) depending on conditions.
Voltage / phase / frequency	380–420 V 3~ 50 Hz; 460 V 3~ 60 Hz.
Application range	Commercial air-conditioning and medium-temp refrigeration.
Key features	Low-sound shell, internal suspension, crankcase heater, internal motor protection.

Maintenance, reliability and retrofit considerations

Maintaining a QR15M1-TFD-501 correctly starts with oil management: technicians should always replace oil with the same viscosity grade mineral oil specified by Copeland and verify oil level after long transport or system leaks. Adequate superheat, properly set expansion devices and clean condenser surfaces are equally important to keep discharge temperatures within safe limits and prevent thermal trips.

In retrofit scenarios, attention must be paid to any system filters and driers, as long-serving R22 circuits often contain moisture, acids or debris that can severely shorten compressor life if not addressed before start-up. Where local regulations phase down or ban R22, owners may consider full system replacement or carefully engineered conversions to modern refrigerants, guided by manufacturer bulletins and local codes.

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