



TR200 Series

Variable Frequency Drives





TR200 Series VFD Introduction



At Trane, our philosophy is grounded in a commitment to offering solutions that support energy efficiency and take a sustainable approach to the environment. We believe in creating High Performance Buildings. Integrated Comfort™ systems are a single-source offering incorporating high-quality HVAC products and controls, backed by a trusted and experienced sales force and extensive service network. They can also encompass fire safety and security systems from a single source. Trane builds upon 30 years of experience in the controls industry and our firm commitment to new technology in practical day-to-day applications. Our variable frequency drive, the TR200 Series, is an example of this commitment.

Today more than ever, facility professionals are required to use a range of strategies for energy efficiency. A variable frequency drive is an electronic system that provides infinitely variable speed control of three-phase AC induction motors. It accomplishes this by converting fixed frequency and voltage input power into adjustable frequency and voltage. With an installed VFD, you control the speed of the AC pump or fan motor to meet the exact needs of your building's customers and environment. A key benefit of a variable frequency drive is to provide savings through the reduction of energy consumption by changing the speed of a motor to meet actual demand. The savings are significant when compared to a motor running constantly at full speed. Controlling the flow of air and water in HVAC systems is an effective, permanent way to meet the ever-changing demands put on the system.

The Trane TR200 Series VFD is an advanced design VFD, fully dedicated to the optimal operation of HVAC applications. It offers energy savings, prolonged motor life, user-friendliness and built-in functionality designed to meet the rigorous demands of HVAC applications. Motor control is based on a vector drive system providing full motor power at rated speed without derating. Automatic Motor Adaptation ensures optimum motor torque performance. The Automatic Energy Optimizer function optimizes the voltage output of the VFD to the actual load of the motor, thus minimizing its power consumption.

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Trane, TR200, IntelliPak, Voyager III are from Trane; BACNet from ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers); LonWorks from Echelon Corp; Modbus from Groupe Schneider



TR200 Series VFD Benefits

Trane TR200 Series drives play an important role in a system to reduce energy usage, extend motor life, optimize AC motor speed control, maximize occupant comfort and reduce costs. They are available factory-mounted and commissioned on Trane IntelliPak™, Voyager III™ and M-Series and T-Series Climate Changers. In addition, TR200 Series support of open standard protocols make them compatible with virtually all HVAC equipment and building automation systems. They can also be ordered specifically for a project and easily installed on-site for new and retrofit applications. With a complete range available from 1½ to 1350 HP, the features and flexibility of TR200 Series VFDs make them ideal for stand-alone control of cooling towers, exhaust fans, pumps and a variety of air handlers.

ENERGY SAVINGS

- **Simplified automatic energy optimization (AEO)**—continually monitors the motor's speed and load and adjusts the applied voltage to maximize energy savings.
- **Sleep mode**—automatically stops or restarts the drive when its speed is outside set levels for a specified time, providing energy savings without separate controllers.

COST SAVINGS

- **Intelligent HVAC controller**—four auto-tuning PIDs control the drive and up to three other devices, eliminating external controllers and reducing cost.
- **Built-in HVAC protocols**—allow TR200 drives to become an intelligent part of the building management system.
- **Built-in protection**—integrated technology eliminates the need for external protection devices while maximizing the life of the motor and other system components.

TROUBLE-FREE OPERATION

- **Dual DC-link reactors**—non-saturating reactors provide better harmonic performance than a 5% AC line or saturating DC reactors.
- **Automatic high ambient derate**—if the ambient temperature exceeds the normal limit, the drive can be set to warn of its overtemperature and continue to run, keeping the HVAC system functional. To control its temperature, the drive will reduce the output carrier frequency and, if necessary, reduce the output current.

EASY TO INSTALL

- **Compact size**—efficient heatsink design significantly reduces the footprint of TR200 Series drives, particularly in the smaller frame sizes.
- **Run-permissive circuit**—the ability to accept a "system ready" signal assures that dampers or other auxiliary equipment are in the proper state for drive operation.
- **Real-time Clock**—adds sophisticated performance to basic control schemes for increased comfort and energy savings.
- **Plenum rated**—all drives and options are UL listed for installation in air handling compartments.

EASY TO USE

- **Simple and flexible menu structure**—many installations require nothing more than scrolling through the twelve "QUICK MENU" items to confirm the default settings. Users can also select up to 20 parameters to be included in a "PERSONAL MENU" for easy access.
- **Trane Drive Utility commissioning and troubleshooting software**—easy connection via the onboard USB port provides PC access to drive parameters without disconnecting the keypad or interrupting communications.
- **Advanced firefighter's override**—provides options for emergency operation (using either the drive only or coordinated with the bypass) that increase the safety of building inhabitants.

IMPRESSIVE RANGE OF STANDARD I/O

- 2 analog inputs (current or voltage) for sensors, setpoint sources or basic speed command
- 6 digital inputs (either PNP or NPN) for hardwired start/stop, safeties, run-permissive, preset speed and much more—two can be used as digital outputs
- 1 analog output for indication of operation or to control other HVAC devices
- 2 Form C relay outputs (240V, 2 amps) for remote indication of operation or to control other HVAC devices
- 200mA of 24 VDC to power customer devices such as sensors and valves

USB CONNECTION

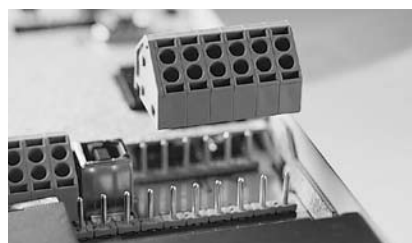
PC access to drive parameters without interrupting communication

STANDARD COMMUNICATION

EIA-485 for direct connection to Modbus, Siemens Building Technologies FLN and Johnson Controls N2 with every drive. Monitoring and controlling over serial communications reduces installation cost. All outputs are available for commanding over the network.

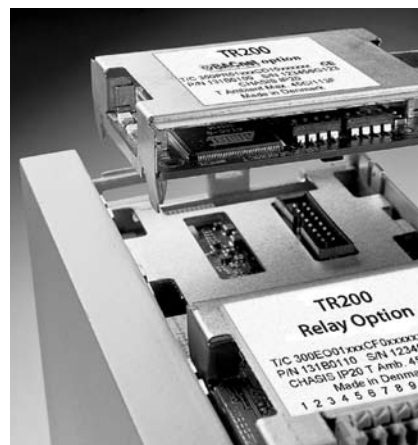
CONTROL BUILT FOR PERFORMANCE

- I/O and communication terminals are galvanically isolated and separated from power terminals to limit interference
- Terminals are spring loaded for security
- Terminals accept a wide range of wire sizes
- Unpluggable terminals



ADVANCED OPTIONS MADE EASY

Plug and play option modules further enhance the standard capabilities of TR200 drives. They fit seamlessly under the drive keypad, simplifying installation. These factory or field-installable modules often eliminate the need for external devices, resulting in a lower overall cost of ownership.



COMMUNICATION OPTION MODULES

- BACnet (MCA116)
- LonWorks (MCA 115)

I/O OPTION MODULES

For additional control and monitoring capabilities:

General Purpose I/O (MCB 101)

- 3 digital inputs
- 2 digital outputs
- 1 analog current output
- 2 analog voltage inputs

Relay Option (MCB 105)

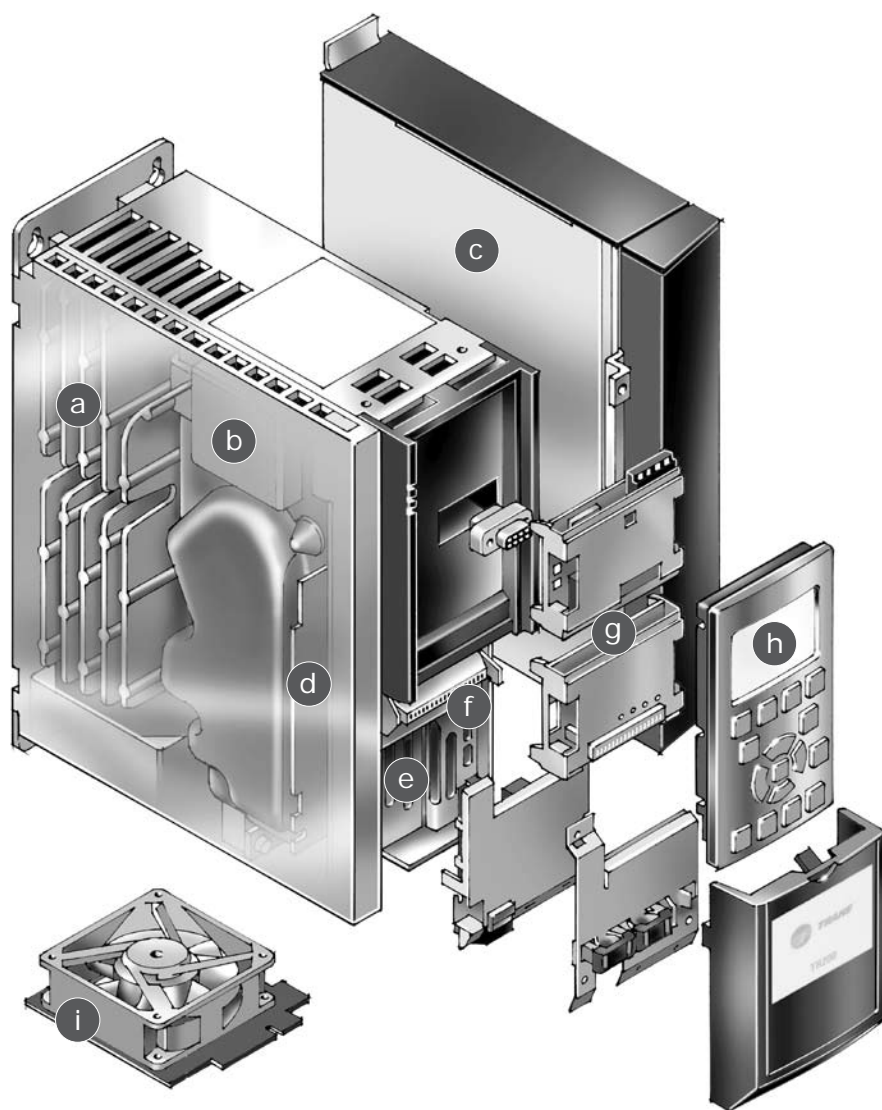
- 3 Form C relay outputs

External 24VDC (MCB 107)

- Allows 24 VDC external supply to be connected to the drive for powering of control and options

Analog I/O (MCB 115)

- 3 analog voltage outputs
- 3 Pt100/Ni1000 inputs



a Cold plate cooling technology
For efficient heat dissipation

b Balanced DC-link reactors
For reduced harmonics

c Advanced controller options
Address the needs of complex applications

d Surface-mount components
For compactness and reliability

e USB interface
For easy connection to PC software suite

f Removable terminal strips
Angled for easy access

g Option modules
Provide additional functionality

h Hot-pluggable keypad
Features on-board memory with user-friendly ergonomic design

i Removable, temperature-controlled fan
For easy servicing



TR200 Series VFD User Benefits

DRIVE FEATURE	USER BENEFIT
Hot-pluggable HVAC keypad with memory	Four drive setups can be uploaded to the keypad and saved. To program multiple drives, upload the parameter settings to the keypad, then place that keypad on each of the other drives and download these same settings to every other drive.
Operates without a keypad in place	Assures tamper-proof operation. Drive status shown even with the keypad removed.
Keypad can easily be remote mounted	The standard keypad can be remotely mounted 10 feet from the drive with a standard 9-pin cable. The remotely mounted keypad is gasketed and carries a NEMA/UL Type 12 and NEMA/UL Type 3R rating.
Simple and flexible menu structure	Many installations require nothing more than scrolling through the twelve "QUICK MENU" items to confirm that these defaults are correct. Users can also select up to 20 parameters to be included in a "PERSONAL MENU" for easy access.
Intelligent HVAC controller	Four auto-tuning PIDs control the drive and up to three other devices, eliminating external controllers and reducing cost.
USB port	PC access to drive parameters without disconnecting the keypad or interrupting communications.
Built-in EIA-485 interface	Fully equipped for serial communication. Up to 31 drives can be connected to one serial bus up to 5,000 feet long.
Built-in HVAC protocols	The inclusion of all popular HVAC protocols allows TR200 Series drives to become an intelligent part of the building management system.
Automatic Motor Adaptation (AMA)	Measures motor stator resistance and reactance without turning the motor or decoupling the load. The drive then automatically uses this information to optimize performance and efficiency.
Simplified Automatic Energy Optimization (AEO)	Eliminates the need to select a V/Hz pattern. AEO continually monitors the motor's speed and load and adjusts the applied voltage to maximize energy savings. Even at full speed, voltage will be reduced if the load is less than 100%. This automatically compensates for oversized motors or systems that are not fully loaded.
Energy monitoring	Real energy savings information is always available without the additional expense of external equipment.
Advanced firefighter's override	Provides options for emergency operation (using the drive only or coordinated with the bypass) that increase the safety of building inhabitants.
Real-time clock	Adds sophisticated performance to basic control schemes for increased comfort and energy savings.
Auto ramping	Ensures no-trip acceleration and deceleration.
High breakaway current	Up to 160% breakaway current available for high friction loads.

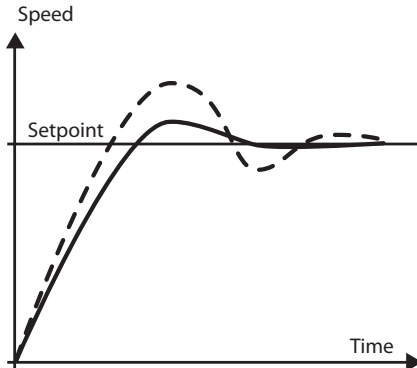


TR200 Series VFD User Benefits

DRIVE FEATURE	USER BENEFIT
VVC ^{PLUS} output switching pattern	Superior Voltage Vector Control provides high efficiency and full motor performance.
Automatic high ambient derate	If the ambient temperature exceeds the normal limit, the drive can be set to warn of its overtemperature and continue to run, keeping the HVAC system functional. To control its temperature, the drive will reduce the output carrier frequency and then, if necessary, reduce the output current.
Preventive maintenance scheduling	The TR200 Series drive can monitor system usage and notify the operator when preventive maintenance is required.
Dual DC-link reactors	Non-saturating reactors provide better harmonic performance than a 5% AC line or saturating DC reactor.
Built-in protection	Eliminate the need for external protection devices while maximizing the life of the motor and other system components. <ul style="list-style-type: none">• Motor preheat• Overload and thermistor input• No-flow, broken belt, dry pump and end-of-curve detection
Automatic Switching Frequency Modulation (ASFM)	Adjusts the carrier frequency based on the load. <ul style="list-style-type: none">• Provides a quiet motor at critical low flow conditions• Provides full rated output without derate at high load
Protected from input or output switching	Input or output can be disconnected while the drive is running without the need for interlocks to protect the drive.
Full torque to base speed	Direct drive fans run without derating. The full output torque can be set to coincide with the maximum design operating speed of the driven equipment, up to 60 Hz.
Flying start	Allows starting into a “windmilling” fan at any speed, in either direction.
Sleep mode	Automatically stops the drive when its speed drops below the “sleep” level for a specified time, and automatically restarts when the speed command exceeds the “wake” level. Provides increased energy savings without separate controllers.
Run-permissive circuit	The ability to accept a “system ready” signal assures that dampers or other auxiliary equipment are in the proper state for drive operation.
Safety Interlock	Provides external fault indication.
UL and C-UL listed	All drives and options sold for US and Canadian applications carry this safety certification.
CE marked	All drives carry the CE mark for sale into international markets.
Plenum rated	All drives and options are UL listed for installation in air handling compartments.



TR200 Series VFD HVAC Control Features



HVAC INTELLIGENT CONTROL

TR200 Series drives include a PID controller with four setpoints and three feedbacks, a feature not currently offered anywhere else in the market. The built-in combination of HVAC system control features and flexible I/O result in the highest level of control possible at the lowest overall cost of ownership.

Four on-board, self-tuning PID controllers can operate as a basic air handling unit controller. One PID maintains fan speed while up to three other PID loops can be used to operate other HVAC devices.

In pump applications, short-cycle prevention allows maintained operation within a desired range without the wear and tear produced by system overstarting. Combined with a flowmeter or a differential pressure transmitter, the TR200 Series drive can measure and regulate flow and replace throttling valves for more accurate control and energy savings.

Fan tracking allows return fans to maintain the desired pressure by utilizing two air flow sensors. An enhanced sleep mode saves energy and system wear by shutting down fans during idle periods.



REAL-TIME CLOCK

The energy savings potential of the TR200 Series drive is maximized with a real-time clock, allowing the system to respond to the changing needs of the building throughout the day and week. The real-time clock allows the system to anticipate conditions or temporarily override the setpoint, enhancing control, comfort and efficiency. It also allows the drive to provide reminders when preventive maintenance is required.

Previously, a building automation system was required to obtain these features. The real-time clock gives these sophisticated functions to any facility.

With the real-time clock, the fault log in all TR200 Series drives contains not only a list of the ten most recent drive faults, but also the year, month, day, hour and minute of each fault, greatly simplifying troubleshooting.

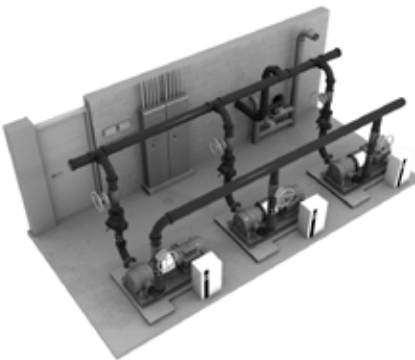


FIREFIGHTER'S OVERRIDE MODE

In any enclosed space, fire and smoke control is a major life-safety concern. Firefighter's override mode allows the HVAC system to control and contain fire or extract smoke using air flow and air pressure. When operating in override, the drive ignores most operating conditions that would otherwise cause it to fault and shut down. It continues to operate as long as possible regardless of line, load or environmental conditions.

Firefighter's override can run the drive at any speed in forward or reverse. It can be activated either by a normally open or normally closed contact from the fire panel or through the building automation system. The drive can be set to switch automatically to a constant speed bypass if operation through the drive becomes impossible due to failure of the drive's power circuitry. The bypass will then run the motor at full speed from the power line until firefighter's override is deactivated.

Firefighter's override is standard in all TR200 Series drives, and can be configured through user-accessible parameters. It can be set up and activated at any time. As fire codes or the needs of the facility change, the adaptable TR200 Series drive is ready.



CASCADE CONTROLLER

With features and functions that eliminate the need for external controllers, the TR200 cascade controller feature increases the efficiency of your multiple pump or blower systems. Through accurate flow, pressure and level control, it provides lower energy consumption than valve throttling or the traditional across-the-line on/off cycling of pumps and blowers.

Other features serve to minimize wear and tear on driven equipment. Lead pump alternation functionality distributes running time equally among all connected pumps, maximizing their overall life.



TR200 Series VFD Features

While offering single-source solutions, Trane stands committed to open-standard protocols to meet the needs of building professionals. The TR200 Series demonstrates this with “plug-and-play” communication capabilities that reduce or eliminate the need for integration gateways.

The TR200 support of major building communication protocols allows seamless communication with open standard protocols such as BACnet™, LonWorks™ and Modbus™ as well as other popular building automation system protocols. Whether factory-installed on Trane HVAC equipment, field-installed on new equipment, or retrofit on existing equipment, the result is an easily programmable drive in an easy-to-manage package that simplifies installation and results in a lower total cost of ownership.



NETWORK COMMUNICATION

- Standard EIA-485 interface
- Built-in serial communication—allows seamless communication over networks using Modbus™ RTU and most building automation systems communications protocols.
- Option modules for BACnet™ and LonWorks®—factory- and field-installable; mounts easily and securely inside the drive.
- Easy installation and operation—simple two-wire connection and programmable through the network or the drive’s keypad.

HVAC-SPECIFIC FEATURES BUILT IN

- Keypad-programmable automatic bypass
- Common start/stop selectable operation in drive and bypass mode
- Coordinated run-permissive in drive and bypass mode
- Advanced firefighter’s override coordinated with TR200 Series drive override mode
- Serial and BAS control of drive and bypass operation

PROPORTIONAL, INTEGRAL, DERIVATIVE (PID) CONTROLLER

- Closed loop control
- Two setpoints and two feedbacks—a feature unique to TR200 Series drives
- Eliminates the need for extra I/O modules
- Allows for two-zone regulation
- Cooling tower systems—improved efficiency by automatically matching its speed to air flow requirements
- Pump applications
 - Used with a flowmeter, can maintain a given rate
 - Used with a differential pressure transmitter, can provide more accurate control and energy savings
 - Optional cascade controller board provides a wide range of efficient control in large pumping systems



ELECTRO-MECHANICAL BYPASS

Door mounted operators:

- Drive / Off / Bypass selector
- Bypass pilot light indication
- Test selection added with 3-contactor bypass units

24 VDC switch mode power supply

- Operates off any two of the three input phases
- Continued drive operation at a reduced load when any input phase is lost
- Eliminates contactor dropout on voltage conditions as low as 70% of nominal voltage

Advanced standard and optional features

- Common start/stop available
- Run-permissive available
- Basic firefighter's override available, which runs the motor in bypass, ignoring stop commands
- Auto bypass with adjustable time delay available
- Class 20 overload



Bypass-specific keypad provides one-touch access to bypass operation

ELECTRONICALLY CONTROLLED BYPASS

Motor Protection

- Phase loss / imbalance protection
- Overload motor protection in bypass
- Overload reset from keypad, digital input or BAS

24 VDC switch mode power supply

- Operates off any two of the three input phases
- Continued drive operation at a reduced load when any input phase is lost
- Eliminates contactor dropout on voltage conditions as low as 70% of nominal voltage
- Separate power source for drive logic

Additional protection features

- Drive input fuses supplied with every panel
- Bypass run-time hour meter
- Password protection prevents unauthorized bypass operation
- Manual bypass initiation override ensures operation
- Bypass control through the drive smart logic controller and real-time clock
- Bypass fault logging and time stamping



TR200 Series VFD Protective Features

With an unmatched combination of drive, motor, and system protection features, the TR200 Series drive is a cost-effective overall solution. Designed and built for long-term, worry-free operation without the need for external devices to protect driven equipment, the TR200 Series drive provides secure, reliable results, right out of the box.

SYSTEM PROTECTION

Belt monitoring

The TR200 Series drive's sophisticated belt monitoring measures both speed and load and calculates the difference between actual torque and expected torque at all speeds. A time delay allows for reduced load during deceleration.

No-flow detection

Operation under dead head conditions provides no flow to the system and may damage the pump. Differential pressure switches or flow meters increase the installation costs and add complexity. The TR200 Series drive can automatically detect no-flow situations and take the appropriate corrective action.

End-of-curve protection

The TR200 Series drive can automatically detect over-flow conditions that indicate operation off the end of the pump curve. Its response can be customized to trigger an alarm and stop the pump, issue a warning while maintaining operation, or perform a variety of other functions to protect both the pump and the system.

Automated vibration avoidance

Fan systems often have resonant speeds that must be avoided to reduce vibration and noise. The TR200 Series drive automates the process of setting up frequency avoidance bands, minimizing system commissioning time.

DRIVE PROTECTION

Metal oxide varistors (MOVs) and capacitor snubbers in both the AC and DC input circuitry reduce the impact of voltage spikes on the input. In addition, a balanced pair of DC-link reactors between the input rectifier and the bank of DC-bus capacitors reduces the severity of any current surge resulting from abrupt changes in the AC supply line.

Conformal coating is available to protect electronic components in aggressive environments.

MOTOR PROTECTION

The TR200 Series drive's built-in I²T motor overload, thermistor input and motor preheat functions increase the life of the controlled motor without the added cost of separately supplied protection. The drive's built-in I²T motor overload is UL-listed as a true overload device, eliminating the need for external motor protection hardware.

HARMONIC MITIGATION

DC-link reactors limit harmonic distortion on the power line, reducing RMS input current by more than 40% compared to drives without input reactors.

Other drive manufacturers address harmonics with AC line reactors, usually external to the drive. Often, these optional AC line reactors are 50% larger than the DC-link reactors standard on the TR200 Series drive. This results in significant additional heat generation and reduced efficiency. The harmonic performance of the DC-link reactors in the TR200 Series drive is equal to that of a 5% AC line reactor, but without the associated voltage drop and efficiency losses.

FRAME RATINGS BY HP

Contact Trane for dimensional information on drives larger than 350 HP.

Frame	Enclosure		HP Range			Base Drive Dimensions (Inches)*			Page
	NEMA 1	NEMA 12	208V	460V	600V	Height	Width	Depth	
A2	•		0.5–3	0.5–5		14.6	3.5	8.1	15
A3	•		5	7.5–10	0.5–10	14.6	5.1	8.1	15
A5		•	0.5–5	0.5–10		16.5	9.5	7.9	16
B1	•	•	7.5–10	15–25		18.9	9.5	10.3	17
B2	•	•	15						18
			20	30–40		25.6	9.5	10.3	19
C1	•	•	25–30	50–75		26.8	12.1	12.2	20
			40						
C2	•	•	50–60	100–125		30.3	14.6	13.2	21
D1	•	•		150–200	150–250	45.6	16.5	14.7	22
D2	•	•		250–350	300–350	60.6	16.5	14.7	22
ALL	NEMA 3R		ALL						

*Base drive dimensions are also valid for T1 packages (see below) on A5 and larger frames

T1, T2 AND T3 PACKAGES

A2 and A3 frames feature vertical construction for T1, T2 and T3 packages.

For A5 frames and larger, T2 and T3 packages will utilize enclosure(s) the same size as the drive enclosure. These enclosure(s) will be mounted directly to the right side of the drive.



T1: Drive only
or
drive with disconnect (with or without fuses)



T2: Drive with bypass
or
Non-bypass panel with AC line reactor, LC filter or contactor motor selection option

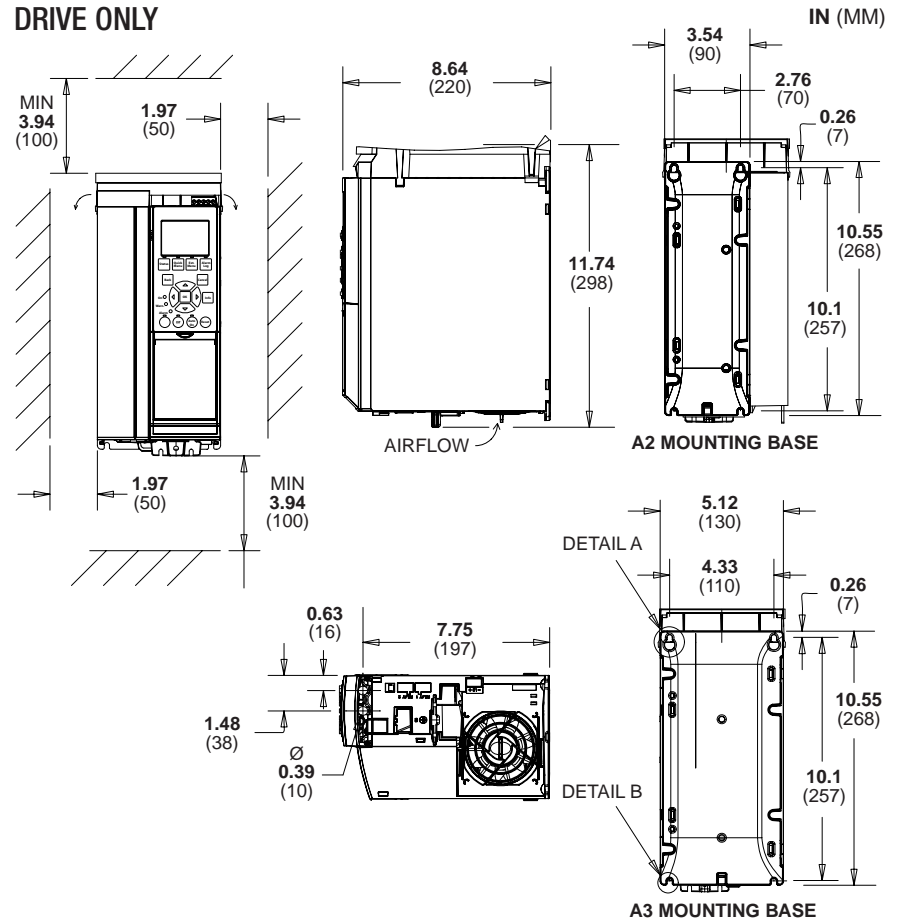
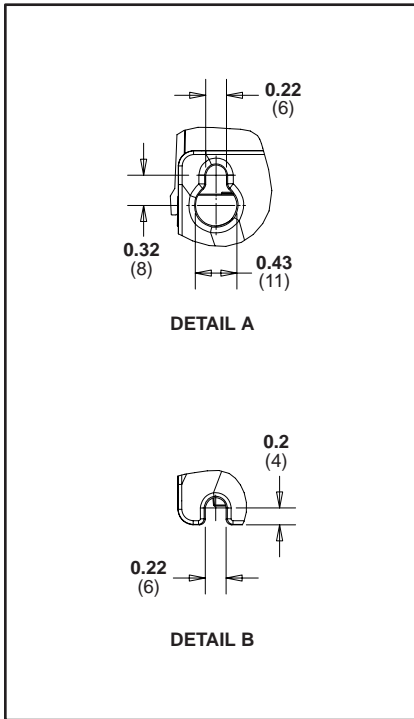


T3: Drive with bypass
and
AC line reactor or LC filter with or without contactor motor selection option

TR200 Series VFD Dimensions

A2 and A3 Frames

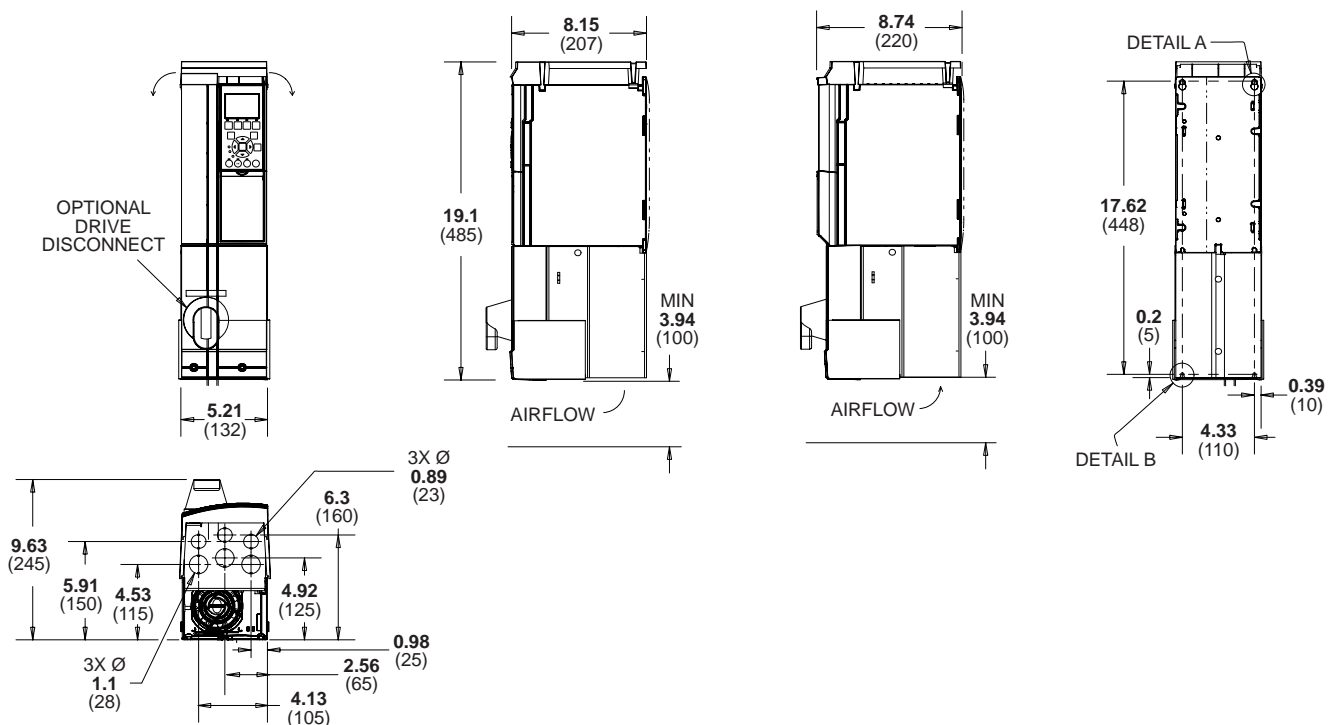
DRIVE ONLY



T1

WITHOUT A OR B OPTION

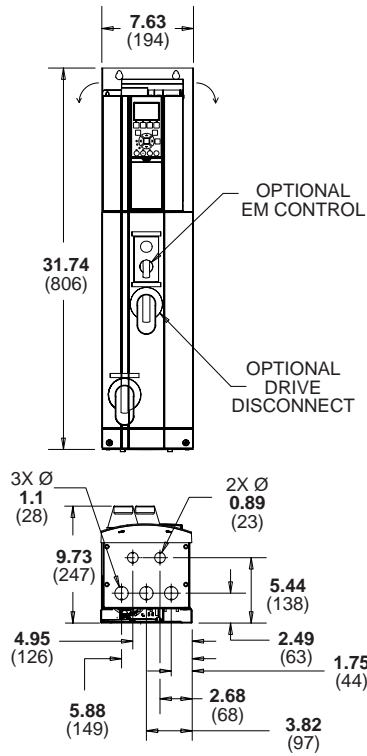
WITH A OR B OPTION



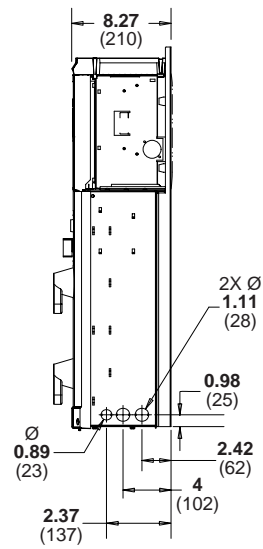
TR200 Series VFD Dimensions

A2 and A3 Frames

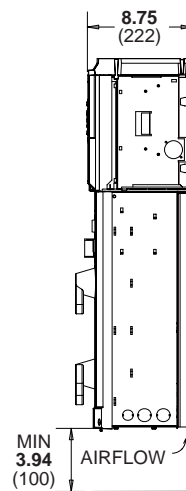
T2



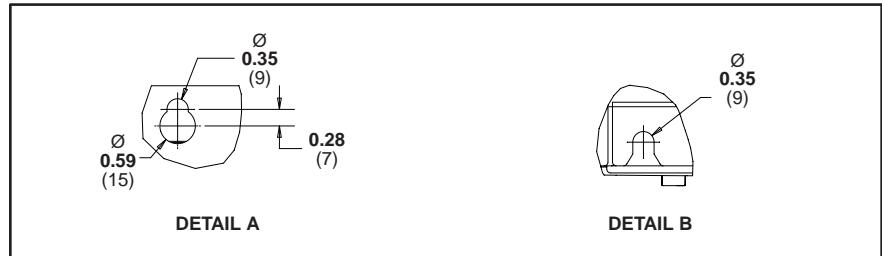
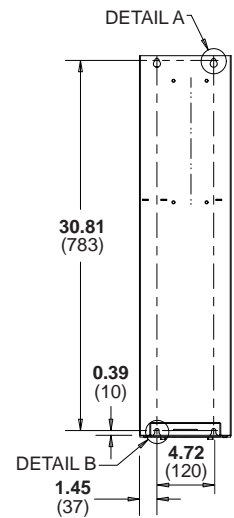
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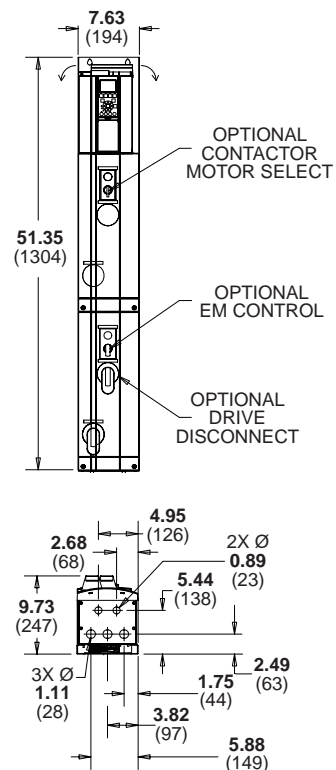
WITH A OR B OPTION



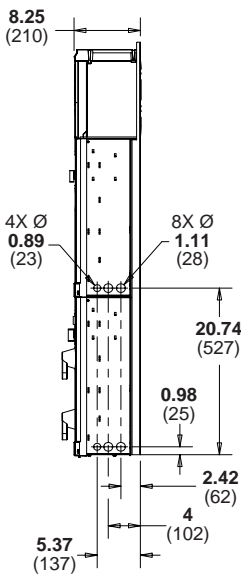
IN (MM)



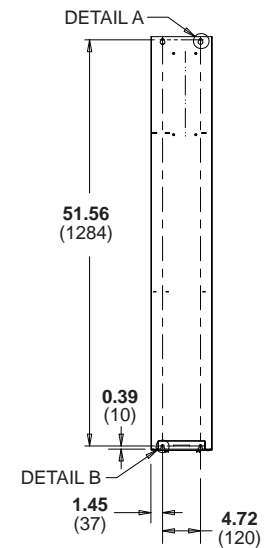
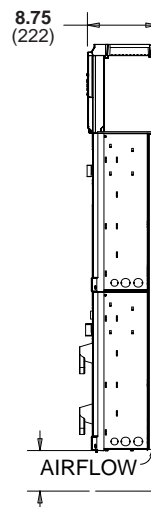
T3



WITHOUT A OR B OPTION



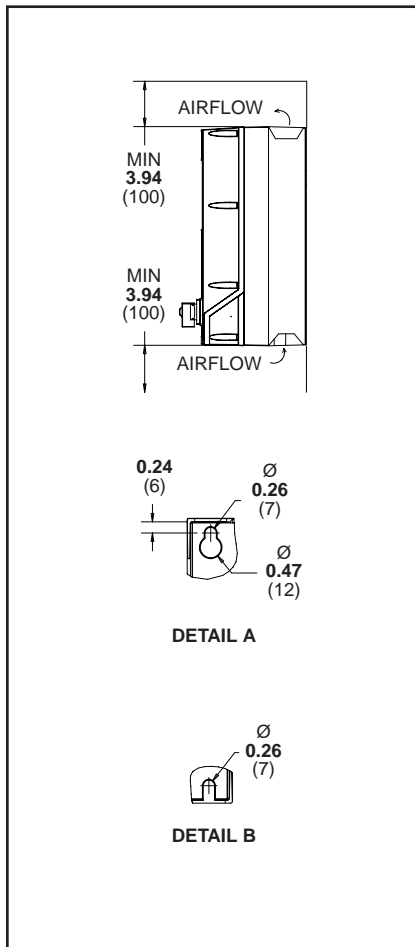
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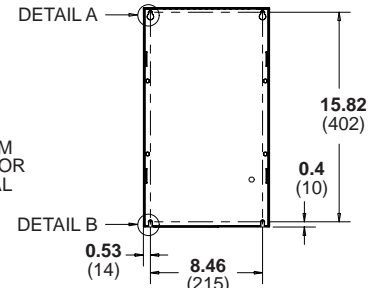
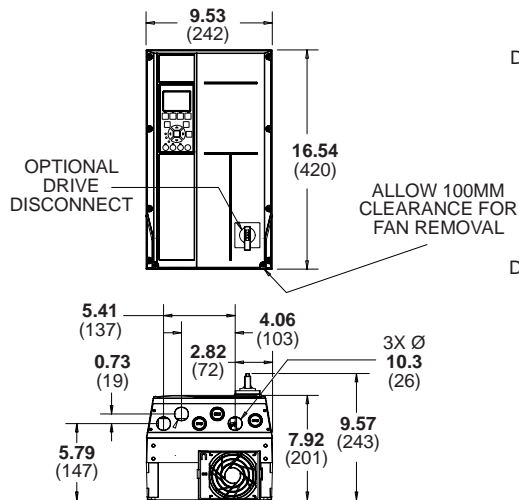
TR200 Series VFD Dimensions

A5 Frames

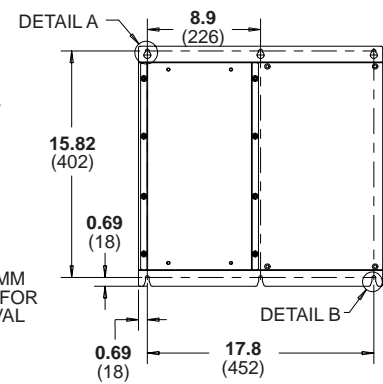
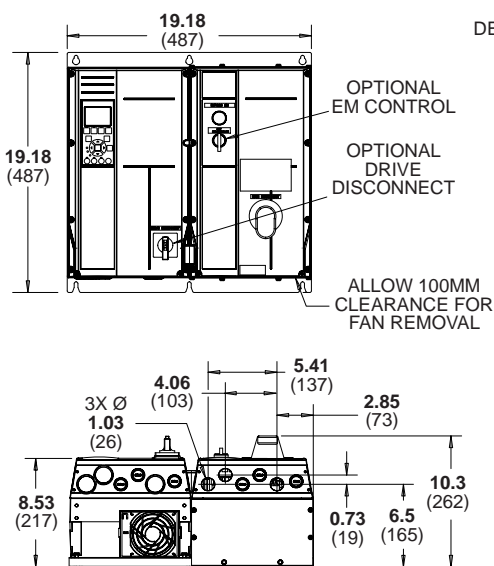
IN (MM)



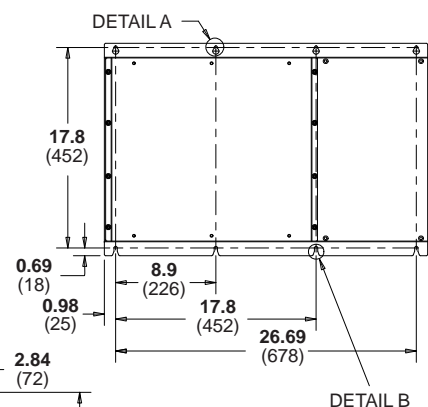
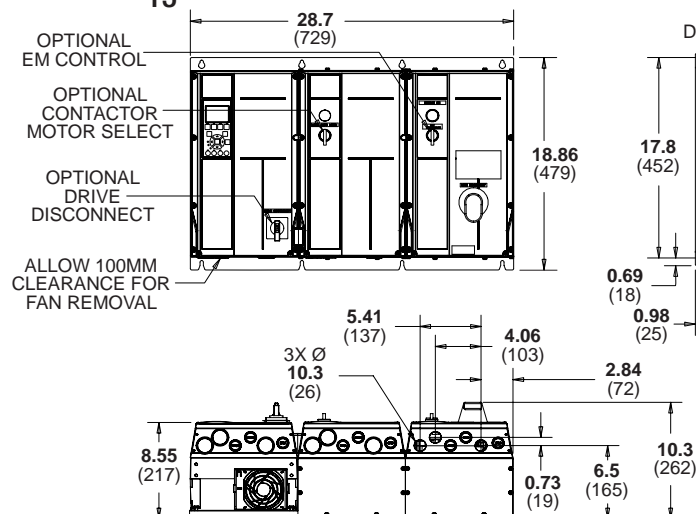
T1



T2

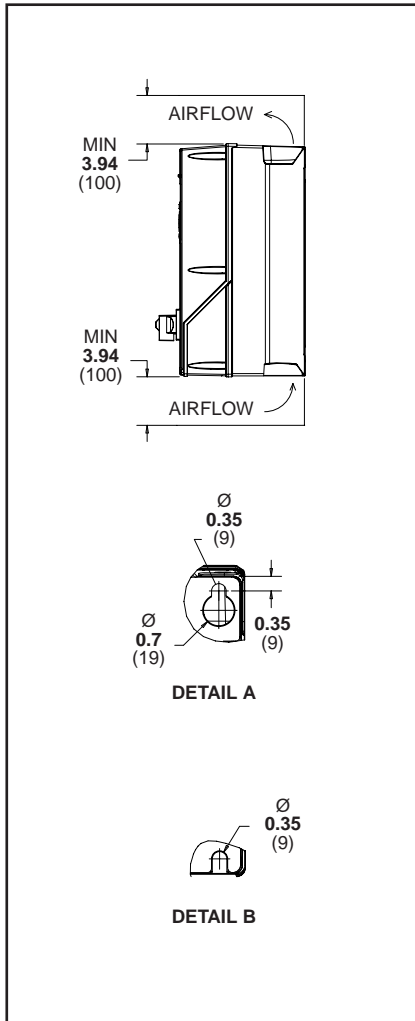


T3

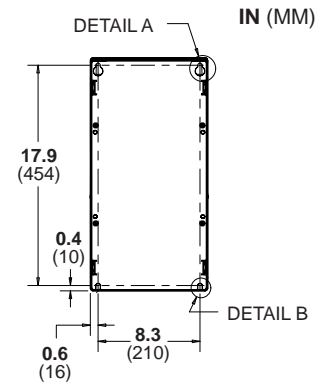
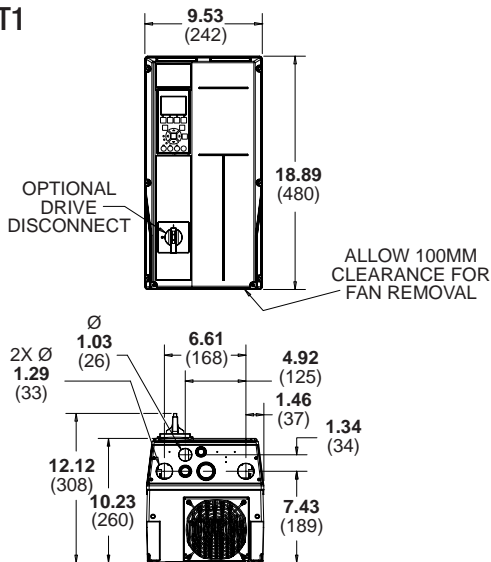


TR200 Series VFD Dimensions

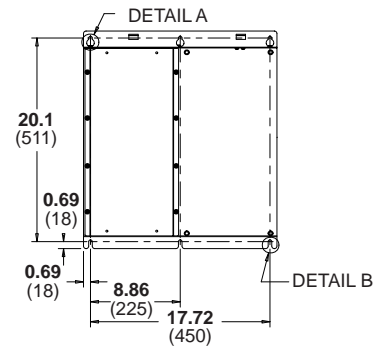
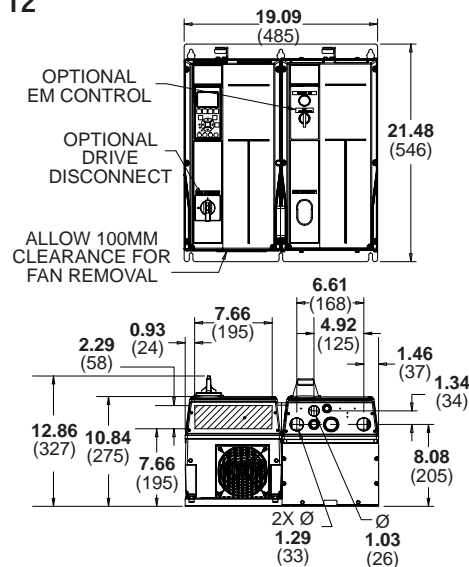
B1 Frames



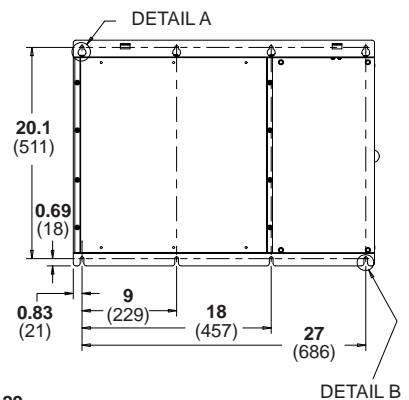
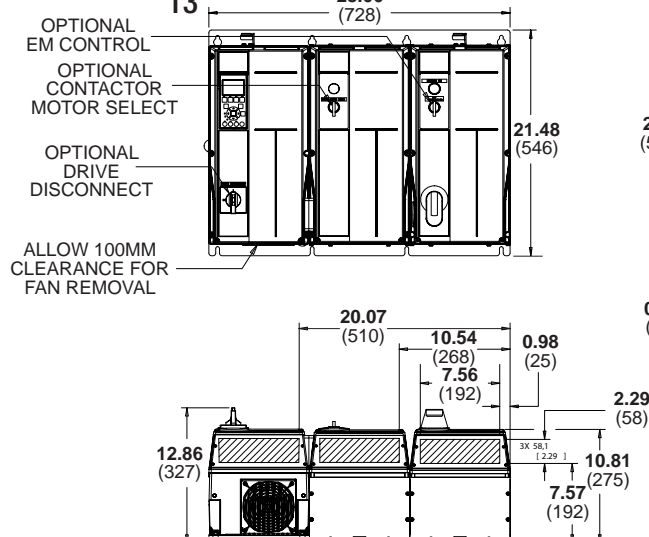
T1



T2

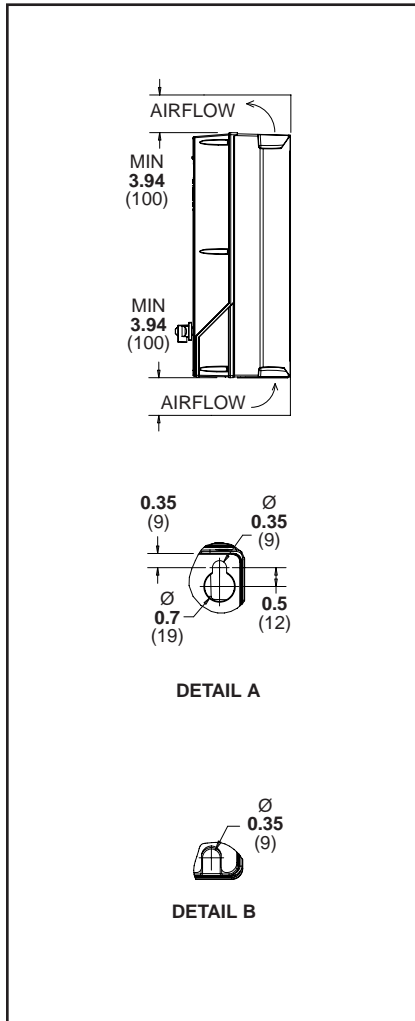


T3

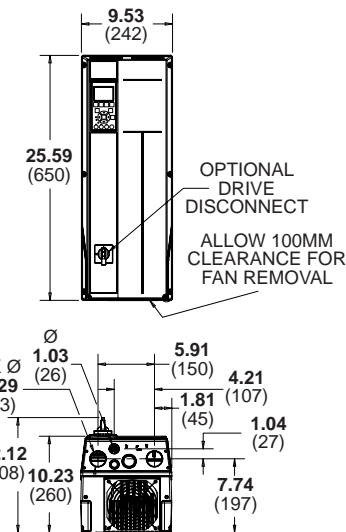


TR200 Series VFD Dimensions

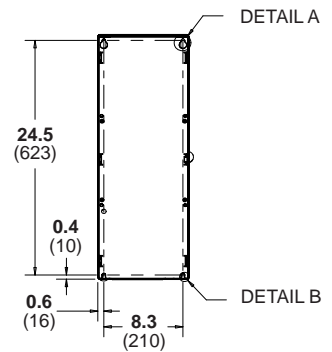
B2 Frames



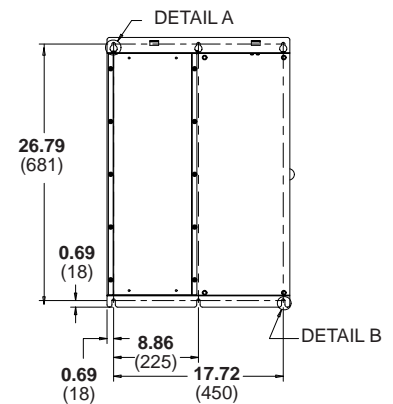
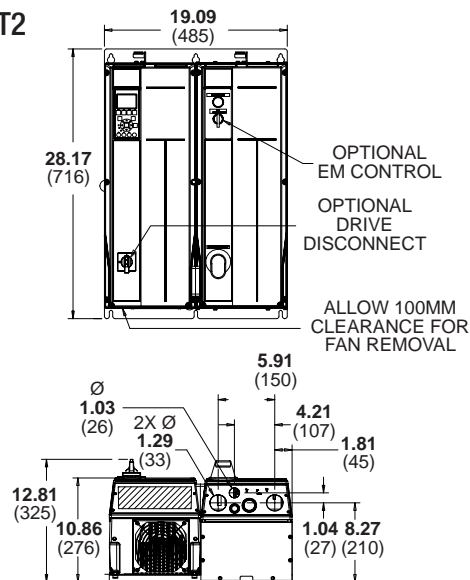
T1



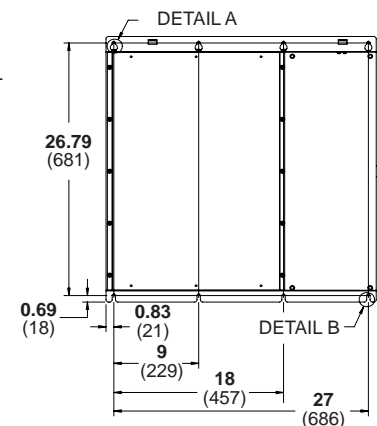
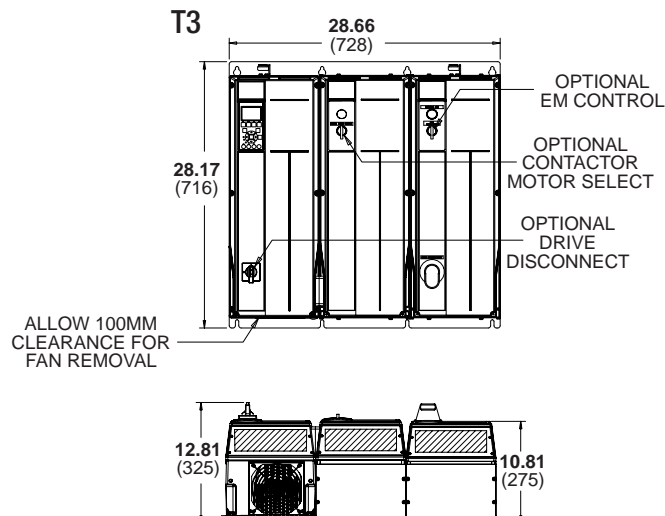
IN (MM)



T2

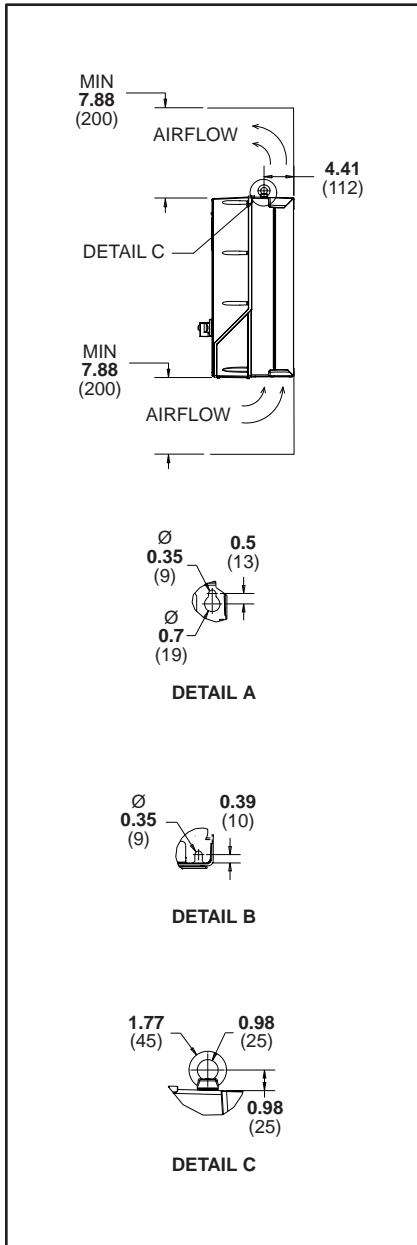


T3

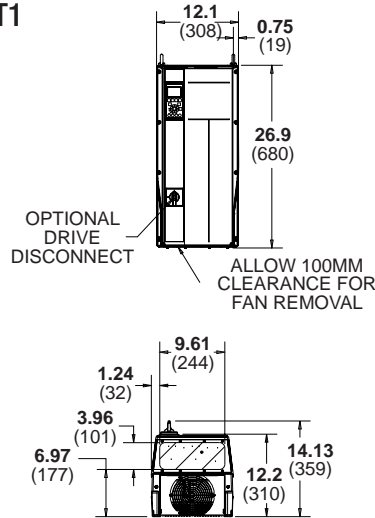


TR200 Series VFD Dimensions

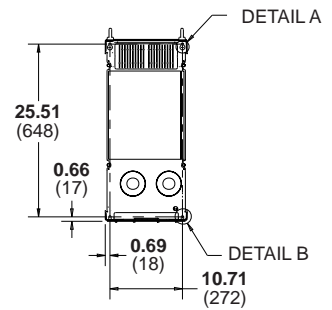
C1 Frames



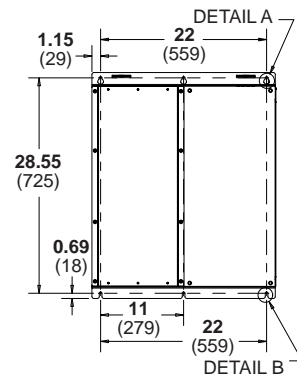
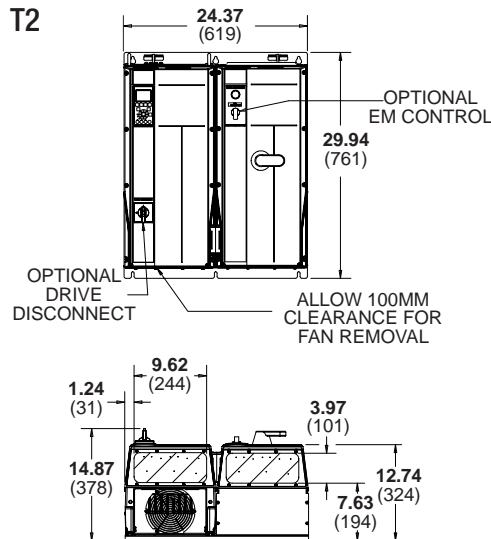
T1



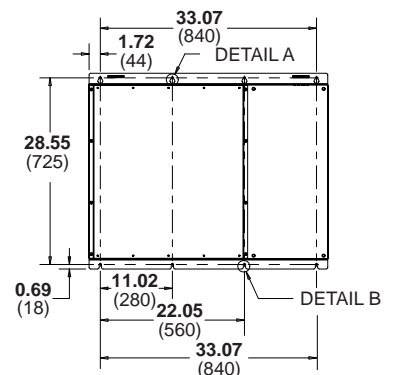
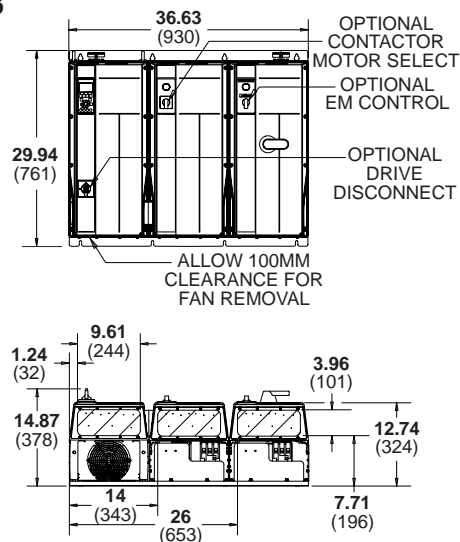
IN (MM)



T2



T3

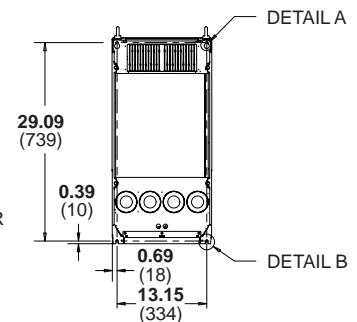
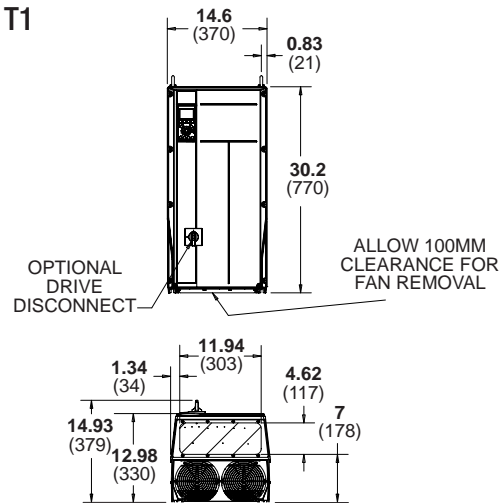


TR200 Series VFD Dimensions

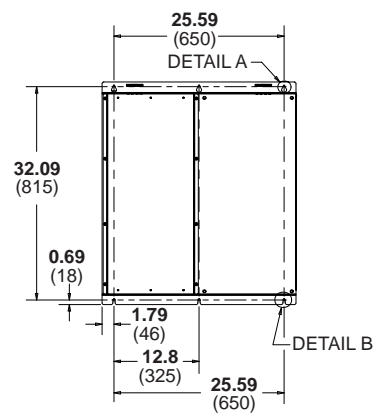
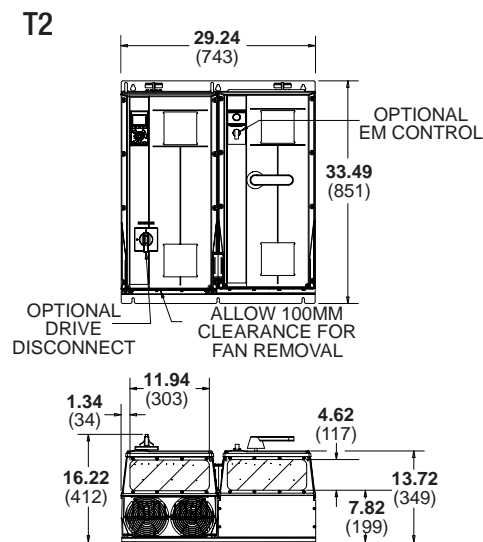
C2 Frames

IN (MM)

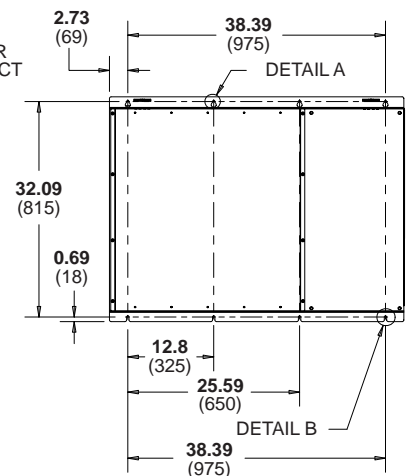
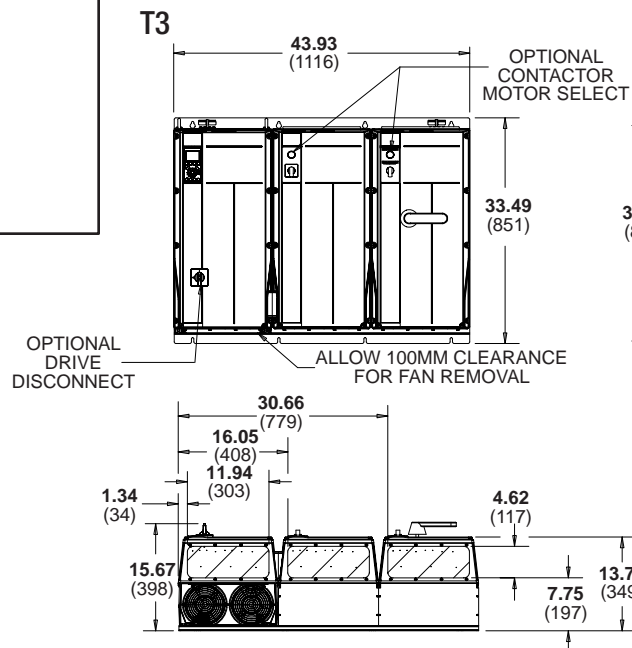
T1



T2

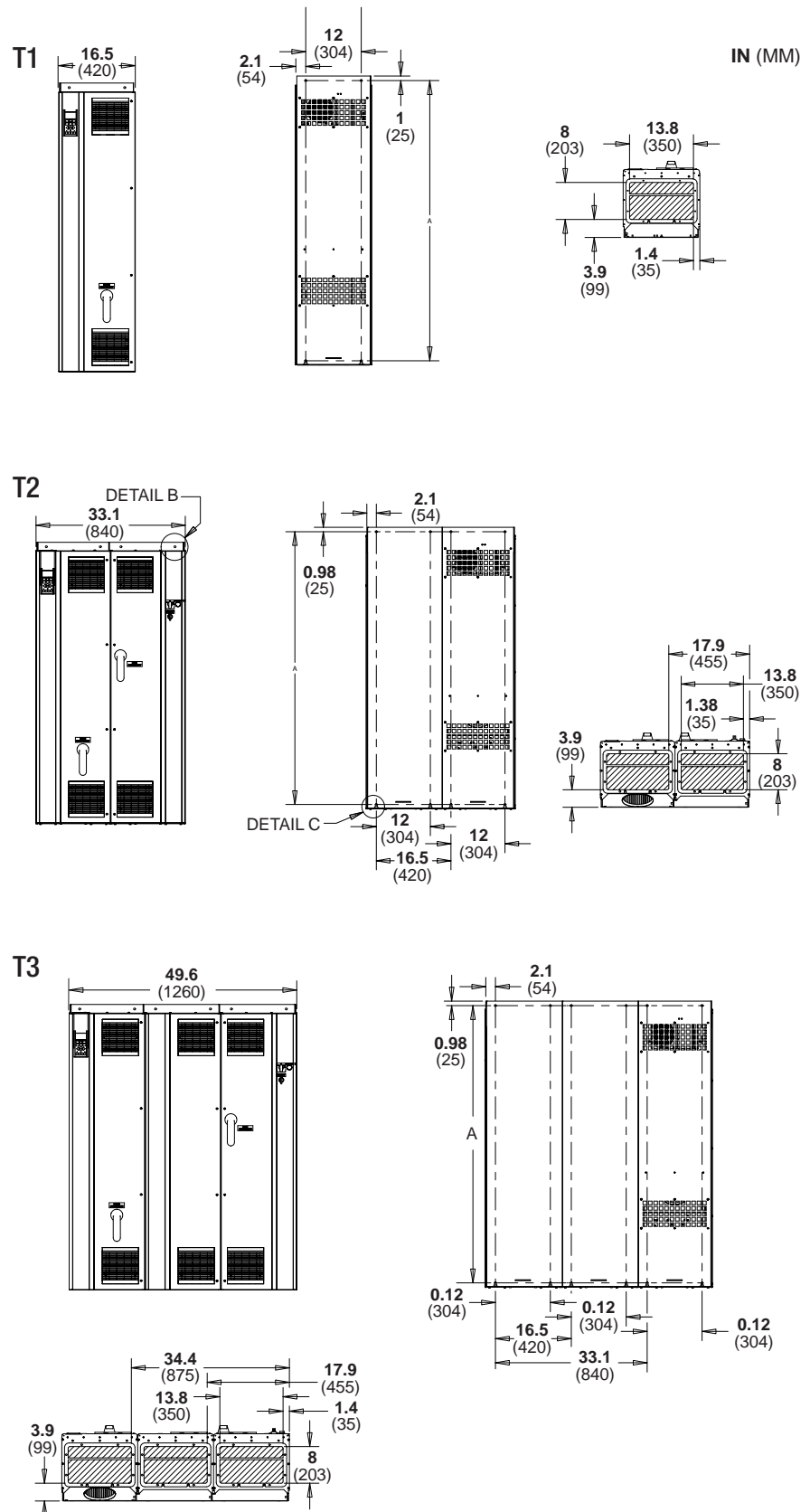
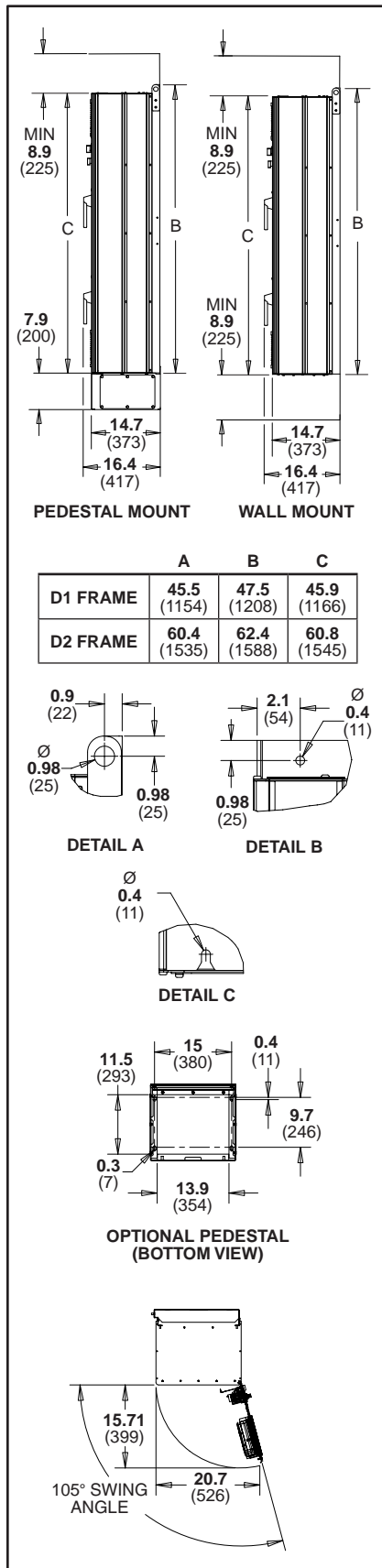


T3



TR200 Series VFD Dimensions

D Frames





TR200 Series VFD Specifications

DRIVE INPUT POWER

Input voltage, 3-phase.....	200–240, 380–460 or 525–600 VAC
Input voltage range for full output	Nominal $\pm 10\%$
Undervoltage trip point	164, 313 VAC or 394 VAC
Overvoltage trip point.....	299, 538 or 690 (792 for 100 HP and above) VAC
Input frequency	50 or 60 Hz, ± 2 Hz
Displacement power factor.....	0.98 or greater at all speeds and loads
Total power factor	0.90 or greater at full load and nominal motor speed

DRIVE OUTPUT POWER

Output frequency.....	Selectable 0 to 120 Hz
Motor voltages	200, 208, 220, 230; 380, 400, 415, 440, 460; 550 or 575 VAC
Continuous output current	100% rated current
Output current limit setting...Adjustable to 110% of drive rating	
Current limit timer	0 to 60 seconds or infinite
Adjustable max. speed.....	From min. speed setting to 120 Hz
Adjustable min. speed.....	From max. speed setting to 0 Hz
Acceleration time	To 3,600 seconds to base speed
Deceleration time	To 3,600 seconds from base speed
Breakaway torque time	0.0 to 0.5 seconds (1.6 times motor nameplate current)
Start voltage.....	0 to 10%
DC braking time	0 to 60 seconds
DC braking start	0 to maximum frequency
DC braking current.....	0 to 50% of rated motor current

PROTECTIONS

Low and high frequency warnings	0 to 120 Hz
Low and high current warnings.....	0 to maximum current
Low and high reference warnings	–999,999 to 999,999
Low and high feedback warnings.....	–999,999 to 999,999
Ground fault.....	Protected
Motor stall	Protected
Motor overtemperature	Protected (predictive motor temp.)
Motor condensation	Protected (motor preheat circuit)
Motor overload	Protected (programmable action)
Vibration protection	Protected (programming automated)

ENVIRONMENTAL LIMITS

Efficiency.....	97% or greater at full load and nominal motor speed
Ambient operating temp.	14°F to 113°F (–10°C to 45°C) frames A2–C2; 14°F to 104°F (–10°C to 40°C) frames D1–E1
Humidity	< 95%, non-condensing
Altitude: maximum without derating	3,300 ft. (1,000 m)
Drive / options enclosure(s)	NEMA/UL Types 1 or 12; 3R optional

CONTROL CONNECTIONS

Follower signal, analog input.....	2; selectable voltage or current, direct and inverse acting
Programmable digital inputs.....	6 (2 can be used as digital outputs)
Programmable analog outputs.....	1; 0/4 to 20 mA
Programmable relay outputs... 2 standard Form C 240 VAC, 2 A;	1 or 3 additional optional
Auxiliary voltage.....	+24 V DC, maximum 200 mA

CONTROL OPTIONAL

MCB 101 General Purpose I/O.....	3 DI, 2 DO, 2 AI (voltage) and 1 AO (current)
MCB 105 Relay Card	3 standard Form C 240 VAC, 2 A
MCB 107 24V DC Supply	Allows external 24 V DC power to be connected to the TR200 Drive
MCB 115 Programmable I/O	Available 2nd half of 2009

SOFTWARE

Lost speed reference action	Selectable to go to a preset speed, max. speed, last speed, stop, turn off, or stop and trip
Time delay for lost speed reference action	1 to 99 seconds
Adjustable auto restart time delay	0 to 600 seconds
Automatic restart attempts	0 to 20 or infinite
Automatic restart time delay ...	0 to 600 sec. between attempts
Relay ON delay and relay OFF delay	0 to 600 seconds
Maximum number of preset speeds	16
Maximum number of frequency stepovers	4
Maximum stepover width	100 Hz
Maximum number of accel rates	4
Maximum number of decel rates.....	4
Delayed start	0 to 120 seconds

Just as important as what's in your VFD...



...is what's behind it

And behind every Trane Variable Frequency Drive you will find a world leader in HVAC equipment, controls and services. Whether pre-installed on Trane equipment, field applied or retrofit, the Trane TR Series VFD comes with the most important feature of all—our proven capabilities throughout the life of your facilities.

We have a dedicated team of professionals located at over 150 local offices in the U.S. and Canada and a network of over 200 parts centers to get you what you want, when you need it. To learn more about our drives and what's behind them, visit www.trane.com/vfd.



Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.Trane.com.