TRANE TR200 Drive

Installation

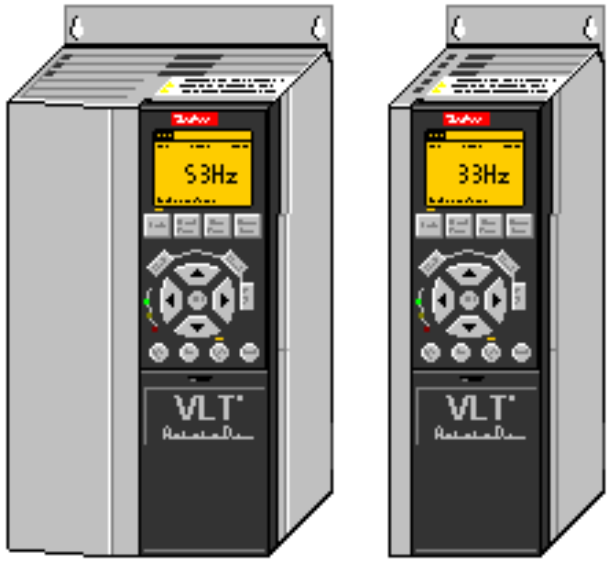
Objectives

Student will be able to:

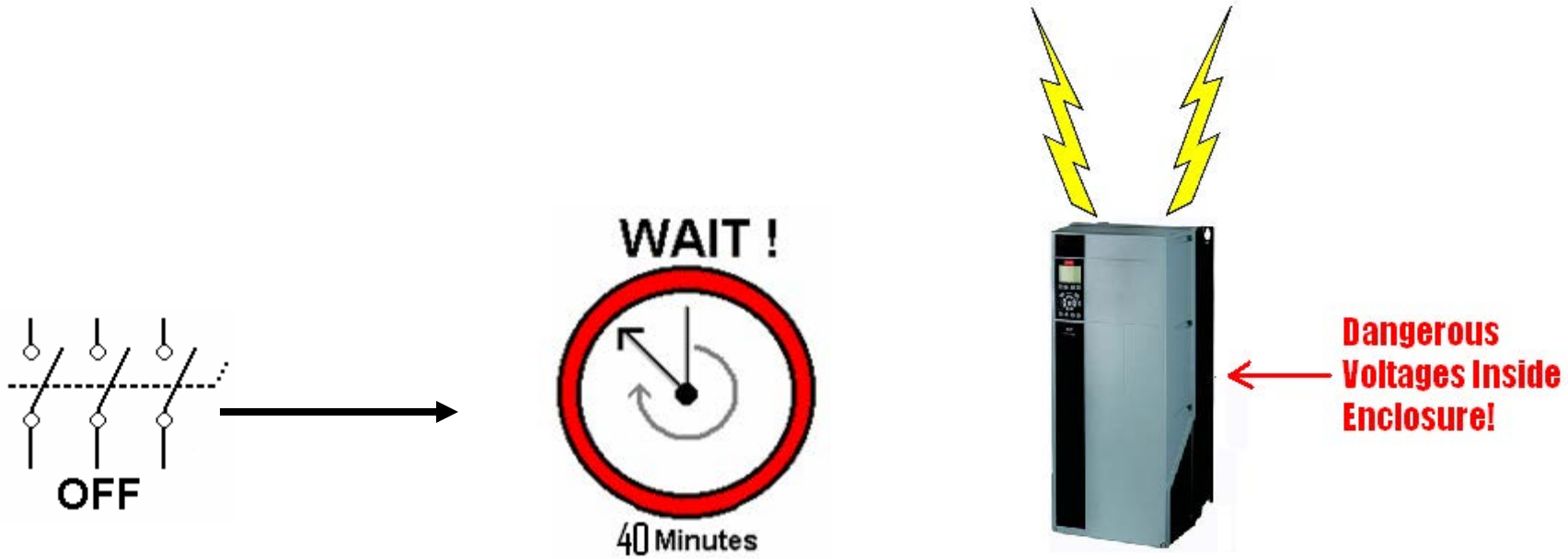
- Identify the reference material needed for an installation and where that material may be found
- Perform the necessary pre installation checks
- Interpret the drive nameplate label & string code
- Identify any environmental concerns prior to an installation
- Perform a proper physical drive installation
- Display proper wiring practices associated with a VFD installation

Trane TR200 Installation Topics

- Safety
- Pre-Installation Checks
- Reference Material
- Installation
- General Wiring



DANGER



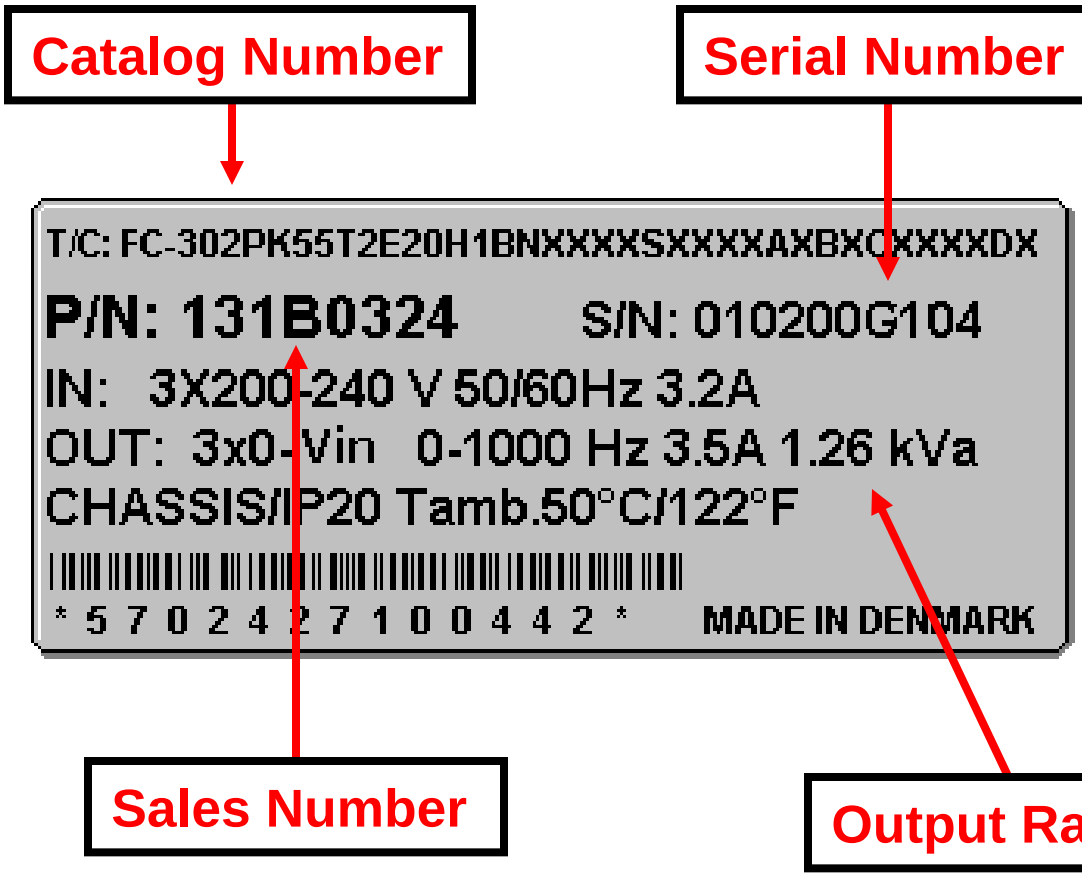
Touching the electrical parts may be fatal — even after the equipment has been disconnected from the AC line. To be sure that the capacitors have fully discharged, you may have to wait ***up to*** 40 minutes.

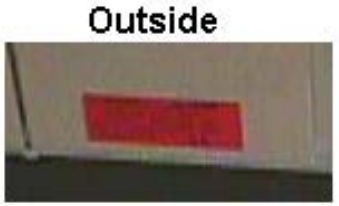
Pre-Installation Checks

- Drive nameplate information
- Visual inspection
- Remove IM and kits from box
- Proper handling
- Check **incoming power**, **drive** and **motor** that they are the same voltage range
- Record motor nameplate data
- Ensure that drive can handle the maximum motor current
- Ensure all tools and accessories are available

Pre-Installation Checks

Drive nameplate and information



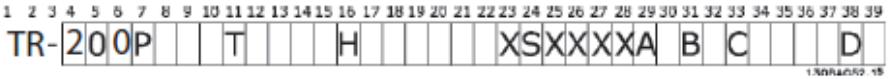


Pre-Installation Checks

TRANE TR200

Ordering String Code

Type Code String low and medium power

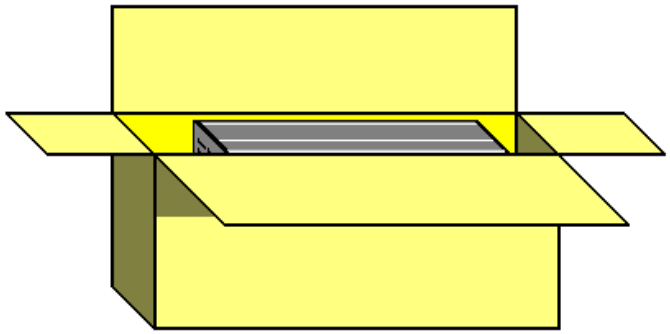


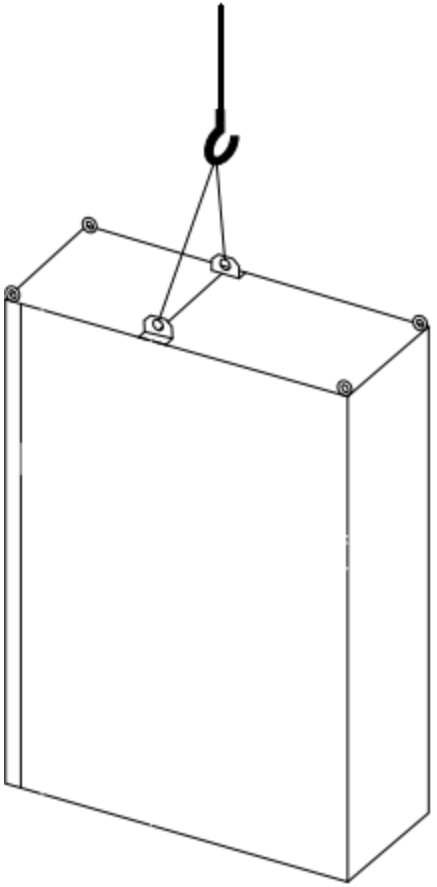
Description	Pos	Possible choice
Product group & FC Series	1-6	TR-200
Power rating	8-10	1.1- 1200 kW (P1K1 - P1M2)
Number of phases	11	Three phases (T)
Mains voltage	11-12	T 2: 200-240 VAC T 4: 380-480 VAC
Enclosure	13-15	E20: IP20 E21: IP 21/NEMA Type 1 E55: IP 55/NEMA Type 12 E66: IP66 P21: IP21/NEMA Type 1 w/backplate P55: IP55/NEMA Type 12 w/backplate
RFI filter	16-17	H1: RFI filter class A1/B H2: RFI filter class A2 H3: RFI filter class A1/B (reduced cable length) Hx: No RFI filter
Brake	18	X: No brake chopper included
Display	19	G: Graphical Local Control Panel (keypad) X: No Local Control Panel
Coating PCB	20	X. No coated PCB C: Coated PCB
Mains option	21	X: No Mains disconnect switch and Load Sharing 1: With Mains disconnect switch (IP55 only) 8: Mains disconnect and Load Sharing D: Load Sharing See Chapter 8 for max. cable sizes.
Adaptation	22	X: Standard 0: European metric thread in cable entries.
Adaptation	23	Reserved
Software release	24-27	Actual software
Software language	28	
A options	29-30	AX: No options A4: MCA 104 DeviceNet AF: MCA 115 LonWorks AE: MCA 116 BACnet gateway
B options	31-32	BX: No option BK: MCB 101 General purpose I/O option BP: MCB 105 Relay option
C0 options MCO	33-34	CX: No options
C1 options	35	X: No options
C option software	36-37	XX: Standard software
D options	38-39	DX: No option D0: DC back-up

Pre-Installation Checks

Inspection and Handling

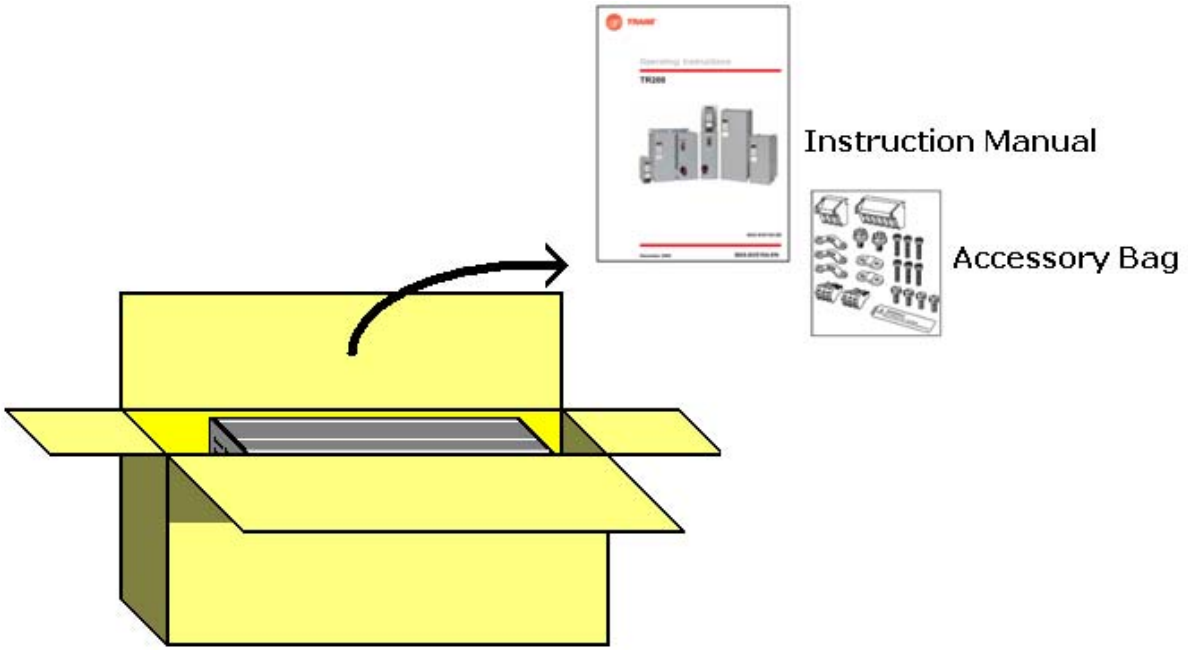
- Immediately make a visual inspection for damage to the drive
- Have proper equipment available for safely mounting the VFD





Pre-Installation Checks

Remove the instruction manual accessory kit from the box



Reference Material

Specific instruction manual ships with each drive

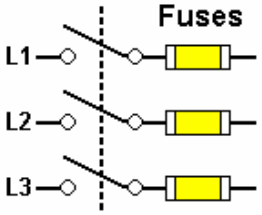
- Safety
- Mechanical Installation
- Electrical Installation
- How to Operate the Frequency Converter
- How to Program the Frequency Converter
- Parameter Lists
- Troubleshooting
- Technical Specifications

Information is also available at

http://www.trane.com/Commercial/Dna/View.aspx?i=2262

Pre-Installation Checks

- Be sure the **line power**, **VFD** & **motor** have same voltage range

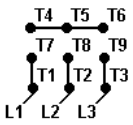
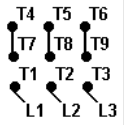


Line Power	Drive	AC Motor
200-240 VAC	T2 200-240 VAC	230 VAC
380-480 VAC	T4 380-480 VAC	460 VAC
380-500 VAC	T5 380-500 VAC	480 VAC

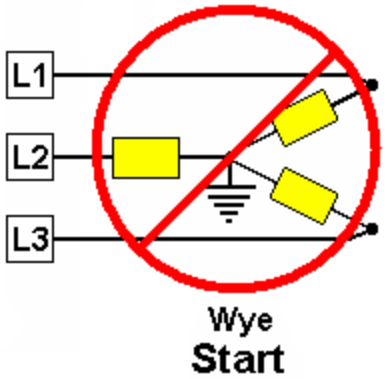
Pre-Installation Checks

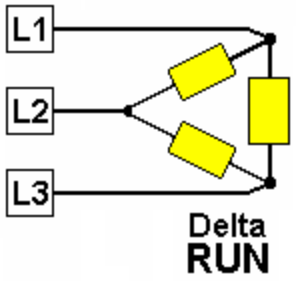
- Record motor data information
  - Motor Power, Voltage, Frequency, Current (FLA) and Speed (RPM)
  - Motor power factor may help, but is not necessary

- Check Motor Wiring
  - No power correction capacitors between drive and motor
  - 2-speed motors must be wired for full speed
  - Part-winding start motors, must be wired for run

Frame 326T	Type P	Design B	Identification No. 1234567890	
HP20	Volts 230/460		Hz 60	Phase 3
RPM 1770	Amps 50/29		S.F. 1.15	Code F
Amb. 40°C	Duty Cont.		Encl. TEFC	Ins.Class F
			Low Volts 	High Volts 
NEMA Nom. Eff. 90.2				

Motor Plate

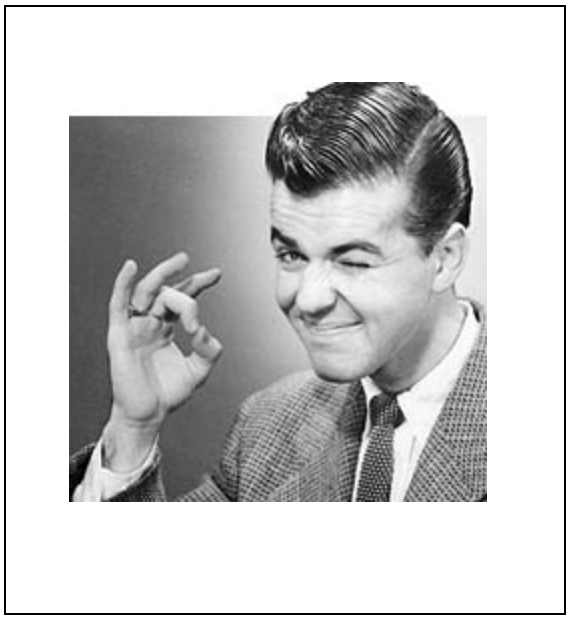


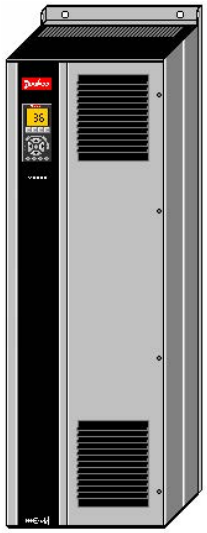


Pre-Installation Checks

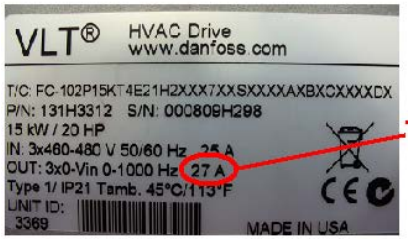
- Ensure that the drive can handle the maximum current of the motor
- VFD output current must meet or exceed sum of all connected motors FLA

Drive Output Current = 27A
Motor FLA = 26A





FLA = 26A @ 460V



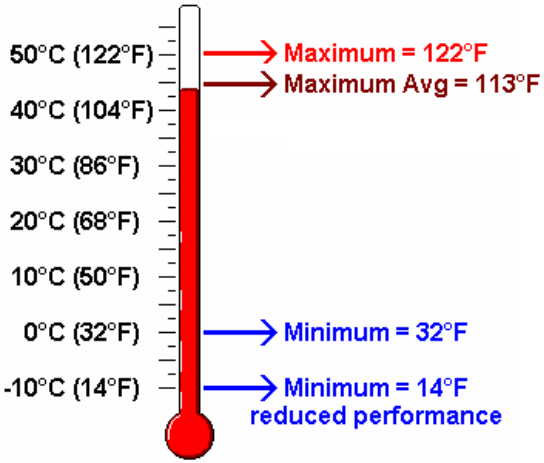
Pre-Installation Checks

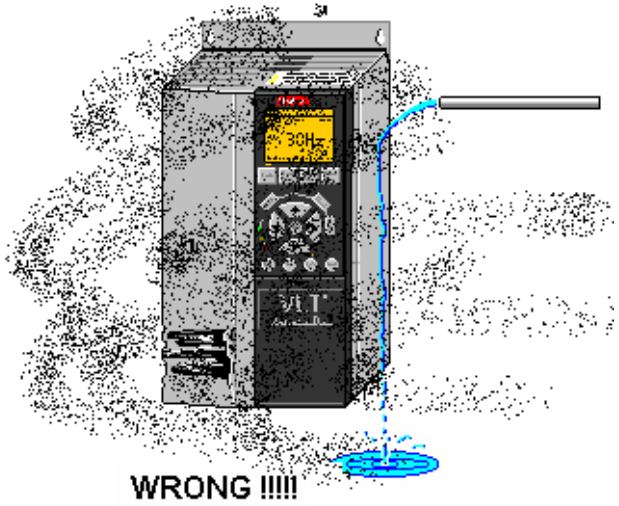
- Ensure that all hand tools, auxiliary equipment, and kits are available and ready

Installation Concerns

Environmental Concerns

- Clean and dry: 5%–95% humidity, non-condensing
- 24-hour temperature limit = 45° C (113° F)
- Maximum temperature limit = 50° C (122° F)
- Altitude limits: 1000m (3300 ft)
- Storage limits: -25° to +65° C (-13° to 149° F)

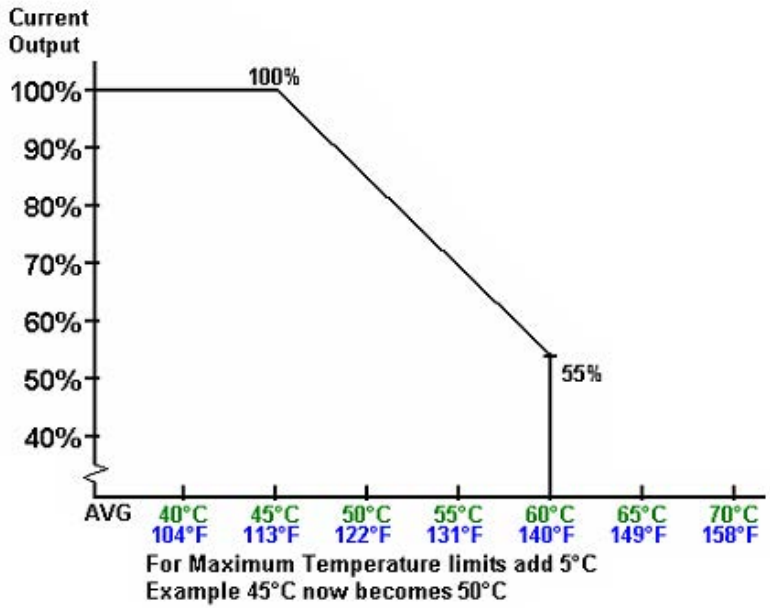


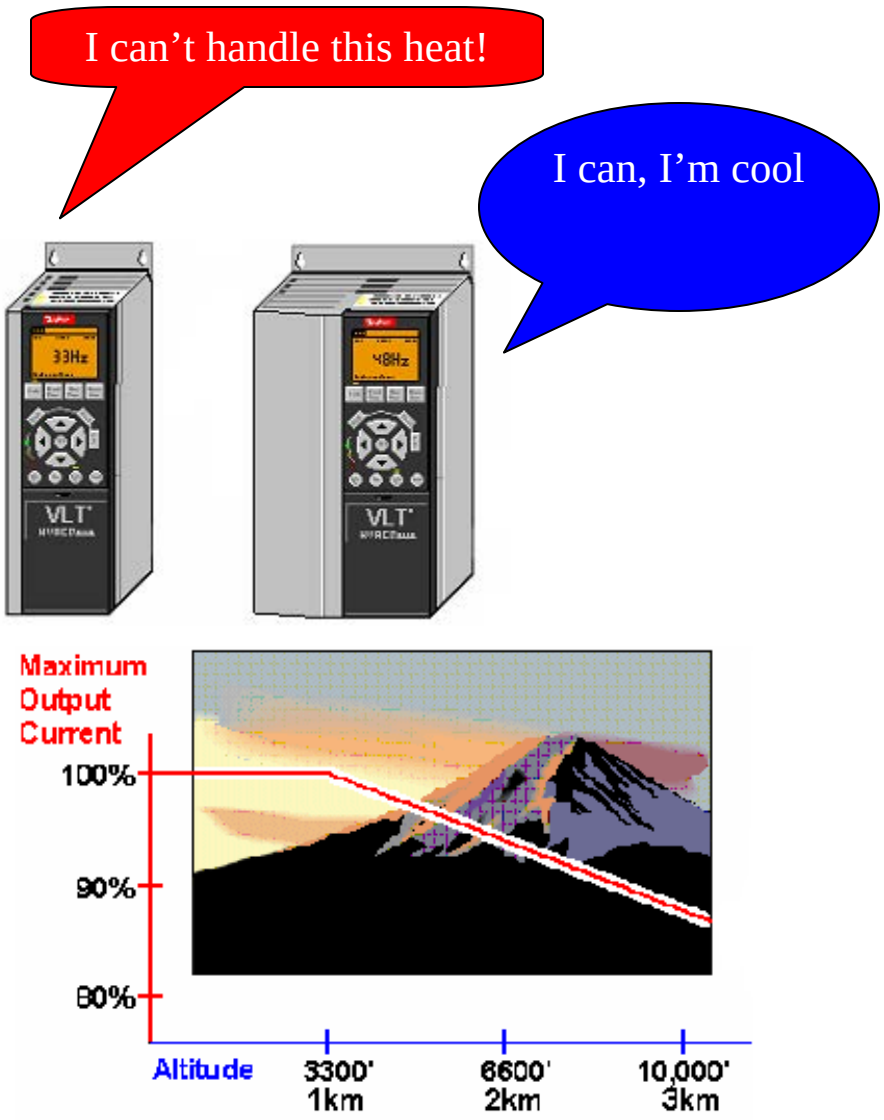


Installation Concerns

Derating

- Derate for temperature and altitude
- Increase drive size



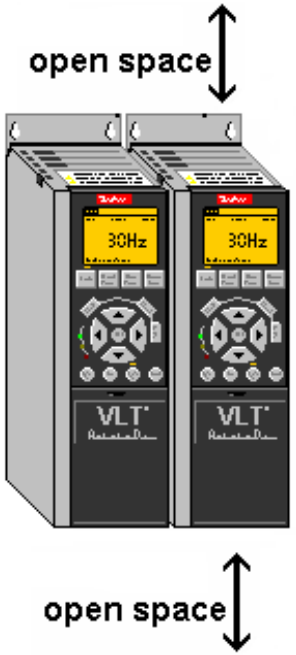


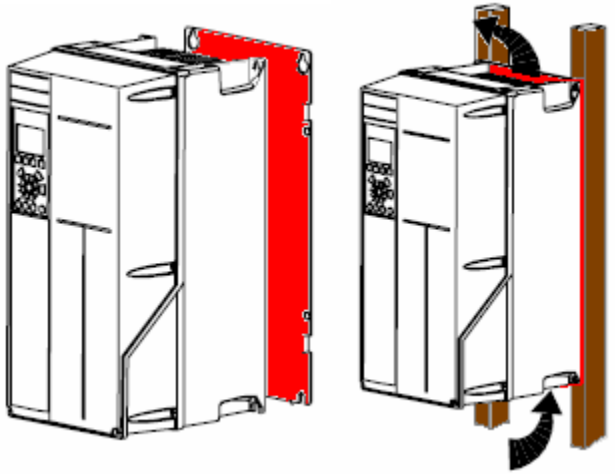
Frame Sizes (A–E)

Installation (A–C Frames)

Mounting

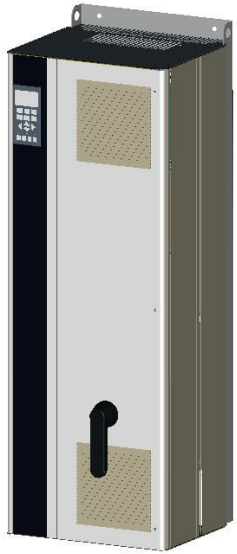
- Side-by-side is acceptable
- Vertical mounting recommended
- Needs space above and below drive (4-16 in)
- Back: flush-mounted only (A, B & C frame)



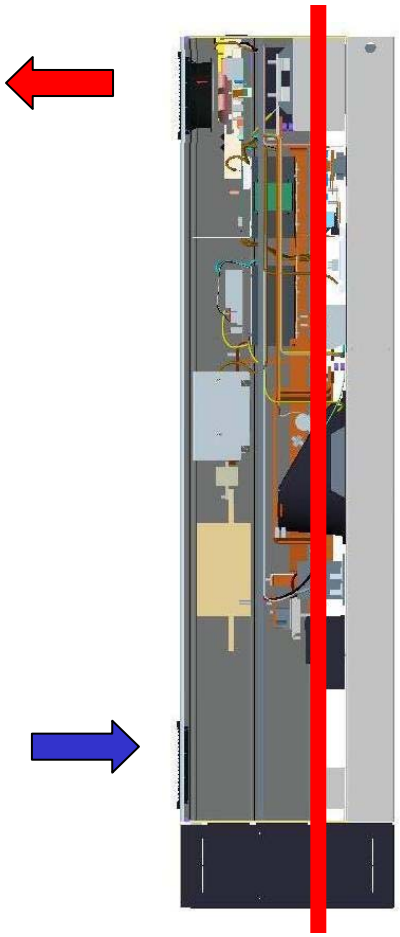


Installation (D–E Frames)

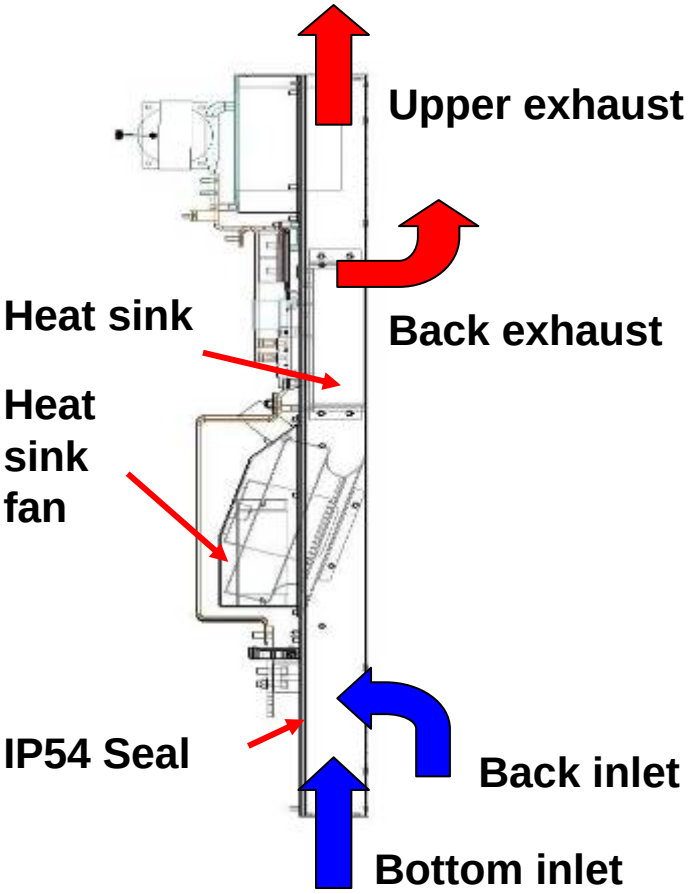
- D Frame: wall mount (floor optional)
- E Frame: floor mount
- Chassis: panel mount
- Check wall strength



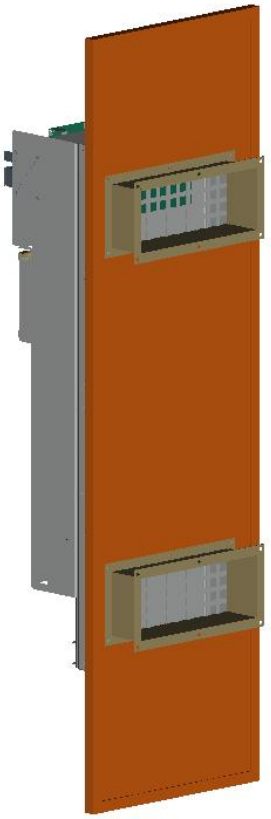
Cooling (D–E Frames)



Side view



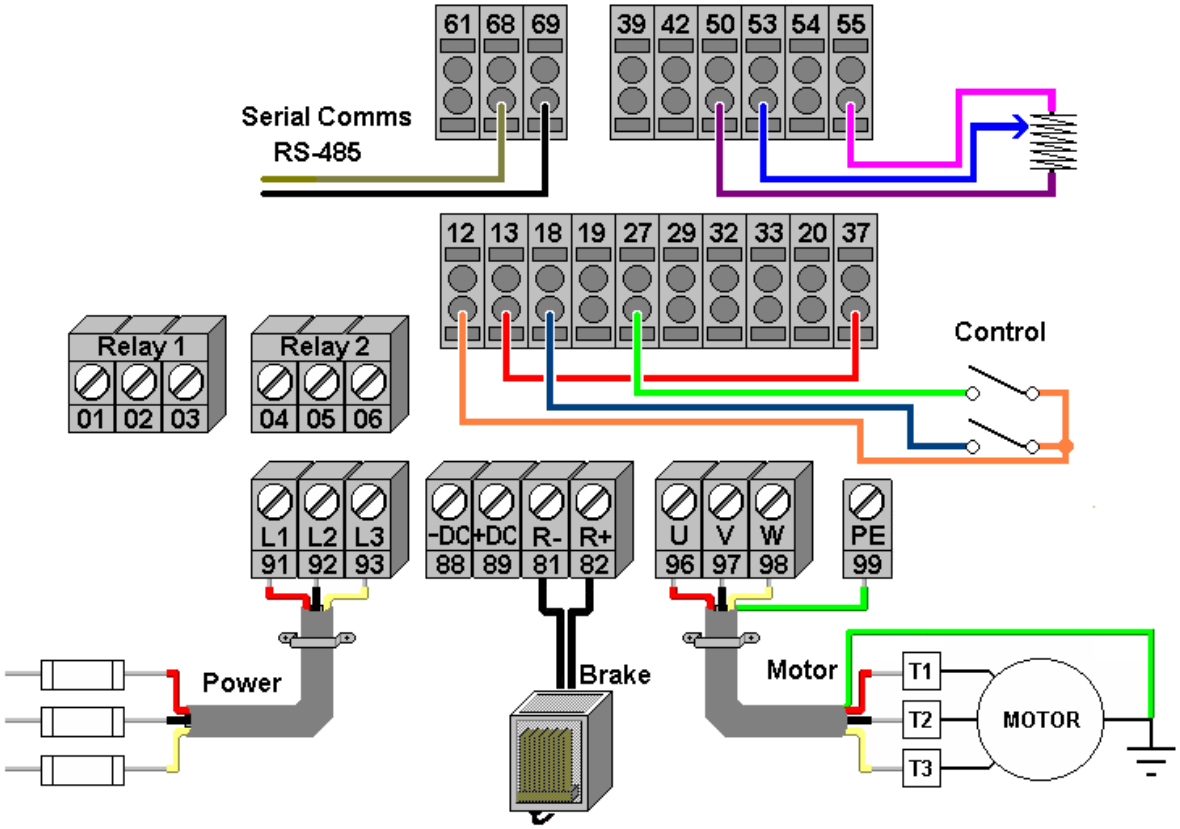
Side view



Side view

Wiring

- General Wiring
- Power Input
- Motor Output
- Control Wiring



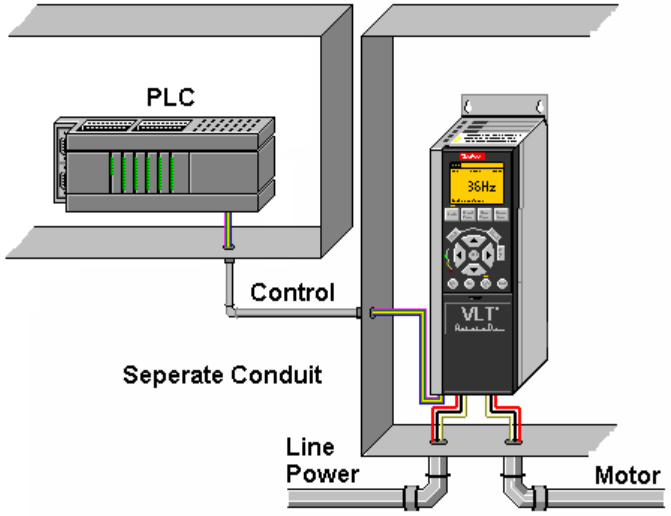
All wire gauges can be found in the Technical Data section of the instruction manual

General Wiring Practices

At least three separate METALLIC conduits (more for relays) must be connected to the drive.

- Incoming power to the drive [L1, L2, L3 & PE]
- Outgoing power to the motor [U, V, W & PE]
- Control wiring
- Check torque required for connectors

Type of Wiring	Voltage Range
Control	0 - 24 VDC
Relay	0 - 240 VAC 0 - 60 VDC
Input Power	0 - 600 VAC
Output Power	0 - 600 VAC (PWM)



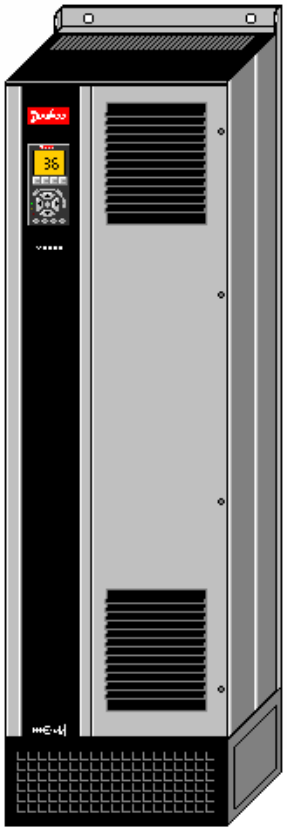
General Wiring Practices

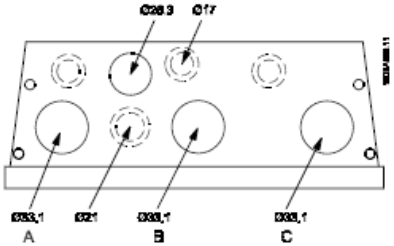
- Route control wiring in separate conduit and as far away from power wires as possible
- VFD cable has higher leakage current and reduces maximum cable length
- A dedicated ground wire is needed, Danfoss does not recommend grounding through the conduit
- Keeping wire runs as short as possible will help avoid problems

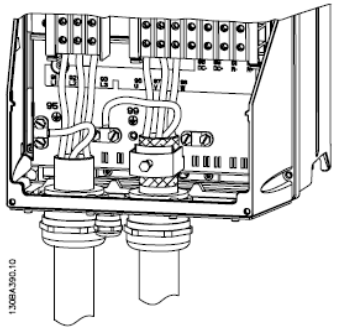
General Wiring Practices

Conduit entry

- All wiring enters the bottom of the drive
- Knock-outs are provided on many drives
- Larger drives have a removable conduit entry or gland plate



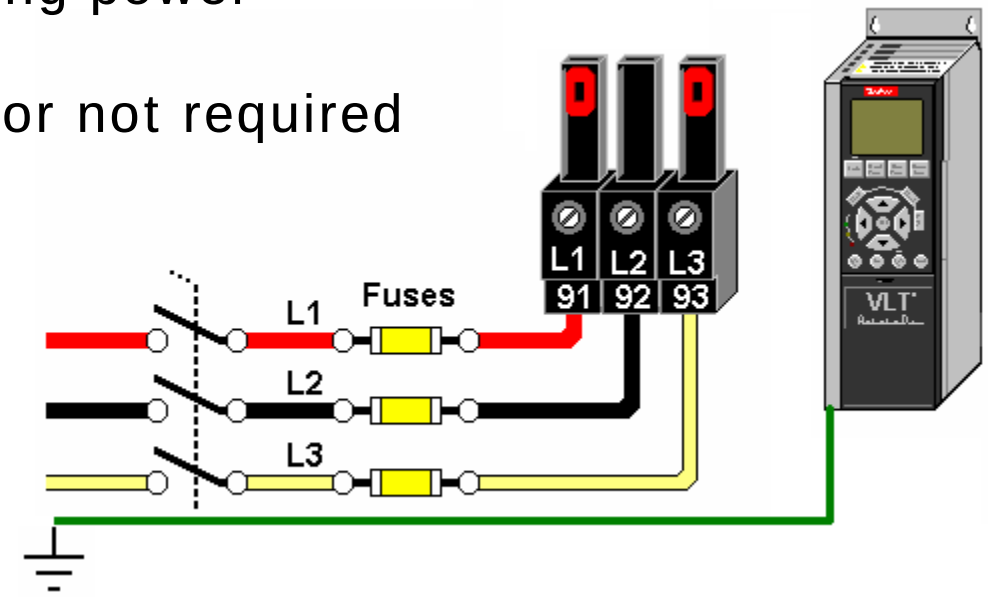




Wiring Incoming Power

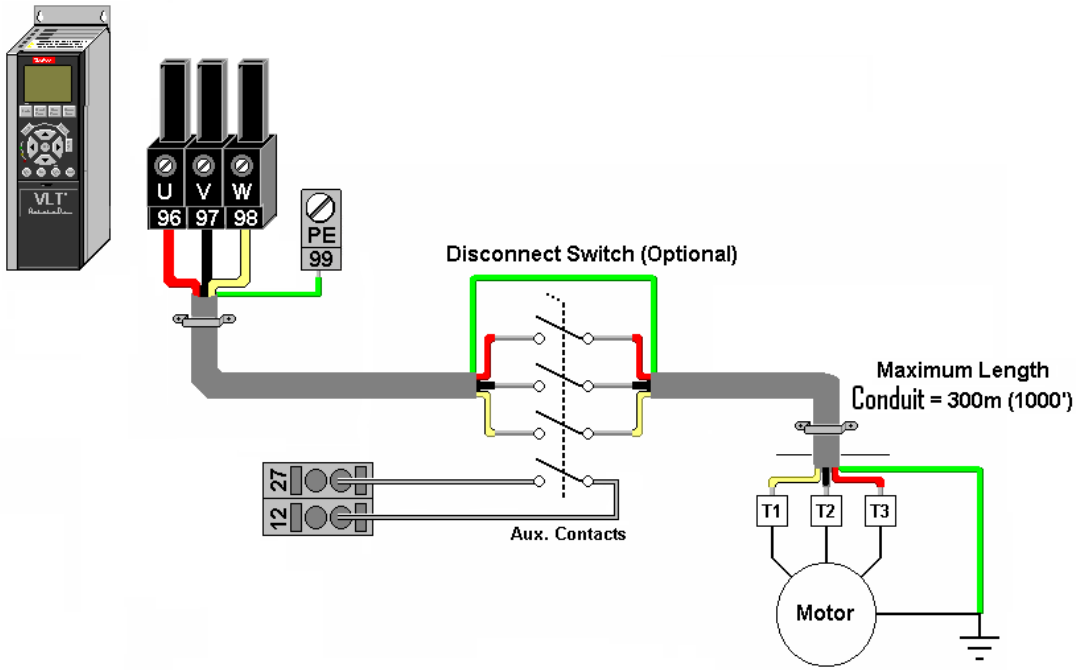
All drives must have input fuses installed in the power supply to the drive in order to meet UL standards. Refer to the instruction manual for fuse sizing.

- Terminals 91(L1), 92(L2) and 93(L3) are always used for incoming power
- Input line reactor not required



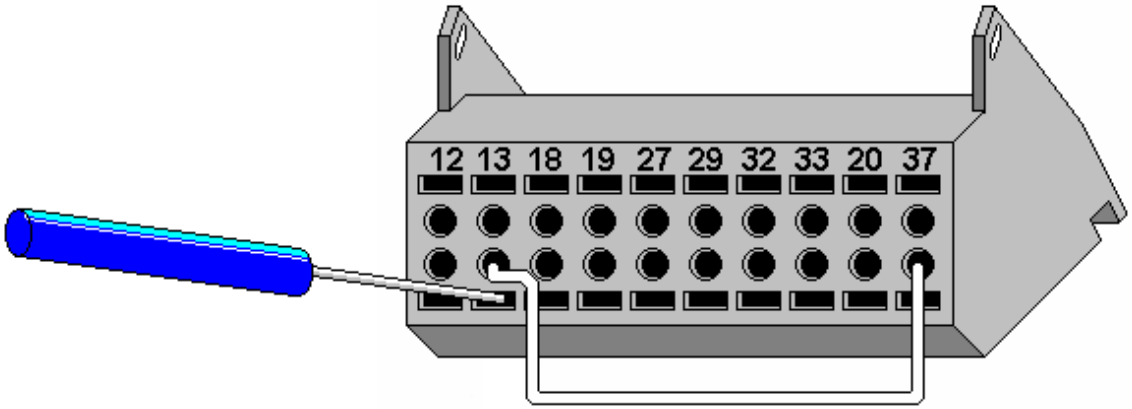
Wiring Motor Output

- Use terminals 96 (U), 97 (V) & 98 (W)
- Check maximum motor length; example: FC-302 is 300m (1000’)
- Disconnect OK
- Be aware that order determines direction
- Be careful not to hook line power to drive’s output terminals!



Wiring Control

- Maximum voltage to control card is 24 VDC
- Screwdriver opens terminal to release wire
- Never run control (low voltage) with high voltage wiring
- Only connect control wiring shield at one end



This concludes this training module. Please proceed to the startup module which covers applications in more detail.

If you have any comments or questions, please contact:

Technical Support

Danfoss Drives

4401 N. Bell School Rd

Loves Park, Illinois 61111 USA

phone: (800) 432-6367 or (815) 639-8600

Review Questions

1. What is the first thing that you should do when receiving the drive?

2. Where can the drive's data label be found? How is the "sales number" on the label created?

Review Questions

3. True or false?

   It is acceptable to use a 460 volt drive to run a motor that is wired for 230 volts.

4. Name two places that information can be found to assist you with an installation.

Review Questions

5. Where can the “Motor Data” that will be programmed into the drive be found?

6. Name some things that need to be taken into consideration prior to installation.

Review Questions

7. True or false?
   Side by side mounting is acceptable.

8. True or false?
   Danfoss drives require no space above and below them.

Review Questions

9. Where does the power and control wiring enter the drive?

10. Which terminals are used to connect the input voltage and which ones for the motor output?

Review Questions

11. Why are circuit breakers unacceptable on the drive's input?

Review Question Answers

1) Check for any damage to the drive

2) The data label can be found on the box, or the drive itself. The sales number is created from the catalog number

3) False: The line voltage, motor voltage and drive voltage range must all match one another

4) The instruction manual and online at Danfoss.com

5) It is found on the motor nameplate

6) Clean and dry environment, Altitude, ambient temperature, adequate mounting space, proper tools and equipment

Review Question Answers

7) True, no space is required between mounted drives

8) False, space is needed and specifics can be found in the instruction manual

9) All the wiring enters at the bottom of the drive

10) Terminals (91-92-93) for the live power and (96-97-98) for the motor

11) Circuit breakers react too slow and the drive could suffer unnecessary damage