

■ Contents

Introduction to VLT 2800	3
Software version	3
High voltage warning	4
These rules concern your safety.	4
Warning against unintended start	4
Installation	6
Mechanical dimensions	6
Mechanical installation	10
General information about electrical installation	11
EMC-correct electrical installation	12
Grounding of shielded/armored control cables	13
Diagram	14
Electrical installation	15
Safety clamp	17
Prefuses	17
AC line connection	17
Motor connection	18
Direction of motor rotation	19
Motor thermal protection	19
Parallel connection of motors	19
Motor cables	19
Brake connection	20
Ground connection	20
Load sharing	20
Tightening Torque, Power Terminals	21
Calculation of brake resistance	21
Access to control terminals	21
Electrical installation, control circuitry	21
Tightening torques, control cables	22
Electrical installation, control terminals	22
Relay connection	23
VLT Software Dialog	23
Connection examples	24
Control unit	26
Manual initialization	26
Automatic motor tuning	27
Display readout	29
Hand Auto	29
Warnings/alarms	30
Special conditions	31
Temperature-related switching frequency	31
Derating for long motor cables	31

VLT 2800 start-up	31
Programming	33
Operation & Display	33
Load and Motor	41
References & Limits	52
Inputs and Outputs	59
Special functions	69
Enhanced Sleep Mode	79
Serial communication	84
Technical functions	93
All about VLT 2800	98
Warnings/alarm messages	98
Warning words, extended status words and alarmwords	102
Special conditions	103
Extreme environments	103
Galvanic Isolation (PELV)	103
UL Standard	104
General technical data	105
Technical data, mains supply 1 x 220 - 240 V/3 x 200-240V	110
Technical data, mains supply 3 x 380 - 480 V	111
Available literature	112
Supplied with the unit	112

VLT 2800
Instruction Manual
Software version: 3.1x



This Design Guide can be used for all VLT 2800 series adjustable frequency drives with software version 3.1x. The software version number is indicated in parameter 640.



Warning

It can be extremely dangerous to touch the electrical parts, even when the line supply has been disconnected. Also ensure that other voltage inputs are disconnected from load sharing through the DC bus. Wait at least 4 minutes after the input power has been removed before servicing the drive.

■ High voltage warning

The voltage of the frequency converter is dangerous whenever the converter is connected to mains. Incorrect fitting of the motor or frequency converter may cause damage to the equipment, serious injury or death. Consequently, it is essential to comply with the instructions in this manual as well as local and national rules and safety regulations.



The Protective Extra Low Voltage (PELV) requirements stated in IEC 61800-5-1 are not fulfilled at altitudes above 2000 m (6562 ft.). For 200V frequency converters the requirements are not fulfilled at altitudes above 5000 m (16 404 ft.). Please contact Danfoss Drives for further information.

■ These rules concern your safety.

1. The adjustable frequency drive must be disconnected from AC line if repair work is to be carried out. Ensure that the line supply has been disconnected and that the prescribed time has passed before removing motor and AC line plugs.
2. The [STOP/RESET] key on the control panel of the adjustable frequency drive does not disconnect the equipment from line power and is therefore not to be used as a safety switch.
3. The unit must be properly grounded, the user must be protected against the supply voltage, and the motor must be protected against overloading in accordance with prevailing national and local regulations.
4. The ground leakage currents are higher than 3.5 mA.
5. Protection against motor overload is not included in the factory setting. If this function is required, set parameter 128 *Motor thermal protection* to data value *ETR trip* or data value *ETR warning*. For the North American market: The ETR functions provide overload protec-

tion of the motor, class 20, in accordance with NEC.

6. Do not remove either the plugs for the motor or line supply while the adjustable frequency drive is connected to line power. Ensure that the line supply has been disconnected and that the prescribed time has passed before removing motor and AC line plugs.
7. Note that the adjustable frequency drive has more voltage inputs than L1, L2 and L3 when the DC bus terminals are used. Check that all voltage inputs are disconnected and that the prescribed time has passed before repair work is commenced.

■ Warning against unintended start

1. The motor can be brought to a stop by means of digital commands, bus commands, references or a local stop, while the frequency converter is connected to mains. If personal safety considerations make it necessary to ensure that no unintended start occurs, these stop functions are not sufficient.
2. While parameters are being changed, the motor may start. Consequently, the stop key [STOP/RESET] must always be activated, following which data can be modified.
3. A motor that has been stopped may start if faults occur in the electronics of the frequency converter, or if a temporary overload or a fault in the supply mains or the motor connection ceases.

■ Motor overload protection

The electronic thermal relay (ETR) in UL listed VLTs provides Class 20 motor overload protection in accordance with the NEC in single motor applications when parameter 128 is set for "ETR TRIP" and pa-

parameter 105 *Motor current* is set for the rated motor current.

**Warning**

It can be extremely dangerous to touch the electrical parts, even when the line supply has been disconnected. Also ensure that other voltage inputs are disconnected from load sharing through the DC bus. Wait at least 4 minutes after the input power has been removed before servicing the drive.

VLT® 2800 Series

■ Mechanical dimensions

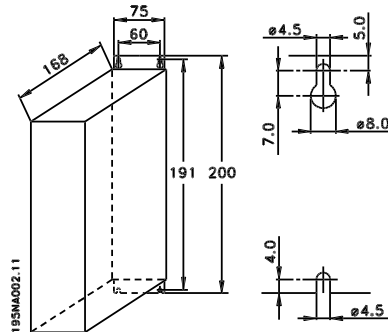
The drawings below describe the mechanical dimensions. All dimensions are given in mm.



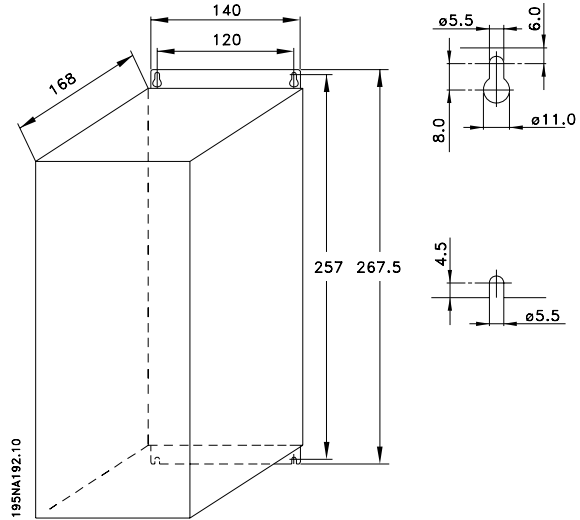
NOTE

Please note that all filter options must be vertically mounted.

VLT 2803-2815 200-240 Volt VLT 2805-2815 380-480 Volt

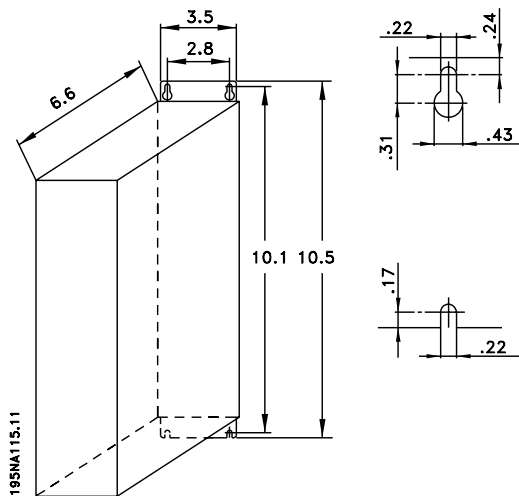


VLT 2822 220 - 240 V, PD2 VLT 2840 200 - 240 Volt VLT 2855-2875 380 - 480 Volt

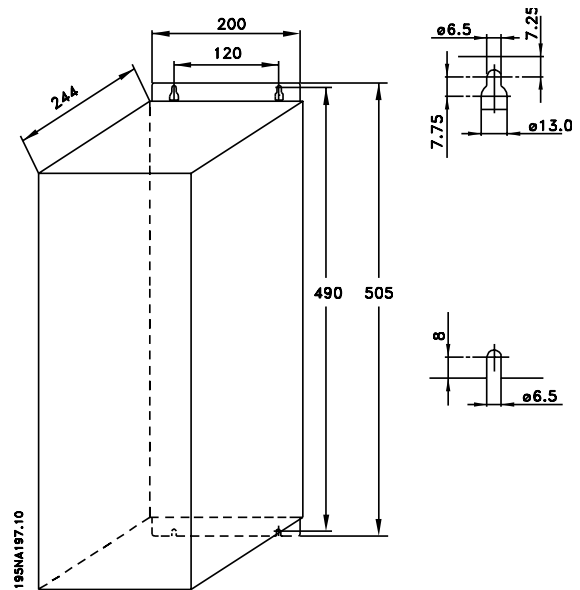


The drawing below gives the mechanical dimensions of VLT 2822 (3 HP) 200-240 Volts and VLT 2822-2840 (3 - 5 HP) 380-480 Volts. All dimensions are in inches.

VLT 2822 200-240 Volt VLT 2822-2840 380-480 Volt

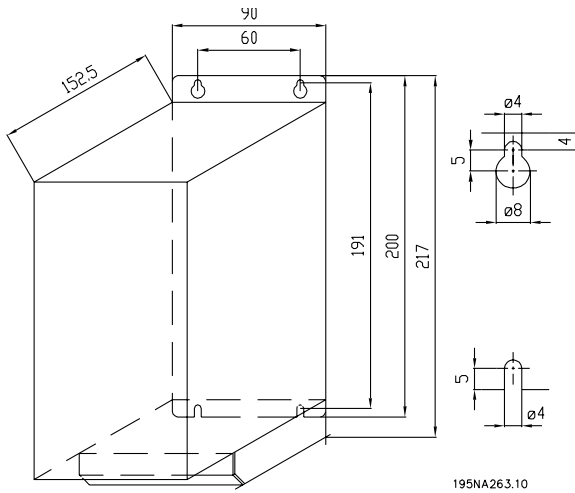


VLT 2840 220 - 240 V, PD2 VLT 2880-82 380 - 480 V



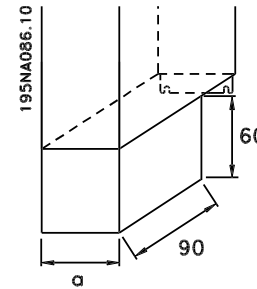
VLT® 2800 Series

■ Motor coils (195N3110)

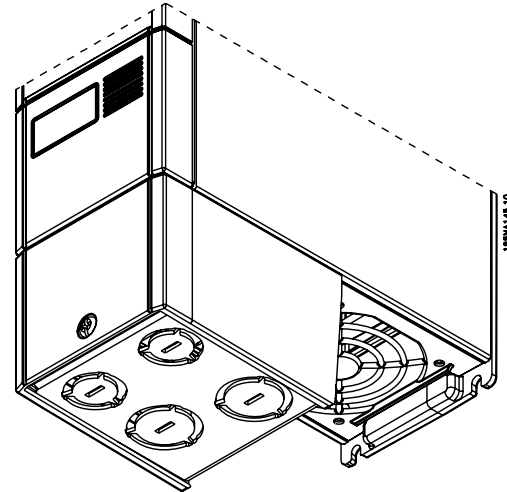
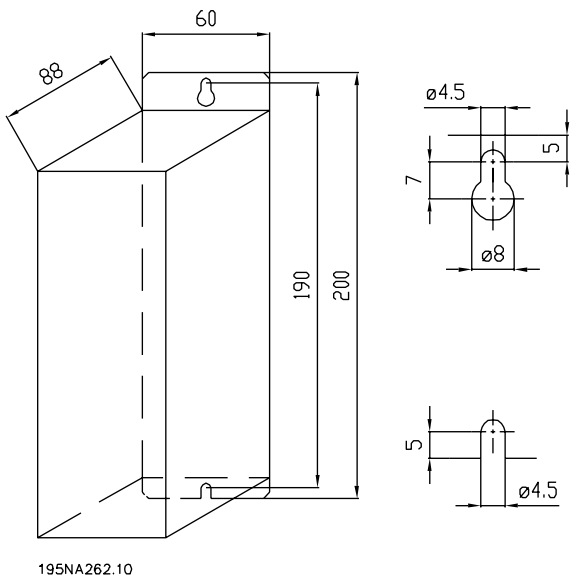


■ Terminal cover

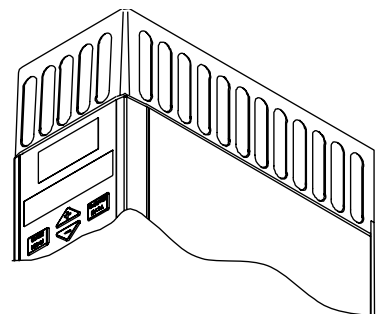
The drawing below gives the dimensions for NEMA 1 terminal covers for VLT 2803-2875. Dimension 'a' depends on the unit type.



■ RFI 1B filter (195N3103)

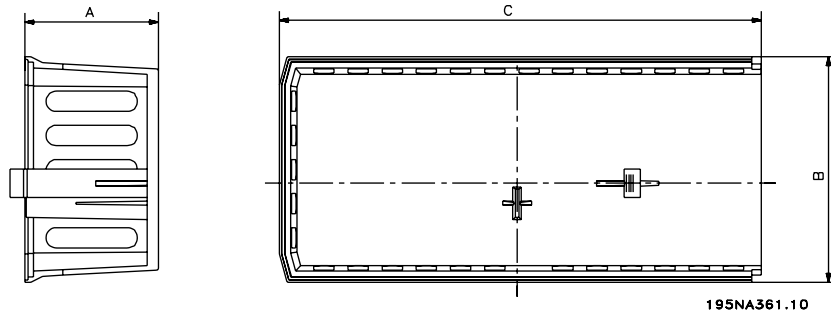


■ IP 21 solution



Installation

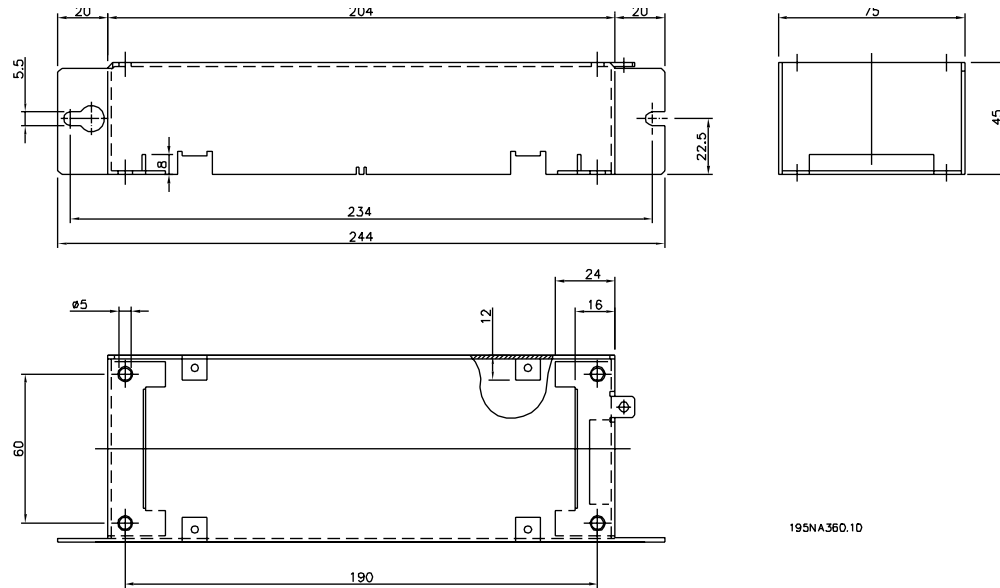
VLT® 2800 Series



Dimensions

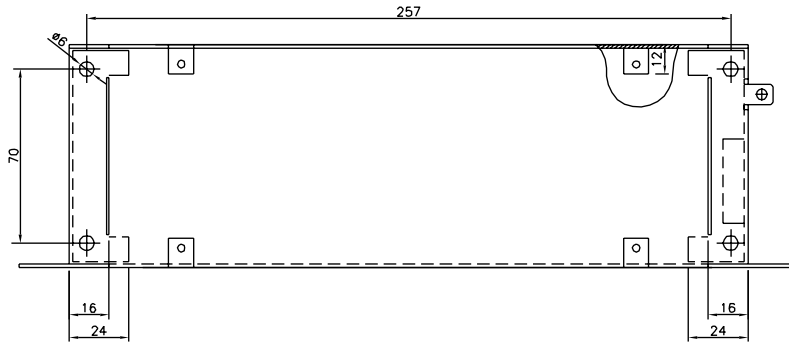
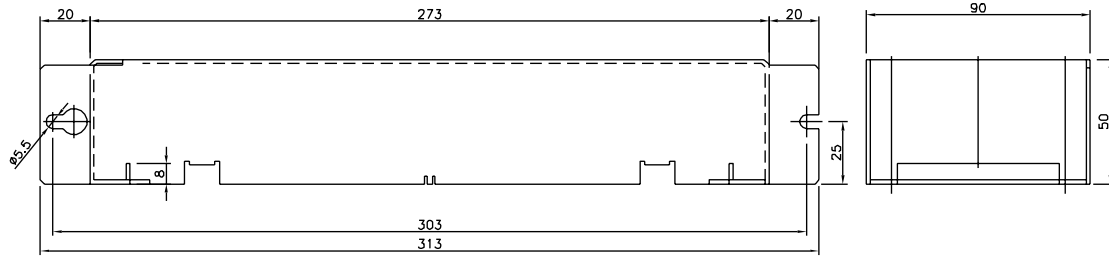
Type	Code number	A	B	C
VLT 2803-2815 200-240 V, VLT 2805-2815 380-480 V	195N2118	47	80	170
VLT 2822 200-240 V, VLT 2822-2840 380-480 V	195N2119	47	95	170
VLT 2840 200-240 V, VLT 2822 PD2, TR1 2855-2875 380-480 V	195N2120	47	145	170
TR1 2880-2882 380-480 V, VLT 2840 PD2	195N2126	47	205	245

■ EMC filter for long motor cables



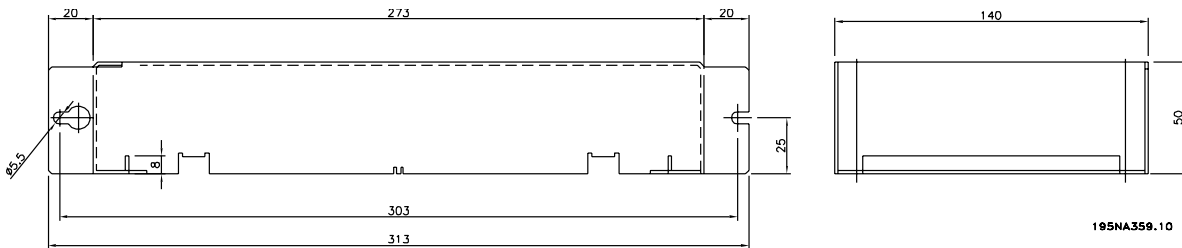
192H4719

VLT® 2800 Series

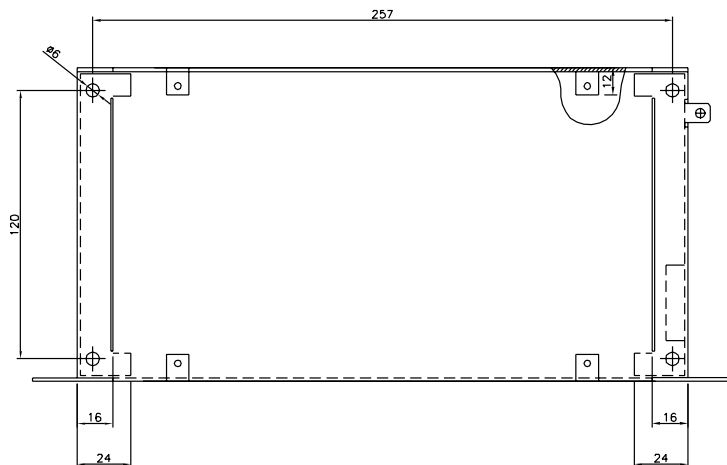


195NA358.10

192H4720



195NA359.10



192H4893

Installation

VLT® 2800 Series

■ Mechanical installation

The adjustable frequency drive is cooled by air circulation. For proper cooling, allow a minimum of 4 inches (100 mm) of open space above and below the unit. To protect the unit from overheating, ensure that both the ambient temperature and the 24-hour average temperature are not exceeded. The maximum temperature and 24-hour average are listed in *General technical data* in this manual. If the ambient temperature is in the range of 113°F - 131°F (45°C - 55°C), derating of the drive must be carried out. See *Derating for ambient temperature* in this manual. The service life of the unit will be reduced without applicable derating.



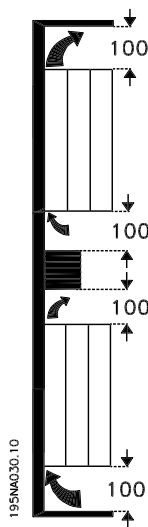
The requirements that apply to enclosures and remote mounting must be complied with to avoid serious injury or equipment damage, especially when installing large units.

■ Enclosures

In the USA and some other countries, a NEMA 1 terminal cover enclosing terminal connectors is required if the drive is not installed within another enclosure.

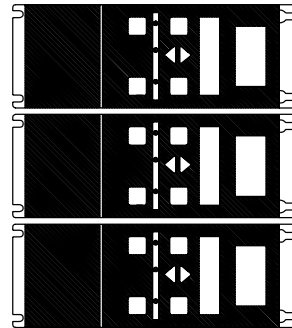
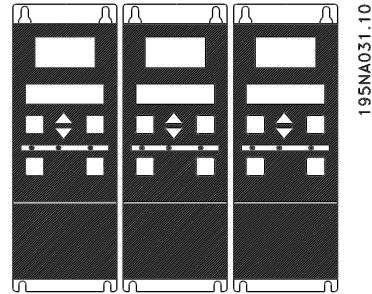
■ Spacing for mechanical installation

All units require a minimum of 4 in of air from other components above and below the enclosure.



■ Side-by-side

All VLT 2800 units can be installed side-by-side and in any position, as the units do not require ventilation on the side.



195NA0147.10



NOTE

With the IP 21 solution all units require a minimum of 4 in air on each side. This means that side-by-side mounting is not allowed.

■ General information about electrical installation

■ High voltage warning



The voltage of the adjustable frequency drive is dangerous whenever the drive is connected to the AC line. Incorrect installation of the motor or drive may cause damage to the equipment, serious injury or death. Comply with the safety instructions in this manual as well as local and national rules and safety regulations. Touching electrical parts may be fatal - even after the equipment has been disconnected from the AC line. Wait at least 4 minutes for current to dissipate.



NOTE

It is the responsibility of the user or installer to ensure correct grounding and protection in accordance with national and local standards.

■ High voltage test

A high voltage test can be performed by short-circuiting terminals U, V, W, L1, L2 and L3, and applying a max. of 2,160 V DC in 1 sec. between this short-circuit and terminal 95.



Do not perform a high voltage test between the control terminals and the chassis, because the voltage potential of the control card cannot exceed approximately 100 volts with respect to chassis due to a voltage limiting circuitry. The terminals are protected against direct hazardous access through barriers.

■ Earthing

Comply with the following at installation:

- Safety earthing: The drive has a high leakage current and must be earthed properly for safety. Follow all local safety regulations.
- High frequency earthing: Keep earthing connections as short as possible.

Connect all earthing SYSTEMS to ensure the lowest possible conductor impedance. The lowest possible conductor impedance is achieved by keeping the conductor as short as possible and by grounding with the greatest possible surface area. If multiple drives are installed in a cabinet, the cabinet backplate, which must be made of metal, should be used as a joint earth reference plate. The drives must be fitted to the backplate at the lowest possible impedance.

To achieve low impedance, connect the drive to the backplate with the drive fastening bolts. Remove all paint from the contact points.

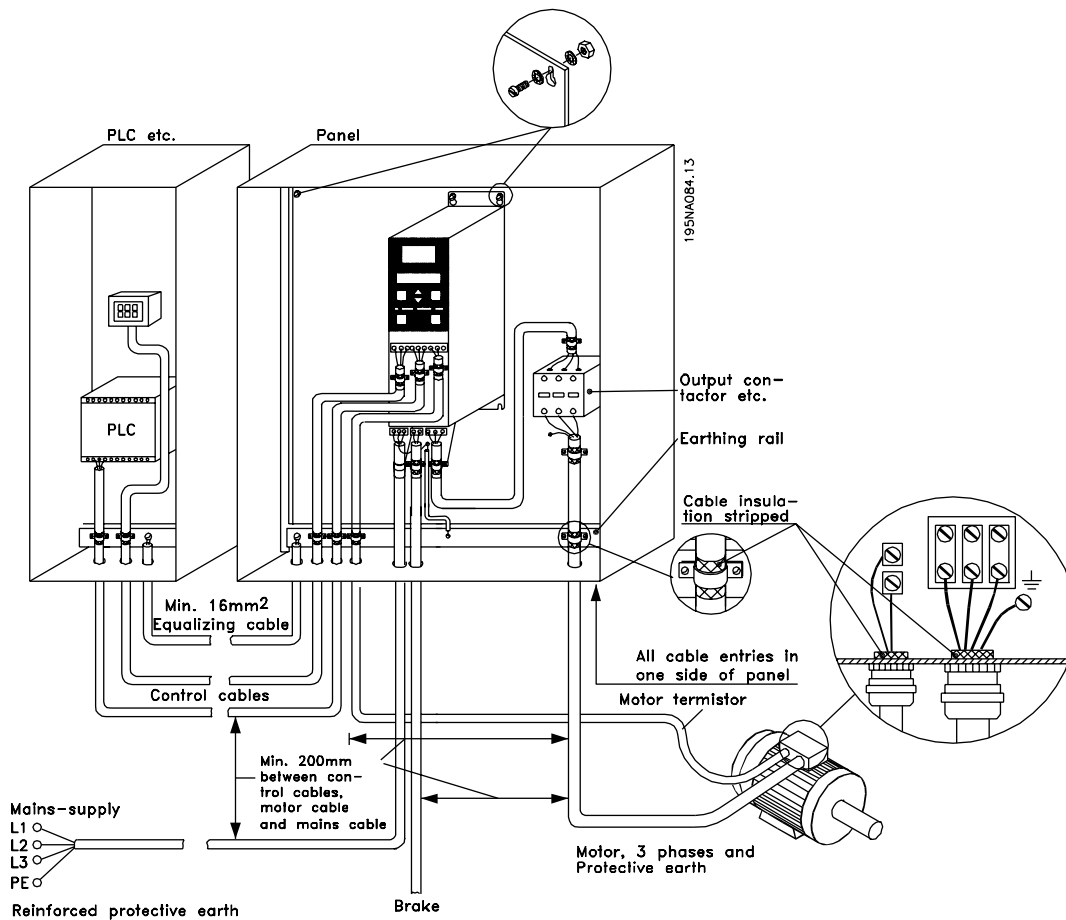
VLT® 2800 Series

■ EMC-correct electrical installation

General points to be observed to ensure EMC-correct electrical installation.

- Use only shielded/armoured motor cables and shielded/armoured control cables.
- Connect the screen to ground at both ends.
- Avoid installation with twisted shield ends (pigtailed), since this ruins the shielding effect at high frequencies. Use cable clamps instead.
- It is important to ensure good electrical contact from the installation plate through the installation screws to the metal cabinet of the variable frequency drive.
- Use starwashers and galvanically conductive installation plates.
- Do not use unshielded/unarmoured motor cables in the installation cabinets.

The illustration below shows EMC-correct electrical installation, in which the variable frequency drive has been fitted in an installation cabinet and connected to a PLC.



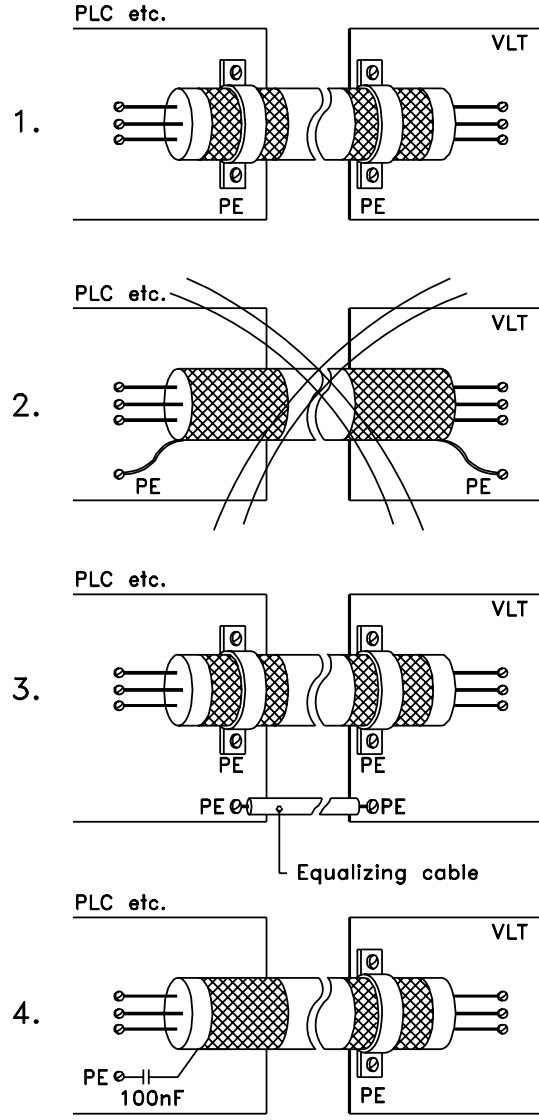
VLT® 2800 Series

■ **Grounding of shielded/armored control cables**

In general, control cables must be shielded/armored, and the shield must be connected to the unit's metal cabinet with a cable clamp at each end.

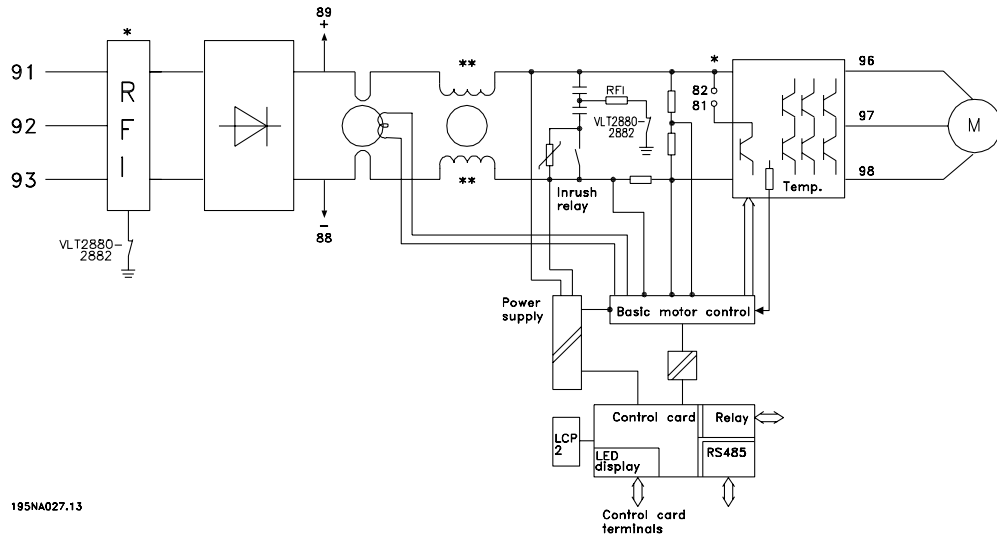
The drawing below shows the correct way to perform the grounding, and what to do when in doubt.

1. **Correct grounding**
Control cables and cables for serial communication must be attached with cable clamps at both ends to ensure the maximum possible electrical contact.
2. **Incorrect grounding**
Do not use twisted shield ends that are plaited together (pigtailed), as these increase shield impedance at higher frequencies.
3. **Protection with respect to ground potential between the PLC and VLT**
If the ground potential between the VLT adjustable frequency drive and the PLC, etc. is different, electric noise may occur that will disturb the whole system. This problem can be solved by fitting an equalizing cable next to the control cable. Minimum cable cross-section: 0.025 in² [16 mm²].
4. **In the event of a 50/60 Hz ground loop**
If very long control cables are used, 50/60 Hz ground loops can arise, and these can interfere with the whole system. This problem is resolved by attaching one end of the shield to the ground via a 100 nF capacitor (short pin length).



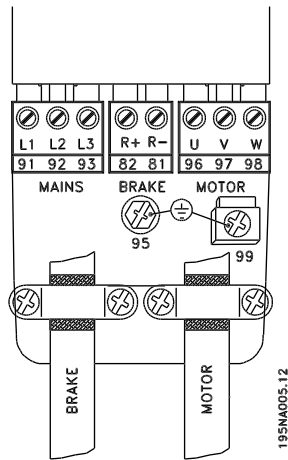
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■ Diagram

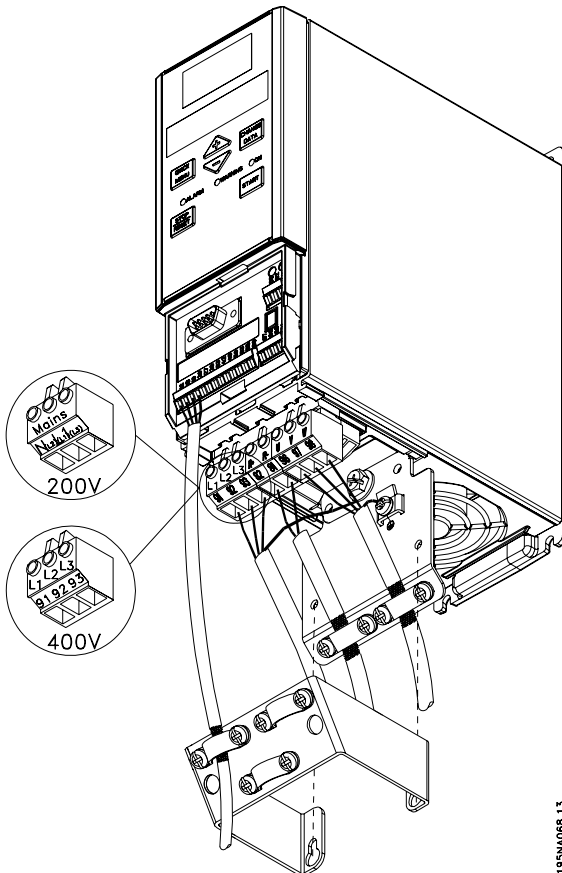


- * Integrated 1A RFI filter and brake is an option.
- ** VLT 2803-2815 200-240 V is not supplied with intermediate circuit coils.

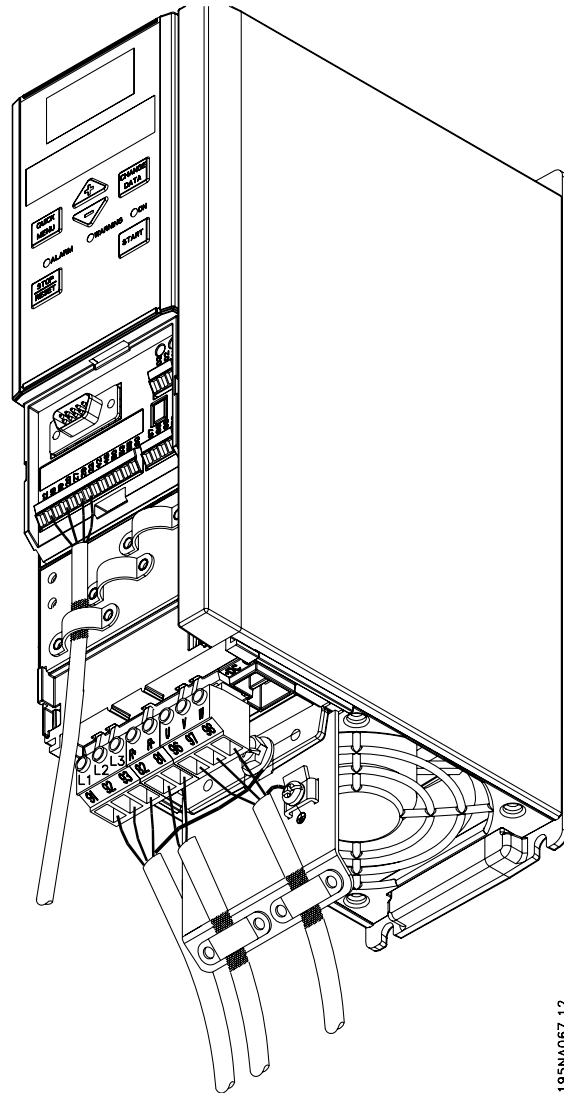
■ Electrical installation



See also the section Brake Connection.

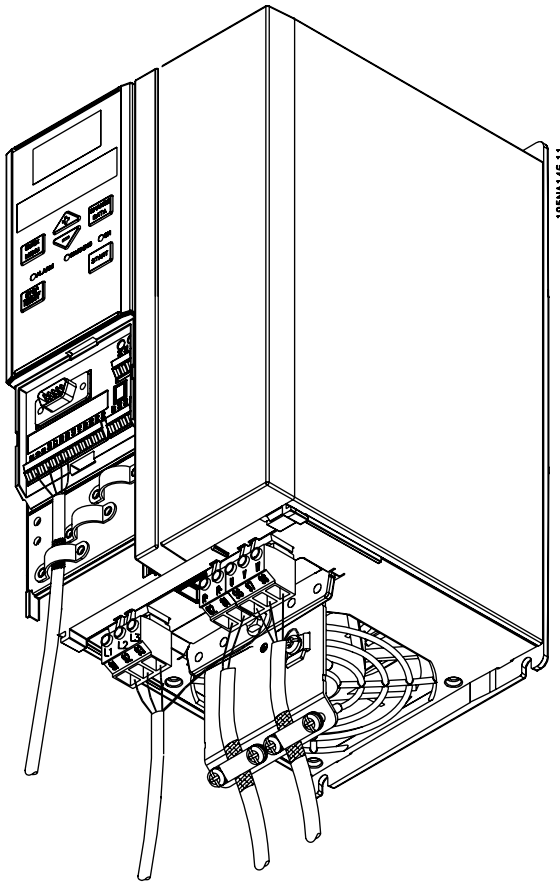


VLT 2803-2815 200-240 V, 2805-2815 380-480 V

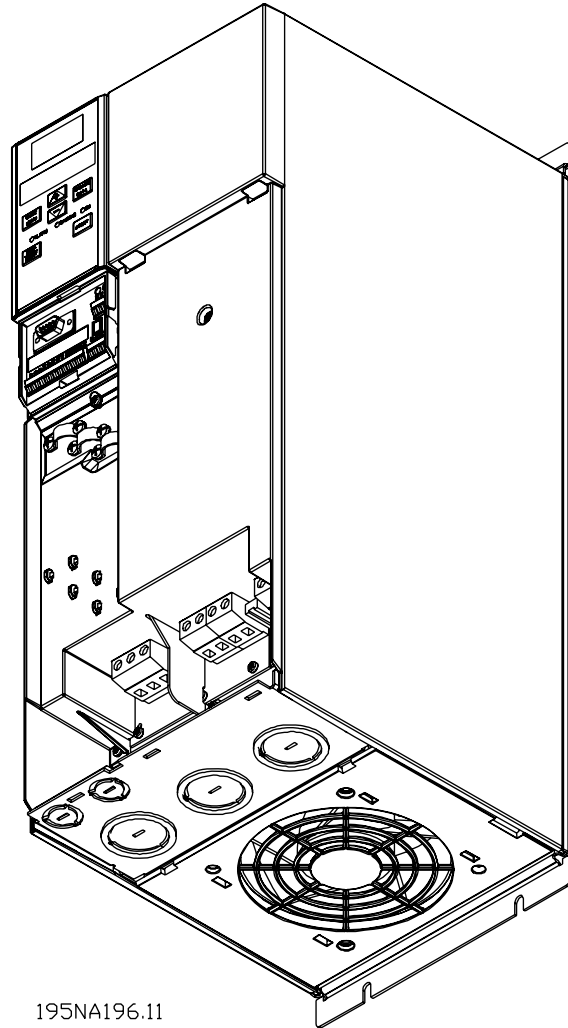


VLT 2822 200-240 V, 2822-2840 380-480 V

VLT® 2800 Series



VLT 2840 200-240 V, VLT 2822 PD2, 2855-2875
380-480 V



195NA196.11

VLT 2880-2882 380-480 V, VLT 2840 PD2

Please note that the units will be supplied with two bottom plates, one for metric glands and one for conduits.

VLT® 2800 Series

■ Safety clamp

To maintain the galvanic isolation (PELV) between the control terminals and high-voltage terminals, the accompanying safety clamp must be attached to VLT 2803-2815, 200-240 V, and VLT 2805-2815, 380-480 V. Attach the safety clamp to the strain relief plate with the two screws provided.

For all unit types, external prefuses must be fitted in the line supply to the adjustable frequency drive. For UL/cUL applications with a line voltage of 200-240 Volt, use prefuses type Bussmann KTN-R (200-240 Volt) or Ferraz Shawmut type ATMR (max. 30A). For UL/cUL applications with a line voltage of 380-480 Volt, use prefuses type Bussmann KTS-R (380-480 Volt).

■ Prefuses

Prefuses for UL application /cUL

Alternative fuses 380-500 V drives

VLT 2800	Bussmann E52273	Bussmann E4273	Bussmann E4273	Bussmann E4273	Bussmann E4273	Bussmann E4273	SIBA E180276	Little Fuse E81895	Ferraz-Shawmut E163267/E2137	Ferraz-Shawmut E163267/E2137
2805-2820	RK1/JDDZ KTS-R20	J/JDDZ JKS-20	T/JDDZ JJS-20	CC/JDDZ FNQ-R-20	CC/JDDZ KTK-R-20	CC/JDDZ LP-CC-20	RK1/JDDZ 5017906-02 0	RK1/JDDZ KLS-R20	CC/JDDZ ATM-R25	RK1/JDDZ A6K-20R
2855-2875	KTS-R25	JKS-25	JJS-25				5017906-02 5	KLS-R25	ATM-R20	A6K-25R
2880-2882	KTS-R50	JKS-50	JJS-50				5014006-05 0	KLS-R50	-	A6K-50R

Alternative Fuses 200-240 V drives

VLT 2800	Bussmann E52273	Bussmann E4273	Bussmann E4273	SIBA E180276	Little Fuse E81895	Ferraz-Shawmut E163267/E2137	Ferraz-Shawmut E163267/E2137
2803-2822	RK1/JDDZ KTN-R20	J/JDDZ JKS-20	T/JDDZ JJN-20	RK1/JDDZ 5017906-02 0	RK1/JDDZ KLS-R20	CC/JDDZ ATM-R25	RK1/JDDZ A6K-20R
2840	KTN-R25	JKS-25	JJN-25	5017906-02 5	KLS-R25	ATM-R20	A6K-25R

■ AC line connection



All drives that are equipped with an RFI filter cannot be connected to a grounded DELTA or IT mains/AC line system.



NOTE
Check that the AC voltage matches the voltage rating of the drive. The drive rating is on the drive nameplate. See *Technical data* in this manual for correct dimensioning of cable cross-section.

For single phase 220-240 Volts input, attach the neutral wire to terminal N (L₂) and connect the phase wire to terminal L1 (L₁).

No	N(L ₂) L1(L ₁) (L ₃)	AC line voltage 1 x 220-240 V
.	N L1	
No	95	Ground connection
.		

No	N(L ₂) L1(L ₁) (L ₃)	AC line voltage 3 x 220-240 V
.	L2 L1 L3	
No	95	Ground connection
.		

No	91 92 93	AC line voltage 3 x 380-480 V
.	L1 L2 L3	
No	95	Ground connection
.		



380-460 Volt units with RFI-filters may not be connected to AC line supplies in which the voltage between phase and ground is more than 300 Volts. Please note that for the AC line for IT and the delta ground the AC line voltage can exceed 300 Volts between phase and ground. Units with type code R5 can be connected

to mains supplies with up to 400 V between phase and ground.

See *Technical data* for correct dimensioning of cable cross-section.

■ **Motor connection**

Connect the motor to terminals 96, 97, 98. Connect ground to terminal 99.

No.	96 97 98	Motor voltage 0-100% of line voltage.
	U V W	3 wires of motor
	U1 V1 W1 W2 U2 V2	6 wires out of motor, Delta-connected
	U1 V1 W1	6 wires out of motor, Star-connected U2, V2, W2 to be interconnected separately (optional terminal block)
No.	PE	Ground connection

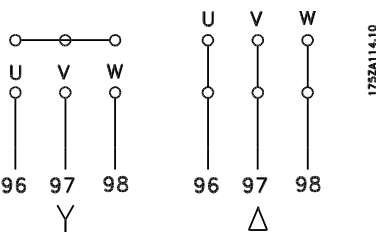
See *Technical data* for correct dimensioning of cable cross-section.

All types of three-phase asynchronous standard motors can be connected to an adjustable frequency drive. Normally, small motors are star-connected (230/400 V, Δ / Y), while large motors are delta-connected (400/690 V, Δ / Y). The correct connection mode and voltage can be read from the motor nameplate.



NOTE

In motors without phase insulation paper, an LC filter should be fitted on the output of the adjustable frequency drive.



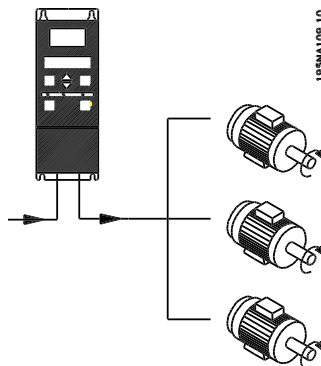
■ Direction of motor rotation

To change the direction of motor rotation, switch any two phases at the drive output or at motor terminals.

■ Motor thermal protection

The electronic thermal relay in UL approved variable frequency drives has received the UL approval for single motor protection, when parameter 128 *Motor thermal protection* has been set for *ETR Trip* and parameter 105 *Motor current, I_{M,N}* has been programmed to the rated motor current (see motor nameplate).

■ Parallel connection of motors



The adjustable frequency drive is able to control several motors connected in parallel. If the motors are to have different rpm values, use motors with different rated rpm values. Motor rpm is changed simultaneously, which means that the ratio between the rated rpm values is maintained across the range. The total current consumption of the motors is not to exceed the maximum rated output current I_{INV} for the adjustable frequency drive.

Problems may arise at the start and at low rpm values if the motor sizes are widely different. This is because the small motors' relatively high ohmic resistance in the stator calls for a higher voltage at the start and at low rpm values.

In systems with motors connected in parallel, the electronic thermal relay (ETR) of the adjustable frequency drive cannot be used as motor protection for the individual motor. For this reason, further motor protection must be used, such as thermistors in each motor or an individual thermal relay, for example (circuit breakers are not a suitable means of protection).



NOTE

Parameter 107 *Automatic motor adaptation, AMT* cannot be used when motors are connected in parallel. Parameter 101 *Torque characteristic* must be set to *Special motor characteristics* [8] when motors are connected in parallel.

■ Motor cables

See Technical data for correct dimensioning of motor cable cross-section and length. Always comply with national and local regulations on cable cross-section.



NOTE

If an unshielded/unarmored cable is used, some EMC requirements are not complied with, see *EMC test results* in the Design Guide.

If the EMC specifications regarding emissions are to be complied with, the motor cable must be shielded/armored unless otherwise stated for the RFI filter in question. It is important to keep the motor cable as short as possible so as to reduce the noise level and leakage currents to a minimum. The motor cable shield must be connected to the metal cabinets of the adjust-

able frequency drive and the motor. The shield connections are to be made with the largest possible surface area (cable clamp). This is enabled by different installation devices in different adjustable frequency drives. Connecting with twisted shield ends (pigtailed) is to be avoided, as these spoil the shielding effect at high frequencies. If it is necessary to break the shield to install a motor isolator or motor relay. The shield must be continued at the lowest possible HF impedance.

■ **Brake connection**



NOTE

Voltages up to 850 VDC occur on the terminals.

No.	81	82	Brake resistor
	R-	R+	terminals

Connect the brake resistor wiring to drive terminals 81 and 82. The connection cable to the brake resistor must be shielded/armored. Connect the shield to both the ground of the drive and the brake resistor by means of cable clamps. Dimension the cross-section of the brake cable to match the brake torque.

■ **Ground connection**

Since the leakage currents to ground may be higher than 3.5 mA, the adjustable frequency drive must always be connected to ground in accordance with applicable national and local regulations. To ensure that the ground cable has good mechanical connection to terminal 95, the cable cross section must be a minimum 7 AWG (10 mm²). To improve protection even further, a Residual Current Device (RCD) can be fitted to ensure that the adjustable frequency drive cuts out when the leakage currents get too high. Also see RCD Application note MN.90.GX.02.

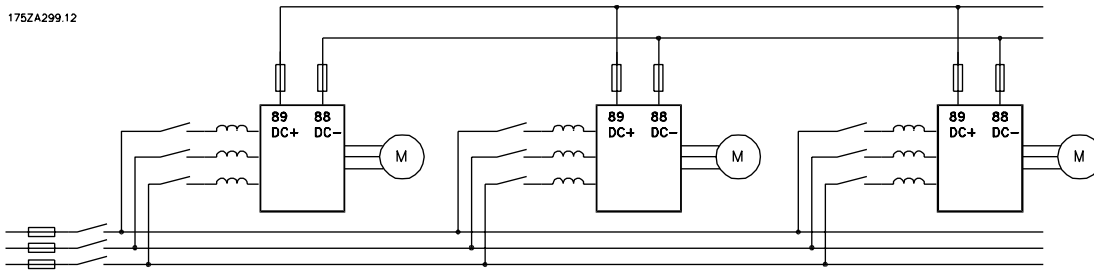
■ **Load sharing**

Load sharing provides the facility to connect several frequency converters' DC intermediate circuits. This requires that the installation is extended using extra fuses and AC coils (see drawing below). For load sharing parameter 400 *Brake function* must be set to *Load sharing* [5].

Use 6.3 mm Faston Plugs for DC (Load Sharing). Contact Danfoss or see instructions no. MI.50.NX.02 for further information.

No.	88	89	Loadsharing
	-	+	

175ZA299.12



Note that voltage levels of up to 850 V DC may occur between terminals 88 and 89.

■ Tightening Torque, Power Terminals

Power and ground terminals must be tightened with the following torques:

VLT	Terminals	Torque [Nm]
2803-2875	Power AC line brake	0.5-0.6
	Ground	2-3
2880-2882, 2840 PD2	Power AC line brake	1.2-1.5
	Ground	2-3

■ Calculation of brake resistance

In lifting/lowering applications you need to be able to control an electromagnetic brake. The brake is controlled using a relay output or digital output (terminal 46). The output must be kept closed (voltage-free) for the period of time during which the variable frequency drive is not able to 'support' the motor, for example due to the load being too great. Select *Mechanical brake control* in parameter 323 or 341 for applications with an electromagnetic brake.

When the output frequency exceeds the brake cut out value set in par. 138, the brake is released if the motor current exceeds the preset value in parameter 140. When stopping the brake is engaged when the output frequency is less than the brake engaging frequency, which is set in par. 139.

If the variable frequency drive is placed at alarm status or in an overvoltage situation the mechanical brake is cut in immediately.

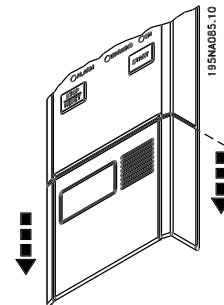


NOTE

This application is only for lifting/lowering without a counterbalance.

■ Access to control terminals

All control terminals are located underneath the protective plate on the front of the adjustable frequency drive. Remove the protective plate by sliding it downwards (see drawing).



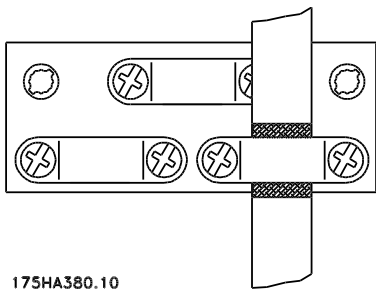
■ Electrical installation, control circuitry



NOTE

Using unshielded/unarmored cable may not comply with some EMI/RFI requirements.

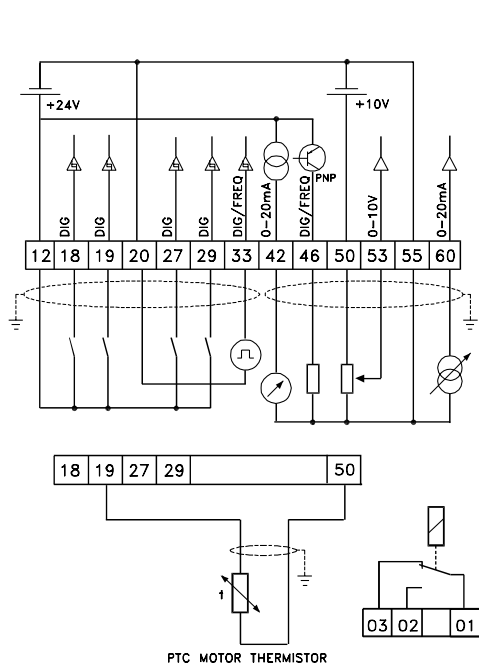
VLT® 2800 Series



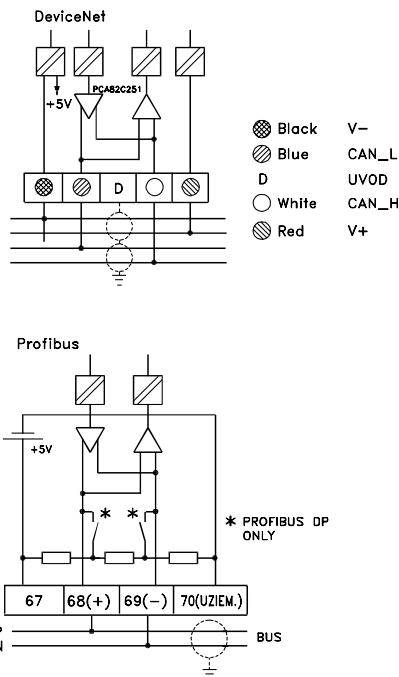
175HA380.10

Control wires must be shielded/armored. Connect the shield to the drive chassis with a clamp. Normally, the

shield must also be connected to the chassis of the controlling device. (See the instructions for the specific device.) In analog signals or connections using very long wires, 50/60 Hz ground loops may occur because of noise transmitted from the AC line. It may be necessary to break the shield and insert a 100 µF capacitor between the shield and the chassis.

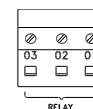


195NA028.14



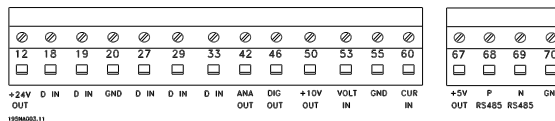
■ Tightening torques, control cables

Control wires must be connected with a tightening torque of 0.22-0.25 Nm.



■ Electrical installation, control terminals

See section entitled *Grounding of shielded/armored control cables* in the VLT 2800 Design Guide for the correct termination of control cables.



VLT® 2800 Series

No.	Function
01-03	Relay outputs 01-03 can be used for indicating status and alarms/warnings.
12	24 V DC voltage supply.
18-33	Digital inputs.
20, 55	Common frame for input and output terminals.
42	Analog output for displaying frequency, reference, current or torque.
46 ₁	Digital output for displaying status, warnings or alarms, as well as frequency output.
50	+10 V DC supply voltage for potentiometer or thermistor.
53	Analogue voltage input 0-10 V DC.
60	Analogue current input 0/4 - 20 mA.
67 ₁	+ 5 V DC supply voltage to Profibus.
68, 69 ₁	RS-485, Serial communication.
70 ₁	Frame for terminals 67, 68 and 69. Normally, this terminal is not to be used.

1. The terminals are not valid for DeviceNet/CANopen. See also the DeviceNet manual, MG.90.BX.YY for further details.

■ Relay connection

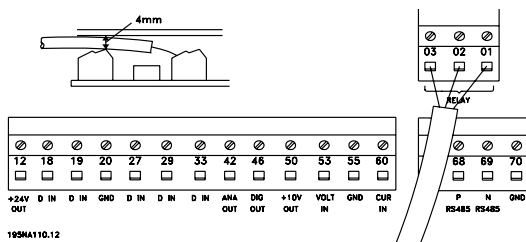
See parameter 323 *Relay output* for programming of relay output.

Nr.	01 - 02	1 - 2 make (normally open)
	01 - 03	1 - 3 break (normally closed)

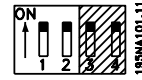


NOTE

Please note that the cable jacket for the relay must cover the first row of control card terminals - otherwise the galvanic isolation (PELV) cannot be maintained. Max. cable diameter: 4 mm. See drawing.



■ Profibus DIP switches setting



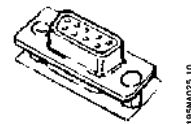
The dip switch is only on the control card with Profibus DP communication. The switch position shown is the factory setting. Switches 1 and 2 are used as cable termination for the RS-485 interface. If the adjustable frequency drive is located as the first or last (or only) unit in the bus system, switches 1 and 2 must be ON. On the remaining adjustable frequency drives, switches 1 and 2 must be OFF. Switches 3 and 4 are not applied.

■ VLT Software Dialog

Connection to terminals 68-70 or Sub D:

- PIN 3 GND
- PIN 8 P-RS 485
- PIN 9 N-RS 485

■ Sub D plug

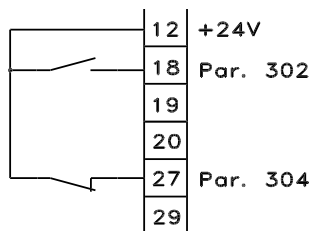


An LCP 2 control unit can be connected to the Sub D plug on the control card. Ordering number: 175N0131. The LCP control unit with ordering number 175Z0401 is not to be connected.

■ Connection examples

■ Start/stop

Start/stop using terminal 18 and coasting stop using terminal 27.



195NA011.11

Par. 302 Digital input = Start [7]

Par. 304 Digital input = Coasting stop inverted [2]

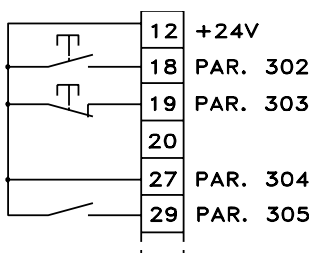
For Precise start/stop the following settings are made:

Par. 302 Digital input = Precise start/stop [27]

Par. 304 Digital input = Coasting stop inverted [2]

■ Pulse start/stop

Pulse start using terminal 18 and pulse stop using terminal 19. In addition, the jog frequency is activated via terminal 29.



195NA012.11

Par. 302 Digital input = Pulse start [8]

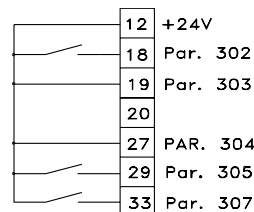
Par. 303 Digital input = Stop inverted [6]

Par. 304 Digital input = Coasting stop inverted [2]

Par. 305 Digital input = Jog [13]

■ Speed up/slow down

Speed up/slow down using terminals 29/33.



195NA249.10

Par. 302 Digital input = Start [7]

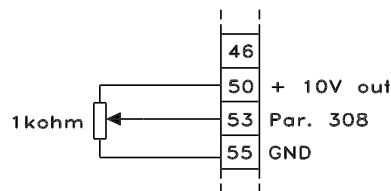
Par. 303 Digital input = Freeze reference [14]

Par. 305 Digital input = Speed up [16]

Par. 307 Digital input = Slow down [17]

■ Potentiometer reference

Voltage reference via a potentiometer.



195NA016.10

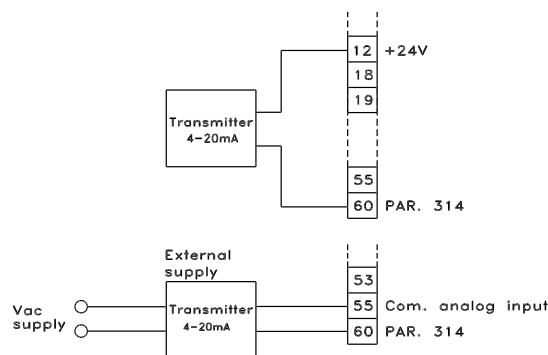
Par. 308 Analog input = Reference [1]

Par. 309 Terminal 53, min. scaling = 0 Volt

Par. 310 Terminal 53, max. scaling = 10 Volt

■ Connection of a 2-wire transmitter

Connection of a 2-wire transmitter as feedback to terminal 60.



195NA013.11

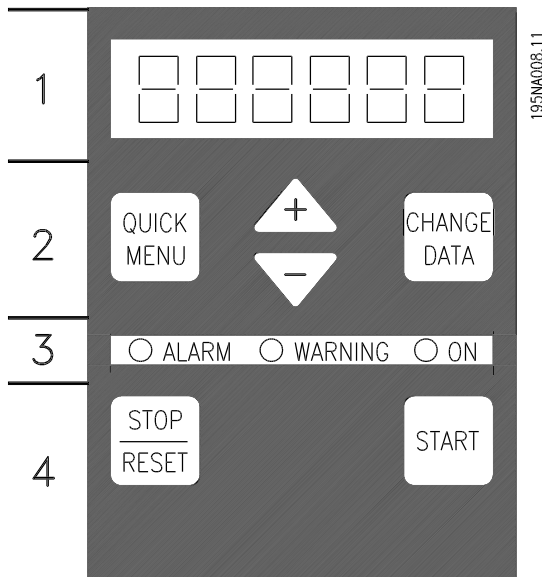
Par. 314 *Analog input = Feedback* [2]

Par. 315 *Terminal 60, min. scaling* = 4 mA

Par. 316 *Terminal 60, max. scaling* = 20 mA

■ Control unit

On the front of the variable frequency drive there is a control panel.



The control panel is divided into five functional groups:

1. Status LED
2. Keys for changing parameters and shifting display function.
3. LEDs.
4. Keys for local operation.

All displays of data are in the form of a six-digit LED display capable of showing one item of operating data continuously during normal operation. As a supplement to the display, there are three LEDs for indication of electrical connection (ON), warning (WARNING) and alarm (ALARM). Most of the variable frequency drive's parameter Setups can be changed immediately via the control panel, unless this function has been programmed as *Locked* [1] via parameter 018 *Lock for data changes*.

■ Control keys

[QUICK MENU] allows access to the parameters used for the Quick menu.

The **[QUICK MENU]** key is also used if a change to a parameter value is not to be implemented.

See also **[QUICK MENU] + [+]**.

[CHANGE DATA] is used for changing a setting.

The **[CHANGE DATA]** key is also used for confirming a change of parameter settings.

[+] / [-] are used for selecting parameters and for changing parameter values.

These keys are also used in Display mode for selecting the display of an operating value.

The **[QUICK MENU] + [+]** keys must be pressed at the same time to give access to all parameters. See *Menu mode*.

[STOP/RESET] is used for stopping the connected motor or for resetting the variable frequency drive after a trip.

Can be selected as *Active* [1] or *Not active* [0] via parameter 014 *Local stop/reset*. In Display mode, the display will flash if the stop function is activated.



NOTE

If the **[STOP/RESET]** key is set at *Not active* [0] in parameter 014 *Local stop/reset*, and there is no stop command via the digital inputs or serial communication, the motor can only be stopped by disconnecting the electrical voltage to the variable frequency drive.

[START] is used for starting the variable frequency drive. It is always active, but the **[START]** key cannot override a stop command.

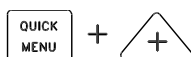
■ Manual initialization

To manually initialize the adjustable frequency drive to factory default settings, first disconnect AC line voltage. Hold the **[QUICK MENU]** and **[+]** and **[CHANGE DATA]** keys down while simultaneously reconnecting the AC line voltage. Release the keys. The drive has now been programmed for factory settings.

■ Display readout states
Display mode

In normal operation, one item of operating data can be displayed continuously at the operator's discretion. By means of the [+/-] keys, the following options can be selected in Display mode:

- Output frequency [Hz]
- Output current [A]
- Output voltage [V]
- Intermediate circuit voltage [V]
- Output power [kW]
- Scaled output frequency $f_{out} \times p008$

Menu mode


In order to enter the Menu mode, [QUICK MENU] + [+] must be activated at the same time.

In Menu mode, most of the adjustable frequency drive parameters can be changed. Scroll through the parameters using the [+/-] keys. While scrolling in the Menu mode proceeds, the parameter number will flash.

The display shows that the setting in parameter 102 *Motor power* $P_{M,N}$ is 0.75. In order to change the value of 0.75, [CHANGE DATA] must first be activated; the parameter value can then be changed using the [+/-] keys.

If a given parameter display shows three dots to the right, it means that the parameter value has more than three digits. In order to see the entire value, activate [CHANGE DATA].

The display shows that in parameter 128 *Motor thermal protection*, the selection made is *Thermistor trip* [2].

Quick menu

Using the [QUICK MENU] key, it is possible to access the 12 most important parameters of the adjustable frequency drive. After programming, the adjustable frequency drive is, in most cases, ready for operation. When the [QUICK MENU] key is activated in Display mode, the Quick menu starts. Scroll through the quick menu using the [+/-] keys and change the data values by first pressing [CHANGE DATA] and then changing the parameter value with the [+/-] keys.

The Quick menu parameters are:

- Par. 100 *Configuration*
- Par. 101 *Torque characteristic*
- Par. 102 *Motor power* $P_{M,N}$
- Par. 103 *Motor voltage* $U_{M,N}$
- Par. 104 *Motor frequency* $f_{M,N}$
- Par. 105 *Motor current* $I_{M,N}$
- Par. 106 *Rated motor speed* $n_{M,N}$
- Par. 107 *Automatic motor adaptation*
- Par. 202 *Output frequency high limit* f_{MAX}
- Par. 203 *Reference range*
- Par. 204 *Minimum reference* Ref_{MIN}
- Par. 205 *Maximum reference* Ref_{MAX}
- Par. 207 *Ramp-up time*
- Par. 208 *Ramp-down time*
- Par. 002 *Local/remote operation*
- Par. 003 *Local reference*

Parameter 102 - 106 can be read out from the motor's nameplate.

Automatic motor tuning

Automatic motor tuning (AMT) is performed as follows:

1. In parameter 107 *Automatic motor tuning*, select data value [2]. "107" will now flash, and "2" will not flash.
2. AMT is activated by pressing start. "107" will now flash and dashes will move from left to right in the data value field.
3. When "107" appears once more with the data value [0], AMT is complete. Press [STOP/RESET] to save the motor data.
4. "107" will then continue to flash with the data value [0]. You can now proceed.

**NOTE**

VLT 2880-2882 do not have AMT function.

■ Display readout

Fr

The variable frequency drive shows the present output frequency in Hertz [Hz].

Io

The variable frequency drive shows the present output current in Amps [A].

Uo

The variable frequency drive shows the present output voltage in Volt [V].

Ud

The variable frequency drive shows the intermediate circuit voltage in Volt [V].

Po

The variable frequency drive shows the calculated output in kilowatt [kW].

notrun

This message is shown if an attempt is made to change a parameter value while the motor is running. Stop the motor to change the parameter value.

LCP

This message is shown if an LCP 2 control unit is fitted and the [QUICK MENU] or [CHANGE DATA] key is activated. If an LCP 2 control unit is fitted you can only change parameters with that.

Ha

The variable frequency drive shows the present Hand mode reference frequency in Herz (Hz).

SC

The variable frequency drive shows scaled output frequency (the present output frequency x parameter 008).

■ Hand Auto


During normal operation the adjustable frequency drive is in auto mode, where the reference signal is given externally, analog or digital via the control terminals. However, in hand mode, it is possible to give the reference signal locally via the control panel.

On the control terminals, the following control signals will remain active when hand mode is activated:


- Hand Start (LCP2)
- Off Stop (LCP2)
- Auto Start (LCP2)
- Reset
- Coasting Stop Inverse
- Reset and Coasting Stop Inverse
- Quick Stop Inverse
- Stop Inverse
- Reversing
- DC Braking Inverse
- Set-up Select LSB
- Set-up Select MSB
- Thermistor
- Precise Stop Inverse
- Precise Stop/Start
- Jog
- Stop Command Via Serial Comm.

Switching between Auto Mode and Hand mode:

By activating the [Change Data] key in [Display Mode], the display will indicate the mode of the adjustable frequency drive.

 => Auto

Scroll up/down in order to switch to hand mode:

 => Hand

When the adjustable frequency drive is in hand mode, the readout will appear as follows:

HA 50.3

and the reference can be changed by using the following keys: