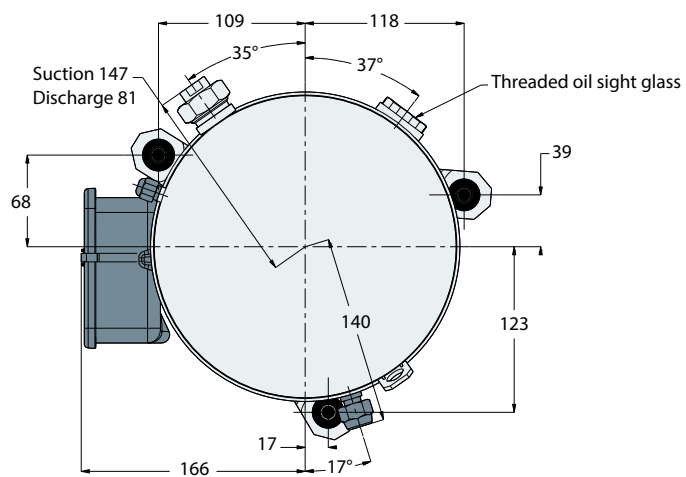
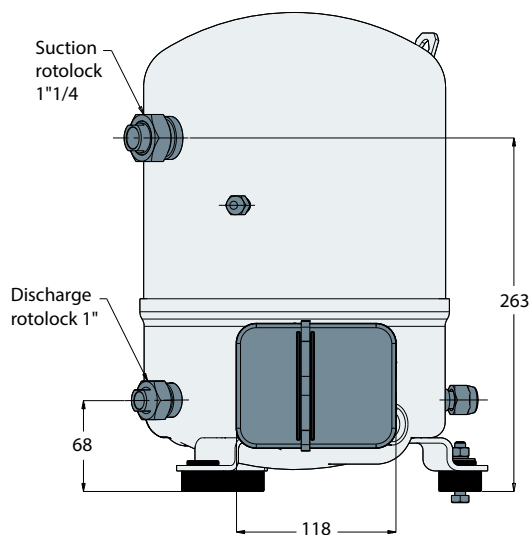
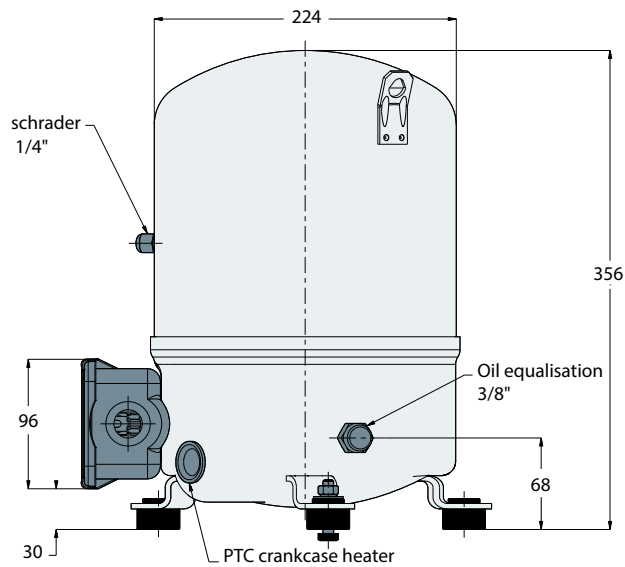
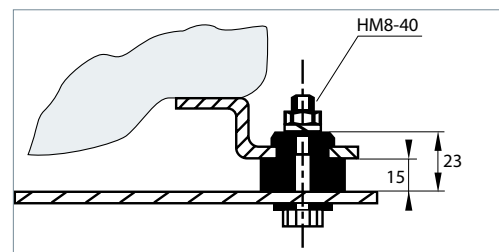


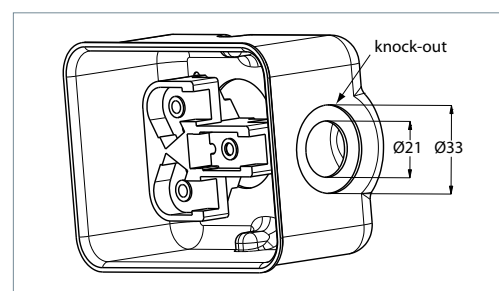
VTZ038 / VTZ054



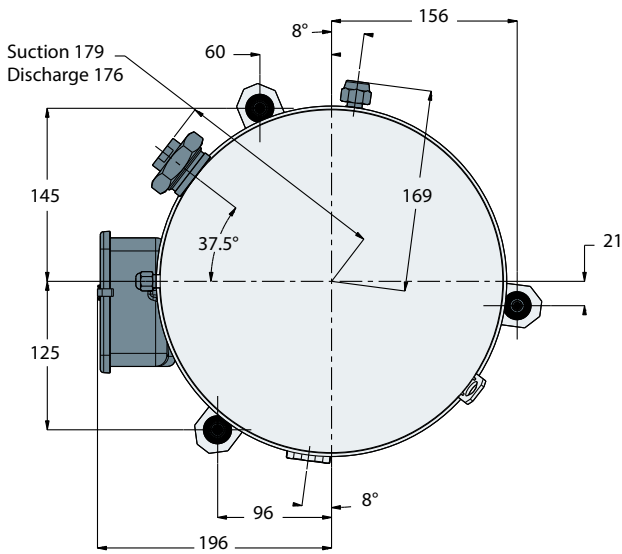
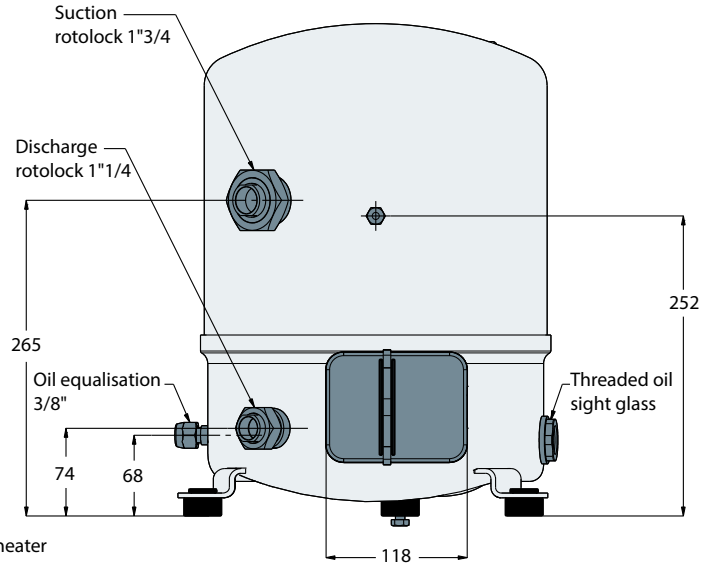
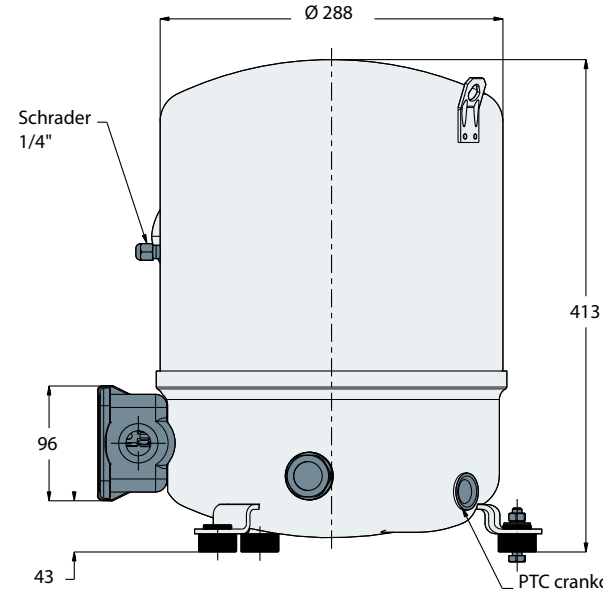
Silent bloc



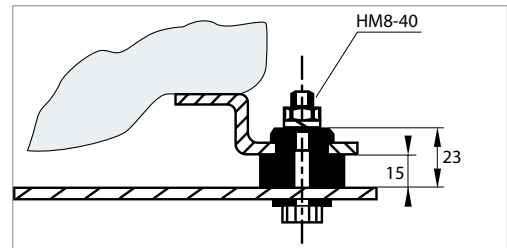
Terminal box



VTZ086 / VTZ121

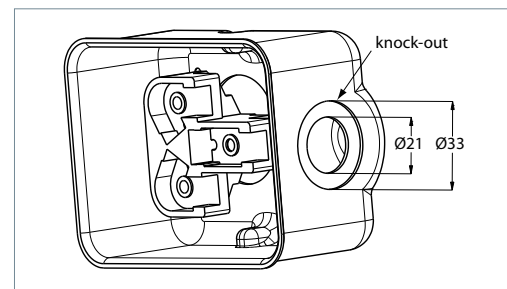


Silent bloc

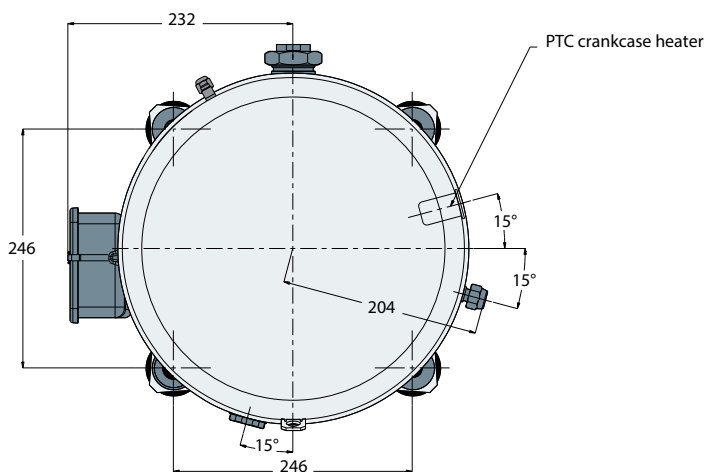
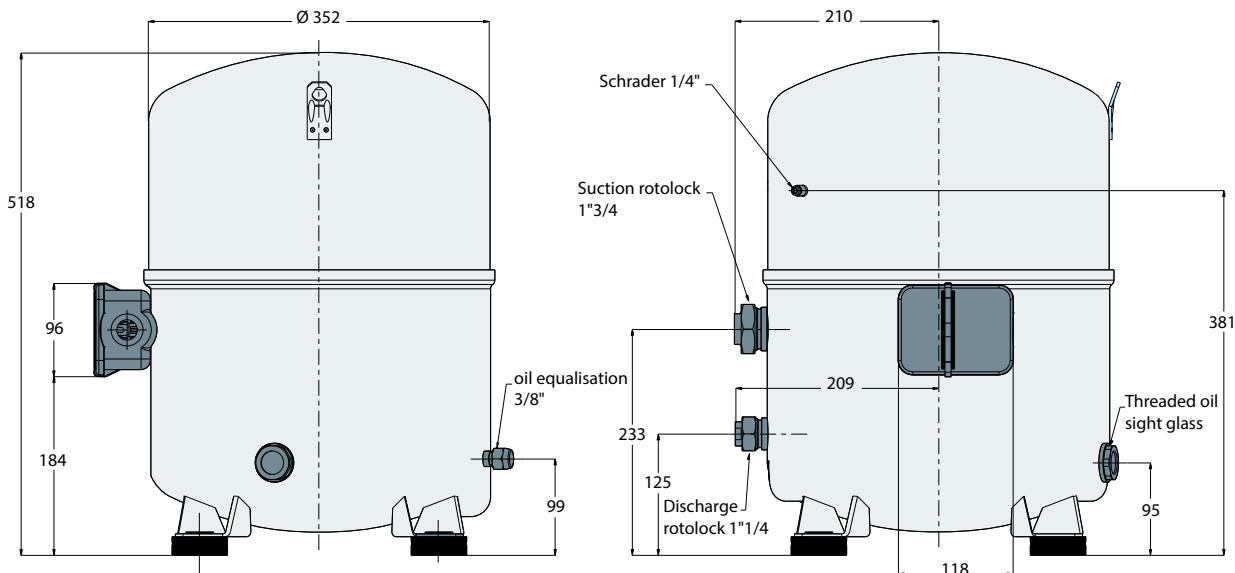


Grommet compression not included around 1 mm

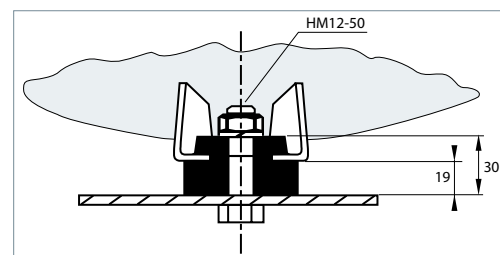
Terminal box



VTZ171 / VTZ215

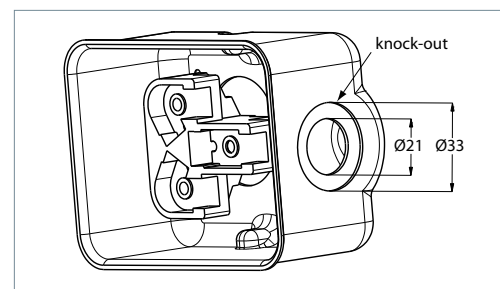


Silent bloc



Grommet compression not included around 1 mm

Terminal box



Application Guidelines

Dimensions

Sight glass

VTZ compressors come equipped with a threaded oil sight glass with 1"1/8 – 18 UNEF connection. It can be used for visual check of oil

amount and conditions, or it may be replaced by an oil management device.

Schrader

The oil fill connection and gauge port is a 1/4" male flare connector incorporating a schrader valve.

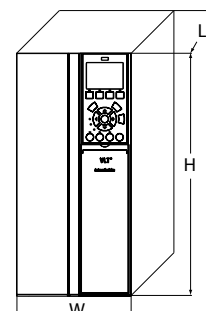
Suction & discharge connections

VTZ compressors are all delivered with suction and discharge rotolock connections only.

	Rotolock connections size		Pipe sizing		Rotolock valve	
	Suction	Discharge	Suction	Discharge	Suction	Discharge
VTZ038-054	1" 1/4	1"	5/8"	1/2"	V09	V06
VTZ086-121	1" 3/4	1"1/4	7/8"	3/4"	V07	V04
VTZ171-215	1" 3/4	1" 1/4	1"1/8	3/4"	V02	V04

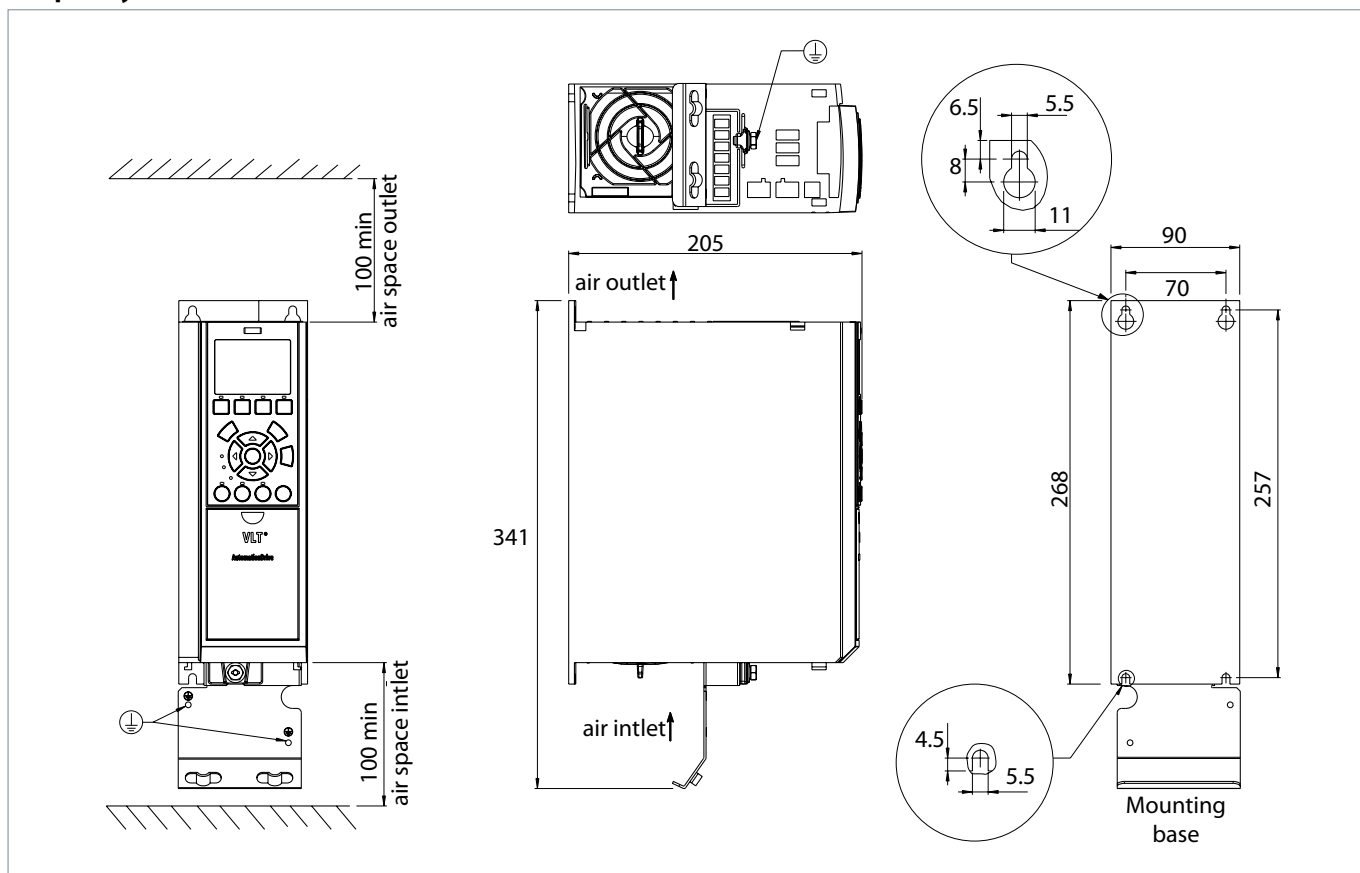
Frequency converter dimensions

Frequency converter dimensions depend on supply voltage, IP rating and power. The below table gives an overview of the overall dimensions and different enclosures. Details for each enclosure are on the following pages.

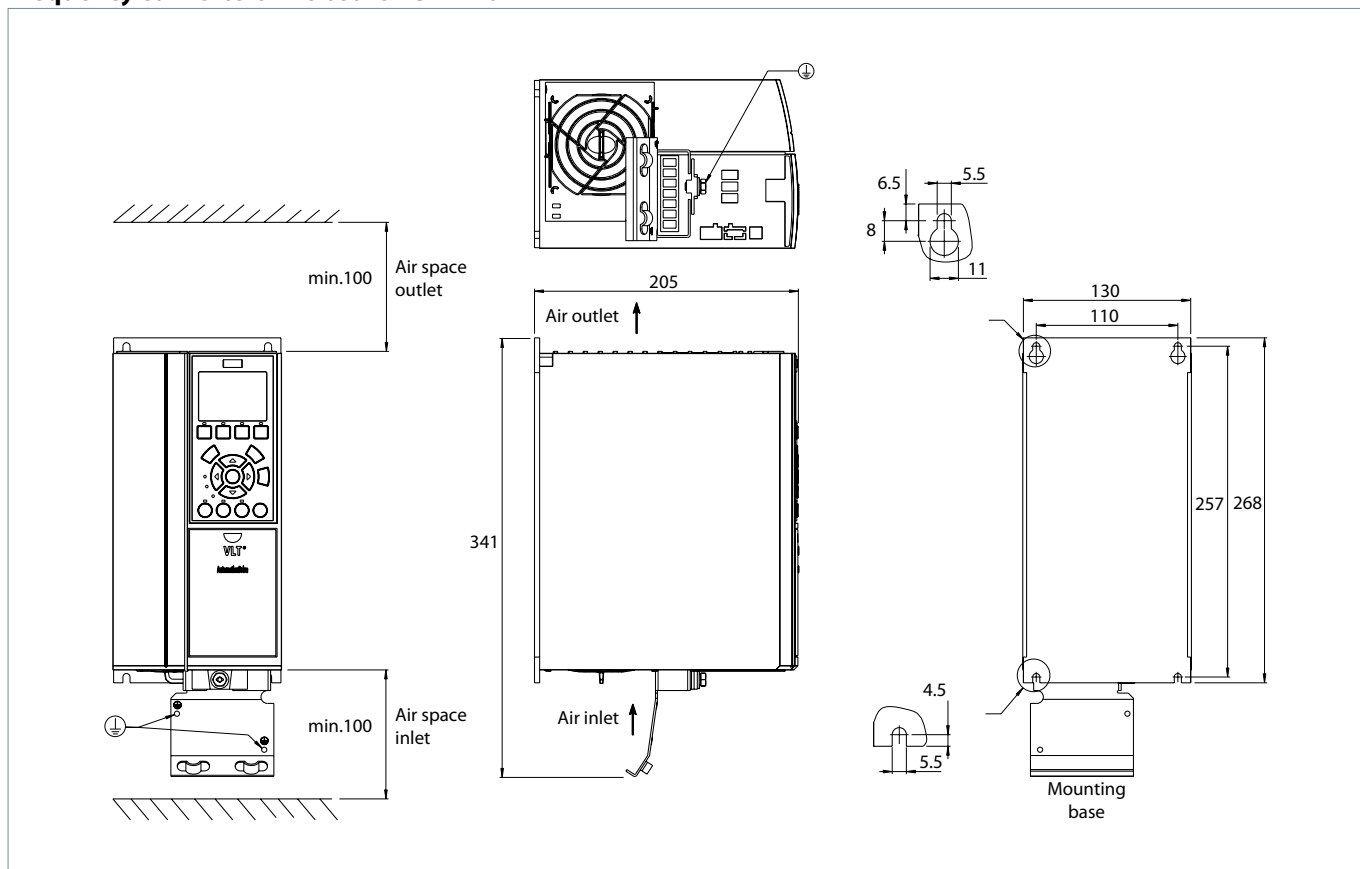


Drive supply voltage	Drive power (kW)	Compressor voltage code	Compressor model	IP20			IP21			IP55		
				Drive enclosure	Overall dimension (hxxwxd) mm	Weight (kg)	Drive enclosure	Overall dimension (hxxwxd) mm	Weight (kg)	Drive enclosure	Overall dimension (hxxwxd) mm	Weight (kg)
T2 : 200-240/3/50-60	3.7	J	VTZ038	A3	268x130x205	6.6	-	-	-	B1	480x242x260	23
	5.5		VTZ054	-	-	-	B1	494x242x260	23	B1	480x242x260	23
	7.5		VTZ086	-	-	-	B1	494x242x260	23	B1	480x242x260	23
	11		VTZ121	-	-	-	B2	664x242x260	27	B2	664x242x260	27
T4 : 380-480/3/50-60	4	G	VTZ038	A2	268x90x205	4.9	-	-	-	A5	420x242x200	13.5
	5.5		VTZ054	A3	268x130x205	6.6	-	-	-	A5	420x242x200	13.5
	7.5		VTZ086	A3	268x130x205	6.6	-	-	-	A5	420x242x200	13.5
	11		VTZ121	B3	399x165x248	12	B1	494x242x260	23	B1	480x242x260	23
	15		VTZ171	B3	399x165x248	12	B1	494x242x260	23	B1	480x242x260	23
	18.5		VTZ215	-	-	-	B2	664x242x260	27	B2	650x242x260	27

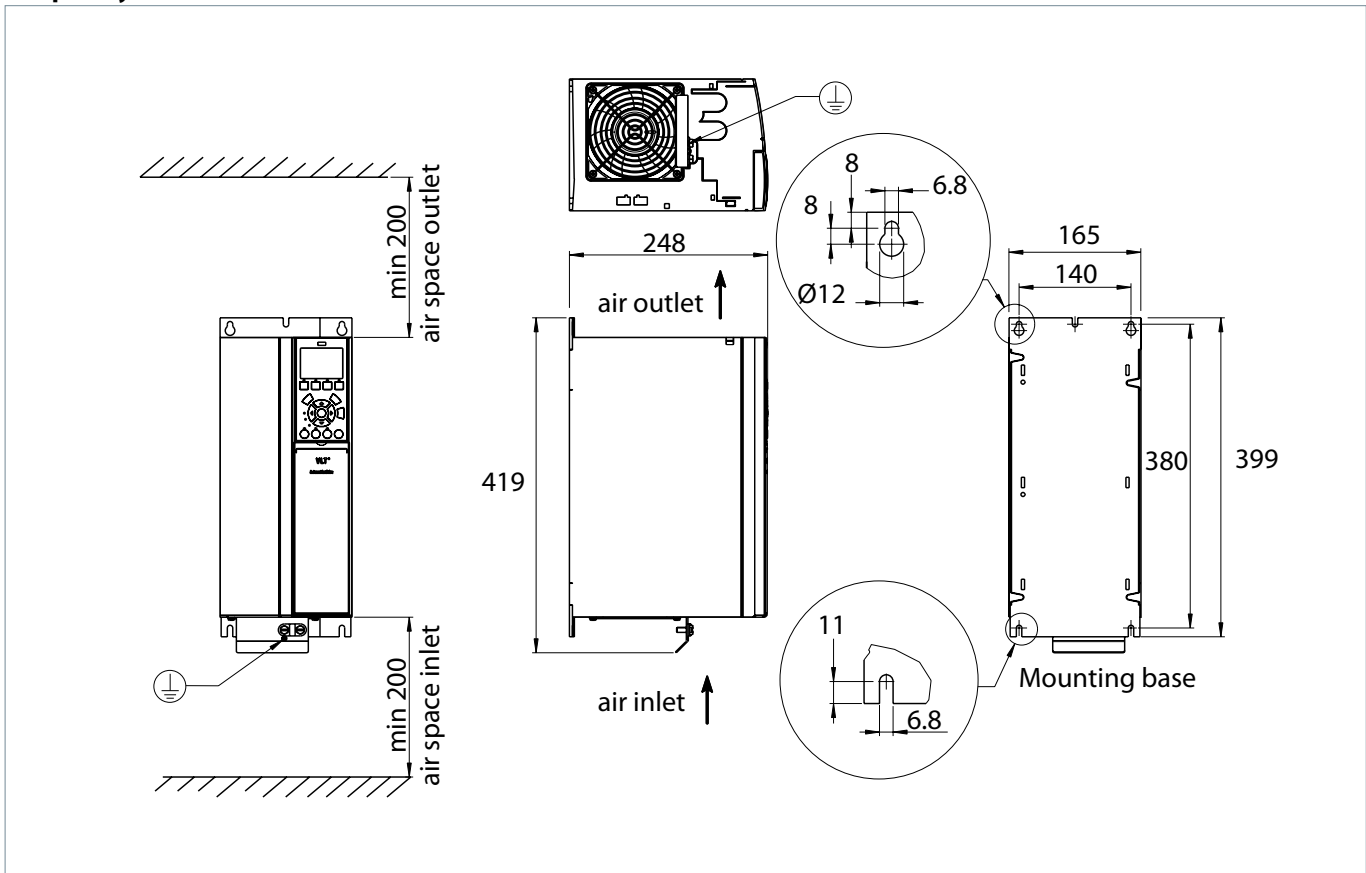
Frequency converters Enclosure A2 - IP20



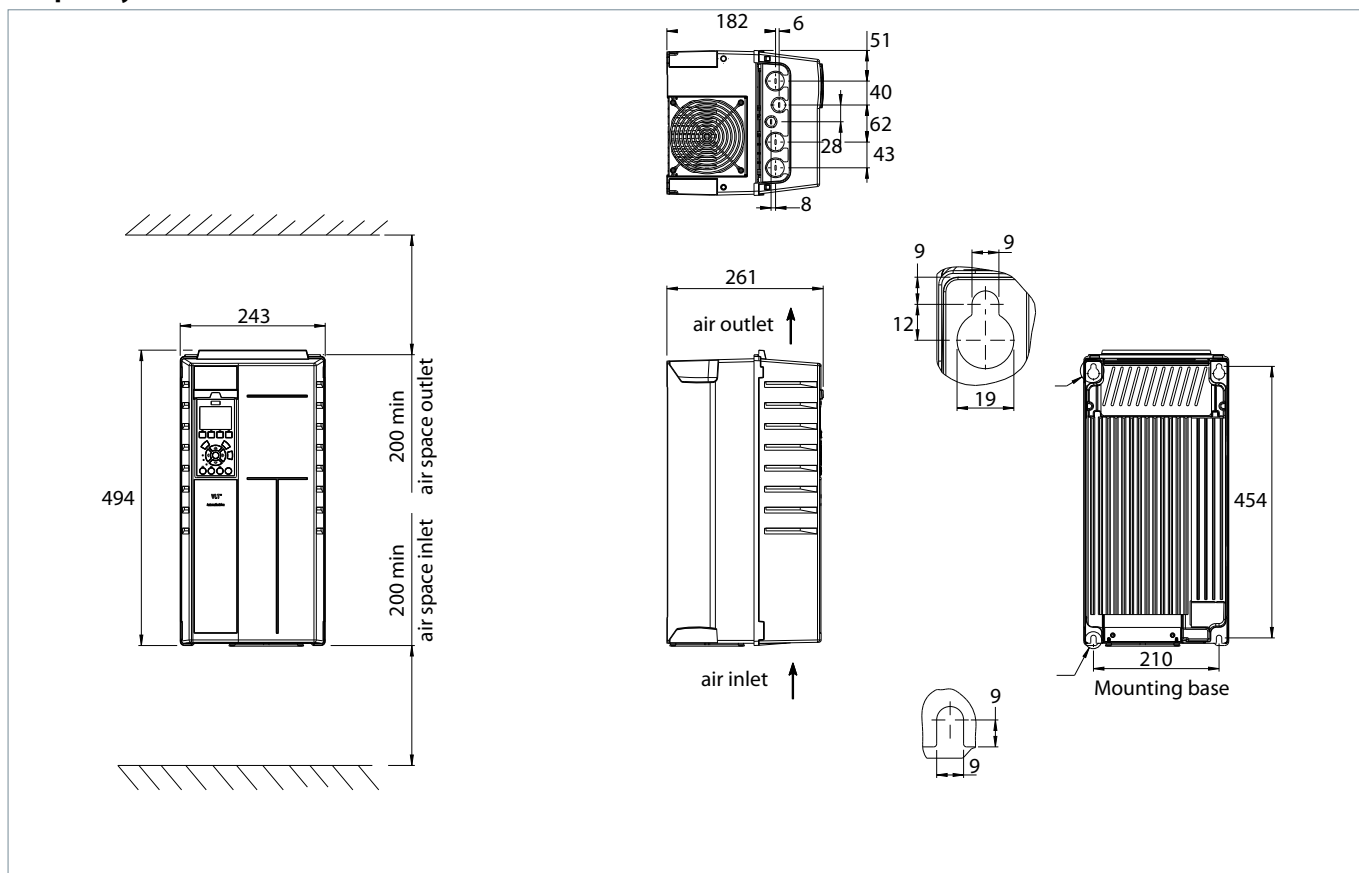
Frequency converters Enclosure A3 - IP20



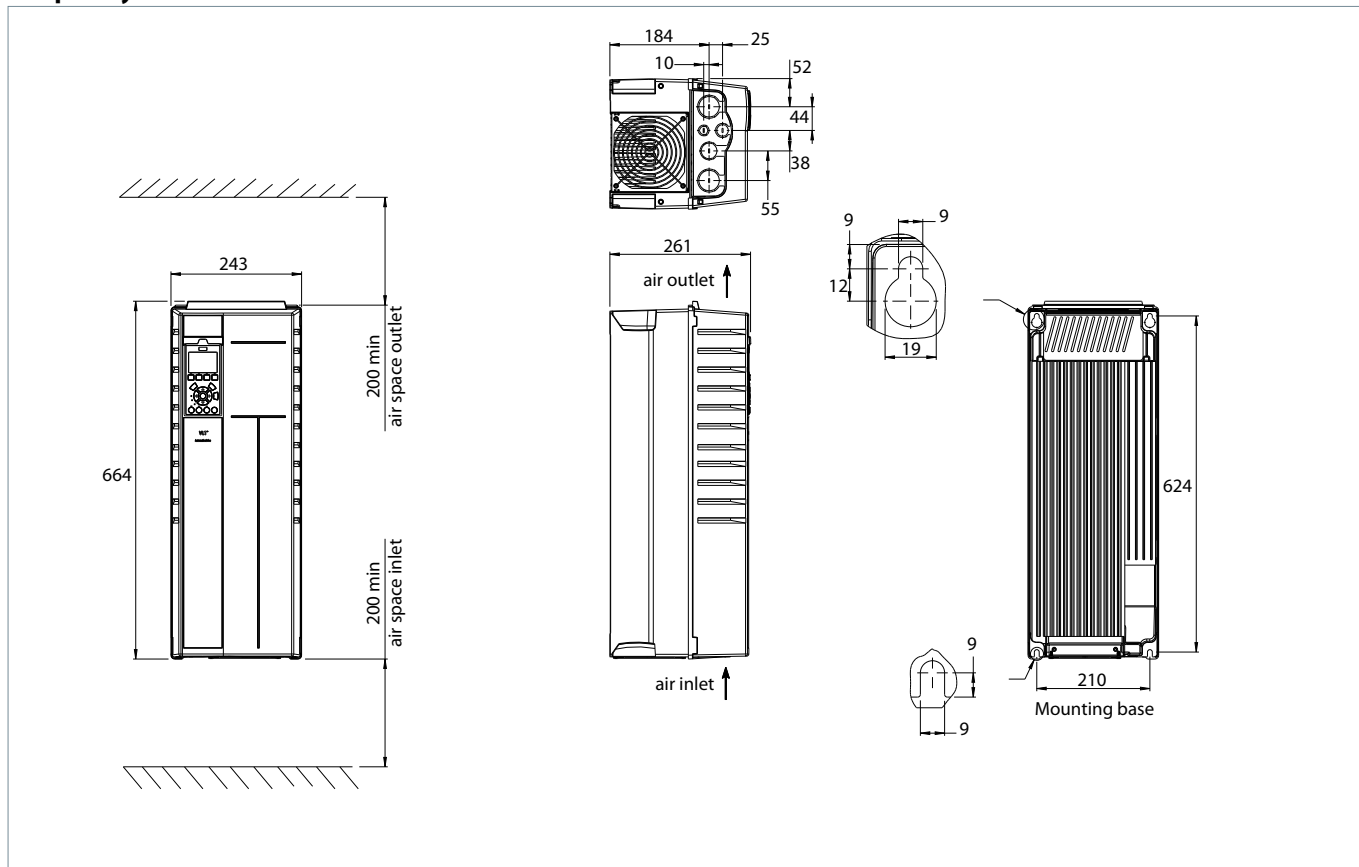
Frequency converters Enclosure B3 - IP20



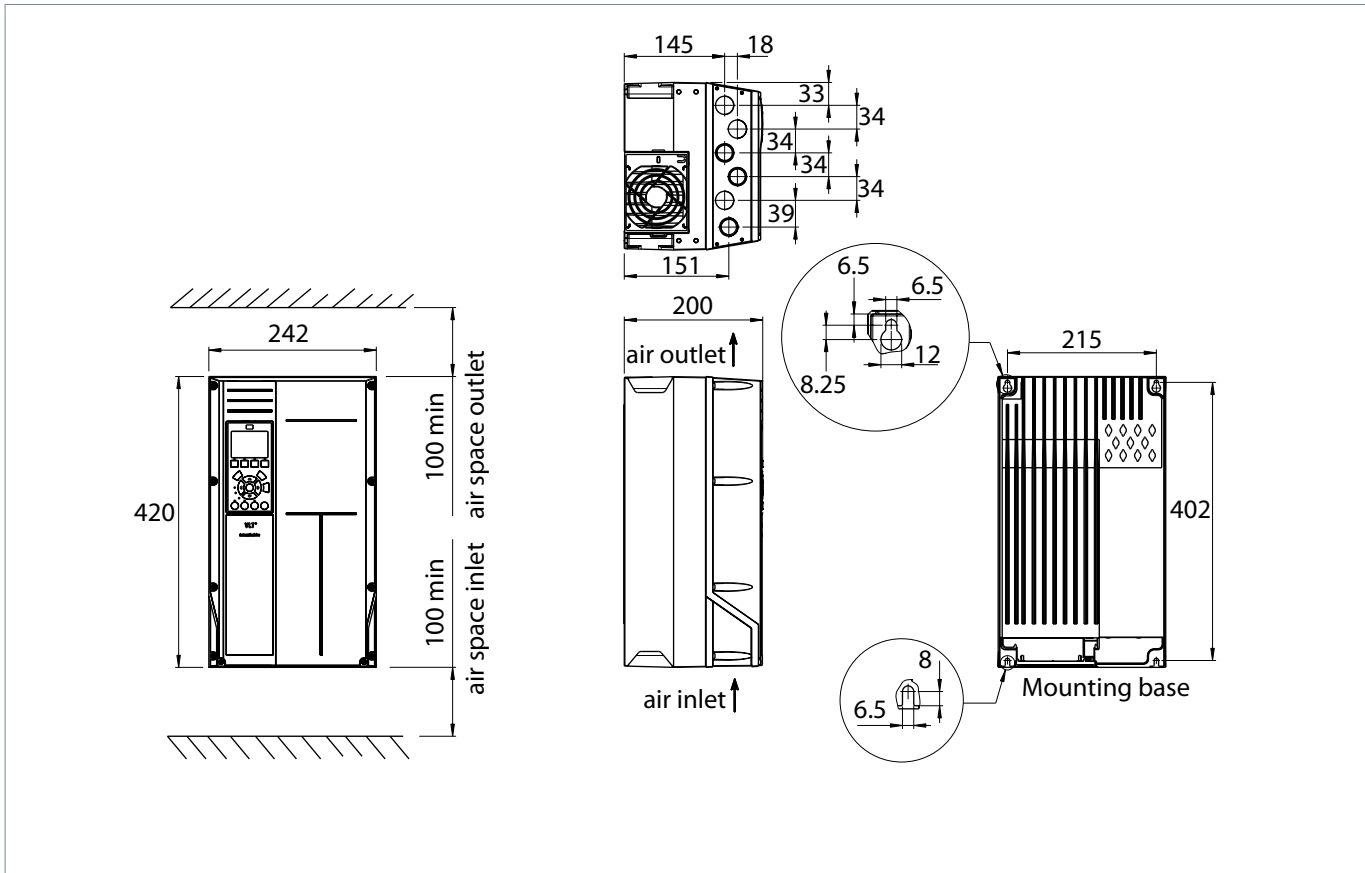
Frequency converters Enclosure B1 - IP21



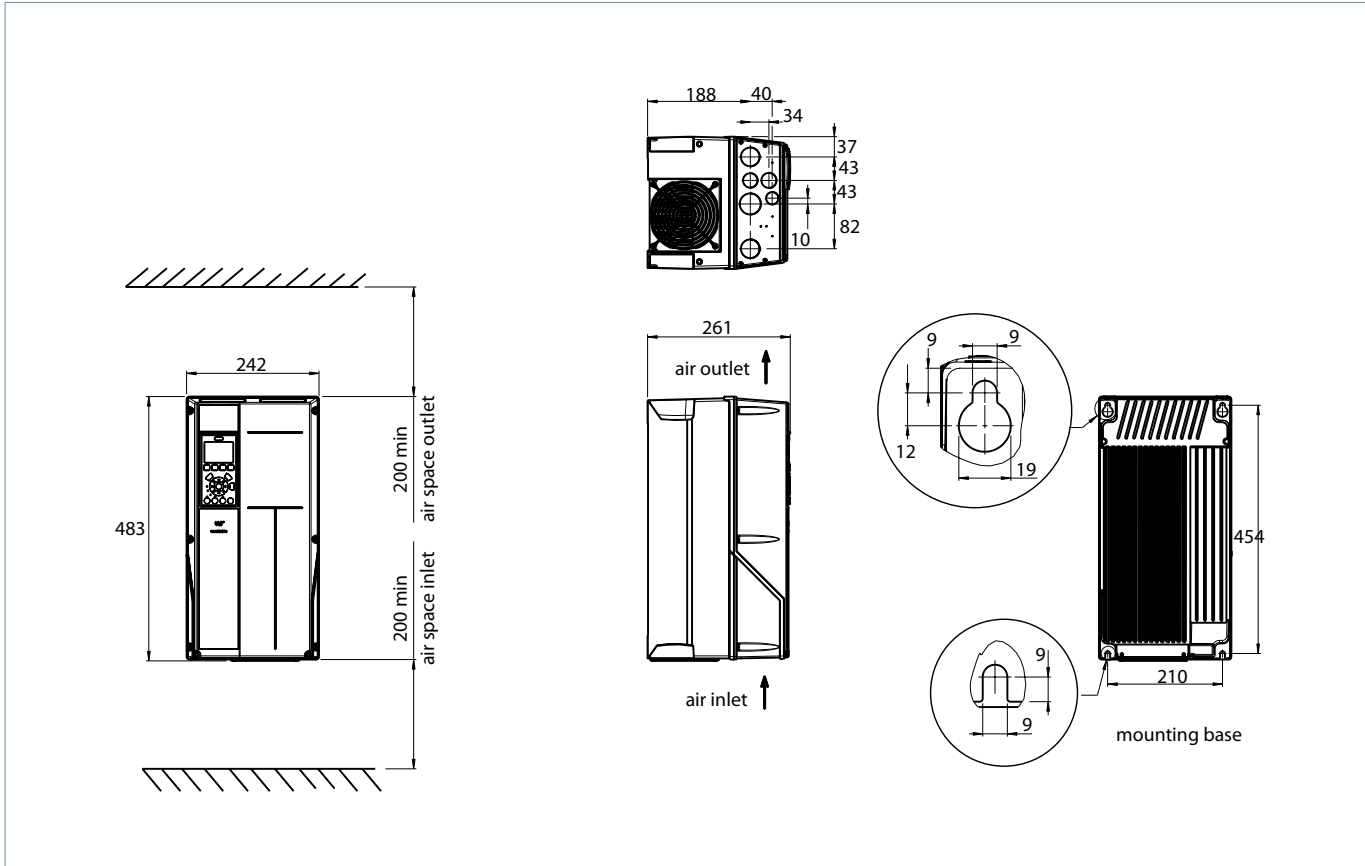
Frequency converters Enclosure B2 - IP21



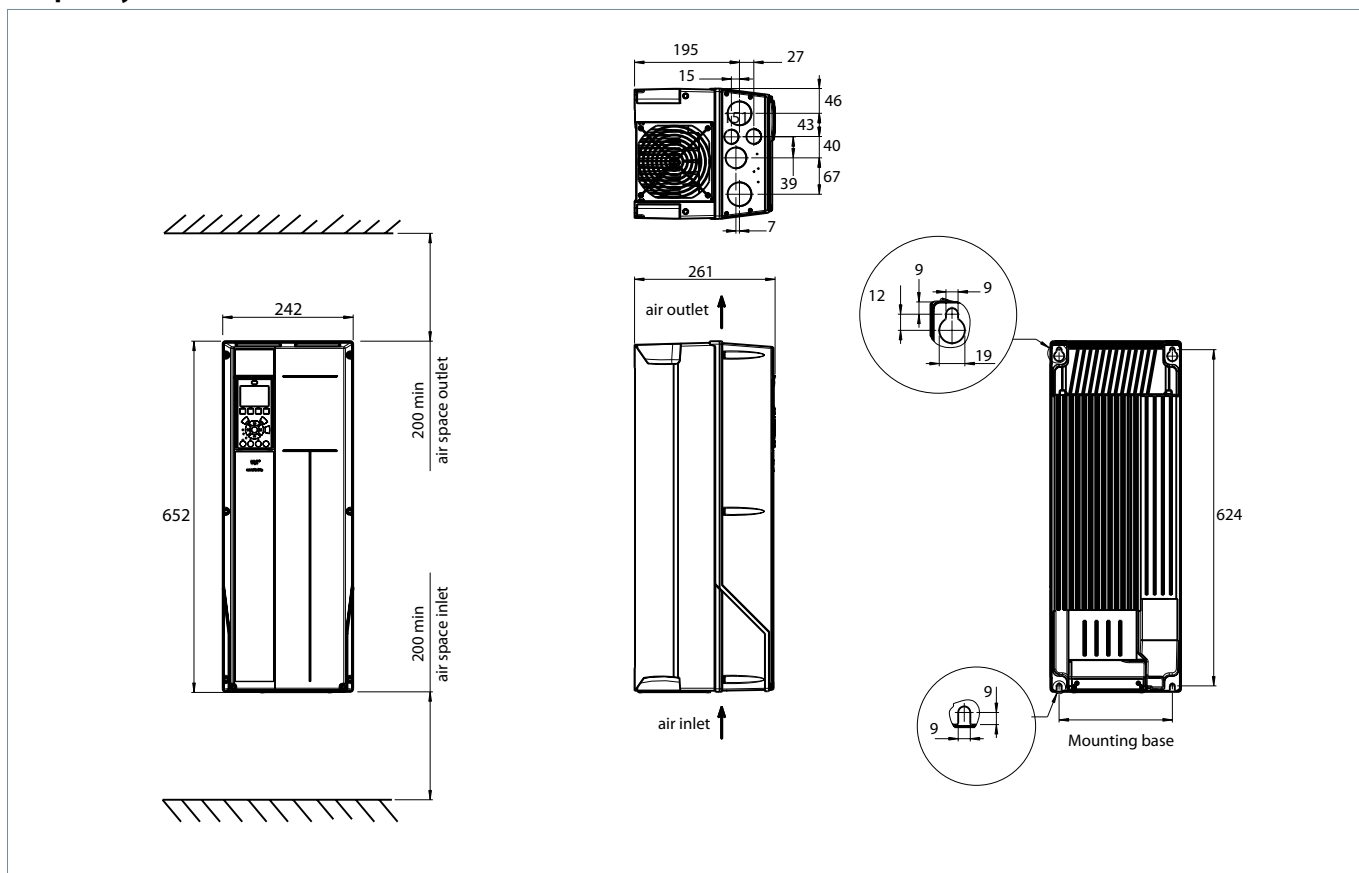
Frequency converters Enclosure A5 - IP55



Frequency converters Enclosure B1 - IP55



Frequency converters Enclosure B2 - IP55



This chapter summarizes the most essential points for VTZ and CD302 electrical installation.

An exhaustive description can be found in literature 85.10.233 (instructions for installation).

Compressor electrical specifications

	Compressor	Nominal motor power (in kW)	RW (Ohm)	RT (Ohm)	RLA (A)	MMT (A)	LRA (A)
200-240 V	VTZ038-J	3.59	0.31	0.65	13.5	17	69
	VTZ054-J	5	0.215	0.44	20	25	93
	VTZ086-J	7.8	0.158	0.317	32.5	40.6	88
	VTZ121-J	12.5	0.095	0.156	50	64.4	160
380-480 Volt	VTZ038-G	3.59	1.684	3.37	7.35	9.2	30.5
	VTZ054-G	4.95	1.039	2.08	12	15	47
	VTZ086-G	7.8	0.685	1.37	16	20	74
	VTZ121-G	11.66	0.294	0.59	23.2	29	139
	VTZ171-G	16	0.337	0.67	30.5	38.1	130
	VTZ215-G	21.3	0.236	0.47	40.8	51	197

RW: Winding resistance per winding (in CD302 parameter list)
 RT: Winding resistance as measured at motor terminals
 RLA: Rated load current with R404A @ +5/+60°C
 MMT: Maximum must trip current
 LRA: Locked rotor current

Note that parameter 1-30 in the frequency converter settings reflects the winding resistance per winding. This is not the same value as measured at the motor terminals.

LRA (Locked Rotor Amp)

Locked Rotor Amp value is the higher average current as measured on a mechanically blocked compressor tested under nominal voltage. As required by UL regulation, this value is printed

on the nameplate. This current value can not be achieved in the case of VTZ compressors, because the frequency converter will cut-out the mains before, according to MMT value.

RLA (Rated Load Amp)

Rated Load Amp value is the current value at maximum load, in the operating envelope, and at maximum speed.

MMT (Maximum Must Trip current)

The Maximum Must Trip current is defined for compressors not equipped with their own motor protection. This MMT value is the maximum at which the compressor can be operated in transient conditions and out of the operating envelope. The tripping current of external over-

current protection must never exceed the MMT value.

For VTZ compressors, according to UL requirements, MMT value is 125% of RLA. This value is printed on the compressor nameplate.

Wiring & EMC protection

The motor compressor power supply (from the CD302 frequency converter to the VTZ compressor) must be done with a braided screened/armored cable. This cable needs to have its screen/armor conduit connected to earth on both ends. Avoid terminating this cable connection with twisting ends (pigtailes) because that would result in an antenna phenomena and decreases the effectiveness of the cable.

and the metal chassis of the converter. Use star-washers and galvanically conductive installation plates to secure good electrical connections. Refer to instructions 85.10.233 for tightening torques and screw sizes.

Control cables to the CD302 frequency converter must use the same installation principles as the power supply cable.

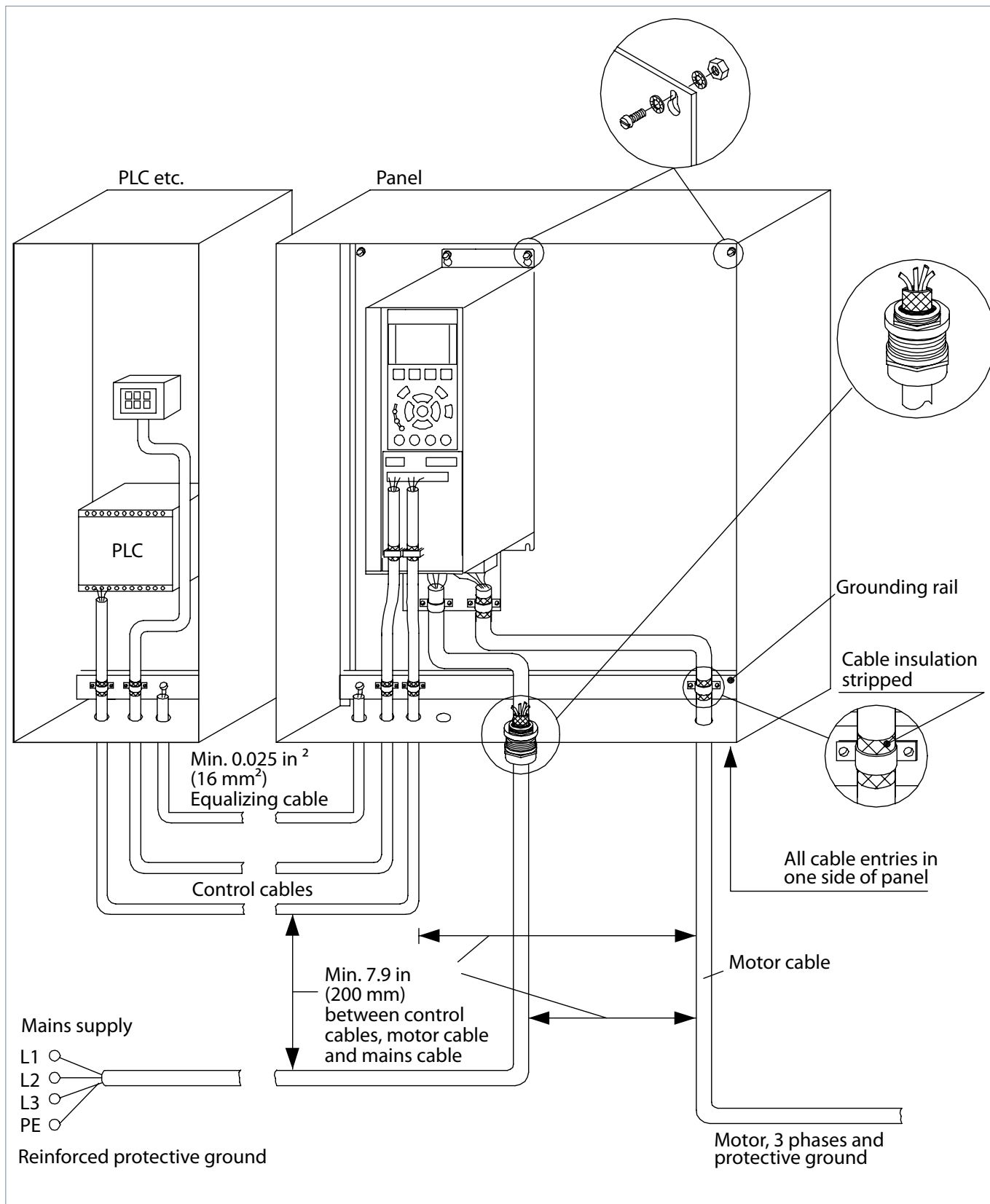
Below table lists recommended wiring sizes for the motor compressor power supply cables. These wiring sizes are valid for a cable length up to 20 m.

The motor compressor cable must be installed in a conduit separate from the control and mains cables.

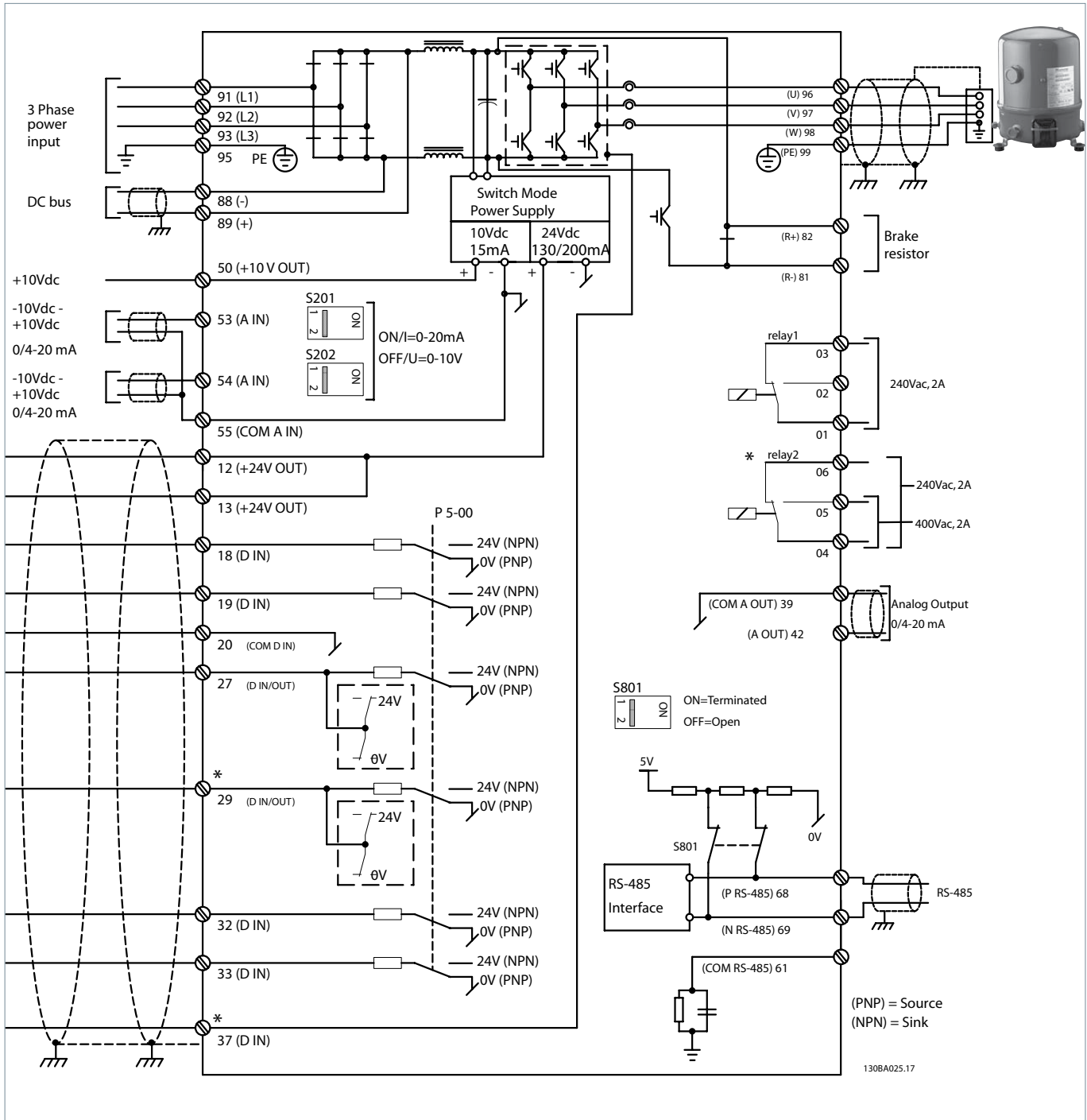
	Compressor	Recommended wiring size	
		mm ²	AWG
200-240 V	VTZ038-J	4	12
	VTZ054-J	4	12
	VTZ086-J	6	10
	VTZ121-J	10	8
380-480 Volt	VTZ038-G	2.5	14
	VTZ054-G	2.5	14
	VTZ086-G	4	12
	VTZ121-G	6	10
	VTZ215-G	10	8

Physical installation of the frequency converter on the mounting plate must ensure good electrical contact between the mounting plate

EMC correct installation of an IP20 frequency converter CD302



Wiring diagram



Fuses

The main power supply to the frequency converter must be done through a circuit breaker or a set of fuses, type gG. For motor code J (200-240 V) also gR type fuses may be applied.

Frequency converter	EN50178 compliant fuses		UL Compliant fuses							
	Size	Type	Bussmann			SIBA	Little fuse	Ferraz-Shawmut		
			Type RK1	Type J	Type T	Type RK1	Type RK1	Type CC	Type RK1	
200-240 V	CD-302 3K7	32 A	gG / gR	KTN-R30	JKS-30	JJN-30	5012406-32	KLN-R30	ATM-R30	A2K-30R
	CD-302 5K5	63 A	gG / gR	KTN-R50	JKS-50	JJN-50	5012406-50	KLN-R50	ATM-R50	A2K-50R
	CD-302 7K5	63 A	gG / gR	KTN-R60	JKS-60	JJN-60	5012406-63	KLN-R60	ATM-R60	A2K-60R
	CD-302 11K	80 A	gG / gR	KTN-R80	JKS-80	JJN-80	5014006-80	KLN-R80	-	A2K-80R
380-480 Volt	CD-302 3K0	20 A	gG	KTS-R15	JKS-15	JJS-15	5017906-16	KLS-R15	ATM-R15	A6K-15R
	CD-302 4K0	20 A	gG	KTS-R20	JKS-20	JJS-20	5017906-020	KLS-R20	ATM-R20	A6K-20R
	CD-302 5K5	32 A	gG	KTS-R30	JKS-30	JJS-30	5012406-32	KLS-R30	ATM-R30	A6K-30R
	CD-302 7K5	32 A	gG	KTS-R30	JKS-30	JJS-30	5012406-32	KLS-R30	ATM-R30	A6K-30R
	CD-302 11K	63 A	gG	KTS-R40	JKS-40	JJS-40	5014006-040	KLS-R40	-	A6K-40R
	CD-302 15K	63 A	gG	KTS-R50	JKS-50	JJS-50	5014006-50	KLS-R50	-	A6K-50R
	CD-302 18K	63 A	gG	KTS-R60	JKS-60	JJS-60	5014006-63	KLS-R60	-	A6K-60R

Supply voltage

Because VTZ compressors are powered by a frequency converter, the mains frequency, 50 or 60 Hz, is no longer an issue. Only the mains voltage is to be taken into account. Two motor

voltage codes are available. Never connect the VTZ compressor directly to the mains power supply.

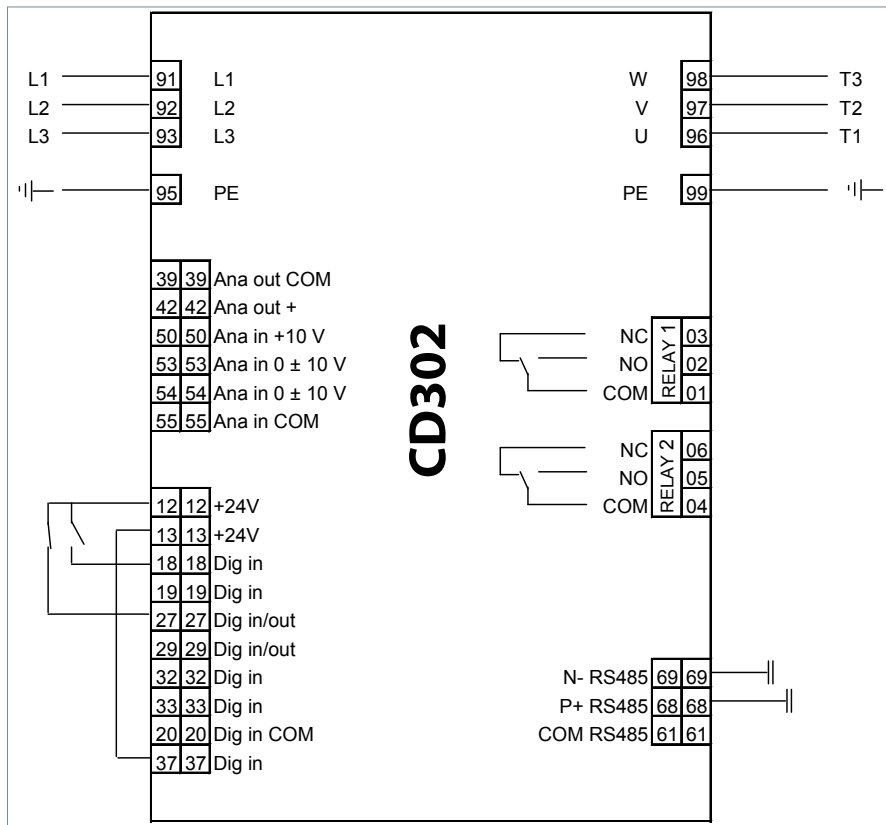
Compressor voltage code	Frequency converter mains voltage range
J	200-240 V / 3 ph / 50 Hz & 200-240 V / 3 ph / 60 Hz
G	380-480 V / 3 ph / 50 Hz & 380 - 480 V / 3 ph / 60 Hz

Operating voltage range

The compressor operating voltage limits are directly managed by the CD302 frequency converter generating a constant voltage /

frequency ratio. This ratio is factory preset in the frequency converter corresponding to the compressor motor design.

Wiring connections



- Legends:
- Ana: Analogue
 - Dig: Digital
 - in: Input
 - out: Output
 - COM: Common
 - NC: Normally-closed
 - NO: Normally-open

		Open loop	Process loop
91, 92, 93	3 Phase mains input	X	X
95	Earth	X	X
39, 42	Analogue output	-	-
50	Analogue input	-	-
53	PLC+ (0 to 10 V)	X	-
54	Sensor -	-	X
55	PLC-	X	-
12	HP/LP switch	X	X
12	External On/Off (NO)	X	X
13	Factory bridged to 37	X	X
13	Sensor +	-	X
18	External On/Off (NO)	X	X
19	Digital input	-	-
27	HP/LP switch (NC) / safety devices	X	X
29	Digital input/output	-	-
32, 33	Digital input	-	-
20	Digital input Common	-	-
37	Factory bridged to 13	X	X
98	To compressor terminal T3	X	X
97	To compressor terminal T2	X	X
96	To compressor terminal T1	X	X
99	To compressor earth connection	X	X
02, 01	Relay 1	-	-
06, 05, 04	Relay 2	-	-
69, 68	RS485 Bus	-	-
61	RS485 Bus Common	-	-

- : Optional connection
 X : Mandatory connection

The CD302 frequency converter is factory preset with parameters for the open loop control principle. The process loop control principle can be selected by changing parameters in the «Quick menu».

Open loop: preset on input 53
 0 - 10 V control
 Frequency converter in slave mode

Process loop: preset on input 54
 4 - 20 mA control
 Frequency converter under own PID controller

Electrical connections

Electrical power is connected to the compressor terminals by Ø 4.8 mm (3/16") screws. The maximum tightening torque is 3 Nm. Use a 1/4" ring terminal on the power leads.

The cable gland has to be of EMC design to garanty a good grounding of the armored cable. Paint free areas on electrical box allow correct ground continuity.

Soft-start control

The CD302 frequency converter generates by design a compressor soft start with an initial ramp up of 0.54 sec.
Current inrush is at highest the frequency converter maximum current.

Basically seen from the mains the inrush peak reach a level which is only a few percent more than the rated nominal current.

Phase sequency and reverse rotation protection

The CD302 frequency converter is preset to run the VTZ compressors clockwise so the only care is to well connect the CDS302 output to the compressor connectors:

- CD302 terminal U (96) to VTZ terminal T1
- CD302 terminal V (97) to VTZ terminal T2
- CD302 terminal W (98) to VTZ terminal T3

Mains connection to the CD302 frequency converter order has no influence on the output phase sequence which is managed by the frequency converter.

IP rating

The compressor terminal box IP rating according to CEI529 is IP54 when correctly sized IP54 rated cable glands are used.

Motor protection

The CD302 frequency converter does not only control the compressor speed, but it provides effective compressor protection as well.

In case of quasi sudden overloads (locked rotor, liquid slugging...) another protection is activated that can only be reset manually.

The CD302 has a built-in over-current protection. When a too high current is detected, for example by working outside the application envelope, the frequency converter immediately adjusts the compressor to a lower speed. The speed can be decreased down to the minimum value as in the setup parameters. When this value is reached, the CD302 stops the compressor. The compressor will re-start automatically after a given delay as in the set-up parameters. When this type of over-current stops has occurred more often than the pre-set maximum (parameter 14.20) the compressor can only be re-started manually.

The CD302 frequency converter allows over-modulation; the frequency converter can compensate the motor torque at a drop of up to 10% of mains voltage and continue operation down to 85% of nominal mains voltage.

The CD302 frequency converter allows to manage low and high current. This function automatically adjusts the motor speed to match motor current to nominal values. Note: Current draw to the VTZ compressor remains close to constant for a given refrigeration working load over the full speed range.

Voltage imbalance

The maximum allowable voltage imbalance between each phase is 3%. Voltage imbalance causes high amperage over one or several phases, which in turn leads to overheating and possible drive damage.

Mains imbalance function in CD302 frequency converter can be set to "[0] Trip" or "[1] Warning" in 14.12 parameter. It is, by default, factory preset to "[1] Warning".

Ambient temperature and altitude

The normal ambient temperature supported by the frequency converter covers a range from -10°C to +50°C without any issue or derating. Anyhow, the frequency converter will operate normally down to -20°C where only the screen of the LCP (if installed) will show display issues which will not be damaged.

For ambient temperatures above +50°C, it is mandatory to integrate a derating output factor for the maximum compressor electrical motor power/current. The derating values are shown in the drive application manual and are linked to the drive frame and IP protection level.

For altitude below 1000m, the frequency converter will be able to deliver 100% output power under full load for above ambient temperature. However, for altitude above 1000m derating must be applied like shown on the table below.

Altitude	Derating factor
1000 m	1
1500 m	0,95
2000 m	0,9
2500 m	0,86
3000 m	0,82
3500 m	0,78

For more details about these specific running conditions, please contact Danfoss technical support.