

■ VLT 6000 HVAC



■ Ordering guide

This section makes it easier for you to specify and order a VLT 6000 HVAC.

■ Choice of frequency converter

The frequency converter should be chosen on the basis of the given motor current at maximum load on the system. The rated output current $I_{VLT,N}$ must be equal to or higher than the required motor current.

VLT 6000 HVAC is available for two mains voltage ranges: 200-240 V and 380-460 V.

■ Mains voltage

Choose mains voltage for 50/60 Hz:

- 200-240 V three-phase AC voltage
- 380-460 V three-phase AC voltage

Mains voltage 200 - 240 V

VLT type	Typical shaft output $P_{VLT,N}$		Max continuous output current	Max continuous output power at 240 V $S_{VLT,N}$
	[kW]	[HP]	$I_{VLT,N}$ [A]	[kVA]
6002	1.1	1.5	6.6	2.7
6003	1.5	2.0	7.5	3.1
6004	2.2	3.0	10.6	4.4
6005	3.0	4.0	12.5	5.2
6006	4.0	5.0	16.7	6.9
6008	5.5	7.5	24.2	10.1
6011	7.5	10	30.8	12.8
6016	11	15	46.2	19.1
6022	15	20	59.4	24.7
6027	18.5	25	74.8	31.1
6032	22	30	88.0	36.6
6042	30	40	115/104*	43.2
6052	37	50	143/130*	54.0
6062	45	60	170/154*	64.0

- * The first figure is for a motor voltage of 200-230 V.
The next figure is for a motor voltage of 231-240 V.

VLT® 6000 HVAC

Mains voltage 380 - 415 V

Typical shaft output $P_{VLT.N}$			Max continuous output current	Max continuous output power at 400 V $S_{VLT.N}$
VLT type	[kW]	[HP]	$I_{VLT.N}$ [A]	[kVA]
6002	1.1	1.5	3.0	2.2
6003	1.5	2.0	4.1	2.9
6004	2.2	3.0	5.6	4.0
6005	3.0	-	7.2	5.2
6006	4.0	5.0	10.0	7.2
6008	5.5	7.5	13.0	9.3
6011	7.5	10	16.0	11.5
6016	11	15	24.0	17.3
6022	15	20	32.0	23.0
6027	18.5	25	37.5	27.0
6032	22	30	44.0	31.6
6042	30	40	61.0	43.8
6052	37	50	73.0	52.5
6062	45	60	90.0	64.7
6075	55	75	106	73.0
6100	75	100	147	102
6125	90	125	177	123
6150	110	150	212	147
6175	132	200	260	180
6225	160	250	315	218
6275	200	300	368	255

Mains voltage 440 - 460 V

Typical shaft output $P_{VLT.N}$			Max continuous output current	Max continuous output power at 460 V $S_{VLT.N}$
VLT type	[kW]	[HP]	$I_{VLT.N}$ [A]	[kVA]
6002	1.1	1.5	3.0	2.4
6003	1.5	2.0	3.4	2.7
6004	2.2	3.0	4.8	3.8
6005	3.0	-	6.3	5.0
6006	4.0	5.0	8.2	6.5
6008	5.5	7.5	11.0	8.8
6011	7.5	10	14.0	11.2
6016	11	15	21.0	16.7
6022	15	20	27.0	21.5
6027	18.5	25	34.0	27.1
6032	22	30	40.0	31.9
6042	30	40	52.0	41.4
6052	37	50	65.0	51.8
6062	45	60	77.0	61.3
6075	55	75	106	84.5
6100	75	100	130	104
6125	90	125	160	127
6150	110	150	190	151
6175	132	200	240	191
6225	160	250	302	241
6275	200	300	361	288

■ Enclosure

VLT 6000 HVAC is available with the following enclosures:

- IP 00: 30 to 45 kW / 200-240 V
- IP 00: 55 to 200 kW / 380-460 V
- Bookstyle IP 20: 1.1 to 3.0 kW / 200-240 V
- Bookstyle IP 20: 1.1 to 7.5 kW / 380-460 V
- IP 20: 1.1 to 45 kW / 200-240 V
- IP 20: 1.1 to 200 kW / 380-460 V
- IP 54: 1.1 to 45 kW / 200-240 V
- IP 54: 1.1 to 200 kW / 380-460 V

IP 00: This enclosure is only available for the larger power sizes of the VLT 6000 HVAC series. It is recommended for installation in standard cabinets.

IP 20 Bookstyle: This enclosure is designed for cabinet installation. It takes up a minimum of space and can be fitted side-by-side without installation of extra cooling equipment.

IP 20: This enclosure is used as standard enclosure for VLT 6000 HVAC. It is ideal for cabinet installation in areas where a high degree of protection is required. This enclosure also permits side-by-side installation.

IP 54: This enclosure can be fitted direct to the wall. Cabinets are not required. IP 54 units can also be installed side-by-side.

■ RFI filter

As standard, the VLT 6000 HVAC has an integral RFI filter up to and including 7.5 kW (3 kW 200 V).

These RFI filters comply with EMC standards EN 55011-1A, provided max. 150 m screened/armoured cable is used, and with EN 55011-1B, provided 50 m screened/armoured cable is used (Bookstyle max. 20 m screened/armoured).

Select a RFI filter for dampening of interference in accordance with EN 55011-1A and EN 55011-1B.

■ Harmonic filter

The harmonic currents do not directly affect the electricity consumption, but they do increase the heat losses in the installation (transformers, cables). That is why in systems with a rather high percentage of rectifier load it is important to keep the harmonic currents at a low level in order to avoid transformer overloads and high cable temperatures.

As standard, the VLT 6000 HVAC has coils in the intermediate circuit in order to ensure low harmonic currents. This typically reduces the input current I_{RMS} by 40 %.

■ Control unit (LCP)

The VLT 6000 HVAC is available with or without control unit (LCP); however, IP 54 units always come with the control unit.

This control unit makes up a complete interface for control and programming of the VLT 6000 HVAC. The control panel is detachable and may - as an alternative - be mounted up to 3 metres away from the VLT frequency converter, i.e. in a cabinet, by means of a fitting kit delivered with the unit.

Data information is given in a 4-line alpha-numerical display, which under normal operation is able to continuously show four operating data items and three operating modes. During programming, all the information required for quickly and efficiently setting up VLT frequency converter parameters will be shown.

As a supplement to the display, there are three indicator lamps for voltage (ON), warning (WARNING) and alarm (ALARM).

All VLT frequency converter parameter Setups can be changed directly via the control panel.

The following options are available:

- Control panel LCP (only for IP 20 units).
- LCP remote-mounting kit for remote control of IP 00 and IP 20 units.
- LCP remote-mounting kit for remote control of IP 54.
- 3 metre cable for LCP.

■ **Fieldbus protocols**

Danfoss VLT frequency converters are able to fulfil many different functions in an automated building management system. The VLT frequency converter can be integrated directly in an overall monitoring system.

This means that detailed process data can be transmitted via serial communication. The protocols listed below are based on a RS 485 bus system with a maximum transmission speed of 9600 bauds.

As standard, the following protocols are supported:

- Danfoss FC protocol
- Johnson's Control Metasys N2
- Landis & Staefa FLN

A frequency converter can be set and applied in all building management control systems.

Status messages, warnings and alarms provide valuable assistance in visualising and assessing processes.

■ **Fieldbus options**

The increasing need for information in building management systems makes it necessary to collect or visualise many different types of process data. Important process data can help the system technician in the day-by-day monitoring of the system, which means that a negative development - e.g. an increase in energy consumption - can be rectified in time.

The substantial amount of data in large buildings may generate a need for a higher transmission speed than 9600 baud. Danfoss VLT 6000 HVAC is available with LonWorks® or Profibus®, both of which have higher performance than standard integrated serial communication.

■ **Profibus**

Profibus is a fieldbus system with FMS and DP, which can be used for linking automation units, such as sensors and actuators, to the controls by means of a two-conductor cable.

Profibus **FMS** is used if major communication tasks are to be solved at cell and system level by means of large volumes of data.

Profibus **DP** is an extremely fast communication protocol, made specially for communication between the automation system and various units.

■ **LON - Local Operating Network**

LonWorks is an intelligent fieldbus system which improves the possibility of decentralising control, as communication is enabled between individual units in the same system (Peer-to-Peer).

This means that there is no need for a big main station for handling all the signals of the system (Master-Slave). Signals are sent direct to the unit that needs them via a common network medium. This makes communication much more flexible and the central building state control and monitoring system can be changed into a dedicated building state monitoring system whose task is to ensure that everything is running as planned. If the potential of LonWorks is fully utilised, sensors will also be connected to the bus, which means that a sensor signal can quickly be moved to another controller. If room dividers are mobile, this is a particularly useful feature.

Two feedback signals can be linked to the VLT 6000 HVAC by means of LonWorks, thereby enabling the internal PID regulator to regulate directly on the bus feedback.

■ Ordering form VLT 6000 HVAC

VLT 6 H T S T R D

Power sizes
e.g. 6008

Application range
HVAC H

Mains voltage
3 x 200 - 240 V T2
3 x 380 - 460 V T4

Enclosure
Bookstyle IP 20 B 20
6002-6005 200-240 V
6002-6011 380-460 V
IP 00 C 00
6042-6062 200-240 V
6075-6275 380-460 V
IP 20 C 20
6002-6062 200-240 V
6002-6275 380-460 V
IP 54 C 54
6002-6062 200-240 V
6002-6275 380-460 V

Hardware variant
standard only ST

RFI filter
Available w/o filter in the ranges R0
6006-6062 200-240 V
6016-6275 380-460 V
With integral 1A + 1B filter R3

Control unit (LCP)
W/o LCP (not an option with IP 54) D0
W/ LCP DL

Fieldbus option card
No option
Profibus
LonWorks Free Topology Process
LonWorks 78 KBPS
LonWorks 1.25 MBPS

Application option card
W/ relay card
(not with fieldbus option) A 31

No. units of this type

Required delivery date

Ordered by:

Date: _____

Take a copy of the ordering forms. Fill them in and send or fax your order to the nearest office of the Danfoss sales organisation.

■ **LC filters VLT 6008-6032, 200 - 240 V / 6016-6062 380 - 460 V**

The table and the drawing give the measurements of IP 00 LC filters for Compact units.

IP 00 LC filters must be integrated and protected against dust, water and corrosive gases.

Max. motor cable length:

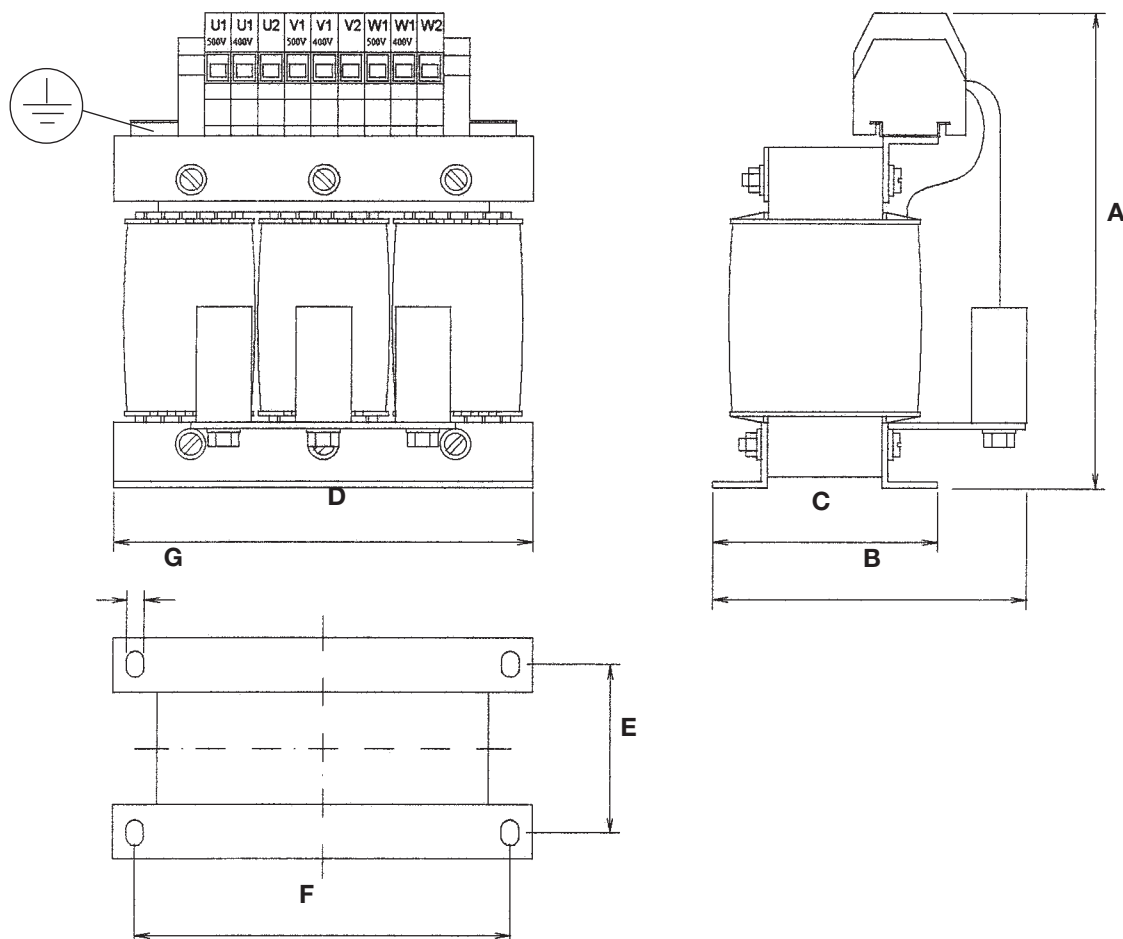
- 150 m screened/armoured cable
- 300 m unscreened/unarmoured cable

If EMC standards are to be complied with:

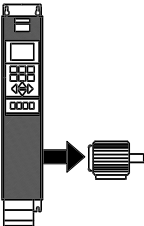
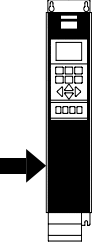
- EN 55011-1B: Max. 50 screened/armoured cable
Bookstyle: Max. 20 m screened/armoured cable
- EN 55011-1A: Max. 150 m screened/armoured cable

LC filter IP 00

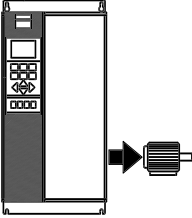
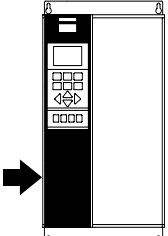
LC type	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	Weight [kg]
175Z4600	220	135	92	190	68	170	8	10
175Z4601	220	145	102	190	78	170	8	13
175Z4602	250	165	117	210	92	180	8	17
175Z4603	295	200	151	240	126	190	11	29
175Z4604	355	205	152	300	121	240	11	38
175Z4605	360	215	165	300	134	240	11	49
175Z4606	280	170	121	240	96	190	11	18
175Z4607	280	175	125	240	100	190	11	20
175Z4608	280	180	131	240	106	190	11	23
175Z4609	295	200	151	240	126	190	11	29
175Z4610	355	205	152	300	121	240	11	38
175Z4611	355	235	177	300	146	240	11	50
175Z4612	405	230	163	360	126	310	11	65



■ **Technical data, mains supply 3 x 380 - 460 V**

According to international requirements		VLT type	6002	6003	6004	6005	6006	6008	6011
	Output current	$I_{VLT,N}$ [A] (380-415 V)	3.0	4.1	5.6	7.2	10.0	13.0	16.0
		$I_{VLT,MAX}$ (60 s) [A] (380-415 V)	3.3	4.5	6.2	7.9	11.0	14.3	17.6
		$I_{VLT,N}$ [A] (440-460 V)	3.0	3.4	4.8	6.3	8.2	11.0	14.0
		$I_{VLT,MAX}$ (60 s) [A] (440-460 V)	3.3	3.7	5.3	6.9	9.0	12.1	15.4
	Output	$S_{VLT,N}$ [kVA] (400 V)	2.2	2.9	4.0	5.2	7.2	9.3	11.5
		$S_{VLT,N}$ [kVA] (460 V)	2.4	2.7	3.8	5.0	6.5	8.8	11.2
	Typical shaft output	$P_{VLT,N}$ [kW]	1.1	1.5	2.2	3.0	4.0	5.5	7.5
	Typical shaft output	$P_{VLT,N}$ [HP]	1.5	2	3	-	5	7.5	10
	Max. cable cross-section to motor	[mm ² /AWG]	4/10	4/10	4/10	4/10	4/10	4/10	4/10
	Max. input current (RMS)	$I_{L,N}$ [A] (380 V) $I_{L,N}$ [A] (460 V)	2.8 2.5	3.8 3.4	5.3 4.8	7.0 6.0	9.1 8.3	12.2 10.6	15.0 14.0
	Max. cable cross-section, power	[mm ²]/[AWG] ²⁾	4/10	4/10	4/10	4/10	4/10	4/10	4/10
	Max. pre-fuses	[A]/UL ¹⁾ [A]	16/6	16/10	16/10	16/15	25/20	25/25	35/30
	Mains contactor	[Danfoss type] [AC value]	CI 6 AC-3	CI 6 AC-3	CI 6 AC-3	CI 9 AC-3	CI 12 AC-3	CI 5 AC-1	CI 6 AC-1
	Efficiency ³⁾		0.96						
	Weight IP 20	[kg]	8	8	8,5	8,5	10,5	10,5	10,5
	Weight IP 54	[kg]	11.5	11.5	12	12	14	14	14
	Power loss at max. load.	Total [W]	67	92	110	139	198	250	295
	Enclosure	VLT type	Bookstyle IP 20/Compact IP 20/IP 54						
			(Bookstyle IP 20 is available in the VLT 6002-6011 power range)						

■ **Mains supply 3 x 380 - 460 V**

According to international requirements		VLT type	6016	6022	6027	6032	6042	6052	6062
	Output current	$I_{VLT,N}$ [A] (380-415 V)	24.0	32.0	37.5	44.0	61.0	73.0	90.0
		$I_{VLT,MAX}$ (60 s) [A] (380-415 V)	26.4	35.2	41.3	48.4	67.1	80.3	99.0
		$I_{VLT,N}$ [A] (440-460 V)	21.0	27.0	34.0	40.0	52.0	65.0	77.0
		$I_{VLT,MAX}$ (60 s) [A] (440-460 V)	23.1	29.7	37.4	44.0	57.2	71.5	84.7
	Output	$S_{VLT,N}$ [kVA] (400 V)	17.3	23.0	27.0	31.6	43.8	52.5	64.7
		$S_{VLT,N}$ [kVA] (460 V)	16.7	21.5	27.1	31.9	41.4	51.8	61.3
	Typical shaft output	$P_{VLT,N}$ [kW]	11	15	18.5	22	30	37	45
	Typical shaft output	$P_{VLT,N}$ [HP]	15	20	25	30	40	50	60
	Max. cable cross-section to motor and DC-bus	[mm ² /AWG]	16/6	16/6	16/6	16/6	35/2	35/2	50/0
	Min. cable cross-section to motor and DC-bus ⁴⁾	[mm ² /AWG]	10/8	10/8	10/8	10/8	10/8	10/8	16/6
	Max. input current (RMS)	$I_{L,N}$ [A] (380 V) $I_{L,N}$ [A] (460 V)	24.0 21.0	32.0 27.6	37.5 34.0	44.0 41.0	60.0 53.0	72.0 64.0	89.0 77.0
	Max. cable cross-section, power	[mm ²]/[AWG]	16/6	16/6	16/6	16/6	35/2	35/2	50/0
	Max. pre-fuses	[A]/UL ¹⁾ [A]	63/40	63/40	63/50	63/60	80/80	100/100	125/125
	Efficiency at rated frequency		0.96						
	Weight IP 20	[kg]	23	23	23	30	30	48	48
	Weight IP 54	[kg]	48	48	48	51	61	67	70
	Power loss at max. load.	[W]	419	559	655	768	1065	1275	1571
	Enclosure		IP 20/IP 54						

1. If UL/cUL is to be complied with, pre-fuses type Bussmann KTS-R or similar must be used. Pre-fuses type gG must be used for VLT 6002 - VLT 6032, 200/240 V and VLT 6002 - VLT 6062, 380/460 V. Pre-fuses type gR must be used for VLT 6042 - 6062, 200/240 V and VLT 6075 - VLT 6275, 380/460 V. The fuses must be placed to protect a circuit capable of supplying max. 100,000 amps rms (symmetrical), 500 V maximum.
2. American Wire Gauge.
3. Measured using 30 m screened motor cable at rated load and rated frequency.
4. Min. cable cross-section is the smallest cable cross-section allowed to be fitted on the terminals.
Always comply with national and local regulations on min. cable cross-section.

■ Mechanical dimensions

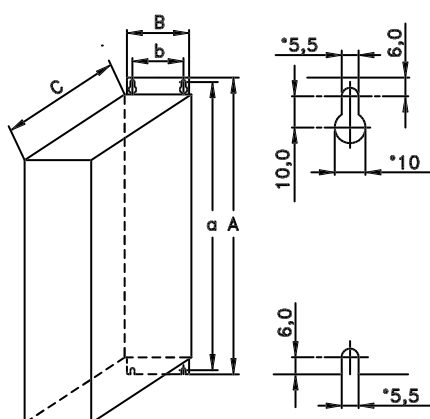
All measurements in mm.

VLT type	A	B	C		a	b	aa/bb	Type
Bookstyle IP 20 200-240 V								
6002 - 6003	395	90	260		384	70	100	A
6004 - 6005	395	130	260		384	70	100	A
Bookstyle IP 20 380-460 V								
6002 - 6005	395	90	260		384	70	100	A
6006 - 6011	395	130	260		384	70	100	A
IP 00 200-240 V								
6042 - 6062	800	370	335		780	270	225	B
IP 00 380-460 V								
6075 - 6125	800	370	335		780	270	225	B
6150 - 6275	1400	420	400		1380	350	225	B
IP 20 200-240 V								
6002 - 6003	395	220	160		384	200	100	C
6004 - 6005	395	220	200		384	200	100	C
6006 - 6011	560	242	260		540	200	200	D
6016 - 6022	700	242	260		680	200	200	D
6027 - 6032	800	308	296		780	270	200	D
6042 - 6062	954	370	335		780	270	225	E
IP 20 380-460 V								
6002 - 6005	395	220	160		384	200	100	C
6006 - 6011	395	220	200		384	200	100	C
6016 - 6027	560	242	260		540	200	200	D
6032 - 6042	700	242	260		680	200	200	D
6052 - 6062	800	308	296		780	270	200	D
6075 - 6125	954	370	335		780	270	225	E
6150 - 6275	1554	420	400		1380	350	225	E
VLT type	A	B	C	D	a	b	a/b	Type
IP 54 200-240 V								
6002 - 6003	460	282	195	85	260	258	100	F
6004 - 6005	530	282	195	85	330	258	100	F
6006 - 6011	810	355	280	70	560	330	200	F
6016 - 6032	940	400	280	70	690	375	200	F
6042 - 6062	937	495	421	-	830	374	225	G
IP 54 380-460 V								
6002 - 6005	460	282	195	85	260	258	100	F
6006 - 6011	530	282	195	85	330	258	100	F
6016 - 6032	810	355	280	70	560	330	200	F
6042 - 6062	940	400	280	70	690	375	200	F
6075 - 6125	937	495	421	-	830	374	225	G
6150 - 6275	1572	495	425	-	1465	445	225	G
Option for IP 00 VLT 6075-6275	A1	B1	C1					
IP 20 bottom cover								
6075 - 6125	175	370	335					
6150 - 6275	175	420	400					

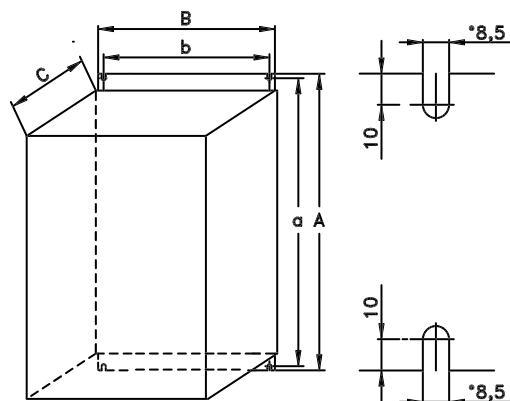
aa: Min. air above enclosure

ab: Min. air below enclosure

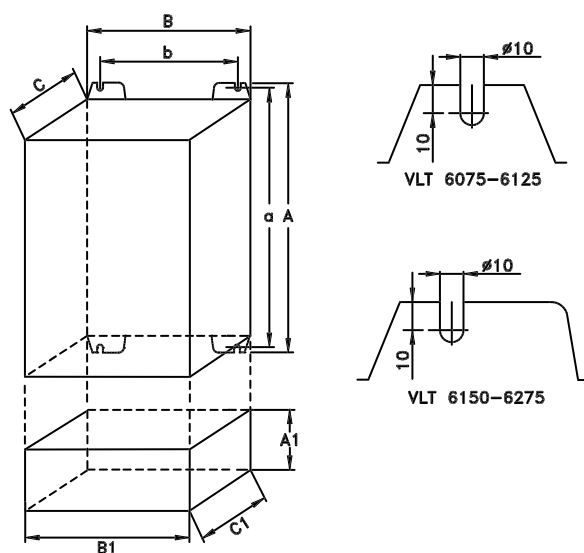
■ Mechanical dimensions



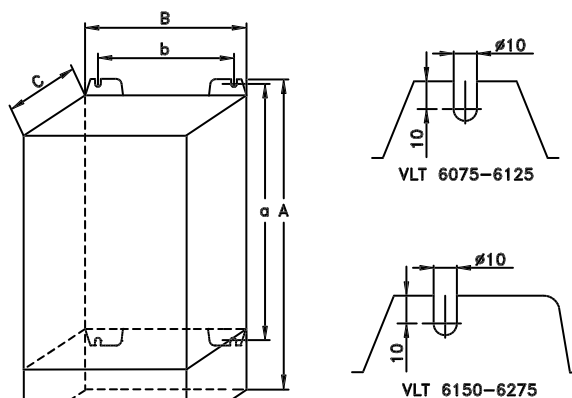
Type A, IP20



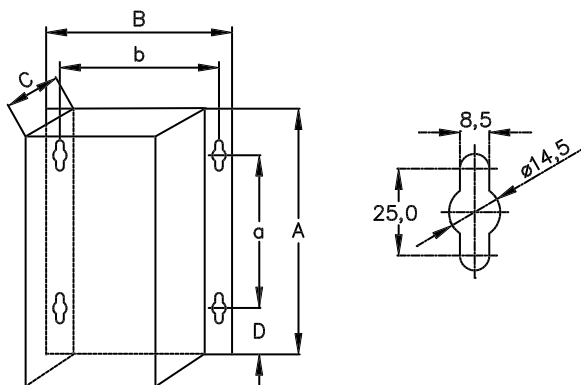
Type D, IP20



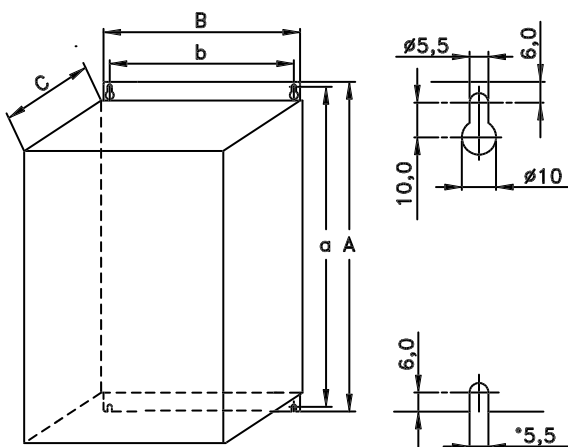
Type B, IP00
With option and enclosure IP20



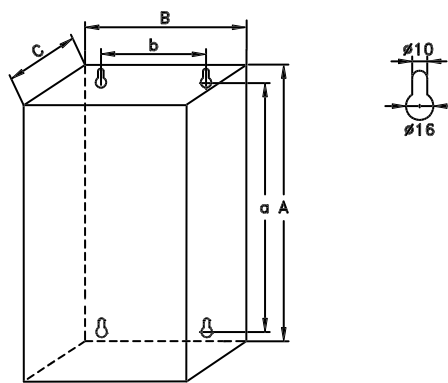
Type E, IP20



Type F, IP54



Type C, IP20



Type G, IP54