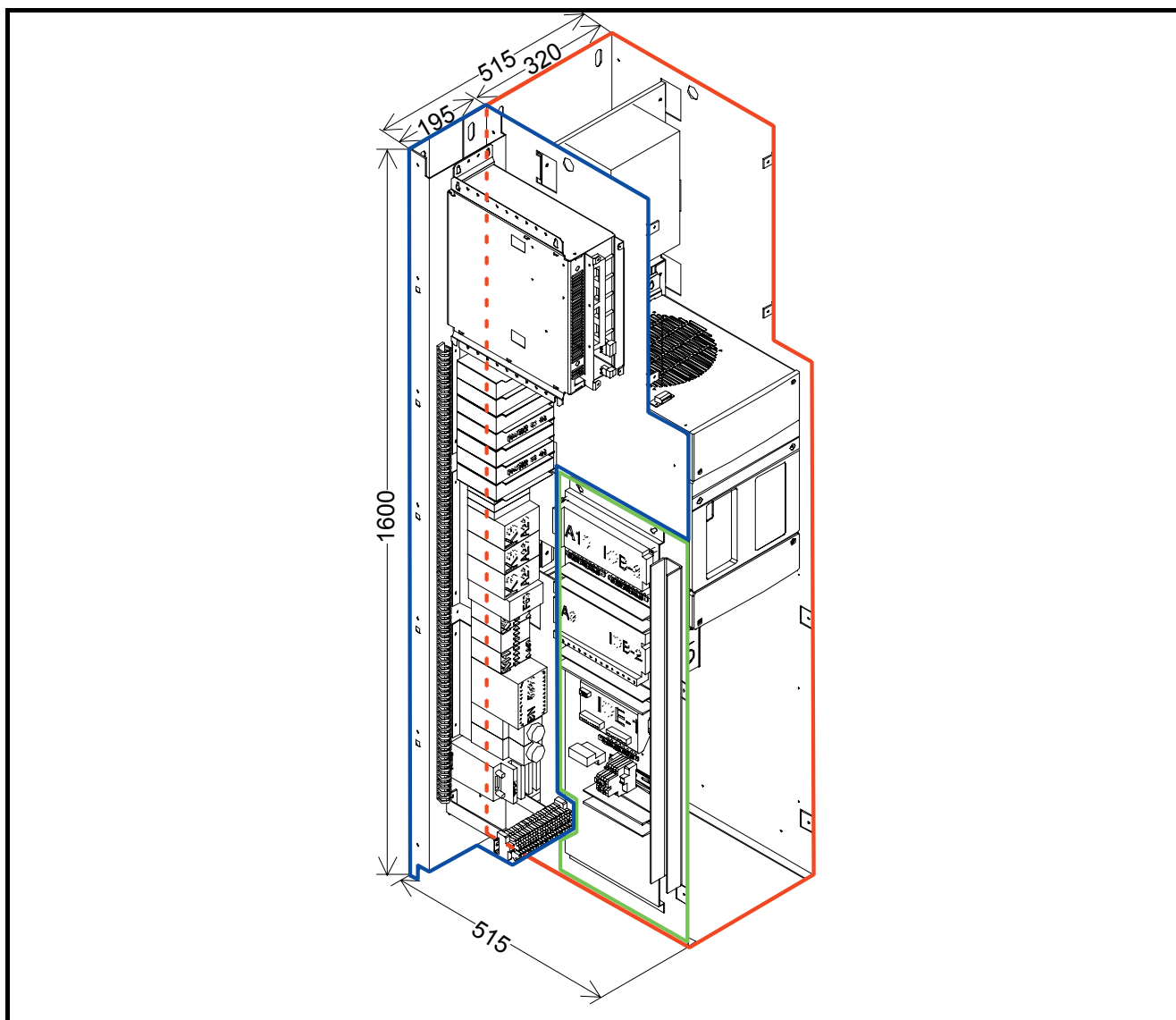


Thyristor Power Converters for DC Drive Systems

Installation Manual DCE500, DCE 600 Panel Solution



Thyristor Power Converters for DC Drive Systems

Installation Manual DCE500, DCE 600 Panel Solution

Code: 3ADW 000 188 R0101 Rev A

DCE5_6_IM_e_a.DOC

EFFECTIVE: May. 26th, 2004
SUPERSEDES:

Safety Instructions

Overview

This chapter contains safety instructions which must be complied with during installation, operation and maintenance of the power converters series **DCS 500 or DCS 600**. If these instructions are not complied with, this may result in injuries (perhaps even with fatal) or in damage to the power converter, the motor and the driven machine. Before starting with any work whatsoever at or with this unit, you must read the information given in this chapter.

Warnings

Warnings provide information on states which if the specified procedure for the state concerned is not meticulously complied with may result in a serious error, in major damage to the unit, in injury to persons and even in death.

They are identified by the following symbols:



Danger: High Voltage! This symbol warns you of high voltages which may result in injuries to persons and/or damage to equipment. Where appropriate, the text printed adjacent to this symbol describes how risks of this kind may be avoided.

- All electrical installation and maintenance work on the thyristor power converter must be carried out by properly qualified staff who have been thoroughly trained in electrical engineering.
- The thyristor power converter and its adjacent units must be properly earthed by qualified professionals.
- You must NEVER perform any work on the thyristor power converter while it is still switched on. First switch the unit off, use a measuring instrument to make absolutely sure that the power converter has really been de-energized, and only then you may start with the work concerned.
- Due to external control circuits, there may be dangerously high voltages present at the thyristor power converter even after the line voltage has been switched off. So always work at the unit with appropriate caution! Non-compliance with these instructions may result in injury (or even death!).



General warning: this symbol warns you of non-electrical risks and dangers which may result in serious or even fatal injury to persons and/or in damage to equipment. Where appropriate, the text printed adjacent to this symbol describes how risks of this kind may be avoided.

- When thyristor power converters are in use, the electric motors, power transmission elements and the driven machines are working in an extended operating range, which means they have to cope with a relatively high loading.
- You should have made sure that all units, devices and appliances used are actually suitable for this higher loading.
- If you have to operate the thyristor power converter at a rated motor voltage and/or a rated motor current significantly below the figures stated in the thyristor power converter's output data, you must take appropriate precautionary measures to protect the unit against overspeed, overload, breakage, etc., by modifying the software or hardware appropriately.
- For insulation testing, you must disconnect all cables from the thyristor power converter. You should avoid operating your unit at values other than the rated data. Non-compliance with these instructions may cause lasting damage to the thyristor power converter.
- The thyristor power converter possesses a number of automatic reset functions. When these functions are executed, the unit will be reset after an error and will then resume operation. These functions should not be used if other units and devices are not suitable for an operating mode of this kind, or if their use might entail dangerous situations.



Warning of electrostatic discharge: this symbol warns you against electrostatic discharges which may damage the unit. Where appropriate, the text printed next to this symbol describes how a risk of this kind may be avoided.

Notes

Notes supply information on states requiring particular attention, or indicate that additional information is available on a specific topic. For this purpose, the following symbols are used:

CAUTION! **Cautions** are designed to draw your attention to a particular state of affairs.

Note A **note** contains or refers you to additional information available on the particular topic concerned.

Mains connection

You can use a switch disconnecter (with fuses) in the power supply of the thyristor power converter to disconnect the electrical components of the unit from the power supply for installation and maintenance work. The type of disconnecter used must be a switch disconnecter as per EN 60947-3, Class B, so as to comply with EU regulations, or a circuit-breaker type which switches off the load circuit by means of an auxiliary contact causing the breaker's main contacts to open. The mains disconnecter must be locked in its "OPEN" position during any installation and maintenance work.

EMERGENCY STOP buttons

EMERGENCY STOP buttons must be installed at each control desk and at all other control panels requiring an emergency stop function. Pressing the STOP button on the CDP 31x control panel of the thyristor power converter will neither cause an emergency motor stop, nor will the drive be disconnected from any dangerous potential.

To avoid unintentional operating states, or to shut the unit down in case of any imminent danger according to the standards in the safety instructions it is **not** sufficient to **merely** shut down the drive via signals „RUN“, „drive OFF“ or „Emergency Stop“ respectively „control panel“ or „PC tool“.

Intended use

The operating instructions cannot take into consideration every possible case of configuration, operation or maintenance. Thus, they mainly give such advice only, which is required by qualified personnel for normal operation of the machines and devices in industrial installations.

If in special cases the electrical machines and devices are intended for use in non-industrial installations - which may require stricter safety regulations (e.g. protection against contact by children or similar) -, these additional safety measures for the installation must be provided by the customer during assembly.

Contents

IX H INSTALLATION MANUAL

Safety Instructions

Chapter 1 - Mechanical Installation

How to use this manual.....	1-1
Associated publications	1-1
Preparations and considerations that can be done before the system shut down.....	1-2
Preparing the cabinet.....	1-3
Fixing the mounting supports	1-3
Inserting the sliding rails	1-4
Push the DCE panel into the cabinet.....	1-5
Removing the Sliding Rails.....	1-5
Mounting of the panel CDP312 on the cabinet door (optional).....	1-6

Chapter 2 – Electrical Installation

AC-connection	2-1
DC-Connection	2-1
Field connection	2-1
Control cable connection	2-1
Commissioning	2-1

Appendix - A

DCE 500 / 600 Panel Solution unit types	A-1
Drilling pattern for CDP 312	A-2
Dimension of DCE panel and fixing holes.....	A-3
Lower mounting support	A-4
Upper mounting support	A-5

Chapter 1 – Mechanical Installation

How to use this manual

The purpose of this manual is to provide you with the information necessary to mount the DCE 500 / DCE 600 Panel into an empty cabinet..

As an example the mounting into an old ASEA Tyrak 8A cabinet is shown. However the given information and described procedures are also valid for other types of cabinets – mostly with only slight modifications. For that detailed dimension drawings are given for you to check the compatibility with your cabinet.

The mounting is described using a mounting kit, consisting of mounting supports and sliding rails. These are optional available and not in the standard scope of delivery. You may check if you can use them for your cabinet by the dimension drawing given in the appendix

This manual does not describe the commissioning of the DCS-Module itself. For that please refer to the documentation of the module

Associated publications

For the commissioning of the module please refer to the module's documentation, that can be found on the DC Drives Documents CD-ROM which is part of the document binder delivered with every DCE Unit.

First information can be found in the DCS 500 resp. DCS 600 Quick guide which too is part of the enclosed documentation

For mounting of the optional CDP312 Door Mounting kit please refer to the corresponding installation instruction.

Basic information about the DCE 500 / DCE 600 can be found in the DCE 500 / DCE 600 Flyer, No. 3ADW000187

Detailed Circuit Diagrams and a list of apparatus are part of the enclosed documentation of every DCE panel.

Preparations and considerations that can be done before the system shut down

If the DCE is used to revamp an existing DC-Drive, usually all work should be done as fast as possible to keep the system power down small. To decrease this time a lot of preparations and considerations can be done before the shut down. These are for example:

- Check the dimensions of the DCE and the clearance inside the cabinet to see if the DCE panel fits.
- The DCE panel consists of 3 separate units:
 - Power Unit
 - Auxiliary (Aux) Unit
 - I/O Unit

They are fixed together in the factory. However you may remove the fixings and mount every unit individually, e.g. if there is not enough free space to mount the whole panel. If you do so, please check the cable lengths for the interconnections between the units. If necessary provide longer cables.

- How will the DCE panel will be brought into the cabinet? Check availability of a crane or a fork-lift. The DCE panel offers handles for manual movement. The weights of the different DCE types is given in the appendix.
- How will the Panel be fixed to the cabinet? Check if you can use the optional available mounting supports and sliding rails (Dimensions can be found in the appendix). If the mounting kit does not fit to your type of cabinet prepare the cabinet or a mounting aid according to the fastening holes on the DCE panel.
- If you want to mount the CDP312 onto the cabinet door, you may do this before the system shut down. You can fix the panel either directly to the door by using the enclosed drilling pattern or you use the optional available CDP312 door mounting kit.
- Check AC and DC power cables. Is their length still sufficient for the DCE panel? DC Output terminals at the very bottom of the Power unit are available as option, as well as AC connection cables. Take also into consideration if you will re-use components like load switches or chokes.
- Check also the control and tacho or encoder cables. Is their length still sufficient for the DCE panel? If not you may purchase some optional available spare cables (check price list or flyer).

This list is intended to give you some useful hints to think about. It cannot be complete and you should consider the individual local situation.

Preparing the cabinet

Remove all old equipment that will not be re-used.

For a typical Tyrak 8 Revamp you may re-use besides the cabinet and busbars the load switch and the main fuses.

Note: Typically only line fuses were used in Tyraks as incoming AC fuses. They can be left in the cabinet and re-used, but the DCE has its own SCR-fuses to protect the DCS-module.

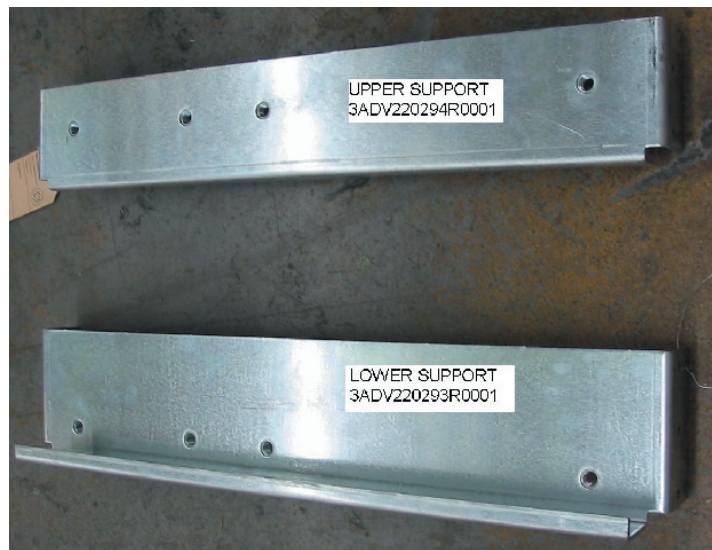
The Tyrak line chokes may also be re-used. But It's recommended to use also the 1% uk-chokes on the DCE-panel, as the Tyrak chokes typical have a very low inductance. But due to the low inductance the losses are very low, and so it may even be operated in serial to the DCE chokes, they do not interfere.

All external equipment, like Residual current detection or field transformer can be re-used, but it's recommended to remove it from the cabinet for installation of the DCE.

Ensure that there is enough free space for mounting of the DCE panel (check dimension drawings in the appendix). Consider also some free space for connecting the cables.

Fixing the mounting supports

Fix the upper and lower mounting support to the cabinet according to following pictures. Screws M6 are delivered together with the supports.



The upper and lower mounting rails should be fixed into the cabinet with a distance of 1520 mm between their lower edges. If your cabinet's grid of fixing holes in the mounting rail does not allow this distance, you may vary the distance by some mms due to the elongated fixing holes in the panel.

The total position of the two mounting supports in the cabinet depends on its clearance and the height of its base. It's useful to install the supports in a way that the lower mounting support is at the

same height of the cabinets base.

For a Standard Tyrak 8 cabinet a height of 122 mms from the floor is recommended.



* for Tyrak 8 standard cabinets

Inserting the sliding rails

The sliding rails are designed for easily sliding the DCE into the cabinet until its weight is carried fully by the lower mounting support.

The rails are put onto the upper mounting support. Their construction prevent the rails from slipping off. In the front the sliding rails are put onto the cabinet base.



Push the DCE panel into the cabinet.

When using a crane, put the DCE onto the front part of the sliding rails.

When using a fork lift, bring the panel to the same level of the sliding rails.

Then push the DCE panel into the cabinet against the support in the back of the cubicle.

To put the DCE panel onto the lower mounting support, it has to be lifted slightly in the back. For that it's useful to throw it a little bit in direction outside the cubicle at the top front edge.

Now the DCE panel can be fixed to the upper and lower mounting support with the enclosed M10-screws (17mm-size nut or wrench needed).

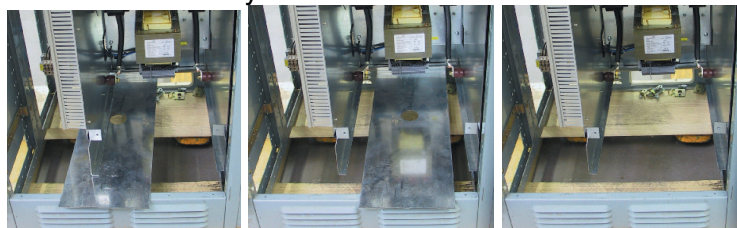
Removing the Sliding Rails

When the DCE panel is fixed to the cabinet, the sliding rails can be removed.

First, remove the sliding rail below the power unit.



Then move the remaining sliding rail also below the power unit, so that it can be easily removed.



The sliding rails now can be re-used for mounting of another DCE panel.

Mounting of the panel CDP312 on the cabinet door (optional)

The DCS 500 / DCS 600 control panel CDP312 can be easily mounted onto the cabinet door by fixing it with two screws. For that 3 holes have to be put into the cabinet door: 2 holes (5 mm in diameter) for the screws and one hole 14x16 mm (wxh) for the connection cable. Drilling pattern see appendix.

Following items are needed in addition (not in the standard scope of delivery)

- 2 pc. screws (M4x10)
- 1 pc. control cable CON-3A-board → CDP312, 3 m long, Id-No. DCA0021499P0001 (refer to pricelist)



The picture shows an example of CDP 312 mounted directly onto an old Tyrak cabinet door.

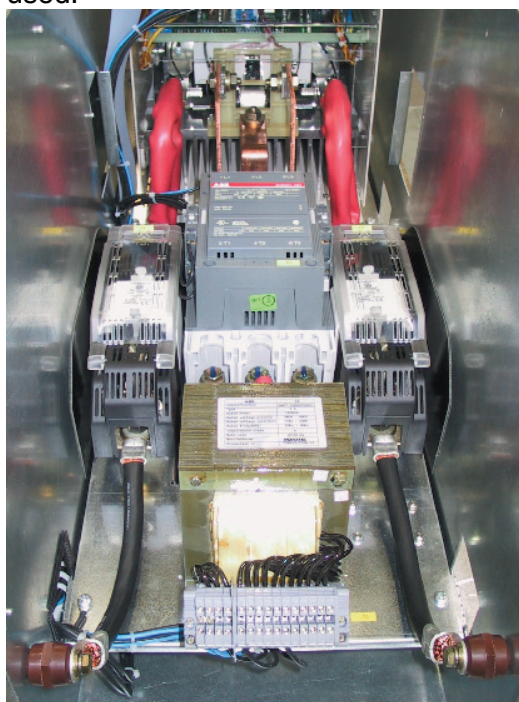
Chapter 2 – Electrical Installation

AC-connection

The AC-connection point is at the top of the power unit, at the incoming terminals of the fuse-holder / fuse-switch.
AC-connection cables with cable lugs are available as option.

DC-Connection

The DC-connection point is at the DC output terminals of the DCS module, or at the secondary side of the DC-fuse-holder, if ordered. If the existing motor cables are too short, a DC block terminal at the very bottom of the DCE panel is available as option. The block terminals are capable for one cable, if double armature cables are used, a short 3-hole-busbar (not in the scope of delivery) has to be used.



Field connection

Field terminals are mounted at the bottom of the Auxiliary unit. They are capable for cables up to 10 mm².
For an external field AC supply (if a field transformer is used) same-sized terminals are available right besides the field terminals.

Control cable connection

The control cables usually are connected to the I/O-cards on the I/O unit. Rails for fixing the cable shields are included for every I/O card.

4x2x0.5 mm² shielded cable for IOB-3, pulse transmitter, IOE-1 etc. and 4 m long cable 7x1 mm² unshielded control cable, all with cable lugs are available as option.

Commissioning

After all electrical connections are done, the installation will be completed with the commissioning of the DCS-Module. Therefore please refer to the enclosed DCS-Module-Dokumentation

DCE 500 / 600 Panel Solution unit types

Unit type	DC I ¹⁾	DC II current		DC III current		DC IV current		Power loss ²⁾	Weight ²⁾
		100 % 15 min	150 % 60 sec	100 % 15 min	150 % 120 sec.	100 % 15 min	200 % 10 sec.		
	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[kW]	[kg]
400 V / 500 V									
DCE n0x-0025-4/51-960t	22	21	32	20	31	18	35	<0.58	90
DCE n0x-0050-4/51-960t	45	40	59	37	56	36	72	<0.65	91
DCE n0x-0075-4/51-960t	67	53	80	50	75	50	100	<0.72	95
DCE n0x-0100-4/51-960t	90	64	96	62	93	61	122	<1.00	103
DCE n01-0140-4/51-960t	115	87	130	83	123	83	166	<1.00	103
DCE n02-0140-4/51-960t	125	95	142	91	136	91	186	<1.00	103
DCE n01-0200-4/51-960t	160	119	180	118	178	99	198	<1.51	121
DCE n02-0200-4/51-960t	180	134	201	131	197	111	223	<1.51	121
DCE n01-0250-4/51-960t	210	150	225	141	212	124	248	<1.51	121
DCE n02-0250-4/51-960t	225	159	239	150	225	132	264	<1.51	121
DCE n01-0350-4/51-960t	285	219	329	211	316	192	384	<1.89	126
DCE n02-0350-4/51-960t	300	228	342	222	333	200	400	<1.89	126
DCE n01-0450-4/51-960t	365	285	428	275	413	254	509	<2.47	141
DCE n02-0450-4/51-960t	405	316	475	306	459	283	567	<2.47	141
DCE n01-0520-4/51-960t	400	308	462	290	435	275	550	<2.57	144
DCE n02-0520-4/51-960t	450	345	517	330	495	308	616	<2.57	144
600 V									
DCE n0x-0050-61-960t	45	43	65	42	62	36	72	<0.63	91
DCE n01-0110-61-960t	95	75	112	71	106	71	142	<0.98	103
DCE n02-0110-61-960t	100	79	118	75	112	75	150	<0.98	103
DCE n01-0270-61-960t	220	174	260	152	228	152	304	<1.81	121
DCE n02-0270-61-960t	240	190	285	166	249	166	332	<1.81	121
DCE n01-0450-61-960t	370	290	435	258	387	258	516	<2.47	141
DCE n02-0450-61-960t	400	313	469	279	418	279	558	<2.47	141

n=5 ⇒ DCE 500 x=1 ⇒ 2-Q converter t=1 ⇒ Standard type
n=6 ⇒ DCE 600 x=2 ⇒ 4-Q converter t=2 ⇒ P&P type
(only for DCE600)

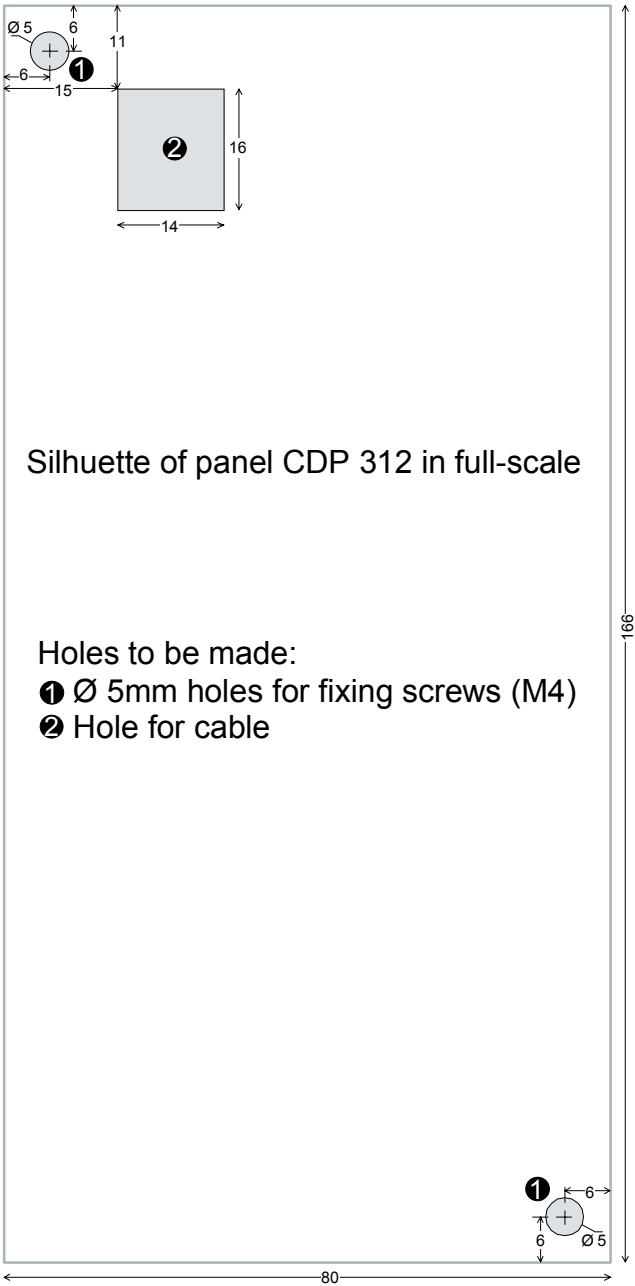
Voltage class: (example: DCE n0x-0025-41-960t)

4 ⇒ 400V 5 ⇒ 500V 6 ⇒ 600V

¹⁾ Given Ratings are typical values for mounting in IP 21 cabinets; actual values may differ and are strongly depending on the cabinet and its cooling, especially with higher protection classes

²⁾ Values are valid for Standard Scope of delivery without options

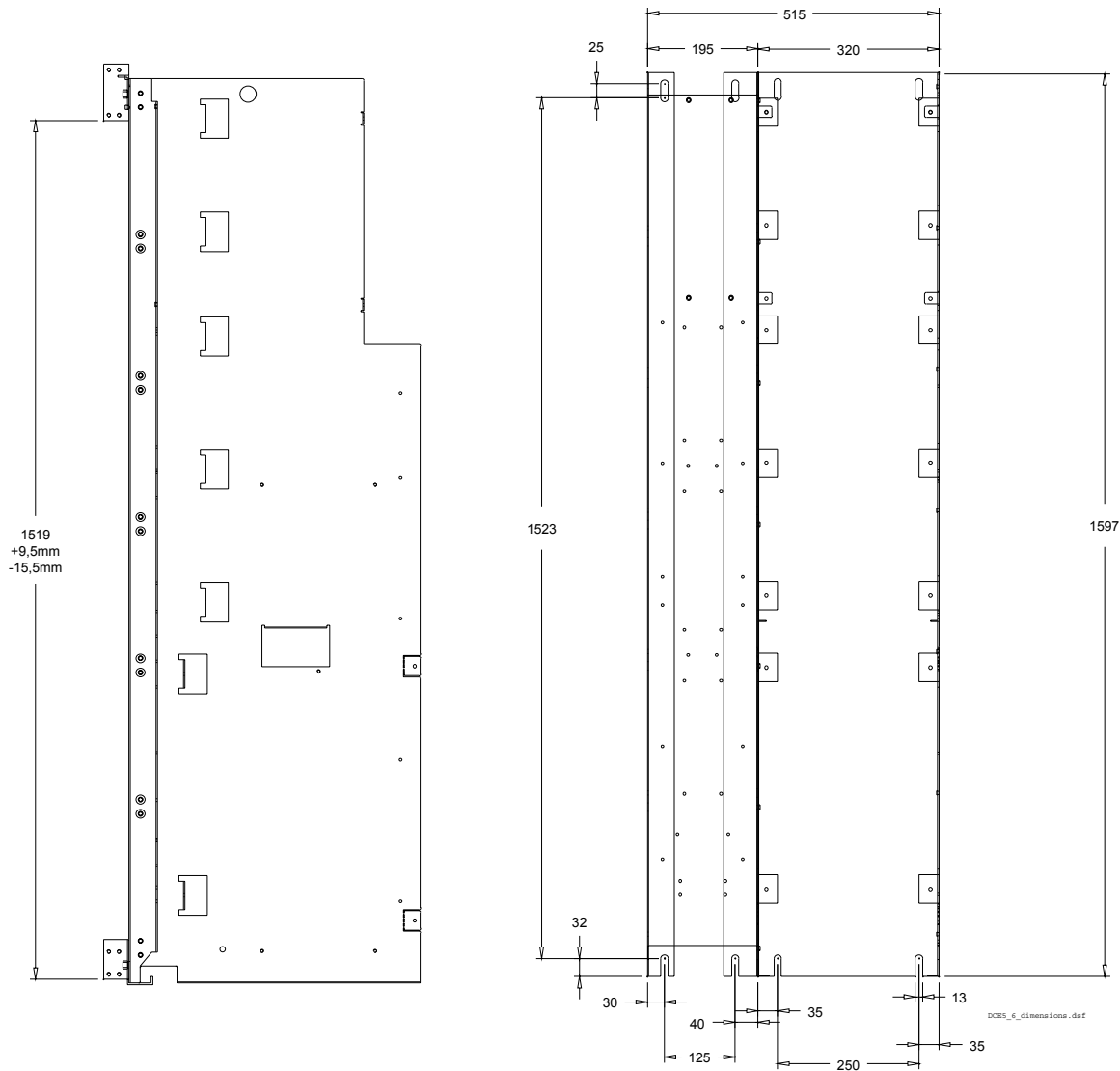
Drilling pattern for CDP 312



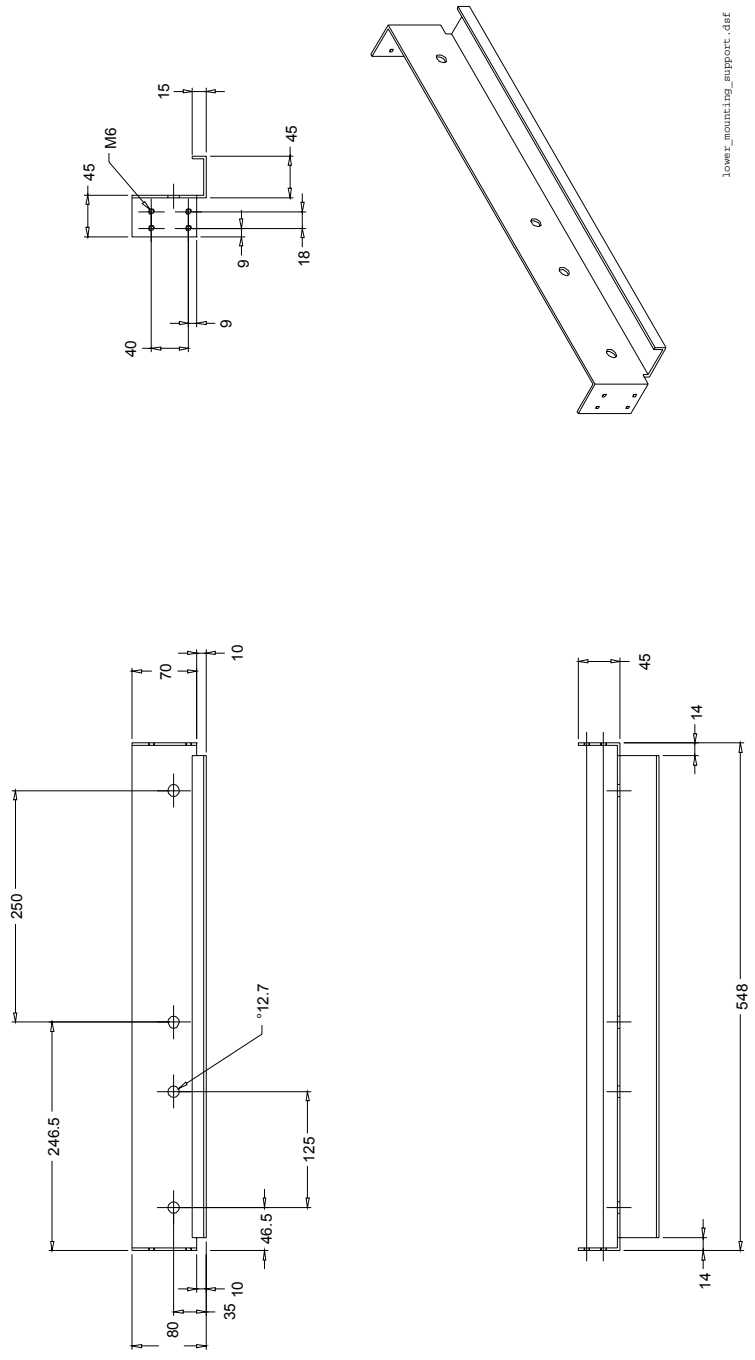
Silhouette of panel CDP 312 in full-scale

- Holes to be made:
- ❶ Ø 5mm holes for fixing screws (M4)
 - ❷ Hole for cable

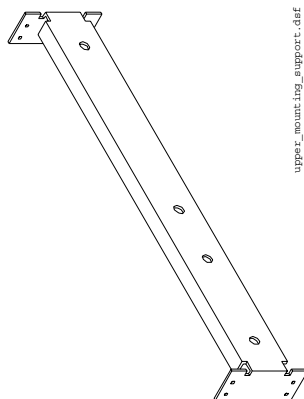
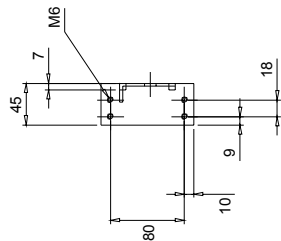
Dimension of DCE panel and fixing holes



Lower mounting support



Upper mounting support



upper_mounting_support.dwg

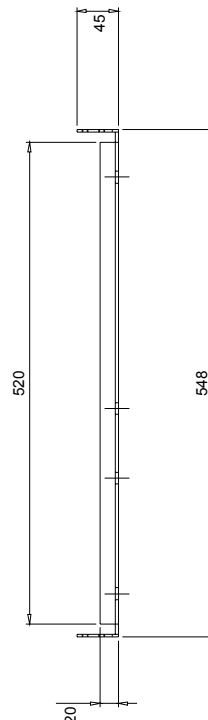
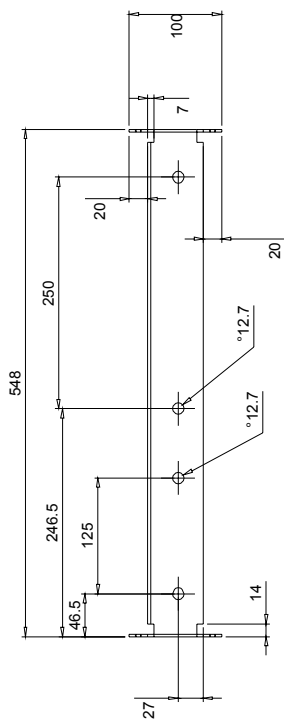




ABB Automation Products GmbH
Postfach 1180
68619 Lampertheim • GERMANY
Tel: +49 (0) 62 06-5 03-0
Fax: +49 (0) 62 06-5 03-6 09
www.abb.com/dc



188R0101A4220000

Ident. No.: 3ADW 000 188 R0101 Rev A
07_2002