DCV 700 thyristor panels
for 6-/ and 12-pulse DC drive systems
in Drive-MNS-cabinets
22 to 5150/10300 A
10 to 4900/9400 kW

Catalogue
The DCV 700 series is a complete range of DC converters intended for the supply and control of DC machines, in stand-alone or multi-drive systems with high performance and reliability specifications.

DCV 700 converters are fully digital and mounted in an enclosure complete with all necessary equipment, meeting the most stringent safety standards. The converter can be used for standard applications but has the flexibility to be customized for the most demanding applications.

Wide Variety of Industrial Applications
The DCV 700 series can handle the most demanding applications in:
• rolling mills
• pulp and paper
• metals (casters, processing lines etc.)
• material handling (cranes, hoists etc.)

Comprehensive Product Range
DCV 700 converters are available as 6-/ and 12-pulse 2- or 4-quadrant, in a current range 22 to 5150/10300 A and supply voltages of 200 to 1000 VAC. A selection of options is available to provide the user with a system meeting the most demanding technical requirements and performance expectations.

Common control electronics throughout the range reduces spare parts inventory and training requirements.

Digital Control
To meet the most stringent control requirements, the DCV 700 features speed control, which reduces the effects from gear backlash and torsional vibration arising in mechanical systems. High-performance speed and torque control will fulfill all requirements for rapid response and control accuracy. Autotuning for armature current control will simplify the commissioning procedure.
Commonality with AC Drives – Flexible System Configurations

Some of the most important features and benefits common to both the DC and AC drives are:

- application control system (APC) - fewer spare parts
- link to automation systems
- commissioning, maintenance and programming tools - less training
- control panel - quick information
- drive-MNS cabinets - standardization benefits; possibility to build mixed systems
- EMC design available

Diagnostics

Digital control allows comprehensive diagnostics, including for example detection of

- overcurrent
- overvoltage
- earth faults

Troubleshooting is easily undertaken via the Control Panel and the Commissioning and Maintenance Tools.

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DCV 700 Components
in new Drives-MNS cabinets

![Diagram of DCV 700 Components](image)

- **Main fused disconnect switch**
- **Application controller (APC) and I/O boards**
- **Control connections**
- **Panel and Metering**
- **Main AC contactor**
- **Converter module with optional field exciter**
- **Auxiliary power distribution**
- **Cable entry for AC power supply, motor and control cables**

Figure 1. Main parts of an enclosed DCV 702-0350-55-D converter
(The picture shows two drive systems)
Fully controlled thyristor bridges with many protection features offer the highest reliability and operational safety.

The thyristor bridge can be 2-quadrant (6 thyristors) or 4-quadrant (12 thyristors). For current ratings up to 700 A the thyristor bridge consists of integrated thyristor modules - more compact, cost effective, less components - so the fuses are installed outside the module, in the supply line. For higher current ratings, disc thyristors are used, so there is a branch fuse for each thyristor. Each thyristor is protected by a snubber circuit. AC voltage, AC current and DC voltage are monitored. These measurements are utilized by the converter software for supervision and protection. Overvoltage protection by means of varistors is also provided. Converters are always equipped with a cooling fan integrated in the converter module.

The monitor and protective features, provided as standard and listed below, have been designed, keeping in mind, personnel safety, equipment integrity and continuity of the process.

**Motor:**
- Loss of speed feedback
- Overtemperature
- Overload
- Overspeed
- Stall
- Armature overcurrent
- Armature current ripple
- Armature overvoltage
- Minimum field current
- Field overcurrent

**Converter:**
- Thyristor temperature

**Supply:**
- Main supply undervoltage
- Auxiliary supply undervoltage
- Wrong phase sequence

The converter includes emergency stop and prevention of unexpected start-up as standard protective functions. The software also includes a fault logger storing up to 100 faults in real time. Information on internal signals is stored in the data logger and it can be displayed by the Commissioning and Maintenance Tool for easy fault finding.

Converter software for application, drive, and torque control

Drive Control receives either speed or torque reference and gives a torque reference to the Torque Control.

Torque Control is controlling the armature current, the field current and the EMF. It receives the torque reference from the Drive Control or from the Application Controller (APC). Auto/manual tuning for armature current simplifies the commissioning and makes the tuning procedure flexible.
Several Solutions

- Ratings from 6 to 450 A
- Integrated, separate or external
- 2-phase or 3-phase versions
- Digital control
- Auto/manual tuning

In the DCV 700, an autotransformer is included to reduce voltage ripple in the field circuit by adapting the AC voltage to a suitable level.

The field exciters are controlled via a serial link with a speed of 62.5 kBaud for fast and accurate control. Fig. 3 shows the connections of the field exciter.

Diode Field Exciter

2-phase, integrated in the converter module, 6 A
The diode field exciter is a diode bridge rated up to 6 A with internal minimum field supervision, without any need for adjustment.

Digital Controlled Field Exciters

2-phase, 1-quadrant, integrated in the converter module, 16 A
(max. 6 A in converter modules up to 50 A max. 8 A in converter modules up to 75 A, max. 16 A in converter modules 110...700 A)
Half controlled thyristor/diode bridge, microprocessor controlled with the electronics supplied from the armature circuit converter. To achieve high resolution in current measurement, the current feedback can be adapted to different current levels such as 3, 5, 7, 9, 11, 13, 15, 17 A.
Insulation voltage 600 V, operation voltage \( \leq 500 \text{ V} \).

2-phase, 1-quadrant, outside the converter module, 50 A
Half controlled thyristor/diode bridge, microprocessor controlled, with separate power supply (115/230 VAC) for the control electronics. To achieve high resolution in current measurement, the current feedback can be adapted to different current levels such as 3, 5, 7, 9, 11, 13, 15, 17, 21, 27, 33, 39, 45, 50 A.
Insulation voltage 700 V, operation voltage \( \leq 500 \text{ V} \) (for operating voltages higher than 500 V an adaptation via T3 autotransformer is available).

3-phase, 2/4-quadrant, 22...450 A
This field exciter is used for converter ratings of 2050...5150 A. For field current ratings above 50 A an external enclosed field exciter will be used. Current ratings are same as the armature current max. 450 A at 500 V AC and max. 400 A at 600 V AC.

Figure 3. Connections of the field exciter.
Control Configuration

The control system provides a flexible and simple method of controlling different drive configurations.

The configurations comprise the converter and its software, Application Controller, Engineering and Maintenance tools and different communication links to other automation systems.

The control system includes an Application Controller (APC) and a Digital Drive Controller (DDC) with well-defined functions and interface.

The Application Controller (APC), common for both AC and DC drives, is a single board controller with all the software and hardware facilities needed to handle the application specific functions.

The Digital Drive Controller (DDC) is not programmable but various functions and operating modes can be selected by a fixed number of parameters, which are set from the APC level. The motor control programs are located in the DDC, which is controlled by either a torque or a speed reference provided by the APC.

Stand-alone drive
A single drive has one Digital Drive Controller DDC connected to the Application controller APC.

Small drive system
In small systems, one APC is connected from 1 up to 4 Digital Drive Controllers. The small drive configuration can also be used in master/slave applications.

Large drive system
Large systems are built by interconnecting application controllers through a communication bus, for example AF100. Common control functions can be distributed to separate nodes. Even very complex systems can be configured by using the same system design concept and its common building blocks, resulting in great savings in, for example, spare parts.
I/O Connections

The I/O connections of the DCV 700 are in the Application Controller (APC) and in the Digital Drive Controller (DDC).

The Application Controller APC includes:
- 4 digital inputs
- 2 digital outputs
- 2 analogue inputs
- 1 voltage reference output

The I/O connections in the Drive Controller DDC are used for safety and other drive specific functions like emergency stop and motor temperature measurement:
- 3 digital inputs
- 4 digital outputs
- 5 analogue inputs
- 2 analogue outputs
- 1 pulse encoder input
- 1 emergency stop input
- 1 emergency stop output
- 1 current source
- 1 voltage reference output
- 1 actual armature current output

Optional I/O boards are available to provide tailored solutions for the most demanding applications.

The quantity of I/Os can be increased by using extended I/O board and speed measurement board.

Extended / Remote I/O Board YPQ110A
Connection to the APC can either be through parallel bus (extended) or through low speed serial bus (remote).
- 8 digital inputs
- 8 digital outputs
- 4 analogue inputs
- 2 analogue outputs
- 3 voltage reference outputs

Speed Measurement Board YPH107A
The board can be used for accurate speed and position measurement. Connection to the APC is through the parallel bus. For positioning there is a 32 bit hardware counter.
- 1 digital input for synchronisation
- 1 pulse encoder input
- 2 analogue outputs

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Figure 4. The 5150 A DC converter with air circuit breaker.
Various communication boards are available to provide communication links between the APC and overriding control systems.

**AF100**
Advant Fieldbus 100 is a high-speed serial bus, which is used for communication between APCs or between an APC and an overriding system such as ABB’s Advant Controller AC400-family. The bus administrator board CI626 (BA) is needed for controlling the bus when not using the Advant Controller AC450. The communication board YPK112A is used to connect the APC to the Advant Fieldbus 100.

**UART Board YPK113A**
The UART board, YPK113A, is used to communicate with other overriding systems. Protocols for Siemens Simatic S5 and Allen Bradley DH are available together with SAMI protocol.

**Control Panel**
The optional Control Panel offers a user-friendly means to communicate with the drive.

- Different languages defined by application program
- 2×20 character display
- Simple operation with 10 pushbuttons (membrane panel well suited to industrial environments)
- Common for AC and DC drives
- Door mounted

The Control Panel provides the following information and functions:
- Status information (run, ready, fault messages)
- Operational control with 4 freely programmable pushbuttons
- Display of reference values (speed, torque)
- Display of actual values (speed, voltage, current)
- Display of fault logger contents
- Uploading, downloading, changing, displaying and saving the Application Controller APC and Drive Controller DDC parameters.
Commissioning, maintenance and programming is easy with the dedicated Windows™ based PC programs.

Digital-Drive-Control-Tool (DDCTool) for Commissioning and Maintenance

DDCTool is ABB’s new PC program, common for both AC and DC drives.
- Runs under Microsoft® Windows™
- Intuitive, easy-to use
- Graphical User Interface
- Fast response

The DDCTool offers the following functions:
- Monitoring of reference and actual values
- Setting, changing, saving, uploading, downloading, and restoring of parameters
- Controlling and displaying data loggers
- Display and clear of the fault logger
- Selection of target drives in multi-drive applications

Engineering Tool for Individual Programming

The application controller (APC2) is a programmable controller by using Adva Build for Windows (FCB).

Microsoft and MS-DOS are registered trade marks, and Windows is a trade of the Microsoft corporation.
Hardware Options

DCV 700 can be tailored to meet different needs by using a combination of the following options.

• **Regenerative Stop**
  This type of emergency stop provides fast stop, stop by ramp, coast stop and dynamic braking. An external push-button is connected to a digital input and when activated it will force the drive, with regenerative braking (fast stop), to stop and then open the main contactor.
  This function works with a hardware safety function that insulates the motor from the network if there is a failure in the drive.

• **Electrical Disconnect (Coast Stop)**
  The electrical disconnect function opens all the main contactors in the converter, allowing the drive to coast stop.
  A pushbutton is connected to a digital input which will give the order to the software to open the main contactor. This function also includes a hardware safety function similar as for the emergency stop.

• **Auto Reclosing**
  If the AC mains supply is lost for a short time, the drive will restart automatically. Technical data has to be specified in each case.

• **Earth Fault Protection (current sensitive)**
  Earth fault protection includes a zero measuring current transformer and operates on the current summation principle. In a direct earthed supply this protection will detect the first earth fault and will disconnect the converter.
  In an impedance earthed or an isolated system this protection will detect the second earth fault provided that it is on opposite sides of the current transformer.

• **Insulation Monitor (voltage sensitive)**
  An insulation monitor for single drives or for system drives can be provided for the detection of ground faults. The insulation resistance is constantly monitored for the system, and earth faults are detected for both AC and DC circuits.

• **Motor Starter**
  A motor starter can be provided for overload and short-circuit protection of an external AC motor such as a motor cooling fan.
  The AC voltage is the same as the drive’s supply voltage. The following ratings are available: 400...690 V, 0.63 A...25 A

• **Galvanic Isolation**
  Galvanic isolation is used for measuring of AC- and DC-voltage with a transformer and a galvanic isolated transducer. This option is recommended for supply voltages > 690 V (available for converter ratings 855...5150 A).

• **Cabinet design according to EMC-regulations**
  Air inlet filters welded, bottom plate with cable entry, door 3-times bolted, fixing points of metal parts not painted, seal ring in door frame of the cabinet is conductive.

• **EMC Filters**
  - (25...700 A) Integrated in the drive cabinet
  - (>700...2500 A) In separate cabinet next to drive cabinet

• **Protection class IP20 - Standard**
  Air inlet in the door; air outlet vertically at top cover (longitudinal slots 8 mm)

• **Protection Class IP 21**
  Air inlet in the door (longitudinal slots 8 mm); air outlet same as IP20 additional a hood - air outlet direction: 90° at the back and at the front.

Options

• **Protection Class IP 21 with insect screen (1×1 mm) in air inlet**

• **Protection Class IP 21 with air inlet filters**
  When the converter is installed in a dirty environment it is recommended that an air filter is installed to clean the incoming air to the converter. These converters are then provided with cabinet bottom plates.

• **Protection Class IP 31 with filter in air inlet/outlet**

• **Protection Class IP 41 with filter in air inlet/outlet**

• **Gland plate and bottom plate**

• **Fire resistant bottom plate**

• **Special Colour (only outside) acc. to RAL standard**

• **Heater**
  If the converter is installed in a cold or humid environment, a heater is required to prevent condensation when the converter is not in operation. The heater (50 W) requires a supply voltage of 230 V.

• **Lightening**
  Cabinet lightening and door switch

• **Incoming Supply Section for Line-ups**
  For system drives, where many converters are installed in a line-up, an incoming cabinet is required for customer cable connection and AC power distribution to all converters. This incoming section can be provided with the following options:
  - only busbars for cable connection and power distribution
  - busbars as above and a mains isolation switch
  - busbars as above and an air circuit breaker
  FOR FURTHER INFORMATION REFER PAGES 12 AND 15.

• **Horizontal Busbars**
  In the event that many converters are installed in a line-up, an AC horizontal bus bar system can be supplied to feed the entire line-up from the incoming supply section. Copper busbars as standard, current ratings available 1000 A, 2000 A and 3000 A.
Incoming Supply Sections

Cabinet Design
The AC supply connections to the incoming supply section can be made by cables or busbars from the bottom of the cabinet. As standard, the AC supply is connected with cables from the bottom of the cabinet. The other connections are available as options. The cabinet is classified to IP 20/21 as standard (Drive-MNS-cabinet).

Basic Design
Rated voltage: 400 V, 500 V, 600 V, 690 V
Rated frequency: 50 Hz or 60 Hz
Rated current: 1000 A, 2000 A, 3000 A, 4000 A (on request)
Short circuit ratings: $i_{\text{dyn}} = 105 \text{ kA (peak)}$

Options
EMC
• Cabinet design according to EMC-regulations

Incoming Breaker
As standard, the incoming breaker is constructed with:
• a fixed version
• manually operated by using pushbuttons in the breaker
• closing springs charged manually by using the front lever
• an overload and overcurrent protection using the analogue solid state overcurrent release

As options the breaker has:
• a draw out version
• a motor for the automatic charging of closing springs
• a shunt opening and closing release for remote control of the breaker
• auxiliary contacts

Isolation Switch
Most applications require only an isolation switch. This design would not be able to interrupt the load current. It is meant only to isolate the circuit from the main supply. As standard, there is a pushbutton on the door of the incoming supply section. With the pushbutton it is possible to open a supply circuit breaker before opening the isolation switch. There is also an auxiliary contact on the isolation switch, used for opening the supply circuit breaker. As an option it is possible to use an electrical interlock between the switch and a supply circuit breaker. The isolation switch therefore requires an electrical coil.

Earthing switch
For safety reasons an earthing switch will ground the AC busbars to earth.

Earth Fault Protection
Insulation monitor (voltage sensitive).

AC Current Measurement

AC Voltage Measurement

Arc Detecting Relay
An arc detecting relay is used in the incoming cabinet to supervise the AC busbars. It is possible to use the arc detecting relay in combination with a current detector to eliminate false trips.

Emergency stop relays, tripping circuits, APC+other options
This depends on the specific application and is determined independently for each case.

Dimensions
Refer page 15 table 3.
DCV 700 converters are suitable for three-phase supply voltages from 230 V to 1000 V, 50 or 60 Hz. Select the DCV 700 type from Table 1, according to the nominal supply voltage and the rated DC current.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>DC I current 2Q 4Q</th>
<th>DC II current (4Q) contin. load 150 % 60 sec.</th>
<th>DC III current (4Q) contin. load 200 % 120 sec.</th>
<th>DC IV current (4Q) contin. load 200 % 125 % 2 hours</th>
<th>Rated power (2Q) kW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>400 V</strong></td>
<td></td>
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<td>21 32</td>
<td>20 31</td>
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<td>35 10</td>
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<td>DCV 700-0050-45-D</td>
<td>45 45</td>
<td>40 59</td>
<td>37 56</td>
<td>36 45</td>
<td>72 22</td>
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<tr>
<td>DCV 700-0075-45-D</td>
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<td>53 80</td>
<td>50 75</td>
<td>50 62</td>
<td>100 32</td>
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<tr>
<td>DCV 700-0140-45-D</td>
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<td>95 143</td>
<td>91 136</td>
<td>91 113</td>
<td>181 56</td>
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<td>132 198</td>
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<td>200 300</td>
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<td>345 517</td>
<td>308 462</td>
<td>308 385</td>
<td>616 190</td>
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<td><strong>500 V</strong></td>
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<td>DCV 700-0025-55-D</td>
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<td>7467 2520</td>
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</table>

Table 1. DCV 700 types.  
- = Air circuit breaker as an OPTION  
- = Without air circuit breaker and separate AC connection for control and main power  
- = Rated power is calculated based on conditions specified on page 14
Selecting and Dimensioning

The drive is normally selected and dimensioned by ABB — you only need to provide the technical data.

ABB dimensions both the converter and motor using a Microsoft® Windows™ based dimensioning software called DCSIZE (see Figure 5). This sizing is based on technical requirements and takes into account different duty classes (Table 1 on page 13), ambient temperatures and altitudes. The input data, as well as the results, are presented by clear tables and graphs, which can be printed out as hardcopies.

The voltage ratings are given in Table 2. The DC voltage ratings are calculated based on the following assumptions:

- \( U_v \) = actual rated AC supply voltage; voltage variation ±10%
- **Internal voltage drop approx. 1%**
- \( S_k \) = Short-circuit power of AC supply
- \( I_d \) = actual direct current
- \( I_{dm} \) = rated continuous direct current of the equipment
- \( I_{lim} \) = max current limit (200% of \( I_{dm} \))
- \( U_d \) = actual direct voltage
- \( U_{di0} \) = ideal no-load voltage
- \( I_d \leq I_{dm} \)
- \( S_k \geq 17 \times U_{di0} \times I_d \)
- \( U_d \) (2-quadrant) = 1.35 \times U_v \times \cos 15°
- \( U_d \) (4-quadrant) = 1.35 \times U_v \times \cos 30°

### Table 2. DCV 700 Series maximum DC voltages achievable with a specified input voltage.

<table>
<thead>
<tr>
<th>System connection voltage</th>
<th>Rated DC voltage (Motor voltage)</th>
<th>Ideal DC voltage without load</th>
<th>Recommended DCV 700 Voltage class</th>
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<tbody>
<tr>
<td>( U_v )</td>
<td>( U_d )</td>
<td>( U_{di0} )</td>
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<td>525</td>
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<td>545</td>
<td>700</td>
</tr>
<tr>
<td>575</td>
<td>670</td>
<td>600</td>
<td>770</td>
</tr>
<tr>
<td>600</td>
<td>700</td>
<td>625</td>
<td>810</td>
</tr>
<tr>
<td>660</td>
<td>765</td>
<td>685</td>
<td>890</td>
</tr>
<tr>
<td>690</td>
<td>800</td>
<td>720</td>
<td>930</td>
</tr>
<tr>
<td>790</td>
<td>915</td>
<td>820</td>
<td>1060</td>
</tr>
<tr>
<td>1000</td>
<td>1160</td>
<td>1040</td>
<td>1350</td>
</tr>
</tbody>
</table>

Figure 5. User interface of the dimensioning program shown on a computer screen.
### Dimensions

<table>
<thead>
<tr>
<th></th>
<th>Single drive</th>
<th>Group drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Depth</td>
<td>Width</td>
</tr>
<tr>
<td>DC-Converter, Size C1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCV70x-0025-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0050-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0075-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0140-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DC-Converter, Size C2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCV70x-0250-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0350-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0520-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-0700-4/5x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DC-Converter, Size C3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCV70x-0900-4/5/7x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-1200-4/5/7x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-1200T-4/5/7x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-1500-4/5/7x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-2000-4/5/7x-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DC-Converter, Size C4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCV70x-2050-7/8/9x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-2500-4/5/7x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-2650-9x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-3200-8/9x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-3300-4/5/7x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-4000-4/5/7/8/9x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-4750-7/8x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>DCV70x-5150-4/5x-D</td>
<td>2000</td>
<td>800</td>
</tr>
<tr>
<td>Incoming Supply Sections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCV70x-1000-CB-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-2000-CB-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-3000-CB-D</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>DCV70x-4000-CB-D (on request)</td>
<td>2000</td>
<td>600</td>
</tr>
<tr>
<td>Connection cabinet</td>
<td>2000</td>
<td>600</td>
</tr>
</tbody>
</table>

Table 3. Dimensions of the DCV 700 series in Drive-MNS- cabinets IP20.

**NOTES:**

- All dimensions are given in mm
- Degree of protection: IP 00 if the frame is without endpanels and doors
- Please add for each endpanel 15 mm and for a door (without buttons) 20 mm
- for IP 21 please add 120 mm for hood
- with circuit breaker or contactor
- without circuit breaker or contactor
- DCV 700 with AC supply voltage 3 x 790 V and 3 x 1000 V are generally without circuit breaker (see page 13)
- Max length of a transportation segment is 3.40 m. If the "line-up"-width greater than 3.40 m a connection cabinet per transportation unit is required.
When ordering your DCV 700 or external field exciter, please specify the type designation according to the type designation tables.

Type designation table for DCV 700 converters.

<table>
<thead>
<tr>
<th>Type designation table for DCV 700 converters.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DC</strong></td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Product family</strong></td>
</tr>
<tr>
<td><strong>Bridge type</strong></td>
</tr>
<tr>
<td><strong>Rated 4Q (IP00) DC current [A]</strong></td>
</tr>
<tr>
<td><strong>Measurement isolation of 2050...5150 A modules</strong></td>
</tr>
<tr>
<td><strong>Rated AC voltage [V]</strong></td>
</tr>
<tr>
<td><strong>Frequency [Hz]</strong></td>
</tr>
<tr>
<td><strong>Power connection of 2050...5150 A modules</strong></td>
</tr>
<tr>
<td><strong>Cabinet type</strong></td>
</tr>
</tbody>
</table>

Type designation table for 3-phase field exciters placed in the armature enclosure.

<table>
<thead>
<tr>
<th>Type designation table for 3-phase field exciters placed in the armature enclosure.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DC</strong></td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Product family</strong></td>
</tr>
<tr>
<td><strong>Bridge type</strong></td>
</tr>
<tr>
<td><strong>Rated 4Q (IP00) DC current [A]</strong></td>
</tr>
<tr>
<td><strong>Rated AC voltage [V]</strong></td>
</tr>
<tr>
<td><strong>Frequency [Hz]</strong></td>
</tr>
<tr>
<td><strong>Options</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Type designation table for 2-phase field exciters (up to 50 A) placed in the armature enclosure.

<table>
<thead>
<tr>
<th>Type designation table for 2-phase field exciters (up to 50 A) placed in the armature enclosure.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DC</strong></td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Product family</strong></td>
</tr>
<tr>
<td><strong>Bridge type</strong></td>
</tr>
<tr>
<td><strong>Rated 4Q (IP00) DC current [A]</strong></td>
</tr>
</tbody>
</table>

Type designation table for 3-phase field exciters placed in a separate enclosure.

<table>
<thead>
<tr>
<th>Type designation table for 3-phase field exciters placed in a separate enclosure.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DC</strong></td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Product family</strong></td>
</tr>
<tr>
<td><strong>Bridge type</strong></td>
</tr>
<tr>
<td><strong>Rated 4Q (IP00) DC current [A]</strong></td>
</tr>
<tr>
<td><strong>Rated AC voltage [V]</strong></td>
</tr>
<tr>
<td><strong>Frequency [Hz]</strong></td>
</tr>
<tr>
<td><strong>Cabinet type</strong></td>
</tr>
</tbody>
</table>
**Environmental Conditions**

**System connection**
- Voltage, 3-phase: 230 to 1000 V to IEC 38
- Voltage deviation: ±10% continuous; ±15% short-time *
- Rated frequency: 50 Hz or 60 Hz
- Static frequency deviation: 50 Hz ±2 %; 60 Hz ±2 %
- Dynamic frequency range: 50 Hz: ±5 Hz; 60 Hz: ± 5 Hz
- Dynamic df/dt: 17 % / s

* = 0.5 to 30 cycles.

**Please note:** Special consideration must be taken for voltage deviation in regenerative mode.

**Enclosure**
- Degree of protection: IP 20/21/31/41
- Paint finish: light beige RAL 9002

**Environmental limit values**
- Permissible ambient temperature with I DC: +5 to +40°C
- Ambient temp. over +40°C: current reduction, see Fig. 2.1/2
- Change of the ambient temp.: < 0.5°C / minute
- Storage temperature: -40 to +55°C
- Transport temperature: -40 to +70°C
- Relative humidity: 5 to 85%, no condensation

- Site elevation:
  - <1000 m above M.S.L.: 100%, without current reduction
  - >1000 m above M.S.L.: with current reduct., see Fig. 2.1/1

- Noises:
  - as module in the ABB standard cabinet
  - C1: 59 dBA, 57 dBA
  - C2: 71 dBA, 64 dBA
  - C3: 71 dBA, 70 dBA
  - C4: 83 dBA, 76 dBA

**Standards**
- Design in accordance with the following standards:
  - **General:** IEC 146-1-1 ≈ VDE 0558 T.11
  - **Safety:** IEC 439 ≈ VDE 0660
  - **Insulation, clearances and creepage distances:** Design in accordance with: IEC 664 (EN 50178)
  - Input voltages ≤ 600 V:
    - UL 508 C,
    - UL 840
  - **Environmental condition IEC 721-3-3**
    - Temperatures and humidity 3K3
    - PC boards as per pollution severity Grade 2
  - In accordance with the 3AFE61101454/ 3ADW 000 032 R0101 installation guidelines the following EMC standards are complied with EN 61800-3
  - **EMC immunity**
    - Immision level in accordance with: EN 50082-2
    - to electrostatic discharge: EN 61000 4-2
    - to electromagnetic fields: EN 50140,
      - ENV 50020
    - to sudden spurious peaks (burst): EN 61000 4-4
    - to transient voltage (surge): EN 61000 4-5
    - to conducted disturbances: EN 50141
  - **EMC emission**
    - Emission level in accordance with: EN 55011
    - Emission and mains-borne radio interference voltage: EN 55011

The technical particulars and dimensions were correct when this document was printed. We reserve the right to make subsequent alterations.

**Current reduction to (%)**

![Current reduction to (%) graph](image1)

Fig. 6: Effect of the site elevation above sea level on the DCV 700’s load capacity.

**Current reduction to (%)**

![Current reduction to (%) graph](image2)

Fig. 7: Effect of the ambient temperature on the DCV 700’s load capacity.
## Technical Data

### Standard I/O Connections

#### Digital Drive Controller DDC

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 digital inputs</strong></td>
<td>Programmable opto isolated inputs, control voltage 230 VAC/ 115 VAC/ 24...48 VDC. Filter time constant 10 ms (2 channels 2 or 10 ms) +48 VDC/ 50 mA control voltage outlets.</td>
</tr>
<tr>
<td><strong>4 digital outputs</strong></td>
<td>3 programmable relay outputs, 2 programmable optocoupler outputs. Relays: voltage 250 VAC, current 3 A 250 VAC. Opto: voltage 48 VDC, current 50 mA</td>
</tr>
<tr>
<td><strong>5 analogue inputs</strong></td>
<td>Input ranges -10 to +10 V, 0/4 to 20 mA, 2 channels also -1 to +1 V. Resolution: 2 channels 12 bit+sign, and 3 channels 11 bit+sign.</td>
</tr>
<tr>
<td><strong>2 analogue outputs</strong></td>
<td>Output ranges -10 to +10 V. Max. load ±10 mA. Resolution 11 bits+sign.</td>
</tr>
<tr>
<td><strong>1 pulse encoder input</strong></td>
<td>Differential or single ended tachometers. 3 channels A, B and Z. +5 V, +12 V and +24 V control voltage outlets.</td>
</tr>
<tr>
<td><strong>1 emergency stop input</strong></td>
<td>230 VAC/ 115 VAC/ 24...48 VDC. +48 VDC/ 50 mA control voltage outlet. Linking to other groups.</td>
</tr>
<tr>
<td><strong>1 emergency stop output</strong></td>
<td>Relay output. Max. voltage 250 VAC, max. current 3 A at 250 VAC.</td>
</tr>
<tr>
<td><strong>Current source</strong></td>
<td>5 mA for Pt 100 element, 1.5 mA for PTC resistor.</td>
</tr>
<tr>
<td><strong>Voltage reference</strong></td>
<td>±10 V output</td>
</tr>
<tr>
<td><strong>Actual armature current output</strong></td>
<td>Analogue output 0 to 10 V</td>
</tr>
<tr>
<td><strong>Earth fault monitoring</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Application Controller APC

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4 digital inputs</strong></td>
<td>Isolated inputs, control voltage 220 VAC/ 110 VAC/ 24 VDC. Input 1 has 0.48 ms hardware filter (in APC), inputs 2 to 4 have 4.8 ms hardware filter (in APC). +24 VDC/ 20 mA control voltage outlet.</td>
</tr>
<tr>
<td><strong>2 digital outputs</strong></td>
<td>Programmable relay outputs, change over contacts. Max. voltage 250 VAC. Max. current 8 A at 250 VAC.</td>
</tr>
<tr>
<td><strong>2 analogue inputs</strong></td>
<td>Differential inputs, resolution 12 bits, accuracy ± 1%. Input ranges -10 to +10 V or 0 to 20 mA (0 to +10 V, 0 to +1 V and 4 to 20 mA by software scaling). Input impedance is 380 kΩ for voltage inputs and 500 Ω for current inputs.</td>
</tr>
<tr>
<td><strong>1 voltage reference output</strong></td>
<td>+10 V reference voltage, accuracy ± 1%. Max. load current 10 mA.</td>
</tr>
</tbody>
</table>
## Technical Data

### Optional I/O Connections

**Extended/Remote I/O board YPQ110A**

**8 digital inputs**
- Opto isolated inputs.
- Control voltage 110 V AC/ 24 V DC.
- Hardware delay 2 ms.
- Digital filter time constants from 0.5 ms to 128 ms in 0.5 ms steps. Input impedance 3 kΩ for 24 VDC and 13 kΩ for 110 VAC.

**8 digital outputs**
- 6 relay outputs, normally open contacts.
  - Max. voltage 230 VAC.
  - Max. current 2 A at 230 VAC.
  - Min. switching time 20 ms.
- 2 opto isolated transistor outputs.
  - Max. voltage 60 V DC.
  - Max. current 100 mA.
  - Min. switching time 100 µs.

**4 analogue inputs**
- Differential inputs, resolution 12 bits + sign.
- Input ranges -10 to +10 V or -20 to +20 mA (0 to +10 V, 0 to +1 V and 0/4 to 20 mA by software scaling), input impedance is 400 kΩ.
- Accuracy ± 0.1 % at ± 10 V and ± 0.4 % at ± 1 V.
- Hardware filter time constant 5 ms.
- Digital filter time constants from 5 ms to 32 s in 1 ms steps.

**2 analogue outputs**
- Output voltage -10 to +10 V.
- Output current -10 to +10 mA.
  - Resolution 12 bits + sign, accuracy ± 0.1 %.

**3 voltage reference outputs**
- +10 V voltage reference, accuracy ± 1 mV.
  - Max. load current 10 mA.
- -10 V voltage reference, accuracy ± 5 mV.
  - Max. load current 10 mA.
- 5 mA current reference, accuracy ± 0.05 mA.
  - Max. load resistance 1 kΩ.

Extended, connection through parallel bus: max. 4 boards.
Remote, connection through low speed serial bus: max. 8 nodes.

### Speed measurement board YPH107A

**1 digital input for synchronisation**
- Control voltage 24 V AC/DC or 110 V AC/DC.
- Input impedance 3 kΩ at 24 V and 13 kΩ at 110 V. Hardware delay 1 ms or 10 ms, software adjustable.

**1 pulse encoder input**
- 3 opto isolated channels (A, B and Z), differential or single ended tachometers.
  - ± 13 mA current input or ± 24 V voltage input.
  - Max. input frequency 300 kHz.

**2 analogue outputs**
- Output voltage ± 10 V, output current ± 10 mA.
  - Resolution 12 bits, accuracy ± 1 %.

Connection through parallel bus.

The technical data and dimensions are valid at the time of printing.
We reserve the right to subsequent alterations.
The ABB Group is the largest electrical engineering company in the world. We offer small and medium range a.c. and d.c. drives, positioning drives and high-power drives. We serve a wide variety of industries in more than 140 countries.