

ABB DC Drives

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



ABB

Latest Technology, High Performance, and a User Friendly Concept – the New DCV 700 Series

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.

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.

Wide Variety of Industrial Applications

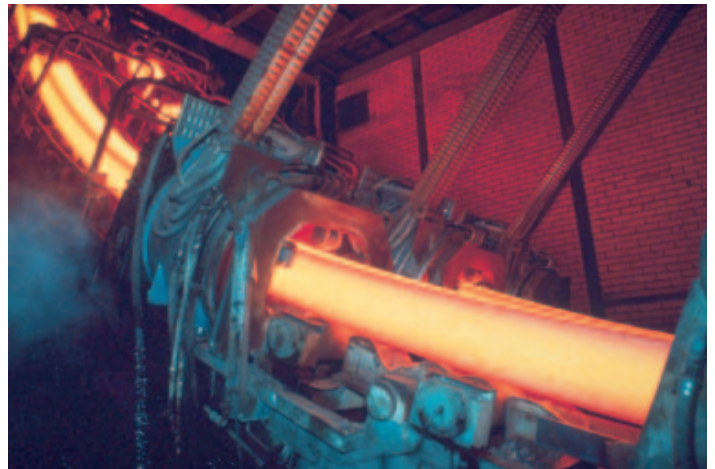
The DCV 700 series can handle the most demanding applications in:

- rolling mills
- pulp and paper
- metals (casters, processing lines etc.)
- material handling (cranes, hoists etc.)

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.



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.

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

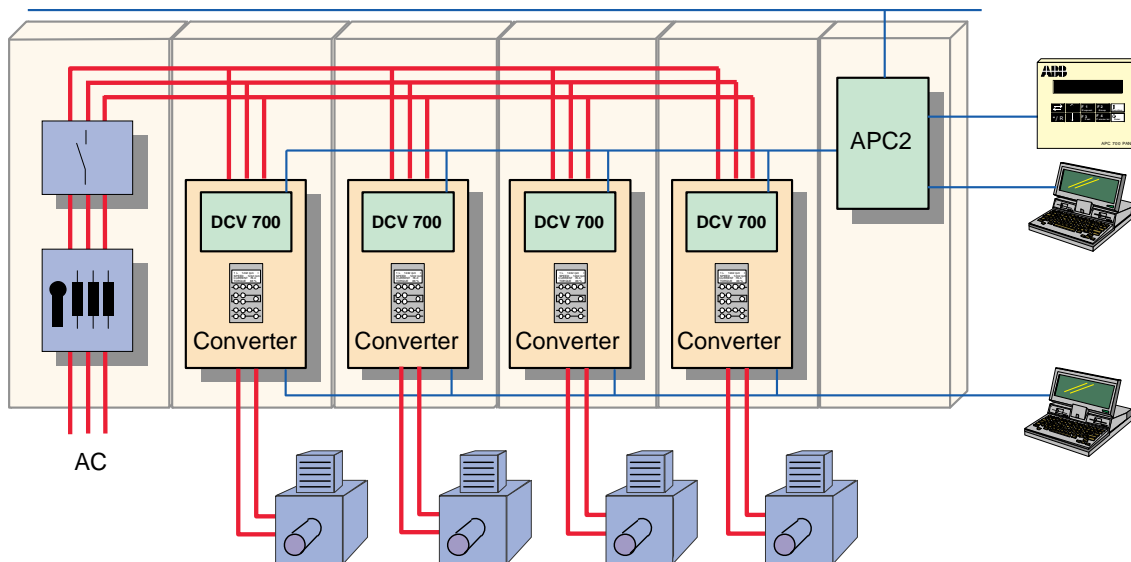


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DCV 700 Components in new Drives-MNS cabinets

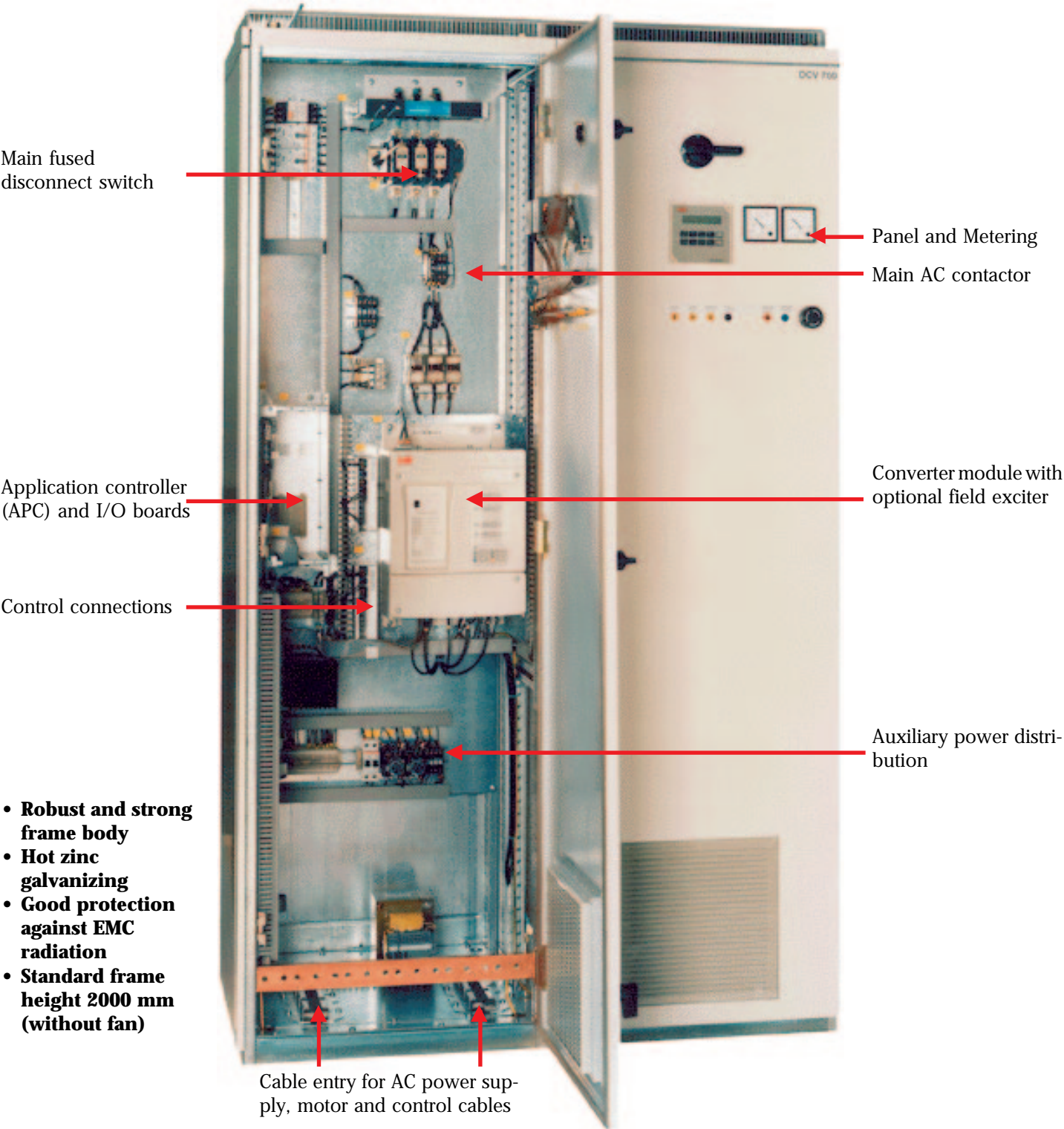


Figure 1. Main parts of an enclosed DCV 702-0350-55-D converter
(The picture shows two drive systems)

Basic Functionality

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.

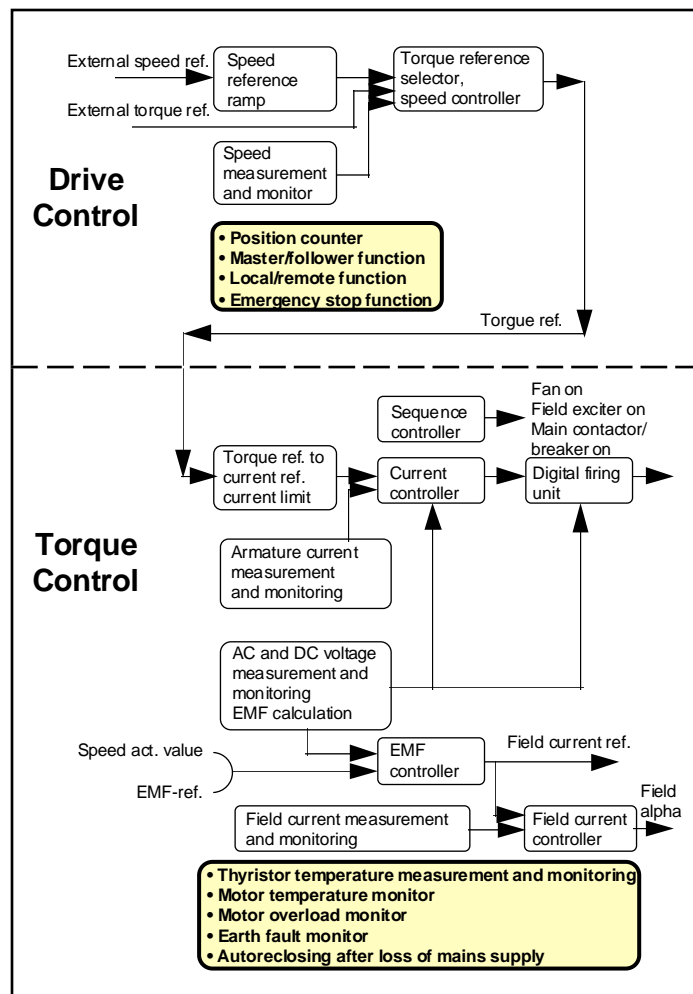


Figure 2. Drive and Torque Control, block diagram

Field Exciters

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 ≤ 500 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 ≤ 500 V (for operating voltages higher than 500 V an adaptation via T3 autotransformer is available).

2-phase, 4-quadrant, outside the converter module, 50 A

Full controlled thyristor bridge, microprocessor controlled, with separate power supply (115/230 VAC) for the control electronics. To achieve high resolution in current measurement, the same solution as in the half controlled 50 A field exciter is used. This design offers field reversal and extra forcing possibilities.

For steady state the full controlled bridge is working in half controlled mode in order to minimize voltage ripple. For fast changes of field current the bridge is working in full controlled mode. Insulation voltage 700 V, operation voltage ≤ 500 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.

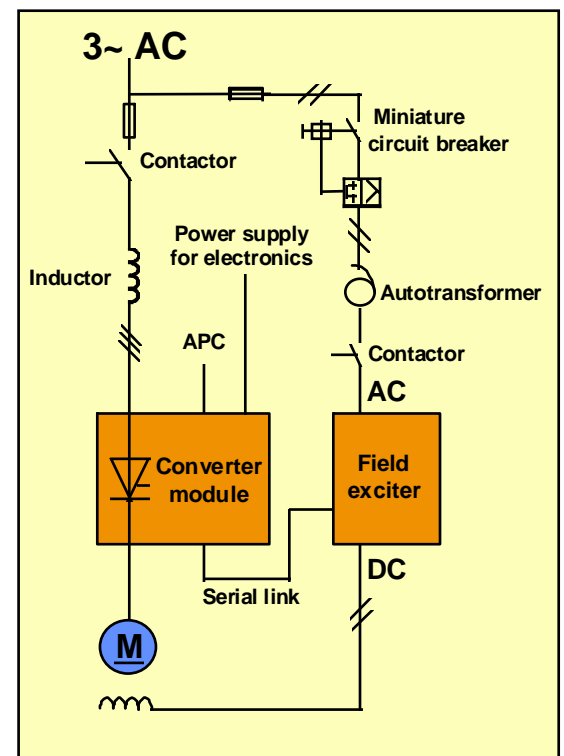


Figure 3. Connections of the field exciter.

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.

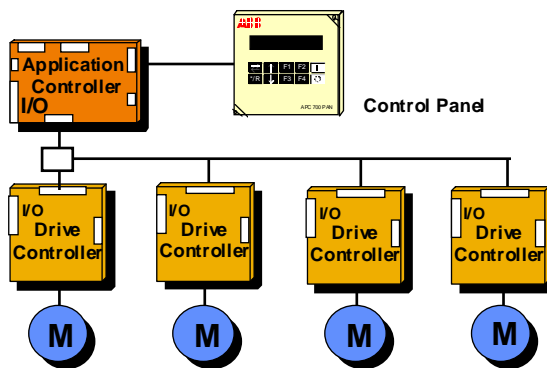
Small drive system

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.

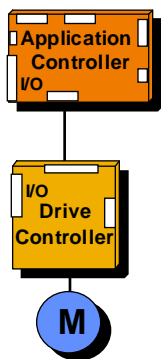
Large drive system

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.

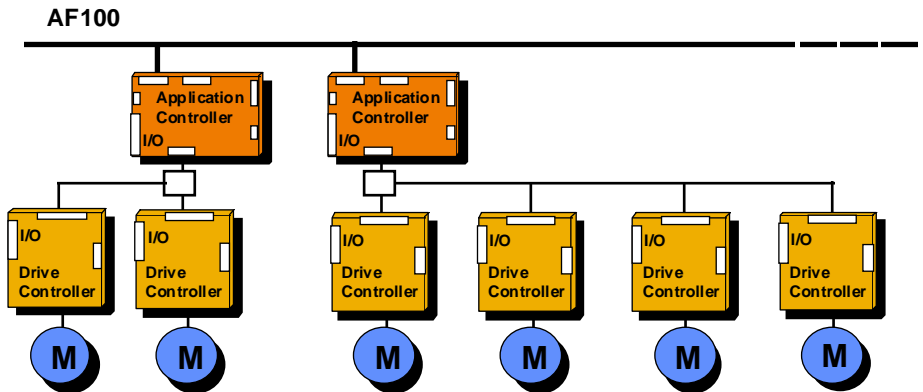
Small drive system



Stand-alone drive



Large drive system



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

I/O Connections

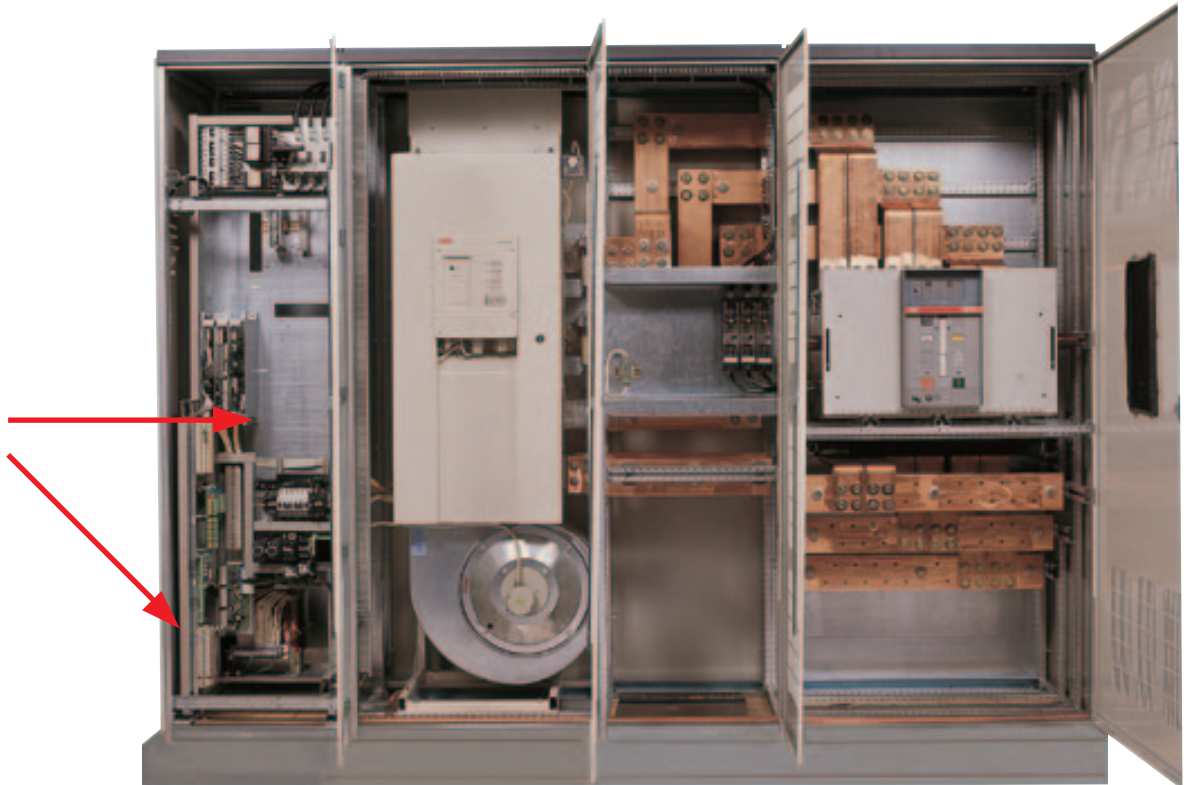


Figure 4. The 5150 A DC converter with air circuit breaker.

Communication

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.

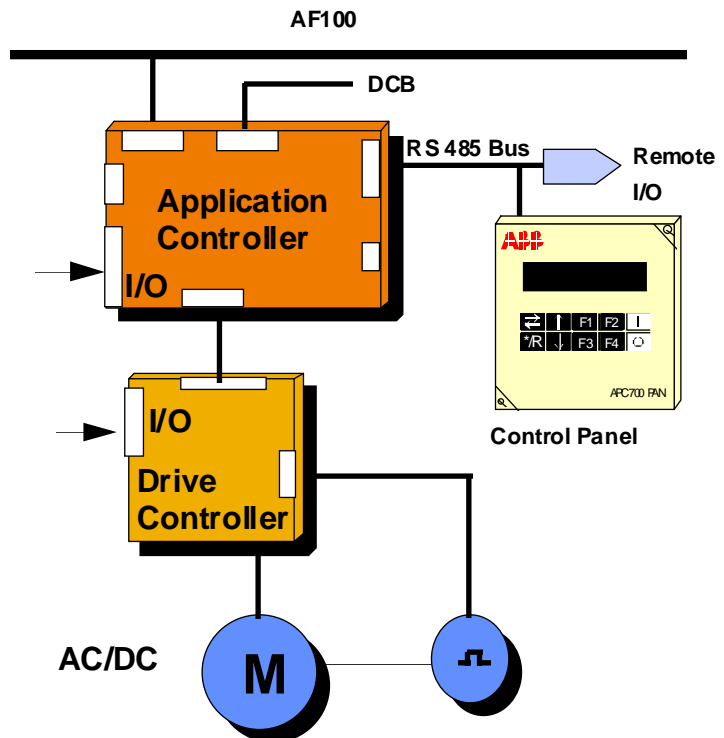
Control Panel

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

- Different languages defined by application program
- 2x20 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 and Programming

Commissioning, maintenance and programming is easy with the dedicated Windows™ based PC programs.

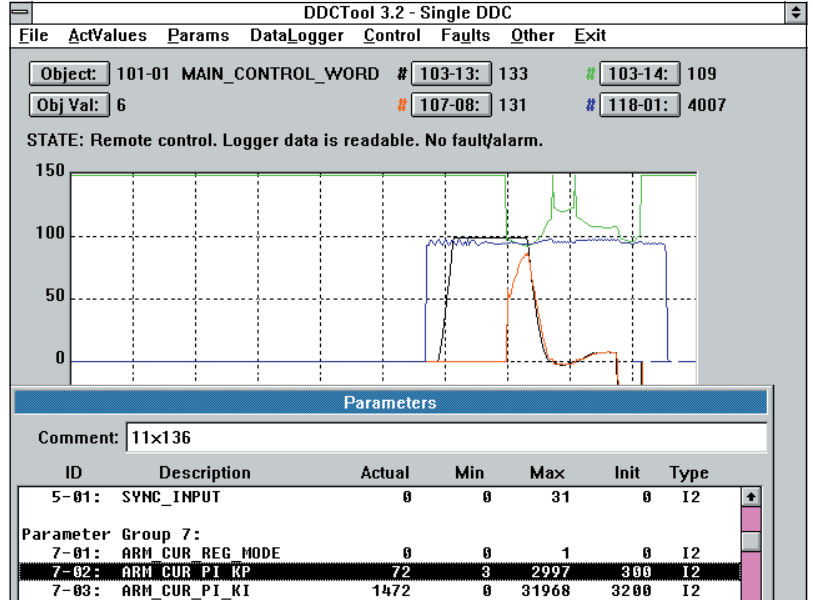
Digital-Drive-Control-Tool (DDCTool) for Commissioning and Maintenance

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

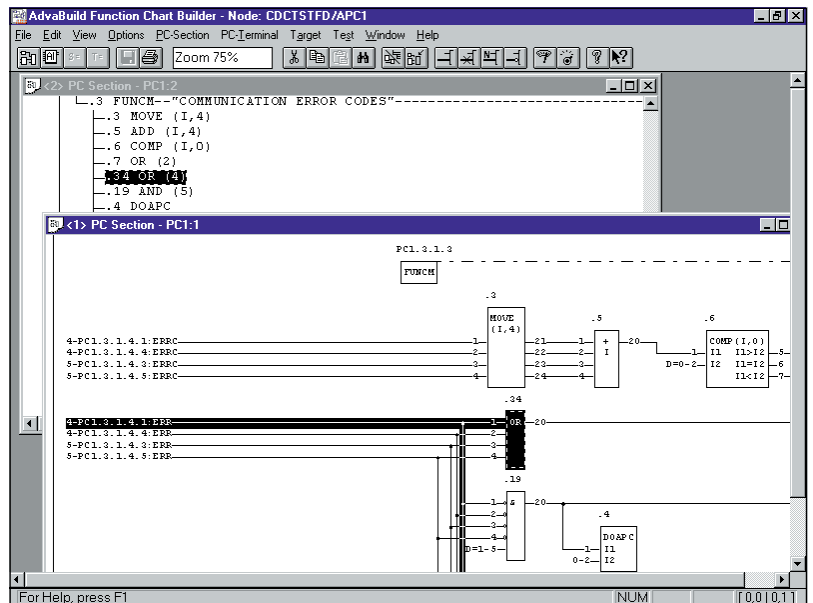
The DDCTool offers the following functions:

- 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, sealing 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:	50 kA (1 sec.) $i_{dyn} = 105$ 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 Types

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.

Type designation	DC I current		DC II current (4Q)		DC III current (4Q)			DC IV current (4Q)			Rated power (2Q) [kW]*
	2Q	4Q	contin. load	150 % 60 sec.	contin. load	150 % 120 sec.	200 % 10 sec.	contin. load	125 % 2 hours	200 % 10 sec.	
400 V											
DCV 700-0025-45-D	22	22	21	32	20	31	41	18	22	35	10
DCV 700-0050-45-D	45	45	40	59	37	56	75	36	45	72	22
DCV 700-0075-45-D	67	67	53	80	50	75	100	50	62	100	32
DCV 700-0140-45-D	115	125	95	143	91	136	181	91	113	181	56
DCV 700-0250-45-D	210	225	159	239	132	198	264	132	165	264	100
DCV 700-0350-45-D	285	300	228	343	200	300	400	200	250	400	130
DCV 700-0520-45-D	400	450	345	517	308	462	616	308	385	616	190
DCV 700-0700-45-D	600	600	476	715	449	674	898	449	561	898	290
DCV 700-0900-45-D	855	855	650	974	565	847	1129	565	706	1129	410
DCV 700-1200-45-D	1140	1140	843	1265	731	1096	1461	731	913	1461	550
DCV 700-1200T-45-D	1140	1140	1095	1643	1055	1583	2111	912	1140	1824	550
DCV 700-1500-45-D	1425	1425	1140	1709	1048	1573	2097	1048	1311	2097	690
DCV 700-2000-45-D	1850	1850	1368	2052	1259	1889	2518	1259	1574	2518	900
DCV 700-2500-45-D	2500	2500	2402	3603	2276	3414	4552	2000	2500	4000	1220
DCV 700-3300-45-D	3300	3300	2416	3623	2277	3415	4553	2277	2846	4553	1610
DCV 700-4000-45-D*	4000	4000	2977	4465	2795	4193	5590	2795	3494	5590	1960
DCV 700-5150-45-D*	5150	5150	3796	5694	3669	5503	7337	3733	4667	7467	2520
500 V											
DCV 700-0025-55-D	22	22	21	32	20	31	41	18	22	35	13
DCV 700-0050-55-D	45	45	40	59	37	56	75	36	45	72	27
DCV 700-0075-55-D	67	67	53	80	50	75	100	50	62	100	41
DCV 700-0140-55-D	115	125	95	143	91	136	181	91	113	181	70
DCV 700-0250-55-D	210	225	159	239	132	198	264	132	165	264	120
DCV 700-0350-55-D	285	300	228	343	200	300	400	200	250	400	170
DCV 700-0520-55-D	400	450	345	517	308	462	616	308	385	616	240
DCV 700-0700-55-D	600	600	476	715	449	674	898	449	561	898	360
DCV 700-0900-55-D	855	855	650	974	565	847	1129	565	706	1129	520
DCV 700-1200-55-D	1140	1140	843	1265	731	1096	1461	731	913	1461	690
DCV 700-1200T-55-D	1140	1140	1095	1643	1055	1583	2111	912	1140	1824	690
DCV 700-1500-55-D	1425	1425	1140	1709	1048	1573	2097	1048	1311	2097	870
DCV 700-2000-55-D	1850	1850	1368	2052	1259	1889	2518	1259	1574	2518	1130
DCV 700-2500-55-D	2500	2500	2402	3603	2276	3414	4552	2000	2500	4000	1530
DCV 700-3300-55-D	3300	3300	2416	3623	2277	3415	4553	2277	2846	4553	2020
DCV 700-4000-55-D*	4000	4000	2977	4465	2795	4193	5590	2795	3494	5590	2450
DCV 700-5150-55-D*	5150	5150	3796	5694	3669	5503	7337	3733	4667	7467	3150
600 V											
DCV 700-0050-65-D	45	45	43	65	42	62	83	36	45	72	33
DCV 700-0110-65-D	95	100	79	119	75	113	150	75	94	150	69
DCV 700-0270-65-D	220	240	190	284	166	250	333	166	208	333	160
DCV 700-0450-65-D	370	400	313	470	279	418	557	279	348	557	270
DCV 700-0900-65-D	855	855	650	974	565	847	1129	565	706	1129	620
DCV 700-1500-65-D	1425	1425	1140	1709	1048	1573	2097	1048	1311	2097	1040
DCV 700-2050-65-D	2050	2050	1502	2253	1426	2139	2852	1484	1855	2967	1500
DCV 700-2500-65-D	2500	2500	2402	3603	2276	3414	4552	2000	2500	4000	1830
DCV 700-3300-65-D	3300	3300	2416	3623	2277	3415	4553	2277	2846	4553	2420
DCV 700-4000-65-D*	4000	4000	3036	4554	2889	4334	5779	2933	3666	5865	2940
DCV 700-4750-65-D*	4750	4750	3734	5601	3608	5412	7216	3673	4591	7346	3490
690 V											
DCV 700-0900-75-D	855	855	650	974	565	847	1129	565	706	1129	720
DCV 700-1500-75-D	1425	1425	1140	1709	1048	1573	2097	1048	1311	2097	1200
DCV 700-2050-75-D	2050	2050	1502	2253	1426	2139	2852	1484	1855	2967	1730
DCV 700-2500-75-D	2500	2500	2402	3603	2276	3414	4552	2000	2500	4000	2110
DCV 700-3300-75-D	3300	3300	2416	3623	2277	3415	4553	2277	2846	4553	2790
DCV 700-4000-75-D*	4000	4000	3036	4554	2889	4334	5779	2933	3666	5865	3380
DCV 700-4750-75-D*	4750	4750	3734	5601	3608	5412	7216	3673	4591	7346	4010
790 V											
DCV 700-2050-85-D*	2050	2050	1502	2253	1426	2139	2852	1484	1855	2967	1980
DCV 700-3200-85-D*	3200	3200	2655	3983	2485	3727	4969	2485	3106	4969	3100
DCV 700-4000-85-D*	4000	4000	3036	4554	2889	4334	5779	2933	3666	5865	3870
DCV 700-4750-85-D*	4750	4750	3734	5601	3608	5412	7216	3673	4591	7346	4600
1000 V											
DCV 700-2050-95-D*	2050	2050	1577	2365	1471	2207	2942	1471	1839	2942	2510
DCV 700-2650-95-D*	2650	2650	2058	3087	1922	2883	3844	1922	2403	3844	3240
DCV 700-3200-95-D*	3200	3200	2551	3827	2428	3642	4856	2458	3072	4915	3920
DCV 700-4000-95-D*	4000	4000	2975	4463	2878	4317	5755	2918	3648	5836	4900

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.

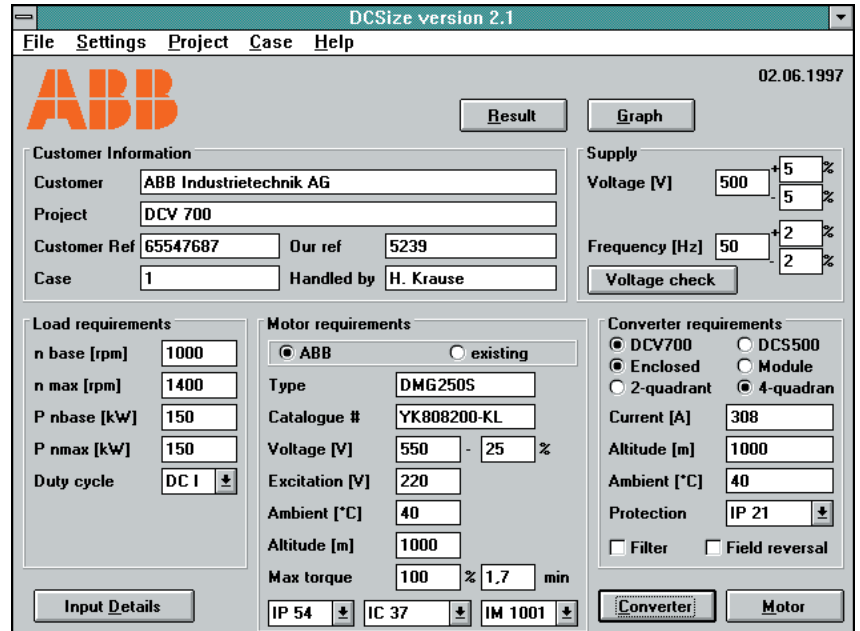


Figure 5. User interface of the dimensioning program shown on a computer screen.

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 $\pm 10\%$**
- **Internal voltage drop approx. 1 %**
- S_k = Short-circuit power of AC supply
- I_d = actual direct current
- I_{dmN} = rated continuous direct current of the equipment
- I_{dm} = max current limit (200 % of I_{dmN})
- 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) = $1.35 \times U_v \times \cos 15^\circ$
- U_d (4-quadrant) = $1.35 \times U_v \times \cos 30^\circ$

System connection voltage U_v	Rated DC voltage (Motor voltage) U_d		Ideal DC voltage without load U_{di0}	Recommended DCV 700 Voltage class
	2Q	4Q		
230	265	240	310	400 V
380	440	395	510	400 V
400	465	415	540	400 V
415	480	430	560	400 V
440	510	455	590	500 V
460	530	480	620	500 V
480	555	500	640	500 V
500	580	520	670	500 V
525	610	545	700	600 V
575	670	600	770	600 V
600	700	625	810	600 V
660	765	685	890	690 V
690	800	720	930	690 V
790	915	820	1060	790 V
1000	1160	1040	1350	1000 V

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

Dimensions

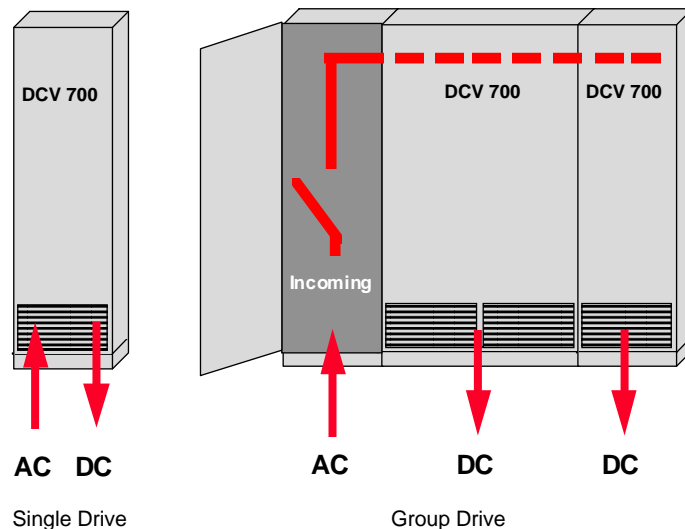
	Single drive				Group drive			
	Height ⌚	Depth	Width ⌚	Width ⌚	Height ⌚	Depth	Width ⌚	Width ⌚
DC-Converter, Size C1								
DCV70x-0025-4/5x-D	2000	600	600	-	2000	600	600	-
DCV70x-0050-4/5x-D	2000	600	600	-	2000	600	600	-
DCV70x-0075-4/5x-D	2000	600	600	-	2000	600	600	-
DCV70x-0140-4/5x-D	2000	600	600	-	2000	600	600	-
DC-Converter, Size C2								
DCV70x-0250-4/5x-D	2000	600	800	-	2000	600	600	-
DCV70x-0350-4/5x-D	2000	600	800	-	2000	600	600	-
DCV70x-0520-4/5x-D	2000	600	800	-	2000	600	600	-
DCV70x-0700-4/5x-D	2000	600	800	-	2000	600	600	-
DC-Converter, Size C3								
DCV70x-0900-4/5/7x-D	2000	600	1400	-	2000	600	1400	-
DCV70x-1200-4/5/7x-D	2000	600	1400	-	2000	600	1400	-
DCV70x-1200T-4/5/7x-D	2000	600	1400	-	2000	600	1400	-
DCV70x-1500-4/5/7x-D	2000	600	1400	-	2000	600	1400	-
DCV70x-2000-4/5/7x-D	2000	600	1400	-	2000	600	1400	-
DC-Converter, Size C4								
DCV70x-2050-7/8/9x-D ⚡	2000	800	2600	2200	not available	<i>detailed techn.</i>		
DCV70x-2500-4/5/7x-D	2000	800	2600	-	not available	<i>information</i>		
DCV70x-2650-9x-D ⚡	2000	800	n.av.	2200	not available	<i>on request</i>		
DCV70x-3200-8/9x-D ⚡	2000	800	n.av.	2200	not available			
DCV70x-3300-4/5/7x-D	2000	800	2600	2200	not available			
DCV70x-4000-4/5/7/8/9x-D ⚡	2000	800	2800	2200	not available			
DCV70x-4750-7/8x-D ⚡	2000	800	3000	2400	not available			
DCV70x-5150-4/5x-D	2000	800	3000	2400	not available			
Incoming Supply Sections								
DCV70x-1000-CB-D					2000	600	600	600
DCV70x-2000-CB-D					2000	600	600	600
DCV70x-3000-CB-D					2000	600	800	800
DCV70x-4000-CB-D (<i>on request</i>)					2000	600	1000	1000
Connection cabinet ⚡								
					2000	600	200	-

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

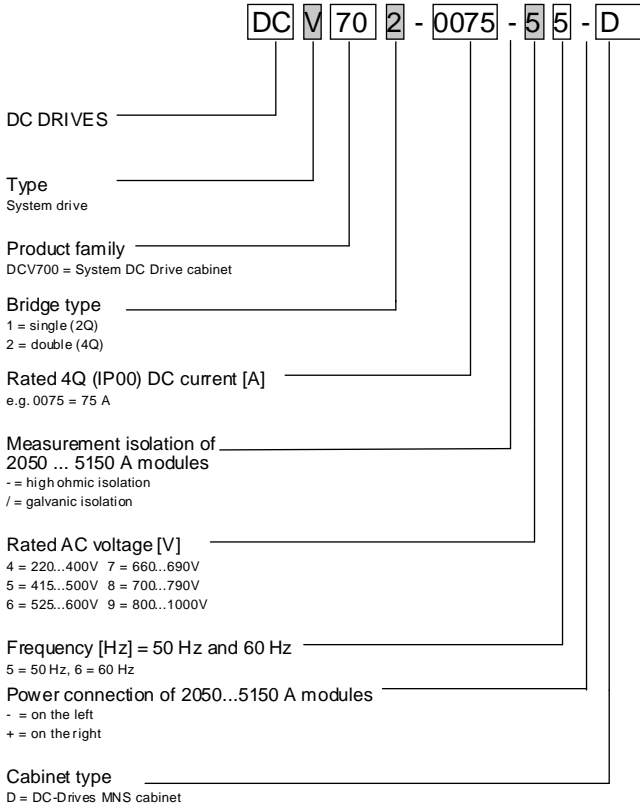
- ⌚ for IP 21 please add 120 mm for hood
- ⌚ **with** circuit breaker or contactor
- ⌚ **without** circuit breaker or contactor
- ⚡ DCV 700 with AC supply voltage 3 x 790 V and 3 x 1000 V are generally without circuit breaker (see page 13)
- ⚡ Max length of a transportation segment is 3.40 m. If the "line-up"-width greater than 3.40 m a connection cabinet per transportation unit is required.



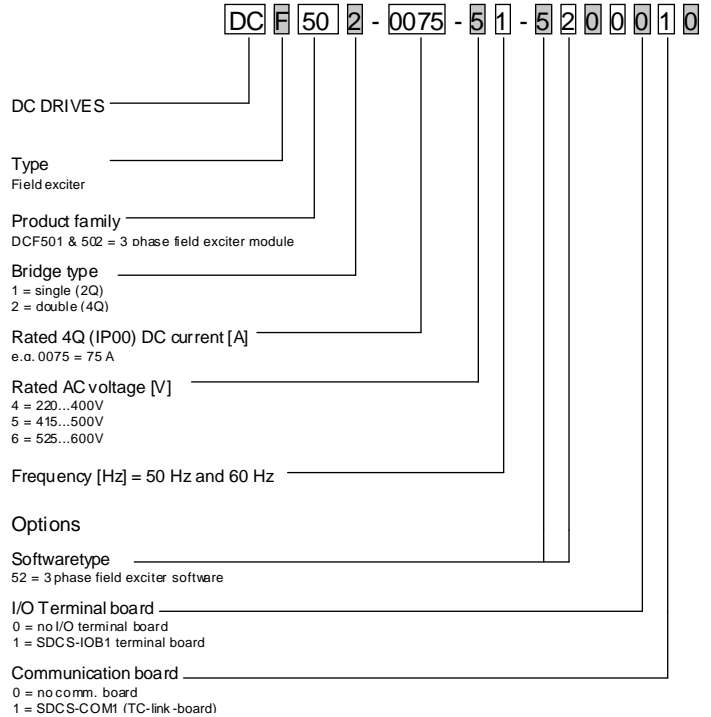
DCV 700 Type Designations

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.

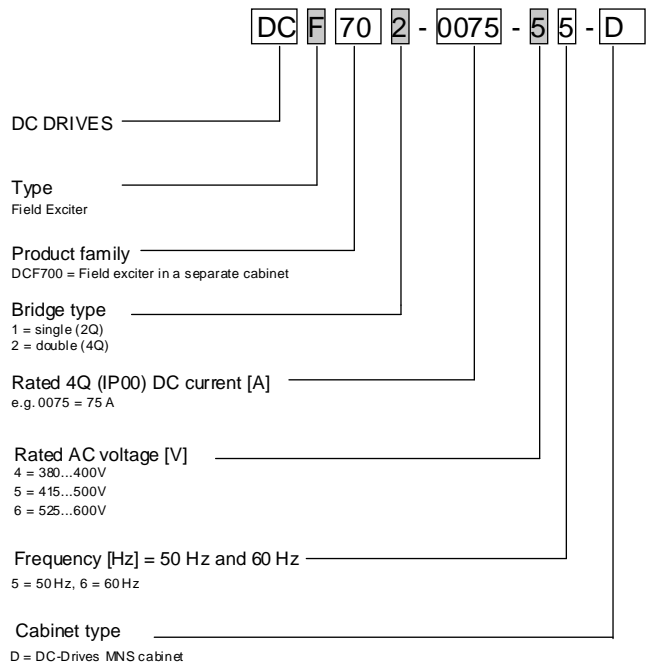
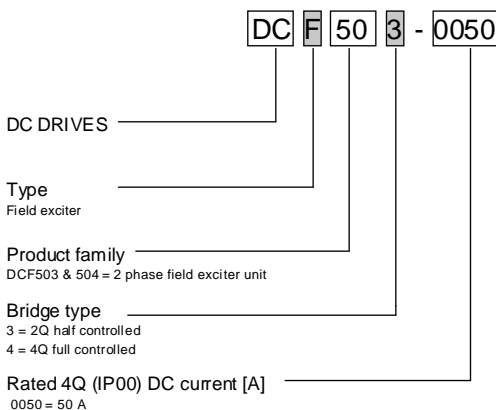


Type designation table for 3-phase field exciters placed in the armature enclosure.



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

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



Environmental Conditions

System connection

Voltage, 3-phase: 230 to 1000 V to IEC 38
 Voltage deviation: $\pm 10\%$ continuous; $\pm 15\%$ short-time *
 Rated frequency: 50 Hz or 60 Hz
 Static frequency deviation: 50 Hz $\pm 2\%$; 60 Hz $\pm 2\%$
 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.: $< 0.5^\circ\text{C} / \text{minute}$
 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:	Size	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 Δ VDE 0558 T.11

Safety: IEC 439 Δ 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 50204
 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 50081-2
 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 (%)

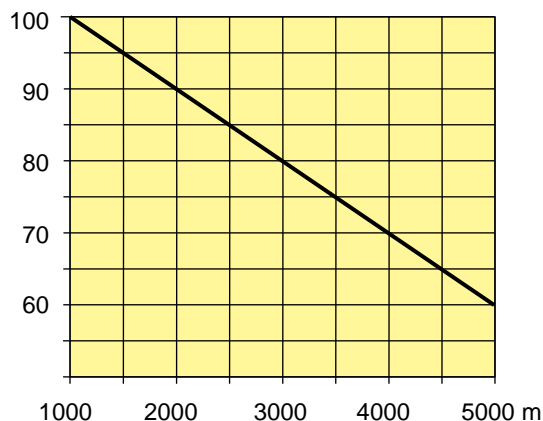


Fig. 6: Effect of the site elevation above sea level on the DCV 700's load capacity.

Current reduction to (%)

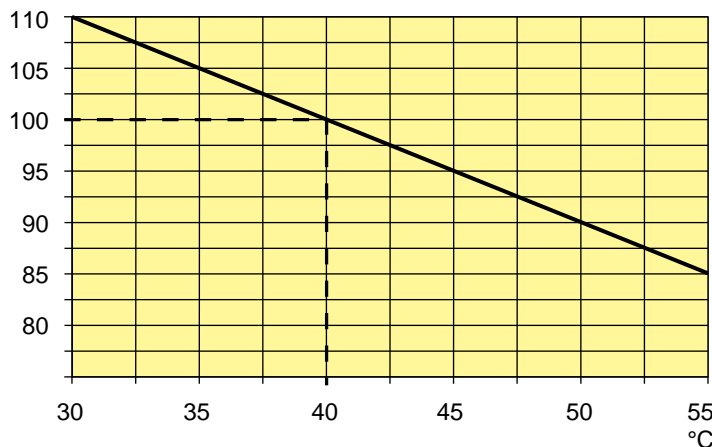


Fig. 7: Effect of the ambient temperature on the DCV 700's load capacity.

Technical Data

Standard I/O Connections

Digital Drive Controller DDC

3 digital inputs	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.
4 digital outputs	3 programmable relay outputs, 2 programmable optocoupler outputs. Relays: voltage 250 VAC, current 3 A 250 VAC. Opto: voltage 48 VDC, current 50 mA
5 analogue inputs	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.
2 analogue outputs	Output ranges -10 to +10 V. Max. load ± 10 mA. Resolution 11 bits+sign.
1 pulse encoder input	Differential or single ended tachometers. 3 channels A, B and Z. +5 V, +12 V and +24 V control voltage outlets.
1 emergency stop input	230 VAC/ 115 VAC/ 24...48 VDC. +48 VDC/ 50 mA control voltage outlet. Linking to other groups.
1 emergency stop output	Relay output. Max. voltage 250 VAC, max. current 3 A at 250 VAC.
Current source	5 mA for Pt 100 element, 1.5 mA for PTC resistor.
Voltage reference	± 10 V output
Actual armature current output	Analogue output 0 to 10 V
Earth fault monitoring	

Application Controller APC

4 digital inputs	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.
2 digital outputs	Programmable relay outputs, change over contacts. Max. voltage 250 VAC. Max. current 8 A at 250 VAC.
2 analogue inputs	Differential inputs, resolution 12 bits, accuracy $\pm 1\%$. 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 k Ω for voltage inputs and 500 Ω for current inputs.
1 voltage reference output	+10 V reference voltage, accuracy $\pm 1\%$. Max. load current 10 mA.

Technical Data

Optional I/O Connections

Extended/Remote I/O board YPQ110A

8 digital inputs	Opto isolated inputs, control voltage 110 VAC/ 24 VDC. Hardware delay 2 ms. Digital filter time constants from 0.5 ms to 128 ms in 0.5 ms steps. Input impedance 3 k Ω for 24 VDC and 13 k Ω 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 μ s.
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 k Ω . Accuracy \pm 0.1 % at \pm 10 V and \pm 0.4 % at \pm 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 \pm 0.1 %.
3 voltage reference outputs	+10 V voltage reference, accuracy \pm 1 mV. Max. load current 10 mA. -10 V voltage reference, accuracy \pm 5 mV. Max. load current 10 mA. 5 mA current reference, accuracy \pm 0.05 mA. Max. load resistance 1 k Ω .

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 k Ω at 24 V and 13 k Ω 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. \pm 13 mA current input or \pm 24 V voltage input. Max. input frequency 300 kHz.
2 analogue outputs	Output voltage \pm 10 V, output current \pm 10 mA. Resolution 12 bits, accuracy \pm 1 %.

Connection through parallel bus.

The technical data and dimensions are valid at the time of printing. We reserve the right to subsequent alterations.