

DPB.. Supply Unit

Structure of NCT Drive Systems

Servo amplifiers of NCT drive system do not contain rectifier unit, but the energy is provided by the same separate power supply module to each servo amplifier. The supply unit and the servo amplifier modules are connected to each other by DC bus carrying rectified voltage. The depth of modules correspond and all electric connectors are found on the front panel, thus can be mounted in one row and an architectural, clear-cut system can be created that is easy to cable. The order of modules is optional, they can even be placed in more rows. The direct line supply and the modular construction characteristic to NCT drive systems make the electric planning, the implementation of line supply as well as the possible future enhancement or module replacement simple.

DPB.. Supply Units

The most important task of DPB.. supply units is to supply the servo amplifiers with energy. The servo amplifier inputs demand DC voltage, that may only alter slightly in function of the loading. The rectified voltage of the three-phase line occurs directly on the DC bus output of DPB.. supply units, the rippled rectified voltage is almost entirely smoothed by the condensers on the DC bus. The voltage of the DC bus is basically determined by the line voltage and the line choke voltage. The task of the line choke is to decrease the harmonic content of the current absorbed from or recuperated to the line. Due to its great size the line choke forms a separate unit in case of DPB.. power supplies.

The DPB.. supply units include a soft start system switching on and off in function of the DC bus voltage. The voltages of switch-on and switch-off differ. Provided the bus voltage is less than half of the nominal value, the soft start switches on, if however the bus voltage rises above 80% of the nominal value, the soft start switches off. Without soft start the over-current protection in front of the supply unit would immediately detach upon power-on.

There is an operation mode (brake mode) in all drive systems, when the power flows from the motor to the main supply unit. DPB supply units force the power occurring upon brake back to the three-phase line.

Safety Instructions

Installation, control, repair and maintenance of servo drive produced by NCT Kft. can only be done by the person with adequate qualification and with the knowledge of the general safety instructions of electrotechnics. Besides the person must know all dangers of the given type of equipment and all rules of prevention of accidents. The person working with electric equipment is not only responsible for his own health but must also ensure, that other people are not subject to danger.

Protection against indirect contact

Installation, repair and maintenance of servo drives produced by NCT Kft. must always be executed according to MSZ 172-1:1986/1 M:1989.

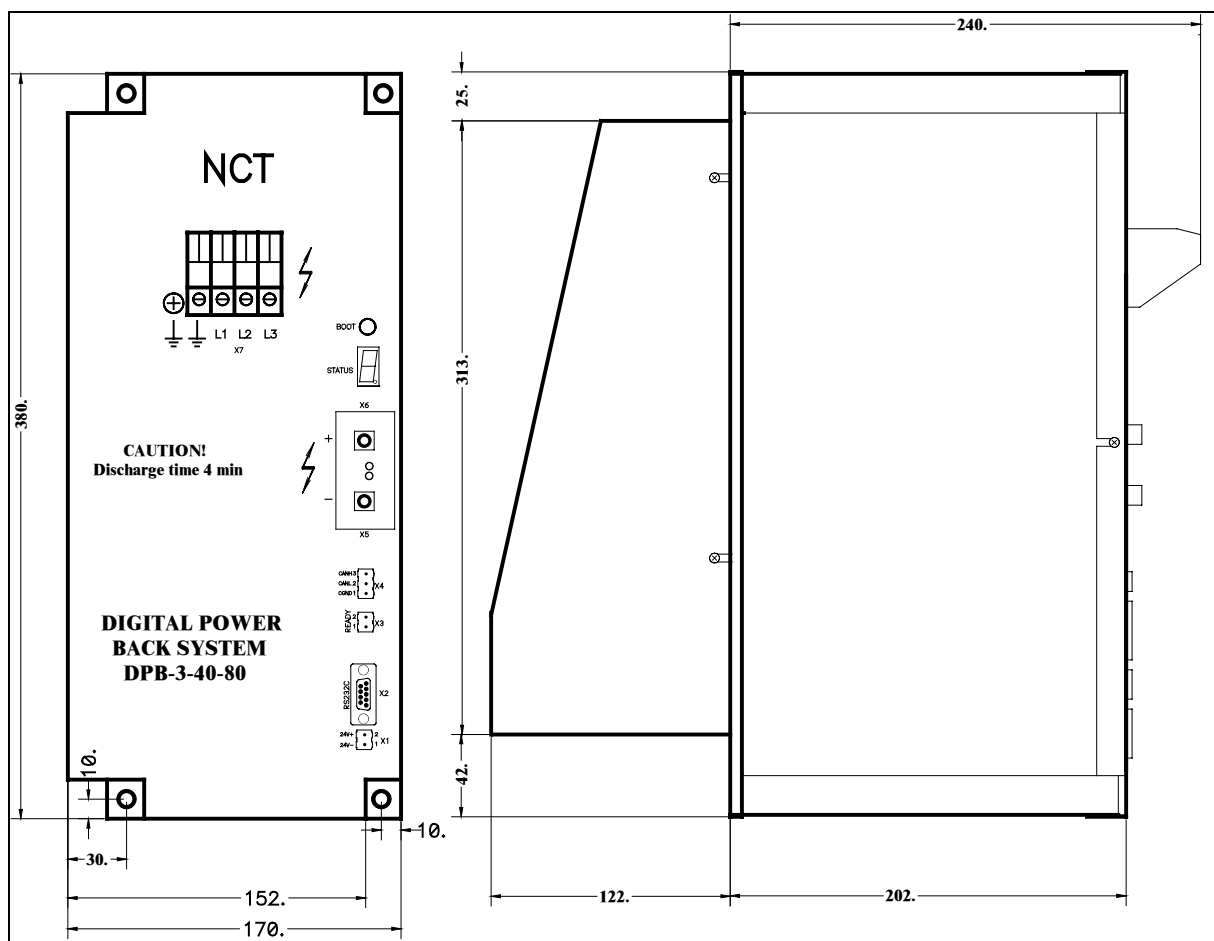
The metal casing of DPB.. supply units must always be connected to the protective conductor carefully, by a cable of standard width. Higher than extra-low voltage can only be connected to DPB.. supply units provided they are properly connected to the protective conductor. Only cables with non-damaged isolation, intact connector counter parts without cracks and coated end sleeves may be applied when installing DPB.. supply units. DC bus outlets of sold DPB.. supply units are out to touch, their inaccessibility must be ensured after mounting the servo amplifiers. Till the DC bus outlets are free to touch, it is forbidden to power the drive system. High-capacity condensers are connected to the DC bus, keeping the stored charge for a long time even after power-off. If for some reason DPB.. supply units have to be touched, always check if the voltage of DC bus has decreased to zero.

Hot Surfaces

DPB.. supply units generate heat during their operation, warming the supply unit and also its environment. DPB.. supply units may warm to so high temperature, that would cause burning injury upon touch. Especially the exothermal surfaces may become hot. Always check if the surface to be touched can cause burning injury.

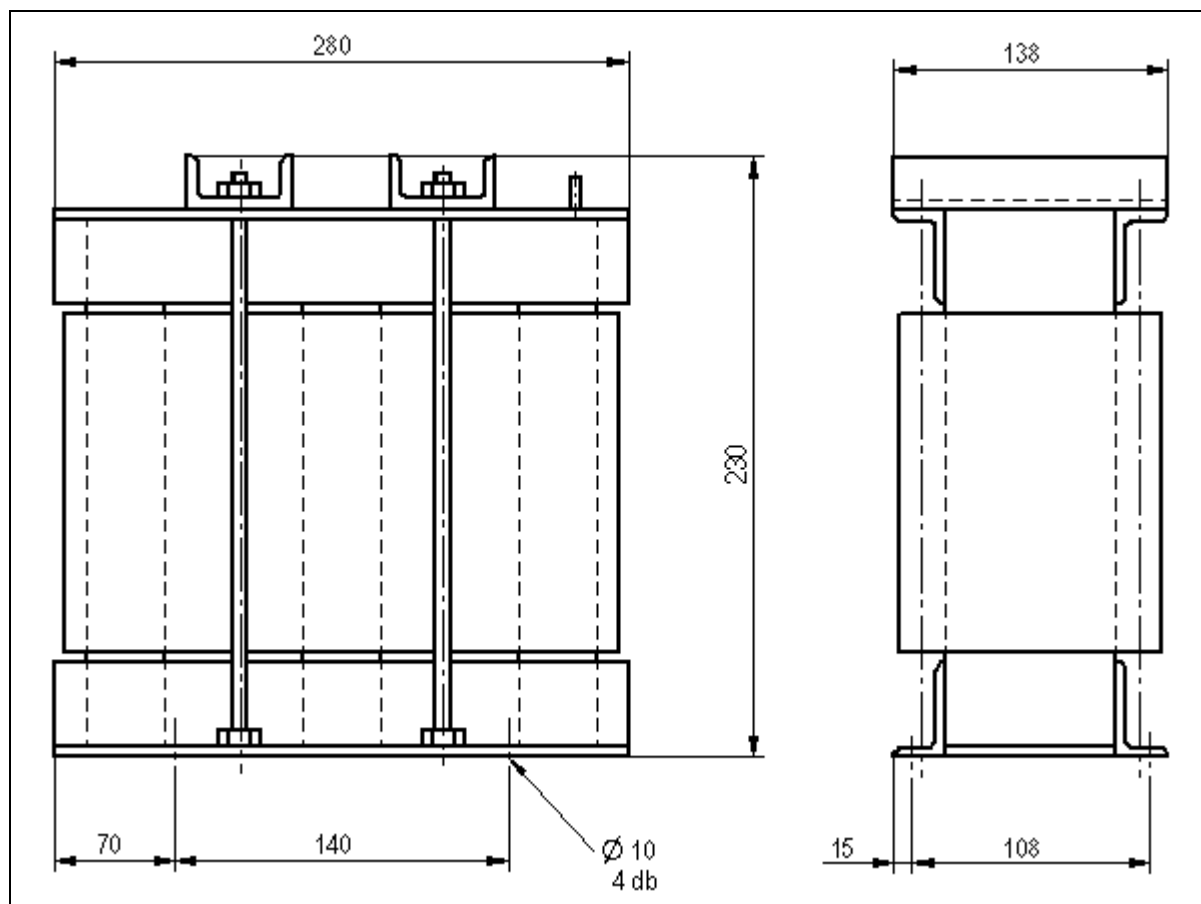
DPB 3-40-80 Supply Unit

Input voltage	3 x 400 V _{ac}
Input current	3 x 80 A _{eff}
Output voltage	540 V _{dc}
Output current	80 A _{dc}
Maximum ambient temperature	45 °C
Protection	IP00
Heat dissipation	300W
Mass	12 kg
Line choke type	DRC-3-40-80
Nominal value of over-current protection	40...80 A



DRC 3-40-80 Three-phase Line Choke

Nominal inductivity	0,5 mH
Line voltage	3x400V
Nominal current	3x80 A
Saturation current	200 A
Protection	IP00
Mass	25 kg



Installment of DPB.. Supply Units

Setting-in DPB.. Supply Units

Basically four standpoints must be taken into account when setting-in DPB.. supply units:

- Prevention of accidents
- Protection against harmful environment
- Avoidance of overheating
- Mechanical fixing

Prevention of accidents

There are points under voltage on DPB.. supply units that are out to touch. For this reason the place of setting-in must be one where normally DPB.. supply units are inaccessible. The most commonly applied procedure is their placement in the electric switchboard.

DPB.. supply units have IP00 protection and can only support IP20 protection upon setting-in protective cover placed above DC buses.

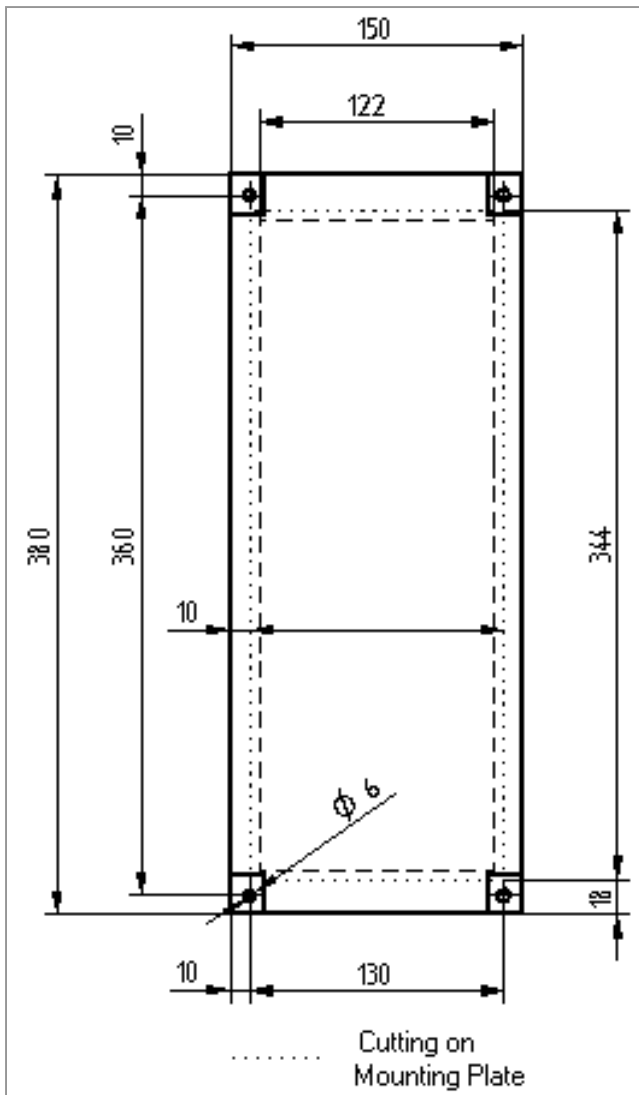
Protection against harmful environment

Similarly to other electronic equipment, DPB.. supply units are sensitive to different contamination as well as to moisture. Naturally drives must be protected from water, as well as from different solid and liquid materials. Similarly contaminated (coolant, oil mist, powdered carbon, sawdust ect.) or moist air must be avoided, thereby keeping the inside of the equipment safe.

In case DPB.. supply units are operated in rooms, where air clarity is inadequate, the equipment must be protected. When ensuring the adequately clear environment, the resulting heat, carried away by the air surrounding the drive must be also taken into account. Nowadays the best solution seems to be the hermetically sealed electric switchboard supported with heat exchanger or climated.

Avoidance of overheating

DPB.. supply units generate heat during their operation, warming themselves, as well as their environment. Should the generated heat not be able to leave with the adequate intensity, the equipment is overheated. One of the most important standpoints of setting-in is the avoidance of the previous case.



These supply units can be mounted in a sealed electric switchboard, so that the part of the supply unit containing electronic parts contacts the clear air of the electric switchboard, while the cooling fin dissipating most of the generated heat contacts the air outside the electric switchboard. Its advantage is that only a little part of the heat generated by the drives warms the inside of the electric switchboard. For this mounting method a cutting shown on the diagram must be performed on the back panel of the electric switchboard and the cooling fin must be wriggled through this offset.

Should this setting-in method not be implementable, the supply units can be fixed to a setting-in plate with the help of a setting-in bracket. Other equipment must also be protected from the heat generated by DPS.. and DPB.. supply units. It is not recommended to build electronic equipment sensitive to heat above the drives (e.g. NC control, other drive ect.).

It is utmost important to clean, as well as to replace the filter of ventilators found on the switchboard with the prescribed periodicity. When applying heat exchanger the characteristics of the given type as well as its position in the switchboard must be

taken into account, and the different exothermal units must be placed in the switchboard on the basis of these.

Mechanical Fixing

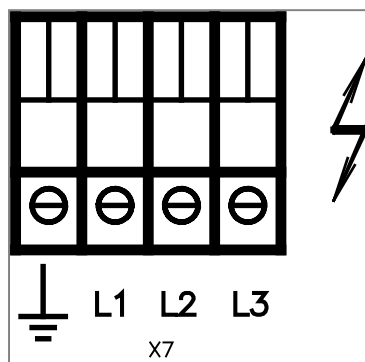
DPB.. supply units can be fixed with 4 M5 screws (hexagon-socket head screw is recommended) to an at least 3mm-thick steel. For position of bores see previous diagram.

Electric Connection

Line Choke Connection

All DPB.. supply units can only operate properly with their appropriate DRC.. line choke. The line choke must be connected after the equipment providing over-current protection. The cross-section of the phase conductors of the line cable must be defined on the basis of the supply unit current according to MSZ EN60204-1:2001, the cross-section of the protective conductor must correspond with the cross-section of phase conductors. The DRC.. line choke has flag outlets, the line cable must be connected to one row of outlets, while the DRC.. line choke must be connected with the DPB.. supply unit through the other row of outlets.

Choke Connector



Manufacturer: PHOENIX CONTACT

Type: HDFKV 16

Maximum 16 mm² wire can be connected into the connector.

The DPB.. supply unit must be connected to its appropriate line choke through this connector.

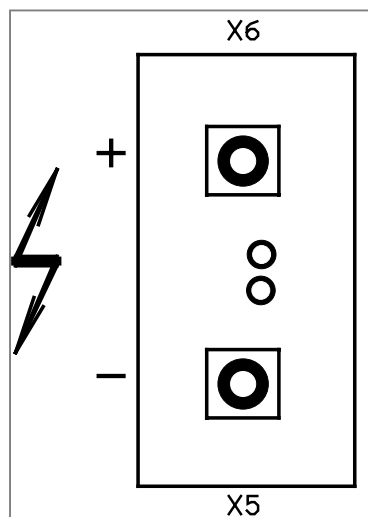
The cross-section of the phase conductors of the choke cable must be defined on the basis of the supply unit current according to MSZ EN60204-1:2001, the cross-section of the protective conductor must correspond with the cross-section of phase conductors.

In order to improve the EMC, the cables must be shielded, the shielding must be connected to the metal case electrogalvanically on both sides.

Grounding

The casing of DPB.. supply units must be connected to the protective conductor. For this purpose a connection point can be found on the metal case of all devices indicated with the generally accepted grounding symbol. The cross-section of the applied protective conductor must be equal to the cross-section of the line cable of the supply unit.

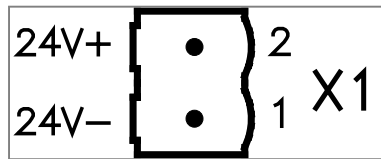
DC Bus Connection



DC voltage connection points of NCT servo drives and supply units are equally far from the mounting plate, thereby copper bus can be used for connecting modules. In case it is not possible, copper cable supported with cable-eye can be applied. The cross-section of the copper cable must correspond with the cross-section of line cables of the supply unit.

The voltage of DC bus is dangerous (for a few minutes even after switching the drive system off the line). Two red-lighted diodes between the DC voltage connection points draw attention to this. Because of the dangerous voltage the accidental touch of DC buses must be avoided, this is the task of the transparent protective cover.

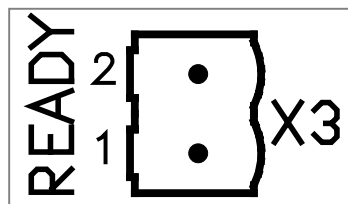
Auxiliary Supply Connection (Input)



In order to operate internal units, the DPB.. supply unit demands external power supply.
 Voltage of auxiliary supply: 24 Vdc (+20%, -10%)
 Maximum current: 500 mA

Manufacturer of connector: Phoenix Mecano
 Connector type: STLZ 950/2G-5.08-V
 Counter part type: AKZ 950/2-5.08

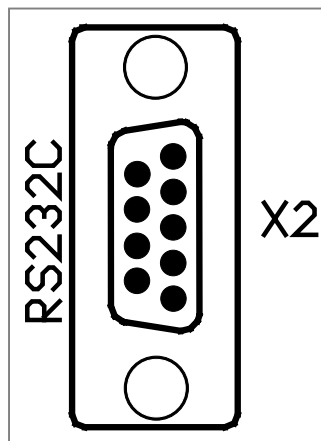
Main Supply Ready Signal Connection (Output)



Main supply ready signal means one electrically controlled contact. If the DPB.. supply unit can operate properly, this contact is closed (0 Ohm). If for some reason the device is not able to operate properly, this contact is open (abruption), or becomes open.

Maximum contact current: 0.5A
 Maximum voltage enabled between the contact poles: 100 Vac, 100 Vdc
 Manufacturer of connector: Phoenix Mecano
 Connector type: STLZ 950/2G-5.08-V
 Counter part type: AKZ 950/2-5.08

RS232C Connection



The programming of DPB.. supply unit is possible by means of IBM compatible personal computers (PC). In this case the DPB.. supply unit must be connected to the computer. Shielded cable must be used for the connection, shielding must be soldered to the connector casing on both sides.

The delivered DPB.. supply units are already programmed to the appropriate current and voltage level.
 Connector type: 9-polar D-Sub female
 Counter part type: 9-polar D-Sub male

DPB.. supply units CS1 RS232C (9P. D-Sub female)

PC serial port (9P. D-Sub male)

2: Transmitter Output (TXD)		2: Receiver Input (RXD)
3: Receiver Input (RXD)		3: Transmitter Output (TXD)
5: Ground (GND)		5: Ground (GND)

CAN Bus Connection X4 Currently out of use.

Operation of DPB.. Supply Units

Normal Operation

If 24V is switched to the auxiliary supply connector of a properly operating DPB.. supply unit, blinking character L can be seen on the seven-segment display and the Main Supply Ready Signal contact is open. When the three-phase line is switched to the supply unit through the choke, the condensers on DC bus begin to charge up through the soft start resistor (soft start process). Should the supply unit not detect phase fault on the three-phase line (short circuit, break), blinking character L changes into a (non-blinking) character according to the current and voltage of the supply unit (0 in case of 400V, 80A) and only the blinking decimal point refers to the supply unit operation. Blinking L only indicates phase fault, its cease does not mean the supply unit is ready. Should the DC bus voltage reach 80 % of the nominal value, the supply unit discharges the soft start resistor. The Main Supply Ready output contact closes after the end of soft start only if the supply unit does not detect line error. DPB.. supply unit does not send ready signal till it does not find the line adequate, in this case blinking letter L is shown on the seven-segment display. Provided the line is adequate and the soft start has ended, the ready contact closes, thereby enabling the operation for the consumers on the supply unit.

If the supply unit enables consuming through ready signal, it tries to keep ready state up until an error occurs or the DC voltage decreases below 50% of the nominal value. In case of line error only blinking letter L appears, the supply unit remains in ready state. Should the DC bus voltage fall under 50% of the nominal value, the ready output contact becomes open, as well as soft start is switched on again.

Error messages

Blinking L Line Error

If the supply unit detects phase fault on the three-phase line, blinking letter L appears on the seven-segment display. It alone does not clear the ready state, however a supply unit not being in ready state will not become ready during this error.

Blinking P

The power electronic module (IGBT) applied in DPB.. supply units is provided with closure protection. If the IGBT module detects abnormality, it sends signal to the processor (PDPINT – power device protection interrupt). This error causes immediate cease of ready state. If this error occurs and there is no sign of equipment failure, switch the supply unit off and on. Should the error not occur again, it is likely the abnormality of the three-phase line causing error. If error PDPINT appears repeatedly, the supply unit is erroneous.

If error PDPINT appears immediately after power-on, the line choke must be checked.

Blinking H Cooling Fin Overheat Error

If the cooling fin of the DPB.. supply unit is near a temperature causing failure, error is generated. In this case the supply unit ceases ready state immediately.

Blinking F DC Bus Over-voltage Error

The supply unit and the servo amplifiers may damage in case the DC bus voltage exceeds 780V. Therefore a voltage monitoring system is built in, generating error when the DC bus voltage exceeds 780V.

There is an operation mode (brake mode) in every drive system, when the power flows from the motor to the main supply. The DPB supply unit forces this power into the supplying system (reversible brake). Error occurs when the main supply is not able to force the power coming from the motor into the line. The main supply may be suspicious in case of such error. However it can also happen, that the line is unable to receive the brake power.

Other cause of voltage increase may be the enormous rise of the high-current supply voltage.