

Main 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 by DC bus carrying rectified voltage. The depth of these modules are the same 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.

DPS.. Supply Units

The most important task of DPS.. 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 is directly on the DC bus output of DPS.. 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 or recuperated from the line.

The DPS.. 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. DPS.. supply units transform this power into heat on brake choppers. There is one brake chopper in each DPS.. supply unit, if it is not possible, the brake power can be increased by means of external brake resistor.

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 avoidance 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 done according to MSZ 172-1:1986/1 M:1989.

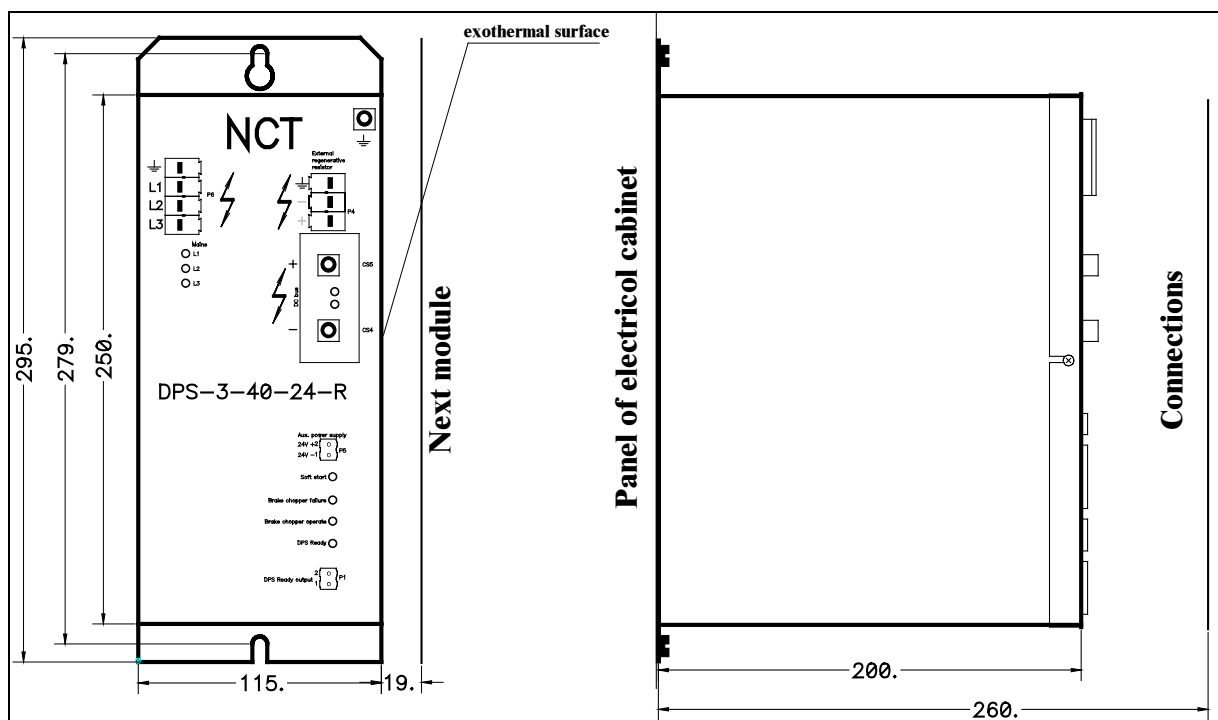
The metal case of DPS.. supply units must always be connected to the protective conductor carefully, with a cable of standard width. Higher than extra-low voltage must only be connected to DPS.. supply units provided they are properly connected to the protective conductor. Only cables with non-damaged isolation, intact connector counter parts without cracks and coated end sleeves may be applied when installing DPS.. supply units. DC bus outlets of sold DPS.. supply units are out to touch, their inaccessibility must be ensured after installing 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 DPS.. supply units have to be touched, always check if the voltage of DC bus has decreased to zero.

Hot Surfaces

DPS.. supply units generate heat during their operation, warming the supply unit and also its environment. DPS.. 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.

DPS 3-40-24-R supply unit

Input voltage	3 x 400 V _{ac}
Input current	3x20 A _{eff}
Output voltage	540 V _{dc}
Nominal output current	24 A _{dc}
Internal brake resistor	150 Ω
Minimum external brake resistor	47 Ω
External resistor power	600 W
Maximum ambient temperature	45 °C
Protection	IP00
Heat dissipation	100W



Installation of DPS.. Supply Units

Setting-in DPS.. Supply Units

Basically four standpoints must be taken into consideration when setting-in DPS.. supply units:

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

Prevention of Accidents

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

DPS.. supply units have IP00 protection and can only support IP20 protection when protective cover is placed above DC buses.

Protection against Harmful Environment

Similarly to other electronic equipments, DPS.. supply units are sensitive to different contamination as well as to moisture. Naturally supplies 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 DPS.. 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 Overheat

DPS.. 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 installation is the avoidance of the previous case.

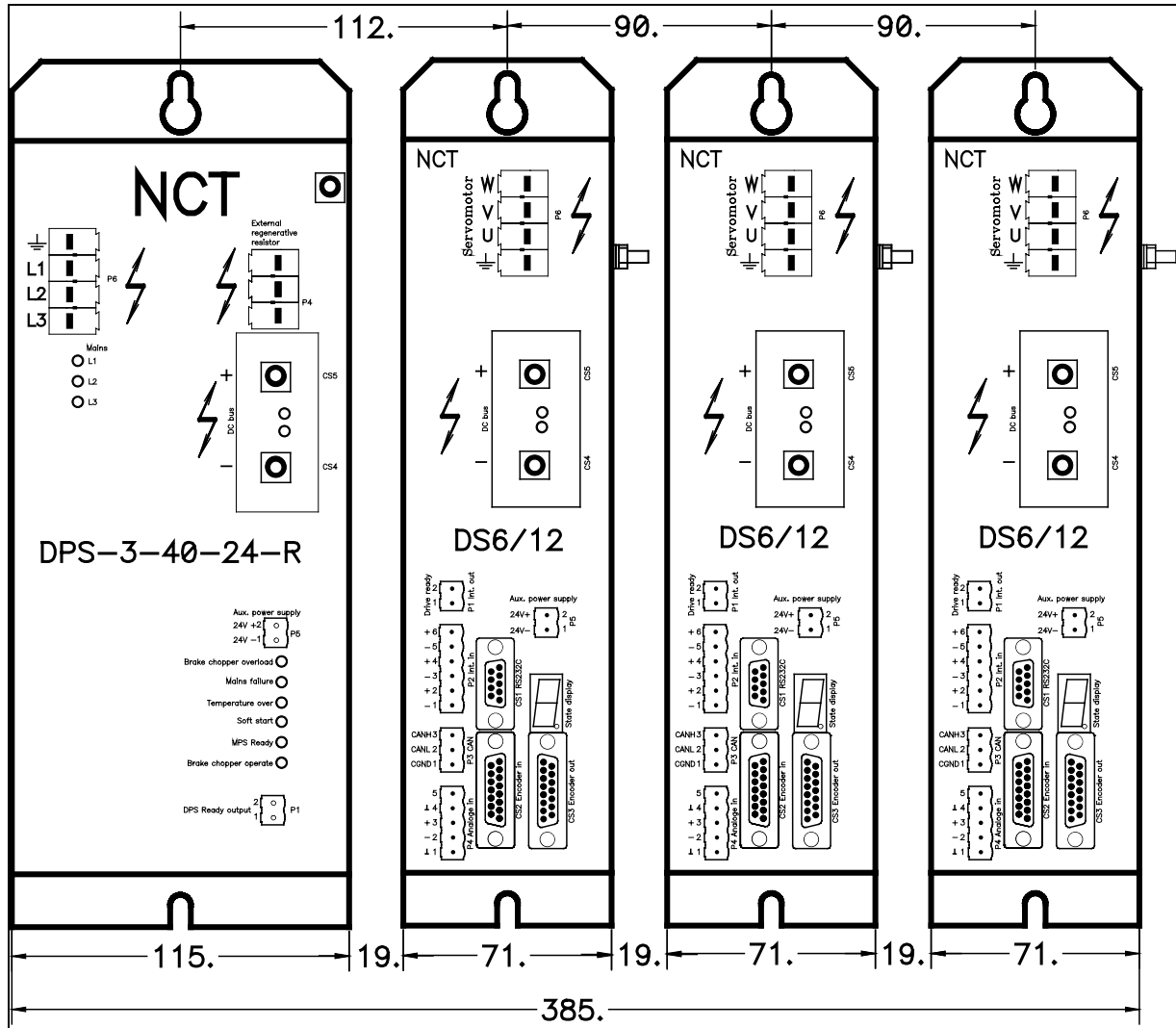
In Case of DPS.. Supply Unit

The cooling plate of the supply unit can be found on the right side of the equipment. The conditions of natural thermal flow must be ensured in the course of setting-in:

- The equipment can only be mounted vertically
- Adequate place must be ensured for thermal flow on the bottom and top

- At least 19 mm must be left between the right side of the device and the next equipment. (The grounding screw of the equipment is on the right side, so that no other equipment can be placed directly beside.)

Often three DS6/12 servo amplifiers are used together with one DPS-3-40-24-R main supply. Diagram of the recommended setting-in of this configuration is shown below as an example.



Other equipment must also be protected from the heat generated by DPS.. supply unit. It is not recommended to build electronic equipment sensitive to heat above the supply units (e.g. NC control, other drives ect.).

It is utmost important to clean, as well as to replace the filter of ventilators found in the switchboard with the prescribed periodicity.

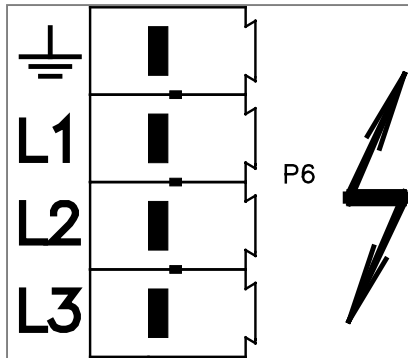
When applying heat exchanger the characteristics of the given type as well as its position in the switchboard must be taken into account, and the different exothermal units must be placed in the switchboard on the basis of these.

Mechanical Fixing

DPS.. supply units can be fixed with 2 M5 screws (hexagon-socket head screw is recommended) to an at least 3mm-thick steel. The distance of clamping bores is 279 mm.

Electric Connection

Line Connector



Manufacturer: PHOENIX CONTACT

Type: PC 6/4-G-10.16

Counter part type: PC 6/4-ST-10.16

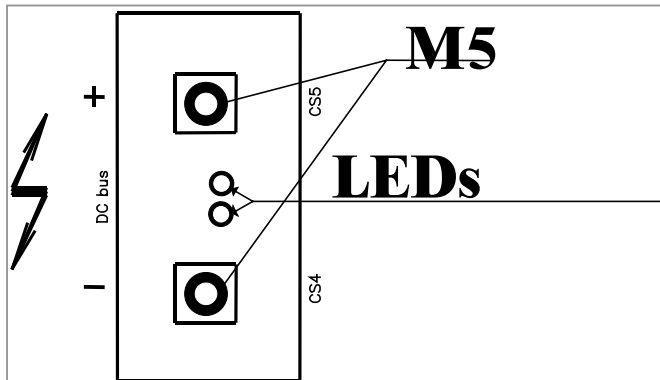
Maximum 10 mm² wire can be connected into the counter part.

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.

Grounding

The casing of DPS.. 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.

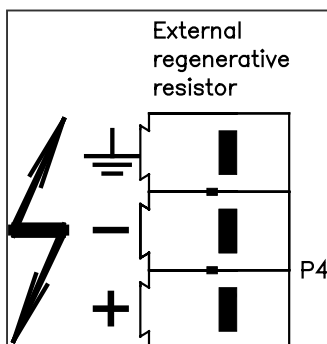
DC Bus Connection



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.

Connecting external brake resistor



Manufacturer: PHOENIX CONTACT

Type: PC 4/3-G-7.62

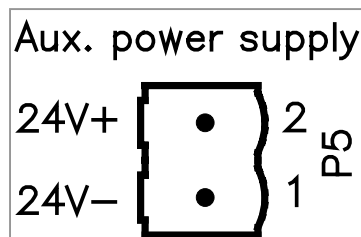
Counter part type: PC 4/3-ST-7.62

Maximum 4 mm² wire can be placed in the counter part.

The cross-section of the external brake resistor wire must be defined on the basis of the current drain according to MSZ EN60204-1:2001.

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

Auxiliary Supply Connection (Input)



In order to operate internal units, the DPS-3-400-24-R main supply unit demands external power supply.

Auxiliary supply voltage: 24 Vdc (+20%, -10%)

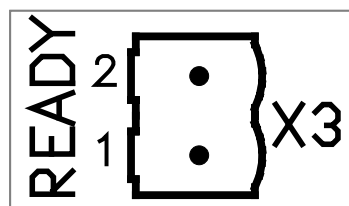
Maximum current: 500 mA

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 (Ready Output)



Main Supply Ready Signal means one electrically controlled contact. If the DPS.. 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

Operation of DPS.. Supply Units

If 24V is switched to the auxiliary supply connector of a properly operating DPS.. supply unit, *Soft start* LED is highlighted with yellow and the Ready Output of the main supply is open. When the three-phase line is switched to the supply unit through the chuck, the condensers on DC bus begin to charge up through the soft start resistor (soft start process). Green LEDs with caption *Mains* indicate the existence of the energizing line. Should the DC bus voltage reach 80 % of the nominal value and no error is detected in the chopper brake system, the supply unit discharges the soft start resistor. At the same time the main supply ready contact closes. All these appear on the display, the *soft start* LED fades, the *DPS Ready* LED becomes highlighted.

The DPS.. supply unit continuously monitors the DC bus voltage, should this voltage reach 650 V, it switches the brake choppers onto the DC bus. The brake choppers remain on the DC bus, until the DC bus voltage falls under 620 V. The brake chopper operation is indicated by the flashes of *Brake chopper operate* LED.

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 the ready state of the supply unit does not cease. 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.

If the supply unit detects error in the chopper brake system, it breaks the main supply unit ready output contact, thereby signaling, that the DC output cannot be loaded. In this case *Brake chopper failure* LED is highlighted with red and the soft start system is switched on again.