

NCT[®]
CONTROL | DRIVES | MOTORS
KEEP MOVING

NCT 304
SMART CNC FAMILY

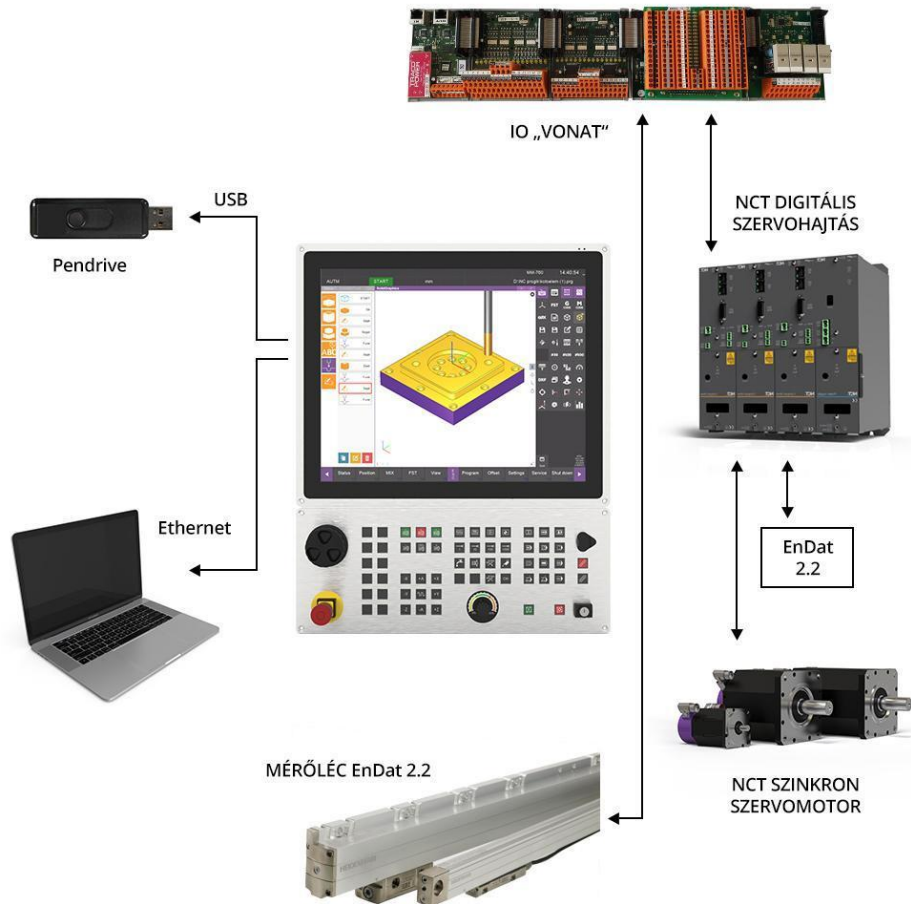
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1. FOREWORD

NCT 304 In the NCT 304 control, behind the monitor, there is a powerful 4-core computer performing CNC and user interface (HMI) tasks. On three cores, the NCT user interface (HMI) installed on well-known WINDOWS operating system and a wide range of applications run, while the NCT CNC system (CNC kernel) runs on one core. Application of the WINDOWS operating system enables the NCT programming software, namely the VECTOR, the myNCT and the solid body graphical representation, to be integrated into the NCT 304. The system has been built up and made open in such a manner that either the NCT Company or the machine tool builder himself can replace or develop further the user interface in accordance with his own demands or the given application. This development opened a totally new market for the NCT. Through it, we became able to design for machine tool builders a custom-tailored, own and special user interfaces. Thus, we can reach those OEM partners demanding CNC user and programmer interfaces of their own design.



1 ETHERCAT HOST UNIT

1.1 DPU1904 / 19" display and the central electronic unit



The DPU1904 unit is composed of a touchscreen control panel, a display and the central electronics. The electronics is an EHU03 unit located behind the display and having LVDS connection to the display; in basic version, there is a fan ensuring uniform temperature distribution inside the electronics. If the unit is built in an enclosed metal box, no further cooling provided by external fan will be required.

A separate optional panel having three USB ports can be connected to the DPU1904 unit. The DPU1904 unit connects to the EtherCAT peripherals through an Ethernet (EtherCAT) connector, and it can be connected to the computer network through another Ethernet (LAN) connector. A speaker is built in the DPU1904 unit that clicks when the pushbuttons are pressed and beeps when the probe stylus touches. The speaker output of the EHU03 is used for playing the sound files.

The WINDOWS 10 operating system and the NCT 304 system software developed on the basis of it are stored in a single SSD. In basic version, data are entered through a virtual keyboard visualized on the capacitive touchscreen. The touchscreen is protected by self-adhesive foil.

Model	DPU1904
NCT article number (order number)	40-00010688-00
Screen size	19"
Control unit	EHU03
USB	3 pieces (optional, on a separate panel)
Speaker	1 piece
Installation method	It can be installed in panel
Supply voltage / Steady-state current consumption / Peak making current	24 Vdc / 1.6 A / 2.6 A
EtherCAT	1 piece of 100 Mbit·s ⁻¹
Ethernet	1 piece of 100 Mbit·s ⁻¹ or 1 Gbit·s ⁻¹
Cooling fan	2 pieces on the EHU01
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	7.5 kg
IP protection class	IP20
IP protection class when built in	IP54

1.2 DPU1504 / 15" display and the central electronic unit



The DPU1504 unit is composed of a touchscreen control panel, a display and the central electronics. The electronics is an EHU03 unit located behind the display and having LVDS connection to the display; in basic version, there is one fan ensuring uniform temperature distribution inside the electronics. If the unit is built in an enclosed metal box, no further cooling provided by external fan will be required.

A separate optional panel having three USB ports can be connected to the DPU1504 unit. The DPU1504 unit connects to the EtherCAT peripherals through an Ethernet (EtherCAT) connector, and it can be connected to the computer network through another Ethernet (LAN) connector. A speaker is built in the DPU1504 unit that clicks when the pushbuttons are pressed and beeps when the probe stylus touches. The speaker output of the EHU03 is used for playing the sound files.

The WINDOWS 10 operating system and the NCT 304 system software developed on the basis of it are stored in a single SSD. In basic version, data are entered through a virtual keyboard visualized on the capacitive touchscreen. The touchscreen is protected by self-adhesive foil.

Model	DPU1504
NCT article number (order number)	40-000010687-00
Screen size	15"
Control unit	EHU03
USB	3 pieces (optional, on a separate panel)
Speaker	1 piece
Installation method	It can be installed in panel
Supply voltage / Steady-state current consumption / Peak making current	24 Vdc / 1.6 A / 2.6 A
EtherCAT	1 piece of 100 Mbit·s ⁻¹
Ethernet	1 piece of 100 Mbit·s ⁻¹ or 1 Gbit·s ⁻¹
Cooling fan	2 pieces on the EHU01
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	5.0 kg
IP protection class	IP20
IP protection class when built in	IP54

1.3 EHU03/ EtherCAT central electronic unit



The EHU03 unit is the control element (host unit) of the EtherCAT (Ethernet for Control Automation Technology) network. In addition to high reliability, low power consumption and minimal heat generation, which are required for industrial applications, high processor speed required for real-time data processing is also ensured by the industrial personal computer (IPC) built by the use of the Intel Atom CPU and a set of Intel chips.

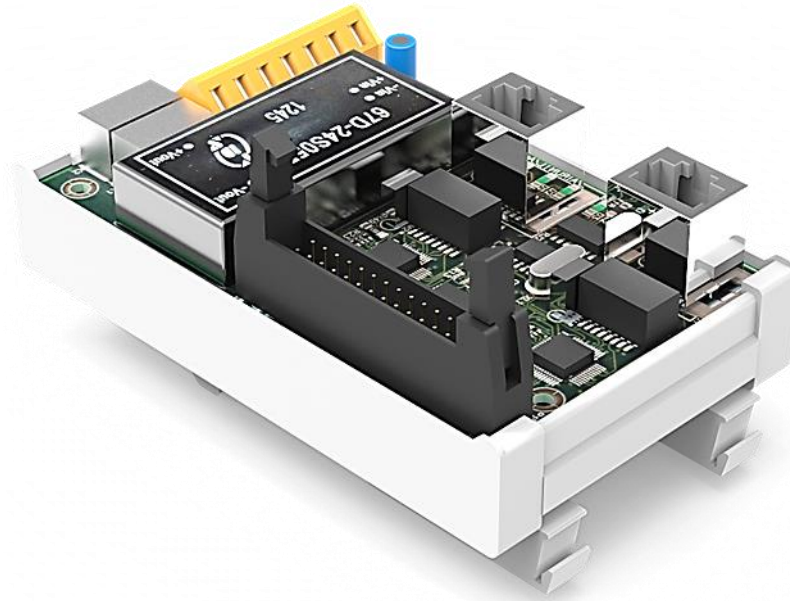
The EHU03 unit has one fan for ensuring the uniform temperature distribution inside the unit. The EHU03 unit has two Ethernet connectors. One of them is for connecting to the EtherCAT network, the other is for connecting to the general-purpose 100 Mbit·s⁻¹ or Gbit·s⁻¹ Ethernet network.

In basic version, the screen is driven from the LVDS output suitable for direct connection by means of a special cable manufactured to size, but a traditional VGA output is also available for connecting a PC monitor. A lithium battery located outside the device cover provides the electronics (clock, memory), which is active even in its turned-off status, with power supply. The battery can be easily replaced approx. 2 ~ 5 years without disassembly, in turned-on status of the electronics.

In the unit, there is a surface available for installation of electronics providing the LCD screen with power supply and interfacing the capacitive touch screen. The fastening holes on both sides of the box are for mechanical fastening; evidently, the unit should be built in so that the narrow part of the holes is at the top.

Model	EHU03
NCT article number (order number)	40-00010381-10
CPU	INTEL ATOM E3845 processor, 4-core
Set of chips	Intel
Motherboard	Mini-ITX
DRAM memory	4 GB
L2 CACHE	2 MB
Hard disk	120 GB SSD
USB	USB: 3 pieces of USB 2.0, 1 piece of USB 3.0
Operating system	WINDOWS 10
Screen outputs	VGA, LVDS
Ethernet	2 pieces of Realtek Gigabit LAN
Software	NCT 304
Supply voltage/Steady-state current consumption/Peak making current	24 Vdc / 1.3 A / 2.6 A
Cooling fan	1 piece
Operating/storage temperature/relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	1.9 kg
IP protection class	IP20

1.4 EPU-SIS / EtherCAT peripheral interface unit and software protection



It is a special purpose SLAVE unit connected to the NCT EtherCAT network. It has two RJ45 connectors for input and output.

Functions:

- It is a non-volatile memory writable and readable at high speed in unlimited cycles for saving the CNC software data changing dynamically.
- This unit contains the list of options purchased by the Customer who ordered the CNC software. In case of purchasing a new feature, the Customer can upgrade the list by entering the code sent by NCT (function of software protection key).
- It manages the operating time constraints (Paybit).
- Its task is to connect the IO modules, which have variety of tasks and wide range of selection, to the EtherCAT bus.

The power supply for the IO modules can also be found here. The number of elements attachable to it is determined by the total current consumption of the elements that cannot be greater than the output current of the EPU. For higher security, on each EPU-SIS unit, there are two relay outputs (Machine-On1 and Machine-On2) for indicating operational readiness of the software and hardware elements of each member of the entire EtherCAT network. In readiness status, both relays will be energized and the output contacts are closed. When readiness status ceases, the relays disconnect their contacts. The statuses of the Run and the Link/Act LEDs are described in the introductory part of this catalogue.

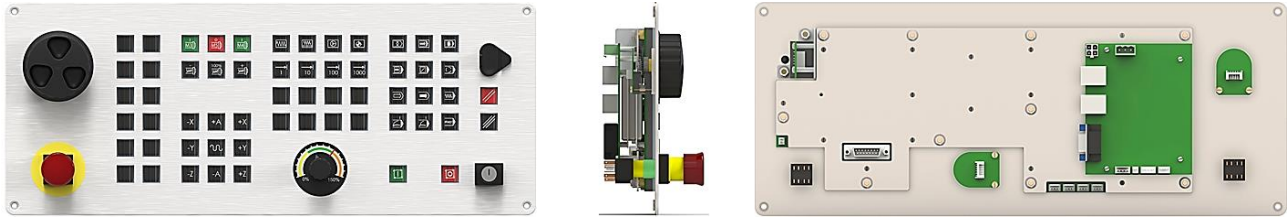
Model	EPU-SIS
NCT article number (order number)	40-00010364-10
Maximum load current of the LVDS bus	2.5 A
Input power supply	24 V (-15% / +20%) / max. 750 mA
Loadability of the Machine-On1 és Machine-On2 relay outputs	24 V / 2 A
Data input rate on the Ethernet side (RJ45)	100 Mbit·s ⁻¹
EtherCAT	2×RJ45 (IN/OUT), 100BASE-TX
Operating / temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	140 g
IP protection class	IP20



40-00011704-00	ESIS-SW-OP01 / SOFTWARE OPTION 01 (+1 AX):
40-00011704-10	ESIS-SW-OP02 / SOFTWARE OPTION 02 (+1 SPINDLE):
40-00011704-20	ESIS-SW-OP03 / SOFTWARE OPTION 03 (+1 CHANNEL):
40-00011704-40	ESIS-SW-OP04 / SOFTWARE OPTION 04 (HSHP):
40-00011704-50	ESIS-SW-OP05 / SOFTWARE OPTION 05 (3+1, 3+2 AXES):
40-00011704-60	ESIS-SW-OP06 / SOFTWARE OPTION 06 (MACHINE SUPERVISION):
40-00011704-70	ESIS-SW-OP07 / SOFTWARE OPTION 07 (COOPERATIVE OPERATING POST):
40-00011704-80	ESIS-SW-OP08 / SOFTWARE OPTION 08 (ENERGY MANAGEMENT):
40-00011704-90	ESIS-SW-OP09 / SOFTWARE OPTION 09 (REMOTE MACHINE ACCESS):
40-00011705-00	ESIS-SW-OP10 / SOFTWARE OPTION 10 (GANTRY AXIS):
40-00011705-20	ESIS-SW-OP12 / SOFTWARE OPTION 12 (5D):
40-00011705-30	ESIS-SW-OP13 / SOFTWARE OPTION 13 (myNCT):
40-00011705-40	ESIS-SW-OP14 / SOFTWARE OPTION 14 (3D GRAPHICS):
40-00011705-80	ESIS-SW-OP18 / SOFTWARE OPTION 18 (COLLISION MONITORING):
40-00011705-90	ESIS-SW-OP19 / SOFTWARE OPTION 19 (MISALIGNMENT COMPENSATION):
40-00011705-10	ESIS-SW-OP11 / SOFTWARE OPTION 11 (COMPLETE MEASURING PACKAGE):
40-00011705-50	ESIS-SW-OP15 / SOFTWARE OPTION 15 (HANDLING BARCODE SCANNER):
40-00011705-60	ESIS-SW-OP16 / SOFTWARE OPTION 16 (+1 HANDWHEEL):
40-00011705-70	ESIS-SW-OP17 / SOFTWARE OPTION 17 (ELECTRONIC DRIVE):
40-00011706-00	ESIS-SW-OP20 / SOFTWARE OPTION 20 (NANOSMOOTH INTERPOLATION):
40-00011706-20	ESIS-SW-OP22 / SOFTWARE OPTION 22 (SKIVING MACHINING):
40-00011706-30	ESIS-SW-OP22 / SOFTWARE OPTION 23 (NCT NOW ONLINE):
40-00011706-40	ESIS-SW-OP22 / SOFTWARE OPTION 24 (NCT NOW OFFLINE):
40-00011706-50	ESIS-SW-OP22 / SOFTWARE OPTION 25 (OPEN INTERFACE):
40-00011706-60	ESIS-SW-OP22 / SOFTWARE OPTION 26 (CANOpen over EtherCAT):

2 ETHERCAT SLAVES

2.1 MK1904 / machine operator panel applicable to DPU19xx unit



The MK1904 machine control panel includes standard control elements (handwheel, feedrate override, JOG, mode changeover buttons, EMERGENCY STOP, etc.), and has 20 freely usable pushbuttons, as well as a key switch and an optional iButton reader. The pushbuttons have a LED illumination clearly visible from all directions.

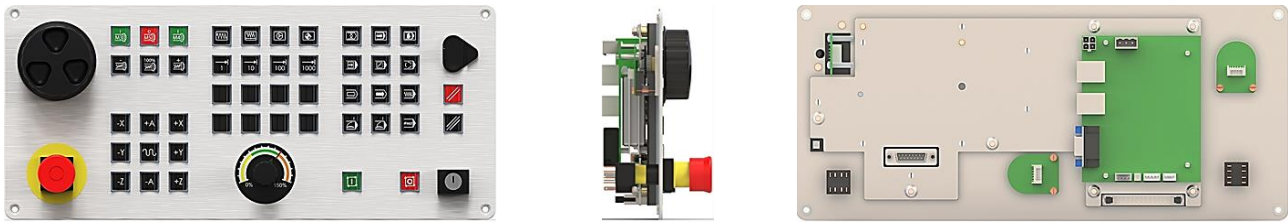
The control panel has two (one TTL and one CAN) handwheel connections and an additional external handwheel connector.

It can be connected to the DPU19xx unit comprising EHU central electronics with two RJ45 connectors through standard EtherCAT line. The USB connector can only be used when it is connected to one of the USB ports of the EHU.

The operator panel electronics requires 24 Vdc supply voltage.

Model	MK1904
NCT article number (order number)	40-00010753-00
Number of pushbuttons	59
Pushbutton lifetime / manufacturer	10 ⁷ operating cycles / ALPS
LED illumination	Each pushbutton
Mounted buttons	EMERGENCY STOP, key switch or iButton reader (optional)
Handwheel connection	TTL, CAN, external
Installation mode	It can be built in the panel
Supply voltage / input current consumption	24 Vdc / 200 mA
Built-in handwheel	Optional
EtherCAT	2×RJ45 (IN/OUT), 100BASE-TX
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	2.9 kg
IP protection class	IP20
IP protection class when built in	IP54

2.2 MK1504 / Machine operator panel applicable to DPU15xx unit



The MK1504 machine control panel includes standard control elements (handwheel, feedrate override, JOG, mode changeover buttons, EMERGENCY STOP, etc.), and has 20 freely usable pushbuttons, as well as a key switch and an optional iButton reader. The pushbuttons have a LED illumination clearly visible from all directions.

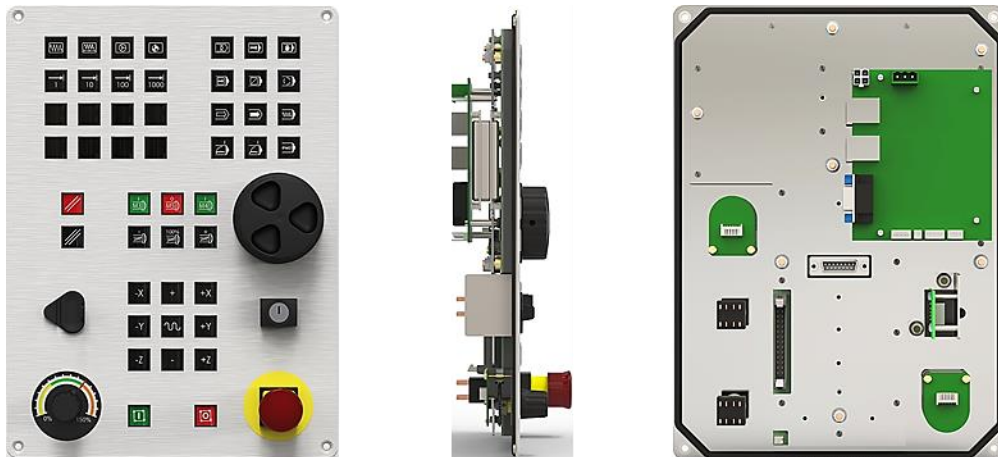
The control panel has two (one TTL and one CAN) handwheel connections and an additional external handwheel connector.

It can be connected to the DPU15xx unit comprising EHU central electronics with two RJ45 connectors through standard EtherCAT line. The USB connector can only be used when it is connected to one of the USB ports of the EHU.

The operator panel electronics requires 24 Vdc supply voltage.

Model	MK1504
NCT article number (order number)	40-00010689-00
Number of pushbuttons	47
Pushbutton lifetime / manufacturer	10 ⁷ operating cycles / ALPS
LED illumination	Each pushbutton
Mounted buttons	EMERGENCY STOP, key switch or iButton reader (optional)
Handwheel connection	TTL, CAN, external
Installation mode	It can be built in the panel
Supply voltage / input current consumption	24 Vdc / 200 mA
Built-in handwheel	Optional
EtherCAT	2×RJ45 (IN/OUT), 100BASE-TX
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	2.35 kg
IP protection class	IP20
IP protection class when built in	IP54

2.3 MK1504V / Machine operator panel applicable to DPU15xx unit



The MK1504V machine control panel includes standard control elements (handwheel, feedrate override, JOG, mode changeover buttons, EMERGENCY STOP, etc.), and has 20 freely usable pushbuttons, as well as a key switch and an optional iButton reader. The pushbuttons have a LED illumination clearly visible from all directions.

The control panel has two (one TTL and one CAN) handwheel connections and an additional external handwheel connector.

It can be connected to the DPU15xx unit comprising EHU central electronics with two RJ45 connectors through standard EtherCAT line. The USB connector can only be used when it is connected to one of the USB ports of the EHU.

The operator panel electronics requires 24 Vdc supply voltage.

Model	MK1504V
NCT article number (order number)	40-00010690-00
Number of pushbuttons	47
Pushbutton lifetime / manufacturer	10 ⁷ operating cycles / ALPS
LED illumination	Each pushbutton
Mounted buttons	EMERGENCY STOP, key switch or iButton reader (optional)
Handwheel connection	TTL, CAN, external
Installation mode	It can be built in the panel
Supply voltage / input current consumption	24 Vdc / 200 mA
Built-in handwheel	Optional
EtherCAT	2×RJ45 (IN/OUT), 100BASE-TX
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	2.5 kg
IP protection class	IP20
IP protection class when built in	IP54

2.4 MK15OP / Add-on panel to the MK15xx machine operator panel

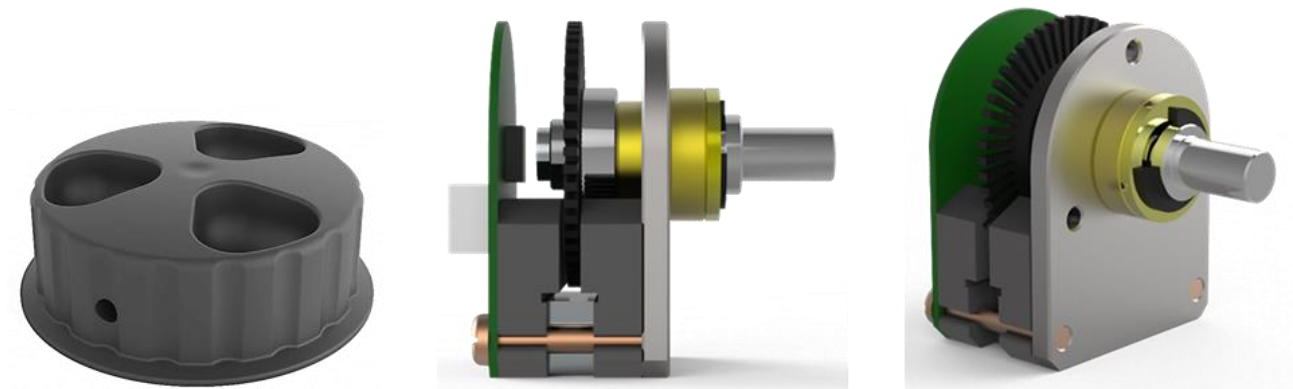


This add-on panel to the MK15xx machine operator panel is for increasing the number of pushbuttons. The MK15OP panel has 4 big mounted buttons and 14 standard pushbuttons. Each pushbutton has a LED illumination clearly visible from all directions.

This panel can be connected to the MK15xx machine operator panel by means of a ribbon cable.

Model	MK15OP
NCT article number (order number)	40-00010691-00
Number of pushbuttons	18
Pushbutton lifetime / manufacturer	10 ⁷ operating cycles / ALPS
LED illumination	Each pushbutton
Mounted buttons (4 pieces)	MACHINE ON, general purpose buttons (e.g. START/STOP)
Installation mode	It can be built in the panel
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	0.9 kg
IP protection class	IP20
IP protection class when built in	IP54

2.5 HWM / HWTC / Built-in magnetic handwheel



It is a front-mountable handwheel with magnetic arrest. It can optionally be equipped either with aluminium rotary knob with revolving crank or with plastic rotary knob of ergonomic design.

The handwheel is recommended for NCT MK19xx and MK15xx machine operator panels.

Model	HWM	HWTC
NCT article number (order number)	40-00011543-00	40-00011543-20
Output	TTL	CAN
Number of arrests	50	
Type of arresting	Magnetic (free of wear)	
Position sensing	Magnetic	
Supply voltage/input current consumption	5 Vdc / 100 mA	9 Vdc/ 200 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%	
Weight	300 g	
IP protection class	IP20	

2.6 iHDW / External handwheel

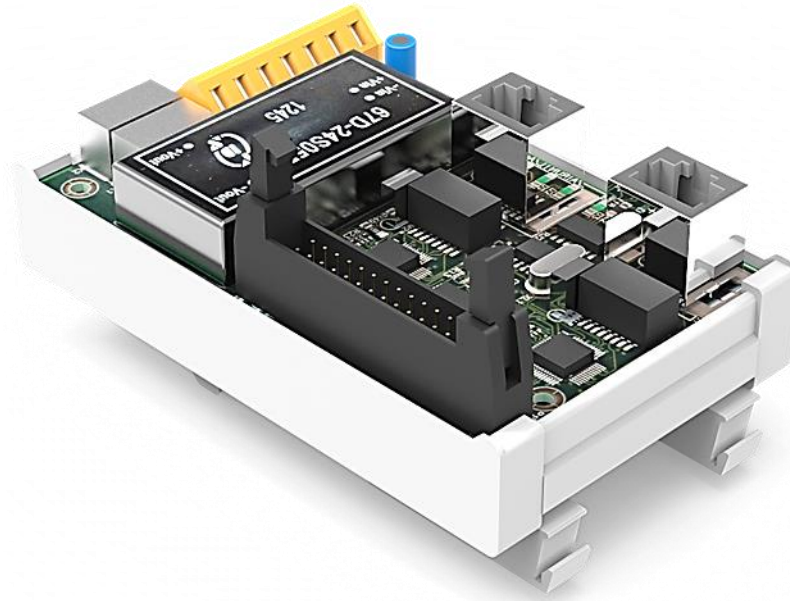


This external handwheel equipped with magnetic rear cover and axis selection switches and emergency stop switch can be connected to the MK19xx and MK15xx machine operator panels.

Model	iHDW	iHDW-EF
NCT article number (order number)	40-00000025-01	40-00000025-02
Output	A, B	
Number of pulses	100 PPR	
Type of arresting	Mechanical	
Length of the spiral cable	3 m or 5 m (optional)	
EMERGENCY STOP switch	Yes	
Axis selection switch	OFF, X, Y, Z, 4, 5, 6	OFF, X, Y, Z, 4, 5, 6, 7
Increment/pulse switch	1, 10, 100	
JOG knobs	–	2
Safety switch	–	2
Digital I/O signal level	24 Vdc	
Supply voltage/input current consumption	5 Vdc / 120 mA	
Material of the case	Plastic	
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +50 °C / -10 ~ +70 °C / 95% / RH35% / 85%	
Weight	1 kg	
IP protection class	IP65	

3 ETHERCAT IO MODULES

3.1 EPU-R / EtherCAT peripheral interface unit



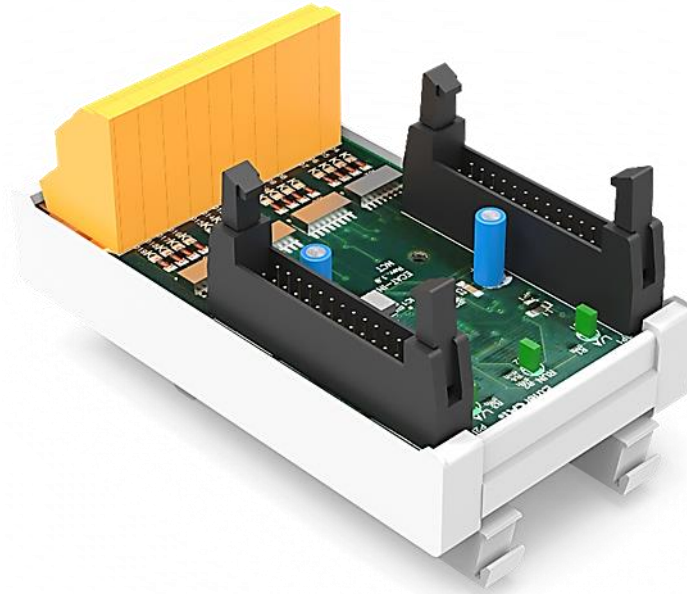
The EtherCAT peripheral interface unit (EPU) is an interface unit with three EtherCAT ports that is used to connect the EtherCAT units operating from the ribbon-cable LVDS connector to the controller and to perform the conversion between the LVDS and RJ45 interfaces.

The module has an input voltage of 24 Vdc, from which it produces galvanically isolated voltage of 5 Vdc to provide supply power to the EtherCAT modules connected, via ribbon cable.

The number of the connectible elements is determined by the total current consumption of the elements that should not exceed the output current of the EPU.

Model	EPU-R
NCT article number (order number)	40-00010364-00
Input power supply	24 V (-15% / +20%) / max. 750 mA
Power supply to the LVDS bus	5 V / max. 2.5 A
Current consumption without modules	100 mA
EtherCAT	2xRJ45 (IN/OUT), 100BASE-TX, 1xLVDS ribbon cable
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	140 g

3.2 I16 / 16x1-line input module



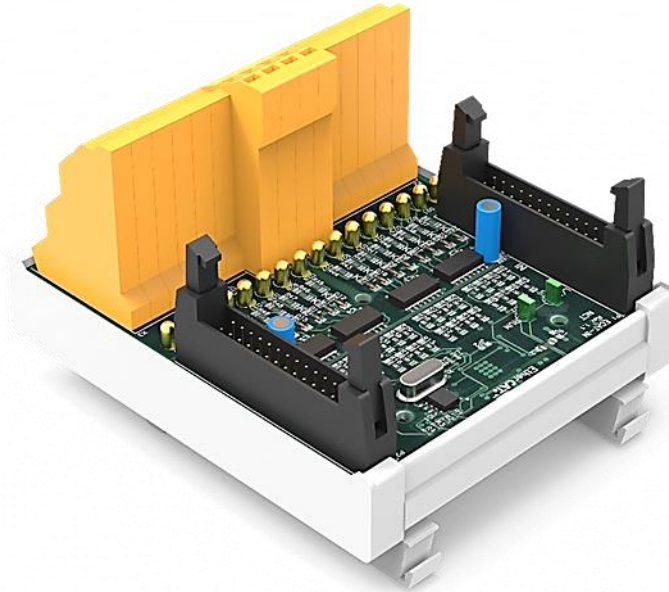
It is a 16-line digital input module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is able to receive sixteen 24 Vdc so-called PLC switching signals. Each line is galvanically isolated. The lines do not have LED indication; their statuses are represented on the display of the EHU unit.

Model	I16
NCT article number (order number)	40-00010365-00
Number of lines	16
„0” status signal level	0 ~ 10 Vdc
„1” status signal level	15 ~ 30 Vdc
Current consumption of the input line	10 mA
Input analogue delay	3 ms
Galvanic isolation	By optocoupler
Module current consumption from the LVDS bus	100 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	100 g

3.3 I16S / 16x3-line input module



It is a 16-input digital input module connected to the EPU unit through LVDS bus by ribbon cable.

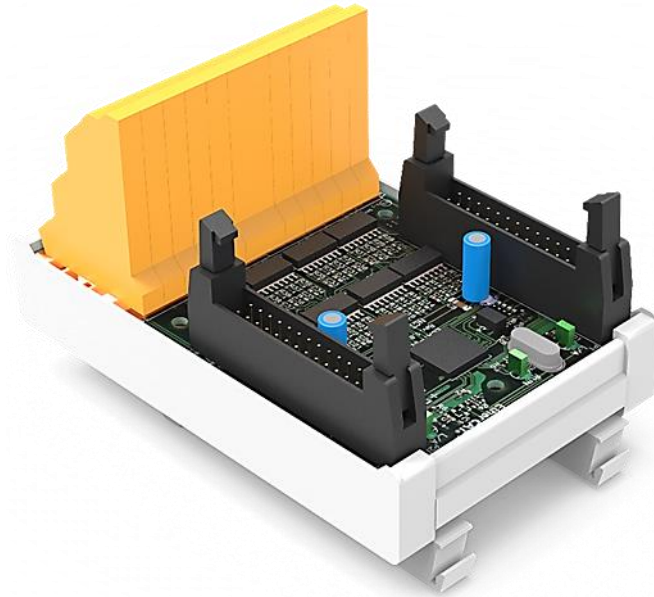
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is able to receive sixteen 24 Vdc so-called PLC switching signals. Each line is galvanically isolated. The lines have LED indication.

The module is ideal primarily for receiving signals from inductive sensors and switches as each input line has a 0 V and a 24 Vdc connection point as well (3-line input).

Model	I16S
NCT article number (order number)	40-00010366-00
Number of lines	16
„0” status signal level	0 ~ 10 Vdc
„1” status signal level	15 ~ 30 Vdc
Current consumption of the input line	10 mA
Input analog delay	3 ms
Galvanic isolation	By optocoupler
Module current consumption from the LVDS bus	100 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	145 g

3.4 I32 / 32x1-line input module



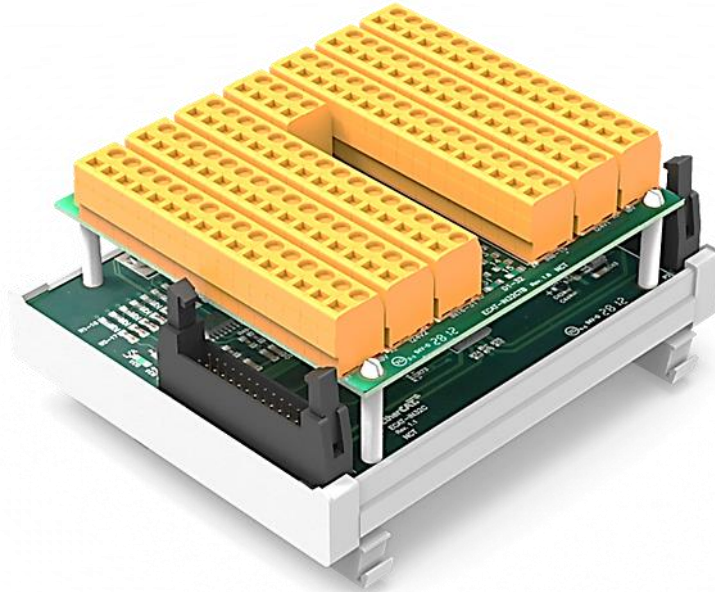
It is a 32-input digital input module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is able to receive thirty-two 24 Vdc so-called PLC switching signals. Each line is galvanically isolated. The lines do not have LED indication; their statuses are represented on the display of the EHU unit.

Model	I32
NCT article number (order number)	40-00010367-00
Number of lines	32
„0” status signal level	0 ~ 10 Vdc
„1” status signal level	15 ~ 30 Vdc
Current consumption of the input line	10 mA
Input analogue delay	3 ms
Galvanic isolation	By optocoupler
Module current consumption from the LVDS bus	70 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	120 g

3.5 I32S / 32x3-line input module



It is a 32-input digital input module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is able to receive thirty-two 24 Vdc so-called PLC switching signals. Each line is galvanically isolated and has LED indication.

The module is ideal primarily for receiving signals from inductive sensors and switches as each input line has a 0 V and a 24 Vdc connection point as well (3-line input).

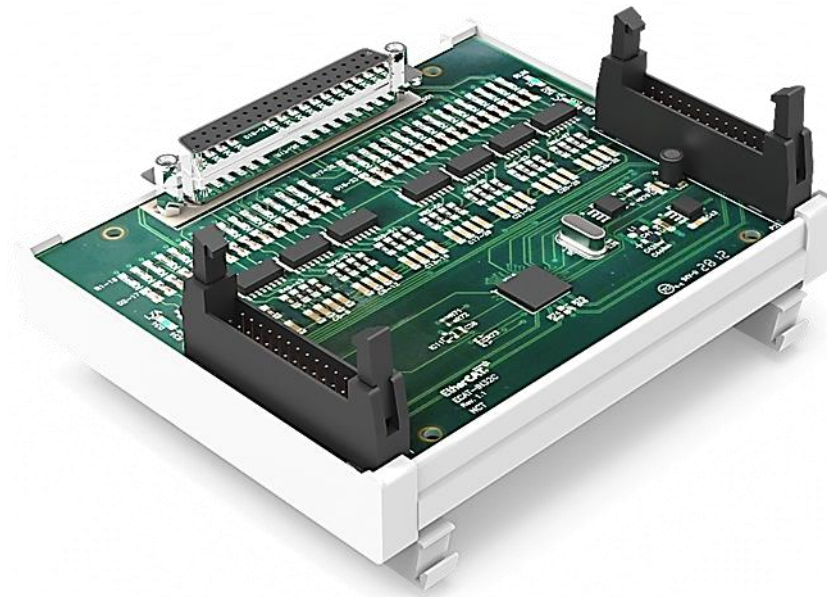
The module is composed of two parts. The lower part contains the complete electronics, while the upper part includes the terminal blocks and the LEDs. The two parts are connected to each other via a 37-pin so-called D-SUB connector.

The connector of the lower unit is compatible with the INPUT connector of the previous NCT controls, so it can be purchased separately under the name I32C, as well.

A further advantage is that the module's electronic card can be replaced without the need for disconnecting the terminal blocks.

Model	I32S
NCT article number (order number)	40-00010367-01
Number of lines	32
„0” status signal level	0 ~ 10 Vdc
„1” status signal level	15 ~ 30 Vdc
Current consumption of the input line	10 mA
Input analog delay	3 ms
Galvanic isolation	By optocoupler
Module current consumption from the LVDS bus	200 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	320 g

3.6 I32C / 32-line input module



It is a 32-input digital input module connected to the EPU unit through LVDS bus by ribbon cable.

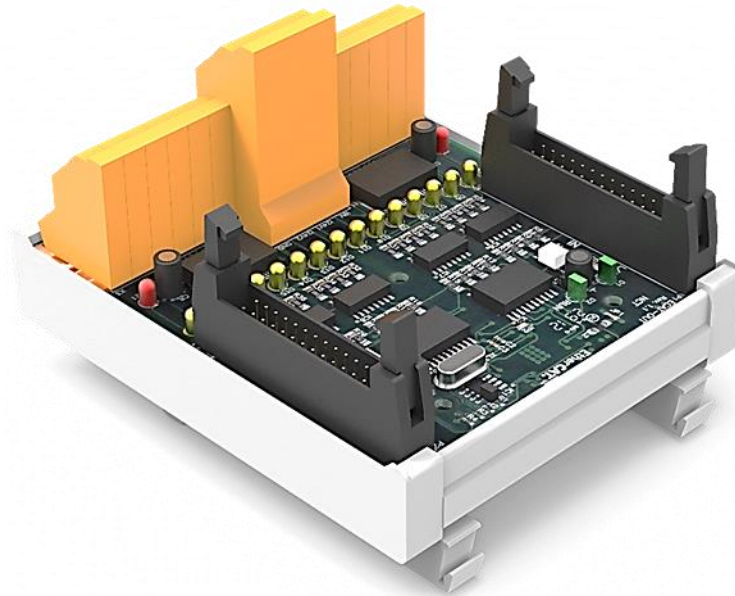
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is able to receive thirty-two 24 Vdc so-called PLC switching signals. Each line is galvanically isolated.

The 37-pin D-SUB connector is compatible with the INPUT connector of the previous NCT controls.

Model	I32C
NCT article number (order number)	40-00010367-02
Number of lines	32
„0” status signal level	0 ~ 10 Vdc
„1” status signal level	15 ~ 30 Vdc
Current consumption of the input line	10 mA
Input analogue delay	3 ms
Galvanic isolation	By optocoupler
Module current consumption from the LVDS bus	200 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	150 g

3.7 O16 / 16-line module with transistor output



It is an output module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has sixteen 24 Vdc transistor-switched output. Each of the lines is galvanically isolated. Each line has LED indication.

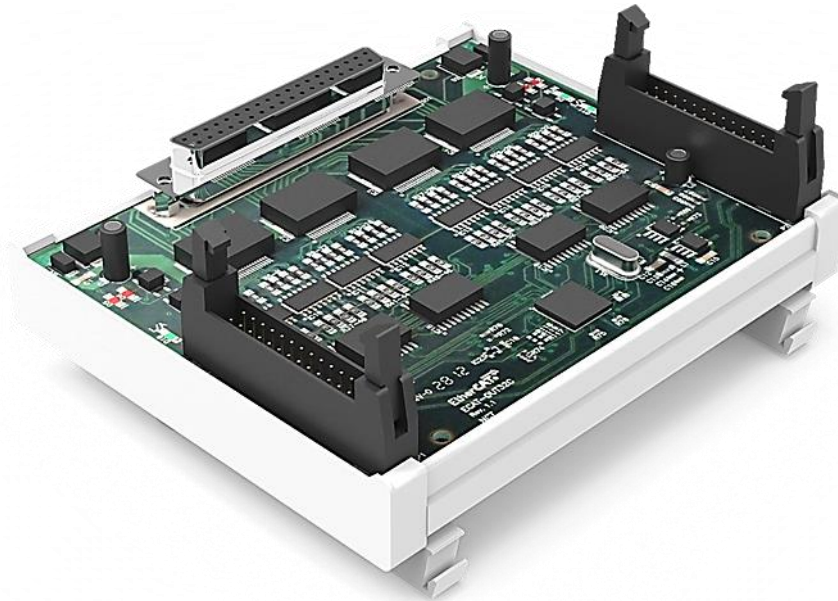
Short LED 1: If it is lit, there is overload on the lines 0 ~ 7.

Short LED 2: If it is lit, there is overload on the lines 8 ~ 15.

Output LED 0 ~ 15: If it is lit, the output is in switched-on status.

Model	O16
NCT article number (order number)	40-00011613-00
Number of lines	16
Output load	Resistive, inductive
Short-circuit protection	Overload protection per 8 lines
Off status signal level	Break
On status signal level	24 Vdc (-15% / +20%)
Maximum load on the switched-on output	500 mA
Module current consumption from the LVDS bus	150 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	150 g

3.8 O32C / 32-line module with transistor output



It is an output module connected to the EPU unit through an LVDS bus by a ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has thirty-two 24 Vdc transistor-switched outputs. Each of the lines is galvanically isolated.

The 37-pin DSUB connector is compatible with the OUTPUT connector of the former NCT controls.

Short LED 1: If it is lit, there is overload on the lines 0 ~ 7.

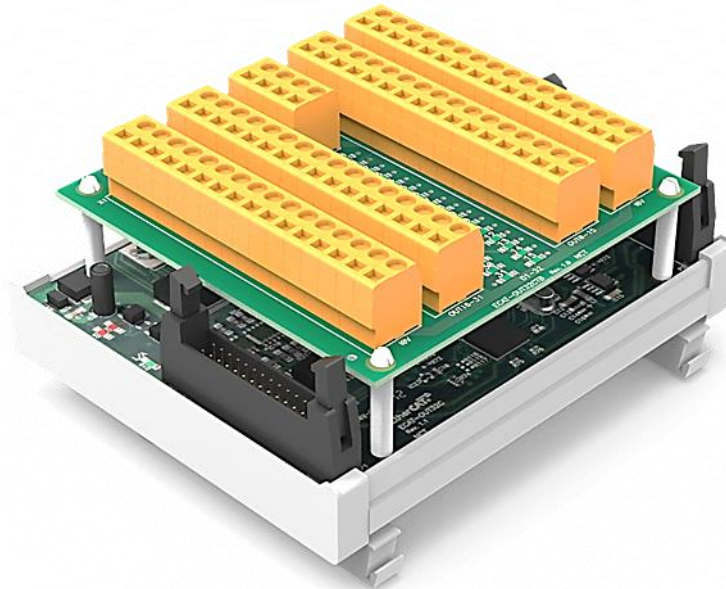
Short LED 2: If it is lit, there is overload on the lines 8 ~ 15.

Short LED 3: If it is lit, there is overload on the lines 16 ~ 23.

Short LED 4: If it is lit, there is overload on the lines 24 ~ 31.

Model	O16
NCT article number (order number)	40-00010368-00
Number of lines	32
Output load	Resistive, inductive
Short-circuit protection	Overload protection per 8 lines
Off status signal level	Break
On status signal level	24 Vdc (-15% / +20%)
Maximum load on the switched-on output	500 mA
Module current consumption from the LVDS bus	150 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	150 g

3.9 O32S / 32-line module with transistor output



It is an output module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has thirty-two 24 Vdc transistor-switched output. Each line is galvanically isolated. Each line has LED indication.

Short LED 1: If it is lit, there is overload on the lines 0 ~ 7.

Short LED 2: If it is lit, there is overload on the lines 8 ~ 15.

Short LED 3: If it is lit, there is overload on the lines 16 ~ 23.

Short LED 4: If it is lit, there is overload on the lines 24 ~ 31.

Output LED 0 ~ 31: if it is lit, the output is in switched-on status.

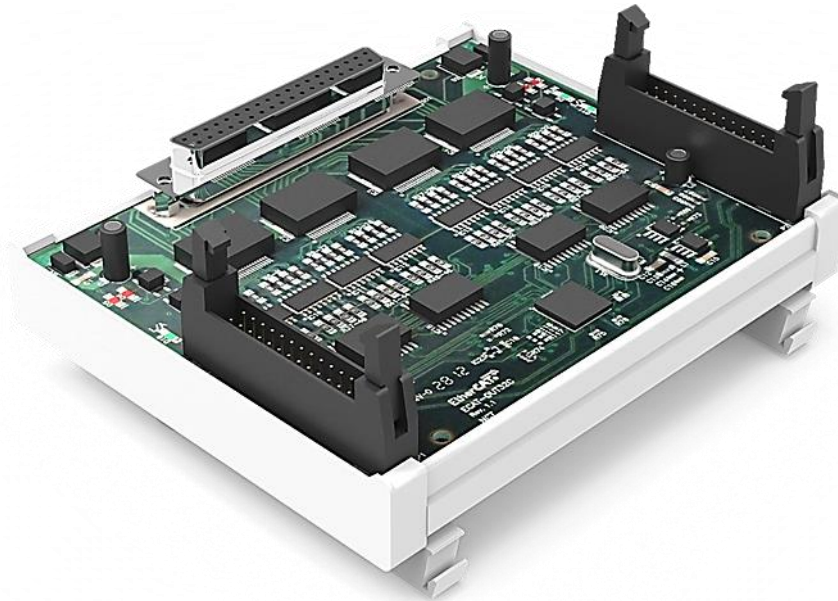
The unit consists of two parts. The complete electronics is placed in the lower part, while the terminal blocks and the LEDs can be found in the upper part. The two parts are connected to each other through a 37-pin DSUB connector.

The connector of the lower part is compatible with the output connector of the former NCT controls so they can be purchased under the designation of O32C.

Another advantage is that the electronic card of the module can be replaced without disconnecting the terminal blocks.

Model	O32C
NCT article number (order number)	40-00010368-02
Number of lines	32
Output load	Resistive, inductive
Short-circuit protection	Overload protection per 8 lines
Off status signal level	Break
On status signal level	24 Vdc (-15% / +20%)
Maximum load on the switched-on output	500 mA
Module current consumption from the LVDS bus	300 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	300 g

3.10 O32C / 32-line module with transistor DSUB output



It is an output module connected to the EPU unit through an LVDS bus by a ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has thirty-two 24 Vdc transistor-switched output. Each line is galvanically isolated.

The 37-pin DSUB connector is compatible with the OUTPUT connector of the former NCT controls.

Short LED 1: If it is lit, there is overload on the lines 0 ~ 7.

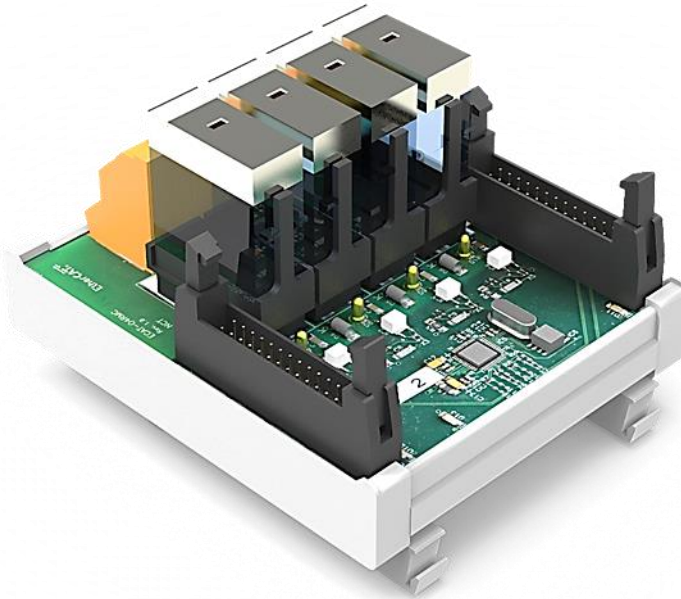
Short LED 2: If it is lit, there is overload on the lines 8 ~ 15.

Short LED 3: If it is lit, there is overload on the lines 16 ~ 23.

Short LED 4: If it is lit, there is overload on the lines 24 ~ 31.

Model	O32S
NCT article number (order number)	40-00010368-01
Number of lines	32
Output load	Resistive, inductive
Short-circuit protection	Overload protection per 8 lines
Off status signal level	Break
On status signal level	24 Vdc (-15% / +20%)
Maximum load on the switched-on output	500 mA
Module current consumption from the LVDS bus	300 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	150 g

3.11 O4RM / 4-relay module with Morse-contact output



It is a relay-based output module connected to the EPU unit through LVDS bus by ribbon cable.

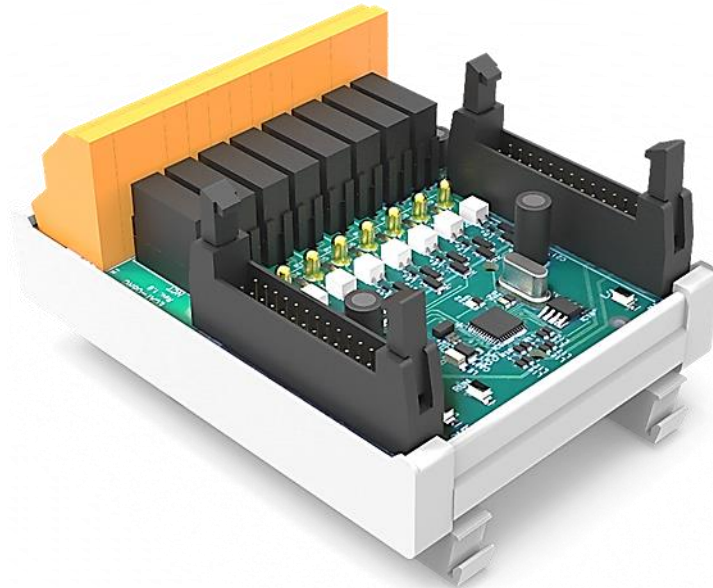
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has four Morse-contact outputs. Each line has LED indication

Output LED 0 ~ 3: If it is lit, the output is in switched-on status.

Model	O4RM
NCT article number (order number)	40-00010369-10
Number of lines	4
OFF status	The relay is free of current (released status)
ON status	Operation status of the relay
Maximum static load on the relay contact	10 A
Maximum current that may flow	5 Adc, 7.5 Aac
Switching voltage	125 Vdc, 380 Vac
Number of switching cycles	Mechanical: $20 \cdot 10^6$ Electrical: 10^5
Switching delay	15 ms
Isolation voltage	1000 Vac
Module current consumption from the LVDS bus	120 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	250 g

3.12 O8RC / 8-relay module with normally-open contact



It is a relay-based output module connected to the EPU unit through LVDS bus by ribbon cable.

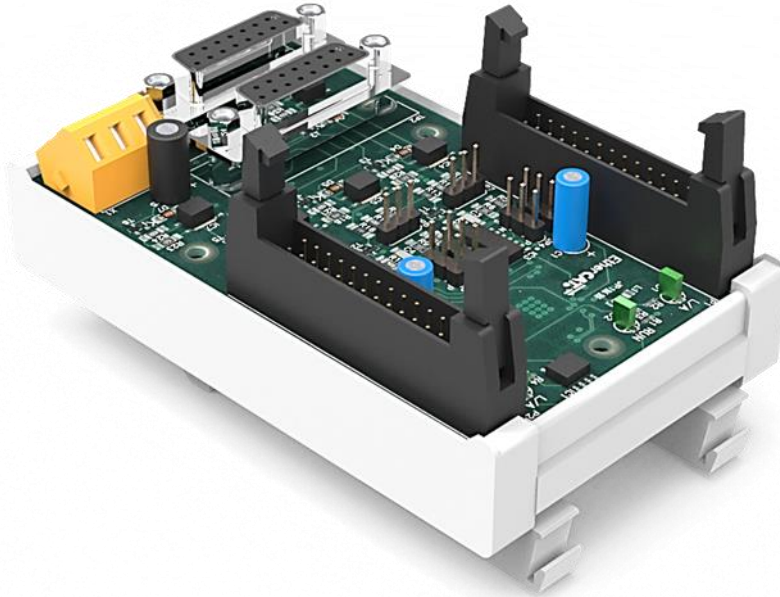
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module has 8 outputs with normally-open contact. Each line has LED indication.

Output LED 0 ~ 7: If it is lit, the output is in switched-on status.

Model	O8RC
NCT article number (order number)	40-00010370-10
Number of lines	8
OFF status	The relay is free of current (released status)
ON status	Operation status of the relay
Maximum static load on the relay contact	5 A
Maximum current that may flow	2 Adc, 2 Aac
Switching voltage	30 Vdc, 250 Vac
Number of switching cycles	Mechanical: $20 \cdot 10^6$ Electrical: 10^5
Switching delay	10 ms
Isolation voltage	750 Vac
Module current consumption from the LVDS bus	120 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	200 g

3.13 ETPC / 2-channel touch probe interface electronics



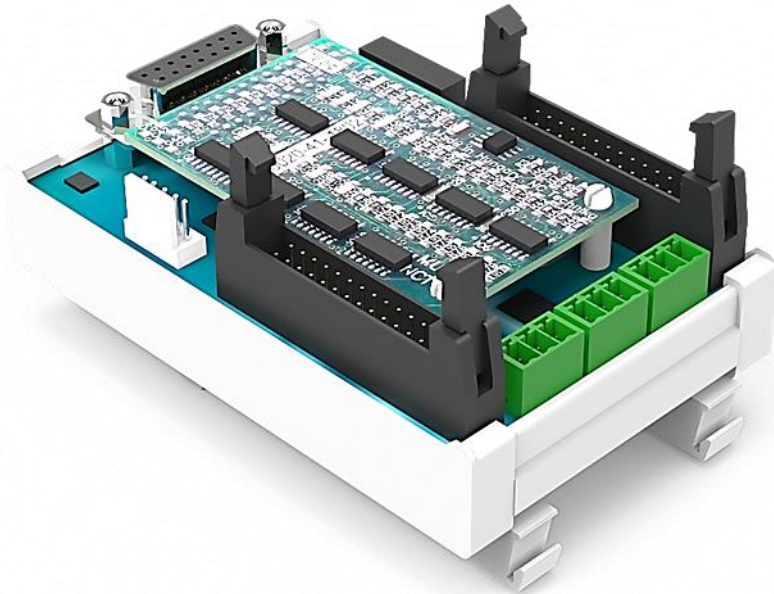
It is a touch probe interface module connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is capable of receiving two touch probes. If the given touch probe is enabled, the positions of all the axes and spindles will be stored at the active moment of the contact.

Model	ETPC
NCT article number (order number)	40-00010378-00
Number of the connectible touch probes	2
Number of the 24 Vdc outputs per one touch probe	2
Module current consumption from the LVDS bus	100 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	110 g

3.14 MUEXE / 5x interpolator of the SINUS measuring system signal (the guest card of the TTLAC)



The MUEXE evaluates the sine wave of the measuring system 5 times, assigning 5 TTL signal periods to each sine period.

- 11 μ A/TTL or 1 Vpp/TTL converter
- Interpolation ratio: 5
- The interpolator interfaces the 11 μ App or 1 Vpp signal of the HEIDENHAIN measuring devices with the NCT controls.
- It is a guest card that can be inserted in the TTLAC(T) card and in the MU2 card of the NCT100 control family.

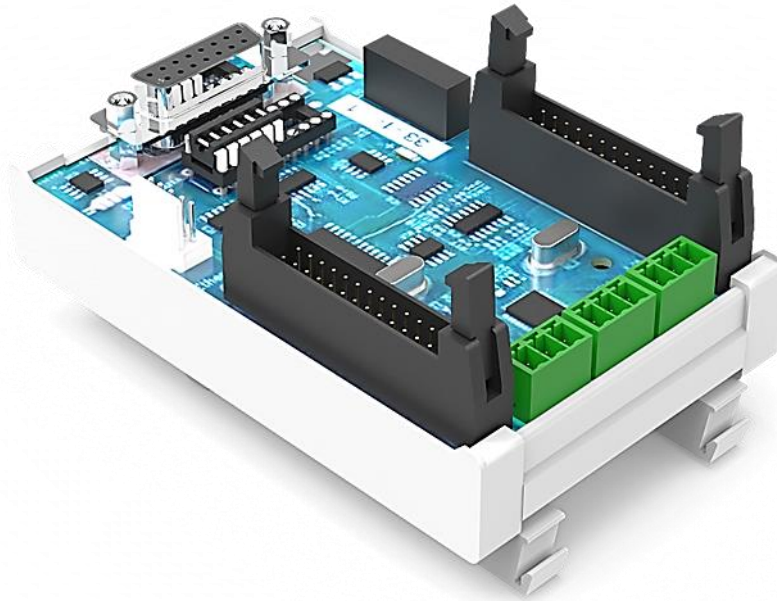
By connecting the unit, the guest card interfaces the reception of TTL measuring system with the SINUS 1 Vpp or 11 μ App measuring system signal.

Characteristics of the assembled module (TTLAC(T)+MUEXE-xS) are as follows:

It is a module for interfacing sine encoder and generating analog and digital outputs, and it is connected to the EPU unit through LVDS bus by ribbon cable.

Model	MUEXE-VS (data: TTLAC(T)+MUEXE-VS)	MUEXE-AS (data: TTLAC(T)+MUEXE-AS)
NCT article number (order number)	40-00001155-01	40-00001155-02
Number of sine inputs	1	1
Number of ± 10 V analogue outputs	1	1
Signs of the sine inputs	A+, A-, B+, B-, R+, R-	A+, A-, B+, B-, R+, R-
Sinusoidal signal level	1 Vpp	11 μ App
Maximum encoder frequency	200 kHz	200 kHz
Analogue output resolution	± 10 V / 2^{15}	± 10 V / 2^{15}
Module current consumption from the LVDS bus	200 mA (without encoder)	200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	220 g	220 g

3.15 TTLAC / A module with one TTL encoder input, one analog output and CAN bus



It is a module for interfacing TTL encoder and generating analog output, and is connected to the EPU unit through LVDS bus by ribbon cable. To the CAN bus output, servo drives manufactured by NCT can be connected.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

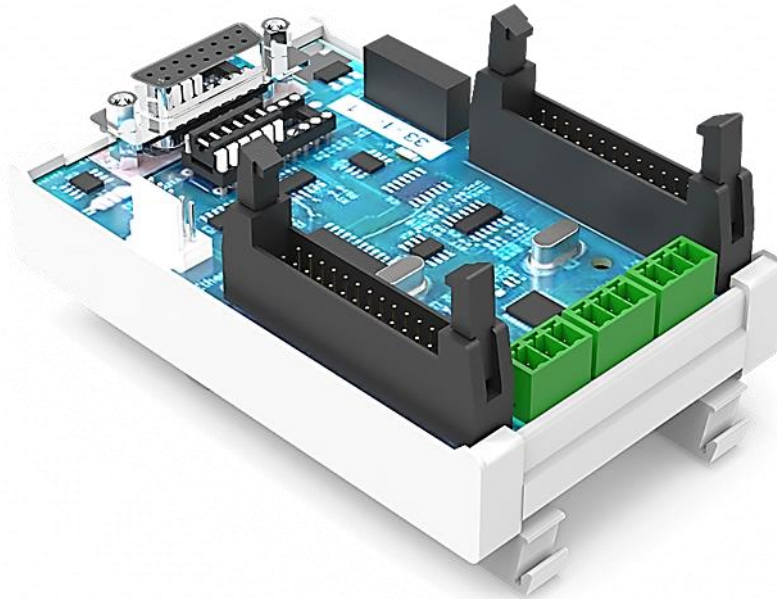
Features of the module are as follows:

- It is capable of receiving and evaluating the signals of one TTL incremental encoder, and generating and transferring the absolute position to the EHU unit.
- It is capable of issuing, at the ± 10 Vdc analog output and on CAN bus, one data of maximum 2^{15} resolution generated by the EHU unit.

The TTLAC module also serves as a motherboard for MUEXE card (in the case of interfacing sine encoder). The MUEXE card can easily be connected to the TTLAC module.

Model	TTLAC
NCT article number (order number)	40-00010379-20
Number of encoder inputs	1
Signs of the TTL inputs	A, AN, B, BN, C, CN
Maximum TTL encoder frequency	2 MHz
Number of ± 10 V analogue outputs	1
Number of CAN outputs	1
Analogue output resolution	$\pm 10 \text{ V} / 2^{15}$
CAN bus transmission rate	$1 \text{ Mb} \cdot \text{s}^{-1}$
Module current consumption from the LVDS bus	200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	$0 \sim +55 \text{ }^{\circ}\text{C} / -24 \sim +85 \text{ }^{\circ}\text{C} / 95\%$
Weight	220 g

3.16 TTLACT / A module with one TTL encoder input, one analog output, CAN bus and a tachometer output



It is a module for interfacing TTL encoder and generating analog and CAN BUS output and is connected to the EPU unit through LVDS bus by ribbon cable. To the CAN BUS output, NCT SERVO DRIVES can be connected.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

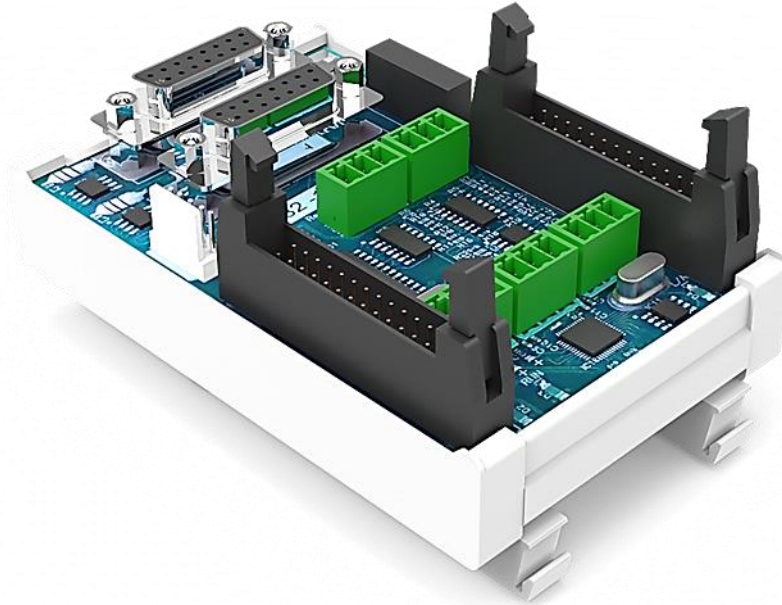
Features of the module are as follows:

- It is capable of receiving and evaluating the signals of one TTL incremental encoder, and generating and transferring the position to the EHU unit.
- It is capable of issuing, at the ± 10 Vdc analog output and on CAN bus, one data of maximum 215 resolution generated by the EHU unit.
- It is capable of generating one ± 10 Vdc analog tachometer signal from the signals of the TTL incremental encoder for the servo drive.

The TTLAC module also serves as a motherboard for MUXE card (in the case of interfacing sine encoder). The MUXE card can easily be connected to the TTLAC module.

Model	TTLACT
NCT article number (order number)	40-00010379-50
Number of encoder inputs	1
Signs of the TTL inputs	A, AN, B, BN, C, CN
Maximum TTL encoder frequency	2 MHz
Number of ± 10 V analogue outputs	1
Number of CAN outputs	1
Number of tachometer outputs	1
Analogue output resolution	$\pm 10 \text{ V} / 2^{15}$
CAN bus transmission rate	$1 \text{ Mb} \cdot \text{s}^{-1}$
Tachometer output resolution	$\pm 10 \text{ V} / 2^{15}$
Module current consumption from the LVDS bus	200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	$0 \sim +55 \text{ }^{\circ}\text{C} / -24 \sim +85 \text{ }^{\circ}\text{C} / 95\%$
Weight	220 g

3.17 TTLAC2 / A module with two TTL encoder inputs, two analog outputs and CAN bus



It is a module for interfacing TTL encoder and generating analog and CAN BUS output and is connected to the EPU unit through LVDS bus by ribbon cable. To the CAN BUS output, NCT SERVO DRIVES can be connected.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

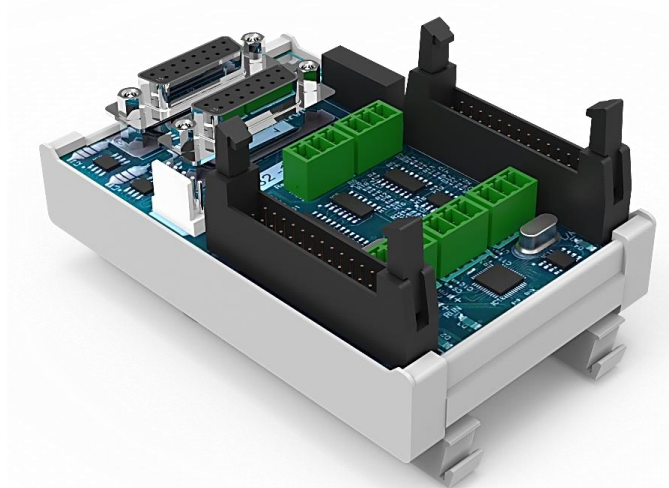
Features of the module are as follows:

- It is capable of receiving and evaluating the signals of two TTL incremental encoders, and generating and transferring the position to the EHU unit.
- It is capable of issuing, at the ± 10 Vdc analog output and on CAN bus, two data of maximum 2^{15} resolution generated by the EHU unit.

It is also capable of receiving and evaluating incremental encoder with TTL output of any kind and generating analogue outputs for any purpose.

Model	TTLAC2
NCT article number (order number)	40-00010379-10
Number of encoder inputs	2
Signs of the TTL inputs	A, AN, B, BN, C, CN
Maximum TTL encoder frequency	2 MHz
Number of ± 10 V analogue outputs	2
Number of CAN outputs	1
Analogue output resolution	± 10 V / 2^{15}
CAN bus transmission rate	$1 \text{ Mb} \cdot \text{s}^{-1}$
Module current consumption from the LVDS bus	200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	$0 \sim +55$ °C / $-24 \sim +85$ °C / 95%
Weight	220 g

3.18 TTLACT2 / A module with two TTL encoder input, two analog output, CAN bus and a tachometer output



It is a module for interfacing TTL encoder and generating analog and CAN BUS output and is connected to the EPU unit through LVDS bus by ribbon cable. To the CAN BUS output, NCT SERVO DRIVES can be connected.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

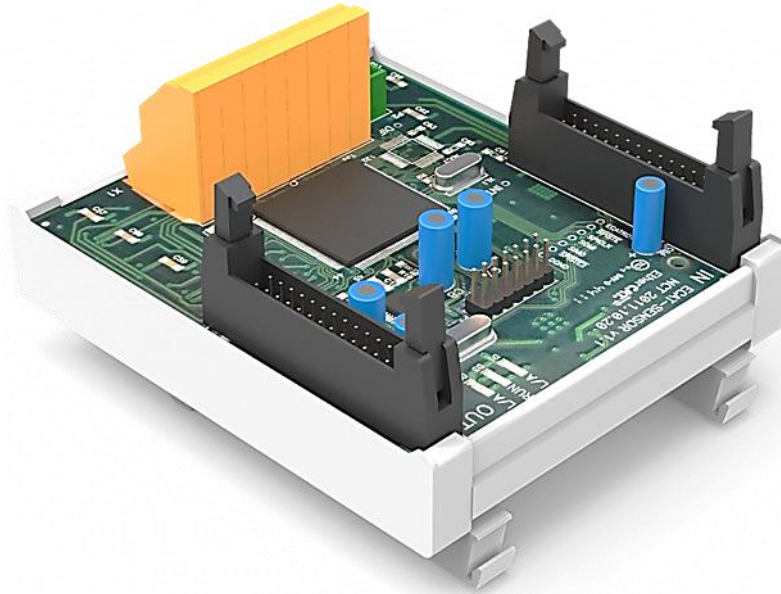
Features of the module are as follows:

- It is capable of receiving and evaluating the signals of two TTL incremental encoders, and generating and transferring the position to the EHU unit.
- It is capable of issuing, at the ± 10 Vdc analog output and on CAN bus, two data of maximum 215 resolution generated by the EHU unit.
- It is capable of generating two ± 10 Vdc analog tachometer signals from the signals of the TTL incremental encoder for the NCT servo drive.

It is also capable of receiving and evaluating incremental encoder with TTL output of any kind and generating analogue outputs for any purpose.

Model	TTLACT2
NCT article number (order number)	40-00010379-60
Number of encoder inputs	2
Signs of the TTL inputs	A, AN, B, BN, C, CN
Maximum TTL encoder frequency	2 MHz
Number of ± 10 V analogue outputs	2
Number of CAN outputs	1
Number of tachometer outputs	2
Analogue output resolution	$\pm 10 \text{ V} / 2^{15}$
CAN bus transmission rate	$1 \text{ Mb} \cdot \text{s}^{-1}$
Tachometer output resolution	$\pm 10 \text{ V} / 2^{15}$
Module current consumption from the LVDS bus	200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	$0 \sim +55 \text{ }^{\circ}\text{C} / -24 \sim +85 \text{ }^{\circ}\text{C} / 95\%$
Weight	220 g

3.19 SENS / A module interfacing 8+1 analog inputs



It is a module for receiving and evaluating analog signals and is connected to the EPU unit through LVDS bus by ribbon cable.

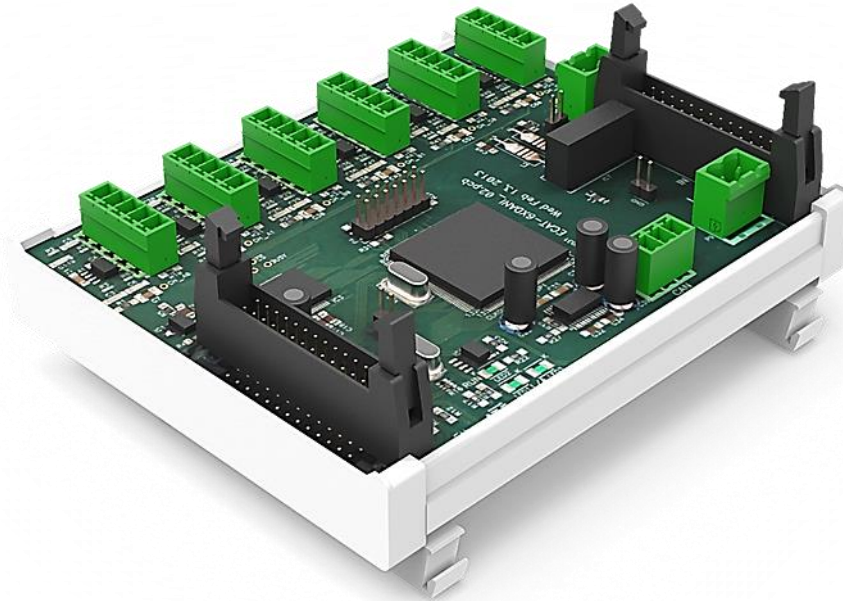
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is capable of receiving and evaluating 8 analog temperature sensors (KTY130/84) with 12-bit resolution. For each sensor, a particular alarm temperature can be specified; when the measured value exceeds this, an indication will be issued through a bit in order to exempt the EHU unit from continuous reading the temperature values. For each temperature sensor, adjustment is possible by specifying the real ambient temperature. The module is capable of receiving through one channel a remote current transmitter of 4/20 mA with 12-bit resolution.

Specific application of the module is monitoring the temperature of motors and spindle of machine tools and, using a remote vibration transmitter connected to the 4/20 mA input, machine diagnostics and vibration analysis can be realized.

Model	SENS
NCT article number (order number)	40-00010380-00
Number of analogue inputs	8+1
Resolution	12-bit in 8 cases and 12-bit (optionally 16-bit) in 1 case
Module current consumption from the LVDS bus	200 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	120 g

3.20 DANI / A module interfacing 6 analog inputs



It is an analog/digital converter module connected to the EPU unit through LVDS bus by ribbon cable.

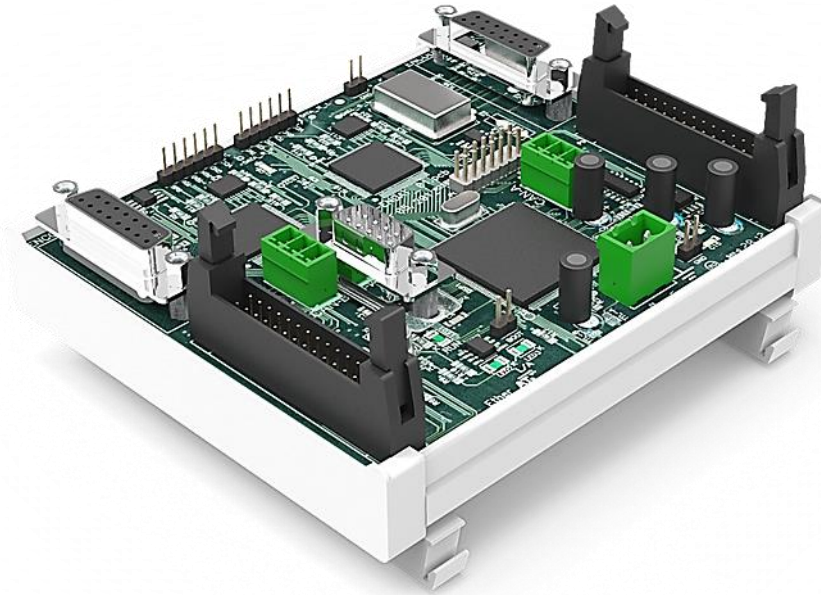
It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

It converts the ± 10 V analog differential input signals on 6 channels to digital data and then transmits them to the EHU unit via EtherCAT bus.

By inserting a resistor between the inputs, a 0 ~ 20 mA current signal transmission can also be realized by means of this card.

Model	DANI
NCT article number (order number)	40-00010379-01
Number of analogue inputs	6
Mode of receiving the signal	Differential input
Resolution	2^{16}
Input voltage range	± 10 V
Maximum of the common-mode voltage	15 V
Module current consumption from the LVDS bus	120 mA
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	135 g

3.21 ENDAT / A 2-channel EnDat 2.2 interface electronics



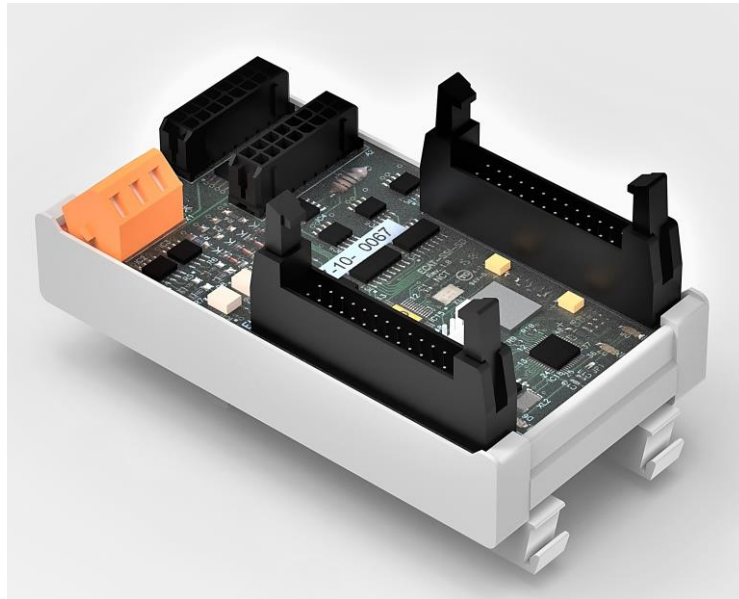
This module, which is connected to the EPU unit through an LVDS bus by a ribbon cable, is for interfacing EnDat 2.2 encoder.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

The module is capable of interfacing two EnDat 2.2 encoders. It processes the positions and transmits them to the EHU unit through EtherCAT.

Model	ENDAT
NCT article number (order number)	40-00010379-03
Number of EnDat 2.2 channels	2
Module current consumption from the LVDS bus	400 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	180 g

3.22 SMI2 / A module with two SSI encoder inputs and a STEP/DIR output



It is a 2-channel output module for receiving SSI encoder, generating STEP/DIR output signal, having PWM function, and connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in any position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

With the STEP/DIR function, the speed reference signal received via EtherCAT can be converted to STEP/DIR output enabling the stepper motor drives to be used in harmony with the NCT control.

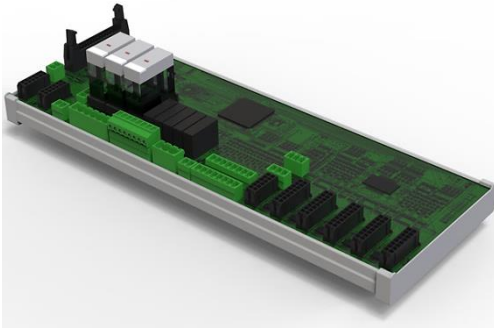
The module is capable of receiving encoders communicating by means of SSI protocol, and this can be used independently; or, together with the STEP/DIR function, a closed-loop stepper motor control can be realized, with which significantly better accuracy and reliability characteristics can be reached than those of the open-loop solution. The output is an open-collector and differential one making it easy to be connected to devices with different voltage level and different inputs.

By means of the 2-channel PWM output function, pulse width modulation signal with a frequency and a duty cycle different channel by channel can be generated.

In addition, the module provides each of the channels with one digital input and one digital output. Both the input and the output are of 24 V and are galvanically isolated.

Model	SMI2
NCT article number (order number)	40-00010602-00
Number of encoder inputs	2
Features of encoder input	SSI (25bit, RS422, constant 400 kHz)
STEP/DIR frequency	Maximum 200 kHz
Type of STEP/DIR output	differential, open-collector
PWM output frequency	20 Hz ~ 20 kHz
PWM output duty cycle	0..100 %
Digital I/O	24 V, galvanically isolated
EtherCAT protocol	CoE, FoE
DC sync	supported (32 bit)
Power supply (from LVDS bus)	5 V / 200 mA (without encoder)
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	220 g

3.23 PI-EMI / EtherCAT interface electronics for PI DENTAL milling machine



This multifunction module consists of a measuring system and interface units, and is connected to the EPU unit through LVDS bus by ribbon cable.

It can be placed in the last position after the EPU. It can mechanically simply be snapped on the DIN-35 rail.

It can primarily be used as interface module for the machine tools that are moved by stepper motor. The device is capable of receiving SSI encoders; the SSI or EnDat reception can be selected at the input 5 of the encoder. In addition to encoder reception and stepper motor control output, each drive connection has a 24 V input PLC interface and a 24 V output PLC interface.

The spindle is controlled by analog reference signal. In addition to the analog reference signal, there are PLC interface 24 V input and output signals at the spindle output.

In addition to reception of touch probe and handwheel, there are further PLC inputs and relay PLC outputs on the module. Moreover, the device has other functions as shown in the table below.

Model	PI-EMI
NCT article number (order number)	40-00011800-21
Stepper motor drive connection	5
Analog main drive connection	1
3-wire PLC input, 24 V	8
Normally-open contact relay, 5 A	5
Normally-open contact relay, 10 A	3
Analogue input	1
Temperature sensor input	1
CAN connection for handwheel	1
Touch probe connection	2
LED series drive	1
PWM PLC output	1
Stepper motor drive connection	SSI/EnDat input, STEP/DIR output, 24 Vdc input, 24 Vdc output
Analogue main drive connection	±10 V analogue output, 24 Vdc input, 24 Vdc output
Analogue input	0 ~ 5 V
Temperature sensor input	0 ~ 5 V
CAN bus transmission rate	500 kb·s ⁻¹
LED series drive	24 Vdc / 1 kohm
PWM PLC output	24 V / 200 mA
Interface power supply	24 Vdc, 2 A
Power supply (from LVDS bus)	700 mA (without encoders)
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	360 g

3.24 ECON1XX / NCT 104/304 EtherCAT interface card



The ECON1XX connects the measuring system card and interface card of the NCT104 control to the EtherCAT network.

The ECON1XX replaces the CPU card in the NCT104 control unit, thereby taking over the function of the CPU card and connecting the peripherals to the central unit (EHU).

The touch probes interfaced with the NCT104 CPU card, the keyboard and handwheel, which connect to the CAN bus, can be connected to the ECON1XX with full compatibility.

The EtherCAT Software Integrity Slave (ESIS) unit is also integrated in the ECON1XX card, so there is no need to apply a separate EPU-SIS module to the EtherCAT network.

Model	ECON1XX
NCT article number (order number)	40-00011715-40
EtherCAT	2×RJ45 (IN/OUT), 100BASE-TX
Number of touch probes	4
CAN bus transmission rate	500 kb·s ⁻¹
Serial port	RS232
Operating / storage temperature / relative humidity (w/o condensation)	0 ~ +55 °C / -24 ~ +85 °C / 95%
Weight	310 g

4 SERVO DRIVES

SYNCHRONOUS & ASYNCHRONOUS NCT SERVO DRIVES UP TO 225 AMPERES



4.1 NCT EtherCAT servo amplifiers

Structure of the NCT drive systems

An NCT drive system is composed of a power supply unit and any number of servo amplifiers and servo motors; to a servo amplifier, a motor is connected. In case of voltage levels usual in Europe, the system does not require a transformer. The mains chokes are built in the smaller power supply units, however, the chokes form separate units in case of larger ones. Since the installation depth of the modules is the same, an eye-appeal multi-axis drive system can be built that can be aligned on row, clearly arranged and cabled easily.

The possibility of placing the elements directly next to each other reduces the room required by the drive system in the cabinet, and furthermore, using perforated mounting plate for mounting makes it possible to remove the heat generated by the power electronics through the cooling channel at the rear of the cabinet, reducing in this way the volume of the hot air inside the cabinet.

The order of the modules is arbitrary; they can be arranged even in several rows. The direct mains supply and modular design, which characterizes the NCT drive systems, simplify electrical planning, the design of the mains supply and any subsequent expansion or replacement of modules.

Marking the model of the NCT EtherCAT servo amplifiers

- DxC-20/40-LE**
- NCT EtherCAT servo amplifier:
 - DSC** – for synchronous motors
 - DAC** – for asynchronous motors
 - DIC*** – inverter mode
 - Rated output current
 - Maximum current
 - Communication connection:
 - R** – EtherCAT RJ45 connection
 - C*** – CAN connection+Analog $\pm 10V$
 - Type of measuring system:
 - E** – Endat 2.2
 - T** – TTL incremental
 - S*** – sincos encoder

* : Not yet available

In contrast with the old series, for both the synchronous and asynchronous drive models, drives with double current division are defined in the compact drive train where the former number is the rated current and the latter one is the maximum current the drive can provide.

The rated current is the value of current the drive can supply continuously, without interruption, for a long time, up to the end of its life, without overheating.

The maximum value of the current can be supplied by the drive for a short time; if it is supplied for a longer time or for a short time but many times, the drive may get overheated and stop with sending error message. (The values for the operating modes will be defined later.)

The cooling design for both the synchronous and asynchronous drive is the same – cooling rib + fan. Dimensions of the cooling rib and the size and the flow rate of the fan are calculated for the rated current.

The NCT servo drives also play a key role in the NCT remote diagnostic service. The SoE communication allows remote visibility up to the level of the EnDat 2.2 transmitter on the NCT motor.

Compact mechanical design

The drive boxes can be placed directly side by side, there is no need to keep a distance between the units. It is a space-saving and inexpensive design that can simply be assembled.

For mounting, the fixing lugs can be placed in two ways from smaller-sized drives to the design of 20 A rated current. Thus, they can be used both for perforated mounting plate and normal mounting technology. The units of 40 A or higher rated current are designed for perforated mounting plate technology only.

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

Cooling outside of the cabinet

The cooling is more intensive, the output power is higher. The electronics is separated, dirt accumulation is minimal, the life is longer, and maintenance is not required. The fan control is temperature-dependent, the design is energy-saving, there is no overcooling, and the life is longer. The heat is generated outside of the cabinet, the cabinet is not heated, energy-saving design.

EtherCAT connection (RJ45)

It has two Ethernet (RJ45) connectors. One of them is the input, the other is the output. To the input, the output of the previous EtherCAT periphery is connected, while from the output, the next EtherCAT periphery can be connected to.

Hidden bus

For high-voltage power supply, there is a pair of buses pocketed into the front panel. Any of the units can be taken out of the driver chain after simple getting down the plastic front panel for shock-hazard protection and tilting the bus element without dismounting them.

Operation

Using pulse-width modulation, the servo amplifier powered from the direct-current bus system generates 3-phase voltage necessary for powering the motor, which voltage is produced as the fundamental frequency of a pulse series characterized by constant switching frequency but changing width. The modulation is space-vector controlled, with superordinate current, speed and position control, which makes it possible to power rectangular-field synchronous machine, sinusoidal-field synchronous machine, and asynchronous machine.

The servo amplifiers have standard EtherCAT (industrial Ethernet) communication channel, thus they can be interfaced with all standard EtherCAT HOST (EHU) units. The digital reference signal is received by the servo amplifiers via EtherCAT real-time channel or CAN/Analog ± 10 V using retrofit front-panel coupler, and via 24 V IO channel, which is capable of replacing our older servo amplifiers that have CAN/Analog input.

These servo amplifiers have been developed purposely for real-time Ethernet (EtherCAT) communication systems, so their main feature is the short control cycle time. The short control cycle time can be achieved independently of the numerous networked devices and this increases the number of axes controllable simultaneously (synchronous and simultaneous operations). Each EtherCAT device is suitable for distributed clock synchronization ensuring their accurate synchronous run and thus improving the surface quality while increasing the machining speed.

The compact servo electronics have automatic fan control, which switches the cooling fan on and off depending on heating ensuring thus the optimal operating temperature of the electronics.

Main features of the NCT EtherCAT servo amplifiers

- High-speed EtherCAT communication system
- Synchronizability via EtherCAT system (Distributed Clock Synchronization)
- Flexible motor selection(synchronous, linear, torque and asynchronous motors)
- EnDAT 2.2 encoder processing up to 128 million position/revolution
- Compact design to build multichannel drive systems easily
- PTC thermistor, thermal circuit-breaker, KTY coil end temperature sensor connection for motor protection
- Parameterization and diagnostics also from the control
- Autotuning, Smooth Interpolation, Tandem configuration

Summary table of characteristics

Model	D□C-10/20-□□	D□C-20/40-□□	D□C-40/80-□□
Power in S1 duty	7 kVA	14 kVA	28 kVA
Power in S6 30% duty	10 kVA	20 kVA	40 kVA
Rated current	10 A	20 A	40 A
Maximum current	20 A	40 A	80 A
Box width	65 mm	65 mm	130 mm

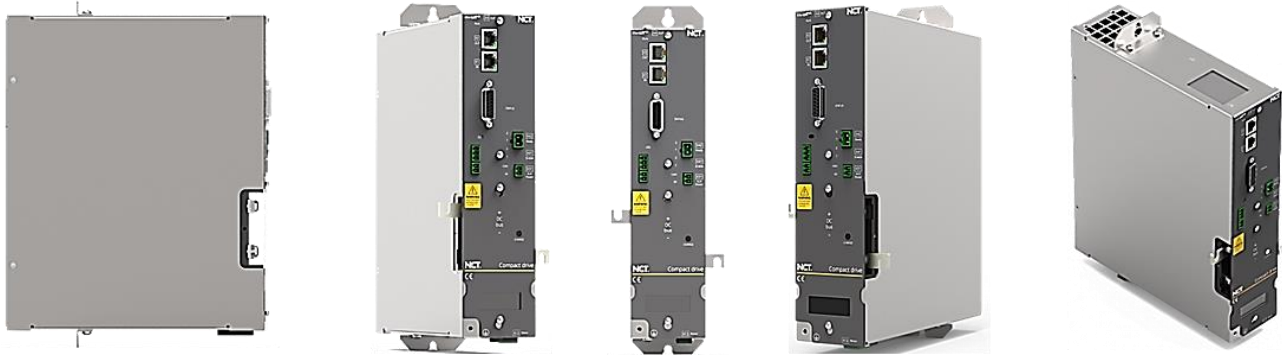
Model	D□C-60/120-□□	D□C-80/160-□□	D□-120/240-□□
Power in S1 duty	42 kVA	56 kVA	84 kVA
Power in S6 30% duty	60 kVA	80 kVA	120 kVA
Rated current	60 A	80 A	120 A
Maximum current	120 A	160 A	240 A
Box width	130 mm	195 mm	300 mm

Model	D□-180/360-□□
Power in S1 duty	126 kVA
Power in S6 30% duty	180 kVA
Rated current	180 A
Maximum current	360 A
Box width	300 mm

SYNCHRONOUS & ASYNCHRONOUS **NCT**
SERVO DRIVES UP TO 225 AMPERES



4.2 D□C 10/20-□□, D□C-20/40-□□ drives



Drive model	NCT article number (order number)
DSC-10/20-RE	40-00005636-00
DAC-10/20-RT	40-00010638-00
DSC-20/40-RE	40-00005637-00
DAC-20/40-RT	40-00005906-00

Functionality:

- S: For operating the permanent magnet synchronous servo motors
- A: For operating the three-phase (induction, squirrel-cage) asynchronous motors

Communication:

- R: EtherCAT UTP RJ-45

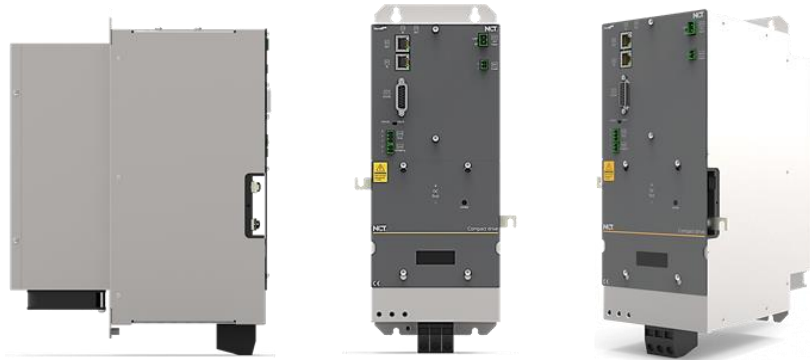
Rate feedback:

- E: HEIDENHAIN/EnDat 2.2 (multiturn absolute or angle encoder)
- T: TTL (5V) incremental

Model	D□C-10/20-□□		D□C-20/40-□□	
Switching frequency	8 kHz			
Control cycle time	125 μs			
Rated DC voltage	230 ~ 540 V			
Maximum operating DC voltage	650 V			
DC voltage limit	80 ~ 750 V			
Output voltage	0 ~ 400 V			
Output frequency range	0 ~ 1000 Hz			
Rated output current	10 A		20 A	
Maximum output current (30 s)	20 A		40 A	
Maximum of the actual current value (125 μs)	40 A		80 A	
Rated output power	7 kVA		14 kVA	
Maximum operating motor power in S1 duty	5.6 kW		11.2 kW	
Storage temperature range	-10 ~ 70 °C			
Operating temperature range	0 ~ 50 °C			
Relative humidity	60 %			
IP protection class	IP00 (IP20)			
Weight	3.5 kg		4 kg	
Total width	65 mm			
Height	265 mm			
Installation depth	160 / 225 mm			

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

4.3 D□C 40/80-□□, D□C-60/120-□□ drives



Drive model	NCT article number (order number)
DXC-40/80-RE	40-00010694-00
DXC-40/80-RT	40-00005905-00
DXC-60/120-RE	40-00010696-00
DXC-60/120-RT	40-00005908-00

Functionality:

- S: For operating the permanent magnet synchronous servo motors
- A: For operating the three-phase (induction, squirrel-cage) asynchronous motors

Communication:

- R: EtherCAT UTP RJ-45

Rate feedback:

- E: HEIDENHAIN/EnDat 2.2 (multiturn absolute or angle encoder)
- T: TTL (5V) incremental

Model	D□C-40/80-□□	D□C-60/120-□□
Switching frequency	8 kHz	
Control cycle time	125 μs	
Rated DC voltage	230 ~ 540 V	
Maximum operating DC voltage	650 V	
DC voltage limit	80 ~ 750 V	
Output voltage	0 ~ 400 V	
Output frequency range	0 ~ 1000 Hz	
Rated output current	40 A	60 A
Maximum output current (30 s)	80 A	120 A
Maximum of the actual current value (125 μs)	160 A	240 A
Rated output power	28 kVA	42 kVA
Maximum operating motor power in S1 duty (cosφ=0,8)	22.4 kW	33.6 kW
Storage temperature range	-10 ~ 70 °C	
Operating temperature range	0 ~ 50 °C	
Relative humidity	60 %	
IP protection class	IP00 (IP20)	
Weight	7 kg	7.5 kg
Total width	130 mm	
Height	300 mm	
Installation depth	160 / 265 mm	

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

4.4 D□C 80/160-□□ drive

Drive model	NCT article number (order number)
DXC-80/160-RE	
DXC-80/160-RT	

Functionality:

- S: For operating the permanent magnet synchronous servo motors
- A: For operating the three-phase (induction, squirrel-cage) asynchronous motors

Communication:

- R: EtherCAT UTP RJ-45

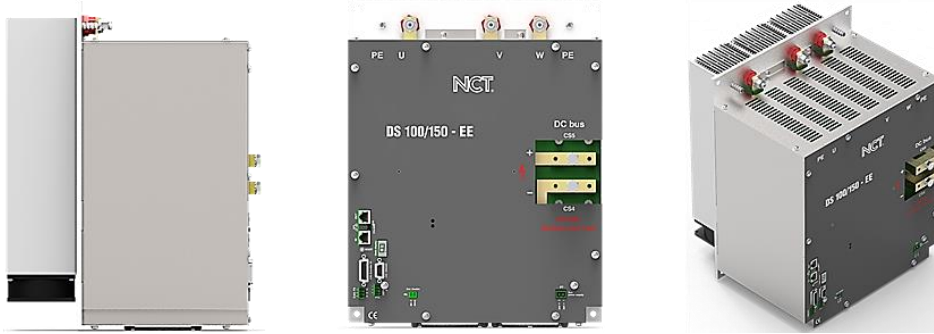
Rate feedback:

- E: HEIDENHAIN/EnDat 2.2 (multiturn absolute or angle encoder)
- T: TTL (5V) incremental

Model	D□C-80/160-□□
Switching frequency	8 kHz
Control cycle time	125 µs
Rated DC voltage	230 ~ 540 V
Maximum operating DC voltage	650 V
DC voltage limit	80 ~ 750 V
Output voltage	0 ~ 400 V
Output frequency range	0 ~ 1000 Hz
Rated output current	80 A
Maximum output current (30 s)	160 A
Maximum of the actual current value (125 µs)	320 A
Rated output power	55 kVA
Maximum operating motor power in S1 duty	44.3 kW
Storage temperature range	-10 ~ 70 °C
Operating temperature range	0 ~ 50 °C
Relative humidity	60 %
IP protection class	IP00 (IP20)
Weight	11 kg
Total width	195 mm
Height	300 mm
Installation depth	160 / 235 mm

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

4.5 D□ 120/240-□□, D□-180/360-□□ drives



Drive model	NCT article number (order number)
DS-120/240-RE	
DA-120/240-RT	
DS-180/360-RE	
DA-180/360-RT	

Functionality:

- S: For operating the permanent magnet synchronous servo motors
- A: For operating the three-phase (induction, squirrel-cage) asynchronous motors

Communication:

- R: EtherCAT UTP RJ-45

Rate feedback:

- E: HEIDENHAIN/EnDat 2.2 (multiturn absolute or angle encoder)
- T: TTL (5V) incremental

Model	D□C-120/240-□□	D□C-180/360-□□
Switching frequency	8 kHz	
Control cycle time	125 μs	
Rated DC voltage	230 ~ 540 V	
Maximum operating DC voltage	650 V	
DC voltage limit	80 ~ 750 V	
Output voltage	0 ~ 400 V	
Output frequency range	0 ~ 1000 Hz	
Rated output current	120 A	180 A
Maximum output current (30 s)	240 A	360 A
Maximum of the actual current value (125 μs)	480 A	720 A
Rated output power	83 kVA	125 kVA
Maximum operating motor power in S1 duty (cosφ=0,8)	66.5 kW	100 kW
Storage temperature range	-10 ~ 70 °C	
Operating temperature range	0 ~ 50 °C	
Relative humidity	60 %	
IP protection class	IP00 (IP20)	
Weight	20 kg	22 kg
Total width	300 mm	
Height	380 mm	
Installation depth	260 / 345 mm	

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

5 POWER SUPPLY UNITS

5.1 PDC ... power supply units



The main purpose of the PDC ... power supply units is to provide servo amplifiers with energy. Servo amplifiers require direct voltage at their input, which may vary only slightly depending on the load. At the DC bus output of the PDC ... power supply units, the rectified voltage of the three-phase mains itself appears; the ripple rectified voltage is almost completely smoothed by the capacitors on the DC bus. The value of the DC bus voltage is basically determined by the line voltage of the mains and the voltage drop on the mains choke. The purpose of the mains choke is to diminish the harmonic content of the current drawn from the mains. In the PDC ... power supply units, there is a soft start system, which switches on and off depending on the DC bus voltage. The switch-on and switch-off voltages are different from each other. If the value of the bus voltage is smaller than the half of the rated value, the soft start will be activated; if the value of the bus voltage exceeds the 80% of the rated value, the soft start will be switched off. Without the soft start, the overcurrent protection before the power supply unit would immediately disconnect at the moment of switch-on.

Every drive system has an operating condition (brake mode) in which power flows from the motor to the main power supply unit. The PDC ... power supply units, through resistors, can convert this power into heat. Since there is no built-in brake resistor in the PDC ... power supply unit, external brake resistor has to be connected to it.

There is a design of the PDC ... power supply units that provides servo amplifiers of the drive system with supply voltage of 24 Vdc and industrial communication channel (EtherCat) through flat cable. In the case of this design, there are two RJ45 connectors (X1 and X2) on the front panel. At the end of the type name, there is a letter R (PDC ... -R) that refers to this design.

Model	PDC 3-40-25(-R)
NCT article number (order number)	
Input voltage	3×400 Vac
Input current	3×20 Aeff
Output voltage	540 Vdc
Loadability	24 Adc
Minimum value of the external brake resistor	22 ohm
Recommended external brake resistor	FZG 400×65-22
Maximum ambient temperature	45 °C
IP protection class	IP00
Heat generation	60 W
Current consumption of auxiliary power supply unit (PDC 3-40-25)	350 mA
Current consumption of auxiliary power supply unit (PDC 3-40-25-R)	400 mA
Maximum permissible current consumption of auxiliary power supply unit	2.6 A
Weight	5.8 kg
Total width	65 mm
Height	265 mm
Installation depth	160 / 200 mm

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector!

5.2 DPB ... / PRC ... power supply units



The main purpose of the DPB ... / PRC ... power supply units is to provide servo amplifiers with energy. Servo amplifiers require direct voltage at their input, which may vary only slightly depending on the load. At the DC bus output of the DPB ... / PRC ... power supply units, the rectified voltage of the three-phase mains itself appears; the ripple rectified voltage is almost completely smoothed by the capacitors on the DC bus. The value of the DC bus voltage is basically determined by the line voltage of the mains and the voltage drop on the mains choke. The purpose of the mains choke is to diminish the harmonic content of the current drawn from or recuperated to the mains. In case of the DPB ... / PRC ... power supply units, because of the large size, the mains choke is a separate unit.

In the DPB ... / PRC ... power supply units, there is a soft start system, which switches on and off depending on the DC bus voltage. The switch-on and switch-off voltages are different from each other. If the value of the bus voltage is smaller than the half of the rated value, the soft start will be activated; if the value of the bus voltage exceeds the 80% of the rated value, the soft start will be switched off. Without the soft start, the overcurrent protection before the power supply unit would immediately disconnect at the moment of switch-on.

Every drive system has an operating condition (brake mode) in which power flows from the motor to the main power supply unit. The DPB ... / PRC ... power supply units force the power generated during braking back into the three-phase mains.

There is a design of the PRC ... power supply units that provides servo amplifiers of the drive system with supply voltage of 24 Vdc and industrial communication channel (EtherCat) through flat cable. In the case of this design, there are two RJ45 connectors (X1 and X2) on the front panel. At the end of the type name, there is a letter R (PRC ... -R) that refers to this design.

Type	PRC 3-40-80-R	DPB 3-40-160
NCT article number (order number)	40-00005642-00	40-00000649-00
Input voltage	3×400 Vac	3×400 Vac
Input current	3×63 Aeff	3×125 Aeff
Output voltage	540 Vdc	540 Vdc
Loadability	80 Adc	160 Adc
Current consumption of auxiliary power supply unit	0.5 A	1 A
Maximum permissible current consumption of auxiliary power supply unit	6 A	
Maximum ambient temperature	45 °C	45 °C
IP protection class	IP00	IP00
Heat generation	300 W	600 W
Type of mains choke	DRC 3-40-80	DRC 3-40-80
Rated value of overcurrent protection	40 ~ 80 A	80 ~ 160 A
Weight	12 kg	20 kg
Total width	195 mm	340 mm
Height	300 mm	380 mm
Installation depth	160 / 200 mm	260 / 345 mm

Always keep a distance of at least 60 mm in front of the front panel of the drive to provide space for the connections, this is mainly determined by the encoder connector and the EtherCAT connector! However, in the case of DPB-3-40-160 unit, keep a distance at least 10 mm in front of the height of the mains 3 phase terminal block connector at the supply side.

5.3 iPS1 and iPS2 power supply units



The iPS1 and iPS2 power supply units provide 24 Vdc operating voltage for the electric cabinet. The input voltage can be 230 Vac or 400 Vac.

The iPS1 power supply unit has one (X3), while the iPS2 power supply unit has two (X3 and X4) connectors of 24 Vdc.

In the case of emergency shutdown of the power supply unit or in the event of mains failure, it operates at the DC bus voltage (540 Vdc) of the drive system as well, so that controlled braking of the motors can be realized.

Generally, the outputs RELAYED OUTPUTS and BUFFERED OUTPUT are equal; each of them supplies the voltage of +24 V. However, if the load current extremely increases at the output RELAYED OUTPUTS (e.g. because of a short-circuit), a short-circuit sensor will disconnect the current consumers from the output RELAYED OUTPUTS with a delay of some ms. The design of the output BUFFERED OUTPUT makes it possible to keep the output voltage at a proper level during this time (while the short-circuit sensor disconnects the current consumers from the output RELAYED OUTPUTS).

So, it is recommended to feed the units essential for stopping the system (the machine tool) (the control, the drives, the ECAT units) from the output BUFFERED OUTPUT. It is not recommended to power these units from the output RELAYED OUTPUTS anyway, because their inputs have higher capacitors that draw a large current when turned on, which can trigger the short-circuit sensor. In addition, these units are usually short-circuit protected on their own (e.g. by fusing element).

In general, from the output RELAYED OUTPUTS, it is worth power the units (magnetic switch, brake unit etc.) comprising inductive elements.

(Each of the outputs -24 V and RELAYED OUTPUTS is doubled to make assembly easier.)

Type	iPS1 (230 V)	iPS2 (400 V)
NCT article number (order number)	40-00001132-00	40-00001132-00
Input voltage	1×230 Vac	1×400 Vac
Input current	1×1.2 Aeff	1×0.7 Aeff
Output voltage	24 Vdc	24 Vdc
Output current	6 A	10 A
Maximum ambient temperature	45 °C	45 °C
IP protection class	IP00	IP00
Heat generation	20 W	20 W
Weight	12 kg	20 kg

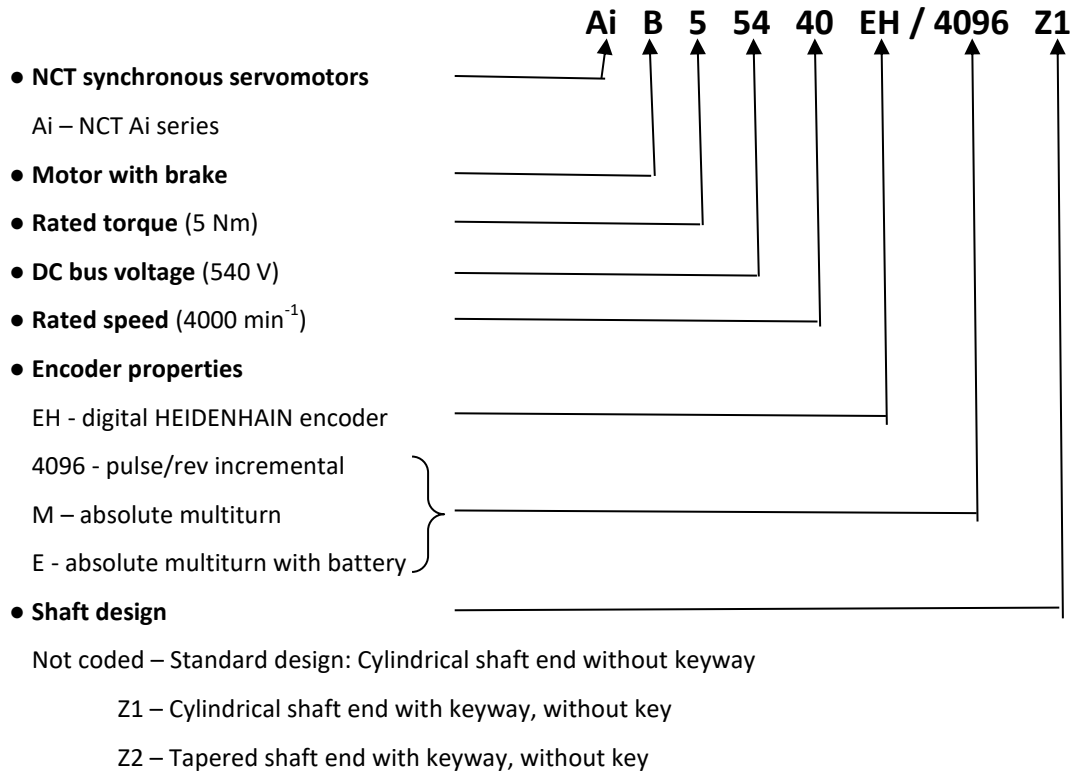
6 SYNCHRONOUS SERVOMOTORS

Construction of the Ai series motors

Geometrical construction of the Ai series motors is the same as described for the A series motors, but the material of the permanent magnets placed on the rotor is a rare earth metal (neodymium or samarium-cobalt) and the stator material is also different from that of the A motors. Ai motors have significantly higher torque, higher power and speed, and have significantly less inertia than A motors when the motors with the same rated torque are compared.

The nameplate of the Ai series servomotors is white.

Type code of the Ai motors



6.1 NCT Ai2.5 and Ai5 synchronous servomotors



Small-sized synchronous servo motors with rear-earth magnet.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector, encoder connector, brake connector (for the design with brake). Pin assignment of the connectors can be found in the introductory part of the motor chapter of this catalogue.

Model	Ai2.5 ... , AiB2.5 ...	Ai5 ... , AiB5 ...
NCT article number (order number)	40-00011064-00	40-00010290-00
Static torque, M_0	2.5 Nm	5 Nm
Static current, I_0	2.3 A	4.6 A
Rated power, P_n	550 W	1100 W
Rated torque, M_n	1.3 Nm	2.6 Nm
Rated current, I_n	1.2 A	2.4 A
Rated speed, n_n	4000 min ⁻¹	4000 min ⁻¹
Maximum torque, M_{max}	10.5 Nm	28 Nm
Maximum current, I_{max}	11 A	33.5 A
Maximum speed, n_{max}	5000 min ⁻¹	5000 min ⁻¹
Voltage constant, K_e (1000 min ⁻¹)	73 V	73 V
Torque constant, K_T	1.1 Nm·A ⁻¹	1.1 Nm·A ⁻¹
DC bus voltage, U_{DCBUSZ}	540 V	
Number of poles (2p)	8	
Moment of inertia without / with brake, J	2.5 / 4 kgcm ²	5.2 / 7 kgcm ²
Weight without / with brake, m	3 / 3.8 kg	4 / 4.8 kg
Winding resistance (between the terminals), R_v (20 °C)	8.73 ohm	3.05 ohm
Winding inductance (L_d)	8.3 mH	4 mH
Inductance rate (L_q/L_d or T_q/T_d)	1.85	2
IP protection class	IP55	
Insulation class	F	
Incremental encoder / number of pulses	ERN1326 / 4096	
Absolute encoder	EBI1135 / EQN1337	
Holding brake	without it (Ai ...) / with storing the energy (AiB ...)	
Maximum torque of the holding brake	5 Nm	
Holding brake actuating voltage for release	24 Vdc	
Holding brake power consumption	12 W	

6.2 NCT Ai8 and Ai15 synchronous servo motors

Medium-sized synchronous servo motors with rear-earth magnet.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector, encoder connector, brake connector (for the design with brake). Pin assignment of the connectors can be found in the introductory part of the motor chapter of this catalogue.

Model	Ai8 ... , AiB8 ...	Ai15 ... , AiB15 ...
NCT article number (order number)	40-00010291-00	40-00010276-00
Static torque, M_0	8.4 Nm	17 Nm
Static current, I_0	6 A	13 A
Rated power, P_n	1800 W	2700 W
Rated torque, M_n	5.8 Nm	9.9 Nm
Rated current, I_n	4.5 A	8.4 A
Rated speed, n_n	3000 min ⁻¹	2600 min ⁻¹
Maximum torque, M_{max}	38 Nm	75 Nm
Maximum current, I_{max}	28,5 A	68 A
Maximum speed, n_{max}	3800 min ⁻¹	4000 min ⁻¹
Voltage constant, K_e (1000 min ⁻¹)	92 V	78 V
Torque constant, K_T	1.45 Nm·A ⁻¹	1.22 Nm·A ⁻¹
DC bus voltage, U_{DCBUSZ}	540 V	
Number of poles (2p)	8	
Moment of inertia without / with brake, J	16 / 17 kg·cm ²	32 / 33 kg·cm ²
Weight without / with brake, m	7.5 / 11 kg	12 / 15,5 kg
Winding resistance (between the terminals), R_v (20 °C)	1.78 ohm	0.466 ohm
Winding inductance (L_d)	3.5 mH	1.2 mH
Inductance rate (L_q/L_d or T_q/T_d)	1.9	2
IP protection class	IP55	
Insulation class	F	
Incremental encoder / number of pulses	ERN1326 / 4096	
Absolute encoder	EBI1135 / EQN1337	
Holding brake	without it (Ai ...) / with storing the energy (AiB ...)	
Maximum torque of the holding brake	12 Nm	
Holding brake actuating voltage for release	24 Vdc	
Holding brake power consumption	25 W	

6.3 NCT Ai28, Ai40, Ai50 and Ai70 synchronous servo motors

They are large-sized synchronous servo motors with rear-earth magnet.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector, encoder connector, brake connector (for the design with brake). Pin assignment of the connectors can be found in the introductory part of the motor chapter of this catalogue.

Model	Ai28 ..., AiB28 ...	Ai40 ..., AiB40...	Ai50 ..., AiB50...	Ai70 ..., AiB70...
NCT article number (order number)	40-00010277-00	40-0010278-01	40-0010278-00	40-00010279-00
Static torque, M0	29 Nm	40 Nm	51 Nm	70 Nm
Static current, I0	18,8 A	18 A	32,6 A	40 A
Rated power, Pn	4130 W	4980 W	4980 W	5600 W
Rated torque, Mn	15,8 Nm	23,7 Nm	23,7 Nm	27 Nm
Rated current, In	10,6 A	12 A	16 A	16 A
Rated speed, nn	2500 min ⁻¹	2000 min ⁻¹	2000 min ⁻¹	2000 min ⁻¹
Maximum torque, Mmax	95 Nm	80 Nm	185 Nm	265 Nm
Maximum current, Imax	72 A	36 A	150 A	180 A
Maximum speed, nmax	3300 min ⁻¹	2500 min ⁻¹	2500 min ⁻¹	2300 min ⁻¹
Voltage constant, Ke (1000 min ⁻¹)	95 V	126 V	94 V	105 V
Torque constant, KT	1,47 Nm·A ⁻¹	1,9 Nm·A ⁻¹	1,46 Nm·A ⁻¹	1,63 Nm·A ⁻¹
DC bus voltage, UDCBUSZ	540 V			
Number of poles (2p)	8			
Moment of inertia without / with brake, J	64 / 67 kg·cm ²	124 / 127 kg·cm ²	124 / 127 kg·cm ²	148 / 151 kg·cm ²
Weight without / with brake, m	18 / 21 kg	30 / 33 kg	30 / 33 kg	43 / 46 kg
Winding resistance (between the terminals), Rv (20 °C)	0,34 ohm	0,25 ohm	0,125 ohm	0,093 ohm
Winding inductance (Ld)	1,74 mH	1,2 mH	0,84 mH	0,7 mH
Inductance rate (Lq/Ld or Tq/Td)	1,9	1,7	1,67	1,8
IP protection class	IP55			
Insulation class	F			
Incremental encoder / number of pulses	ERN1326 / 4096			
Absolute encoder	EBI1135 / EQN1337			
Holding brake	without it (Ai ...) / with storing the energy (AiB ...)			
Maximum torque of the holding brake	40 Nm			
Holding brake actuating voltage for release	24 Vdc			
Holding brake power consumption	25 W			

6.4 NCT AiT190 torque motor

It is a large-sized, synchronous servo multi-pole torque motor with rear-earth magnet.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

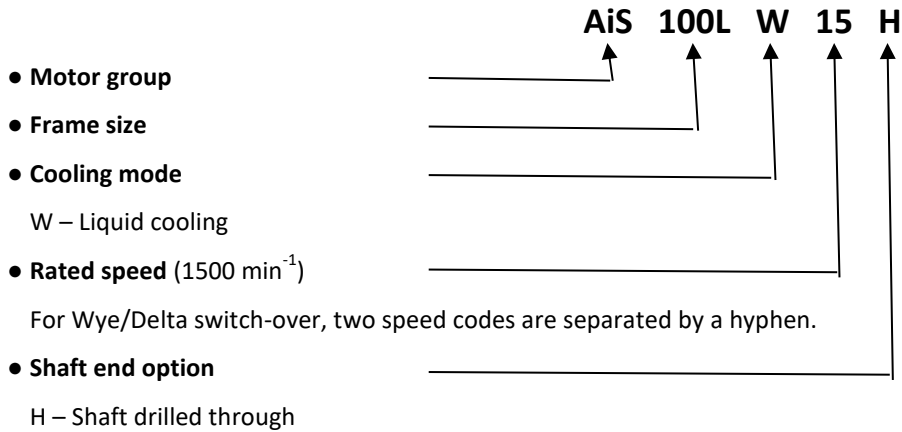
Mains connector, encoder connector, brake connector (for the design with brake). Pin assignment of the connectors can be found in the introductory part of the motor chapter of this catalogue.

Model	AiT190-120-54-3
NCT article number (order number)	
Static torque, M_0	275 Nm
Static current, I_0	24 A
Rated power, P_n	7230 W
Rated torque, M_n	230 Nm
Rated current, I_n	20 A
Rated speed, n_n	300 min ⁻¹
Maximum torque, M_{max}	750 Nm
Maximum current, I_{max}	70 A
Number of poles (2p)	44
Rated frequency, f_n	110 Hz
Maximum speed, n_{max}	330 min ⁻¹
Voltage constant, K_e (1000 min⁻¹)	740 V
Torque constant, K_T	11.5 Nm·A ⁻¹
DC bus voltage, U_{DCBUSZ}	540 V
Moment of inertia without / with brake, J	1500 kg·cm ²
Weight without / with brake, m	18 / 21 kg
Winding resistance (between the terminals), R_v (20 °C)	1.66 ohm
Winding inductance (L_d)	7.35 mH
Inductance rate (L_q/L_d or T_q/T_d)	1.2
IP protection class	IP55
Insulation class	F
Incremental encoder / number of pulses	–
Absolute encoder	Heidenhain ECN 125 EnDat22
Holding brake	Hydraulic disc brake
Maximum torque of the holding brake	200 Nm

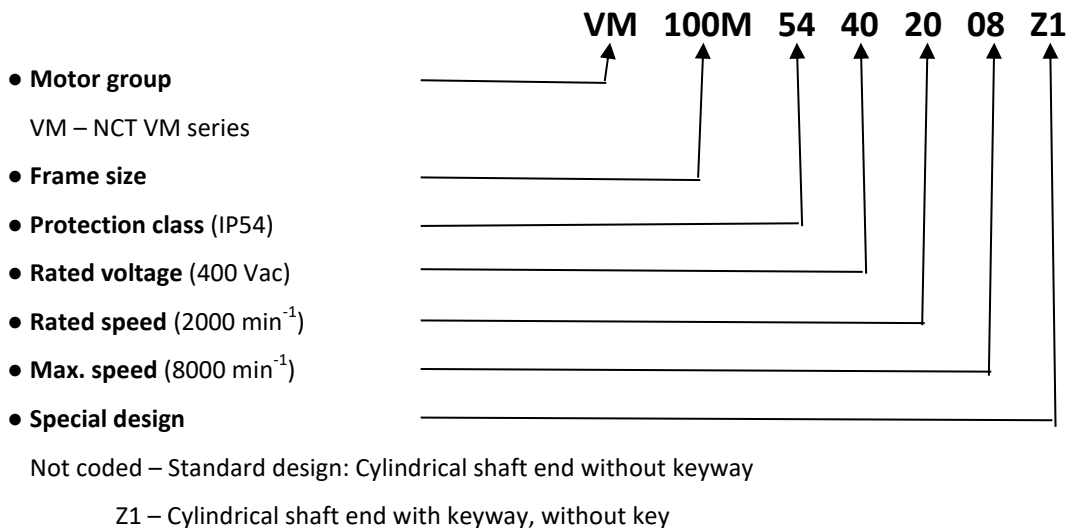
7 ASYNCHRONOUS SERVO MOTORS

Our AiS asynchronous servomotors are primarily designed to drive the spindles of automatic machine tools. Due to their special design, they are suitable for meeting the high level of dynamic requirements demanded by modern machine tools, with a long service life and without the need for maintenance. The motors can also be produced with a drilled shaft to provide high-pressure tool cooling through the spindle (for direct drive).

Type code of the AiS motors



Type code of the VM motors



7.1 NCT AiS asynchronous servo motors

They are liquid-cooled, asynchronous servo motors used mainly for main drives of machine tools.



Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector, encoder connector.

Model	AiS100LW15-26H		AiS132LW08-15	
NCT article number (order number)	40-00010202-01		40-00010204-00	
Connection	Y	D	Y	D
Number of poles, 2p	4		4	
Rated power, P_n	10.5 kW	20 kW	12.6 kW	22.0 kW
Rated torque, M_n	67 Nm	72 Nm	140 Nm	140 Nm
Rated current, I_n	24 A	46 A	29.4 A	48 A
Magnetizing current, I_μ	12 A	23 A	18 A	20 A
Rated speed, n_n	1500 min ⁻¹	2650 min ⁻¹	860 min ⁻¹	1500 min ⁻¹
Field reduction limit, n_{tgy}	7200 min ⁻¹	11 000 min ⁻¹	3900 min ⁻¹	7200 min ⁻¹
Maximum speed, n_{max}	10 000 min ⁻¹	15 000 min ⁻¹	10 000 min ⁻¹	10 000 min ⁻¹
Rated frequency, f_n	51,2 Hz	91 Hz	29,6 Hz	51,1 Hz
Power factor, $\cos\phi_n$	0.85	0.83	0.74	0.87
Efficiency, μ_n	0.90	0.915	0.88	0.92
Rated voltage, U_n	330 Vac	300 Vac	380 Vac	330 Vac
Winding resistance (between the terminals), R_v (20 °C)	0.37 ohm	0.123 ohm	0.47 ohm	0.21 ohm
Main field inductance, L_m	46 mH	12,5 mH	60 mH	28 mH
Leakage inductance, $L_{1\sigma} / L_{2\sigma}$	1.8 / 1.6 mH	0.55 / 0.45 mH	3.2 / 3.2 mH	1.14 / 0.93 mH
Reduced rotor resistance, R_r	0.2 ohm	0.09 ohm	0.28 ohm	0.089 ohm
Moment of inertia, J	440 kg·cm ²		1100 kg·cm ²	
Weight, m	85 kg		160 kg	
IP protection class	IP54		IP54	
Insulation class	F		F	
Cooling	Liquid cooling		Liquid cooling	
Encoder	GEL 244		GEL 244	
Encoder pulse number / signal	256 / TTL		256 / TTL	

7.2 NCT AMS motor spindles

They are compact motor spindles with liquid-cooled asynchronous motor.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

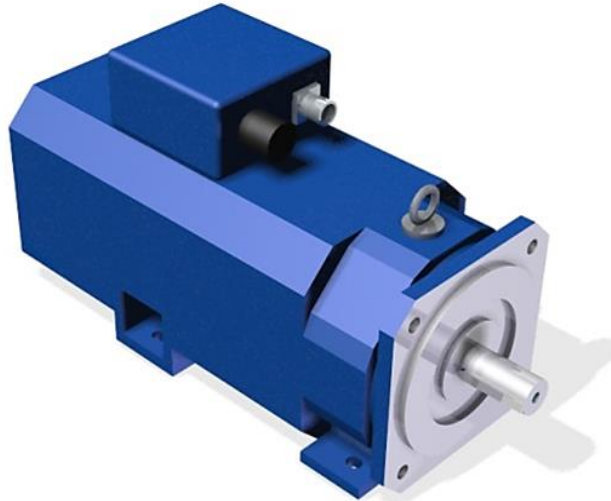
Electrical connections

Mains connector, encoder connector (leading the cable out without conduit box).

Model	AMS112MW20-A2-5/32
NCT article number (order number)	40-00010299-00
Connection	Y
Rated power, P_n	9.5 kW
Rated torque, M_n	45 Nm
Rated current, I_n	27 A
Magnetizing current, I_μ	15.5 A
Rated speed, n_n	2000 min ⁻¹
Field reduction limit, n_{mgy}	4500 min ⁻¹
Maximum speed, n_{max}	6000 min ⁻¹
Rated frequency, f_n	70.1 Hz
Power factor, $\cos\varphi_n$	0.77
Efficiency, μ_n	0.85
Rated voltage, U_n	310 V
Moment of inertia, J	360 kg·cm ²
Number of poles, 2p	4
Winding resistance (between the terminals), R_v (20 °C)	0.7 ohm
Main field inductance, L_m	23.7 mH
Series transient inductance, L_{1s}	1.28 mH
Series rotor transient inductance, L_{2s}	1.28 mH
Rotor resistance, R_{r2}	0.37 ohm
Weight, m	44 kg
IP protection class	IP54
Insulation class	F
Cooling	Liquid cooling
Encoder disc (magnetic)	ERM200 900RA A05
900RA A05	AK ERM 280
1200RA A03	A2-5
Spindle bar capacity	32 mm

Model	AMS180MW10-25-A2-6/53		AMS180MW10-25-A2-8/75	
NCT article number (order number)	40-00010300-00		40-00010301-00	
Connection	Y	D	Y	D
Rated power, P_n	18.2 kW	23.4 kW	18.2 kW	23.4 kW
Rated torque, M_n	173,8 Nm	89,4 Nm	173,8 Nm	89,4 Nm
Rated current, I_n	47.5 A	47.4 A	47.5 A	47.4 A
Magnetizing current, I_μ	18.7 A	17 A	18.7 A	17.4 A
Rated speed, n_n	1000 min ⁻¹	2500 min ⁻¹	1000 min ⁻¹	2500 min ⁻¹
Field reduction limit, n_{mgy}	2800 min ⁻¹	6000 min ⁻¹	2800 min ⁻¹	6000 min ⁻¹
Maximum speed, n_{max}	6000 min ⁻¹		6000 min ⁻¹	
Rated frequency, f_n	34.8 Hz	84.5 Hz	34.8 Hz	84.5 Hz
Power factor, $\cos\varphi_n$	0.8	0.86	0.8	0.86
Efficiency, μ_n	0.87	0.92	0.87	0.92
Rated voltage, U_n	320 Vac	360 Vac	320 Vac	360 Vac
Moment of inertia, J	5000 kg·cm ²		5000 kg·cm ²	
Number of poles, 2p	4		4	
Winding resistance (between the terminals), R_v (20 °C)	0.37 ohm	0.123 ohm	0.37 ohm	0.123 ohm
Main field inductance, L_m	40 mH	21 mH	40 mH	21 mH
Series transient inductance, L_{1s}	2 mH	1 mH	2 mH	1 mH
Series rotor transient inductance, L_{2s}	2 mH	1 mH	2 mH	1 mH
Rotor resistance, R_{r2}	0.115 ohm	0.061 ohm	0.115 ohm	0.061 ohm
Weight, m	122 kg			
IP protection class	IP54			
Insulation class	F			
Cooling	Liquid cooling			
Encoder disc (magnetic)	ERM200 1200RA A03		ERM200 1200RA A03	
900RA A05	AK ERM 280		AK ERM 280	
1200RA A03	A2-6		A2-8	
Spindle bar capacity	53 mm		75 mm	

7.3 VM75 and VM90 asynchronous servo motors



They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

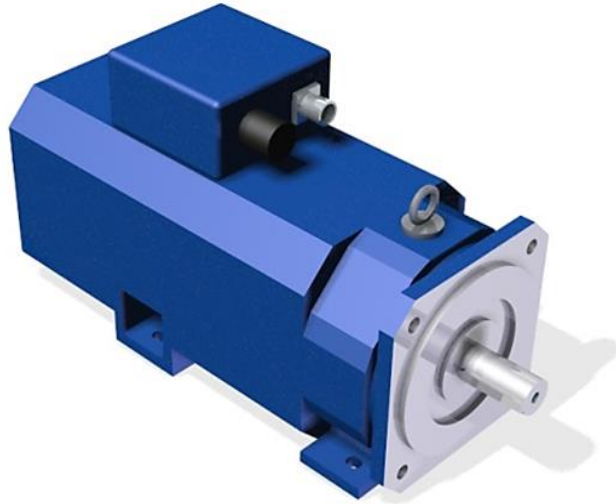
The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	SVM75L-54-40-30-20		SVM90L-54-40-20-12	
NCT article number (order number)			40-00011520-00	
Connection	Y	D	Y	D
Rated power, P_n	3.7 kW		5.17 kW	
Rated torque, M_n	11.6 Nm		24.7 Nm	
Rated current, I_n	8.4 A	14.6 A	9.99 A	
Magnetizing current, I_μ	5 A	8 A	5 A	
Rated speed, n_n	3000 min ⁻¹		2000 min ⁻¹	
Field reduction limit, n_{mgy}	8000 min ⁻¹	12 000 min ⁻¹	4000 min ⁻¹	
Maximum speed, n_{max}	20 000 min ⁻¹		12 000 min ⁻¹	
Rated frequency, f_n	103 Hz		68,87 Hz	
Power factor, $\cos\phi_n$	0.766		0.87	
Efficiency, μ_n	0.83		0.86	
Rated voltage, U_n	400 Vac	230 Vac	400 V	
Moment of inertia, J	42.5 kg·cm ²		136 kg·cm ²	
Weight, m	25 kg		38 kg	
IP protection class	IP54		IP54	
Insulation class	F		F	
Encoder	TTL		TTL	

7.4 VM90 and VM100 asynchronous servo motors



They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

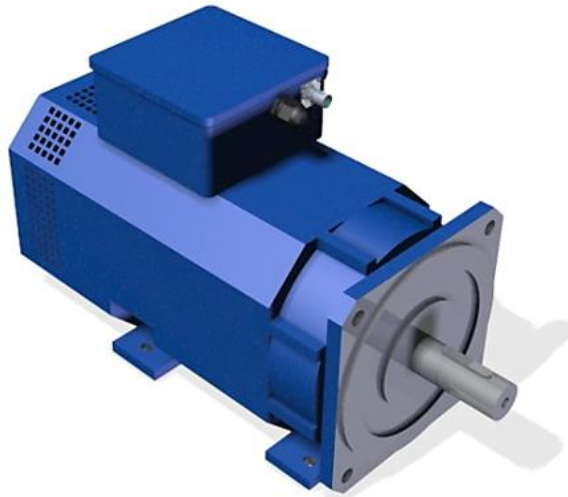
Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	VM100S-54-40-15-08	VM100M-54-40-15-08	VM100L-54-40-10-08
NCT article number (order number)		40-00010522-00	
Rated power, P_n	5.73 kW	8.92 kW	9.16 kW
Rated torque, M_n	36.5 Nm	56.8 Nm	87.5 Nm
Rated current, I_n	11.68 A	17.7 A	18.75 A
Magnetizing current, I_μ	5 A	7 A	8 A
Rated speed, n_n	1500 min ⁻¹	1500 min ⁻¹	1000 min ⁻¹
Field reduction limit, n_{mgy}	3300 min ⁻¹	3300 min ⁻¹	2200 min ⁻¹
Maximum speed, n_{max}	8000 min ⁻¹	8000 min ⁻¹	8000 min ⁻¹
Rated frequency, f_n	52.08 Hz	51.87 Hz	35.01 Hz
Power factor, $\cos\phi_n$	0.83	0.85	0.83
Efficiency, μ_n	0.85	0.86	0.85
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	245 kg·cm ²	353 kg·cm ²	405 kg·cm ²
Weight, m	51 kg	68 kg	83 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

Model	VM100L-54-40-15-08	VM100L-54-40-20-12
NCT article number (order number)	40-00010521-00	40-00010435-00
Rated power, P_n	13.08 kW	17.38 kW
Rated torque, M_n	83.3 Nm	83 Nm
Rated current, I_n	25.89 A	33 A
Magnetizing current, I_μ	8 A	11 A
Rated speed, n_n	1500 min ⁻¹	2000 min ⁻¹
Field reduction limit, n_{mgy}	3300 min ⁻¹	4000 min ⁻¹
Maximum speed, n_{max}	8000 min ⁻¹	12 000 min ⁻¹
Rated frequency, f_n	51.55 Hz	68.38 Hz
Power factor, $\cos\varphi_n$	0.85	0.88
Efficiency, μ_n	0.86	0.86
Rated voltage, U_n	400 V	400 V
Moment of inertia, J	405 kg·cm ²	405 kg·cm ²
Weight, m	83 kg	83 kg
IP protection class	IP54	IP54
Insulation class	F	F
Encoder	TTL	TTL

7.5 VM132 asynchronous servo motors



They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

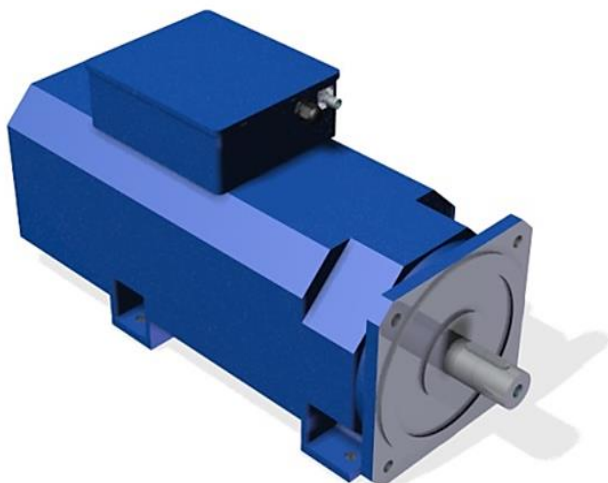
The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	VM132S-54-40-15-06	VM132M-54-40-20-06	VM132L-54-40-15-06
NCT article number (order number)	40-00010436-00	40-00010447-00	40-00010437-00
Rated power, P_n	17.37 kW	27.75 kW	26.17 kW
Rated torque, M_n	110.6 Nm	132.5 Nm	166.6 Nm
Rated current, I_n	31.69 A	47.88 A	46.69 A
Magnetizing current, I_μ	11 A	15 A	15 A
Rated speed, n_n	1500 min ⁻¹	2000 min ⁻¹	1500 min ⁻¹
Field reduction limit, n_{mgy}	3300 min ⁻¹	4000 min ⁻¹	3300 min ⁻¹
Maximum speed, n_{max}	6000 min ⁻¹	6000 min ⁻¹	6000 min ⁻¹
Rated frequency, f_n	51.49 Hz	67.96 Hz	51.33 Hz
Power factor, $\cos\phi_n$	0.86	0.89	0.87
Efficiency, μ_n	0.92	0.94	0.93
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	650 kg·cm ²	770 kg·cm ²	1010 kg·cm ²
Weight, m	105 kg	120 kg	152 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

7.6 VM160 asynchronous servo motors



They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

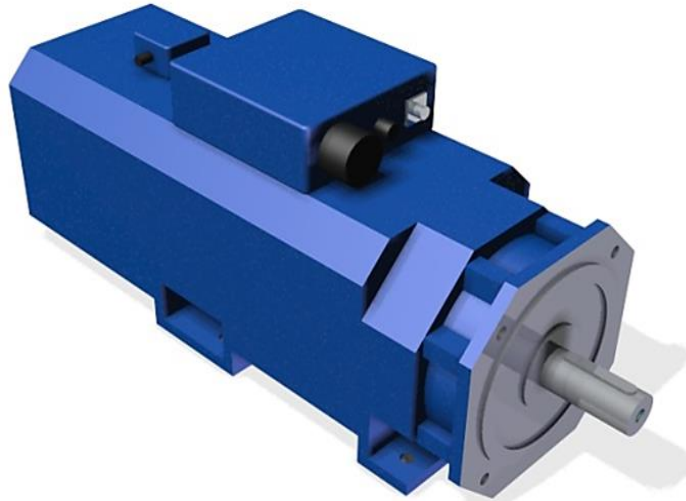
Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	VM160S-54-40-	VM160S-54-40-15-04	VM160S-54-40-
NCT article number (order number)		40-00010449-00	40-00010448-00
Rated power, P_n	27.75 kW	39.27 kW	19.44 kW
Rated torque, M_n	265 Nm	250 Nm	320 Nm
Rated current, I_n	52.53 A	70.12 A	41.26 A
Magnetizing current, I_μ	16 A	18 A	15 A
Rated speed, n_n	1000 min ⁻¹	1500 min ⁻¹	580 min ⁻¹
Field reduction limit, n_{mgy}	2200 min ⁻¹	3300 min ⁻¹	1200 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	34.61 Hz	51.23 Hz	20.12 Hz
Power factor, $\cos\phi_n$	0.82	0.86	0.8
Efficiency, μ_n	0.93	0.94	0.85
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	1860 kg·cm ²	1860 kg·cm ²	2300 kg·cm ²
Weight, m	240 kg	240 kg	265 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

Model	VM160M-54-40-10-04	VM160S-54-40-
NCT article number (order number)	40-00010448-01	40-00011523-00
Rated power, P_n	31.94 kW	35.08 kW
Rated torque, M_n	305 Nm	335 Nm
Rated current, I_n	60.37 A	65.52 A
Magnetizing current, I_μ	19 A	20 A
Rated speed, n_n	1000 min ⁻¹	1000 min ⁻¹
Field reduction limit, n_{mgy}	2200 min ⁻¹	2200 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	34.51 Hz	34.29 Hz
Power factor, $\cos\varphi_n$	0.83	0.84
Efficiency, μ_n	0.92	0.92
Rated voltage, U_n	400 V	400 V
Moment of inertia, J	2300 kg·cm ²	2560 kg·cm ²
Weight, m	265 kg	282 kg
IP protection class	IP54	IP54
Insulation class	F	F
Encoder	TTL	TTL

7.7 VM180 asynchronous servo motors



They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	VM180S-54-40-	VM180M-54-40-05-04	VM180S-54-40-
NCT article number (order number)	40-00010434-00	40-00011571-00	40-00011571-01
Rated power, P_n	40.98 kW	34.01 kW	57.6 kW
Rated torque, M_n	391.3 Nm	560 Nm	550 Nm
Rated current, I_n	78.4 A	68.95 A	110.36 A
Magnetizing current, I_μ	20 A	20 A	35 A
Rated speed, n_n	1000 min ⁻¹	580 min ⁻¹	1000 min ⁻¹
Field reduction limit, n_{mgy}	2200 min ⁻¹	1200 min ⁻¹	2200 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	34.01 Hz	19.89 Hz	33.98 Hz
Power factor, $\cos\phi_n$	0.82	0.80	0.81
Efficiency, μ_n	0.92	0.89	0.93
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	5000 kg·cm ²	6900 kg·cm ²	6900 kg·cm ²
Weight, m	370 kg	440 kg	440 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

Model	VM180L-54-40-05-04	VM180S-54-40-	VM180L-54-40-15-04
NCT article number (order number)	40-00011570-00	40-00011570-01	40-00011570-02
Rated power, P_n	38.87 kW	64.93 kW	90.1 kW
Rated torque, M_n	640 Nm	620 Nm	573 Nm
Rated current, I_n	78.8 A	122.89 A	162.44 A
Magnetizing current, I_μ	28 A	40 A	45 A
Rated speed, n_n	580 min ⁻¹	1000 min ⁻¹	1500 min ⁻¹
Field reduction limit, n_{mgy}	1200 min ⁻¹	2200 min ⁻¹	3300 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	19.83 Hz	33.91 Hz	50.66 Hz
Power factor, $\cos\varphi_n$	0.8	0.82	0.86
Efficiency, μ_n	0,89	0,93	0,93
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	7770 kg·cm ²	7770 kg·cm ²	7770 kg·cm ²
Weight, m	500 kg	500 kg	500 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

7.8 VM225 asynchronous servo motors

They are air-cooled, fully enclosed asynchronous servo motors.

Outline drawing

The outline drawings of the motors can be found in the Chapter Outline drawings of this catalogue.

Electrical connections

Mains connector (six lead-outs 230/400 V D/Y), encoder connector, fan connector (in the conduit box).

Model	VM225S-54-40-	VM225S-54-40-10-04	VM225S-54-40-
NCT article number (order number)	40-00011572-00	40-00011572-01	40-00011572-02
Rated power, P_n	40.39 kW	68.07 kW	99.12 kW
Rated torque, M_n	665 Nm	650 Nm	631 Nm
Rated current, I_n	80.08 A	130.24 A	177.17 A
Magnetizing current, I_μ	25 A	30 A	40 A
Rated speed, n_n	580 min ⁻¹	1000 min ⁻¹	1500 min ⁻¹
Field reduction limit, n_{mgy}	1200 min ⁻¹	2200 min ⁻¹	3300 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	19.75 Hz	33.91 Hz	50.61 Hz
Power factor, $\cos\phi_n$	0.80	0.82	0.85
Efficiency, μ_n	0.91	0.92	0.95
Rated voltage, U_n	400 V	400 V	400 V
Moment of inertia, J	14 790 kg·cm ²	14 790 kg·cm ²	14 790 kg·cm ²
Weight, m	635 kg	635 kg	635 kg
IP protection class	IP54	IP54	IP54
Insulation class	F	F	F
Encoder	TTL	TTL	TTL

Model	VM225M-54-40-05-04	VM225S-54-40-
NCT article number (order number)	40-00011573-00	40-00011573-01
Rated power, P_n	55.88 kW	94.25 kW
Rated torque, M_n	920 Nm	900 Nm
Rated current, I_n	112.02 A	184.56 A
Magnetizing current, I_μ	35 A	40 A
Rated speed, n_n	580 min ⁻¹	1000 min ⁻¹
Field reduction limit, n_{mgy}	1500 min ⁻¹	3300 min ⁻¹
Maximum speed, n_{max}	4000 min ⁻¹	4000 min ⁻¹
Rated frequency, f_n	19.73 Hz	33.89 Hz
Power factor, $\cos\varphi_n$	0.80	0.81
Efficiency, μ_n	0.90	0.91
Rated voltage, U_n	400 V	400 V
Moment of inertia, J	19 300 kg·cm ²	19 300 kg·cm ²
Weight, m	735 kg	735 kg
IP protection class	IP54	IP54
Insulation class	F	F
Encoder	TTL	TTL

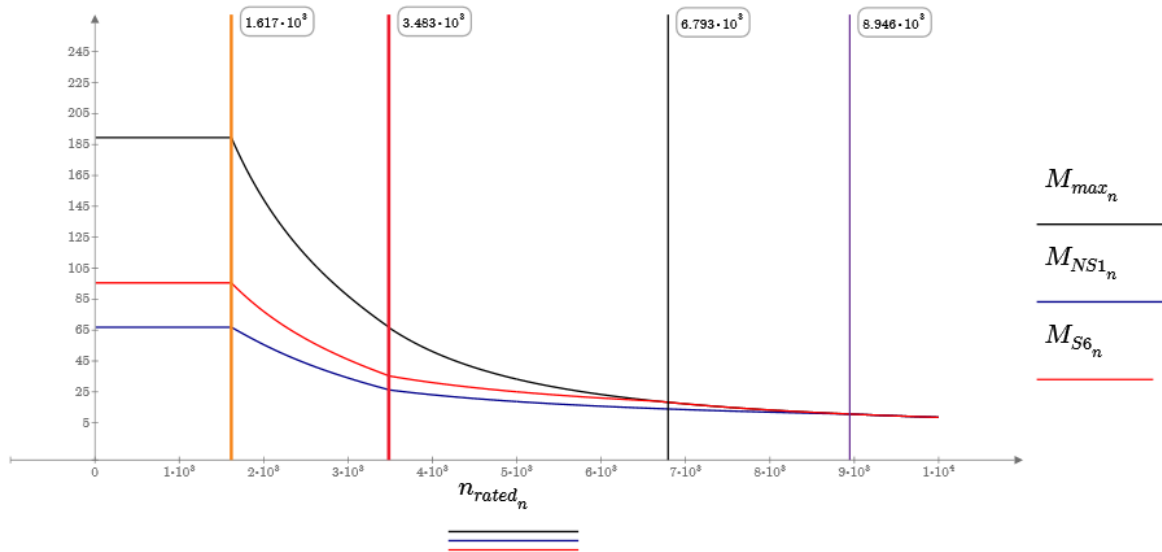


Figure 1 The torque of the AiS100LW15-26H motor in Y-connection

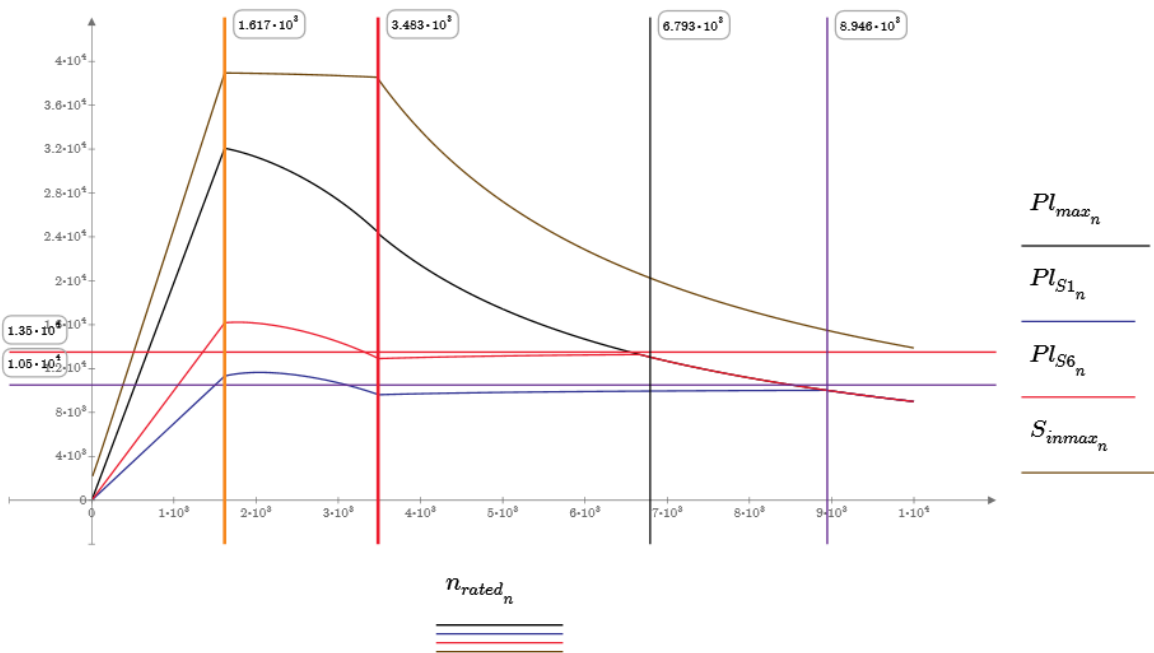


Figure 2 The power of the AiS100LW15-26H motor in Y-connection

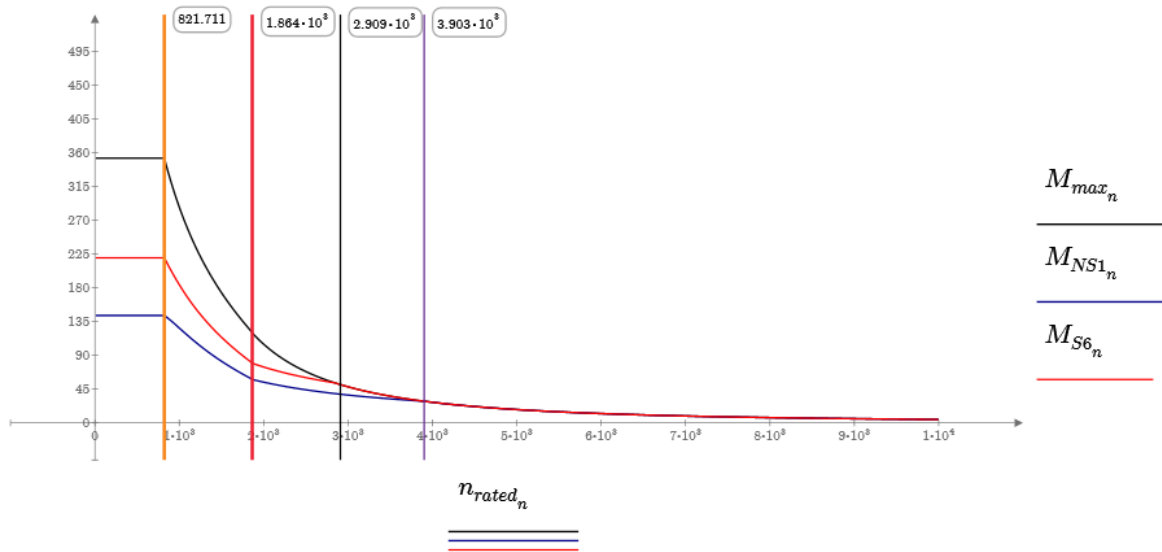


Figure 3 The torque of the AiS132LW08-15H motor in Y-connection

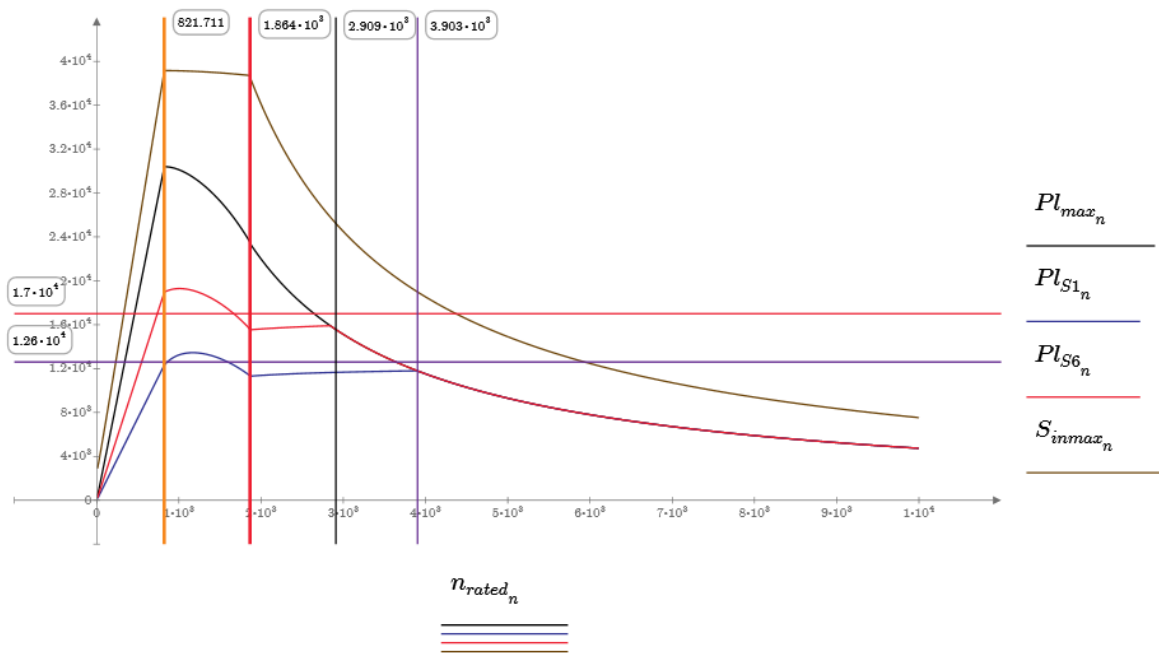
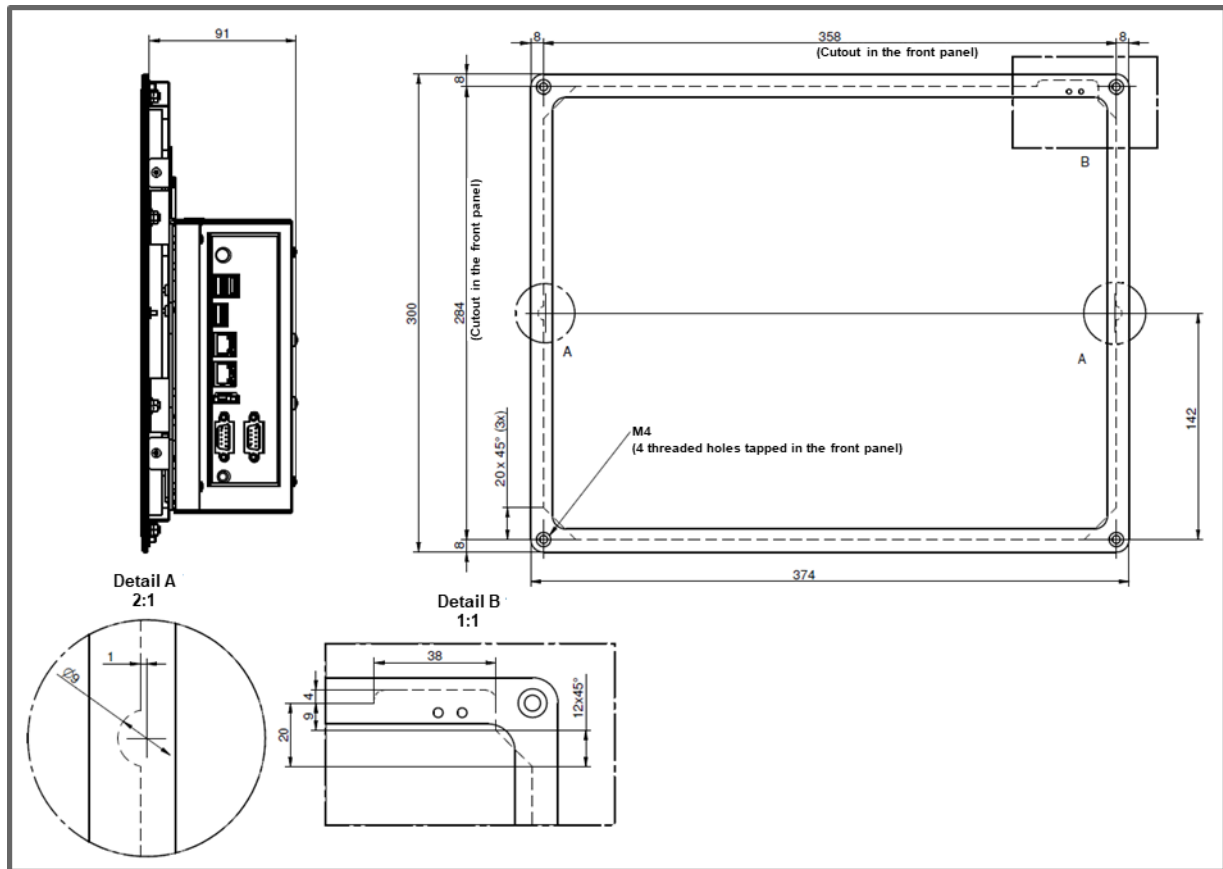


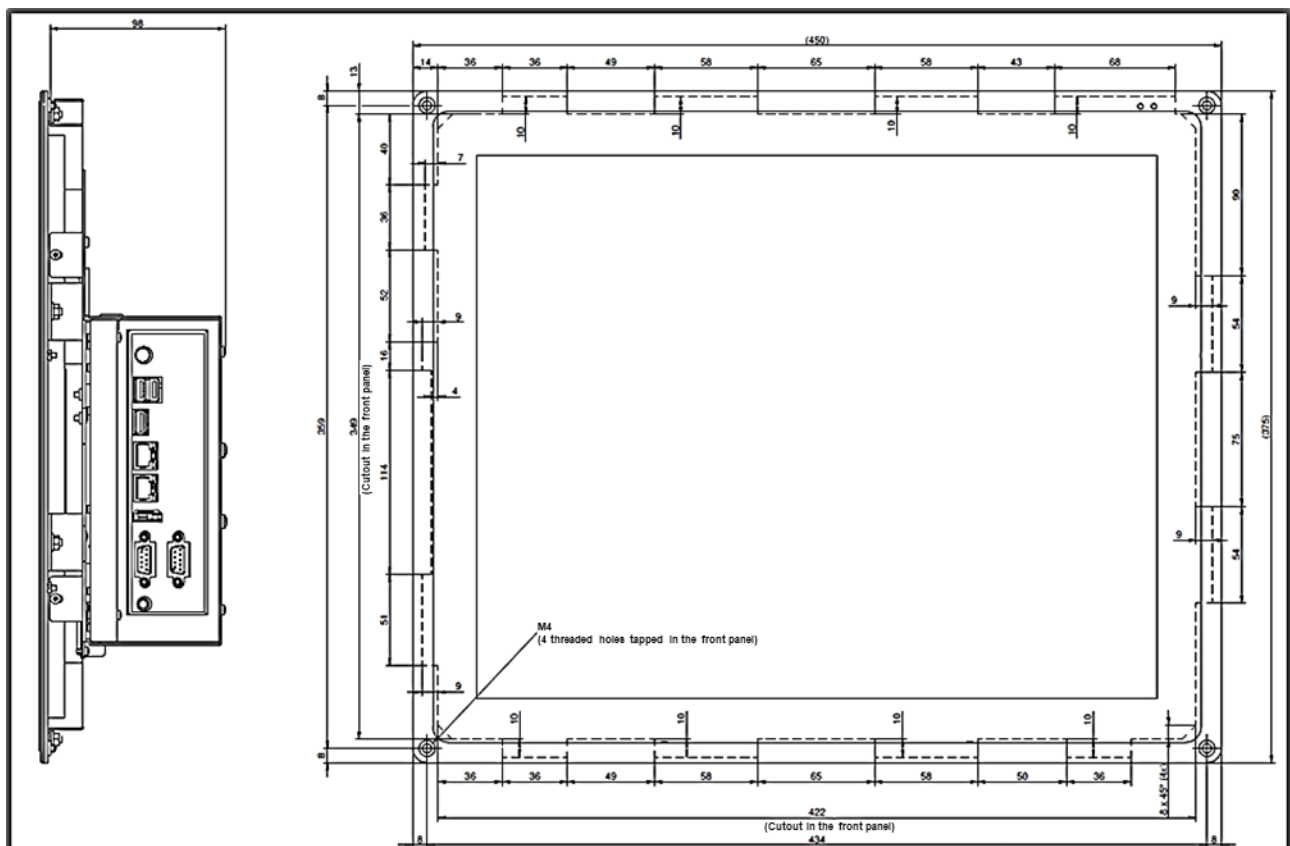
Figure 4 The power of the AiS132LW08-15H motor in Y-connection

9 OUTLINE DRAWINGS

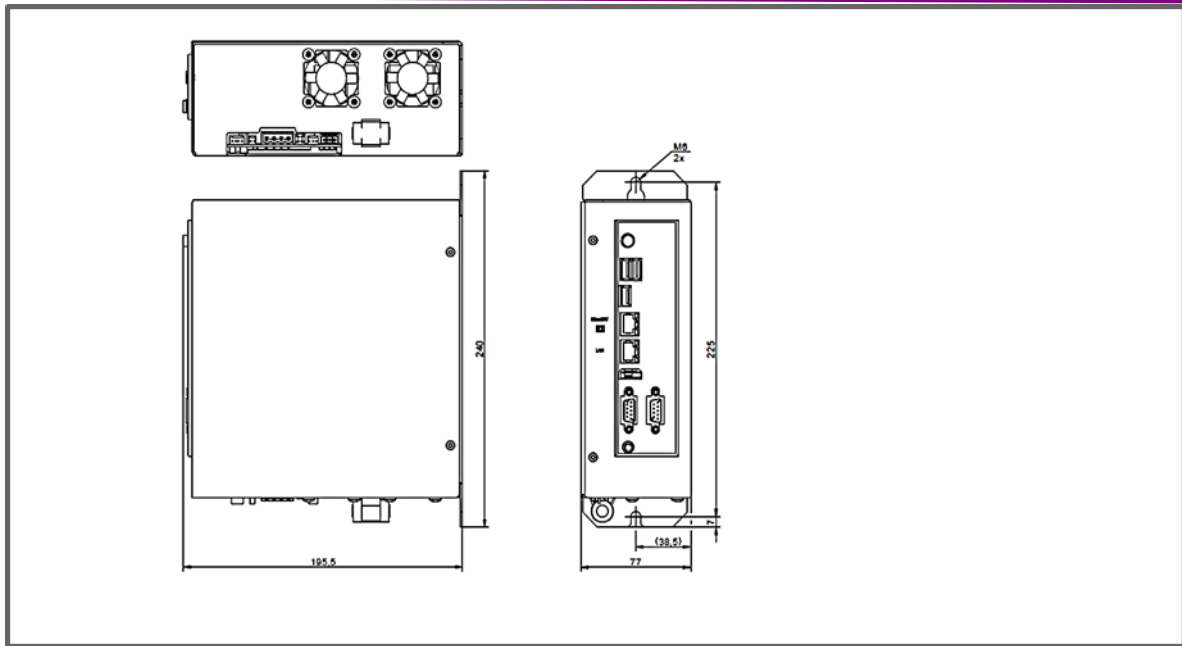
9.1 EtherCAT HOST unit



OUTLINE DRAWING OF THE DPU1504 UNIT

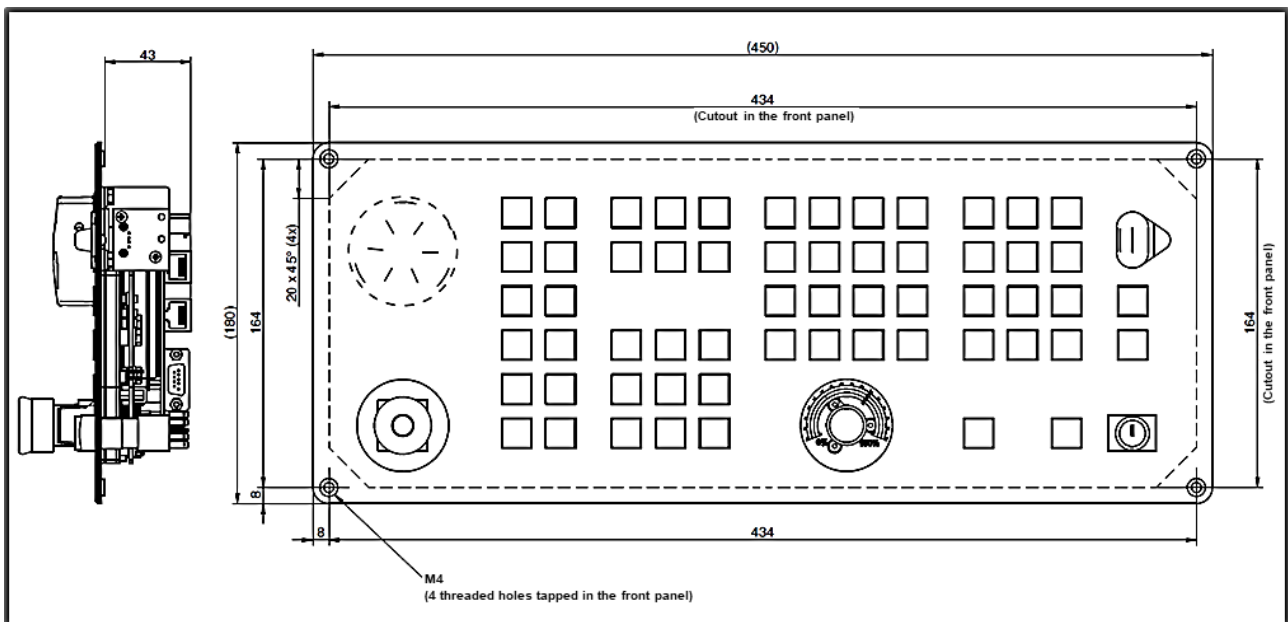


OUTLINE DRAWING OF THE DPU1904 UNIT

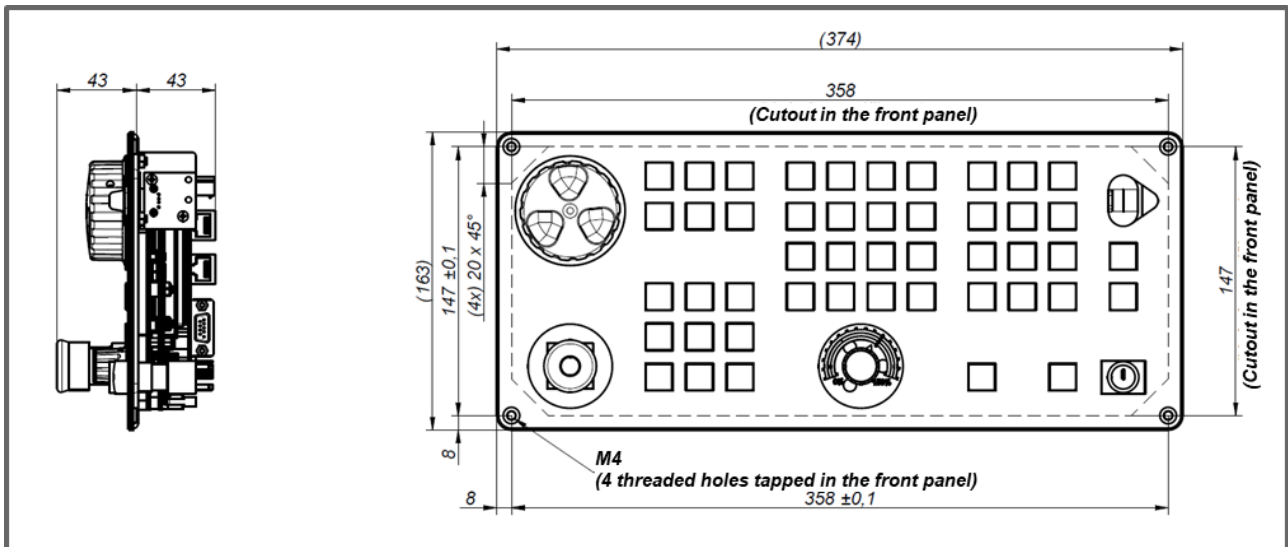


OUTLINE DRAWING OF THE EHU04B UNIT

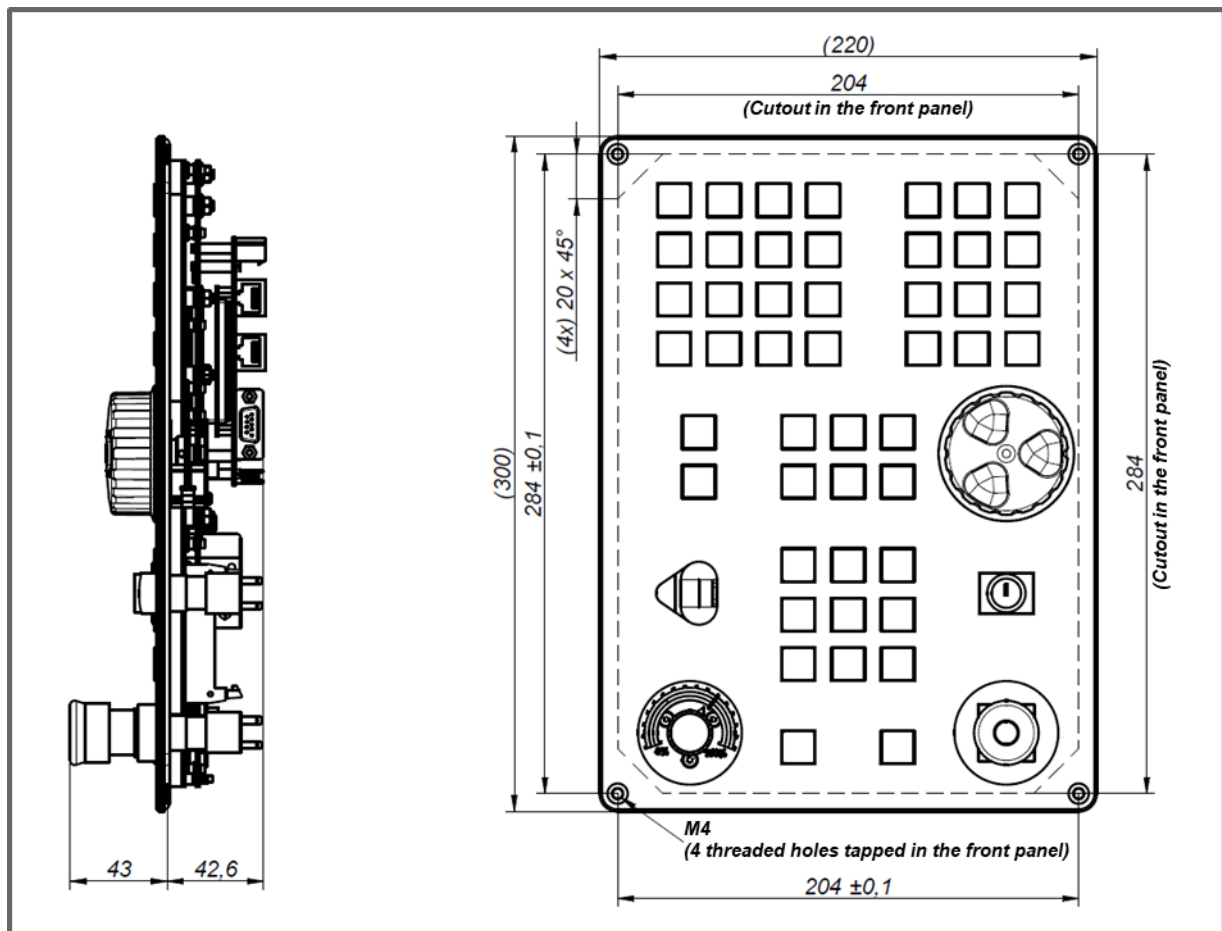
9.2 EtherCAT slaves



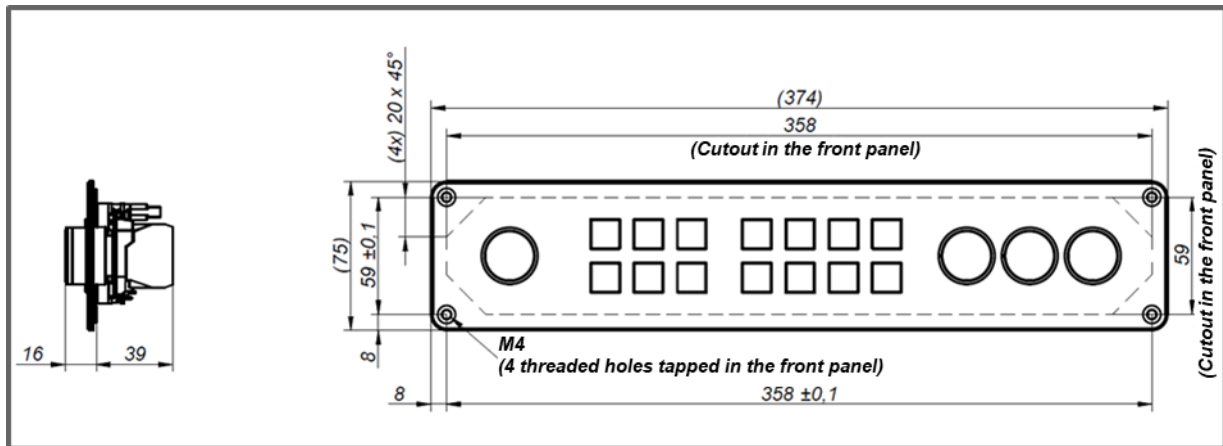
OUTLINE DRAWING OF THE MK1904 PANEL



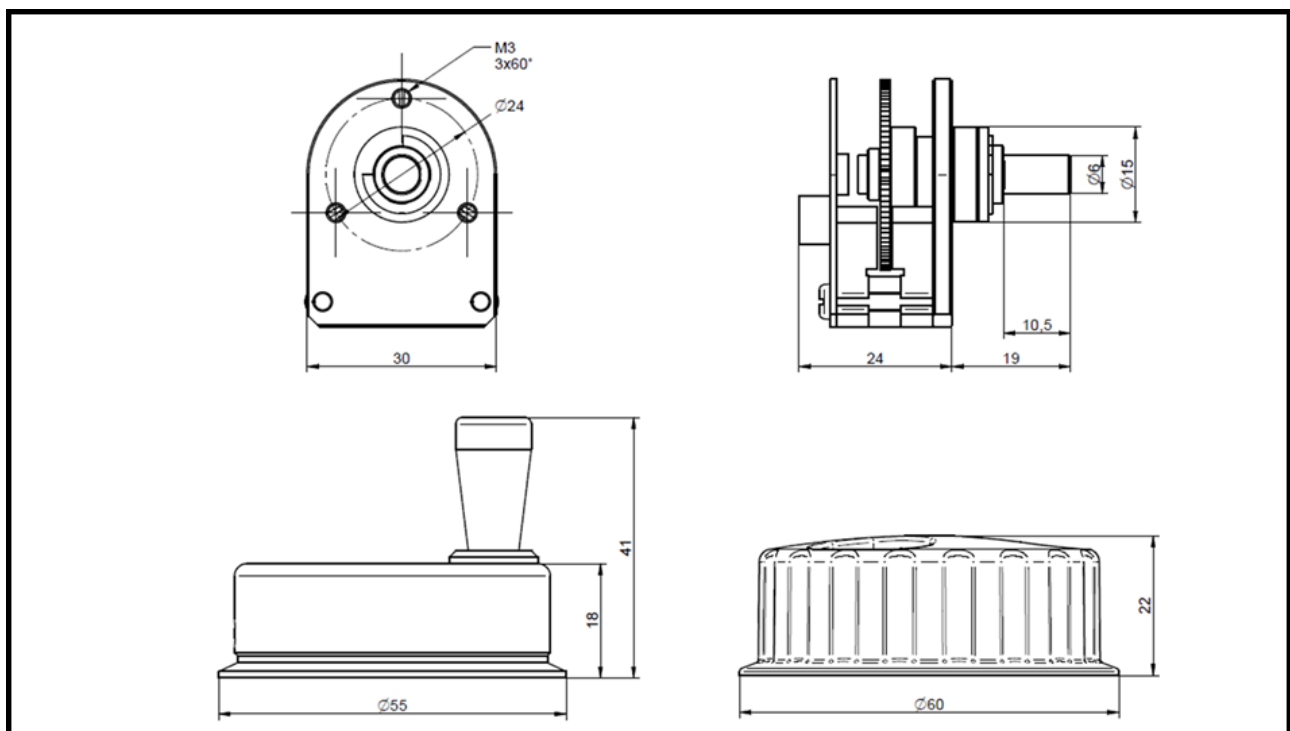
OUTLINE DRAWING OF THE MK15C PANEL



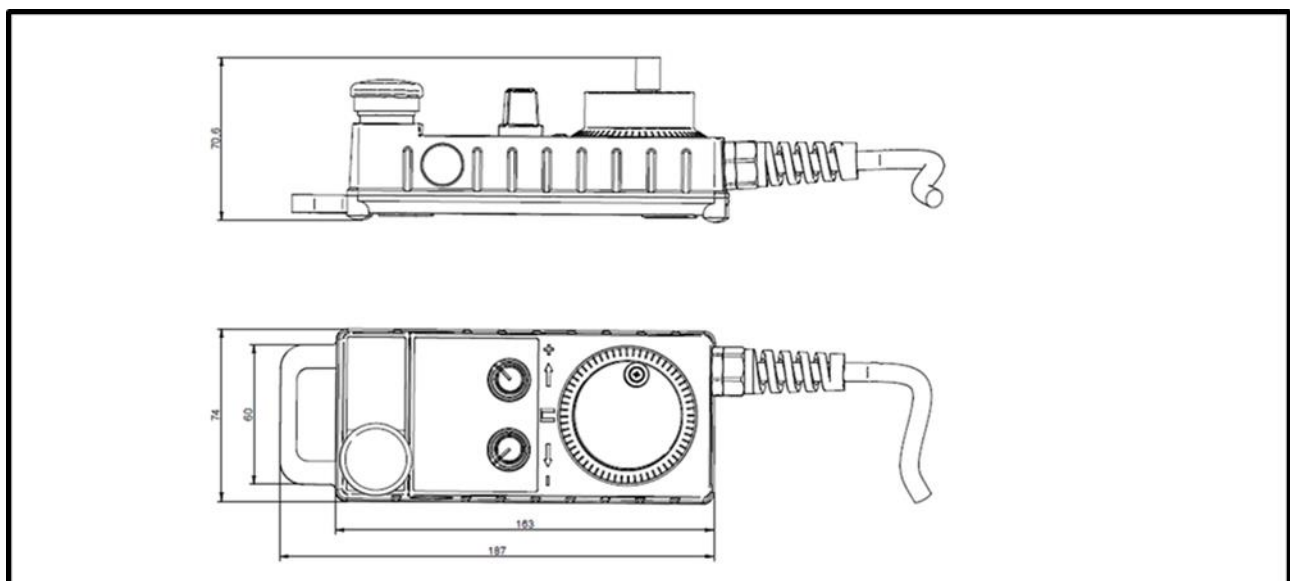
OUTLINE DRAWING OF THE MK15CV PANEL



OUTLINE DRAWING OF THE MKC15-OP PANEL

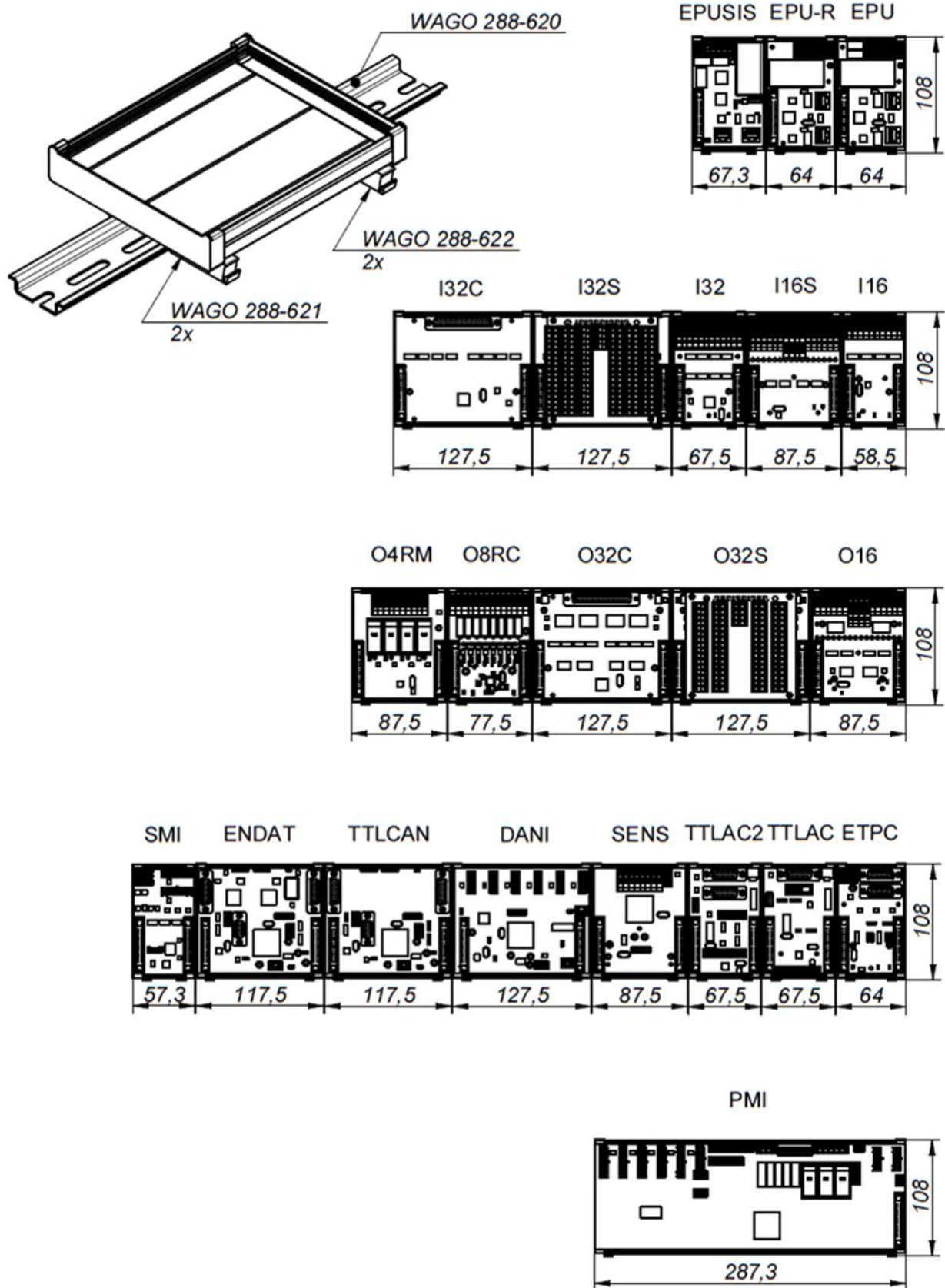


OUTLINE DRAWING OF THE HWM HANDWHEEL

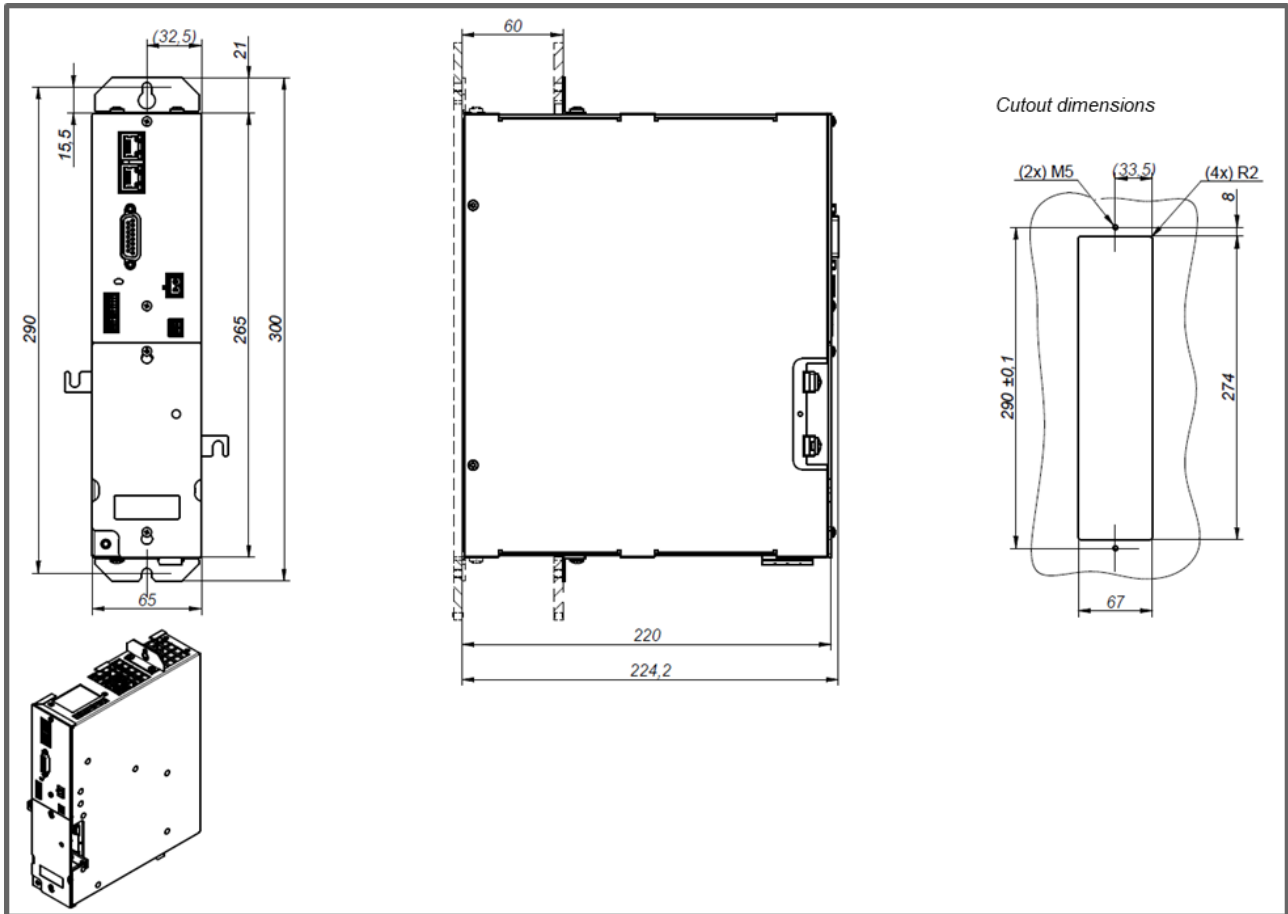


OUTLINE DRAWING OF THE IHDW EXTERNAL HANDWHEEL

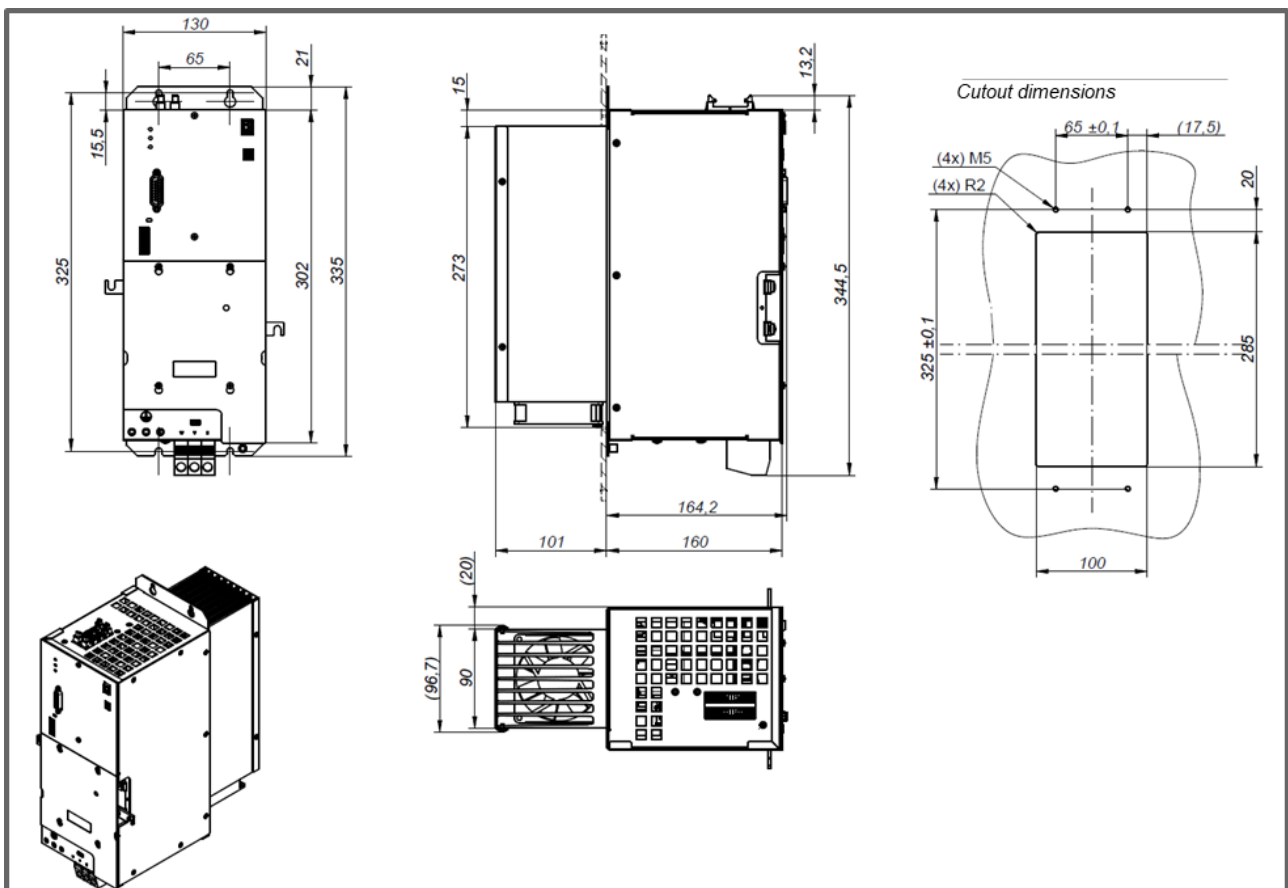
9.3 EtherCAT IO modules



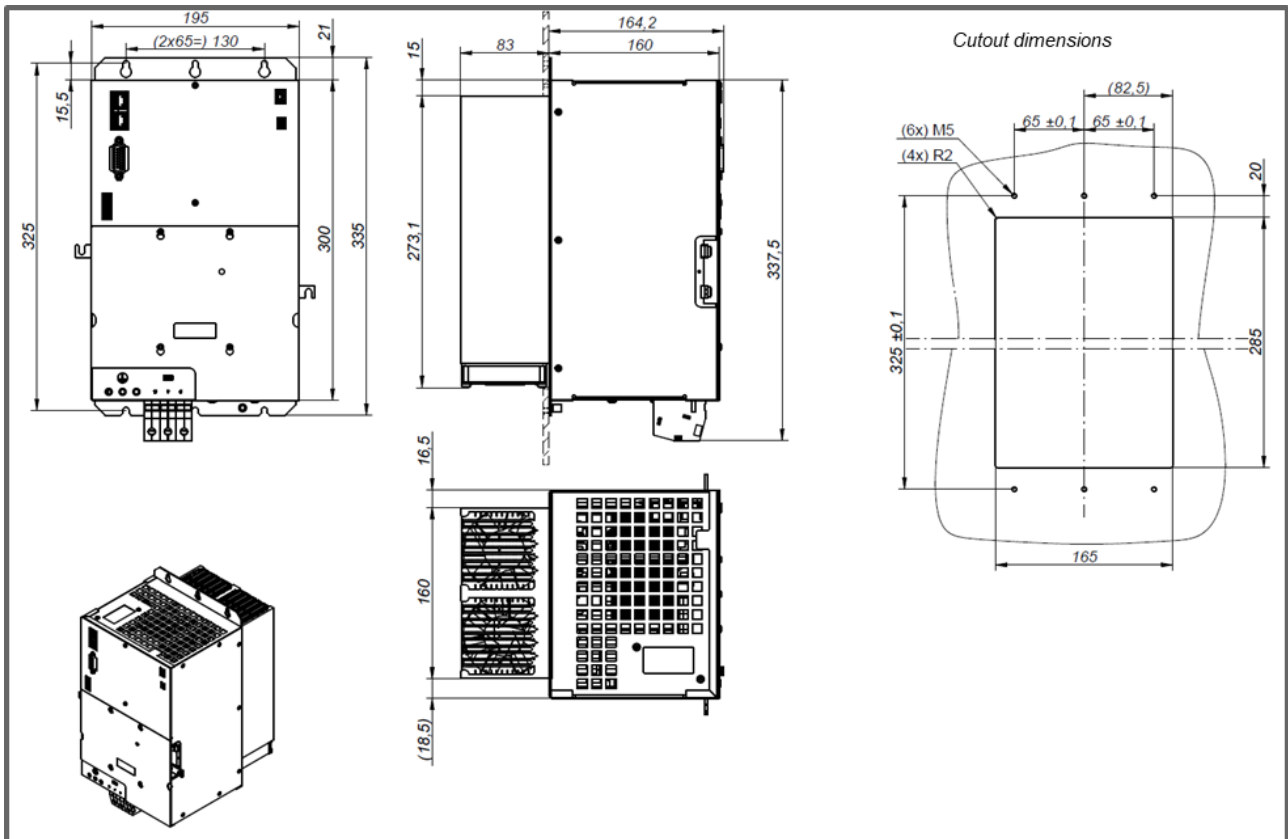
9.4 Servo drives



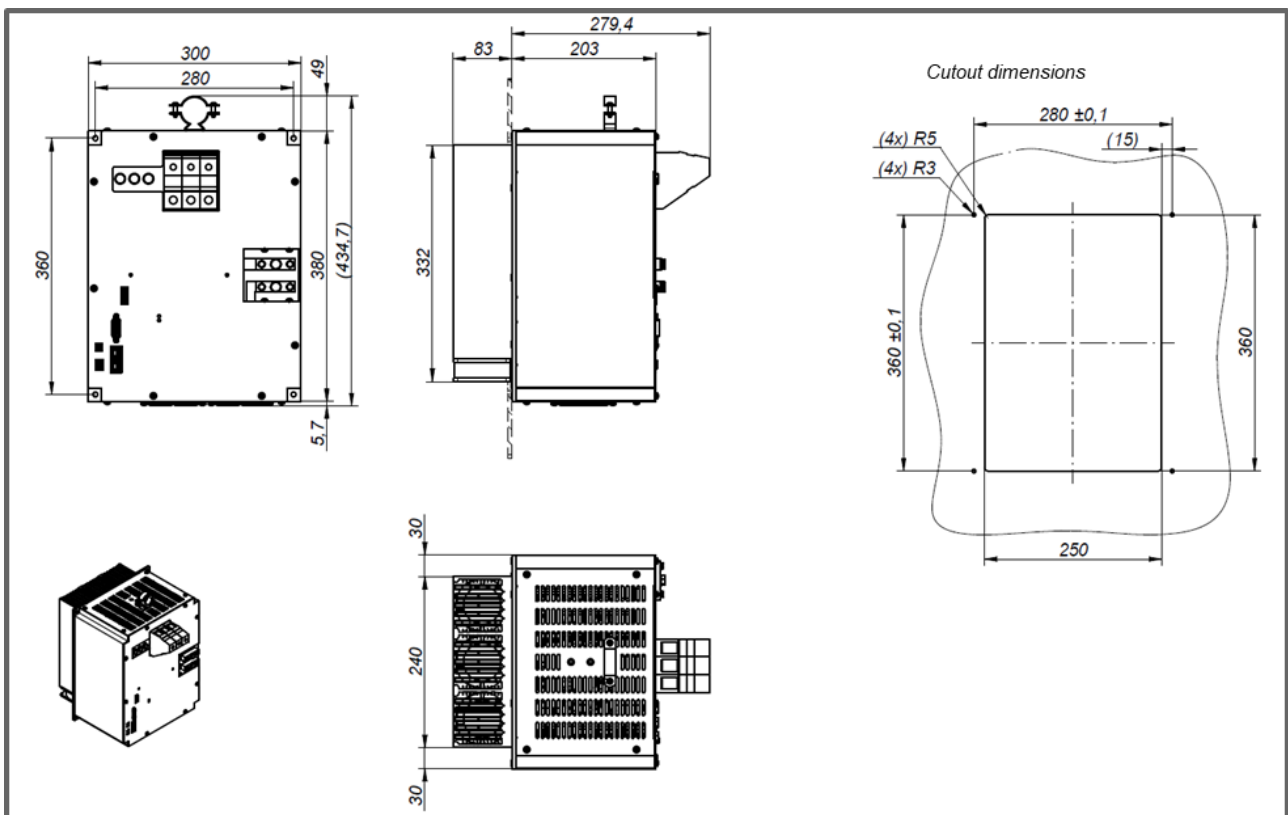
OUTLINE DRAWING OF THE D□C-10/20~20/40 SERVO DRIVE



OUTLINE DRAWING OF THE D□C-40/80~60/120 SERVO DRIVE

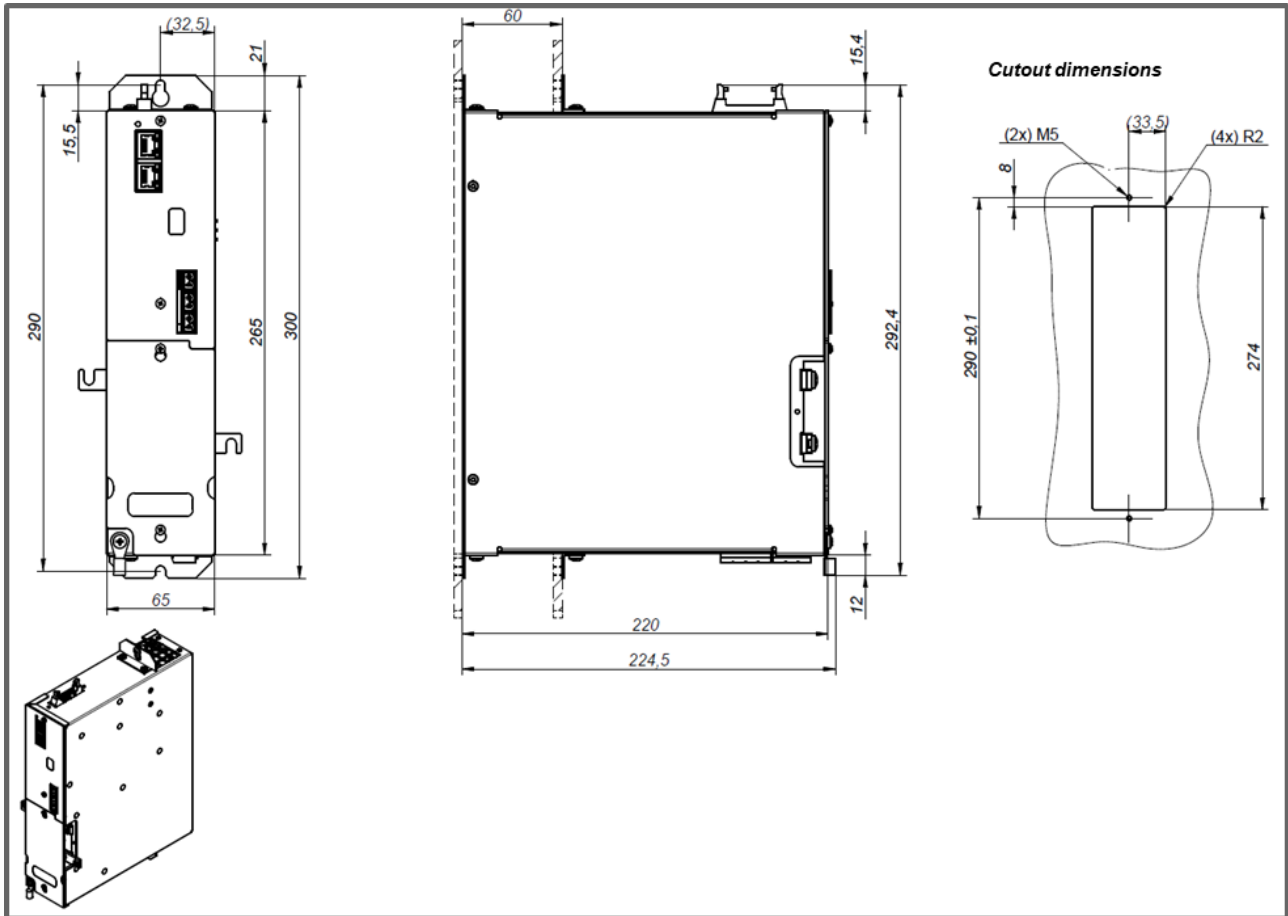


OUTLINE DRAWING OF THE D□C-80/160 SERVO DRIVE

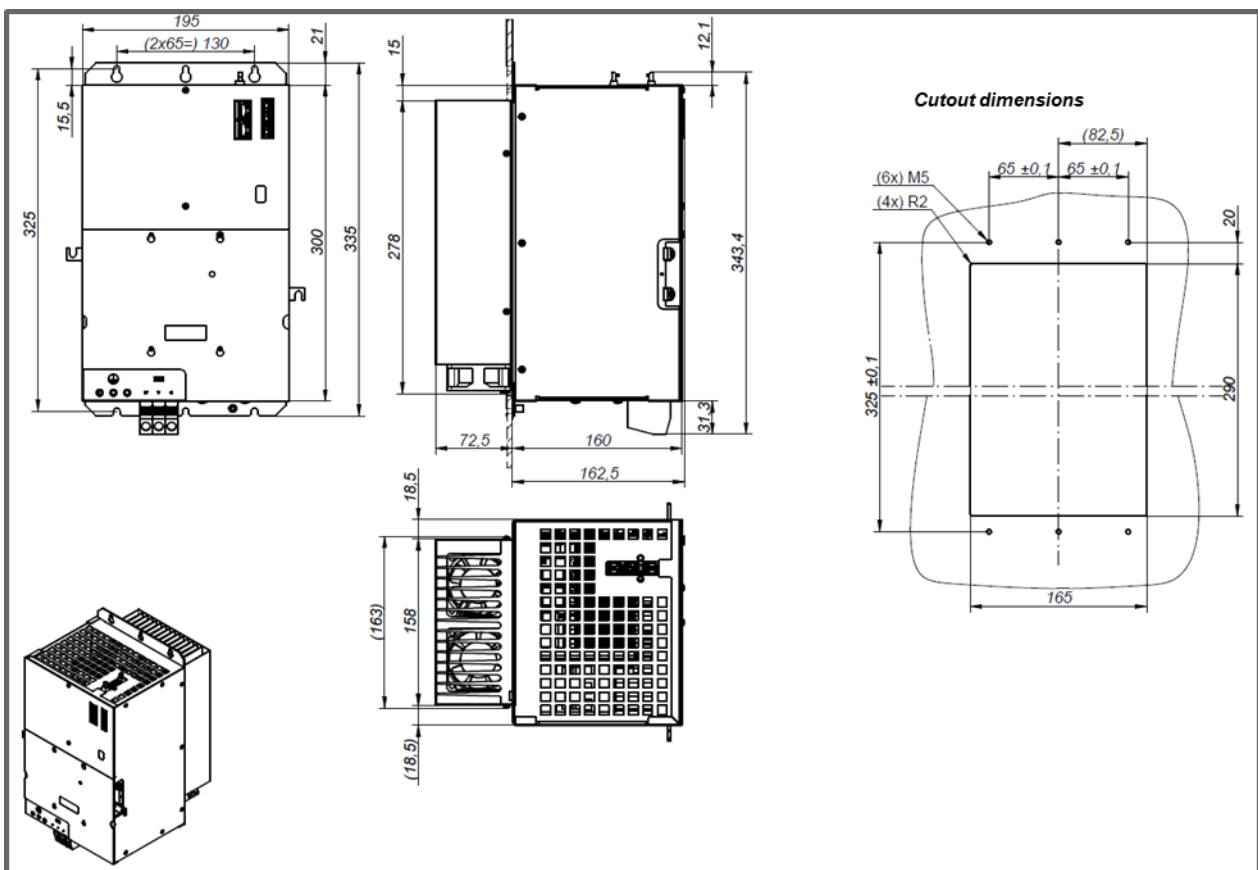


OUTLINE DRAWING OF THE DS-100/150-EE ~ DA-120/150 ~ DA-180/225-EE SERVO DRIVE

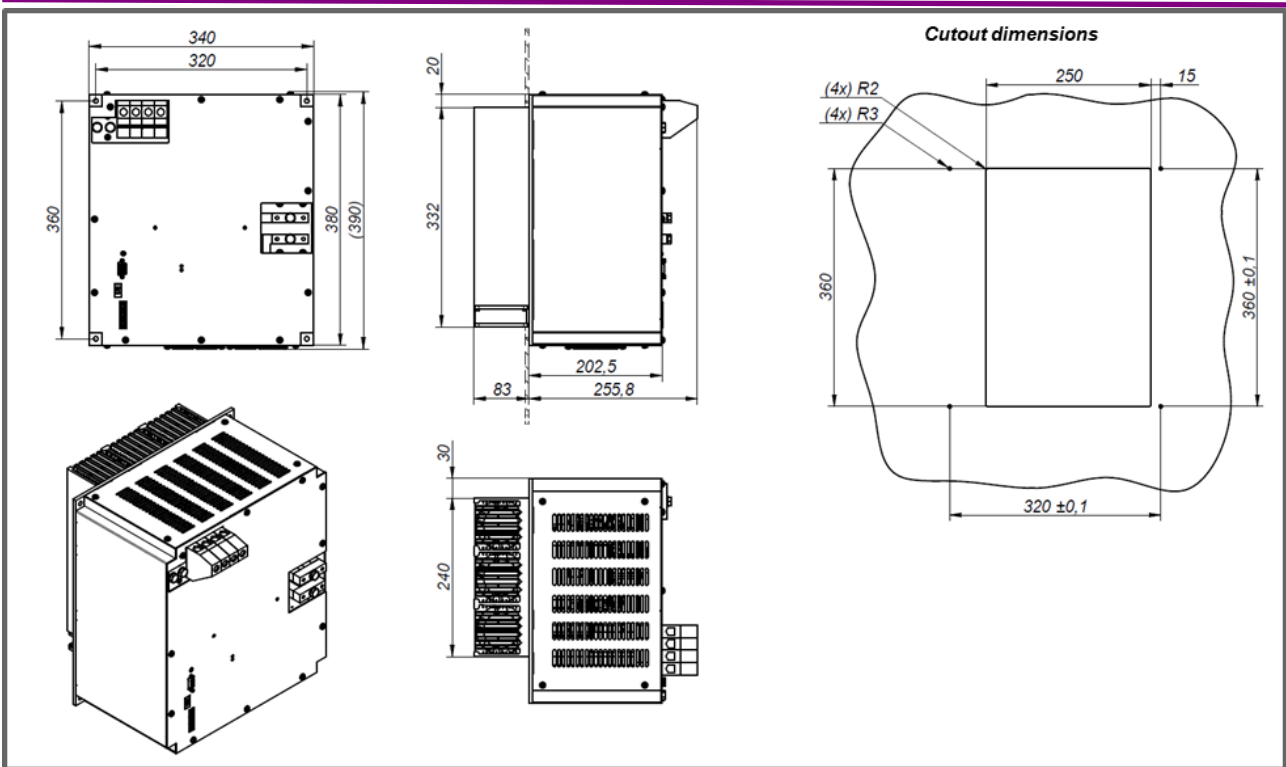
9.5 Power supply units



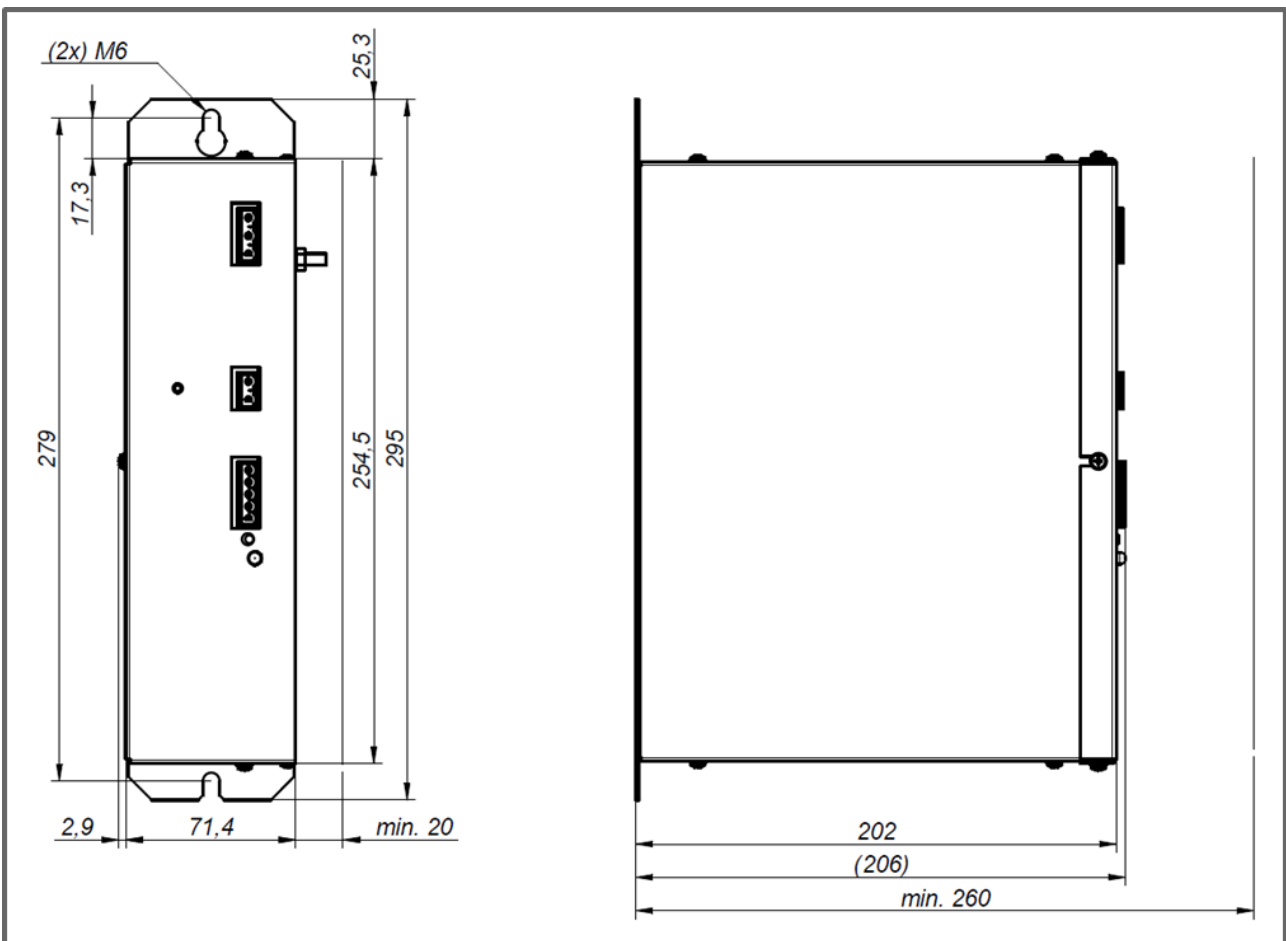
OUTLINE DRAWING OF THE PDC-3-40-24 / PDC-3-40-24-R POWER SUPPLY UNIT



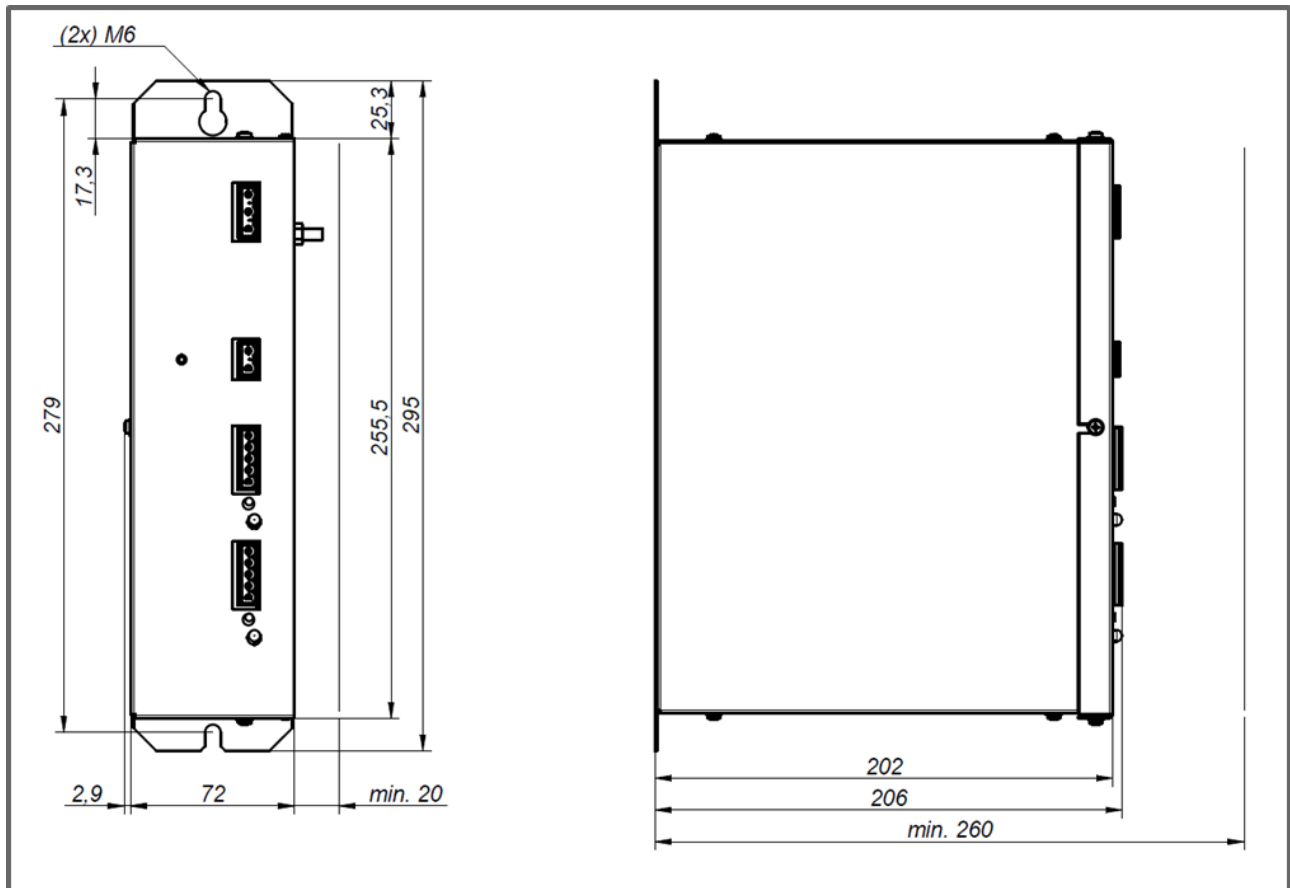
OUTLINE DRAWING OF THE PRC-3-40-80-R POWER SUPPLY UNIT



OUTLINE DRAWING OF THE DPB-3-40-160 POWER SUPPLY UNIT

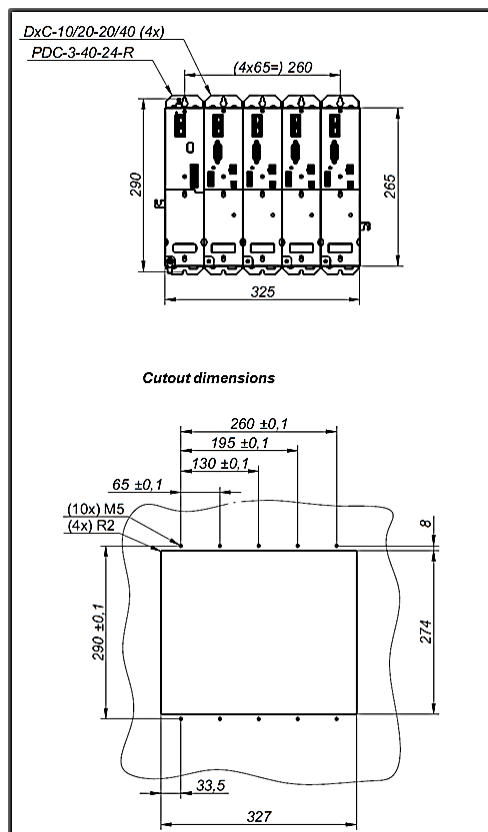


OUTLINE DRAWING OF THE ips1 POWER SUPPLY UNIT

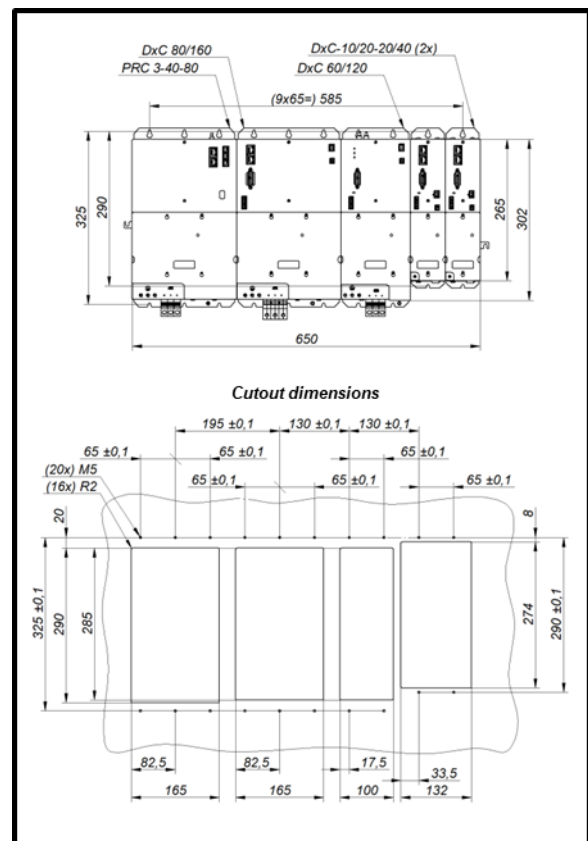


OUTLINE DRAWING OF THE iPS2 POWER SUPPLY UNIT

Drive configurations



Variant I



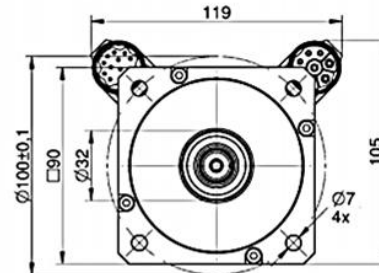
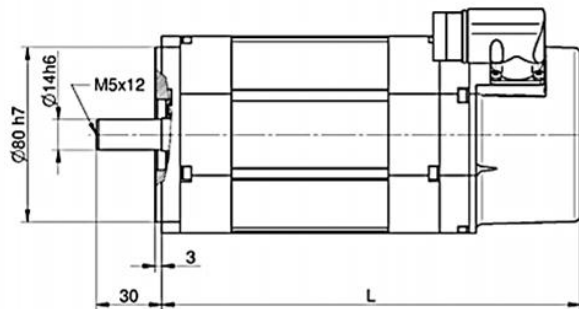
Variant II

9.6 Synchronous servo motors

NCT servo

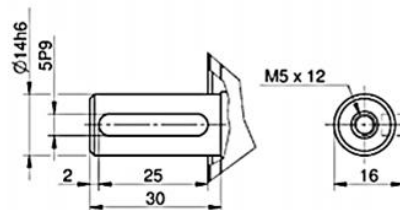
A1 (Ai2.5), A2 (Ai5)

NCT.

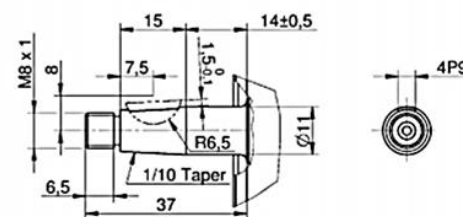


Model	L
A1 / Ai2.5	157
A2 / Ai5	192

Shaft end options



Cylindrical shaft end with keyway

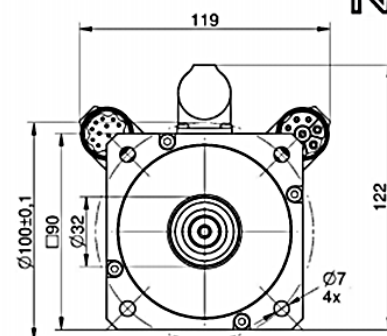
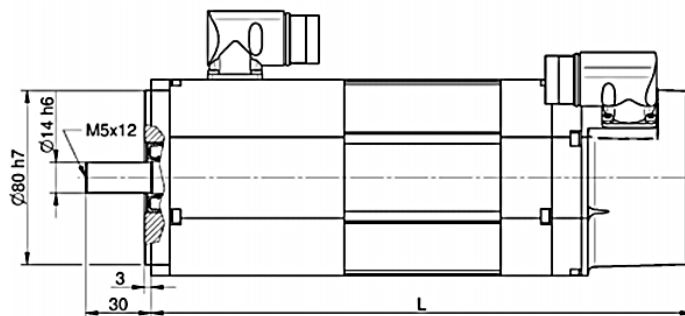


Tapered shaft end

NCT servo

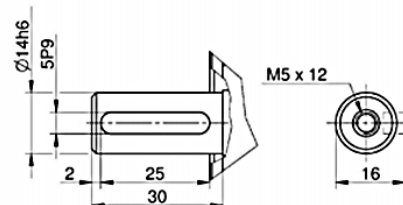
AB1 (AiB2.5), AB2 (AiB5)

NCT.

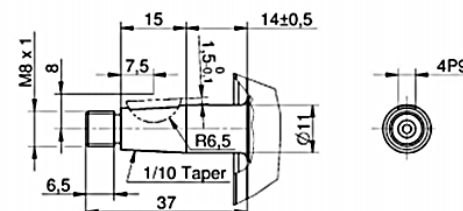


Model	L
AB1 / AiB2.5	213,5
AB2 / AiB5	248,5

Shaft end options



Cylindrical shaft end with keyway

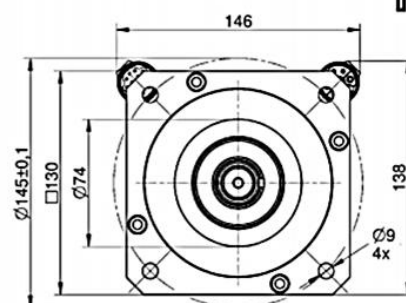
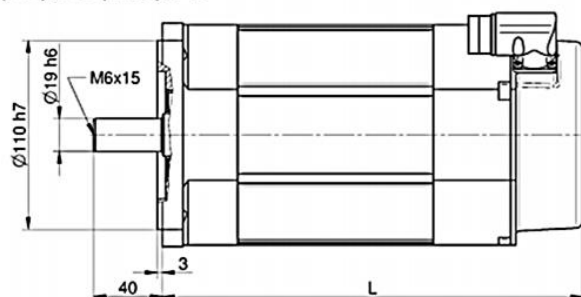


Tapered shaft end

NCT servo

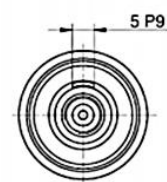
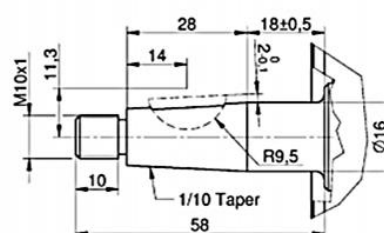
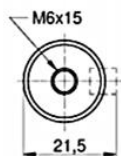
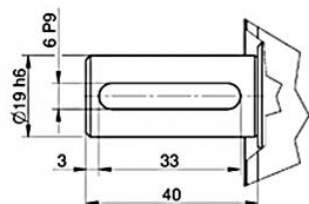
A3 (Ai8), A6 (Ai15), A9

NCT



Model	L
A3 / Ai8	188
A6 / Ai15	245
A9	302

Shaft end options



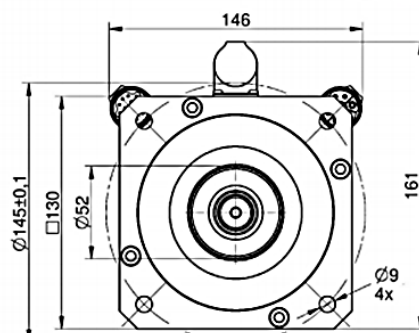
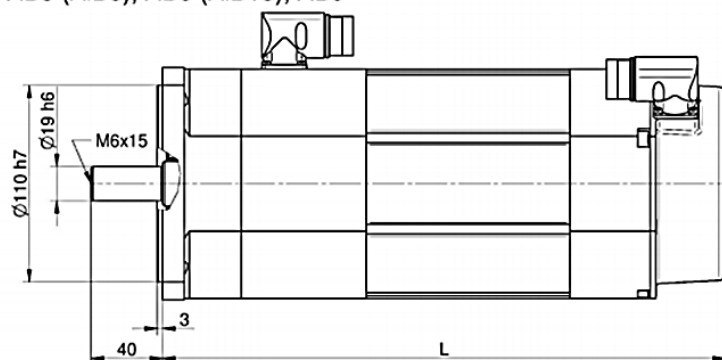
Cylindrical shaft end with keyway

Tapered shaft end

NCT servo

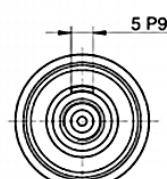
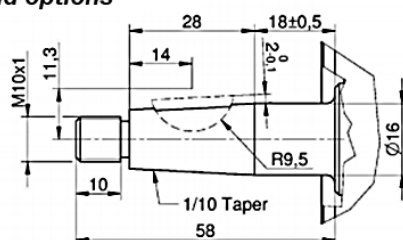
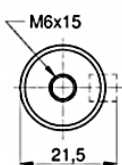
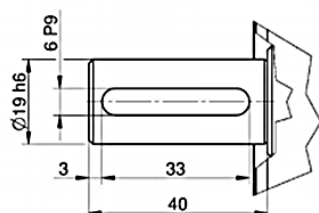
AB3 (AiB8), AB6 (AiB15), AB9

NCT



Model	L
AB3 / AiB8	258
AB6 / AiB15	315
AB9	372

Shaft end options



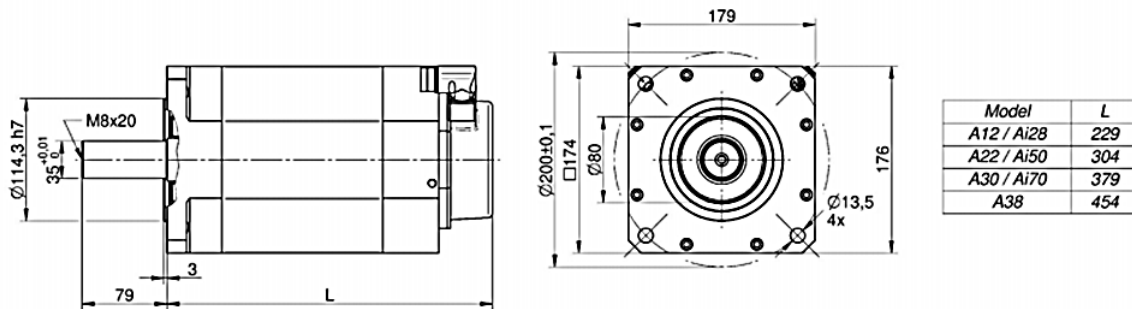
Cylindrical shaft end with keyway

Tapered shaft end

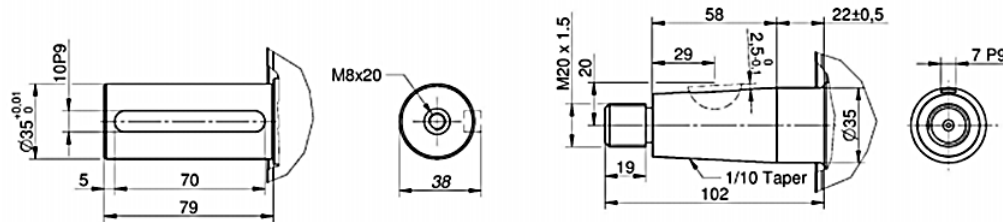
NCT servo

A12 (Ai28), A22 (Ai50), A30 (Ai70), A38

NCT.



Shaft end options



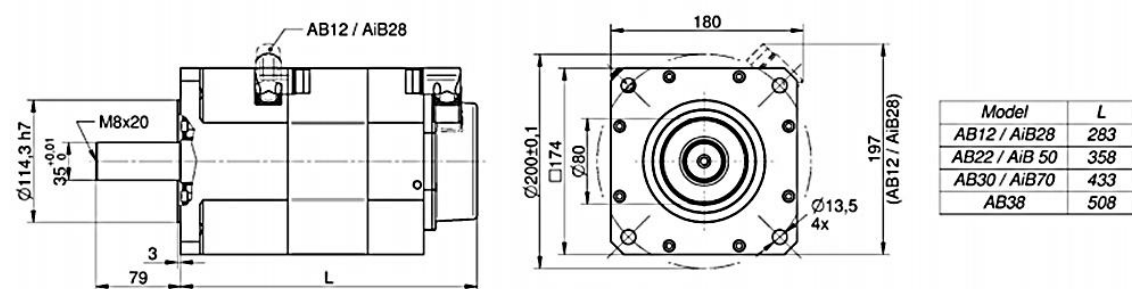
Cylindrical shaft end with keyway

Tapered shaft end

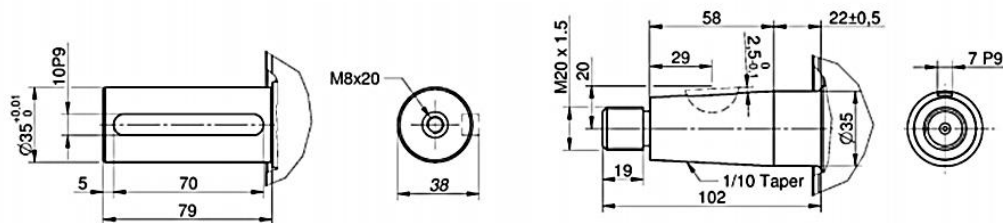
NCT servo

AB12 (AiB28), AB22 (AiB50), AB30 (AiB70), AB38

NCT.



Shaft end options

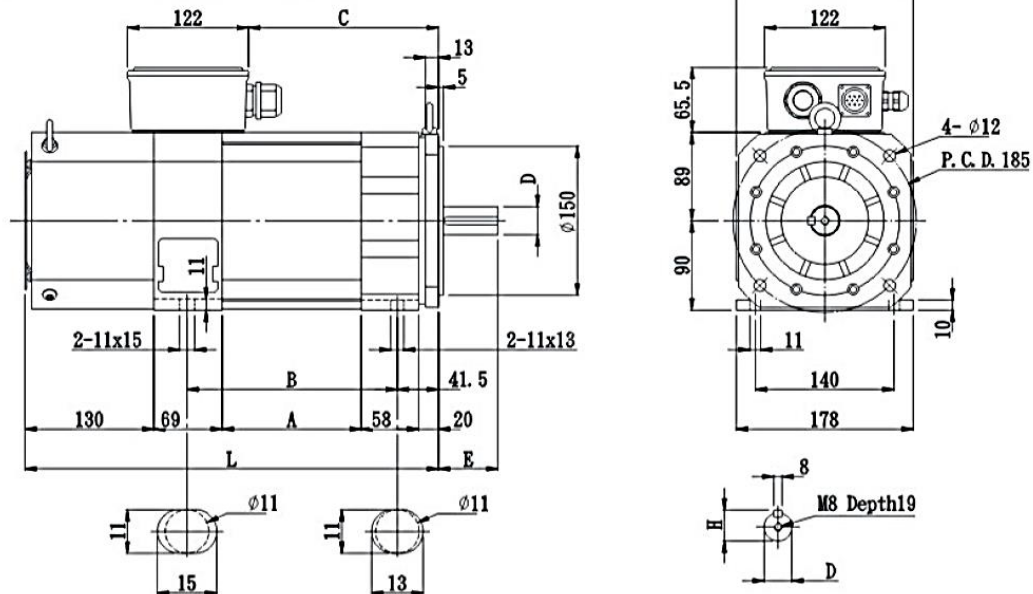


Cylindrical shaft end with keyway

Tapered shaft end

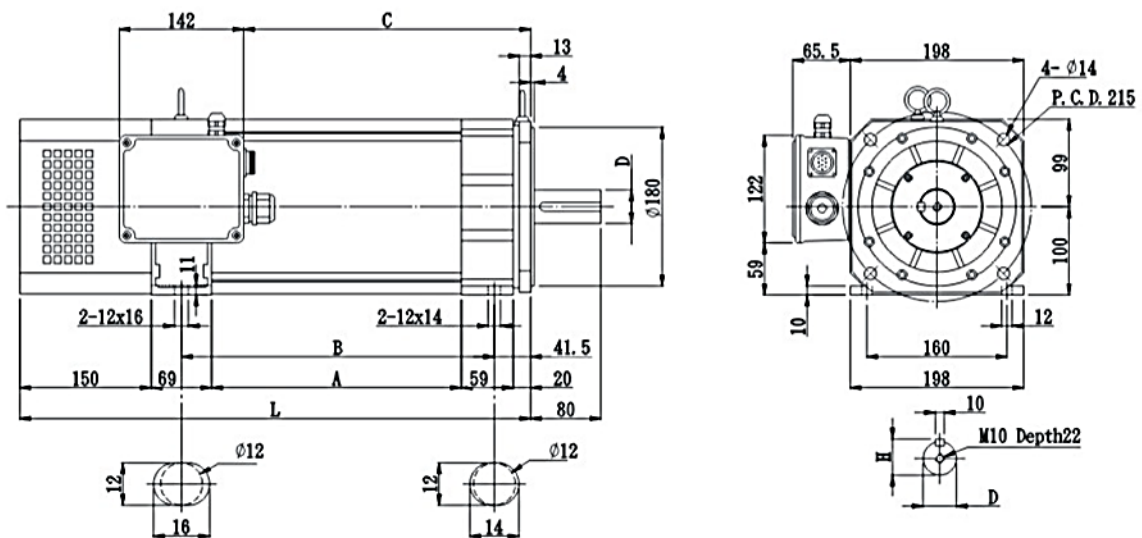
9.7 Asynchronous servo motors

VM-80 & VM-90 IP54



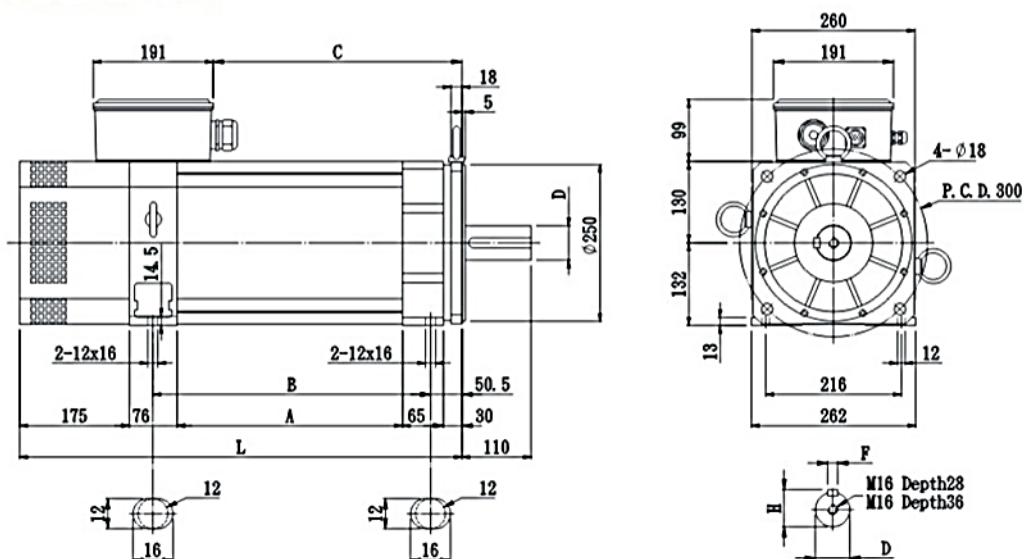
	A	B	C	D	E	H	L
80S	60	132	111.5	Ø24	50	27	337
90S	80	152	131.5	Ø24	50	27	357
90M	100	172	151.5	Ø28	60	31	377
90L	140	212	191.5	Ø28	60	31	417

VM-100 IP54



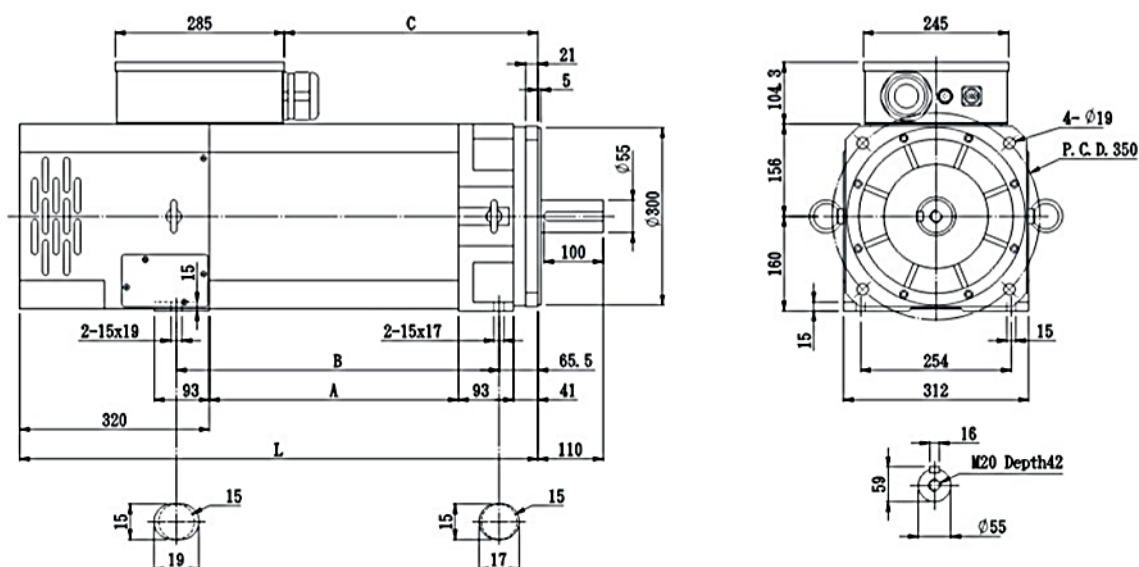
	A	B	C	D	H	L
100S	140	212	182.5	Ø32	35	438
100M	215	287	257.5	Ø32	35	513
100L	285	357	327.5	Ø38	41	583

VM-132 IP54



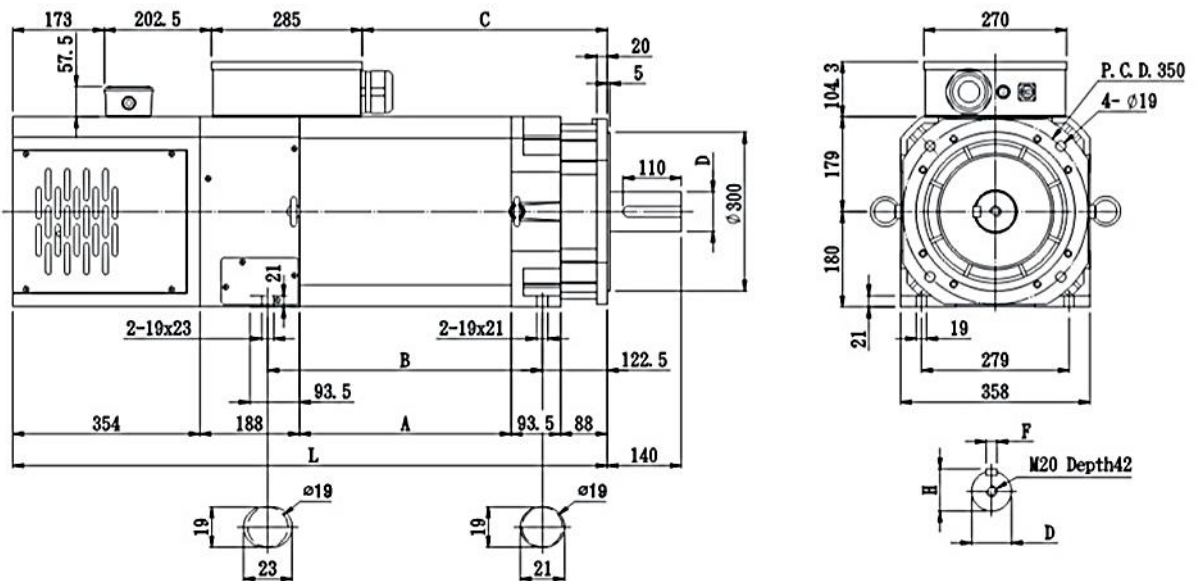
	A	B	C	D	F	H	L
132S	180	263	217.5	Ø42	12	45	526
132M	220	303	257.5	Ø42	12	45	566
132L	290	373	327.5	Ø42	12	45	636
132X	360	443	397.5	Ø55	16	59	706

VM-160 IP54



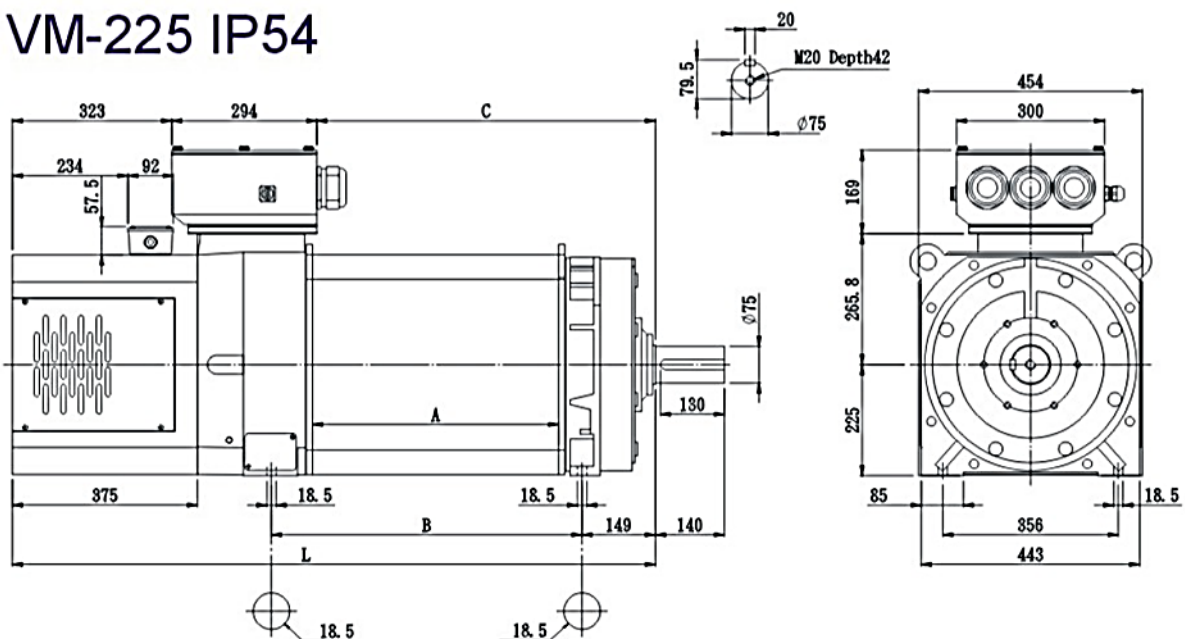
	A	B	C	L
160S	320	444	327.5	774
160M	380	504	387.5	834
160L	420	544	427.5	874

VM-180 IP54



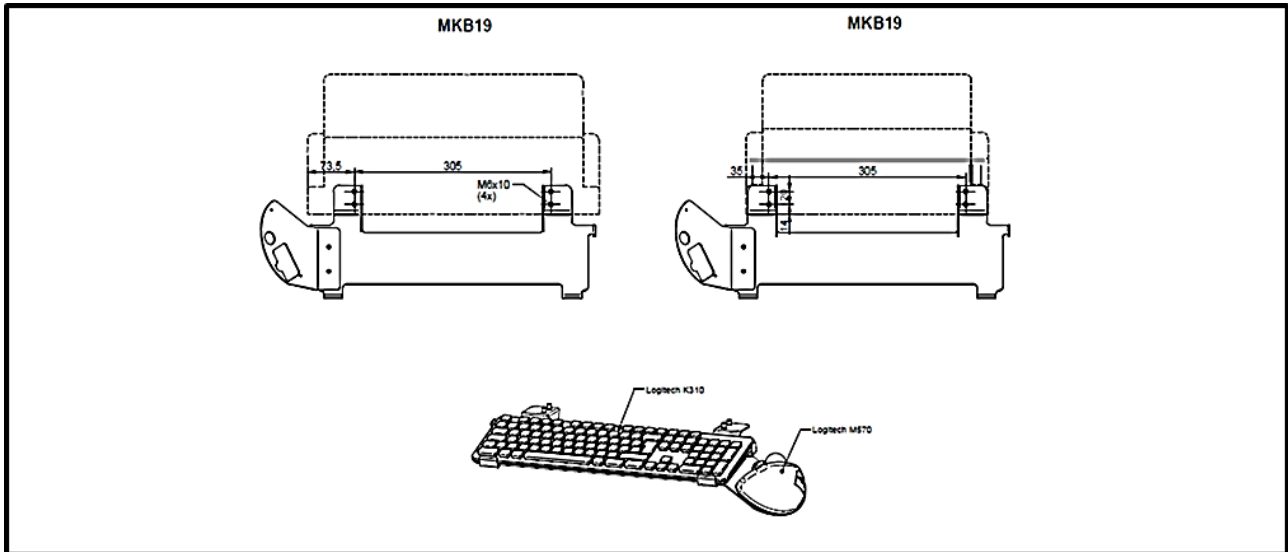
	A	B	C	D	F	H	L
180S	265	384	328	φ60	18	64	988.5
180M	355	474	418	φ75	20	79.5	1078.5
180L	400	519	463	φ75	20	79.5	1123.5

VM-225 IP54

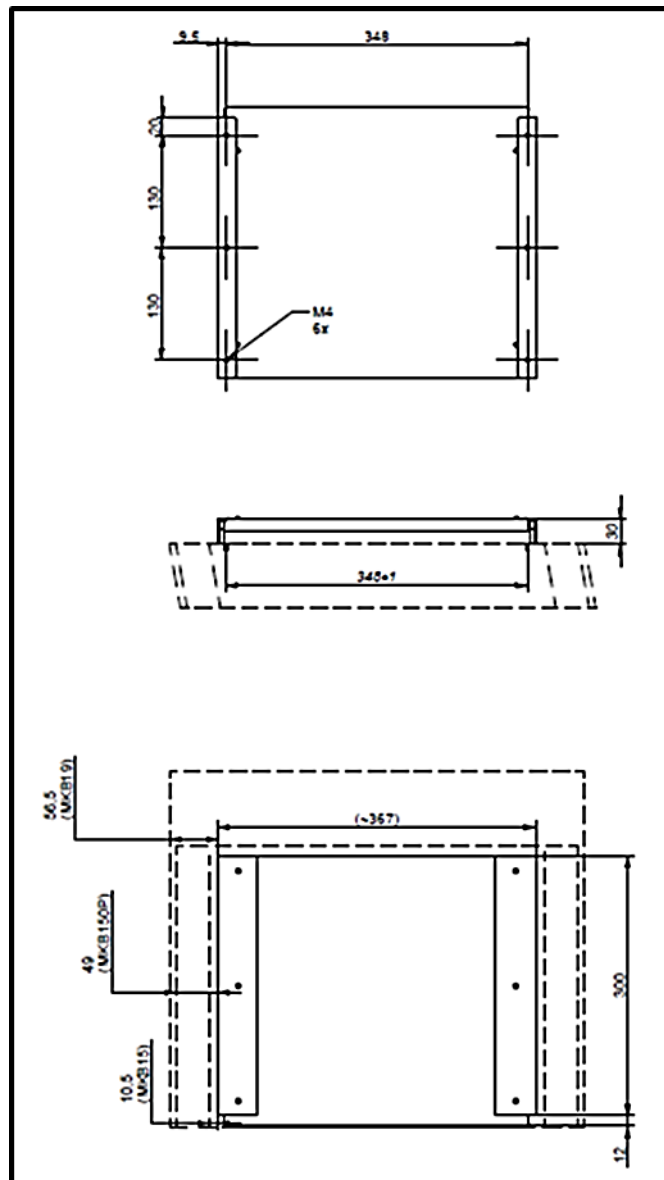


	A	B	C	L
225S	315	445	502	1119
225M	410	540	597	1214
225L	500	630	687	1304

9.8 Accessories



KEYBOARD AND MOUSE HOLDER



DOCUMENTATION HOLDER

