

# TRIODRIVE C / MIDIDRIVE C

Modular Multi-Axis Servo System for Any Type of Servo Motors  
Servo Power Modules for Direct Mains Connection  
Motion Control Modules for Coordinated Axis Motion



MidiDrive C (3×400/480 V AC)  
Servo Power Modules

Motion Control Modules as  
19" Modules in the  
SYSTEM-90E Controller

TrioDrive C (230 V AC)  
Servo Power Modules

## Main Characteristics

- High-quality drive system for coordinated multi-axis motion
- Modular construction with perfectly matching components
- Minimum variety of components

## Servo power modules

- For the flexible control of different motor types, e. g. AC or DC servo motors, linear motors, 2- and 3-phase servo motors from 1 to 50 pole pairs
- Compact design for direct mains connection to 230 V AC / 3 × 400/480 V AC
- For motor powers from 0.1 to approx. 11 kW

## Motion control modules

- With integrated digital position and speed control for highest accuracy
- High flexibility and dynamics due to multi-tasking operation and minimum response times
- Suitable for various position sensor types (resolvers, incremental encoders, absolute encoders, etc.)

## Applications

Particularly useful for coordinated multi-axis applications, e. g. in

- handling and assembly systems or
- pick-and-place applications

## Main Characteristics

### Eight power classes

Servo Power Modules		Servo Motors	
Family	$I_N$	$U_{ZK}$	$P_N$
TrioDrive C	2 A	320 V	up to 0.6 kW
	4 A	320 V	up to 1.2 kW
	6 A	320 V	up to 1.8 kW
MidiDrive C	2 A	560 V	up to 1.1 kW
	4 A	560 V	up to 2.2 kW
	8 A	560 V	up to 4.5 kW
	12 A	560 V	up to 6.6 kW
	20 A	560 V	up to 11 kW

### Characteristics of the multi-axis servo system

- High-quality drive system for coordinated multi-axis motion
- Optimized motion with defined acceleration and jerk control
- Modular design with perfectly matching components
- Minimum variety of components
- Digital system parameterization, programming, and monitoring (drives and motion control) with only one software
- For applications with different motor types such as
  - AC or DC servo motors
  - linear motors, solenoid motors
  - direct drives, torque motors
  - 2- and 3-phase motors
  - 1 to 50 pole pairs
- Flexible position sensing
- Functions such as point-to-point positioning, axis interpolation, etc. available via the SYSTEM-90E Promicon Systems controller
- Integral system diagnosis with alarms and log file recording
- Integration into higher-level controller systems via Profibus, Interbus, OPC, or pNET (RS232)

### Characteristics of the servo power modules

- For the flexible control of different motor types
- Suitable for servo motors by ESR Pollmeier or other manufacturers
- For motor powers from 0.1 to approx. 11 kW

- Compact design for direct mains connection:
  - TrioDrive C to 230 V AC
  - MidiDrive C to 3 × 400/480 V AC
- Wide-range inputs, also suitable for lower connection voltages
- Simple connection to the motion control module via standard RJ 45 cable
- Several devices can be mounted directly next to each other (without lateral gap)
- Clearly arranged wiring as all connectors can be plugged in at the front
- High performance at compact dimensions due to use of surface mounting devices (SMT) and state-of-the-art power transistors (IGBT)
- Convenient commissioning via motion control module
- Rapid motor acceleration, deceleration, and reversing by momentary current increase to twice the rated current
- No noise due to switching frequency far above the audible range
- Servo power module protected by rapid discharge of DC-bus voltage in case of mains switch-off, frequent switch-on and -off possible without delay
- Simple fault diagnosis via motion control module and on site via LEDs

### Characteristics of the motion control modules

- Highest accuracy due to digital position and speed control with motion coordination
- Integrated in the SYSTEM-90E controller system by Promicon Systems (19" plug-in module)
- Highest flexibility and dynamics due to multi-tasking operation and minimum response times
- Suitable for various position sensor types such as
  - resolvers
  - incremental encoders with RS422 signals
  - high-resolution incremental encoders with sine and cosine signals
  - EnDat (absolute encoders)
  - HIPERFACE (absolute encoders)
- Connection to TrioDrive C or MidiDrive C servo power modules via uniform pLINK interface

## Overview of the Multi-Axis Servo System

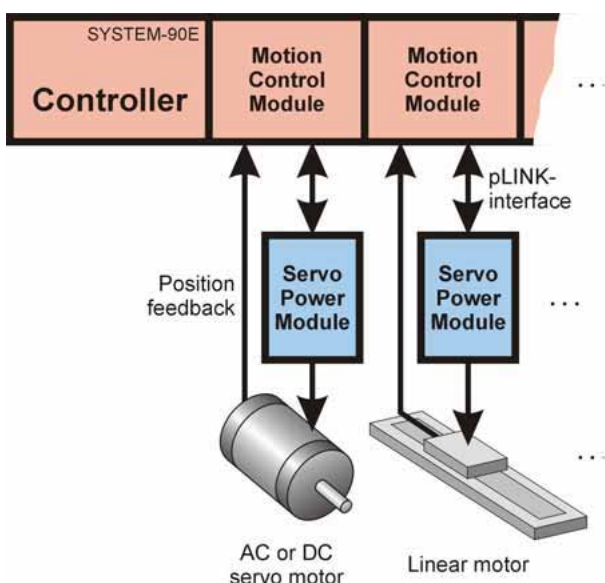
### Modular design

With the modular design of the multi-axis servo system, customized drive tasks can be carried out with a minimum number of components. For each axis, one servo power module and one motion control module are needed. The motor power determines the required servo power module, the motion control module is selected according to the desired position sensor system. The open system permits connection of any type of servo motors with a wide range of position feedback systems (see page 5).

Being part of the Promicon SYSTEM-90E controller, the multi-axis servo system can use all its functions and, depending on the application, be extended with position controllers, digital and analog inputs and outputs, or field bus interfaces.

### Flexible axis coordination

The multi-axis servo system provides all options of co-ordinated multi-axis motion. For that, SYSTEM-90E offers a multi-tasking environment for up to 3 independent application programs. Minimum response times result in highest dynamics. As the software is not coupled with the axis motion and continues running while the axes carry out the drive task in the background, an extraordinary degree of freedom in the realization of automation tasks is guaranteed.



### Digital parameterization

All axes are parameterized in SYSTEM-90E with only one software. This reduces the parameterization works. Furthermore, digital parameterization guarantees an absolute reproducibility of all settings.

### Protection and monitoring functions

SYSTEM-90E offers extensive protection and monitoring functions from alarm to log file recording. The servo power modules are integrated into system diagnosis via the pLINK interface.

In case of a mains switch-off, a rapid discharge circuit is activated in the servo power modules to reduce the DC-bus voltage within less than 0.5 seconds. Thus, the drive is no longer able to carry out dangerous motions actively.

## Servo Power Modules

### General

The servo power modules supply energy to the motor. Depending on the required power, various types are available:

- TrioDrive C (up to approx. 1.8 kW motor power)  
rated current 2 to 6 A, mains connection 230 V AC
- MidiDrive C (up to approx. 11 kW motor power)  
rated current 2 to 20 A, mains connection 3 × 400/480 V AC

### Design

The servo power modules are compact devices for installation in control cabinets. All connectors are located at the front panel. To avoid radiated emissions, the enclosure is made of zinc-plated sheet metal. Since the enclosure is not varnished, all metal parts have best electrical contact.

### Mains connection

The power supply unit is integrated. The power component is fed directly by the mains (230 V AC or 3 × 400/480 V AC). For the control unit, a control supply voltage of 24 V has to be supplied. The power supply unit contains a RFI filter as well as a shunt regulator. The shunt resistor of this regulator absorbs the energy fed back when the motor is braked.

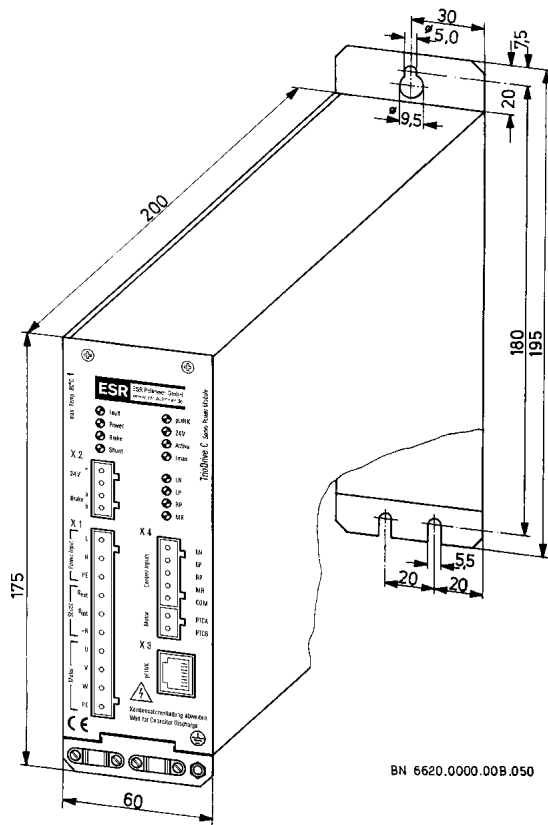


Figure 1: Dimensions TrioDrive C (mm)

**Motor connection**

Any type of servo motor can be connected to the servo power module: AC or DC servo motors, direct drives such as linear motors, torque motors, or solenoid motors, 2- and 3-phase servo motors with 1 to 50 pole pairs. The motor type is specified via the parameterization. The power supply cable is connected to the servo power module, the position sensor is connected to the motion control module.

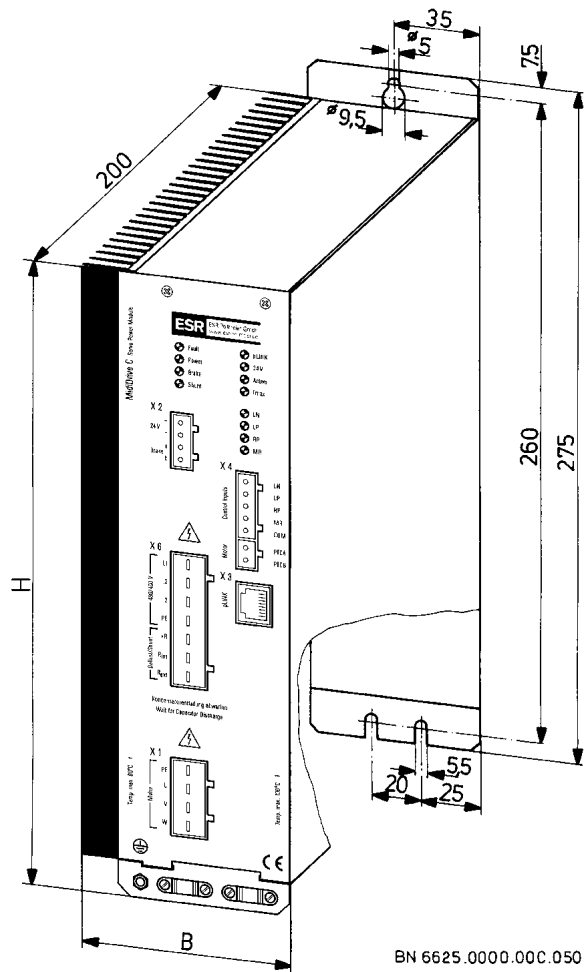
**Interfaces of the servo power modules**

All connections are plugged in at the front. This allows a specially easy, clear, and low-cost wiring:

- motor, mains connection, and external shunt resistor (if required)
- control supply voltage (24 V DC), brake (if installed)

- pLINK interface for the connection to the motion control module (RJ45)
- control signals
- motor temperature sensor

The operating mode of the servo power modules and the status of external signals (e. g. limit switch) are displayed via LEDs.



Order Number	B	H
BN 6626, BN 6627, BN 6628	85	255
BN 6629, BN 6630	150	270

Figure 2: Dimensions MidiDrive C (mm)

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## Motion Control Modules

### General

The motion control modules are part of the Promicon SYSTEM-90E modular controller system. For integrated position and speed control, the motor position sensor is connected directly to the corresponding motion control module. The motor position sensor does not need to be connected to the servo power module which facilitates wiring. Different motion control modules are available for different position feedback systems.

Each motion control module is equipped with a quick-response setpoint generator creating a sequence of time-equidistant high-resolution interpolation points with a high resolution from the data of the driving task (target position, velocity, acceleration, and jerk).

Together with the high-precision jerk control, a particularly harmonic motion profile is created which protects the mechanical elements perfectly.

A special feature is that a motion can be started within a millisecond without delay.

Furthermore, velocity and target position can be modified during a running motion.

### Position feedback systems

- **Motion Control Module MCQ-5**  
for incremental encoders with square-wave signals  
Incremental encoders are inexpensive, and a wide range of motors equipped with them as standard is available.
- **Motion Control Module MCR-6**  
for common resolvers  
The advantages of the resolver are a relatively small construction and a very low price. It stands out for a high control quality due to the flash evaluation without delay.
- **Motion Control Module MCS-7**  
for position sensors with sinusoidal incremental signals (Sincos encoders)  
With the interpolation electronics of the motion control module, a sinus period can be resolved to up to 200 measurement steps which permits high-precision control.

- **Motion Control Module MCE-8**  
for absolute encoders with EnDat 2.1 interface  
With the interpolation electronics of the motion control module, a sinus period can be resolved to up to 200 measurement steps which permits high-precision control. Due to the evaluation of the sinus signals, the position information of the position sensor is improved, and a high-resolution absolute position information is created.
- **Motion Control Module MCE-9**  
for absolute encoders with digital EnDat 2.2 interface  
The runtime compensation installed in the motion control module provides for a high transmission speed even with high cable lengths. This results in minimum position transmission times leading to a control with highest dynamics. The absolute position information is transmitted to the motion control module as purely digital signal which reduces the wiring.
- **Motion Control Module MCB-10**  
for absolute encoders with BiSS interface  
This motion control module can be combined with a wide range of position sensor types with absolute position measurement. The controller automatically adjusts to the encoder so that a time-consuming parameterization is not required and motors and drives can be commissioned quickly. The runtime compensation installed in the motion control module provides for a high transmission speed even with high cable lengths. This results in minimum position transmission times leading to a control with highest dynamics. The absolute position information is transmitted as purely digital signal to the motion control module which reduces the wiring.

### Interfaces of the motion control modules

All connections can be plugged in at the front. This allows a specially easy, clear, and low-cost wiring. The front panel also includes LEDs for simple diagnosis.

The following connectors are located at the front panel:

- motor position sensor (D sub connector)
- pLINK interface as connection to the servo power module (RJ45)

## Accessories

Description	Order Number
Connector set for TrioDrive C servo power modules	ST 6620
Connector set for MidiDrive C servo power modules	ST 6625
Motor supply cable (power), 4 × 1.5 mm <sup>2</sup> , shield	BN 8817*
Motor supply cable for motor with brake, 4 × 1.5 mm <sup>2</sup> + 2 × 1 mm <sup>2</sup> , shield	BN 8820*
Motor choke for TrioDrive C with medium cable lengths (15 to 25 m)	BN 3845.2258
Motor choke for TrioDrive C with higher cable lengths (25 to 40 m)	BN 3857.2311
Resolver connection cable	BN 8818*
Encoder connection cable (for incremental encoder with RS422 signals or Sincos encoder)	BN 8821*
Encoder connection cable (for high-resolution incremental encoder or EnDat encoder)	BN 8829*
External shunt resistor, 33 Ω, 600 W (in enclosure) (for TrioDrive C only)	EW 0600.0033
External shunt resistor, 68 Ω, 600 W (in enclosure)	EW 0600.0068
pLINK connection cable (standard patch cable CAT5)	on request

\* also available as ready-assembled cables

## Order Numbers and Technical Specifications

### TrioDrive C and MidiDrive C servo power modules

Description		Order No.
<b>TrioDrive C</b> 230 V mains connection, single-phase, corresponds to 320 V DC-bus	output current 2 A <sub>rms</sub>	BN 6621
	output current 4 A <sub>rms</sub>	BN 6622
	output current 6 A <sub>rms</sub>	BN 6623
<b>MidiDrive C</b> 3 × 400/480 V mains connection, corresponds to 560/680 V DC-bus	output current 2 A <sub>rms</sub>	BN 6626
	output current 4 A <sub>rms</sub>	BN 6627
	output current 8 A <sub>rms</sub>	BN 6628
	output current 12 A <sub>rms</sub>	BN 6629
	output current 20 A <sub>rms</sub>	BN 6630

**TrioDrive C and MidiDrive C servo power modules, major technical specifications**

Order Number Servo Power Module	BN 6621	BN 6622	BN 6623*	BN 6626	BN 6627	BN 6628	BN 6629	BN 6630
Rated supply voltage	230 V AC $\pm 10\%$ , 50 .. 60 Hz			3 $\times$ 400 .. 480 V AC $\pm 10\%$ , 50 .. 60 Hz				
Rated DC-bus voltage	320 V DC			560 .. 680 V DC				
Permissible supply voltage	42 .. 253 V AC (corresponds to 60 .. 360 V DC-bus voltage)			85 .. 528 V AC (corresponds to 120 .. 740 V DC-bus voltage)				
Maximum mains inrush peak current	5 A (at 230 V)			approx. 8.5 A (3 $\times$ 400 V) .. 10 A (3 $\times$ 480 V)				
Rated current (rms)	2 A	4 A	6 A	2 A	4 A	8 A	12 A	20 A
Maximum peak current (crest value)	5.5 A	11 A	17 A	5.5 A	11 A	22 A	34 A	55 A
Switching frequency of the power circuit (can be parameterized)	16 or 32 kHz			16 or 32 kHz		16 kHz	8 or 16 kHz	
Power dissipation under rated conditions and at a switching frequency of 16 kHz	30 W	40 W	50 W	60 W	100 W	150 W	200 W	250 W
Apparent electric power	0.75 kVA	1.5 kVA	2.25 kVA	1.3 kVA	2.6 kVA	5.2 kVA	7.8 kVA	13 kVA
Max. possible motor power	0.6 kW	1.2 kW	1.8 kW	1.1 kW	2.2 kW	4.5 kW	6.6 kW	11 kW
Max. continuous braking power (internal)	40 W			50 W		125 W		
Pulse braking power, 1.5% ED, 1 s	2.1 kW			8.2 kW		17 kW		
Suitable shunt resistor (external)	27..120 $\Omega$	27..100 $\Omega$	27..70 $\Omega$	62..220 $\Omega$	62..120 $\Omega$	62..70 $\Omega$	30..50 $\Omega$	
Control supply voltage	24 V DC $\pm 25\%$							
Max. interruption time without power module reset	10 ms							
Current consumption at 24 V	approx. 500 mA			approx. 600 mA			approx. 700 mA	
Max. length of motor connection cable	15 m / 40 m (without / with choke)			25 m				
Width	60 mm			85 mm		150 mm		
Height (without mounting straps)	175 mm			255 mm		270 mm		
Height (with mounting straps)	195 mm			275 mm		305 mm		
Depth without connector	200 mm							
Weight	2.0 kg			3.4 kg		7.2 kg		
Protection type	IP20 according to EN 60529							
Mounting height (without current reduction)	$\leq 1000$ m above sea level							
Mounting height (with current reduction)	$\leq 2000$ m above sea level ( $-1.5\%$ per 100 m above 1000 m)							
Climatic category acc. to DIN EN 50178	operation: 3K3 / storage: 1K4 / transportation: 2K3							
Permissible ambient temperature	$+5 .. +40$ $^{\circ}\text{C}$ / $-25 .. +55$ $^{\circ}\text{C}$ / $-25 .. +70$ $^{\circ}\text{C}$							
Permissible relative humidity	5 .. 85% / 5 .. 95% / 5 .. 95%							
Compliance with EMC limits	first and second environment according to EN 61800-3 **							

\* Power module BN 6623 (6 A device) may be operated up to a loading of 70% without restrictions. For a higher loading, the device must be installed next to a control cabinet fan or equipped with a sub-assembled fan.

\*\* This is a product with limited availability according to EN 61800-3. Operation of this device can cause radio interferences in the residential environment ("first environment") which might require appropriate action. In this case, please contact us.

### Motion control modules and other modules of Promicon SYSTEM-90E (selection)

Description	Order No.
<b>Basic devices</b> with 24 V DC power supply and 5, 9, or 19 slots	PP SBR-5/9/19
<b>Central units</b> with VLRISC processor, 24 .. 90 MHz, 16/32 bit, RS232 interface	PP CPU-..
<b>Motion control module</b> for incremental encoders (RS422, 5.0 MHz)	PP MCQ-5
<b>Motion control module</b> for resolvers	PP MCR-6
<b>Motion control module</b> for high-res. incremental encoders with sine-cosine signals	PP MCS-7
<b>Motion control module</b> for EnDat 2.1 encoders (absolute encoder)	PP MCE-8
<b>Motion control module</b> for EnDat 2.2 encoders (absolute encoder)	PP MCE-9
<b>Motion control module</b> for EnDat encoders with BiSS interface	PP MCE-10
<b>Position controller*</b> for incremental encoders (12 bit DAC, 250 kHz or 16 bit DAC, 2.0 MHz)	PP PCQ-3/-4
<b>Position controller*</b> for absolute encoders (16 bit DAC, SSI interface)	PP PCS-4
<b>RS232 interface</b> double, 115 kBaud	PP SDC-3
<b>Profibus DP interface</b> up to 32 byte	PP PBS-1
<b>Interbus interface</b> double conductor remote bus or peripheral bus	PP IBS-3/-2
<b>16 digital inputs</b> , 24 V (optocoupler)	PP DI-7
<b>16 digital outputs</b> , 24 V (optocoupler)	PP DO-8
<b>8 digital inputs, 8 digital outputs</b> 24 V (optocoupler)	PP DIO-6
<b>2 analog inputs, 2 analog outputs</b> 12 Bit	PP VIO-2
<b>Operating panel</b> with 26 × 12 characters, 35 keys, 10 of them function keys with LED	PP PT-1226-..
<b>Software</b> for operation and programming	PP PIDS-..
<b>OPC server</b> via pNET online communication	PP POPC-..

\* with ±10 V output for speed setpoint, e. g. for connecting the TrioDrive A or MidiDrive A analog servo drives.

### Drive System Packages

On the basis of the modular multi-axis system with TrioDrive C and MidiDrive C servo power modules, the motion control modules, and our AC, DC, or linear motors, we will be pleased to select drive and control packages according to your specifications. Information on the servo motors can be found in the following data sheets:

- MR 4 AC Servo Motors (Data Sheet 6660.260)
- MR 6 AC Servo Motors (Data Sheet 6612.264)
- MR 74 AC Servo Motors (Data Sheet 6674.260)
- MR 77 AC Servo Motors (Data Sheet 6677.260)
- RS/RX DC Servo Motors (Data Sheet 6508.260)
- ML 1 Linear Motors (Data Sheet 6700.261)

We will be pleased to determine the servo drive matching your application and submit you an offer.

The statements in this data sheet are for information, only. They do not guarantee properties. We reserve the right to make changes without notice.

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