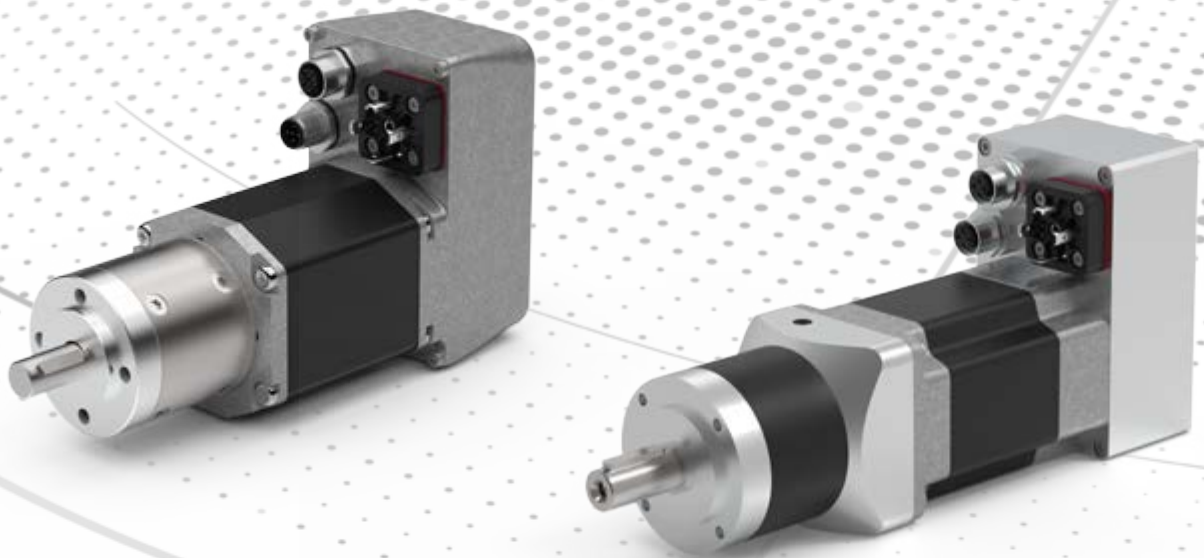


Intelligent compact drives



Progress – Shaping the future with decentralized and intelligent technology



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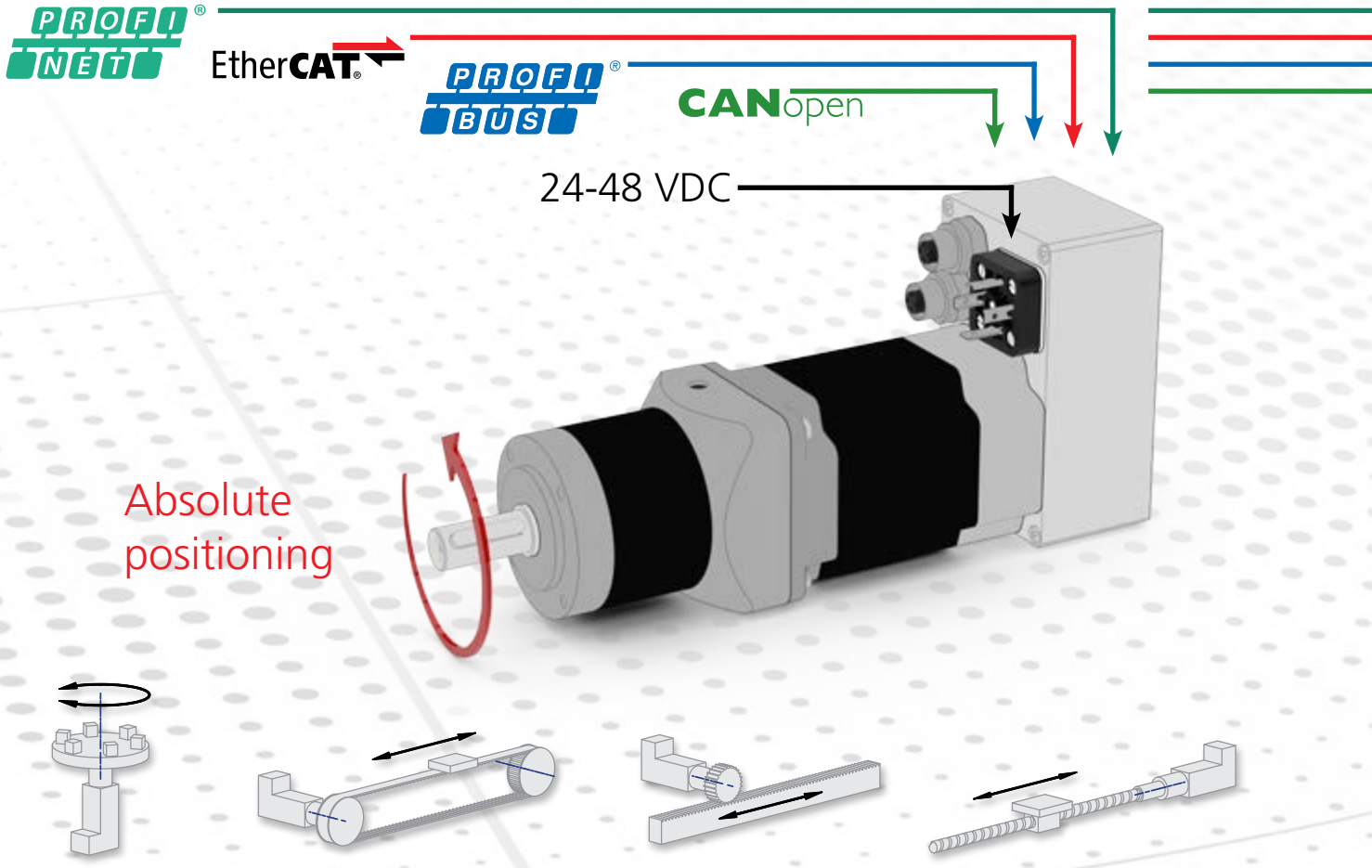
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Voltage + fieldbus = positioning



Power supply and fieldbus connection – this is all that’s required to implement actuating and positioning tasks in your system with encoTRive compact drives. The concept of gear motor with integrated positioning controller offers numerous advantages:

Advantages for the switch cabinet

- _ No space consumption and no heat emission by the drive electronics

Simple wiring

- _ No EMC-critical motor cables need to be laid
- _ Thanks to the extra low voltage supply, all components and connections can be touched

Absolute position available at any time

- _ No reference runs required
- _ Reference initiators and associated wiring not necessary

Easy implementation of machine safety

- _ STO (safe torque off) optionally integrated

Tailored to your application

- _ Broad range of motor and gear variants
- _ Wide power range from 50 to 600 watts
- _ Assistance with selection and design by our drive specialists

Advantages for the application software

- _ Control of different types identical within a fieldbus
- _ Changeover or mixed operation between PROFIBUS and PROFINET possible with minimum effort
- _ Example PLC projects available

Problem-free use overseas

- _ Optionally available as a UL-Recognized Component

Everything integrated

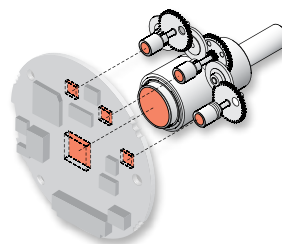
Interface

The encoTRive speaks many languages. It speaks the language of your control too.



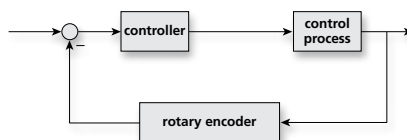
Absolute encoder

Even if the drive is turned while de-energized, the absolute position is known as soon as the encoder is powered up again – battery-free, with a sturdy mechanical multiturn gear.



Positioning control

Simple to use:
Target and ramp parameters are preset using the fieldbus.
Reliable positioning is handled entirely in the drive.



Power electronics

The necessary power commutation to move the drive quickly and powerfully into position is generated from the extra-low voltage supply.



Motor

Numerous motor sizes and variants are available to suit the wide range of applications.
Whether brush motor or electronically commutated, with or without holding brake.



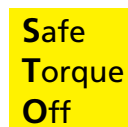
Gear

To consistently ensure the correct operating point, a wide range of gears with finely graduated reductions is available. Planetary gears - axial or with an angled stage - and worm gears are typical.



Safety

The safety functions **STO** (safe torque off) or **SS1** (safe stop 1) are optionally integrated.



Tailored to your specific application

The individual series are designed for application categories. This means that drives with the optimum scope of performance are available for automation tasks with a wide variety of requirements.

The control is identical across all variants within the same fieldbus interface. This saves time and effort in the development of your application software.

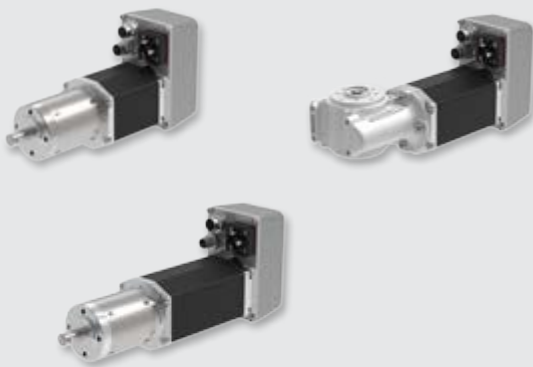
Positioning drive

EC (brushless)

_ For frequent and dynamic movements

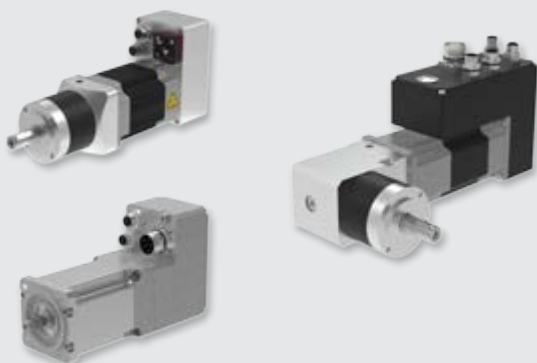
MP 060 ... 180

_ With dynamic motors and simple and cost-efficient gears



MP 200 ... 280, MD 300

_ Highest dynamics, performance and accuracy.
Flexibly designed for application-specific adaptations



Actuating drive

DC (brush)

_ For occasional movements

MA 055 ... 130

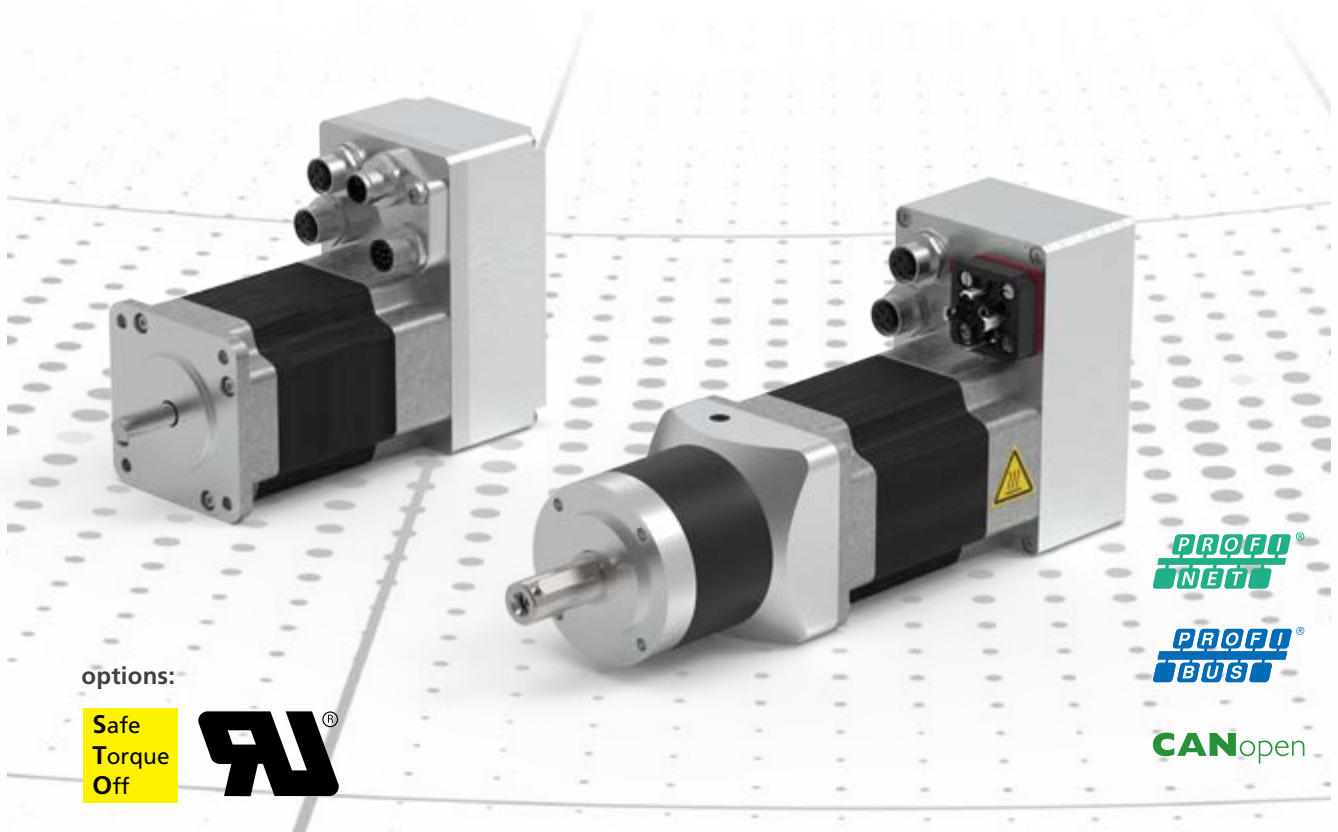
_ Particularly cost-efficient motors with identical gears in comparison to MP 060 ... 180, therefore mechanically compatible



Decentralized drive technology with encoTRive

EncoTRive is the brand name for the complete product line. It is derived from the two components "Absolute Encoder and Drive", modified by inserting the company abbreviation TR.

Positioning drive MP 200



options:



Safe
Torque
Off



PROFI
NET

PROFI
BUS

CANopen

Technical data		MP 200	
Nominal voltage	VDC	24	48
Nominal torque S1 (S3)	Nm	0.40 (1.10)	0.40 (1.10)
Nominal power S1 (S3)	W	91 (178)	182 (357)
Nominal speed S1 (S3)	min ⁻¹	2,175 (1,550)	4,350 (3,100)
Nominal current S1 (S3)	A	5.2	4.8
Inertia torque	gcm ²	512 (612 with holding brake)	
Electric motor		EC, electronically commutated motor	
_ Technology		IP 54, motor shaft IP 41	
_ Protection class			
Encoder		Absolute encoder, multi turn	
_ Technology		0.088° / 4,096 steps per revolution	
_ Positioning resolution		65,536 revolutions	
_ Positioning range		±0.7° / ±8 steps	
_ Positioning accuracy			
Options		Holding brake,  , 	

Definitions

S1

Continuous operation

S3

Intermittent operation

25 %, 4 min

Make time 1 min

Cycle time 4 min

Max. torque 1.10 Nm

True absolute encoder

Fail-safe position information through electromechanical principle of measurement

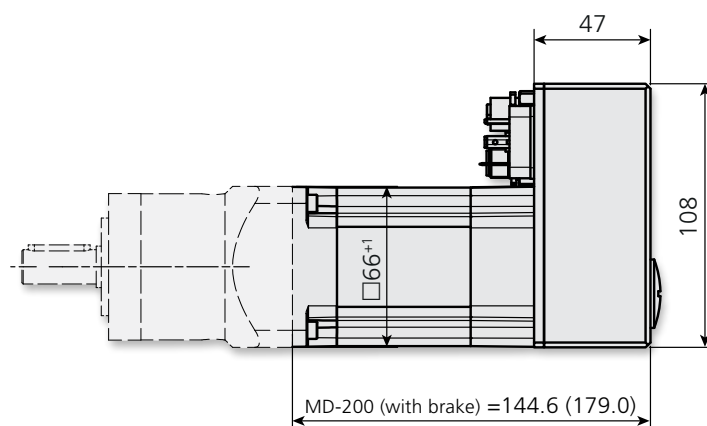
Positioning drive MP 200

The MP 200 features high efficiency and dynamics in a compact size. The available gears can transfer high torques with precise angular accuracy. Numerous variants and reductions are available.

Thanks to its flexible design, the MP 200 is also suitable for the use of special gears or for direct mounting without a gear, e.g. on lifting spindles.

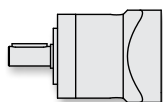
Dimensions [mm]

MP 200, with planetary gear PLE 60

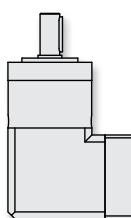


Combination options

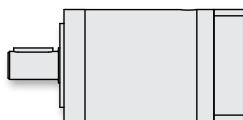
PLE 60
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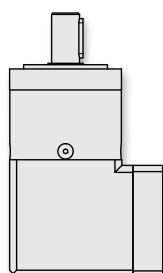
WPLE 60
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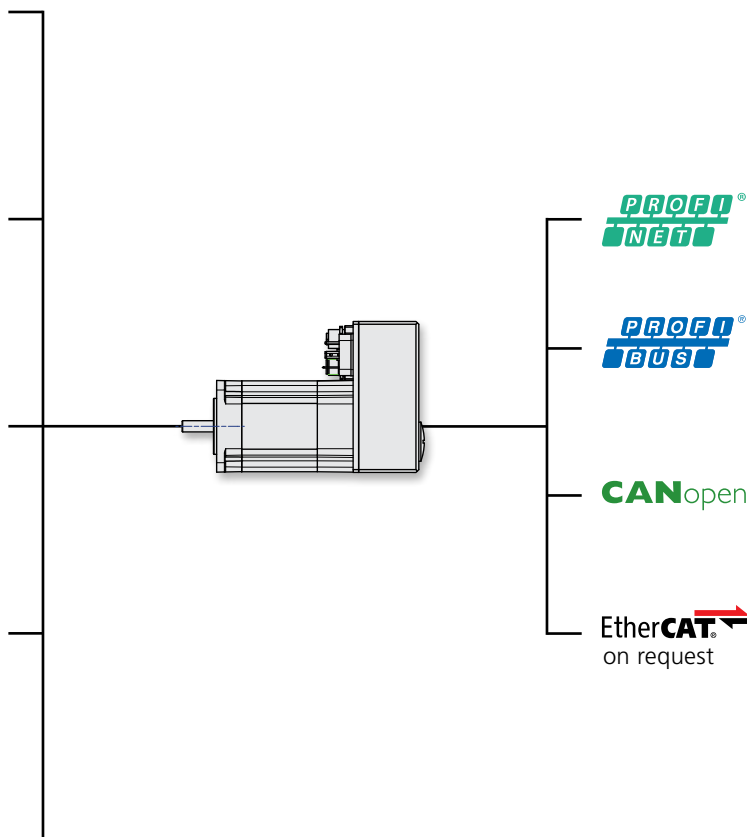
PLE 80
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WPLE 80
Details on page 17



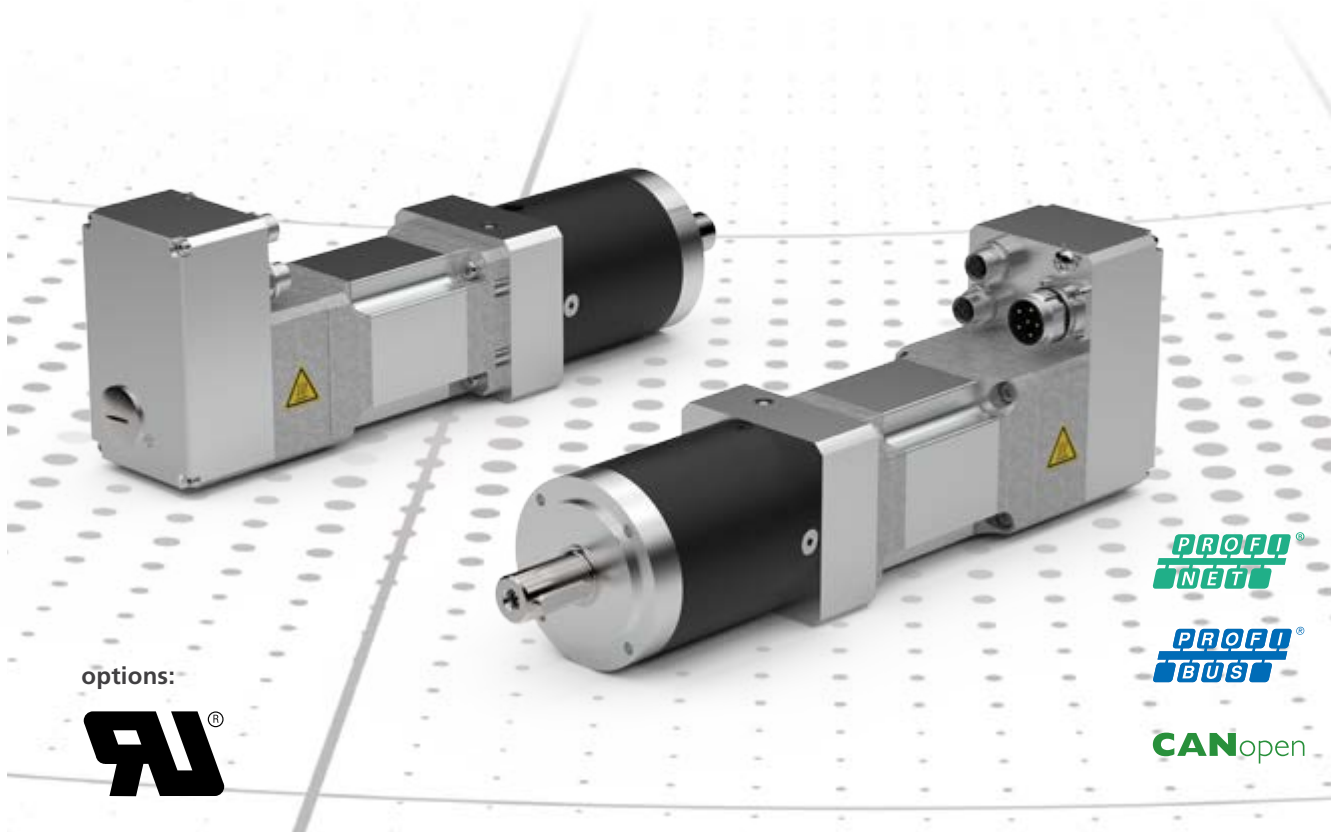
Customer-specific gear / without gear



Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at www.tr-electronic.com or on request.

www.tr-electronic.com

Positioning drive MP 220 / 280



options:



Technical data		MP 220	MP 280
Nominal voltage	VDC	48	48
Nominal torque S1 (S2)	Nm	0,40 (1,4)	0,40 (2,0)
Nominal power S1 (S2)	W	167 (586)	167 (837)
Nominal speed S1 (S2)	min ⁻¹	4.000 (4.000)	4.000 (4.000)
Nominal current S1 (S2)	A	4,5 (16)	4,5 (20)
Inertia torque	gcm ²	360	700
Electric motor		EC, electronically commutated motor	
_ Technology		IP 54, motor shaft IP 41	
_ Protection class			
Encoder		Absolute encoder, multi turn	
_ Technology		0.088° / 4,096 steps per revolution	
_ Positioning resolution		65,536 revolutions	
_ Positioning range		±0.7° / ±8 steps	
_ Positioning accuracy			
Options		Holding brake,	

definition

- S1**
Continuous operation
- S2**
short-time operation
2 min

True absolute encoder
Fail-safe position information through electromechanical principle of measurement

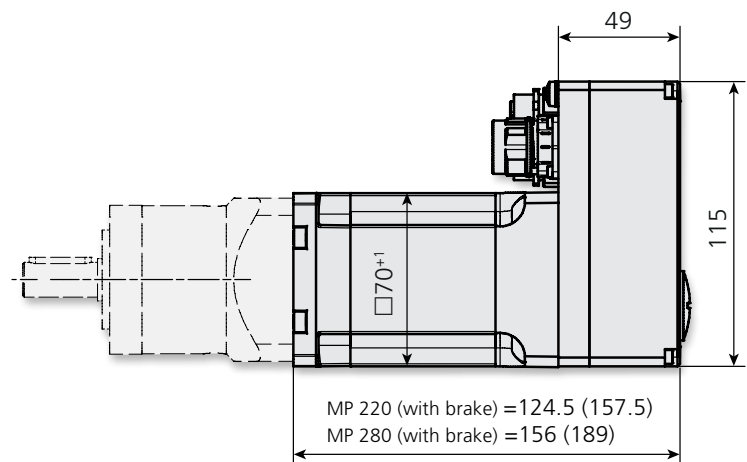
Positioning drive MP 220 / 280

The MP 280 provides very high efficiency and dynamics in a compact size. The MP 220 can be used in all applications that require a combination of high torque and very short overall length. The available gears can transfer high torques with precise angular accuracy.

Numerous variants and reductions are available. Thanks to their flexible design, the MP 220 and MP 280 are also suitable for the use of special gears or for direct mounting without a gear, e.g. on lifting spindles.

Dimensions [mm]

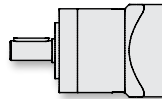
MP 220/280, with planetary gear PLE 60



Combination options

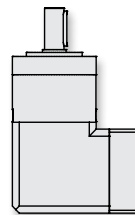
PLE 60

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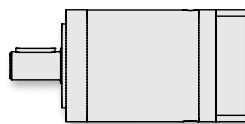
WPLE 60

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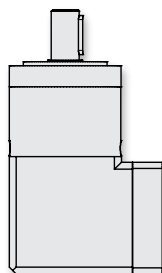
PLE 80

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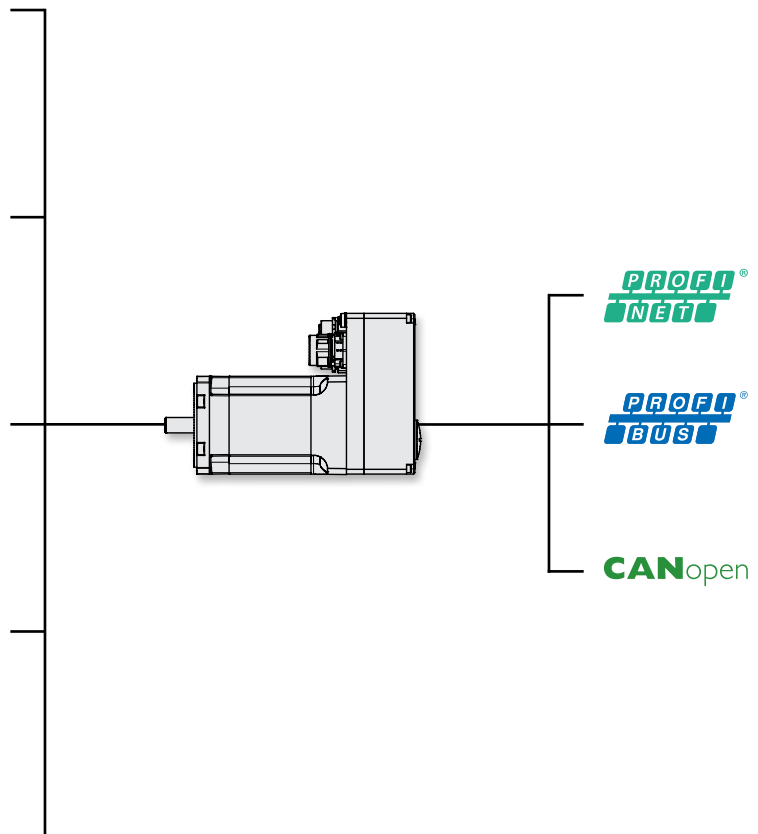


WPLE 80

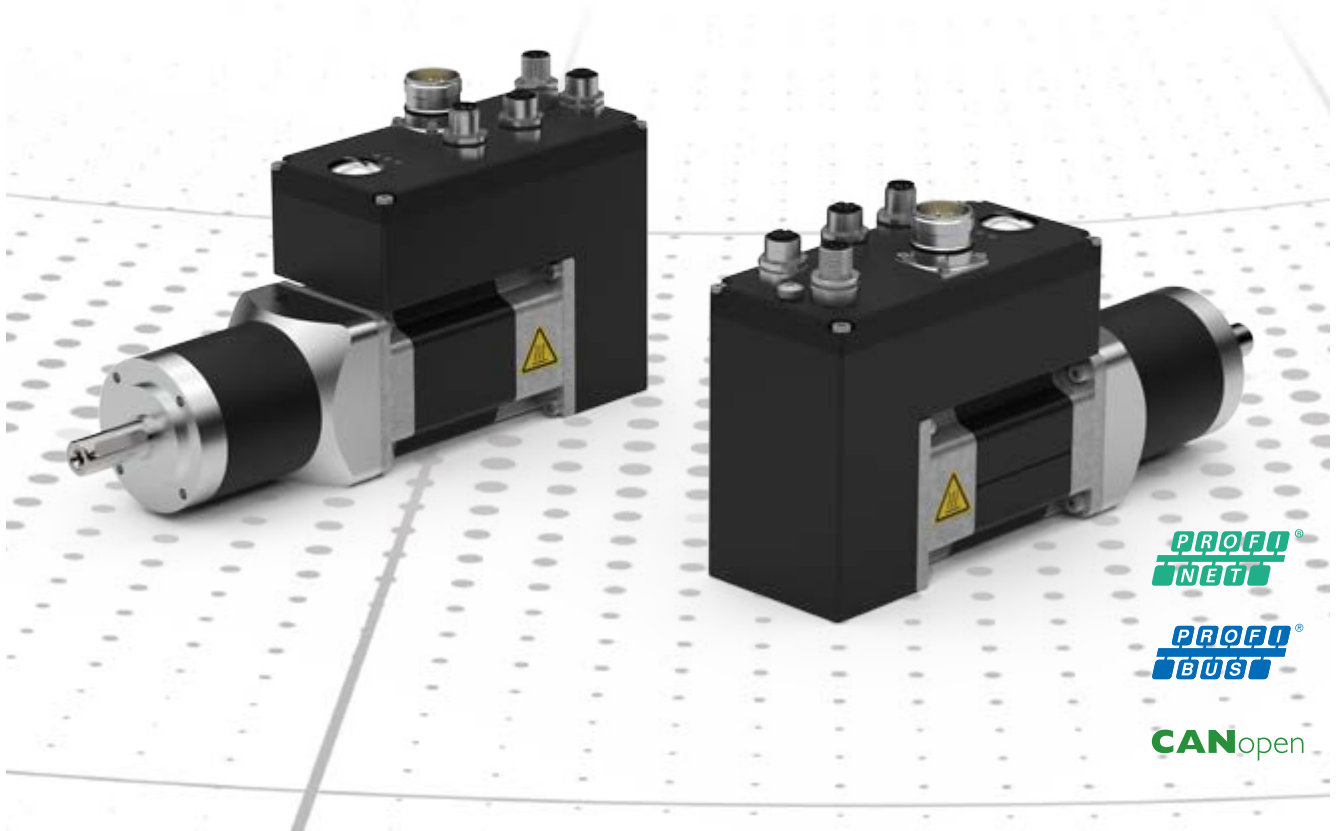
Details on page 17



Customer-specific gear / without gear



Positioning drive MD 300



PROFI[®]
NET

PROFI[®]
BUS

CANopen

Technical data		MD 300	
Nominal voltage	VDC	24	48
Nominal torque S1 (S3)	Nm	0.60 (1.10)	0.60 (1.10)
Nominal power S1 (S3)	W	136 (178)	273 (357)
Nominal speed S1 (S3)	min ⁻¹	2,175 (1,550)	4,350 (3,100)
Nominal current S1 (S3)	A	8.0	7.6
Inertia torque	gcm ²	512 (612 with holding brake)	
Electric motor		EC, electronically commutated motor	
_ Technology		IP 54, motor shaft IP 41	
_ Protection class			
Encoder		Absolute encoder, multi turn	
_ Technology		0.35° / 1,024 steps per revolution	
_ Positioning resolution		65,536 revolutions	
_ Positioning range		±0.7° / ±2 steps	
_ Positioning accuracy			
Options		Holding brake, hand-held operator panel	
Brake chopper		Power 50 W, pulse energy 35 Ws	

Definitions

S1
Continuous operation

S3
Intermittent operation
25 %, 10 min
Make time 2.5 min
Cycle time 10 min
Max. torque 1.10 Nm

True absolute encoder
Fail-safe position information
through electromechanical
principle of measurement

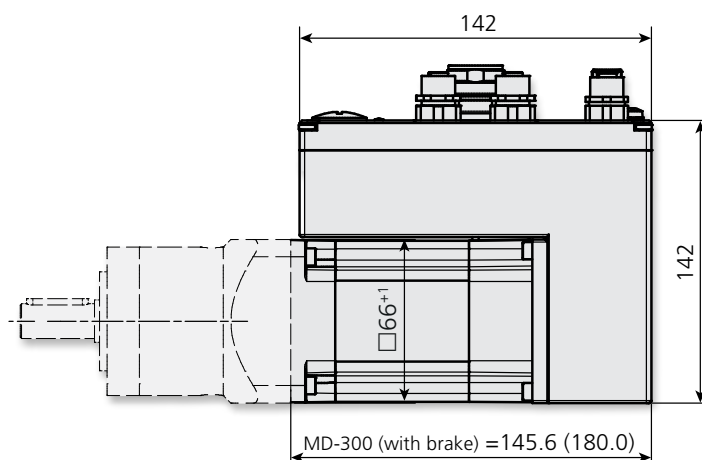
Positioning drive MD 300

The MD 300 delivers high performance and dynamics. Digital inputs and outputs can be used for additional tasks and a serial interface enables drive diagnosis even without a connected fieldbus. The available gears can transfer high torques with precise angular accuracy.

Numerous variants and reductions are available. Thanks to its flexible design, the MD 300 is also suitable for the use of special gears or for direct mounting without a gear, e.g. on lifting spindles.

Dimensions [mm]

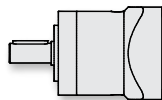
MD 300, with planetary gear PLE 60



Combination options

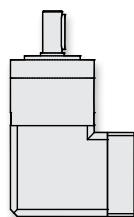
PLE 60

Details on page 16



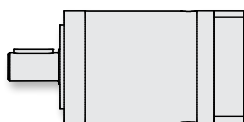
WPLE 60

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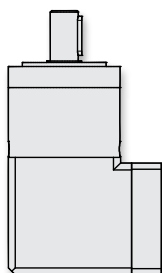
PLE 80

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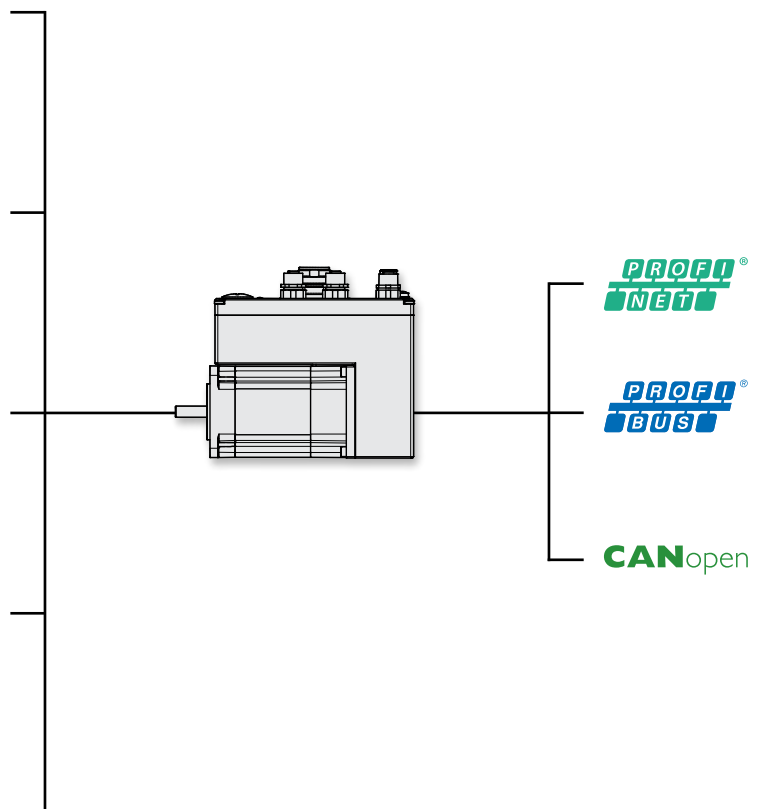


WPLE 80

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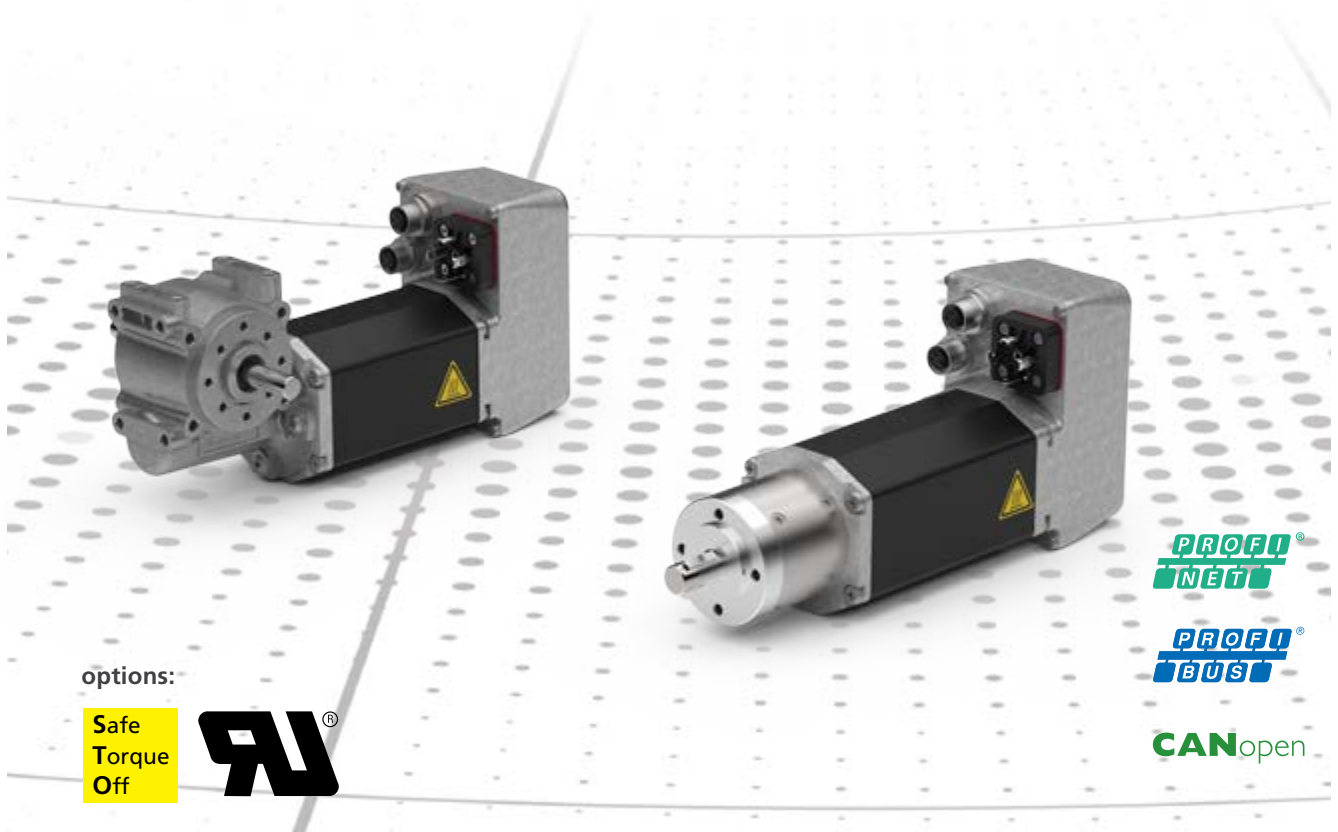




Customer-specific gear / without gear



Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at www.tr-electronic.com or on request.

Positioning drive MP 060 ... 180



Technical data		MP 060	MP 100	MP 140	MP 180
Nominal voltage	VDC	24	24	42	24
Nominal torque S1	Nm	0.17	0.26	0.40	0.49
Nominal power S1	W	55	84	120	166
Nominal speed S1	min ⁻¹	3,080	3,090	2,860	3,240
Nominal current S1	A	4.0	5.6	4.5	9.5
Inertia torque	gcm ²	72	128	172	129
Electric motor		EC, electronically commutated motor with neodymium magnet IP 50			
_ Technology					
_ Protection class					
Encoder		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65.536 revolutions ±0.7° / ±8 steps			
_ Technology					
_ Positioning resolution					
_ Positioning range					
_ Positioning accuracy					
Options		Special voltages for large production series,  , 			

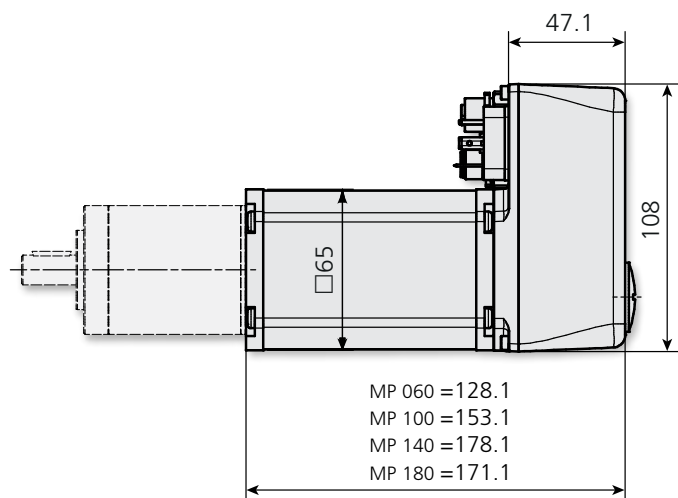
Positioning drive MP 060 ... 180

Positioning drives MP 060...180 boast an extremely compact design. To ensure precise adaptation to the respective application, different motor outputs and gear variants with numerous gear reductions are available.

The brushless motors can also handle continuous dynamic movements. The simple gears make the drives especially suitable for applications in which cost-effectiveness is a crucial factor.

Dimensions [mm]

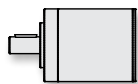
MP 060...180, with planetary gear PLG 52



Combination options

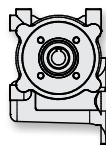
PLG 52

Details on page 18



SG 80

Details on page 18



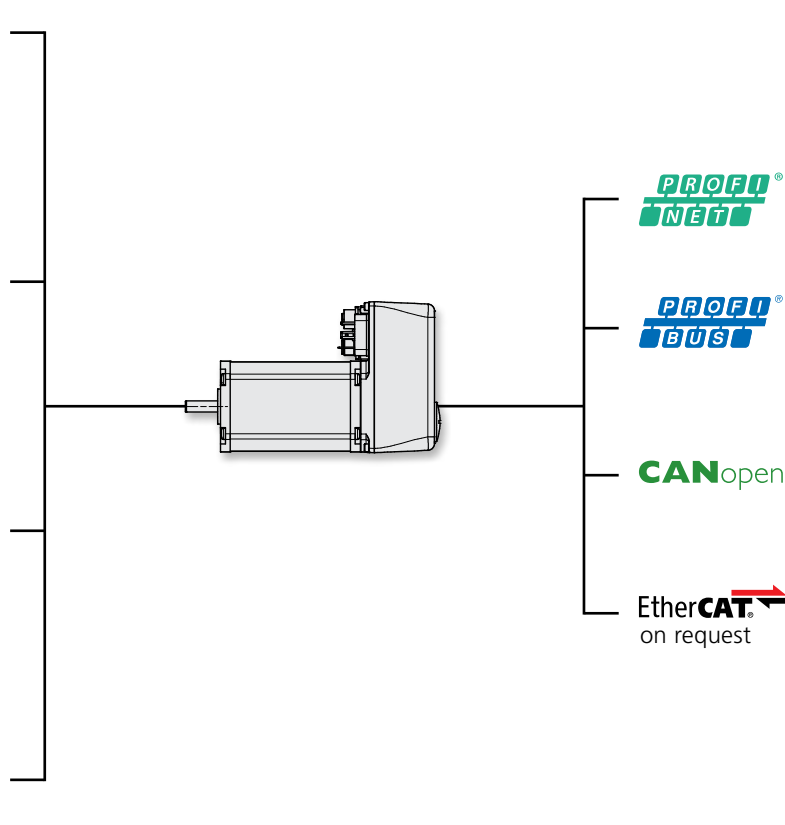
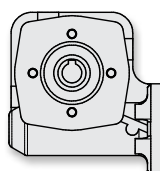
PLG 63

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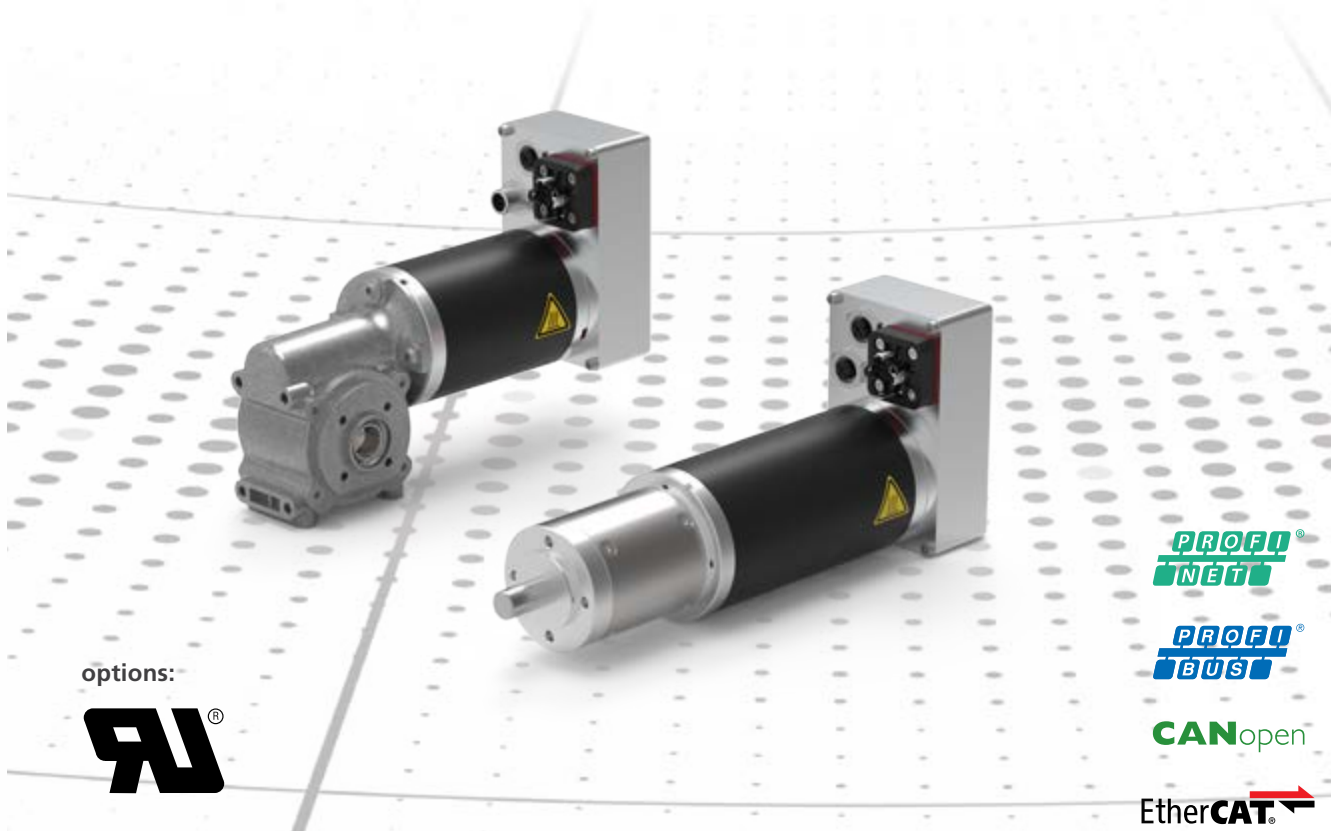


SG 120

Details on page 19



Actuating drive MA 055 ... 130



options:



PROFI
NET

PROFI
BUS

CANopen

EtherCAT

Technical data		MA 055	MA 100	MA 130
Nominal voltage	VDC	24	24	48
Nominal torque S1	Nm	0.14	0.27	0.32
Nominal power S1	W	44	86	107
Nominal speed S1	min ⁻¹	3,000	3,050	3,750
Nominal current S1	A	2.7	4.9	4.5
Inertia torque	gcm ²	400	750	750
Electric motor		DC, brushed motor IP 50		
_ Technology				
_ Protection class				
Encoder		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65,536 revolutions ±0.7° / ±8 steps		
_ Technology				
_ Positioning resolution				
_ Positioning range				
_ Positioning accuracy				
Options		Special voltages for large production series,		

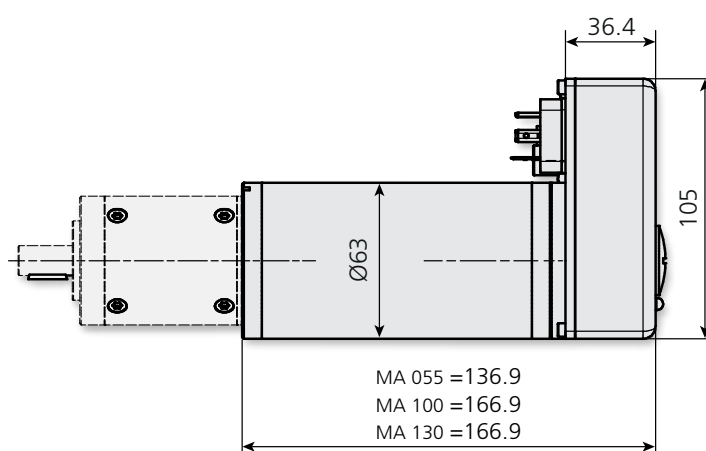
Actuating drive MA 055 ... 130

Actuating drives MA 055 ... 130 feature an extremely compact design. To ensure precise adaptation to the respective application, different motor outputs and gear variants with numerous reductions are available.

The brush motors are particularly advantageous for non-time critical actuating tasks. The simple gears and motors make the drives ideal for applications in which cost-effectiveness is a crucial factor.

Dimensions [mm]

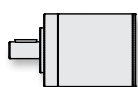
MA 055 ... 130, with planetary gear PLG 52



Combination options

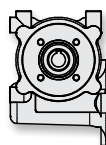
PLG 52

Details on page 18



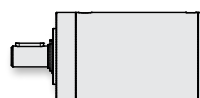
SG 80

Details on page 18



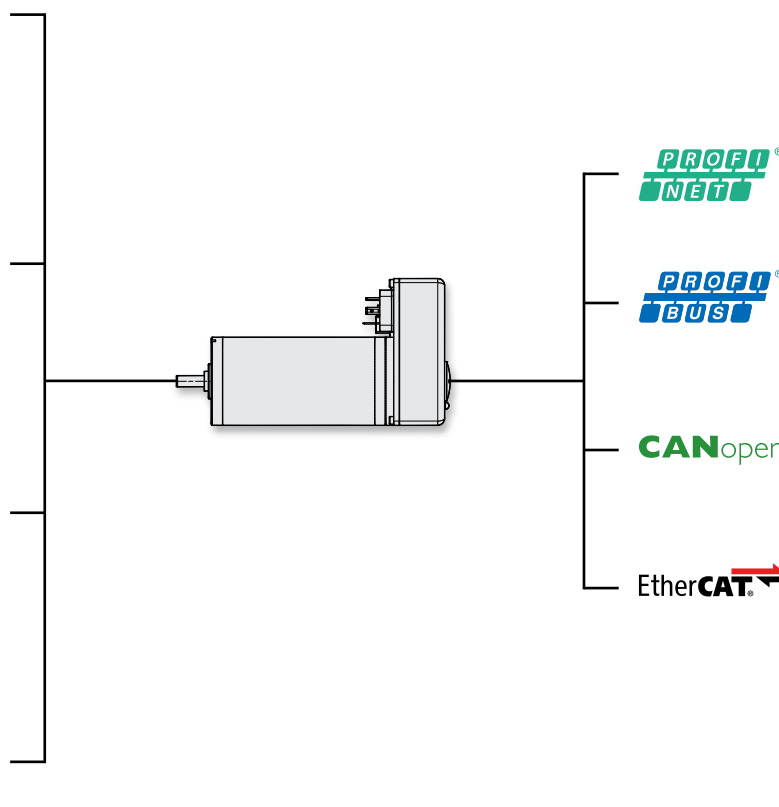
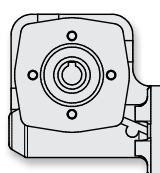
PLG 63

Details on page 19



SG 120

Details on page 19



Precision gear for MP 200 ... 280 and MD 300

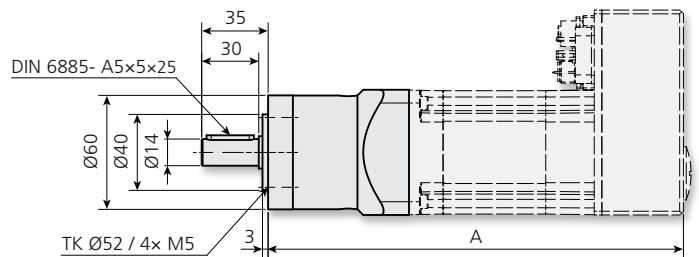
Planetary gear PLE 60

The PLE 60 is ideal for applications that require high torques and low backlash combined with high efficiency.

- _ High torque up to 44 Nm (S1) and 70 Nm (S3)
- _ Low backlash: 10 ... 15 arcmin
- _ High efficiency: 98 ... 88 %
- _ High permissible shaft forces: axial 600 N / radial 500 N



Dimensions [mm]



Gear		Dimension A [mm]: Drive variant (with brake)			
Stages	Reduction	MP 200	MP 220	MP 280	MD 300
1	3, 4, 5, 7, 8, 10	218.8 (253.2)	198.7 (231.7)	230.2 (263.2)	219.8 (254.2)
2	12, 15, 16, 20, 25, 32, 40	231.3 (265.7)	211.2 (244.2)	242.7 (275.7)	232.3 (266.7)
3	60, 80, 100, 120	243.8 (278.2)	223.7 (256.7)	255.2 (288.2)	244.8 (279.2)

Angular planetary gear WPLE 60

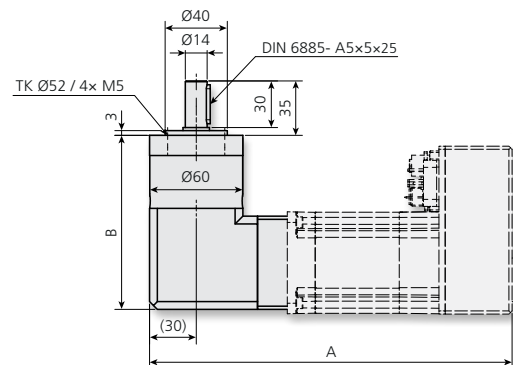
The WPLE 60 is ideal for applications that require high torques and low backlash combined with high efficiency, with an orthogonal output shaft.

Four different outlet directions are available.

- _ High torque up to 44 Nm (S1) and 70 Nm (S3)
- _ Low backlash: 16 ... 21 arcmin
- _ High efficiency: 95 ... 80 %
- _ High permissible shaft forces: axial 600 N / radial 500 N



Dimensions [mm]



Gear		Dimension B [mm]
Stages	Reduction	
1	3, 4, 5, 7, 8, 10	112
2	12, 15, 16, 20, 25, 32, 40	124.5
3	60, 80, 100, 120	137

Dimension A [mm]: Drive variant (with brake)			
MP 200	MP 220	MP 280	MD 300
233.2 (267.6)	213.1 (246.1)	244.6 (277.6)	234.2 (268.6)

Planetary gear PLE 80

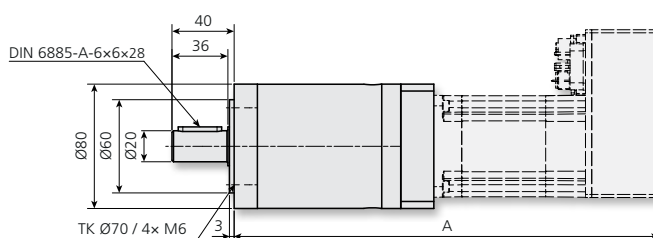
The PLE 80 is ideal for applications that require very high torques and low backlash combined with high efficiency.



All gears provide maximum space for your design, thanks to the option of using any installation position and lifetime lubrication.

- _ Very high torque up to 120 Nm (S1) and 192 Nm (S3)
- _ Low backlash: 9 ... 11 arcmin
- _ High efficiency: 97 ... 84 %
- _ High permissible shaft forces: axial 1200 N / radial 950 N

Dimensions [mm]



Gear		Dimension A [mm]: Drive variant (with brake)			
Stages	Reduction	MP 200	MP 220	MP 280	MD 300
2	12, 15, 16, 20, 25, 32, 40	255.6 (290)	235.5 (253)	267 (284.5)	256.6 (291)
3	60, 80, 100, 120, 200, 256	273.1 (307.5)	268.5 (286)	300 (317.5)	274.1 (308.5)

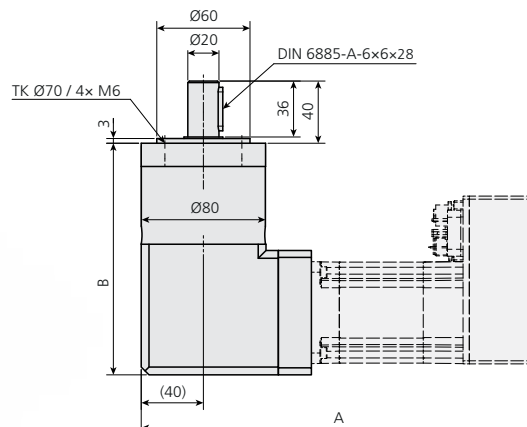
Angular planetary gear WPLE 80

The WPLE 80 is ideal for applications that require very high torques and low backlash combined with high efficiency, with an orthogonal output shaft. Four different outlet directions are available.



- _ Very high torque up to 120 Nm (S1) and 192 Nm (S3)
- _ Low backlash: 15 ... 17 arcmin
- _ High efficiency: 94 ... 72 %
- _ High permissible shaft forces: axial 1200 N / radial 950 N

Dimensions [mm]



Gear		Dimension B [mm]
Stufen	Reduction	
2	12, 15, 16, 20, 25, 32, 40	161.5
3	60, 80, 100, 120, 200, 256	179

Dimension A [mm]: Drive variant (with brake)			
MP 200	MP 220	MP 280	MD 300
254.1 (288.5)	234 (267)	265.5 (298.5)	255.1 (289.5)

Simple gear for MA 055 ... 130 and MP 060 ... 180

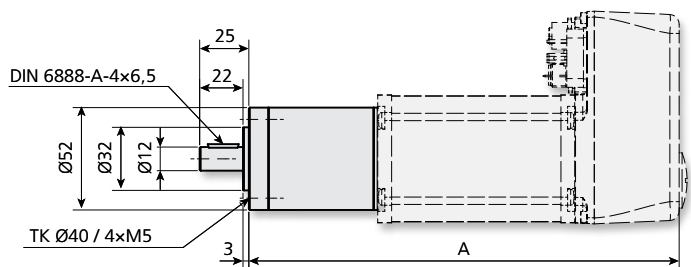
Planetary gear PLG 52

The PLG 52 is ideal for applications that require medium torques and moderate backlash combined with good efficiency.

- _ Torque up to 24 Nm (S1)
- _ Backlash: 0.7 ... 1.5°
- _ Efficiency: 90 ... 73 %
- _ Permissible shaft forces: axial 500 N / radial 350 N



Dimensions [mm]



Gear		Dimension Maß A [mm]: Drive variant					
Stages	Reduction	MA 055	MA 100...130	MP 060	MP 100	MP 140	MD 180
1	4.5, 6.25, 8	186.9	216.9	178.1	203.1	228.1	221.1
2	15, 20.25, 28.125, 36, 50	202.4	232.4	193.6	218.6	243.6	236.6
3	91.125, 126.5625, 162, 225	217.4	247.4	208.5	233.6	258.6	251.6

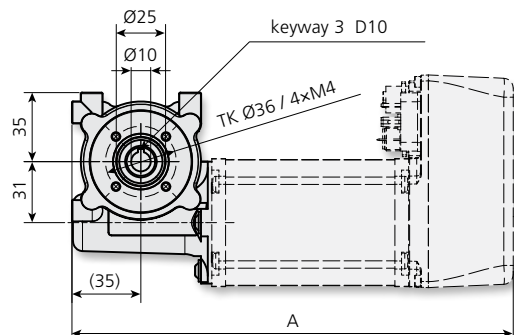
Worm gear SG 80

The SG 80 is ideal for applications in which an orthogonal output shaft is used with restricted space conditions. It can be designed with a single or double-sided solid shaft or for direct mounting with a hollow shaft. Four different outlet directions are available.

- _ Torque up to 4 Nm (S1)
- _ Backlash: 1°
- _ Efficiency: 70 ... 25 %
- _ Permissible shaft forces: axial 300 N / radial 350 N

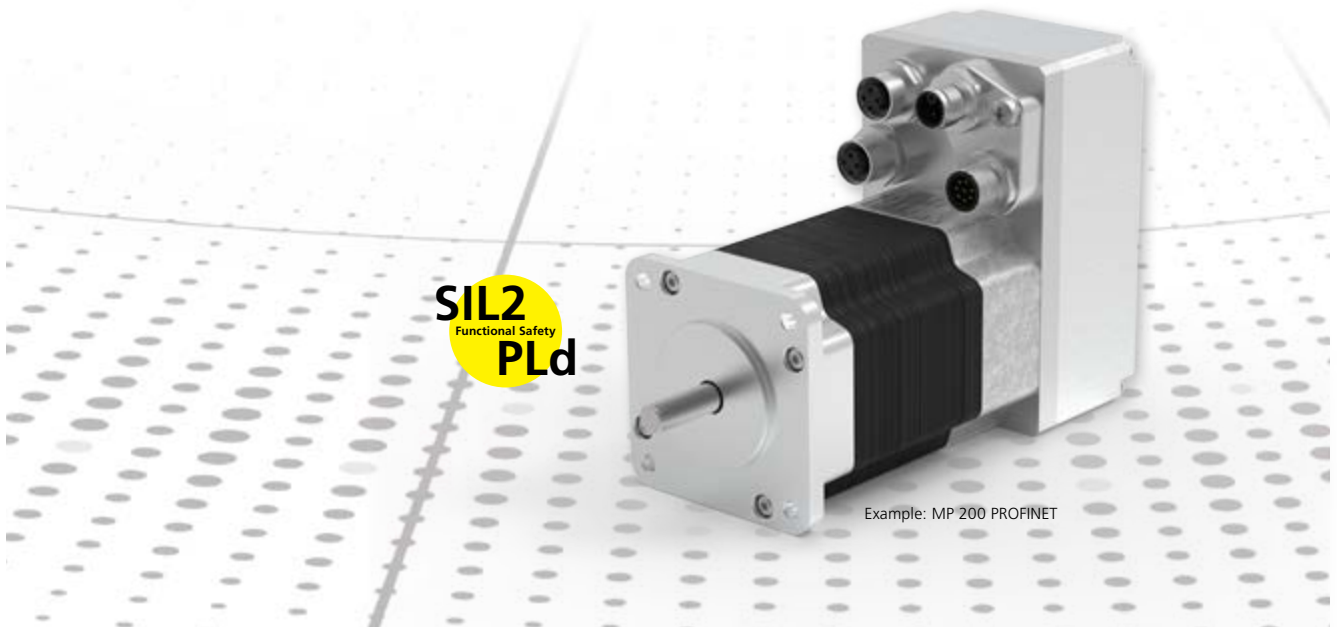


Dimensions [mm]



Gear		Dimension Maß A [mm]: Drive variant					
Reduction	MA 055	MA 100... 130	MP 060	MP 100	MP 140	MP 180	
5, 10, 15, 24, 38, 50, 75	207.9	237.9	199.1	224.1	249.1	242.1	

Integrated safety technology



Drives MP 060 ... 200 PN are also optionally available with integrated safety technology. All drive functions continue to be controlled via the PROFINET interface. In addition, the **STO** (safe torque off) or **SS1** (safe stop 1) function can be triggered via a safe digital input.

STO (safe torque off)

In response to a specific trigger or a safety-relevant error, the drive is disconnected from the power, so that no further torque is generated and the motor coasts to a stop if necessary.

Safe digital input

Two channels are used, in order to also ensure safe control of the safety function. The correct signals must be present in order for the drive to turn: e.g. two 24 volt signals, depending on the configuration. If one of the two signals fails, this is immediately recognized as a safety-relevant error.

A second possibility is to define the signals non-equivalently: one 24 volt signal and one 0 volt signal. This has the advantage that a possible short-circuit between the signals is also recognized as a safety-relevant error. Two digital signals are available for confirmation. These indicate whether a safety-relevant error is present and whether the drive is in a safe (powerless) state.

SS1 (safe stop 1)

In response to a specific trigger or a safety-relevant error, a safety timer starts. When this has run down the drive is disconnected from the power, so that no further torque is generated and the motor coasts down if necessary. While the safety timer is running down, the drive can be controlled normally and can e.g. be braked in a controlled manner.

Configuration

The different configuration options are defined according to the customer's requirements and set in the factory. This guarantees that the safety function is correctly configured in the system and saves the user the need for onerous setting procedures and separate configuration programs.

Different selection options include:

- _ **STO** or **SS1**
- _ The desired **SS1** time
- _ With or without short-circuit monitoring

Customer-specific solutions

Thanks to our expert development team, we are also able to implement special requirements. On this page you will find a selection of our customer-specific developments. Please speak to us about implementing your own application.

MA 025-EN

Extremely cost-efficient format adjuster with proprietary Ethernet protocol.



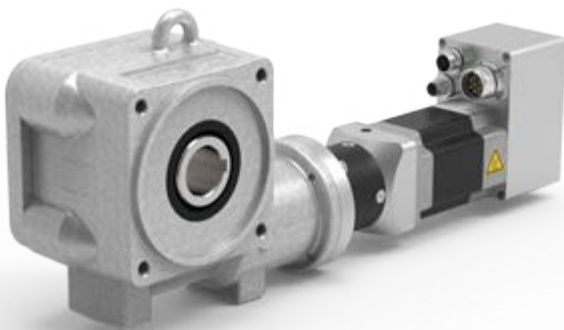
MC 200-PN

Intelligent screwdriver control for automobile assembly with integrated Profinet interface.



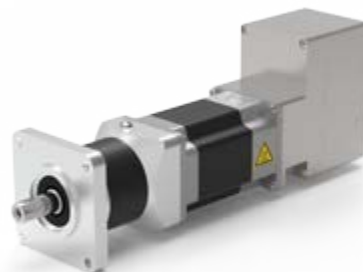
MP 200-PB

With multi-stage gear for extreme torques.



MP 200-AN

Highly dynamic thanks to optical encoder and sealed against the penetration of application-specific media.



Interfaces

PROFINET



The encoTRive drives with PROFINET use the same device profile PROFIdrive V3.0 as PROFIBUS DP. When migrating from PROFIBUS to PROFINET, the control logic and the PZD configuration remain the same. Logical programming adjustments do not occur. The range of PROFIBUS functions is fully integrated into PROFINET. PROFINET offers some additional functions. There is an alarm telegram in case of trouble when the cycle times are too low and there are more addressable nodes.

The projecting is carried out with the same tools used for PROFIBUS. Together with the identical program and processing logic, the change from PROFIBUS to PROFINET is solely a matter of the communication technology.

Features

- _ no bus termination necessary
- _ address assignment via software
- _ the protocol analysis can be done with freely available Ethernet tools (for example with Wireshark™)
- _ the topology is simplified by star, lines, tree and ring structures as well as arbitrary hybrid forms

PROFIBUS



The drive version with PROFIBUS DP is based on the device profile PROFIdrive V3.0 and is assigned to application class 3 - position drive with decentralized positioning control (single axis point-to-point). The device profile V3.0 allows free configuration of process data telegrams as an essential enhancement to V2.0 with a fixed pre-defined telegram structure.

The appropriate communication profile is PROFIBUS DP VO/V1 with cyclic and acyclic data traffic. All common bit rates are accessible and get adjusted automatically based on a bus analysis. In the case a drive has a digital input, a hand-held device can be connected. Simple processing operations are possible without any bus connection. If the bus is in operation, the input is for connecting hardware limit switches, or together with digital output, they serve as logical I/O module at the PROFIBUS.

Features

- _ positioning and speed control
- _ cyclic and acyclic communication according to PROFIBUS DP VO/V1
- _ free configurable process data telegrams according to device profile PROFIdrive V3.0
- _ voltage failure-safe update possibility

Technical Communication Data

Communication profile	PROFINET-IO	PROFIBUS - DP
Range of functions	Conformance Class A, Real Time Class1	DP-V0 and DP-V1
Device profile	Profidrive V3.0, Application Class 3	
Transfer	cyclic (process data), acyclic (alarm and time uncritical parameters)	
Process data configuration	free or over standard protocols	
Max. participants	>1000	max. 96
Terminating resistance	needless	MD: internal, MP/MA: external

Function blocks for PROFIBUS and PROFINET

The available demo function blocks allow commissioning any drive type without having to know the parameter features and the telegram sequences.

The interfaces of the individual function blocks are identical for Profibus and Profinet.

	Description
Parameter PIV	Function block for parameterizing individual parameters using the cyclic PIV channel (parameter identification value)
Parameter DPV1	Function block for parameterizing individual parameters using the acyclic data channel (DPV1)
Control PCD	Function block for commissioning and activating the drive using the cyclic PCD channel (processdata)
Demo Control PCD	Demo program for using the Control PCD function block to cyclically approach two positions in positioning mode

CANopen

CANopen

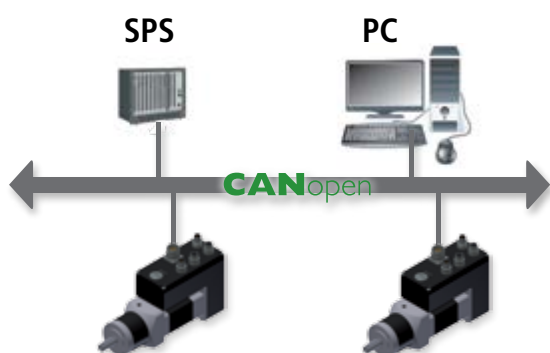
The drive version with CANopen is based on the device profile CiA DSP 402 – drives and motion control. The device profile permits a free configuration of process telegrams through PDO mapping of application objects. Available are 4 RxPDO and 4 TxPDO.

The associated communication profile is CiA DS 301 – CANopen application layer and communication profile.

CANopen defines, for distributed industrial automation systems, a standardized protocol based on CAN. All common bit rates are accessible and set over a DIP-switch. The fast exchange of process data uses a process data object (PDO), the access to the entries within the object directory happens over service data object (SDO). All drive specific information is summed up within the object directory.

Features

- _ installation of the GSD (ML) file within the projecting tool
- _ positioning and speed control
- _ cyclic and acyclic communication with PDO/SDO
- _ free configurable process data telegram according to the communication profile CiA DS 301
- _ each transmission direction with up to 4 PDOs



Technical Communication Data

Communication profile	CANopen
Device profile	CiA DS 301-DP
Geräteprofil	CiA DSP 402
Address range	0 ... 127
Address adjustment	hardware, DIP-switch
Bitrates	10/20/50/100/125/250/500/800/1.000 kBit/s
Process data configuration	free or over standard protocols
Terminating resistance	MD: internal, MP/MA: external
Transfer	cyclic (PDO), acyclic (SDO)

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Absolute encoder, incremental rotary encoder, wire-actuated encoder

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Linear encoders

Linear absolute measuring systems, laser displacement measurement

Linear encoders register linear motions in machines, tools and systems according to specific requirements using different technologies. Linear encoders allow measuring distances of max. 20 m almost without any wear. This value is max. 240 m for laser measuring systems. Machines and systems can be precisely controlled to reach their desired positions.

Motion

Compact actuating and positioning drives

Intelligent encoTRive drives are available with the current field bus systems, such as PROFIBUS, PROFINET and CANopen, within a power range of up to 300 watts. The drives are configured to meet customer requirements and can be freely combined with precision gear, holding brake and I/O. Values of up to 4,350 rpm and powerful 200 Nm are available to cope with demanding applications.



Components

**Industrial PC, field bus I/O,
PLC, HMI controller**

Industrial PCs are available in numerous variants and offer customized calculation power for PC-assisted automation. Programmable logic controllers (PLC) are the traditional means for automation. HMI controllers establish the interface to the user. Field bus nodes, I/O modules and cam controllers complete the range of automation components.

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**Consulting and implementation
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You want to set up a largely automated new machine or retrofit and modernize your existing machine with automation systems? Then you just need our extensive expert knowledge and the more than 20 years of our experience.

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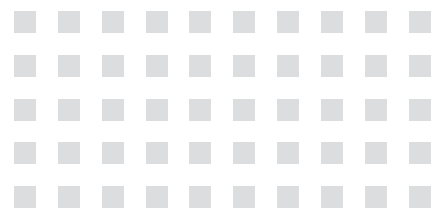
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