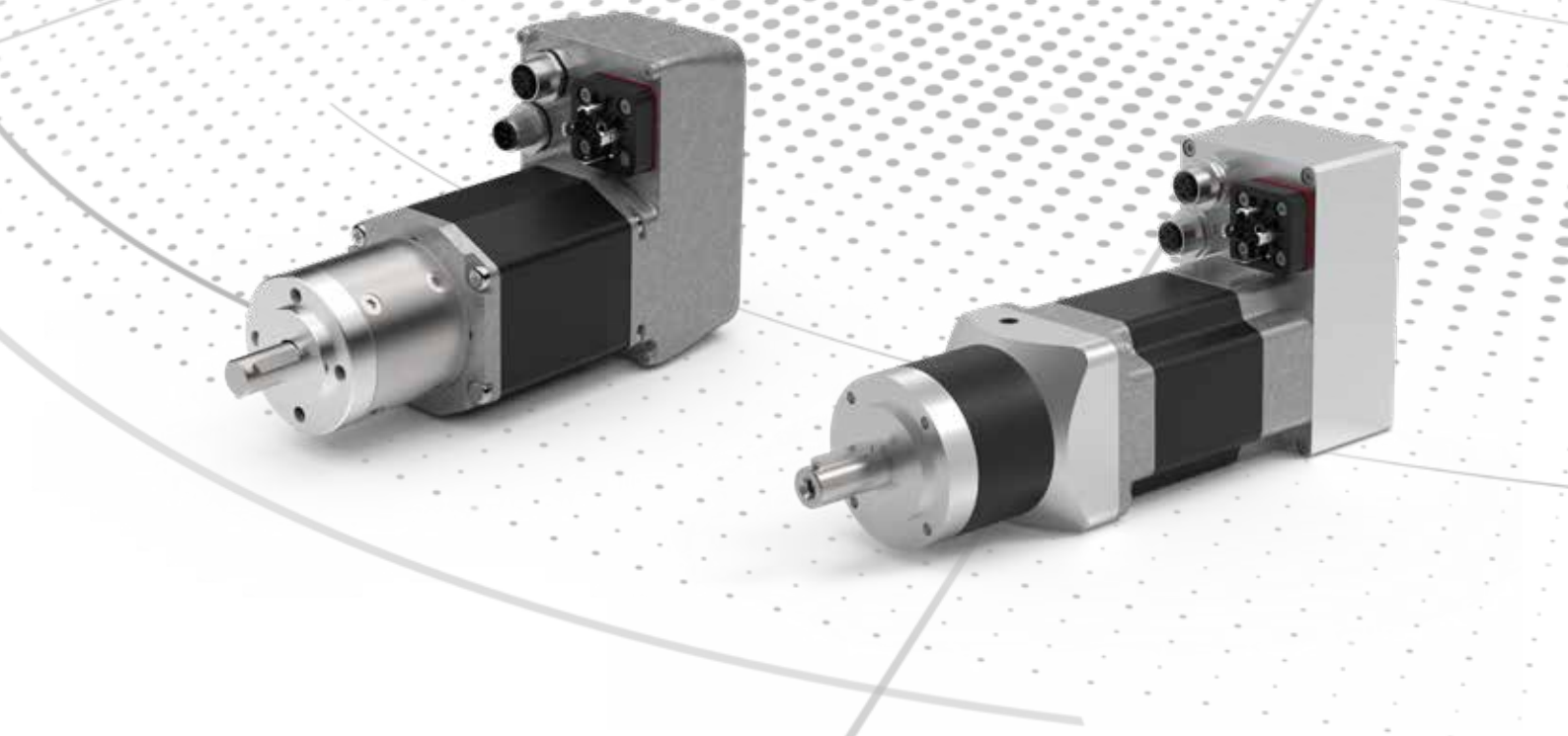
Intelligent compact drives



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Progress – Shaping the future with decentralized and intelligent technology

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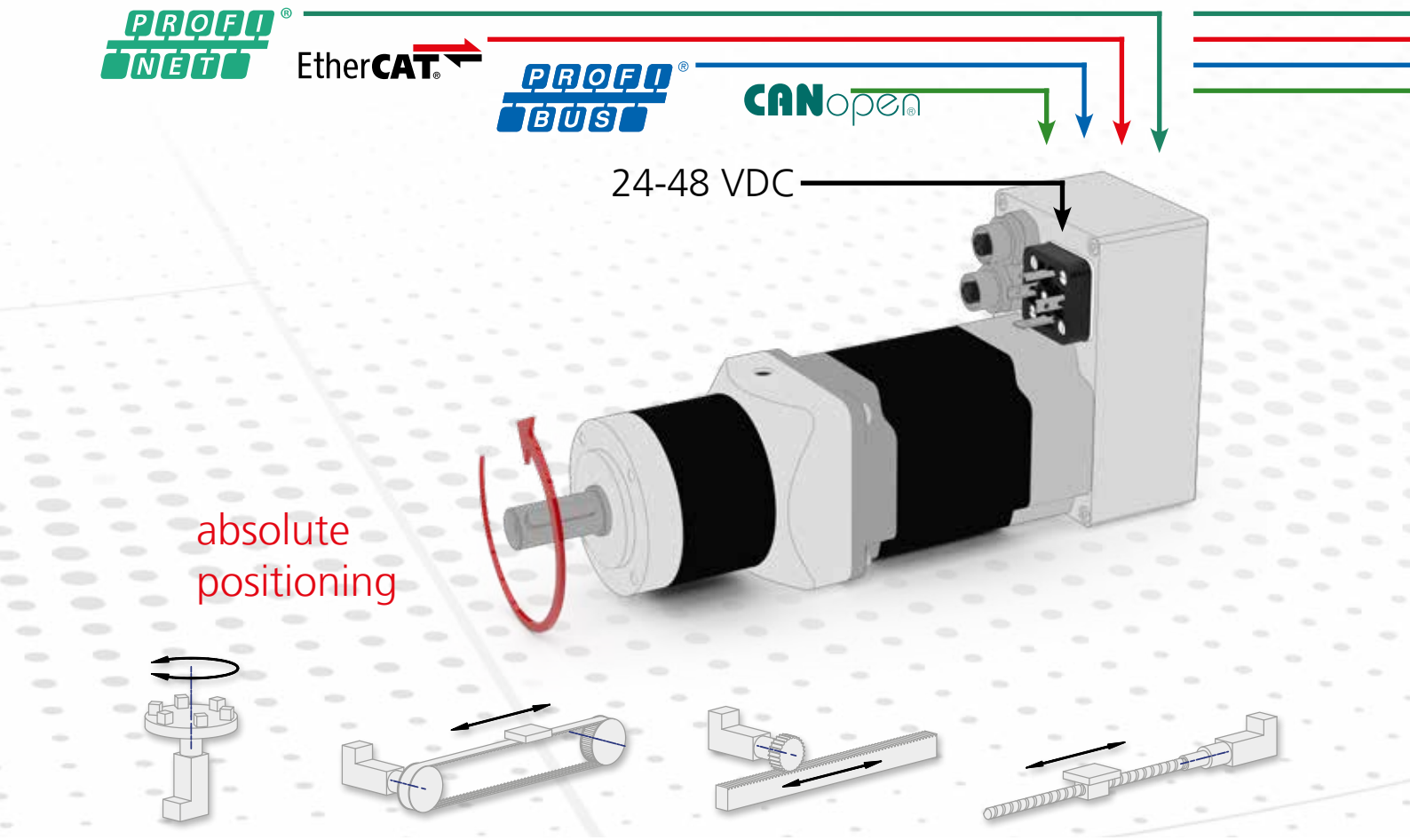
Gear variants (worm, planetary, angular planetary gears)

Interfaces

General information

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 (**s**afe **t**orque **o**ff) optionally integrated

Tailored to your application

_Broad range of motor and gear variants
_Wide power range from 50 to 400 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.

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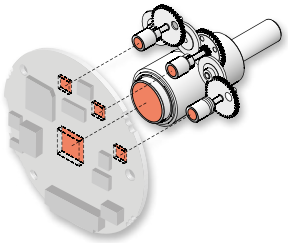
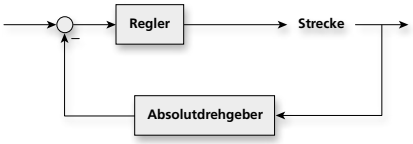
Absolute encoder

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** (**s**afe **t**orque **o**ff) or **SS1** (**s**afe **s**top **1**) are optionally integrated.

Safe
Torque
Off

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)

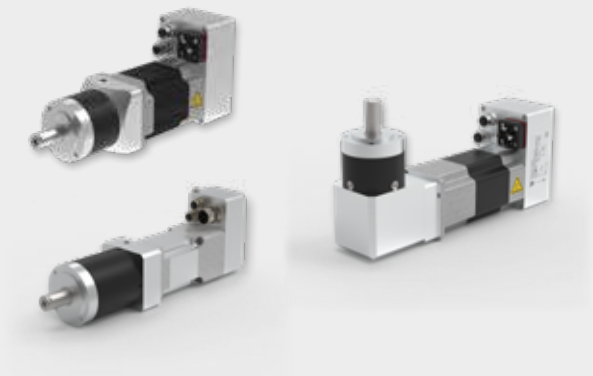
_For frequent and dynamic movements

MP 062 … 182

_With dynamic motors and simple and cost-efficient gears

MP 202 … MP 282

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



Actuating drive

DC (brush)

_For occasional movements

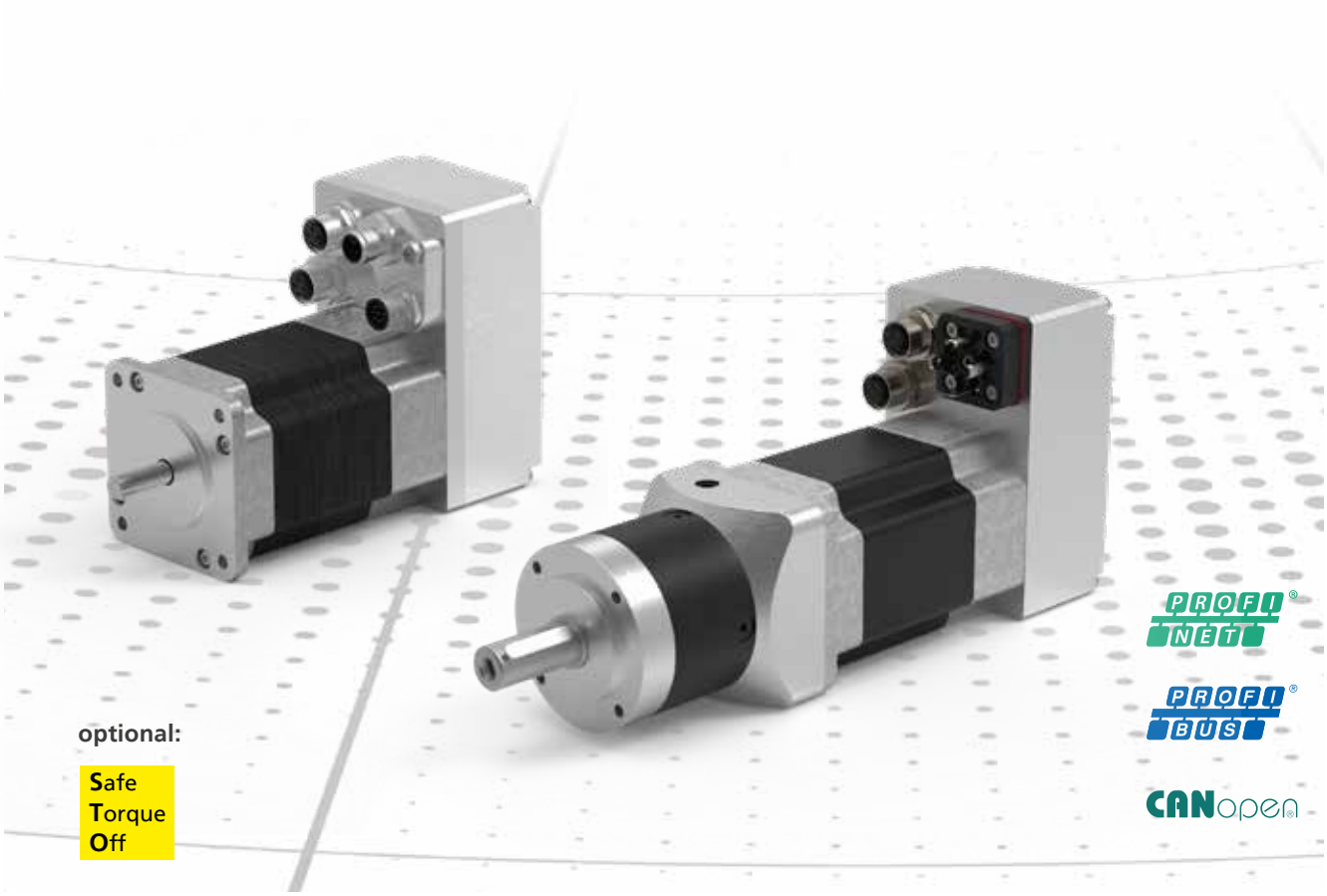
MA 055 … 130

_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 202



Technical data		MP 202	
Nominal voltage	VDC	24	48
Nominal torque S1 (S3)	Nm	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	5.0 (13,8)	
Inertia torque	gcm^2	512 (612 with holding brake)	
Electric motor _Technology _Protection class		EC, electronically commutated motor IP 54, motor shaft IP 41	
Encoder _Technology _Positioning resolution _Positioning range _Positioning accuracy		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65,536 revolutions ±0.7° / ±8 steps	
Options		Holding brake, NRTL approval to UL 61800-5-1 and CSA C22.2 No.274, Safe Torque Off	

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

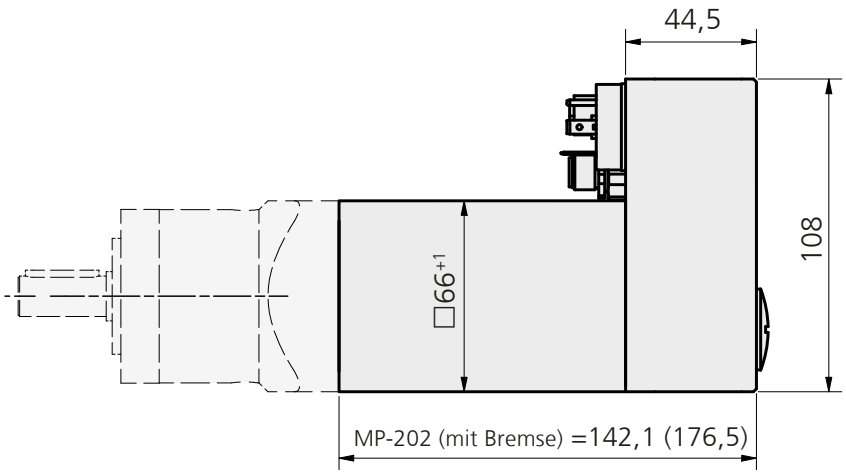
Positioning drive MP 202

The MP 202 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 202 is also suitable for the use of special gears or for direct mounting without a gear, e.g. on lifting spindles.

Dimensions [mm]

MP 202, with planetary gear PLE 60



PLE 60
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WPLE 60
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PLE 80
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WPLE 80
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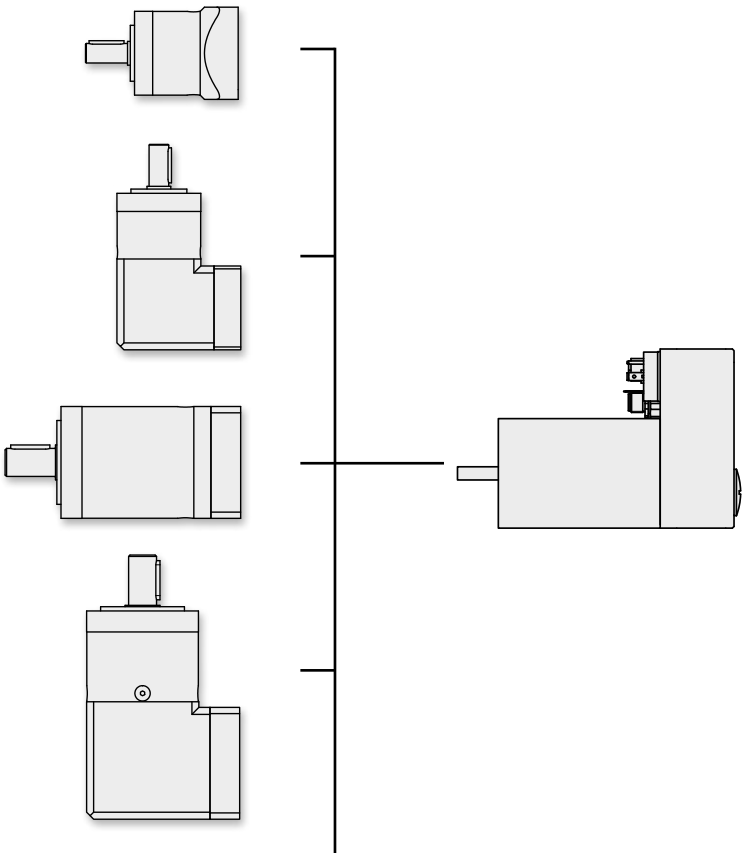

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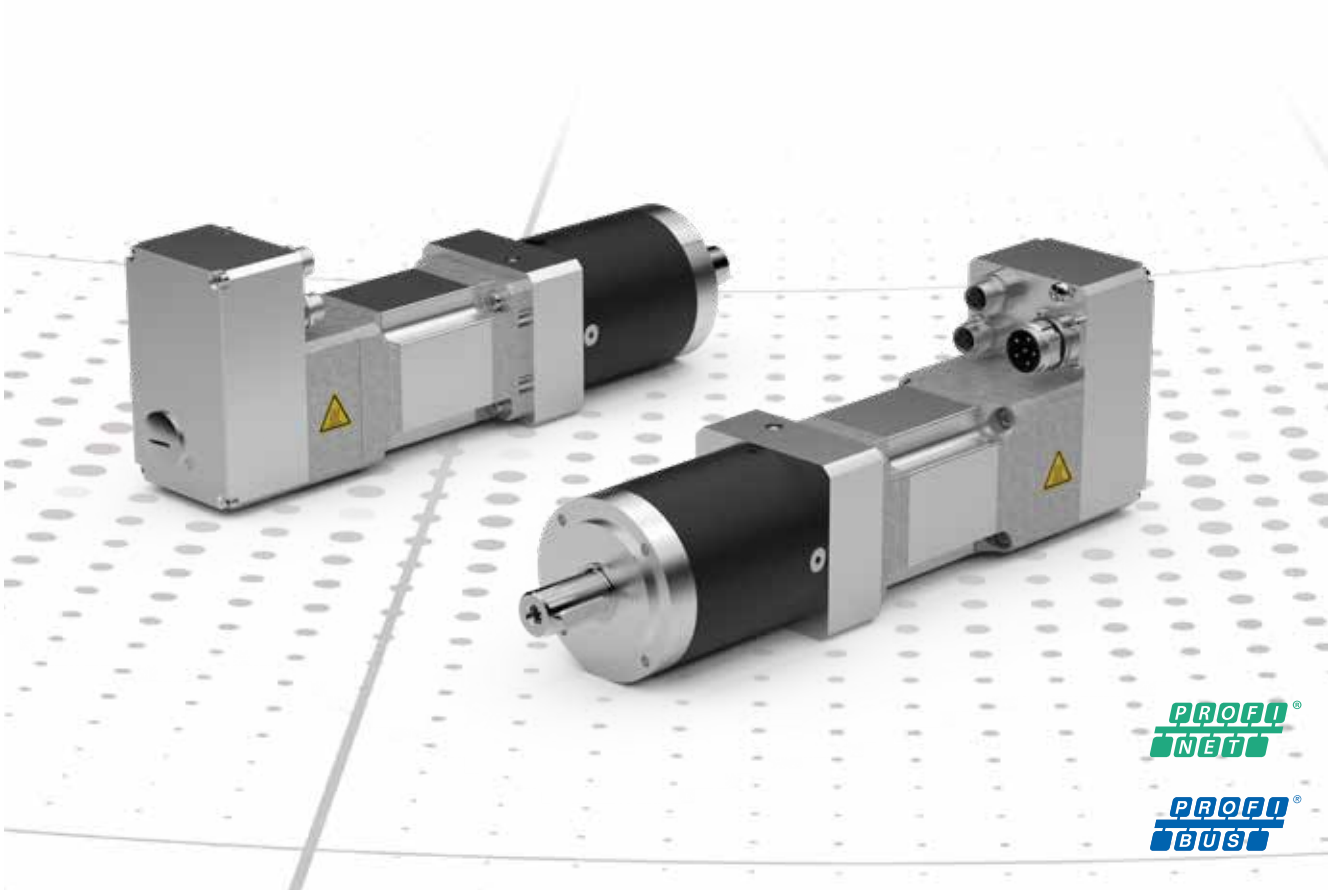
Customer-specific gear / without gear

Illustrations are principle representations. Binding dimensional drawings and CAD data for specific order numbers at www.tr-electronic.de or on request.

Positioning drive MP 282



Technical data		MP 282
Nominal voltage	VDC	48
Nominal torque S1 (S3)	Nm	0.40 (1.90)
Nominal power S1 (S3)	W	167 (795)
Nominal speed S1 (S3)	min^{-1}	4,000 (4,000)
Nominal current S1 (S3)	A	5.0 (19,0)
Inertia torque	gcm^2	700
Electric motor _Technology _Protection class		EC, electronically commutated motor IP 54, motor shaft IP 41
Encoder _Technology _Positioning resolution _Positioning range _Positioning accuracy		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65,536 revolutions ±0.7° / ±8 steps
Options		Holding brake, NRTL approval to UL 61800-5-1 and CSA C22.2 No.274, Safe Torque Off

Definitions

S1
Continuous operation

S3
Intermittent operation
10 %, 4 min
Make time 24 sec
Cycle time 4 min

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

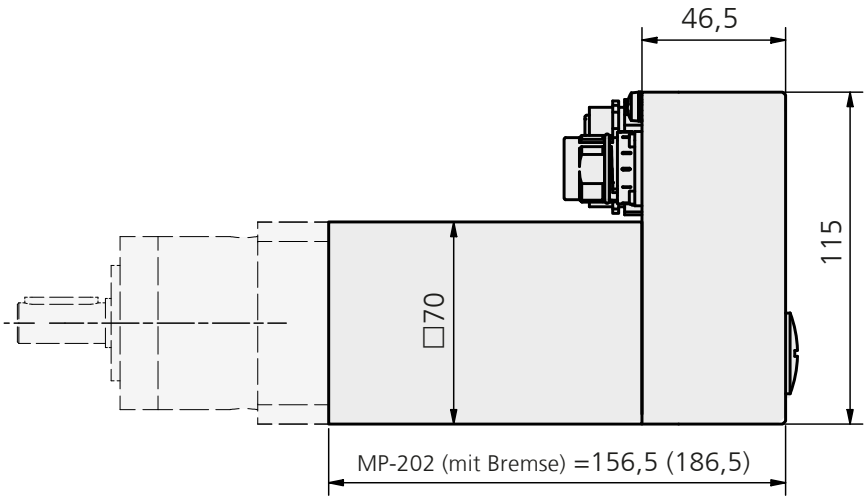
Positioning drive MP 282

The MP 282 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 282 is also suitable for the use of special gears or for direct mounting without a gear, e.g. on lifting spindles.

Dimensions [mm]

MP 282, with planetary gear PLE 60



PLE 60
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WPLE 60
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PLE 80
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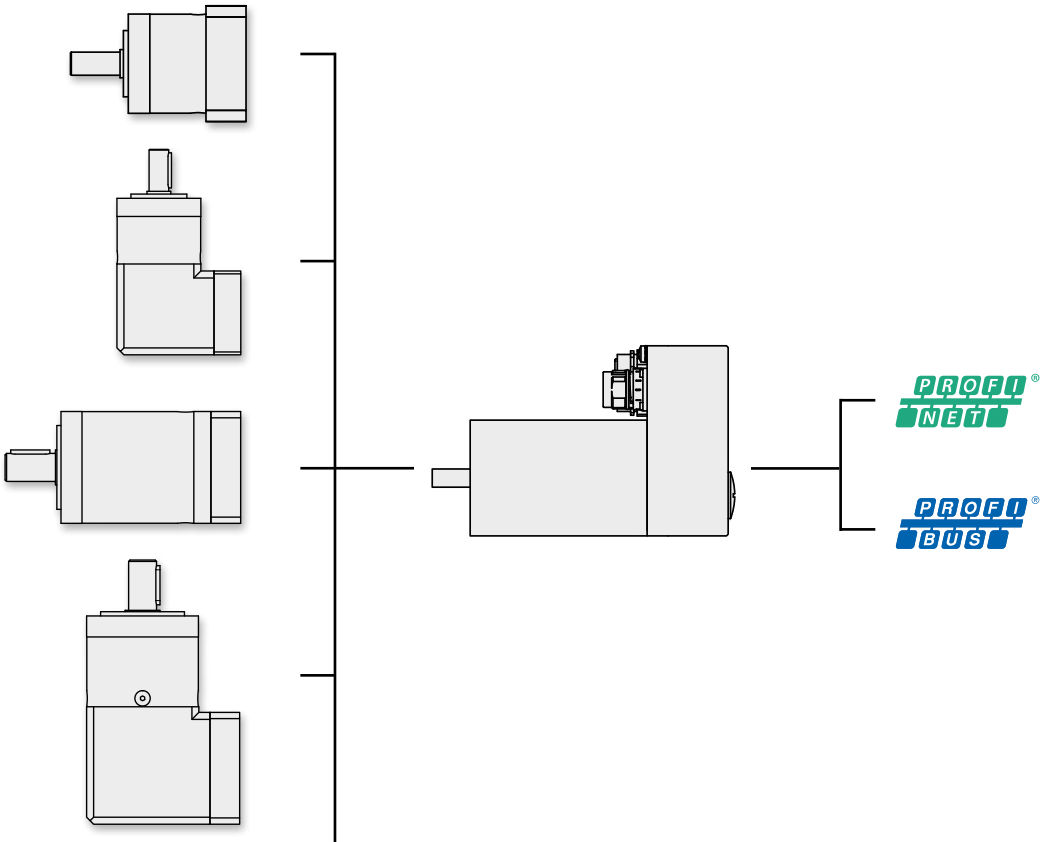
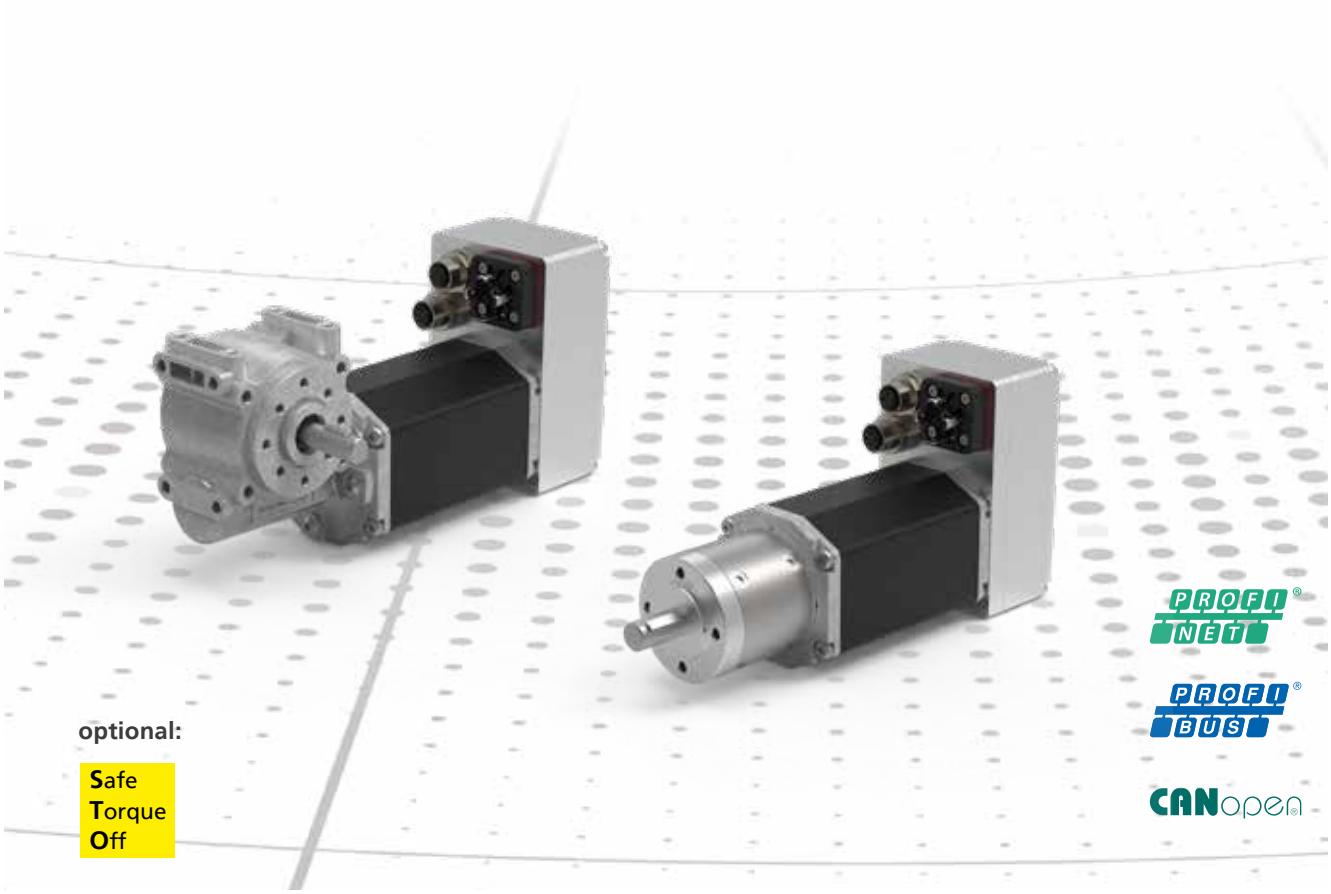
WPLE 80
Details on page 15



Customer-specific gear / without gear

Illustrations are principle representations. Binding dimensional drawings and CAD data for specific order numbers at www.tr-electronic.de or on request.

Positioning drive MP 062 … 182



Technical data		MP 062	MP 102	MP 142	MP 182
Nominal voltage	VDC	24	24	48	24
Nominal torque S1 (S3)	Nm	0.17 (0.25)	0.26 (0.39)	0.40 (0.80)	0.49 (0.80)
Nominal power S1 (S3)	W	55 (58)	84 (90)	120 (189)	166 (189)
Nominal speed S1 (S3)	min^{-1}	3,080 (2,230)	3,090 (2,220)	2,860 (2,260)	3,240 (2,260)
Nominal current S1 (S3)	A	4.0 (6.0)	5.6 (9.1)	4.5 (9.4)	9.5 (14.7)
Inertia torque	gcm^2	72	128	172	129
Electric motor _Technology _Protection class		EC, electronically commutated motor with neodynium magnet IP 40			
Encoder _Technology _Positioning resolution _Positioning range _Positioning accuracy		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65.536 revolutions ±0.7° / ±8 steps			
Options		Special voltages for large series, NRTL approval to UL 61800-5-1 and CSA C22.2 No.274, Safe Torque Off			

Definitions

S1
Continuous operation

S3
Intermittent operation
25 %, 4 min
Make time 1 min
Cycle time 4 min

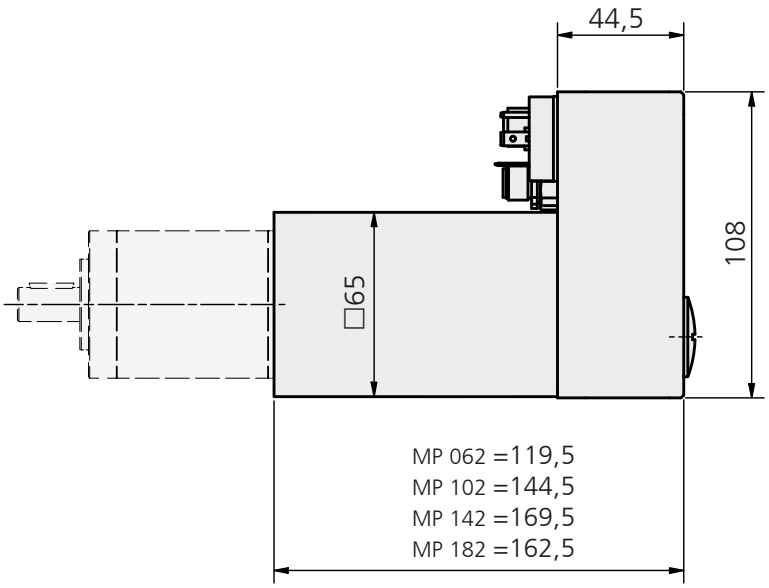
Positioning drive MP 062 … 182

The MP 062…182 positioning actuators impress with their their particularly compact design. For precise to the respective application, various motor different motor outputs and gearbox variants with with numerous reduction ratios are available.

The brushless motors can also withstand dynamic continuous movements. Thanks to the simple gearboxes the drives are particularly suitable for applications where economic efficiency plays a major role.

Dimensions [mm]

MP 062…182, with planetary gear PLG 52



Combination options

PLG 52
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SG 80
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PLG 63
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SG 120
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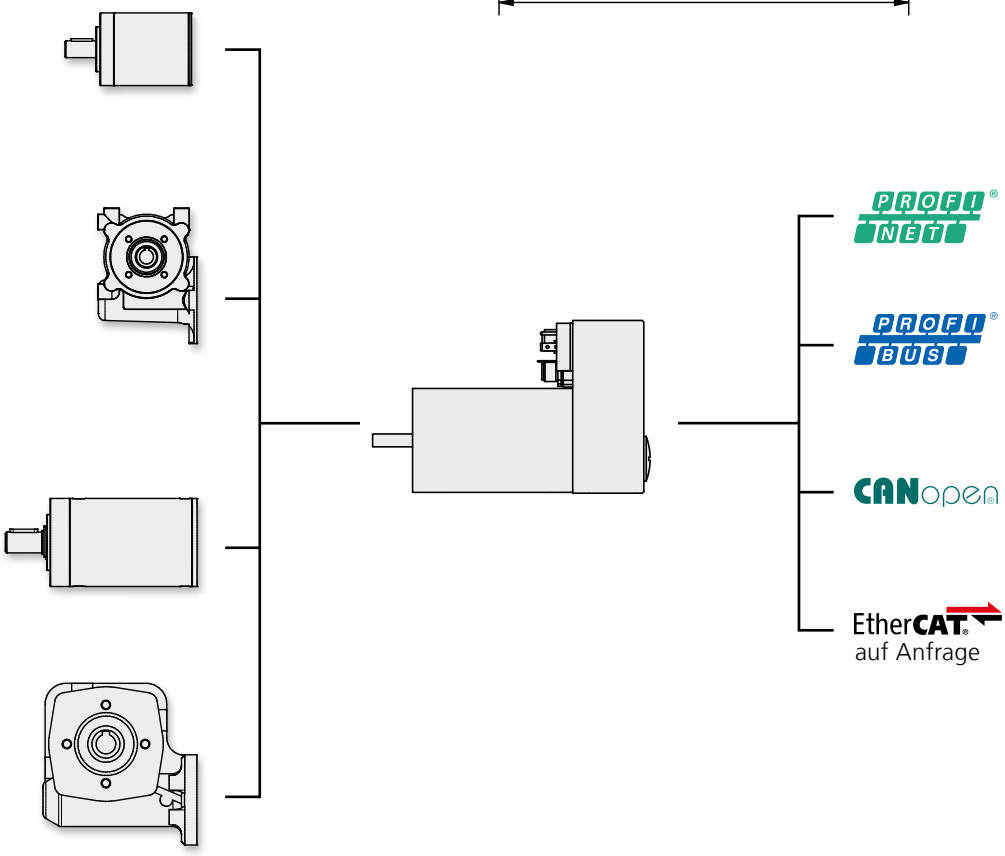

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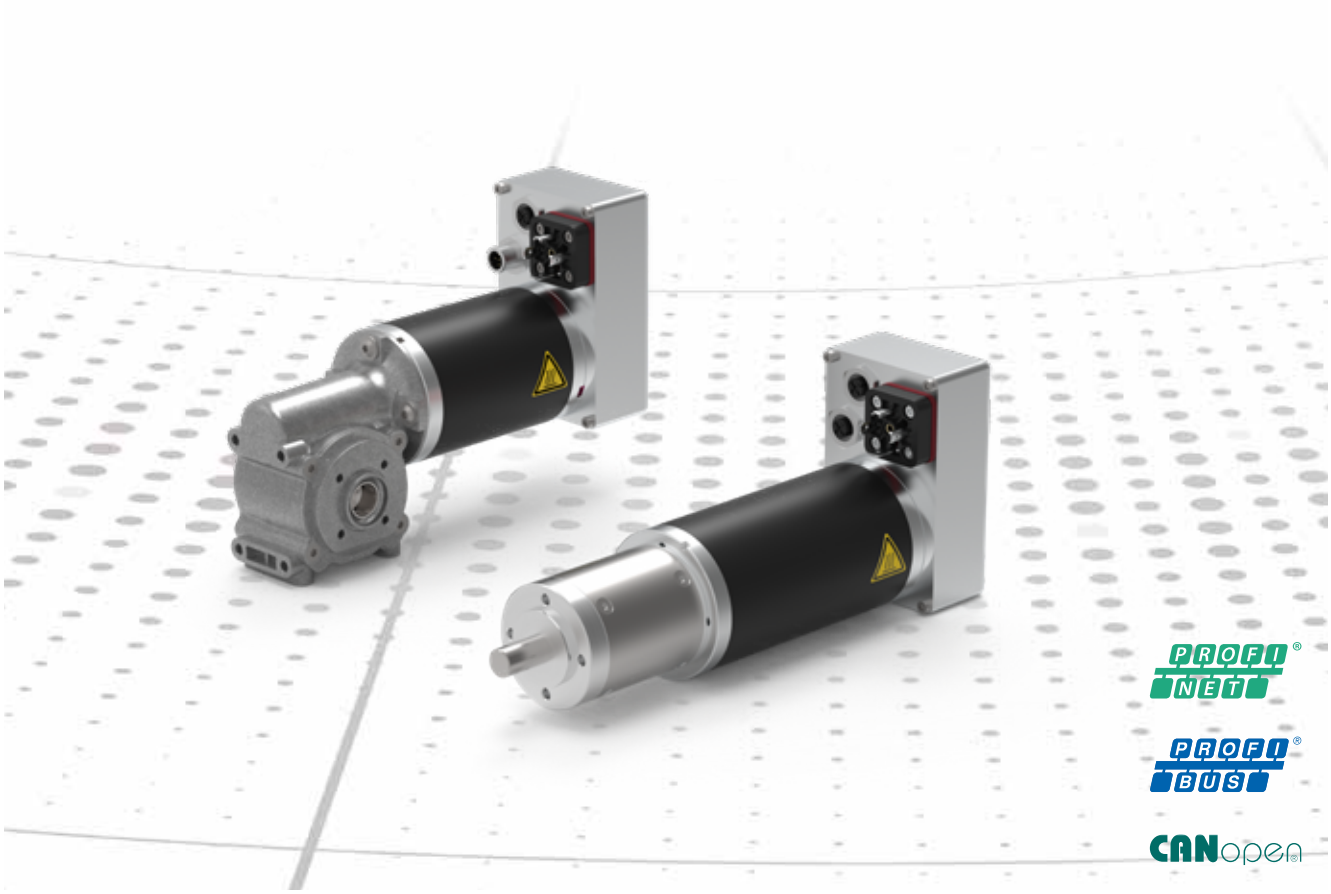
Actuating drive MA 055 … 130



Technical data		MA 055	MA 100	MA 130
Nominal voltage	VDC	24	24	48
Nominal torque S1 (S3)	Nm	0.14 (0.28)	0.27 (0.54)	0.32 (0.60)
Nominal power S1 (S3)	W	44 (67)	86 (141)	107 (235)
Nominal speed S1 (S3)	min^{-1}	3,000 (2,300)	3,050 (2,500)	3,750 (3,750)
Nominal current S1 (S3)	A	2.7 (5.5)	4.9 (11.0)	4.5 (8.0)
Inertia torque	gcm^2	400	750	750
Electric motor _ Technology _ Protection class		DC, brushed motor IP 40		
Encoder _ Technology _ Positioning resolution _ Positioning range _ Positioning accuracy		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65,536 revolutions ±0.7° / ±8 steps		
Options		Special voltages for large-scale production, NRTL approval according to UL 61800-5-1 and CSA C22.2 No.274		

Definitions

S1
Continuous operation

S3
Intermittent operation
25 %, 4 min
Make time 1 min
Cycle time 4 min

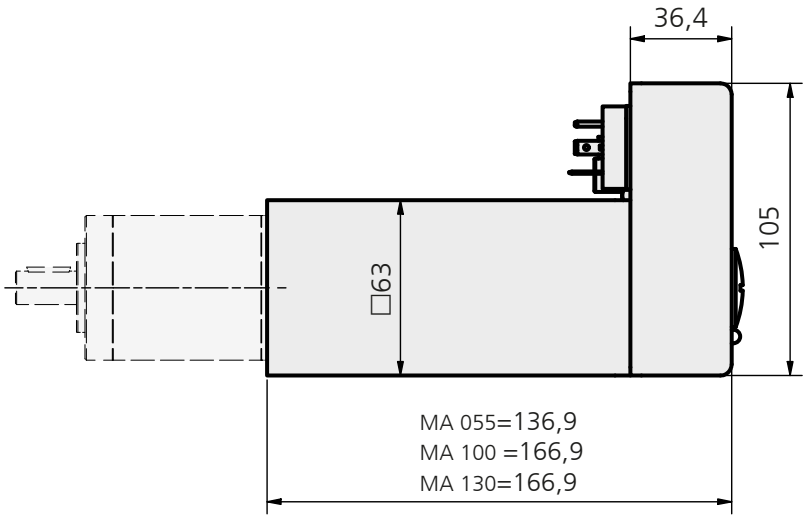
Actuating drive MA 055 … 130

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
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SG 80
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PLG 63
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SG 120
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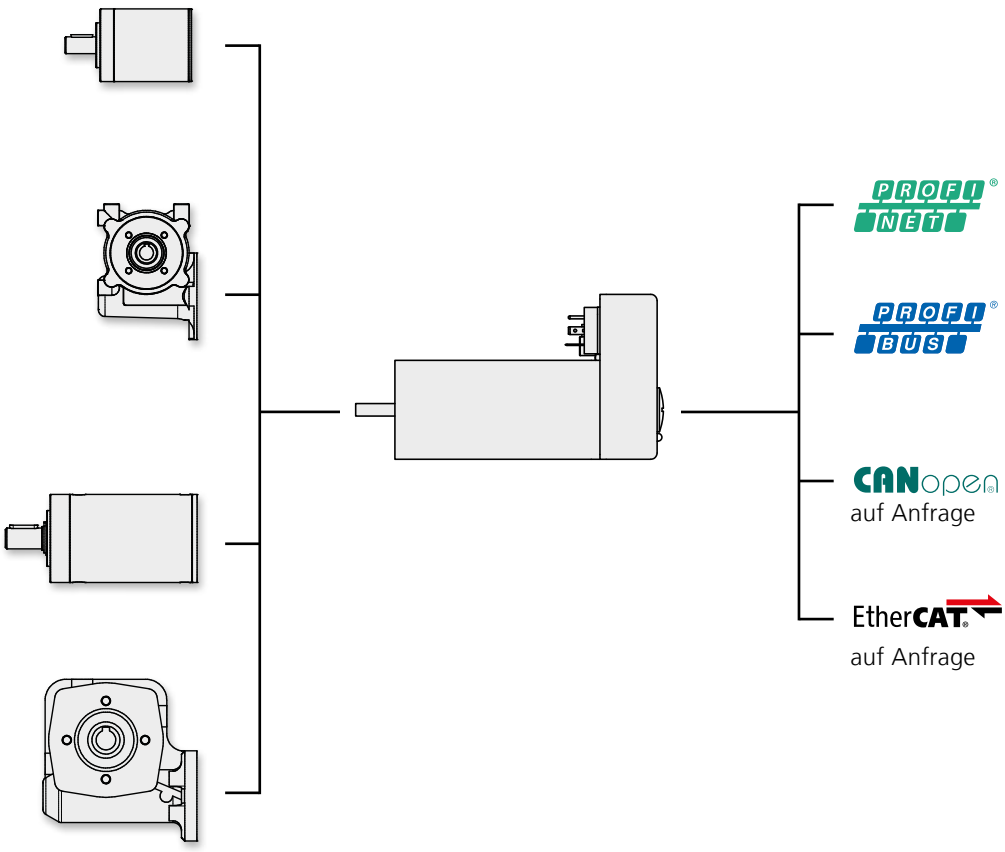

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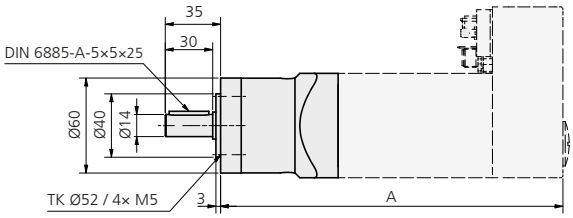
Precision gear for MP 202 and MP 282

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]



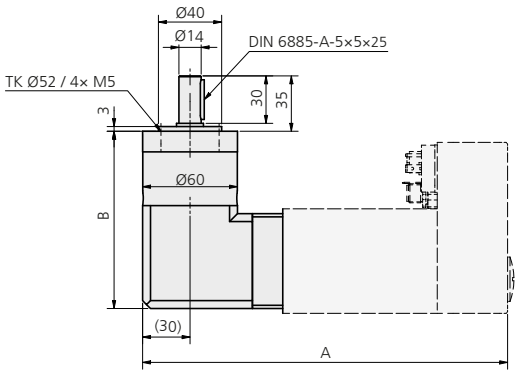
Gear		Dimension A [mm]: Drive variant			
Stage	Reduction	MP 202 withour brake	MP 202 with brake	MP 282 withour brake	MP 282 with brake
1	3, 4, 5, 7, 8, 10	218,8	253,2	230,2	263,2
2	12, 16, 20, 25, 32, 40	231,3	265,7	242,7	275,7
3	60, 80, 100, 120	243,8	278,2	255,2	288,2

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, 16, 20, 25, 32, 40	124.5
3	60, 80, 100, 120	137

Dimension A [mm]: Drive variant			
MP 202 without brake	MP 202 with brake	MP 282 without brake	MP 282 with brake
233,2	267,6	244,6	277,6

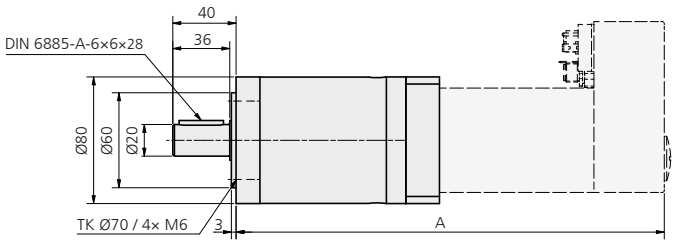
All gears provide maximum space for your design, thanks to the option of using any installation position and lifetime lubrication.

Planetary gear PLE 80

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

_ 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]



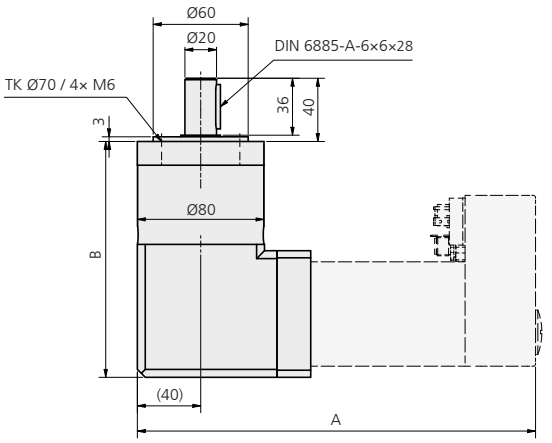
Gear		Dimension A [mm]: Drive variant			
Stage	Reduction	MP 202 withour brake	MP 202 with brake	MP 282 withour brake	MP 282 with brake
2	12, 16, 20, 25, 32, 40	255,6	290	267	284,5
3	60, 80, 100, 120, 200, 256	273,1	307,5	300	317,5

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, 16, 20, 25, 32, 40	161.5
3	60, 80, 100, 120, 200, 256	179

Dimension A [mm]: Drive variant			
MP 202 without brake	MP 202 with brake	MP 282 without brake	MP 282 with brake
254,1	288,5	265,5	298,5

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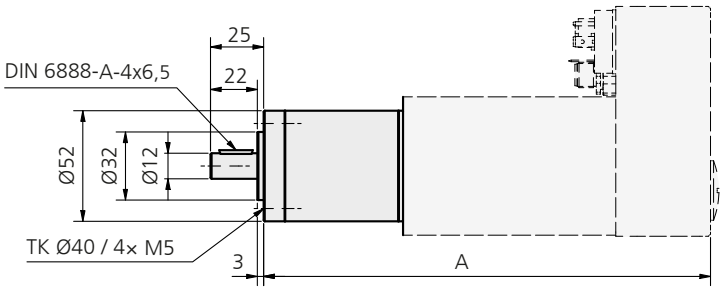
Standard gear for MA 055 … 130 and MP 062 … 182

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]



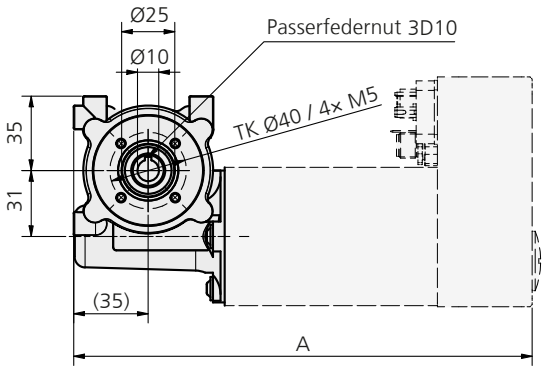
Gear		Dimension A [mm]: Drive variant					
Stages	Reduction	MA 055	MA 100…130	MP 062	MP 102	MP 142	MP 182
1	4.5, 6.25, 8	186.9	216.9	178.1	203.1	228.1	221.1
2	15, 20.25, 28.125, 36, 50	202.4	232.4	193.6	218.6	243.6	236.6
3	91.125, 126.5625, 162, 225	217.4	247.4	208.5	233.6	258.6	251.6

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 A [mm]: Drive variant					
Reduction		MA 055	MA 100 … 130	MP 062	MP 102	MP 142	MP 182
5, 10, 15, 24, 38, 50, 75		207.9	237.9	199.1	224.1	249.1	242.1

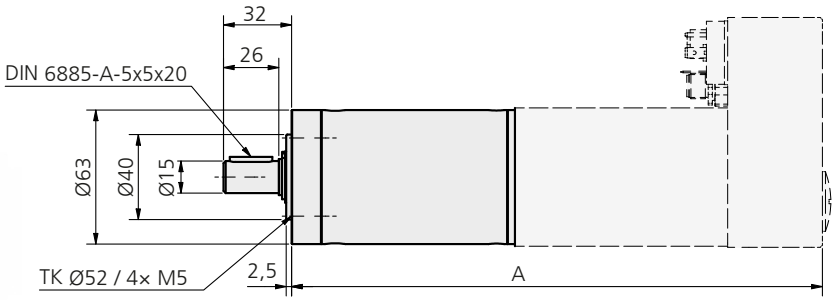
All gears provide maximum space for your design, thanks to the option of using any installation position and lifetime lubrication.

Planetary gear PLG 63

The PLG 63 is ideal for applications that require high torques and moderate backlash combined with good efficiency.

- High torque up to 100 Nm (S1)
- Backlash: 0.7 … 1.5°
- Efficiency: 90 … 73 %
- High permissible shaft forces: axial 800 N / radial 800 N

Dimensions [mm]



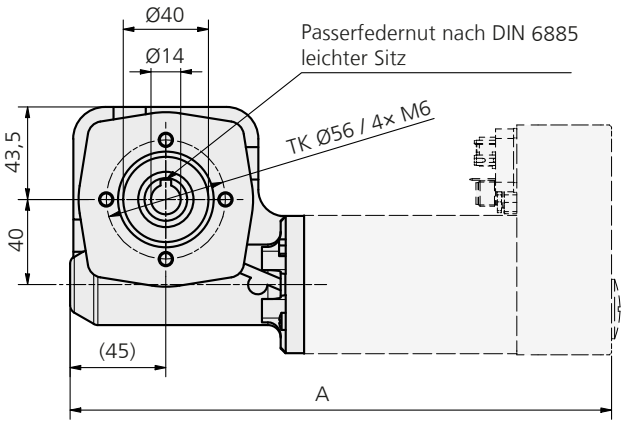
Gear		Dimension [mm]: Drive variant					
Stages	Reduction	MA 055	MA 100 … 130	MP 062	MP 102	MP 142	MP 182
1	3, 4, 7, 10	199.4	229.4	190.6	215.6	240.6	233.6
2	16.8, 29.4, 35, 42, 50, 70	219.9	249.9	211.1	236.1	261.1	254.1
3	70.56, 84, 100, 147, 175, 210, 250	241.9	271.9	233.1	258.1	283.1	276.1

Worm gear SG 120

The SG 120 is ideal for applications that require high torques with an orthogonal output shaft. 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.

- High torque up to 15 Nm (S1)
- Backlash: 0.5°
- Efficiency: 70 … 25 %
- Permissible shaft forces: axial 300 N / radial 500 N

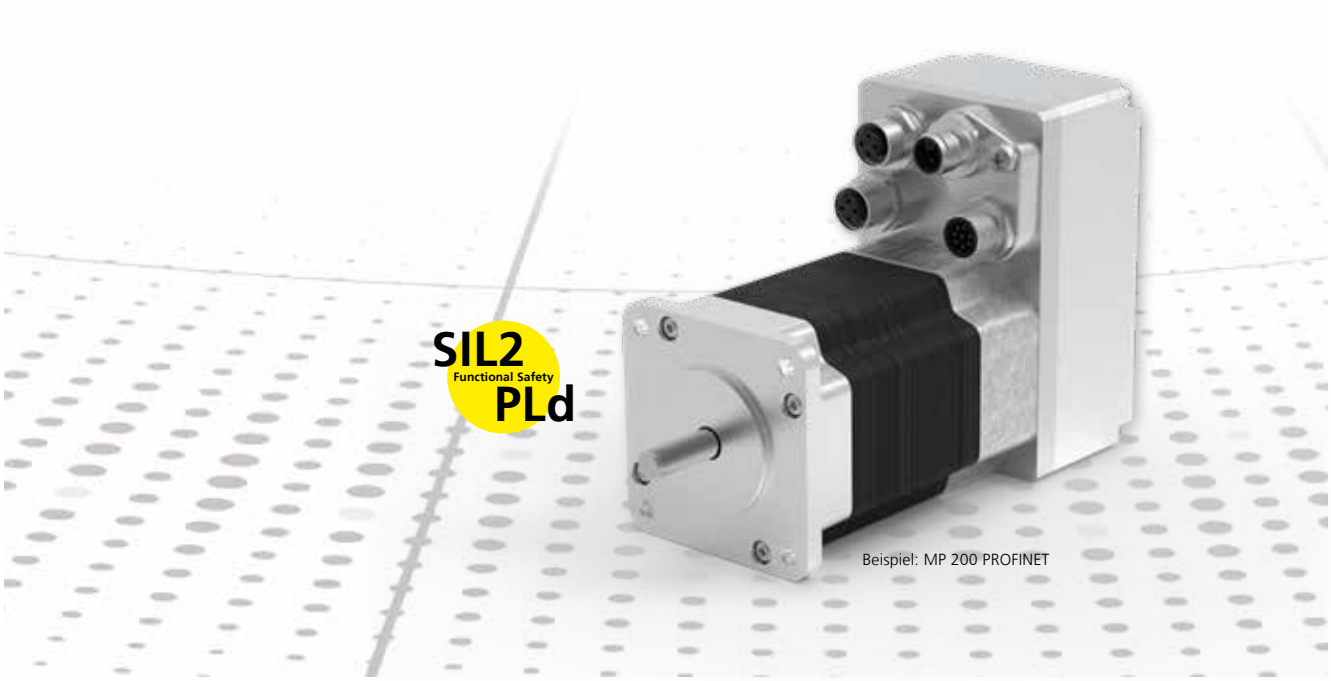
Dimensions [mm]



Gear	Dimension A [mm]: Drive variant					
Reduction	MA 055	MA 100 … 130	MP 062	MP 102	MP 142	MP 182
8, 10, 15, 20, 30, 40, 50, 60, 70, 80	246.9	276.9	238.1	263.1	288.1	281.1

Illustrations are principle representations. Binding dimensional drawings and CAD data for specific order numbers at www.tr-electronic.de or on request.

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** (**s**afe **t**orque **o**ff) or **SS1** (**s**afe **s**top **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

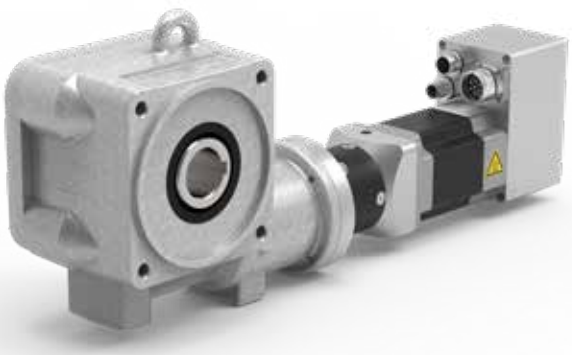
Extremely cost-efficient format adjuster with proprietary Ethernet protocol.

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 – easy change

PROFINET

The encoTRive drives with PROFINET use the same device profile as with PROFIBUS DP (PROFIdrive V3.0). When migrating from PROFIBUS to PROFINET, the control logic and the PZD configuration are retained. There are no adjustments to the PLC process. Furthermore, the functional scope of PROFIBUS is fully integrated in PROFINET. PROFINET also offers some additional functions. This concerns alarm telegrams in the event of a fault with shorter cycle times and also more addressable nodes.
Project planning is carried out with the same tools as for PROFIBUS. Thus, the change from PROFIBUS to PROFINET is purely a matter of communication technology.

PROFIBUS

The drive versions with PROFIBUS DP are based on the PROFIdrive V3.0 device profile, which allows free configuration of process data telegrams.
These are used for the cyclic exchange of recurrently used data, such as the target and actual position. In addition, acyclic data traffic is also possible, with which only rarely required parameters can be transmitted in a resource-saving manner. All common bit rates are accessible and are automatically set by means of a bus analysis.

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
_ Diagnosis via web server possible
_ Special operating mode: Round axis function with Rounding error correction

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

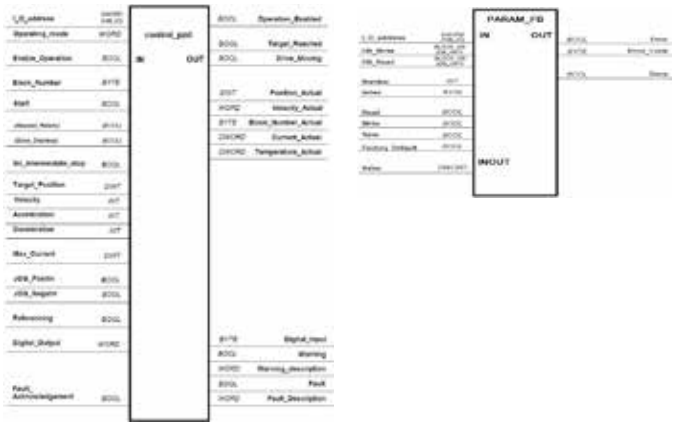
Technical Communication Data

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

Funktionsbausteine für PROFIBUS und PROFINET

With existing example function blocks all drive types can be put into operation without great effort.
These blocks are available for the Siemens TIA Portal and are implemented in SCL (Standard Control Language). The interfaces of the individual function blocks are identical for Profibus and Profinet.

	Description
Parameter DPV1	Block for parameterizing individual parameters via the acyclic data channel (DPV1)
Control PZD	Function block for commissioning and controlling the drive via the cyclic PZD channel (process data)



CANopen

The drive versions with CANopen are based on the device profile CiA DSP 402 - Drives and Motion Control. The device profile allows the free configuration of process data telegrams by PDO mapping of application objects.
The associated communication profile is CiA DS 301 - CANopen Application Layer and Communication Profile.

All common bit rates are accessible and are set via DIP switches. The fast exchange of process data is done via process data objects (PDO), the access to entries of the object dictionary via service data objects (SDO).

Features

_ cyclic and acyclic communication with PDO / SDO
_ freely configurable process data telegrams according to communication profile CiA DS 301
_ each transmission direction with up to 4 PD

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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