

# Intelligent compact drives



### Exemption note

We expressly point out that the details, measurement values and tolerances provided in the drawings are not binding. They are subject to technology and design modifications. Their only objective is to illustrate the product. Please contact our sales and distribution team if you need a concrete offer with a binding drawing.

# encoTRive

## Progress – Decentralized and Intelligent

A wide variety of products, smaller batch sizes and the individualization of production are the main requirements of progressive machines. In order to fulfill these demands, while market prices are static or even shrinking, and personnel costs are rising, automation technology must be used exhaustively. It must go beyond the actual production process

and enter secondary functions such as setup and material supply tasks. encoTRive fills the gap between fieldbus and drive technology. It is a compact device containing motor, power electronics, fieldbus communication, closed-loop controller and an absolute measuring system as well as optional I/O and brake.

# Contents

## General

Drive technology	6/7
Design – MD, MP, MA	8/9
Combinations – drives, components	10/11

## Drives

Process drive – MD 300	12/13
Positioning drive – MP 200	14/15
Positioning drive – MP 220 /-280	16/17
Positioning drive – MP xxx (060, 100, 140, 180)	18/19
servo drive – MA xxx (055, 100, 130)	20/21
Precision Gears – MD 300, MP 200/220/280	22/23

## Gear variants (worm, planetary, angular planetary gears)

Enhanced Precision Gears for MD 300, MP 200/220/280	24/25
_ Planetary gear PLE 80	
_ Angular planetary gear WPLE 80	
Simple gear for MP xxx, MA xxx	26/27
_ Planetary gear PLG 52	
_ Worm gear SG 80	
_ Worm gear SG 80 H	
Reinforced simple gear for MD xxx, MP xxx, MA xxx	28/29
_ Planetary gear PLG 63	
_ Worm gear SGF 80	
_ Worm gear SGF 120 H	

## Interfaces

Features – PROFIBUS, PROFINET	30
Features – CANopen	31

## Accessories and options

Device-Tool (EDT) – Parameterization and diagnosis tool	32
PC-USB-to-CANopen converter – for the EDT	33
PROFIBUS hand-held operator panel – for MD drives	34
Demo kit and function blocks – for S7	35

## General

Product overview – your automation partner	36/37
Addresses – sales in Germany and international	38/39

## Performance

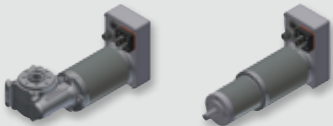
### Actuating Drive

#### As auxiliary drive for adjusting ...

- \_ dimensions
- \_ guide rails
- \_ stops
- \_ valves, dampers and sliders

#### To use in ...

- \_ folding machines
- \_ thermoforming machines
- \_ cardboard gluing machines
- \_ component mixing systems



**actuating drive: MA**  
page 20 ... 21

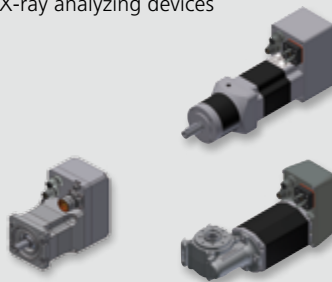
### Positioning Drive

#### As auxiliary or main drive for ...

- \_ cyclic format adjustments
- \_ dynamic rough settings
- \_ fine adjustments
- \_ speed

#### To use in ...

- \_ wood working machines
- \_ package ejection machines
- \_ profile measuring machines
- \_ X-ray analyzing devices



**positioning drive: MP**  
page 14 ... 19

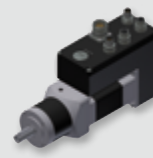
### Processing Drive

#### As main drive for ...

- \_ precise positioning
- \_ a synchronized and cyclic transfer
- \_ sensor coupled position measurement
- \_ application optimized portal systems

#### To use in ...

- \_ accurate grinding machines
- \_ inspection machines
- \_ tool controlling modules
- \_ tire testing facilities



**processing drive: MD**  
page 12 / 13

from ... up to ...

P	Controller structure	PID
1.000 min <sup>-1</sup> per s	Dynamics	10.000 min <sup>-1</sup> per s
20 ms	Real time	2 ms
1 – 2°	Accuracy	20 arcmin
without	Inputs and outputs	programmable
1.000 h	Life time	30.000 h

## TR-Electronic – Helps You to Face the Challenges of Market

TR-Electronic – Helps You to Face the Challenges of Knowing and reacting to the demands of the market is the key to success. Today, innovative drive technology has to transfer technology trends and specific user requirements into new products. Aspects like mechatronics, electronics and software must be custom-fit and industry-sector-specific. The challenges is to increase machine productivity, while simplifying the design and operation.

In combination with automation technology, the encoTRive intelligent positioning and actuating drives maximise the innovative potential of modern machinery or retrofitting. Our encoTRive integrates and tunes all important required electrical, electronic and mechanical components. encoTRive is a fully functional drive unit ready to be connected. The advantage of using decentralized drive technology is felt when realizing modular concepts, retrofits, making acquisitions or when used in machines and equipment where large measurements occur. Both aspects of innovation – automation and integration – enable progressive machine concepts. Besides the already automated main processes, the auxiliary

functions have to be electromotive automated. This demands new and integrated drive technology concepts. Standardization and fieldbus systems play a dominant role.

To create a perfect combination of innovation, increased performance and flexibility, you have to be able to choose from a variety of multiple drive configurations and you must be able to make optimal changes between those configurations. For this purpose, we designed and adapted the variety of the individual encoTRive models. The wide range of applications go from simple tasks for the actuating drives up to complex highly accurate tasks for positioning drives.

### Decentralized Drive Technology with encoTRive

The name encoTRive is the brand for our complete drive technology product line. It is derived from the two components **absolute Encoder and DRive**, modified and exchanged with our company abbreviation **TR**.

---

**Integration** is the first trademark. Enclosed are the power and positioning electronics, zero voltage safe encoder, fieldbus technology and gear. It is also available with optional holding brake and different I/O.

**Variety Diversity** is the second trademark. This is due to the diverse electronic functionality, numerous gear ratios and a wide range of gear types. Further options include radial or axial shaft, solid or hollow shaft, a moderate backlash or backlash-free. This is accomplished by using a planetary, worm or special gears.

**Cross-Range Compatibility** is the third trademark. All series are based on a common software platform. Only the MD and MP series differ in their absolute encoder and electronics. However, they use an identical platform and use the same electric motor and gear box.

### MD 300, Version PROFIBUS



Individual models are constructed for application categories. For automation tasks with different requirements we offer drives with optimal performance levels.

- \_ **Actuating Drive MA (Stellantriebe)**
- \_ **Positioning Drive MP (Positionierantriebe)**
- \_ **Drive in Core Process MD (Prozessantriebe)**

This structure is supported by a standard platform in the implementation of firmware, interfaces and bus. In practice

this means, there is considerably less effort in engineering and maintenance. System costs and installation times decrease as well. Available bus systems are: PROFIBUS, PROFINET and CANopen, enhanced through busses based on newer EtherNet technologies.

The encoTRive series opens with its standard decentralized concept, a new level of automation technology that applies all mechanical engineering applications, in particular in industries like packaging, press, wood, glass, print, plastics, textile and machine tools.

---

## Series Features

- \_ design according to application classification
- \_ implementing software platform
- \_ position measurement with fail-safe multi turn absolute encoder
- \_ integration into a mechatronic system
- \_ variant diversity through modularity
- \_ operating modes, positioning and speed control
- \_ control completely decentralized within the drive

## Working Features

- \_ high resolution, 1.024 or 4.096 steps per revolution
- \_ long range, 4.096 or 65.536 revolutions
- \_ precise positioning up  $\pm 2$  increments
- \_ smooth running even at low speed
- \_ limitable with software limit switch
- \_ set parameters according to bus standards

## Design of MD, MP and MA series

Based on its standard products, TR also develops customer- and application-specific drives. The series range from simple modifications, for example in plug connectors, to drives with new drive motors and additional bus interfaces.

- 10 different electric motors
- 11 gear types (axial and rectangular shaft output)

### Electronics and drives of the MD series

The absolute encoder and the electronics are arranged in extension of the motor axis and on the side of the motor.

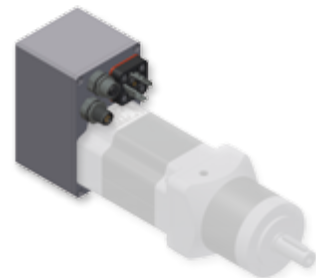
The connector cover accommodates not only the bus interface but also the application module for PROFIBUS and PROFINET. There is 1 standard M23 connector for power, logic and holding brake. In addition, there are 4 M12 connectors for bus IN/OUT and digital I/O. A sixth connector serves for communication with a PC featuring an RS-232 interface.



### Electronics and drives of the MP series

The absolute encoder and the electronics are arranged in extension of the motor axis.

The electronics is simpler in its design and features less functionality than the MD series. The electronics housing is smaller as well. As a result, there is less output power during continuous operation. During intermittent operation or short-time operation, the same output and the same torque are available, but they are limited to shorter make and cycle times.



### Electronics and drives of the MA series

The electronics is especially configured for short-time operation and moderate intermittent operation. The electric motors are brushed DC motors.

The absolute encoder and the electronics of the MA 025 are arranged in extension of the output shaft of the gear. The measurement involves the position of the gear shaft. The series features two defined types each with a driving torque of 2 and 4 Nm.

The absolute encoder and the electronics of the MA xxx (-055/ -100/ -130) are attached to the electric motor. This series features different power stages, torques and gear types.





### **Detachably mounted gears with coupling and clamping hub**

Most of the precision gears are mounted to the electric motor such that they can be detached. This is the most flexible solution for project businesses, special machine building, and medium-size series.

Gear types range from economy planetary gears to low-backlash servo gears. Driving torques of up to 180 Nm are accessible for reinforced gears.



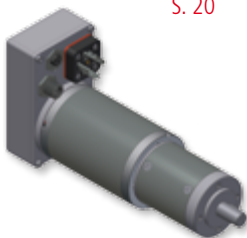
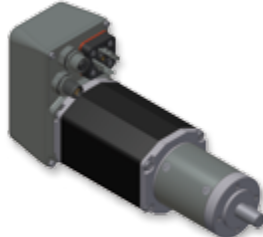
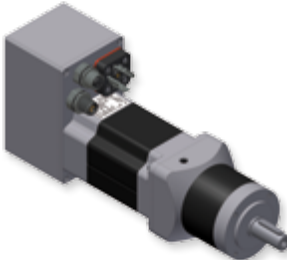

### **Non-detachably mounted gear with direct connection**

All simple gears are permanently mounted to the electric motor. Coupling, clamping hub, gearbox flange and gearbox bearing are not applicable. For this purpose, the shaft of the electric motor features a pinion which couples directly to the first stage of the gear.








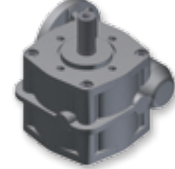




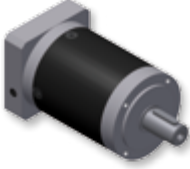
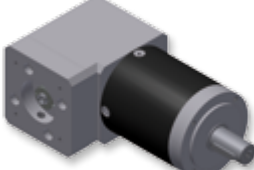

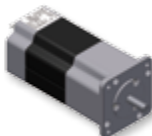

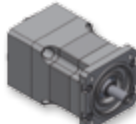
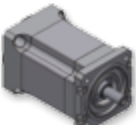
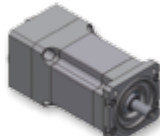
The gear types available are planetary gears and worm gears. The output direction of the gear shaft of drives with worm gear is set to one of the four possible directions.



# Collection of drive series

	Electronics	MA	MP	MD
<p><b>DC</b> (brushed)</p> <p><b>PROFIBUS</b> <b>CANopen</b> <b>PROFINET</b> <b>EtherCAT</b></p>		<p>MAxxx S. 20</p> 		
<p><b>EC</b> (electronically commutated)</p> <p><b>PROFIBUS</b> <b>PROFINET</b> <b>CANopen</b> <b>EtherCAT</b></p>			<p>MP xxx S. 18</p> 	
<p><b>EC</b> (electronically commutated)</p> <p><b>PROFIBUS</b> <b>PROFINET</b> <b>CANopen</b> <b>EtherCAT</b></p>			<p>MP200 S. 14</p> <p>MP220/280 S. 16</p> 	<p>MD 300 S. 12</p> 

# Possible component combinations

Motors		Gears		
 055  100  130		<b>Simple gears</b> <b>Standard</b>  PLG 52 <i>S. 26</i>  SG 80 H <i>S. 26</i>  SG 80 WL1 <i>S. 26</i>		<b>Reinforced</b>  PLG 63 <i>S. 28</i>  SGF 120 H <i>S. 28</i>  SGF 120 WL1 <i>S. 28</i>
 060  100  140  180		<b>Precision gears</b> <b>Standard</b>  PLE 60 <i>S. 22</i>  WPLE 60 <i>S. 22</i>		<b>Reinforced</b>  PLE 80 <i>S. 24</i>  WPLE 80 <i>S. 24</i>
 200 <b>without break</b>  <b>with break</b>  220 <b>without break</b>  <b>with break</b>  280 <b>without break</b>  <b>with break</b>				

# Process drive MD 300

The MD 300 series features comprehensive electronic functions and high-quality gears. Various gear series are available in several overall sizes and reductions.

The drives that can be configured based on these gears can be used as process drives or as auxiliary drives when special requirements must be met with regard to electronics, accuracy and mechanical flexibility.

This type series is particularly suited for special machine building where machine configurations are constantly changing, from quantities of 1 piece to medium-size series.



### Fits perfect

- \_ for precise positioning
  - \_ for cyclic and pulsed positioning
  - \_ for simultaneous use of decentralized I/Os
- \_ in machine tools
  - \_ in inspection machines
  - \_ in special machines

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 <sup>-1</sup>	2,175 (1,550)	4,350 (3,100)
Nominal current S1 (S3)	A	8.0	7.6
Inertia torque	g cm <sup>2</sup>	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			
Gear		Planetary gear / angular planetary gear	
_ Type		3 ... 512	
_ Reductions		up to 44 (70) Nm, reinforced up to 120 (192) Nm	
_ Torques S1 (S3)			
Interfaces		(V0/V1)                      (IO)                      (402)	
		RS-232, logic I/O module, limit switch	
Options		Holding brake, hand-held operator panel	
Brake chopper		Power 50 W, pulse energy 35 Ws	

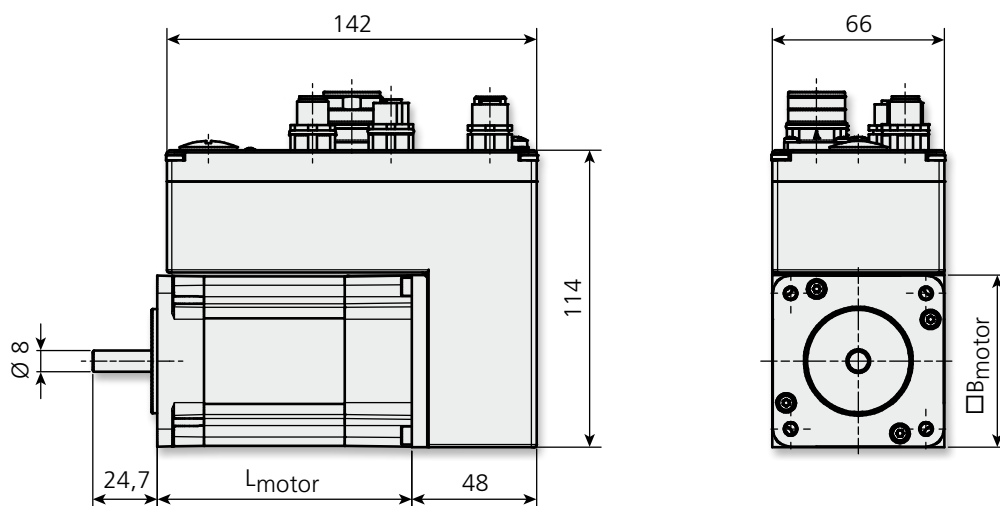
### Definitions

- S1**  
Continuous operation
- S3**  
Intermittent operation  
25 %, 10 min  
Make time 2.5 min  
Cycle time 10 min  
Max. torque 1.10 Nm

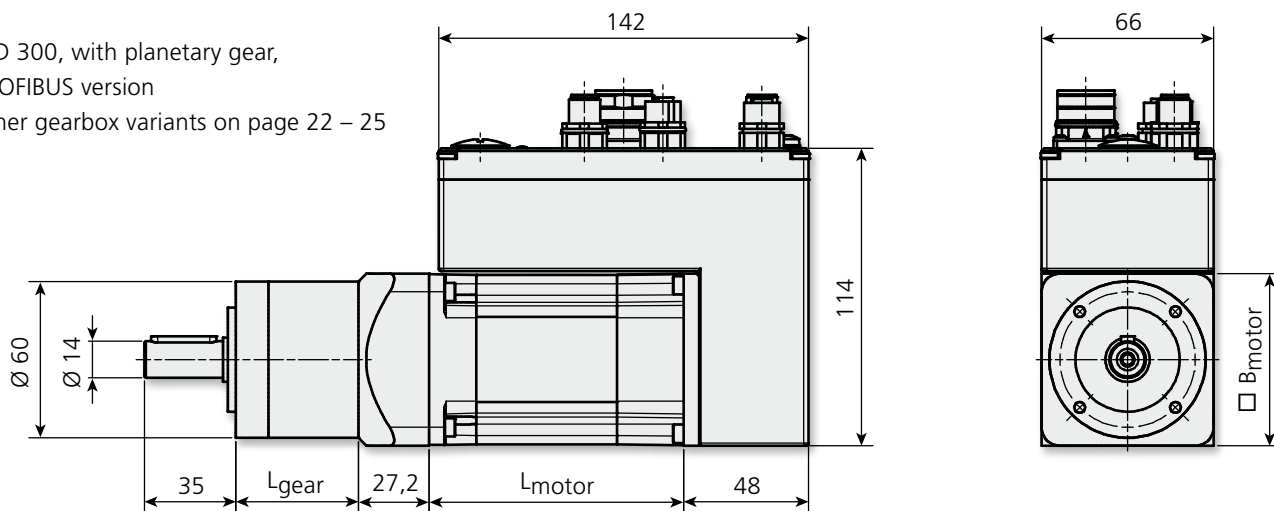
**True absolute encoder**  
Fail-safe position information through electromechanical principle of measurement

# Drawings

MD 300, without gear,  
PROFIBUS version



MD 300, with planetary gear,  
PROFIBUS version  
other gearbox variants on page 22 – 25



## Motor design

Brake	L <sub>motor</sub>	B <sub>motor</sub>
no	97,6 mm	□ 66 mm
yes	132 mm	□ 67 mm

## PLE 60 gear design

Gear stages	L <sub>gear</sub>
1	47 mm
2	59,5 mm
3	72 mm

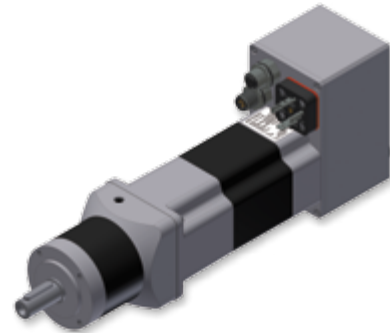
Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.

# Positioning drive MP 200

The MP 200 series features numerous electronic functions and high-quality gears. Various gear series are available in several overall sizes and reductions.






The drives that can be configured based on these gears can be used as positioning drives or as auxiliary drives when special requirements must be met with regard to accuracy and mechanical flexibility.

This type series is particularly suited for special machine building where machine configurations are constantly changing, from quantities of 1 piece to medium-size series.



### Fits perfect

- \_ for demanding positioning
- \_ for precise format setting
- \_ for high-precision pulsed positioning
- \_ in transfer lines
- \_ in testing devices
- \_ in special machines

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 <sup>-1</sup>	2,175 (1,550)	4,350 (3,100)
Nominal current S1 (S3)	A	5.2	4.8
Inertia torque	g cm <sup>2</sup>	512 (612 with holding brake)	
<b>Electric motor</b>		EC, electronically commutated motor	
_ Technology		IP 54, motor shaft IP 41	
_ Protection class			
<b>Encoder</b>		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			
<b>Gear</b>		Planetary gear / angular planetary gear	
_ Type		3 ... 512	
_ Reductions		up to 44 (70) Nm, reinforced up to 120 (192) Nm	
_ Torques S1 (S3)			
<b>Interfaces</b>		 (V0/V1)  (402)	
		 (IO) 	
<b>Options</b>		Holding brake 	

### Definitions

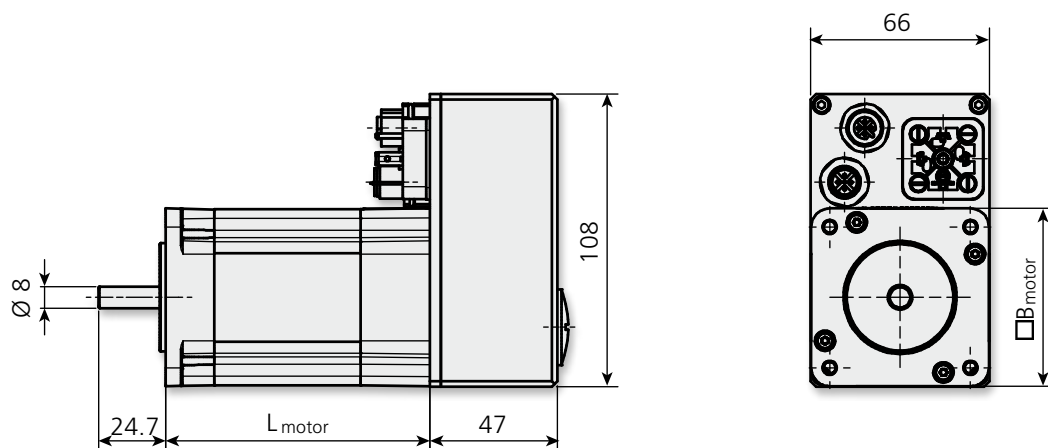
**S1**  
Continuous operation

**S3**  
Intermittent operation  
25 %, 4 min  
Make time 1 min  
Cycle time 4 min  
Max. torque 1.10 Nm

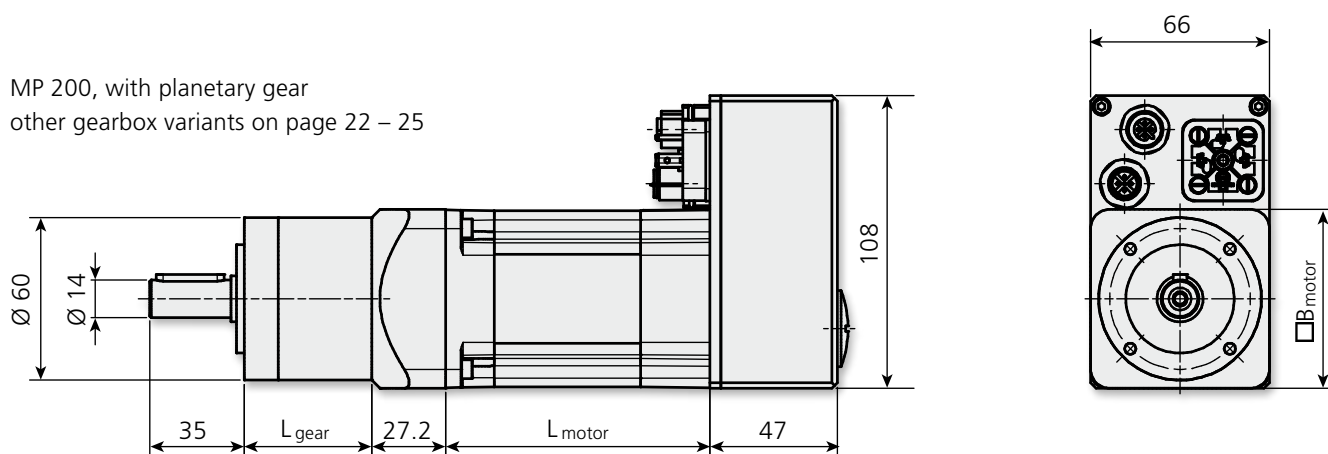
**True absolute encoder**  
Fail-safe position information through electromechanical principle of measurement

# Drawings

MP 200, without gear



MP 200, with planetary gear  
other gearbox variants on page 22 – 25



## Motor design

Type series	L <sub>motor</sub>	B <sub>motor</sub>
no	97,6 mm	□ 66 mm
yes	132 mm	□ 67 mm

## PLE 60 gear design

Gear stages	L <sub>gear</sub>
1	47 mm
2	59,5 mm
3	72 mm

Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.



# Positioning drive MP 220 / 280

MP 280 complements the MP 200 series with a model with a peak torque of 2 Nm. MP 220 is a much shorter version of the MP 200 with standard torque. MP220 / 280 can be offered with the same gearbox as the MP 200 series - only the motor-side geometry is adapted to the modified motors. With MP 280, applications are in reach that require a high torque during short time. As with the MP-200, many gearbox types are available: The perfect solution for special machine construction or for use in machines with multiple applications.



### Fits perfect

- \_ vertical positioning
  - \_ acceleration of heavy loads
  - \_ to overcome initial friction
- \_ woodworking machines
  - \_ packaging machines
  - \_ in assembly and handling units

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 <sup>-1</sup>	4.000 (4.000)	4.000 (4.000)
Nominal current S1 (S2)	A	4,5 (16)	4,5 (20)
Inertia torque	g cm <sup>2</sup>	360	700
<b>Electric motor</b>		EC, electronically commutated motor IP 54, motor shaft IP 41	
_ Technology _ Protection class			
<b>Encoder</b>		Absolute encoder, multi turn 0.088° / 4,096 steps per revolution 65,536 revolutions ±0.7° / ±8 steps	
_ Technology			
_ Positioning resolution			
_ Positioning accuracy			
<b>Gear</b>		Planetary gear / angular planetary gear 3 ... 512 up to 44 (70) Nm, reinforced up to 120 (192) Nm	
_ Type			
_ Reductions			
_ Torques S1 (S3)			
<b>Interfaces</b>		 (V0/V1) <b>CANopen</b> (402)  (IO)	
<b>Options</b>		Haltebremse	

### definition

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

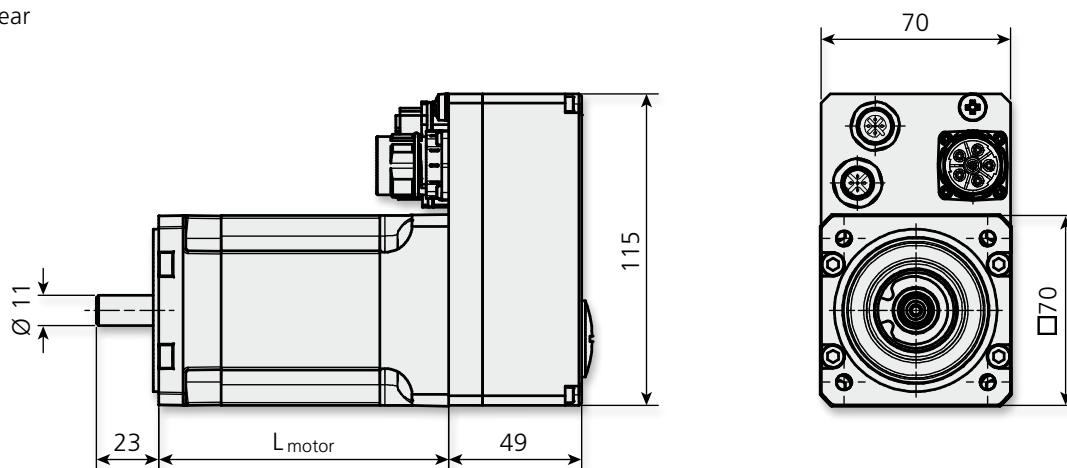
### True absolute encoder

Fail-safe position information through electromechanical principle of measurement

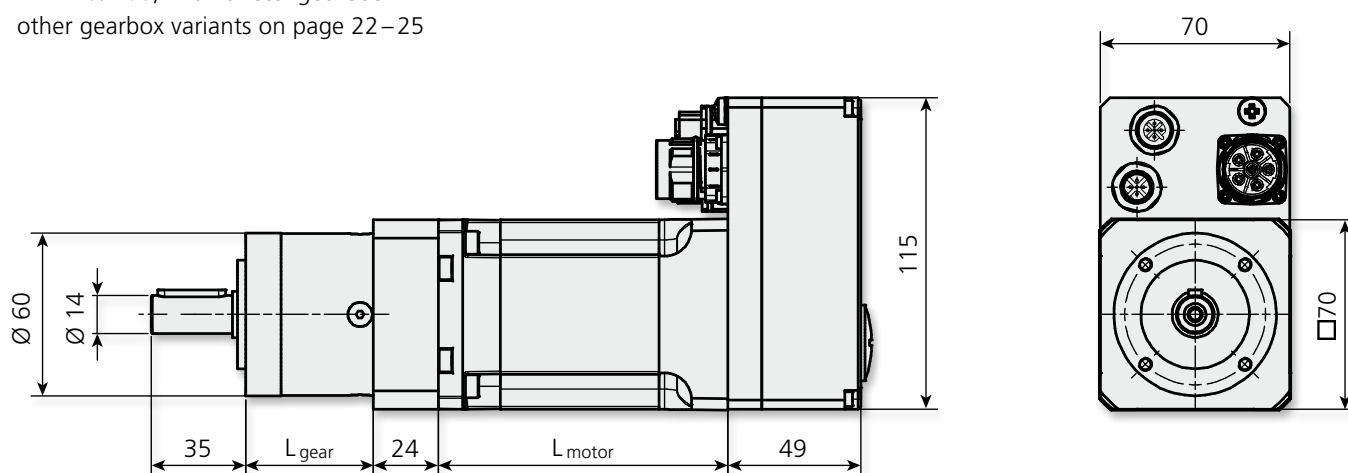


# Drawings

MP 220/280, without gear



MP 220/280, mit Planetengetriebe  
other gearbox variants on page 22 – 25



Motor design MP 220

break	L <sub>motor</sub>
yes	108,5 mm
no	75,5 mm

Motor design MP 280

break	L <sub>motor</sub>
yes	140 mm
no	107 mm

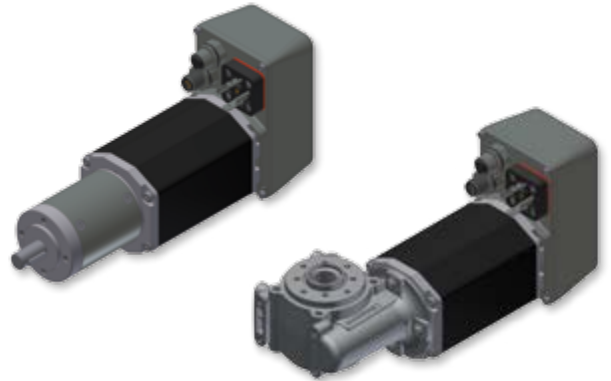
PLE 60 gear design

Gear stages	L <sub>gear</sub>
1	47 mm
2	59,5 mm
3	72 mm

Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.




# Positioning drive MP xxx (-060, -100, -140, -180)

The MP xxx series is characterized by numerous electronic functions and simple gears. The gears available are planetary and worm gears in several overall sizes and reductions. The drives that can be configured based on these gears can be used as positioning drives or as auxiliary drives when simple requirements must be met with regard to electronics and mechanics. This type series is particularly suited for mass production with defined drive configurations.



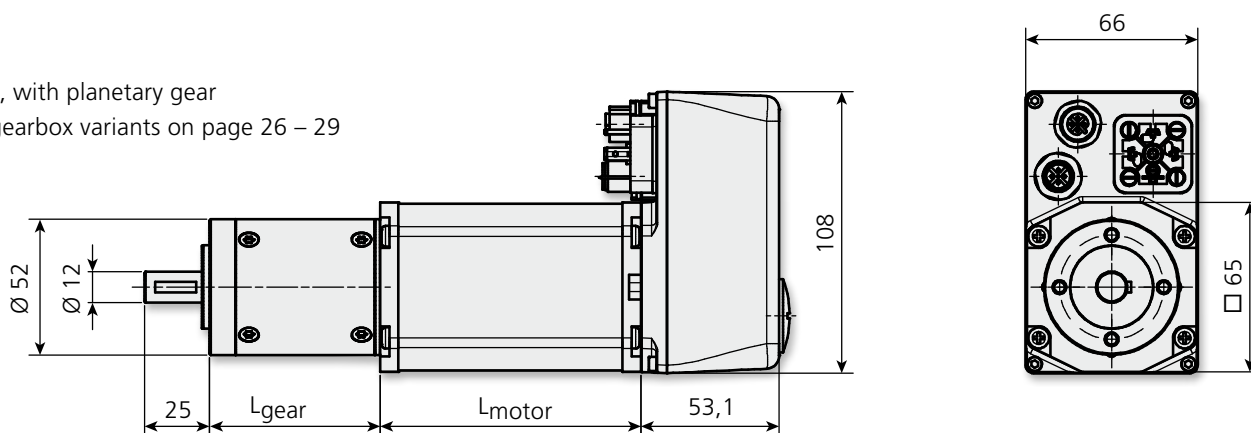
### Fits perfect

- \_ for easy positioning
  - \_ for coarse format setting
  - \_ for high-precision constant travel
- \_ in handling systems
  - \_ in assembly devices
  - \_ in special machines

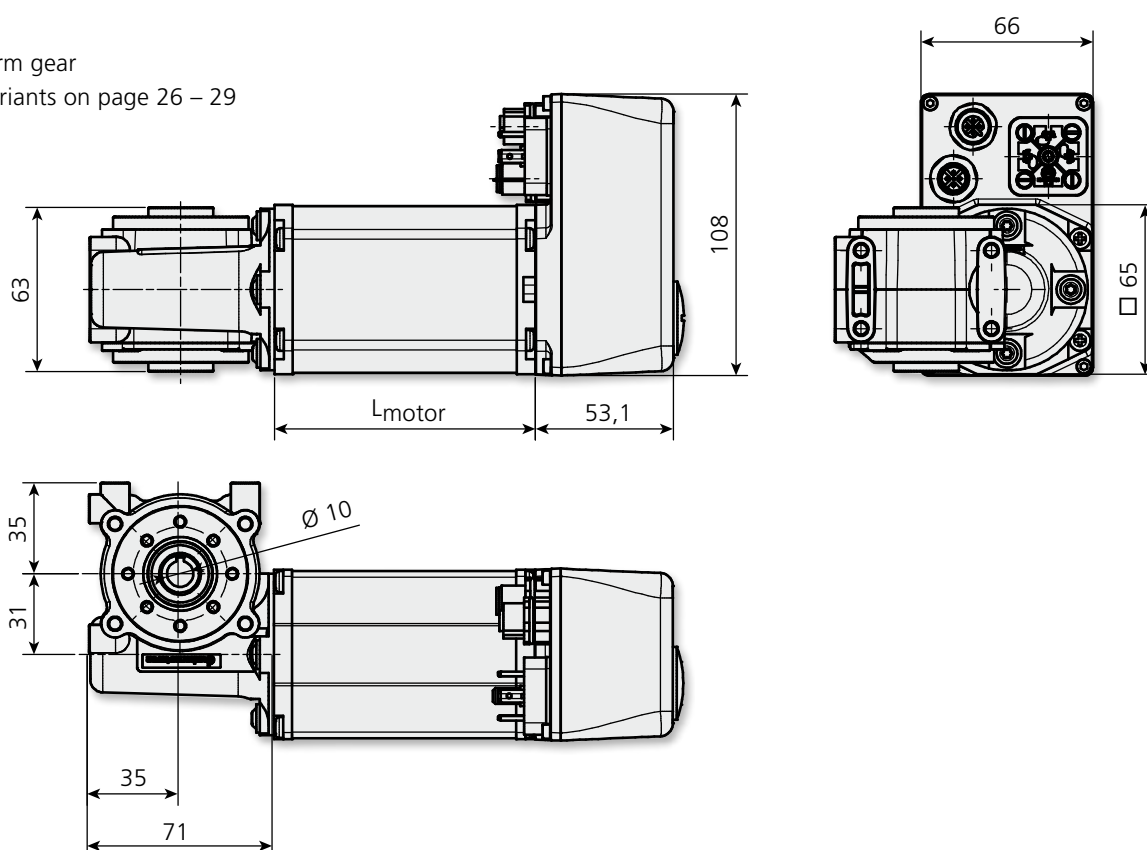
Technical data		MP 060	MP 100	MP 140	MP 180
Nominal voltage	VDC	24	24	42	24
Nominal torque S1	Nm	0.17	0.26	0.40	0.49
Nominal power S1	W	55	84	120	166
Nominal speed S1	min <sup>-1</sup>	3,080	3,090	2,860	3,240
Nominal current S1	A	4.0	5.6	4.5	9.5
Inertia torque	gcm <sup>2</sup>	72	128	172	129
<b>Electric motor</b>		EC, electronically commutated motor with neodymium magnet IP 50			
_ Technology					
_ Protection class					
<b>Encoder</b>		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					
<b>Gear</b>		Planetary gear / worm gear 4.5 ... 512/5 ... 75, reinforced 3 ... 710 / 8 ... 80 up to (24/10) Nm, reinforced up to (100/30) Nm			
_ Type					
_ Reductions					
_ Torques S1 (S3)					
<b>Interfaces</b>		 (V0/V1)  (IO)                    CANopen (402)			
<b>Options</b>		Special voltages for large production series 			

# Drawings

MP xxx, with planetary gear  
other gearbox variants on page 26 – 29



MP xxx, with worm gear  
other gearbox variants on page 26 – 29



## Motor design

Type series	L <sub>motor</sub>
MP 060	75 mm
MP 100	100 mm
MP 140	125 mm
MP 180	118 mm

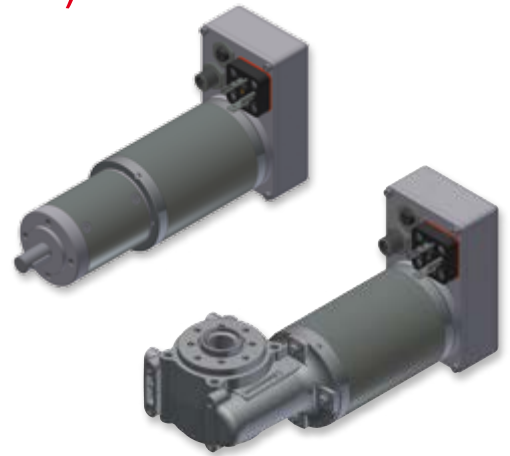
## PLG 52 gear design

Gear stages	L <sub>gear</sub>
1	50 mm
2	65,5 mm
3	80,5 mm

Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.

# Servo drive MA xxx (-055, -100, -130)

The MA xxx series is characterized by simple electronic functions and simple gears. The gears available are planetary and worm gears in several overall sizes and reductions. The drives are designed for occasional adjustment tasks when simple requirements must be met with regard to electronics, mechanics and service life. The MA xxx series is particularly suited for mass production with defined drive configurations.



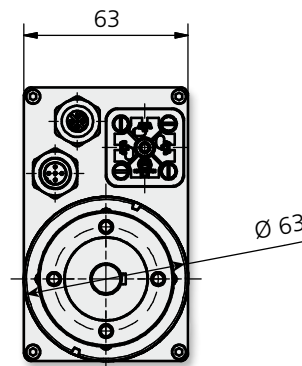
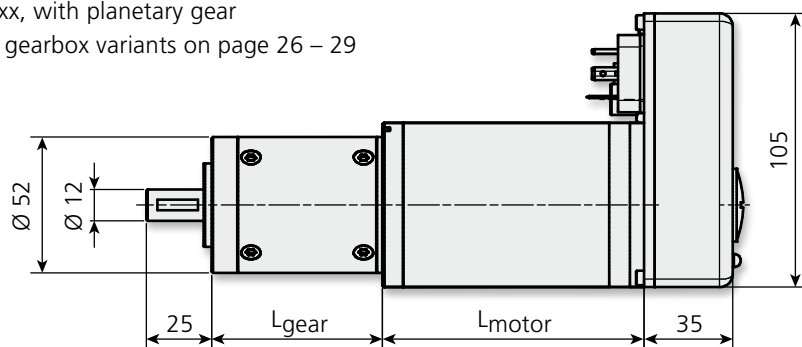
### Fits perfect

- \_ for setting stops
  - \_ for positioning guide rails
  - \_ for aligning spray nozzles
- \_ in woodworking machines
  - \_ in packaging machines
  - \_ in coating machines

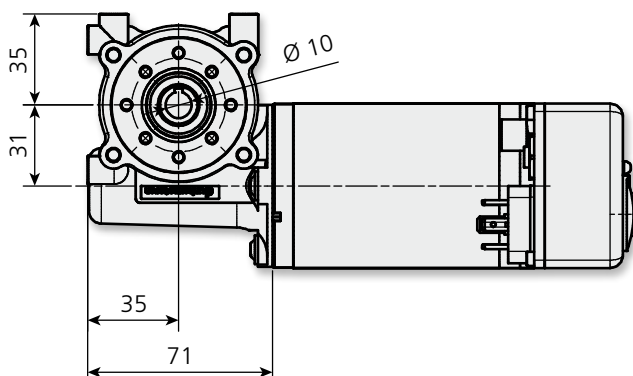
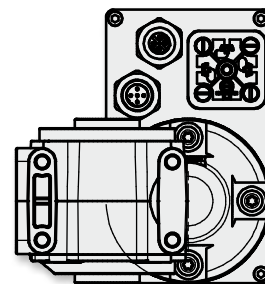
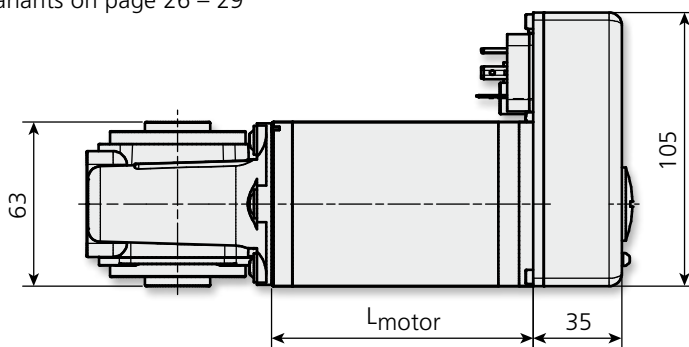
Technical data		MA 055	MA 100	MA 130
Nominal voltage	VDC	24	24	48
Nominal torque S1	Nm	0.14	0.27	0.32
Nominal power S1	W	44	86	107
Nominal speed S1	min <sup>-1</sup>	3,000	3,050	3,750
Nominal current S1	A	2.7	4.9	4.5
Inertia torque	gcm <sup>2</sup>	400	750	750
<b>Electric motor</b>		DC, brushed motor IP 50		
_ Technology				
_ Protection class				
<b>Encoder</b>		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				
<b>Gear</b>		Planetary gear / worm gear 4.5 ... 512/5 ... 75, reinforced 3 ... 710 / 8 ... 80 up to (24/10) Nm, reinforced up to (100/30) Nm		
_ Type				
_ Reductions				
_ Torques S1 (S3)				
<b>Interfaces</b>		(V0/V1) <b>CANopen</b> (402) (IO) <b>EtherCAT</b>		
<b>Options</b>		Special voltages for large production series		

# Drawings

MA xxx, with planetary gear  
other gearbox variants on page 26 – 29



MA xxx, with worm gear  
other gearbox variants on page 26 – 29



## Motor design

Type series	L <sub>motor</sub>
MA 055	95 mm
MA 100	125 mm
MA 130	125 mm

## PLG 52 gear design

Gear stages	L <sub>gear</sub>
1	50 mm
2	65,5 mm
3	80,5 mm

Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.

## Precision Gears for MD 300, MP 200 / 220 / 280

### Planetary Gear PLE 60

Permanent Operation/Periodic Duty up to 44/70 Nm

The PLE 60 is the perfect economical alternative to servo planetary gears. The motor and gear are connected with a detachable coupling and clamping hub. Friction losses are negligible. The gear is suitable for all applications in where it is adequate to have a backlash of approximately 15 arcmin.

#### Features

- \_ low backlash (10-12-15 arcmin), (1-2-3)-stage
- \_ high level of efficiency (96-94-90 %), (1-2-3)-stage
- \_ high admissible shaft forces (600/500) N, (axial/radial)



up to 44/70 Nm

- \_ high short-term overload factor 1,60
- \_ arbitrary mounting position
- \_ lifetime lubrication

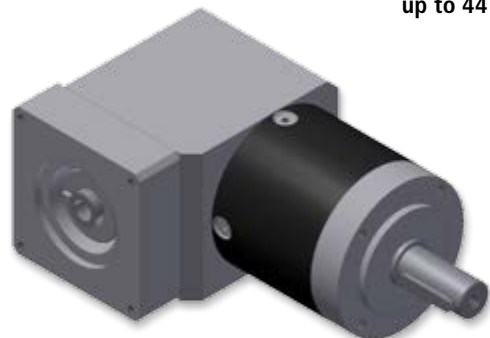
### Angular Planetary Gear WPLE 60

Permanent Operation/Periodic Duty up to 44/70 Nm

The WPLE 60 is the 90° angle version to the PLE 60. The motor and gear are connected with a detachable coupling and clamping hub. Friction losses are negligible. A bevel gear 1:1 is in front of the PLE 60.

#### Features

- \_ low backlash, (16-18-21 arcmin), (1-2-3)-stage
- \_ high level of efficiency (94-92-88 %), (1-2-3)-stage
- \_ high admissible shaft forces (600/500) N, (axial/radial)



up to 44/70 Nm

- \_ high short term overload factor 1,60
- \_ arbitrary mounting position
- \_ lifetime lubrication

### Harmonic Drive gear HFUC-14

Continuous / intermittent torque up to 7.8 / 28 Nm

The HFUC-14 is a backlash-free precision gear and is non-detachably connected to the motor. It is ideally suited for applications where the backlash of servo gears is insufficient. The angular tolerance is determined by the torsional stiffness.

#### Features

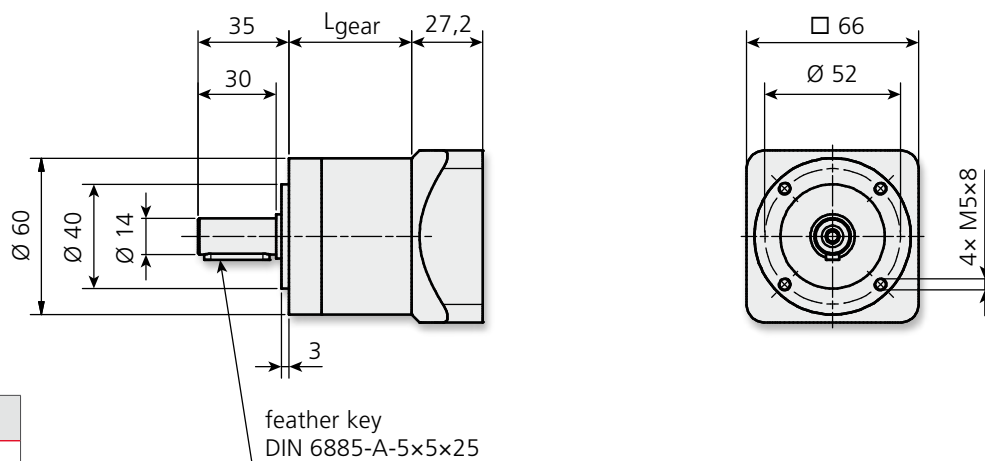
- \_ 4 different reductions  $i = (30 \dots 100)$
- \_ high load-dependent efficiency
- \_ high allowed radial force 1.500 N



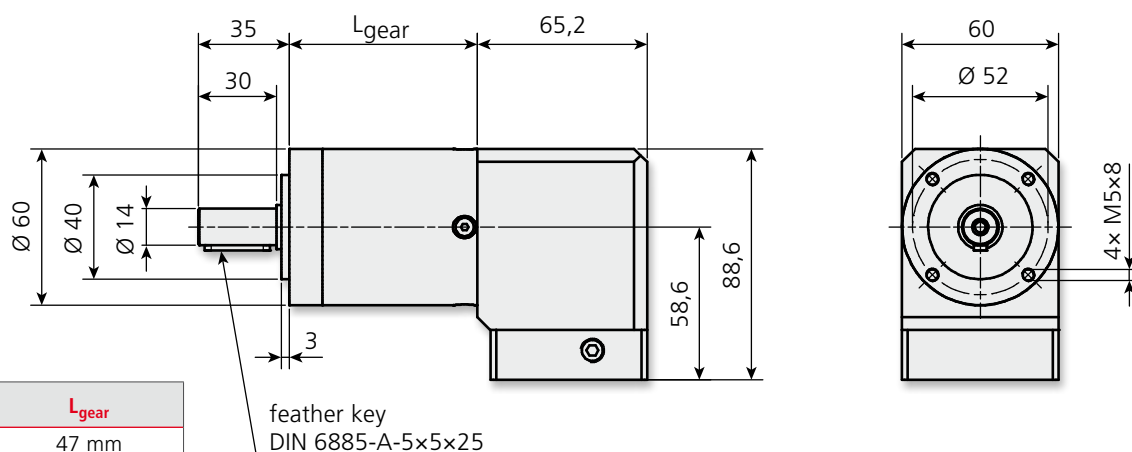
Backlash-free

- \_ short-term overload 100 %
- \_ any installation position
- \_ lifetime lubrication

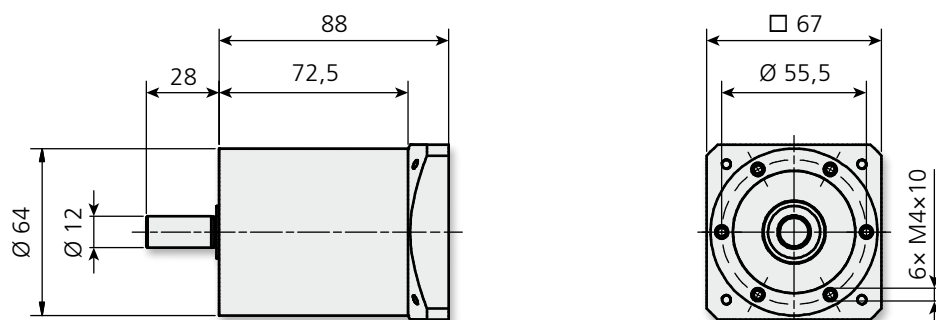
# Drawings



Gear stages	$L_{\text{gear}}$
1	47 mm
2	59,5 mm
3	72 mm



Gear stages	$L_{\text{gear}}$
1	47 mm
2	59,5 mm
3	72 mm



## Enhanced Precision Gears for MD 300, MP 200 / 220 / 280

### Planetary Gear PLE 80

Permanent Operation/Periodic Duty up to 130/208 Nm

The PLE 80 is the perfect economical alternative to servo planetary gears. The motor and gear are connected with a detachable coupling and clamping hub. Friction losses cannot be neglected. The gear is suitable for all applications where it is adequate to have a backlash of approximately 15 arcmin.

#### Features

- \_ low backlash (7-9-11 arcmin), (1-2-3)-stage
- \_ high level of efficiency (96-94-90 %), (1-2-3)-stage
- \_ high admissible shaft forces, (1.200/950 N), (axial-radial)
- \_ high short term overload factor 1,60
- \_ arbitrary mounting position
- \_ lifetime lubrication



130 / 208 Nm

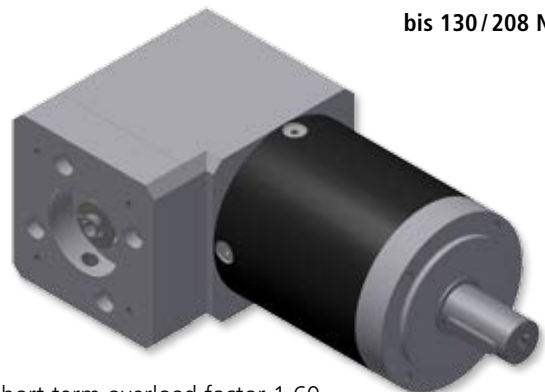
### Angular Planetary gear WPLE 80

Permanent Operation/Periodic Duty up to 130/208 Nm

The WPLE 80 is the 90° angle version to the PLE 80. The motor and gear are connected with a detachable coupling and clamping hub. Friction losses can not be neglected. A bevel gear 1:1 is in front of the PLE 80. The gear backlash increases by an angle part of 6 arcmin.

#### Features

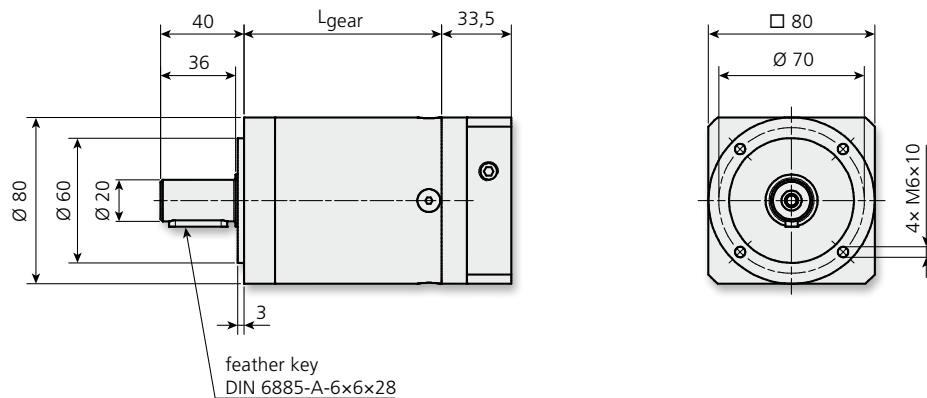
- \_ low backlash (13-15-17 arcmin), (1-2-3)-stage
- \_ high level of efficiency (94-92-88 %), (1-2-3)-stage
- \_ high admissible shaft forces, (1.200/950 N), (axial-radial)
- \_ high short term overload factor 1,60
- \_ arbitrary mounting position
- \_ lifetime lubrication



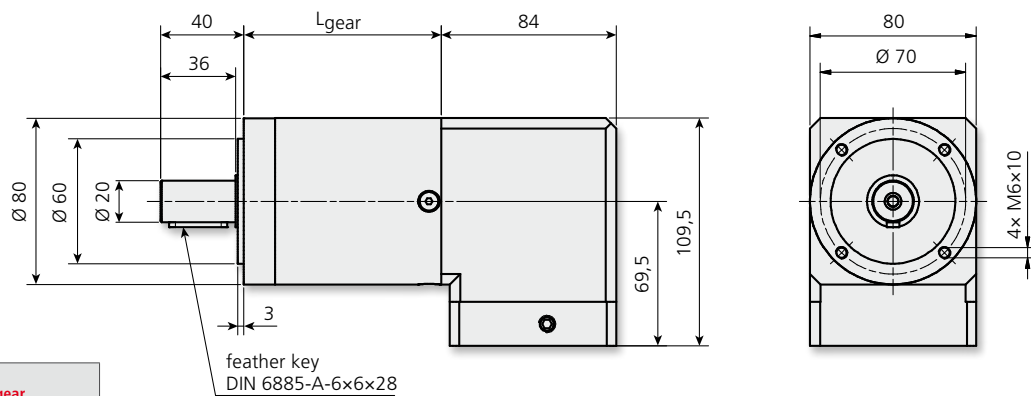
bis 130 / 208 Nm



# Drawings



Gear stages	$L_{\text{gear}}$
1	60,5 mm
2	77,5 mm
3	95 mm



Gear stages	$L_{\text{gear}}$
1	60,5 mm
2	77,5 mm
3	95 mm

## Simple gears for MP xxx, MA xxx

### Planetary gear PLG 52

Continuous torque up to 24 Nm

The PLG 52 is a gear with simple circumferential backlash and is non-detachably connected to the motor. It is suitable for any application in which the circumferential backlash is approx.  $1^\circ$  and the startup frequency does not have to meet special requirements. Friction losses can be neglected.

#### Features

- \_ backlash (1-1-1,5)°, (1-2-3) -stage
- \_ level of efficiency (90-81-73) %, (1-2-3) -stage
- \_ admissible shaft forces, (300/350) N, (axial/radial)
- \_ output shaft with double ball bearing
- \_ arbitrary mounting position
- \_ lifetime lubrication



up to 24 Nm

### Worm gear SG 80, with solid shaft

Continuous torque up to 10 Nm

The SG 80 is a worm gear with one-sided shaft and is non-detachably connected to the motor. It is suitable for applications with confined installation spaces and low circumferential backlash requirements. Friction losses can be neglected.

#### Features

- \_ backlash  $1^\circ$
- \_ level of efficiency (70...25) % bei  $1.500 \text{ min}^{-1}$
- \_ admissible shaft forces, (300/350) N, (axial/radial)
- \_ output shaft offset by 31 mm
- \_ arbitrary mounting position
- \_ lifetime lubrication



up to 10 Nm

### Worm gear SG 80 H

Continuous torque up to 10 Nm

The SG 80 H is the hollow shaft version of the SG 80 and is non-detachably connected to the motor. It is push-fitted and excellently suitable for applications with highly confined installation spaces and low circumferential backlash requirements. Friction losses can be neglected.

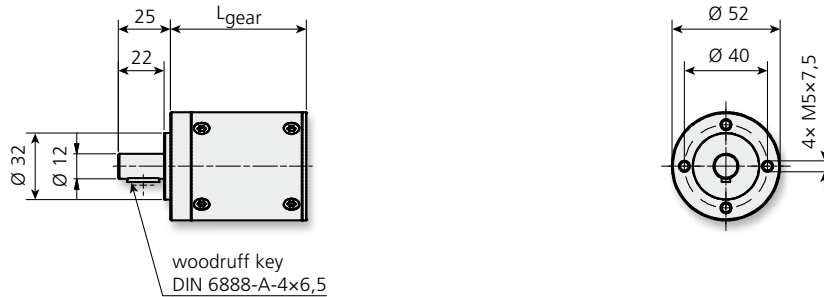
#### Features

- \_ backlash  $1^\circ$
- \_ level of efficiency (70...25) % bei  $1.500 \text{ min}^{-1}$
- \_ admissible shaft forces, (300/350) N, (axial/radial)
- \_ output shaft offset by 31 mm
- \_ arbitrary mounting position
- \_ lifetime lubrication

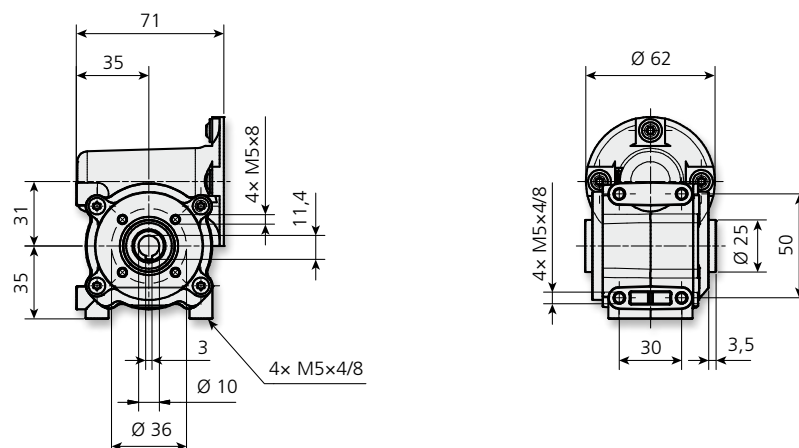
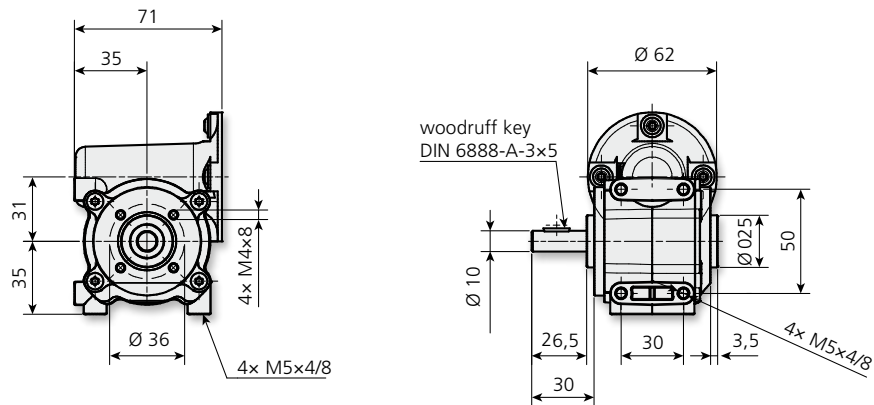


up to 10 Nm

# Drawings



Gear stages	$L_{Gear\ box}$
1	50 mm
2	65,5 mm
3	80,5 mm



Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.

## Reinforced simple gears for MP xxx, MA xxx

### Planetary gear PLG 63

Continuous torque up to 100 Nm

The PLG 63 is a gear with simple circumferential backlash and is non-detachably connected to the motor. It is suitable for any application in which the circumferential backlash is approx. 1° and the startup frequency does not have to meet special requirements. Friction losses can be neglected.

#### Features

- \_ circumferential backlash (1-1.5)°, (1-2-3) stages
- \_ efficiency (90-81-73) %, (1-2-3) stages
- \_ allowed shaft forces, (800/800) N, (axial/radial)

- \_ output shaft with double ball bearing
- \_ any installation position
- \_ lifetime lubrication



up to 100 Nm

### Worm gear SGF 120, with solid shaft

Continuous torque up to 30 Nm

The SGF 120 is a worm gear with one-sided shaft and is non-detachably connected to the motor. It is particularly suited for applications with confined installation spaces and low circumferential backlash requirements. Friction losses can be neglected.

#### Features

- \_ circumferential backlash 1°
- \_ efficiency (70 ... 25) % at 1.500 min<sup>-1</sup>
- \_ allowed shaft forces, 300/500 N, (axial/radial)

- \_ output shaft offset by 31 mm
- \_ any installation position
- \_ lifetime lubrication



up to 30 Nm

### Worm gear SGF 120 H

Continuous torque up to 30 Nm

The SGF 120 H is the hollow shaft version of the SGF 120 and is non-detachably connected to the motor. It is push-fitted and excellently suitable for applications with highly confined installation spaces and low circumferential backlash requirements. Friction losses can be neglected.

#### Features

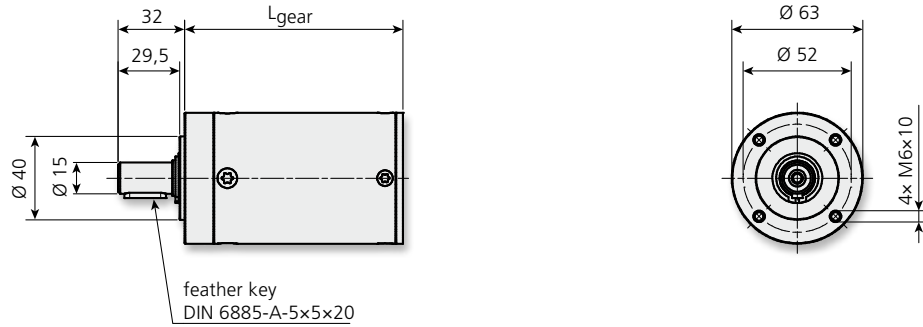
- \_ circumferential backlash 1°
- \_ efficiency (70 ... 25) % at 1.500 min<sup>-1</sup>
- \_ allowed shaft forces, 300/500 N, (axial/radial)

- \_ output shaft offset by 31 mm
- \_ any installation position
- \_ lifetime lubrication

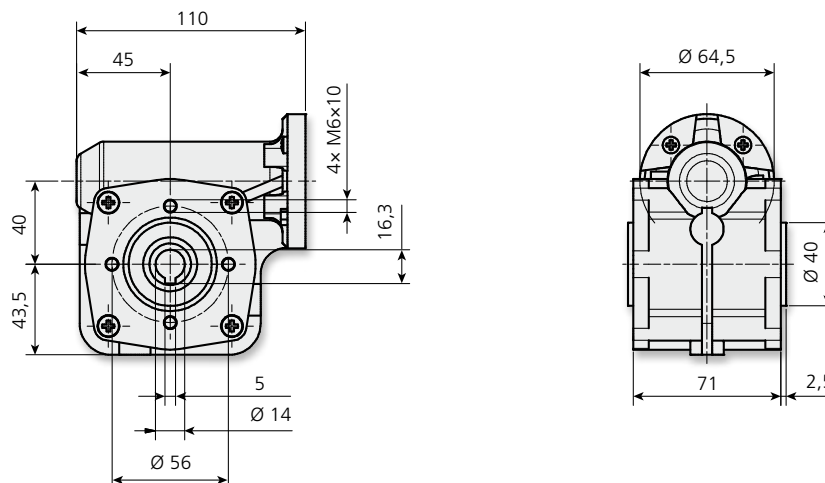
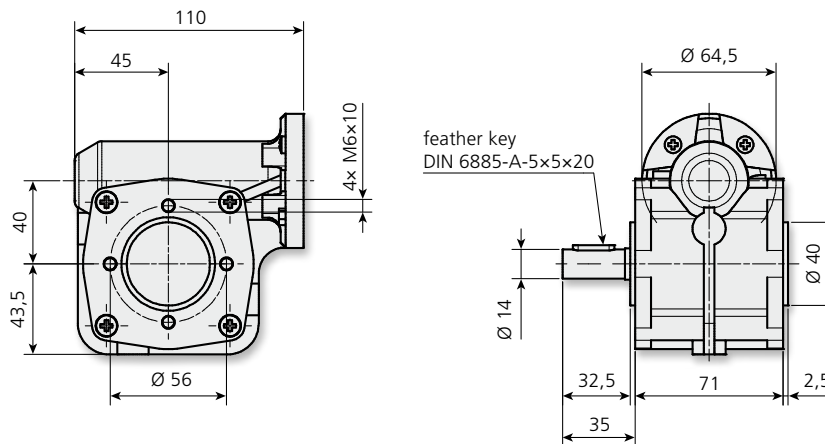


up to 30 Nm

# Drawings



Gear stages	$L_{gear}$
1	62,5 mm
2	83 mm
3	105 mm



Illustrations are schematic diagrams. Binding dimension drawings and CAD data for specific order numbers at [www.tr-electronic.com](http://www.tr-electronic.com) or on request.

# Interfaces

## 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 handheld 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

## 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

### Technical Communication Data

Communication profile	PROFIBUS - DP	PROFINET-IO
Range of functions	DP-V0 and DP-V1	Conformance Class A, Real Time Class1
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	max. 96	>1000
Terminating resistance	MD: internal, MP/MA: external	needless

## 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

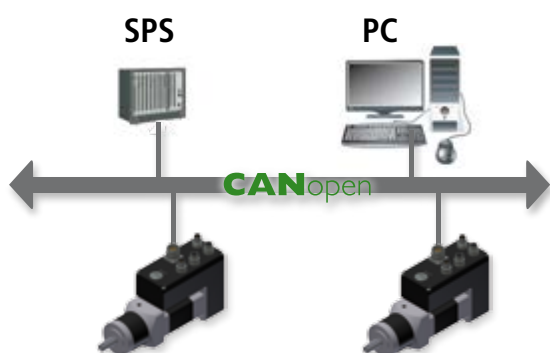
The drive version with CANopen is based on the device profile CiA DSP 402 – drives and motion control. The device profile permits a free configuration of process telegrams through PDO mapping of application objects. Available are 4 RxPDO and 4 TxPDO.

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)

# Electrical and mechanical accessories

## EncoTRive-Control-Device-Tool (EDT)

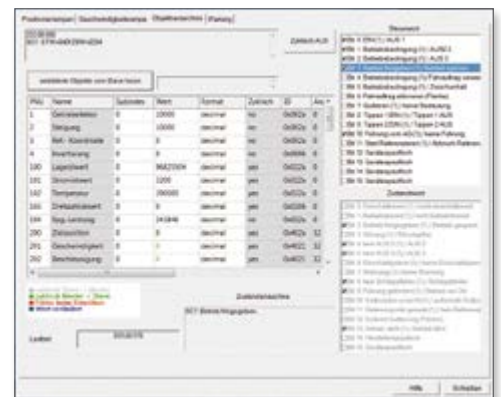
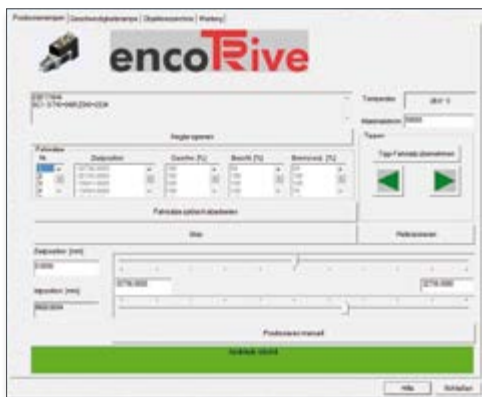
EDT is the parameterization and diagnosis tool for all drives of the EncoTRive product family. It is accessed via predefined interfaces. In case of PROFIBUS, these interfaces are the Hilscher Master Class 1/2, Siemens CP5xxx and other interface cards. In addition, a PC can be connected to the MD type series via an integrated interface converter (RS-232).

The elements of the user interface are subdivided into logical subgroups. The user interface can therefore be controlled intuitively. There are two menu items for **positioning** and **speed control** modes which easily allow starting traveling operations. At the same time, current actual values are displayed, such as position and velocity.

A table consisting of the objects of the object directory lists the cyclic parameters in different colors. The control word and the status word are broken down to bit level. This allows free access to both the individual state transitions and the resulting states. The individual actions are directly performed at the level of the status machine. The command order can be defined as desired.

### Technical data

- \_ parameterization and diagnosis tool
- \_ connection options to PC via RS-232 or interface cards
- \_ intuitive user interface
- \_ input of position and velocity
- \_ freely accessible state transitions





## Converter PC-USB to CANopen for the EDT

The PC-USB to CANopen converter enables the connection to CANopen networks via an USB interface. The converter is ideal for mobile use due to its compact plastic housing.



### Technical Data

- \_ transmission rate up to 1 Mbit/s
- \_ connection to PC over USB 1.1, compatible to USB 2.0
- \_ connection to CAN-Bus over D-Sub, 9-pole according to CiA® 102
- \_ voltage supply over USB
- \_ CAN specification 2.0A (11-Bit-ID) and 2.0B (29-Bit-ID)
- \_ time-stamp resolution approx. 42  $\mu$ s

## Electrical and mechanical accessories

### PROFIBUS hand-held operator panel for MD drives

The hand-held operator panel is connected to the M12 plug connectors of the digital I/Os. It allows executing simple drive functions without bus connection, for example, on initial commissioning or during service work. It is designed as a portable component and features a 5 m long connecting cable.

When it is fitted without bus connection or when PROFIBUS communication is interrupted, the hand-held panel automatically obtains control change rights. Monitoring algorithms ensure that the control change rights are assigned either only to the hand-held operator panel or only to the PROFIBUS master.

The hand-held operator panel holds the control change rights until either an acknowledgement is made via the control or a restart is carried out.

#### Features

- \_jog into positive or negative direction up to the software limit switch
- \_Indicator for software limit min., max. and reference
- \_setting a reference point
- \_fault acknowledgement



### Demo kit and function block for S7 (PROFIBUS, PROFINET)

The demo kits contain all components required for fast commissioning. For this purpose, the power supply unit and the drive are already pre-wired. Commissioning only requires that the bus lines be established by means of configurable plug connectors.



#### EncoTRive demo kit contents

- \_ encoTRive as chosen
- \_ wired power supply unit  
230/110 VAC at 24/48 VDC
- \_ configurable connector set
- \_ RS-232 connecting cable
- \_ Bus cable
- \_ PC-USB to CANopen adapter,  
including driver
- \_ demo function blocks
- \_ encoTRive Device Tool (EDT)
- \_ documentation

# TR-Electronic – your partner in automation

## Rotary encoders

**Absolute encoder, incremental rotary encoder, wire-actuated encoder**

Rotary encoders with optical and magnetic scanning function register the precise position in a wide variety of applications and industries.

In medical engineering, miniature versions ensure correct positioning while SIL3-approved absolute rotary encoders provide the necessary safety. We offer not only high-quality rotary encoders (from Ø 22 to 160 mm) for almost any application but also comprehensive accessories.

## 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

**Servo drives, compact drives, process 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.

## Automation

**Consulting and implementation  
for new machines and retrofit**

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.

## Unidor

**Blanking and forming,  
systems, controls and sensors**

Trendsetting blanking and forming technology for more than 30 years. We are your reliable partner in the world of blanking and pressing and can prove this with thousands of machines which we have successfully installed all over the world. Sensors, controls and systems ensure optimal results in machines, tools and retrofit projects.



---

## Deutschland

### TR-Electronic GmbH

Eglisshalde 6  
D-78647 Trossingen  
Germany

Tel.: +49/7425 228-0  
Fax: +49/7425 228-33

info@tr-electronic.de  
www.tr-electronic.de

### Technischer Innendienst TR-Electronic

**Tessari Claudia**  
Tel.: +49/7425 228-212  
claudia.tessari@tr-electronic.de

**Uwe Schmissrauter**  
Tel.: +49/7425 228-207  
uwe.schmissrauter@tr-electronic.de

**Bastian Seufert**  
Tel.: +49/7425 228-209  
bastian.seufert@tr-electronic.de

---

## Vertrieb Außendienst

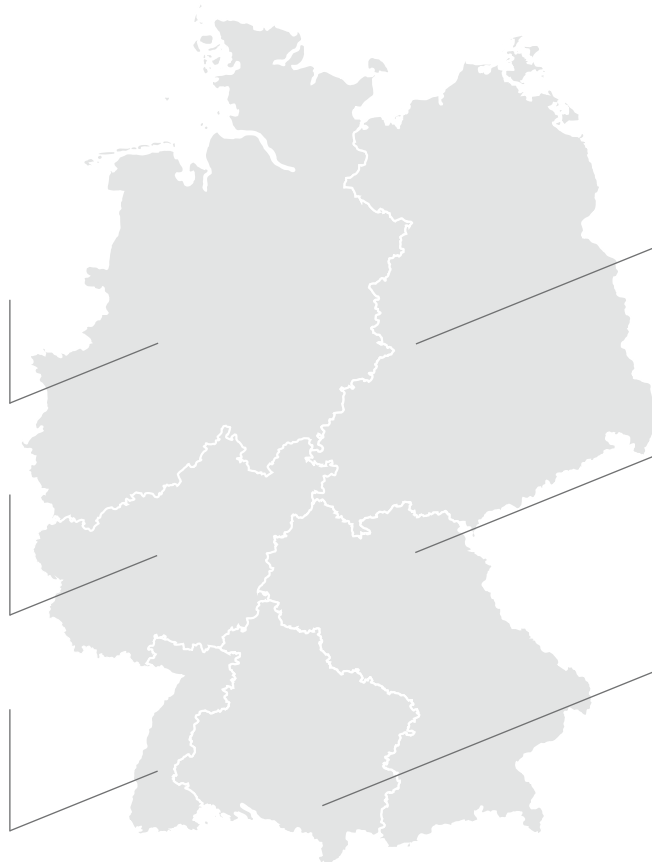
Key Account

**Heiko Flentje**  
Tel.: +49/7454 80 12  
Fax +49/7454 87 28 4  
heiko.flentje@tr-electronic.de

**Guido Siebert**  
Tel.: +49/7425 228-502  
guido.siebert@tr-electronic.de

**Andreas Bäuerle**  
Tel.: +49/7425 228-503  
Mobil +49/171 8865584  
andreas.baeuerle@tr-electronic.de

**Kay Vogt**  
Tel.: +49/7805 9165684  
Mobil +49/172 6758851  
kay.vogt@tr-electronic.de



**Dr. Dietrich Thoß**  
Tel.: +49/3661 671104  
Mobil +49/172 9242376  
dietrich.thoss@tr-electronic.de

**Jörg Neugirg**  
Tel.: +49/7425 228-501  
Mobil +49/172 9951710  
joerg.neugirg@tr-electronic.de

**Mathias Walz**  
Tel.: +49/7425 228-504  
Mobil +49/171 8719620  
mathias.walz@tr-electronic.de

## International

### Argentinien Buenos Aires

AEA Aparatos Eléctricos Automáticos  
Tel.: +54/11 - 45 74 11 55  
servicioalcliente@aea.com.ar  
www.aea.com.ar

### Australien AU-Booragoon

Sensor Measurement  
Tel.: +61/8 - 93 17 25 52  
sales  
@sensormeasurement.com.au  
www.sensormeasurement.com.au

### Belgien (NL-Geffen)

TR-Electronic Benelux BV  
Tel.: +31/4335 23 614  
rene.verbruggen@tr-electronic.nl  
www.tr-electronic.nl

### Brasilien São Paulo

Grupo C+ Tecnologia  
Tel.: +55/11 - 2168 6554  
info@ctecnologia.com.br  
www.ctecnologia.com.br

### Chile Santiago Chile

Allware, Casa Haverbeck  
General Lagos 2060 2º Piso  
Region de Los Rios Valdivia  
Santiago Chile  
Tel.: +56 63/239298  
www.allware.dv.cl

### China Beijing

TR-Electronic (Beijing) CO., LTD.  
Tel.: +86/10 - 582 386 55  
lu.yu@tr-electronic.de  
www.tr-electronic.com.cn

### Dänemark Hedensted

TR-Electronic Danmark ApS  
Tel.: +45/75 89 06 03  
cbj@tr-electronic.dk  
www.tr-electronic.dk

### Finnland Helsinki

Sarlin Oy Ab  
Tel.: +358/10 - 550 4000  
info@sarlin.com  
www.sarlin.com

### Frankreich Serris

TR-Electronic France SARL  
Tel.: +33/1 - 64 63 68 68  
info@tr-electronic.fr  
www.tr-electronic.fr

### Großbritannien Essex

TR-Electronic Limited  
Tel.: +44/1 371 - 876 187  
info@tr-electronic.co.uk  
www.tr-electronic.co.uk

### Indien Pune

Global-Tech (India) Pvt Ltd  
Tel.: +91/20 - 2447 00 85  
info@globaltechindia.com  
www.globaltechindia.com

### Israel Kibutz Einat

Dor Engineering  
Tel.: +972/3 900 75 95  
info@doreng.co.il  
www.doreng.co.il

### Italien Vaprio D'Agogna

Telestar S.r.l.  
Tel.: +39/03 - 21 966 768  
telestar@telestar-automation.it  
www.telestar-automation.it

### Berlingo

TR Systems Italia srl / Unidor  
Tel.: +39/030 9973094  
info@trsystems.it  
www.trsystems.it

### Japan Osaka

SANTEST CO. LTD.  
Tel.: +81/6 - 6465 5561  
info@santest.co.jp  
www.santest.co.jp

### Kanada CDN-London

TR Electronic  
Tel.: +1/519 - 452 1999  
customercare@trelectronic.com  
www.trelectronic.com

### Mexiko CDN-London

TR Electronic  
Tel.: +1/519 - 452 1999  
customercare@trelectronic.com  
www.trelectronic.com

### Niederlande Geffen

TR-Electronic Benelux BV  
Tel.: +31/4335 23 614  
rene.verbruggen@tr-electronic.nl  
www.tr-electronic.nl

### Norwegen Asker

TR Electronic Norway AS  
Tel.: +46/708 696 533  
info@trelectronic.no  
www.trelectronic.no

### Österreich Bruck / Mur

TR-Electronic GmbH  
Tel.: +43/3862 - 55006 0  
info@tr-electronic.at  
www.tr-electronic.at

### Peru São Paulo

Grupo C+ Tecnologia  
Tel.: +55/11 - 2168 6554  
info@ctecnologia.com.br  
www.ctecnologia.com.br

### Polen Lodz

Stoltronic-Polska Sp. z o.o  
Tel.: +43/69910532720  
stoltronic@stoltronic.pl  
www.stoltronic.pl

### Republik Korea Seoul

MS Intech Co., Ltd.  
Tel.: +82/2 - 334 0577  
sales@msintech.com  
www.msintech.com

### Russland Moskau

Sensotec LLC  
Tel.: +7 495 181-56-67  
info@sensotek.ru  
www.sensotek.ru

### Saudi-Arabien Ad Dammam

Business Tribune Company Ltd.  
Tel.: +966/3-832 72 17  
waleed@bustribune.com.sa  
www.bustribune.com

### Schweden Sollentuna

TR Electronic Sweden AB  
Tel.: +46/8 - 756 72 20  
mailbox@trelectronic.se  
www.trelectronic.se

### Schweiz Plan-les-Ouates

TR-Electronic SA  
Tel.: +41/22 - 7 94 21 50  
info@tr-electronic.ch  
www.tr-electronic.ch

### Singapur Singapore

Globaltec Electronics Pte. Ltd.  
Tel.: +65/6267 9188  
janice@globaltec.com.sg  
www.globaltec.com.sg

### Slowenien Maribor

S.M.M. d.o.o.  
Tel.: +386/2450 2300  
smm@siol.net  
www.smm.si

### Spanien, Portugal Valencia

Intertronic Internacional, SL  
Tel.: +34/96 - 375 8050  
info@intertronic.es  
www.intertronic.es

### Südafrika Meyerton

Angstrom Engineering (Pty) Ltd.  
Tel.: +27/16 3620300  
info@angstromeng.co.za  
www.angstromeng.co.za

### Taiwan Beijing

TR-Electronic (Beijing) CO., LTD.  
Tel.: +86/10 - 582 386 55  
lu.yu@tr-electronic.de  
www.tr-electronic.com.cn

### Thailand Chonburi

T+R Electronic (Thailand) Co., Ltd.  
Tel.: +66/38 364 788  
trthailand@trelectronic.co.th  
www.trelectronic.co.th

### Tschechische Republik, Slowakei

Praha 1,  
DEL a.s.  
Tel.: +420/566 657 100  
tr-electronic@del.cz  
www.del.cz

### Türkei Karsiyaka-IZMIR

ÜNİVERSA İÇ ve Dİİ TİC.  
MAK. SAN. LTD. ŞTİ.  
Tel.: +90/232 382 23 14  
info@universa.com.tr  
www.universa.com.tr

### USA (TR-Electronic) US-Troy

TR Electronic  
Tel.: +1/248 - 244 - 2280  
customercare@trelectronic.com  
www.trelectronic.com

### USA (TRsystems)

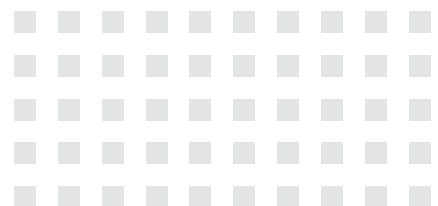
US-Birmingham  
TRS Fieldbus Systems, Inc.  
Tel.: +1/586 826 - 9696  
support@trs-fieldbus.com  
www.tr-systems.com

**TR-Electronic GmbH**

Eglishalde 6  
D - 78647 Trossingen

Tel. +49 7425 228-0  
Fax +49 7425 228-33

info@tr-electronic.de  
[www.tr-electronic.de](http://www.tr-electronic.de)



Last update: 04/2018

68-105-022 - TR-V-PR-GB-0010-06

Subject to technology and design modifications.

Cover photo background: ©kras99-fotolia.com