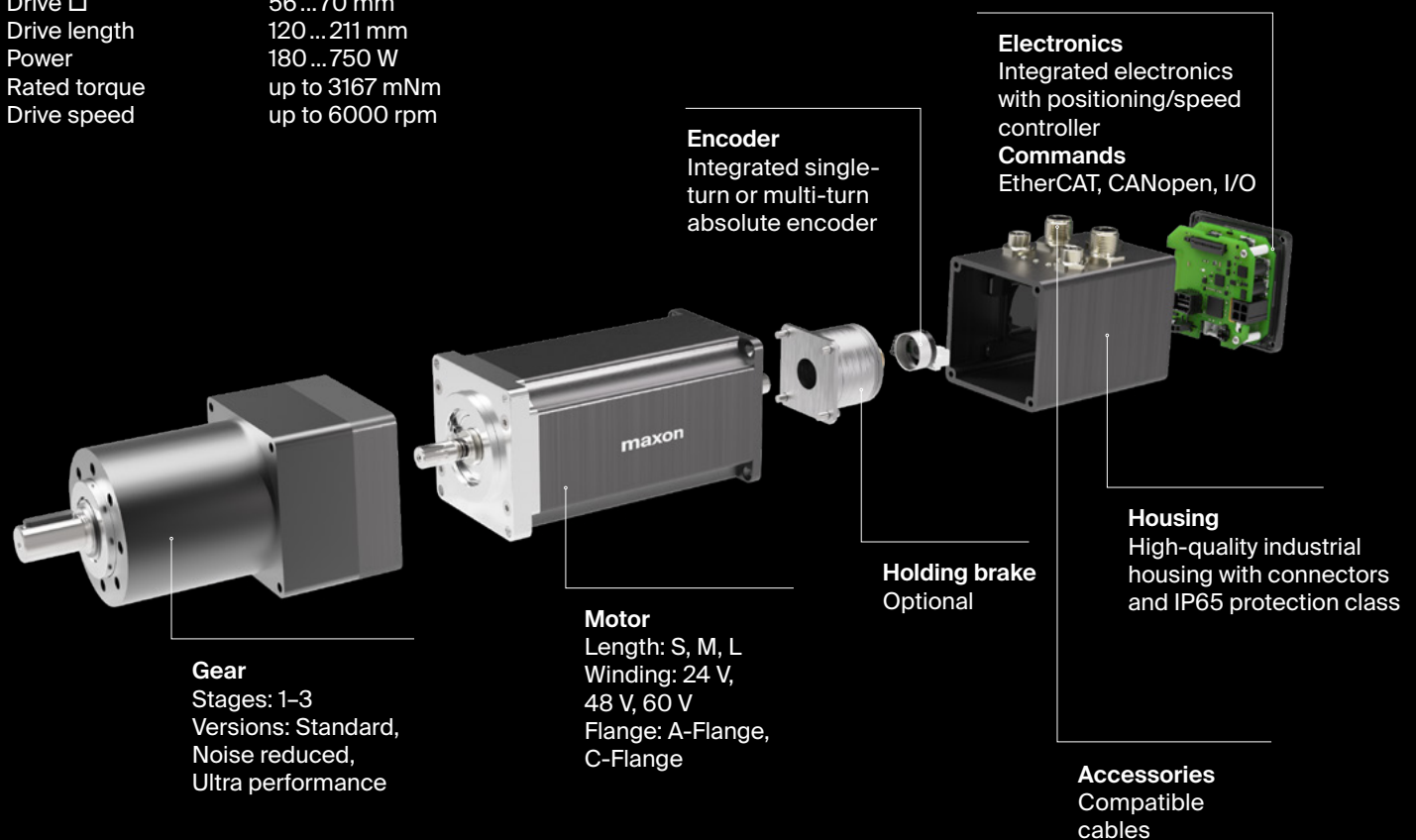# maxon IDX

Drive with positioning/speed controller

A maintenance-free positioning drive with proven components. The compact brushless EC-i motor combined with an EPOS4 positioning controller makes for a highly-dynamic, powerful drive package with field-oriented control (FOC), a high level of efficiency, and maintenance-free components in high-quality industrial housing.

Key data

Drive □	56 … 70 mm
Drive length	120 … 211 mm
Power	180 … 750 W
Rated torque	up to 3167 mNm
Drive speed	up to 6000 rpm

Encoder
Integrated single-turn or multi-turn absolute encoder

Electronics
Integrated electronics with positioning/speed controller
Commands
EtherCAT, CANopen, I/O

Housing
High-quality industrial housing with connectors and IP65 protection class

Holding brake
Optional

Gear
Stages: 1–3
Versions: Standard, Noise reduced, Ultra performance

Motor
Length: S, M, L
Winding: 24 V, 48 V, 60 V
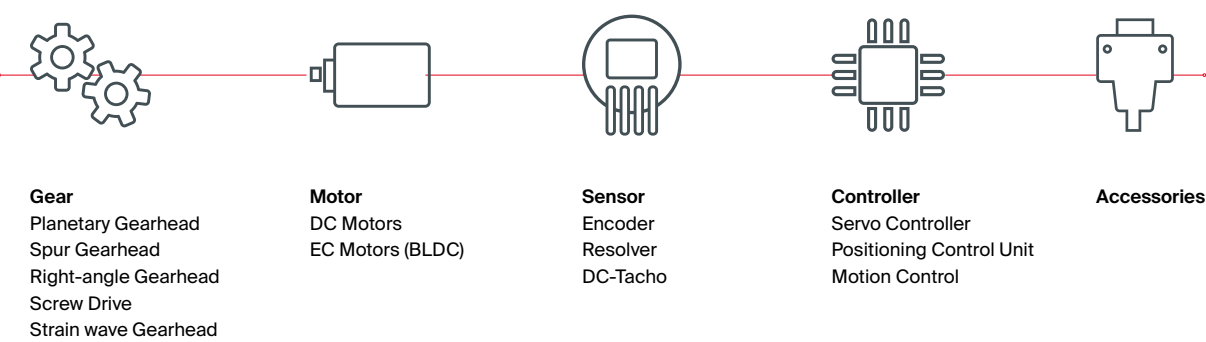Flange: A-Flange, C-Flange

Accessories
Compatible cables

→ High continuous torque

→ Outstanding energy efficiency

→ Maximum power density

→ Unmatched precision in dynamic motion

→ IP65-protected design

→ Easily configured online

shop.maxongroup.com

Combine

The maxon modular system

The motors, gearheads, sensors, brakes, and controllers of maxon are perfectly matched to each other and can be combined in a number of ways. Our modular system makes it easy to find suitable components for your motor – in the catalog and in the online shop.

Gear
Planetary Gearhead
Spur Gearhead
Right-angle Gearhead
Screw Drive
Strain wave Gearhead

Motor
DC Motors
EC Motors (BLDC)

Sensor
Encoder
Resolver
DC-Tacho

Controller
Servo Controller
Positioning Control Unit
Motion Control

Accessories

Great choice, easy ordering

The diversity of motors and product combinations offered by maxon is unmatched worldwide. The maxon modular system and the numerous options for windings offer even more possibilities for variation. To make the delivery times as short as possible for our customers, we organized our products into program groups.

Stock program
The market-oriented selection from our extensive product portfolio offers you short delivery times.

Standard program
In the comprehensive standard program, products are included which can be produced and delivered in a short time. The plenitude of versions in this program offer tried and tested standard products for optimized application.

Special program
A wide range of motors and combinations is available on request.

Explanation of maxon IDX drives terminology

Dimensional drawings
Presentation of the views according to the projection method E (ISO).
All dimensions in [mm].

Drive data
The values were determined for sinusoidal commutation and a drive without additional attachments, such as a brake or gearhead. Additional attachments may change the performance data of the system.

1   **Nominal power supply voltage** U_N [Volt]
is the supply voltage at which the nominal values of the drive are achieved. The nominal values (lines 2–7) are based on this voltage. The supply voltage may vary within the range of the nominal operating voltage (line 12).

2   **Nominal speed** n_N [rpm]
is the speed for which the drive is rated. For torques up to the nominal torque, the integrated motor controller is capable of regulating to this speed.

3   **Nominal torque at 25°C**
(max. continuous torque) [mNm]
and
4   **Nominal torque at 40°C**
(max. continuous torque) [mNm]
is the torque generated during operation with the nominal supply voltage and nominal supply current at 25°C/40°C. It is at the limit of the drive's continuous operation range. To prevent the winding from heating up too much, higher torques are only possible for brief periods. The integrated motor controller monitors the winding with a temperature sensor.

5   **Nominal supply current at 25°C** [A]
and
6   **Nominal supply current at 40°C** [A]
is the supply current required to reach the nominal torque with the nominal supply voltage at 25°C/40°C.

7   **Maximum speed with nominal**
supply voltage [rpm]
is the maximum speed the drive can achieve at the nominal supply voltage.

8   **Maximum permissible drive speed**
n_{max} [rpm]
is the maximum speed the drive can achieve. The maximum speed can only be achieved if a sufficiently high supply voltage is available. Higher speeds are not permitted.

9   **Maximum torque (short-term)**
M_{max} [mNm]
is the torque that the drive can output for short periods of time. The duration depends on the installation and is monitored by the integrated motor controller using temperature sensors.

10   **Maximum supply current (short term)**
I_{max} [A]
is the maximum current. The supply current is not proportional to the torque, but instead depends on the supply voltage and the operating point.

11   **Rotor moment of inertia** J_R [gcm²]
is the mass moment of inertia of the rotor, based on the axis of rotation.

12   **Nominal supply voltage** $+V_{CC}$ [V]
shows the permitted range for the supply voltage relative to GND. If the actual voltage is lower than the nominal supply voltage, then the nominal torque and speed cannot be guaranteed. If a brake is attached, then the supply voltage of the brake is considered to be the lower limit (see feature chart).

13   **Mechanical time constant** τ_m [ms]
is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

14   **Thermal resistance**
housing-ambient R_{th2} [K/W]
and
15   **Thermal resistance**
winding-housing R_{th1} [K/W]
Characteristic values of thermal contact resistance without additional heat sinking. Lines 14 and 15 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

16   **Thermal time constant of winding** τ_w [s]
and
17   **Thermal time constant of drive** τ_s [s]
These are the typical response times for temperature changes of the winding and drive. It is noticeable that the drive has a much slower thermal response than the winding. The values have been calculated from the product of the thermal capacity and the given heat resistances. The integrated motor controller monitors the temperatures with temperature sensors.

18   **Ambient temperature** [°C]
Operating temperature range. It results from the thermal resistance of the materials and components used, and the viscosity of the bearing lubrication.

19   **Axial play** [mm]
On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

20   **Radial play** [mm]
Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

21/22   **Max. axial load** [N]
Dynamic: axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.
Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

23   **Max. radial load** [N]
The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

24   **Weight of motor** [g]

25   **Typical noise level** [dBA]
is the statistical average of the noise level measured in accordance with the maxon standard (10 cm distance radially to the drive, no-load operation at the given speed.) The drive lies freely on a plastic foam mat in the noise chamber). The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone. The acoustic noise level is measured and determined during product qualification.
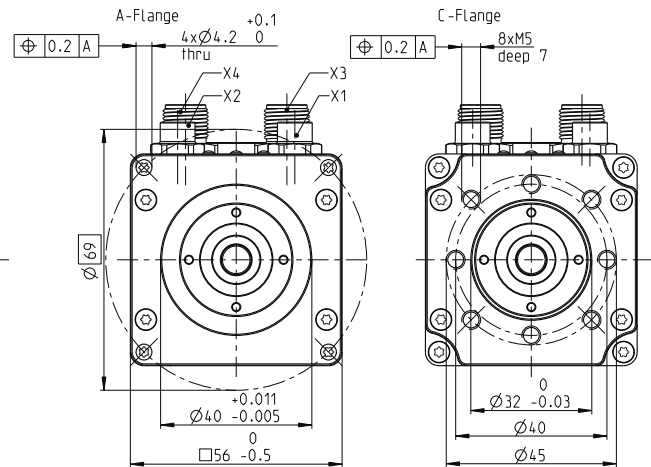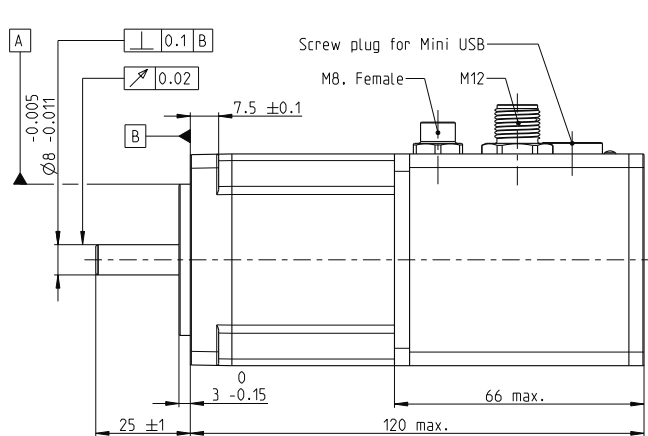
IDX 56 S □56 mm, with integrated electronics

IP65 drive with positioning/Speed Controller

Key data: 180/212 W, 450 mNm, 6000 rpm

IDX

EtherCAT®
CANopen®
I/O ⇄

M 1:2

Drive data (provisional)

1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	4400	4500
3_	Nominal torque at 25°C	mNm	393	450
4_	Nominal torque at 40°C	mNm	349	399
5_	Nominal supply current at 25°C	A	9.0	5.3
6_	Nominal supply current at 40°C	A	8.0	4.7
7_	Maximum speed at nominal voltage	rpm	6000	6000
8_	Maximum permissible drive speed	rpm	6000	6000
9_	Maximum torque (short-time)	mNm	775	1546
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	107	107
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.82	0.783

Thermal data
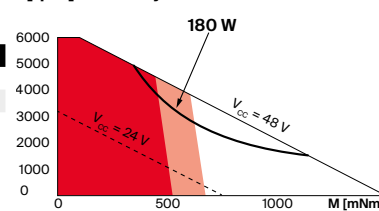
14_	Thermal resistance housing-ambient	K/W	2.04
15_	Thermal resistance winding-housing	K/W	1.94
16_	Thermal time constant winding	s	38.2
17_	Thermal time constant drive	s	585
18_	Ambient temperature	°C	-30...+85

Mechanical data

19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

Other specifications

24_	Weight of the drive	g	574
25_	Typical noise level [rpm]	dBA	55 [4000]
	Protection class without shaft		IP65

Sensor

ENC single-turn absolute encoder:		
resolution, bits		12
EMT multi-turn absolute encoder:		
resolution, bits		14
Multi-turn: max. no. of turns		65 536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

Compatible cables available online in the configurator

Operating range

n [rpm] **24-V-system**

n [rpm] **48-V-system**

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
□ Short term operation

Modular system
Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
406_GPX 52 A/UP	1–3	integrated ENC	integrated
407_GPX 52 LN	1–3	integrated EMT	
456_GSW 62			
458_GB 80	1	**Accessories**	
459_GB 12	1	591_Brake AB 42 S	

Configuration

Flange front: A-Flange / C-Flange
Interface with Positioning / Speed Controller: CANopen / EtherCAT
Interface with Speed Controller: I/O
Shaft: standard/short

IDX 56 M □56 mm, with integrated electronics
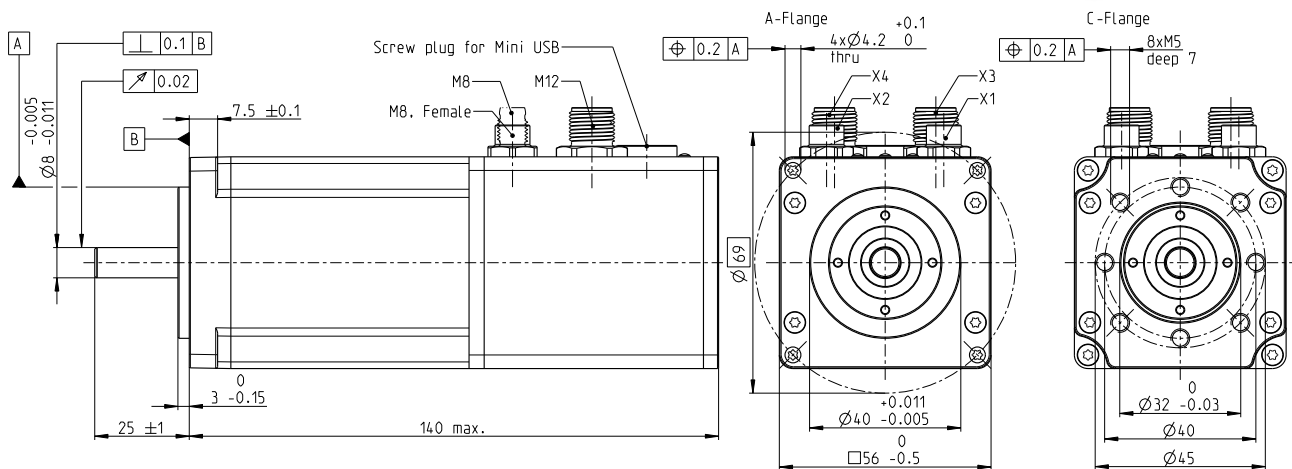
IP65 drive with positioning/Speed Controller

Key data: 230/256 W, 516 mNm, 6000 rpm

EtherCAT®
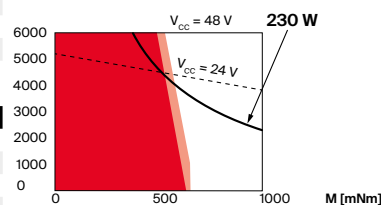CANopen®
I/O ⇄

M 1:2

Drive data (provisional)

1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	4477	4500
3_	Nominal torque at 25°C	mNm	433	516
4_	Nominal torque at 40°C	mNm	376	458
5_	Nominal supply current at 25°C	A	10.0	5.8
6_	Nominal supply current at 40°C	A	8.7	5.2
7_	Maximum speed at nominal voltage	rpm	5227	6000
8_	Maximum permissible drive speed	rpm	6000	6000
9_	Maximum torque (short-time)	mNm	948	1498
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	170	170
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.654	0.693

Thermal data
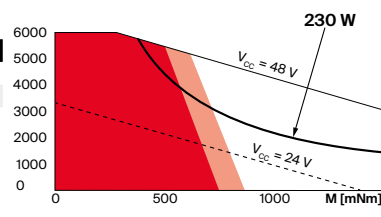
14_	Thermal resistance housing-ambient	K/W	2.47
15_	Thermal resistance winding-housing	K/W	1.16
16_	Thermal time constant winding	s	18.9
17_	Thermal time constant drive	s	1320
18_	Ambient temperature	°C	-30...+85

Mechanical data

19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

Other specifications

24_	Weight of the drive	g	1070
25_	Typical noise level [rpm]	dBA	54 [4000]
	Protection class without shaft		IP65

Sensor

ENC single-turn absolute encoder: resolution, bits		12
EMT multi-turn absolute encoder: resolution, bits		14
Multi-turn: max. no. of turns		65 536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

Compatible cables available online in the configurator

Operating range

n [rpm]   24-V-system

n [rpm]   48-V-system

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
□ Short term operation

Modular system   Details on catalog page 44

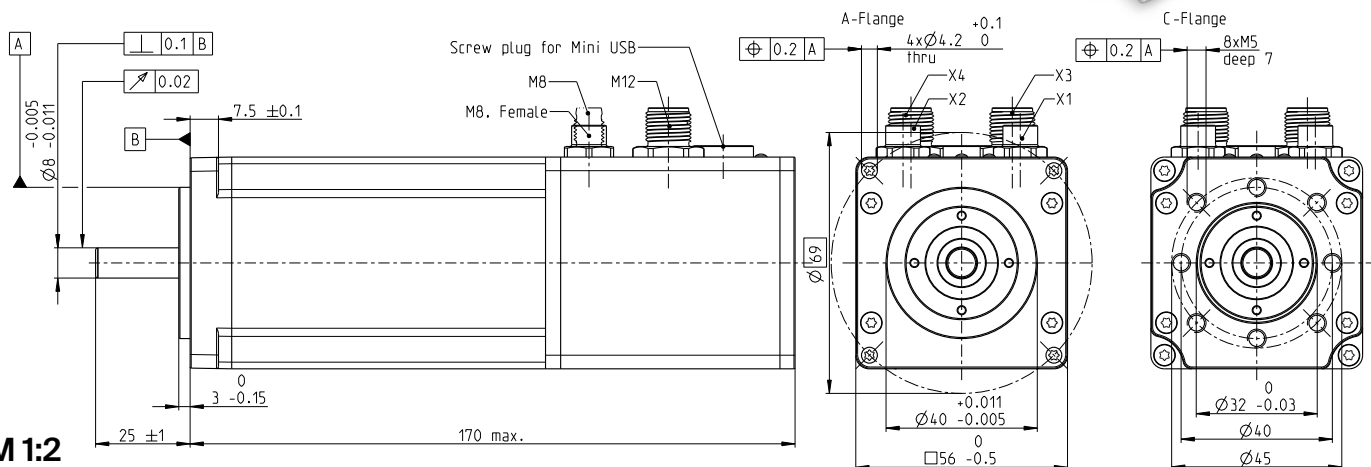| Gear	Stages [opt.]	Sensor	Motor Control
406_GPX 52 A/UP	1–3	integrated ENC	integrated
407_GPX 52 LN	1–3	integrated EMT	
456_GSW 62			
458_GB 80	1	**Accessories**	
459_GB 12	1	591_Brake AB 42 S	

Configuration

Flange front: A-Flange / C-Flange
Interface with Positioning / Speed Controller: CANopen / EtherCAT
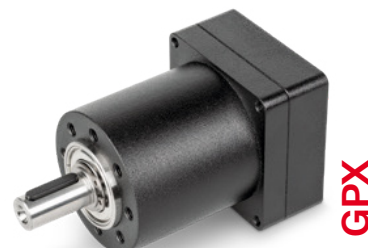Interface with Speed Controller: I/O
Shaft: standard/short

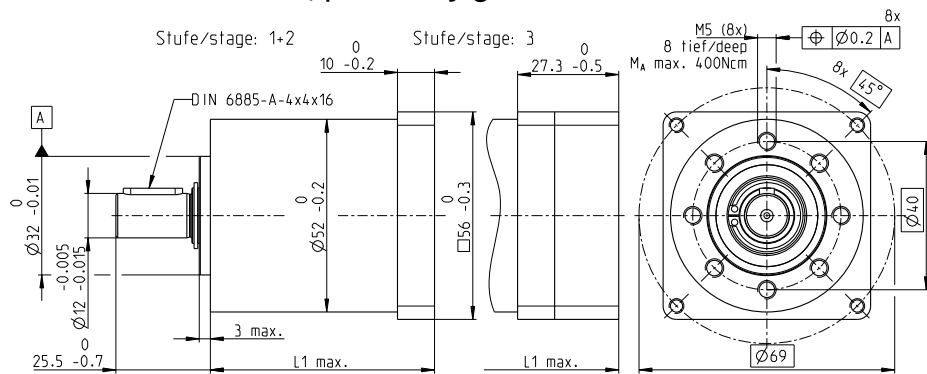# IDX 56 L □56 mm, with integrated electronics

IP65 drive with positioning/Speed Controller

Key data: 280/316 W, 795 mNm, 6000 rpm

IDX

EtherCAT.
CANopen
I/O ⇄

M 1:2

Screw plug for Mini USB
M8 M12
M8. Female

A-Flange
C-Flange

Drive data (provisional)

1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	2724	3500
3_	Nominal torque at 25°C	mNm	795	779
4_	Nominal torque at 40°C	mNm	690	690
5_	Nominal supply current at 25°C	A	11.4	6.7
6_	Nominal supply current at 40°C	A	9.9	6.0
7_	Maximum speed at nominal voltage	rpm	3110	4925
8_	Maximum permissible drive speed	rpm	6000	5000
9_	Maximum torque (short-time)	mNm	1589	2006
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	265	265
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.57	0.55

Thermal data

14_	Thermal resistance housing-ambient	K/W	2.01
15_	Thermal resistance winding-housing	K/W	0.76
16_	Thermal time constant winding	s	20.1
17_	Thermal time constant drive	s	1450
18_	Ambient temperature	°C	-30...+85

Mechanical data

19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

Other specifications

24_	Weight of the drive	g	1445
25_	Typical noise level [rpm]	dBA	58 [4000]
	Protection class without shaft		IP65

Sensor

ENC single-turn absolute encoder:
resolution, bits — 12

EMT multi-turn absolute encoder:
resolution, bits — 14
Multi-turn: max. no. of turns — 65 536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

Compatible cables available online in the configurator

Operating range

n [rpm] 24-V-system

280 W
V_{CC} = 48 V
V_{CC} = 24 V

n [rpm] 48-V-system

280 W
V_{CC} = 48 V
V_{CC} = 24 V

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- ☐ Short term operation

Modular system
Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
406_GPX 52 A/UP	1–3	integrated ENC	integrated
407_GPX 52 LN	1–3	integrated EMT	
456_GSW 62			
458_GB 80	1	**Accessories**	
459_GB 12	1	591_Brake AB 42 S	

Configuration

Flange front: A-Flange / C-Flange
Interface with Positioning / Speed Controller: CANopen / EtherCAT
Interface with Speed Controller: I/O
Shaft: standard/short

GPX 52 ⌀52 mm, planetary gearhead

Stufe/stage: 1+2   Stufe/stage: 3

DIN 6885-A-4x4x16

M5 (8x)
8 tief/deep
M_A max. 400Ncm

M 1:2

GPX

Key data		A Standard version	UP Ultra performance
Max. transmittable power	W	400	600
Max. continuous torque	Nm	30.0	45.0
Max. continuous input speed	rpm	6000	6000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

A   Standard version

UP   Ultra performance

■ Continuous operation
--- Intermittent operation
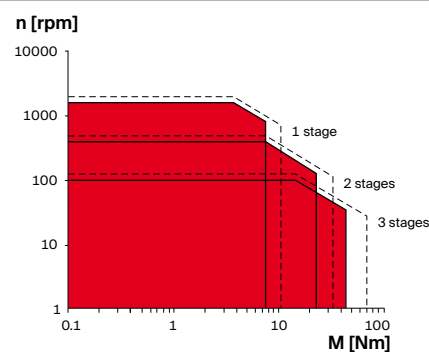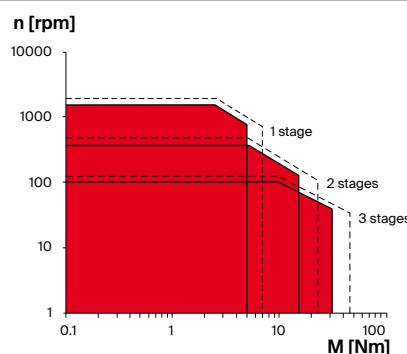
Specifications		A Standard version			UP Ultra performance		
Number of stages		1	2	3	1	2	3
Max. transmittable power (continuous)	W	400	200	100	600	300	150
Max. transmittable power (intermittent)	W	500	250	125	750	375	188
Max. continuous torque	Nm	5.0	15.0	30.0	7.5	22.5	45.0
Max. intermittent torque	Nm	7.0	23.0	45.0	10.5	34.5	67.5
Max. continuous input speed	rpm	6000	6000	6000	6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500	7500	7500	7500
Max. efficiency	%	95	92	89	95	92	89
Average backlash no load	°	0.5	0.6	0.8	0.3	0.4	0.5
Max. axial load (dynamic)	N	200	200	200	200	200	200
Max. permissible radial load, 10 mm from flange	N	420	630	900	420	630	900
Gearhead length L1[1]	mm	44	61	78	44	61	78
Weight	g	545	713	930	552	719	926

Configuration	A Standard version			UP Ultra performance		
Number of stages	1	2	3	1	2	3
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172
Version	Standard/noise reduced/ultra performance					
Flange	Standard flange					
Shaft	Length/diameter/feather key					

| Modular system		Page			Page	
EC motor	Nº of stages [opt.]		**Compact drive**	Nº of stages [opt.]		
IDX 56 S	1–3	249	IDX 56 S	1–3	353	
IDX 56 M	1–3	250	IDX 56 M	1–3	354	
IDX 56 L	1–3	251	IDX 56 L	1–3	355	

[1]This length may vary depending on the configuration
and choice of motor. The effective length is
calculated at the end of the configuration process.

GPX 52 ⌀52 mm, planetary gearhead

Stufe/stage: 1+2   Stufe/stage: 3

DIN 6885-A-4x4x16

M5 (8x)
8 tief/deep
M_A max. 400Ncm

⌀0.2 A   8x
8x   45°

⌀40

� 56 -0.3

⌀52 -0.2

⌀32 -0.01

⌀12 -0.005/-0.015

10 -0.2   27.3 -0.5

3 max.   L1 max.   L1 max.   ⌀69

25.5 -0.7

M 1:2

Key data		LN Noise reduced
Max. transmittable power	W	320
Max. continuous torque	Nm	24.0
Max. continuous input speed	rpm	6000
Ambient temperature	°C	-20…+85
Bearing at output		Ball bearing
Typical noise level	dBA	-5 compared to standard configuration

Operating range (output shaft)

LN   Noise reduced

■ Continuous operation

---- Intermittent operation

n [rpm]

10000

1000

100

10

1

0.1   1   10   100

M [Nm]

1 stage
2 stages
3 stages
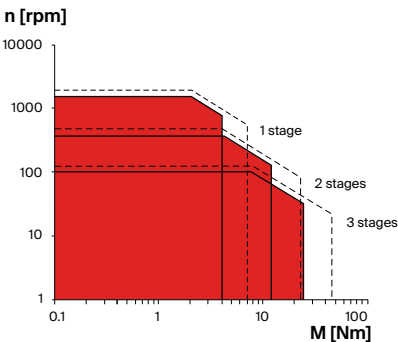
Specifications		LN Noise reduced		
Number of stages		1	2	3
Max. transmittable power (continuous)	W	320	160	80
Max. transmittable power (intermittent)	W	400	200	100
Max. continuous torque	Nm	4.0	12.0	24.0
Max. intermittent torque	Nm	7.0	23.0	45.0
Max. continuous input speed	rpm	6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500
Max. efficiency	%	95	92	89
Average backlash no load	°	0.5	0.6	0.8
Max. axial load (dynamic)	N	200	200	200
Max. permissible radial load, 10 mm from flange	N	420	630	900
Gearhead length L1[1]	mm	44	61	78
Weight	g	544	712	995

Configuration	LN Noise reduced		
Number of stages	1	2	3
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172
Version	Standard/noise reduced/ultra performance		
Flange	Standard flange		
Shaft	Length/diameter/feather key		

Modular system		Page			Page	
EC motor	Nº of stages [opt.]		**Compact drive**	Nº of stages [opt.]		
IDX 56 S	1–3	249	IDX 56 S	1–3	353	
IDX 56 M	1–3	250	IDX 56 M	1–3	354	
IDX 56 L	1–3	251	IDX 56 L	1–3	355	

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GSW 62 A ⌀62 mm, strain wave gearhead
Zero backlash
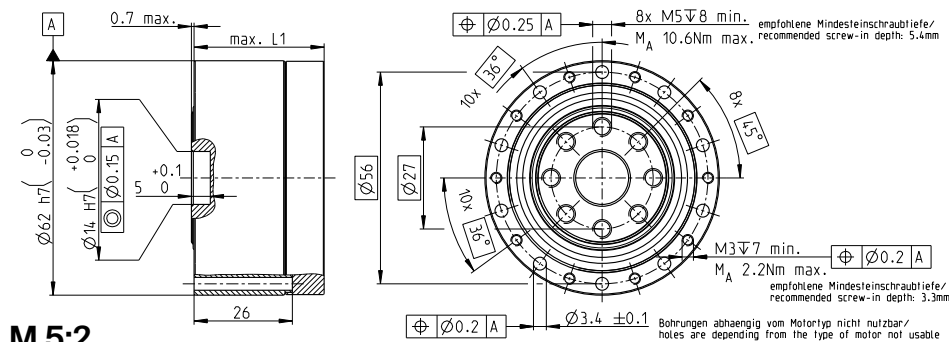
M 5:2

	Stock program
	Standard program
	Special program (on request)

	Part numbers			
		867137	867132	867073
Gearhead data				
1	Reduction		50:1	80:1	100:1
2	Max. continuous torque	Nm	18.0	19.0	27.0
3	Max. intermittent torque	Nm	23.0	29.0	37.0
4	Max. overload torque	Nm	48.0	61.0	71.0
5	Max. continuous input speed	rpm	3500	3500	3500
	Max. intermittent input speed	rpm	7300	7300	7300
6	Max. efficiency	%	72	72	75
7	Weight	g	460	460	460
8	Mass moment of inertia	gcm²	8.77	8.49	8.40
9	Gearhead length L1	mm	32.4	32.4	32.4
10	Mech. positioning accuracy	arcmin	1.50	1.80	1.56
11	Mech. repeatability	arcmin	k.a.	0.036	0.047
12	Hysteresis loss	arcmin	2.00	1.00	1.00
13	Torsional rigidity C1	10⁴ Nm/rad	0.67	0.56	0.63
	Torsional rigidity C2	10⁴ Nm/rad	0.88	0.56	0.66
	Torsional rigidity C3	10⁴ Nm/rad	1.20	0.67	0.56
14	Torque M1	Nm	3.90	3.00	3.00
	Torque M2	Nm	12.00	7.00	7.00
15	Starting torque, no load	mNm	34.0	22.0	19.0
16	Backdriving torque, no load	Nm	2.50	2.00	2.30
17	Ratcheting torque	Nm	105	140	110
18	Buckling torque	Nm	330	330	330

Technical data

19	Bearing at output	cross roller bearings
20	Tilting rigidity	17 Nm/arcmin
21	Max. tilting torque	42.0 Nm
22	Max. radial load	2030 N
23	Max. axial load	4075 N
24	Dynamic load rating	2060 N
25	Static load rating	2640 N
26	Distance rolling bearing center to output	10 mm
27	Pitch diameter	42.7 mm
28	Ambient temperature	-40...+100 °C

Modular system

EC motor
249–251_IDX 56
312–313_EC-i 52
321–323_EC 60 flat

Compact drive
353–355_IDX 56

Additional information

Explanation of the line numbers and additional information
on page 454.

GB 80 Worm Gear
Composite Version

DETAIL B

1 X KEY1005705 - 3x5x13 WOODRUFF KEY (DIN 6888)
(KEYS MAY BE SUPPLIED SEPERATLEY)

PRODUCT LABEL

PART No.

4 x M5 - 6H ↧ 9.0 / 8.0

15.00 ±0.15   15.00 ±0.15

4 x M5 - 6H ↧ 10.00 / 8.00

25.00 ±0.15   25.00 ±0.15

45.0° TYP

PCD ⌀36.0
PCD ⌀40.0

8 x M4 - 6H ↧ 11.00 / 8.00
BOTH SIDES

M4 ↧7.5 ±0.5

4 x 15

Gearbox output positions
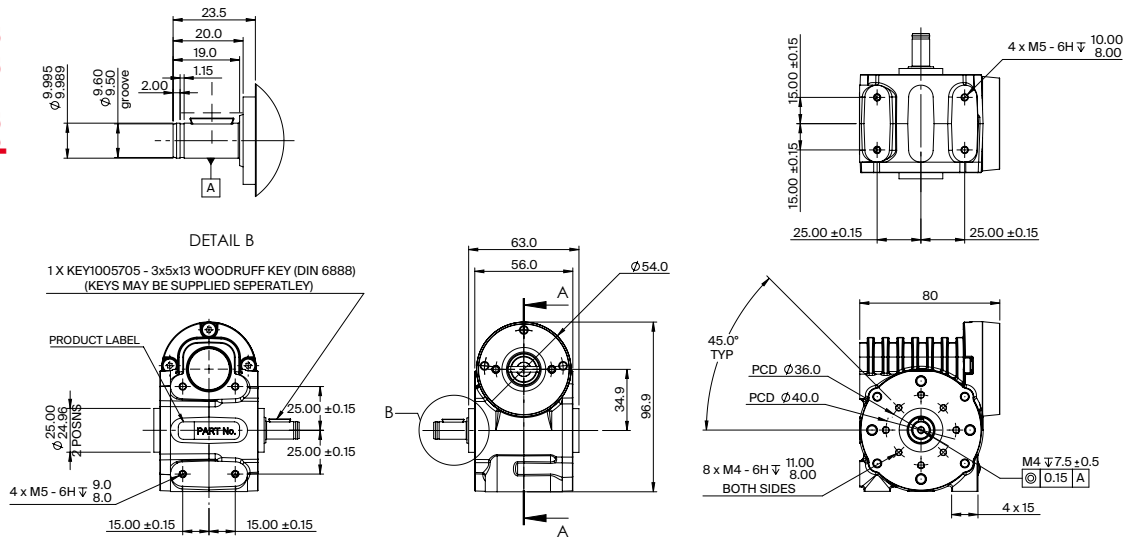
Key data		Composite version
Max. continuous torque	Nm	8
Ambient temperature	°C	-30...+130
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	80
Bearing at output		Ball bearing
Weight	kg	0.7

Specifications		Composite version		
Part numbers (special program on request)		812954	848376	848379
Reduction	X:1	15.5	30	60
Number of stages		1	1	1
Max. continuous torque	Nm	8	8	6
Max. intermittent torque	Nm	13	13	10
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	77	70	54
Average backlash no load	arcmin	10–25	10–25	10–25
Max. axial load (dynamic)	N	150	150	150
Max. permissible radial load, 12 mm from flange	N	500	500	500

Configuration	Composite version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	**Page**
IDX 56	249–251
EC-i 52	312–313
EC 60 flat	321–323
EC 90 flat	324–329
Compact drive	
IDX 56	353–355

Notes
[1]Length given excludes intermediate plate for motor combination

GB 12 Worm Gear
Bronze Version

DETAIL A
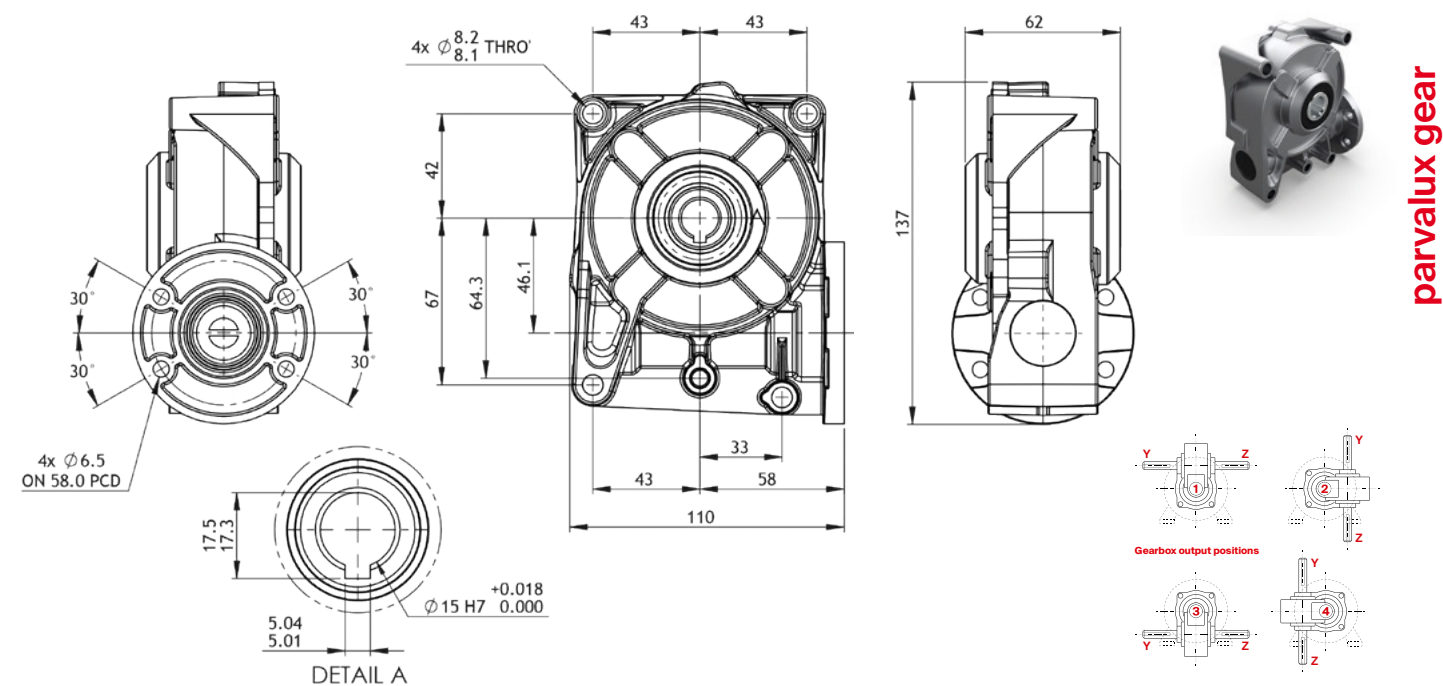
Key data		Bronze version
Max. continuous torque	Nm	30
Ambent temperature	°C	-30...+130
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	110
Bearing at output		Ball bearing
Weight	kg	1.5

Specifications		Bronze version		
Part numbers (special program on request)		735900	735901	735902
Reduction	X:1	15	30	60
Number of stages		1	1	1
Max. continuous torque	Nm	30	30	30
Max. intermittent torque	Nm	48	48	48
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	75	65	50
Average backlash no load	arcmin	10–25	10–25	10–25
Max. axial load (dynamic)	N	600	600	600
Max. permissible radial load, 12 mm from flange	N	800	800	800

Configuration	Bronze version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	**Page**
IDX 56	249–251
IDX 70 S, M	252–253
EC-i 52	312–313
EC 90 flat	324–329
Compact drive	
IDX 56	353–355
IDX 70 S, M	356–357

Notes
[1]Length given excludes intermediate plate for motor combination
Standard shaft ⌀25, length 50 mm with 8 mm keyway 735903

Brake AB 42 S 24 VDC, 1.4 Nm

accessories

Important information
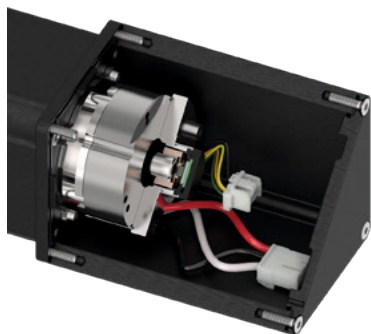
- Spring-loaded brake – single-disc brake with two friction surfaces for direct current. Braked in unpowered condition (dry operation).
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Not backlash-free (±1° max.).
- Additional length +20 mm.

	Stock program
	Standard program
	Special program (on request)

Type

Part numbers

x drives

overall length

overall length

Modular system

+ Drive	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 56 S	353					online
IDX 56 S	353	GPX 52	406-407			online
IDX 56 S	353	GB 80	458			online
IDX 56 S	353	GB 12	459			online
IDX 56 M	354					online
IDX 56 M	354	GPX 52	406-407			online
IDX 56 M	354	GB 80	458			online
IDX 56 M	354	GB 12	459			online
IDX 56 L	355					online
IDX 56 L	355	GPX 52	406-407			online
IDX 56 L	355	GB 80	458			online
IDX 56 L	355	GB 12	459			online

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 56 S	249					online
IDX 56 S	249	GPX 52	406-407			online
IDX 56 S	249	GB 80	458			online
IDX 56 S	249	GB 12	459			online
IDX 56 M	250					online
IDX 56 M	250	GPX 52	406-407			online
IDX 56 M	250	GB 80	458			online
IDX 56 M	250	GB 12	459			online
IDX 56 L	251					online
IDX 56 L	251	GPX 52	406-407			online
IDX 56 L	251	GB 80	458			online
IDX 56 L	251	GB 12	459			online

Technical data

				Pin allocation
Holding torque	1.4 Nm	Nominal voltage, smoothed	24 VDC -10 … +5%	online
Mass inertia	6.1 gcm²	Resistance	R_{20} = 82.6 Ω +10%	
Max. speed	8000 rpm	Duty cycle	100%	
Weight	0.14 kg	Reaction time	– Coupling	≤ 30 ms
Ambient temperature range	-40…+120°C		– Opening	≤ 85 ms

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Multi-Axis Motion Controller Summary

	MicroMACS6	MicroMACS6 Module	MiniMACS6-AMP4	MiniMACS6-AMP4-IF1	MiniMACS6-AMP4 OEM	MasterMACS
Fully programmable	✓	✓	✓	✓	✓	✓
Integrated power stage	No	No	✓	✓	✓	No
Number of axes	6	6	6 (4)	6 (4)	6 (4)	32
CANopen	✓	✓	✓	✓	✓	✓
Ethernet interfaces	✓	✓	No	✓	No	✓
EtherCat slave	No	No	No	✓	No	✓
EtherCat master	No	No	No	No	No	✓
Bluetooth	on request	on request	No	No	No	No

NEW (MicroMACS6 Module)

Solutions optimized for less complex or cost-sensitive applications:

- MicroMACS6
- MicroMACS6 Module
- MiniMACS6-AMP-4/50/10

Solutions for high flexibility:

- MiniMACS6-AMP-4/50/10-IF1

– Variants with integrated amplifiers (50 V/up to 10 A/30 A) and various encoder inputs (also absolute)

Solutions for highest performance:

- MasterMACS

– Most powerful Motion Controller
– Synchronization of up to 32 axes
– Various fieldbus interfaces
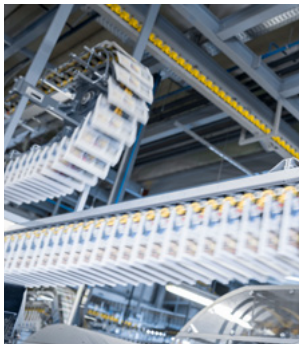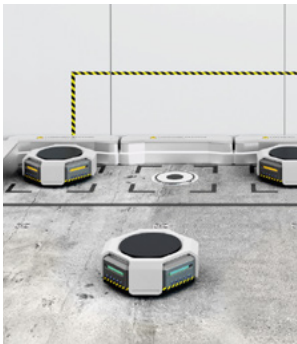
MiniMACS6-AMP-4/50/10-IF1 Data
Programmable Motion Controller

motion control

MiniMACS6-AMP-4/50/10 OEM
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages, without housing.

MiniMACS6-AMP-4/50/10
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages.

MiniMACS6-AMP-4/50/10-IF1
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages and a network option card (Ethernet/EtherCAT/ProfiNet in planning).

Controller versions	
	CANopen Master/Slave, EtherCAT Slave optional, Ethernet optional, Standalone with APOSS® win

Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	6
Web server (visualization)	optional
Expandable memory	yes (datalogging on USB stick)

Electrical data	
Logic supply voltage V_C	18 - 30 VDC
Inputs	
Digital inputs	16 (PLC level, 4 latch capable)
Analog inputs	2 (12-bit resolution, 0...10 V)
Hall sensor signals	4 x (H1, H2, H3)
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	8 (max. 100 mA per output)
Analog output	–
Encoder voltage output	5 VDC, max. 200 mA per output, total 1 A
Interfaces	
EtherCAT-Master / Profinet	on request
CAN	2 (max. 1 Mbit/s)
RS232 / RS485	–
EtherCAT-Slave	1
Ethernet	1
USB 2.0	1 Data+; Data- (High Speed)
Encoder inputs	4
Digital incremental	4 (differential, max. 6.25 MHz)
SSI absolute	4 (39 kHz...5 MHz)
Analog incremental (sin/cos)	4 (differential, max. 150 kHz)
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / EtherCAT
Display	–

Environmental conditions	
Temperature – Operation	-30...+70 °C
Temperature – Storage	-30...+85 °C
Humidity (condensation not permitted)	5...90%

Mechanical data	
Weight	ca. 600 g
Dimensions (L x W x H)	141 x 110 x 34 mm
Mounting	Metal compact housing / OEM without housing

Ordering Information: Please contact your maxon sales engineer

Amplifier	
Operating voltage V_{CC}: 12 - 60 VDC	
6 DC / 4 EC (BLDC) / 3 stepper motors / Twin Mode / Chopper	
Max. output voltage: 0.9 x V_{CC}	
Max. output current (per axis) I_{cont}: 10 A I_{max}: 30 A	
Switching frequency of power stage: 48 kHz	
Sampling rate of PI current controller: 24 kHz (41 µs)	
Sampling rate of PI speed controller: 8 kHz (125 µs)	
Sampling rate of PID positioning controller: 1 kHz (1 ms)	

Product variants	
Order no. 001755 MiniMACS6-AMP-4/50/10	
Order no. 001756 MiniMACS6-AMP-4/50/10 OEM	
Order no. 001757 MiniMACS6-AMP-4/50/10-IF1 EtherCAT	
Order no. 001784 MiniMACS6-AMP-4/50/10-IF1 Ethernet	

MicroMACS6 Data
Programmable Motion Controller

MicroMACS6
Compact, freely programmable multi-axis controller with optional BLE (Bluetooth Low Energy) interface.

MicroMACS6
Compact and powerful

The MicroMACS6 is a high-performance, ultra-compact, freely programmable multi-axis controller without power output stages.
One Ethernet and two independent CAN interfaces are available for commanding up to 6 power stages. The axes can be set up individually or as a kinematics group. Four PWM outputs are available for use with ESCON controllers.
An optional BLE (Bluetooth Low Energy) board expands the controller, making it possible to communicate with the controller via a smartphone app. Note: BLE option on request.

Controller versions	
	CANopen Master/Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	–
Maximum number of axes	6
Web server (visualization)	–
Expandable memory	–
Electrical data	
Logic supply voltage V_C	8 - 28 VDC
Inputs	
Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	–
Encoder voltage output	–
Interfaces	
Profinet	–
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	–
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1
Encoder inputs	
Digital incremental	–
SSI absolute	–
Analog incremental (sin/cos)	–
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / Ethernet
Display	–
Environmental conditions	
Temperature – Operation	-30...+55 °C
Temperature – Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 80 g
Dimensions (L x W x H)	55 x 40 x 21 mm
Mounting	M2.5 screws
Ordering Information: Please contact your maxon sales engineer	

001794 MicroMACS6

MicroMACS6 Module Data
Programmable Motion Controller

NEW

MicroMACS6 Module
Compact, programmable multi-axis controller as plug-in option for integration into custom motherboards.

MicroMACS6 Module
Flexible and compact

The MicroMACS6 Module is designed for flexibility and can be integrated into custom motherboards. The MicroMACS6 Module, with its small size and focused functions (similar to the MicroMACS6), is an excellent choice for users looking for a more affordable alternative to high-performance master motion controllers. For initial commissioning, the MicroMACS6 with identical functionality can be used as a fully integrated and ready-to-use solution. This simplifies the setup process.

Controller versions	
	CANopen Master/Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	–
Maximum number of axes	6
Web server (visualization)	–
Expandable memory	–
Electrical data	
Logic supply voltage V_C	8 - 28 VDC
Inputs	
Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable
Output	
Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	–
Encoder voltage output	–
Interfaces	
Profinet	–
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	–
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1
Encoder inputs	
Digital incremental	–
SSI absolute	–
Analog incremental (sin/cos)	–
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / Ethernet
Display	–
Environmental conditions	
Temperature – Operation	-30...+55 °C
Temperature – Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 9 g
Dimensions (L x W x H)	45 x 30 x 9.8 mm
Mounting	M2 screws
Ordering Information: Please contact your maxon sales engineer	

001822 MicroMACS6 Module

MasterMACS Data
Programmable Motion Controller

MasterMACS
Rounds off the Motion Controller portfolio with the highest computing power and multiple integrated bus interfaces as standard.

Data logger/web server
For development and analysis purposes, it is frequently helpful to collect, prepare and output data on drive systems.
Our MACS controllers provide easy options for high-performance data storage, be it on an internal SD card or via a connected PC tool. Relevant data can be recorded on a per-event basis or for long-term observation.
This data can be read out and analyzed at a later time. This flexibility makes it possible to use the MasterMACS purely as data collectors. An integrated web server provides the option of performing analysis and configuration via remote diagnostics.

Controller versions	
	CANopen Master/Slave, EtherCAT Master, EtherCAT Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	32
Web server (visualization)	yes
Expandable memory	SD-Card
Electrical data	
Logic supply voltage V_C	18 - 30 VDC
Inputs	
Digital inputs	10 (PLC level)
Analog inputs	–
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	4 (max. 100 mA per output)
Analog output	–
Encoder voltage output	5 VDC, max. 200 mA
Profinet	on request
Interfaces	
CAN	2 high; low (max. 1 Mbit/s)
RS232 / RS485	1 x RxD; TxD / 1 x Data+; Data-
EtherCAT-Master / EtherCAT-Slave	1 / 1
Ethernet	1
USB 2.0	1 Data+; Data- (Full Speed)
Encoder inputs	1
Digital incremental	1 (differential, max. 5 MHz)
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	10 (status, USB, EtherCAT)
Display	Option
Environmental conditions	
Temperature – Operation	0...40 °C
Temperature – Storage	-20...+85 °C
Humidity (condensation not permitted)	20...80%
Mechanical data	
Weight	500 / 300 g (DIN/compact housing)
Dimensions (L x W x H)	108 x 108 x 67 / 125 (108) x 98 x 42 mm
Mounting	DIN mounting / compact housing
Ordering Information: Please contact your maxon sales engineer	

001725 MasterMACS DIN 32 ax
001728 MasterMACS compact housing 32ax

Programmable Motion Controllers
Application development

APOSS® win

APOSS® enables simplified implementation of complex motion control applications. The programming is performed in the high-level languages C, which has been supplemented with very powerful, specific motion control commands.

APOSS® IDE – Application Engineering

State machines

The development of extensive software systems requires a structured and modular procedure. It is essential to have an appropriate system architecture, including its components and the interfaces to the subsystems and system environment.
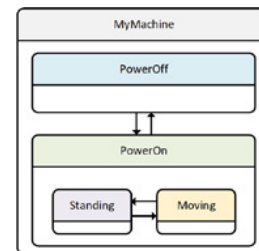

APOSS® makes it possible to create programs by means of hierarchical state machines. Thus comprehensive applications can be structured and developed in a transparent and serviceable way. Several state machines can be called up and processed in parallel.

Motion control functions

Comprehensive positioning and synchronization tasks are initiated with APOSS® using simple commands [e.g. AxisPosAbsStart(); AxisPosRelStart(); SyncPos(); SyncVel();] and processed independently in the background.

- **Jerk-limited positioning**
  Profile motion with limited jerking. Jerk limiting can be individually defined for all four acceleration phases. Jerk-limited motion can be changed dynamically during the motion.
- **CAM profiles**
  Each axis can travel along an own CAM profile. CAM profiles can be combined in any way desired and dynamically calculated. CAM segments can be splines, polynomials up to the fifth order or straight lines.
- **Path motion**
  Path motion can be performed with constant or with maximum path speed, for any number of axes.
- **Synchronization tasks**
  Axis motion synchronized with a master axis, position synchronization, speed synchronization or position synchronization with marker correction. Each axis can be synchronized with another master.
- **Kinematics**
  Synchronization of several axes in a 2- or 3-dimensional Cartesian coordinate system. Various kinematic models are available, for example a SCARA or DELTA model.
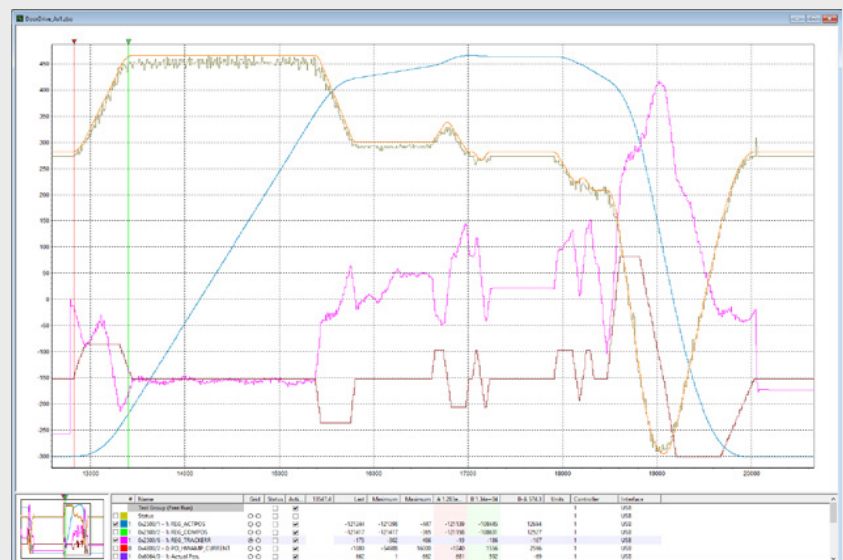
APOSS® Oscilloscope

Engineering tailored to your needs

The engineers at maxon have many years of experience in developing controllers and applications, and provide support from programming to commissioning.

Precision Drive Systems