

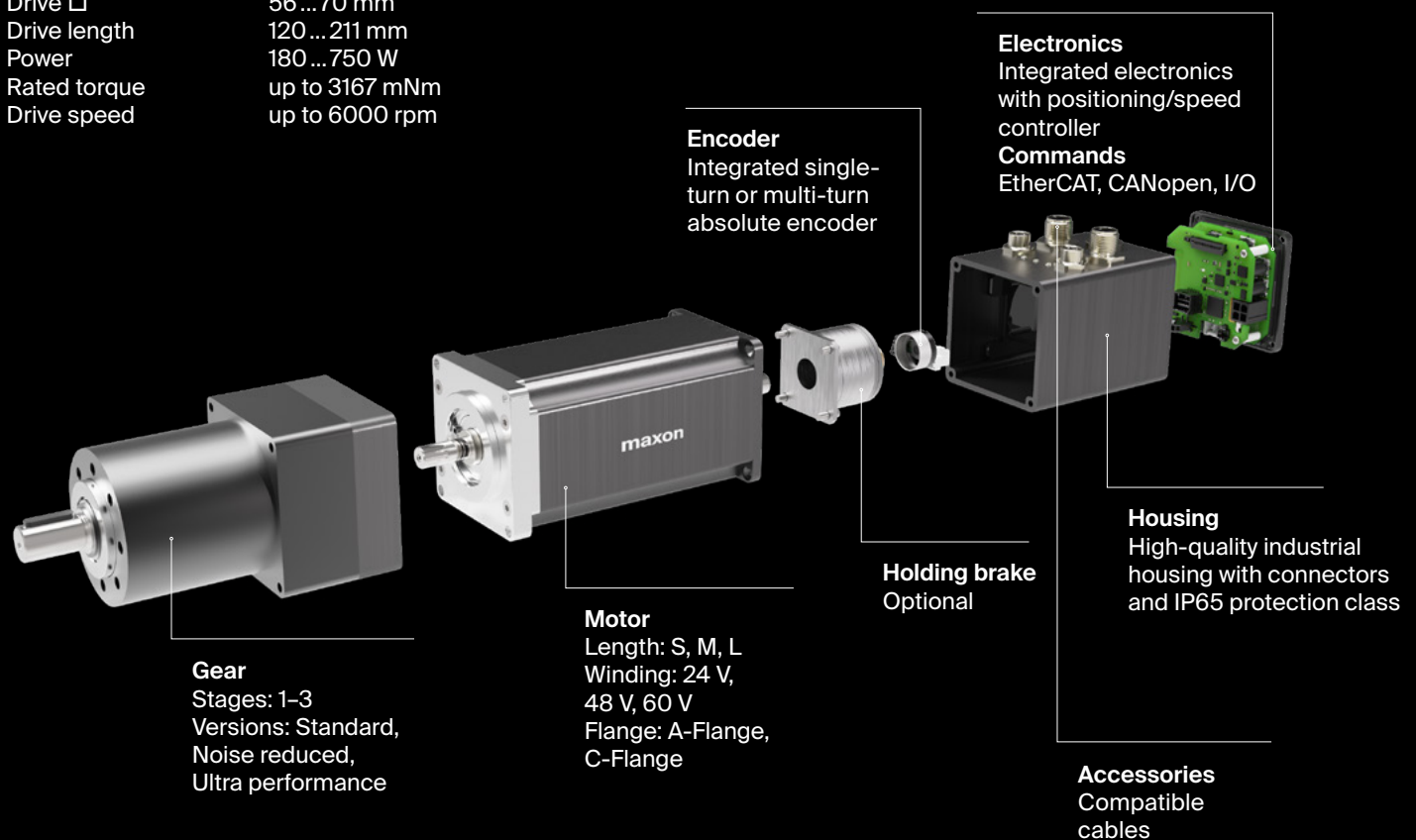
maxon IDX

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



- High continuous torque
- Outstanding energy efficiency
- Maximum power density
- Unmatched precision in dynamic motion
- IP65-protected design
- Easily configured online



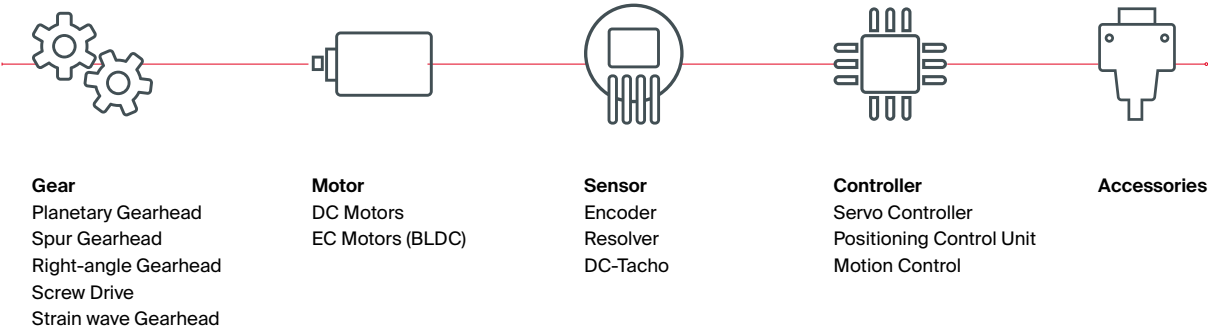
shop.maxongroup.com

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.

shop.maxongroup.com



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.

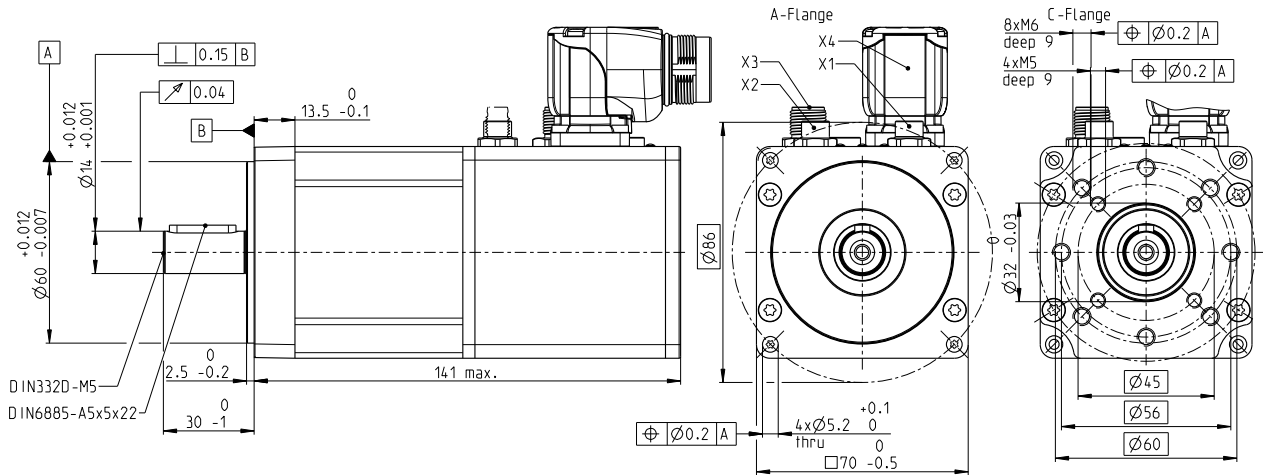
IDX 70 S □70 mm, with integrated electronics

IP65 Drive with positioning/Speed Controller

Key data: 550/641 W, 1530 mNm, 6000 rpm

IDX

EtherCAT
CANopen
I/O



M 1:3

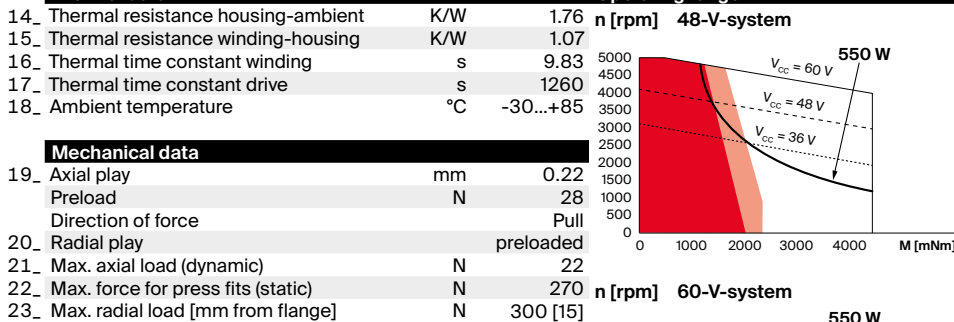
Drive data (provisional)

1. Nominal power supply voltage	V	24	48	60
2. Nominal speed	rpm	3870	3800	4000
3. Nominal torque at 25°C	mNm	1069	1339	1530
4. Nominal torque at 40°C	mNm	928	1163	1329
5. Nominal supply current at 25°C	A	19.7	12.1	11.6
6. Nominal supply current at 40°C	A	17.1	10.5	10.1
7. Maximum speed at nominal voltage	rpm	4100	4100	4280
8. Maximum permissible drive speed	rpm	6000	5125	4280
9. Maximum torque (short-time)	mNm	2208	4416	5290
10. Maximum supply current (short-time)	A	46	46	46
11. Rotor inertia of the drive	gcm ²	568	568	568
12. Nominal supply voltage + V _{cc}	V	12...60	12...60	12...60
13. Mechanical time constant	ms	0.598	0.543	0.569

Thermal data

14. Thermal resistance housing-ambient	K/W	1.76
15. Thermal resistance winding-housing	K/W	1.07
16. Thermal time constant winding	s	9.83
17. Thermal time constant drive	s	1260
18. Ambient temperature	°C	-30...+85

Operating range



Mechanical data

19. Axial play	mm	0.22
Preload	N	28
Direction of force	Pull	
20. Radial play	preload	
21. Max. axial load (dynamic)	N	22
22. Max. force for press fits (static)	N	270
23. Max. radial load [mm from flange]	N	300 [15]

Other specifications

24. Weight of the drive	g	1800
25. Typical noise level [rpm]	dBA	55 [3000]

Sensor

ENC single-turn absolute encoder:
resolution, bits

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

Supply	M23, male, 6 poles, N-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.

Modular system

Gear	Stages [opt.]	Sensor	Motor Control
408_GPX 70 A/UP	1-2	integrated ENC	integrated
409_GPX 70 LN	1-2	integrated EMT	
459_GB 12	1		
460_GB 9	1	Accessories	
461_GB 65	2	593_Brake AB 60 S	

Details on catalog page 44

Configuration

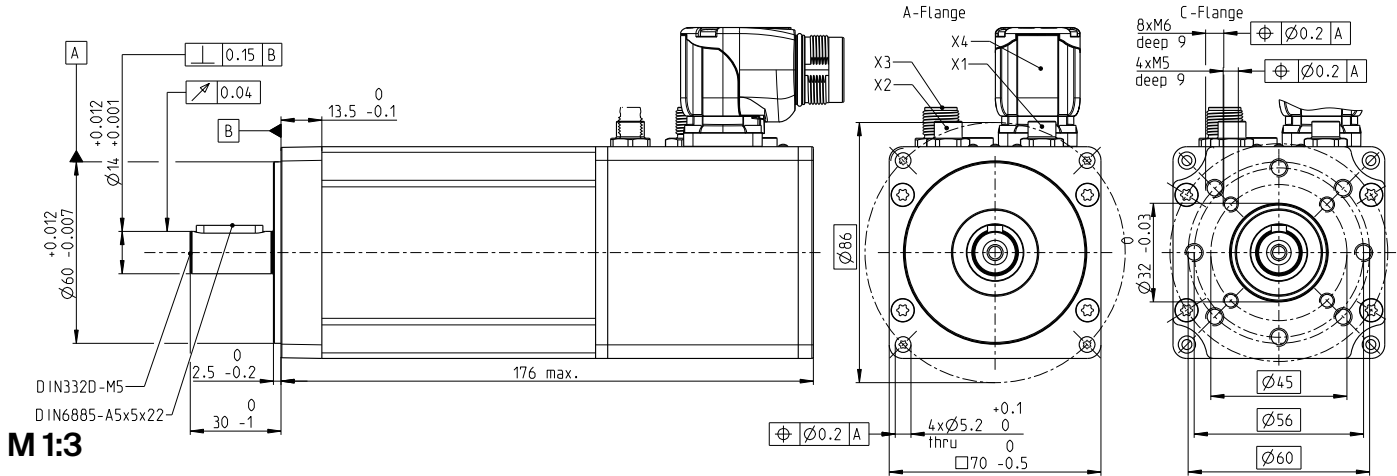
Flange front: A-Flange / C-Flange
 Interface with Positioning / Speed Controller: CANopen / EtherCAT
 Interface with Speed Controller: I/O
 Angle Power Connector: 0° / 90°
 Shaft: Standard with feather key / small diameter without feather key

IDX 70 M □70 mm, with integrated electronics **IP65 Drive with positioning/Speed Controller**

Key data: 650/773 W, 2441 mNm, 4000 rpm



IDX



Drive data (provisional)

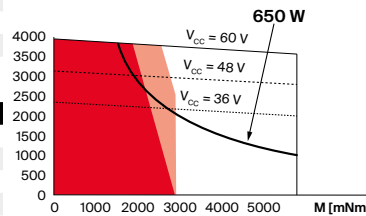
1_	Nominal power supply voltage	V	48	60
2_	Nominal speed	rpm	3038	3022
3_	Nominal torque at 25°C	mNm	2096	2441
4_	Nominal torque at 40°C	mNm	1820	2120
5_	Nominal supply current at 25°C	A	15.3	14.0
6_	Nominal supply current at 40°C	A	13.3	12.2
7_	Maximum speed at nominal voltage	rpm	3150	3195
8_	Maximum permissible drive speed	rpm	4000	3195
9_	Maximum torque (short-time)	mNm	5750	7084
10_	Maximum supply current (short-time)	A	46	46
11_	Rotor inertia of the drive	gcm ²	1050	1050
12_	Nominal supply voltage + V _{cc}	V	12...60	12...60
13_	Mechanical time constant	ms	0.487	0.437

Thermal data

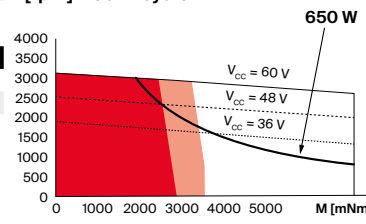
14_	Thermal resistance housing-ambient	K/W	1.41
15_	Thermal resistance winding-housing	K/W	0.642
16_	Thermal time constant winding	s	9.83
17_	Thermal time constant drive	s	1260
18_	Ambient temperature	°C	-30...+85

Operating range

n [rpm] 48-V-system



n [rpm] 60-V-system



Mechanical data

19_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		Pull
20_	Radial play	preloaded	
21_	Max. axial load (dynamic)	N	22
22_	Max. force for press fits (static)	N	270
23_	Max. radial load [mm from flange]	N	300 [15]

Other specifications

24_	Weight of the drive	g	2500
25_	Typical noise level [rpm]	dBA	60 [3000]
	Protection class without shaft		IP65

Sensor

ENC single-turn absolute encoder:
 resolution, bits

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

Supply	M23, male, 6 poles, N-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.

Modular system

Gear	Stages [opt.]	Sensor
408_GPX 70 A/UP	1-2	integrated ENC
409_GPX 70 LN	1-2	integrated EMT
459_GB 12	1	
460_GB 9	1	
461_GB 65	2	
		Accessories
		593_Brake AB 60 S

Details on catalog page 44

Motor Control
 integrated

Configuration

Flange front: A-Flange / C-Flange
 Interface with Positioning / Speed Controller: CANopen / EtherCAT
 Interface with Speed Controller: I/O
 Angle Power Connector: 0° / 90°
 Shaft: Standard with feather key/small diameter without feather key

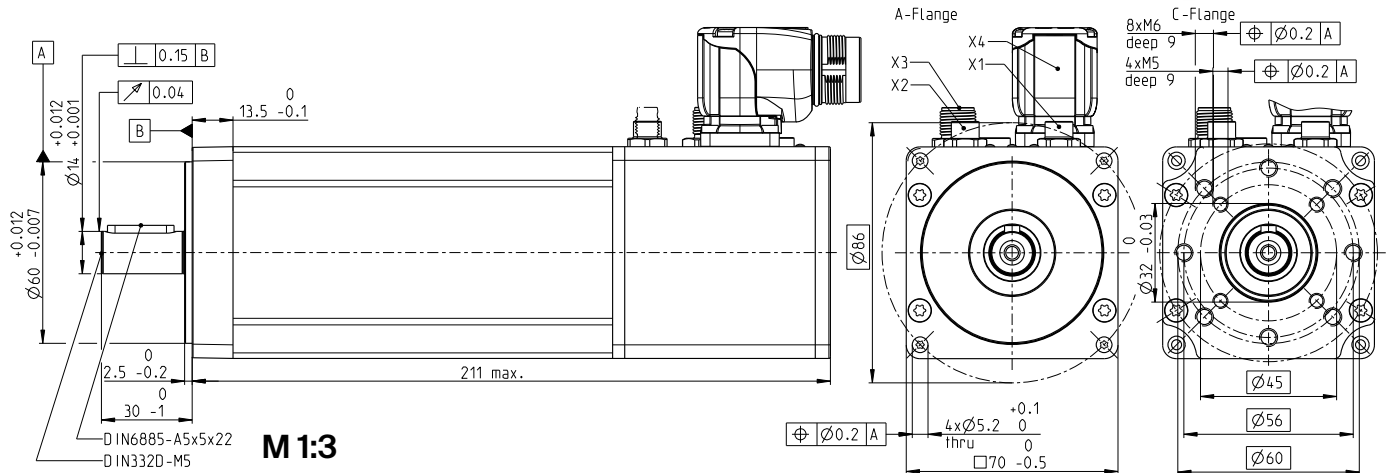
IDX 70 L □70 mm, with integrated electronics

IP65 Drive with positioning/Speed Controller

Key data: 750/831 W, 3167 mNm, 3200 rpm

IDX

EtherCAT
CANopen
I/O



M 1:3

Drive data (provisional)

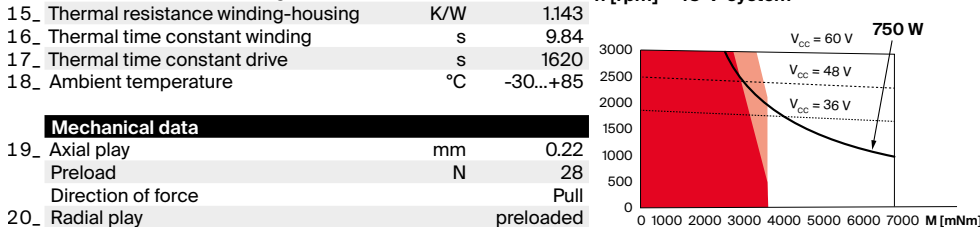
1_ Nominal power supply voltage	V	48	60
2_ Nominal speed	rpm	2424	2505
3_ Nominal torque at 25°C	mNm	2890	3167
4_ Nominal torque at 40°C	mNm	2510	2750
5_ Nominal supply current at 25°C	A	16.7	15.1
6_ Nominal supply current at 40°C	A	14.5	13.1
7_ Maximum speed at nominal voltage	rpm	2490	2630
8_ Maximum permissible drive speed	rpm	3200	2630
9_ Maximum torque (short-time)	mNm	7268	8602
10_ Maximum supply current (short-time)	A	46	46
11_ Rotor inertia of the drive	gcm ²	1534	1534
12_ Nominal supply voltage + V _{cc}	V	12...60	12...60
13_ Mechanical time constant	ms	0.408	0.449

Thermal data

14_ Thermal resistance housing-ambient	K/W	0.364
15_ Thermal resistance winding-housing	K/W	1.143
16_ Thermal time constant winding	s	9.84
17_ Thermal time constant drive	s	1620
18_ Ambient temperature	°C	-30...+85

Operating range

19_ Thermal resistance housing-ambient K/W 0.364 n [rpm] 48-V-system



Mechanical data

19_ Axial play	mm	0.22
Preload	N	28
Direction of force		Pull
20_ Radial play	preloaded	
21_ Max. axial load (dynamic)	N	22
22_ Max. force for press fits (static)	N	270
23_ Max. radial load [mm from flange]	N	300 [15]

n [rpm] 60-V-system

Other specifications

24_ Weight of the drive	g	3200
25_ Typical noise level [rpm]	dBA	65 [3000]
Protection class without shaft		IP65

Sensor

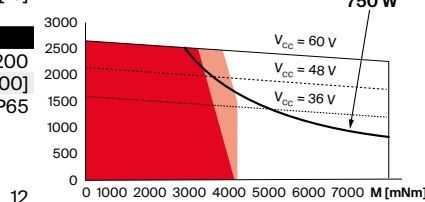
ENC single-turn absolute encoder:
resolution, bits

EMT multi-turn absolute encoder:
resolution, bits

Multi-turn: max. no. of turns

Supply	M23, male, 6 poles, N-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.



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

Modular system

Sensor
integrated ENC
integrated EMT

Accessories
593_Brake AB 60 S

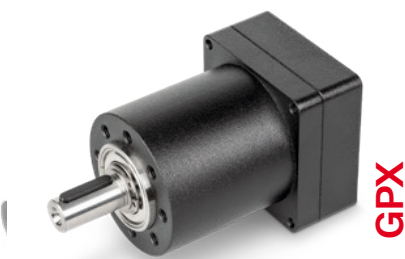
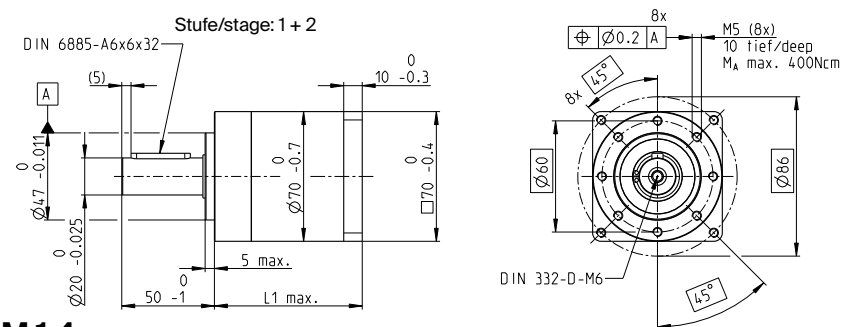
Details on catalog page 44

Motor Control
integrated

Configuration

Flange front: A-Flange / C-Flange
Interface with Positioning / Speed Controller: CANopen / EtherCAT
Interface with Speed Controller: I/O
Angle Power Connector: 0° / 90°
Shaft: Standard with feather key / small diameter without feather key

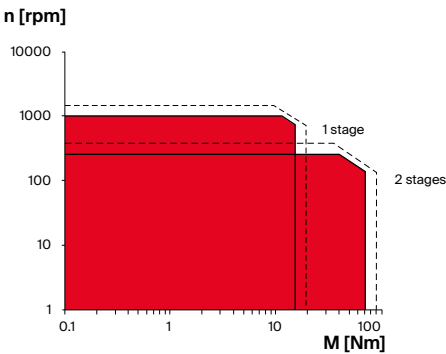
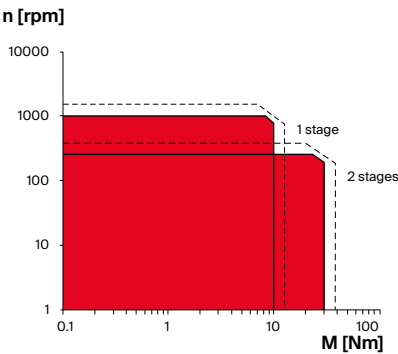
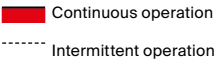
GPX 70 Ø70 mm, planetary gearhead



M 1:4

Key data	A Standard version	UP Ultra performance
Max. transmittable power	W 850	1200
Max. continuous torque	Nm 30.0	70.0
Max. continuous input speed	rpm 4000	4000
Ambient temperature	°C -20...+100	-20...+100
Bearing at output	Ball bearing	Ball bearing

Operating range (output shaft)	A Standard version	UP Ultra performance
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Specifications	A Standard version	UP Ultra performance
Number of stages	1 2	1 2
Max. transmittable power (continuous)	W 850 600	1200 1050
Max. transmittable power (intermittent)	W 1063 750	1500 1313
Max. continuous torque	Nm 10.0 30.0	15.0 70.0
Max. intermittent torque	Nm 12.5 37.5	18.8 87.5
Max. continuous input speed	rpm 4000 4000	4000 4000
Max. intermittent input speed	rpm 6000 6000	6000 6000
Max. efficiency	% 95 92	95 92
Average backlash no load	° 0.5 0.5	0.5 0.5
Max. axial load (dynamic)	N 825 825	825 825
Max. permissible radial load, 10 mm from flange	N 1000 1200	1000 1200
Gearhead length L1 [†]	mm 58 80	58 80
Weight	g 993 1399	1001 1425

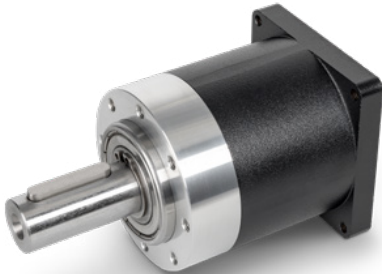
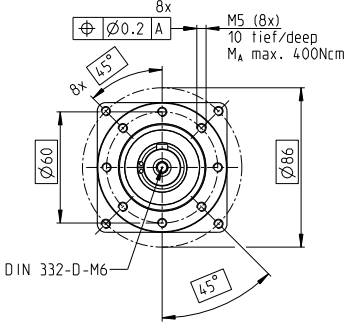
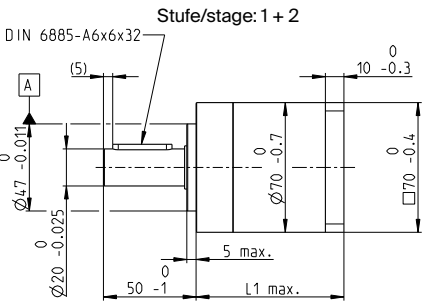
Configuration	A Standard version	UP Ultra performance
Number of stages	1 2	1 2
Reduction	3.9, 5.3, 6.6 16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6 16, 21, 26, 28, 35, 44
Version	Standard/noise reduced/ultra performance	
Flange	Standard flange	
Shaft		

Modular system	Page	Modular system	Page
EC motor		Compact drive	
Idx 70 S	Nº of stages [opt.] 1-2 252	Idx 70 S	Nº of stages [opt.] 1-2 356
Idx 70 M	1-2 253	Idx 70 M	1-2 357

[†]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 70
 Ø70 mm, planetary gearhead

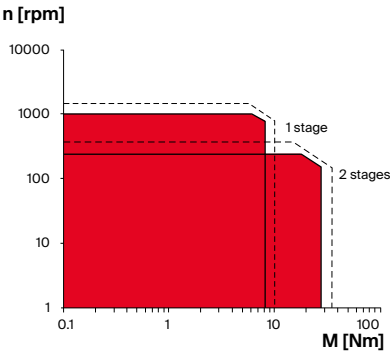
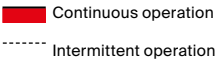
GPX



M 1:4

Key data		LN Noise reduced
Max. transmittable power	W	700
Max. continuous torque	Nm	27.0
Max. continuous input speed	rpm	4000
Ambient temperature	°C	-20...+85
Bearing at output		Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration

Operating range (output shaft)	LN Noise reduced
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Specifications		LN Noise reduced
Number of stages		1 2
Max. transmittable power (continuous)	W	700 450
Max. transmittable power (intermittent)	W	875 563
Max. continuous torque	Nm	8.0 27.0
Max. intermittent torque	Nm	10.0 34.0
Max. continuous input speed	rpm	4000 4000
Max. intermittent input speed	rpm	6000 6000
Max. efficiency	%	95 92
Average backlash no load	°	0.5 0.5
Max. axial load (dynamic)	N	825 825
Max. permissible radial load, 10 mm from flange	N	1000 1200
Gearhead length L ¹	mm	58 80
Weight	g	924 1330

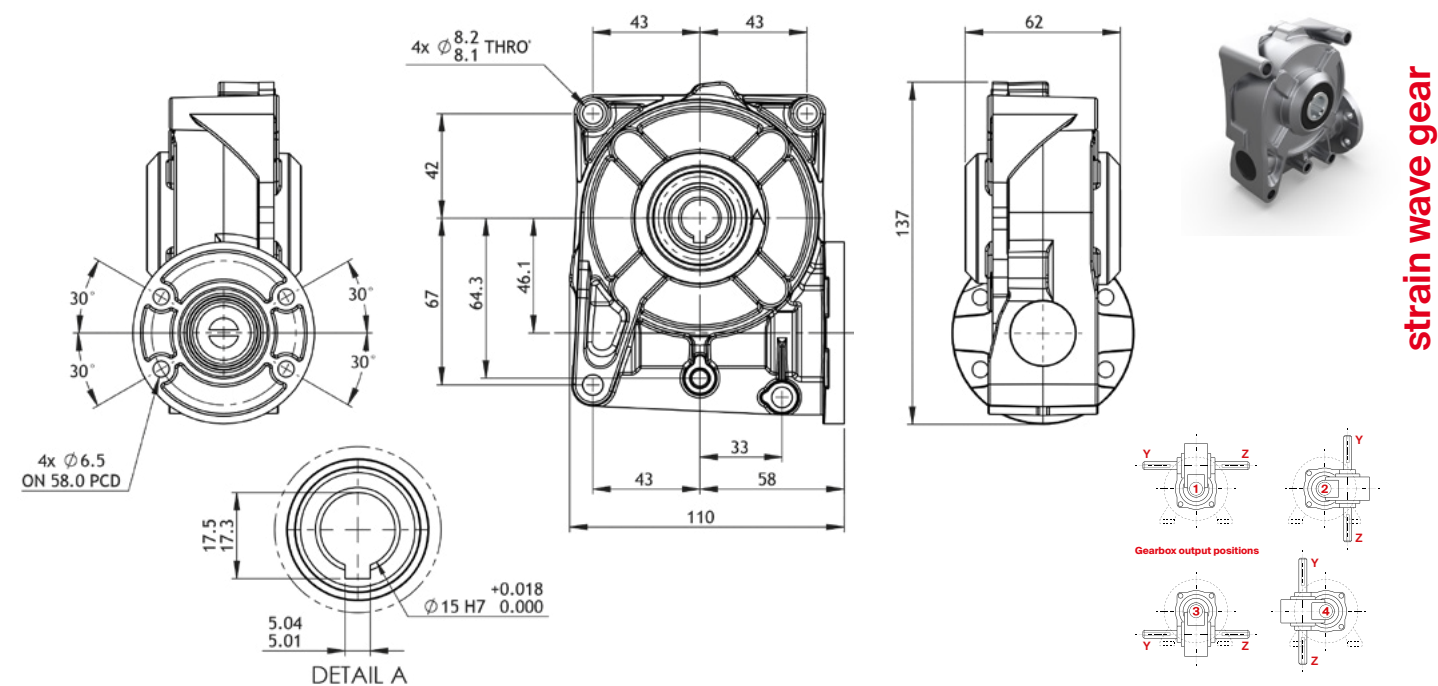
Configuration		LN Noise reduced						
Number of stages		1	2					
Reduction		3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44					
Version		Standard/noise reduced/ultra performance						
Flange		Standard flange						
Shaft								

Modular system		Page			Page
EC motor	Nº of stages [opt.]		Compact drive	Nº of stages [opt.]	
IDX 70 S	1-2	252	IDX 70 S	1-2	356
IDX 70 M	1-2	253	IDX 70 M	1-2	357

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

GB 12 Worm Gear
Bronze Version

NEW



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

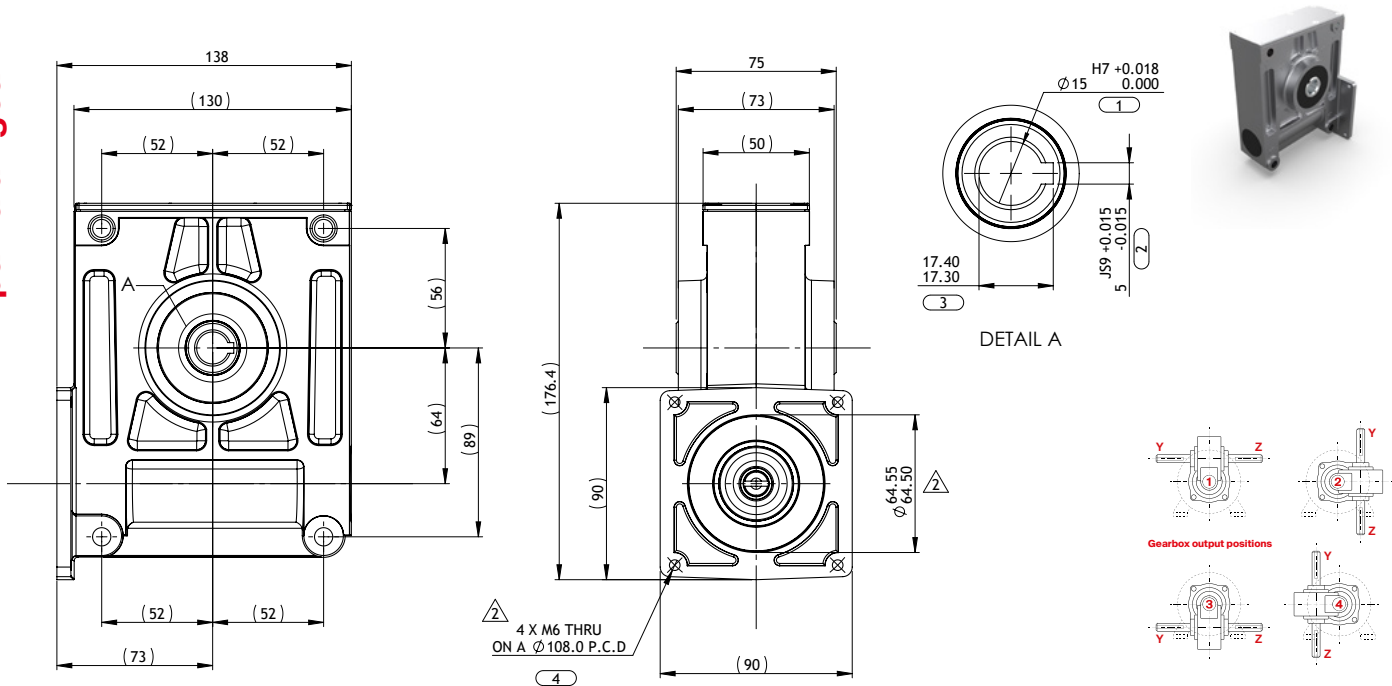
Specifications		Bronze version			
Part numbers (special program on request)		735900	735901	735902	
Reduction	X:1	15	30	60	
Number of stages		1	1	1	
Max. continuous torque	Nm	30	30	30	
Max. intermittent torque	Nm	48	48	48	
Max. continuous input speed	rpm	4000	4000	4000	
Max. intermittent input speed	rpm	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		Notes
EC motor	Page	¹ Length given excludes intermediate plate for motor combination Standard shaft Ø25, length 50 mm with 8 mm keyway 735903
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	

GB 9 Worm Gear
Composite Version

parvalux gear



Key data	Composite version
Max. continuous torque	Nm 50
Ambient temperature	°C -30...+130
Max. continuous input speed	rpm 4000
Gearhead length ¹	mm 138
Bearing at output	Ball bearing
Weight	kg 2.3

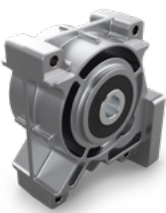
Specifications	Composite version
Part numbers (special program on request)	735894 735895 735896
Reduction	X:1 15 30 60
Number of stages	1 1 1
Max. continuous torque	Nm 50 50 50
Max. intermittent torque	Nm 80 80 80
Max. continuous input speed	rpm 4000 4000 4000
Max. intermittent input speed	rpm 5000 5000 5000
Max. efficiency	% 85 75 65
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	Composite version
Gearhead position to motor	4 positions, all at 90°

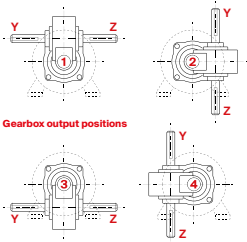
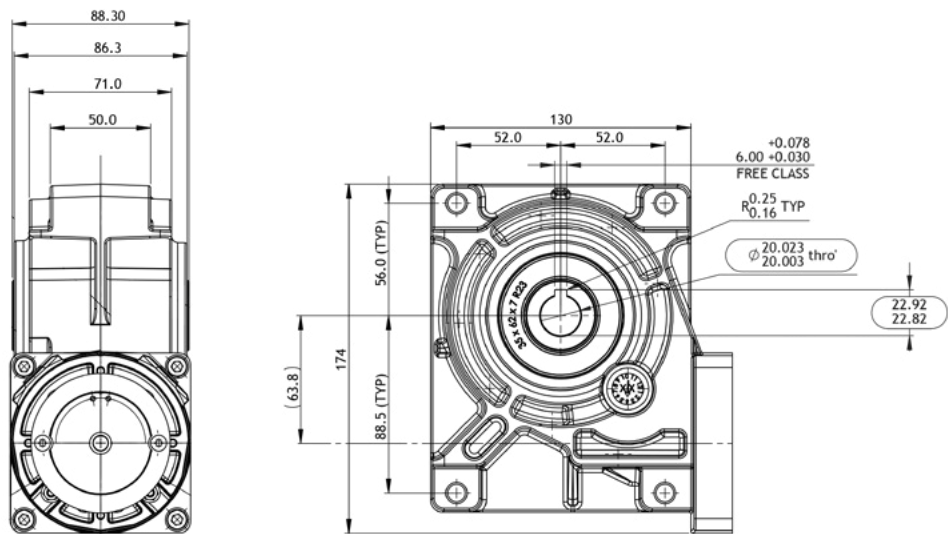
Modular system	Notes
EC motor	Page
EC 90 flat	324-329
IDX 70 S, M	252-253
Compact drive	
IDX 70 S, M	356-357

¹Length given excludes intermediate plate for motor combination
Standard shaft Ø25, length 50 mm with 8 mm keyway **735898**

GB 65 Worm Gear
Steel/Bronze Version



parvalux gear



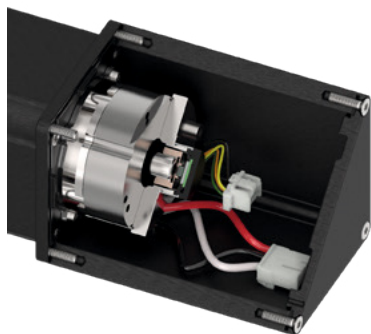
Key data		Steel/bronze version	
Max. continuous torque		Nm	120
Ambient temperature		°C	-30...+120
Max. continuous input speed		rpm	4000
Gearhead length¹		mm	130
Bearing at output			Ball bearing
Weight		kg	3.5

Specifications		Steel/bronze version			
Part numbers (special program on request)		848390 848392 848393			
Reduction	X:1	80	120	160	
Number of stages		2	2	2	
Max. continuous torque	Nm	120	120	120	
Max. intermittent torque	Nm	300	300	300	
Max. continuous input speed	rpm	4000	4000	4000	
Max. intermittent input speed	rpm	5000	5000	5000	
Max. efficiency	%	70	60	55	
Average backlash no load	arcmin	35	35	35	
Max. axial load (dynamic)	N	1000	1000	1000	
Max. permissible radial load, 12 mm from flange	N	3000	3000	3000	

Configuration		Steel/bronze version	
Gearhead position to motor		4 positions, all at 90°	

Modular system		Notes
EC motor	Page	¹Length given excludes intermediate plate for motor combination
EC 90 flat	324-329	
IDX 70 S, M	252-253	
Compact drive		
IDX 70 S, M	356-357	

accessories



- 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 ($\pm 1^\circ$ max.).
- Additional length +39 mm.

Part numbers

x drives

Type

[illegible]

Holding torque	5 Nm	Nominal voltage, smoothed	24 VDC -10...+5%	online
Mass inertia	25 gcm ²	Resistance	R ₂₀ = 41.16 Ω 0...+10%	
Max. speed	8800 rpm	Duty cycle	100%	
Weight	480 g	Reaction time	≤ 75 ms	
Ambient temperature range	-40...+120°C	- Coupling - Opening	≤ 75 ms	

online

Multi-Axis Motion Controller Summary



MicroMACS6



MicroMACS6
Module

NEW



MiniMACS6-
AMP4



MiniMACS6-
AMP4-IF1



MiniMACS6-
AMP4 OEM



MasterMACS

motion control

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

Solutions optimized for less complex or cost-sensitive applications:

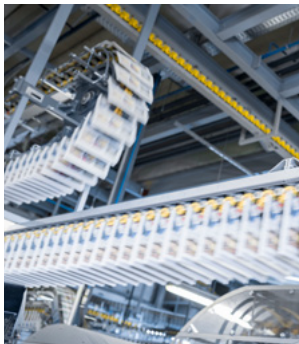
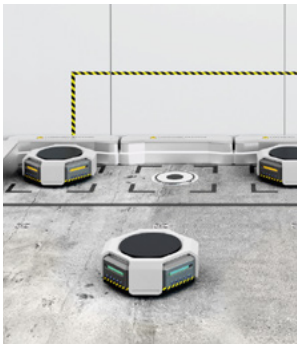
- MicroMACS6
- MicroMACS6 Module
- MiniMACS6-AMP-4/50/10

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
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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

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	-
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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: $0.9 \times V_{CC}$
 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.

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
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 smart-phone app. Note: BLE option on request.

MicroMACS6 Module Data

Programmable Motion Controller

NEW



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

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

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.

MasterMACS Data

Programmable Motion Controller



motion control

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

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 Rx/D; Tx/D / 1 x Data+; Data-
EtherCAT-Master / EtherCAT-Slave	1 / 1
Ethernet	1
USB 2.0	1 Data+; Data- (Full Speed)
Encoder inputs	
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

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.

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.

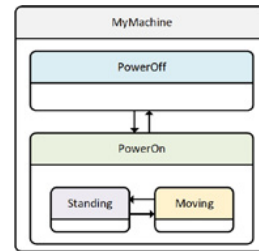
```

StateMachineSyntax.mc
//*****
// Event Definitions
//*****
70 SmEvent SIG_POWER_ON ()
71 SmEvent SIG_POWER_OFF ()
72 SmEvent SIG_TARGET_REACHED ()
73 SmEvent SIG_START_POS ()
74
//*****
// State Definitions
//*****
75
76 == State MyMachine {
77
78 == Sig_Init = {
79
80 SmInput(I_POWER_INPUT, SM_INPUT_RISING, id, SIG_POWER_ON);
81 SmInput(I_POWER_INPUT, SM_INPUT_FALLING, id, SIG_POWER_OFF);
82 SmInput(I_START_INPUT, SM_INPUT_RISING, id, SIG_START_POS);
83 SmParam(ACT_PROCESS_INDEX((id-1), SIG_FLAGS), SM_STAT_POSREACHED, SM_PARAM_RISING, id, SIG_TARGET_REACHED);
84 return(SmTrans(--PowerOff));
85 }
86
87 == State PowerOff {
88
89 SIG_ENTRY = {
90 print("Enter Power Off State");
91
92 SIG_POWER_ON = SmTrans(PowerOn--Standing);
93 }
94
95 == State PowerOn {
96
97 SIG_ENTRY = {
98 AxisControl(id, ON);
99 DigOutput(O_BRAKE_OUTPUT, C_RELEASE_BRAKE);
100 print("Switch Power ON");
101 }
102
103 SIG_EXIT = {
104 AxisControl(id, OFF);
105 DigOutput(O_BRAKE_OUTPUT, C_ENABLE_BRAKE);
106 print("Switch Power OFF");
107 }
108
109 SIG_POWER_OFF = SmTrans(PowerOff);
110
111 == State Moving {
112
113 SIG_ENTRY = { print("State --> Moving"); }
114 SIG_TARGET_REACHED = {
115 print("Target reached, position : ", Opus(id));
116 return(SmTrans(Standing));
117 } // Moving
118
119 == State Standing {
120
121 SIG_ENTRY = { print("State --> Standing"); }
122
123 SIG_START_POS = MoveNextPosition;
124 } // Standing
125 } // PowerOn
126 } // MyStateMachine
  
```

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.

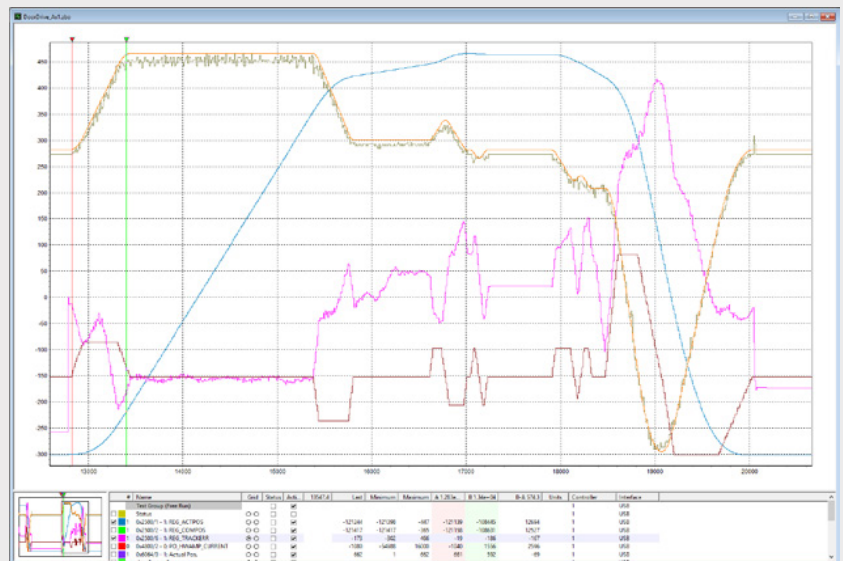


APOSS® makes it possible to create programs by means of hierarchical state machines. Thus comprehensive applications can be structured and developed in a transparent and serviceable way. Several state machines can be called up and processed in parallel.

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.

