



**MAC K TECHNOLOGY**

# AXOR was founded in 1988...

1988: AXOR IS FOUNDED  
1992: PATENT FOR CD180  
1992: DISTRIBUTION IN EUROPE & USA  
1993: AXOR FOUNDS PRIME STP COMPANY  
1996: ISO 9001 CERTIFICATION BY CSQ  
1997: SERVO DRIVES & BRUSHLESS MOTORS  
1997: DISTRIBUTION TO MOST INDUSTRIAL NATIONS  
2002: AXOR MOVES TO THE ACTUAL PREMISES  
2004: FASTBACK COMBO SERVO DRIVE AND MOTOR  
2005: PRIME MOVES TO THE ACTUAL PREMISES  
2005: PEOPLE2PEOPLE AND TCS IMPLEMENTATION  
2006: CANOPEN FIELDBUS COMMUNICATION  
2010: PATENT FOR MACK SERIES  
2012: ETHERCAT COMMUNICATION  
2015: NANO MACK TECHNOLOGY  
201.: TO BE CONTINUED....





Axor headquarters is the old consortium, a key part of the local farming community. It was saved and renovated by Franco Policante, the company owner, as an emblem of Axor's leading role in the area's new economy and as an expression of Old values in New markets.

Our customers know their job, we aim to be the means for them to achieve success and excellence through leading edge technology, optimized performance to price ratio easy installation and reliability.

All individuals can contribute their different potential towards a common goal in a chain of supply that is the success of an end-user.

Each of us can aspire to goals of excellence, perfection and fulfillment. Together we can achieve these goals.



Axor Quality Management has been ISO 9001 certified since 1996, the first Italian company in this sector.

Quality starts from the American avionics Halt Hass extreme prototype testing, assessing and defining real operating and failure limits, thereby accelerating product time to market and correcting design defects in-house, before field testing.

Over and above a strong vocation in quality control by self assessment and full participation in constant improvement, end of line testing is carried out on each single product:

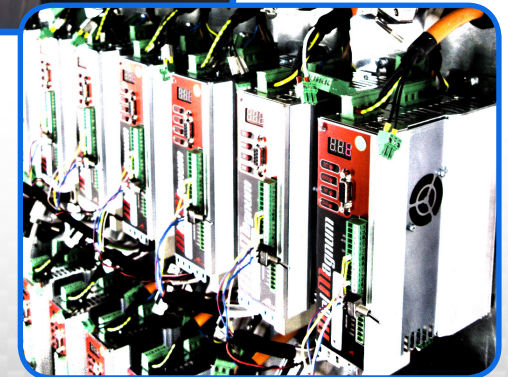
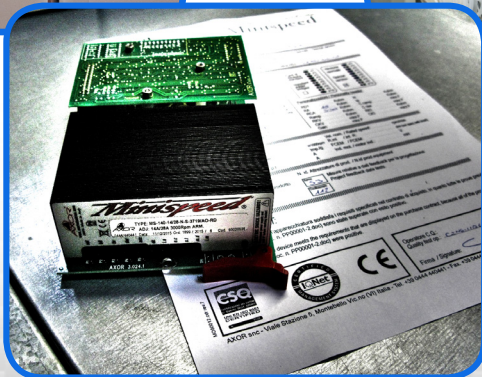
- 72 hour burn-in testing
- Acoustic/vibration analysis
- Functional tests
- Calibration




Axor allocates 23% of resources in R&D.



R&D focuses on innovation, however Axor also considers performance, reliability and cost as key factors in creating new products and added value for customers.

MADE IN ITALY





A Brand grouping all the recent years of technological innovation. Designed and engineered in-house to satisfy all the demands of modern automation.

<div><div>pag.6</div><div></div></div>	MACK MOTOR (MKM)													
	Model	MKM 40		MKM 60		MKM 70			MKM 85			MKM 120		
	Size	M	L	M	L	S	M	L	S	M	L	S	M	L
	Torque Nm	0.16	32	0.65	1.3	0.9	1.5	2.0	1.8	3.3	5	4	7.5	11
	Power W	50	100	200	400	280	470	630	570	1050	1600	1250	2150	3450

<div><div>pag.10</div><div></div></div>	MACK DRIVE (MKD) & MACK POWER (MKP)													
	300 230 V <sub>AC</sub> 1 or 3 ph.	2/4	2/4	2/4	4/8	2/4	2/4	2/4	2/4	4/8	6/12	4/8*	6/12*	8/16*
		3000 rpm										1500 rpm*		
<div></div>	600 400 V <sub>AC</sub> 3 ph.	1.5/3	1.5/3	1.5/3	2.5/5	1.5/3	1.5/3	2.5/5	1.5/3	2.5/5	3.5/7	2.5/5	5/10	7/14
		3000 rpm												

<div><div>pag.14</div><div></div></div>	MACK INDY (MKY)													
	230 V <sub>AC</sub> 1 or 3 ph.	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	2.5/5	2.5/5	3.5/7	5/10	2.5/5*	5/10*	8/16*
		3000 rpm										1500 rpm*		

<div><div>pag.18</div><div></div></div>	MACK NANO (MKN)													
	9 - 60 V <sub>DC</sub>	4/8	4/8	8/16	8/16									

<div><div>pag.22</div><div></div></div>	SPEEDER ONE													
	Speeder One PC interface & configuration software													

# MACK<sup>®</sup> MOTOR AC Brushless Servomotor



A very robust, high performance, low noise motor Engineered & designed for axis control, compact dimensions and long-term reliability. A very robust, high performance, low noise motor Engineered & designed for axis control, compact dimensions and long-term reliability.

## SALIENT FEATURES

- ◆ 0.16 - 11 Nm (50 - 3500W)
- ◆ 8 pole
- ◆ No cogging
- ◆ 200 frame & stack combinations
- ◆ IP54 & optional IP67
- ◆ Medium or High inertia
- ◆ Very smooth even at low speeds
- ◆ Holding Brake with Drive control

Round body for easy cleaning

Keystroke or smooth shaft

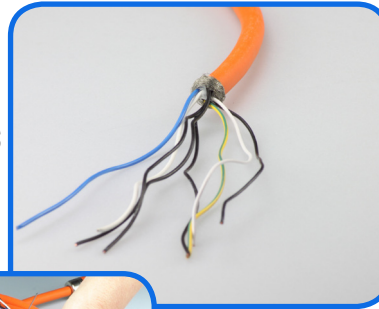
Food grade anodized finish

30'000 hr work life



## Single hybrid cable technology

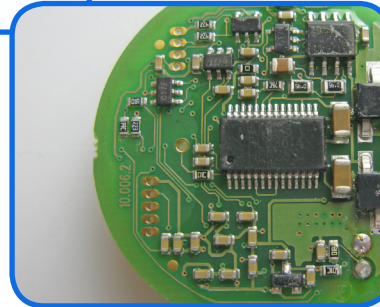
**Only 8 wires for power, feedback & signals**



**Highly flexible & tight bend radius**



**Serial encoder with no moving parts, 2048 p/rev - 13bit**  
**Designed & engineered by Axor**



**Easy fit, Clip-on connector**  
**270° swivel - Anti-vibration - IP67**



### **SPECIFIC NEEDS**

**For special applications**  
**For other drives**

- ◆ Multiturn absolute encoder
- ◆ Commutation encoder 2048 13bit
- ◆ Screw connectors for 2 cable connections
- ◆ 200 frame & stack combinations
- ◆ Custom flanges and shafts often readily available



# MACK

# MOTOR

MKM



**P. N. : D.S. / 10.05.16 / MKM / 08**

SERIES			MKSM 40		MKSM 60		MKM 70			MKM 85			MKM 120			
SIZE			M	L	M	L	S	M	L	S	M	L	S	M	L	
Mo	stall Torque ( $\Delta t=100^{\circ}\text{C}$ )	(Nm)	0.16	0.32	0.65	1.3	0.9	1.5	2.0	1.8	3.3	5	4	7.5	11	
Mo <sup>1</sup>	stall Torque ( $\Delta t=70^{\circ}\text{C}$ )	(Nm)	0.15	0.29	0.6	1.2	0.8	1.35	1.8	1.65	3	4.5	3.6	6.8	10	
400 VAC	Io <sup>1</sup> Stall Current	(Arms)	—	—	—	—	*	*	*	1.1	2	2.8	2.3	4.3	6.5	
Drive's Voltage	K <sub>T</sub> Torque Constant	(Nm/Arms)	—	—	—	—	*	*	*	1.5	1.5	1.6	1.55	1.6	1.55	
	N <sub>n</sub> Rated Speed	(Rpm)	—				3000									
230 VAC	Io <sup>1</sup> Stall Current	(Arms)	0.6	0.85	1.35	2.3	1.1	1.5	2	2	3.3	4.7	2.3	4.3	6.5	
Drive's Voltage	K <sub>T</sub> Torque Constant	(Nm/Arms)	0.26	0.38	0.45	0.52	0.7	0.9	0.9	0.8	0.9	0.95	1.55	1.6	1.55	
	N <sub>n</sub> Rated Speed	(Rpm)	3000										1500			
Power			(W)	50	100	200	400	280	470	630	570	1050	1600	1300	2400	3500
W weight			kg	0.35	0.5	1.0	1.4	1.35	1.9	2.4	2.2	3.2	4.2	4.9	7.3	9.7
W1 weight with brake			kg	0.44	0.59	1.4	1.8	1.55	2.1	2.6	2.5	3.5	4.5	5.8	8.2	10.6
W2 weight with Hith Inertia Rotor			kg	-	-	-	-	1.7	2.3	2.8	3.0	4.0	5.0	6.9	9.3	11.7
J	Rotor Inertia (std)	(Kg <sup>m</sup> <sup>2</sup> )-10 <sup>-4</sup>	0.03	0.04	0.14	0.24	0.35	0.7	1.0	1.3	2.2	3.1	9	14	19	
J <sub>H</sub>	Higher Rotor Inertia (opt)	(Kg <sup>m</sup> <sup>2</sup> )-10 <sup>-4</sup>	N.A.	N.A.	N.A.	N.A.	1.9	2.2	2.5	6.3	7.2	8.2	30	35	40	
J <sub>B</sub>	Rotor Inertia with brake	(Kg <sup>m</sup> <sup>2</sup> )-10 <sup>-4</sup>	0.05	0.06	0.15	0.25	0.4	0.75	1.05	1.5	2.4	3.3	9.5	14.5	19.5	
BRAKE stall torque (24 VDC +6% -10%)			0.4 Nm (0.5 A <sub>DC</sub> )		2 Nm (0.5 A <sub>DC</sub> )		2 Nm (0.45 A <sub>DC</sub> )			4.5 Nm (0.5 A <sub>DC</sub> )			9 Nm (0.8 A <sub>DC</sub> )			
MODULE			2	4	2	4	2	4	6	2	4	6	2	4	6	

**Mo** : speed 5 -100rpm - mounted on AL flange (300x300x6.5 mm, 65°C max) - Resolver - no brake    **Mo<sup>1</sup>** : with encoder (**Mo** -10%) - with brake -5%    \*See 230VAC version

## STANDARD FEATURES

- ♦ 8 Poles sinusoidal B.E.M.F.
- ♦ Medium - high rotor inertia
- ♦ Permanent rare earth magnets
- ♦ Very low torque fluctuation at minimum speed
- ♦ 230 and 400 VAC Nominal Voltages
- ♦ Feedback: ..... **Mack®** Serial Encoder
- ♦ Ambient temp.\*:    operating ..... 0 - 40°C  
   storage ..... -20 - 60°C
- ♦ Ambient Humidity\*: operating & storage ..... 85% RH max
- ♦ Altitude (a.m.s.l.):    operating & storage ..... 1000m
- ♦ Vibration: ..... 5G max
- ♦ Insulation class: ..... F
- ♦ Protection rating: ..... IP54
- ♦ Ball-bearing life: ..... >20'000h







NOTE: \* Free from condensation

## OPTIONS

- ♦ Holding brakes
- ♦ Protection rating: IP65
- ♦ Special flanges and shafts
- ♦ JH Higher rotor inertia (additional)
- ♦ Thermal Switch
- ♦ Resolver feedback

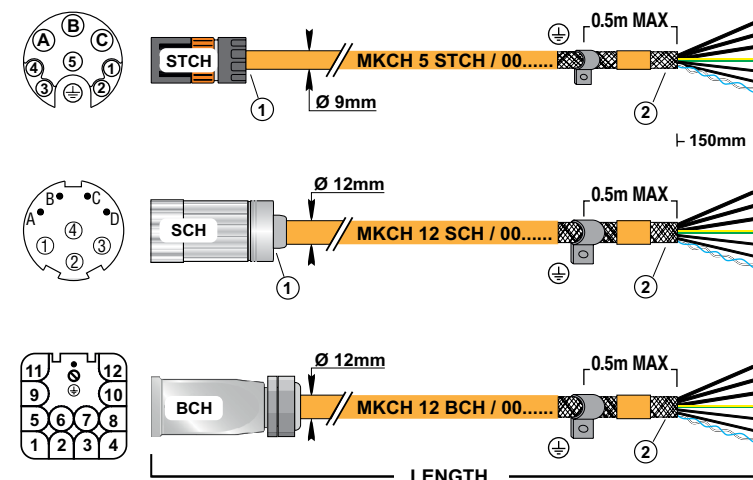
## CABLE SPEC.

- ♦ Mobile usage for chain tracks
- ♦ External sheathing:    PUR polyurethane
- ♦ Flame / oil resistance
- ♦ Trailing speed: ..... 300m / min. max
- ♦ Acceleration: ..... 20m / sec<sup>2</sup>
- ♦ Cycles: ..... 5 million
- ♦ Minimum bending radius: ..... 7 x Ø
- ♦ Operating temperature:    -25°C / +80°C
- ♦ Length > 10m use a 3 Ph choke (LXT20).
- ♦     DIN VDE

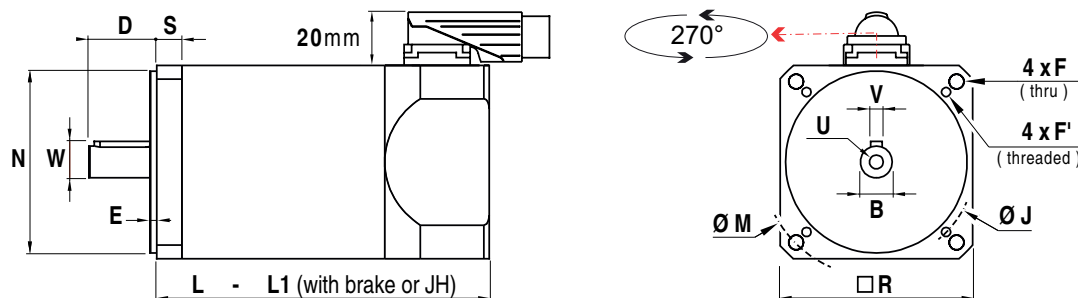


TYPE	Mo	L	L1	B <sub>h7</sub>	D	V <sub>h9</sub>	W	U	N <sub>h6</sub>	M	F	J	F'	E	S	R
	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
MKSM 40 M	0.16	88	120	8	25	3 x 12	9.2	M3 x 6	30	46	4.3	-	-	2.5	5	40 □
MKSM 40 L	0.32	105	137													
MKSM 60 M	0.65	105	135	14	30	5 x 20	16	M5 x 10	50	70	5.5	-	-	3	8	60 □
MKSM 60 L	1.3	133	163													
MKM 70 S	0.9	100	125	11	23	4 x 18	12.5	M4 x 10	60	90	5.5	75	Ø 4.2 x 10	2.5	10	75 □
MKM 70 M	1.5	125	150													
MKM 70 L	2.0	150	175	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85 □
MKM 85 S	1.8	115	145													
MKM 85 M	3.3	145	175	19	40	6 x 32	21.5	M6 x 16	110	145	9	-	-	3.5	12.5	120 □
MKM 85 L	5	175	205													
MKM 120 S	4	135	170	11	205	240										
MKM 120 M	7.5	170	205													
MKM 120 L	11	205	240													

## HYBRID: Power + MKES Serial Encoder



NOTE: (1) All shields (int. and ext.) wired to housing (2) Int. and ext. shields wrapped together



STCH	SCH	BCH	FUNCTION	WIRE COLOR	MARK
A / C / B	1 / 4 / 3	10 / 11 / 12	U / V / W MOTOR	BLACK	U-1/V-2/W-3
1 / 2	C / D	8 / 4	(+) / (-) BRAKE	WHITE / BLACK	-
4 / 3	A / B	5 / 1	SE+ / SE-	BLU / WHITE	-
⊕	2	⊕	PE	GREEN YELLOW	-
5	-	2 - 3 - 6 - 7	N.C.	-	-
HOUSING	HOUSING	9	ALL SHIELDS	-	-

## MACK® MOTOR

MKM85 M 30/40

- 000 D 00 X

## ORDERING CODE

P 0 MKES1STR1 X X - Sxxx

SERIES:  
MKSM 40 - 60  
MKM 70 - 85 - 120

SIZE: S, M, L

SPEED: 30 = 3000 Rpm

VOLTAGE: 23 = 230V<sub>AC</sub>, 40 = 400V<sub>AC</sub>

MOUNTING FLANGE:  
000 = standard  
001-499 = IEC metric  
501-999 = Reserved

MOUNTING HOLES:  
D = B5 thru holes (std)  
C = B14 threaded holes (opt)

SHAFT KEY:  
X = with key (std)  
W = w/out key (opt)

SHAFT DIAMETER:  
00 = standard  
01-49 = IEC metric  
51-99 = Reserved

TH.PROT.:  
P = PTC (std)  
N = w/out

BRAKE:  
0 = w/out (std)  
1 = with (opt)

FEEDBACK:  
MKES1 = Mack® Serial Enc. (std)  
R020 = 2 p resolver (0° ph.) (opt)

SPEC  
GEARBOX: R = With, X = W/out  
INERTIA: X = (std), H = High (opt)

IP RATING: 1 = IP54 (std), 2 = IP65 (opt)

CONNECTOR ORIENTATION:  
R = Rear (std), F = Front (opt), T = Top (opt)

CONNECTOR TYPE:  
ST = STCH (std), S = SCH (opt), B = BCH (opt),  
SC = SC, 2xM23 power+signal (opt)

FLANGES & SHAFT OPTIONAL	B <sub>h7</sub>	D	V <sub>h9</sub>	W	U	N <sub>h6</sub>	M	F	J	F'	E	S	R
090D14X (MKM70 all)	14	30	5x25	16	M4x10	60	90	5.2	75	4.2x10	2.5	10	75
100D19X (MKM85 all)	19	40	6x32	21.5	M6x16	80	100	6.5	-	-	3	11	85
115D19X (MKM85 all)	19	40	6x32	21.5	M6x16	95	115	9	-	-	3	11	100

## MACK® CABLE ORDERING CODE

MKCH

5STCH / 00 - 030 Sxxx

CABLE LINE:  
Preassembled  
Hybrid cables

ASSEMBLY MOTOR SIDE:  
5STCH = 5 Arms cable + M15 Springtec connector  
12SCH = 12 Arms cable + M23 Screw connector  
12BCH = 12 Arms cable + Bayonet connector

ASSEMBLY DRIVE SIDE:  
00 = Flying leads (no connector)

SPEC

LENGTH:  
030 = 3m  
050 = 5m  
070 = 7m  
100 = 10m



*A very robust multiple axis system with single power unit, especially conceived for applications needing up to 6 - 12 drives, offering high performance control and excellent power to dimension ratio. It can be supplied with customer specific hardware & software, preloaded or with easy file loading for best stock management. On-site start-up service or remote support.*

## SALIENT FEATURES

- ◆ 230V and 400V power supply
- ◆ Full programmable through miniUSB
- ◆ SpeederOne PC software for configuration and setup
- ◆ Very smooth Sine wave
- ◆ Built-in EMI filter



**DC Bus daisy chain**

**9 digital inputs  
2 digital outputs  
all fully programmable**

**STO - Safe Torque Off  
to CEI EN 61800-5-2 SIL 2  
ISO EN 13849-1 PLd 60536  
Safety Class III**

## MACK POWER—the center of operations



All drive programming thru a single miniUSB on MackPower



**Danger**  
400 volts

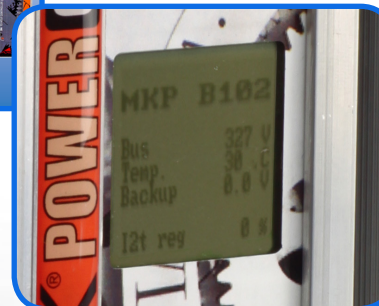


Power supply direct from mains,  
with just one power line to Mack power,  
savings in transformer and multiple power cabling

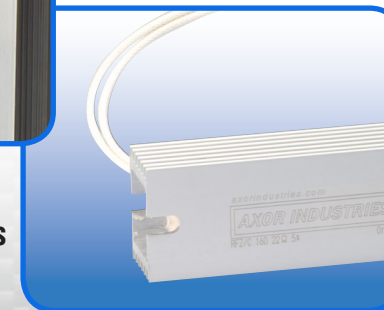
Seperate power unit for a lower temperature  
and longer lifetime of the drives.  
Optimisation of cabinet space with excellent  
power to dimensions ratio



Centralized diagnostics & alarm messages of all drives



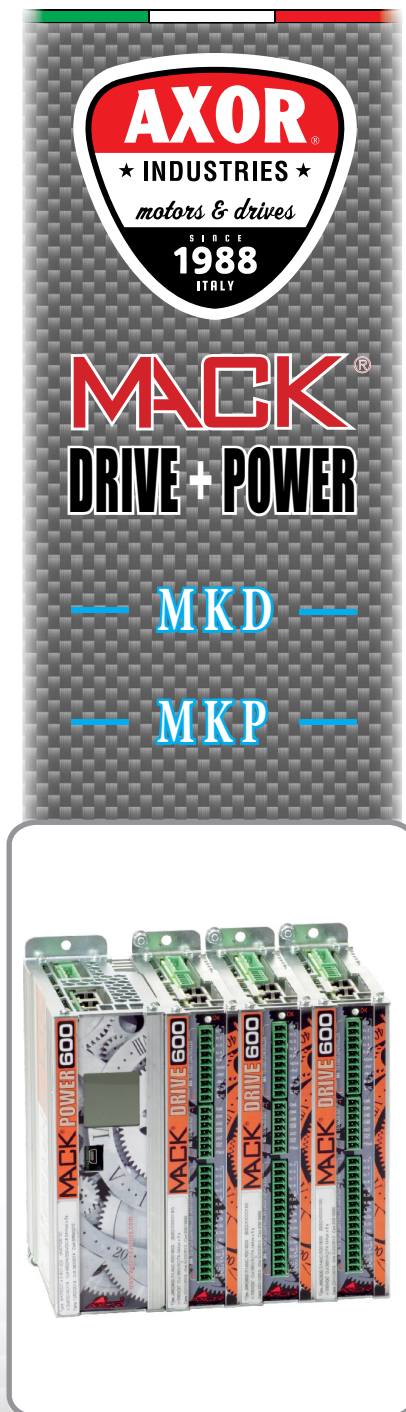
Single regeneration resistor for all drives



### CONTROL MODES

- ◆  $\pm 10\text{V}$  Analog Speed reference
- ◆ Pulse Direction
- ◆ 0-10V Torque reference
- ◆ Analog 2 position
- ◆ Encoder feedback
- ◆ 512 to 2048 p/rev settings
- ◆ Linear encoder

**CANopen** Ether**CAT**



DRIVE MODEL	MKD 300				MKD 600				
SIZE (A)	2/4	4/8	6/12	8/16	1.5/3	2.5/5	3.5/7	5/10	7/14
Rated Current / Peak Current x 5 sec ( Arms )	2 / 4	4 / 8	6 / 12	8 / 16	1.5 / 3	2.5 / 5	3.5 / 7	5 / 10	7 / 14
Power Supply	310 ÷ 385 V <sub>DC</sub> ( from MKP 300 )				530 ÷ 650 V <sub>DC</sub> ( from MKP 600 )				
Control Brake Supply	24 V <sub>DC</sub> ( ±5% ) - 1 A <sub>DC</sub> max ( from insulating transformer )								
Backup Logic Supply	24 V <sub>DC</sub> ( ±10% ) - 0.25 A <sub>DC</sub> max ( from specific MACK POWER Supply )								
Case	A	A	A-V ☹	A-V ☹	A	A	A-V ☹	A-V ☹	A-V ☹

POWER MODEL	MKP 300 M *	MKP 300 T	MKP 600 T
SIZE	3.0 ( 3000 w )	4.5 ( 4500 w )	4.5 ( 4500 w )
Power In ( 50/60 Hz - grounded system only ) ( V <sub>rms</sub> )	1 x 230 V <sub>AC</sub> ( ± 10% )	3 x 230 V <sub>AC</sub> ( ± 10% )	3 x 400 V <sub>AC</sub> ( ± 10% )
( Arms )	8 A	12 A	7 A
Power Out ( at full - load ) ( V <sub>DC</sub> )	310 - 385 V	310 - 385 V	530 - 650 V
( A <sub>DC</sub> )	10 A / 20 A <sub>PK</sub> X 5"	15 A / 30 A <sub>PK</sub> X 5"	8.5 A / 17 A <sub>PK</sub> X 5"
Backup In ( from insulating transformer )	24 V <sub>DC</sub> ( ± 10% ) - 2.5 A <sub>DC</sub> max		
F1: Power In Line Fuses ( T - type = time - lag )	12 A / 250 V	16 A / 250 V	8 A / 500 V
Case	B		

\* Single ph does not allow to obtain the rated torque and speed of motor. Contact Axor for details.

## STANDARD FEATURES

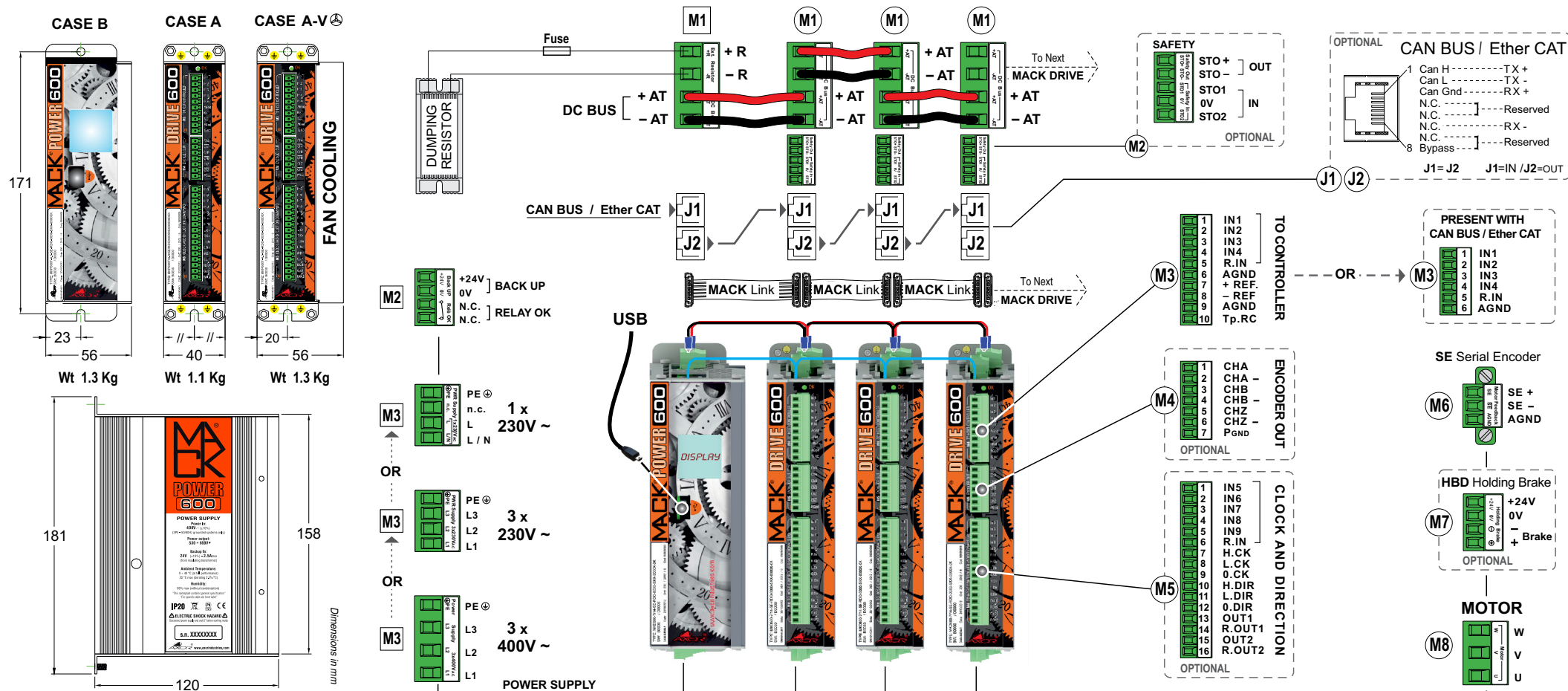
- ♦ Very compact multiaxis servosystem for brushless motors
- ♦ Power supply 230 and 400 V<sub>AC</sub> direct from the mains
- ♦ Driving motor ranges up to 11 Nm
- ♦ Several drives powered by a single supply unit
- ♦ Built-in **EMC** line filter, in-rush and regen circuits
- ♦ **USB** single access for setting and monitoring all drives
- ♦ **SE** Serial Encoder feedback with single hybrid cable for motor connections
- ♦ **Speeder-One**® software interface
- ♦ **RD0** differential analog ref. ± 10v (13 bit)
- ♦ Protection rating: IP20
- ♦ Storage time: 1 year<sup>2</sup>
- ♦ Operating frequency ..... 8 KHz
- ♦ Current / velocity loop bandwidth ..... 2 KHz / 200 Hz
- ♦ Ambient temp<sup>1</sup>:
  - operating at rated data: ..... 0 - 40°C (no derating)
  - rated and pk current derating: ..... 40 - 55°C (2.5% / °C)
  - maximum operating: ..... 55°C max
  - storage: ..... -20 - 55°C
- ♦ Humidity<sup>1</sup>: ..... 85% max (operating & storage)
- ♦ Altitude a.m.s.l.
  - operating at rated data: ..... 1000 m
  - rated and pk current derating: up to 2500 m (1.5% /100m)

## OPTIONS

- ♦ **CD0** Clock and Direction control mode
- ♦ **CB0** CAN Bus control mode
- ♦ **ETC** Ether CAT control mode
- ♦ **AE** Absolute Multiturn Encoder feedback
- ♦ **EC** Commutation Encoder feedback
- ♦ **HBD** Motor holding brake drive circuit
- ♦ **STO** Safe Torque Off safety function
- ♦ **M5** Additional I/O connector
- ♦ **M4** Emulated Encoder connector
- ♦ **R02 / R05 / R10** increased dumping to 160W / 500W / 1000W

NOTE: <sup>1</sup> Free from condensation <sup>2</sup> After one year storage the electrolytic capacitors must be reformed. Contact AXOR for details.





MACK® DRIVE			HARDWARE CODE			SW CODE			MACK® POWER			HARDWARE CODE			SW CODE		
MKD 600 - 7/14 SE - RD0			- 0 0 0 0 - Sxxx			(X000/X000/X000)			MKP 600T - 4.5-R01-000 - Sxxx			(X000/X000/X000)					
DRIVE LINE			HBD (Holding Brake Drive): 0 = w/out (std), 1 = with (opt)			SPEC NUMBER (opt)			FW			SW			POWER SUPPLY		
MODEL: 300 or 600			STO (Safe torque Off): 0 = w/out (std), 1 = with (opt)												MODEL Power In:		
SIZE: (see table on reverse)			M5 (Additional I/O): 0 = w/out (std), 1 = with (opt)												300M = 1x230V <sub>AC</sub> ( for MKD 300 )		
FEEDBACK:			M4 (Emulated Encoder): 0 = w/out (std), 1 = with (opt)												300T = 3x230V <sub>AC</sub> ( for MKD 300 )		
SE = Serial Encoder (std)			T (Tropicalized): 0 = w/out (std), 1 = with (opt)												600T = 3x400V <sub>AC</sub> ( for MKD 600 )		
AE = Absolute Multiturn Encoder (opt)															SIZE: Power Out		
EC = Commutation Encoder (opt)															3.0 = 3000 Wrms (for MKD 300M)		
CONTROL MODE:															4.5 = 4500 Wrms (for MKD 300T-600T)		
RD0 = Diff. analog reference (std)															DUMPING SIZE: Ext. Resistors		
CD0 = Clock and Direction (opt)															MKP300 : R02 / 300 = 160W 22 Ω (std), R05 / 300 = 500W 22 Ω (opt)		
CB0 = CAN BUS (opt)															MKP600 : R01 / 600 = 100W 39 Ω (std), R02 / 600 = 160W 33 Ω (opt)		
ETC = Ether CAT (opt)															R05 / 600 = 500W 33 Ω (opt), R10 / 600 = 1000W 33 Ω (opt)		
															SPEC NUMBER (opt)		
															FW		
															SW		
															CONFIG FILE		
															T (Tropicalized): 0 = w/out (std) 1 = with (opt)		
															NOT IN USE: 0 = (std)		
															CB0 (CAN Bus): 0 = w/out (std) 1 = with (opt)		



*A truly flexible standalone drive for all servo requirements.  
It is compact and reliable, ideal for one or more axis on  
machinery and articulated workstations or lines.*

## SALIENT FEATURES

- ◆ 230V single phase power supply
- ◆ Full programmable by miniUSB
- ◆ SpeederOne PC software for configuration and setup
- ◆ Very smooth Sine wave
- ◆ Built-in EMI filter
- ◆ Automatic holding brake control



**6 digital inputs  
2 digital outputs  
all fully programmable**

**Motor Brake Control**

**STO - Safe Torque Off  
to CEI EN 61800-5-2 SIL 2  
ISO EN 13849-1 PLd 60536  
Safety Class III**

## MACK INDY- designed for quick & easy installation



230Vac 1 phase supply direct from mains

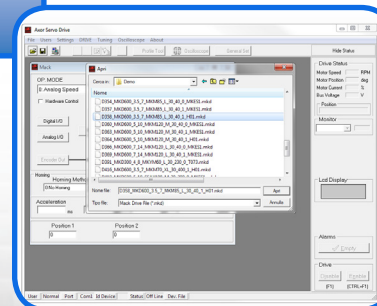


Compact dimensions to fit easily in cabinet space



Custom configurations  
for a trouble-free application

Plug n play preloaded software or  
easy loading for best stock management



### CONTROL MODES

- ◆  $\pm 10\text{V}$  Analog speed reference
- ◆ Pulse Direction
- ◆ 0-10V Torque reference
- ◆ Analog 2 position
- ◆ Digital 2 position
- ◆ Square wave profiles
- ◆ Encoder feedback
- ◆ 512 to 2048 p/rev settings
- ◆ Linear encoder

**CANopen** Ether**CAT**



**MACK**  
**INDY**

**— MKYD —**



P.N. : D.S. / 10.05.16 / MKYDSM / 05

DRIVE MODEL		MKYD 230					
SIZE (A)		1.5/3	2.5/5	3.5/7	5/10	8/16	
Rated Current / Peak Current x 5 sec ( Arms )		1.5 / 3	2.5 / 5	3.5 / 7	5 / 10	8 / 16	
Power & Backup Logic Supply		1 x 230 V <sub>Ac</sub> ( ± 10% ) - 50/60 HZ ( grounded system only )					
Case		A			A-V Ⓢ		

MOTOR MODEL		MKSM 40		MKSM 60		MKM 70			MKM 85		
SIZE		M	L	M	L	S	M	L	S	M	L
Mo	stall Torque ( Δt = 100°C ) ( Nm )	0.16	0.32	0.65	1.3	0.9	1.5	2.0	1.8	3.3	5
230 VAC	Io <sup>1</sup> Stall Current ( Arms )	0.6	0.85	1.35	2.3	1.1	1.5	2	2	3.3	4.7
Drive's Voltage	K <sub>T</sub> Torque Constant ( Nm / Arms )	0.26	0.38	0.45	0.52	0.7	0.9	0.9	0.8	0.9	0.95
	N <sub>n</sub> Rated Speed ( Rpm )	3000									
Power	( W )	50	100	200	400	280	470	630	570	1050	1600
W weight / W1 with brake	( kg )	0.35 / 0.44	0.5 / 0.59	1 / 1.4	1.4 / 1.8	1.4 / 1.6	1.9 / 2.1	2.4 / 2.6	2.2 / 2.5	3.2 / 3.5	4.2 / 4.5
J Rotor Inertia / J <sub>B</sub> with brake	( Kg·m <sup>2</sup> )·10 <sup>-4</sup>	0.03 / 0.05	0.04 / 0.06	0.14 / 0.15	0.24 / 0.25	0.35 / 0.4	0.7 / 0.75	1.0 / 1.05	1.3 / 1.5	2.2 / 2.4	3.1 / 3.3
BRAKE	stall torque ( 24 VDC +6% -10% )	0,4 Nm ( 0.5 A <sub>DC</sub> )		2 Nm ( 0.5 A <sub>DC</sub> )		2 Nm ( 0.45 A <sub>DC</sub> )			4.5 Nm ( 0.5 A <sub>DC</sub> )		

**Mo** : speed 5 - 100rpm - mounted on AL flange (300x300x6.5 mm, 65°C max) - Resolver - no brake

**Io<sup>1</sup>** : motor with encoder, refer to **Mo<sup>1</sup>** (**Mo** -10%) - with brake -5%

## STANDARD FEATURES

- ♦ Driving motor range up to 5 Nm (2500W)
- ♦ Built-in in-rush and regen circuits
- ♦ **Speeder-One<sup>®</sup>** software interface with **USB** for setting and monitoring
- ♦ **SE** Serial Encoder Feedback
- ♦ **CD0** Clock and Direction Command
- ♦ Operating frequency 8KHz ♦ Loop bandwidth: 2KHz current / 200Hz speed
- ♦ Ambient temp.<sup>1</sup>: - operating at rated data: ..... 0 - 40°C (no derating)  
- rated & pk current derating: 40 - 55°C max (2.5% / °C)  
- storage ..... -20 - 55°C
- ♦ Ambient Humidity<sup>1</sup>: - operating & storage ..... 85% RH max
- ♦ Altitude (a.m.s.l.): - operating & storage ..... 1000m  
- rated & pk current derating: up to 2500m (1.5% / 100m)
- ♦ Protection rating: IP20 ♦ Storage time: 1 year<sup>2</sup>

## OPTIONS

- ♦ **RD0** differential analog ref. ± 10v (13 bit)
- ♦ **M3** Emulated Encoder connector
- ♦ **ST0** Safe Torque off safety function
- ♦ **AE** Absolute Multiturn Encoder feedback
- ♦ **CB0** Can Bus
- ♦ **EMC** Line filter
- ♦ **EC** Comm. Enc. feedback
- ♦ **ETC** Ether CAT control mode

## MOTOR SPEC.

- ♦ 8 Poles sinusoidal B.E.M.F. permanent rare earth magnets
- ♦ Medium - high rotor inertia
- ♦ Very low torque fluctuation at minimum speed
- ♦ 3 x stall torque overload capacity
- ♦ Feedback: Serial Incremental Encoder (std)  
Comm. Incremental Encoder (opt)  
Absolute Multiturn Encoder (opt)
- ♦ Ambient temp.<sup>1</sup>: operating at rated data 0 - 40°C  
storage -20 - 60°C
- ♦ Ambient Humidity<sup>1</sup>: operating & storage 85% RH max
- ♦ Altitude (m.s.l.): operating & storage 1000m
- ♦ Vibration: ..... 5g max
- ♦ Insulation class: F ♦ Protection rating: IP54 (IP65 optional)
- ♦

## CABLE SPEC.

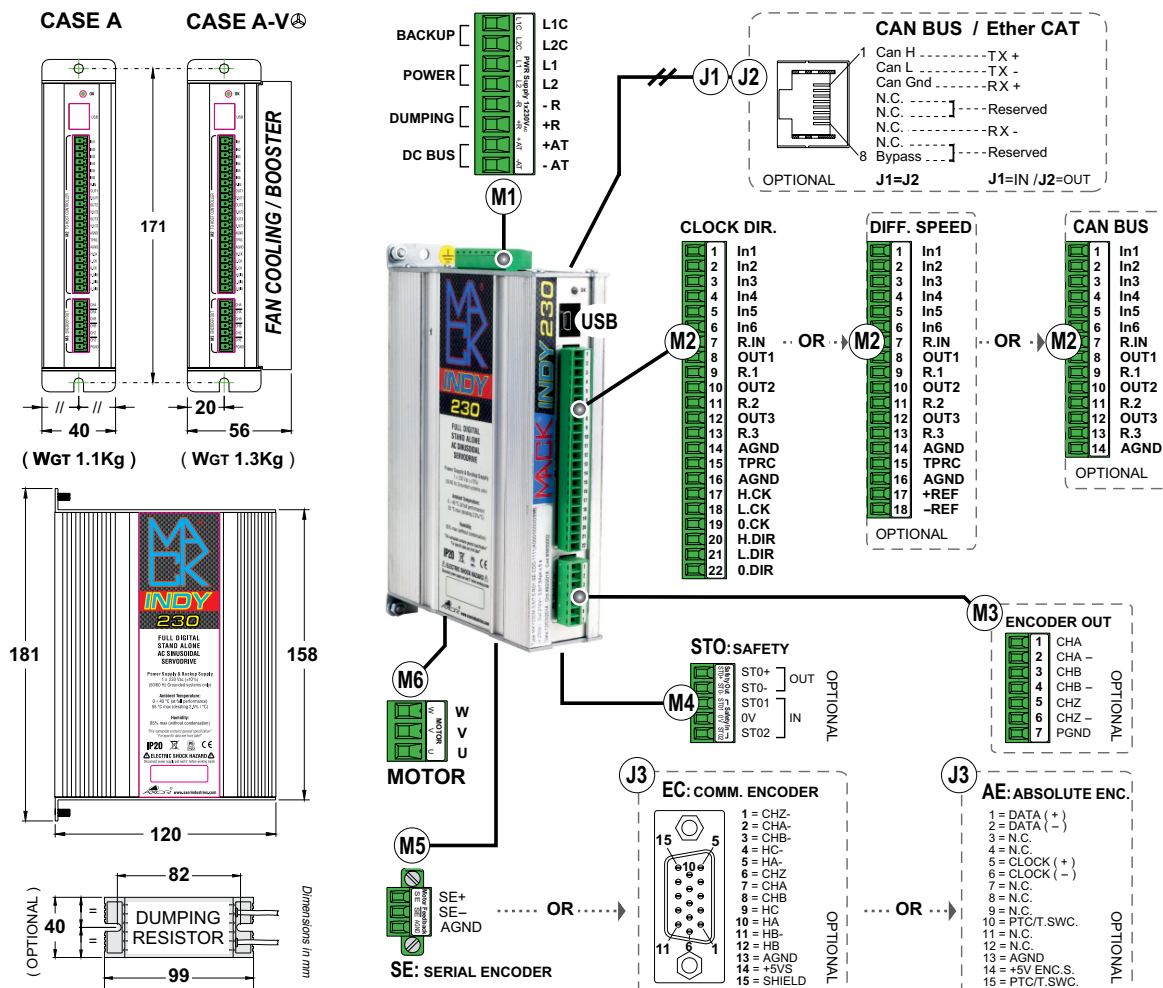
- ♦ Mobile usage for chain tracks, flame / oil resistance
- ♦ External sheathing: PUR polyurethane
- ♦ Cycles: 5 million ♦ Minimum bending radius: 7 x Ø
- ♦ Operating temperature: ..... -25°C / +80°C
- ♦ Trail speed: 300m / min. max ♦ Acceleration: 20m / sec<sup>2</sup>
- ♦ DIN VDE

NOTE: <sup>1</sup> Free from condensation <sup>2</sup> After one year storage the electrolytic capacitors must be reformed. Contact AXOR for details.

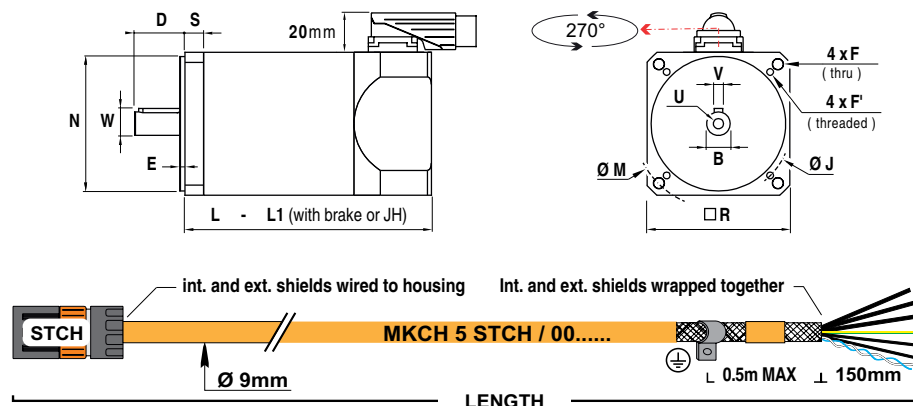
EtherCAT<sup>®</sup>



AXOR IND. viale Stazione, 5 - 36054 Montebello Vic.no - Vicenza - Italy - phone: (+39) 0444 440441 - www.axorindustries.com - e-mail: info@axorindustries.com



TYPE	Mo - Pwr	L	L1	B h6	D	V h9	W	U	N h7	M	F	J	F'	E	S	R
MKSM 40 M	0.16 - 50	88	120	8	25	3 x 12	9.2	M3 x 6	30	46	4.3	-	-	2.5	5	40
MKSM 40 L	0.32 - 100	105	137	14	30	5 x 20	16	M5 x 10	50	70	5.5	-	-	3	8	60
MKSM 60 M	0.65 - 200	105	135	11	23	4 x 18	12.5	M4 x 10	60	90	5.5	75	Ø 4.2 x 10	2.5	10	75
MKSM 60 L	1.3 - 400	133	163	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 70 S	0.9 - 280	100	125	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 70 M	1.5 - 470	125	150	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 70 L	2.0 - 630	150	175	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 85 S	1.8 - 570	115	145	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 85 M	3.3 - 1050	145	175	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85
MKM 85 L	5.0 - 1600	175	205	14	30	5 x 25	16	M4 x 10	80	100	6.5	-	-	3	11	85



STCH	FUNCTION	WIRE COLOR	MARK
A / C / B	U / V / W MOTOR	BLACK	U-1/V-2/W-3
1 / 2	(+) / (-) BRAKE	WHITE / BLACK	-
4 / 3	SE+ / SE-	BLU / WHITE	-
⊕	PE	GREEN YELLOW	-
5	N.C.	-	-

**MACK® INDY** **HARDWARE CODE** **SW CODE**

**MKYD 230M 1.5/3-D01 SE-CD0-0000-Sxxx (X000/X000/X000)**

**DRIVE LINE**

MODEL: 230M = 1x230V<sub>AC</sub>

SIZE: ( see table on reverse )

**DUMPING CIRCUIT SIZE:**

D01= for R01 / 300 (100W / 39Ω ext. resistor) (std)  
(ext. resistor is not included)

**FEEDBACK:** SE=Serial Enc. (std), EC=Comm. Enc. (opt)  
AE=Absolute Multiturn Enc. (opt)

**CONTROL MODE:** CD0 = Clock Dir. (std) RD0 = Diff. ref. (opt)  
CB0 = CAN Bus (opt) ETC = Ether CAT (opt)

**SPEC**

**FW**

**SW**

**CONFIG FILE**

**EMC ( line filter ):**

0 = w/out (std) 1 = with (opt)

**T ( Tropicalized ):**

0 = w/out (std) 1 = with (opt)

**M3 ( Emulated Enc. ):**

0 = w/out (std) 1 = with (opt) (std for RD0)

**STO ( Safe torque Off ):**

0 = w/out (std) 1 = with (opt)

**MACK® MOTOR** **MACK® CABLE**

**MKSM60 M 30/23-000D 00X P 0 MKES1ST-1 Sxxx** **MKCH5 STCH/00-030 Sxxx**

**SERIES:**

SIZE: S, M, L

SPEED: 30 = 3000 Rpm

VOLTAGE: 23 = 1x230V<sub>AC</sub>

MOUNTING FLANGE: 000 = std (see table)

HOLES: D = B5 thru (std) C = B14 threaded (opt)

SHAFT DIAMETER: 00 = std (see table)

SHAFT KEY: X = with key (std), W = w/out key (opt)

TH.PROTECTION: P=PTC (std) N=w/out (opt)

**SPEC**

**IP CLASS:**

1=IP54 (std)  
2=IP65 (opt)

**CONNECTION:**

ST = Sprigtec M15 (std)

**FEEDBACK:**

MKES1= Mack® Serial Enc. (std)  
MKEC1= Mack® Comm. Enc. (opt)

**BRAKE:** 0 = w/out (std) 1 = with (opt)

**CABLE LINE:**

Preassembled Hybrid cables

**CURRENT RATING:**

5 = uo to 5 Arms

**ASSEMBLY MOTOR SIDE:**

STCH = Sprigtec M15 conn.

**ASSEMBLY DRIVE SIDE:**

00 = Flying leads ( no conn. )

**LENGTH:** 030 = 3m, 050 = 5m, 070 = 7m, 100 = 10m



*State of the art technology in electronics, designed and engineered in-house by Axor, has given us this Universal drive as a revolution in the market's view of automation. Ultra compact dimensions open the horizon to a multitude of new application concepts. High precision and excellent dynamic performance.*

## SALIENT FEATURES

- ◆ Full digital vector drive
- ◆ 9 - 60Vdc power supply
- ◆ Very smooth Sine wave
- ◆ Programmable by miniUSB
- ◆ SpeederOne PC software for configuration and setup
- ◆ Status LED's



**4 digital inputs  
2 digital outputs  
fully programmable**

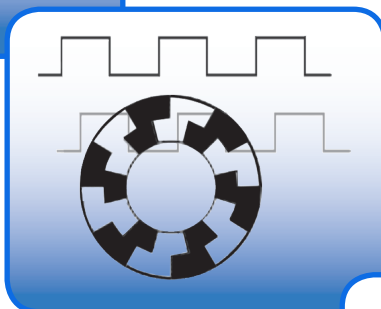
**Emulated encoder feedback**

**RS485 - RJ45 - mini USB**

## Universal drive programmable for all types of motor



Mackmotor, AC or DC brushless, DC brushed and Stepper motors



Encoder feedback for all types of motor  
Tacho, armature, hall & sensorless options

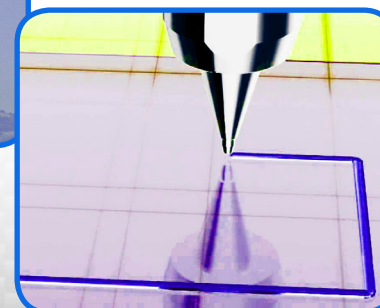
Battery operated machinery & equipment



Low voltage systems e.g. Health & Military



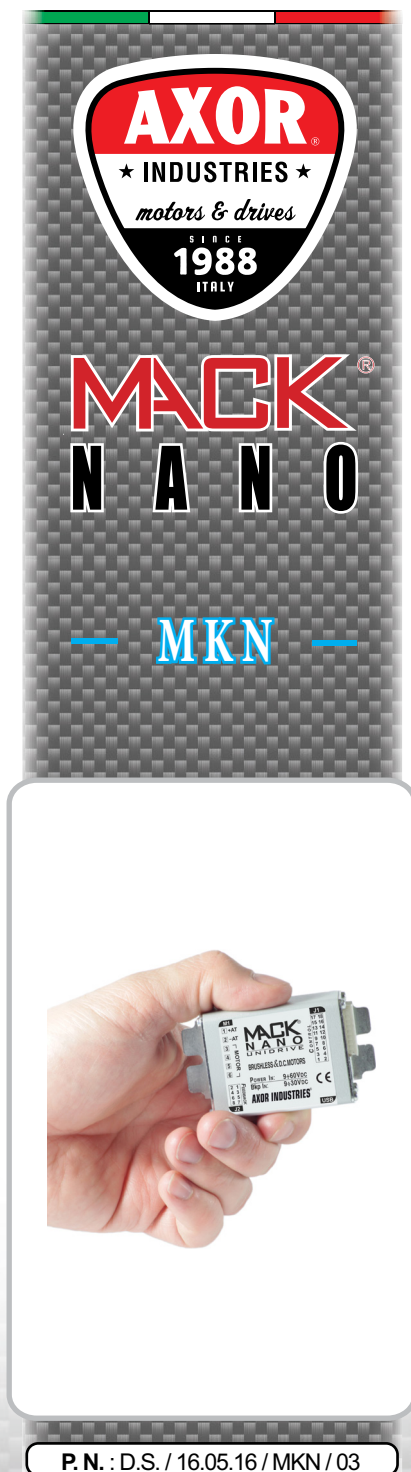
Easy machine add-on's like accessories & custom options  
with a decentralized Mack nano drive  
& no changes to the electric cabinet



### CONTROL MODES

- ◆  $\pm 10V$  Analog Speed reference
- ◆ Pulse Direction
- ◆ 0-10V Torque reference
- ◆ Analog 2 position
- ◆ Digital 2 position
- ◆ Square wave profiles

CANopen EtherCAT



DRIVE MODEL		MKN 60	
SIZE		4/8	8/16
Rated Current	( Arms )	4	8*
Peak Current x 3 sec	( Arms )	8	16
Power Supply		9 - 60 V <sub>DC</sub>	
Backup Logic Supply		9 - 30 V <sub>DC</sub> - 0.1 A <sub>DC</sub> max	
F1: Power In Line Fuses	( T - type = time - lag )	10 A	
WEIGHT		70 g	

NOTE \* : Rated current refers to drive mounted on cabinet metal plate.

### STANDARD FEATURES

- ♦ Driving motor range up to **400W**
- ♦ Sinusoidal waveform current
- ♦ **BL** Brushless and **DC** Brushed Motor Control
- ♦ **EI** Incremental Encoder feedback
- ♦ **EC** Commutation Encoder feedback for **BL** brushless motors
- ♦ **HS** Hall feedback for **BL** brushless motors
- ♦ **RA** Armature feedback for **DC** brushed motors
- ♦ **SL** Sensorless feedback for **BL** brushless, **SM** stepper motors
- ♦ **CD** Clock and Direction Command
- ♦ **RD** Differential analog ref. velocity command  $\pm 10V$  ( 12 bit )
- ♦ **CB** Can BUS
- ♦ Single ended analog ref. torque  $\pm 10V$  ( 12 bit )
- ♦ Two tone led drive status signal
- ♦ Over/Undervoltage, overtemperature, overcurrent and I<sup>2</sup>t monitoring
- ♦ **Speeder-One**® software interface (Windows based)
- ♦ **USB** access for setting and monitoring
- ♦ 4 INPUT / 2 OUTPUT programmable
- ♦ Operating frequency 8KHz
- ♦ Loop Bandwidth: 2KHz current / 200Hz speed
- ♦ Ambient temp.<sup>1</sup>:.....- operating at rated data: ..... 0 - 40°C(no derating)
  - rated & pk current derating: 40 - 55°C max (2.5% / °C)
  - storage ..... -20 - 55°C
- ♦ Ambient Humidity<sup>1</sup>:.....- operating & storage ..... 85% RH max
- ♦ Altitude (a.m.s.l.):.....- operating & storage ..... 1000m
  - rated & pk current derating: up to 2500m (1.5% / 100m)
- ♦ Protection rating:.....IP20
- ♦ Storage time:.....1 year<sup>2</sup>

NOTE: <sup>1</sup> Free from condensation <sup>2</sup> After one year storage the electrolytic capacitors must be reformed. Contact AXOR for details.

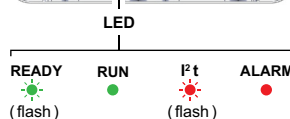
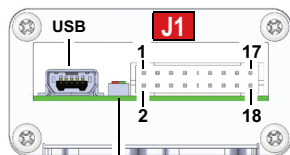
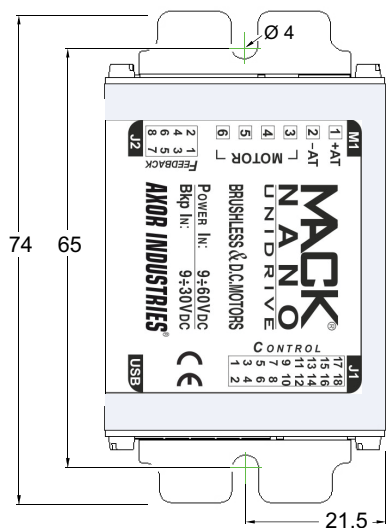
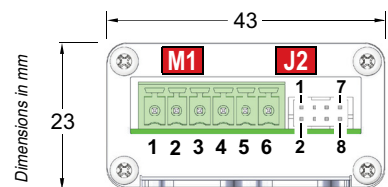
### OPTIONS

- ♦ **S** Stepper Motor Control
- ♦ **SE** Serial Encoder Feedback for **BL** brushless motors
- ♦ **DT** Tachogenerator Feedback for **DC** motors
- ♦ **MB** ModBus-RTU, RS 485 Interface

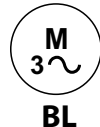
### APPLICATIONS

- ♦ Printing Machines
- ♦ Textile Machines
- ♦ Coding Machines
- ♦ Conveyors
- ♦ Machine Tools
- ♦ Battery operated Machines
- ♦ Upgrade replacement for stepper system
- ♦ Packaging Machines
- ♦ Sewing Machines
- ♦ Jewellery Machines
- ♦ Actuators
- ♦ Door operators
- ♦ Antenna positioners
- ♦ CNC axis control





## BRUSHLESS

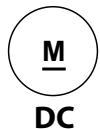


BL

## MOTOR

M1	BRUSHLESS
1	+AT POWER
2	-AT SUPPLY
3	U
4	V MOTOR
5	W
6	N.C.

## BRUSHED



DC

M1	BRUSHED
1	+AT POWER
2	-AT SUPPLY
3	N.C.
4	+M MOTOR
5	-M
6	N.C.

## FEEDBACK

J2	EI	EC	SL	HS	SE (opt)
1	Ch. A	Ch. A	N.C.	N.C.	N.C.
2	Ch. B	Ch. B	N.C.	N.C.	N.C.
3	Ch. Z	Ch. Z	N.C.	N.C.	N.C.
4	N.C.	Hall U	N.C.	Hall U	N.C.
5	N.C.	Hall V	N.C.	Hall V	N.C.
6	N.C.	Hall W	N.C.	Hall W	N.C.
7	+5Vs	+5Vs	N.C.	+5Vs	SE +
8	AGND	AGND	N.C.	AGND	SE -

J2	EI	RA	DT (opt)
1	Ch. A	N.C.	N.C.
2	Ch. B	N.C.	N.C.
3	Ch. Z	N.C.	N.C.
4	N.C.	N.C.	N.C.
5	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.
7	+5Vs	N.C.	Tacho +
8	AGND	N.C.	Tacho -

## CONTROL

J1	CD / RD / CB	MB (opt)
1	+ Bkup Supply	+ Bkup Supply
2/12	AGND	AGND
3/4/5/6	D. IN 1/2/3/4	D. IN 1/2/3/4
7/8	An / D. OUT 1/2	An / D. OUT 1/2
9/10	+/- An. Diff. Ref.	N.C.
11	An. Ref. Torque	An. Ref. Torque
13/14	Clock/Dir. IN	Clock/Dir. IN
15/17	Can HIGH	RS485 A
16/18	Can LOW	RS485 B

J1	CD / RD / CB	MB (opt)
1	+ Bkup Supply	+ Bkup Supply
2/12	AGND	AGND
3/4/5/6	D. IN 1/2/3/4	D. IN 1/2/3/4
7/8	An / D. OUT 1/2	An / D. OUT 1/2
9/10	+/- An. Diff. Ref.	N.C.
11	An. Ref. Torque	An. Ref. Torque
13/14	Clock/Dir. IN	Clock/Dir. IN
15/17	Can HIGH	RS485 A
16/18	Can LOW	RS485 B

## STEPPER



SM

M1	STEPPER
1	+AT POWER
2	-AT SUPPLY
3	A
4	B MOTOR
5	A-
6	B-

J2	EI	SL
1	Ch. A	N.C.
2	Ch. B	N.C.
3	Ch. Z	N.C.
4	N.C.	N.C.
5	N.C.	N.C.
6	N.C.	N.C.
7	+5Vs	N.C.
8	AGND	N.C.

J1	CD / CB	MB (opt)
1	+ Bkup Supply	+ Bkup Supply
2/12	AGND	AGND
3/4/5/6	D. IN 1/2/3/4	D. IN 1/2/3/4
7/8	An / D. OUT 1/2	An / D. OUT 1/2
9/10	N.C.	N.C.
11	An. Ref. Torque	An. Ref. Torque
13/14	Clock/Dir. IN	Clock/Dir. IN
15/17	Can HIGH	RS485 A
16/18	Can LOW	RS485 B

## OPTIONAL

## NANO MACK®

MKN 60 - 4 / 8

B

## HARDWARE CODE

XX -

XX -

Sxxx

## SOFTWARE CODE

( X000 / X000 / X000 )

DRIVE LINE

MODEL

SIZE

MOTOR TYPE:

B = Standard:

BL Brushless

DC Brushed

S = SM Stepper (opt)

FEEDBACK:

XX = Standard: EI = Incremental Encoder (for: BL, DC, SM motors)

EC = Commutation Encoder (for: BL motors)

SL = Sensorless (for: BL, SM motors)

RA = Armature (for: DC motors)

HS = Hall (for: BL motors)

SE = Serial Encoder (optional for BL motors)

DT = Tachogenerator (optional for DC motors)

CONTROL MODE:

XX = Standard:

CD Clock and Direction (for: BL, DC, SM motors)

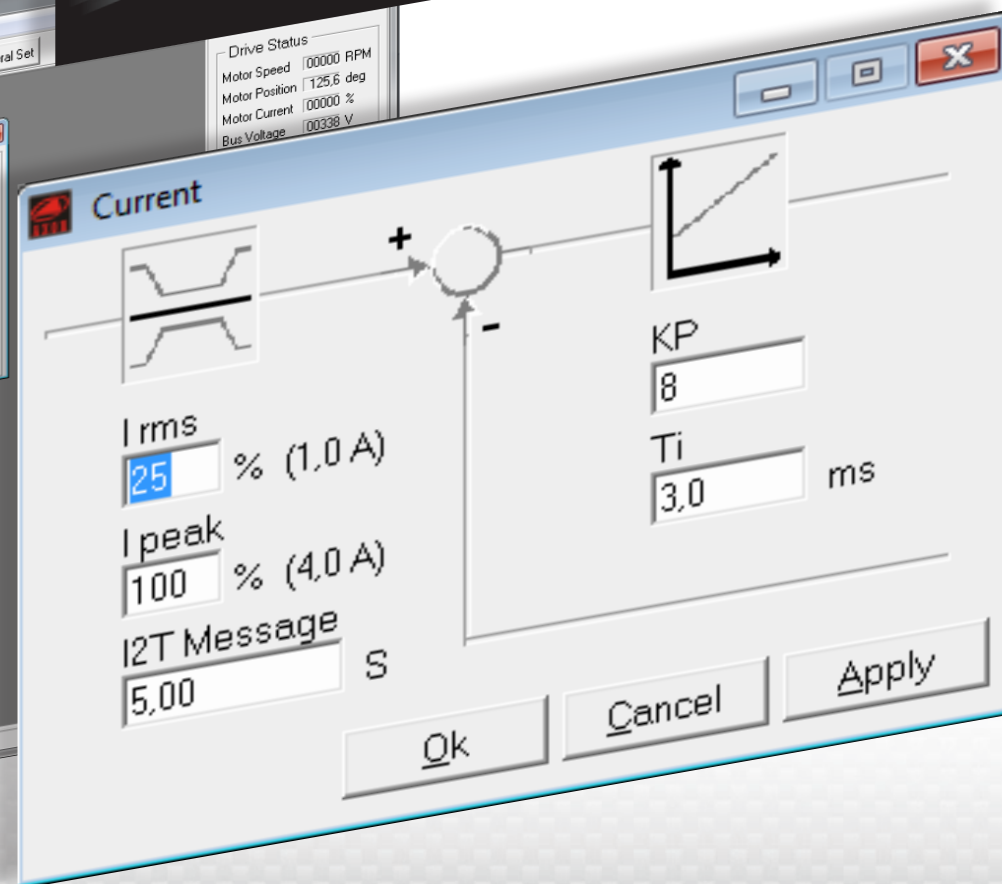
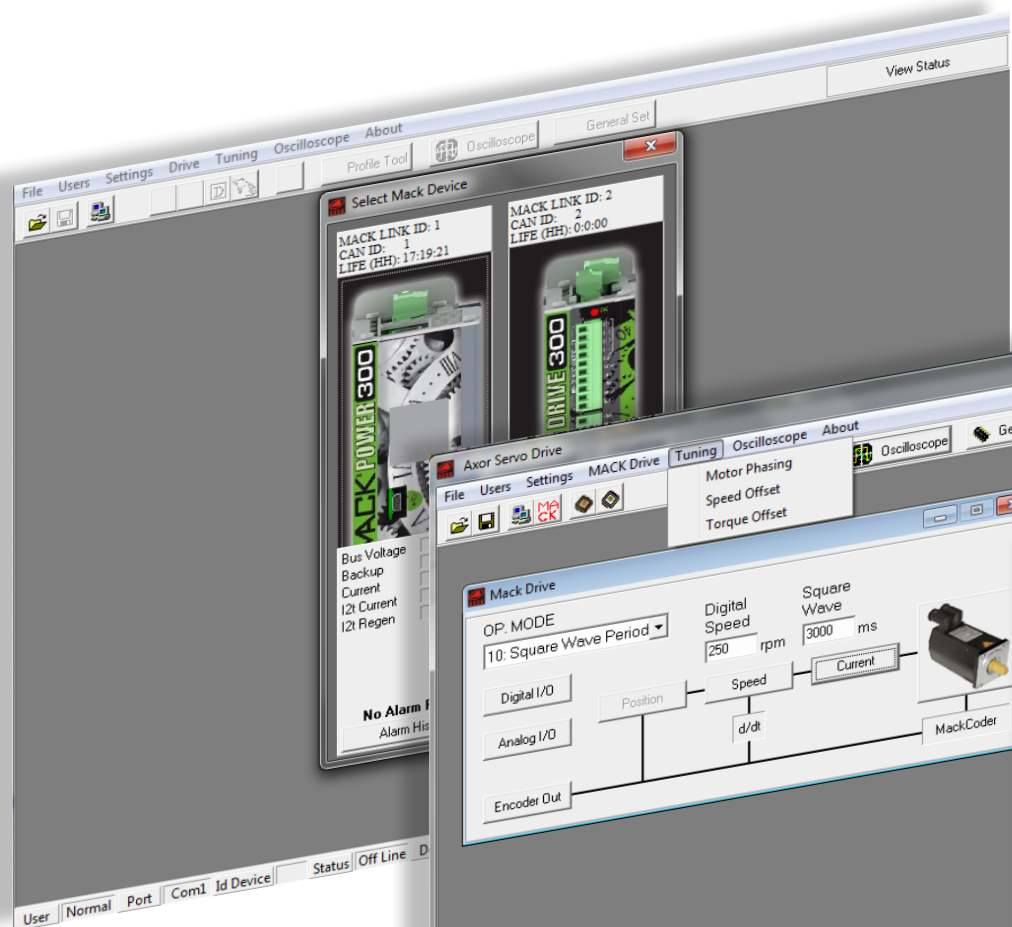
RD Diff. analog reference (for: BL, DC motors)

CB Can BUS (for: BL, DC, SM motors)

MB = RS 485 MODBUS-RTU (optional for BL, DC, SM motors)

SPEC. NUMBER (opt)

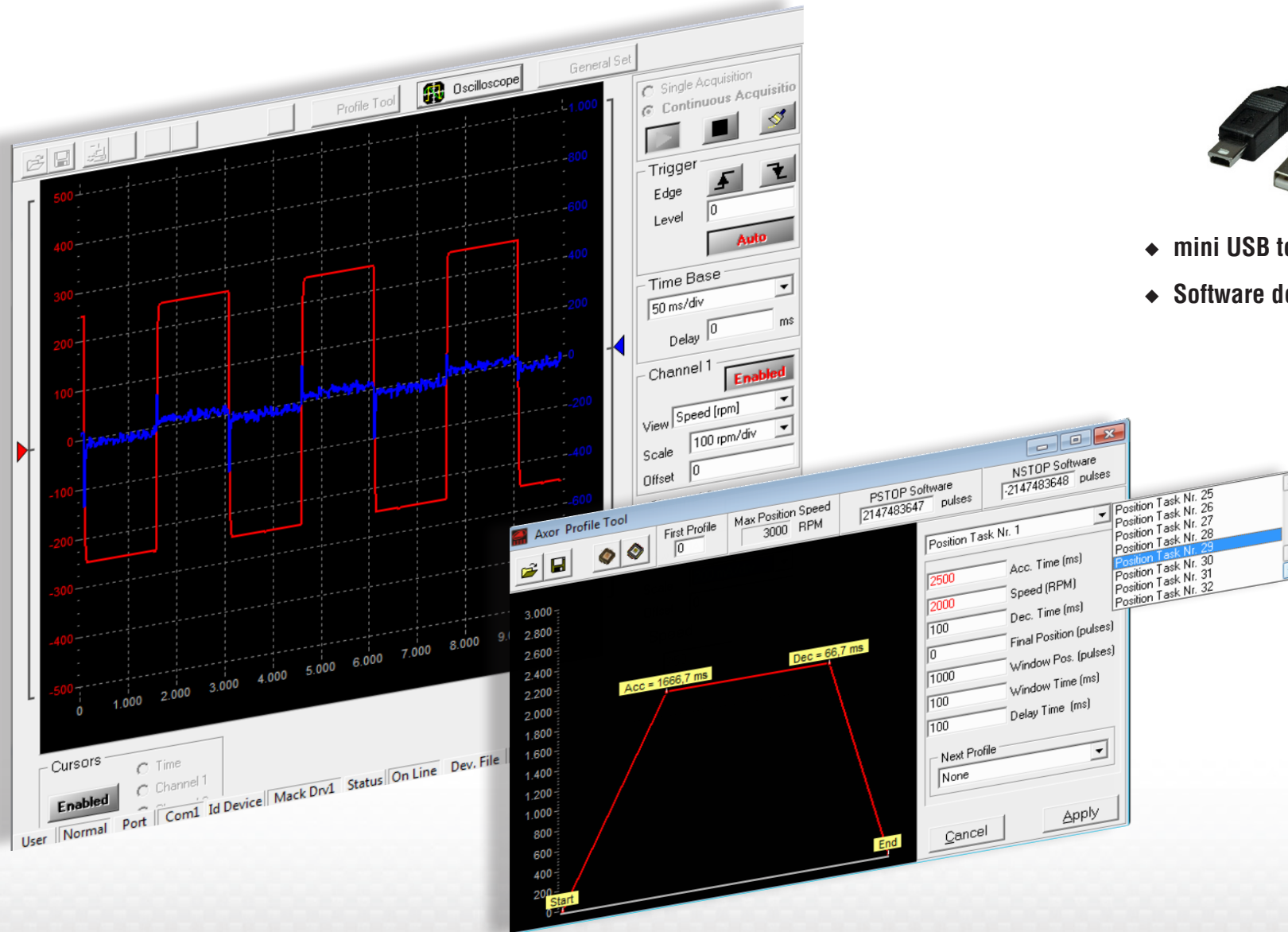
FIRMWARE  
VERSIONSOFTWARE  
VERSIONCONFIG  
FILE



# SPEEDER ONE PC INTERFACE PROGRAM



- ◆ mini USB to USB
- ◆ Software download in freeware



**AXOR IND.®**

viale Stazione, 5 - 36054 Montebello Vic.no - Vicenza - Italy

ph.: (+39) 0444 440441 - fax: (+39) 0444 440418

[www.axorindustries.com](http://www.axorindustries.com) - [info@axorindustries.com](mailto:info@axorindustries.com)

