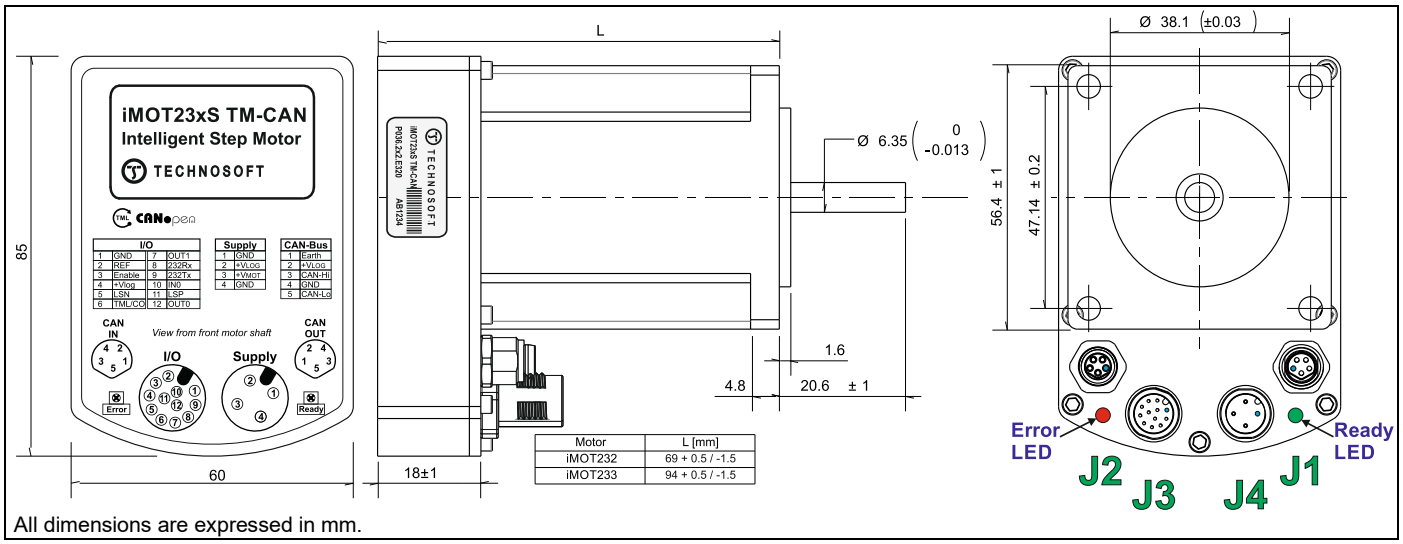


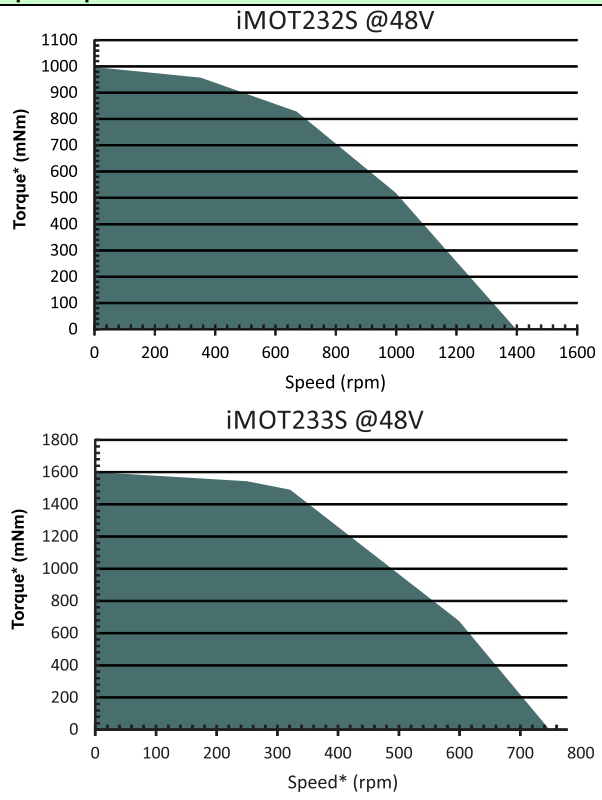
All dimensions are expressed in mm.

Features

- Fully digital intelligent 2 phase step motor with embedded motion controller, drive and absolute position sensor
- Available in 2 motor lengths, offering 1000 and 1600 mNm of continuous torque
- Motor supply: 12-48V; Logic supply 15-36V; Rated current 2.8 A
- No load speed of 750 and 1400 rpm at 48V
- Advanced motion control capabilities (PVT, S-curve, electronic cam)
- Motion programming via TML (Technosoft Motion Language) or motion libraries for Visual C / VB / LabVIEW / Linux and PLC
- Two control options: stepless closed loop servo using an absolute feedback sensor; stepper open loop using microstepping and step loss detection based on the feedback sensor
- Standalone operation with stored motion sequences
- Communication:
  - TMLCAN and CANopen (CiA 301 v4.2 and CiA 402 v3.0) protocols selectable by hardware pin
- Digital and analogue I/Os:
  - 4 digital programmable inputs, 5-24V, PNP/NPN *
  - 2 digital outputs, 24V/TTL, PNP (0.3A) / NPN (0.4A) *
  - 1 analogue input: 12 bits resolution, 0-5V
- Feedback devices:
  - Integrated absolute position sensor offering a resolution of 4096 bits / revolution
- Protections:
  - Over-current, over-temperature, short circuit
  - Over and undervoltage, i2t, control error
- 2.5K × 16 SRAM for data acquisition
- 4K × 16 E^2ROM for TML motion programs and data storage

**PNP/NPN selection is software selectable and applies on both inputs and outputs at the same time*

Torque – Speed characteristic



*** All values ±10% at 20ºC**

Ordering Information	
Part Number	**Description**
P036.222.E320	iMOT232S TM-CAN Intelligent Step Motor, CAN
P036.232.E320	iMOT233S TM-CAN Intelligent Step Motor, CAN
P036.222.E326	iMOT232S TM-CAN Intelligent Step Motor, Opto CAN
P036.232.E326	iMOT233S TM-CAN Intelligent Step Motor, Opto CAN
P034.001.E002	EasyMotion Studio Software
P040.001.Exxx	TML_LIB Motion Library
P038.040.C189	Complete cable set for iMOT23x TM-CAN

Mating Connectors				
Connector	**Producer**	**Part No.**	**Description**	**Wire Gauge**
J1	**MOLEX**	30029-0002	M8 Single-ended, 5 Poles, Female (90°), 1m	AWG 26
J2	**MOLEX**	30029-0005	M8 Single-ended, 5 Poles, Male (90°), 1m	AWG 26
J3	**Phoenix Contact**	1430161	M12 Single-ended, 12 Poles, Female (90°), 1.5m	AWG 26
J4	**Phoenix Contact**	1682906	M12 Single-ended, 4 Poles, Female (90°), 1.5m	AWG 22

Connector J1 and J2 Description

Pin	Name	Type	Description
1	Earth	-	Earth connection
2	$+V_{LOG}$	I	Positive terminal of the logic supply: 12.5 to $36V_{DC}$. Internally connected to the other $+V_{LOG}$ pin.
3	Can-Hi	I/O	CAN-Bus positive line (dominant high)
4	GND	-	Return ground for Motor supply; Internally connected to all GND pins.
5	Can-Lo	I/O	CAN-Bus negative line (dominant low)

Connector J3 Description

Pin	Name	Type	Description
1	GND	-	Return ground for I/O pins; Internally connected to all GND pins.
2	REF	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position/speed reference, or used as general-purpose analogue input
3	Enable	I	5-36V digital PNP/NPN input. Enable input
4	$+V_{LOG}$	I	Positive terminal of the logic supply: 12.5 to $36V_{DC}$. Internally connected to the other $+V_{LOG}$ pin.
5	IN3/LSN	I	5-36V digital PNP/NPN input. Negative limit switch input
6	CANopen	I	Connect to GND to enable CANopen protocol; Leave unconnected for TMLCAN protocol
7	OUT1	-	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
8	232RX	I	RS-232 Data Reception
9	232TX	O	RS-232 Data Transmission
10	IN0	I	5-36V general-purpose digital PNP/NPN input
11	IN2/LSP	I	5-36V digital PNP/NPN input. Positive limit switch input
12	OUT0	O	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up

Connector J4 Description

Pin	Name	Type	Description
1	GND	-	Return ground for Motor supply; Internally connected to all GND pins.
2	$+V_{LOG}$	I	Positive terminal of the logic supply: 12.5 to $36V_{DC}$
3	$+V_{MOT}$	I	Positive terminal of the motor supply: 12 to $48V_{DC}$ /
4	GND	-	Return ground for Motor supply; Internally connected to all GND pins.

Characteristics

All parameters were measured under the following conditions (unless otherwise specified):

- Tamb = 25°C, logic supply (VLOG) = 24VDC, motor supply (VMOT) =48VDC;
- Supplies start-up / shutdown sequence: -any-

Motor and feedback sensor parameters		Value	Units
Step angle		1.8	°
Rated torque	iMOT232	1000	mNm
	iMOT233	1600	
Rated current	iMOT232	2.8	A
	iMOT233	2.8	
Microstepping resolution in open loop control		102400	Bits/rot
Absolute position feedback in closed loop control		4096	Bits/rot
Rotor inertia	iMOT232	275	gcm^2
	iMOT233	480	
	Axial	Radial	
Shaft play	0.08	0.06	mm
At load	450	450	g

Environmental Characteristics			Min.	Typ.	Max.	Units
Size (Length x Width x Height)		iMOT232		69 x 60 x 85		mm
				~2.71 x 2.36 x 3.35		inch
		iMOT233		94 x 60 x 85		mm
				~3.70 x 2.36 x 3.35		inch
Weight	Without mating connectors	iMOT232		740		g
		iMOT233		1140		
Power dissipation	Idle (no load)			1.5		W
	Operating				TBD	
Efficiency				98		%
Cleaning agents	Dry cleaning is recommended			Only Water- or Alcohol- based		
Protection degree	According to IEC60529, UL508			IP50		-

Operating Conditions		Min.	Typ.	Max.	Units
Ambient temperature[1]		0		+40	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure[2]	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	[2]	Km
	Ambient Pressure	0 [2]	0.75 ÷ 1	10.0	atm
Magnetic field				20	mT

Storage Conditions		Min.	Typ.	Max.	Units
Ambient temperature		-40		+105	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm

Logic Supply Input ($+V_{LOG}$)			Min.	Typ.	Max.	Units
Supply voltage	Nominal values		15	24	36	V_{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters		12.5		39	V_{DC}
	Absolute maximum values, surge (duration ≤ 10ms) †		0		+45	V
Supply current	No Load on Digital Outputs	$+V_{LOG}$ = 15V		70	200	mA
		$+V_{LOG}$ = 24V		47	120	
		$+V_{LOG}$ = 36V		36	100	

Motor Supply Input ($+V_{MOT}$)		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	12	24	48	V_{DC}
	Absolute maximum values, continuous	-0.3		50	
	Absolute maximum values, surge (duration ≤ 8s)	-1		55	
Supply current	Idle		1	5	mA
	Operating	-13.6	±3	+13.6	A

Analog reference input (REF)		Min.	Typ.	Max.	Units
Input voltage	Operational range	0		5	V
	Absolute maximum values, continuous	-8		+12	
	Absolute maximum, surge (duration ≤ 1s) †			±24	
Input impedance	To 0.23V		33		kΩ
Resolution			12		bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	% FS[3]
Bandwidth (-3dB)	Software selectable	0		250	Hz
ESD protection	Human body model	±5			kV

RS-232		Min.	Typ.	Max.	Units
Compliance		TIA/EIA-232-C			
Bit rate	Software selectable	9600		115200	Baud
Short-circuit	232TX short to GND	Guaranteed			
ESD protection	Human body model	±15			kV

[1] Operating temperature can be extended up to **+65ºC** with reduced current and power ratings.

[2] iMOT23xS XM-CAN can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

[3] "FS" stands for "Full Scale"

Digital Inputs (IN0, IN2/LSP, IN3/LSN, Enable)		**Min.**	**Typ.**	**Max.**	**Units**
Input voltage	Logic “LOW”		2.2	1.2	V
	Logic “HIGH”	4.8	3.8		
	Hysteresis	0.8	1.6	2.8	
	Absolute maximum, continuous	-36		+36	
	Absolute maximum, surge (duration ≤ 1s) †	-50		50	
	Floating voltage, PNP (not connected)		0		
	Floating voltage, NPN (not connected)		$+V_{LOG}$		
Input frequency		0		400	kHz
Minimum pulse		-15	1.2	0.9	ms
ESD protection	Human body model	±15			kV
Mode compliance	Internal 10kΩ resistor to GND	PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input current	Logic “LOW”;			0	mA
	Logic “HIGH”; pulled to +24V		6	8	
	Hysteresis		0.5		
Mode compliance	Internal 10kΩ resistor to $+V_{LOG}$	NPN/ TTL / CMOS / Open-collector			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input current	Logic “HIGH”			0	mA
	Logic “LOW”; pulled to GND		6	8	
	Hysteresis		0.5		

CAN-Bus (opto-isolated)		**Min.**	**Typ.**	**Max.**	**Units**
Compliance		ISO11898, CiA 402v3.0			
Bit rate	Software selectable	125		1000	Kbps
Bus length	1Mbps			25	m
	500Kbps			100	
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo	none on-board			
Node addressing	Software	1 ÷ 127 (CANopen); 1- 255 (TMLCAN)			
ESD protection	Human body model	±15			kV

Digital Outputs (OUT0, OUT1)			**Min.**	**Typ.**	**Max.**	**Units**
Output voltage	Logic “LOW”; output current = 0.5A			0.2	0.8	V
	Logic “HIGH”; output current = 0, no load	OUT0, OUT1	4	4.5	5	
	Logic “HIGH”, external load to $+V_{LOG}$			V_{LOG}		
	Absolute maximum, continuous		-0.5		V_{LOG}+0.5	
	Absolute maximum, surge (duration ≤ 1s) †		-1		V_{LOG}+1	
Minimum pulse width			2			µs
ESD protection	Human body model		±15			kV

Mode compliance			PNP			
Default state	Not supplied (+VLOG floating or to GND)		High-Z (floating)			
	Normal operation	OUT0, OUT1	Logic “LOW”			
Output current	Logic “HIGH”, source current, continuous				0.3	A
	Logic “HIGH”, source current, pulse ≤ 5 s				0.6	A
	Logic “LOW”, source current; external load to GND; V_{OUT} >= 2.0V				4	mA
	Logic “LOW”, leakage current; external load to $+V_{LOG}$; $V_{OUT} = V_{LOG}$ max = 40V			0.1	0.2	mA

Mode compliance			TTL / CMOS / Open-collector / NPN 24V			
Default state	Not supplied (+VLOG floating or to GND)		High-Z (floating)			
	Normal operation	OUT0, OUT1	Logic “HIGH”			
Output current	Logic “LOW”, sink current, continuous				0.4	A
	Logic “LOW”, sink current, pulse ≤ 5 s				0.8	A
	Logic “HIGH”, source current; external load to GND; V_{OUT} >= 2.0V				4	mA
	Logic “HIGH”, leakage current; external load to $+V_{LOG}$; $V_{OUT} = V_{LOG}$ max = 40V			0.1	0.2	mA

† Stresses beyond values listed under “absolute maximum ratings” may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.