



Pin	Name	Type	Description
1	+Vlog	I	Positive terminal of the logic supply input: 6 to 48 VDC
2	A	O	Phase A for 3-ph motors, Motor+ for DC brush motors
3	GND	-	Ground return for logic supply
4	B	O	Phase B for 3-ph motors, Motor- for DC brush motors
5	GND	-	Shield for motor windings cable
6	C	O	Phase C for 3-ph motors
7	+Vmot	I	Positive terminal of the motor supply: 7 to 48 VDC
8	Rsvd.	-	Reserved.
9	BFS	-	Connect to GND to perform a firmware update after a critical firmware failure
10	ID2	I	AxisID <sup>2</sup> selection pin. See AxisID register settings table
11	TX1-	I/O	Transmit/Receive negative, OUT port.
12	RX1-	I/O	Receive/Transmit negative, OUT port.
13	TX1+	I/O	Transmit/Receive positive, OUT port.
14	RX1+	I/O	Receive/Transmit positive, OUT port.
15	GND	-	Ground shield for port 1
16	GND	-	Ground shield for port 0
17	TX0-	I/O	Transmit/Receive negative, IN port.
18	RX0-	I/O	Receive/Transmit negative, IN port.
19	TX0+	I/O	Transmit/Receive positive, IN port.
20	RX0+	I/O	Receive/Transmit positive, IN port.
21	ID0	I	AxisID <sup>0</sup> selection pin. See AxisID register settings table
22	ID1	I	AxisID <sup>1</sup> selection pin. See AxisID register settings table
23	232TX	O	RS-232 Data Transmission.
24	232RX	I	RS-232 Data Reception.
25	CAN Hi	-	CAN-Bus positive line (dominant high)
26	CAN Lo	-	CAN-Bus negative line (dominant low)
27	IN2/LSP	I	5-60V digital NPN input. Positive limit switch input
28	IN3/LSN	I	5-60V digital NPN input. Negative limit switch input
29	IN5/Enable	I	5-60V digital NPN input. Drive Enable input
30	I/O0	I/O	5-50V NPN general-purpose digital programmable input IN0 /or NPN 1.5A output OUT0
31	I/O1	I/O	5-50V NPN general-purpose digital programmable input IN1 / or NPN 0.1A output OUT1
32	I/O2	I/O	5-50V NPN general-purpose digital programmable input IN4 / or NPN 0.1A output OUT4
33	GND	-	Ground return and shield
34	AnalogIn	I	Analog input (range software selectable 0-5V or ±10V)

Pin	Name	Type	Description
1	+V USB	I	5V input from USB
2	GND	-	Ground return for USB
3	Hall1	I	Digital Hall, or Linear Hall sensor 1
4	Hall2	I	Digital Hall, or Linear Hall sensor 2
5	Hall3	I	Digital Hall, or Linear Hall sensor 3
6	GND	-	Ground return and shield
7	+5V	O	Supply for all feedback sensors
8	GND	-	Ground return and shield
9	EncA1+/EncA1/ Dt1+/Dt1	I	Encoder 1 A+/Data+ diff. input or single-ended input
10	EncA1-/Dt1-	I	Encoder 1 A-/Data- diff. input. Leave open for single-ended; Add externally 120Ω to pin 9 for differential
11	EncB1+/EncB1/ Clk1+/Clk1	I	Encoder 1 B+/Clock+ diff. input or single-ended input
12	EncB1/ Clk1-	I	Encoder 1 B-/Clock- diff. input. Leave open for single-ended; Add externally 120Ω to pin 11 for differential
13	EncA2+/EncA2/ Dt2+/Dt2	I	Encoder 2 A+/Data+ diff. input or single-ended input
14	EncA2-/Dt2-	I	Encoder 2 A-/Data- diff. input. Leave open for single-ended; Add externally 120Ω to pin 13 for differential
15	EncB2+/EncB2/ Clk2+/Clk2	I/O	Encoder 2 B+/Clock+ diff. input or single-ended input
16	EncB2/ Clk2-	I	Encoder 2 B-/Clock- diff. input. Leave open for single-ended; Add externally 120Ω to pin 15 for differential
17	Z1+	I	Encoder 1 Z+ diff. input or single-ended input
18	Z1-	I	Encoder 1 Z- diff. input. Leave open for single-ended; Add externally 120Ω to pin 17 for differential
19	USB DM	I/O	USB data-
20	USB DP	I/O	USB data+

No.	Name	Color	Description
LED2	TML ERR	RED	Turned on when the drive detects an error condition.
LED3	TML RDY	GREEN	Lit after power-on when the drive initialization ends. Turned off when an error occurs.

## AxisID register

MSB Bit 8 Bit 7 Bit 6 Bit 5 Bit 4 Bit 3 Bit 2 Bit 1 Bit 0 LSB

ID2		ID1		ID0	
Nominal[V]	Minimum[V]	Maximum[V]	IDx* Bits	IDx* Value	
0.000	0.00	0.53	000	0	
1.057	0.53	1.41	001	1	
1.756	1.41	2.01	010	2	
2.254	2.01	2.43	011	3	
2.600	2.43	2.75	100	4	
2.894	2.75	3.01	101	5	
3.128	3.01	3.22	110	6	
3.319	3.22	3.35	111	7	

**Remarks:**

- If Bit 7 (ID2) = 1 -> TMLCAN mode is selected
- If Bit 7 (ID2) = 0 -> CANOpen mode is selected
- Bit 8 (MSB of ID2) is ignored, and always considered as "0"
- The maximum AxisID value is 127 (Bit 0 ... Bit 6)
- TMLCAN mode:  $AxisID = (64 * ID2\_Value - 128) + (8 * ID1\_Value) + ID0\_Value$
- CANOpen mode:  $AxisID = (64 * ID2\_Value) + (8 * ID1\_Value) + ID0\_Value$
- If the AxisID pins are not connected, the AxisID value can't be determined.
- If all "IDx" pins are connected to GND the AxisID value is 255
- If the CANOpen mode is selected and the AxisID value is 255, drive will be in "LSS inactive" state and the Green LED will flash at 1 second intervals

\* where "x" can be 1, 2 or 3

## Electrical characteristics

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

- V<sub>LOG</sub> = 24 VDC; V<sub>MOT</sub> = 48 VDC; F<sub>PWM</sub> = 20 kHz
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude) = 4.2A

Operating Conditions	Min.	Typ.	Max.	Units
Ambient temperature	0		40 <sup>1</sup>	°C
Ambient humidity	Non-condensing	0	90	%Rh
Altitude / pressure <sup>2</sup>	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	Km
	Ambient Pressure	0 <sup>2</sup>	0.75 ÷ 1	10.0 atm
<b>Storage Conditions</b>				
Ambient temperature	-40		100	°C
Ambient humidity	Non-condensing	0	100	%Rh
Ambient Pressure		0	10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part		±0.5	kV
	Original packaging		±15	kV
<b>Environmental Characteristics</b>				
Size (Length x Width x Height)	Global size		38.35 x 25 x 9.71	mm
			~1.51 x 0.98 x 0.38	inch
Weight		8		g
Cleaning agents	Dry cleaning is recommended		Only Water- or Alcohol- based	
Protection degree	According to IEC60529		IP20	-

<sup>1</sup> Operating temperature at higher temperatures is possible with reduced current and power ratings

<sup>2</sup> Micro 4803 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.

# Micro 4803 MZ-CAN DATASHEET P/N: P020.001.E102


Mechanical Mounting		Min.	Typ.	Max.	Units
Airflow		natural convection <sup>1</sup> , closed box			
Spacing required for horizontal mounting	Between adjacent drives		10		mm
	Between drives and nearby walls		10		mm
	Space needed for drive removal		20		mm
Insertion force	Between drives and roof-top		30		mm
	Using recommended mating connectors		20		N
Extraction force			8		N
Logic Supply Input (+V <sub>LOG</sub> )		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	6	24	48	V <sub>DC</sub>
	Absolute maximum values, drive operating but outside guaranteed parameters	4.9		60	V <sub>DC</sub>
	Absolute maximum values, continuous	-0.5		63	V <sub>DC</sub>
Supply current	+V <sub>LOG</sub> = 12V		90	150	mA
	+V <sub>LOG</sub> = 24V		60	90	
	+V <sub>LOG</sub> = 48V		45	60	
Voltage Measurement	Total error			1.5	%
Utilization category	Acc. to 60947-4-1 (I <sub>PEAK</sub> ≤ 1.05 * I <sub>NOM</sub> )	DC-1			
Motor Supply Input (+V <sub>MOT</sub> )		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	7		48	V <sub>DC</sub>
	Absolute maximum values, drive operating but outside guaranteed parameters	6		60	V <sub>DC</sub>
	Absolute maximum values, continuous	-0.5		63	V <sub>DC</sub>
Supply current	Idle		25		mA
	Operating	-15	±3	+15	
	Absolute maximum value, short-circuit condition (Duration ≤ 10ms) <sup>†</sup>			16.5	
Voltage Measurement	Total error			1.5	%
Utilization category	Acc. to 60947-4-1 (I <sub>PEAK</sub> ≤ 4.0 * I <sub>NOM</sub> )	DC-3			
Motor Outputs (A/A+, B/A-, C)		Min.	Typ.	Max.	Units
Nominal current	PMSM motors sinusoidal amplitude			4.2	A
	PMSM motors sinusoidal RMS			3	A <sub>RMS</sub>
	DC/BLDC motors continuous <sup>2</sup>			3.65	A
Peak current	maximum 2.5s	-14		+14	A
Short-circuit protection threshold		±16.5		±18	A
Short-circuit protection delay		2		4	µs
On-state voltage drop	Nominal output current; including typical mating connector contact resistance		0.1		V
Off-state leakage current			0.3	1	mA
Voltage Efficiency			92		%
Motor inductance (phase-to-phase)	Recommended value, for current ripple max. ±5% of full range; +V <sub>MOT</sub> = 48 V	F <sub>PWM</sub>			µH
		20 kHz		900	
		40 kHz		480	
	60 kHz		320		
	80 kHz		240		
	100 kHz		200		
Minimum value, limited by short-circuit protection; +V <sub>MOT</sub> = 48 V	20 kHz		270	µH	
	60 kHz		150		
	40 kHz		100		
80 kHz		80			
100 kHz		60			
Motor electrical time-constant (L/R)	Recommended value for ±5% current measurement error	20 kHz			330
		40 kHz		170	
		60 kHz		140	
		80 kHz		80	
		100 kHz		66	
Current measurement	FS = Full Scale accuracy		±2	±3	%FS

Digital Inputs (IN0, IN1, IN2/LSP, IN3/LSN, IN4, IN5/ENA)		Min.	Typ.	Max.	Units
Mode compliance		NPN			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"	IN0, IN1, IN4, IN5/ENA	1.4	1.8	V
	Logic "HIGH"		3.1	2.5	
	Hysteresis		0.9	1.1	
	Logic "LOW"	IN2/LSP, IN3/LSN	1.4	1.6	
	Logic "HIGH"		4	3.5	
	Hysteresis			0.6	
Floating voltage (not connected)			4.5		
Absolute maximum, continuous		-5		+55	
Input current	Logic "LOW"; Pulled to GND		9	10	mA
	Logic "HIGH"; Pulled to +24V			0.4	
Input frequency		0		500	kHz
Minimum pulse		1			µs
ESD protection	Human body model	±2			kV
Digital Outputs (OUT0, OUT1, OUT4)		Min.	Typ.	Max.	Units
Mode compliance		NPN 24V			
Default state	Not supplied (+V <sub>LOG</sub> floating)	High-Z (floating)			
Immediately after power-up		Logic "HIGH"			
Output voltage	Logic "LOW"; output current = 1.5A for OUT0/ 0.05A for the other digital outputs			0.4	V
	Logic "HIGH"; output current = 0, no load	4	4.5	5	
	Logic "HIGH", external load to +V <sub>LOG</sub>		V <sub>LOG</sub>		
	Absolute maximum, continuous (free-wheeling diodes to +V <sub>LOG</sub> to GND)	-0.5		V <sub>LOG</sub> +0.5	
Absolute maximum, surge (duration ≤ 1s) <sup>†</sup>		-1		V <sub>LOG</sub> +1	
Output current	Logic "LOW", sink current, short duration, duty cycle <=1%	5s max	OUT1, OUT4		A
			OUT0		
		0.5s max	OUT1, OUT4		
	OUT0		2.5		
	Logic "HIGH", source current; external load to GND; V <sub>OUT</sub> ≥ 2.0V				5
Logic "HIGH", leakage current; external load to +V <sub>LOG</sub> ; V <sub>OUT</sub> = V <sub>LOG</sub> max = 40V			0.05	0.1	mA
Minimum pulse width		0.5			µs
ESD protection	Human body model	±15			kV
Hall Inputs (Hall1, Hall2, Hall3)		Min.	Typ.	Max.	Units
Mode compliance		TTL / CMOS / Open-collector (NPN sink), or analog (linear) 0...5V			
Default state	Input floating (Wiring disconnected)	4.5	4.7	5	V
Input voltage	Digital	Logic "LOW"	1.5	1.7	
		Logic "HIGH"	3	2.5	
	Hysteresis		0.5		
Analog		0	0.5...4.5	4.95	
Input current	Logic "LOW"; Pull to GND		2.3		mA
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5		0		
Minimum pulse width			70		µs
ESD protection	Human body model		±15		kV

<sup>1</sup> In case of forced cooling (conduction or ventilation) the spacing requirements may drop substantially down to zero as long as the ambient temperature is kept below the maximum operating limit

<sup>2</sup> For current values >3A<sub>RMS</sub> pins needs to be soldered instead of socketed

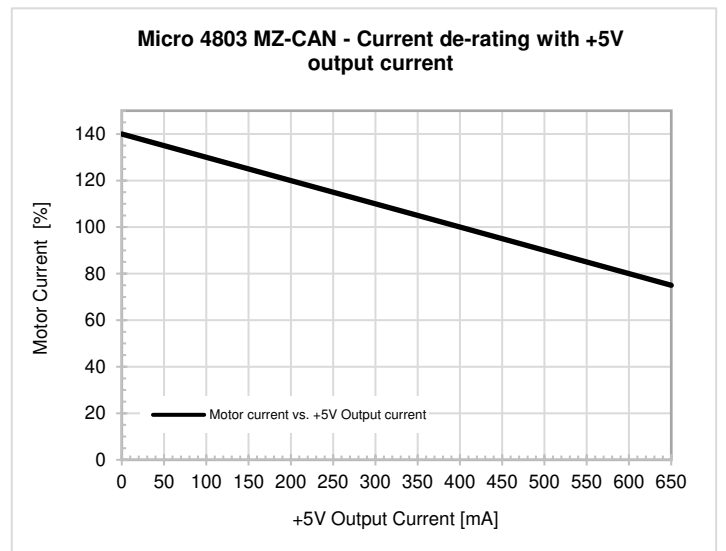
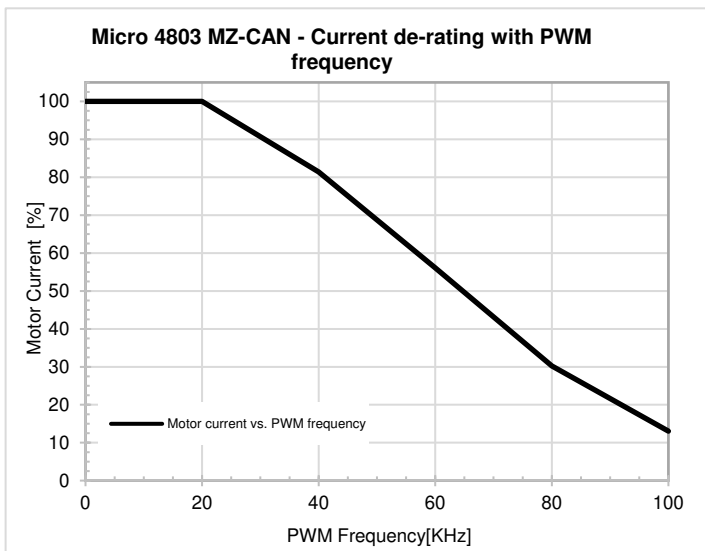
<sup>3</sup> For more details see the "Current de-rating with +5V output current" graph

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# Micro 4803 MZ-CAN DATASHEET P/N: P020.001.E102

Encoder Inputs (A+, A-, B+, B-, Z+, Z-, A2+, A2-, B2+, B2-) <sup>1</sup>		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave A1-, B1-, Z1-, A2-, B2-floating	TTL/CMOS/Open-collector (NPN)			
Single-ended threshold	A1+, B1+, Z1+, A2+, B2+	1.2	1.3	1.5	V
Single-ended input current	Input pulled to GND against on-board 2.2 K $\Omega$ pull-up to +5V		2.2	2.5	mA
Differential mode compliance	For full RS422 compliance, see <sup>2</sup>	TIA/EIA-422-A			
Input voltage	Hysteresis	$\pm 0.03$	$\pm 0.05$	$\pm 0.2$	V
	Differential mode	-15		+15	
	Common-mode range (A+ to GND, etc.)	-7		+12	
Input impedance, differential	A+, A2+, B+, B2+, Z+, Z2+		2.2		k $\Omega$
Input frequency	A-, A2-, B-, B2-, Z-, Z2-		4.4		
Minimum pulse width	Differential mode	0		15	MHz
ESD protection	Human body model	$\pm 30$			kV
<b>Absolute encoder interface: SSI, BiSS-C, EnDAT, Tamagawa, Nikon, Sanyo Denki</b>					
Differential mode (CLOCK, DATA)	For full RS422 compliance, see <sup>2</sup>	Min.	Typ.	Max.	Units
CLOCK (DATA) Output voltage	Differential; 50 $\Omega$ differential load Common-mode, referenced to GND	1.5 1	3.3 1.7		V
CLOCK frequency	Software selectable	1000, 2000, 3000, 4000			kHz
CLOCK (DATA) Short-circuit protection	Common-mode voltage $\pm 15V$	Yes, protected			
DATA format	Software selectable	Binary / Gray Single-turn / Multi-turn Counting direction CRC type			
DATA resolution	Single-turn Multi-turn and single-turn If total resolution >31 bits, some bits must be ignored by software setting to achieve a max 31 bits resolution			56 56	Bits

Analog Inputs (REF, FDBK)		Min.	Typ.	Max.	Units
<b>0...5V Mode</b>					
Input voltage	Operational range	0		4.95	V
	Absolute maximum values, continuous	-12		+18	
	Absolute maximum, surge (duration $\leq 1s$ )			$\pm 36$	
Input impedance	To 1.447V		20		k $\Omega$
Resolution			12		bits
Integral linearity				$\pm 2$	bits
Offset error			$\pm 2$	$\pm 10$	bits
Gain error			$\pm 1\%$	$\pm 3\%$	%FS <sup>3</sup>
Bandwidth (-3dB)	Software selectable	0		1.5	kHz
ESD protection	Human body model	$\pm 2$			kV
<b><math>\pm 10V</math> Mode</b>					
Differential voltage range			$\pm 10$		V
Common-mode voltage range	Referenced to GND	-12	0...10	+50	V
Input impedance	To 1.447V		20		k $\Omega$
Resolution			12		bits
Integral linearity				0.036	%FS <sup>3</sup>
Offset error	Common-mode voltage =		$\pm 0.2$	$\pm 0.5$	%FS <sup>1</sup>
Gain error	0...10 V		$\pm 0.5$	$\pm 3$	%FS <sup>1</sup>
Bandwidth (-3dB)	Software selectable	0		5.5	kHz
<b>CAN-Bus</b>					
Compliance		ISO11898, CiA-301v4.2, CiA 305 v2.2.13, 402v3.0			
Bit rate	Software selectable	125		1000	Kbps
Bus length	1Mbps			25	m
	500Kbps			100	
	$\leq 250Kbps$			250	
Resistor	Between CAN-Hi, CAN-Lo	none on-board			
Node addressing	Hardware: by "IDx" pins	1-127 & 255			TMLCAN
		1-127 & 255 (LSS inactive)			CANopen
	Software	1 $\div$ 127 (CANopen); 1- 255 (TMLCAN)			
Voltage, CAN-Hi or CAN-Lo to GND		-58		+58	V
Voltage, CAN-Hi to CAN-Lo		-45		+45	
ESD protection	Human body model	$\pm 15$			kV

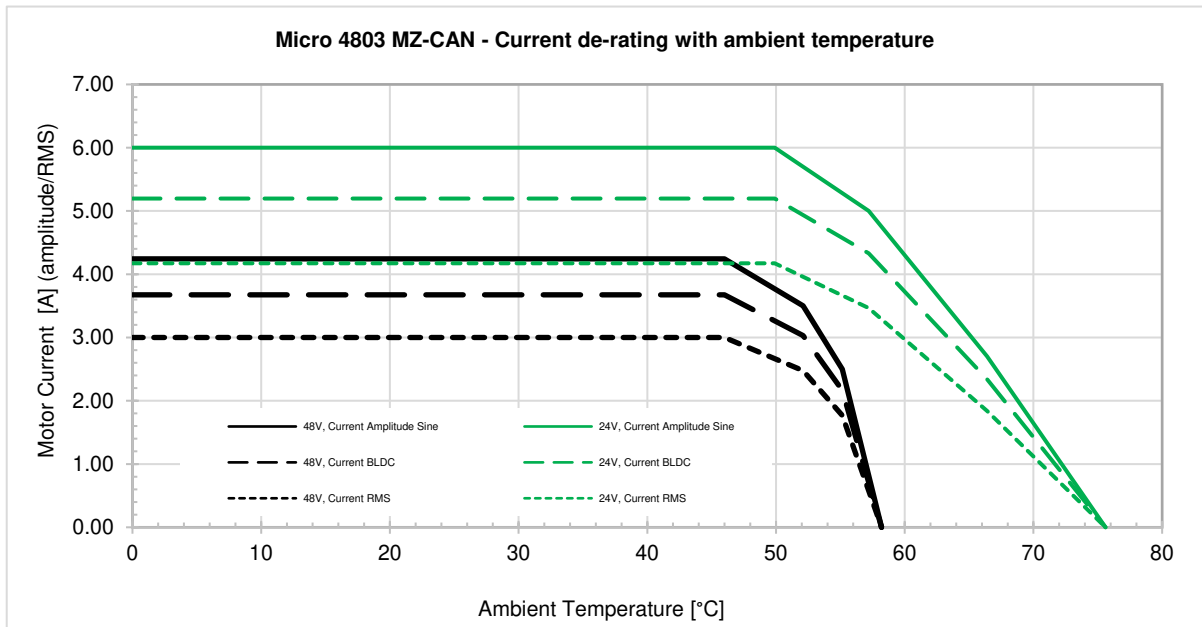
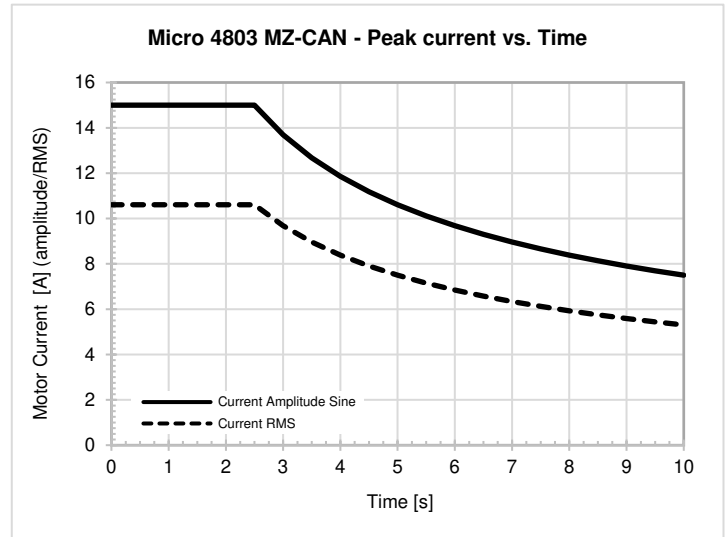
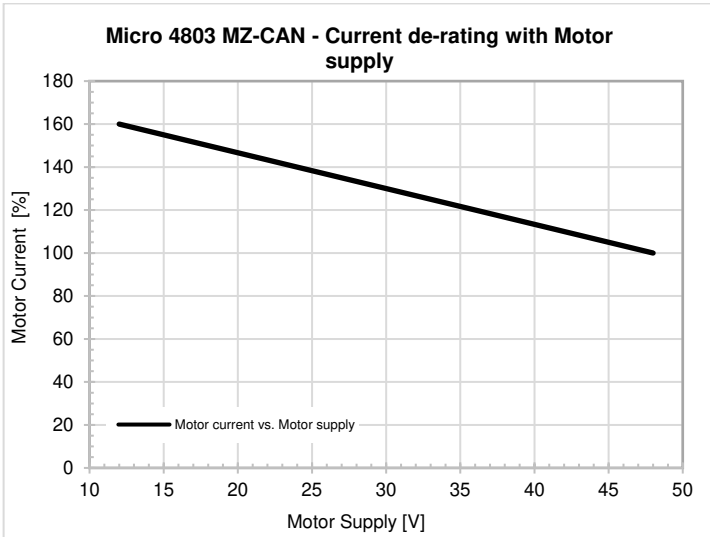



<sup>1</sup> Full RS-422 compatibility, as well as noise rejection improvement requires an external 120 $\Omega$  resistor connected across each signal pair (A1+/A1-, B1+/B1-, Z1+/Z1-, A2+/A2-, B2+/B2-)

<sup>2</sup> Full RS-422 compatibility, as well as noise rejection improvement requires an external 120 $\Omega$  resistor connected across each signal pair (A1+/A1-, B1+/B1-, Z1+/Z1-, A2+/A2-, B2+/B2-)

<sup>3</sup> "FS" stands for "Full Scale"

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