

**IO**  
**Micro 4804**

**v0.1A**  
**I/O Board for**  
**Micro 4804 MZ**  
**Intelligent**  
**Servo Drives**



T E C H N O S O F T  
MOTION TECHNOLOGY

**Technical  
Reference**

***-Preliminary-***

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## 2. Read This First

Whilst Technosoft believes that the information and guidance given in this manual is correct, all parties must rely upon their own skill and judgment when making use of it. Technosoft does not assume any liability to anyone for any loss or damage caused by any error or omission in the work, whether such error or omission is the result of negligence or any other cause. Any and all such liability is disclaimed. All rights reserved. No part or parts of this document may be reproduced or transmitted in any form or by any means, electrical or mechanical including photocopying, recording or by any information-retrieval system without permission in writing from Technosoft S.A. The information in this document is subject to change without notice.

## 3. About This Manual

This book is a technical reference manual for the **IO-Micro 4804 MZ** extension boards **version 0.1A** that are included in the **Micro 4804 MZ** intelligent servo drives starter kits:

Part Number	Description
P020.002.E804	Micro 4804 MZ-CAN starter kit with brushless motor
P020.003.E804	Micro 4804 MZ-CAN-STO starter kit with brushless motor
P020.002.E814	Micro 4804 MZ-CAT starter kit EtherCAT with brushless motor
P020.003.E814	Micro 4804 MZ-CAT-STO starter kit EtherCAT with brushless motor
P020.002.E803	Micro 4804 MZ-CAN starter kit w/o motor
P020.003.E803	Micro 4804 MZ-CAN-STO starter kit w/o motor
P020.002.E813	Micro 4804 MZ-CAT starter kit EtherCAT w/o motor
P020.003.E813	Micro 4804 MZ-CAT-STO starter kit EtherCAT w/o motor
P020.002.E881	Micro 4804 I/O board

## 4. Notational Conventions

This document uses the following conventions:

- **IU** units – Internal units of the drive
- **SI** units – International standard units (meter for length, seconds for time, etc.)
- **STO** – Safe Torque Off
- **TML** – Technosoft Motion Language
- **CANopen** – Standard communication protocol that uses 11-bit message identifiers over CAN-bus
- **TMLCAN** – Technosoft communication protocol for exchanging TML commands via CAN-bus, using 29bit message identifiers
- **CoE** – CAN application protocol over EtherCAT

## 5. Related Documentation

**Micro 4804 MZ-CAN Datasheet (P020.002.E102.DSH)**

**Micro 4804 MZ-CAN-STO Datasheet (P020.003.E102.DSH)**

**Micro 4804 MZ-CAT Datasheet (P020.002.E122.DSH)**

**Micro 4804 MZ-CAT-STO Datasheet (P020.003.E122.DSH)**

– describes the hardware connections of the Micro 4804 MZ family of intelligent servo drives including the technical data and connectors.

**EasyMotion Studio II – Quick Setup and Programming Guide (P091.034.ESM II - Quick.Setup.and.Programming.Guide.xxxx)**

– describes the compatible software installation, drive software setup commissioning, introduction to TML motion programming and motion evaluation tools.

**iPOS family Safe Torque Off (STO) Operating instructions ( 091.099.STO.Operating.Instructions.xxxx)**

– describes the principles of STO function, the applied standards, the safety-related data and the electrical data. It presents the requested information for installation and commissioning of STO function

**Help of the EasyMotion Studio II software – EasyMotion Studio II** simplifies the setup process for any Technosoft drive, enabling quick configuration. The software generates setup data that can be downloaded into the drive's EEPROM or saved as a file on a PC. Upon power-up, the drive initializes with the setup data read from its EEPROM. Additionally, EasyMotion Studio II allows retrieval of complete setup information from a previously programmed drive. The **LITE version of EasyMotion Studio II** is available for free download from the Technosoft website.

**Motion Programming using EasyMotion Studio (part no. P091.034.ESM.UM.xxxx)** – describes how to use the EasyMotion Studio to create motion programs using in Technosoft Motion Language (TML). EasyMotion Studio platform includes a **Motion Wizard** for the motion programming. The Motion Wizard provides a simple, graphical way of creating motion programs and automatically generates all the TML instructions. *With EasyMotion Studio you can fully benefit from a key advantage of Technosoft drives – their capability to execute complex motions without requiring an external motion controller, thanks to their built-in motion controller.*

**iPOS CANopen Programming (part no. P091.063.iPOS.UM.xxxx)** – explains how to program the iPOS family of intelligent drives using **CANopen** protocol and describes the associated object dictionary for **CiA 301 v.4.2** application layer and communication profile, **CiA WD 305 v.2.2.13** layer settings services and protocols and **CiA**

DSP 402 v3.0 device profile for drives and motion control now included in IEC 61800-7-1 Annex A, IEC 61800-7-201 and IEC 61800-7-301 standards

**iPOS CoE Programming (part no. P091.064.UM.0919)** – describes how to program the Technosoft intelligent drives equipped with EtherCAT® communication interface. These drives support CAN application protocol over EtherCAT® (CoE) in conformance with CiA 402 device profile. The manual presents the object dictionary associated with this profile. The manual also explains how to combine the Technosoft Motion Language and the CoE commands in order to distribute the application between the EtherCAT® master and the Technosoft drives.

**TML\_LIB v2.0 (part no. P091.040.v20.UM.xxxx)** – explains how to program in **C, C++,C#, Visual Basic or Delphi Pascal** a motion application for the Technosoft intelligent drives using TML\_LIB v2.0 motion control library for PCs. The TML\_lib includes ready-to-run examples that can be executed on **Windows** or **Linux** (x86 and x64).

**TML\_LIB\_LabVIEW v2.0 (part no. P091.040.LABVIEW.v20.UM.xxxx)** – explains how to program in **LabVIEW** a motion application for the Technosoft intelligent drives using TML\_LIB\_LabVIEW v2.0 motion control library for PCs. The TML\_Lib\_LabVIEW includes over 40 ready-to-run examples.

**TML\_LIB\_S7 (part no. P091.040.S7.UM.xxxx)** – explains how to program in a PLC **Siemens series S7-300 or S7-400** a motion application for the Technosoft intelligent drives using TML\_LIB\_S7 motion control library. The TML\_LIB\_S7 library is **IEC61131-3 compatible**.

**TML\_LIB\_CJ1 (part no. P091.040.CJ1.UM.xxxx)** – explains how to program in a PLC **Omron series CJ1** a motion application for the Technosoft intelligent drives using TML\_LIB\_CJ1 motion control library for PLCs. The TML\_LIB\_CJ1 library is **IEC61131-3 compatible**.

**TML\_LIB\_X20 (part no. P091.040.X20.UM.xxxx)** – explains how to program in a PLC **B&R series X20** a motion application for the Technosoft intelligent drives using TML\_LIB\_X20 motion control library for PLCs. The TML\_LIB\_X20 library is **IEC61131-3 compatible**.

## 6. If you Need Assistance ...

If you want to ...	Contact Technosoft at ...
Visit Technosoft online	World Wide Web: <a href="http://www.technosoftmotion.com/">http://www.technosoftmotion.com/</a>
Receive general information or assistance (see Note)	World Wide Web: <a href="http://www.technosoftmotion.com/">http://www.technosoftmotion.com/</a> Email: <a href="mailto:sales@technosoftmotion.com">sales@technosoftmotion.com</a>
Ask questions about product operation or report suspected problems (see Note)	Tel: +41 (0)32 732 5500 Email: <a href="mailto:support@technosoftmotion.com">support@technosoftmotion.com</a>
Make suggestions about, or report errors in documentation.	Mail: Technosoft SA Avenue des Alpes 20 CH-2000 Neuchatel, NE Switzerland

## 7. Safety information

**Read carefully the information presented in this chapter before carrying out the drive installation and setup! It is imperative to implement the safety instructions listed hereunder.**

This information is intended to protect you, the drive and the accompanying equipment during the product operation. Incorrect handling of the drive can lead to personal injury or material damage.

The following safety symbols are used in this manual:



**WARNING!** SIGNALS A DANGER TO THE OPERATOR WHICH MIGHT CAUSE BODILY INJURY. MAY INCLUDE INSTRUCTIONS TO PREVENT THIS SITUATION



**CAUTION!** SIGNALS A DANGER FOR THE DRIVE WHICH MIGHT DAMAGE THE PRODUCT OR OTHER EQUIPMENT. MAY INCLUDE INSTRUCTIONS TO AVOID THIS SITUATION



**CAUTION!** Indicates areas SENSITIVE TO electrostatic discharges (ESD) WHICH REQUIRE HANDLING IN AN ESD PROTECTED ENVIRONMENT

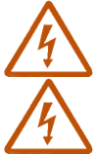
## 8. Warnings



**WARNING!** THE VOLTAGE USED IN THE DRIVE MIGHT CAUSE ELECTRICAL SHOCKS. DO NOT TOUCH LIVE PARTS WHILE THE POWER SUPPLIES ARE ON



**WARNING!** TO AVOID ELECTRIC ARCING AND HAZARDS, NEVER CONNECT / DISCONNECT WIRES FROM THE DRIVE WHILE THE POWER SUPPLIES ARE ON



**WARNING!** THE DRIVE MAY HAVE HOT SURFACES DURING OPERATION.

**WARNING!** DURING DRIVE OPERATION, THE CONTROLLED MOTOR WILL MOVE. KEEP AWAY FROM ALL MOVING PARTS TO AVOID INJURY

## 9. Cautions



**CAUTION!** THE POWER SUPPLIES CONNECTED TO THE DRIVE MUST COMPLY WITH THE PARAMETERS SPECIFIED IN THIS DOCUMENT










**CAUTION!** TROUBLESHOOTING AND SERVICING ARE PERMITTED ONLY FOR PERSONNEL AUTHORISED BY TECHNOSOFT



**CAUTION!** THE DRIVE CONTAINS ELECTROSTATICALLY SENSITIVE COMPONENTS WHICH MAY BE DAMAGED BY INCORRECT HANDLING. THEREFORE THE DRIVE SHALL BE REMOVED FROM ITS ORIGINAL PACKAGE ONLY IN AN ESD PROTECTED ENVIRONMENT

To prevent electrostatic damage, avoid contact with insulating materials, such as synthetic fabrics or plastic surfaces. In order to discharge static electricity build-up, place the drive on a grounded conductive surface and also ground yourself.

## 10. Quality system, conformance and certifications

 	<p><b>IQNet and Quality Austria</b> certification about the implementation and maintenance of the Quality Management System which fulfills the requirements of Standard <b>ISO 9001:2015</b>.  <b>Quality Austria Certificate</b> about the application and further development of an effective Quality Management System complying with the requirements of Standard <b>ISO 9001:2015</b></p>
	<p><b>REACH Compliance - TECHNOSOFT</b> hereby confirms that this product comply with the legal obligations regarding Article 33 of the European REACH Regulation 1907/2006 (Registration, Evaluation, Authorization and Restriction of Chemicals), which came into force on 01.06.2007.</p>
	<p><b>RoHS Compliance - Technosoft SA</b> here with declares that this product is manufactured in compliance with the RoHS directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)</p>
	<p><b>Technosoft SA</b> hereby declares that this product conforms to the following European applicable directives:  2014/30/EU Electromagnetic Compatibility (EMC) Directive  2014/35/EU Low Voltage Directive (LVD)  93/68/EEC CE Marking Directive</p>
	<p><b>Conflict minerals statement - Technosoft</b> declares that the company does not purchase 3T&amp;G (tin, tantalum, tungsten &amp; gold) directly from mines or smelters...  We have no indication that Technosoft products contain minerals from conflict mines or smelters in and around the DRC.</p>
	<p><b>STO compliance – TUV SUD</b> certifies that this product is <b>SIL 3 / Cat 3 / PL e compatible</b> and is in conformity with the following safety – related directives:  EN ISO 13849-1:2015 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design  EN 61800-5-1:2007 Adjustable speed electrical power drive systems — Safety requirements — Electrical, thermal and energy  EN 61800-5-2:2007 Adjustable speed electrical power drive systems - Safety requirements –Functional  EN 61508:2010 Functional safety of electrical/electronic/programmable electronic safety-related systems  EN ISO 13849-1:2008 Safety of machinery - Safety-related parts of control systems  EN 61326-3-1:2008 - General industrial applications - EMC - Immunity requirements for functional safety</p>

For other certifications visit: <https://technosoftmotion.com/en/quality/>

## 11. Product Overview

### 11.1 Introduction

The IO-Micro 4804 MZ extension board is a supplementary module designed to facilitate the rapid evaluation of Micro 4804 MZ-CAN and Micro 4804 MZ -CAT Intelligent Servo Drives.

### 11.2 Product features

- **Motor supply:** 7-48V; **Logic supply:** 6-48V; **STO supply**<sup>1</sup>: 18-40V; **PWM** switching frequency: up to 100kHz.
- **Motor current**<sup>2</sup>:
  - **Nominal:**
    - 4.5A<sub>RMS</sub> / 6.3A amplitude for PMSM motors
    - 5.5A for DC / BLDC / Step motors
  - **Peak:** 11.3A<sub>RMS</sub> / 16A amplitude
- Direct access to the following Micro I/O signals, via spring type terminals connectors:
  - **3 x digital inputs**, 5-48V, NPN, : 2 for limit switches or general-purpose use, and 1 for Enable<sup>3</sup> input or general-purpose use. Pull-up on-board to +5V. Pull to GND to activate
  - **3 x configurable I/Os, each software selectable as:**
    - **Digital input**, 5-48V, NPN, with pull-up on-board to +5V. Pull to GND to activate;
    - **Digital output**, 5-48V, NPN (open-collector), with pull-up on-board to +5V. Sink current: 1 x 1.5A to drive inductive loads (dedicated for motor brake or general-purpose), 2 x 0.1A (for general-purpose use).
    - **1 x analogue input**, 12-bit, 0-5V or ±10V selectable: Reference (REF), Feedback(FDBK) or general-purpose
- Emulation of external NPN inputs commutation via 6 push-buttons connected to inputs: IN0/Home, IN1, IN2/LSP, IN3/LSN, IN4, IN5/ENA<sup>3</sup>
- Emulation of external analogue command via potentiometer VR1
- **Communication:**
  - RS-232
  - USB 2.0 type C connector for communication with the PC
  - 2 x Spring type terminal block connectors for CAN communication
  - 2 x RJ 45 for EtherCAT communication<sup>4</sup>
- One spring type terminal block connector for **STO** inputs<sup>1</sup>
- **Feedback #1** available connectors:
  - 2x5 pin shrouded header, 2.54mm pitch
  - HDB15
  - 10 pin connector for pluggable terminal block with 2.5mm pin spacing
- **Feedback #2** available connectors:
  - 2x5 pin shrouded header, 2.54mm pitch
  - HDB15

### 11.3 IO-Micro 4804 MZ Board Version Identification

This manual refers to **IO-Micro 4804 MZ version 0.1A**.

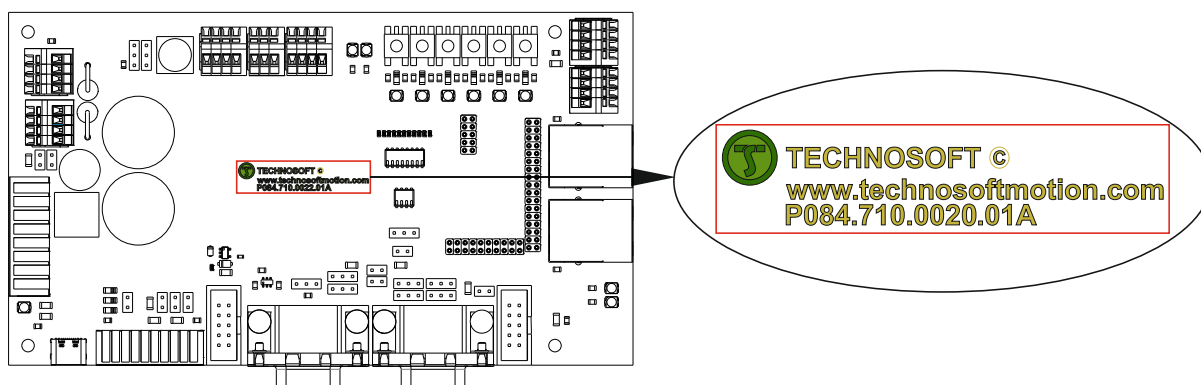


Figure 11.3.1. Board version identification

<sup>1</sup> Needed only for the STO executions of Micro 4804 MZ

<sup>2</sup> The motor current at the IO-Micro 4804 MZ board level is restricted to a maximum of 5A due to the limitations of the motor connector. For more details on specific performance characteristics, please refer to the Micro 4804 MZ documentation.

<sup>3</sup> The Enable input is available only for non-STO executions of the Micro 4804. Otherwise, it functions as a general-purpose input.

<sup>4</sup> Usable only for the EtherCAT executions of Micro 4804 MZ

## 11.4 IO-Micro 4804 MZ Board Dimensions

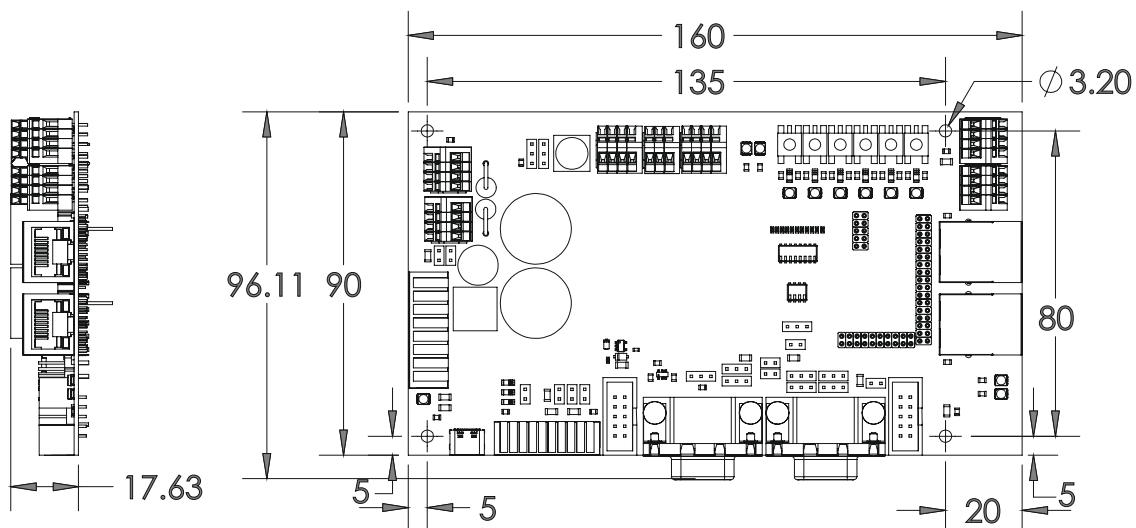




Figure 11.4.1. IO-Micro 4804 MZ board dimensions

All dimensions are in mm. Drawing not to scale.

## 12. Hardware Installation

### 12.1 I/O Board Mounting

The IO-Micro 4804 MZ drive is intended to be mounted horizontally on a metallic support using the provided mounting holes and the recommended inserts and screws:

Image	Description	Manufacturer	Part Number
	Self-clinching nuts M3	PennEngineering® (PEM®)	KF2-M3-ET
	Screws M3x10	Bossard	BN610-M3x10

### 12.2 Micro 4804 MZ Mounting

Securely press the Micro 4804 MZ-CAN/CAT drive into the IO-Micro board, matching each Jx<sup>1</sup> connector on the MZ drive with its corresponding Jx<sup>1</sup>\_MZ connector on the I/O board.

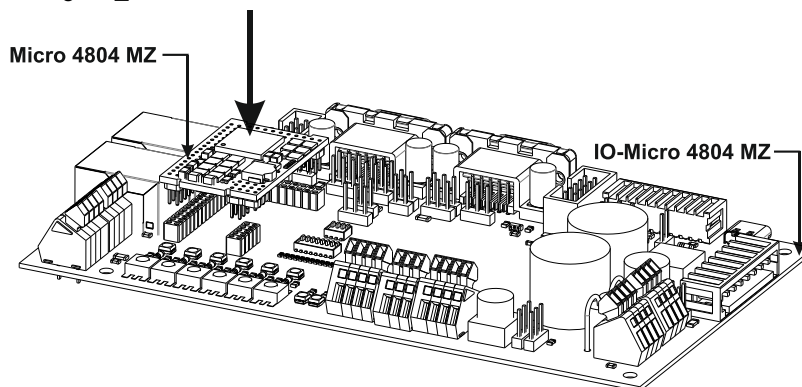


Figure 12.2.1 Installing an Micro 4804 MZ-CAN/CAT drive in the IO-Micro 4804 MZ

### 12.3 Mating connectors

Connector	Description	Manufacturer	Part Number
J7	10 socket pluggable terminal connector	Wago	733-110
J13, J15	generic 15-pin High Density D-Sub male	-	-
J14, J16	2x5 pin wire to board connector	Harting	0918-510-6803
J17	8 socket pluggable terminal connector	Wago	734-108
J1, J2	Standard 8P8C modular jack (RJ-45) male	-	-
J3	Standard USB 2.0 C type connector	-	-

<sup>1</sup> where x can be 1,2 or 3



#### 12.4.1 J5 – Feedback#1 and Digital Hall connector

Pin	Pin name	Type	Function
1	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).
2	HALL1	I	Hall 1 digital sensor input, or Linear Hall sensor 1.
3	HALL2	I	Hall 2 digital sensor input, or Linear Hall sensor 2.
4	HALL3	I	Hall 3 digital sensor input, or Linear Hall sensor 3.
5	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
6	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
7	EncA1+/EncA1/ Dt1+/Dt1	I	Encoder 1 A+/Data+ diff. input or single-ended input
8	EncB1+/EncB1/ Clk1+/Clk1	I	Encoder 1 B+/Clock+ diff. input or single-ended input
9	Z/Z1+	I	Encoder 1 Z+ diff. input or Z (index) single-ended input
10	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).

**Remarks:**

1. Feedback#1 signals are also available at J15 and J16 connectors.
2. To use the J5 single-ended encoder signals, set jumpers JP11, JP12, and JP13 to OFF.
3. Mount JP10 to connect the HALL signal lines to ground (GND).

#### 12.4.2 J6 – STO (Safe Torque Off) connector

Pin	Pin name	Type	Function
1	STO1-	I	Safe Torque Off input 1, negative return (opto-isolated, 0V).
2	STO1+	I	Safe Torque Off input 1, positive input (opto-isolated, 18÷40V).
3	STO2+	I	Safe Torque Off input 2, positive input (opto-isolated, 18÷40V).
4	STO2-	I	Safe Torque Off input 2, negative return (opto-isolated, 0V).

Apply 24 V<sub>DC</sub> between STO1+ and STO1-, as well as between STO2+ and STO2-, to enable motor PWM output.

**Remark:** The STO inputs can be bypassed using the SW1 sliding switch functions.

#### 12.4.3 J4 and J7 – CAN connectors

Pin	Pin name	Type	Function
1	+V CAN	O	If JP1 is ON, +V <sub>LOG</sub> will be connected to this pin .
2	CAN HI	I/O	CAN-Bus positive line (positive during dominant bit).
3	CAN LO	I/O	CAN-Bus negative line (negative during dominant bit).
4	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.

**Remarks:**

1. Connect the JP15 jumper to add a 120Ω termination resistor to your CAN network.
2. The termination resistor is physically located near J4.
3. Connect JP1 jumper to connect the logic supply +V<sub>LOG</sub> to +V CAN.

#### 12.4.4 J9 – Digital I/O connector

Pin	Pin name	Type	Function
1	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
2	I/O0	I/O	5–48 V, 1.5 A NPN (sinking) digital programmable input IN0 or output OUT0. Can be used as a dedicated motor brake output or general-purpose I/O.
3	I/O1	I/O	5–48 V, 0.1A NPN (sinking) general-purpose digital programmable input IN1 or output OUT1.
4	I/O4	I/O	5–48 V, 0.1A NPN (sinking) general-purpose digital programmable input IN4 or output OUT4.

**Remarks:**

1. The I/O pins are internally connected to LEDs as follows: IO0 → LED5, IO1 → LED6, IO4 → LED9.
2. The I/O pins are internally connected to push buttons as follows: IO0 → S1, IO1 → S2, IO4 → S3.
3. When the I/O pins are configured as outputs, changing their states will turn the corresponding LEDs on or off.
4. When the I/O pins are configured as inputs, pressing the corresponding push button will change the input state and also toggle the associated LED on or off.

#### 12.4.5 J8 – Supply connector

Pin	Pin name	Type	Function
1	+V <sub>LOG</sub>	I/O	Positive terminal of the logic supply input: 6 to 48V <sub>DC</sub> from SELV/ PELV type power supply. Internally connected to all +V <sub>LOG</sub> pins.
2	+12V	I	+12V input supply. Internally connected to J13 pin 6.
3	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.

#### 12.4.6 J10 – Digital Inputs connector

Pin	Pin name	Type	Function
1	IN3/LSN	I	5–48 V digital NPN (sinking) input. Can be used as positive limit switch input or general-purpose input.
2	IN2/ LSP	I	5–48 V digital NPN (sinking) input. Can be used as negative limit switch input or general-purpose input.
3	IN5/ENA	I	5–48 V digital NPN (sinking) input. Used as Drive Enable input for non-STO executions or general-purpose input.
4	+V <sub>Log</sub>	I/O	Positive terminal of the logic supply input: 6 to 48V <sub>DC</sub> from SELV/ PELV type power supply. Internally connected to all +V <sub>Log</sub> pins.

**Remark:**

1. The IN pins are internally connected to push buttons as follows: IN3 → S4, IN2 → S3, IN5 → S6.
2. The IN pins are internally connected to LEDs as follows: IN3 → LED3, IN2 → LED4, IN5 → LED10.
3. Pressing the corresponding push button will change the input state and also toggle the associated LED on or off.

#### 12.4.7 J11 – Analog Reference connector

Pin	Pin name	Type	Function
1	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
2	REF	I	Analogue input, 12-bit, monopolar 0-5V or bipolar ±10V (software selectable) . Reads analogue reference, or general-purpose analogue input. Internally connected to AnalogIn and Temp Mot inputs.
3	Temp Mot	I	NTC/PTC 3.3V input. Used to read an analogue temperature value. Internally connected to AnalogIn and REF inputs.
4	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).

**Remarks:**

1. To use the REF input, set jumper JP8 to position 1–2. In this configuration, JP9 must remain unconnected. The Temp Mot input and other AnalogIn signals cannot be used.
2. To use the Temp Mot input, set jumper JP8 to position 2–3. In this configuration, JP9 must remain unconnected. The REF input and other AnalogIn signals cannot be used.
3. To internally generate a monopolar 0-5V analog reference using the VR1 potentiometer, set jumper JP9 to position 2–3. In this case, JP8 must remain unconnected. The REF input, Temp Mot, and AnalogIn signals available on other connectors cannot be used.

#### 12.4.8 J13 – Feedback #2 connector (DB15)

Pin	Pin name	Type	Function
1	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).
2	EncA2+/EncA2/ Dt2+/Dt2	I/O	Encoder 2 A+/Data+ diff. input or single-ended input
3	EncA2-/Dt2-	I/O	Encoder 2 A-/Data- diff. input. Leave open for single-ended.
4	EncB2+/EncB2/ Clk2+/Clk2	I/O	Encoder 2 B+/Clock+ diff. input or single-ended input.
5	EncA2+/EncA2/ Dt2+/Dt2	I	Encoder 2 A+/Data+ diff. input or single-ended input.
6	+12V	I	+12V input supply. Internally connected to J8 pin 2.
7	EncB2+/EncB2/ Clk2+/Clk2	I/O	Encoder 2 B+/Clock+ diff. input or single-ended input.
8	EncB2-/Clk2-	I/O	Encoder 2 B-/Clock- diff. input. Leave open for single-ended.
9	Z2+	I	Incr. encoder2 Z+ diff. input.
10	Z2-	I	Incr. encoder2 Z- diff. input.
11	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
12	AnalogIn	I	12-bit analog input, monopolar 0–5 V or bipolar ±10 V (software-selectable). Used for reading analog reference or as a general-purpose analog input. Internally connected to REF input, Temp Mot, and other AnalogIn signals.
13	n.c.	-	not connected.
14	EncB2-/Clk2-	I/O	Encoder 2 B-/Clock- diff. input. Leave open for single-ended.
15	EncA2-/Dt2-	I/O	Encoder 2 A-/Data- diff. input. Leave open for single-ended

**Remarks:**

1. Feedback #2 signals are also accessible at J14.
2. A 120Ω resistor can be connected across the differential pairs by mounting JP17(A2+ and A2-), JP18 (B2+ and B2-) and JP19 (Z2+ and Z2-).
3. Set JP4, JP5, JP6, and JP7 as follows:
  - a. Position 1–2: selects pins 4, 5, 14, 15
  - b. Position 2–3: selects pins 2, 3, 7, 8
4. The index signal can be sourced from either Feedback 1 or Feedback 2, selectable via jumper JP2 and JP3.
5. To use the AnalogIn input, jumper JP9 must remain unconnected. The REF input, Temp Mot input, and AnalogIn signals available on other connectors cannot be used in this configuration.

- To internally generate a monopolar 0-5V analog reference using the VR1 potentiometer, set jumper JP9 to position 2–3. In this case, JP8 must remain unconnected. The REF input, Temp Mot, and AnalogIn signals available on other connectors cannot be used.

#### 12.4.9 J14 – Feedback #2 connector (2x5 pin)

Pin	Pin name	Type	Function
1	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
2	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).
3	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
4	AnalogIn	I	12-bit analog input, monopolar 0–5 V or bipolar ±10 V (software-selectable). Used for reading analog reference or as a general-purpose analog input. Internally connected to REF input, Temp Mot, and other AnalogIn signals.
5	EncA2-/Dt2-	I/O	Encoder 2 A-/Data- diff. input. Leave open for single-ended.
6	EncA2+/EncA2/ Dt2+/Dt2	I/O	Encoder 2 A+/Data+ diff. input or single-ended input
7	EncB2-/ Clk2-	I/O	Encoder 2 B-/Clock- diff. input. Leave open for single-ended.
8	EncB2+/EncB2/ Clk2+/Clk2	I/O	Encoder 2 B+/Clock+ diff. input or single-ended input.
9	Z2-	I	Incr. encoder2 Z- diff. input.
10	Z2+	I	Incr. encoder2 Z+ diff. input.

#### Remarks:

- Feedback #2 signals are also accessible at J13.
- In order for the J14 connector to function, jumpers JP4, JP5, JP6, and JP7 must be set to position 1–2.
- A 120Ω resistor can be connected across the differential pairs by mounting JP17(A2+ and A2-), JP18 (B2+ and B2-) and JP19 (Z2+ and Z2-).
- The index signal can be sourced from either Feedback 1 or Feedback 2, selectable via jumper JP2 and JP3.
- To use the AnalogIn input, jumper JP9 must remain unconnected. The REF input, Temp Mot input, and AnalogIn signals available on other connectors cannot be used in this configuration.
- To internally generate a monopolar 0-5V analog reference using the VR1 potentiometer, set jumper JP9 to position 2–3. In this case, JP8 must remain unconnected. The REF input, Temp Mot, and AnalogIn signals available on other connectors cannot be used.

#### 12.4.10 J15 – Feedback #1 connector (DB15)

Pin	Pin name	Type	Function
1	+5V	O	+5V <sub>OUT</sub> output supply (generated by Micro drive).
2	HALL 1	I	Hall 1 digital sensor input, or Linear Hall sensor 1.
3	HALL 2	I	Hall 2 digital sensor input, or Linear Hall sensor 2.
4	EncB1+/EncB1/ Clk1+/Clk1	I	Encoder 1 B+/Clock+ diff. input or B single-ended input.
5	EncA1+/EncA1/ Dt1+/Dt1	I	Encoder 1 A+/Data+ diff. input or A single-ended input.
6	n.c.	-	not connected.
7	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
8	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
9	Z1+	I	Encoder 1 Z+ diff. input or Z (index) single-ended input.
10	Z1-	I	Encoder 1 Z- diff. input .
11	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
12	AnalogIn	I	12-bit analog input, monopolar 0–5 V or bipolar ±10 V (software-selectable). Used for reading analog reference or as a general-purpose analog input. Internally connected to REF input, Temp Mot, and other AnalogIn signals.
13	HALL 3	I	Hall 3 digital sensor input, or Linear Hall sensor 3.
14	EncB1/Clk1-	I	Encoder 1 B-/Clock- diff. input.
15	EncA1-/Dt1-	I	Encoder 1 A-/Data- diff. input.

#### Remarks:

- Feedback #1 signals are also accessible at J5 and J16.
- A 120Ω resistor can be connected across the differential pairs by mounting JP11 (pins 9 and 10), JP12 (pins 4 and 14) and JP13 (pins 5 and 15).
- The index signal can be sourced from either Feedback 1 or Feedback 2, selectable via jumper JP2 and JP3.
- To use the AnalogIn input from J15, jumper JP9 must remain unconnected. The REF input, Temp Mot input, and AnalogIn signals available on other connectors cannot be used in this configuration.
- To internally generate a monopolar 0-5V analog reference using the VR1 potentiometer, set jumper JP9 to position 2–3. In this case, JP8 must remain unconnected. The REF input, Temp Mot, and AnalogIn signals available on other connectors cannot be used.

#### 12.4.11 J16 – Feedback #1 connector (2x5 pin)

Pin	Pin name	Type	Function
1	<b>GND</b>	-	Return ground for motor. Internally connected to all GND signals except STO GND.
2	<b>+5V Out</b>	O	+5V <sub>OUT</sub> output supply (generated by Micro drive)
3	<b>GND</b>	-	Return ground for motor. Internally connected to all GND signals except STO GND.
4	<b>AnalogIn</b>	I	12-bit analog input, monopolar 0–5 V or bipolar ±10 V (software-selectable). Used for reading analog reference or as a general-purpose analog input. Internally connected to REF input, Temp Mot, and other AnalogIn signals.
5	<b>EncA1-/Dt1-</b>	I	Encoder 1 A-/Data- diff. input.
6	<b>EncA1+/EncA1/ Dt1+/Dt1</b>	I	Encoder 1 A+/Data+ diff. input or A single-ended input.
7	<b>EncB1/Cik1-</b>	I	Encoder 1 B-/Clock- diff. input.
8	<b>EncB1+/EncB1/ Cik1+/Cik1</b>	I	Encoder 1 B+/Clock+ diff. input or B single-ended input.
9	<b>Z1-</b>	I	Encoder 1 Z- diff. input .
10	<b>Z1+</b>	I	Encoder 1 Z+ diff. input or Z (index) single-ended input.

##### Remarks:

1. Feedback #1 signals are also accessible at J5 and J15.
2. A 120Ω resistor can be connected across the differential pairs by mounting JP11 (pins 9 and 10), JP12 (pins 7 and 8) and JP13 (pins 5 and 6).
3. The index signal can be sourced from either Feedback 1 or Feedback 2, selectable via jumper JP2 and JP3.
4. To use the AnalogIn input, jumper JP9 must remain unconnected. The REF input, Temp Mot input, and AnalogIn signals available on other connectors cannot be used in this configuration.
5. To internally generate a monopolar 0-5V analog reference using the VR1 potentiometer, set jumper JP9 to position 2–3. In this case, JP8 must remain unconnected. The REF input, Temp Mot, and AnalogIn signals available on other connectors cannot be used.

#### 12.4.12 J17 – Power supply and motor connector

Pin	Pin name	Type	Function
1	<b>GND</b>	-	Return ground for motor. Internally connected to all GND signals except STO GND.
2	<b>+V<sub>LOG</sub></b>	I	Positive terminal of the logic supply input: 6 to 48V <sub>DC</sub> from SELV/ PELV type power supply. Internally connected to all +V <sub>LOG</sub> pins.
3	<b>+V<sub>MOT</sub></b>	I	Positive terminal of the motor supply: 7 to 48V <sub>DC</sub> .
4	<b>GND</b>	-	Return ground for motor. Internally connected to all GND signals except STO GND.
5	<b>A/A+</b>	O	Phase <b>A</b> for 3-ph motors, <b>A+</b> for 2-ph steppers, <b>Motor+</b> for DC brush motors
6	<b>B/A-</b>	O	Phase <b>B</b> for 3-ph motors, <b>A-</b> for 2-ph steppers, <b>Motor-</b> for DC brush motors
7	<b>C/B+</b>	O	Phase <b>C</b> for 3-ph motors, <b>B+</b> for 2-ph steppers
8	<b>Cr/B-</b>	O	<b>Chopping resistor</b> / Phase <b>B-</b> for 2-ph steppers

#### 12.4.13 J1 and J2 – EtherCAT connectors

##### J1 & J2 EtherCAT

EtherCAT standard RJ45 Ethernet IN/OUT ports, compatible with IEEE 802.3 100BASE-T (100 Mbit/s), supporting both STP and UTP cabling.

#### 12.4.14 J3 – USB connector

##### J3 – USB connector

USB 2.0 type C connector for communication with the PC.



**CAUTION!** WHILE USING CONNECTOR J3, THE J18 RS232 CONNECTOR MUST REMAIN UNCONNECTED.

#### 12.4.15 J18 – RS232 connector

Pin	Pin name	Type	Function
1	<b>RX232</b>	I	RS-232 Data Reception
2	<b>GND</b>	-	Ground
3	<b>TX232</b>	O	RS-232 Data Transmission



**CAUTION!** WHILE USING CONNECTOR J18, THE J3 USB CONNECTOR MUST REMAIN UNCONNECTED.

#### 12.4.16 SW1 – Sliding Switch 2 – STO bypass

Pin	Pin name	Type	Function
1	STO2- bypass	-	Connects the STO2- input to GND.
2	STO2+ bypass	-	Connects the STO2+ input to +V <sub>LOG</sub> .
3	STO1+ bypass	-	Connects the STO1+ input to +V <sub>LOG</sub> .
4	STO1- bypass	-	Connects the STO1- input to GND.

#### 12.4.17 SW2 – Sliding Switch 2 – Axis ID selection

Pin	Pin name	Type	Function	
1	CAN protocol / ID2-Bit7	-	CAN execution	ON: CANopen communication protocol. OFF: TMLCAN communication protocol.
			CAT execution	7 <sup>th</sup> Bit (MSB) of the Axis ID Register.
2	ID2-Bit6	-	Hardware Axis ID Selection Switches These switches define 6 bits of the 8-bit Axis ID for CAN executions, and 7 bits for CAT executions. If all switch positions are set to 0, the Axis ID defaults to 255.	
3	ID1-Bit5	-		
4	ID1-Bit4	-		
5	ID1-Bit3	-		
6	ID0-Bit2	-		
7	ID0-Bit1	-		
8	ID0-Bit0	-		

#### 12.4.18 LEDs

LED	Function	Color	Description
LED1	ECAT ERR	Red	EtherCAT® ERROR indicator.
LED2	ECAT RUN	Green	EtherCAT® RUN indicator.
LED3	IN3/LSN	Yellow	Internally connected to the IN3/LSN input and the S4 push button. Pressing the S4 button changes the input state. The LED will turn on or off according to the input state.
LED4	IN2/LSP	Yellow	Internally connected to the IN2/LSP input and the S5 push button. Pressing the S5 button changes the input state. The LED will turn on or off according to the input state.
LED5	I/O0	Yellow	Internally connected to IO0 and the S1 push button. When configured as an input, pressing S1 changes the input state, and the LED reflects it. When configured as an output, the LED follows the output state.
LED6	I/O1	Yellow	Internally connected to IO1 and the S2 push button. When configured as an input, pressing S2 changes the input state, and the LED reflects it. When configured as an output, the LED follows the output state.
LED7	TML ERR	Red	Turned on when the drive detects an error condition.
LED8	TML RDY	Green	Lit after power-on when the drive initialization ends. Turned off when an error occurs.
LED9	I/O2	Yellow	Internally connected to IO2 and the S3 push button. When configured as an input, pressing S3 changes the input state, and the LED reflects it. When configured as an output, the LED follows the output state.
LED10	IN5/ENA	Yellow	Internally connected to the IN5/ENA input and the S6 push button. Pressing the S6 button changes the input state. The LED will turn on or off according to the input state.
LED16	V <sub>LOG</sub>	Green	Indicates that logic supply is present.

#### 12.4.19 Jumper settings

0 = Jumper OFF; 1 = Jumper ON; 1-2 – pin 1 and 2 connected; 2-3 – pin 2 and 3 connected

Jumper	Function	Option	Result
JP1	+V CAN	0	Do not connect +V CAN supply to +V <sub>LOG</sub> .
		1	Connect +V CAN supply to +V <sub>LOG</sub> .
JP2	Index Z+/Z2+ selection	1-2	Select the index signal from the first feedback channel (Z+).
		2-3	Select the index signal from the second feedback channel (Z2+).
JP3	Index Z-/Z2- selection	1-2	Select the index signal from the first feedback channel (Z-).
		2-3	Select the index signal from the second feedback channel (Z2-).
JP4	Fdbk#2 B2+/CLK+ selection	1-2	Use the B2+/CLK+ from J13 pin 4.
		2-3	Use the B2+/CLK+ from J13 pin 7.

JP5	Fdbk#2 B2-/CLK- selection	1-2	Use the B2-/CLK- from J13 pin 14.	
		2-3	Use the B2-/CLK- from J13 pin 8.	
JP6	Fdbk#2 A2+/DAT+ selection	1-2	Use the A2+/DAT+ from J13 pin 5.	
		2-3	Use the A2+/DAT+ from J13 pin 2.	
JP7	Fdbk#2 A2-/DAT- selection	1-2	Use the A2-/DAT- from J13 pin 15.	
		2-3	Use the A2-/DAT- from J13 pin 3.	
JP8	REF / Temp mot selection	OFF	Neither analog signal is selected.	
		1-2	Select REF analogue input.	Do not connect JP9.
		2-3	Select Temp mot input.	
JP9	VR1 selection	OFF	VR1 is not connected.	
		1-2		
		2-3	VR1 simulates a 0–5V analog input. The other analog signals should not be used while VR1 is active.	Do not connect JP8.
JP10	AutoRun	0	Enable AutoRun (standard operation with TMLCAN)	
		1	Disable AutoRun when using TMLCAN; Disable Setup when using EtherCAT.	
JP11	Z1+ & Z1- termination	0	Do not connect a 120Ω resistor between Z1+ and Z1-.	
		1	Connect a 120Ω resistor between Z1+ and Z1-.	
JP12	B1+/CLK+ & B1-/CLK termination	0	Do not connect a 120Ω resistor between B1+/CLK+ and B1-/CLK-.	
		1	Connect a 120Ω resistor between B1+/CLK+ and B1-/CLK-.	
JP13	A1+/DAT+ & A1-/ DAT- termination	0	Do not connect a 120Ω resistor between A1+/DAT+ and A1-/ DAT-.	
		1	Connect a 120Ω resistor between A1+/DAT+ and A1-/ DAT-.	
JP14	KTY83 sensor for Temp Mot input	1-2	A 1mA reference current is required when using the KTY83 temperature sensor on Temp Mot (J11 pin 3).	Connect JP8 = 2-3. Do not connect JP9.
		2-3	No function.	
JP15	CAN termination	0	Do not connect a CAN terminator resistor.	
		1	Connect a 120Ω CAN terminator resistor.	
JP16	BFS	0	Normal operation.	
		1	Connect the Boot Fail-Safe signal to GND to reprogram firmware in the improbable case when a power loss occurs during a firmware update and the normal firmware recovery fails.	
JP17	A2+/DAT+ & A2-/DAT- termination	0	Do not connect a 120Ω resistor between A2+/DAT+ and A2-/DAT-.	
		1	Connect a 120Ω resistor between A2+/DAT+ and A2-/DAT-.	
JP18	B2+/CLK+ & B2-/CLK- termination	0	Do not connect a 120Ω resistor between B2+/CLK+ and B2-/CLK-.	
		1	Connect a 120Ω resistor between B2+/CLK+ and B2-/CLK-.	
JP19	Z2+ & Z2- termination	0	Do not connect a 120Ω resistor between Z2+ and Z2-.	
		1	Connect a 120Ω resistor between Z2+ and Z2-.	

## 13. Default settings and AxisID

### 13.1 Default jumper settings

By default, the I/O board is shipped with the jumpers set as follows:

- OFF: 1, 9, 11, 12, 13, 14, 15, 16,
- ON: 10, 17, 18, 19
- Position 1-2: 2, 3, 4, 8
- Position 2-3: 5, 6, 7

The default SW1 settings configure the board for the TMLCAN protocol with an axis ID of 255 (all switches set to 0). To quickly switch to the CANopen protocol, set switches 8 and 1 of SS1 to 1. This will change the CANopen axis ID to 1 (since switch 1 is set to 1).

The SS2 (STO bypass settings) are set with all switches OFF by default.

### 13.2 Axis ID and CAN Protocol selection for CAN drives

The **AxisID** can be selected using **sliding switches 2 (MSB) to 8 (LSB) on SW2**, following an **8-bit binary format**. Examples:

Switch 8	Switch 7	Switch 6	Switch 5	Switch 4	Switch 3	Switch 2	8-bit Binary	Resulting AxisID (Decimal)
0	0	0	0	0	0	0	00000000	255 (default)
1	0	0	0	0	0	0	00000001	1
1	0	1	0	0	0	0	00000101	5
1	0	1	1	1	0	1	01011101	93
1	1	1	1	1	1	1	01111111	127

- CAN Protocol Selection (Switch 1 on SW2)
  - **ON** → **CANopen Mode**
  - **OFF** → **TMLCAN Mode**
- Special Case in CANopen Mode (AxisID = 255)
  - If the AxisID is set to **255**, the drive remains in a "**non-configured**" state.
  - In this state, it **only responds to CiA-305 protocol** commands from a CANopen master.
  - All other CANopen commands are ignored, and no messages (including boot-up) are transmitted.
  - The **green Ready LED blinks at 1-second intervals** until the AxisID is changed from **255**.

### 13.3 Axis ID Selection for EtherCAT drives

The Micro 4804 MZ drives support all EtherCAT standard addressing modes. In the case of device addressing mode based on node address, the Micro 4804 MZ drive sets the configured station alias address with its AxisID value during bootup. The drive's AxisID value is set after power on in one of the following ways:

- By hardware, using the SW1.**
- By software, setting via EasyMotion Studio II a specific AxisID value** in the range of 1-255.  
*Remark: Some EtherCAT masters do not work with drives that have the configured station alias set to 255.*

## 14. Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified):  $T_{amb} = 0 \dots 40^{\circ}\text{C}$ ,  $+V_{LOG} = 24V_{DC}$

### 14.1.1 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	<sup>2</sup>	Km
	Ambient Pressure	0 <sup>2</sup>	0.75 ÷ 1	10.0	atm

### 14.1.2 Storage Conditions

		Min.	Typ.	Max.	Units
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

### 14.1.3 Mechanical Mounting

		Min.	Typ.	Max.	Units
Airflow		natural convection <sup>3</sup> , closed box			
Insertion force				40	N
Extraction force		8			

### 14.1.4 Environmental Characteristics

		Min.	Typ.	Max.	Units
Size (Length x Width x Height)	Global size	160.0 x 96.4 x 17.6			mm
	(Without mating connectors)	~6.29 x 3.79 x 0.69			inch
Weight		~150			g
Cleaning agents	Dry cleaning is recommended	Only Water- or Alcohol- based			
Protection degree	According to IEC60529, UL508	IP20			-

### 14.1.5 Logic Supply Input: $+V_{LOG}$

		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	6	24	48	$V_{DC}$
	Absolute maximum values <sup>†</sup>	4.9		60	$V_{DC}$
	Absolute maximum values, continuous <sup>†</sup>	-0.5		63	$V_{DC}$

### 14.1.6 Motor Supply Input: $+V_{MOT}$

		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	7		48	$V_{DC}$
	Absolute maximum values <sup>†</sup>	6		60	$V_{DC}$
	Absolute maximum values, continuous <sup>†</sup>	-0.5		63	$V_{DC}$
	Absolute maximum values, surge (duration ≤ 10ms) <sup>†</sup>	-1		57	V
Supply current	Rated		5		A

<sup>†</sup> 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. Operation at absolute maximum ratings is possible but not guaranteed to meet specified performance parameters.



T E C H N O S O F T  
MOTION TECHNOLOGY

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

<sup>2</sup> IO Micro 4804 MZ 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.

<sup>3</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