MICROPHASE
Technology & Performance

# Traction Power

# Service Manual


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**www.microphase.eu**

# *Declaration of conformity*

**BLDC SERVODRIVES**

Product name: Traction Power

Manufacturer: MICROPHASE s.r.l.

Address: Via Palladio 23
36051 Creazzo (VI) Italy

MICROPHASE s.r.l assures that the drives listed above meet the following European Norms Standard:

*in accordance with EC Directive 2014/30/EU (EMC Directive)*

**EN 55022, EN 61000-4-2**

*in accordance with EC Directive 2014/35/EU (Low Voltage Directive))*

**EN 61010-1**

**WARNING - Risk of damage and/or personal injury**

This drives doesn't contain any user serviceable part. Attempting to replace any internal component, may result in damage to the unit and/or personal injury. This may also avoid the warranty.



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## Chapter 1



## Chapter 2



## Chapter 3



## Chapter 4



## Chapter 5

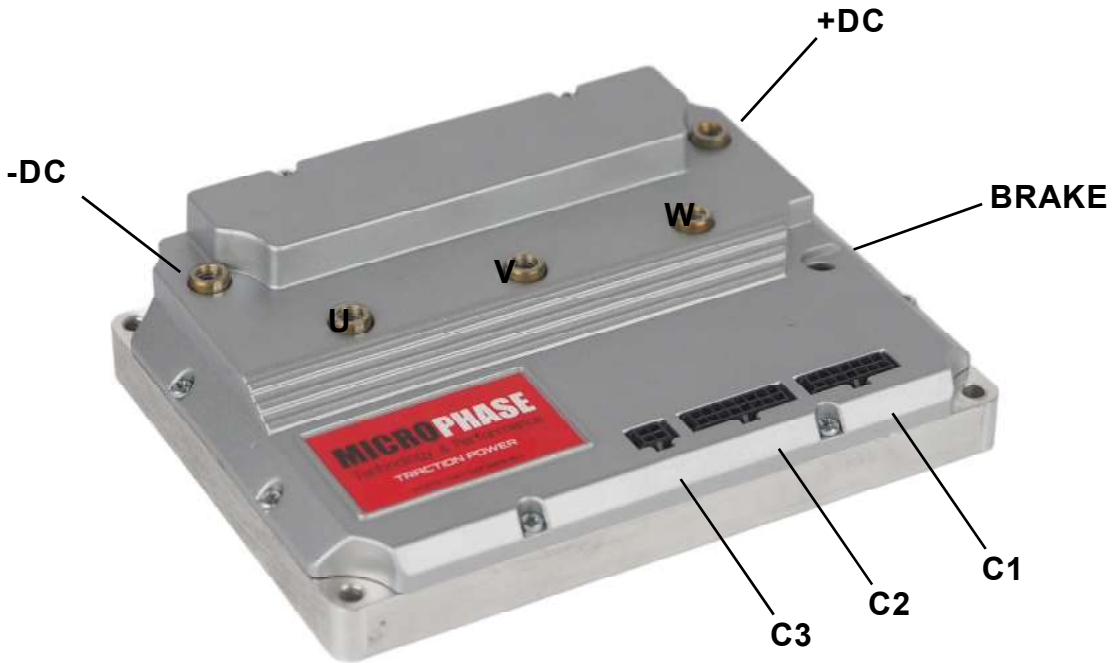
# *1.0 Model and size*

| MODEL & TYPE | | | | |
|---|---|---|---|---|
| | | | | |
| RATED VOLTAGE type | V | **Model 24** | **Model 48** | **Model 60** |
| MINIMUM VOLTAGE | V | 18 | 20 | 20 |
| MAXIMUM VOLTAGE ADMITTED | V | 32 | 80 | 90 |
| BOOST CURRENT (5s) | A | 200@5s | 200@5s | 200@5s |
| PEAK CURRENT (2 Min) | A | 150@2min | 150@2min | 150@2min |
| RATED CURRENT | A | 100 | 100 | 100 |
| RATED OUTPUT POWER | kW | 2,8 | 5,5 | 7,5 |
| DEFAULT PWM FREQUENCY | KHz | 20 | | |
| | °C | 0°C +40°C | | |

| TECNICAL DATA CHARACTERISTICS | |
|---|---|
| Supply voltage output | 0,9 Vdc Input |
| PWM frequency | 20Khz |
| Operating temperature | 0/+45°C |
| Storage temperature | -10/+70°C |
| Power supply output (+5V) | +5Vdc max 200 mA |
| Band width (current) | 2KHz |
| Band width (velocity) | 150Hz |
| Minimum Inductance motor | 200uH |
| Weight | 1,2kg |
| Contaminants | 2° or better (Norms EN60204 e EN50178) |
| Altitude | Up to 1000m without restrictions, from 1000 to 2000m power derating 1,5%/100m |
| Flammability rating 94V-0 | The PCB and the electronic component meet 94V-0 |

# 1.1 View product

C1 Motor feedback
C2 I/O - CanOpen
C3 Serial communication
+ / - DC Power Supply (M5 pitch screw)
U - V - W Phase Motor (M5 pitch screw)
Brake Output (M4 pitch screw)

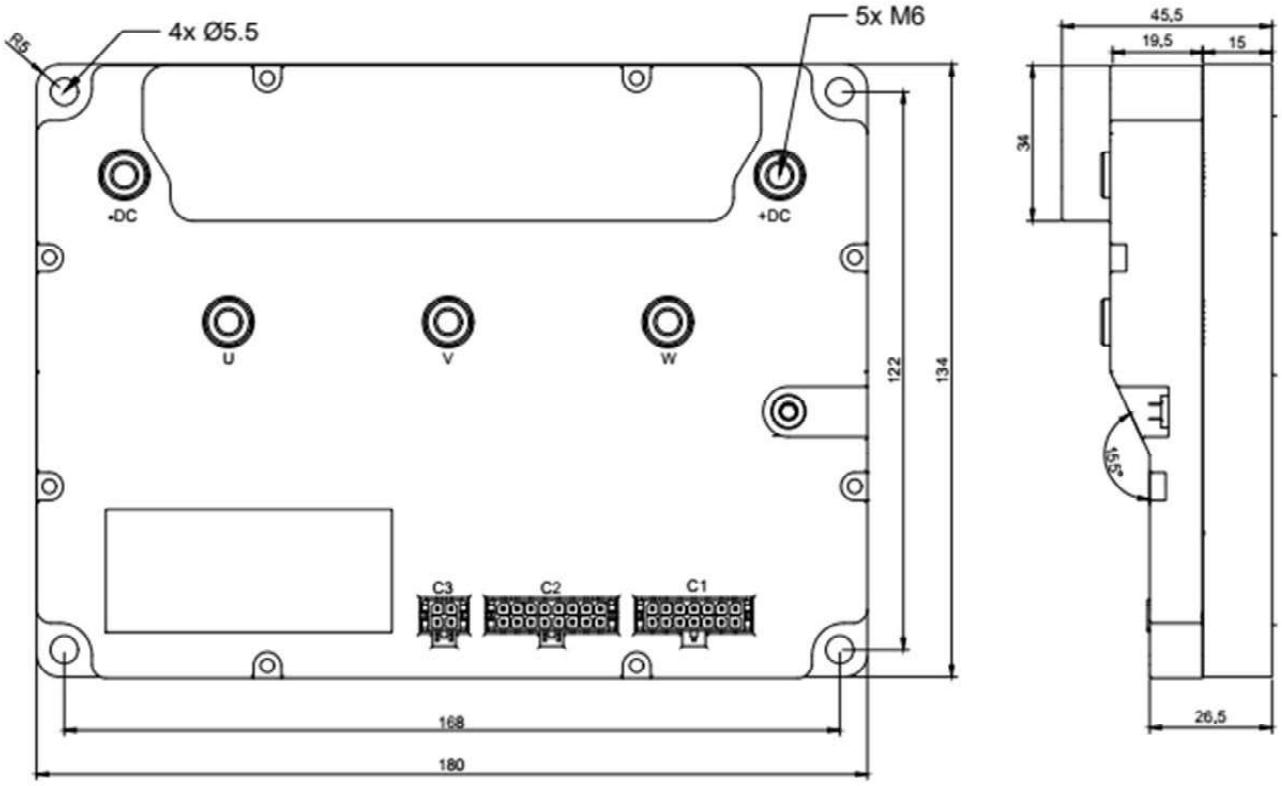



# 1.2 Control and I/O

This drive is full digitally controlled. It can be run in different modes, with or without feedback sensor. It can be drive DC Brushless motor, AC Brushless motor and Asinchronous motors.

- 2 analog inputs
- 1 Can Bus interface
- 2 RS232 for setup and debug
- 3 temperature sensor
- 1 motor temperature input
- 1 inclinometer

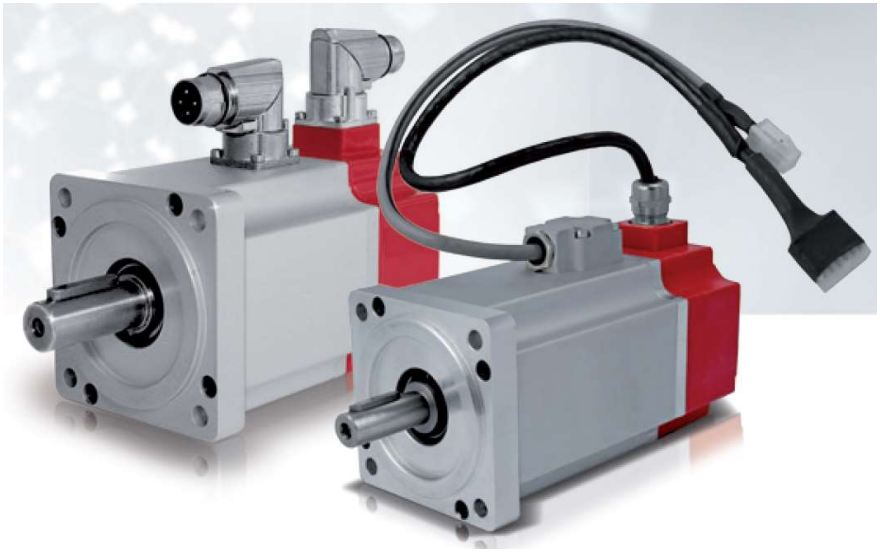
# *1.3 Mechanical dimensions*



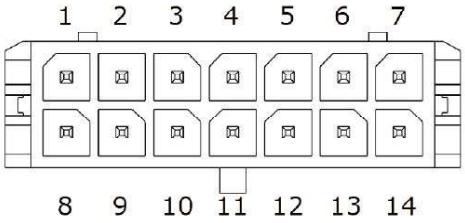

Dimensions in mm

# 2.0 Feedback available

The Traction Drive converter can be combined with the following speed feedbacks.
- 17bit absolute single turn serial encoder (4 wires)
- Facoder (Hall cells + encoder)
- Hall sensors only
- Sin - cos encoder 1Vpp
- Resolver



The C1 connector (Mini Traction Power) is unique for the various feedback versions.
The connections for each feedback version are highlighted




Motor Feedback Connector C1

**The Mini Traction drive is delivered with the relevant connection datasheet for the chosen brushless motor.**

# 2.1 Smart serial encoder feedback

The table below highlights the connections for the 4-wire serial encoder

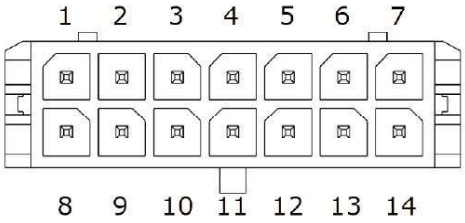
| I/O CONNECTOR C1 | | |
|---|---|---|
| 2 | **5V** | Output supply 5V@300mA |
| 3 | **GND** | GND Zero signals |
| **4** | **DATA -** | -485 SmartABS serial encoder |
| 5 | **DATA +** | +485 of SmartABS serial encoder |

# 2.2 Resolver feedback

The table below highlights the connections for the 6-wire resolver feedback

| I/O CONNECTOR C1 | | |
|---|---|---|
| 1 | **HV** | Hall sensor V input |
| 2 | **5V** | Output supply 5V@300mA |
| 3 | **GND** | GND Zero signals |
| **4** | **-** | - |
| 5 | **-** | - |
| 6 | **RES OUT** | Resolver sinusoidal output |
| 7 | **GND** | GND Zero signals |
| 8 | **-** | - |
| 9 | **-** | - |
| 10 | **/RES_SIN** | inv. Resolver sinus input |
| 11 | **RES_SIN** | Resolver sinus input |
| 12 | **/RES_COS** | inv. Resolver cosinus input |
| 13 | **RES_COS** | Resolver cosinus input |
| 14 | **STM** | Motor thermal sensor |

The C1 connector (Mini Traction Power) is unique for the various feedback versions. The connections for each feedback version are highlighted



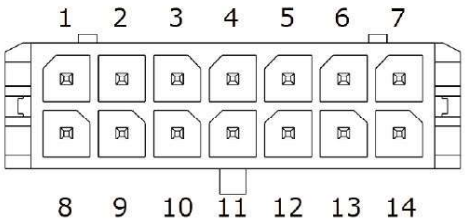

Motor Feedback Connector C1

# *2.3 Encoder + Hall feedback*

The table below highlights the connections for the encoder + hall feedback

| I/O CONNECTOR C1 | | |
|---|---|---|
| 1 | **HV** | Hall sensor V input |
| 2 | **5V** | Output supply 5V@300mA |
| 3 | **GND** | GND Zero signals |
| **4** | **CHZ-** | Inverted Z channel encoder input |
| 5 | **CHZ+** | Z channel encoder input |
| 6 | **-** | - |
| 7 | **GND** | GND Zero signals |
| 8 | **HU** | Hall sensor U input |
| 9 | **HW** | Hall sensor W input |
| 10 | **CHB-** | Inverted B channel encoder input |
| 11 | **CHA+** | A channel encoder input |
| 12 | **CHA-** | Inverted A channel encoder input |
| 13 | **CHB+** | B channel encoder input |
| 14 | **STM** | Motor thermal sensor |

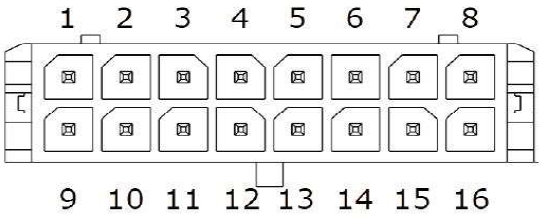
The C1 connector (Mini Traction Power) is unique for the various feedback versions. The connections for each feedback version are highlighted




Motor Feedback Connector C1

# *2.4 Inputs and outputs connection*

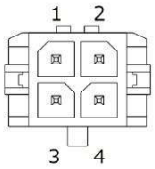
| I/O CONNECTOR C2 | | |
|---|---|---|
| 1 | **CAN-TERM** | CAN L termination resistance 120 Ohm |
| 2 | **CANL** | CAN-Low |
| 3 | **CAN_GND** | CAN-GND / board GND |
| **4** | **DGT-IN2** | Digital input 2, 24V - PROGRAMMABLE |
| 5 | **DGT_OUT_2** | Digital output 2 |
| 6 | **DGT_OUT_VCC** | Digital output Vcc |
| 7 | **DGT_OUT_1** | Digital output 1 |
| 8 | **AGND GROUND** | Analog ground of AGND-IN1 and 2. Connect to GND of ext. controller |
| 9 | **CAN-TERM** | CAN H termination resistance 120 Ohm |
| 10 | **CANH** | CAN-High |
| 11 | **ANALOG-IN1** | Analog input 1, 0-10V - PROGRAMMABLE |
| 12 | **ANALOG-IN2** | Analog input 2, 0-10V - PROGRAMMABLE |
| 13 | **DGT-IN1** | Digital input 1, 24V - PROGRAMMABLE |
| 14 | **5V** | Otput supply 5V@200mA |
| 15 | **DGT-OUT-GND** | Digital output GND |
| 16 | **CONTROL SUPPLY** | Control board power supply, supply with a voltage from 10V to 80V |



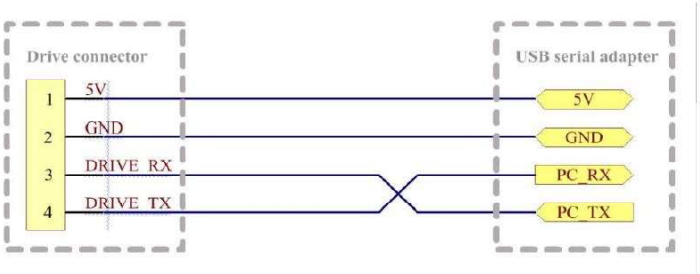

Connector C2 (I/O - CanOpen)

# 3.0 Serial Communication

| SERIAL COM COMMUNICATION | | |
|---|---|---|
| PIN | NAME | DESCRIPTION |
| 1 | 5V | Output supply 5V@200mA |
| 2 | GND | Ground 0V |
| 3 | RX | RX Signal communication |
| 4 | TX | TX Signal communication |




C3
Serial com

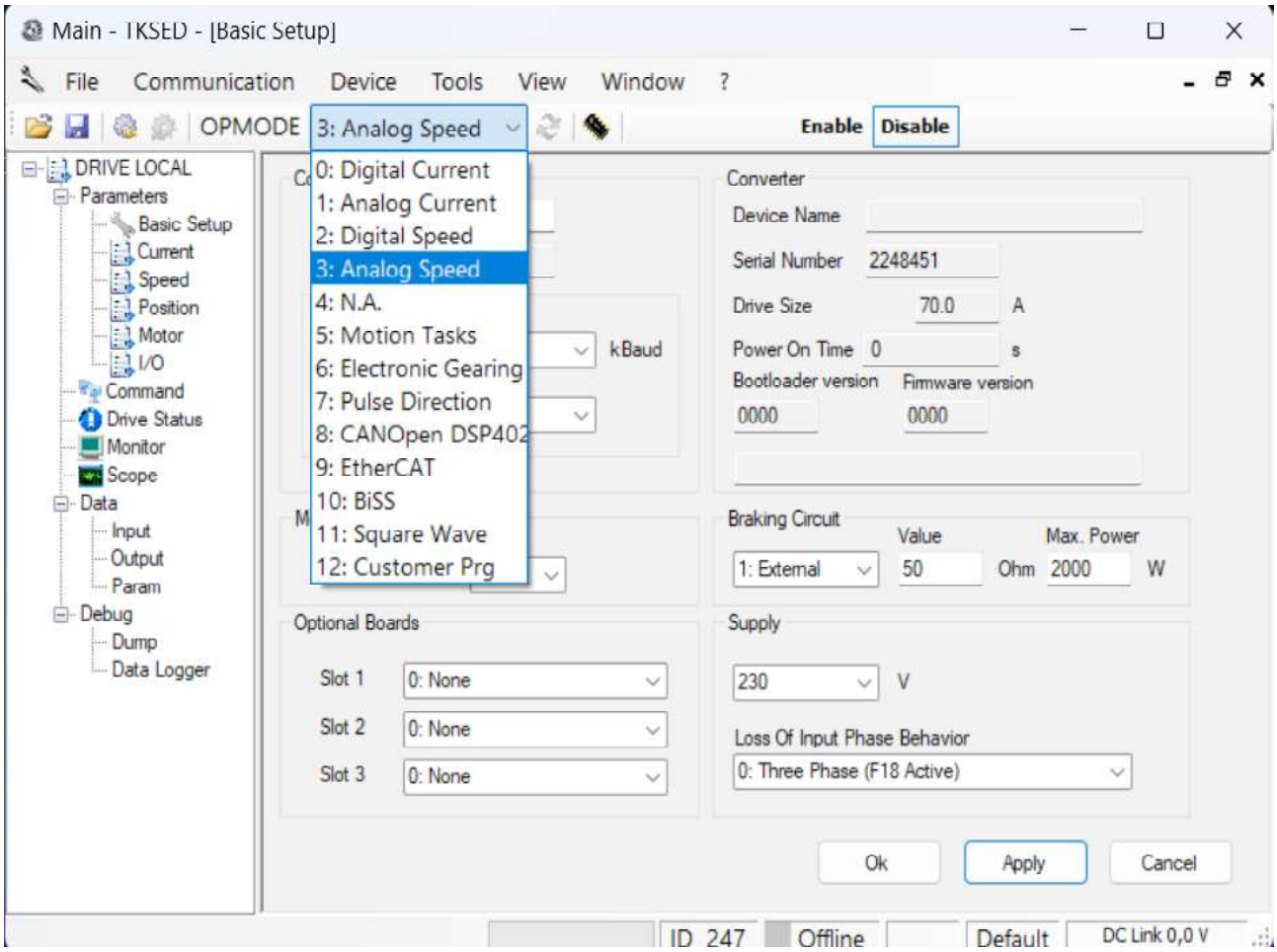



The Mini Traction Power product comes with a TKSED software interface to be installed on your notebook. The interface is free.

The connection is possible via a USB/RS interface complete with cable and connector that can be inserted into C3 (see figure).

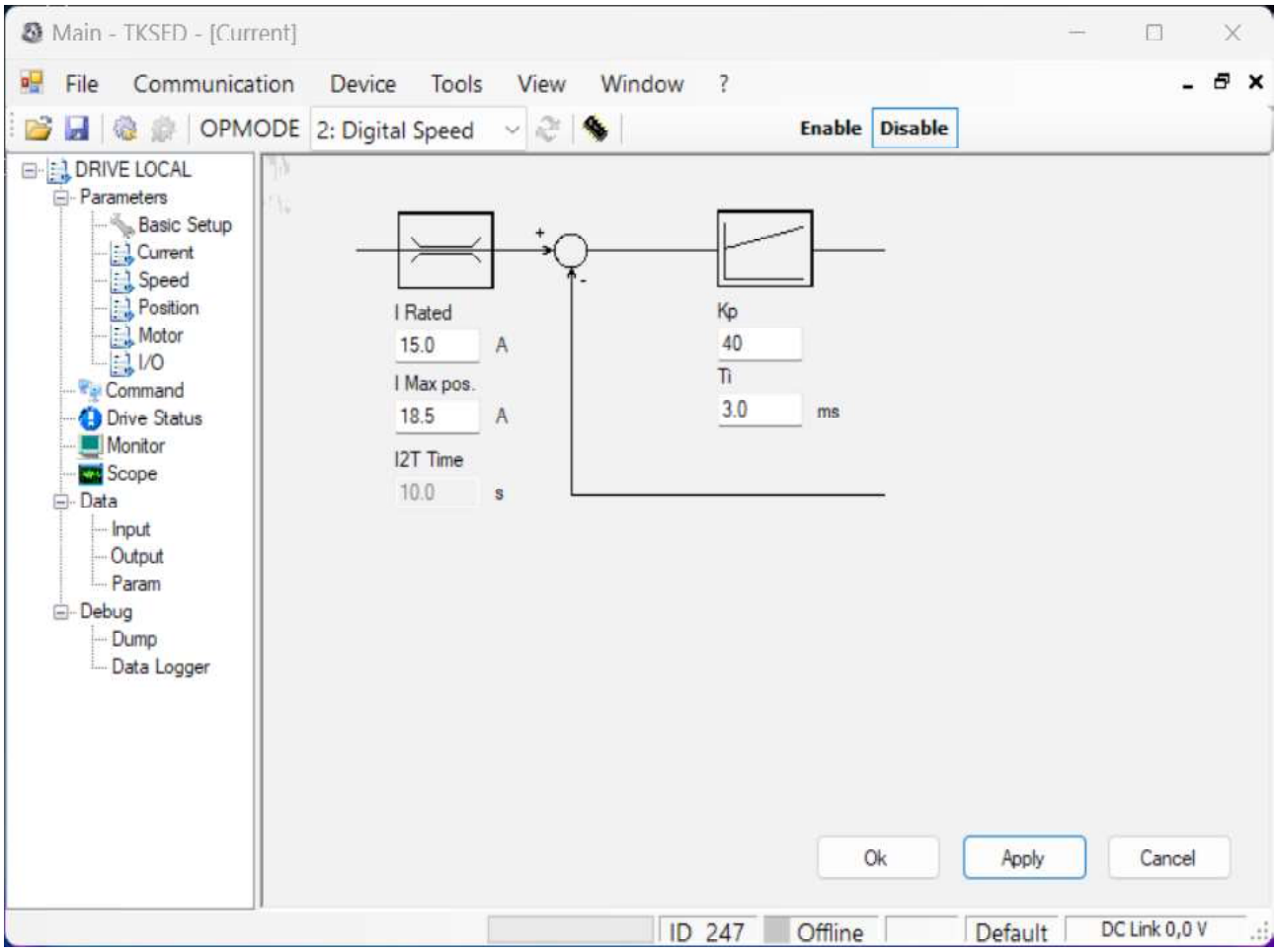
For the supply of this USB/RS interface, contact Microphase.

# 4.0 Software interface



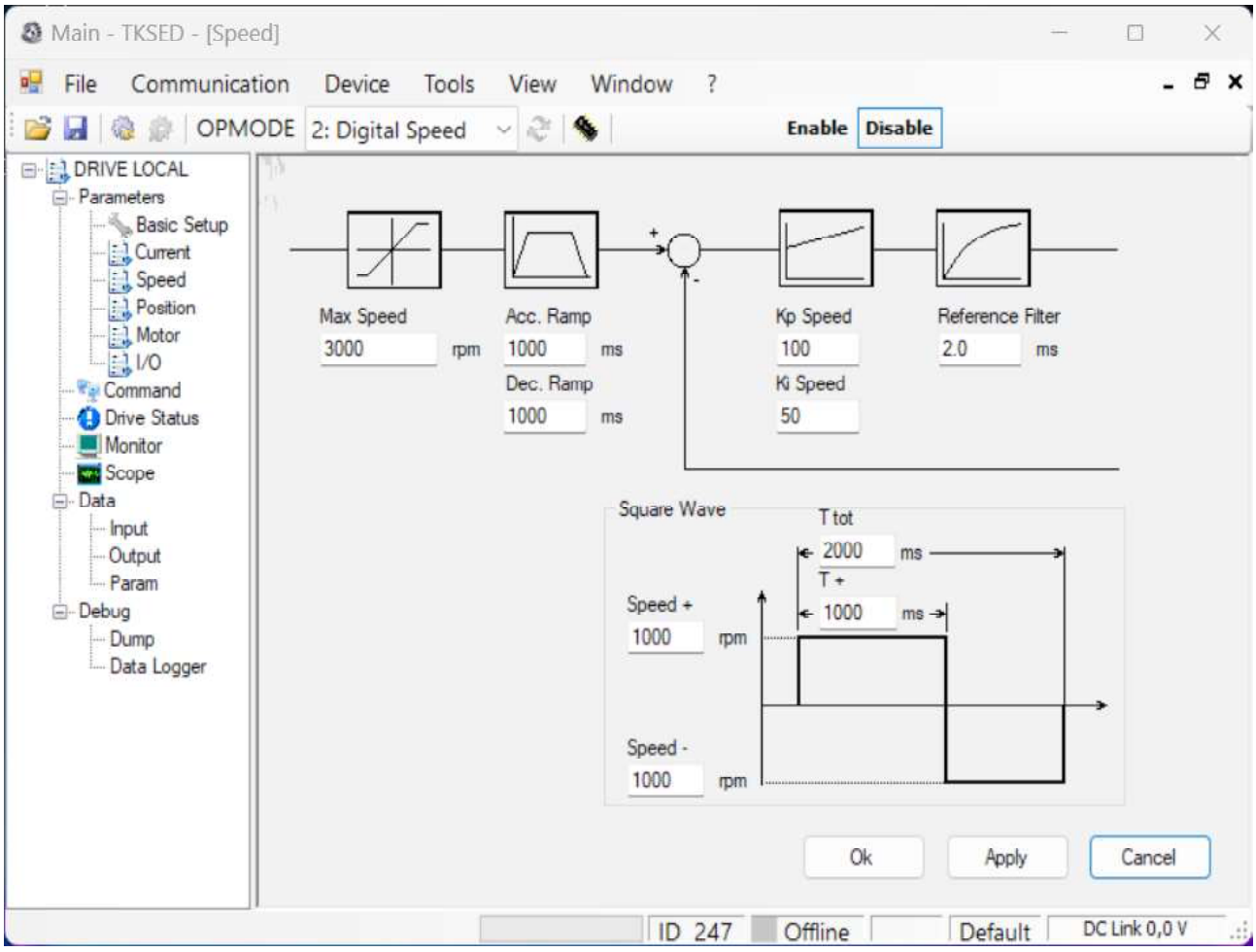

To program the converter, the interface software is provided (free of charge). In the OPMODE window, you can set the operating mode of the servodrive.
*To change or enter values, click on the Ok and Apply boxes so the value is saved. To retain it and store it in the internal flash memory, click on the top window with the Chip symbol.*

# 4.1 Software interface




In the Current window, you can set the nominal and peak current values, as well as the gains for the PROPORTIONAL and INTEGRAL current loop.
*To change or enter values, click on the Ok and Apply boxes so the value is saved. To retain it and store it in the internal flash memory, click on the top window with the Chip symbol.*

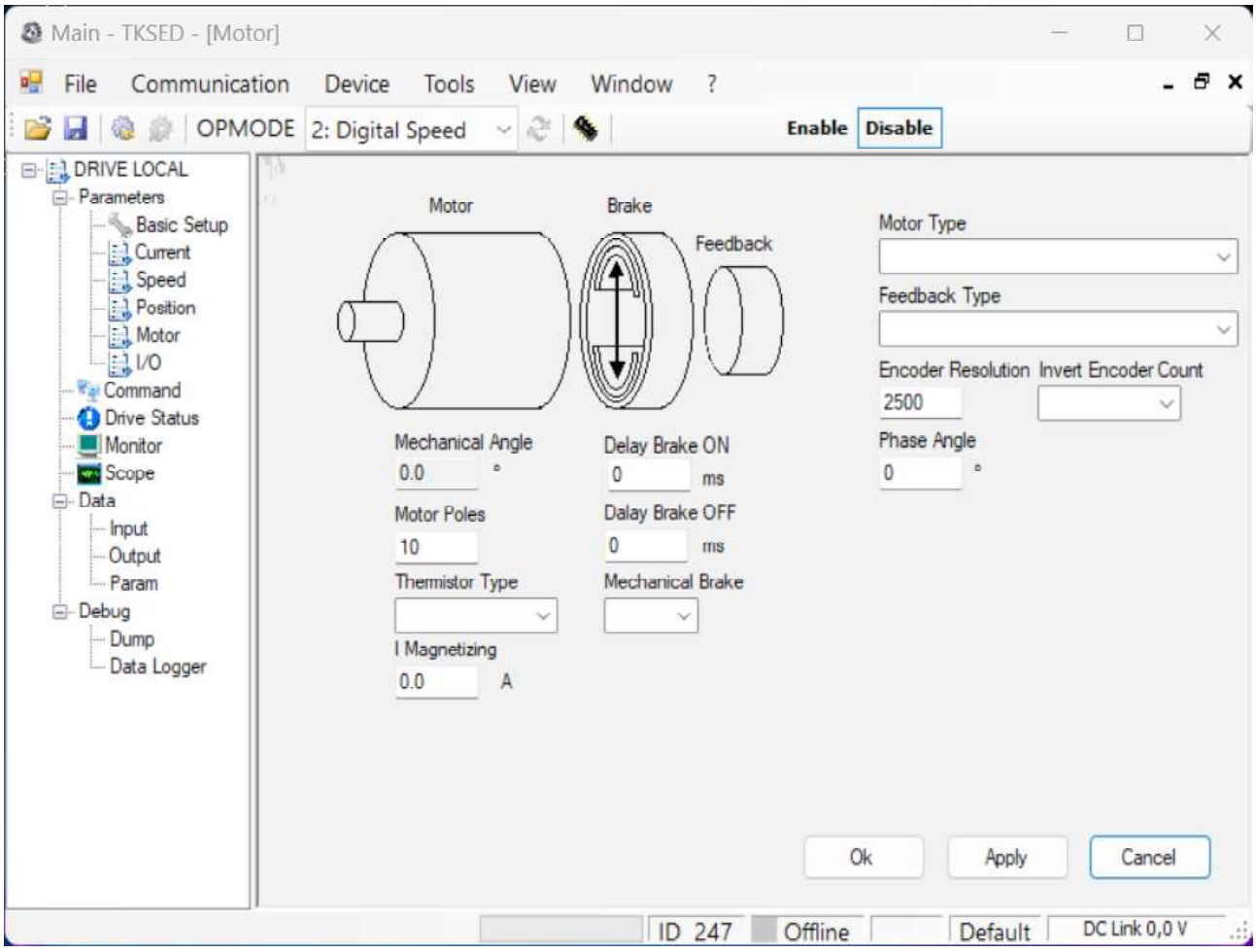
# 4.2 Software interface




In the Speed window, you can set the motor's maximum speed in RPM and the acceleration/ deceleration time. Additionally, you can configure the proportional and integral gains of the speed loop. A filter, in milliseconds, can also be applied to reduce potential noise on the reference signal input.

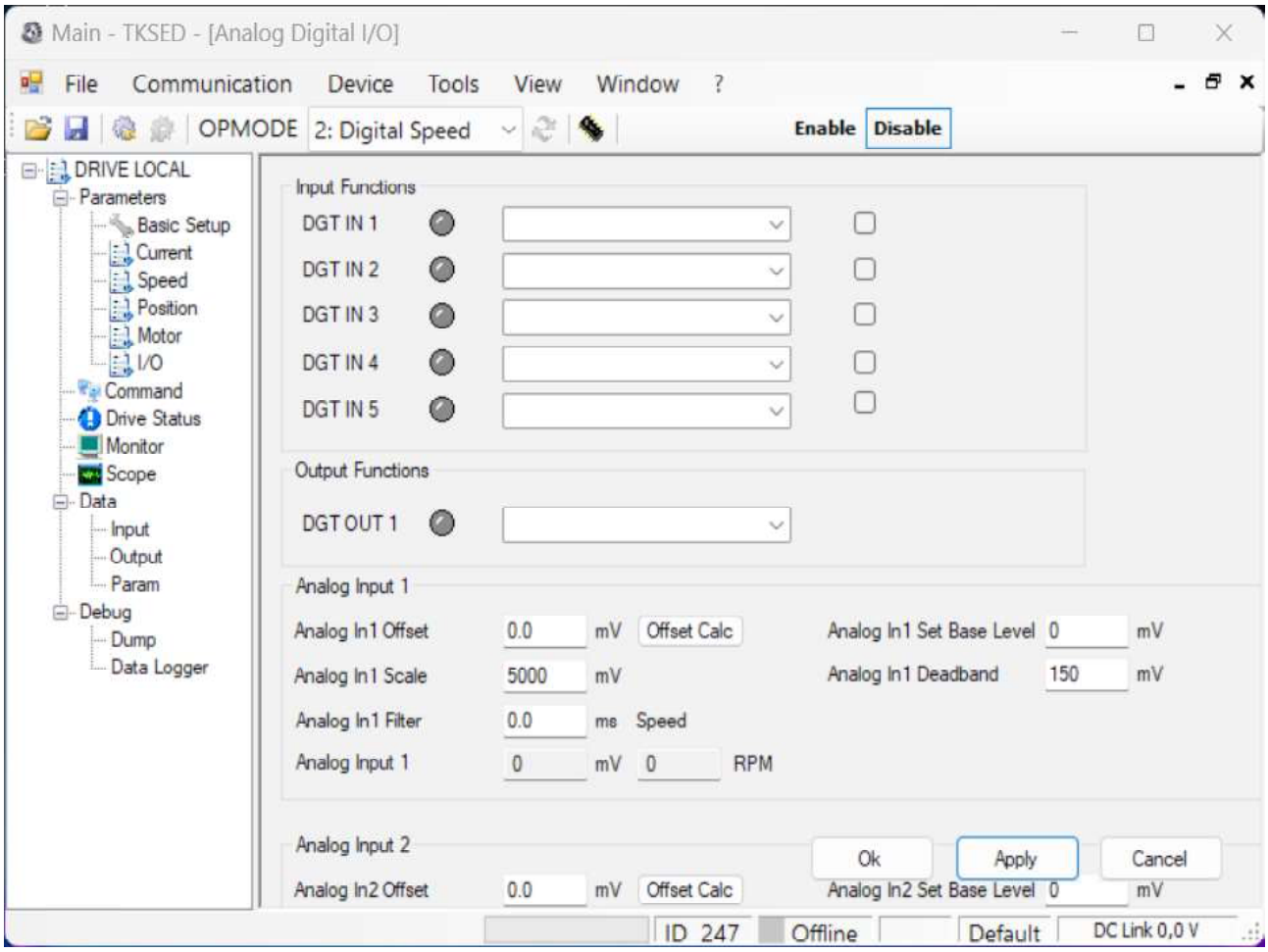
*To change or enter values, click on the Ok and Apply boxes so the value is saved. To retain it and store it in the internal flash memory, click on the top window with the Chip symbol.*

# 4.3 Software interface



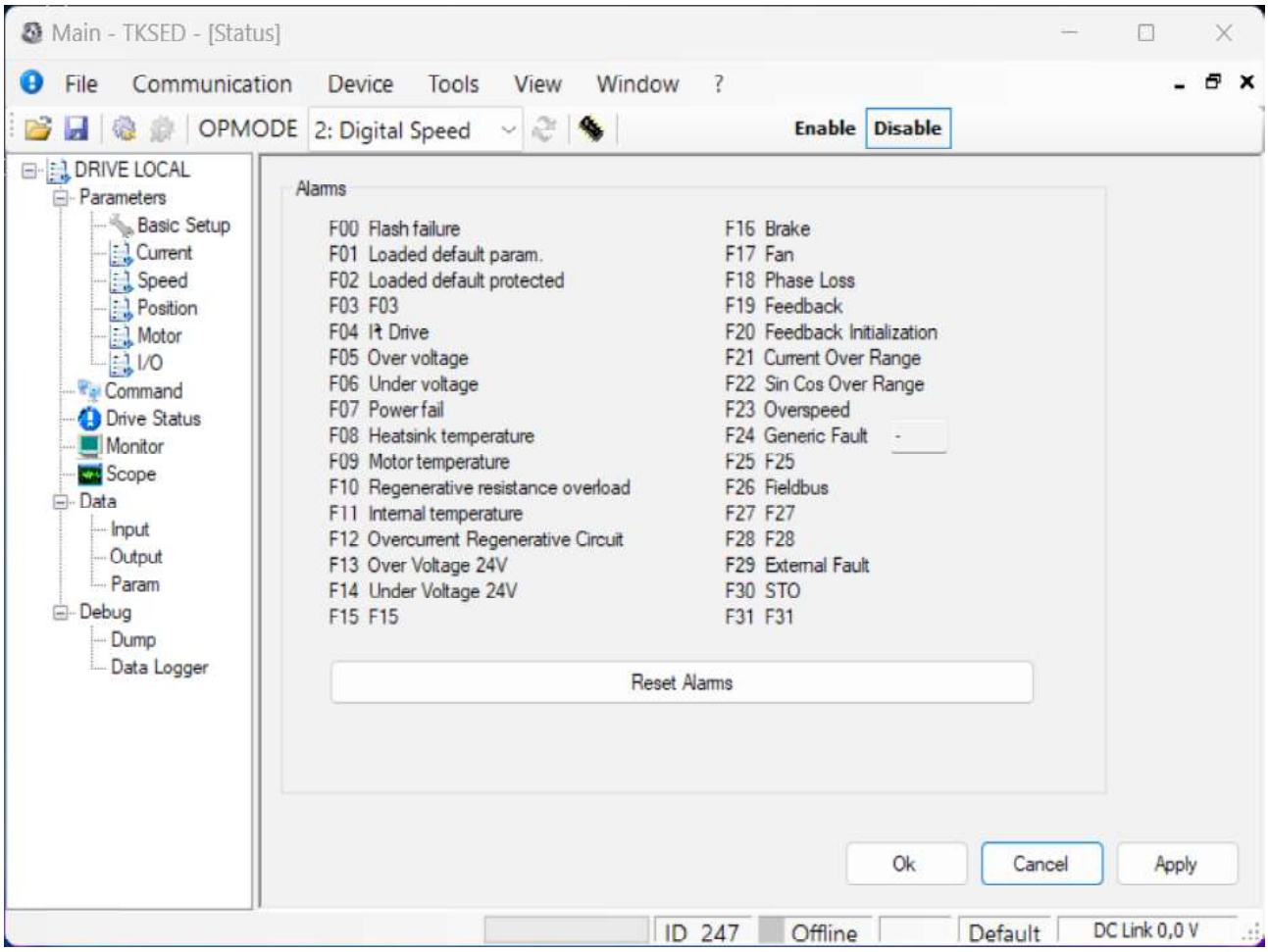

In the Motor window, the following settings are configured:
The motor's number of poles, the type of feedback, the number of pulses of the incremental encoder, etc.
*To change or enter values, click on the Ok and Apply boxes so the value is saved. To retain it and store it in the internal flash memory, click on the top window with the Chip symbol.*

# 4.4 Software interface




In the I/O window, you can set the operating functions that can be assigned to the digital inputs.
On the Mini Traction Drive converter, there are 2 available inputs. Additionally, in the Analog In1 and Analog In2 fields, you can set the reference speed signal value in mV, which will correspond to the motor's maximum speed.
*To change or enter values, click on the Ok and Apply boxes so the value is saved. To retain it and store it in the internal flash memory, click on the top window with the Chip symbol.*

# 4.5 Software interface

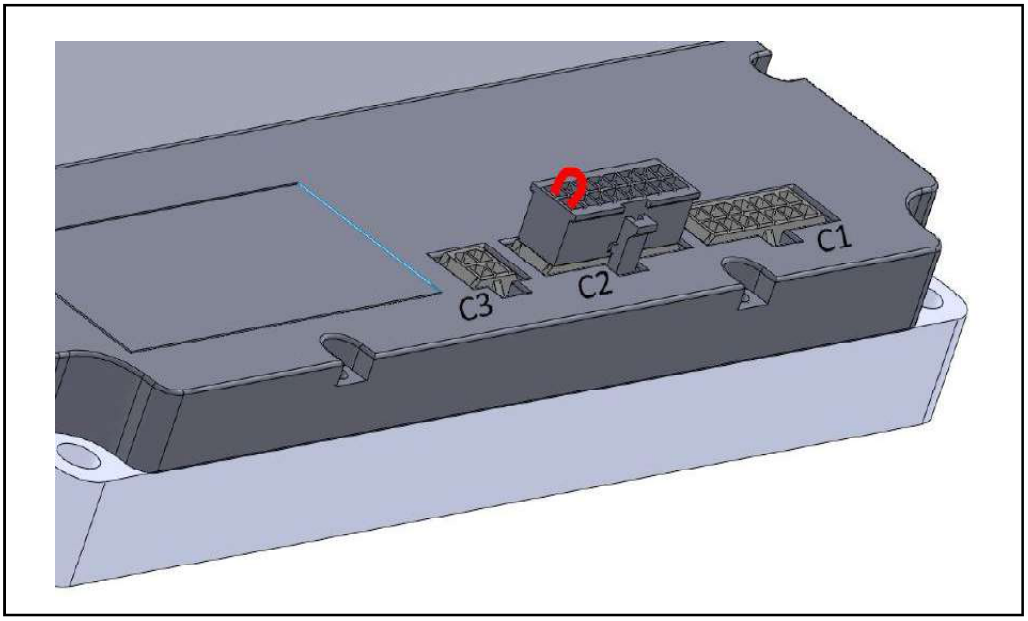



In the Drive Status window, any converter errors are displayed. For further information, please contact Microphase.

# 5.0 CanOpen

When using CANOpen DSP402 the following parameters are already set in the drive:
- Baud Rate = 500 kBaud
- DeviceID = 1

When the bus termination is needed manage the female connector as follow:




By shorting pin 1 with pin 9 a 120ohm resistor is set between CAN_High and CAN_Low wires.

In order to help eliminate electromagnetic interference, the wires need to be shielded and twisted together to create a canceling effect.