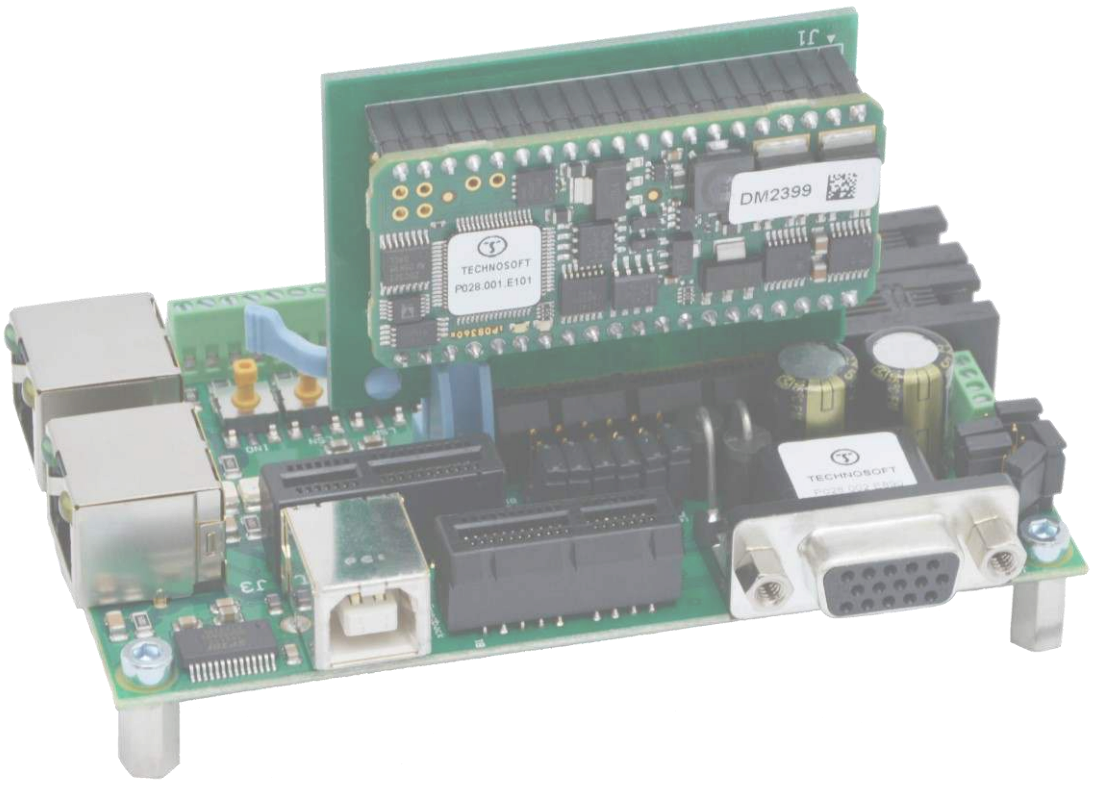
IO iPOS360x

v.11A

I/O Board for iPOS360x CAN/CAT Intelligent Servo Drives

TECHNOSOFT



Technical Reference

P091.084.IO-iPOS360x.UM.0623

1. 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.

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About This Manual

This book is a technical reference manual for the **iPOS360x VX-CAN/CAT** extension boards **version 11A** that are included in the **iPOS360x** intelligent servo drives Starter Kits.

The **IO iPOS360x** extension board can be one of the following products:

iPOS360x VX-CAN IO	p/n P028.002.E880	For drives with CAN.
iPOS360x VX-CAT IO	p/n P028.002.E890	For drives with EtherCAT.

Paragraph 3.3 shows how to quickly identify the IO-iPOS360x version. If your IO-iPOS360x is an older version, you can find the appropriate manual on the Technosoft web page.

Notational Conventions

This document uses the following conventions:

iPOS360x – any iPOS3602 or iPOS3604 drive that can be connected to this I/O extension

iPOS360x VX-CAN – iPOS3602 VX-CAN and iPOS3604 VX-CAN drives with CAN

iPOS360x VX-CAT – iPOS3602 VX-CAT and iPOS3604 VX-CAT drives with EtherCAT. Require presence of the EtherCAT interface card.

TML – Technosoft Motion Language

Related Documentation

iPOS360x VX Technical Reference (part no. P091.028.iPOS360x.VX.UM.xxxx) – describes the hardware installation of the iPOS360x VX family of intelligent servo drives including the technical data, the connectors and the wiring diagrams needed for installation and an overview of the setup steps and motion programming options

iPOS360x MX Technical Reference (part no. P091.028.iPOS360x.MX.UM.xxxx) – describes the hardware installation of the iPOS360x MX family of intelligent servo drives including the technical data, the connectors and the wiring diagrams needed for installation and an overview of the setup steps and motion programming options

Help of the EasySetUp software – describes how to use **EasySetUp** to quickly setup any Technosoft drive for your application using only 2 dialogues. The output of EasySetUp is a set of setup data that can be downloaded into the drive EEPROM or saved on a PC file. At power-on, the drive is initialized with the setup data read from its EEPROM. With EasySetUp it is also possible to retrieve the complete setup information from a drive previously programmed. EasySetUp includes a firmware programmer with allows you to update your drive firmware to the latest revision. **EasySetUp can be downloaded free of charge from Technosoft web page**

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 **EasySetUp** for the drive/motor setup, and 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.* **A demo version of EasyMotion Studio (with EasySetUp part fully functional) can be downloaded free of charge from Technosoft web page**

iPOS CANopen Programming **(part no. P091.063.iPOS.UM.xxxx)** – explains how to program the iPOS drives using **CANopen** protocol and describes the associated object dictionaries for the supported profiles

CANopen over EtherCAT Programming **(part no. P091.064.UM.xxxx)** – explains how to program the Technosoft intelligent drives using **CoE** protocol and describes the associated object dictionary.

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 PCs. 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 B&R PLC series X20 a motion application for the Technosoft intelligent drives using TML_LIB_X20 motion control library for PCs. The TML_LIB_X20 library is **IEC61131-3 compatible**

TechnoCAN **(part no. P091.063.TechnoCAN.UM.xxxx)** – presents TechnoCAN protocol – an extension of the CANopen communication profile used for TML commands

If you Need Assistance …

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

Contents

2. 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.

Only qualified personnel may install, setup, operate and maintain the drive. A “qualified person” has the knowledge and authorization to perform tasks such as transporting, assembling, installing, commissioning and operating drives.
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***

2.1. 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***

2.2. 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!	***ALWAYS REMOVE THE JUMPERS: JP11, JP12, JP13, JP14, JP15, JP16 WHEN THE ETHERCAT INTERFACE MODULE IS INSERTED***

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.

3. Product Overview

3.1. Introduction

The **IO-iPOS360x** I/O extension board is an auxiliary module allowing rapid evaluation of the **iPOS360x VX-CAN/ MX-CAN** and **iPOS360x VX-CAT** Intelligent Servo Drives.

On the IO-iPOS360x, the iPOS360x drives are connected to J1 connector. In case of iPOS360x VX-CAT drives, an additional **EtherCAT interface module** is needed to be plugged into J3 connector.

The IO-iPOS360x offers the user an easy and direct access to the main signals available on the iPOS360x connector like: USB, CAN or EtherCAT communication, motor and feedback connections, digital I/Os and analogue inputs. The IO-iPOS360x can be used in many ways starting from basic evaluation purposes up to complete implementation of motion control applications.

3.2. Key Features

- Motor supply: +9…. +36 V_{DC}
- Logic supply: +7…. +36 V_{DC}
- Direct access to the following iPOS360x I/O signals, via screw-terminals connectors:
  - 5 digital inputs, 5-36 V (compatible with NPN outputs):
    - 2 general – purpose inputs: IN0 and IN1
    - 2 limit switch inputs: IN2/LSP (positive) and IN3/LSN (negative)
    - One Enable input: IN4/Enable
  - 4 digital outputs, 5-36 V, 0.5 A (NPN open-collector/TTL pull-up):
    - 2 general-purpose outputs: OUT0 and OUT1
    - One Error output: OUT2/Error
    - One Ready output: OUT3/Ready
  - 2 analog inputs, 0-5 V,12-bit used to read:
    - One analogue Reference: REF
    - One analogue Feedback sensor: FBDK
    - 2 general-purpose analogue inputs
- Emulation of external inputs commutation via 4 push-buttons: connected to inputs: IN0, IN2/LSP, IN3/LSN, IN4/Enable
- Emulation of external analogue reference command via potentiometer VR1
- USB type ‘B’ female connector for communication with the PC
- Two RJ10 connectors for CAN communication
- Two RJ45 connectors for EtherCAT communication[1]
- 2x5 motor feedback connector accepting
  - Single-ended or RS-422 differential incremental digital encoder
  - 1Vpp differential Sine/cosine incremental encoder
  - Linear Hall sensors
- HDB15 motor feedback connector

[1] Available only on the iPOS360x VX-CAT IO board. Usable only when the EtherCAT extension module is present.

IO-iPOS360x Board Dimensions

Figure 0.1 presents the IO-iPOS360x board dimensions.

All dimensions are in mm.

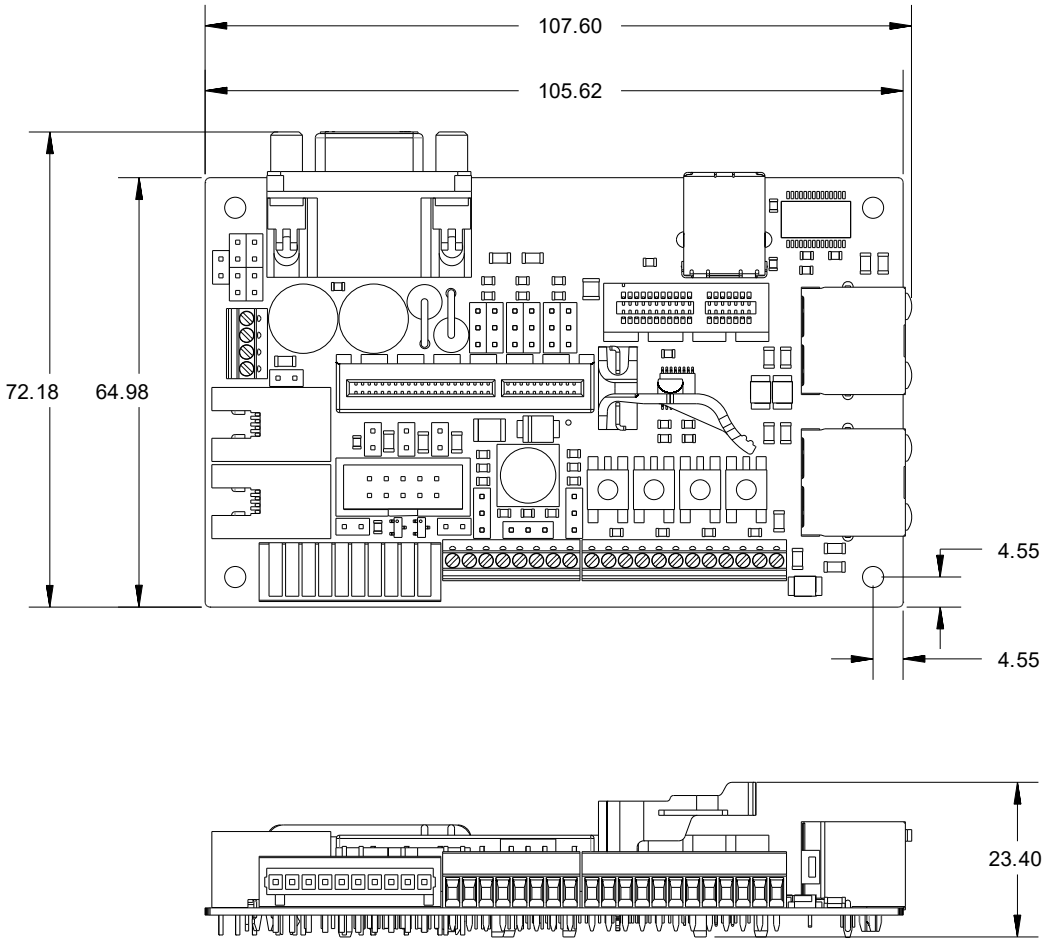


Figure 0.1. *IO-iPOS360x board dimensions*

Remark:

The iPOS360x VX-CAN IO (p/n P028.002.E880) does not have EtherCAT connectors. The dimension 107.60 mm does not apply on the CAN version.

3.3. IO-iPOS360x Board Version Identification

Figure 3.3.1 shows how to identify the IO-iPOS360x board version on its back side.

This manual refers to IO-iPOS360x **version 11A**. If your IO-iPOS360x version differs, please refer to the appropriate IO-iPOS360x Technical Reference Manual, that can be freely downloaded from Technosoft web page.

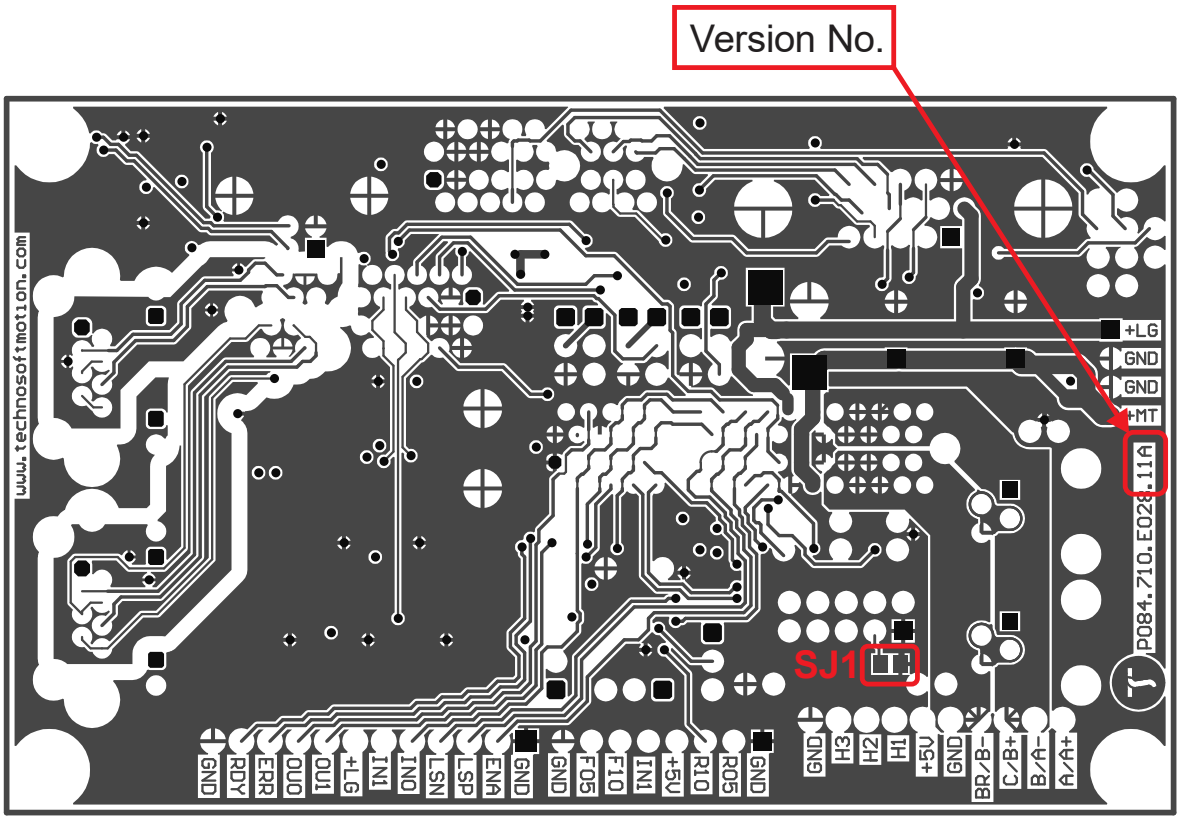


Figure 3.3.1. *IO-iPOS360x board version identification*

Remark:

The iPOS360x VX-CAN IO (p/n: 028.002.E880) does not have EtherCAT connectors.

4. Hardware Installation

4.1. Mounting the iPOS360x VX board

Push the iPOS360x VX drive into IO-iPOS360x board J1 connector until the retainer enters in the fixing hole of the drive.

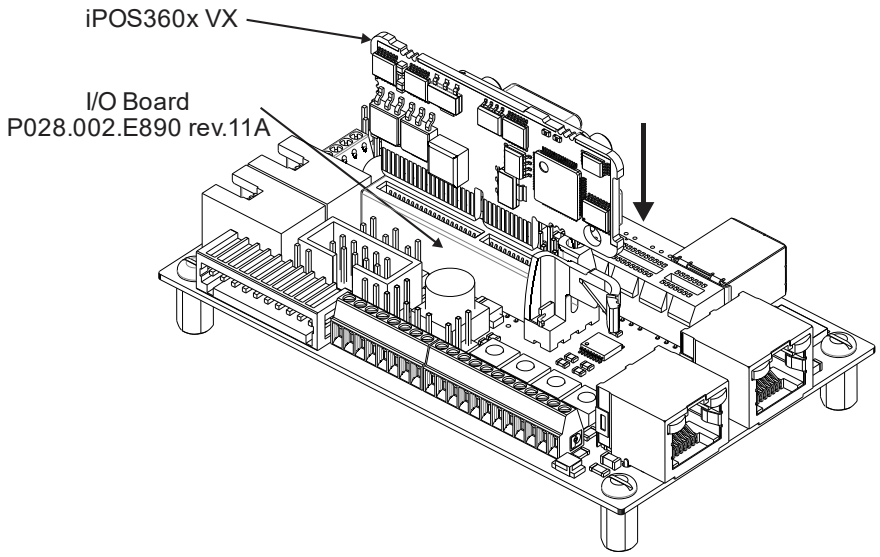


***Figure 4.1.1** Installing an iPOS360x VX drive in the IO-iPOS360x*

4.2. Mounting the iPOS360x MX board

For the iPOS360x MX drives, first plug the drive into the MX to VX adapter (p/n P028.101.E101), then press the assembly into the IO iPOS360x J1 connector until the retainer enters the fixing hole of the adapter.

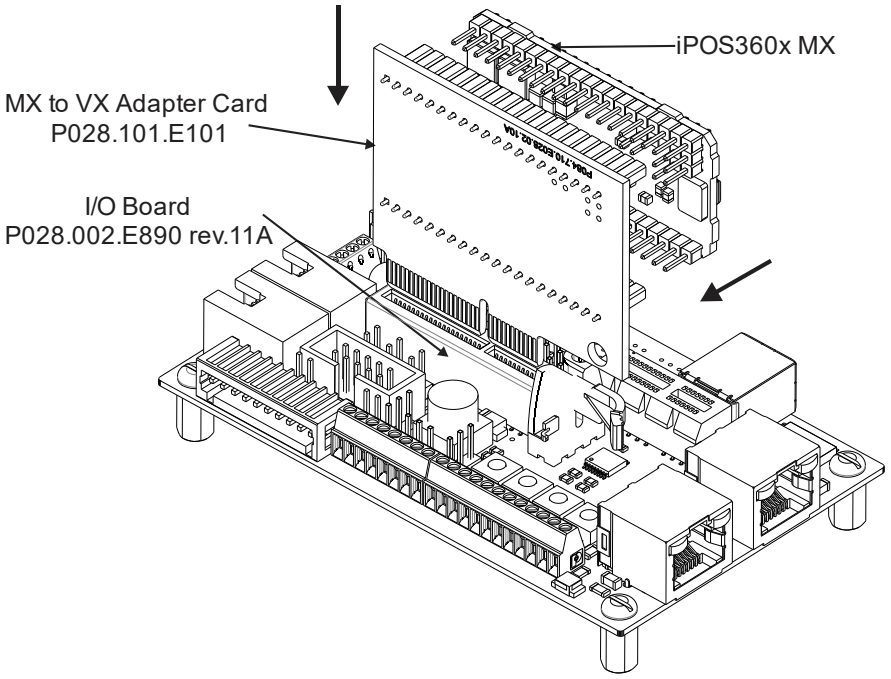


Figure 4.2.1 Installing an iPOS360x MX drive in the IO-iPOS360xusing the MX to VX adapter

4.3. Mounting the EtherCAT interface module[1]

Insert the EtherCAT interface into J3 board connector.

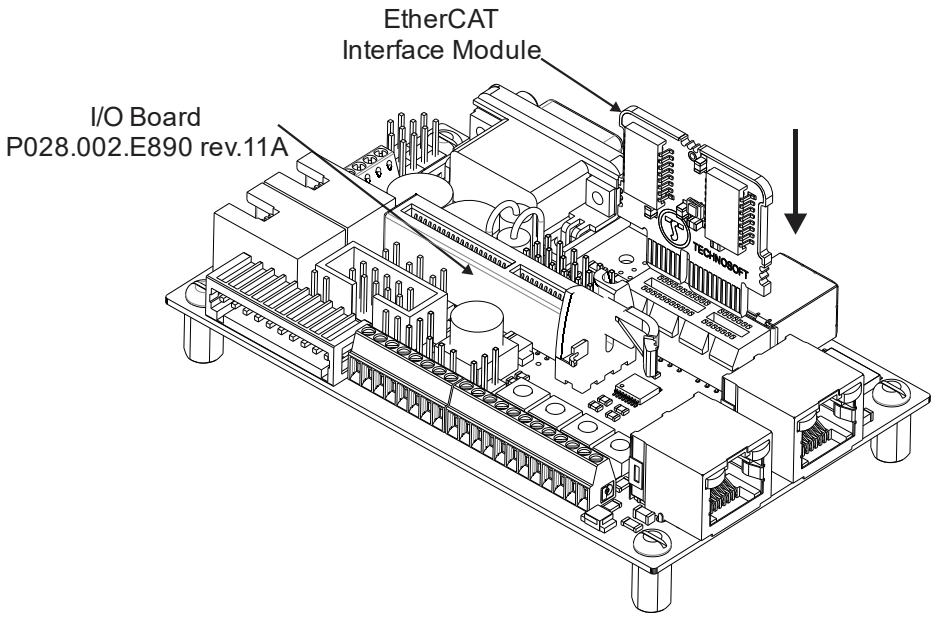


Figure 4.3.1 *Installing an EtherCAT interface module in the IO iPOS360x VX-CAT*

[1] Available only on the iPOS360x VX-CAT board

4.4. Connectors

4.4.1. Connectors Layout

The Figure **3.2.1.** shows the top view of the **IO iPOS360x VX** Extension Board.

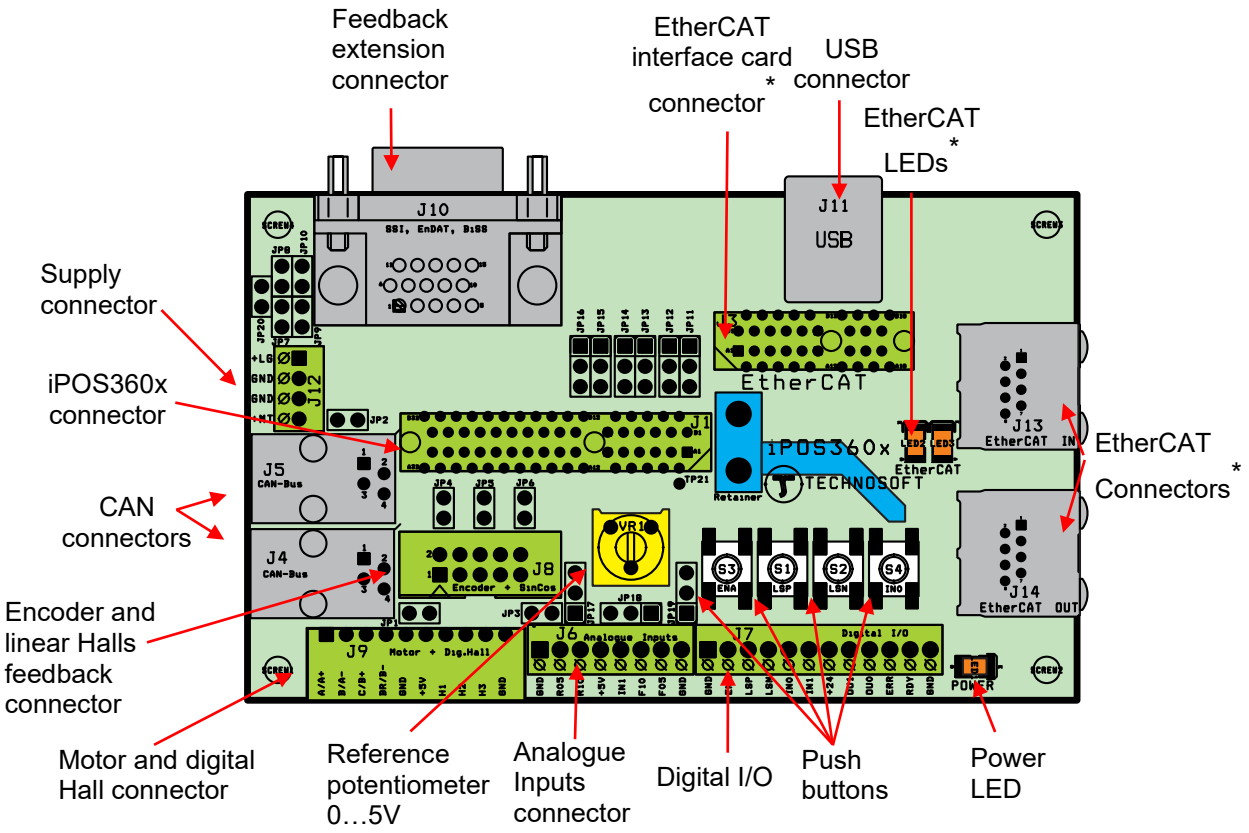


Figure 4.4.1. Top view of the** iPOS360x VX-CAT/CAN **extension board

Remark:

Pin1 on any connector is represented by a black square.

**The EtherCAT connectors are present only on the iPOS360x VX-CAT IO board.*

CAUTION! ***BEFORE CONNECTING / DISCONNECTING ANY OF THE SIGNALS TURN OFF ALL POWER SUPPLIES!***

4.4.2. J4 and J5 – CAN connectors

Pin	Pin name	Type	Function
1	CAN_V+	I	+24 V_{DC} isolated supply input
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	-	Ground

Remarks:

1. *Put JP1 jumper to add a 120Ω terminal resistor in your CAN network. Leave JP1 open if the CAN network already has terminal resistors.*
2. *Put JP2 jumper to connect the IOiPOS360x logic supply +V_{LOG} to CAN_V+. Leave JP2 open if the CAN network has a separate supply connected to CAN_V+.*

4.4.3. J6 – Analog inputs connector

Pin	Pin name	Type	Function
1	GND	-	Ground
2	R05	I	External reference signal (mono-polar 0 to +5 V). See JP19 jumper selection for additional details.
3	R10	I	External reference signal (bipolar -10 V to +10 V). See JP19 jumper selection for additional details.
4	+5V	O	+5 V_{OUT} output supply (generated by iPOS360x drive)
5	IN1	I	General-purpose digital input IN1
6	F10	I	External feedback signal (bipolar -10 V to +10 V)
7	F05	I	External feedback signal (mono-polar 0 to +5 V)
8	GND	-	Ground

4.4.4. J7 – Digital I/O connector

Pin	Pin name	Type	Function
1	GND	-	Ground
2	ENA	I	Drive enable digital input IN4/Enable
3	LSP	I	Positive limit switch digital input IN2/LSP
4	LSN	I	Negative limit switch digital input IN3/LSN
5	IN0	I	General-purpose digital input IN0
6	IN1	I	General-purpose digital input IN1[1]
7	+24	O	Logical supply
8	OUT1	O	General-purpose digital output OUT1
9	OUT0	O	General-purpose/ digital output OUT0
10	ERR	O	Drive error digital output OUT2/Error
11	Ready	O	Drive ready digital output OUT3/Ready
12	GND	-	Ground

[1] Also available at J6 pin 5.

4.4.5. J8 – Linear Hall, single-ended encoder and differential encoder connector

Pin	Pin name	Type	Function
1	GND	-	Ground
2	+5V_{OUT}	O	+5 V_{OUT} output supply (generated by iPOS360x drive)
3	GND	-	Ground for AvagoTech Option (solder SJ1)
4	+5V_{OUT}	O	+5 V_{OUT} output supply (generated by iPOS360x drive)
5	A-/Sin-/LH1	I	Incremental encoder A- differential input, or analogue encoder Sin- differential input, or linear Hall 1 input
6	A/A+/Sin+	I	Incremental encoder A single-ended, or A+ differential input, or analogue encoder Sin+ differential input
7	B-/Cos-/LH2	I	Incremental encoder B- differential input, or analogue encoder Cos- differential input, or linear Hall 2 input
8	B/B+/Cos+	I	Incremental encoder B single-ended, or B+ differential input, or analogue encoder Cos+ differential input
9	Z-/LH3	I	Incremental encoder Z- (index) differential input, or linear Hall 3 input
10	Z/Z+	I	Incremental encoder Z (index) single-ended, or Z+ differential input

Remark:

For direct connection of AvagoTech HEDL encoders, you need to connect pin 3 to ***GND.***

4.4.6. J9 – Motor supply and digital hall connector

Pin	Pin name	Type	Function
1	A	O	Phase A for 3-phase motors Phase A+ for 2-phase steppers Motor+ for DC brushed motors
2	B	O	Phase B for 3-phase motors Phase A- for 2-phase steppers Motor- for DC brushed motors
3	C	O	Phase C for 3-phase motors Phase B+ for 2-phase steppers
4	D	O	External brake resistor Phase B- for 2-phase steppers
5	GND	-	Ground
6	+5ViPOS	O	+5 V_{OUT} output supply (generated by iPOS360x drive)
7	Hall1	I	Hall 1 digital sensor input
8	HALL2	I	Hall 2 digital sensor input
9	HALL3	I	Hall 3 digital sensor input
10	GND	-	Ground

4.4.7. J11 – USB connector

J11 is a standard USB B connector, used for communication between the iPOS and PC.
A USB A - B cable type is required.

4.4.8. J12 – Power supply connector

Pin	Pin name	Type	Function
1	LOG	I	Positive terminal of the logic supply $+V_{LOG}$: +7 to $+36V_{DC}$
2	GND	-	Ground
3	GND	-	Ground
4	MOT	I	Positive terminal of the motor supply $+V_{MOT}$:+9 to $+36V_{DC}$

4.4.9. J13 and J14 – EtherCAT connectors[1]

J13 and J14 are standard RJ45 Ethernet connectors, compatible with IEEE802.3 100BASE-T (100Mbit/s). Accepts STP/UTP wiring.

4.5. Jumper Settings

Jumper Name	Jumper Function	Option	Result
JP1	CAN termination	0[2]	Do not connect a CAN terminator
		1	Connect a CAN terminator (120 Ω resistor)
JP2	CAN supply	0	Do not connect CAN Supply to $+V_{LOG}$
		1	Connect CAN Supply to $+V_{LOG}$
JP3	AutoRun	0	Enable AutoRun (normal operation)
		1	Disable AutoRun
JP4	EncA/Sin termination	0	Don't connect a 120 Ω resistor between A+/Sin+ and A-/Sin-
		1	Connect a 120 Ω resistor between A+/Sin+ and A-/Sin-
JP5	EncB/Cos termination	0	Don`t connect a 120 Ω resistor between B+/Cos+ and B-/Cos-
		1	Connect a 120 Ω resistor between B+/Cos+ and B-/Cos-
JP6	EncZ termination	0	Don`t connect a 120 Ω resistor between Z+ and Z-
		1	Connect a 120 Ω resistor between Z+ and Z-
JP7	Sine+	0	reserved
		1	Sin+ is 1 Vpp and goes from J10 to iPOS360x
JP8	Sine-	0	reserved

[1] The EtherCAT connectors are available only on the iPOS360x VX-CAT (p/n P028.002.E890) board

[2] 0 = Jumper OFF, 1 = Jumper ON

		1	Sin- is 1 Vpp and goes from J10 to iPOS360x
JP9	Cosine+	0	reserved
		1	Cos+ is 1 Vpp and goes from J10 to iPOS360x
JP10	Cosine-	0	reserved
		1	Cos- is 1 Vpp and goes from J10 to iPOS360x
JP11	AxisID0_MSB	1-2	Connect AxisID0 input to +5 V_{DC}
		2-3	Connect AxisID0 input to GND
		OFF	Leave input unconnected
JP12	AxisID0_LSB	1-2	Don't connect a pull-up/pull-down resistor to AxisID0
		2-3	Connect a pull-up/pull-down 4.7K Ω resistor (depending on jumper 3) to AxisID0
		OFF	Connect a pull-up/pull-down 22K Ω resistor (depending on jumper 3) to AxisID0
JP13	AxisID1_MSB	1-2	Connect AxisID1 input to +5 V_{DC}
		2-3	Connect AxisID1 to GND
		OFF	Leave input unconnected
JP14	AxisID1_LSB	1-2	Don't connect a pull-up/pull-down resistor to AxisID1
		2-3	Connect a pull-up/pull-down 4.7K Ω resistor (depending on jumper 9) to AxisID1
		OFF	Connect a pull-up/pull-down 22K Ω resistor (depending on jumper 9) to AxisID1
JP15	AxisID2_MSB	1-2	Connect AxisID2 to +5 V_{DC}
		2-3	Connect AxisID2 to GND
		OFF	Leave input unconnected
JP16	AxisID2_LSB	1-2	Don't connect a pull-up/pull-down resistor to AxisID2
		2-3	Connect a pull-up/pull-down 4.7K Ω resistor (depending on jumper 13) to AxisID2
		OFF	Connect a pull-up/pull-down 22K Ω resistor (depending on jumper 13) to AxisID2
JP17	Ref. 5/10	1-2	Select 0…+5 V Reference
		2-3	Select -10…+10 V Reference
JP18	Ref. Int/Ext	1-2	Select Internal Reference
		2-3	Select External Reference
JP19	Fdbk. 5/10	1-2	Select 0…+5 V Feedback
		2-3	Select -10…+10 V Feedback
JP20	Reserved	-	-

Remark:

Remove the jumpers: JP11, JP12, JP13, JP14, JP15, JP16 when using the EtherCAT Interface Module.

4.6. Axis ID Selection and CAN Protocol for iPOS360x VX-CAN drives

The iPOS360x VX-CAN drives use 3 analogue inputs named AxisID0, AxisID1 and AxisID2 inputs to select the CAN protocol: CANopen or Technosoft TMLCAN and the drive address or axis ID. The iPOS360x VX-CAN drive can detect up to 7 different voltage levels on these 3 inputs. On the IO iPOS360x VX-CAN module the 7 voltage levels can be selected via the jumpers: JP11-JP16 . Each AxisID input has 2 jumpers associated. A 3-pin jumper (JP11 / JP13 / JP15) is used to connect the input to GND (position 2-3), +5 V_{DC} (position 1-2) or leave unconnected (OFF). Another 3-pin jumper (JP12 / JP14 / JP16) is used to select how to do the connection: directly (position 1-2), via a pull-up / pull-down resistor 4.7K Ω (position 2-3) or 22K resistor when left unconnected (OFF). The 7 levels can be obtained using the following jumper positions:

Table 4.1 *Jumper setting for the seven voltage levels of AxisID0*

Level	Connection needed	JP12	JP11
L0	Connect input directly to ground	1-2	2-3
L1	Connect input through a 4.7 KΩ resistor to ground	2-3	2-3
L2	Connected input through a 22 KΩ resistor to ground	OFF	2-3
L3	Nothing connected – leave input open	-	OFF
L4	Connect input through a 22 KΩ resistor to +5 V_{DC}	OFF	1-2
L5	Connect input through a 4.7 Kohm resistor to +5 V_{DC}	2-3	1-2
L6	Connect input directly to +5 V	1-2	1-2

Table 4.2 *Jumper setting for the seven voltage levels of AxisID1*

Level	Connection needed	JP14	JP13
L0	Connect input directly to ground	1-2	2-3
L1	Connect input through a 4.7 KΩ resistor to ground	2-3	2-3
L2	Connected input through a 22 KΩ resistor to ground	OFF	2-3
L3	Nothing connected – leave input open	-	OFF
L4	Connect input through a 22 KΩ resistor to +5 V_{DC}	OFF	1-2
L5	Connect input through a 4.7 Kohm resistor to +5 V_{DC}	2-3	1-2
L6	Connect input directly to +5 V	1-2	1-2

Table 4.3 *Jumper setting for the seven voltage levels of AxisID2*

Level	Connection needed	JP16	JP15
L0	Connect input directly to ground	1-2	2-3
L1	Connect input through a 4.7 KΩ resistor to ground	2-3	2-3
L2	Connected input through a 22 KΩ resistor to ground	OFF	2-3
L3	Nothing connected – leave input open	-	OFF
L4	Connect input through a 22 KΩ resistor to +5 V_{DC}	OFF	1-2
L5	Connect input through a 4.7 Kohm resistor to +5 V_{DC}	2-3	1-2
L6	Connect input directly to +5 V	1-2	1-2

Table 4.4. *Axis ID setting in CANopen mode*

The CAN protocol selection is done via AxisID2:

- CANopen mode, if the input levels are: L0, L1 or L2
- TMLCAN mode, if the input levels are L3, L4, L5, L6

Remark: *In CANopen mode, if the AxisID is set to 255, the drive remains "non-configured" waiting for a CANopen master to configure it using CiA-305 protocol. A "non-configured" drive answers only to CiA-305 commands. All other CANopen commands are ignored and transmission of all other messages (including boot-up) is disabled until the drive is configured with a new AxisID.*

Axis ID 2	Axis ID 1	Axis ID 0	ID CANopen
L0	L0	L0	127
L0	L0	L1	1
L0	L0	L2	2
L0	L0	L3	3
L0	L0	L4	4
L0	L0	L5	5
L0	L0	L6	6
L0	L1	L0	7
L0	L1	L1	8
L0	L1	L2	9
L0	L1	L3	10
L0	L1	L4	11
L0	L1	L5	12
L0	L1	L6	13
L0	L2	L0	14
L0	L2	L1	15
L0	L2	L2	16
L0	L2	L3	17
L0	L2	L4	18
L0	L2	L5	19
L0	L2	L6	20
L0	L3	L0	21
L0	L3	L1	22
L0	L3	L2	23
L0	L3	L3	24
L0	L3	L4	25
L0	L3	L5	26
L0	L3	L6	27
L0	L4	L0	28
L0	L4	L1	29
L0	L4	L2	30
L0	L4	L3	31
L0	L4	L4	32
L0	L4	L5	33
L0	L4	L6	34
L0	L5	L0	35

Axis ID 2	Axis ID 1	Axis ID 0	ID CANopen
L0	L5	L1	36
L0	L5	L2	37
L0	L5	L3	38
L0	L5	L4	39
L0	L5	L5	40
L0	L5	L6	41
L0	L6	L0	42
L0	L6	L1	43
L0	L6	L2	44
L0	L6	L3	45
L0	L6	L4	46
L0	L6	L5	47
L0	L6	L6	48
L1	L0	L0	49
L1	L0	L1	50
L1	L0	L2	51
L1	L0	L3	52
L1	L0	L4	53
L1	L0	L5	54
L1	L0	L6	55
L1	L1	L0	56
L1	L1	L1	57
L1	L1	L2	58
L1	L1	L3	59
L1	L1	L4	60
L1	L1	L5	61
L1	L1	L6	62
L1	L2	L0	63
L1	L2	L1	64
L1	L2	L2	65
L1	L2	L3	66
L1	L2	L4	67
L1	L2	L5	68
L1	L2	L6	69
L1	L3	L0	70
L1	L3	L1	71

Axis ID 2	Axis ID 1	Axis ID 0	ID CANopen
L1	L3	L2	72
L1	L3	L3	73
L1	L3	L4	74
L1	L3	L5	75
L1	L3	L6	76
L1	L4	L0	77
L1	L4	L1	78
L1	L4	L2	79
L1	L4	L3	80
L1	L4	L4	81
L1	L4	L5	82
L1	L4	L6	83
L1	L5	L0	84
L1	L5	L1	85
L1	L5	L2	86
L1	L5	L3	87
L1	L5	L4	88
L1	L5	L5	89
L1	L5	L6	90
L1	L6	L0	91
L1	L6	L1	92
L1	L6	L2	93
L1	L6	L3	94
L1	L6	L4	95
L1	L6	L5	96
L1	L6	L6	97
L2	L0	L0	98
L2	L0	L1	99
L2	L0	L2	100
L2	L0	L3	101
L2	L0	L4	102
L2	L0	L5	103
L2	L0	L6	104
L2	L1	L0	105
L2	L1	L1	106
L2	L1	L2	107
L2	L1	L3	108
L2	L1	L4	109

Axis ID 2	Axis ID 1	Axis ID 0	ID CANopen
L2	L1	L5	110
L2	L1	L6	111
L2	L2	L0	112
L2	L2	L1	113
L2	L2	L2	114
L2	L2	L3	115
L2	L2	L4	116
L2	L2	L5	117
L2	L2	L6	118
L2	L3	L0	119
L2	L3	L1	120
L2	L3	L2	121
L2	L3	L3	122
L2	L3	L4	123
L2	L3	L5	124
L2	L3	L6	125
L2	L4	L0	126
L2	L4	L1	255
L2	L4	L2	255
L2	L4	L3	255
L2	L4	L4	255
L2	L4	L5	255
L2	L4	L6	255
L2	L5	L0	255
L2	L5	L1	255
L2	L5	L2	255
L2	L5	L3	255
L2	L5	L4	255
L2	L5	L5	255
L2	L5	L6	255
L2	L6	L0	255
L2	L6	L1	255
L2	L6	L2	255
L2	L6	L3	255
L2	L6	L4	255
L2	L6	L5	255
L2	L6	L6	255

***Table 4.5**. Axis ID setting in TMLCAN mode*

Axis ID 2	Axis ID 1	Axis ID 0	ID TMLCAN
L3	L0	L0	255
L3	L0	L1	1
L3	L0	L2	2
L3	L0	L3	3
L3	L0	L4	4
L3	L0	L5	5
L3	L0	L6	6
L3	L1	L0	7
L3	L1	L1	8
L3	L1	L2	9
L3	L1	L3	10
L3	L1	L4	11
L3	L1	L5	12
L3	L1	L6	13
L3	L2	L0	14
L3	L2	L1	15
L3	L2	L2	16
L3	L2	L3	17
L3	L2	L4	18
L3	L2	L5	19
L3	L2	L6	20
L3	L3	L0	21
L3	L3	L1	22
L3	L3	L2	23
L3	L3	L3	24
L3	L3	L4	25
L3	L3	L5	26
L3	L3	L6	27
L3	L4	L0	28
L3	L4	L1	29
L3	L4	L2	30
L3	L4	L3	31
L3	L4	L4	32
L3	L4	L5	33
L3	L4	L6	34
L3	L5	L0	35
L3	L5	L1	36
L3	L5	L2	37
L3	L5	L3	38
L3	L5	L4	39
L3	L5	L5	40
L3	L5	L6	41
L3	L6	L0	42
L3	L6	L1	43
L3	L6	L2	44
L3	L6	L3	45
L3	L6	L4	46
L3	L6	L5	47
L3	L6	L6	48
L4	L0	L0	49
L4	L0	L1	50
L4	L0	L2	51
L4	L0	L3	52
L4	L0	L4	53
L4	L0	L5	54
L4	L0	L6	55
L4	L1	L0	56
L4	L1	L1	57
L4	L1	L2	58
L4	L1	L3	59
L4	L1	L4	60
L4	L1	L5	61
L4	L1	L6	62
L4	L2	L0	63
L4	L2	L1	64
L4	L2	L2	65
L4	L2	L3	66
L4	L2	L4	67
L4	L2	L5	68
L4	L2	L6	69
L4	L3	L0	70
L4	L3	L1	71
L4	L3	L2	72
L4	L3	L3	73

Axis ID 2	Axis ID 1	Axis ID 0	ID TMLCAN
L4	L3	L4	74
L4	L3	L5	75
L4	L3	L6	76
L4	L4	L0	77
L4	L4	L1	78
L4	L4	L2	79
L4	L4	L3	80
L4	L4	L4	81
L4	L4	L5	82
L4	L4	L6	83
L4	L5	L0	84
L4	L5	L1	85
L4	L5	L2	86
L4	L5	L3	87
L4	L5	L4	88
L4	L5	L5	89
L4	L5	L6	90
L4	L6	L0	91
L4	L6	L1	92
L4	L6	L2	93
L4	L6	L3	94
L4	L6	L4	95
L4	L6	L5	96
L4	L6	L6	97
L5	L0	L0	98
L5	L0	L1	99
L5	L0	L2	100
L5	L0	L3	101
L5	L0	L4	102
L5	L0	L5	103
L5	L0	L6	104
L5	L1	L0	105
L5	L1	L1	106
L5	L1	L2	107
L5	L1	L3	108
L5	L1	L4	109
L5	L1	L5	110
L5	L1	L6	111
L5	L2	L0	112

Axis ID 2	Axis ID 1	Axis ID 0	ID TMLCAN
L5	L2	L1	113
L5	L2	L2	114
L5	L2	L3	115
L5	L2	L4	116
L5	L2	L5	117
L5	L2	L6	118
L5	L3	L0	119
L5	L3	L1	120
L5	L3	L2	121
L5	L3	L3	122
L5	L3	L4	123
L5	L3	L5	124
L5	L3	L6	125
L5	L4	L0	126
L5	L4	L1	127
L5	L4	L2	128
L5	L4	L3	129
L5	L4	L4	130
L5	L4	L5	131
L5	L4	L6	132
L5	L5	L0	133
L5	L5	L1	134
L5	L5	L2	135
L5	L5	L3	136
L5	L5	L4	137
L5	L5	L5	138
L5	L5	L6	139
L5	L6	L0	140
L5	L6	L1	141
L5	L6	L2	142
L5	L6	L3	143
L5	L6	L4	144
L5	L6	L5	145
L5	L6	L6	146
L6	L0	L0	147
L6	L0	L1	148
L6	L0	L2	149
L6	L0	L3	150
L6	L0	L4	151

Axis ID 2	Axis ID 1	Axis ID 0	ID TMLCAN
L6	L0	L5	152
L6	L0	L6	153
L6	L1	L0	154
L6	L1	L1	155
L6	L1	L2	156
L6	L1	L3	157
L6	L1	L4	158
L6	L1	L5	159
L6	L1	L6	160
L6	L2	L0	161
L6	L2	L1	162
L6	L2	L2	163
L6	L2	L3	164
L6	L2	L4	165
L6	L2	L5	166
L6	L2	L6	167
L6	L3	L0	168
L6	L3	L1	169
L6	L3	L2	170
L6	L3	L3	171
L6	L3	L4	172
L6	L3	L5	173

Axis ID 2	Axis ID 1	Axis ID 0	ID TMLCAN
L6	L3	L6	174
L6	L4	L0	175
L6	L4	L1	176
L6	L4	L2	177
L6	L4	L3	178
L6	L4	L4	179
L6	L4	L5	180
L6	L4	L6	181
L6	L5	L0	182
L6	L5	L1	183
L6	L5	L2	184
L6	L5	L3	185
L6	L5	L4	186
L6	L5	L5	187
L6	L5	L6	188
L6	L6	L0	189
L6	L6	L1	190
L6	L6	L2	191
L6	L6	L3	192
L6	L6	L4	193
L6	L6	L5	194
L6	L6	L6	195

4.7. Axis ID Selection for iPOX360x VX-CAT drives with EtherCAT protocol

When the EtherCAT Interface Module is inserted into IO-iPOS360x always remove the JP11 to JP16 jumpers. The presence of these jumpers interferes with the operation of the EtherCAT Interface Module.

The iPOS360x VX-CAT drives support all EtherCAT standard addressing modes. In case of device addressing mode based on node address, the iPOS360x VX-CAT drive sets the *configured station alias* address with its AxisID value. The drive AxisID value is set after power on by software, imposing via EasySetUp a specific AxisID value in the range 1-255.

4.8. Installing and configuring the USB drivers

4.8.1. Installing the USB drivers

4.8.1.1 Windows 7

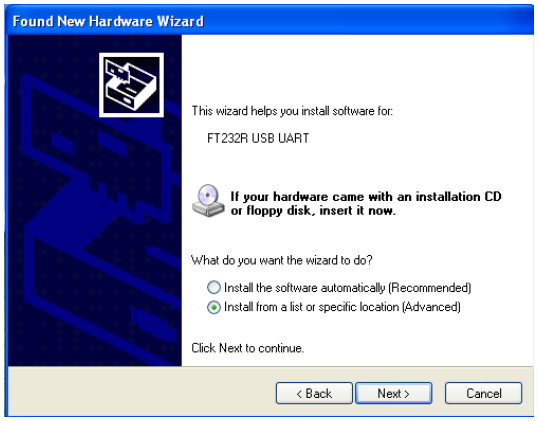
Windows 7 finds the drives automatically. In case your current version of Windows does not automatically detect the USB drivers, download the latest version from here http://www.ftdichip.com/Drivers/VCP.htm.

4.8.1.2 Windows XP

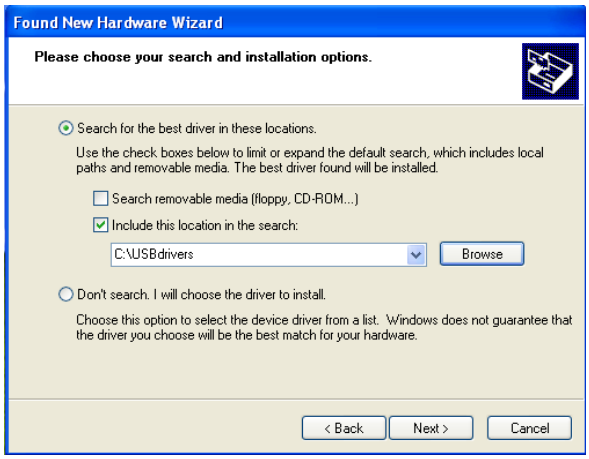
Download the latest drivers for your version of windows from http://www.ftdichip.com/Drivers/VCP.htm.

After connecting the USB IO board, Windows XP shows a new hardware found wizard.

Choose “No, not at this time” and the Next button.



In the next dialogue, choose “Install from a list or specific location (Advanced)” and click Next button.



Click Browse button and choose the folder where you have extracted the USB drivers. Click Next button.

After the installing is finished, another new hardware will be detected. Do the same steps as before and give the same location for the drivers.

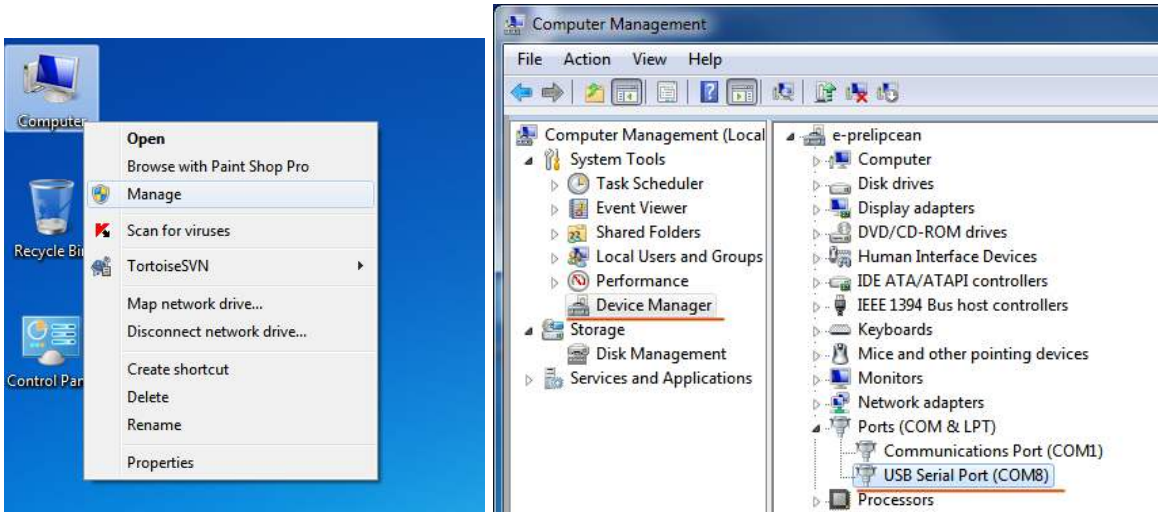
The driver is installed.

4.8.2. USB driver configuration

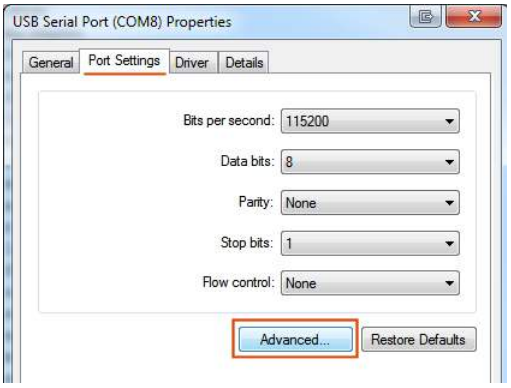
After the drivers are installed follow the steps below to configure the USB driver:

Remark: *The driver configuration procedure is identical for both Windows 7 and Windows XP.*

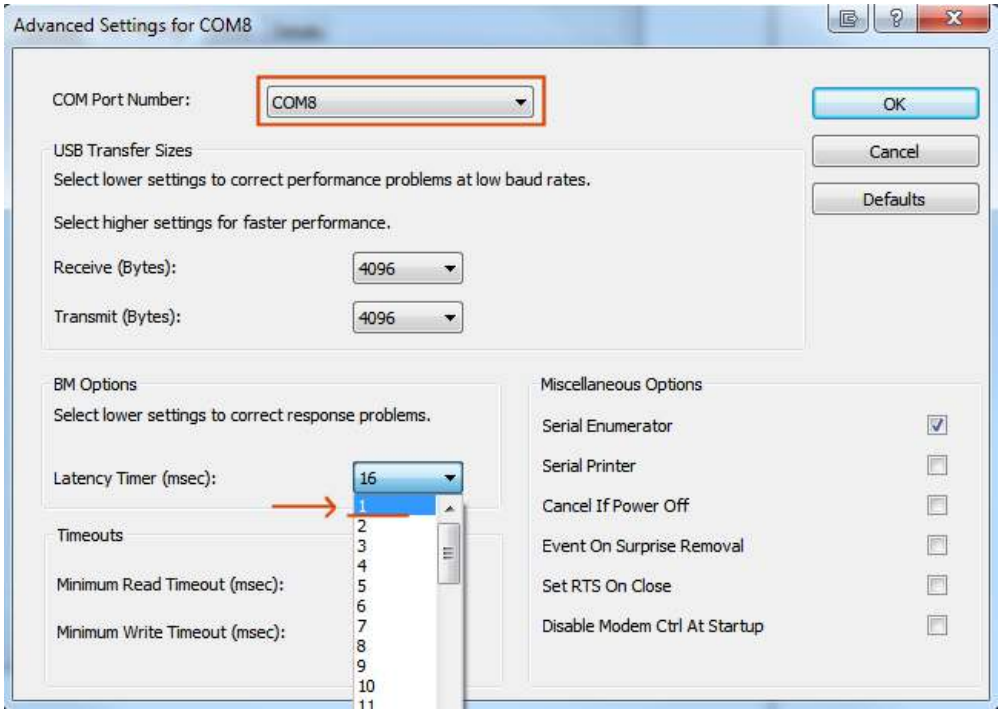
1. Open Computer Management tool and select Device Manager. Expand Ports (COM & LPT) and double click on the USB Serial Port (COMx).



2. Click the Port Settings tab and then the Advanced button.



3. Set the Latency Time (ms) to 1 instead of the default value. This will ensure optimal communication with the drive.



Remark: *The COM port number can be also changed from Advanced Settings dialog*

4. Press OK button to complete the configuration of the COM port.

4.9. First Power Up

In order to setup the drive for your application you need to communicate with it. The easiest way is via an USB link between your PC and the drive. As an USB cable you can use a standard A – B cable.

Before the first power up, check the following:

1. **iPOS360x** mounting: it shall be fully inserted in the **IO-iPOS360x** board **J1** connector with the retainer holding the drive.

2. In case an **iPOS360x VX-CAT** board is used, the **EtherCAT interface module** must also be fully inserted into the **J3** connector.

3. Motor connections.

4. USB cable connections.

5. **IO-iPOS360x** board jumpers, if you use an **iPOS360x VX-CAN** drive: by default the I/O board is delivered with the jumpers in the following positions:
   a. JP1, JP7-JP10, JP20 = ON;
   b. JP2-JP6, JP15, JP16 = OFF**;**
   c. JP12, JP14, JP17-JP19 = 1-2;
   d. JP11, JP13 = 2-3;

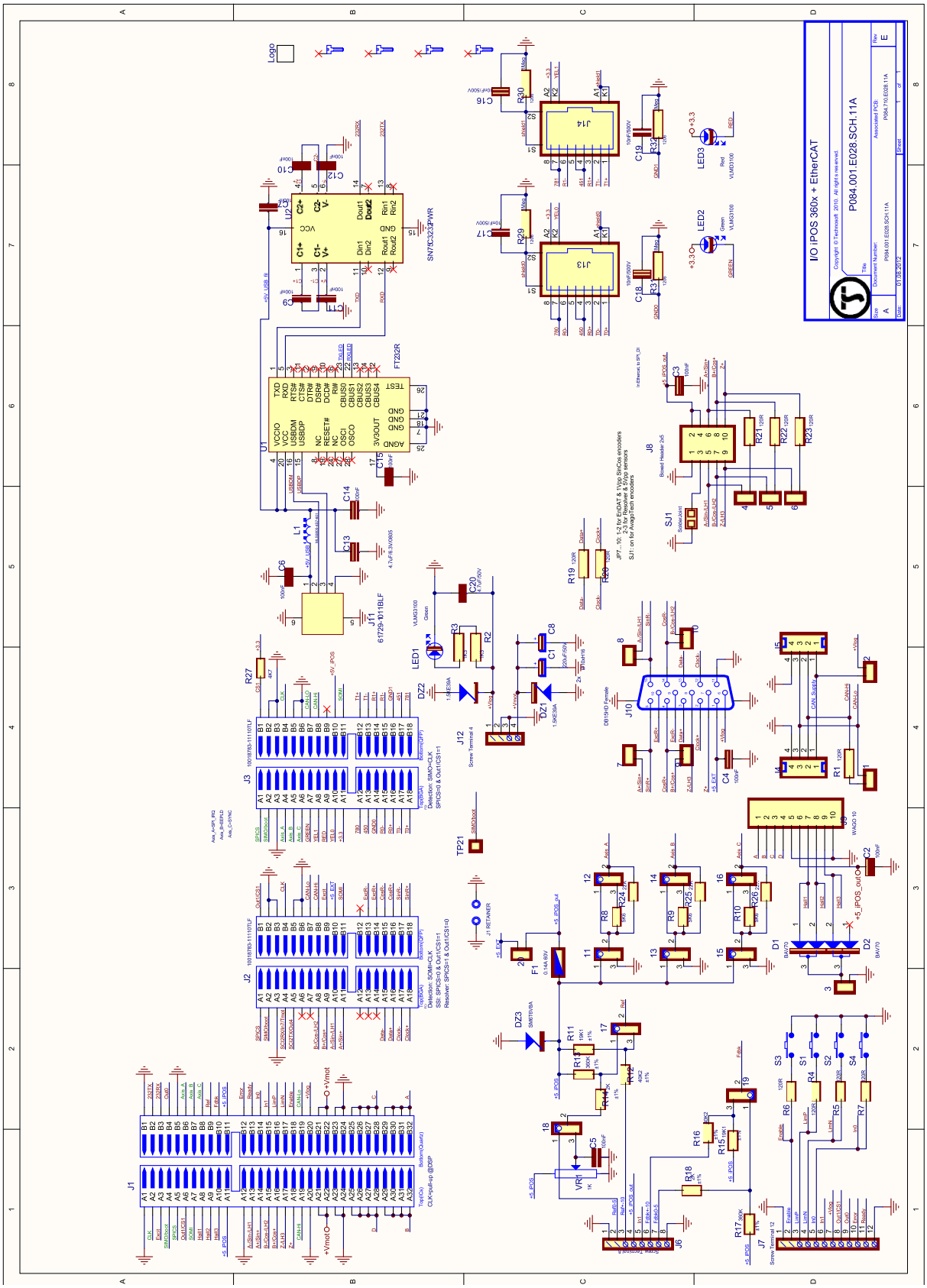
   The default jumper settings select the TMLCAN protocol with the axisID 255. In order to quickly change to CANopen protocol, set JP15 = 2-3 and JP16 = 1-2. The corresponding CANopen axisID is 127.

   If you use an **iPOS360x VX-CAT** drive, the AxisID is always 255 for serial communication. Always remove the jumpers: JP11, JP12, JP13, JP14, JP15, JP16. These jumpers interferes with EtherCAT Interface Module operation.

6. Power on the **IO-iPOS360x** board. The green LEDs from both the **IO-iPOS360x** and **iPOS360x** should light up.

CAUTION! ***ALWAYS REMOVE THE JUMPERS: JP11, JP12, JP13, JP14, JP15, JP16 WHEN THE ETHERCAT INTERFACE MODULE IS INSERTED***

Appendix 1: *IO-iPOS360x schematics*



Appendix 2: *iPOS360x VX Plug-in Connector Pins*

J1 Connector pinout (A Side)

Connector description				
	Pin	**Name**	**Type**	**Description**
J1	A1	GND	-	Return ground for extension bus
	A2	reserved	I/O	Reserved, do not connect
	A3	reserved	O	Reserved, do not connect
	A4	reserved	I/O	Reserved, do not connect
	A5	reserved	I/O	Reserved, do not connect
	A6	OUT1	O	5-36 V 0.5 A general-purpose digital output, NPN open-collector/TTL pull-up
	A7	reserved	I/O	Reserved, do not connect
	A8	Hall 1	I	Digital input Hall 1 sensor
	A9	Hall 2	I	Digital input Hall 2 sensor
	A10	Hall 3	I	Digital input Hall 3 sensor
	A11	$+5V_{OUT}$	O	5 V supply for sensors - internally generated
	A12	GND	-	Return ground for sensors supply
	A13	A- / Sin- / LH1	I	Incr. encoder A- differential input, or analogue encoder Sin- differential input, or linear Hall 1 input
	A14	A / A+ / Sin+	I	Incr. encoder A single-ended, or A+ differential input, or analogue encoder Sin+ differential input
	A15	B- / Cos- / LH2	I	Incr. encoder B- differential input, or analogue encoder Cos- differential input, or linear Hall 2 input
	A16	B / B+ / Cos+	I	Incr. encoder B single-ended, or B+ differential input, or analogue encoder Cos+ differential input
	A17	Z- / LH3	I	Incr. encoder Z- differential input, or linear Hall 3 input
	A18	Z / Z+	I	Incr. encoder Z (index) single-ended, or Z+ differential input
	A19	Can-Hi	I/O	CAN-Bus positive line (dominant high)
	A20	GND	-	Negative return (ground) of the logic supply
	A21, A22	$+V_{MOT}$	I	Positive terminal of the motor supply: 9 to 36 V_{DC}
	A23, A24	GND	-	Negative return (ground) of the motor supply
	A25-A28	BR / B-	O	Brake resistor / Phase B- for step motors
	A29-A32	B / A-	O	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors

J1 Connector pinout (B side)

	Pin	Name	Type	Description
J1	B1	GND	-	Return ground for CAN-Bus and RS232 pins
	B2	232TX	O	RS-232 Data Transmission
	B3	232RX	I	RS-232 Data Reception
	B4	OUT0	O	5-36 V 0.5 A general-purpose digital output, NPN open-collector/TTL pull-up
	B5	GND	-	Return ground for I/O pins
	B6	AxisID 0	I	Axis ID/Address input. 5 states: floating, strap to GND or +5 V, resistor 4K7 to GND or +5 V.
	B7	AxisID 1	I	Axis ID/Address inputs. 5 states: floating, strap to GND or +5 V, resistor 4K7 to GND or +5 V.
	B8	AxisID 2	I	Axis ID/Address input. 5 states: floating, strap to GND or +5 V, resistor 4K7 to GND or +5 V
	B9	REF	I	Analogue input, 12-bit, 0-5 V. Used to read an analog position, speed or torque reference, or used as general purpose analogue input
	B10	FDBK	I	Analogue input, 12-bit, 0-5 V. Used to read an analogue position or speed feedback (as tacho), or used as general purpose analogue input
	B11	$+5V_{OUT}$	O	5V output supply for I/O usage
	B12	OUT2/ Error	O	5-36 V 0.5 A drive error output, active low, NPN open-collector/TTL pull-up. Also drives the red LED.
	B13	OUT3/ Ready	O	5-36 V 0.5 A drive ready output, active low, NPN open-collector/TTL pull-up. Also drives the green LED
	B14	IN0	I	5-36 V digital input General-purpose
	B15	IN1	I	5-36 V digital input
	B16	IN2/ LSP	I	5-36 V digital input Positive limit switch input
	B17	IN3/ LSN	I	5-36 V digital input Negative limit switch input
	B18	IN4/ Enable	I	5-36 V digital input Drive enable input
	B19	Can-Lo	I/O	CAN-Bus negative line (dominant low)
	B20	$+V_{LOG}$	I	Positive terminal of the logic supply: 7 to 36 V_{DC}
	B21, B22	$+V_{MOT}$	I	Positive terminal of the motor supply: 9 to 36 V_{DC}
	B23, B24	GND	-	Negative return (ground) of the motor supply
	B25-B28	C / B+	O	Phase C for 3-ph motors, B+ for 2-ph steppers
	B29-B32	A / A+	O	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors

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