



T E C H N O S O F T

IO
iPOS360x

v1.0C

I/O Board for
iPOS360x
Intelligent
Servo Drives

Intelligent Drives

**Technical
Reference**

TECHNOSOFT

IO-iPOS360x
Technical Reference

P091.084.IO-iPOS360x.UM.0911

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Read This First

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About This Manual

This book is a technical reference manual for the **IO-iPOS360x** I/O extension board **version 1.0C** that is included in the **iPOS360x** intelligent servo drives Starter Kits.

Paragraph 2.4 shows how to quickly identify the IO-iPOS360x version. If your IO-iPOS360x is version 1.0B, please refer to the IO-iPOS360x Technical Reference Manual with p/n: P091.084.IO-iPOS360x.UM.0711, that can be freely downloaded from 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 – iPOS3602 VX-CAN and iPOS3604 VX-CAN drives

iPOS360x MX – iPOS3602 MX-CAN and iPOS3604 MX-CAN drives

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

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: contact@technosoftmotion.com
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1. 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*

1.1. 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*

1.2. 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! *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.

2. Product Overview

2.1. Introduction

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

On the IO-iPOS360x, the iPOS360x VX drives are connected directly to J1 connector, while the iPOS360x MX drives are connected to J1 via an adapter. The IO-iPOS360x also offers the possibility to connect an *iPOS360x feedback extension module* via J2 connector. The feedback extension module extends the iPOS360x range of supported motor feedback devices¹.

The IO-iPOS360x offers the user an easy and direct access to the main signals available on the iPOS360x connector like: RS232 and CAN 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.

2.2. 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, 5-36V (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, 5-36V, 0.5A (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, 0-5V, 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
- One DB9 connector for RS-232 communication
- Two RJ11 connectors for CAN communication

¹ Contact Technosoft for details regarding feedback extension module availability

- 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 usable with the feedback extension module

2.3. IO-iPOS360x Board Dimensions

Figure 2.3.1 presents the IO-iPOS360x board dimensions.

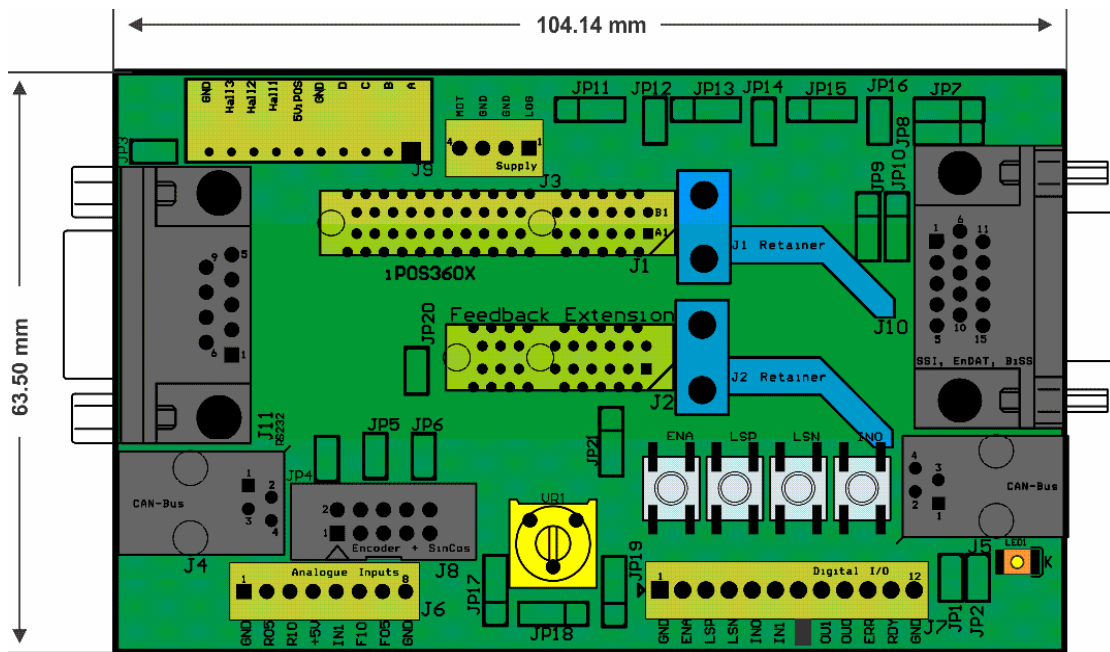


Figure 2.3.1. IO-iPOS360x board dimensions

2.4. IO-iPOS360x Board Version Identification

Figure 2.4.1 shows how to identify the IO-iPOS360x board version on its back side.

This manual refers to IO-iPOS360x **version 1.0C**. If your IO-iPOS360x is version 1.0B, please refer to the IO-iPOS360x Technical Reference Manual with p/n: P091.084.IO-iPOS360x.UM.0711, that can be freely downloaded from Technosoft web page.

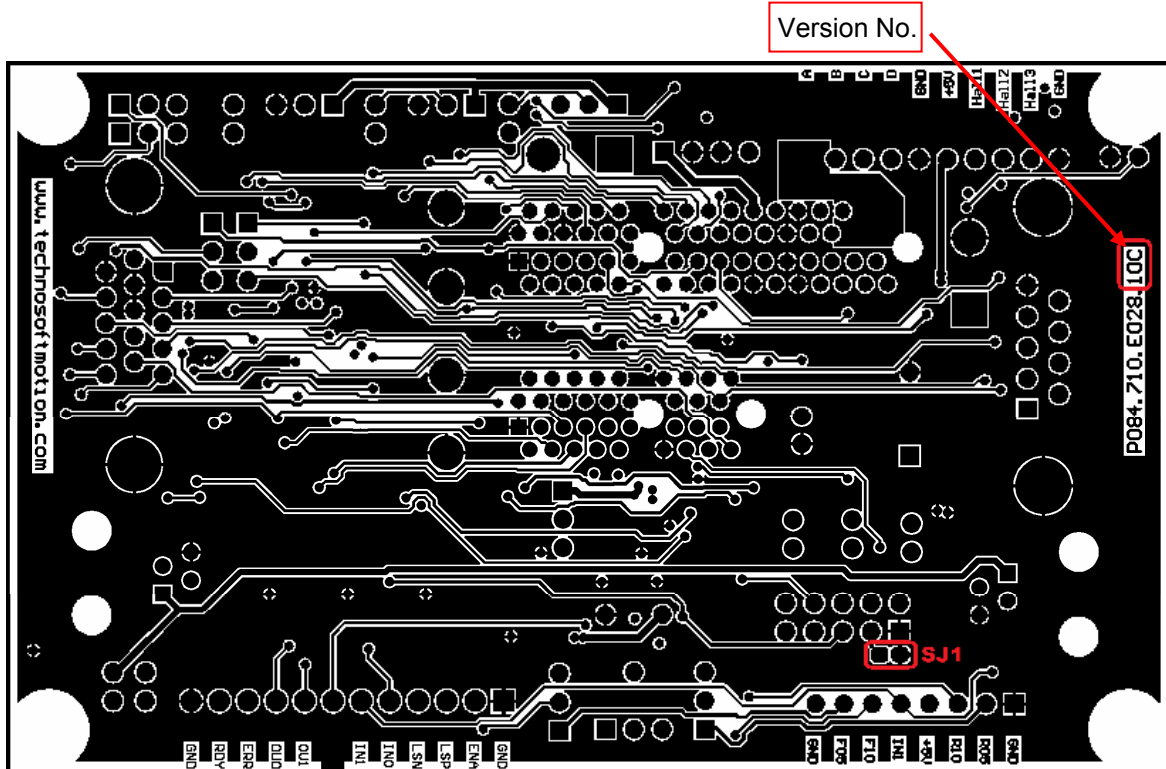


Figure 2.4.1. IO-iPOS360x board version identification

3. Hardware Installation

3.1. Mounting

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

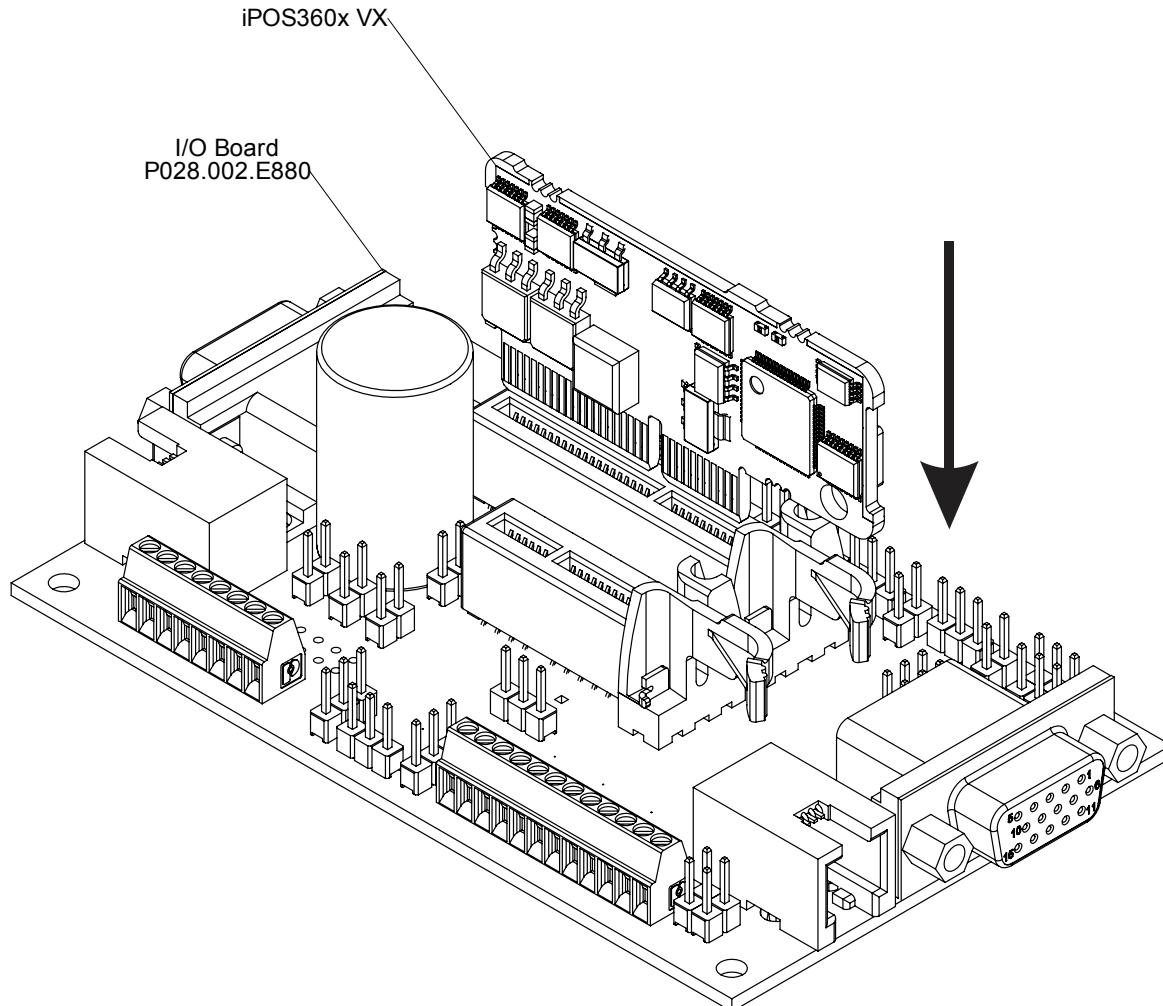


Figure 3.1.1 Installing an iPOS360x VX drive in the IO-iPOS360x

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

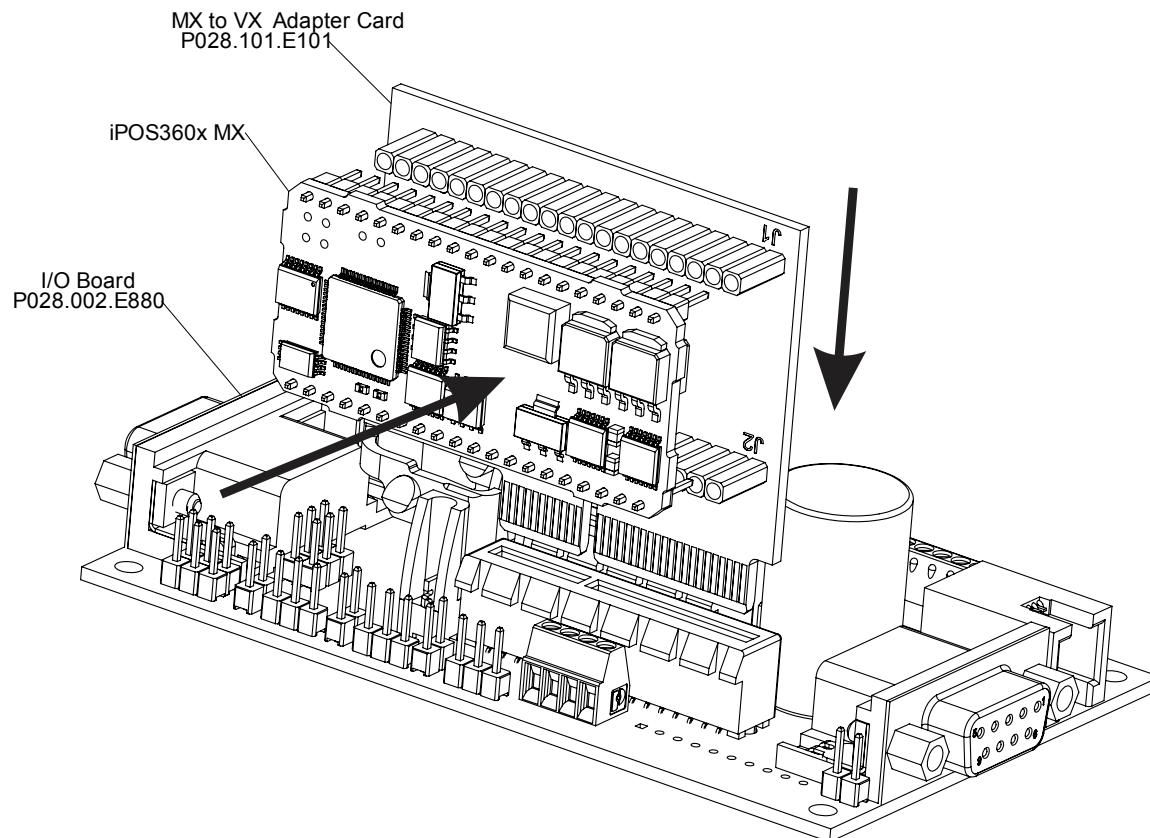


Figure 3.1.2 Installing an iPOS360x MX drive in the IO-iPOS360x using the MX to VX adapter

3.2. Connectors

3.2.1. Connectors Layout

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

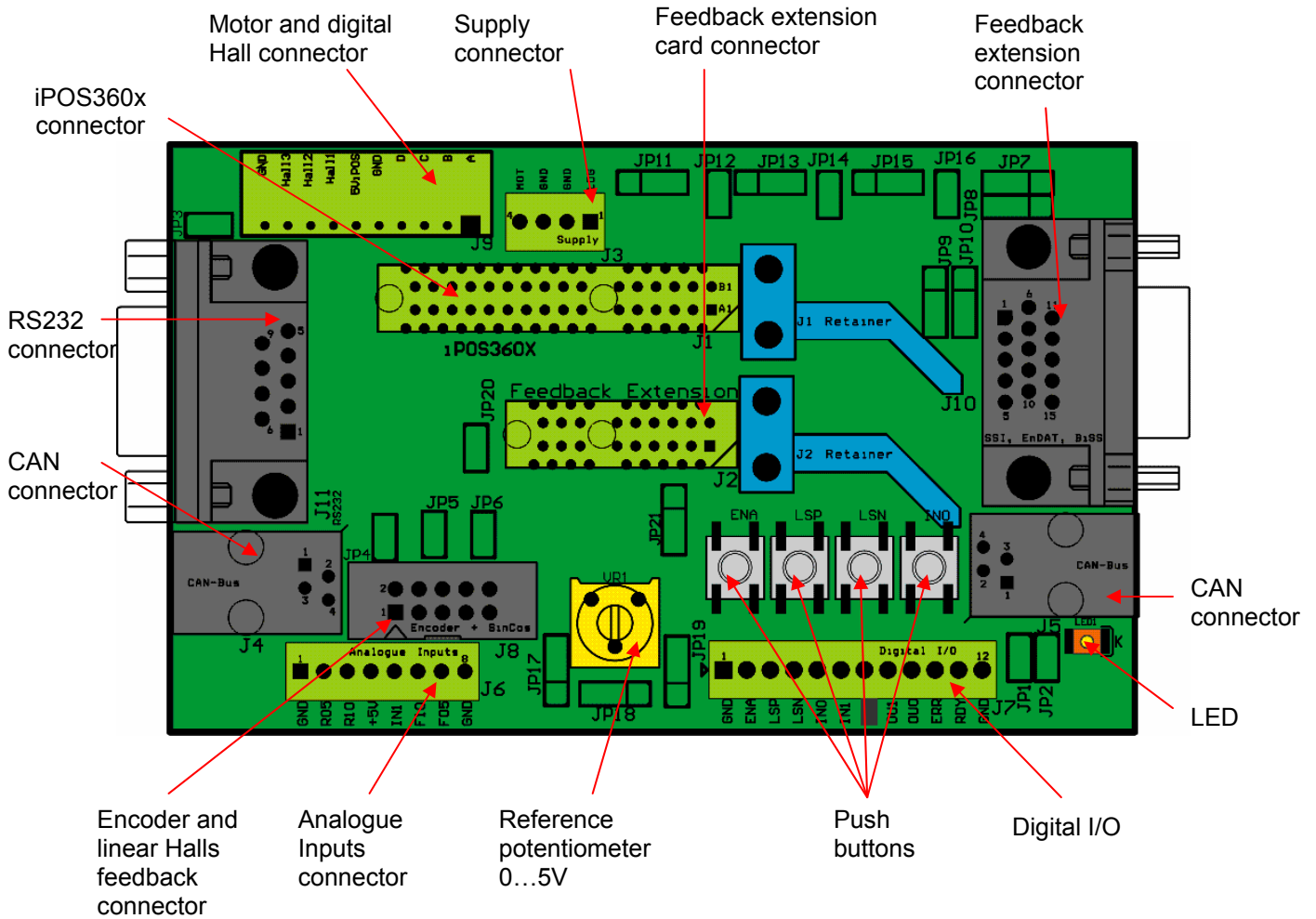


Figure 3.2.1. Top view of the IO-iPOS360x extension board



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

3.2.2. J3 – 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}

3.2.3. J4 and J5 – CAN connectors

Pin	Pin name	Type	Function
1	CAN_V+	I	+24VDC 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+.

3.2.4. J6 – Analog inputs connector

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

3.2.5. 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 ²
7	Reserved	I	Reserved. Do not connect
8	OUT1	O	General-purpose digital output OUT1 ³
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 Not available when using an iPOS360x MX drive

² Also available at J6 pin 5.

³ Not available when additional feedback extension module is used

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

Pin	Pin name	Type	Function
1	GND	-	Ground
2	+5V _{OUT}	O	+5V _{OUT} output supply (generated by iPOS360x drive)
3	GND	-	Ground for AvagoTech Option (solder SJ1)
4	+5V _{OUT}	O	+5V _{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**.

3.2.7. 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	+5V _{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

3.2.8. J10 –Feedback extension connector

Pin	Pin name	Type	Function
1	+5V _{OUT}	O	+5V _{OUT} output supply
2	Clock+	O	Clock+ for SSI, BiSS, EnDAT encoders
3	Data+	I/O	Data+ for SSI, BiSS, EnDAT encoders
4	Cos+	I	Cos+ for analogue encoders or resolvers
5	Sin+	I	Sin+ for analogue encoders or resolvers
6	+5V _{LOG}		Logic supply: +7 to +36V _{DC}
7	GND	-	Ground
8	GND	-	Ground
9	ExcR-	O	Resolver Excitation -
10	ExcR+	O	Resolver Excitation +
11	GND	-	Ground
12	Clock-	O	Clock- for SSI, BiSS, EnDAT encoders
13	Data-	I/O	Data- for SSI, BiSS, EnDAT encoders
14	Cos-	I	Cos- for analogue encoders or resolvers
15	Sin-	I	Sin- for analogue encoders or resolvers

3.2.9. J11 – RS232 connector

Pin	Pin name	Type	Function
1	NC	-	Not connected
2	TX232	O	RS-232 Data Transmission
3	RX232	I	RS-232 Data Reception
4	NC	-	Not connected
5	GND	-	Ground
6	NC	-	Not connected
7	NC	-	Not connected
8	NC	-	Not connected
9	NC	-	Not connected

3.3. Jumper Settings

Jumper Name	Jumper Function	Option	Result
JP1	CAN termination	0 ⁵	Do not connect a CAN terminator
		1	Connect a CAN terminator (120Ω 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 120Ω resistor between A+/Sin+ and A-/Sin-
		1	Connect a 120Ω resistor between A+/Sin+ and A-/Sin-
JP5	EncB/Cos termination	0	Don't connect a 120Ω resistor between B+/Cos+ and B-/Cos-
		1	Connect a 120Ω resistor between B+/Cos+ and B-/Cos-

⁵ 0 = Jumper OFF, 1 = Jumper ON

JP6	EncZ termination	0	Don't connect a 120Ω resistor between Z+ and Z-
		1	Connect a 120Ω resistor between Z+ and Z-
JP7	Sine+	1-2	Sin+ is 1Vpp and goes from J10 to iPOS360x
		2-3	Sin+ is 5Vpp and goes from J10 to Feedback extension card
JP8	Sine-	1-2	Sin- is 1Vpp and goes from J10 to iPOS360x
		2-3	Sin- is 5Vpp and goes from J10 to Feedback extension card
JP9	Cosine+	1-2	Cos+ is 1Vpp and goes from J10 to iPOS360x
		2-3	Cos+ is 5Vpp and goes from J10 to Feedback extension card
JP10	Cosine-	1-2	Cos- is 1Vpp and goes from J10 to iPOS360x
		2-3	Cos- is 5Vpp and goes from J10 to Feedback extension card
JP11	AxisID1_MSB	1-2	Connect AxisID1 input to +5Vdc
		2-3	Connect AxisID1 input to GND
JP12	AxisID1_LSB	0	Connect a pull-up/pull-down resistor (depending on JP11) to AxisID1
		1	Don't connect a pull-up/pull-down resistor to AxisID1
JP13	AxisID2_MSB	1-2	Connect AxisID2 input to +5Vdc
		2-3	Connect AxisID2 to GND
JP14	AxisID2_LSB	0	Connect a pull-up/pull-down resistor to (depending on JP13) to AxisID2
		1	Don't connect pull-up/pull-down resistor to AxisID2
JP15	AxisID3_MSB	1-2	Connect AxisID3 to +5Vdc
		2-3	Connect AxisID3 to GND
JP16	AxisID3_LSB	0	Connect a pull-up/pull-down resistor (depending on JP15) to AxisID3
		1	Don't connect pull-up/pull-down resistor to Axis C

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	Boot	0	Normal operation
		1	Boot mode for 1 st firmware programming ⁶
JP21	Feedback extension supply	1-2	+5V output for feedback extension connector is provided by the feedback extension module
		2-3	+5V output for feedback extension connector is provided by the iPOS360x drive (+5V _{OUT})

3.4. CAN Protocol and Axis ID Selection

The iPOS360x VX drive has 3 analogue inputs named AxisID0, AxisID1 and AxisID2 inputs used to select the CAN protocol: CANopen or Technosoft TMLCAN and the drive address or axis ID. The iPOS360x VX drive can detect up to 7 different voltage levels on these 3 inputs. On the IO iPOS360x module only 5 voltage levels can be selected via the jumpers: JP11 to JP 16. Each AxisID input has 2 jumpers associated: a 3-pin jumper to connect the input to GND or +5Vdc and a 2-pin jumper to select how to do this connection: directly or via a pull-up/pull-down resistor present on the IO board.

CAN protocol	JP15	JP16	JP13	JP14	JP11	JP12	Axis ID
CANopen	2-3	ON	2-3	ON	2-3	ON	127
CANopen	2-3	ON	2-3	ON	2-3	OFF	1
CANopen	2-3	ON	2-3	ON	OFF	OFF	3
CANopen	2-3	ON	2-3	ON	1-2	OFF	5
CANopen	2-3	ON	2-3	ON	1-2	ON	6
CANopen	2-3	ON	2-3	OFF	2-3	ON	7
CANopen	2-3	ON	2-3	OFF	2-3	OFF	8
CANopen	2-3	ON	2-3	OFF	OFF	OFF	10

⁶ To be used only if normal firmware update procedure is accidentally interrupted

CANopen	2-3	ON	2-3	OFF	1-2	OFF	12
CANopen	2-3	ON	2-3	OFF	1-2	ON	13
CANopen	2-3	ON	OFF	OFF	2-3	ON	21
CANopen	2-3	ON	OFF	OFF	2-3	OFF	22
CANopen	2-3	ON	OFF	OFF	OFF	OFF	24
CANopen	2-3	ON	OFF	OFF	1-2	OFF	26
CANopen	2-3	ON	OFF	OFF	1-2	ON	27
CANopen	2-3	ON	1-2	OFF	2-3	ON	35
CANopen	2-3	ON	1-2	OFF	2-3	OFF	36
CANopen	2-3	ON	1-2	OFF	OFF	OFF	38
CANopen	2-3	ON	1-2	OFF	1-2	OFF	40
CANopen	2-3	ON	1-2	OFF	1-2	ON	41
CANopen	2-3	ON	1-2	ON	2-3	ON	42
CANopen	2-3	ON	1-2	ON	2-3	OFF	43
CANopen	2-3	ON	1-2	ON	OFF	OFF	45
CANopen	2-3	ON	1-2	ON	1-2	OFF	47
CANopen	2-3	ON	1-2	ON	1-2	ON	48
CANopen	2-3	OFF	2-3	ON	2-3	ON	49
CANopen	2-3	OFF	2-3	ON	2-3	OFF	50
CANopen	2-3	OFF	2-3	ON	OFF	OFF	52
CANopen	2-3	OFF	2-3	ON	1-2	OFF	54
CANopen	2-3	OFF	2-3	ON	1-2	ON	55
CANopen	2-3	OFF	2-3	OFF	2-3	ON	56
CANopen	2-3	OFF	2-3	OFF	2-3	OFF	57
CANopen	2-3	OFF	2-3	OFF	OFF	OFF	59
CANopen	2-3	OFF	2-3	OFF	1-2	OFF	61
CANopen	2-3	OFF	2-3	OFF	1-2	ON	62
CANopen	2-3	OFF	OFF	OFF	2-3	ON	70
CANopen	2-3	OFF	OFF	OFF	2-3	OFF	71
CANopen	2-3	OFF	OFF	OFF	OFF	OFF	73
CANopen	2-3	OFF	OFF	OFF	1-2	OFF	75
CANopen	2-3	OFF	OFF	OFF	1-2	ON	76
CANopen	2-3	OFF	1-2	OFF	2-3	ON	84
CANopen	2-3	OFF	1-2	OFF	2-3	OFF	85
CANopen	2-3	OFF	1-2	OFF	OFF	OFF	87

CANopen	2-3	OFF	1-2	OFF	1-2	OFF	89
CANopen	2-3	OFF	1-2	OFF	1-2	ON	90
CANopen	2-3	OFF	1-2	ON	2-3	ON	91
CANopen	2-3	OFF	1-2	ON	2-3	OFF	92
CANopen	2-3	OFF	1-2	ON	OFF	OFF	94
CANopen	2-3	OFF	1-2	ON	1-2	OFF	96
CANopen	2-3	OFF	1-2	ON	1-2	ON	97
TMLCAN	OFF	OFF	2-3	ON	2-3	ON	255
TMLCAN	OFF	OFF	2-3	ON	2-3	OFF	1
TMLCAN	OFF	OFF	2-3	ON	OFF	OFF	3
TMLCAN	OFF	OFF	2-3	ON	1-2	OFF	5
TMLCAN	OFF	OFF	2-3	ON	1-2	ON	6
TMLCAN	OFF	OFF	2-3	OFF	2-3	ON	7
TMLCAN	OFF	OFF	2-3	OFF	2-3	OFF	8
TMLCAN	OFF	OFF	2-3	OFF	OFF	OFF	10
TMLCAN	OFF	OFF	2-3	OFF	1-2	OFF	12
TMLCAN	OFF	OFF	2-3	OFF	1-2	ON	13
TMLCAN	OFF	OFF	OFF	OFF	2-3	ON	21
TMLCAN	OFF	OFF	OFF	OFF	2-3	OFF	22
TMLCAN	OFF	OFF	OFF	OFF	OFF	OFF	24
TMLCAN	OFF	OFF	OFF	OFF	1-2	OFF	26
TMLCAN	OFF	OFF	OFF	OFF	1-2	ON	27
TMLCAN	OFF	OFF	1-2	OFF	2-3	ON	35
TMLCAN	OFF	OFF	1-2	OFF	2-3	OFF	36
TMLCAN	OFF	OFF	1-2	OFF	OFF	OFF	38
TMLCAN	OFF	OFF	1-2	OFF	1-2	OFF	40
TMLCAN	OFF	OFF	1-2	OFF	1-2	ON	41
TMLCAN	OFF	OFF	1-2	ON	2-3	ON	42
TMLCAN	OFF	OFF	1-2	ON	2-3	OFF	43
TMLCAN	OFF	OFF	1-2	ON	OFF	OFF	45
TMLCAN	OFF	OFF	1-2	ON	1-2	OFF	47
TMLCAN	OFF	OFF	1-2	ON	1-2	ON	48
TMLCAN	1-2	OFF	2-3	ON	2-3	ON	98
TMLCAN	1-2	OFF	2-3	ON	2-3	OFF	99
TMLCAN	1-2	OFF	2-3	ON	OFF	OFF	101

TMLCAN	1-2	OFF	2-3	ON	1-2	OFF	103
TMLCAN	1-2	OFF	2-3	ON	1-2	ON	104
TMLCAN	1-2	OFF	2-3	OFF	2-3	ON	105
TMLCAN	1-2	OFF	2-3	OFF	2-3	OFF	106
TMLCAN	1-2	OFF	2-3	OFF	OFF	OFF	108
TMLCAN	1-2	OFF	2-3	OFF	1-2	OFF	110
TMLCAN	1-2	OFF	2-3	OFF	1-2	ON	111
TMLCAN	1-2	OFF	OFF	OFF	2-3	ON	119
TMLCAN	1-2	OFF	OFF	OFF	2-3	OFF	120
TMLCAN	1-2	OFF	OFF	OFF	OFF	OFF	122
TMLCAN	1-2	OFF	OFF	OFF	1-2	OFF	124
TMLCAN	1-2	OFF	OFF	OFF	1-2	ON	125
TMLCAN	1-2	OFF	1-2	OFF	2-3	ON	133
TMLCAN	1-2	OFF	1-2	OFF	2-3	OFF	134
TMLCAN	1-2	OFF	1-2	OFF	OFF	OFF	136
TMLCAN	1-2	OFF	1-2	OFF	1-2	OFF	138
TMLCAN	1-2	OFF	1-2	OFF	1-2	ON	139
TMLCAN	1-2	OFF	1-2	ON	2-3	ON	140
TMLCAN	1-2	OFF	1-2	ON	2-3	OFF	141
TMLCAN	1-2	OFF	1-2	ON	OFF	OFF	143
TMLCAN	1-2	OFF	1-2	ON	1-2	OFF	145
TMLCAN	1-2	OFF	1-2	ON	1-2	ON	146
TMLCAN	1-2	ON	2-3	ON	2-3	ON	147
TMLCAN	1-2	ON	2-3	ON	2-3	OFF	148
TMLCAN	1-2	ON	2-3	ON	OFF	OFF	150
TMLCAN	1-2	ON	2-3	ON	1-2	OFF	152
TMLCAN	1-2	ON	2-3	ON	1-2	ON	153
TMLCAN	1-2	ON	2-3	OFF	2-3	ON	154
TMLCAN	1-2	ON	2-3	OFF	2-3	OFF	155
TMLCAN	1-2	ON	2-3	OFF	OFF	OFF	157
TMLCAN	1-2	ON	2-3	OFF	1-2	OFF	159
TMLCAN	1-2	ON	2-3	OFF	1-2	ON	160
TMLCAN	1-2	ON	OFF	OFF	2-3	ON	168
TMLCAN	1-2	ON	OFF	OFF	2-3	OFF	169
TMLCAN	1-2	ON	OFF	OFF	OFF	OFF	171

TMLCAN	1-2	ON	OFF	OFF	1-2	OFF	173
TMLCAN	1-2	ON	OFF	OFF	1-2	ON	174
TMLCAN	1-2	ON	1-2	OFF	2-3	ON	182
TMLCAN	1-2	ON	1-2	OFF	2-3	OFF	183
TMLCAN	1-2	ON	1-2	OFF	OFF	OFF	185
TMLCAN	1-2	ON	1-2	OFF	1-2	OFF	187
TMLCAN	1-2	ON	1-2	OFF	1-2	ON	188
TMLCAN	1-2	ON	1-2	ON	2-3	ON	189
TMLCAN	1-2	ON	1-2	ON	2-3	OFF	190
TMLCAN	1-2	ON	1-2	ON	OFF	OFF	192
TMLCAN	1-2	ON	1-2	ON	1-2	OFF	194
TMLCAN	1-2	ON	1-2	ON	1-2	ON	195

3.5. First Power Up

In order to setup the drive for your application you need to communicate with it. The easiest way is via an RS-232 serial link between your PC and the drive. As serial cable you can use an standard 9-wire male to female non-inverting serial cable. If your PC has no serial port, use an RS232-USB adapter.

Before the first power up, check the following:

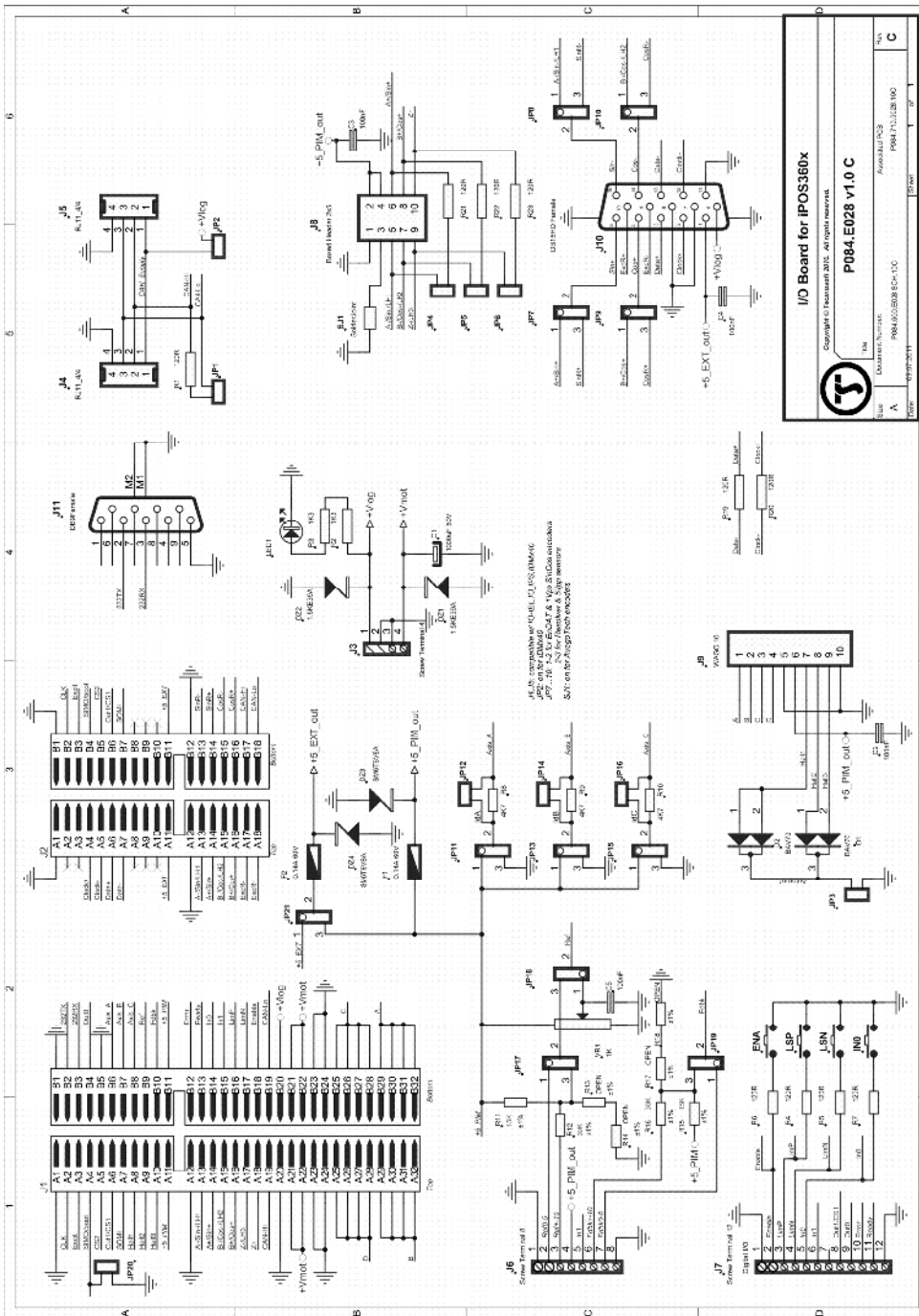
1. **iPOS360x** mounting: it shall be fully inserted in the **IO-iPOS360x** board with the retainer holding the drive
2. Motor connections
3. Serial cable connections
4. **IO-iPOS360x** board jumpers: by default the I/O board is delivered with the jumpers in the following positions:
 - a. JP1,JP12,JP14 = ON;
 - b. JP2-JP6, JP15, JP16, JP20 = OFF;
 - c. JP7-JP10, JP17-JP19 = 1-2;
 - d. JP11,JP13,JP21 = 2-3;

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

Note: the current drive axisID can be detected using EasySetUp or EasyMotion Studio and a serial link. To do this, in the dialogue open by menu command Communication | Setup select at "Axis ID of drive/motor connected to PC is" the option autodetected. The drive axis ID occurs on the application status bar.

5. Power on the **IO-iPOS360x** board, the green LED (**READY**) from **IO-iPOS360x** board should light

Appendix 1: IO-iPOS360x schematics



Appendix 2: iPOS360x VX Plug-in Connector Pins

J1 Connector pinout (A Side)

Connector description					
Pin	Name	Type	Description		
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	5-36V 0.5A 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	5V supply for sensors - internally generated		
A12	GND	-	Return ground for sensors supply		
J1	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 36V _{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
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	5-36V 0.5A 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 +5V, resistor 4K7 to GND or +5V
B7	AxisID 1	I	Axis ID/Address inputs. 5 states: floating, strap to GND or +5V, resistor 4K7 to GND or +5V.
B8	AxisID 2	I	Axis ID/Address input. 5 states: floating, strap to GND or +5V, resistor 4K7 to GND or +5V
B9	REF	I	Analogue input, 12-bit, 0-5V. Used to read an analog position, speed or torque reference, or used as general purpose analogue input
B10	FDBK	I	Analogue input, 12-bit, 0-5V. 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	5-36V 0.5A drive error output, active low, NPN open-collector/TTL pull-up. Also drives the red LED.
B13	OUT3/ Ready	O	5-36V 0.5A drive ready output, active low, NPN open-collector/TTL pull-up. Also drives the green LED
B14	IN0	I	5-36V digital input General-purpose
B15	IN1	I	5-36V digital input
B16	IN2/ LSP	I	5-36V digital input Positive limit switch input
B17	IN3/ LSN	I	5-36V digital input Negative limit switch input
B18	IN4/ Enable	I	5-36V 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 36V _{DC}
B21, B22	+V _{MOT}	I	Positive terminal of the motor supply: 9 to 36V _{DC}
B23, B24	GND	-	Negative return (ground) of the motor supply

B25-B28	C / B+	○	Phase C for 3-ph motors, B+ for 2-ph steppers
B29-B32	A / A+	○	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors

† not available when additional feedback extension module is used



T E C H N O S O F T