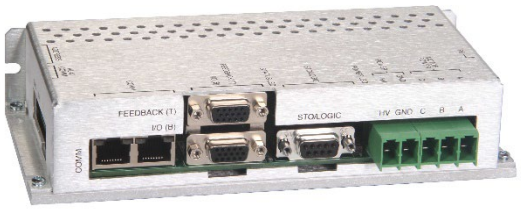
FMP060-25-IPM

FlexPro® Series
Product Status: Active



SPECIFICATIONS

Current Peak	**50 A**
Current Continuous	**25 A**
DC Supply Voltage	**10 – 55 VDC**
Network Communication	**Ethernet IP**

The **FMP060-25-IPM** is a servo drive and integration board assembly for a FE060-25-IPM FlexPro® series servo drive with IMPACT™ architecture. Connections to the controller, motor, power, and feedback are simplified through the standard connectors. The assembly is housed within a case, allowing vertical and horizontal panel mounting orientations.

The **FMP060-25-IPM** offers full tuning control of all servo loops and is designed to drive brushed and brushless servo motors, and closed loop stepper motors. The drive assembly accepts a variety of external command signals, or can use the built-in Motion Engine, an internal motion controller used with Sequencing and Indexing commands. Programmable digital and analog I/O are included to enhance interfacing with external controllers and devices.

The **FMP060-25-IPM** utilizes Ethernet IP network communication and is configured via USB. All drive and motor parameters are stored in non-volatile memory. *ADVANCED* Motion Controls' Ethernet IP/ protocol operates based on a control state machine as defined by CANopen standards. CIP Motion and CIP Sync are not currently supported.

IMPACT™ (**I**ntegrated **M**otion **P**latform **A**nd **C**ontrol **T**echnology) combines exceptional processing capability and high-current components to create powerful, compact, feature-loaded servo solutions. IMPACT™ is used in all FlexPro® drives and is available in custom products as well.

FEATURES

- Four Quadrant Regenerative Operation
- Programmable Gain Settings
- PIDF Velocity Loop
- On-the-Fly Mode Switching
- On-the-Fly Gain Set Switching
- Dedicated Safe Torque Off (STO) Inputs
- Bridge Status, Fault and Network Status LEDs
- Integrated Cooling Fan
- Standard Connections for Easy Setup

Feedback Supported	• Absolute Encoder
	  ○ BiSS C-Mode
	  ○ EnDat 2.2
	• Incremental Encoder
	• Hall Sensors
	• Tachometer (±10V)
		Motors Supported	• Three Phase
			• Single Phase
			• Stepper
				Modes of Operation	• Profile Modes
					• Current
					• Velocity
					• Position

Command Sources	• Over the Network • ±10V Analog • Sequencing • Indexing • Jogging	**Inputs / Outputs**	• 4 Programmable Digital Inputs • 3 Programmable Digital Outputs • 1 Programmable Analog Input	**Agency Approvals**	• RoHS • UL/cUL • CE (LVD) • CE Class A (EMC)

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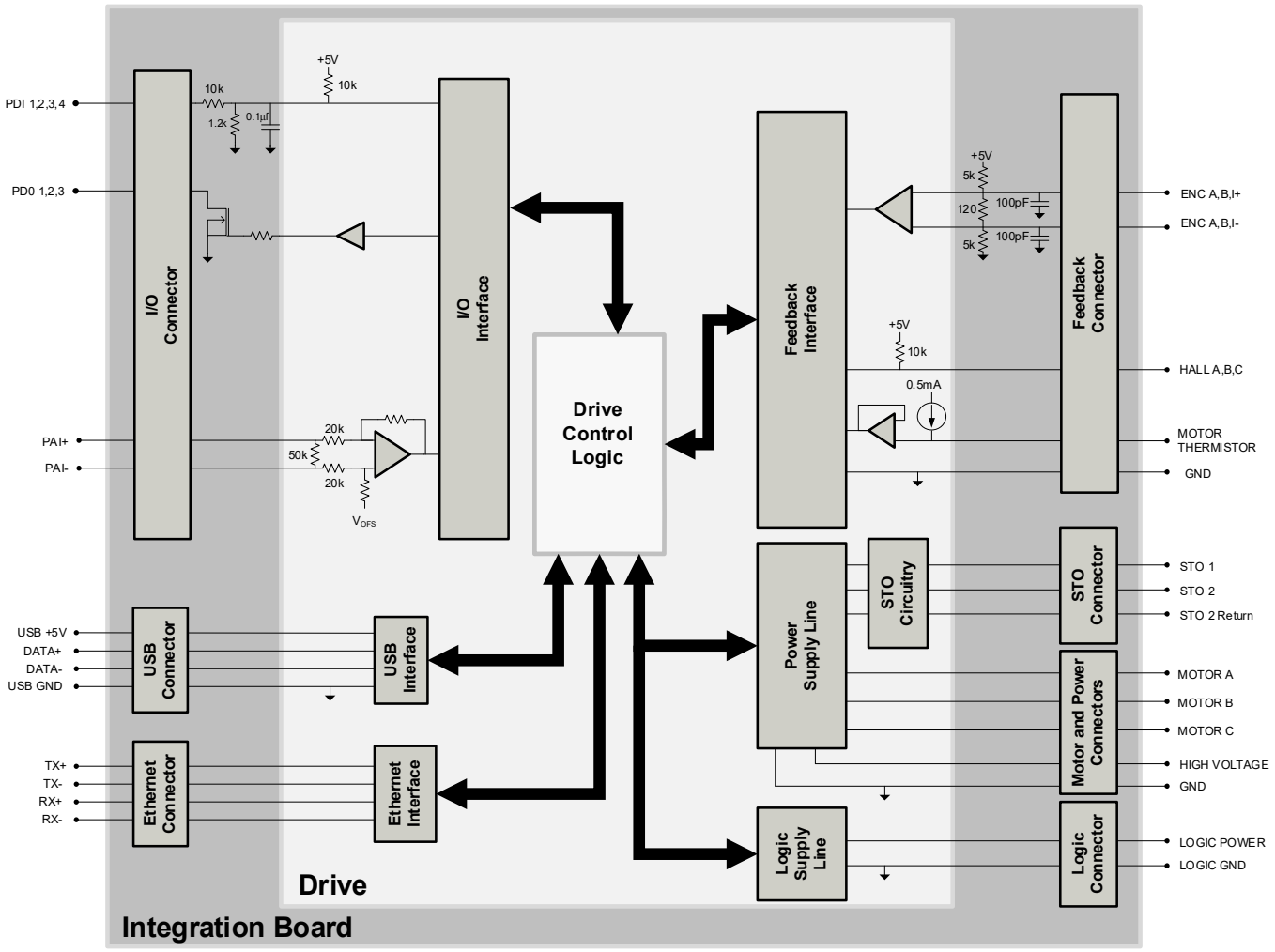
BLOCK DIAGRAM



INFORMATION ON APPROVALS AND COMPLIANCES

cULus	US and Canadian safety compliance with UL/IEC 61800-5-1, the industrial standard for adjustable speed electrical power drive systems. UL registered under file number E140173. Note that machine components compliant with UL are considered UL registered as opposed to UL listed as would be the case for commercial products.
CE	Compliant with European EMC Directive 2014/30/EU on Electromagnetic Compatibility (specifically EN 61000-6-4:2007/A1:2011 for Emissions, Class A and EN 61000-6-2:2005 for Immunity, Performance Criteria A). LVD requirements of Directive 2014/35/EU (specifically, EN 60204-1:2019, a Low Voltage Directive to protect users from electrical shock).
RoHS Compliant	The RoHS Directive restricts the use of certain substances including lead, mercury, cadmium, hexavalent chromium and halogenated flame retardants PBB and PBDE in electronic equipment.

SPECIFICATIONS

Electrical Specifications		
Description	Units	Value
Nominal DC Supply Voltage Range	VDC	12 – 48
DC Supply Input Range	VDC	10 – 55
DC Supply Undervoltage	VDC	8
DC Supply Overvoltage	VDC	58
Logic Supply Input Range (optional)	VDC	10 – 55
Safe Torque Off Voltage (Default)	VDC	24
Bus Capacitance	µF	221
Maximum Peak Current Output[1]	A (Arms)	50 (35.3)
Maximum Continuous Current Output[2]	A (Arms)	25 (25)
Efficiency at Rated Power	%	99
Maximum Continuous Output Power	W	1361
Maximum Power Dissipation at Rated Power	W	14
Minimum Load Inductance (line-to-line)[3]	µH	150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)
Switching Frequency	kHz	20
Maximum Output PWM Duty Cycle	%	83
Control Specifications		
Description	Units	Value
Communication Interfaces	-	Ethernet IP (USB for configuration)
Command Sources	-	±10 V Analog, Over the Network, Sequencing, Indexing, Jogging
Feedback Supported	-	Absolute Encoder (BiSS C-Mode, EnDat 2.2), Incremental Encoder, Hall Sensors, Tachometer (±10V)
Commutation Methods	-	Sinusoidal, Trapezoidal
Modes of Operation	-	Profile Modes, Current, Velocity, Position
Motors Supported[4]	-	Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop)
Hardware Protection	-	40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage
Programmable Digital Inputs/Outputs	-	4/3
Programmable Analog Inputs/Outputs	-	1/0
Primary I/O Logic Level	VDC	24
Current Loop Sample Time	µs	50
Velocity Loop Sample Time	µs	100
Position Loop Sample Time	µs	100
Maximum Encoder Frequency	MHz	20 (5 pre-quadrature)
Mechanical Specifications		
Description	Units	Value
Size (H x W x D)	mm (in)	190.50 x 88.90 x 41.28 (7.50 x 3.50 x 1.63)
Weight	g (oz)	484.8 (17.1)
Relative Humidity	-	0-95%
Ambient Operating Temperature	°C (°F)	0 – 40 (32 – 104)
Storage Temperature	°C (°F)	-20 – 85 (-4 – 185)
Shock	-	15g, 11ms, Half-sine
Vibration	-	30 grms for 5 minutes in 3 axes
Cooling System	-	Fan Cooled
IP Rating	-	IP20
P1 POWER CONNECTOR	-	2-port, 7.62mm spaced, enclosed, friction lock header
P2 MOTOR POWER CONNECTOR	-	3-port, 7.62mm spaced, enclosed, friction lock header
P3 IO CONNECTOR	-	15-pin high-density female D-Sub
P4 FEEDBACK CONNECTOR	-	15-pin high-density female D-Sub
P5 ETHERNET COMMUNICATION CONNECTORS	-	Shielded, Dual RJ-45 socket with LEDs
P6 STO / LOGIC CONNECTOR	-	9-pin female D-sub
P7 USB COMMUNICATION CONNECTOR	-	5-pin, Mini USB B Type port

Notes

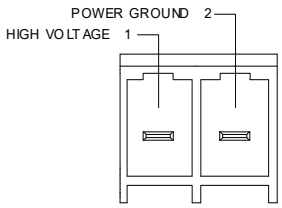
1. Capable of supplying drive rated peak current for 2 seconds with 5 second foldback to continuous value. Longer times are possible with lower current limits.
2. Continuous A_{rms} value attainable when RMS Charge-Based Limiting is used.
3. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
4. Maximum motor speed for stepper motors is 600 RPM. Consult the hardware installation manual for 2-phase stepper wiring configuration.

PIN FUNCTIONS

P1 - Power Connector

Pin	Name	Description / Notes	I/O
1	POWER GROUND	Power Ground. (Common with Signal Ground)	GND
2	HIGH VOLTAGE	DC Supply Input (10-55 VDC).	I

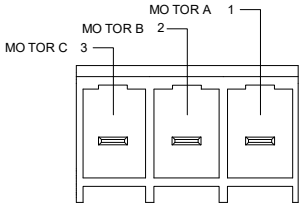
Connector Information	2-port, 7.62mm spaced, enclosed, friction lock header
Mating Connector Details	Amphenol: P/N ET0201500000G
Mating Connector Included	Yes



P2 - Motor Power Connector

Pin	Name	Description / Notes	I/O
1	MOTOR A	Motor Phase A.	O
2	MOTOR B	Motor Phase B.	O
3	MOTOR C	Motor Phase C.	O

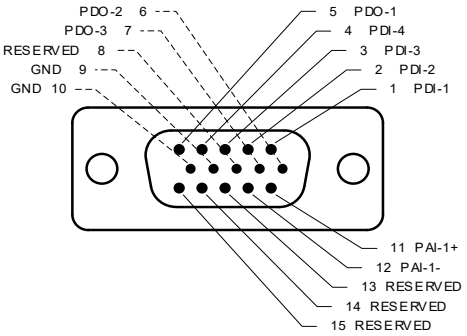
Connector Information	3-port, 7.62mm spaced, enclosed, friction lock header
Mating Connector Details	Amphenol: P/N ET0301500000G
Mating Connector Included	Yes



P3 – IO Connector

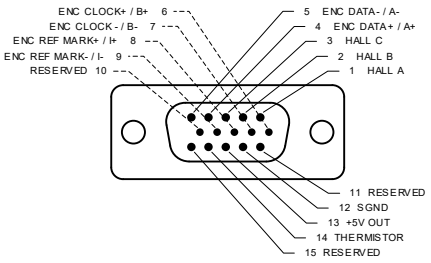
Pin	Name	Description / Notes	I/O
1	PDI-1	General Purpose Programmable Digital Input	I
2	PDI-2	General Purpose Programmable Digital Input	I
3	PDI-3	General Purpose Programmable Digital Input	I
4	PDI-4	General Purpose Programmable Digital Input	I
5	PDO-1	General Purpose Programmable Digital Output (24V Open Drain/1A)	O
6	PDO-2	General Purpose Programmable Digital Output (24V Open Drain/1A)	O
7	PDO-3	General Purpose Programmable Digital Output (24V Open Drain/1A)	O
8	RESERVED	Reserved.	-
9	GND	Signal Ground. (Common with Power Ground)	GND
10	GND	Ground.	GND
11	PAI-1+	General Purpose Differential Programmable Analog Input or Reference Signal Input.	I
12	PAI-1-	±10VDC Range (12-bit Resolution)	I
13	RESERVED	Reserved.	-
14	RESERVED	Reserved.	-
15	RESERVED	Reserved.	-

Connector Information	15-pin high-density female D-Sub
Mating Connector Details	TYCO: Plug P/N 748364-1; Housing P/N 5748677-2; Terminals P/N 1658670-2 (loose) or 1658670-1 (strip)
Mating Connector Included	No



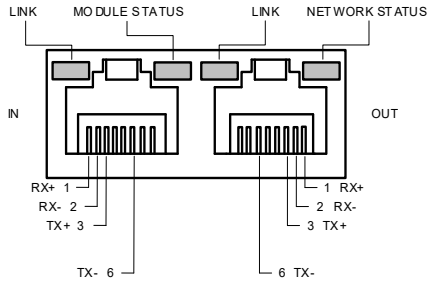
P4 – Feedback Connector				
Pin	Absolute Encoder	Incremental Encoder	Description / Notes	I/O
1	RESERVED	HALL A	Reserved for Absolute Encoders or Single-ended Commutation Sensor Inputs.	I
2	RESERVED	HALL B		I
3	RESERVED	HALL C		I
4	ENC DATA+	ENC A+	Differential Data Line for Absolute Encoders (BiSS: SLO+/-) or Differential Incremental Encoder A.	I
5	ENC DATA-	ENC A-		I
6	ENC CLOCK+	ENC B+	Differential Clock Line for Absolute Encoders (BiSS: MA+/-) or Differential Incremental Encoder B.	I
7	ENC CLOCK-	ENC B-		I
8	RESERVED	ENC I+	Reserved for Absolute Encoders or Differential Incremental Encoder Index.	I
9	RESERVED	ENC I-		I
10	RESERVED	RESERVED	Reserved.	-
11	RESERVED	RESERVED	Reserved.	-
12	GND	GND	Ground.	GND
13	+5V OUT	+5V OUT	+5V Supply Output. Short-circuit protected. (300ma total load capacity)	O
14	THERMISTOR	THERMISTOR	Motor Thermal Protection.	I
15	RESERVED	RESERVED	Reserved.	-

Connector Information	15-pin, high-density, female D-sub
Mating Connector Details	TYCO: Plug P/N 748364-1; Housing P/N 5748677-2; Terminals P/N 1658670-2 (loose) or 1658670-1 (strip)
Mating Connector Included	No



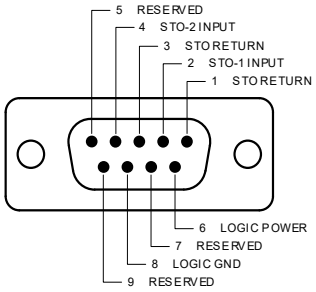
P5 – Ethernet Communication Connectors			
Pin	Name	Description / Notes	I/O
1	RX+	Receiver + (100Base-TX)	I
2	RX-	Receiver - (100Base-TX)	I
3	TX+	Transmitter + (100Base-TX)	O
4	RESERVED	Reserved.	-
5	RESERVED	Reserved.	-
6	TX-	Transmitter - (100Base-TX)	O
7	RESERVED	Reserved.	-
8	RESERVED	Reserved.	-

Connector Information	Shielded, dual RJ-45 socket with LEDs
Mating Connector Details	CAT 5 Cable
Mating Connector Included	No



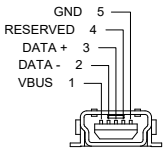
P6 – STO / Logic Connector			
Pin	Name	Description / Notes	I/O
1	STO RETURN	Safe Torque Off Return	STORET
2	STO-1 INPUT	Safe Torque Off – Input 1	I
3	STO RETURN	Safe Torque Off Return	STORET
4	STO-2 INPUT	Safe Torque Off – Input 2	I
5	RESERVED	Reserved.	-
6	LOGIC POWER	Logic Supply Input.	I
7	RESERVED	Reserved.	-
8	LOGIC GND	Logic Supply Ground. (Common with Signal Ground). When using a separate logic power supply, turn on the logic supply first before turning on the main power supply.	GND

Connector Information	9-pin, female D-sub
Mating Connector Details	TYCO: P/N 205204-4 (Plug); 5748677-1 (Housing); 1658540-5 (Terminals – Loose); 1658540-4 (Terminals – Strip)
Mating Connector Included	No



P9 – USB Communication Connector			
Pin	Name	Description / Notes	I/O
1	VBUS	Supply Voltage	O
2	DATA-	Data -	I/O
3	DATA+	Data +	I/O
4	RESERVED	Reserved.	-
5	GND	Ground	GND

Connector Information	5-pin, Mini USB B Type port
Mating Connector Details	TYCO: 1496476-3 (2-meter STD-A to MINI-B ASSY)
Mating Connector Included	No



BOARD CONFIGURATION

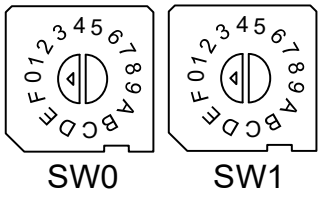
Status LED Functions

LED	Description
STATUS	Indicates drive power bridge status. GREEN when DC bus power is applied and the drive is enabled. RED when the drive is in a fault state.
POWER	Indicates that power is available to the drive. GREEN when power is applied.

Communication Status LED Functions (on RJ-45 Communication Connectors)

LED	Description	
MODULE STATUS	Off	No power
	Green	Device Operational
	Flashing Green	Standby
	Flashing Red	Minor Fault
	Red	Major Fault
	Flashing Green/Red	Self-test
NETWORK STATUS	Off	Not powered, no IP address
	Flashing Green	No connections
	Green	Connected
	Flashing Red	Connection Timeout
	Red	Duplicate IP address
	Flashing Green/Red	Self-test

IP Address Selector Switches

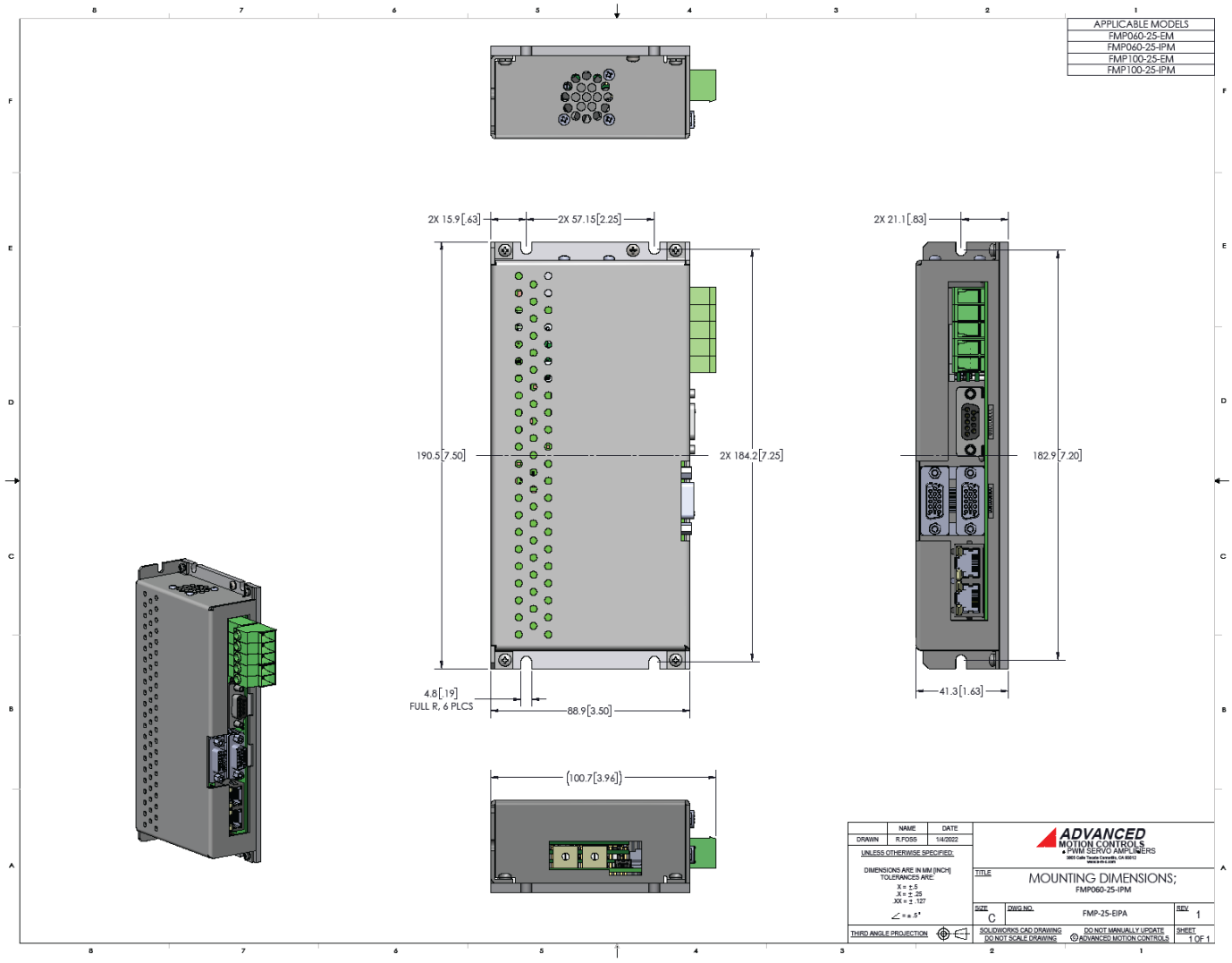
Switch Diagram	Description
	The IP Address of the drive is set to 192.168.1.xxx. Hexadecimal switch settings correspond to the last octet of the IP address of the drive within the Ethernet network. The IP address is also configurable through software.

SW1	SW0	Last Octet
0	0	Address stored in NVM
0	1	001
0	2	002
…	…	…
F	D	253
F	E	254
F	F	255

Safe Torque Off (STO) Inputs

The Safe Torque Off (STO) inputs are dedicated +24VDC sinking single-ended inputs. For applications not using STO functionality, disabling of the STO feature is required for proper drive operation. STO may be disabled by following the STO Disable wiring instructions as given in the hardware installation manual. Consult the hardware installation manual for more information.

MOUNTING DIMENSIONS



CUSTOMIZATION INFORMATION

ADVANCED Motion Controls also has the capability to promptly develop and deliver specified products for OEMs with volume requests. Our Applications and Engineering Departments will work closely with your design team through all stages of development in order to provide the best servo drive solution for your system. Equipped with on-site manufacturing for quick-turn customs capabilities, *ADVANCED* Motion Controls utilizes our years of engineering and manufacturing expertise to decrease your costs and time-to-market while increasing system quality and reliability.

Examples of Customized Products

- Optimized Footprint
- Private Label Software
- OEM Specified Connectors
- No Outer Case
- Increased Current Resolution
- Increased Temperature Range
- Custom Control Interface
- Integrated System I/O
- Tailored Project File
- Silkscreen Branding
- Optimized Base Plate
- Increased Current Limits
- Increased Voltage Range
- Conformal Coating
- Multi-Axis Configurations
- Reduced Profile Size and Weight

Feel free to contact us for further information and details!

Available Accessories

ADVANCED Motion Controls offers a variety of accessories designed to facilitate drive integration into a servo system. Visit www.a-m-c.com to see which accessories will assist with your application design and implementation.

All specifications in this document are subject to change without written notice. Actual product may differ from pictures provided in this document.