Description

The DigiFlex® Performance™ (DP) Series digital servo drives are designed to drive brushed and brushless servomotors, stepper motors, and AC induction motors. These fully digital drives operate in torque, velocity, or position mode and employ Space Vector Modulation (SVM), which results in higher bus voltage utilization and reduced heat dissipation compared to traditional PWM. The drive can be configured for a variety of external command signals. Commands can also be configured using the drive's built-in Motion Engine, an internal motion controller used with distributed motion applications. In addition to motor control, these drives feature dedicated and programmable digital and analog inputs and outputs to enhance interfacing with external controllers and devices.

This DP Series drive features an Ethernet interface for network communication using Ethernet POWERLINK, Modbus TCP or Ethernet, and a USB port for drive commissioning using DriveWare® 7, available for download at www.a-m-c.com.

All drive and motor parameters are stored in non-volatile memory. The DPP Series Hardware Installation Manual is available for download at www.a-m-c.com.

Power Range

Peak Current	20 A (14.1 A_RMS)
Continuous Current	10 A (10 A_RMS)
Supply Voltage	20 - 80 VDC

ETHERNET POWERLINK   Modbus   Ethernet

Features

- Four Quadrant Regenerative Operation
- Space Vector Modulation (SVM) Technology
- Fully Digital State-of-the-art Design
- Programmable Gain Settings
- Fully Configurable Current, Voltage, Velocity and Position Limits
- PIDF Velocity Loop

- PID + FF Position Loop
- Compact size, high power density
- 16-bit Analog to Digital Hardware
- Built-in brake/shunt regulator
- On-the-Fly Mode Switching
- On-the-Fly Gain Set Switching

MODES OF OPERATION
- Profile Modes
- Cyclic Synchronous Modes
- Current
- Velocity
- Position

COMMAND SOURCE
- ±10 V Analog
- Encoder Following
- Over the Network
- Sequencing
- Indexing
- Jogging

FEEDBACK SUPPORTED (FIRMWARE DEPENDENT)
- Halls
- Incremental Encoder
- Absolute Encoder (EnDat® 2.1/2.2, Hiperface®, or BiSS C-Mode)
- 1Vp-p Sine/Cosine Encoder
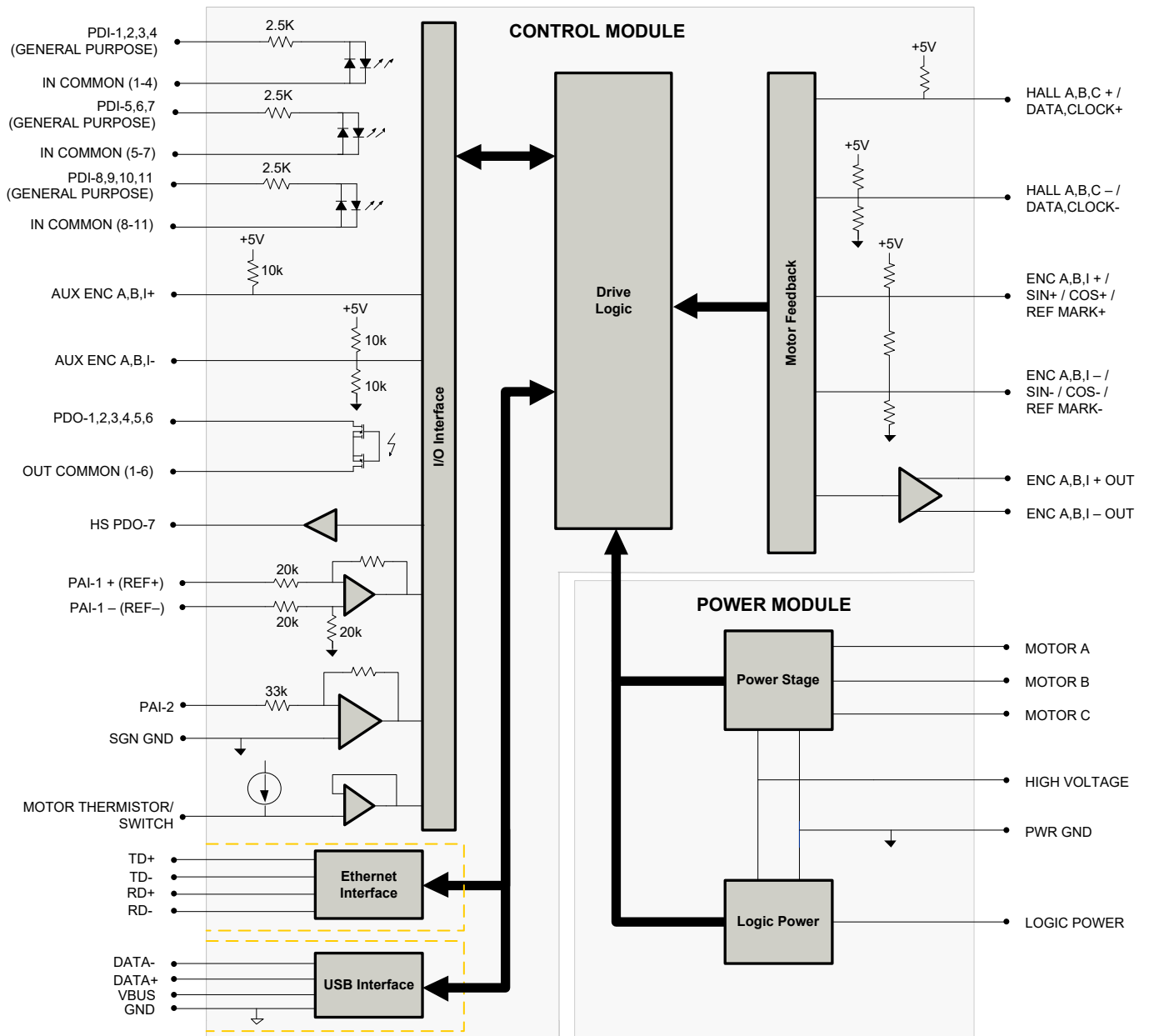- Auxiliary Incremental Encoder
- Tachometer (±10 VDC)

INPUTS/OUTPUTS
- 1 Motor Thermistor/Switch Input
- 11 General Purpose Programmable Digital Inputs
- 6 General Purpose Programmable Digital Outputs
- 1 High Speed Programmable Digital Output
- 2 Programmable Analog Inputs

COMPLIANCES & AGENCY APPROVALS
- CE Class A (LVD)
- CE Class A (EMC)
- RoHS
- UL
- cUL

BLOCK DIAGRAM

	Information on Approvals and Compliances	
![UL cUL US]	US and Canadian safety compliance with UL 508c, the industrial standard for power conversion electronics. 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 60204-1:2006/A1:2009, 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

Power Specifications

Description	Units	Value
DC Supply Voltage Range	VDC	20 – 80
DC Bus Over Voltage Limit	VDC	88.3
DC Bus Under Voltage Limit	VDC	17.5
Logic Supply Voltage	VDC	20 - 80
Maximum Peak Output Current[1]	A (A_{RMS})	20 (14.1)
Maximum Continuous Output Current[2]	A (A_{RMS})	10 (10)
Maximum Continuous Output Power	W	760
Maximum Power Dissipation at Continuous Current	W	40
Internal Bus Capacitance	µF	33
Minimum Load Inductance (Line-To-Line)[3]	µH	250 (at 80 V supply); 150 (at 48 V supply); 75 (at 24 V supply)
Switching Frequency	kHz	20
Maximum Output PWM Duty Cycle	%	85
Low Voltage Supply Outputs	-	+5 VDC (250 mA)

Control Specifications

Description	Units	Value
Communication Interfaces	-	Ethernet POWERLINK / Modbus TCP / Ethernet (USB for Configuration)
Command Sources	-	±10 V Analog, Encoder Following, Over the Network, Sequencing, Indexing, Jogging
Feedback Supported	-	Halls, Incremental Encoder, Absolute Encoder (EnDat® 2.1/2.2, Hiperface®, or BiSS C-Mode), 1Vp-p Sine/Cosine Encoder, Auxiliary Incremental Encoder, Tachometer (±10 VDC)
Commutation Methods	-	Sinusoidal, Trapezoidal
Modes of Operation	-	Profile Modes, Cyclic Synchronous 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), AC Induction (Closed Loop Vector)
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 (PDIs/PDOs)	-	11/7
Programmable Analog Inputs/Outputs (PAIs/PAOs)	-	2/0
Primary I/O Logic Level	-	24 VDC
Current Loop Sample Time	µs	50
Velocity Loop Sample Time	µs	100
Position Loop Sample Time	µs	100
Maximum Sin/Cos Encoder Frequency	kHz	200
Maximum Sin/Cos Interpolation	-	2048 counts per sin/cos cycle
Internal Shunt Regulator	-	No
Internal Shunt Resistor	-	No

Mechanical Specifications

Description	Units	Value
Agency Approvals	-	CE Class A (EMC), CE Class A (LVD), RoHS, UL, cUL
Size (H x W x D)	mm (in)	166.7 x 87.8 x 35.9 (6.6 x 3.5 x 1.4)
Weight	g (oz)	496 (17.5)
Heatsink (Base) Temperature Range[5]	°C (°F)	0 - 65 (32 - 149)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
Cooling System	-	Natural Convection
Form Factor	-	Panel Mount
AUX. COMM Connector	-	5-pin, Mini USB B Type port
COMM Connector	-	Shielded, dual RJ-45 socket with LEDs
FEEDBACK Connector	-	15-pin, high-density, female D-sub
AUX. ENCODER Connector	-	15-pin, high-density, male D-sub
I/O Connector	-	26-pin, high-density, female D-sub
POWER Connector	-	6-pin, 3.96 mm spaced, friction lock header

Notes

1. Capable of supplying drive rated peak current for 2 seconds with 10 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.
5. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

COMM – Ethernet Communication Connector

Pin	Name	Description / Notes	I/O
1	RD+	Receiver + (100Base-TX)	I
2	RD-	Receiver - (100Base-TX)	I
3	TD+	Transmitter + (100Base-TX)	O
4	RESERVED	-	-
5	RESERVED	-	-
6	TD-	Transmitter - (100Base-TX)	O
7	RESERVED	-	-
8	RESERVED	-	-
9	RESERVED	-	-

I/O – Signal Connector

Pin	Name	Description / Notes	I/O
1	PDO-1	General Purpose Programmable Digital Output (120 mA maximum)	O
2	PDO-2	General Purpose Programmable Digital Output (120 mA maximum)	O
3	PDO-3	General Purpose Programmable Digital Output (120 mA maximum)	O
4	OUT COMMON	Digital Output Common (1-6)	OCOM
5	GROUND	Ground	GND
6	PDO-4	General Purpose Programmable Digital Output (120 mA maximum)	O
7	PDO-5	General Purpose Programmable Digital Output (120 mA maximum)	O
8	HS PDO-7	High Speed Programmable Digital Output (5V CMOS Compatible Output)	O
9	PDO-6	General Purpose Programmable Digital Output (120 mA maximum)	O
10	PDI-1	General Purpose Programmable Digital Input	I
11	PDI-2	General Purpose Programmable Digital Input	I
12	PDI-3	General Purpose Programmable Digital Input	I
13	PDI-4	General Purpose Programmable Digital Input	I
14	IN COMMON	Digital Input Common (1-4)	ICOM
15	IN COMMON	Digital Input Common (5-7)	ICOM
16	PDI-5	General Purpose Programmable Digital Input	I
17	PDI-6	General Purpose Programmable Digital Input	I
18	PDI-7	General Purpose Programmable Digital Input	I
19	PDI-8	General Purpose Programmable Digital Input	I
20	PDI-9	General Purpose Programmable Digital Input	I
21	PDI-10	General Purpose Programmable Digital Input	I
22	PDI-11	General Purpose Programmable Digital Input	I
23	IN COMMON	Digital Input Common (8-11)	ICOM
24	PAI-1+	General Purpose Differential Programmable Analog Input or Reference Signal Input (16-bit Resolution)	I
25	PAI-1-		I
26	GROUND	Ground	GND

FEEDBACK – Feedback Connector*

Pin	Incremental Encoder	Absolute Encoder	1Vp-p Sin/Cos Encoder	Description / Notes	I/O
1	HALL A+	DATA-	HALL A+	Differential Hall A+/ Differential Data Line (BiSS: SLO-)	I
2	HALL B+	CLOCK+	HALL B+	Differential Hall B+ / Differential Clock Line (BiSS: MA+)	I
3	HALL C+	N/C	HALL C+	Differential Hall C+	I
4	ENC A+	SIN +	SIN +	Differential Encoder A / Differential Sine Input (Leave open for BiSS and EnDat 2.2)	I
5	ENC A-	SIN -	SIN -		I
6	ENC B+	COS +	COS +	Differential Encoder B/ Differential Cosine Input (Leave open for BiSS and EnDat 2.2)	I
7	ENC B-	COS -	COS -		I
8	ENC I+	REF MARK+	REF MARK +	Differential Encoder Index / Differential Reference Mark (Leave open for BiSS and EnDat 2.2)	I
9	ENC I-	REF MARK-	REF MARK -		I
10	HALL A-	DATA+	HALL A-	Differential Hall A- / Differential Data Line (BiSS: SLO+)	I
11	HALL B-	CLOCK-	HALL B-	Differential Hall B- / Differential Clock Line (BiSS: MA-)	I
12	SGND	SGND	SGND	5V Return (Signal Ground)	SGND
13	+5V OUT	+5V OUT	+5V OUT	+5V Encoder Supply Output. Short-circuit protected. (250mA)	O
14	THERMISTOR	THERMISTOR	THERMISTOR	Motor Thermal Protection	I
15	HALL C-	N/C	HALL C-	Differential Hall C-.	I

*Note: Feedback supported (Incremental Encoder, Absolute Sin/Cos Encoder, or 1Vp-p Sin/Cos Encoder) will be dependent on firmware.

AUX. ENCODER – Auxiliary Encoder Connector

Pin	Name	Description / Notes	I/O
1	ENC A+ OUT / RESERVED	Buffered Encoder Channel A Output* or Reserved.	O
2	ENC A- OUT / RESERVED		O
3	ENC B+ OUT / RESERVED	Buffered Encoder Channel B Output* or Reserved.	O
4	AUX ENC A+	Auxiliary Encoder Input (For single ended signal leave negative terminal open)	I
5	AUX ENC A-		I
6	AUX ENC B+	Auxiliary Encoder Input (For single ended signal leave negative terminal open)	I
7	AUX ENC B-		I
8	AUX ENC I+	Auxiliary Encoder Index Input (For single ended signal leave negative terminal open)	I
9	AUX ENC I-		I
10	ENC B- OUT / RESERVED	Buffered Encoder Channel B Output* or Reserved.	O
11	ENC I+ OUT / RESERVED	Buffered Encoder Index Output* or Reserved.	O
12	SGND	Signal Ground	SGND
13	+5V OUT	+5 VDC User Supply	O
14	PAI-2	Programmable Analog Input (12-bit Resolution)	I
15	ENC I- OUT / RESERVED	Buffered Encoder Index Output* or Reserved.	O

*Buffered encoder output only available with incremental encoder or 1Vp-p sin/cos encoder feedbacks. 1:1 input-to-output ratio, 5V square wave output. Reserved pins for all other feedbacks.
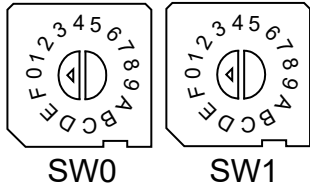
AUX. COMM - USB Communication Connector

Pin	Name	Description / Notes	I/O
1	VBUS	Supply Voltage	O
2	DATA -	Data -	I/O
3	DATA +	Data +	I/O
4	RESERVED	-	-
5	USB GND	USB Ground	UGND

POWER - 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
4	HIGH VOLTAGE	DC Power Input	I
5	PWR GND	Power Ground (Common With Signal Ground)	PGND
6	LOGIC PWR	Logic Supply Input	I

HARDWARE SETTINGS

Network IP Address Switches

Switch Diagram	Description
SW0 SW1	Hexadecimal switch settings correspond to the last octet of the IP Address of the drive within the Ethernet network. Note that for POWERLINK, the IP address will always be 192.168.100.xxx.

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

LED Functions (on RJ-45 Communication Connectors)

| LINK LED	
LED State	**Description**
Green – On	Valid Link - No Activity
Green – Flickering	Valid Link - Network Activity
Off	Invalid Link

MECHANICAL INFORMATION

| COMM - Ethernet Communication Connector		
Connector Information		Shielded, dual RJ-45 socket with LEDs
Mating Connector	Details	Standard CAT 5e or CAT 6 ethernet cable
	Included with Drive	No
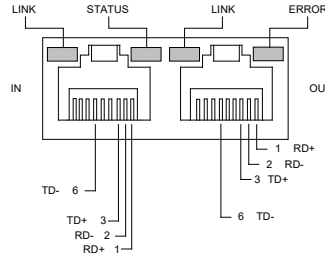
I/O - Signal Connector		
Connector Information		26-pin, high-density, female D-sub
Mating Connector	Details	TYCO: Plug P/N 1658671-1; Housing P/N 5748677-3; Terminals P/N 1658670-2 (loose) or 1658670-1 (strip)
	Included with Drive	No
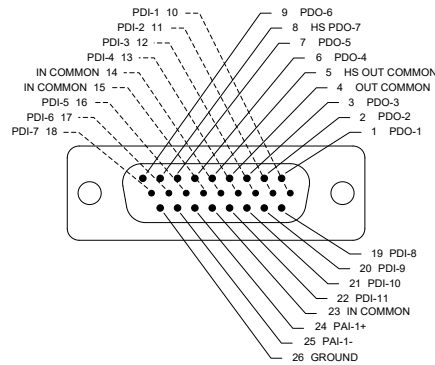
FEEDBACK - Feedback Connector		
Connector Information		15-pin, high-density, female D-sub
Mating Connector	Details	TYCO: Plug P/N 748364-1; Housing P/N 5748677-2; Terminals P/N 1658670-2 (loose) or 1658670-1 (strip)
	Included with Drive	No
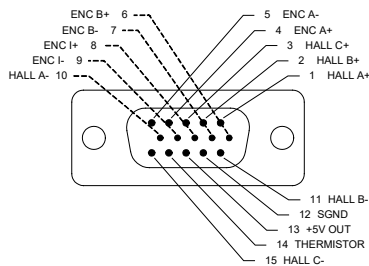
Incremental Encoder   **Absolute Encoder**   **1Vp-p Sin/Cos Encoder**
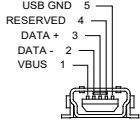
AUX. ENCODER - Auxiliary Feedback Connector

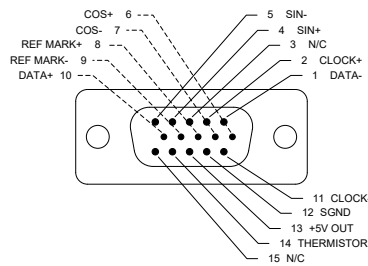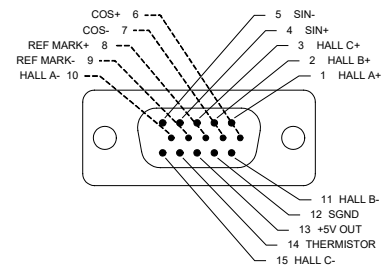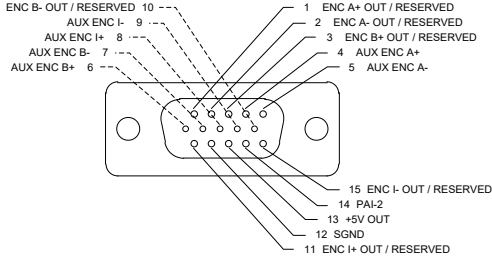| Connector Information		15-pin, high-density, male D-sub
Mating Connector	Details	TYCO: Plug P/N 1658681-1; Housing P/N 5748677-2; Terminals P/N 1658686-2 (loose) or 1658686-1 (strip)
	Included with Drive	No

ENC B- OUT / RESERVED 10
AUX ENC I- 9
AUX ENC I+ 8
AUX ENC B- 7
AUX ENC B+ 6

1 ENC A+ OUT / RESERVED
2 ENC A- OUT / RESERVED
3 ENC B+ OUT / RESERVED
4 AUX ENC A+
5 AUX ENC A-

15 ENC I- OUT / RESERVED
14 PAI-2
13 +5V OUT
12 SGND
11 ENC I+ OUT / RESERVED
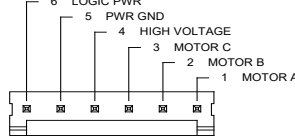
AUX. COMM – USB Communication Connector

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

USB GND 5
RESERVED 4
DATA + 3
DATA - 2
VBUS 1

POWER - Power Connector

Connector Information		6-pin, 3.96 mm spaced, friction lock header
Mating Connector	Details	AMP: Plug P/N 770849-6; Terminals P/N 770522-1 (loose) or 770476-1 (strip)
	Included with Drive	Yes

6 LOGIC PWR
5 PWR GND
4 HIGH VOLTAGE
3 MOTOR C
2 MOTOR B
1 MOTOR A

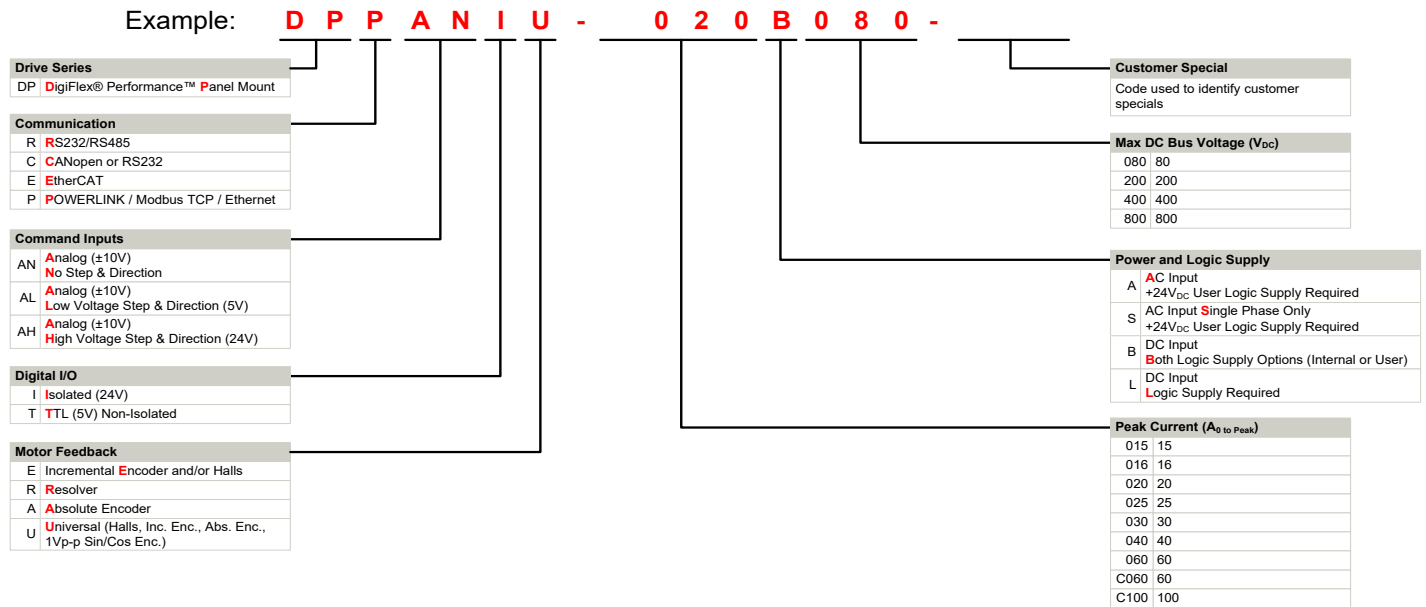# MOUNTING DIMENSIONS

MOUNTING DIMENSIONS;
DPPE-020B080-EXT

DWG NO. MD_DPPE_020B080-EXT   REV 1
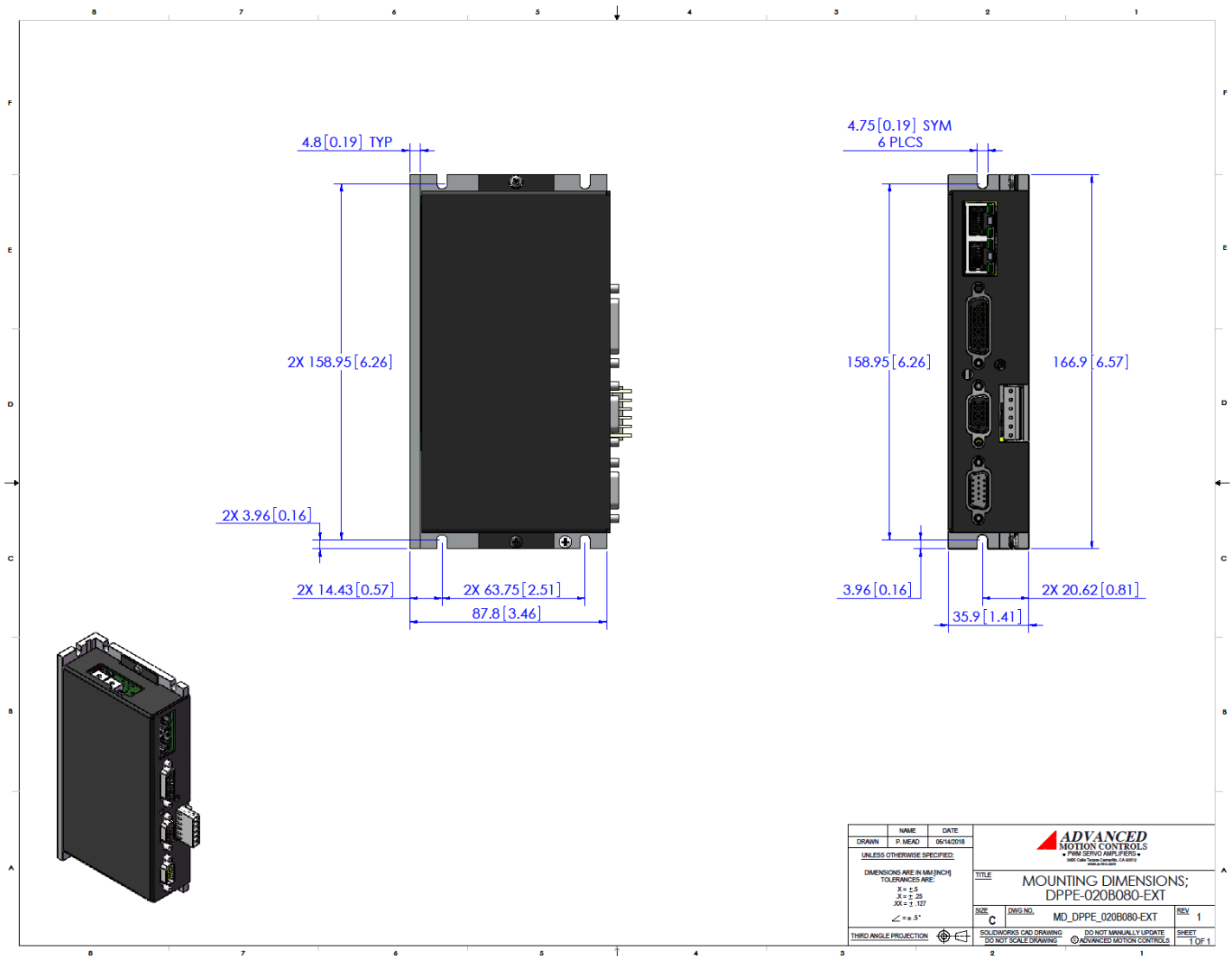
PART NUMBERING INFORMATION

Example: **D P P A N I U - 0 2 0 B 0 8 0 -**

Drive Series

DP	**D**igiFlex® **P**erformance™ **P**anel Mount

Communication

R	**R**S232/RS485
C	**C**ANopen or RS232
E	**E**therCAT
P	**P**OWERLINK / Modbus TCP / Ethernet

Command Inputs

AN	**A**nalog (±10V) **N**o Step & Direction
AL	**A**nalog (±10V) **L**ow Voltage Step & Direction (5V)
AH	**A**nalog (±10V) **H**igh Voltage Step & Direction (24V)

Digital I/O

I	**I**solated (24V)
T	**T**TL (5V) Non-Isolated

Motor Feedback

E	Incremental **E**ncoder and/or Halls
R	**R**esolver
A	**A**bsolute Encoder
U	**U**niversal (Halls, Inc. Enc., Abs. Enc., 1Vp-p Sin/Cos Enc.)

Customer Special

Code used to identify customer specials

Max DC Bus Voltage (V$_{DC}$)

080	80
200	200
400	400
800	800

Power and Logic Supply

A	**A**C Input +24V$_{DC}$ User Logic Supply Required
S	AC Input **S**ingle Phase Only +24V$_{DC}$ User Logic Supply Required
B	DC Input **B**oth Logic Supply Options (Internal or User)
L	DC Input **L**ogic Supply Required

Peak Current (A$_{0\ to\ Peak}$)

015	15
016	16
020	20
025	25
030	30
040	40
060	60
C060	60
C100	100

DigiFlex® Performance™ series of products are available in many configurations. Note that not all possible part number combinations are offered as standard drives. All models listed in the selection tables of the website are readily available, standard product offerings.

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. Feel free to contact Applications Engineering for further information and details.

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

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.

Shunt Regulators — **Drive(s)** — **Filter Cards** → **To Motor**

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