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 a CANopen interface for networking and a RS-232 interface for drive configuration and setup. Drive commissioning is accomplished using DriveWare® 7, available for download at www.a-m-c.com.

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

Power Range

Peak Current	15 A (10.6 A$_{RMS}$)
Continuous Current	7.5 A (7.5 A$_{RMS}$)
Supply Voltage	100 - 240 VAC

Features

- Follows the CAN in Automation (CiA) 301 Communications Profile and 402 Device Profile
- 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
- Dedicated Safe Torque Off (STO) Inputs

MODES OF OPERATION
- Profile Modes
- Cyclic Synchronous Modes
- Current
- Velocity
- Position
- Interpolated Position Mode (PVT)

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

FEEDBACK SUPPORTED
- ±10 VDC Position
- Auxiliary Incremental Encoder
- EnDat® 2.1/2.2
- Hiperface®
- 1Vp-p Sine/Cosine Encoder
- Tachometer (±10 VDC)

INPUTS/OUTPUTS
- 3 High Speed Captures
- 4 Programmable Analog Inputs (16-bit/12-bit Resolution)
- 1 Programmable Analog Output (10-bit Resolution)
- 3 Programmable Digital Inputs (Differential)
- 7 Programmable Digital Inputs (Single-Ended)
- 4 Programmable Digital Outputs (Single-Ended)

COMPLIANCES & AGENCY APPROVALS
- UL
- cUL
- CE Class A (LVD)
- CE Class A (EMC)
- RoHS
- TÜV Rheinland® (STO)

BLOCK DIAGRAM
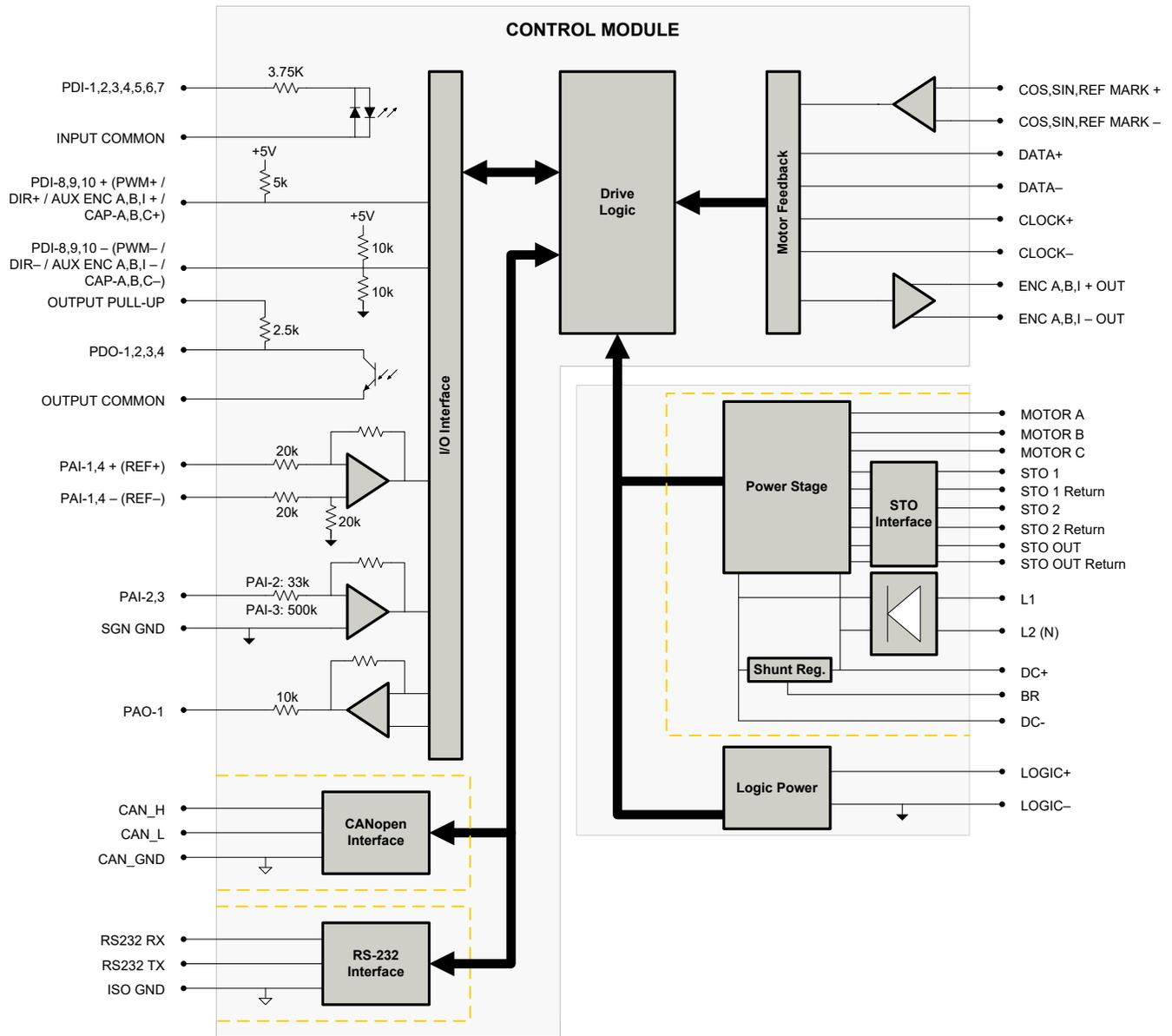
Information on Approvals and Compliances	
cULus	US and Canadian safety compliance with UL 508c, the industrial standard for power conversion electronics. UL registered under file number E140173. Note that machine components compliant with UL are considered UL registered as opposed to UL listed as would 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.
TÜV Rheinland Functional Safety Type Approved CERTIFIED www.tuv.com ID 0600000000	Functional Safety STO is TÜV Rheinland® certified and meets requirements of the following standards: • EN ISO 13849-1 Category 4 / PL e • EN IEC 61800-5-2 STO (SIL 3) • EN62061 SIL CL3 • IEC 61508 SIL 3

SPECIFICATIONS

Power Specifications		
Description	Units	Value
Rated Voltage	VAC (VDC)	240 (339)
AC Supply Voltage Range	VAC	100 - 240
AC Supply Minimum	VAC	90
AC Supply Maximum	VAC	264
AC Input Phases	-	1
AC Supply Frequency	Hz	50 - 60
DC Supply Voltage Range[1]	VDC	127 - 373
DC Bus Over Voltage Limit	VDC	394
DC Bus Under Voltage Limit	VDC	55
Logic Supply Voltage	VDC	20 - 30 (@ 850 mA)
Safe Torque Off Voltage[2]	VDC	24 (±6)
Maximum Peak Output Current[3]	A (Arms)	15 (10.6)
Maximum Continuous Output Current[4]	A (Arms)	7.5 (7.5)
Max. Continuous Output Power @ Rated Voltage[5]	W	2415
Max. Continuous Power Dissipation @ Rated Voltage	W	127
Internal Bus Capacitance	μF	540
External Shunt Resistance Minimum Resistance[6]	Ω	25
Minimum Load Inductance (Line-To-Line)[7]	μH	600
Switching Frequency	kHz	20
Maximum Output PWM Duty Cycle	%	100
Low Voltage Supply Outputs	-	+5 VDC (250 mA)

Control Specifications		
Description	Units	Value
Communication Interfaces	-	CANopen (RS-232 for configuration)
Command Sources	-	±10 V Analog, Encoder Following, Over the Network, PWM and Direction, Sequencing, Indexing, Jogging
Feedback Supported	-	±10 VDC Position, Auxiliary Incremental Encoder, EnDat® 2.1/2.2, Hiperface®, 1Vp-p Sine/Cosine Encoder, Tachometer (±10 VDC)
Commutation Methods	-	Sinusoidal
Modes of Operation	-	Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position, Interpolated Position Mode (PVT)
Motors Supported[8]	-	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)	-	10/4
Programmable Analog Inputs/Outputs (PAIs/PAOs)	-	4/1
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	-	Yes
Internal Shunt Resistor	-	No

Mechanical Specifications		
Description	Units	Value
Agency Approvals	-	CE Class A (EMC), CE Class A (LVD), cUL, RoHS, TÜV Rheinland® (STO), UL
Size (H x W x D)	mm (in)	177.50 x 123.39 x 44.45 (6.99 x 4.86 x 1.75)
Weight	g (oz)	894 (31.5)
Heatsink (Base) Temperature Range[9]	°C (°F)	0 - 75 (32 - 167)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
Form Factor	-	Panel Mount
Cooling System	-	Natural Convection
+24V LOGIC Connector	-	2-port, 3.5 mm spaced insert connector
AUX COMM Connector	-	3-pin, 2.5 mm spaced, enclosed, friction lock header
AUX ENCODER Connector	-	15-pin, high-density, male D-sub
COMM Connector	-	Shielded, dual RJ-45 socket with LEDs
FEEDBACK Connector	-	15-pin, high-density, female D-sub
I/O Connector	-	26-pin, high-density, female D-sub
POWER Connector	-	10-port, 5.08 mm spaced, enclosed, friction lock header
STO Connector	-	8-port, 2.0 mm spaced, enclosed, friction lock header

Notes
1. Large inrush current may occur upon initial DC supply connection to DC Bus. See installation manual for details.
2. STO features must be disabled for applications not using STO. See page 6 for more information.
3. 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.
4. Continuous Arms value attainable when RMS Charge-Based Limiting is used.
5. P = (DC Rated Voltage) * (Cont. RMS Current) * 0.95.
6. *ADVANCED* Motion Controls recommends using an external fuse in series with the shunt resistor. A 3 amp motor delay fuse is typical.
7. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
8. Maximum motor speed for stepper motors is 600 RPM. Consult the hardware installation manual for 2-phase stepper wiring configuration.
9. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

+24V LOGIC - Logic Power Connector

Pin	Name	Description / Notes	I/O
1	LOGIC GND	Logic Supply Ground (Common with Signal Ground)	GND
2	LOGIC PWR	Logic Supply Input	I

AUX COMM - RS232 Communication Connector

Pin	Name	Description / Notes	I/O
1	RS232 RX	Receive Line (RS-232)	I
2	RS232 TX	Transmit Line (RS-232)	O
3	ISO GND	Isolated Signal Ground	IGND

AUX ENCODER - Auxiliary Feedback Connector

Pin	Name	Description / Notes	I/O
1	RESERVED	Reserved	-
2	RESERVED	Reserved	-
3	RESERVED	Reserved	-
4	PDI-8 + (PWM+ / AUX ENC A+ / CAP-B+)	Programmable Digital Input or PWM or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals Leave Negative Terminal Open)	I
5	PDI-8 - (PWM- / AUX ENC A- / CAP-B-)		I
6	PDI-9 + (DIR+ / AUX ENC B+ / CAP-C+)	Programmable Digital Input or Direction Input or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals Leave Negative Terminal Open)	I
7	PDI-9 - (DIR- / AUX ENC B- / CAP-C-)		I
8	PDI-10 + (AUX ENC I+ / CAP-A+)	Programmable Digital Input or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals Leave Negative Terminal Open)	I
9	PDI-10 - (AUX ENC I- / CAP-A-)		I
10	SGN GND	Signal Ground	SGND
11	SGN GND	Signal Ground	SGND
12	SGN GND	Signal Ground	SGND
13	+5V OUT	+5V Encoder Supply Output (Short Circuit Protected)	O
14	PAI-4 +	Differential Programmable Analog Input (12-bit Resolution)	I
15	PAI-4 -		I

COMM - CAN Communication Connector

Pin	Name	Description / Notes	I/O
1	CAN_H	CAN_H Line (Dominant High)	I
2	CAN_L	CAN _L Line (Dominant Low)	I
3	CAN_GND	CAN Ground	CGND
4	RESERVED	Reserved	-
5	RESERVED	Reserved	-
6	RESERVED	Reserved	-
7	CAN_GND	CAN Ground	CGND
8	RESERVED	Reserved	-

FEEDBACK - Feedback Connector

Pin	Name	Description / Notes	I/O
1	COS +	Cosine Input	I
2	COS -		I
3	SIN +	Sine Input	I
4	SIN -		I
5	SGN GND	Signal Ground	SGND
6	DATA-	Differential Data Line (Differential Hall A if using 1Vp-p Sine/Cosine encoder. Pin 6 = Hall A+, Pin 7 = Hall A-. For single-ended Halls leave negative terminal open.)	I/O
7	DATA+		I/O
8	CLOCK+	Differential Clock Line (Differential Hall B if using 1Vp-p Sine/Cosine encoder. Pin 8 = Hall B+, Pin 9 = Hall B-. For single-ended Halls leave negative terminal open.)	O
9	CLOCK-		O
10	REF MARK +	Reference mark from sine/cosine encoder	I
11	RESERVED	Reserved (Differential Hall C if using 1Vp-p Sine/Cosine encoder. Pin 11 = Hall C+, Pin 12 = Hall C-. For single-ended Halls leave negative terminal open.)	-
12	RESERVED		-
13	+5V OUT	+5V Encoder Supply Output (Short Circuit Protected)	O
14	PAI-3	Programmable Analog Input (12-bit Resolution)	I
15	REF MARK -	Reference mark from sine/cosine encoder	I

I/O - Signal Connector

Pin	Name	Description / Notes	I/O
1	PDO-1	Isolated Programmable Digital Output	O
2	OUTPUT COMMON	Digital Output Common	OGND
3	PDO-2	Isolated Programmable Digital Output	O
4	PAI-1 + (REF+)	Differential Programmable Analog Input or Reference Signal Input (16-bit Resolution)	I
5	PAI-1 - (REF-)		I
6	PAI-2	Programmable Analog Input (12-bit Resolution)	I
7	PAO-1	Programmable Analog Output (10-bit Resolution)	O
8	OUTPUT PULL-UP	Digital Output Pull-Up For User Outputs	I
9	PDI-5	Isolated Programmable Digital Input	I
10	PDO-3	Isolated Programmable Digital Output	O
11	PDI-1	Isolated Programmable Digital Input	I
12	PDI-2	Isolated Programmable Digital Input	I
13	PDI-3	Isolated Programmable Digital Input	I
14	PDO-4	Isolated Programmable Digital Output	O
15	INPUT COMMON	Digital Input Common (Can Be Used To Pull-Up Digital Inputs)	IGND
16	SGN GND	Signal Ground	SGND
17	PDI-4	Isolated Programmable Digital Input	I
18	PDI-6	Isolated Programmable Digital Input	I
19	PDI-7	Isolated Programmable Digital Input	I
20	ENC A+ OUT	Emulated Encoder Channel A Output	O
21	ENC A- OUT		O
22	ENC B+ OUT	Emulated Encoder Channel B Output	O
23	ENC B- OUT		O
24	ENC I+ OUT	Emulated Encoder Index Output	O
25	ENC I- OUT		O
26	SGN GND	Signal Ground	SGND

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	SHIELD	Motor cable shield. Internally connected to protective earth ground.	-
5	PE	Protective Earth Ground	-
6	L1	AC Supply Input (Single Phase)	I
7	L2 (N)		I
8	DC+	Internal DC Bus Voltage. If using an external brake resistor, connect between this port and BR. For DC Supply operation, connect DC supply +HV IN to this port.	I
9	BR	External Brake Resistor Connection. If using an external brake resistor, connect between this port and DC+.	-
10	DC-	Internal DC Bus Voltage. For DC Supply operation, connect DC supply ground to this port.	I

STO – Safe Torque Off Connector*

Pin	Name	Description / Notes	I/O
1	STO OUTPUT	Safe Torque Off Output	O
2	RESERVED	Reserved	-
3	STO-1 RETURN	Safe Torque Off 1 Return	STORET1
4	STO-1	Safe Torque Off – Input 1	I
5	STO-2 RETURN	Safe Torque Off 2 Return	STORET2
6	STO-2	Safe Torque Off – Input 2	I
7	RESERVED	Reserved	-
8	STO OUT RETURN	Safe Torque Off Output Return	STORETO

*STO features must be disabled for applications not using STO. See page 6 for more information.

HARDWARE SETTINGS

Switch Functions

Switch	Description	Setting	
		On	Off
1	Bit 0 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
2	Bit 1 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
3	Bit 2 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
4	Bit 3 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
5	Bit 4 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
6	Bit 5 of binary CANopen node ID. Does not affect RS-232 settings.	1	0
7	Bit 0 of drive CANopen bit rate setting. Does not affect RS-232 settings.	1	0
8	Bit 1 of drive CANopen bit rate setting. Does not affect RS-232 settings.	1	0

Additional Details

The drive can be configured to use the address and/or bit rate stored in non-volatile memory by setting the address and/or bit rate value to 0. Use the table below to map actual bit rates to a bit rate setting. Note that higher bit rates are possible when using the value stored in NVM.

Bit Rate (kbits/sec)	Value For Bit Rate Setting
Load from non-volatile memory	0
500	1
250	2
125	3

Safe Torque Off (STO) Inputs

The Safe Torque Off (STO) Inputs are dedicated +24VDC max 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 installing the included mating connector for the STO connector and following the STO Disable wiring instructions as given in the hardware installation manual. Consult the hardware installation manual for more information. Alternatively, a dedicated STO Disable Key connector is available for purchase for applications where STO is not in use. Contact the factory for ordering information.

CAN Termination Jumper Configuration

Jumper	Description	Configuration		
	Header Jumper	Not Installed	Pins 1-2	Pins 3-4
J1	CAN bus termination. For the last drive in a CAN network, a jumper (2.54mm) must be installed on the 4-pin header adjacent to the RS-232 connector. The jumper should be installed between pins 1 and 2, which are the two pins furthest from the connector (see graphic below).	Non-terminating Node	Terminating Node	N/A
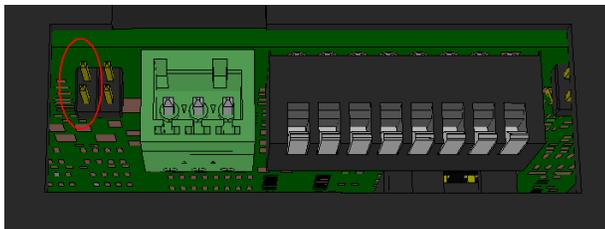
MECHANICAL INFORMATION

+24V LOGIC - Logic Power Connector

Connector Information		2-port, 3.5 mm spaced insert connector
Mating Connector	Details	Phoenix Contact: P/N 1840366
	Included with Drive	Yes

1 LOGIC GND
2 LOGIC PWR
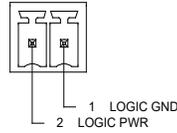
AUX COMM - RS232 Communication Connector

Connector Information		3-pin, 2.5 mm spaced, enclosed, friction lock header
Mating Connector	Details	Phoenix Contact: Plug P/N 1881338
	Included with Drive	Yes

3 ISO GND
2 RS232 TX
1 RS232 RX
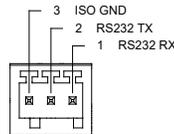
POWER - Power Connector

Connector Information		10-port, 5.08 mm spaced, enclosed, friction lock header
Mating Connector	Details	Phoenix Contact: P/N 1781069
	Included with Drive	Yes

1 MOTOR A
2 MOTOR B
3 MOTOR C
4 SHIELD
5 PE
6 L1
7 L2 (N)
8 DC+
9 BR
10 DC-
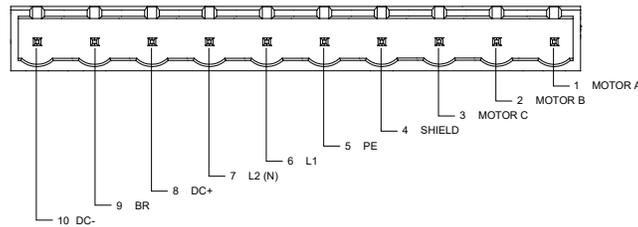
COMM - CAN Communication Connector

Connector Information		Shielded, dual RJ-45 socket with LEDs
Mating Connector	Details	TYCO: Plug P/N 5-569552-3
	Included with Drive	No
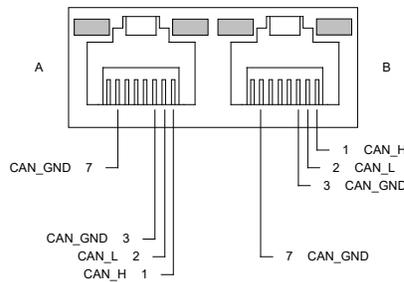
A   B

CAN_GND 7
1 CAN_H
2 CAN_L
3 CAN_GND

CAN_GND 3
CAN_L 2
CAN_H 1
7 CAN_GND

FEEDBACK - Feedback Connector

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

DATA- 6
DATA+ 7
CLOCK+ 8
CLOCK- 9
REF MARK + 10

5 SGN GND
4 SIN -
3 SIN +
2 COS -
1 COS +

13 +5V OUT
14 PAI-3
15 REF MARK -
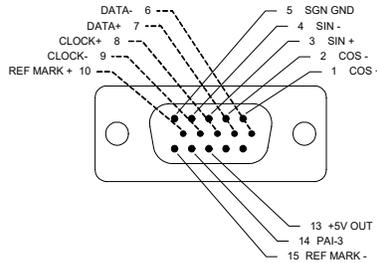
I/O - Signal Connector

Connector Information		26-pin, high-density, female D-sub
Mating Connector	Details	TYCO: Plug P/N 1658671-1; Housing P/N 5748677-2; Terminals P/N 1658670-2 (loose) or 1658670-1 (strip)
	Included with Drive	No
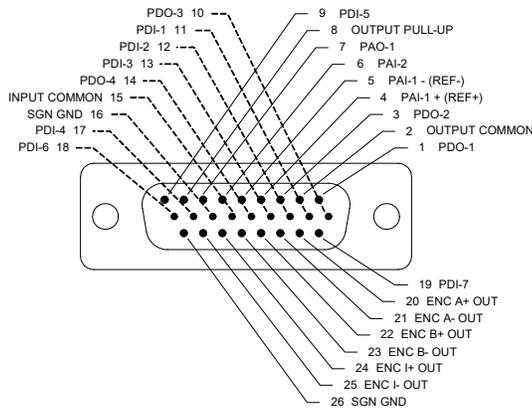
PDO-3 10
PDI-1 11
PDI-2 12
PDI-3 13
PDO-4 14
INPUT COMMON 15
SGN GND 16
PDI-4 17
PDI-6 18

9 PDI-5
8 OUTPUT PULL-UP
7 PAO-1
6 PAI-2
5 PAI-1 - (REF-)
4 PAI-1 + (REF+)
3 PDO-2
2 OUTPUT COMMON
1 PDO-1

19 PDI-7
20 ENC A+ OUT
21 ENC A- OUT
22 ENC B+ OUT
23 ENC B- OUT
24 ENC I+ OUT
25 ENC I- OUT
26 SGN GND

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 5748677-1; Terminals P/N 1658686-2 (loose) or 1658686-1 (strip)
	Included with Drive	No

SGN GND 10
PDI-10 - (AUX ENC I- / CAP-A-) 9
PDI-10 + (AUX ENC I+ / CAP-A+) 8
PDI-9 - (DIR- / AUX ENC B- / CAP-C-) 7
PDI-9 + (DIR+ / AUX ENC B+ / CAP-C+) 6

4 PDI-8 + (PWM+ / AUX ENC A+ / CAP-B+)
5 PDI-8 - (PWM- / AUX ENC A- / CAP-B-)

15 PAI-4 -
14 PAI-4 +
13 +5V OUT
12 SGN GND
11 SGN GND
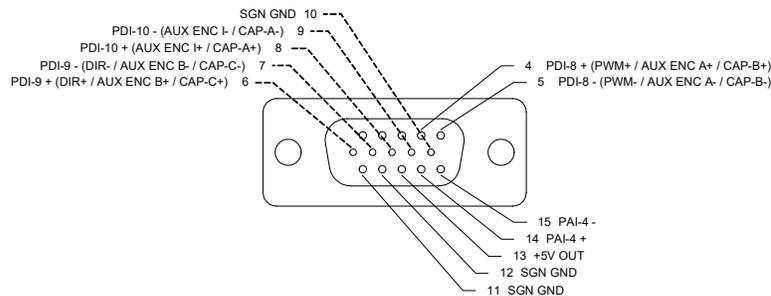
STO – Safe Torque Off Connector		
Connector Information		8-port, 2.00 mm spaced, enclosed, friction lock header
Mating Connector	Details	Molex: P/N 51110-0860 (housing); 50394-8051 (pins)
	Included with Drive	Yes

```
STO-2 RETURN  5 ──┐   ┌── 3  STO-1 RETURN
   RESERVED   7 ──┐   ┌── 1  STO OUTPUT



STO OUT RETURN  8 ──┐   ┌── 2  RESERVED
        STO-2   6 ──┘   └── 4  STO-1
```
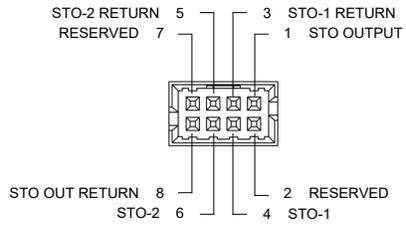
MOUNTING DIMENSIONS
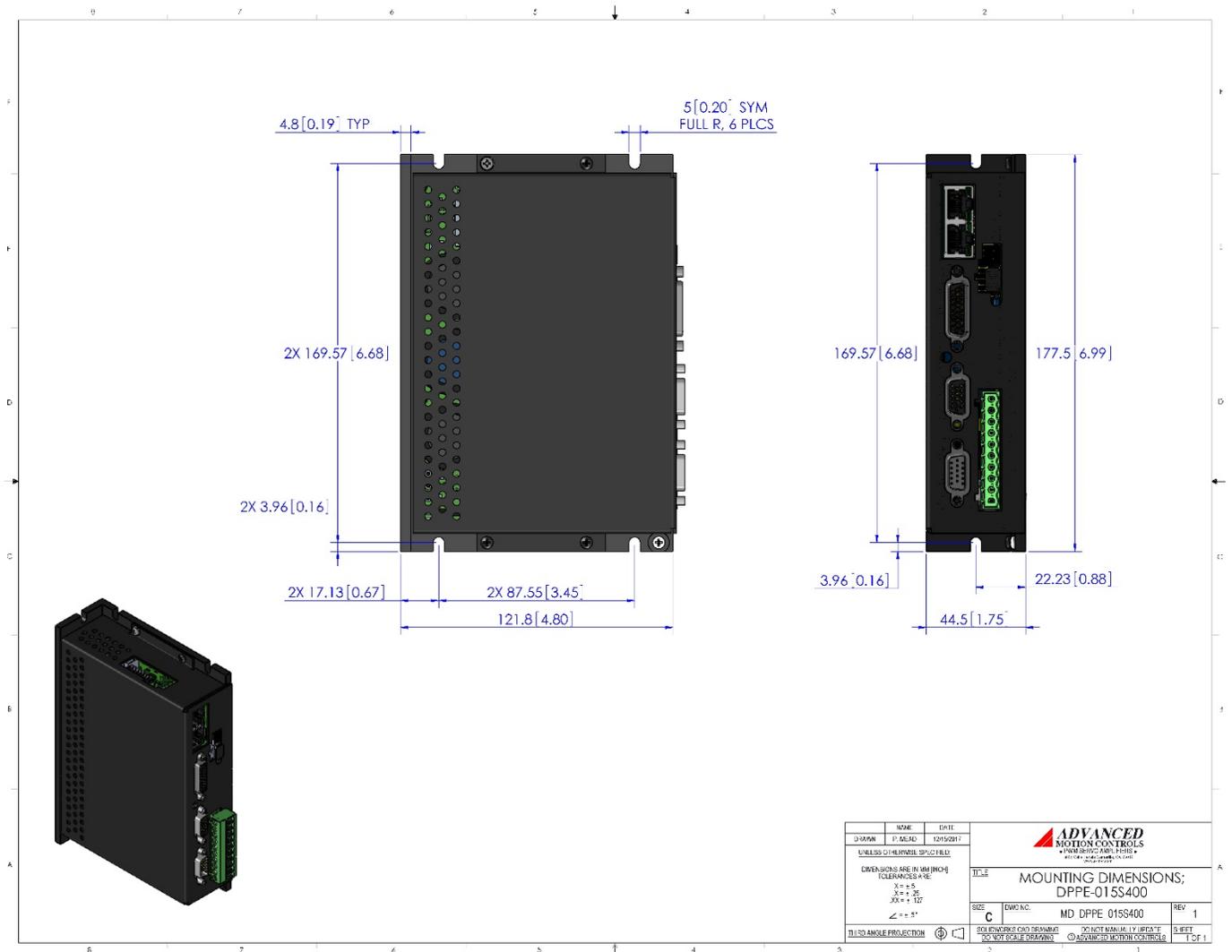
PART NUMBERING INFORMATION

Example: **D P C A N I A - 0 1 5 S 4 0 0 -**

Drive Series

DP	**D**igiFlex® **P**erformance™

Communication

C	**CA**Nopen®
E	**E**therCAT®
M	Click&**M**ove® Embedded
P	**P**OWERLINK / Modbus TCP / Ethernet
R	**R**S485 / Modbus RTU

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