

| Description | Power Range |
|-------------|-------------|
|-------------|-------------|

The DigiFlex® Performance™ (DP) Series digital servo drives are designed to drive brushed and brushless servomotors. 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.

| | |
|--------------------|-------------------------------|
| Peak Current | 60 A (42.4 A _{RMS}) |
| Continuous Current | 30 A (21.2 A _{RMS}) |
| Supply Voltage | 200 - 480 VAC |



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 Current
- Profile Velocity
- Profile Position
- Cyclic Synchronous Current Mode
- Cyclic Synchronous Velocity Mode
- Cyclic Synchronous Position Mode

COMMAND SOURCE

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

FEEDBACK SUPPORTED

- Auxiliary Incremental Encoder
- Heidenhain EnDat®
- Stegmann Hiperface®
- Tachometer (±10 VDC)

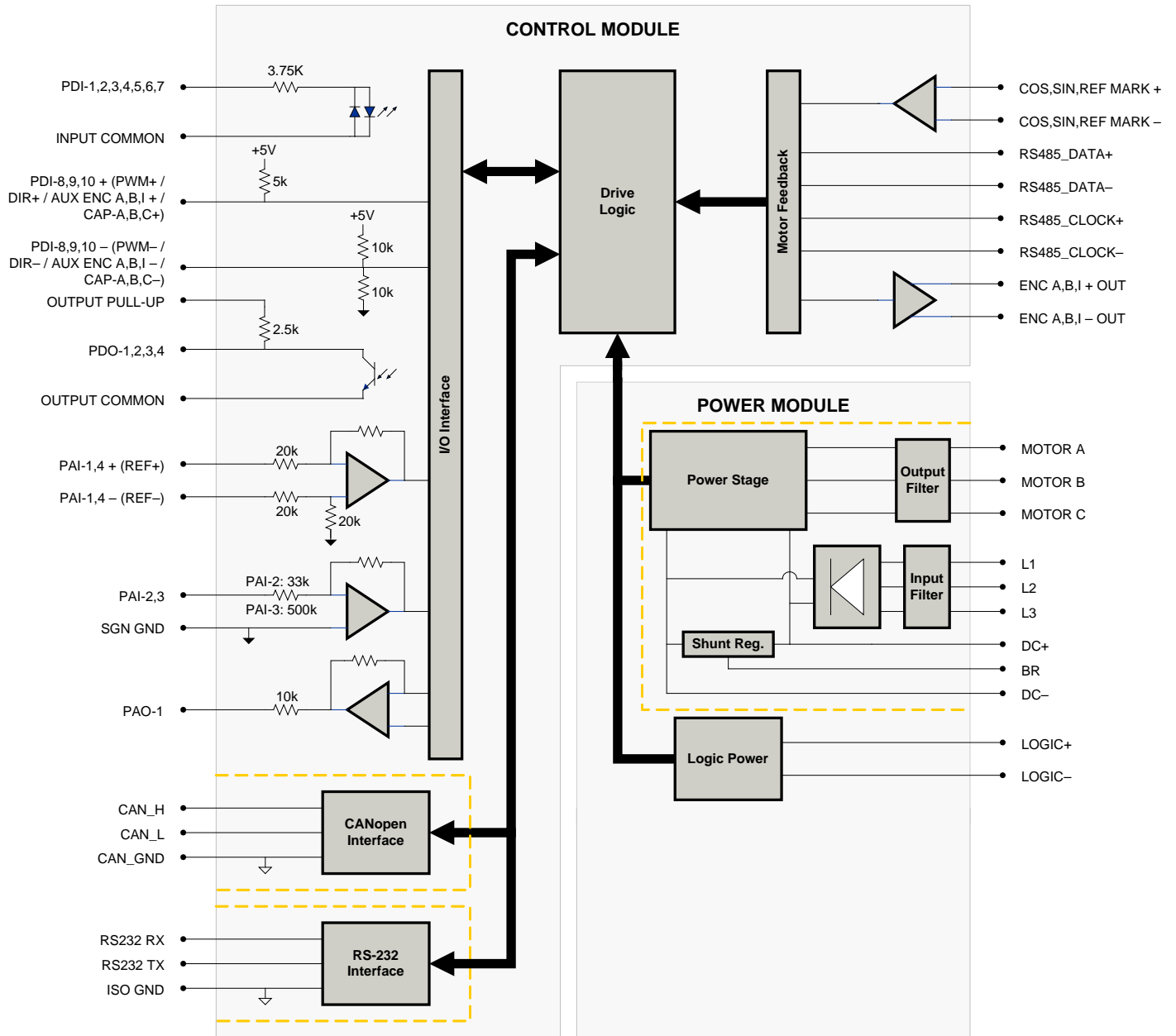
INPUTS/OUTPUTS

- 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

- CE Class A (LVD)
- CE Class A (EMC)
- RoHS

BLOCK DIAGRAM



Information on Approvals and Compliances



Compliant with European CE for both the Class A EMC Directive 2004/108/EC on Electromagnetic Compatibility (specifically EN 61000-6-4:2007 and EN 61000-6-2:2005) and LVD requirements of directive 2006/95/EC (specifically EN 60204-1:2006), a low voltage directive to protect users from electrical shock.



RoHS (Reduction of Hazardous Substances) is intended to prevent hazardous substances such as lead from being manufactured in electrical and electronic equipment.

SPECIFICATIONS

| Power Specifications | | |
|---|-----------|--|
| Description | Units | Value |
| Rated Voltage | VAC (VDC) | 480 (678) |
| AC Supply Voltage Range | VAC | 200 - 480 |
| AC Supply Minimum | VAC | 180 |
| AC Supply Maximum | VAC | 528 |
| AC Input Phases | - | 3 |
| AC Supply Frequency | Hz | 50 - 60 |
| DC Supply Voltage Range ¹ | VDC | 255 - 747 |
| DC Bus Over Voltage Limit | VDC | 850 |
| DC Bus Under Voltage Limit | VDC | 230 |
| Logic Supply Voltage | VDC | 20 - 30 (@ 850 mA) |
| Maximum Peak Output Current ² | A (Arms) | 60 (42.4) |
| Maximum Continuous Output Current | A (Arms) | 30 (21.2) |
| Max. Continuous Output Power @ Rated Voltage ³ | W | 13680 |
| Max. Continuous Power Dissipation @ Rated Voltage | W | 720 |
| Internal Bus Capacitance | µF | 330 |
| External Shunt Resistor Minimum Resistance ⁴ | Ω | 40 |
| Minimum Load Inductance (Line-To-Line) ⁵ | µH | 3000 |
| Switching Frequency | kHz | 10 |
| 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, Indexing, Jogging |
| Feedback Supported | - | Auxiliary Incremental Encoder, Heidenhain EnDat®, Stegmann Hiperface®, Tachometer (±10 VDC) |
| Commutation Methods | - | Sinusoidal |
| Modes of Operation | - | Profile Current, Profile Velocity, Profile Position, Cyclic Synchronous Current Mode, Cyclic Synchronous Velocity Mode, Cyclic Synchronous Position Mode |
| Motors Supported | - | Closed Loop Vector, Single Phase (Brushed, Voice Coil, Inductive Load), Three Phase (Brushless) |
| 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 | 100 |
| Velocity Loop Sample Time | µs | 200 |
| Position Loop Sample Time | µs | 200 |
| 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), RoHS |
| Size (H x W x D) | mm (in) | 300.5 x 232.1 x 139.3 (11.8 x 9.1 x 5.5) |
| Weight | g (oz) | 6174 (217.8) |
| Heatsink (Base) Temperature Range ⁶ | °C (°F) | 0 - 75 (32 - 167) |
| Storage Temperature Range | °C (°F) | -40 - 85 (-40 - 185) |
| Form Factor | - | Panel Mount |
| Cooling System | - | Natural Convection |
| IP Rating | - | IP10 |
| +24V LOGIC Connector | - | 2-port, 5.08 mm spaced, enclosed, friction lock header |
| 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 |
| DC BUS Connector | - | 4-port, 7.62 mm spaced, enclosed, friction lock header |
| FEEDBACK Connector | - | 15-pin, high-density, female D-sub |
| I/O Connector | - | 26-pin, high-density, female D-sub |
| MOTOR POWER Connector | - | 4-port, 7.62 mm spaced, enclosed, friction lock header |
| POWER Connector | - | 3-port, 7.62 mm spaced, enclosed, friction lock header |

Notes

- DC supply operation through the L1, L2, or L3 terminals will reduce peak/cont. current ratings by 30%. See installation manual for details.
- 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.
- $P = (\text{DC Rated Voltage}) \times (\text{Cont. RMS Current}) \times 0.95$.
- ADVANCED Motion Controls recommends using an external fuse in series with the shunt resistor. A 3 amp motor delay fuse is typical.
- Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
- 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 PWR | Logic Supply Input | I |
| 2 | LOGIC GND | Logic Supply Ground | GND |

| 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 | - |

| DC BUS - Power Connector | | | |
|---------------------------------|------|---|-----|
| Pin | Name | Description / Notes | I/O |
| 1 | DC- | Internal DC Bus Voltage (Can Be Used To Connect External Shunt Regulator) | O |
| 2 | BR | External Brake Resistor Connection | - |
| 3 | DC+ | Brake Resistor DC+. Connection for brake resistor. | O |
| 4 | DC+ | Internal DC Bus Voltage (Can Be Used To Connect External Shunt Regulator) | O |

| 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 | RS485_DATA- | Differential Data Line | I/O |
| 7 | RS485_DATA+ | | I/O |
| 8 | RS485_CLOCK+ | Differential Clock Line | O |
| 9 | RS485_CLOCK- | | O |
| 10 | REF MARK + | Reference mark from sine/cosine encoder | I |
| 11 | RESERVED | Reserved | - |
| 12 | RESERVED | 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 |

| MOTOR POWER - Power Connector | | | |
|-------------------------------|---------|---|-----|
| Pin | Name | Description / Notes | I/O |
| 1 | SHIELD | Motor feedback cable shield. Internally connected to protective earth ground. | - |
| 2 | MOTOR C | Motor Phase C | O |
| 3 | MOTOR B | Motor Phase B | O |
| 4 | MOTOR A | Motor Phase A | O |

| POWER - Power Connector | | | |
|-------------------------|------|-------------------------------|-----|
| Pin | Name | Description / Notes | I/O |
| 1 | L3 | AC Supply Input (Three Phase) | I |
| 2 | L2 | | I |
| 3 | L1 | | I |

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.

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

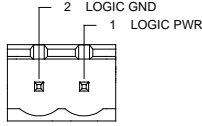
Jumper Settings

| Jumper | Description | Configuration | | |
|--------|---|----------------------|------------------|----------|
| | | Not Installed | Pins 1-2 | Pins 2-3 |
| J1 | CAN bus termination. Install this jumper (2.54mm) on the last drive in a CAN network. This jumper is located on a 4-pin header adjacent to the RS-232 connector. It consists of the two pins furthest from the connector. | Non-terminating Node | Terminating Node | N/A |
| J2 | Reserved. | - | - | N/A |

MECHANICAL INFORMATION

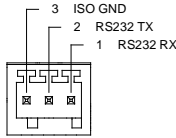
+24V LOGIC - Logic Power Connector

| | | |
|-----------------------|---------------------|--|
| Connector Information | | 2-port, 5.08 mm spaced, enclosed, friction lock header |
| Mating Connector | Details | Phoenix Contact: P/N 1757019 |
| | Included with Drive | Yes |



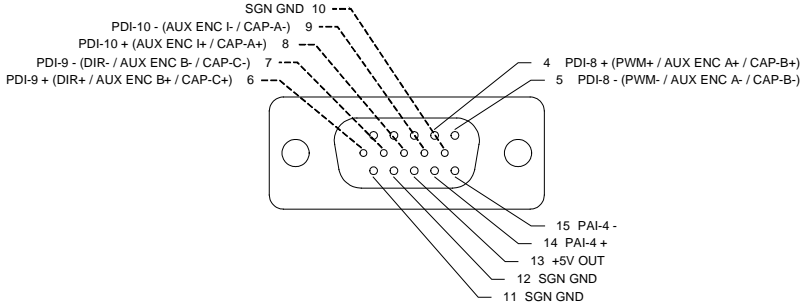
AUX COMM - RS232 Communication Connector

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



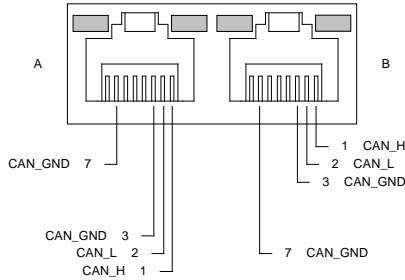
AUX ENCODER - Auxiliary Feedback Connector

| | | |
|-----------------------|---------------------|---|
| 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 |



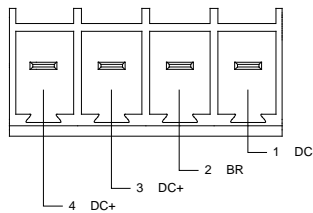
COMM - CAN Communication Connector

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



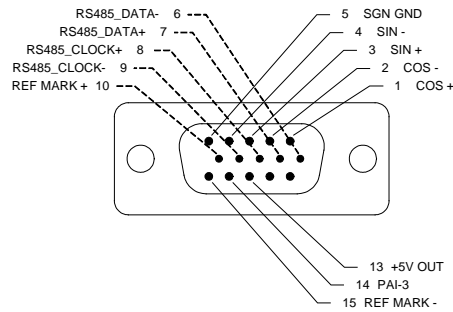
DC BUS - Power Connector

| | | |
|-----------------------|---------------------|--|
| Connector Information | | 4-port, 7.62 mm spaced, enclosed, friction lock header |
| Mating Connector | Details | Phoenix Contact: P/N 1804920 |
| | Included with Drive | Yes |



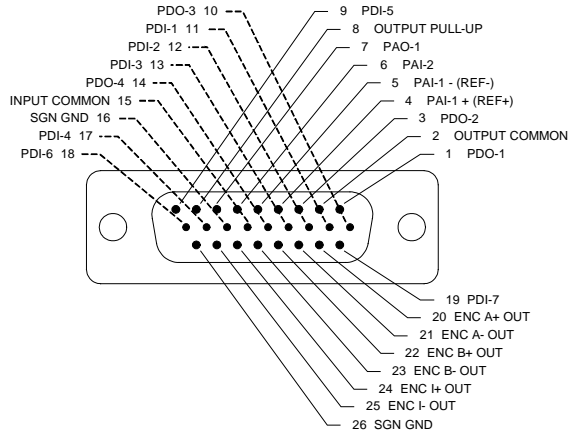
FEEDBACK - Feedback Connector

| | | |
|-----------------------|---------------------|--|
| 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 |



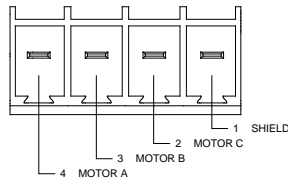
I/O - Signal Connector

| | | |
|-----------------------|---------------------|---|
| 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 |



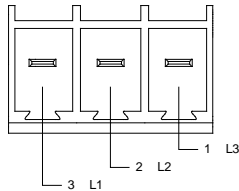
MOTOR POWER - Power Connector

| | | |
|-----------------------|---------------------|--|
| Connector Information | | 4-port, 7.62 mm spaced, enclosed, friction lock header |
| Mating Connector | Details | Phoenix Contact: P/N 1804920 |
| | Included with Drive | Yes |

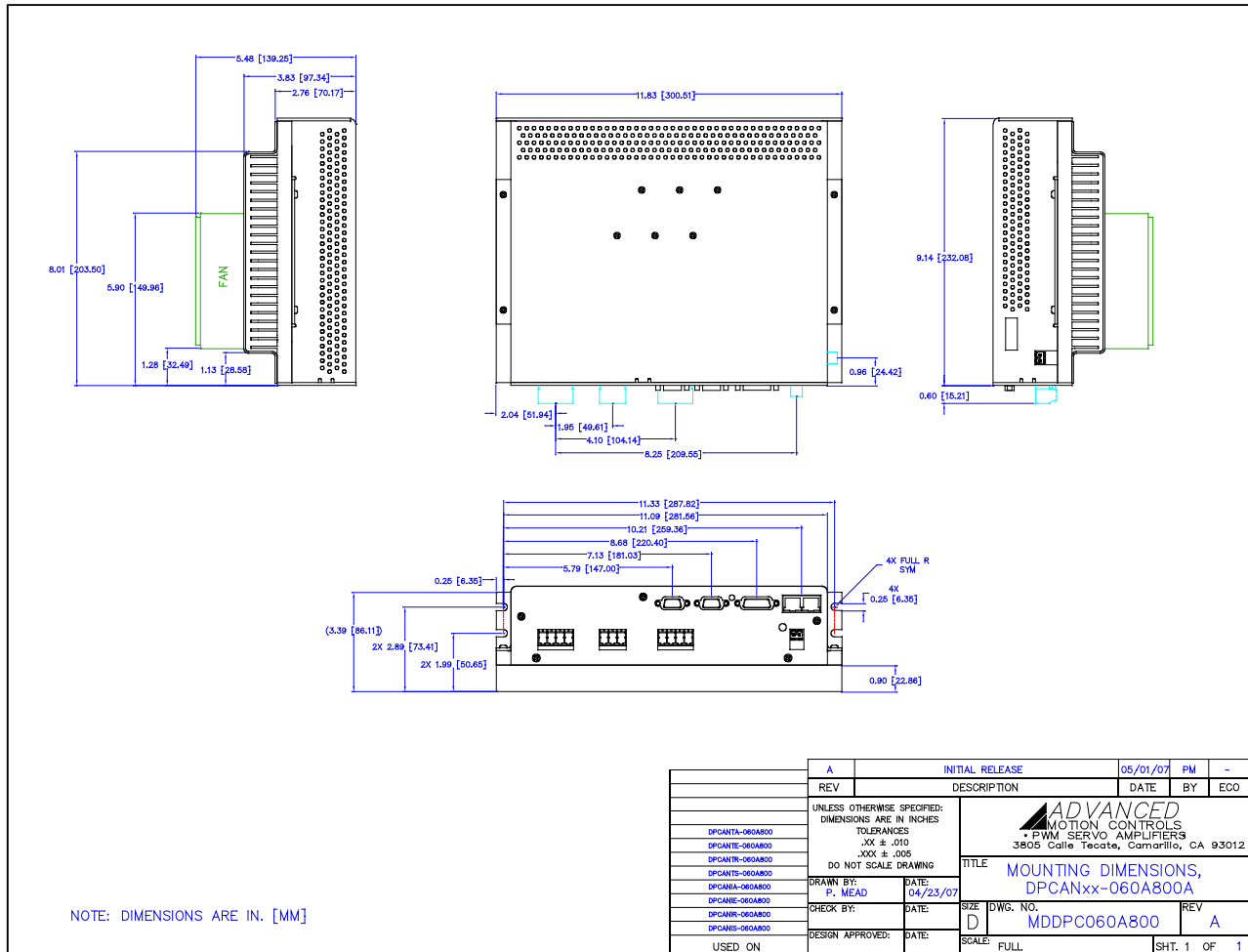


POWER - Power Connector

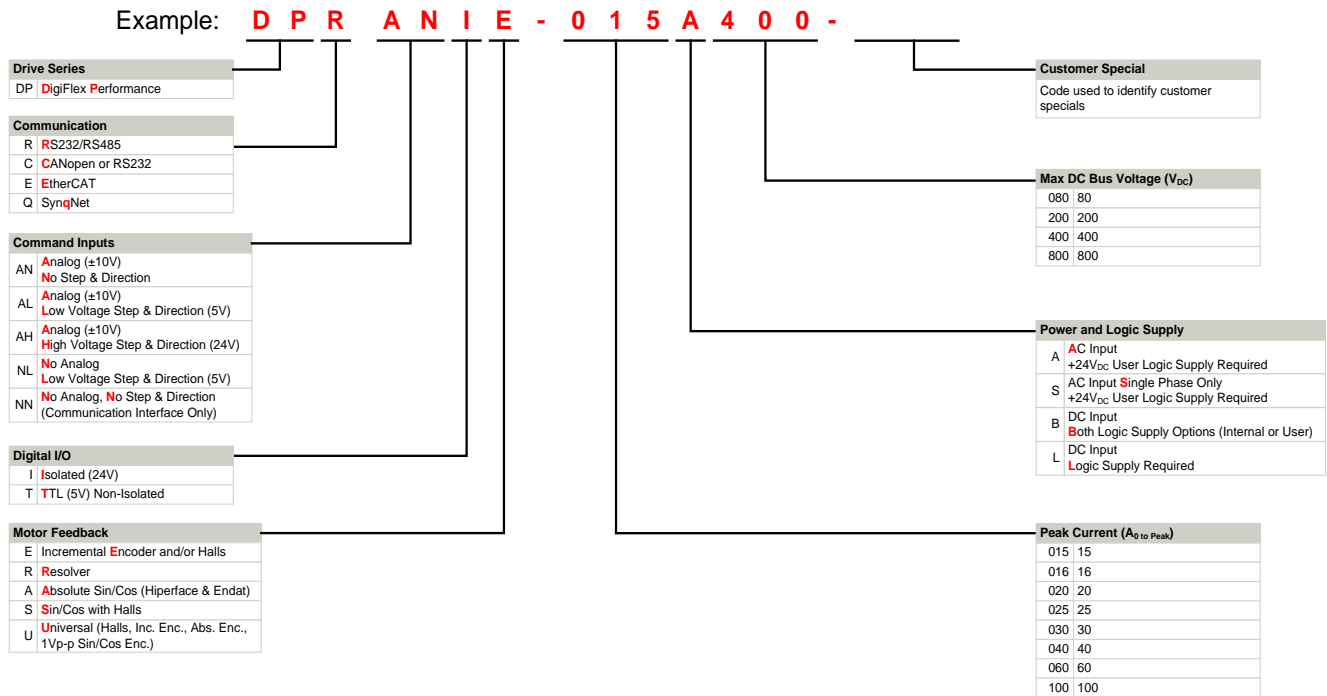
| | | |
|-----------------------|---------------------|--|
| Connector Information | | 3-port, 7.62 mm spaced, enclosed, friction lock header |
| Mating Connector | Details | Phoenix Contact: P/N 1804917 |
| | Included with Drive | Yes |



MOUNTING DIMENSIONS



PART NUMBERING INFORMATION



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.



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