

**Description**

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 command source can be generated internally or can be supplied externally. 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 SynqNet™ interface for networking and a RS-232 interface for drive configuration and setup. Drive commissioning is accomplished using DriveWare, available at [www.a-m-c.com](http://www.a-m-c.com).

All drive and motor parameters are stored in non-volatile memory.

**Power Range**

|                    |                               |
|--------------------|-------------------------------|
| Peak Current       | 30 A (21.2 A <sub>RMS</sub> ) |
| Continuous Current | 15 A (10.6 A <sub>RMS</sub> ) |
| Supply Voltage     | 100 - 240 VAC                 |



**Features**

- ▲ Four Quadrant Regenerative Operation
- ▲ Space Vector Modulation (SVM) Technology
- ▲ Fully Digital State-of-the-art Design
- ▲ Programmable Gain Settings
- ▲ Compact Size, High Power Density
- ▲ 16-bit Analog to Digital Hardware
- ▲ Built-in brake/shunt regulator

**MODES OF OPERATION**

- Current

**COMMAND SOURCE**

- Over the Network

**FEEDBACK SUPPORTED**

- Halls
- Incremental Encoder

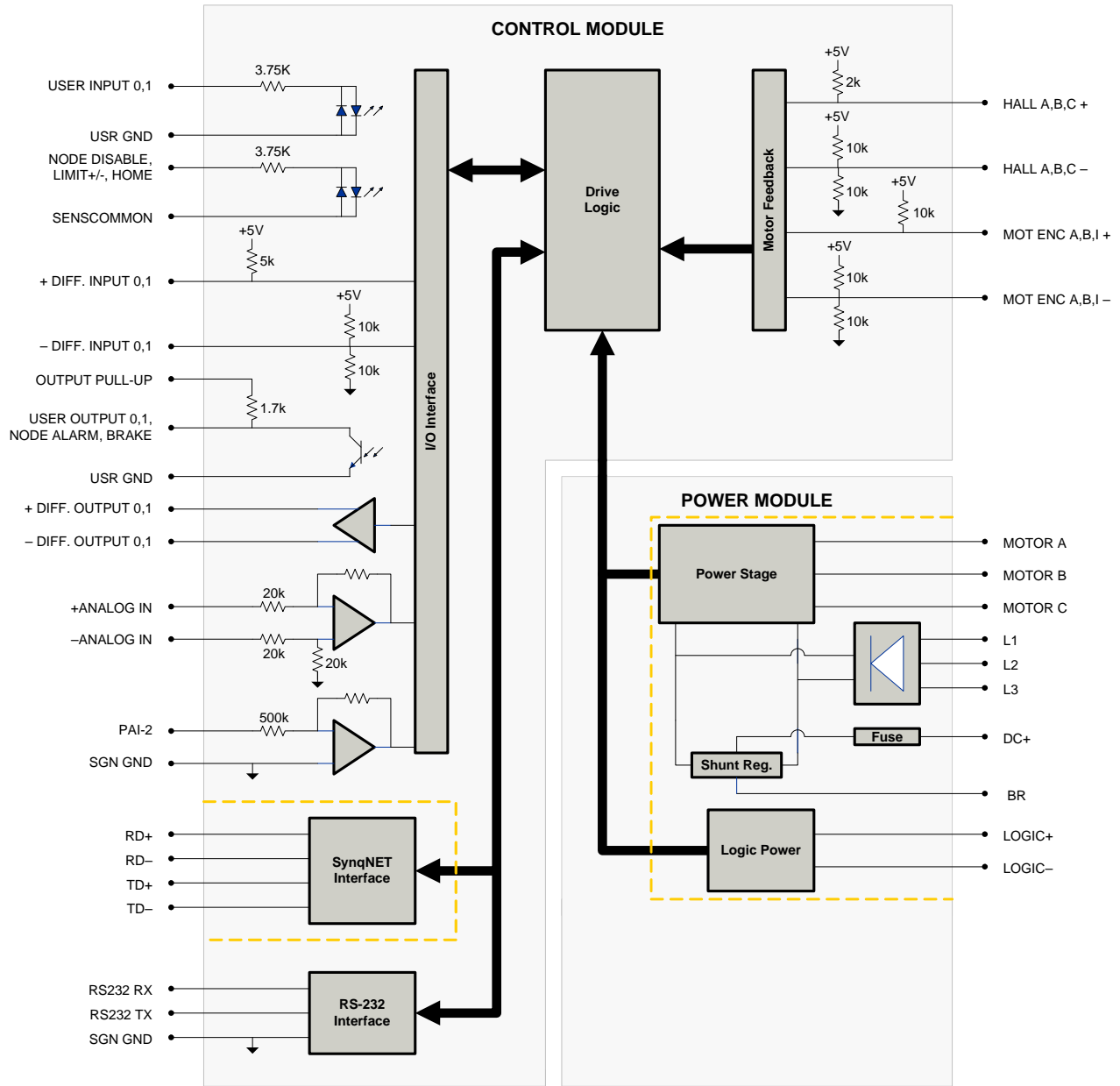
**INPUTS/OUTPUTS**

- 3 Dedicated Digital Inputs
- 2 Dedicated Digital Outputs
- 2 High Speed Captures
- 2 Programmable Analog Inputs (16-bit/12-bit Resolution)
- 2 Programmable Digital Inputs (Differential)
- 2 Programmable Digital Inputs (Single-Ended)
- 2 Programmable Digital Outputs (Differential)
- 2 Programmable Digital Outputs (Single-Ended)

**COMPLIANCES & AGENCY APPROVALS**

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

**BLOCK DIAGRAM**



**Information on Approvals and Compliances**



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.



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) | 240 (339)   |
| AC Supply Voltage Range                                   | VAC       | 100 - 240   |
| AC Supply Minimum   | VAC       | 90  |
| AC Supply Maximum   | VAC       | 264   |
| AC Input Phases <sup>1</sup>                              | -         | 3   |
| AC Supply Frequency                                       | Hz        | 50 - 60   |
| DC Supply Voltage Range <sup>2</sup>                      | VDC       | 127 - 373   |
| DC Bus Over Voltage Limit                                 | VDC       | 429   |
| DC Bus Under Voltage Limit                                | VDC       | 55  |
| Logic Supply Voltage                                      | VDC       | 20 - 30 (@ 850 mA maximum)  |
| Maximum Peak Output Current <sup>3</sup>                  | A (Arms)  | 30 (21.2)   |
| Maximum Continuous Output Current                         | A (Arms)  | 15 (10.6)   |
| Max. Continuous Output Power @ Rated Voltage <sup>4</sup> | W         | 3420  |
| Max. Continuous Power Dissipation @ Rated Voltage         | W         | 180   |
| Internal Bus Capacitance                                  | µF        | 1410  |
| Minimum Load Inductance (Line-To-Line) <sup>5</sup>       | µH        | 600   |
| Switching Frequency                                       | kHz       | 16  |
| Internal Shunt Fuse Rating                                | A         | 3 A time-delay fuse   |
| Maximum Output PWM Duty Cycle                             | %         | 100   |
| Low Voltage Supply Outputs                                | -         | +5 VDC (250 mA)   |
| Control Specifications                                    |           |   |
| Description   | Units     | Value   |
| Communication Interfaces                                  | -         | SynqNet (RS-232 for configuration)  |
| Command Sources   | -         | Over the Network  |
| Feedback Supported  | -         | Halls, Incremental Encoder  |
| Commutation Methods                                       | -         | Sinusoidal, Trapezoidal   |
| Modes of Operation  | -         | Current   |
| 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)           | -         | 4/2   |
| Programmable Analog Inputs/Outputs (PAIs/PAOs)            | -         | 2/0   |
| Current Loop Sample Time                                  | µs        | 62.5  |
| Maximum Encoder Frequency                                 | MHz       | 5 (1.25 pre-quadrature)   |
| 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, UL   |
| Size (H x W x D)  | mm (in)   | 202 x 157 x 70 (8 x 6.2 x 2.8)  |
| Weight  | g (oz)    | 1473 (52)   |
| Heatsink (Base) Temperature Range <sup>6</sup>            | °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 with threaded flange   |
| AUX COMM Connector  | -         | 3-pin, 2.5 mm spaced, enclosed, friction lock header  |
| COMM IN Connector   | -         | Shielded RJ-45 socket with LEDs   |
| COMM OUT Connector  | -         | Shielded 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   | -         | 8-contact, 11.10 mm spaced, dual-barrier terminal block   |

**Notes**

1. Can operate on single-phase VAC if peak/cont. current ratings are reduced by at least 30%.
2. DC Supply operation will reduce peak/cont. current ratings by at least 30%.
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.  $P = (\text{DC Rated Voltage}) * (\text{Cont. RMS Current}) * 0.95$ .
5. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
6. Additional cooling and/or heatsink may be required to achieve rated performance.

**PIN FUNCTIONS**

| <b>+24V LOGIC - Logic Power Connector</b> |           |                     |     |
|---|-----------|---------------------|-----|
| Pin                                       | Name      | Description / Notes | I/O |
| 1   | LOGIC GND | Logic Supply Ground | GND |
| 2   | LOGIC PWR | Logic Supply Input  | I   |

| <b>AUX COMM - RS232 Communication Connector</b> |          |                        |      |
|---|----------|------------------------|------|
| Pin   | Name     | Description / Notes    | I/O  |
| 1   | RS232 RX | Receive Line (RS-232)  | I    |
| 2   | RS232 TX | Transmit Line (RS-232) | O    |
| 3   | SGN GND  | Signal Ground          | SGND |

| <b>COMM IN - SynqNet Communication Connector</b> |          |                             |     |
|--|----------|-----------------------------|-----|
| Pin  | Name     | Description / Notes         | I/O |
| 1  | RD+      | Receiver Line (100BaseT)    | I   |
| 2  | RD-      |                             | I   |
| 3  | TD+      | Transmitter Line (100BaseT) | O   |
| 4  | RESERVED | Reserved                    | -   |
| 5  | RESERVED | Reserved                    | -   |
| 6  | TD-      | Transmitter Line (100BaseT) | O   |
| 7  | RESERVED | Reserved                    | -   |
| 8  | RESERVED | Reserved                    | -   |

| <b>COMM OUT - SynqNet Communication Connector</b> |          |                             |     |
|---|----------|-----------------------------|-----|
| Pin   | Name     | Description / Notes         | I/O |
| 1   | TD+      | Transmitter Line (100BaseT) | O   |
| 2   | TD-      |                             | O   |
| 3   | RD+      | Receiver Line (100BaseT)    | I   |
| 4   | RESERVED | Reserved                    | -   |
| 5   | RESERVED | Reserved                    | -   |
| 6   | RD-      | Receiver Line (100BaseT)    | I   |
| 7   | RESERVED | Reserved                    | -   |
| 8   | RESERVED | Reserved                    | -   |

| <b>FEEDBACK - Feedback Connector</b> |            |   |      |
|--------------------------------------|------------|---|------|
| Pin                                  | Name       | Description / Notes   | I/O  |
| 1                                    | HALL A+    | Commutation Sensor Inputs   | I    |
| 2                                    | HALL B+    |   | I    |
| 3                                    | HALL C+    |   | I    |
| 4                                    | MOT ENC A+ | Differential Encoder A Channel Input (For Single Ended Signals Use Only The Positive Input) | I    |
| 5                                    | MOT ENC A- |   | I    |
| 6                                    | MOT ENC B+ | Differential Encoder B Channel Input (For Single Ended Signals Use Only The Positive Input) | I    |
| 7                                    | MOT ENC B- |   | I    |
| 8                                    | MOT ENC I+ | Differential Encoder Index Input (For Single Ended Signals Use Only The Positive Input)     | I    |
| 9                                    | MOT ENC I- |   | I    |
| 10                                   | HALL A-    | Commutation Sensor Input (For Differential Signals Only)                                    | I    |
| 11                                   | HALL B-    | Commutation Sensor Input (For Differential Signals Only)                                    | I    |
| 12                                   | SGN GND    | Signal Ground   | SGND |
| 13                                   | +5V OUT    | +5V Encoder Supply Output (Short Circuit Protected)   | O    |
| 14                                   | PAI-2      | Programmable Analog Input (12-bit Resolution)   | I    |
| 15                                   | HALL C-    | Commutation Sensor Input (For Differential Signals Only)                                    | I    |

**I/O - Signal Connector**

| Pin | Name                     | Description / Notes   | I/O    |
|-----|--------------------------|---|--------|
| 1   | USER OUTPUT 0 (PDO-1)    | 24V Isolated Programmable Digital Output (Referenced To USER GND) | O      |
| 2   | USER OUTPUT 1 (PDO-2)    | 24V Isolated Programmable Digital Output (Referenced To USER GND) | O      |
| 3   | USER GND                 | Ground Reference For User Outputs And Inputs                      | ISOGND |
| 4   | NODE ALARM (PDO-12)      | 24V Network Error (Isolated Output Referenced To USER GND)        | O      |
| 5   | BRAKE (PDO-13)           | 24V Brake (Isolated Output Referenced to USER GND)                | O      |
| 6   | SGN GND                  | Signal Ground   | SGND   |
| 7   | + DIFF. INPUT 0 (PDI-3)  | 5V Non-Isolated Differential Digital Input                        | I      |
| 8   | - DIFF. INPUT 0 (PDI-3)  |   | I      |
| 9   | OUTPUT PULL-UP           | Digital Output Pull-Up For User Outputs                           | I      |
| 10  | NODE DISABLE (PDI-12)    | 24V Node Disable (Isolated Input Referenced to SENSCOMMON)        | I      |
| 11  | LIMIT + (PDI-9)          | 24V Positive Limit (Isolated Input Referenced To SENSCOMMON)      | I      |
| 12  | LIMIT - (PDI-10)         | 24V Negative Limit (Isolated Input Referenced To SENSCOMMON)      | I      |
| 13  | HOME (PDI-11)            | 24V Home Switch (Isolated Input Referenced To SENSCOMMON)         | I      |
| 14  | USER INPUT 0 (PDI-1)     | 24V Isolated Programmable Digital Input (Referenced To USER GND)  | I      |
| 15  | USER INPUT 1 (PDI-2)     | 24V Isolated Programmable Digital Input (Referenced To USER GND)  | I      |
| 16  | SENSCOMMON               | Sensor Common (Can Be Used To Pull-Up Related Inputs)             | CMN    |
| 17  | + DIFF. INPUT 1 (PDI-4)  | 5V Non-Isolated Differential Digital Input                        | I      |
| 18  | - DIFF. INPUT 1 (PDI-4)  |   | I      |
| 19  | SGN GND                  | Signal Ground   | SGND   |
| 20  | + DIFF. OUTPUT 0 (PDO-3) | 5V Non-Isolated Differential Digital Output                       | O      |
| 21  | - DIFF. OUTPUT 0 (PDO-3) |   | O      |
| 22  | + DIFF. OUTPUT 1 (PDO-4) | 5V Non-Isolated Differential Digital Output                       | O      |
| 23  | - DIFF. OUTPUT 1 (PDO-4) |   | O      |
| 24  | + ANALOG IN (PAI-1)      | ±10V Programmable Differential Analog Input (16-bit Resolution)   | I      |
| 25  | - ANALOG IN (PAI-1)      |   | I      |
| 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   | DC+     | Brake Resistor DC+. Connection for brake resistor. | O   |
| 5   | BR      | External Brake Resistor Connection                 | -   |
| 6   | L1      | AC Supply Input (Single or Three Phase)            | I   |
| 7   | L2      |  | I   |
| 8   | L3      |  | I   |

## HARDWARE SETTINGS

### Switch Functions

| Switch | Description   | Setting |     |
|--------|---|---------|-----|
|        |   | On      | Off |
| 1      | Bit 0 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 2      | Bit 1 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 3      | Bit 2 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 4      | Bit 3 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 5      | Bit 4 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 6      | Bit 5 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 7      | Bit 6 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |
| 8      | Bit 7 of binary SynqNet drive address. Does not affect RS-232 settings. | 1       | 0   |

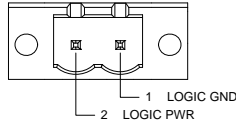
### LED Functions

| LINK_IN LED  |                                    |
|--------------|------------------------------------|
| On           | Receive Valid                      |
| Off          | Not Valid or Power Off or Reset    |
| CYCLIC LED   |                                    |
| On           | Network Cyclic                     |
| Off          | Power Off or Reset                 |
| Blinking     | Network Not Cyclic                 |
| LINK_OUT LED |                                    |
| On           | Receive Valid                      |
| Off          | Not Valid or Power Off or Reset    |
| REPEATER LED |                                    |
| On           | Repeater On, Network Cyclic        |
| Off          | Repeater Off or Power Off or Reset |
| Blinking     | Repeater On, Network Not Cyclic    |

**MECHANICAL INFORMATION**

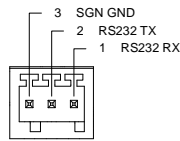
**+24V LOGIC - Logic Power Connector**

|                       |                     |   |
|-----------------------|---------------------|---|
| Connector Information |                     | 2-port, 5.08 mm spaced, enclosed, friction lock header with threaded flange |
| Mating Connector      | Details             | Phoenix Contact: P/N 1777808  |
|                       | Included with Drive | Yes   |



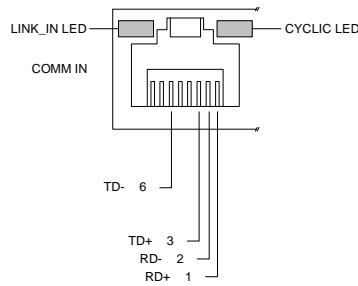
**AUX COMM - RS232 Communication Connector**

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



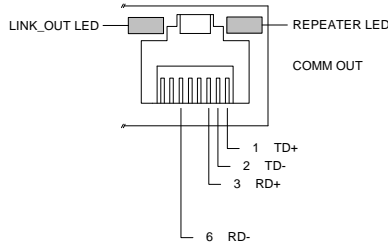
**COMM IN - SynqNet Communication Connector**

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



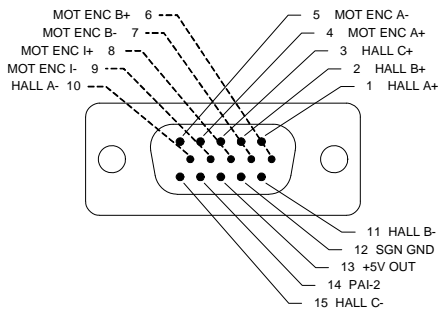
**COMM OUT - SynqNet Communication Connector**

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



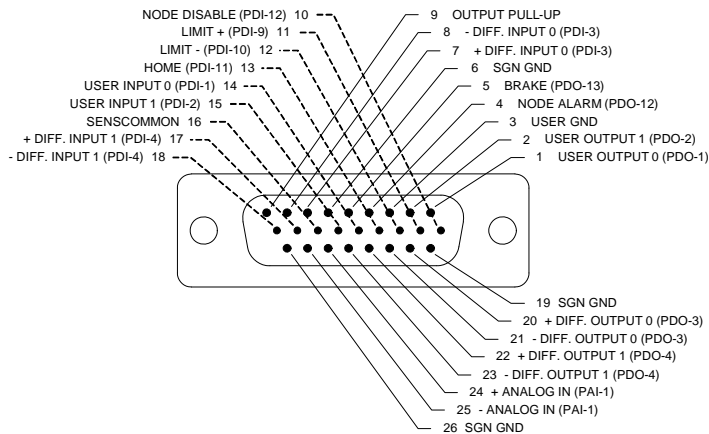
**FEEDBACK - Feedback Connector**

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



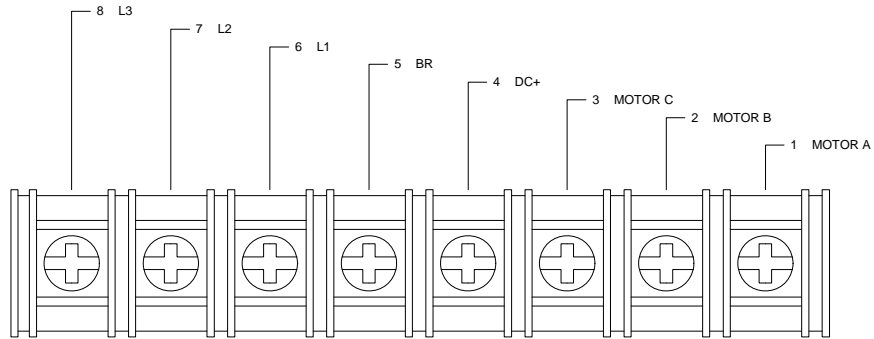
**I/O - Signal Connector**

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

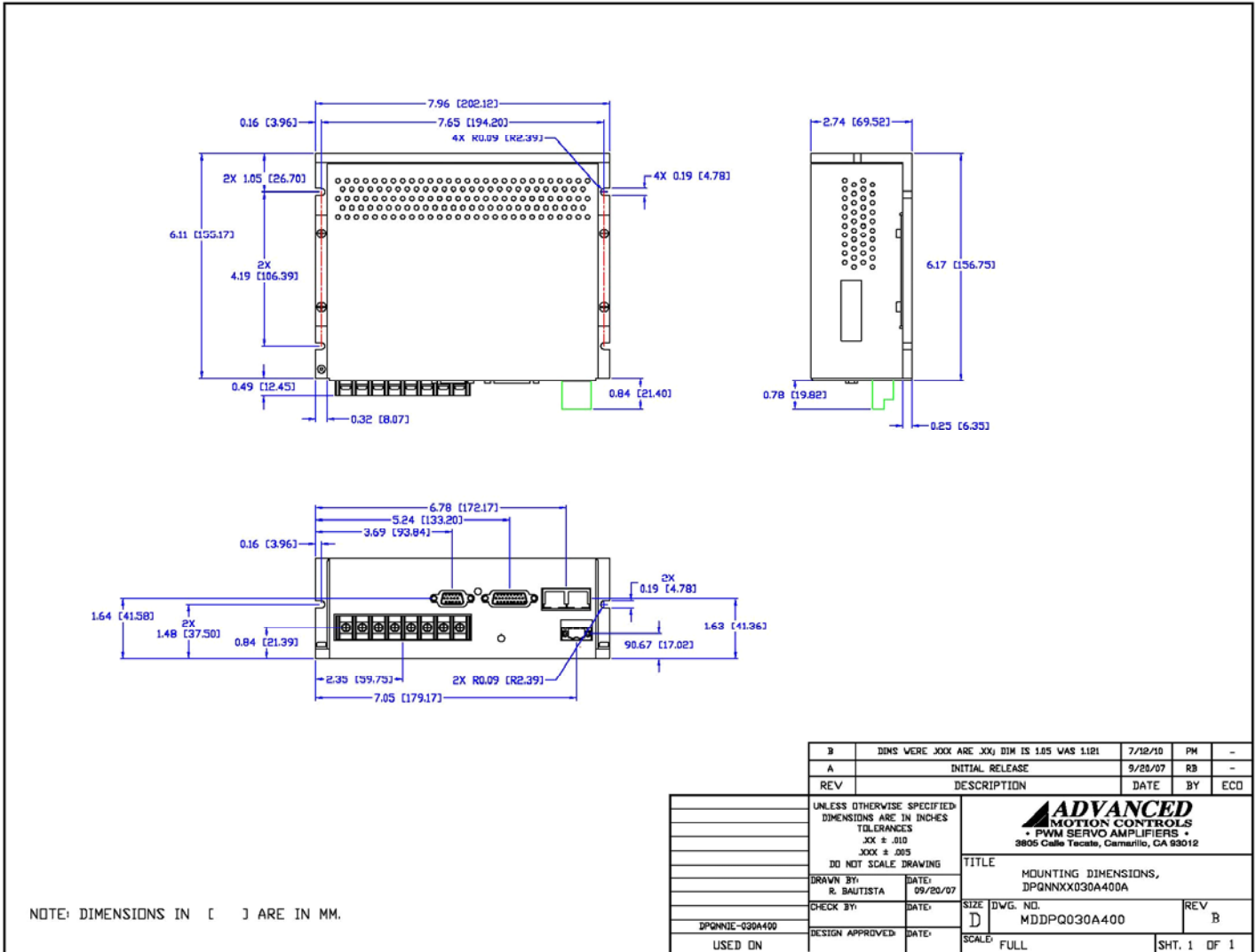


**POWER - Power Connector**

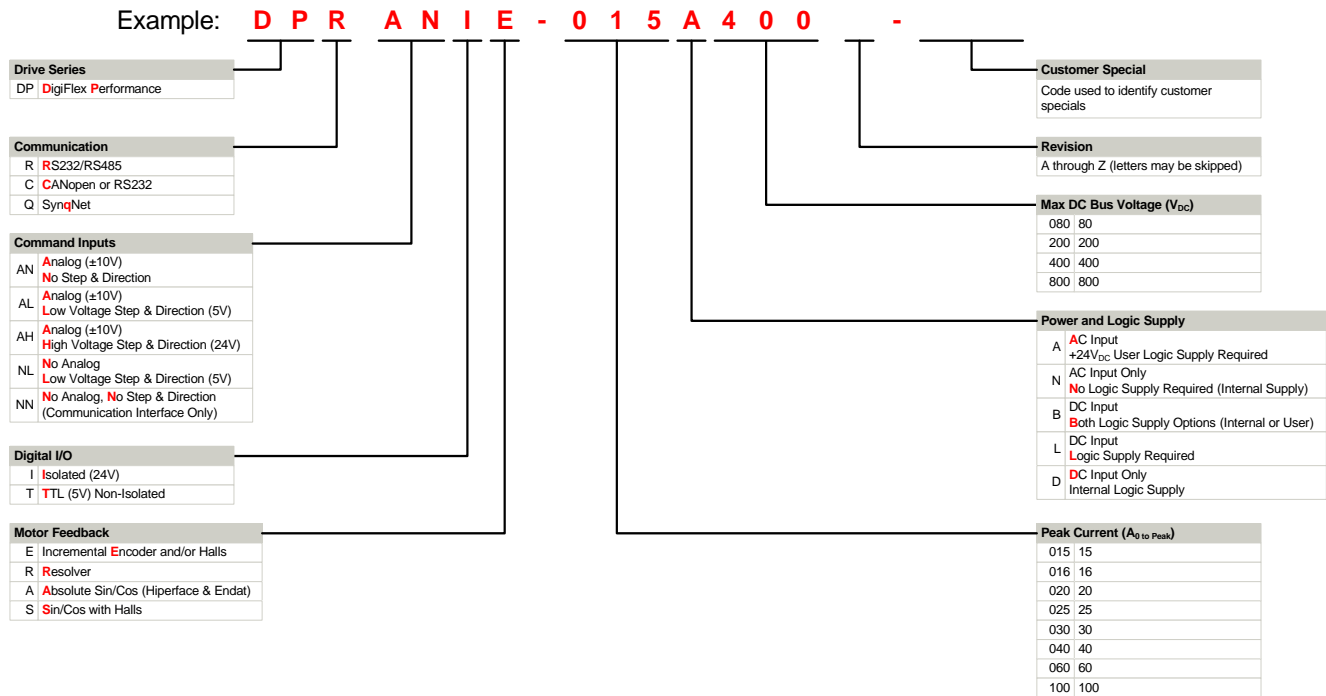
|                       |                     |   |
|-----------------------|---------------------|---|
| Connector Information |                     | 8-contact, 11.10 mm spaced, dual-barrier terminal block |
| Mating Connector      | Details             | Not applicable  |
|                       | Included with Drive | Not applicable  |



**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](http://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.