

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.

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

Power Range

| | |
|--------------------|-------------------------------|
| Peak Current | 40 A (28.3 A _{RMS}) |
| Continuous Current | 20 A (14.1 A _{RMS}) |
| Supply Voltage | 20 - 80 VDC |



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

MODES OF OPERATION

- Current
- Position
- Velocity

COMMAND SOURCE

- Communication Interface

FEEDBACK SUPPORTED

- Halls
- Incremental Encoder
- ±10 V Analog
- Auxiliary Incremental Encoder

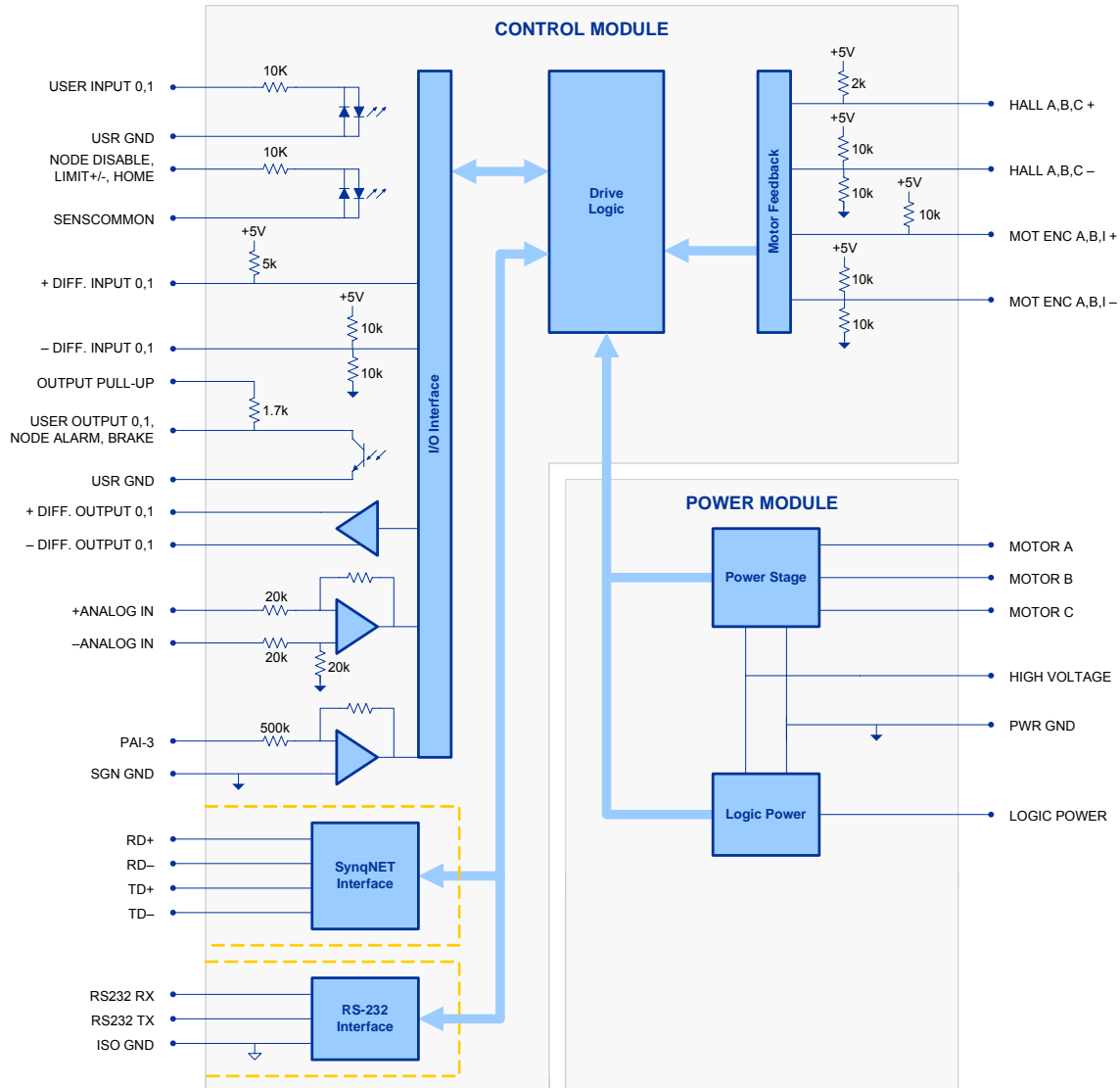
INPUTS/OUTPUTS

- 3 Dedicated Digital Inputs
- 2 Dedicated Digital Outputs
- 2 High Speed Captures
- 1 Programmable Analog Input
- 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

- RoHS
- UL/cUL Pending
- CE Pending

BLOCK DIAGRAM



Approvals and Compliances

| | |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>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.</p> |
|  | <p>Compliant with European CE for both the Class A EMC Directive 89/336/EEC on Electromagnetic Compatibility (specifically EN 61000-6-4:2001, EN 61000-6-2:2001, EN 61000-3-2:2000, and EN 61000-3-3:1995/A1:2001) and LVD requirements of directive 73/23/EEC (specifically EN 60204-1), a low voltage directive to protect users from electrical shock.</p> |
|  | <p>RoHS (Reduction of Hazardous Substances) is intended to prevent hazardous substances such as lead from being manufactured in electrical and electronic equipment.</p> |

SPECIFICATIONS

| Power Stage Specifications | | |
|-----------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Description | Units | Value |
| DC Supply Voltage | VDC | 20 - 80 |
| Over Voltage Limit | VDC | 86 |
| Under Voltage Limit | VDC | 20 |
| Logic Supply Voltage | VDC | 20 - 80 |
| Peak Output Current | A | 40 |
| Maximum Continuous Output Current | A | 20 |
| Maximum Continuous Output Power | W | 1600 |
| Maximum Power Dissipation at Continuous Current | W | 80 |
| Minimum Load Inductance (Line-To-Line) ¹ | μH | 250 |
| Switching Frequency | kHz | 20 |
| Control Specifications | | |
| Description | Units | Value |
| Communication Interfaces | - | RS-232, SynqNet |
| Command Sources | - | Communication Interface |
| Feedback Supported | - | ±10 V Analog, Auxiliary Incremental Encoder, Halls, Incremental Encoder |
| Commutation Methods | - | Sinusoidal, Trapezoidal |
| Modes of Operation | - | Current, Position, Velocity |
| Motors Supported | - | Brushed, Brushless, Induction, Voice Coil |
| 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) | - | 1/0 |
| Current Loop Sample Time | μs | 50 |
| Velocity Loop Sample Time | μs | 100 |
| Position Loop Sample Time | μs | 100 |
| Maximum Encoder Frequency | MHz | 16 (4 pre-quadrature) |
| Mechanical Specifications | | |
| Description | Units | Value |
| Size (H x W x L) | mm (in) | 127 x 79.9 x 36.5 (5 x 3.1 x 1.4) |
| Heatsink (Base) Temperature Range ² | °C (°F) | 0 - 65 (32 - 149) |
| Storage Temperature Range | °C (°F) | -40 - 85 (-40 - 185) |
| Cooling System | - | Natural Convection |
| Form Factor | - | Stand Alone |
| IP Rating | - | IP10 |
| AUX COMM Connector | - | 3-pin, 2.5 mm spaced, enclosed, friction lock header |
| COMMa Connector | - | Shielded RJ-45 socket with LEDs |
| COMMb 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 |
| MOTOR POWER Connector | - | 3-port, 7.62 mm spaced, enclosed, friction lock header |
| POWER Connector | - | 4-port, 7.62 mm spaced, enclosed, friction lock header |

Notes

1. Low inductance motors, such as 'pancake' and 'basket-wound', require external inductors. The Minimum Load Inductance provided assumes the highest allowed bus voltage. Lower inductances are acceptable for lower bus voltages.
2. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

| 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 |

| COMMa - SynqNet Communication Connector | | | |
|-----------------------------------------|----------|-----------------------------|-----|
| 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 | - |

| COMMb - SynqNet Communication Connector | | | |
|-----------------------------------------|----------|-----------------------------|-----|
| 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 | - |

| FEEDBACK - Feedback Connector | | | |
|-------------------------------|------------|---------------------------------------------------------------------------------------------|------|
| 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 | RESERVED | Reserved | - |
| 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 | Isolated Programmable Digital Output (Referenced To USER GND) | O |
| 2 | USER OUTPUT 1 | Isolated Programmable Digital Output (Referenced To USER GND) | O |
| 3 | USR GND | Ground Reference For User Outputs And Inputs | ISOGND |
| 4 | NODE ALARM | Network Error (Isolated Output Referenced To USER GND) | O |
| 5 | BRAKE | Brake (Isolated Output Referenced to USER GND) | O |
| 6 | SGN GND | Signal Ground | SGND |
| 7 | + DIFF. INPUT 0 | Non-Isolated Differential Digital Input (Programmable Capture Function) | I |
| 8 | - DIFF. INPUT 0 | | I |
| 9 | OUTPUT PULL-UP | Digital Output Pull-Up | I |
| 10 | NODE DISABLE | Node Disable (Isolated Input Referenced to SENSCOMMON) | I |
| 11 | LIMIT + | Positive Limit (Isolated Input Referenced To SENSCOMMON) | I |
| 12 | LIMIT - | Negative Limit (Isolated Input Referenced To SENSCOMMON) | I |
| 13 | HOME | Home Switch (Isolated Input Referenced To SENSCOMMON) | I |
| 14 | USER INPUT 0 | Isolated Programmable Digital Input (Referenced To USER GND) | I |
| 15 | USER INPUT 1 | 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 | Non-Isolated Differential Digital Input (Programmable Capture Function) | I |
| 18 | - DIFF. INPUT 1 | | I |
| 19 | SGN GND | Signal Ground | SGND |
| 20 | + DIFF. OUTPUT 0 | Non-Isolated Differential Digital Input (Programmable Step & Direction Or Divide-By-N Function) | O |
| 21 | - DIFF. OUTPUT 0 | | O |
| 22 | + DIFF. OUTPUT 1 | Non-Isolated Differential Digital Input (Programmable Step & Direction Or Divide-By-N Function) | O |
| 23 | - DIFF. OUTPUT 1 | | O |
| 24 | + ANALOG IN | Programmable Differential Analog Input ($\pm 10V$ Range) | I |
| 25 | - ANALOG IN | | I |
| 26 | SGN GND | Signal Ground | SGND |

| MOTOR 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 |

| POWER - Power Connector | | | |
|-------------------------|--------------|-------------------------------------------------|------|
| Pin | Name | Description / Notes | I/O |
| 1 | PWR GND | Power Ground (Common With Signal Ground) | PGND |
| 2 | HIGH VOLTAGE | DC Power Input | I |
| 3 | LOGIC GND | Logic Supply Ground (Common With Signal Ground) | GND |
| 4 | LOGIC PWR | Logic Supply Input | I |

HARDWARE SETTINGS

Switch Functions

| Switch | Description | Setting | |
|--------|-------------|---------|-----|
| | | On | Off |
| 1 | Reserved. | - | - |
| 2 | Reserved. | - | - |
| 3 | Reserved. | - | - |
| 4 | Reserved. | - | - |
| 5 | Reserved. | - | - |
| 6 | Reserved. | - | - |
| 7 | Reserved. | - | - |
| 8 | Reserved. | - | - |

MECHANICAL INFORMATION

AUX COMM - RS232 Communication Connector

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

3 ISO GND
2 RS232 TX
1 RS232 RX

COMMa - SynqNet Communication Connector

| | |
|-----------------------|---------------------------------|
| Connector Information | Shielded RJ-45 socket with LEDs |
| Mating Connector | AMP: Plug P/N 5-569552-3 |

A

TD- 6
TD+ 3
RD- 2
RD+ 1

COMMb - SynqNet Communication Connector

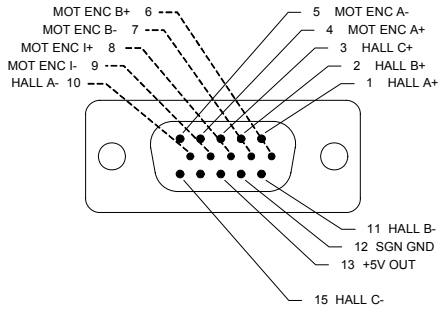
| | |
|-----------------------|---------------------------------|
| Connector Information | Shielded RJ-45 socket with LEDs |
| Mating Connector | AMP: Plug P/N 5-569552-3 |

B

1 TD+
2 TD-
3 RD+
6 RD-

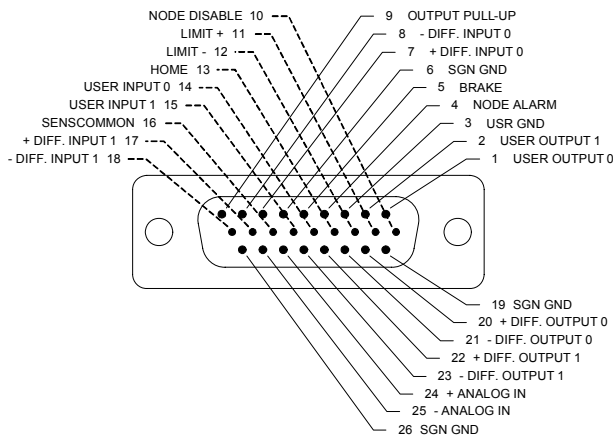
FEEDBACK - Feedback Connector

| | |
|-----------------------|--------------------------------------------------------------------------------------------------|
| Connector Information | 15-pin, high-density, female D-sub |
| Mating Connector | AMP: Plug P/N 748365-1; Housing P/N 748677-1; Terminals P/N 748333-4 (loose) or 748333-2 (strip) |



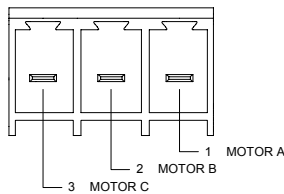
I/O - Signal Connector

| | |
|-----------------------|--------------------------------------------------------------------------------------------------|
| Connector Information | 26-pin, high-density, female D-sub |
| Mating Connector | AMP: Plug P/N 748365-1; Housing P/N 748677-2; Terminals P/N 748333-4 (loose) or 748333-2 (strip) |



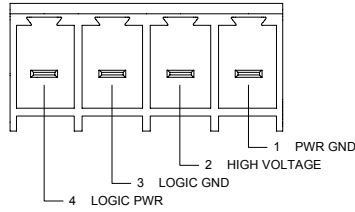
MOTOR POWER - Power Connector

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



POWER - Power Connector

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



PART NUMBERING INFORMATION

Example: **D P R A N I E - 0 1 5 A 4 0 0 -**

| Drive Series | |
|--------------|----------------------|
| DP | DigiFlex Performance |

| Communication | |
|---------------|------------------|
| R | RS232/RS485 |
| C | CANopen or RS232 |
| Q | SynqNet |

| Command Inputs | |
|----------------|------------------------------------------------------------------|
| AN | Analog (±10V) No Step & Direction |
| AL | Analog (±10V) Low Voltage Step & Direction (5V) |
| AH | Analog (±10V) High Voltage Step & Direction (24V) |
| NL | No Analog Low Voltage Step & Direction (5V) |
| NN | No Analog, No Step & Direction (Communication Interface Only) |

| Digital I/O | |
|-------------|-----------------------|
| I | Isolated (24V) |
| T | TTL (5V) Non-Isolated |

| Motor Feedback | |
|----------------|--------------------------------------|
| E | Incremental Encoder and/or Halls |
| R | Resolver |
| A | Absolute Sin/Cos (Hiperface & Endat) |
| S | Sin/Cos with Halls |

| Customer Special | |
|-----------------------------------------|--|
| Code used to identify customer specials | |

| Revision | |
|--------------------------------------|--|
| A through Z (letters may be skipped) | |

| Max DC Bus Voltage (V _{DC}) | |
|---------------------------------------|-----|
| 080 | 80 |
| 200 | 200 |
| 400 | 400 |
| 600 | 600 |

| Power and Logic Supply | |
|------------------------|-------------------------------------------------------------|
| A | AC Input +24V _{DC} User Logic Supply Required |
| N | AC Input Only No Logic Supply Required (Internal Supply) |
| B | DC Input Both Logic Supply Options (Internal or User) |
| L | DC Input Logic Supply Required |
| D | DC Input Only Internal Logic Supply |

| Peak Current (A _{0 to Peak}) | |
|----------------------------------------|-----|
| 015 | 15 |
| 016 | 16 |
| 020 | 20 |
| 025 | 25 |
| 030 | 30 |
| 040 | 40 |
| 060 | 60 |
| 100 | 100 |

DigiFlex® Performance™ series of products are available in many configurations. All models listed on the website are readily available, standard product offerings. Other combinations or possibilities can be made available for OEMs with volume requests of 100 or more. Contact Applications Engineering for further information and details.

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