# Modular *Sensorless* Brushless Motor Drives
# DPFlex II Series

## *Compact motor drive with up to 1200 W output*

Allied Motion's DPFlex™ II is the second generation of our innovative, patented digital sensorless brushless motor drive series. The DPFlex II adds higher speed capability (up to 150,000 RPM), a higher bus voltage capability, the ability to drive lower impedance motors, and convenient digital direction selection instead of motor rewiring. The result: a brushless sensorless drive able to power a broader range of motors.

The patented technology in the DPFlex II enables detection of motor rotor position even at standstill using algorithms that use motor phase inductance measurements to enable reliable starting under load. The result is robust, stable motor operation at reduced cost compared to sensored motor drive combinations. The DPFlex II boasts performance levels exceeding even those of conventional Hall-commutated drives.

Applications that can benefit from use of the DPFlex II include pumps, high speed compressors, medical hand pieces, fans and blowers, respirators, centrifuges, conveyors, variable-speed scanners, and similar speed/torque control equipment.

Allied Motion provides DP.D™ Windows-based software for the DPFlex II. DP.D enables you to easily set-up and configure the DPFlex II. It auto-calculates optimum current loop settings for the motor; enables easy setting of inputs and outputs on the drive; and provides a four-channel oscilloscope tool able to log system register data in real time.



## Features & Benefits

- 12, 24 and 48 VDC models at up to 30 A continuous peak will mate with most small brushless motors
- Software selectable CW or CCW direction; full PID closed loop motoring and dynamic braking in either direction mode
- Sensorless control of brushless motors reduces system cost and wiring
- Capable of driving low impedance motors, delta- or wye-connected at up to 150,000 RPM
- Compact modular drive for brushless motors with up to 1200 W output power
- Up to 48 V and 30 A peak output will drive a wide range of brushless motors
- Broad 20:1 speed control range
- Closed loop control of current (torque) and velocity
- Adjustable PID loop compensation
- Analog input to set speed levels along with digital inputs for enable and motor direction control
- Protection afforded against phase-to-phase shorts, over and under voltage, over current and over temperature conditions
- LED status indicator
- Easy software set up and configuration

## Options

- Comm-to-USB translator dongle
- Pre-made cables
- Embeddable PCB assembly version with or without mounting kit

## Allied Motion

Issue Date: 07.07.2022    *Specifications subject to change without notice*

# DPFlex II – Specifications

| Model | | DPX-20430001 | DPX-20430002 | DPX-20430003 | DPX-20430004 | DPX-20430005 | DPX-20430006 | DPX-20430007 | DPX-20430008 | DPX-20430009 |
|---|---|---|---|---|---|---|---|---|---|---|
| DC Bus Voltage Input | | 12 VDC (nominal) Range: 9 - 18 | | | 24 VDC (nominal) Range: 18 - 34 | | | 48 VDC (nominal) Range: 36 - 55 | | |
| Output Voltage – VDC (max) | | 17 | | | 33 | | | 54 | | |
| Output Current | Continuous [1] | 5 | 15 | 30 | 5 | 15 | 30 | 5 | 15 | 30 |
| | Peak | 5 | 15 | 30 | 5 | 15 | 30 | 5 | 15 | 30 |
| Output Power – W (cont) | | 50 | 150 | 300 | 100 | 300 | 600 | 200 | 600 | 1200 |
| Motor Type Compatibility | | AC brushless or DC brushless motors, delta- or wye-connected, rated up to 1200 W; 150 µs minimum time constant; 10 µH minimum phase-phase inductance | | | | | | | | |
| Amplifier Type | | PID closed loop control of torque or velocity in CW or CCW direction; rotation direction software selectable; 20 kHz PWM, 100% duty-cycle capable | | | | | | | | |
| Efficiency | | > 92% at 30 °C | | | | | | | | |
| Current Loop Type | | PID, 50 µs loop delay | | | | | | | | |
| Velocity Loop Type | | PID, 1 ms loop delay | | | | | | | | |
| Speed or Torque Command Input | | 0 - 5 VDC, 10-bit resolution, non-isolated, single-ended | | | | | | | | |
| Speed Range & Regulation | | 20:1 typical, 10:1 minimum (no-load speed at rated bus voltage to minimum controllable speed), ± 5% top speed regulation | | | | | | | | |
| Analog I/O | | Analog command input: 0 - 5 V, 10-bit resolution, non-isolated, single-ended, speed or torque | | | | | | | | |
| Digital I/O | | • 2 IN: Active high; minimum 8V high level threshold; maximum 0.5V low level threshold; 20 kHz sampled; absolute values: 60V maximum, -0.5V minimum: <br> - One input for motor direction control <br> - One input for motor enable control <br> • 1 OUT non-isolated, bus level output (approximately 2V below), clamped to 24V for greater bus voltages, 10 mA max source (configurable through DP.D software as either a speed or a fault indicator) | | | | | | | | |
| Status Indicator | | Two-color LED: Red blink (1 Hz): fault; green blink (1 Hz): disabled but powered; green blink (2 Hz): enabled | | | | | | | | |
| Communication Interface | | USB UART, 115.2 kBd (requires USB-to-RS232 converter accessory) | | | | | | | | |
| Protection Features | | • Over- under-bus voltage fault: <br> Nom. Bus / Low V / High V <br> 12 / 8 / 20 <br> 24 / 16 / 36 <br> 48 / 34 / 57 <br> • Reverse voltage protection <br> • Over current shutoff at 115% of peak <br> • Phase-to-phase short-circuit protection <br> • Over temperature shutdown at 90 °C | | | | | | | | |
| Weight | | 0.2 kg (0.44 lb) | | | | | | | | |
| Ambient Operating Temperature | | -30 to +50 °C max | | | | | | | | |
| Ambient Storage Temperature | | -40 to +100 °C | | | | | | | | |

[1] *Heat sink temperature dependent: Heat sink must remain below 90 ºC*

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## DP.D Software

DP.D™ is our Windows-based commissioning software for the DPFlex™ family of drives, designed to assist you with:

- Motor set-up and configuration
- I/O set-up and configuration
- Motor verification and performance analysis

DP.D also includes an integrated Help system that is easily accessible within DP.D. It provides detailed documentation that fully describes the operation of the DPFlex. In addition, background information is provided related to setup and mechanical configuration, the command set, and detailed operation within each functional block of the drive.

DP.D can be used with or without a physical connection to the DPFlex. By operating in virtual mode, you are able to access all documentation and help functions, access and set up all parameter settings and save your settings to a file for later use.

### Features

- DP.D is a Windows 2000/ XP/ Vista/7/8 application designed to assist the user in tuning, configuring and programming the DPFlex
- DP.D commands are sent to the driver via a standard USB-UART interface
- Quickly set up, tune and program the DPFlex
- Built-in oscilloscope tool to datalog system registers in real time
- Auto-calculation of optimum current loop settings for any compatible motor
- Performs cyclic motion to exercise system axes
- Enables viewing and setting of inputs
- Includes a motor verification tool

### Key DP.D Modules

- Windows Configuration and Diagnostics
- Motor and System Tuning
- 4-channel Oscilloscope views
- Graphical Configuration of I/O
- Diagnostic and Error displays
- Parameter Configuration file creation
- Firmware update download
- Interactive Help Screens with User Manual
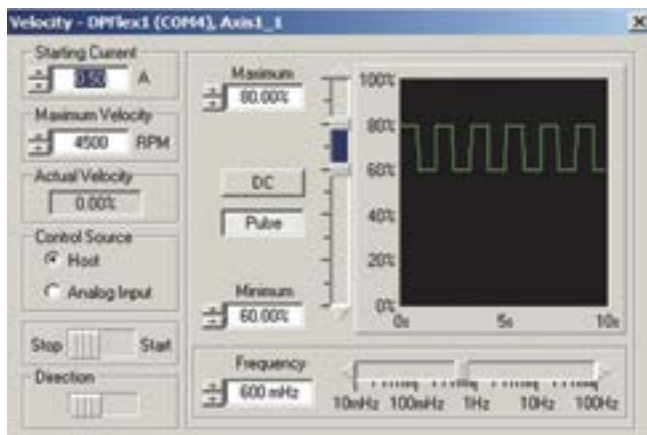


*A built-in four-channel oscilloscope allows you to visually monitor results on the PC while adjusting tuning parameters. DP.D is capable of automatically determining the resistance and inductance of a motor to in order to set up current loop compensation. In addition, it will automatically determine the motor's start-up parameters.*

## Allied Motion
*Motion Solutions That Change the Game*
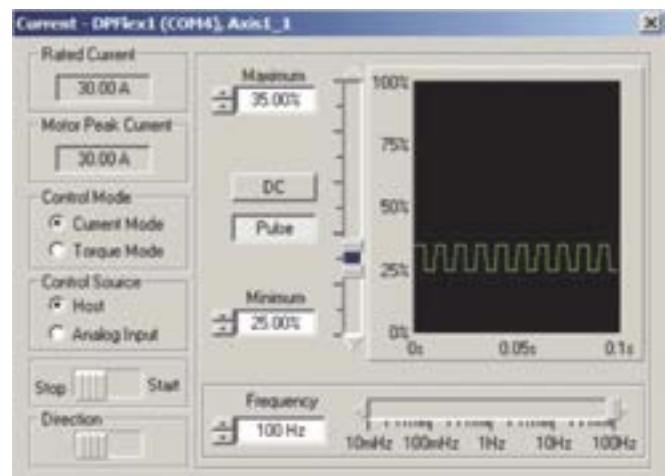
## DPFlex II Electrical Connections
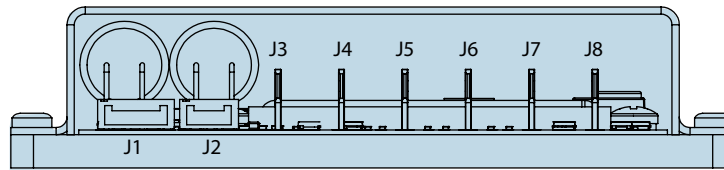


### I/O Connector (J1)

| Pin | Function |
|-----|----------|
| 1 | 3.3 V Output |
| 2 | Analog Input, 0 - 5 V |
| 3 | Analog/Logic Common |
| 4 | Digital Input 1 |
| 5 | Digital Input 2 |
| 6 | Digital Output |

JST #SM06B-GHS-TB
(Mate: JST #GHR-06V-S,
Pins JST #SSHL-002T-P0.2)

### Comm Connector (J2)

| Pin | Function |
|-----|----------|
| 1 | Common |
| 2 | Receive |
| 3 | 3.3 V Output |
| 4 | Transmit |

JST #SM04B-GHS-TB
(Mate: JST #GHR-04V-S,
Pins JST #SSHL-002T-P0.2)

### Power Connectors

| Pin | Function |
|-----|----------|
| J3 | + Power VDC |
| J4 | – Power VDC |
| J5 | Motor Phase A |
| J6 | Motor Phase B |
| J7 | Motor Phase C |
| J8 | Digital Input 1 |

Mates: TE Connectivity
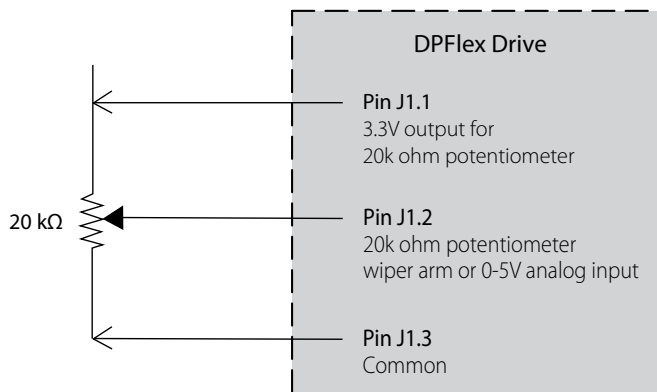#62181-1 or #2-520193-2

## DPFlex II Digital Active-High Input Circuit:
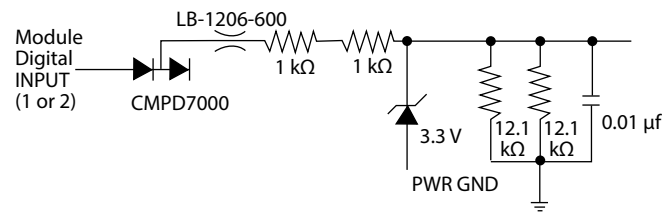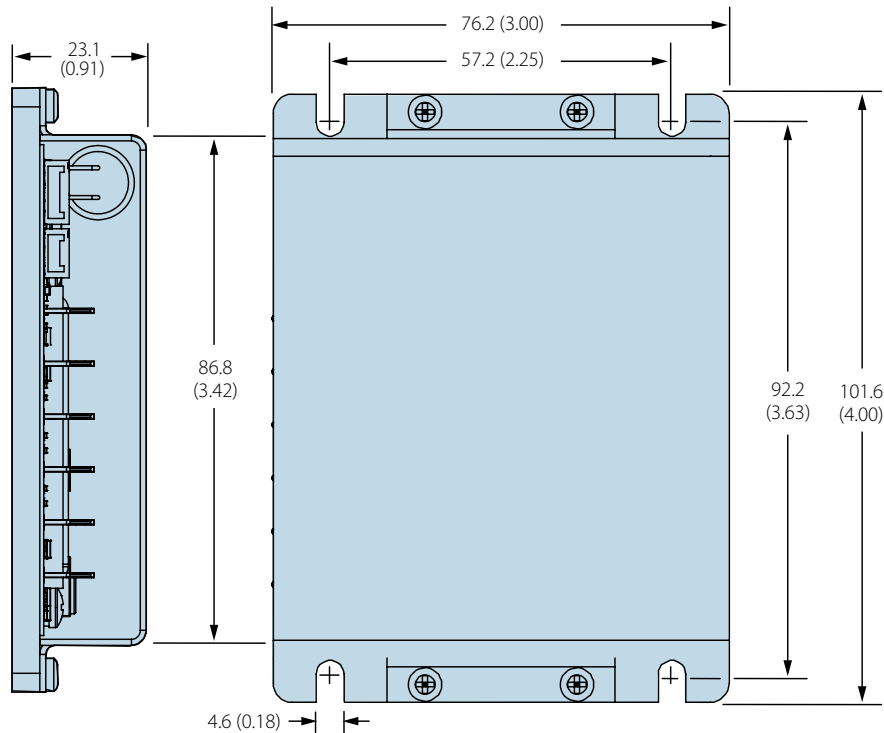


## DPFlex II Digital Output Circuit:
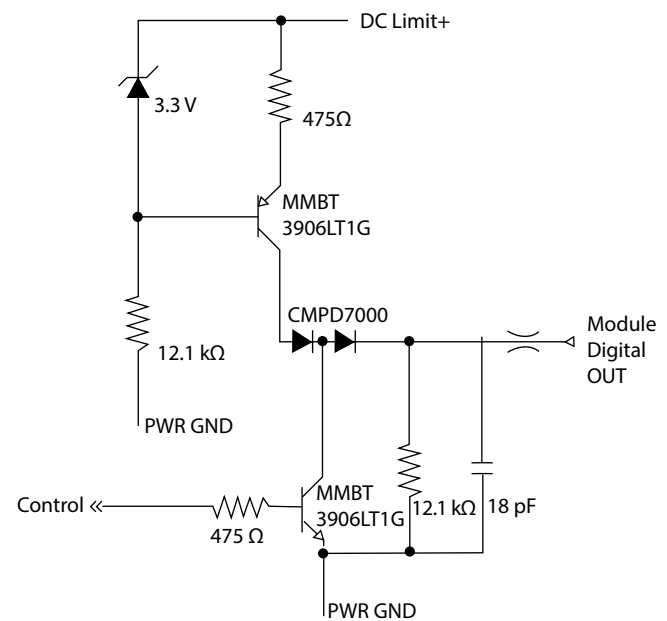


## DPFlex II Analog Input Connection

## DPFlex II Dimensions —  mm (in)



## DPFlex II Cable Accessories

| | Description | Part Number |
|---|---|---|
| USB | DPFlex USB translator "dongle" (p/n: 10-0177) plus 1 meter USB extension cable (Type B and Type A connectors) | AC-CB-100117 |
| Power | DPFlex power (p/n: 40-0165), motor (p/n: 40-0166), and signal (p/n: 40-0167) cables kit, each cable 1 meter in length | AC-CB-100118 |

## Documents & Software

*Documentation and most software are available for download from the Allied Motion website (www.allliedmotion.com)*

| | |
|---|---|
| 34-2003 | User Manual, DPFlex Gen 2 Series Sensorless Brushless Motor Drives |
| DP.D | DP.D development and commissioning software for the DPFlex I and II drive |

**Allied Motion**

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## Allied Motion Solution Centers

Allied Motion Solution Centers provide support to customers around the world from five geographically-strategic locations. Each facility is staffed by experienced application engineers and customer service teams to assist you with all aspects of your motion control needs. We also have a global network of factory-trained Allied Motion Sales Partners to serve you. For contact information on the location nearest you, please see below or visit our website.

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▲ Solutions Center

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## Allied Motion

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