Brushless IDEA™ Drive

Hardware Manual

PBL4850E

Haydon Motion Solutions kerk™

www.haydonkerk.com

03-2015

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Revision History

Date	Description
January 2015	Initial version

Introduction

This manual is intended to provide basic hardware specifications for the Haydon Kerk Brushless IDEA drive. For detailed information on use and programming of the drive, please refer to the IDEA Drive User's Manual. For detailed information on the command structure of the drive for coding purposes, please refer to the IDEA drive Communication Manual. All manuals are available at idea-drive.com.

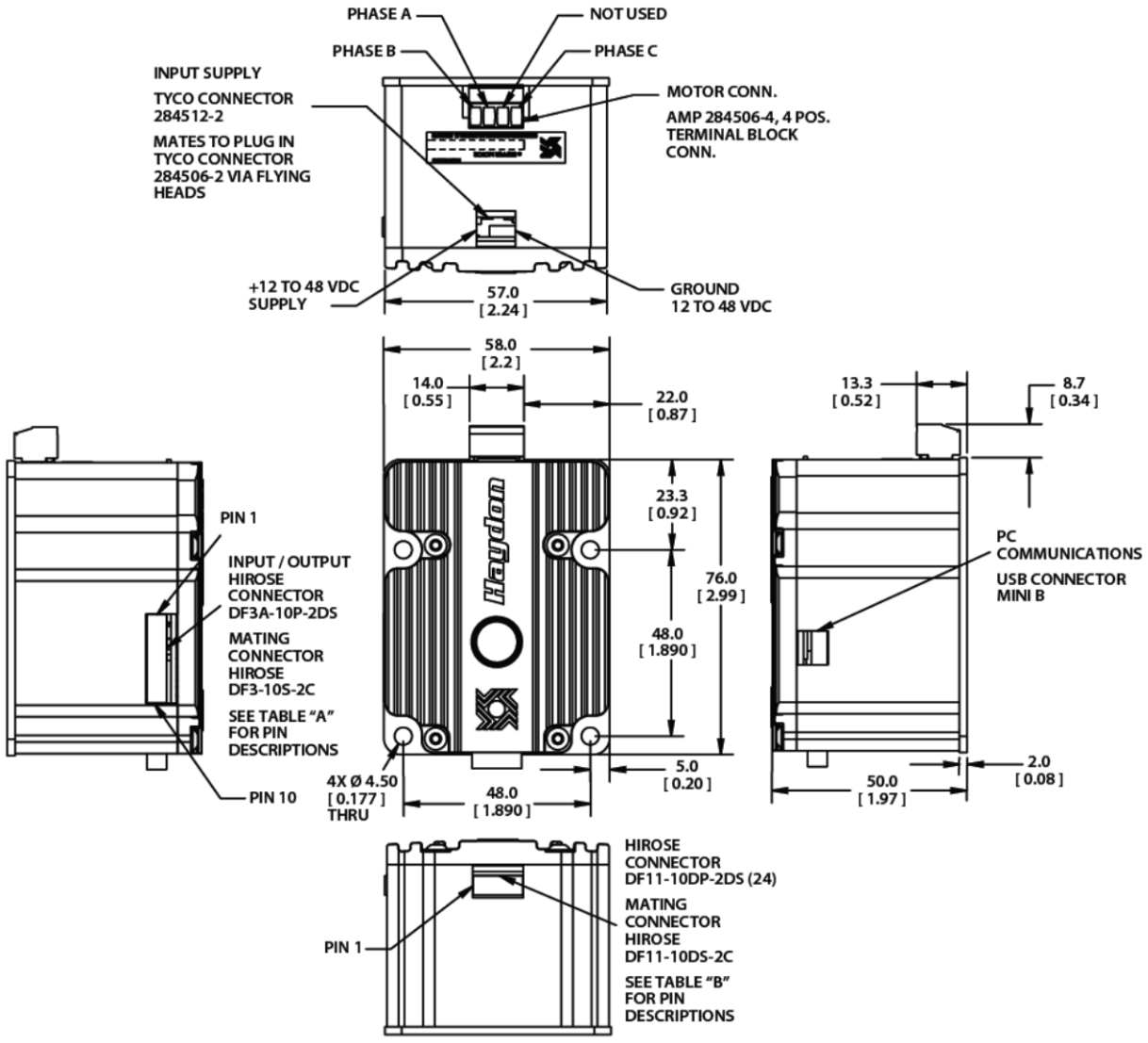
PBL4850E IDEA™ DRIVE

Specifications

Attribute	Value
Drive Input Voltage Range	12 – 48 VDC
Maximum Drive Current (per phase)	4.0 Arms (Up to 6.5 Apeak current boost capability during ramping)
Motor Type	3 Phase Brushless
Commutation Type	Sinusoidal with Hall Cell Initialization
Hall Cell Spacing	60° / 120°
Type of Ramping	Trapezoidal S-Curve
Communications	USB (Mini B connector)
Digital I/O Voltage Range	5-24Vdc
Digital Inputs	4
Digital Sinking Outputs	4
Digital Output Maximum Sinking Current	200mA (each)
Digital Input Maximum Current	8mA (each)
Maximum Temperature	70ºC (Measured at heat sink)
Program Storage Size-Type	85 Kbytes-Flash
Maximum Number of Stored Programs	85, Referenced by 10 character program names
Position counter range	64bit
Interrupt sources	4 inputs (rising, falling or both edges), internal position counter (when reaching a programmed position).

PBL4850E IDEA™ DRIVE Engineering Drawing

Engineering Drawings



Connections

TABLE "A"

PIN #	DESCRIPTION	NOTES
1	GROUND I/O SUPPLY	5 - 24 VDC
2	+ I/O SUPPLY	5 - 24 VDC
3	INPUT 1	
4	INPUT 2	
5	INPUT 3	
6	INPUT 4	
7	OUTPUT 1	
8	OUTPUT 2	
9	OUTPUT 3	
10	OUTPUT 4	

TABLE "B"

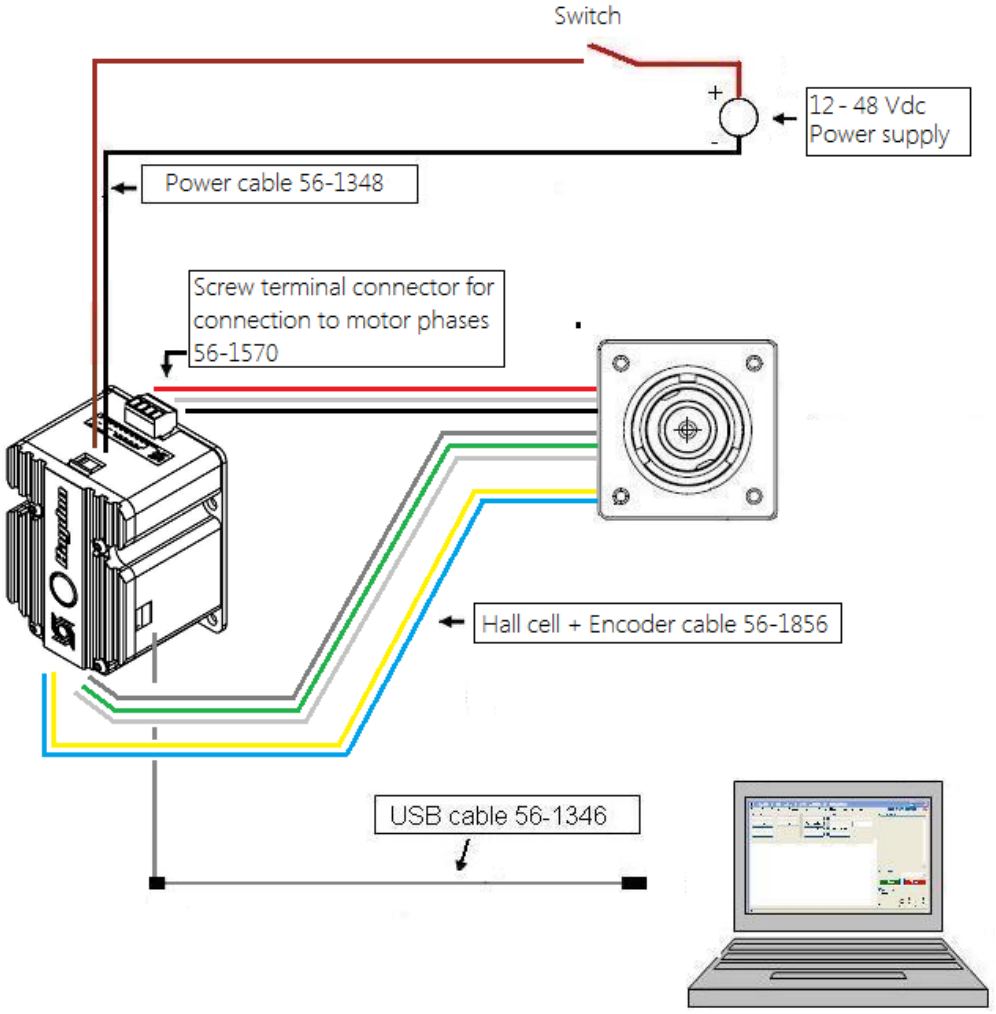
PIN #	DESCRIPTION
1	ENCODER CH A
3	ENCODER CH B
5	ENCODER INDEX
7	ENCODER 5VDC
9	ENCODER GND
2	HALL CELL A
4	HALL CELL B
6	HALL CELL C
8	HALL CELL 5 VDC
10	HALL CELL GND

Basic Wiring: To connect power to the drive and control it with the IDEA Drive User Interface you will need the following:

- A power supply, minimum of 12VDC.
- A PC
- Power cable (available from Haydon Kerk p/n 56-1348)
- Hall cell / Encoder harness (available from Haydon Kerk p/n 56-1856)
- Motor connected with screw terminal block (available from Haydon Kerk p/n 56-1570
- 10 wire I/O cable (available from Haydon Kerk p/n 56-1352).
    - Note: this cable is only required if the drive is interacting with an external device.
- USB to Mini B USB cable (available from Haydon Kerk p/n 56-1346)

The following page contains the proper wiring diagram for the IDEA drive, power supply and PC. The I/O and encoder cables are omitted.

Basic Wiring Diagram



Accessories

Accessories	Part No.
USB Cable (A to mini B), 2 meters	56-1346
Power Cable, 1 meter	56-1348
I/O Cable, 1 meter	56-1352
Motor Connector Screw Terminal	56-1570
Hall Cell & Encoder Cable	56-1856

Encoder Inputs

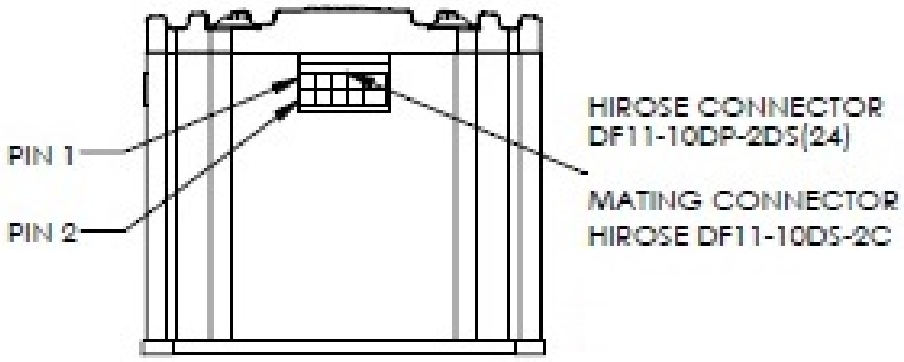
The IDEA drive is equipped with inputs for a single-ended, Quadrature encoder attached to the motor it drives. Quadrature encoders have 2 output signals, A and B, which are nominally 90 electrical degrees out of phase. On each rising or falling edge, the relative logic levels of the two phases can be used to determine the direction of rotation. The decoder within the drive interprets A leading B as motion in the clockwise direction, as viewed from the front face of the motor. This means that if a rising edge is detected on phase A, and phase B is at a logical high, then the motor just rotated counter-clockwise.

The IDEA drive watches for the rising and falling transitions on phase A and B, and increments or decrements the position counter accordingly. Using this method, a 1000 cycle per revolution optical rotary encoder would have 4000 counts per revolution.

Encoder Wiring

The encoder connector can be wired to any 2 channel quadrature encoder that operates between 3.3Vdc and 5Vdc**.** For encoders that work on 5VDC, power to the encoder can be supplied through pin 4 of the encoder connector, otherwise a separate 3.3Vdc power supply is required. Whether or not power is being supplied by the drive, pin 5 must be connected to the same ground as the encoder. This is internally connected to the IDEA drive's ground connection. Pin 3 is for encoders with an index signal. This may be left unconnected, and is for future revisions which may make use of the index signal.

Pins 1 and 2 are the A and B connections, respectively. When the output shaft of the motor is rotating clockwise as viewed from the front of the motor phase A should lead phase B. Check your encoder's documentation to check if A and B need to be swapped, which can also be performed via software.

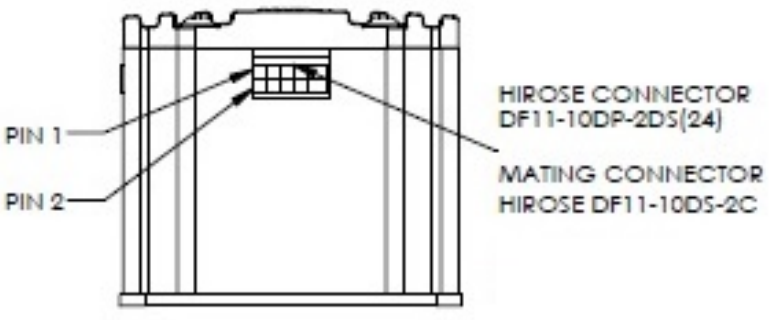


PIN #	DESCRIPTION
1	ENCODER CH A
3	ENCODER CH B
5	ENCODER INDEX
7	ENCODER 5VDC
9	ENCODER GND

Hall Cell Inputs

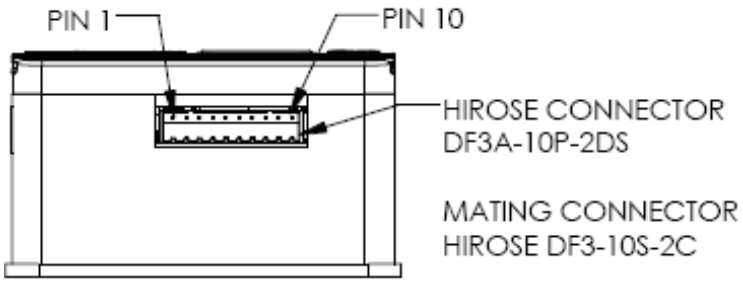
The brushless IDEA drive uses sinusoidal commutation and utilizes the hall cells for phase initialization. The IDEA drive accepts hall cell spacing configurations of 60° and 120°. Please follow the wiring diagram which came with the drive and motor combination for proper commutation and ideal motor performance.

Hall Cell Wiring



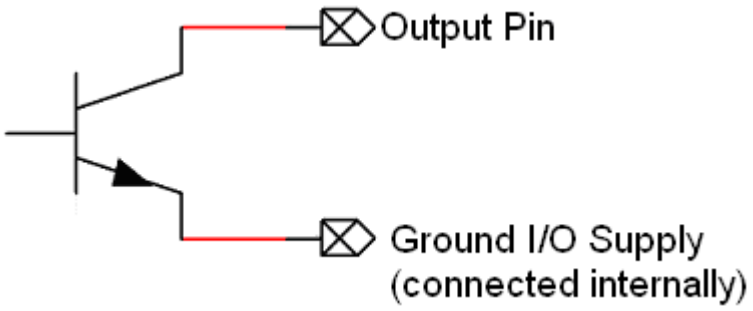
PIN #	DESCRIPTION
2	HALL CELL A
4	HALL CELL B
6	HALL CELL C
8	HALL CELL 5 VDC
10	HALL CELL GND

Digital I/O Pin Descriptions

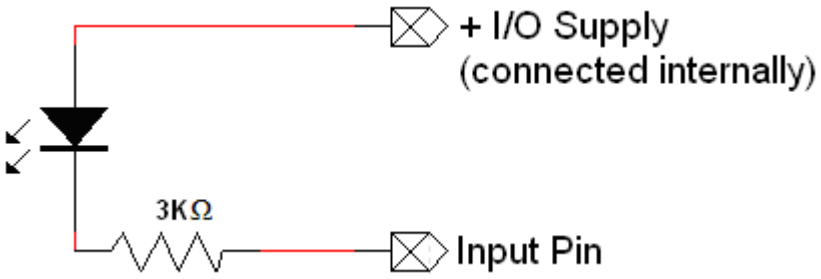


PIN POSITION	DESCRIPTION	NOTES
PIN 1	GROUND I/O SUPPLY	5 TO 24 VDC
PIN 2	+ I/O SUPPLY	5 TO 24 VDC
PIN 3	INPUT 1	
PIN 4	INPUT 2	
PIN 5	INPUT 3	
PIN 6	INPUT 4	
PIN 7	OUTPUT 1	
PIN 8	OUTPUT 2	
PIN 9	OUTPUT 3	
PIN 10	OUTPUT 4	

Open Collector Output Pin Description



Input Pin Description



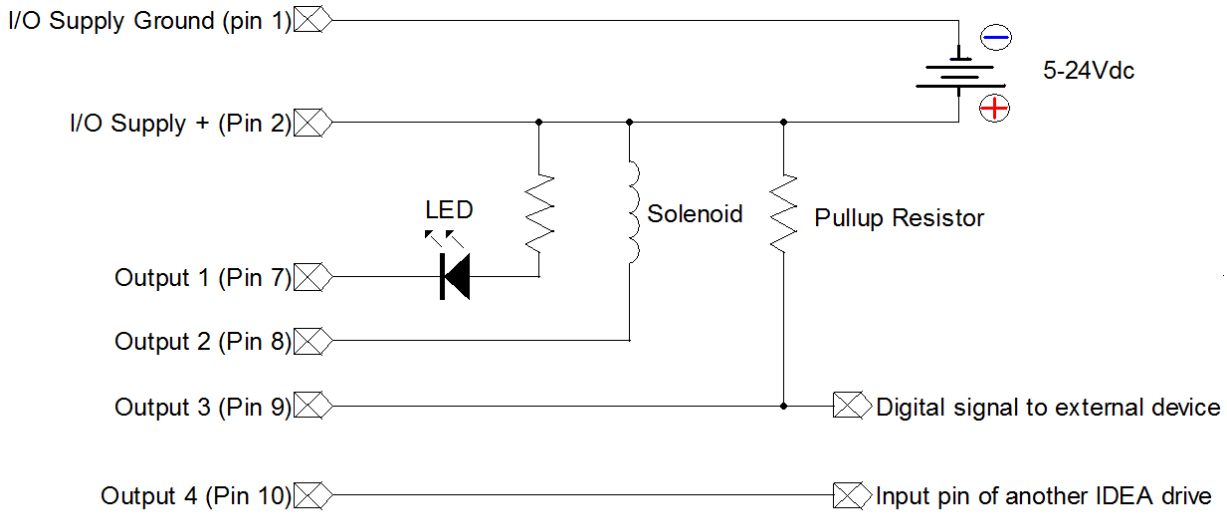
Digital I/O Wiring

The IDEA drive has four optically isolated inputs and four optically isolated, open-collector outputs. A power supply is necessary to activate the opto-isolators with a voltage range of 5-24VDC. As the outputs are open-collector, they will need a pull-up resistor tied to the + I/O supply if a high level voltage is required. The outputs are capable of sinking up to 200mA each.

Note: The inputs can be used in two ways. They can be connected to logic levels that swing between I/O supply ground and + I/O supply, or they can be attached to a switch connected to I/O supply ground. In the second configuration, when the switch is open, the drive will see this as a logic high, when the switch is closed, and the input is connected to I/O supply ground, the drive will see this as a logic low.

Note: When an input is connected to a mechanical switch or relay, a phenomenon called “bounce” can occur. When the switch contact is almost closed, several electrical arcs can form. If an input is being used as an interrupt, each arc will be seen as a rising and falling edge, causing several false interrupts to trigger. Any input being used as an interrupt source should only be attached to solid state devices or a switch with de-bounce circuitry.

Digital Output Wiring Examples



Digital Input Wiring Examples