

Appendix A. ENCODER SETUP

Introduction

This section is applicable when the BDS-E drive is not used with Digiplan MD Series motors.

BDS-E drives are designed to operate with 3-phase brushless servo motors which have both a commutation encoder (Hall effect encoder) and an incremental encoder fitted. The commutation encoder must have Com A leading Com B by 120° electrical and Com B leading Com C by 120° electrical, and must have the same pole count as the motor. The incremental encoder must have 512 or 1024 lines, with A+ leading B+ for clockwise (CW) motor rotation. The I+ output is a high going pulse that occurs when A+ and B+ are high and is shorter than one complete cycle of A+ (see Table 3-1 waveform diagram).

Commutation

When power is first applied to the drive, the commutation encoder is used to establish a torque angle of approximately 90° electrical, so that 87% smooth motor torque can be achieved immediately. Once the motor has moved through 180° electrical, it will have passed an edge of Com A, achieving a more accurate setting of the torque angle, allowing 95% torque to be obtained. Following a complete revolution, the motor will have received an index pulse which provides the most accurate position information allowing 100% torque to be applied. The index pulse also acts as a continual check on the electrical position.

Encoder Setup

When setting up the encoders, you should disconnect the motor cable from the drive, but leave the encoder cable connected and the drive powered up but de-energised. Select any motor phase, say 'u' in Figure A-1, and take it to the negative connection of a DC power supply, as shown. Connect the other two motor phases to the power supply positive connection via power diodes.

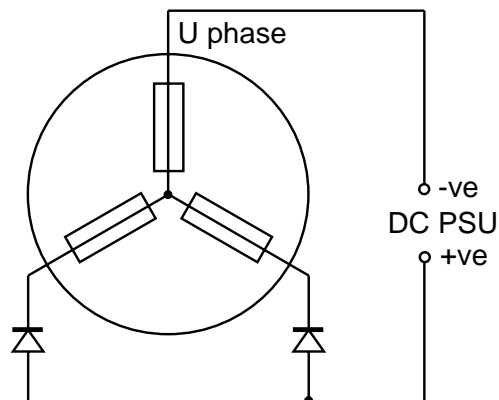


Figure A-1. Encoder Set-up Circuit

The DC power supply should be set to provide a current approximately equal to the motor's stall current. This will pull the rotor into the index position.

To identify the 'v' or 'w' phase, disconnect one of the diode connected phases, if the motor moves CW the 'v' phase has just been disconnected. If the motor moves CCW, you have just removed the 'w' phase.

The index position can be confirmed by the illumination of the middle yellow LED on the top of the drive. The commutation A LED will also light up when the motor is turned CW indicating the rising edge of Comm A+.

Bit Switch Setup

The bit switch can be used to configure the drive for different motor/encoder types.

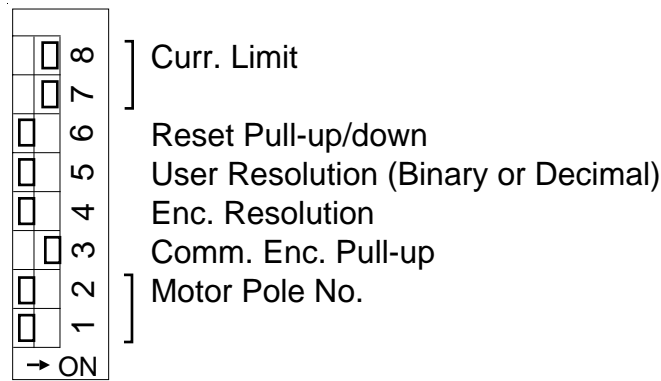


Figure A-2. Bit Switch Settings

Motor Pole Number

Bit switches 1 and 2 are set to the number of motor poles as follows:

<u>Number of Poles</u>	<u>Switch 1</u>	<u>Switch 2</u>
4	OFF	ON
6	OFF	OFF
8	ON	OFF

Commutation Encoder Pull up Voltage

The BDS-E drive may be used with the following types of commutation encoders:

Open collector outputs (single ended or complementary)
TTL outputs (single ended or complementary)
Line driver outputs

The bit switch 3 selects the pull-up voltage for the commutation encoder inputs:

<u>Function</u>	<u>Switch 3</u>
Inputs pulled up to +15V	OFF
Inputs pulled up to +5V	ON

Open collector outputs will require a setting of +15V, whilst line driver and TTL outputs should be set to +5V. Please contact Digiplan if the open collector option is required.

Encoder Resolution

The BDS-E drive can be used with incremental encoders having a resolution of 512 or 1024 lines per revolution. After processing, the encoders would effectively produce 2048 and 4096 steps/rev respectively.

<u>Function</u>	<u>Switch 4</u>
512 lines per revolution	ON
1024 lines per revolution	OFF

Note: Digiplan 3.4 inch motors are fitted with a 1024 line encoder.

User Resolution

The user resolution switch setting allows you to choose between working in Binary steps or Decimal steps. For example, with bit switch 5 set to OFF, a 1024 line encoder would produce 4096 steps/rev using a normal X4 decode. When bit switch 5 is set to ON (decimal mode), the same 1024 line encoder would produce 4000 steps/rev (steps/rev = clock pulses for one mechanical revolution).

Polarity of the 'Reset' Input

The reset input circuit can be configured as a normally open (pull-up) or a normally closed (pull-down) input, as shown in Figure A-3.

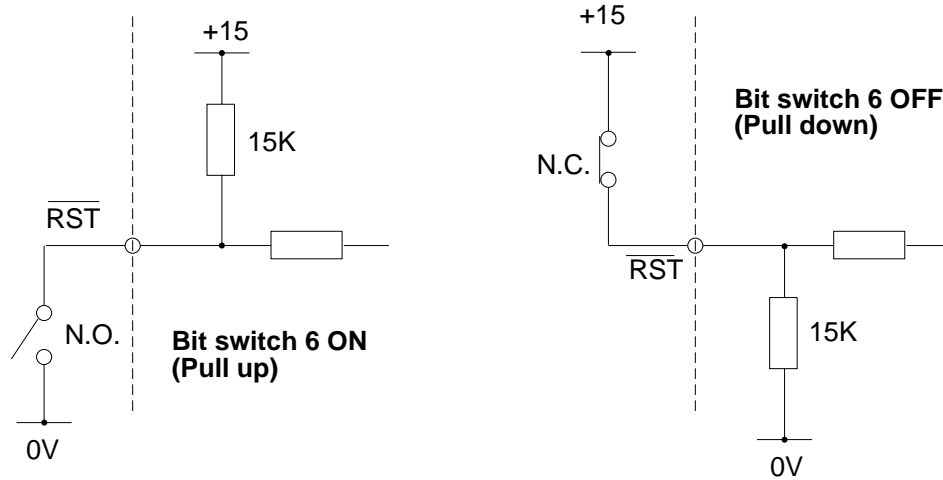


Figure A-3. Reset/Disable Input Circuit Options

Set bit switch 6 as follows:

Function	Switch 6
Reset pulled down to 0V	OFF
Reset pulled up to +15V	ON

Current Limit

Bit switches 7 and 8 are used to set the RMS motor current as follows:

BDS75E Current Limit	BDS150E Current Limit	Switch 7	Switch 8
6.0A	12.0A	OFF	OFF
4.2A	8.5A	OFF	ON
3.0A	6.0A	ON	OFF
2.5A	5.0A	ON	ON

It is normal to set the peak current at approximately 3 times the continuous current rating of the motor. The table below shows the allowable peak current for each motor size:

Motor	Peak Current
MD3450/230V	15A
MD3475/230V	30A

Table A-1. Motor Peak Current Rating