Optidrive Applications Support Library

Application Note	**AN-ODE-3-021**
Title	**Setting Up Preset Speeds**
Related Products	**Optidrive E3**
Level **2**	1 – Fundamental - No previous experience necessary 2 – Basic – Some Basic drives knowledge recommended 3 – Advanced – Some Basic drives knowledge required 4 – Expert – Good experience in topic of subject matter recommended

Overview

The Optidrive E3 can be configured to operate with up to a maximum 4 preset speeds. This application shows some of the common configurations for preset speeds. The preset speed parameters allow for both the setting of positive and negative values, allowing for each preset to be individually configured for a forward or reverse direction. Alternatively the forward / reverse selection can be made independently of the preset speed selection giving mirrored preset speeds in the opposite direction.

The method used for enabling preset speeds on the Optidrive E3 and configuring the digital input selection is to select one of the predefined input configurations using the Digital Input Configuration Parameter (P-15)

Preset speed selection might be performed using logic selector switches or by a controlling PLC. For simplicity this application note shows examples using selector switches to clearly show logic conditions on the digital inputs to the drive.

As Preset Speed functionality is used predominantly when the drive is in terminal control mode this application note focuses on the terminal control mode of operation (P-12=0). Some options for Preset speeds do exist in the other control methods and these are detailed in the product user guide.

Selecting Preset speeds using the Digital Input selection parameter P-15.

The Digital Input Selection Parameter P-15 allows predefined digital input configurations to be chosen from a table provided in the User Guide. Optidrive E3 has several settings for parameter P-15 that configure preset speed functionality. The predefined options in parameter P-15 allow for selection of one, two or four preset speed configurations.

- Preset speed 1 value (commanded speed when preset speed 1 is selected) is set in parameter P-20
- Preset speed 2 value (commanded speed when preset speed 2 is selected) is set in parameter P-21
- Preset speed 3 value (commanded speed when preset speed 3 is selected) is set in parameter P-22
- Preset speed 4 value (commanded speed when preset speed 4 is selected) is set in parameter P-23

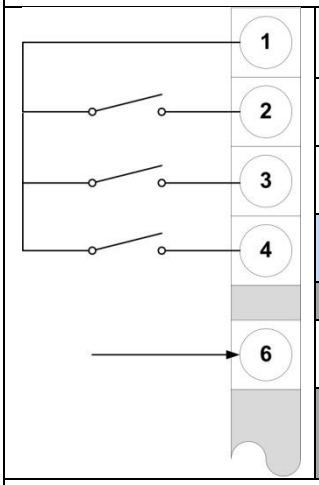
In order to access parameters greater than P-14 a security code is required to be set in parameter P-14 (default value 101).

Configurations for four preset speeds use a rotary binary switch that converts each position into a binary number. The four preset speed configurations use a two pole binary switch (using two digital inputs). The table below shows the input selection of the preset speed parameters is shown below.

Input 1 (LSB)	Input 2 (MSB)	Preset Speed Selected
Open	Open	Preset 1 – P-20
Closed	Open	Preset 2 – P-21
Open	Closed	Preset 3 – P-22
Closed	Closed	Preset 4 – P-23

Connection diagrams for the configurations provided by parameter P-15 are shown below:

P-15 = 0: 1 Preset Speed, Run, Fwd/Rev and Analog Reference



Terminal 1: +24V Supply
24V @ 100mA

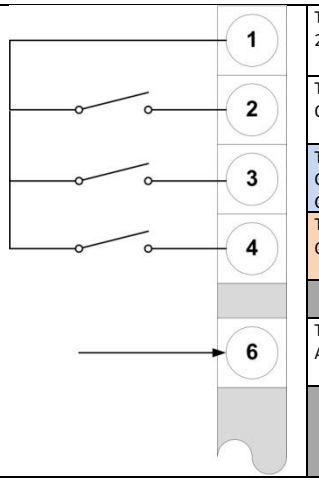
Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Open=Forward : Closed=Reverse

Terminal 4: Digital Input 3
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1

Terminal 6: Analog Input 1
Analog Speed Reference

P-15 = 1: 2 Preset Speeds, Run, and Analog Reference



Terminal 1: +24V Supply
24V @ 100mA

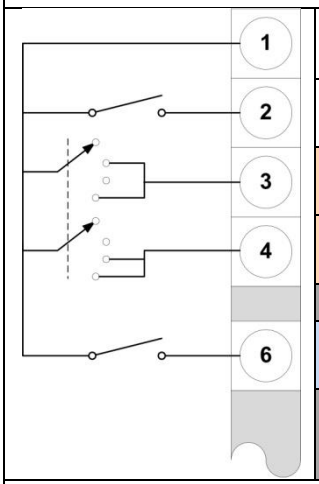
Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1 / 2

Terminal 4: Digital Input 3
Open=Preset Speed 1 : Closed=Preset Speed 2

Terminal 6: Analog Input 1
Analog Speed Reference

P-15 = 2: 4 Preset Speeds, Run, Max Speed (5th Preset)



Terminal 1: +24V Supply
24V @ 100mA

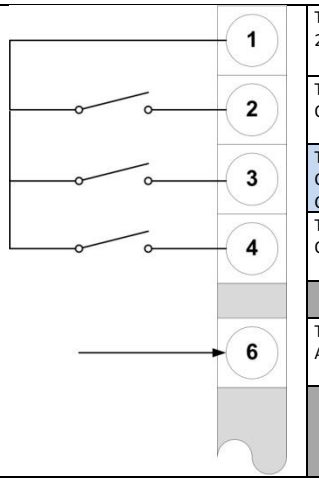
Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Closed=Preset Speed selection – Bit 0 (LSB)

Terminal 4: Digital Input 3
Closed=Preset Speed selection – Bit 1 (MSB)

Terminal 6: Digital Input 4
Open=Preset Speed 1-4 : Max Speed (P-01)

P-15 = 3: 1 Preset Speed, Run, External Trip and Analog Reference



Terminal 1: +24V Supply
24V @ 100mA

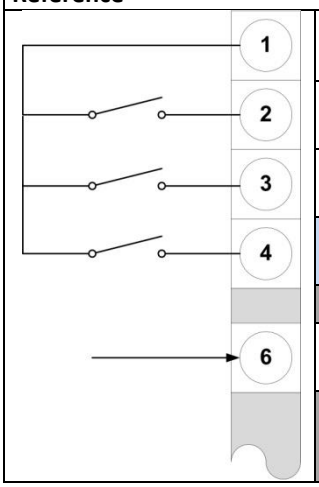
Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1

Terminal 4: Digital Input 3
Open=External Trip : Closed=OK to Run

Terminal 6: Analog Input 1
Analog Speed Reference

P-15 = 5: 1 Preset Speed, Run Fwd, Run Rev, and Analog Reference



Terminal 1: +24V Supply
24V @ 100mA

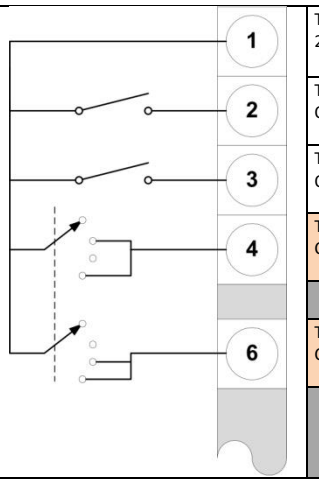
Terminal 2: Digital Input 1
Open=Stop (Fwd): Closed=Run Forward

Terminal 3: Digital Input 2
Open=Stop (Rev): Closed=Run Reverse

Terminal 4: Digital Input 3
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1

Terminal 6: Analog Input 1
Analog Speed Reference

P-15 = 8: 4 Preset Speeds, Run, and Fwd/Rev



Terminal 1: +24V Supply
24V @ 100mA

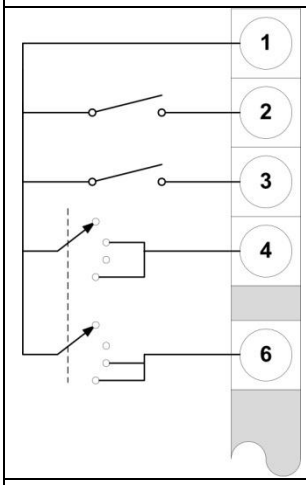
Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Open=Forward : Closed=Reverse

Terminal 4: Digital Input 3
Closed=Preset Speed selection – Bit 0 (LSB)

Terminal 6: Digital Input 4
Closed=Preset Speed selection – Bit 1 (MSB)

P-15 = 9: 4 Preset Speed, Run Forward, and Run Reverse



Terminal 1: +24V Supply
24V @ 100mA

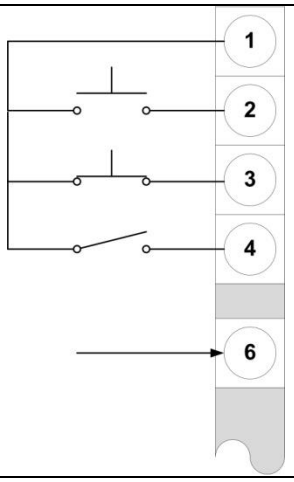
Terminal 2: Digital Input 1
Open=Stop : Closed=Run Forward

Terminal 3: Digital Input 2
Open=Stop : Closed=Run Reverse

Terminal 4: Digital Input 3
Closed=Preset Speed selection – Bit 0 (LSB)

Terminal 6: Digital Input 4
Closed=Preset Speed selection – Bit 1 (MSB)

P-15 = 10: 1 Preset Speed, Run, External Trip and Analog Reference



Terminal 1: +24V Supply
24V @ 100mA

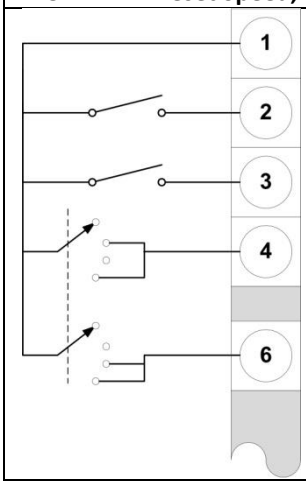
Terminal 2: Digital Input 1
Normally Open : Momentary Closed=Run

Terminal 3: Digital Input 2
Normally Closed : Momentary Open=Run

Terminal 4: Digital Input 3
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1

Terminal 6: Analog Input 1
Analog Speed Reference

P-15 = 12: 4 Preset Speed, Run Forward, and Run Reverse



Terminal 1: +24V Supply
24V @ 100mA

Terminal 2: Digital Input 1
Open=Stop : Closed=Run

Terminal 3: Digital Input 2
Open= Fast Stop : Closed=Run

Terminal 4: Digital Input 3
Open = Analog Speed (Analog In 1)
Closed = Preset Speed 1

Terminal 6: Analog Input 1
Analog Speed Reference

: Preset Speed Mode Selection

: Preset Speed Reference Selection

LSB = Least Significant Bit / MSB = Most Significant Bit

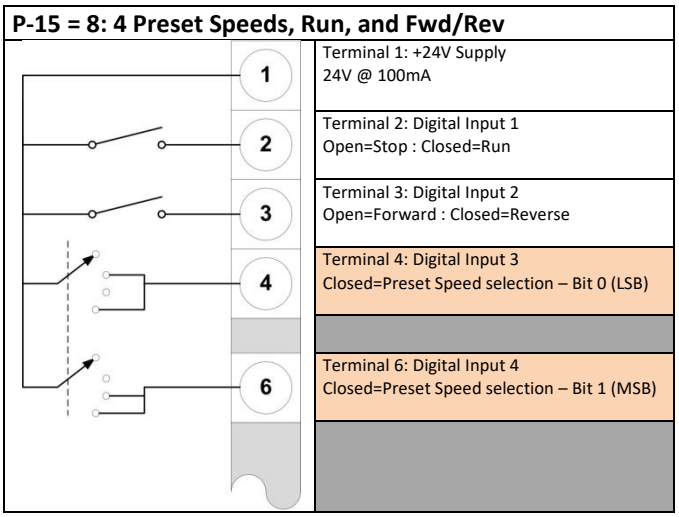
Example Set-Up for Parameter P-15:

The following application requires 4 preset speeds of the following values:

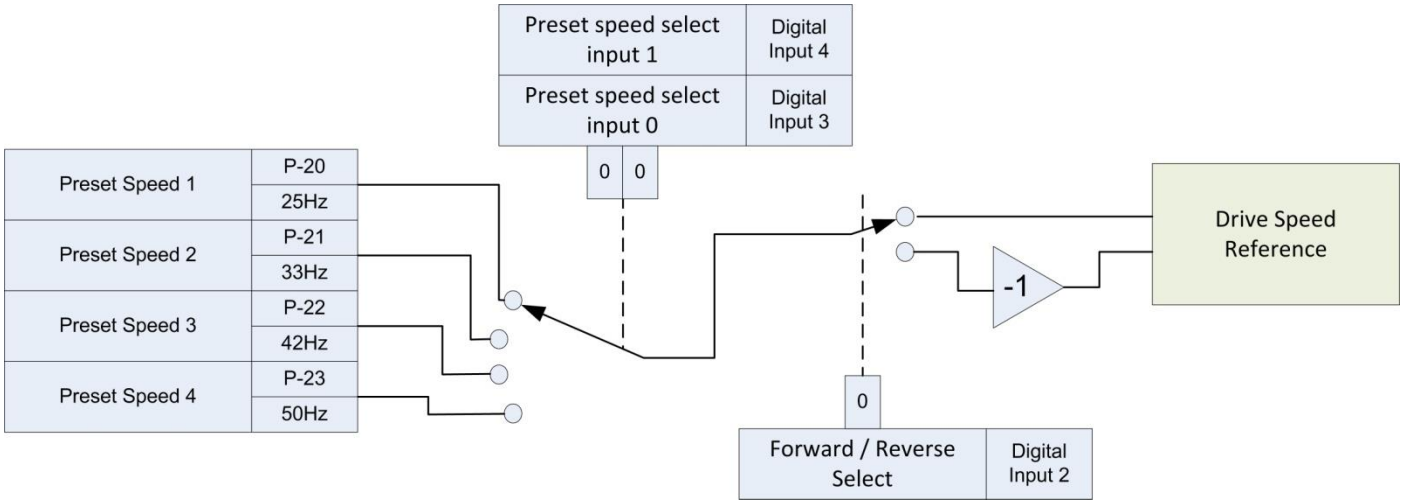
- Preset speed 1, 25Hz
- Preset speed 2, 33Hz
- Preset speed 3, 42Hz
- Preset speed 4, 50Hz

These are selected by two digital inputs.
All four preset speeds need to be available on both the forward and reverse directions via a third digital input.
There should be a Run / Stop input to start and stop the drive.

The connection diagram for the drive is shown below:



Below is a parameter map showing the selection and values of the preset speeds.



The Following setting should be made to the drive.
The parameter settings listed are required *following a default of the drive* to factory setting. This should be performed prior to any programming to ensure all necessary default parameters are restored. Parameters listed in **Blue** are default values (do not require setting) but are listed in the table for clarity.

Parameter	Description	Value	Notes:
P-12	Primary Command Source	0	Operate Drive in Terminal Control Mode
P-14	Extended Menu Access Code	101	Allows security level access is all parameters
P-15	Digital Input Function Select	8	Set Digital Input Configuration to match Application Requirements
P-20	Preset Speed 1	25	Speed reference value when preset speed 1 is selected
P-21	Preset Speed 2	33	Speed reference value when preset speed 2 is selected
P-22	Preset Speed 3	42	Speed reference value when preset speed 3 is selected
P-23	Preset Speed 4	50	Speed reference value when preset speed 4 is selected

Notes

	**When a Run Reverse input is provided to the drive and a negative preset speed is selected it will result in the drive running in the forward direction. If is recommended, to avoid confusion, that reverse speeds are selected from a single source, either by setting negative preset speeds or by having a dedicated reverse input to the drive.**

Appendix:

Revision History			
Issue	Comments	Author	Date
01	New Application note created	KB	09/12/15
02	Edited	BL	23/01/17
03	Corrected preset speed parameter numbers	KB	13/06/17