Optidrive Applications Support Library

Application Note	AN-ODV-3-008
Title	Selecting the Start - Restart Mode
Related Products	Optidrive Eco
Level **1**	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

Optidrive Eco includes parameters which allow the user to configure

- Whether the drive should start immediately after power on or wait for an "enable" signal
- Whether the enable signal is from Control Terminals, Keypad or network such as Modbus or BacNet
- Whether the drive should reset and restart automatically following a trip
- At what speed the drive should start, following the enable signal being applied

This application note provides details of the parameters which may be used to configure this behaviour.

Parameters Affecting Starting Behaviour

P1-12 - Primary Command Source Selection

Parameter P1-12 selects the primary command source for the drive – e.g. from which source will the drive enable signal be applied. The options are as follows :-

0 : Terminal Control. The enable signal will be applied via a digital input on the control terminal strip, normally Digital Input 1, Terminal 2 on the control terminals. Starting behaviour is controlled by P2-36 setting, as described later.

1 : Keypad Control. Control can be made via the drive built in keypad, or a remote keypad, with behaviour dependent on P2-37 setting as described later.

2 : Keypad Control. Control can be made via the drive built in keypad, or a remote keypad, with behaviour dependent on P2-37 setting as described later.

3 : PID Control. The enable signal will be applied via a digital input on the control terminal strip, normally Digital Input 1, Terminal 2 on the control terminals.

4 : Fieldbus Control. Control of the drive can be via a fieldbus network, either Modbus RTU using the integral Modbus RTU RJ45 connection point, or via an alternative fieldbus such as BacNet IP if an optional plug in fieldbus interface is installed in the drive. Behaviour of the enable signal is then based on the setting of P2-37 as described later.

5 : Slave Mode. The drive acts as a Slave to a connected Master, and all control will be via the Master drive. Note that an enable signal is still required, usually digital input 1, to allow the slave to be manually disabled, otherwise all control signals are provided by the Master.

6 : BacNet MS/TP Control. Control signals will be via the built in BacNet MS/TP interface, with behaviour also affected by the setting of P2-37 as described later.

P2–36 Start Mode Select / Automatic Restart

P2-36 has two functions :-

- When operating in a control mode where the enable signal is via a digital input (e.g. P1-12 = 0 or 3), following a power on or trip reset, should the drive start if the input is already made, or wait for a rising edge of the input
- In the event of a drive trip occurring, should the drive remain in the trip condition, and await reset from an external source, or should the drive automatically attempt to reset the fault and restart.

P2-36 Function when enable signal is from terminals (e.g. P1-12 = 0 or 3)

P2-36 = EdGE-r (Edge run):

The enable signal input (usually Digital input 1) is configured to be edge-triggered and requires the run signal to be re-applied *after* a trip or a power-up to start the drive. If the run input is closed prior to the mains power being applied to the Optidrive, and remains closed whilst the drive is powered up, the Optidrive Eco will not start.

"Edge-r" may be used where, for safety reasons, the drive should not start automatically on power up should the run switch already be in a closed state. In this case, the run switch must be opened and then re-closed before the drive will start. The same rule applies after clearing / re-setting a trip condition.

P2-36 = AUto-0 (Auto-run, default)

The enable signal input (usually Digital input 1) is configured to be automatically recognised and is not required to be re-applied following a trip or a power-up in order to start the drive. If the run input is closed prior to the mains power being applied to the Optidrive Eco, and remains closed whilst the drive is powered up, the Optidrive Eco will start automatically.

"Auto-0" is normally used where access to the enable input is restricted and the drive needs to run as soon as mains power is applied. It must only be used where this form of start-up presents no danger to personnel or equipment in the vicinity of any moving or electrical parts.

P2-36 = AUto-1, AUto-2, AUto-3, AUto-4, AUto-5

In this mode, the operation is similar to Auto-0, except that the user can define how many times the drive will **automatically** attempt to clear a trip and restart before permanently tripping and requiring a manual reset. The drive will make between 1 (Auto-1) and 5 (Auto-5) automatic attempts to clear the trip and restart.

The default delay between restart attempts is set at 20 seconds, and may be adjusted by the user in parameter P6-03 if desired.

The restart attempt counter (1..5) is reset by any of the following operation:

- Powering the drive down and back up again
- Pressing the reset (Stop) button on the drive keypad when the drive is tripped (displaying a trip message).
- Removing and re-applying the hardware enable signal.

P2-36 Function when enable signal is from an alternative source (e.g. P1-12 = 1, 2, 4, 5 or 6)

When an alternative command source, such as keypad or a fieldbus interface is selected, the enable signal input must always by present in order for the drive to run. Dependent on the setting of P2-37, an additional action may be required to start the drive, e.g. in keypad mode, pressing the keypad start key or in Modbus mode, setting the drive enable bit in the control word sent to the drive.

P2–37 Keypad / Fieldbus Mode Start Control

Parameter P2-37 also has two functions :-

- When a command source other than the terminals is selected, the drive enable may be selected to ignore the command source, and use only the enable signal from the digital input
- When using keypad control, following a start command, which speed should the drive operate at on starting

The available options are described in more detail below. These are formed into two groups as follows.

Settings 0 – 3

With settings 0 – 3, a hardware enable signal is required to be applied in order for the drive to start, typically on Digital Input 1. In addition, depending on the setting of P1-12, an additional action or command will be required, e.g. if P1-12 = 1, P2-37 = 1, in order to start the drive, the enable signal must be present AND the user must then press the start button. The drive can be stopped by either removing the enable input, or by pressing the stop key. The same behaviour also applies to any fieldbus control option, e.g. if P1-12 = 4 or 6, the hardware enable must be present, and the relevant enable bit must be set in the command to the drive. The drive will stop if the enable bit is switched off, or the enable digital input is removed.

With settings 0 – 3, P2-36 controls the automatic restart function only, using the AUto-1 to AUto-5 settings only. Other settings have no effect.

Settings 4 – 7

Settings 4 – 7 replicate the behaviour of settings 0 – 3, however in this case, only the hardware enable signal on the drive terminal strip is required, and the drive does not wait for a secondary action, e.g. pressing the start key in keypad mode. This can be useful in cases where it is desired to use the motorised pot function in the drive to control the speed using raise and lower inputs, whilst providing an enable signal also from the terminals.

With settings 4 - 7, P2-36 controls the starting an automatic restart function in the same way as if the drive were operating in keypad mode.

P2-37 Starting Speed Control when operating in keypad Mode (P1-12= 1 or 2)

When using the built in keypad, or a remote keypad to control the drive, P2-37 determines at what speed the drive should start following the enable command being applied. This allows the behaviour to be defined to suit the application.

P2-37 = 0: Minimum Speed

The Optidrive Eco will automatically run at the minimum programmed frequency (value entered into parameter P1-02) when started from the keypad, regardless of the speed it was previously running at prior to a stop or power off condition being applied. With minimum speed (P1-02) set to 0 the drive will always restart with a set point speed of 0.

P2-37 = 1: Previous Operating Speed

The Optidrive Eco will automatically run at the previous speed set point, prior to the stop condition being applied, when started from the keypad. This applies both to the drive being stopped and to the mains input power being removed (previous set-point is retained on power off). E.g. with the drive powered off whilst running at 20Hz, the next start after power on will cause the drive to run immediately up to 20Hz.

P2-37 = 2: Current Running Speed

This mode of operation is used where the drive has other speed references signals that can be selected by the user in addition to keypad operation. When set to 'current running speed' the drive will maintain its current operating speed when switching back into keypad mode.

For example, if the drive was running in preset speed mode at a speed of 35Hz and is switched from Preset speed mode into keypad mode then keypad mode operation would commence at 35Hz. If 'current running speed' was not selected (in P2-37) then the drive would revert to operating at the start-up speed defined by P2-37.

P2-37 = 3: Preset Speed 4

The Optidrive Eco will automatically run at the frequency programmed into preset speed 4 (value entered into parameter P2-04) when started from the keypad, regardless of the speed it was previously running at prior to a stop of power off condition being applied. With preset speed 4 (P2-04) set to 0 the drive will always restart with a set point speed of 0.

P2-37 = 4: Minimum Speed

As setting 0, however the enable is from the control terminals only, no additional starting action is required.

P2-37 = 5: Previous Operating Speed

As setting 1, however the enable is from the control terminals only, no additional starting action is required.

P2-37 = 6: Current Running Speed

As setting 2, however the enable is from the control terminals only, no additional starting action is required.

P2-37 = 7: Preset Speed 4

As setting 3, however the enable is from the control terminals only, no additional starting action is required.

Appendix

Revision History			
Issue	Comments	Author	Date
01	Document Creation	KB	01/04/15