



Optidrive Applications Support Library

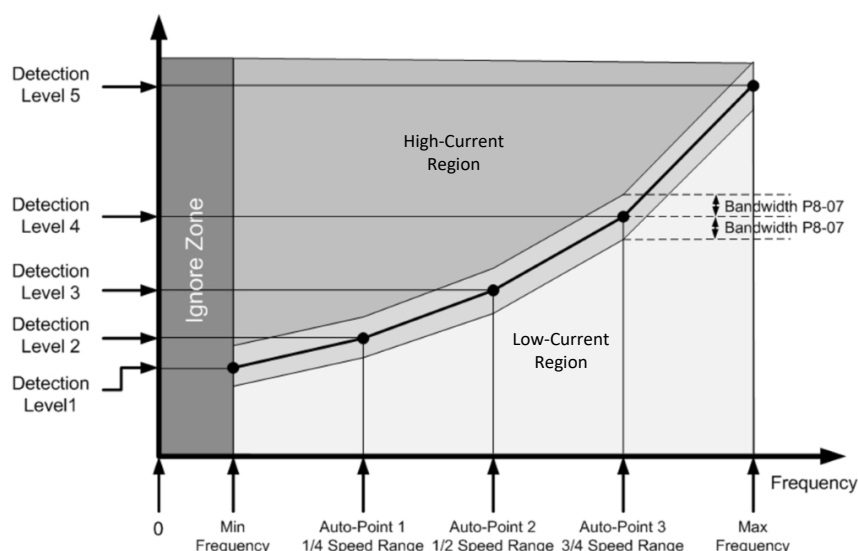
Application Note	AN-ODV-3-075
Title	Motor Current Profile Monitoring Function
Related Products	Optidrive Eco
Level 2	1 – Fundamental - No previous experience necessary 2 – Basic – Some Basic drives knowledge recommended 3 – Advanced – Some Basic drives knowledge required 4 – Expert – Good experience in topic of subject matter recommended

Overview

The Motor Current Profile Monitoring Function provides low-current and high-current protection to the driven load. Practical applications for the function might include Belt Snap detection, Motor Stall detection, Pump Blockage, or Pump Dry Run protection.

The Motor Current Profile Monitoring Function uses a standard operating profile stored in memory and the motor current is continuously compared to the standard profile during operation. Should total motor current deviate outside of the standard profile for a specified period of time then a trip can be generated within the drive or the condition can be indicated. The Optidrive Eco uses 5 measured points on the frequency versus total motor current curve in order to model normal operation.

A graphical representation of the Motor Current Profile Monitoring Function is shown below:



Operational Overview

In order to use the Motor Current Profile Monitoring Function the standard (normal) operating profile of the motor current versus speed must be established. Set-up of the Motor Current Profile Monitoring Function and the standard operating profile is normally performed as the final step in commissioning the system.

The standard operating profile is established within the drive using an automatic measurement sequence. The automatic measurement sequence is activated when the Motor Current Profile Monitoring Function is enabled (P8-06 changed from 0). When the drive is first run, following enable of this Monitoring Function, the drive output will be ramped to the maximum frequency setting (P1-01) with 5 evenly spaced motor current measurements recorded. The drive will then return to the normal

set-point operating speed. In order to repeat the automatic measurement sequence the Motor Current Profile Monitoring Function must be disabled (P8-06 = 0) and re-enabled (P8-06 \neq 0).



Caution: The automatic measurement sequence over-rides the normal drive set-point speed and the drive will run the motor up to maximum frequency (P1-01). Ensure that the system is in a suitable condition to operate through the programmed speed range.

Maximum Frequency / Speed parameter (P1-01) and Minimum Frequency / Speed parameter (P1-02) can be adjusted following execution of the automatic measurement sequence but the drive will consider the current level below and above the originally set min/max frequency to be constant – if the motor current measured with P1-01 set to 50Hz was 10A and P1-10 was subsequently changed to 55Hz, the drive would assume that the current profile would be 10A at 50Hz and remain as 10A up to 55Hz. When operating outside of the maximum and minimum speed range the function is disabled.

When setting parameter P8-06 to activate the Motor Current Profile Monitoring Function a value is set that instructs the Optidrive Eco unit to trip on detection of under-current (P8-06=1), over-current (P8-06=2), or combination of both under-current or over-current (P8-06=3) or simply indicate the condition in the status word or by relay output (P8-06=4).

A detection tolerance for the Motor Current Profile Monitoring Function is set within parameter P8-07. Parameter P8-07 (Motor Current Profile Monitoring Function Bandwidth) is set as a current (amps) value and is then applied to the standard operating profile stored within the drive to allow for acceptable variations in the motor current measurement. The value entered is applied symmetrically to the nominal current value so total bandwidth is 2 x P8-07 (motor rated current). The Current values measured during the auto-tune are recorded to parameter P0-58 for reference.

In addition to a bandwidth of tolerance being applied to the standard operating profile (P8-07) a trip delay or time limit can also be specified for operation on the drive within the high current or low current regions. This time is set within parameter P8-08 (Motor Current Profile Monitoring Function Trip Delay). This parameter can be set to avoid nuisance tripping whilst the load is in a temporary or transitional state.

The Optidrive Eco will trip immediately on detecting a High or low-current condition for a time period greater than that set in P8-08 and will disable output to the motor with coast to stop. The trip will be displayed on the OLED display and can be reset by pressing the Keypad STOP key.

The Optidrive Eco can be set to run an automatic pump cleaning function once the Motor Current Profile Monitoring Function has detected a high-current condition.

Trip Codes: $\overline{U_Error}$: High-Current Level Detected resulting in drive trip (Fault code 24)
 $\overline{L_Error}$: Low-Current Level Detected resulting in drive trip (Fault code 25)

Quick Setup Overview

- **Read Caution note associated with this function (above)**
- Set the maximum and minimum speed limits for the drive (P1-01 & P1-02).
- Set Basic parameters P1-03 to P1-10.
- Set Parameter P1-14 = 101 to allow access to advanced parameters in menu 8
- Enable the Motor Current Profile Monitoring Function by setting P8-06
 - 0: Disabled
 - 1: Low Current Detection Enabled (Belt Failure / Dry Pump / Broken Impeller)
 - 2: High Current Detection Enabled (Pump Blockage)
 - 3: Low and High Current Detection
 - 4: Low and High Current Detection without trip
- Mode 4 is to allow the monitoring and signalling of a high/low current condition without tripping the drive. The condition can be read in the status word in bit 7 (1 will indicate high/low current detected)
- The user relay can be set to indicate the low/high current condition (P2-15 / P2-18 = 15)
- Set an acceptable tolerance bandwidth in P8-07. Set a high bandwidth initially and monitor current during normal operation to determine tighter levels if required.
- Enable the drive and allow the automatic measurement sequence to run.
- Should some nuisance tripping occur Increase the Motor Current Profile Monitoring Function Trip Delay in P8-08. If tripping still occurs, then repeat the automatic measurement sequence.

Appendix:

Revision History			
Issue	Comments	Author	Date
01	Document Creation	KB	28/04/14
02	Updated terminology	DD	16/04/18