

## Configuring a load-sharing system using Optidrive Plus

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- **General:**

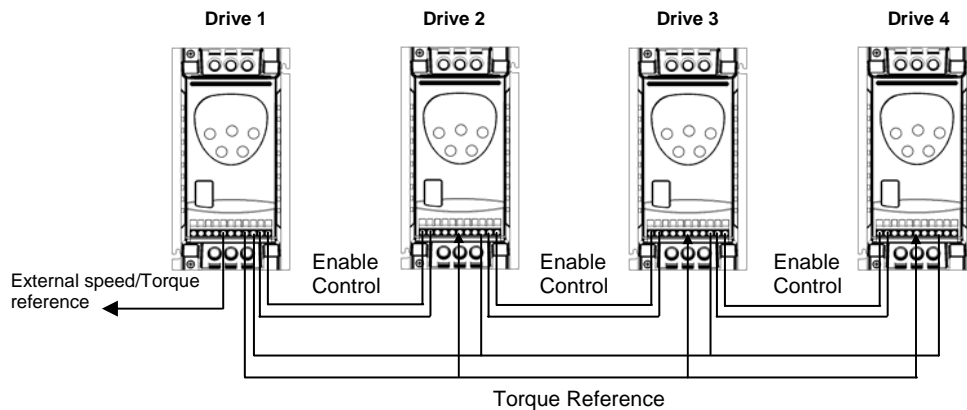
The Optidrive Plus is capable of load sharing, where two or more drives equally share a common load. In addition, the Optidrive Plus can be used to setup a cascade system, so that successive drives are automatically started when the load increases, or stopped when the load reduces.

Typical load sharing applications include pressure control systems with multiple compressors or motors connected mechanically to a common load.

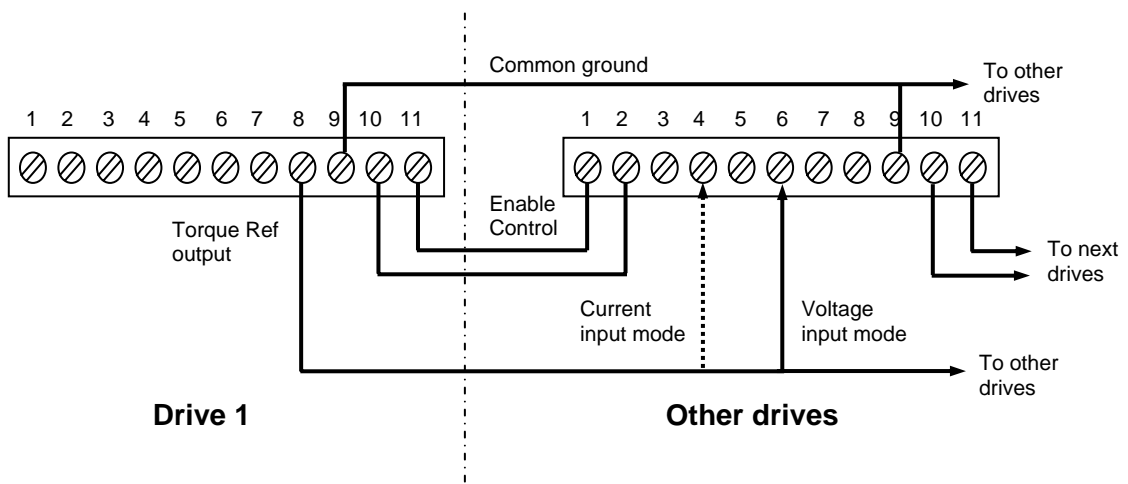
This document describes how to configure the Optidrive Plus for a load sharing application.

- **Drive connection and wiring**

*Drive connection*



*Optidrive Plus Terminal Connection*



- **Parameters**

**P2-11 Analog output function select**

For a load sharing application, the analog output should be set to 8, representing load current (load torque applied to motor).

This signal will effectively be used as the torque control reference for the other drives in the system.

**P2-13 Relay output function select**

This parameter should be set to 5, configuring the relay output to change state depending on the load torque. The switching limits for the relay output can be configured in P2-14 (see below).

This relay output signal is connected to the enable input of the following drive and is used to enable / disable that drive depending on load.

**P2- 14 Relay control limit**

This parameter sets the levels at which the relay switches, as a percentage of rated load current. This parameter allows two limits to be set : the upper limit and the lower limit, effectively providing a configurable hysteresis band. A hysteresis band is always required for load sharing applications.

P2-15 should be left to its default setting, ie Normally Open (N.O.)

- **Example**

Consider a system with up to 4 drives with four pumps providing pressure control into a common pressure system. The first drive in the system uses PID control with a pressure transducer to maintain constant pressure.

For drive one, the PID control is set up as usual (see AN-ODP-32). The remaining parameters are set as follows:

P2-11 = 8      analog output function as motor torque output  
P2-36 = 0      analog output format as 0...10V\*  
P2-13 = 5  
P2-14 (high) = 90% and P2-14 (low) = 30%

\* If 4...20mA format is selected, then this signal should connect to the second analog input channel of other drive and the 2<sup>nd</sup> analog input signal format must be set to 4...20mA.

For the second drive, the parameters are set as follows:

P4-01 = 1      as torque control mode  
P4-06 = 1      bipolar analog input as torque reference  
P2-30 = 1      bipolar analog input format as 0...10V  
P2-13 = 5  
P2-14 (high) = 90% and P2-14 (low) = 45%

For the third drive, the parameters are set as follows:

P4-01 = 1 as torque control mode  
P4-06 = 1 bipolar analog input as torque reference  
P2-30 = 1 bipolar analog input format as 0...10V  
P2-13 = 5  
P2-14 (high) = 90% and P2-14 (low) = 60%

For the fourth drive, the parameters are set as follows:

P4-01 = 1 as torque control mode  
P4-06 = 1 bipolar analog input as torque reference  
P2-30 = 1 bipolar analog input format as 0...10V  
P2-13 = 5  
P2-14 (high) = 90% and P2-14 (low) = 68%

When setting the lower limit for the output relay, a good rule is as follows:

Master drive (drive 1) :  $P2-14 (low) = P2-14 (high) \times 1/3$

Slave drive (drive n) :  $P2-14 (low) = P2-14 (high) \times (n-1)/n$

where n = drive number (2, 3, 4 etc)

As the load on the first drive increases, the relay will close at 90% load. This starts the 2<sup>nd</sup> drive which will then increase its speed until the load is shared equally with the first drive. Similarly, as the load increases further, the output relay on the second drive will close when 90% load is reached.

The lower limits are calculated to ensure that the drives are disabled sequentially as the total load reduces.

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