How do I control a PowerFlex drive on EtherNet/IP with MicroLogix 1100, MicroLogix1400, SLC5/05, and PLC5?

Can I control a PowerFlex drive over EtherNet/IP with a MicroLogix1100, MicroLogix1400?

Quick Summary:

- Controlling I/O with messages (ie. SLC, MicroLogix 1100/1400, PLC5) is relatively complex compared to normal implicit I/O control (CompactLogix, ControLogix)
- ControlLogix / CompactLogix PLC's with EtherNet/IP provides the easiest and most integrated form of implicit I/O control for a PowerFlex drive.
- If you are not using ControlLogix / CompactLogix, then PowerFlex drives on EtherNet/IP can be controlled with explicit messages using ML1100, ML1400, SLC and PLC5. However there are a number of limitations.
- There are 3 MSG's needed to control the drive. The first MSG writes to N42:3, this is the timeout in the drives communication module (ie 20-Comm-E, etc), the value needs to be set between 5-20 (seconds). The timeout is the amount time, that if the communication module does not receive another MSG a communication loss will be issued to the drive. The timeout is stored in RAM in the communication, anytime the communication module is power cycled this timeout MSG must be re-written again. This timeout is very important, if the timeout is not changed to a value between 5-20, it will reject the other MSG write for control (N41). However the MSG read will work if the timeout is not written too.
- The second MSG writes to the Control word, speed reference, and datalinks.
- The third MSG reads the Status word, speed feedback, and datalinks.

Controlling a PowerFlex Drive on EtherNet/IP with Explicit Messages

Overall Description

This application note details controlling a PowerFlex40 drive on EtherNet/IP using explicit messages, with a MicroLogix 1100 PLC being used as the controller. This application note can also be used with the other PowerFlex 4 class drives with 22-COMM-E, and PowerFlex 7 class drives with 20-COMM-E, and 1305 / 1336 Scanport drives with 1203-EN1. Additionally this application note can be used with SLC 5/05E and PLC5 controllers.

Background and Limitations

Controlling I/O with explicit messages is relatively complex compared to normal implicit I/O control.

ControlLogix / CompactLogix PLC’s with EtherNet/IP provides the easiest and most integrated form of implicit I/O control for a PowerFlex drive. RSLogix5000 v16.x programming software for ControlLogix / CompactLogix contains integrated profiles for PowerFlex drives that with a few clicks of the mouse create all control tags automatically and an implicit connection at the specified Requested Packet Interval to control the drive. This connection is monitored at both ends to ensure that the PLC and drive are communicating. A watchdog will cause a drive fault if the drive doesn’t respond in the order of 100mSecs. Therefore using ControlLogix / CompactLogix, is by far the much preferred method of controlling drives
on EtherNet/IP.

If you are not using these PLC’s, then PowerFlex drives on EtherNet/IP can be controlled

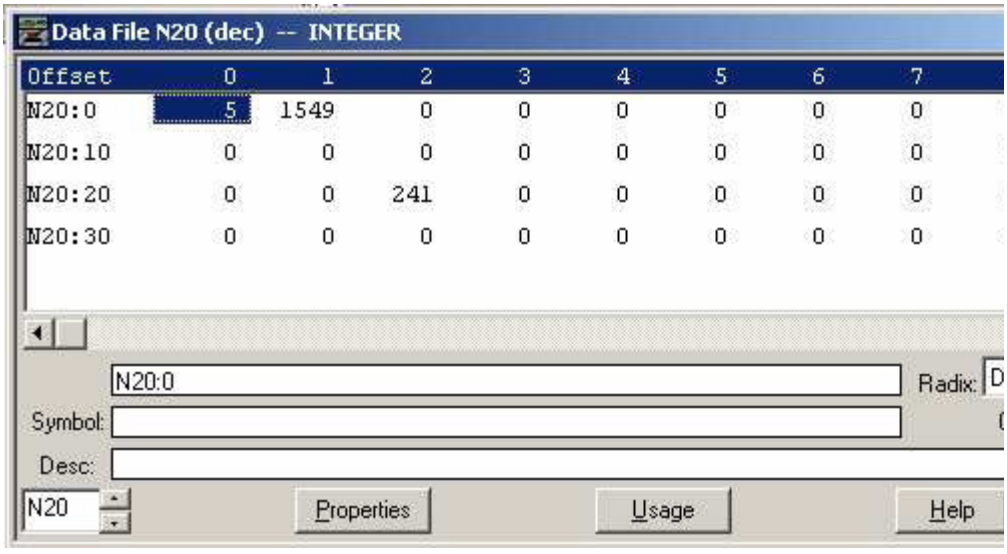
with explicit messages using ML1100, SLC and PLC5, with the following limitations:

- An explicit message is a much slower form of control and non deterministic. This means that you cannot guarantee how long the drive will take to start up / stop when the command is given. Therefore all equipment used in this manner, should be subject to a risk assessment, taking into account the mechanical and electrical implementation.
- A time-out value (in seconds) in the drive will issue a drive fault if a message is not received from the PLC within the specified time. However the PLC has no way of detecting a loss of comms to the drive, until the next cycle of explicit messages. This is another factor in the risk assessment.
- Any additional drives to be controlled, will require additional explicit messages for control which need to be carefully sequenced. Most PLC's (refer to PLC user manuals) have small communication queues, which need to be carefully managed if messages are not to be lost.
- Each PLC has a limited number of communication connections (refer to PLC user manuals for max connections), which will limit the number of drives that can be connected.
- Unlike a ControlLogix / CompactLogix solution, programming a controller using RSLogix5 / RSLogix500 software with explicit messages is a lot more difficult, and produces a far more complex program.

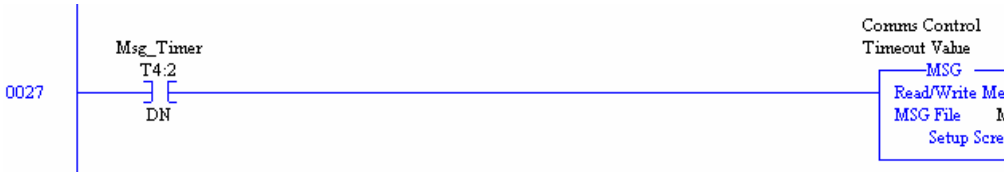
Description

Controlling a drive with explicit messages involves the use of PCCC emulated block transfer using NFiles. (Refer to EtherNet/IP PCCC Objects in the 22-COMM-E user manual)

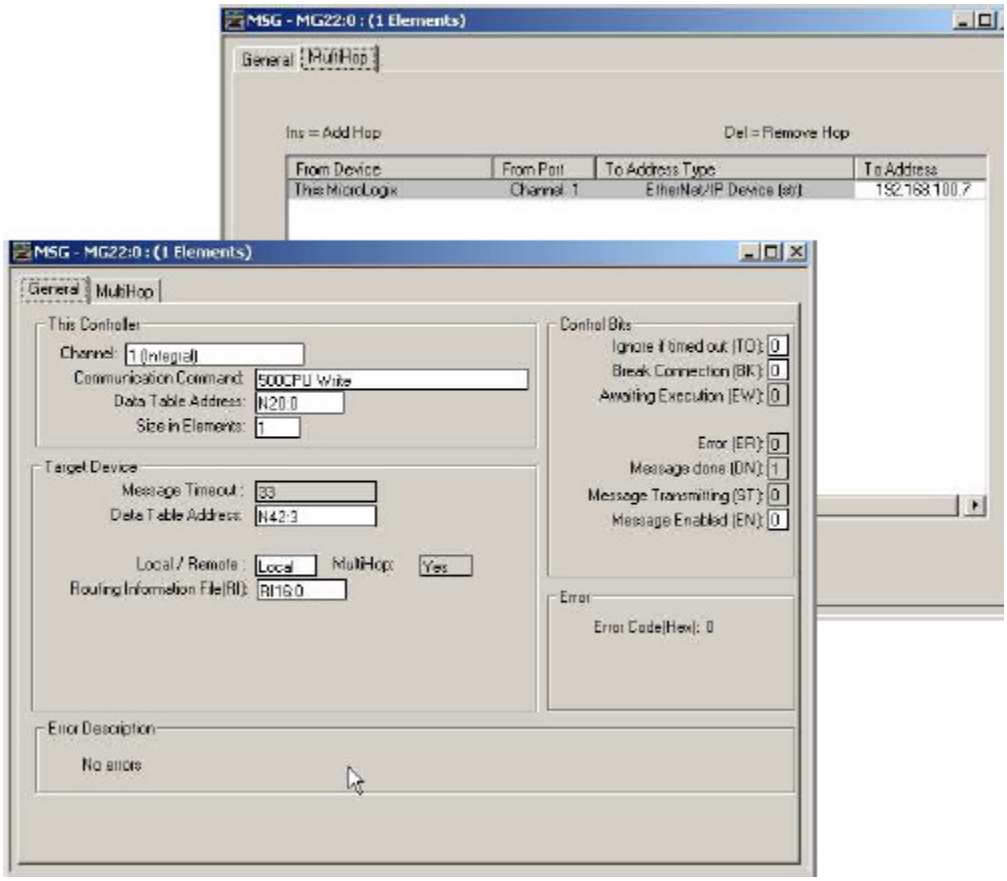
Firstly we need to send a time-out value to the drive (in seconds), before sending any control data. The N42:3 value normally defaults to 0, and so needs a non 0 value before it accepts any valid control data.



The screenshot above details a value of 5 (secs) in N20:0 which will need to be sent to the drive. The following MSG instruction is used:

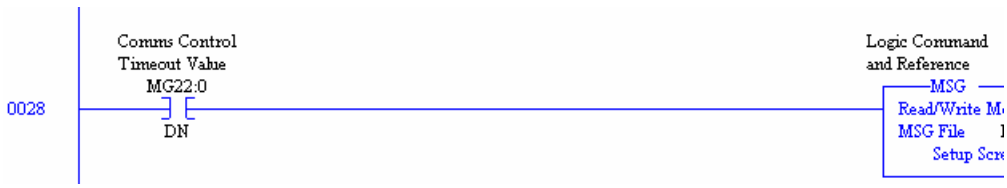


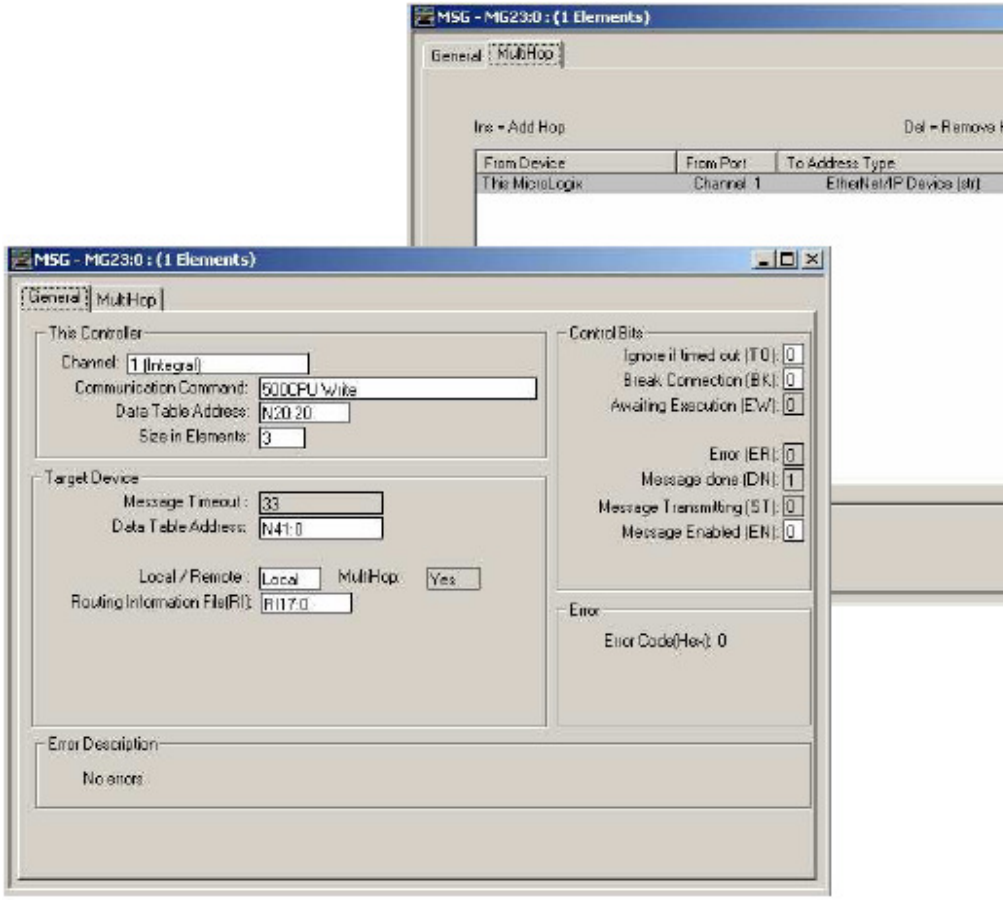
The format of the message is as below:



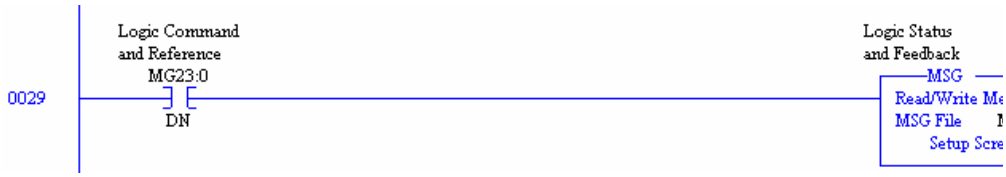
N.B. The time-out value message above is being sent continuosly. In reality it would only need sending once whilst the drive is powered up.

Now we can send the Logic Control and reference words. The user manual details these starting from N41:0. The user program (detailed later in this application note) writes the control data for the Logic Control word at N20:20 and the Speed Reference at N20:22. Therefore the explicit messages is:

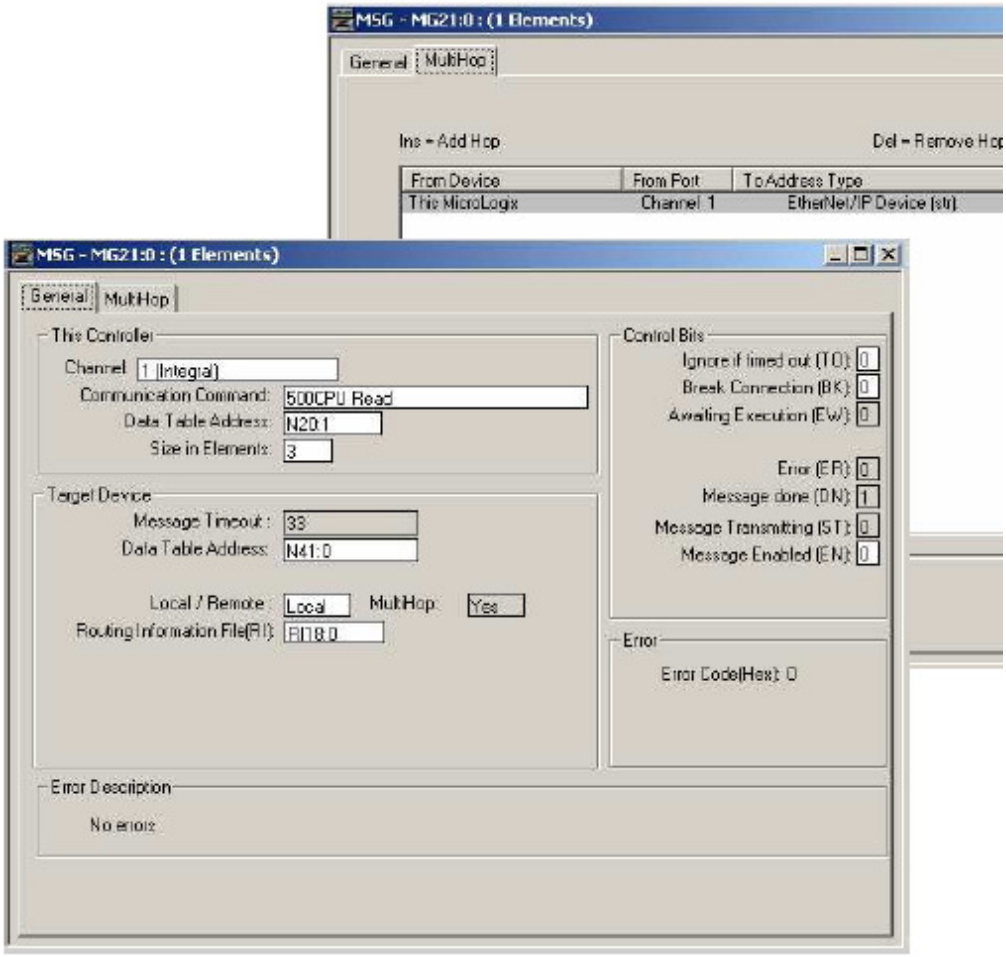




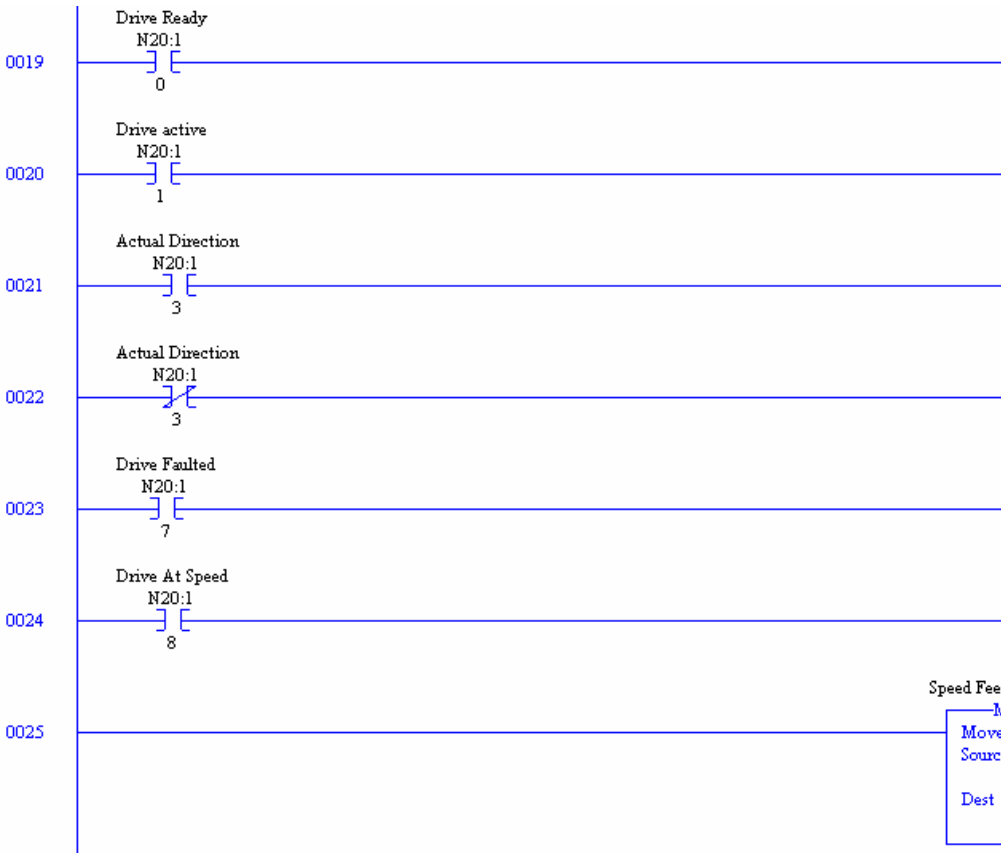
Additionally we can read the Logic Status and Feedback words. The user manual details these starting from N41:0. The user program (detailed later in this application note) reads the status data for the Status word and locates it at N20:1 and the Speed Feedback at N20:3. Therefore the explicit messages is:



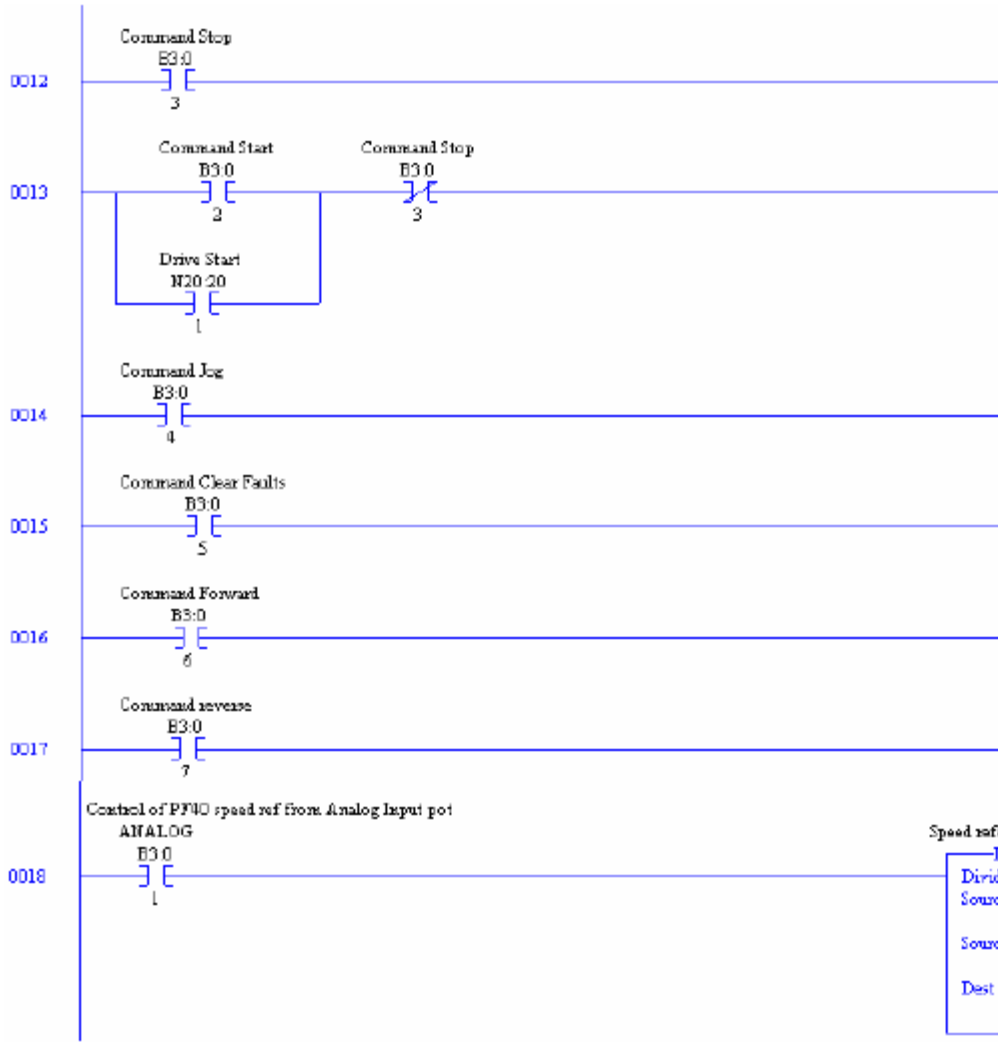
Here is an example of the Logic program for the Logic Status / Feedback:



Here is an example of the Logic program for the Logic Command / Reference:



Here is an example of the Logic program for the Logic Command / Reference:



Please refer to the latest drives communication user manuals for more information and the layout of the PCCC object (N41 and N42:3 word layout) in appendix C of each manual. The PowerFlex 755, instead of using N41 addressing it uses N45 addressing, but the process is same as N41

20-Comm-E user manual:
http://literature.rockwellautomation.com/idc/groups/literature/documents/um/20comm-um010_-en-p.pdf

22-Comm-E user manual:
http://literature.rockwellautomation.com/idc/groups/literature/documents/um/22comm-um004_-en-p.pdf

1203-EN1 user manual:
http://literature.rockwellautomation.com/idc/groups/literature/documents/um/1203-um013_-en-p.pdf

755 embedded ethernet user manual:
http://literature.rockwellautomation.com/idc/groups/literature/documents/um/750com-um001_-en-p.pdf

Details

Answer ID	52205
Products	Drives & Motors AC Drives Drive Communications & Accessories Industrial Communications & Networks Ethernet Programmable Controllers PLC (PLC/SLC/MicroLogix) MicroLogix MicroLogix 1100 (1763) MicroLogix 1400 (1766) PLC5 SLC500 (1747)
Categories	General
Date Created	05/19/2008 10:20 AM
Last Updated	04/16/2010 04:04 PM
Answer Notes	Steve Klumb 11/1/09 - updated the content of the knowbase doc. The PDF was not changed. 12/7/2009 - JH - Fixed layout Friday, April 16, 2010 16:4 Kurt Helfrich (automated) - Cleaned keywords.