
Application Note

C009 Peer to Peer Phase Locking mode

HA502487C009

AC30P/D V2.16 onwards

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Requirements

Intended Users

This Application Note is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to enable the user to obtain maximum benefit from the equipment.

Application Area

The equipment described is intended for industrial motor speed control utilising AC induction or AC synchronous machines.

Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Hazards

Refer to the Safety Information given at the front of the Product Manual supplied with every Parker SSD Drives product.

C009 PEER TO PEER PHASE LOCKING MODE

Abstract

This application note described the possible settings with the Phase locking application described in HA503284U008, using the Peer to Peer feature.

Pre-Requisite

The pre-requisites are :

- a AC30P, AC30D or AC30A drives
- Firmware version 2.16 onwards
- Application RA503284U008 (Detailed setting of the application is well described in HA503284U008)

Introduction

Phase Control or Phase Lock, sometimes referred to as electronic gearbox, is a position trim of a slave drive to a speed to maintain the relative position between a master and a slave shaft or a precision ratio between the two shafts. The slave speed demand is composed of the master speed demand and a position trim from a counter of the accumulated differences between the Master and Slave Encoders.

The AC30P, AC30D and AC30A includes the ability to use real-time peer-to-peer communications, over Ethernet, to pass the speed/position reference from one drive to another in the system.

At least, one drive (configured to be the Master) generates a speed and position command. It could be a Real Master, using the position information (either the encoder mounted to the motor or from an external encoder connected to the drive), or a Virtual Master, internally generating position and speed profile.

In some cases, multiple Masters on the same line may be of interest. Slaves have to select which one of the master to follow.

Virtual master may also be generated by one drive while it runs controlled by another 'master'.

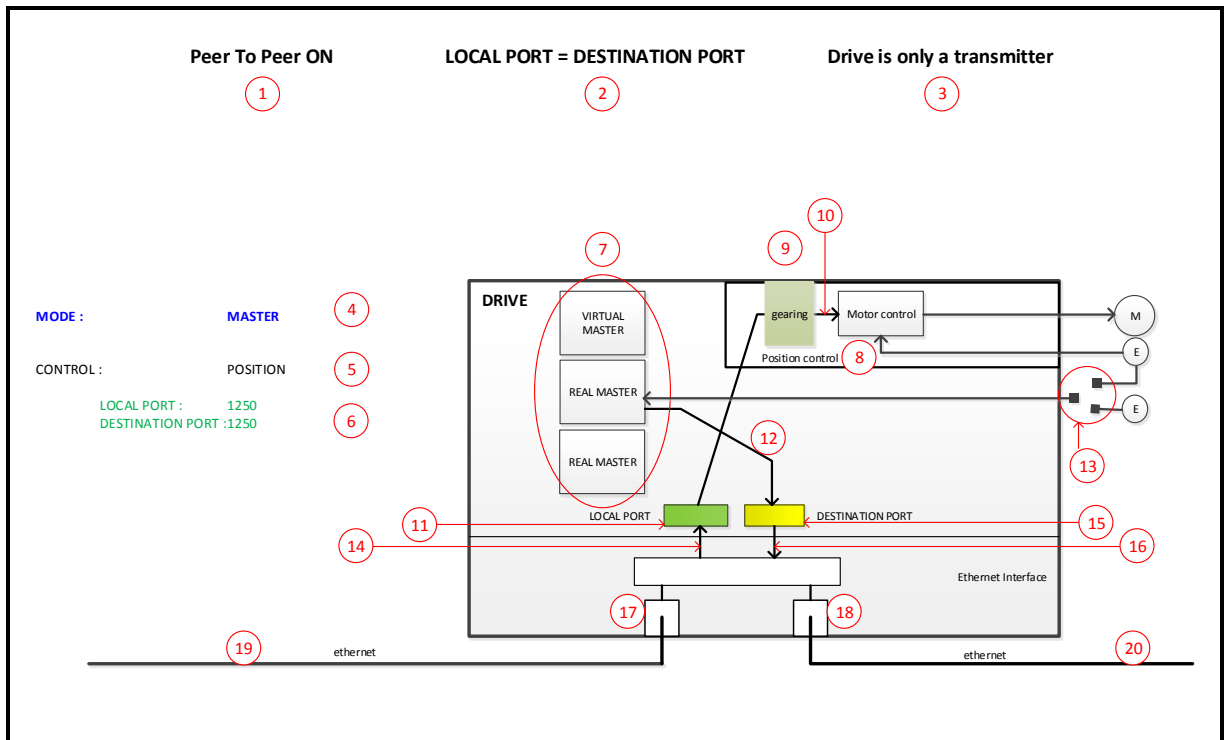
The various configurations are described in this document.

Up to 16 drives could be integrated in the master/slave configuration.

Explanation to read the drawings

Below is a detailed description of the drawing to describe each of the possible configurations.

For each of the mode available, a drawing gives the setting of the main parameters and describes the loop in action in the drive.



	Description
1	Peer to Peer setting : Application :: PTP :: PTP Enable = TRUE Application :: PTP :: Peer to Peer Enable = TRUE
2	Peer to Peer Local and Destination Port Settings: Parameters :: Base Comms :: Peer to Peer :: Destination Port = xxxx Parameters :: Base Comms :: Peer to Peer :: Local Port = xxxx
3	How the drive behaves on the Peer to Peer : Transmitter : data are generated by the drive and are sent on the network Receiver : data are received and used by the drive (position loop)
4	Mode Selection setting: Application :: Virtual Master Ref :: VMRefMode = MASTER
5	Type of Control mode Selected : POSITION -> Application :: Position Loop :: PL Enable = TRUE SPEED -> Application :: Position Loop :: PL Enable = FALSE
6	Values set up in Local Port and Destination Port
7	Mode selected is highlighted
8	Type of control mode selected
9	Gearing Feature : Application :: Virtual Master Ref :: VMRef GearRatioA Application :: Virtual Master Ref :: VMRef GearRatioB
10	Data feeding the control loop
11	Filter Data received on the Peer to Peer
12	Data generated by the Master (Real or Virtual)
13	Encoder selection for real Master mode : Application :: VMRef SourceSelect
14	Data received on the Peer to Peer
15	Filter Data to transmit on the Peer to Peer
16	Data sent on the Peer to Peer
17	Physical Ethernet Port on Drive

18	Physical Ethernet Port on Drive
19	Physical Ethernet Cable
20	Physival Ethernet Cable

Local Port and Destination Port

By default, these 2 parameters are set up to 1250.

For the rest of the document, the values used in Local Port and Destination Port are set to 1250 (default value) or 1260 (to get a different value from the default one).

1250 and 1260 have been chosen but may be set to any other value in the range of their possible values.

When a value is set to xxxx or yyyy in the drawing, that means that it's not to be considered when setting up the drive.

(Virtual) Master Mode

Drive generates a virtual master profile which is sent on the network for the drive using the same PORT number.

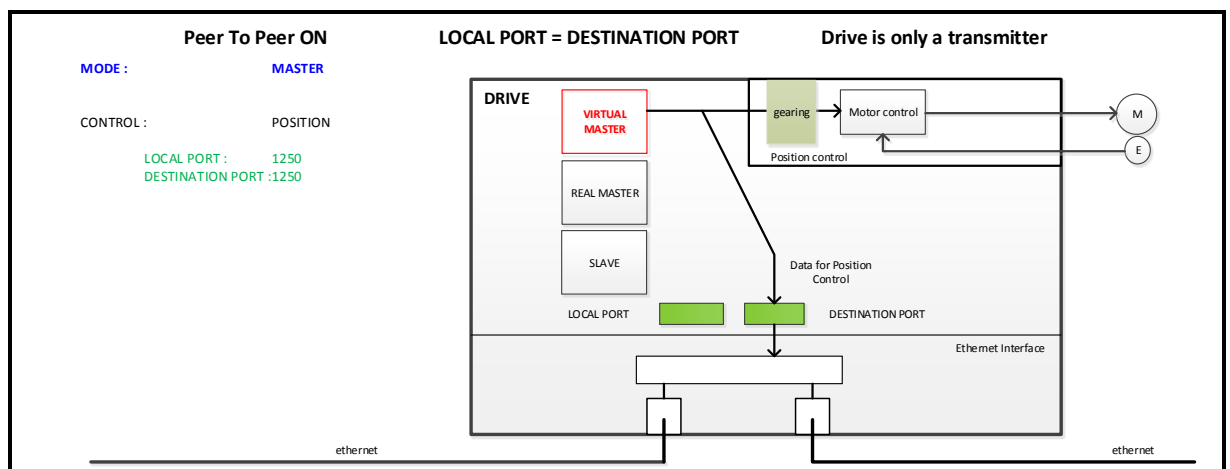
Depending of its own configuration, the drive can follow its master (by selecting LOCAL PORT and DESTINATION PORT to the same value, another master by selecting another PORT number as LOCAL PORT, or simply be used in speed loop control.

Position Loop

LOCAL PORT = DESTINATION PORT

The drive is controlled by using its master (by setting up LOCAL PORT = DESTINATION PORT)

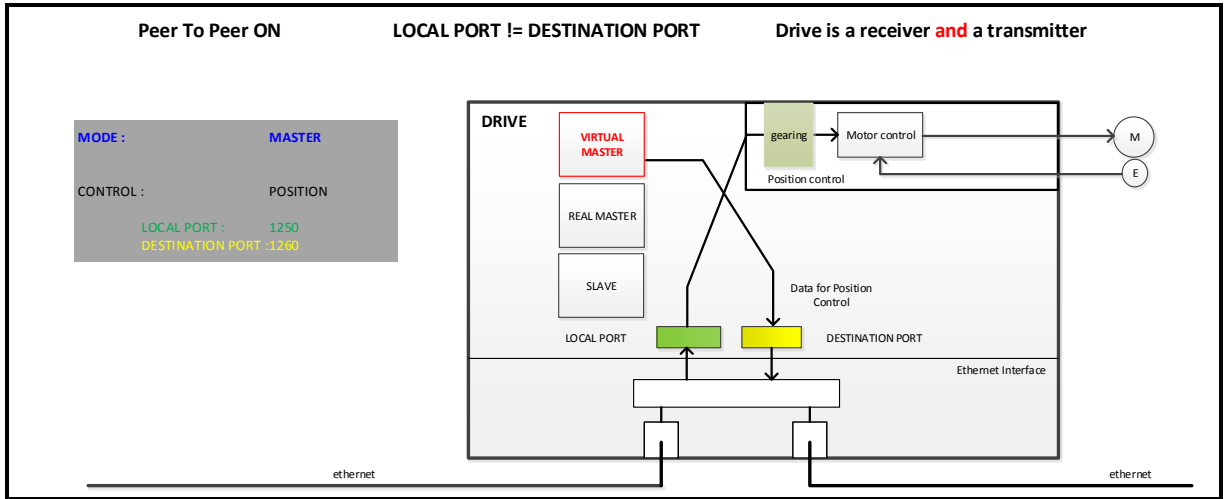
It generates a master for other drives (which have been set up with a LOCAL PORT corresponding to **this drive** DESTINATION PORT).



LOCAL PORT != DESTINATION PORT

The drive is controlled by a master on the network (Master has been set up in another drive with a DESTINATION PORT corresponding to **this drive LOCAL PORT**).

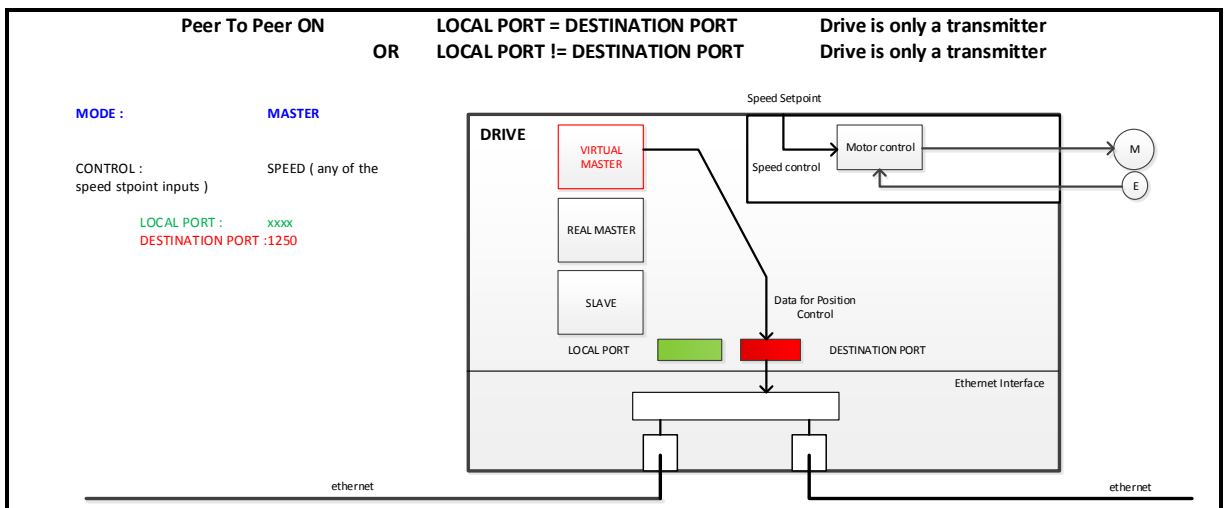
It generates a master for other drives (which have been set up with a LOCAL PORT corresponding to **this drive DESTINATION PORT**).



Speed Loop

The local drive is controlled as usual by the user speed setpoint/torque setpoint.

The Virtual Master generates a profile for other drives on the network (which have been set up with a LOCAL PORT corresponding to **this drive DESTINATION PORT**).



Real Master Mode

Drive follows a real master which can be configured to be any of the encoder feedback connected to the drive.

A Master profile is sent on the Peer to Peer.

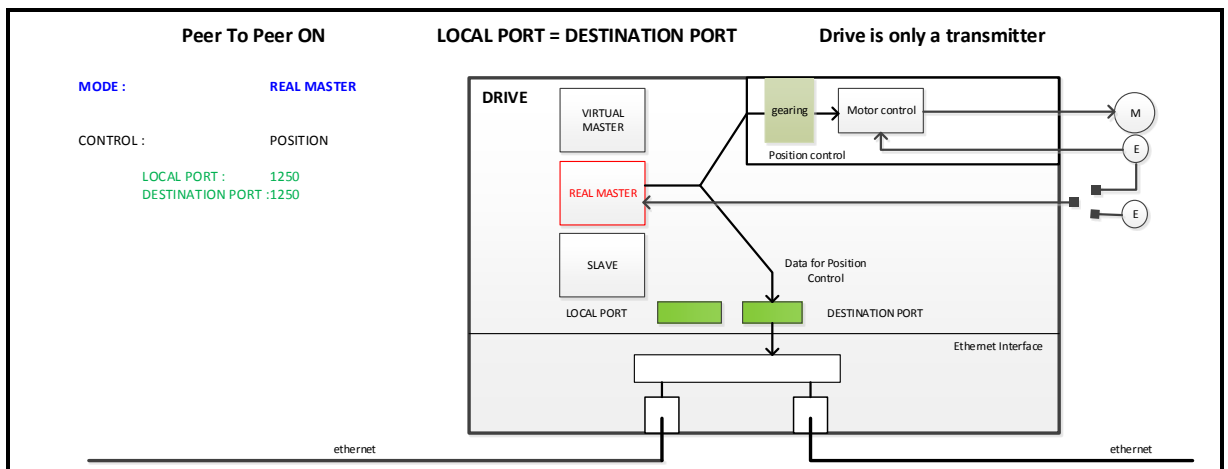
Depending of its own configuration, the drive can follow its master, another master by selecting another PORT number as LOCAL PORT, or simply be used in speed loop control.

Position Loop

LOCAL PORT = DESTINATION PORT

The drive is controlled by using its master (by setting up LOCAL PORT = DESTINATION PORT)

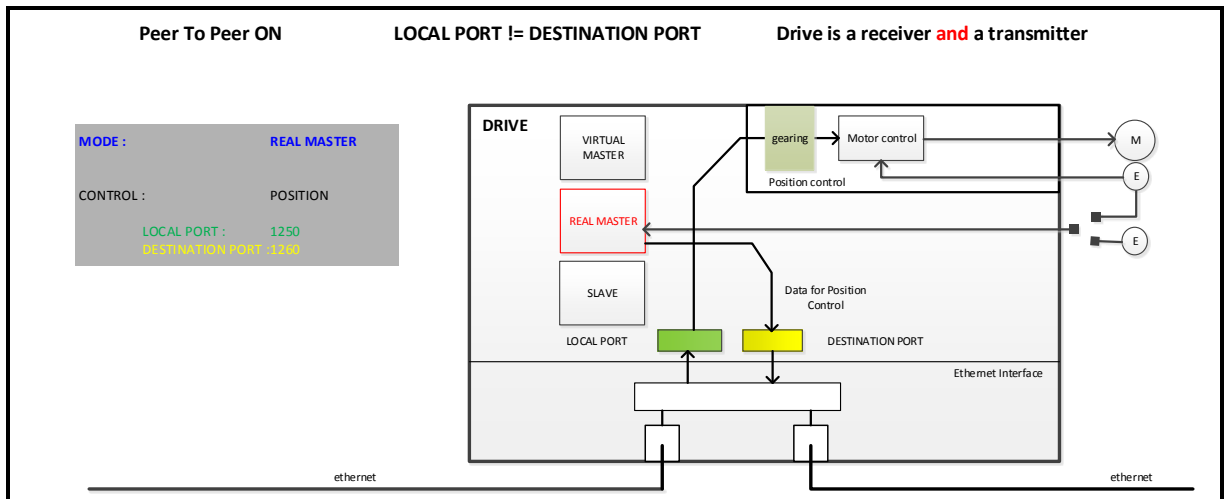
It generates a master for other drives (which have been set up with a LOCAL PORT corresponding to **this drive** DESTINATION PORT).



LOCAL PORT != DESTINATION PORT

The drive is controlled by a master on the network (Master has been set up in another drive with a DESTINATION PORT corresponding to **this drive** LOCAL PORT).

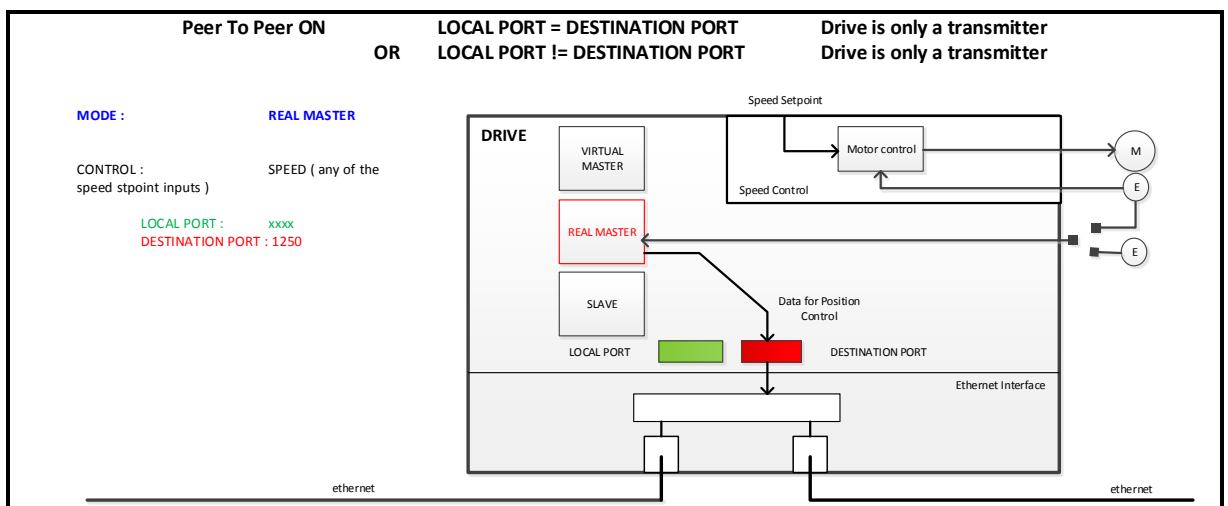
It generates a master for other drives (which have been set up with a LOCAL PORT corresponding to **this drive** DESTINATION PORT).



Speed Loop

The local drive is controlled as usual by the user speed setpoint/torque setpoint.

The Virtual Master generates a profile for other drives on the network (which have been set up with a LOCAL PORT corresponding to **this drive** DESTINATION PORT).



Slave Mode

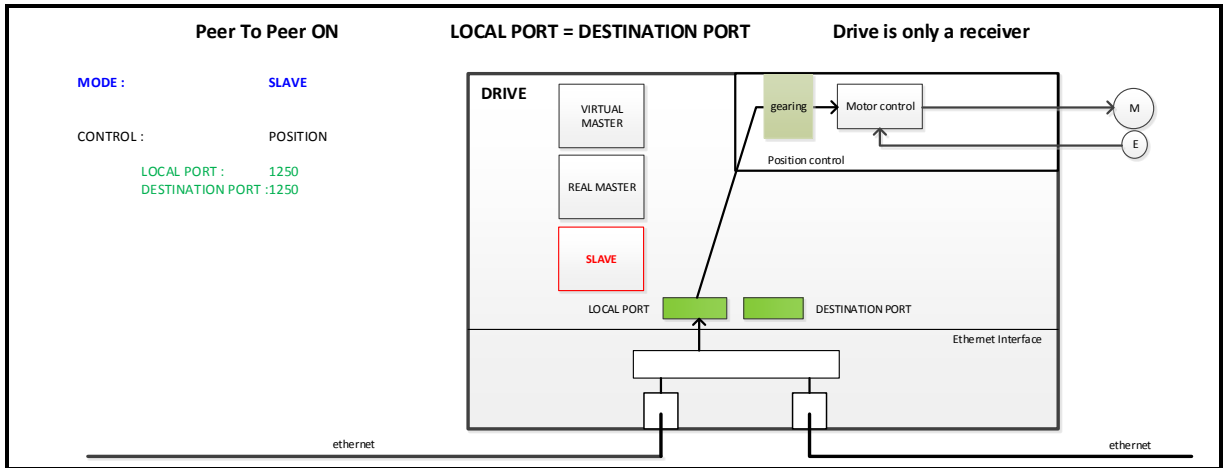
Drive needs to be set up in position mode to act as a slave.

Position Loop

LOCAL PORT = DESTINATION PORT

The drive is controlled by a master (which has been set up with a DESTINATION PORT corresponding to **this drive** LOCAL PORT)

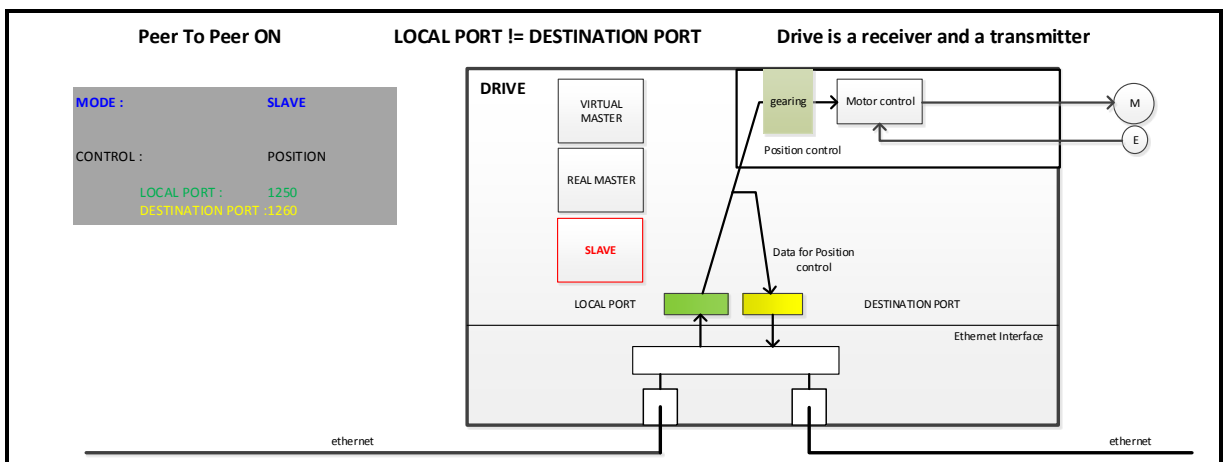
Nothing is generated over the Peer to Peer



LOCAL PORT != DESTINATION PORT

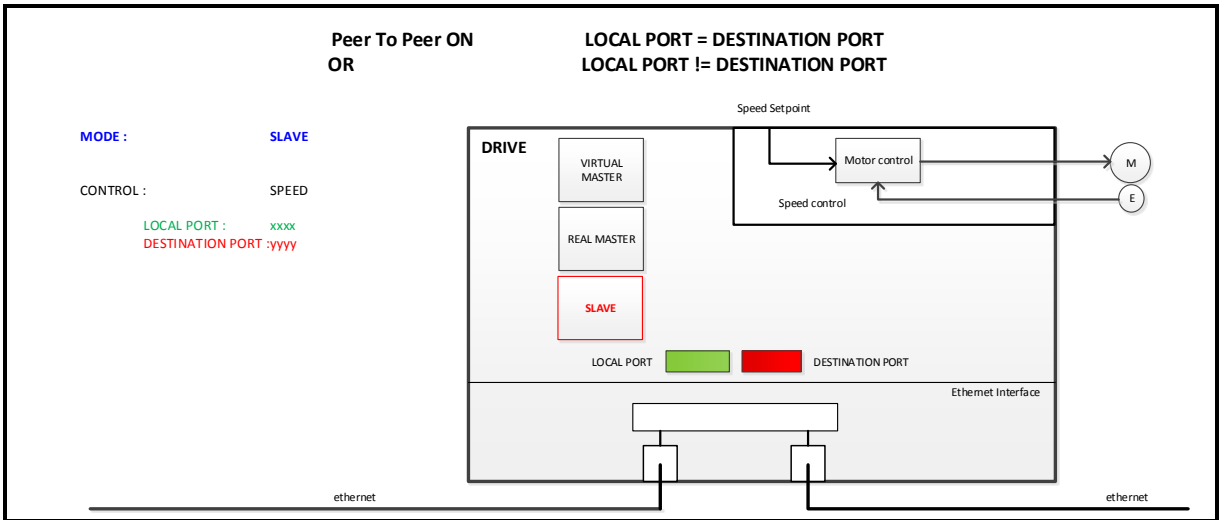
The drive is controlled by a master (which has been set up with a DESTINATION PORT corresponding to **this drive** LOCAL PORT)

It generates **a copy of the master** for other drives (which have been set up with a LOCAL PORT corresponding to **this drive** DESTINATION PORT).



Speed Loop

No effect on the control loop (speed or torque) from the peer to peer data.



Example

Drive 1 is in Master mode, position control.

Drive 2 and Drive 4 are slaves of Drive 1, following the profile generated by Drive 1

Drive 2 is in Real Master mode, generating a profile based on encoder E.

Drive3 is a Slave of the Real Master from Drive 2.

	DRIVE1	DRIVE 2	DRIVE 3	DRIVE 4
Control loop Type	POSITION	POSITION	POSITION	POSITION
MODE	MASTER	REAL MASTER from external Encoder E	SLAVE	SLAVE
LOCAL PORT	1250	1250	1300	1250
DESTINATION PORT	1250	1300	1300	1250
SOURCE	Own Virtual Master	MASTER is DRIVE 1	MASTER is from external Encoder E connected to DRIVE 2	MASTER is DRIVE 1
Follows	Profile form its ownVirtual Master	Virtual Master from DRIVE 1 with Gearing 2	Encoder E with Gearing 3	Virtual Master from DRIVE 1 with Gearing 4

