

Modbus TCP Interface User Guide

Overview

This option module is specifically designed to be used with the Optidrive P2 and Optidrive HVAC range of variable speed drive products and is intended for professional incorporation into complete equipment or systems. If installed incorrectly it may present a safety hazard. Before commencing installation and commissioning, the user should ensure they are fully familiar with the Optidrive P2, and in particular have read the important safety information and warnings contained in the Optidrive P2 / Optidrive HVAC User Guide.

Note

This User Guide is intended to be used with Optidrive P2 & HVAC firmware version 1.20 or later. The firmware version of the drive can be displayed in parameter P0-28. Previous versions of firmware can be upgraded using Optitools Studio PC software. Contact your local Invertek Sales Partner for further Information.

Available Functions

The Modbus TCP Interface is intended to be installed in the Optidrive option slot, and allows the Optidrive to be connected to a Modbus TCP network. The interface offers the following functionality :-

- Two Ethernet IP Ports
- 10 / 100Mbit Full / Half Duplex operation
- Galvanically isolated
- High speed cyclic data exchange

IP Address Configuration

If it is desired to change the IP Address, an IP address configuration tool is available for download from www.invertekdrives.com

Compatibility

This Option is suitable for use on the following product ranges:

Optidrive P2 (ODP-2-.... Drives)
Optidrive HVAC (ODV-2-... Drives)

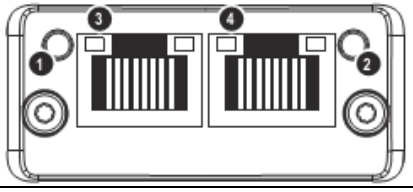
Model Code

OPT-2-MODTCP-IN

Invertek Drives Ltd

Layout

	Item
1	Network Status LED
2	Module Status LED
3	Link / Activity Port 1
4	Link / Activity Port 2



Network Status LED

State	Indication
Off	No Power / No IP Address
Green	Process Active / Idle State
Green Flashing	Waiting for connection
Red	Duplicate IP Address / Error
Red Flashing	Process Active Timeout

Module Status LED

State	Indication
Off	No Power
Green	Normal Operation
Red	Major Fault
Red Flashing	Recoverable Fault, e.g. IP conflict

Link / Port Activity LEDs

Off	No Link
Green	Link Established, no communication
Green Flickering	Lint Established & Communicating

Installation

- Ensure the drive power is removed prior to installing the option module
- Remove the blanking cover from the option module slot
- Carefully slide the option module into the slot, ensuring that the locating tabs are correctly aligned. Do not use excessive force
- Tighten the 2 clamping screws to secure the module in place



PLC Configuration

Configuration of the PLC varies between different systems. Refer to information on the specific PLC system in use for further guidance.
All registers are 16 bit holding registers.

Optidrive Setup

- Set the drive to Fieldbus control mode by setting parameter P1-12 = 4
- Ensure Advanced Parameter Access is enabled on the drive by setting P1-14 = 101
- By default, DHCP is enabled, and the IP address will be assigned automatically. If a fixed IP address is desired, this can be configured using the IP address configuration software.

Data Mapping

For simple control, Optidrive P2 & Optidrive HVAC support cyclic data exchange of registers. All Registers are 16 bit Holding Registers. There are 4 basic registers for control of the drive, and 4 registers for monitoring. The format and data contained in each register are detailed below.

Input Data (PDI) Telegram

This part of the memory contains the real-time drive commands sent from the network master to the Optidrive, allowing the Optidrive to be controlled. The function of the first two data words (PDI 1 and PDI 2) is fixed, to allow basic control over the drive operation and output frequency to be achieved. The configuration of the remaining two words can be adjusted by the user.

Register 0 : Drive Control Word

A 16 Bit control word is used to control the behaviour of the drive when P1-12 = 4. The bits function as follows :-

Bit	Name	Description
0	Drive Run	0 : Drive Stop 1 : Drive Run
1	Fast Stop Select	0 : No Function 1 : Drive Stop with Deceleration Ramp 2
2	Fault Reset	0 : No Function 1 : Rising Edge fault reset request
3	Coast Stop	0 : No Function 1 : Drive Coasts to stop. Overrides bit 0
4 - 15	Not Used	

For normal operation, Bit 3 has the highest priority, bit 0 has the lowest priority (bit 3>bit 1>bit 0). For normal run/stop control, Bit 0 only should be used. Note that the start/stop (bit 0), fast stop (bit 1) and coast stop (bit 3) can only be used to control the drive when P2-31= 0 to 3. If P2-37 > 3, the start/stop function is controlled directly by the drive control terminals. The Reset function (bit 2) will operate providing that the drive is set for Fieldbus control P1-12 = 4.

Register 1: Fixed Function : Frequency Setpoint

This word is used to transfer the frequency setpoint to the Optidrive. The input data is a 16bit signed integer including one decimal place. For example, a value of 500 represents a frequency setpoint to the Optidrive of 50.0Hz, value 123 gives 12.3Hz. For a negative (reverse) speed reference, a negative value can be transferred to the drive, where the MSB of the high byte must be 1. For example, -1(0xFFFF) gives -0.1Hz. -234(0xFF16) gives -23.4Hz.

The allowed input value range is from -5000 to +5000; however the drive output speed will be limited by the maximum speed set by P1-01.

Register 2 : User Defined Function

The function of this data word can be selected by the user using drive parameter P5-14. The possible setting options are shown below :-

0: Torque limit/reference (Optidrive P2 Only) – This option must be selected if the drive output torque limit / setpoint is to be controlled from the fieldbus. This also requires setting P4-06 = 3. The input data is a 16bit unsigned integer including one decimal place. For example, a value of 500 represents a torque setpoint to the Optidrive of 50.0%, value 123 gives 12.3%.

The allowed input value range is from 0 to +2000; however the drive output torque will be limited by the maximum limit set by P4-07.

1: User PID reference register – This option allows the setpoint to the PID controller to be received from the Fieldbus. In order for this option to be used, P9-38 must be set to 1, and the PID User setpoint must not be utilised within the drive PLC function.

2: User register 3 - The value received by the drive in PDI 3 is transferred to User Register 3. This option allows the function of the process data word to be defined in Parameter Group 9. In this case, User Register 3 should not be written to within any PLC function code, although the value can be read.

Register 3: User Defined Function

The function of this data word can be selected by the user using drive parameter P5-13. The possible setting options are shown below :-

0: Fieldbus Ramp Control – This option must be selected if the drive acceleration and deceleration ramps are to be controlled from the fieldbus. P5-07 must also be set to 1 to enable this function.

1: User register 4 – The value received by the drive in PDI 4 is transferred to User Register 4. This option allows the function of the process data word to be defined in Parameter Group 9. In this case, User Register 3 should not be written to within any PLC function code, although the value can be read.

Output Data

This part of the memory contains the real-time drive data returned from the Optidrive to the network master. The function of the first two data words (PDO 1 and PDO 2) is fixed. The configuration of the remaining two words can be adjusted by the user.

Register 256: Fixed Function : Drive Status & Error Code :

This word contains 2 bytes with information as follows :-

High byte : Gives the drive error (fault) code. (Valid when the drive is tripped)

Low byte : Gives the drive status information, 8 bits which function as follows :-

Bit	Logic 0	Logic 1	Notes
0	Drive Stopped	Drive Running	Indicates that the drive output to the motor is enabled
1	Drive Healthy	Drive Fault (Tripped)	Indicates that the drive has tripped. Fault code indicated by bits 8 - 15
2	Hand Control Mode	Auto Control Mode	Optidrive HVAC Only
3	OK	Inhibit	Indicates the status of the STO / Hardware Inhibit circuit
4	OK	Maintenance Time Interval	Indicates the programmable maintenance time period has been exceeded
5 - 7	Not used		No Function Assigned
8 - 15	Drive Trip Code		Indicates the current / Last drive trip code. Refer to the drive User guide for trip code information

Register 257 : Fixed Function : Output Frequency

This word gives the real time drive output frequency information. The data is a 16bit signed integer with one decimal place. E.g. value 123 means 12.3Hz. Value -234 (0xFF16) means -23.4Hz.

Register 258 : Output Current

Data to be transferred in this word can be selected by the User in drive parameter P5-12. The possible settings are as follows :-

0: Motor current – Output current to 1 decimal place, e.g. 100 = 10.0 Amps

1: Power (x.xx kW) Output power in kW to two decimal places, e.g. 400 = 4.00kW

2: Digital input status – Bit 0 indicates digital input 1 status, bit 1 indicates digital input 2 status etc.

3: Analog Input 2 Signal Level - 0 to 1000 = 0 to 100.0%

4: Drive Heatsink Temperature – 0 to 100 = 0 to 100°C

5: User register 1 – User Defined Register 1 Value

6: User register 2– User Defined Register 1 Value

7: P0-80 value – User Selected data value.

Register 259 : User Defined

Data to be transferred in this word can be selected by the User in drive parameter P5-08. The possible settings are as follows :-

0 : Output Torque (Optidrive P2 Only) – 0 to 2000 = 0 to 200.0%

1 : Output Power – Output power in kW to two decimal places, e.g. 400 = 4.00kW

2 : Digital Input Status – Bit 0 indicates digital input 1 status, bit 1 indicates digital input 2 status etc.

3 : Analog Input 2 Signal Level – 0 to 1000 = 0 to 100.0%

4 : Drive Heatsink Temperature – 0 to 100 = 0 to 100°C