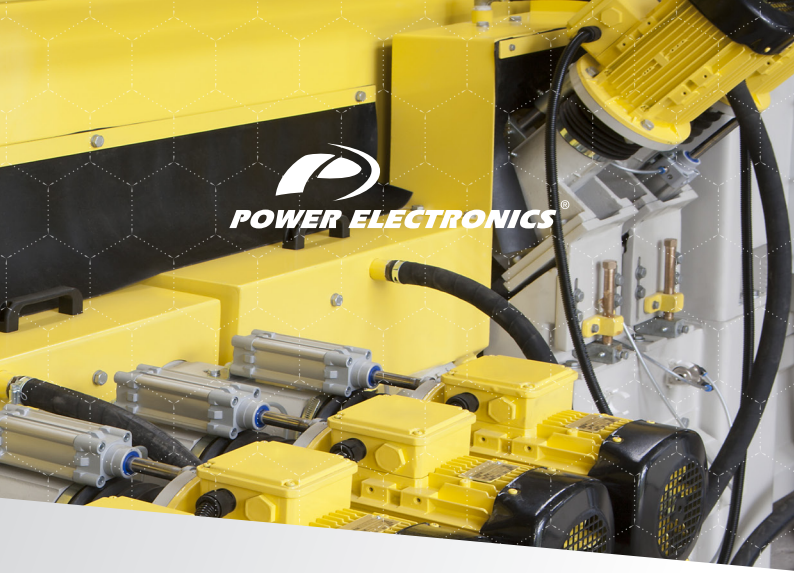

POWER ELECTRONICS®

SD300

ETHERNET MODULE

ACCESSORIES MANUAL

SD300

ACCESORIES

Ethernet Module

Accessories Manual

Edition: August 2017

SD30MA01AI

ABOUT

PURPOSE

This manual contains important instructions for the installation and maintenance of the optional Ethernet communication module for Power Electronics SD300 variable speed drives.

AUDIENCE

This manual is intended for qualified customers who will install, operate and maintain Power Electronics SD300 variable speed drives.

Only trained electricians approved by the installation company may install and commission the drives. The instructions assume that the installer is familiar with electrical installation rules and regulations.

REFERENCE MANUALS

The following reference guide is available for the SD300 variable speed drives:

- Getting Started Manual

POWER ELECTRONICS CONTACT INFORMATION
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Revisions

Date	Revision	Description
29 / 08 / 2017	A	First edition.

TABLE OF CONTENTS

SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

 **WARNING**	Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death. Be extremely careful and follow the instructions to avoid the risk of electrical shocks.
 **CAUTION**	Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury. Read the message and follow the instructions carefully.
 **NOTICE**	Identifies important measures to take in order to prevent damage equipment and warranty lost, as well as encouraging good use and environmental practices

The following CAUTION symbols can be used in this manual and they symbolize:

	Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.
	Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.

SAFETY INSTRUCTIONS

IMPORTANT!

Read carefully this manual to maximize the performance of the product and to ensure its safe use.

In order to appropriately use the drive, please, follow all instructions described in the installation manual which refer to transportation, installation, electrical connection and commissioning of the equipment.

Power Electronics accepts no responsibility or liability for partial or total damages resulting from incorrect use of equipment.

Please, pay careful attention to the following recommendations:

WARNING

Be cautious when handling the CMOS components of the communication module.
Static may lead to product malfunctioning.

Turn the drive power off before changing the communication cable. Otherwise, you may damage the module or a communication error may occur.

Make sure to insert precisely the communication module connector to the drive.
Otherwise, you may damage the module or a communication error may occur.

Check the parameter unit before setting up the parameters.
Otherwise, a communication error may occur.

Do not remove the cover while power supply is connected or the drive is operating.
Otherwise, you may get an electric shock.

Do not run the drive with the front cover removed.
Otherwise, you may get an electric shock.

The drive does not remove the voltage from the input terminals. Before working on the drive, isolate the whole drive from the supply.
If you do not remove the power supply, you may get an electric shock.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.
Otherwise, you get an electric shock.

Operate the drive with dry hands.
Otherwise, you may get an electric shock.

Do not use cables with damaged insulation.
Otherwise, you may get an electric shock.

Do not subject the cables to abrasions, excessive stress, heavy loads or pinching.
Otherwise, you may get an electric shock.

CAUTION

Install the drive on a non-flammable surface. Do not place flammable material nearby. Otherwise, a fire could occur.

Disconnect the input power if the drive is damaged.
Otherwise, it could result in a secondary accident or fire.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive. Otherwise, a fire or accident could occur.

The inverter becomes hot during operation. Wait until it cools down before performing any actions.
Touching hot parts may result in skin burns.

Do not apply power to a damaged drive or to a drive with parts missing, even if the installation is complete.
Otherwise, you may get an electric shock.

NOTICE

RECEPTION

- The SD300 are carefully tested and perfectly packed before delivering.
- In the event of transport damage, please ensure to notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57), or your nearest agent, within 24hrs from receiving the goods.

UNPACKING

- Make sure model and serial number of the variable speed drive are the same on the box, delivery note and unit.
- Each variable speed drive is delivered with Hardware and Software technical manuals.

RECYCLING

Equipment packaging must be recycled. Separate all different materials (plastic, paper, cardboard, wood…) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.

To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).

Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management

Our products contain electronic cards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic cards, capacitors and other electronic devices)

If you have any questions about the electric and electronic equipment waste, please contact Power Electronics.

CYBER SECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. The customer is the sole responsible for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ELECTROMAGNETIC COMPATIBILITY (EMC)

- The drive is intended to be used in industrial environments (Second Environment). It achieves compliance with C3 category defined in IEC/EN 61800-3 standard when the installation recommendation within this manual are followed.
- Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.

SAFETY

Before operating the drive, read this manual thoroughly to gain an understanding of the unit. If any doubt exists, please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.

- Wear safety glasses when operating the drive with power applied or for when the front cover is removed.
- Handle and transport the drive following the recommendations within this manual.
- Install the drive according to the instructions within this manual and local regulations.
- Do not place heavy objects on the drive.
- Ensure that the drive is mounted vertically and keeping the minimum clearance distances.
- Do not drop the drive or subject it to impact.
- The SD300 drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.

Avoid installing the drive under conditions that differ from those described in the Environmental Ratings section.

CONNECTION PRECAUTIONS

- To ensure a correct operation of the drive, it is recommended to use a SCREENED CABLE for the control wiring.
- The motor cable should comply with the requirements within this manual. Due to increased leakage capacitance between conductors, the external ground fault protection threshold value should be adjusted ad hoc.
- Do not disconnect motor cables if the input power supply remains connected.
- The internal circuits of the SD300 Series will be damaged if the incoming power is connected and applied to the output terminals (U, V, W).
- Do not use power factor correction capacitor banks, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
- Before wiring the terminals, make sure that the inverter keypad display is turned off and the front cover is off as well. The inverter may hold a high voltage electric charge long after the power supply has been turned off.

EARTH CONNECTION

- Ground the drive and adjoining cabinets to ensure a safe operation and to reduce electromagnetic emission.
- Connect the input PE terminal only to the dedicated PE terminal of the drive. Do not use the case, nor chassis screws for grounding.
- Ground the drive chassis through the labelled terminals. Use appropriate conductors to comply with local regulations. The ground conductor should be connected first and removed last.
- Motor ground cable must be connected to the PE output terminal of the drive and not to the installation's ground. We recommend that the section of the ground conductor (PE) is equal or greater than the active conductor (U, V, W).

TRIAL RUN

- Verify all parameters before operating the drive. Alteration of parameters may be required depending on application and load.
- Always apply voltage and current signals to each terminal that are within the levels indicated in this manual. Otherwise, damage to the drive may occur.

CAPACITORS DEPLETION

If the drive has not been operated for a long time, capacitors lose their charging characteristics and are depleted. To prevent depletion, once a year run the device under no-load conditions during 30-60 minutes. For further information, contact Power Electronics.

INTRODUCTION

1

What is Ethernet?

Ethernet communication module board connects the SD300 drives to the Ethernet network. It supports two kinds of protocols, Modbus/TCP and Ethernet/IP.

The drive can be controlled and monitored by PLC sequence program or any Master Module. Since Ethernet and IPv4, which are the core of the Internet, have been supported, wherever the Internet can be deployed, controlling and monitoring are possible. But, the factory Ethernet network must be connected to the Internet through a gateway.

Installation time can be reduced and maintenance becomes easier, since only simple wiring is needed.

Components

The Ethernet module kit contains the following parts:

- 1 Ethernet Communication Module board
- 1 Ethernet module manual
- 1 Brass bar (M3xL23)
- 1 Brass bar (M3xL17.3)
- 2 Fixing screws (M3xL8)

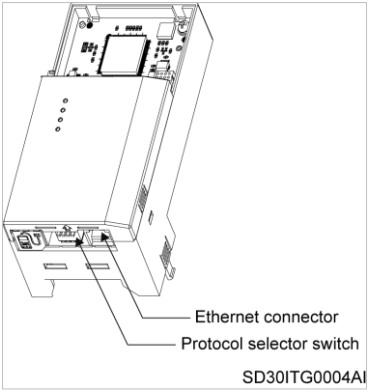
ETHERNET COMMUNICATION MODULE FEATURES

2

Common Features

Transmission Speed	10Mbps, 100Mbps
Transmission Method	Baseband
Max. Extensible Distance between Nodes	100m (Node-Hub)
Max. Node Number	Hub connection
Auto-Negotiation	Supported
Max. Frame Size	1,500 bytes
Communication Zone Access Method	CSMA/CD
Frame Error Checking Method	CRC32
Recommended TCP Socket	2 sockets

Layout of the module



INSTALLATION AND CONNECTION

3

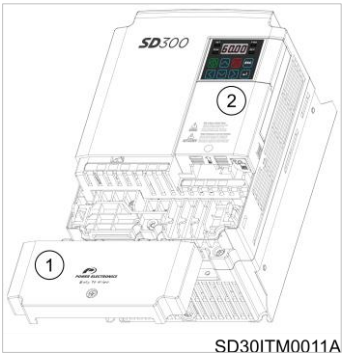
WARNING

Turn the power supply off before connecting a communication network. If the Ethernet communication module is removed or installed, the power supply should be switched off.
Otherwise, the SD300 drive may get damaged and warranty will be voided.
Take off Ethernet communication module from the product after the power supply is totally discharged.

Installation

To install the Ethernet communication module, please follow these steps:

① Unfasten the front cover fixing bolt to remove the front cover and ② remove the I/O cover.



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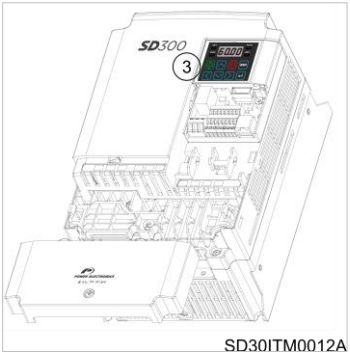
③ Remove the keypad



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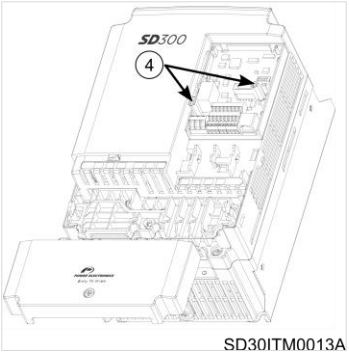
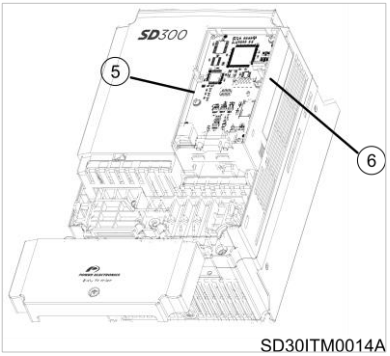
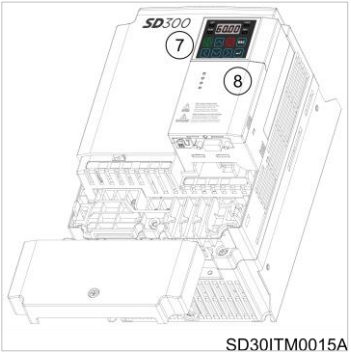
④ Unfasten the screw from I/O the board and fasten the prepared brass bars.



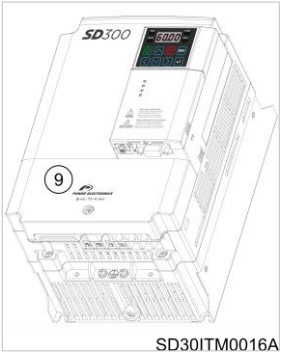
⑤ Mount Ethernet communication module and ⑥ fasten the two brass bar screws (one was removed in step 4; the second is included in the kit).



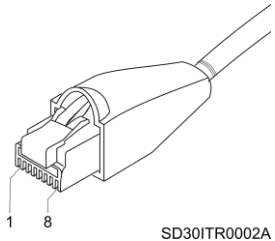
⑦ Install the keypad and ⑧ the communication module cover.



⑨ Install the front cover again.



Terminal Block of Ethernet Communication Specification



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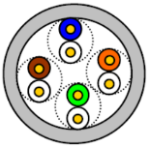
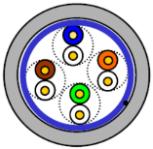
Pin No.	Signal	Description	Cable color
1	TX+	Transmitting data Plus	White / Yellow
2	TX-	Transmitting data Minus	Yellow
3	RX+	Receiving data Plus	White / Green
4	None	Not used	Blue
5	None	Not used	White / Blue
6	RX-	Receiving data Minus	Green
7	None	Not used	White / Brown
8	None	Not used	Brown

Notes:

- Make sure that cables connected to Pin 1 and 2 are twisted together.
- Make sure that cables connected to Pin 3 and 6 are twisted together.

Network cable specification

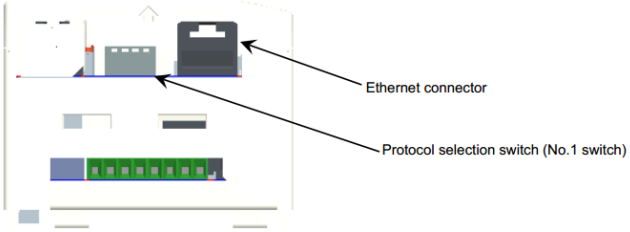
Category 5 is used. Transmission speed of category 5 is 100MHz and available up to 100Mbps.

Classification	Detail	Used
UTP (U.UTP) 	Unshielded twisted pair cable	Maximum 200MHz, Voice + Information (Data) + Low video signal
FTP (S.UTP) 	Foil screened twisted pair cable	Maximum 100MHz Electromagnetic interruption (EMI) or electric stability considered, Voice + Information (Data) + Low Video signal
STP (S.STP) 	Shielded twisted pair cable	Maximum 500MHz, Voice + Information(Data) + Video signal, Replacement for 750 coaxial cable

Protocol Selection

The Ethernet communication module supports two communication protocols: Modbus TCP and Ethernet IP.

Use switch number 1 (located next to the Ethernet cable connector) at the bottom of the module to select the protocol. Switch number 2, 3 and 4 are not available.

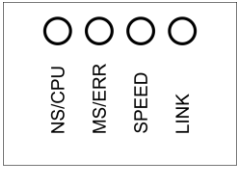


Switch state	Protocol
OFF (Switch at the upper position)	Modbus TCP
ON (Switch at the lower position)	Ethernet IP

The protocol cannot be changed while the module is operating, even if the switch selection is changed. Protocol is determined by the state of the switch when the option module is turned on or when the drive is initialized by setting parameter [CM.94 Comm Update] to YES.

LEDs description

The Ethernet module has four LEDs that show its status at all times. The behaviour of the first two, from left to right, depends on the active communication protocol (Modbus TCP or Ethernet IP), while the other two (SPEED and LINK) have the same behaviour for both protocols.



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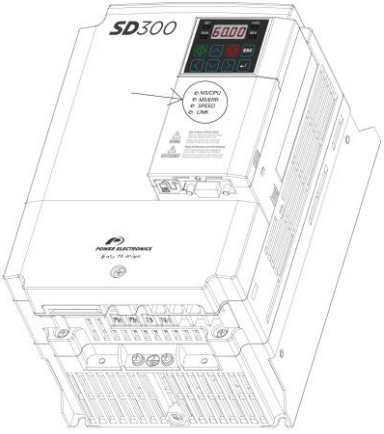


The status of Ethernet Line LED (Ethernet/IP and Modbus/TCP are the same)

LED	COLOR	STATUS	FUNCTION
SPEED	Green	**ON**	Communication speed is 100Mbps.
		OFF	Communication speed is 10Mbps.
LINK	Green	**ON**	Ready to communicate.
		OFF	There is a problem with the communication cable. Check if wiring is correct.

The status of Modbus/TCP LED & Troubleshooting

LED	COLOR	STATUS	FUNCTION AND TROUBLESHOOTING
CPU	Green	**FLASH**	The CPU of Modbus/TCP is operating normally when the power is well supplied to the communication module.
		OFF	Failure in power supply to the communication module. Reinstall the module.
ERROR	Red	**OFF**	The communication module is working normally, without errors.
		ON	IP adress is set to 0.0.0.0 or 255.255.255.255 (these values should not be used).
		CPU and Flash	- Interrupted communication. Turn off the power and then reinstall the module. - Data from the drive is not updated to the Ethernet module. Execute communications update command or regenerate the power again.
		Flashing slower than CPU	IP address conflict. Ensure that the IP address is correct and not repeated in another device from the network.

The status of Ethernet/IP LED & Troubleshooting

LED	COLOR	STATUS	DESCRIPTION
NS	Green	**ON**	The status is I/O communicating when Class 1 connection is well connected.
		OFF	Client and TCP are not connected.
		FLASH	UCMM communication is available once client and TCP are connected.
	Red	**ON**	IP address conflict. Ensure that the IP address is correct and not repeated in another device from the network.
		OFF	No problems with the Ethernet module.
		FLASH	Connection abnormally interrupted. Check if the network cable and connection state are correct.
MS	Green	**ON**	The communication module is working normally.
		OFF	There is a problem with the communication module.
	Red	**ON**	IP adress is set to 0.0.0.0 or 255.255.255.255 (these values should not be used).
		OFF	The communication module is working normally.
		FLASH	- Interrupted communication. Turn off the power and reinstall the module. - Data from the drive is not updated to the Ethernet module. Excute a communications update command or regenerate the power again.

Notes:

- When the module is initialized by the selection of Ethernet/IP, LEDs turn on and off following the sequence:

MS (green) → NS (red) → MS (red) → NS (green) → NS (red) → NS (off) → MS (green).

- When IP address is crashed, please reset IP and execute Comm. Update (CM.94=1).
- Do not use Comm Update (CM.94=1) when the drive is running or in cyclic communication.

MODBUS TCP

4

Modbus TCP frame structure

Modbus TCP frame can be divided in two parts: header + PDU.

Modbus Application Protocol (MBAP) Header: 7 bytes	Protocol Data unit (PDU): 5 bytes ~

Generally, Ethernet uses Ethernet II Frame.

The header is composed by 7 bytes:

- Transaction Identifier: 2 bytes. It is increased by 1 each time as a unique transmitting number when data frame is sent from Client to Server.
- Protocol Identifier: 2 bytes. It is fixed to 0.
- Length: 2 bytes. Data frame length (length from MBAP header to the Unit Identifier).
- Unit Identifier: 1 byte. When using Modbus/TCP and Modbus/RTU external gateway, slave number should be written. When using Ethernet module with Modbus/TCP, the slave number is fixed as 0xFF.

The Protocol Data Unit is composed of a Function Code and data. Function codes are explained in the following subsections.

Function Codes

From all of the functions that exist in Modbus protocol, these are the ones used by the Ethernet optional module:

Function	Description
3	Registers Reading
4	Read Input Register
6	Write Single Register
16	Registers Writing

The implementation of this function code in the drive allows reading up to 120 registers into a Parameter Group in a frame. If you want to access to a consecutive memory registers, but belonging to different groups, you should access in so many frames as groups are involved.

Please, refer to the *Getting Started* manual of your SD300 for further information on Modbus functions and examples.

Exception Frame

If there is any error while the Client sends data to the Server, an exception frame will be sent to the Client.

The structure of this frame is:

Error code: 1 byte	Exception code: 1 byte

The **error code** is 0x80 + Code of the function required by the client.

The **exception code**, on the other hand, may be one of the following:

Type	Code	Description
Illegal Function	0x01	The required function is not supported.
Illegal Data Address	0x02	Unused address is required or to be modified.
Illegal Data Value	0x03	The modified data exceeds the permitted range when it needs to modify the data.
Slave Device Failure	0x04	There is an error in the server (drive communication failure, Initialization failure…)
Slave Device Busy	0x06	The server can't respond due to another process (such as drive parameter initialization or module initialization setting)
Write Permition Error	0x20	The value cannot be modified because the parameter is prohibited to modify.

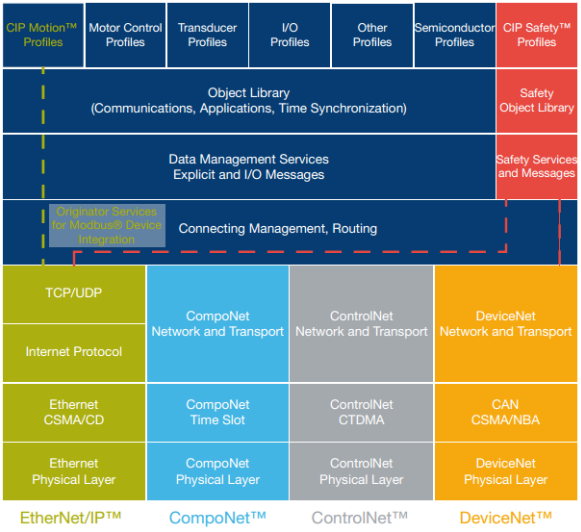
ETHERNET IP

5

Basic Protocol Configuration

The Ethernet/IP is a protocol implemented with the CIP (Common Industrial Protocol), defined by the ODVA, by using TCP and UDP.

- Originator: Device requesting connection, called Client. The device represents a PLC or a scanner.
- Target: Device that responds to the connection, called Server. The device represents a SD300 drive.



Ethernet/IP Layers [1]

Implicit Messaging

An Implicit Message is also called an I/O Message, which are the data communicated between the Client (Originator) and the Server (Target) at present period by the Input Instance and Output Instance. The connection is in Class 1.

[1] Source: https://www.odva.org

Supported range

- Transport Type
  - Originator->Target: Point to Point
  - Target->Originator: Multicast

- Transport Trigger: Cyclic
- Configuration Connection: 1
- Connection Tag: Not supported
- Priority
  - Originator->Target: Scheduled
  - Target->Originator: Scheduled
  - Configuration Data: Not supported

Input instance

Drive status data periodically sent from the drive to a PLC or Client device.

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
70	0						Running 1 (Fwd)		Faulted
	1								
	2	Speed Actual (Low Byte) - RPM unit (note 1)							
	3	Speed Actual (High Byte) - RPM unit							
71	0	At Reference	Ref From Net	Ctrl From Net	Ready	Running 2 (Rev)	Running 1 (Fwd)	Warning	Faulted
	1	Drive State							
	2	Speed Actual (Low Byte) - RPM unit							
	3	Speed Actual (High Byte) - RPM unit							
110	0						Running 1 (Fwd)		Faulted
	1								
	2	Speed Actual (Low Byte) - Hz unit (note 1)							
	3	Speed Actual (High Byte) - Hz unit							
111	0	At Reference	Ref From Net	Ctrl From Net	Ready	Running 2 (Rev)	Running 1 (Fwd)	Warning	Faulted
	1	Drive State							
	2	Speed Actual (Low Byte) - Hz unit							
	3	Speed Actual (High Byte) - Hz unit							
141	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
142	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
143	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
144	0	Status Parameter - 1 data (Low Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
	6	Status Parameter - 4 data (Low Byte)							
	7	Status Parameter - 4 data (Hi Byte)							
145	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
	6	Status Parameter - 4 data (Low Byte)							
	7	Status Parameter - 4 data (Hi Byte)							
	8	Status Parameter - 5 data (Low Byte)							
	9	Status Parameter - 5 data (Hi Byte)							
146	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
	6	Status Parameter - 4 data (Low Byte)							
	7	Status Parameter - 4 data (Hi Byte)							
	8	Status Parameter - 5 data (Low Byte)							
	9	Status Parameter - 5 data (Hi Byte)							
	10	Status Parameter - 6 data (Low Byte)							
	11	Status Parameter - 6 data (Hi Byte)							
147	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
	6	Status Parameter - 4 data (Low Byte)							
	7	Status Parameter - 4 data (Hi Byte)							
	8	Status Parameter - 5 data (Low Byte)							
	9	Status Parameter - 5 data (Hi Byte)							
	10	Status Parameter - 6 data (Low Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	11	Status Parameter - 6 data (Hi Byte)							
	12	Status Parameter - 7 data (Low Byte)							
	13	Status Parameter - 7 data (Hi Byte)							
148	0	Status Parameter - 1 data (Low Byte)							
	1	Status Parameter - 1 data (Hi Byte)							
	2	Status Parameter - 2 data (Low Byte)							
	3	Status Parameter - 2 data (Hi Byte)							
	4	Status Parameter - 3 data (Low Byte)							
	5	Status Parameter - 3 data (Hi Byte)							
	6	Status Parameter - 4 data (Low Byte)							
	7	Status Parameter - 4 data (Hi Byte)							
	8	Status Parameter - 5 data (Low Byte)							
	9	Status Parameter - 5 data (Hi Byte)							
	10	Status Parameter - 6 data (Low Byte)							
	11	Status Parameter - 6 data (Hi Byte)							
	12	Status Parameter - 7 data (Low Byte)							
	13	Status Parameter - 7 data (Hi Byte)							
	14	Status Parameter - 8 data (Low Byte)							
	15	Status Parameter - 8 data (Hi Byte)							

The description of the bit data for the 0, 1 byte of 70, 71, 110, 111 is shown in the table below:

Name	Description	Related Attribute	
		Class	Attr. ID
Faulted	Inverter Error	0x29	10
Warning	Not Supported	0x29	11
Running1	Motor is running Forward	0x29	7
Running2	Motor is running Reverse	0x29	8
Ready	Motor is ready to running	0x29	9
Ctrl From Net	Run/Stop control	0x29	15
Ref From Net	Speed control	0x2A	29
At Reference	Reach at reference Speed	0x2A	3
Drive State	Current Motor State	0x29	6
Speed Actual	Speed Command	0x2A	7

Output instance

Command data sent periodically from the PLC or a Client to the drive.

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
20	0						Fault Reset		Run Fwd
	1	0							
	2	Speed Reference (Low Byte) - RPM unit							
	3	Speed Reference (High Byte) - RPM unit							
21	0		NetRef (note2)	NetCtrl (note2)			Fault Reset	Run Rev	Run Fwd
	1	0							
	2	Speed Reference (Low Byte) - RPM unit							
	3	Speed Reference (High Byte) - RPM unit							
100	0						Fault Reset		Run Fwd
	1	0							
	2	Speed Reference (Low Byte) - Hz unit							
	3	Speed Reference (High Byte) - Hz unit							
101	0		NetRef	NetCtrl			Fault Reset	Run Rev	Run Fwd
	1	0							
	2	Speed Reference (Low Byte) - Hz unit							
	3	Speed Reference (High Byte) - Hz unit							
121	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
122	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
123	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
124	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
	6	Control Parameter - 4 data (Low Byte)							
	7	Control Parameter - 4 data (Hi Byte)							
125	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
	6	Control Parameter - 4 data (Low Byte)							
	7	Control Parameter - 4 data (Hi Byte)							
	8	Control Parameter - 5 data (Low Byte)							
	9	Control Parameter - 5 data (Hi Byte)							
126	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
	6	Control Parameter - 4 data (Low Byte)							
	7	Control Parameter - 4 data (Hi Byte)							
	8	Control Parameter - 5 data (Low Byte)							
	9	Control Parameter - 5 data (Hi Byte)							
	10	Control Parameter - 6 data (Low Byte)							
	11	Control Parameter - 6 data (Hi Byte)							
127	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
	6	Control Parameter - 4 data (Low Byte)							
	7	Control Parameter - 4 data (Hi Byte)							
	8	Control Parameter - 5 data (Low Byte)							
	9	Control Parameter - 5 data (Hi Byte)							
	10	Control Parameter - 6 data (Low Byte)							
	11	Control Parameter - 6 data (Hi Byte)							
	12	Control Parameter - 7 data (Low Byte)							
	13	Control Parameter - 7 data (Hi Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
128	0	Control Parameter - 1 data (Low Byte)							
	1	Control Parameter - 1 data (Hi Byte)							
	2	Control Parameter - 2 data (Low Byte)							
	3	Control Parameter - 2 data (Hi Byte)							
	4	Control Parameter - 3 data (Low Byte)							
	5	Control Parameter - 3 data (Hi Byte)							
	6	Control Parameter - 4 data (Low Byte)							
	7	Control Parameter - 4 data (Hi Byte)							
	8	Control Parameter - 5 data (Low Byte)							
	9	Control Parameter - 5 data (Hi Byte)							
	10	Control Parameter - 6 data (Low Byte)							
	11	Control Parameter - 6 data (Hi Byte)							
	12	Control Parameter - 7 data (Low Byte)							
	13	Control Parameter - 7 data (Hi Byte)							
	14	Control Parameter - 8 data (Low Byte)							
	15	Control Parameter - 8 data (Hi Byte)							

The description of the bit data for the 0 byte of 20, 21, 100 and 101 is shown in the table below:

Name	Description	Related Attribute	
		Class	Attr. ID
Run Fwd [2]	Forward Run Command	0x29	3
Run Rev [2]	Reverse Run Command	0x29	4
Fault reset [2]	Fault Reset Command	0x29	12
NetRef	Not used	0x2A	4
NetCtrl [3]	Not used	0x29	5
Speed Reference	Speed Command	0x2A	8

[2] Refer to the Drive Run and Fault in the Control Supervisor Object (Class 0x29).
[3] The setting of the Reference Control and Run/Stop Control can only be made by the LCD Control Panel. Therefore, NetRef and NetCtrl are not used at the Instances 21 and 101.

Explicit Messaging

A non-periodic communication method used for reading or writing the attribute value of the Drive or Ethernet/IP.

The UCMM method can communicate data between Originator and Target without connection, in addition a periodic data communication method using Class 3 Connection are available.

Supported Objects: Identity, Motor Data, Control Supervisor, AC Drive and Class 0x64 – Manufacture Profile.

Identity object (Class 0x01, Instance 1)

Attributes:

ID	Access	Attribute Name	Length	Value
1	Get	Vendor ID (Power Electronics)	Word	259
2	Get	Device Type (AC Drive)	Word	2
3	Get	Product Code	Word	10 [1]
4	Get	Low Byte - Major revision High Byte - Minor revision	Word	0x0102[2]
5	Get	Status	Word	See “Status bits” definition below.
6	Get	Serial Number	Double Word	See “Service Codes” definition below
7	Get	Product Name	12 Bytes	SD300 Ethernet

[1] Product code ‘6’ means SD300 AC drive.
[2] The Upper and Lower byte represent the Major Revision and Minor Revision, respectively. For example, 0x0102 means 2.01. The version of the Ethernet communication is indicated in CM.6.

Status bits (definition of each bit of status):

Bit	Definition
0	0: Device is not connected to Master. 1: Device is connected to Master.
1	Reserved
2	Configured (always '0' since Ethernet/IP is not supported.)
3	Reserved
4	0: Unknown 2: in case of incorrect I/O connection. 3: in case of no previous I/O connection at all. 5: Major Fault 6: I/O in connection.
5	
6	
7	
8	Minor Recoverable Fault (In case of Warning state of inverter)
9	Minor Unrecoverable Fault (N/A)
10	Major Recoverable Fault (In case of H/W trip state of inverter)
11	Major Unrecoverable Fault (In case of trip state except for H/W trip of inverter)

Service codes:

Service Code	Definition	Support for Class	Support for Instance
0x0E	Get Attribute Single	No	Yes
0x05	Reset	No	Yes
0x10	Set Attribute Single	No	Yes

Serial number is made by last four numbers of MAC ID.

For example, if MAC ID is 00:0B:29:00:00:22, Serial number will be 0x29000022.

Motor data object (Class 0x28, Instance 1)

Attributes:

Attribute ID	Access	Attribute Name	Range	Definition
3	Get	Motor Type	0~10	0: Non-standard motor 1: PM DC Motor 2: FC DC Motor 3: PM Synchronous Motor 4: FC Synchronous Motor 5: Switched Reluctance Motor 6: Wound Rotor Induction Motor 7: Squirrel Cage Induction Motor 8: Stepper Motor 9: Sinusoidal PM BL Motor 10: Trapezoidal PM BL Motor
6	Get/Set	Motor Rated Current	0.0~1000.0	[Get] Read Rated Current of bA-13. [Set] The setting value is reflected on Rated Current of bA-13 Scale: 0.1
7	Get/Set	Motor Rated Voltage	0~690	[Get] Read Rated Voltage of bA-15 [Set] The setting value is reflected on Rated Voltage of bA-15 Scale: 1

Service codes:

Service Code	Definition	Support for Class	Support for Instance
0x0E	Get Attribute Single	No	Yes
0x10	Set Attribute Single	No	Yes

Control supervisor object (Class 0x29, Instance 1)

Attributes:

Attribute ID	Access	Attribute Name	Range	Definition
3	Get / Set	Forward Run Cmd.	0	Stop
			1	Operation in normal direction. See “Drive Run Command” description below this table.
4	Get / Set	Reverse Run Cmd.	0	Stop
			1	Operation in reverse direction. See “Drive Run Command” description below this table.
5	N/A	Net Control	-	Can be set up as Drive parameter only.
6	Get	Drive State	0	Vendor specific
			1	Startup
			2	Not Ready (resetting)
			3	Ready (stopping)
			4	Enabled (running, except decelerating to stop)
			5	Stopping (decelerating to stop)
			6	Fault Stop
			7	Faulted (tripped)
7	Get	Running Forward	0	Stopping
			1	Operating in normal direction
8	Get	Running Reverse	0	Stopping
			1	Operating in reverse direction
9	Get	Drive Ready	0	Being reset or tripped
			1	Normal condition for Inverter operation
10	Get	Drive Fault	0	Presently not tripped
			1	Presently being tripped.
12	Get / Set	Drive Fault Reset	0	Trip Reset after a trip. Reset can be done only when TRUE is inputted in FALSE status. See “Drive Fault” definition below this table.
			1	
13	Get	Drive Fault		See “Drive Fault” definition below this table.

Attribute ID	Access	Attribute Name	Range	Definition
		Code		
14	Get	Control From Net.	0	Provide operation reference through a source other than FieldBus communication.
			1	Provide operation reference through FieldBus communication source.

Drive Run Command: It is the drive operation using Forward Run Cmd. and Reverse Run Cmd.

Run 1	Run 1	Trigger Event	Run Type
0	0	Stop	NA
0 -> 1	0	Run	Run1
0	0 -> 1	Run	Run2
0 -> 1	0 -> 1	No Action	NA
1	1	No Action	NA
1 -> 0	1	Run	Run2
1	1 -> 0	Run	Run1

In the above table, Run1 stands for the Forward Run Cmd. and Run 2 stands for the Reverse Run Cmd. In other words, the Option gives an operation reference to the drive at the moment of change from 0(FALSE) to 1(TRUE). When the Forward Run Cmd. value has been read, it does not represent the present operation status of the drive, but the operation command value of the Option.

Drive Fault: If the drive is tripped, the Drive Fault becomes TRUE. At this time, the Drive Fault Codes are as follow;
Drive Fault Code:

Fault Code Number	Description
0x0000	None
0x1000	Ethermal Out Phase Open InverterOLT InPhaseOpen Thermal Trip UnderLoad ParaWriteTrip IOBoardTrip PrePIDFail OptionTrip1 OptionTrip2 OptionTrip3 LostCommand UNDEFINED LostKeypad
0x2200	OverLoad
0x2310	OverCurrent1
0x2330	GFT
0x2340	OverCurrent2
0x3210	OverVoltage
0x3220	LowVoltage
0x2330	GroundTrip
0x4000	NTCOpen
0x4200	OverHeat
0x5000	FuseOpen HWDiag
0x7000	FanTrip
0x7120	No Motor Trip
0x7300	EncoderTrip
0x8401	SpeedDevTrip
0x8402	OverSpeed
0x9000	ExternalTrip BX

Drive Fault Reset:

At 0 → 1 (FALSE → TRUE), the Drive Fault Reset gives TRIP RESET reference to the drive. Overwriting 1 (TRUE) on 1 (TRUE) does not generate RESET reference to the drive trip. To send RESET reference from Option to drive in 1 (TRUE) status, write 0 (FAULT) and then write 1(TRUE) again.

Service:

Service Code	Definition	Support for Class	Support for Instance
0x0E	Get Attribute Single	No	Yes
0x10	Set Attribute Single	No	Yes

AC Drive Object (Class 0x2A; Instance 1)

Attributes:

Attribute ID	Access	Attribute Name	Range	Definition
3	Get	At Reference	0	The output frequency has not reached the set up frequency, yet.
			1	The output frequency has reached the set up frequency.
4	Not supported	Net Reference	-	-
6	Get	Drive Mode[1]	0	Vendor specific mode
			1	Open Loop Speed (Frequency)
			2	Closed Loop Speed Control
			3	Torque Control
			4	Process Control (e.g. PI)
7	Get	Actual Speed	0-24000	Displayed present output frequency in [rpm] unit
8	Get/Set	Speed Ref.	0-24000	Give reference after converting the target frequency in [rpm] unit. For this, the DRV-07 Freq Ref Src must have been set up to FieldBus
9	Get	Actual Current	0-111.0 A	Monitor present current by 0.1 A unit basis.
29	Get	Ref. from Network	0	The frequency reference source is not the FieldBus communication.
			1	The frequency reference source is the FieldBus communication.
100	Get	Actual Hz	0-400.00 Hz	Monitor present operating frequency by Hz unit.
101	Get/Set	Reference Hz	0-400.00 Hz	When the dr-07 Freq Ref Src is set to FieldBus, the reference frequency can be set up by communication.
102	Get/Set	Acceleration Time[2]	0-6000.0 s	Set-up/monitor Inverter acceleration time.

[1] It is related with dr-10 Torque Control and AP-01 App mode. If the dr-10 Torque Control is set to 'Yes,' Drive Mode becomes "Torque Control," and if AP-01 App mode is set to Proc PID, the Drive Mode becomes "Process Control (e.g.PI)."
[2] dr-03: Acc Time value.

Attribute ID	Access	Attribute Name	Range	Definition
103	Get/Set	Deceleration Time[3]	0-6000.0 s	Set-up/monitor Inverter deceleration time.

Service:

Service Code	Definition	Support for Class	Support for Instance
0x0E	Get Attribute Single	No	Yes
0x10	Set Attribute Single	No	Yes

[3] dr-04: Dec Time value.

Class 0x64 (Drive Object) – Manufacture Profile

This is the object to access Keypad Parameters of the Inverter.

Attributes:

Attribute ID	Access	Attribute Name	Range	Definition
1 (dr Group)	Get/Set	Identical to SD300 Manual Code No.	SD300 Keypad Title (Refer to SD300 Manual)	Setting range of SD300 Parameter (Refer to SD300 Manual)
2 (bA Group)				
3 (Ad Group)				
4 (Cn Group)				
5 (In Group)				
6 (OU Group)				
7 (CM Group)				
8 (AP Group)				
9 (Reserved)				
10 (Reserved)				
11 (PRT Group)		Identical to SD300 Manual Code No.		
12 (M2 Group)				

Service:

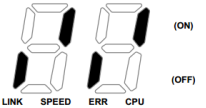
Service Code	Definition	Support for Class	Support for Instance
0x0E	Get Attribute Single	No	Yes
0x10	Set Attribute Single	No	Yes

6 PARAMETERS CONFIGURATION

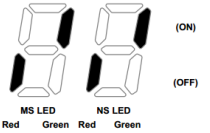
Drive parameters related to Modbus/TCP and Ethernet/IP communication are listed below. Protocol 'M' is used for Modbus/TCP and Protocol 'E' is used for Ethernet/IP.

Note: For further information about SD300 programming parameters, please refer to the Getting Started Manual.

Screen	Description	Default value	Range	Function	Protocol
CM.6	Communication S/W version	0.00	-	Show the software version of the optional Ethernet communication module.	M/E
CM.9	LED status	-	-	Show the ON/OFF data of the LED on the Ethernet communication module depending on the active protocol: **MODBUS TCP:** ON/OFF state of 4 LEDs in SD300 Ethernet communication module is displayed at keypad parameter CM.9. If you check CM.9 with Keypad, 4 bits can be seen according to the order of LED of CM.9 (Left -> Right) CPU, ERR, SPEED and LINK LED. When LED is ON, the bit becomes 1 and when OFF, it becomes 0.	M/E

Screen	Description	Default value	Range	Function	Protocol
				ETHERNET IP: It represents the ON/OFF status of the 2 LEDs on the right side among the 4 LEDs on the keypad parameter CM.9. 4 bits can be displayed in CM.9 by using keypad. The data list of CM.9 are shown below. When LED turns on, each bit becomes 1, and vice versa. Ethernet communication module has MS LED and NS LED only, but 4 LEDs are shown from CM.9 using keypad. It displays the information of NS LED Red, NS LED Green, MS LED Red and MS LED Green in the order of CM.9 LEDs (Right * Left). If CM.9 is displayed as below, it indicates that NS LED is currently Green and MS LED is Green. **Example 1**: CM.9 LED in Modbus TCP  operation. **LED STATE** **LINK** | **SPEED** | **ERR** | **CPU** OFF | ON | OFF | ON **Note**: Continues on the next page.	

<table>
<tr><th>Screen</th><th>Description</th><th>Default value</th><th>Range</th><th>Function</th><th>Protocol</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Note: Comes from the previous page.

Example 2: CM.9 LED in Ethernet IP operation
 

<table><tr><th colspan="4">LED STATE</th></tr><tr><th>MS (Red)</th><th>MS (Green)</th><th>NS (Red)</th><th>NS (Green)</th></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr></table></td><td></td></tr>
<tr><td>CM.10</td><td>Opt Parameter1</td><td>0</td><td>0 to 255</td><td rowspan="9">The IP version supported by Ethernet Module is v4.
All the addresses and masks are expressed in (decimal).(decimal).(decimal).(decimal) and each decimal number is within 0~255.
In Ethernet communication Module, decimal numbers can be entered directly in Opt Parameter. The opt parameters acceptable values range is from 0 to 255, which is implemented with each field of addresses divided with ‘.’.

Example. To set up IP Address 196.168.10.131, enter the Opt Parameter as shown in the table below.

Note: Continues on the next page.</td><td>M/E</td></tr>
<tr><td>CM.11</td><td>Opt Parameter2</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.12</td><td>Opt Parameter3</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.13</td><td>Opt Parameter4</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.14</td><td>Opt Parameter5</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.15</td><td>Opt Parameter6</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.16</td><td>Opt Parameter7</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.17</td><td>Opt Parameter8</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.18</td><td>Opt Parameter9</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
</table>

<table>
<tr><th>Screen</th><th>Description</th><th>Default value</th><th>Range</th><th>Function</th><th>Protocol</th></tr>
<tr><td>CM.19</td><td>Opt Parameter10</td><td>0</td><td>0 to 255</td><td rowspan="3">Note: Comes from the previous page.
<table><tr><th>Code number</th><th>Name of parameter</th><th>Input value</th></tr><tr><td>CM.10</td><td>Opt Parameter1</td><td>196</td></tr><tr><td>CM.11</td><td>Opt Parameter 2</td><td>168</td></tr><tr><td>CM.12</td><td>Opt Parameter 3</td><td>10</td></tr><tr><td>CM.13</td><td>Opt Parameter 4</td><td>131</td></tr></table>Use the following parameter groups to set up the communication addresses of your equipment:
• CM.10-13: Set up the IP address.
• CM.14-17: Set up the subnet mask.
• CM.18-21: Set up the gateway address.</td><td>M/E</td></tr>
<tr><td>CM.20</td><td>Opt Parameter11</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.21</td><td>Opt Parameter12</td><td>0</td><td>0 to 255</td><td>M/E</td></tr>
<tr><td>CM.22</td><td>Opt Parameter13</td><td>0</td><td>0 to 2</td><td>Set up the Ethernet communication rate:
<table><tr><th>Option</th><th>Description</th></tr><tr><td>0</td><td>Set the speed automatically</td></tr><tr><td>1</td><td>100Mbps</td></tr><tr><td>2</td><td>10Mbps</td></tr></table>Automatic speed setting function automatically sets up the highest speed in the network.</td><td>M/E</td></tr>
</table>

<table>
<tr><th>Screen</th><th>Description</th><th>Default value</th><th>Range</th><th>Function</th><th>Protocol</th></tr>
<tr><td>CM.29</td><td>CIP Input Instance</td><td>1</td><td>0 to 11</td><td>This parameter is displayed when the protocol is set to Ethernet/IP. It sets up the data format of the drive status sent from the drive to the Client (Originator) during the I/O communication module of the CIP (Common Industrial Protocol). Refer to the Assembly Object:

<table>
<tr><th>Set value</th><th>Input value</th><th>Data size</th><th>Number of parameters</th></tr>
<tr><td>0</td><td>70</td><td>4</td><td>X</td></tr>
<tr><td>1</td><td>71</td><td>4</td><td>X</td></tr>
<tr><td>2</td><td>110</td><td>4</td><td>X</td></tr>
<tr><td>3</td><td>111</td><td>4</td><td>X</td></tr>
<tr><td>4</td><td>141</td><td>2</td><td>1</td></tr>
<tr><td>5</td><td>142</td><td>4</td><td>2</td></tr>
<tr><td>6</td><td>143</td><td>6</td><td>3</td></tr>
<tr><td>7</td><td>144</td><td>8</td><td>4</td></tr>
<tr><td>8</td><td>145</td><td>10</td><td>5</td></tr>
<tr><td>9</td><td>146</td><td>12</td><td>6</td></tr>
<tr><td>10</td><td>147</td><td>14</td><td>7</td></tr>
<tr><td>11</td><td>148</td><td>16</td><td>8</td></tr>
</table></td><td>E</td></tr>
<tr><td>CM.30</td><td>Output parameters number</td><td>3</td><td>0 to 8</td><td>Configure a group of addresses to read several output parameters at once. The user must set the number of parameters and then configure them in CM.31-38. This value is conditioned to CM.29.</td><td>E</td></tr>
<tr><td>CM.31 [1]</td><td rowspan="4">Status parameters 1 to 8</td><td>0x000A</td><td rowspan="4">0x0000 to 0xFFFF</td><td rowspan="4">These parameters are not used in Modbus TCP.

Define the output parameter group for data transmission, so that addresses configured in CM.31-38 can be used to send several parameters at once in the same communications frame.</td><td>E</td></tr>
<tr><td>CM.32 [1]</td><td>0x000D</td><td>E</td></tr>
<tr><td>CM.33 [1]</td><td>0x000F</td><td>E</td></tr>
<tr><td>CM.34 [1]</td><td>0x0000</td><td>E</td></tr>
</table>

[1] Only parameters corresponding to the value set in CM.30 will be shown (E.g., if CM.30 = 3, parameters CM.31, CM.32 and CM.33 will be shown).

<table>
<tr><th>Screen</th><th>Description</th><th>Default value</th><th>Range</th><th>Function</th><th>Protocol</th></tr>
<tr><td>CM.35 [1]</td><td rowspan="4"></td><td>0x0000</td><td rowspan="4"></td><td rowspan="4">The size of the group is set in CM.30.</td><td>E</td></tr>
<tr><td>CM.36 [1]</td><td>0x0000</td><td>E</td></tr>
<tr><td>CM.37 [1]</td><td>0x0000</td><td>E</td></tr>
<tr><td>CM.38 [1]</td><td>0x0000</td><td>E</td></tr>
<tr><td>CM.49</td><td>CIP Output Instance</td><td>1</td><td>0 to 11</td><td>This parameter is displayed only when the protocol is set to Ethernet IP. It sets up the data format of the drive command sent from the Client (Originator) to control the drive during the I/O communication module of the CIP (Common Industrial Protocol). Refer to the Assembly Object:
<table>
<tr><th>Set value</th><th>Input value</th><th>Data size</th><th>Number of parameters</th></tr>
<tr><td>0</td><td>20</td><td>4</td><td>X</td></tr>
<tr><td>1</td><td>21</td><td>4</td><td>X</td></tr>
<tr><td>2</td><td>100</td><td>4</td><td>X</td></tr>
<tr><td>3</td><td>101</td><td>4</td><td>X</td></tr>
<tr><td>4</td><td>121</td><td>2</td><td>1</td></tr>
<tr><td>5</td><td>122</td><td>4</td><td>2</td></tr>
<tr><td>6</td><td>123</td><td>6</td><td>3</td></tr>
<tr><td>7</td><td>124</td><td>8</td><td>4</td></tr>
<tr><td>8</td><td>125</td><td>10</td><td>5</td></tr>
<tr><td>9</td><td>126</td><td>12</td><td>6</td></tr>
<tr><td>10</td><td>127</td><td>14</td><td>7</td></tr>
<tr><td>11</td><td>128</td><td>16</td><td>8</td></tr>
</table></td><td>E</td></tr>
<tr><td>CM.50</td><td>Number of input parameters</td><td>2</td><td>0 to 8</td><td>Configure a group of addresses to read several input parameters at once. The user must set the number of parameters and then configure them in CM.51-58. This value is conditioned to CM.49.</td><td>E</td></tr>
</table>

Screen	Description	Default value	Range	Function	Protocol
CM.51 [2]	Control parameters 1 to 8.	0x0005	0x0000 to 0xFFFF	These parameters are not used in Modbus TCP. Define the input parameter group for data transmission, so that addresses configured in CM.51-58 ca be used to send several parameters at once in the same communications frame. The size of the group is set in CM.50.	E
CM.52 [2]		0x0006			E
CM.53 [2]		0x0000			E
CM.54 [2]		0x0000			E
CM.55 [2]		0x0000			E
CM.56 [2]		0x0000			E
CM.57 [2]		0x0000			E
CM.58 [2]		0x0000			E
CM.94	Communications update	N	NO YES	This parameter enables sending the current drive data configuration to the Ethernet communication module.	M/E

[2] Only parameters corresponding to the value set in CM.50 will be shown (E.g., if CM.50 = 2, parameters CM.51 and CM.52 will be shown).

LOST COMMAND

7

Drive Keypad Parameters

Code Number	Name / Description	Default	Set Value	Function
Pr-12	RlRLs / Response in case of a speed reference loss	"None"	0 None 1 Free-Run 2 Dec 3 Hold Input 4 Hold Output 5 Lost Preset	Set the action to be taken if the drive loses a speed reference. See "Lost Command Mode" below. ⚠ **Caution**: Users should ensure that disabling this protection does not compromise the operation of the equipment.
Pr-13	RfLsDl / Lost reference delay	1.0	0.1-120.0 s	Delay time setting after which the speed reference loss protection will enable.
Pr-14	RfLRf / Reference for lost reference	0	0-400.00 Hz	In order to set the frequency value at which the drive will operate in case a speed reference loss occurs. Therefore, the parameter Pr.12 must be set to 'LostPreset'.

Lost Command Mode:

Code Number	Description
"None"	Protection is disabled.
"Free-Run"	The drive cuts the output voltage and allows the motor free run.
"Dec"	The motor decelerates and then stops at the time set at G9.7 (Pr.7).
"Hold Input"	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.
"Hold Output"	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.
"Lost Preset"	The drive operates to the frequency defined in parameter G9.14 (Pr.14).

Modbus/TCP Lost Command Status

If the Modbus TCP receives no data from Client for 100msec, the Option becomes Lost Command status, and after the time set up in the Pr-13, the Drive operates according to the settings in the Pr-12.

Ethernet/IP Lost Command Status

If there is no Implicit Message Connection (Class1 Connection) between the Originator (PLC or Client) and Target (Drive), the Option becomes Lost Command status, and after the time set up in the Pr-13, the drive operates according to the settings in the Pr-12.

CONFIGURATION REGISTER 8

VARIABLE SPEED DRIVE: SD300.
SERIAL Nº: MODEL:
APPLICATION:
DATE:
CUSTOMER:
NOTES:

PARAMETER / DESCRIPTION	DEFAULT VALUE	SETTING 1	SETTING 2
CM: Communication Bus			
CM.6 Communication S/W version	0.00		
CM.9 LED status	-		
CM.10 Opt Parameter1	0		
CM.11 Opt Parameter2	0		
CM.12 Opt Parameter3	0		
CM.13 Opt Parameter4	0		
CM.14 Opt Parameter5	0		
CM.15 Opt Parameter6	0		
CM.16 Opt Parameter7	0		
CM.17 Opt Parameter8	0		
CM.18 Opt Parameter9	0		

PARAMETER / DESCRIPTION	DEFAULT VALUE	SETTING 1	SETTING 2
CM.19 Opt Parameter10	0		
CM.20 Opt Parameter11	0		
CM.21 Opt Parameter12	0		
CM.22 Opt Parameter13	0		
CM.29 CIP Input Instance	1		
CM.30 Output parameters number	3		
CM.31 Status parameter 1	0x000A		
CM.32 Status parameter 2	0x000D		
CM.33 Status parameter 3	0x000F		
CM.34 Status parameter 4	0x0000		
CM.35 Status parameter 5	0x0000		
CM.36 Status parameter 6	0x0000		
CM.37 Status parameter 7	0x0000		
CM.38 Status parameter 8	0x0000		
CM.49 CIP Output Instance	1		
CM.50 Number of input parameters	2		
CM.51 Control parameter 1	0x0005		
CM.52 Control parameter 2	0x0006		
CM.53 Control parameter 3	0x0000		
CM.54 Control parameter 4	0x0000		

PARAMETER / DESCRIPTION	DEFAULT VALUE	SETTING 1	SETTING 2
CM.55 Control parameter 5	0x0000		
CM.56 Control parameter 6	0x0000		
CM.57 Control parameter 7	0x0000		
CM.58 Control parameter 8	0x0000		
CM.94 Communications update	N		

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