

User Manual

Absolute Rotary Encoder with Ethernet/IP-Interface





Your partner for standard and special designs - precise, reliable and fast -





1. Introduction 4
1.1 Control and Information Protocol (CIP)5
1.2 Object model5
2. Data Transmission6
2.1 Implicit Messaging I/O Connection
2.1.1 I/O Assembly Instances
2.1.1.1 Data Attribute Format9
2.1.2 Data Mapping9
2.1.3 Data Mapping (Parameter) 10
2.1.3.1 Data Offset 10
2.1.4 Connection Path 11
2.2 Explicit Messaging11
2.2.1 CIP Common Services for Position sensor object
(Class 0x23 _{hex}) 12
Save / Restore12
2.2.2 Position Sensor Objects 13
2.3 TCP/IP Interface Object14
2.3.1 Status Instance Attribute (01 _{hex}) 14
2.3.2 Configuration Instance Attribute (02 _{hex}) 15
2.3.3 Configuration Control Inst. Attribute (04_{hex}) 15
2.3.4 Physical Link Object (05 _{hex}) 15
2.3.5 Interface Configuration (06 _{hex}) 16
2.3.6 Host Name
2.4 Ethernet Link Object17
2.4.0 Instance Attributes
2.4.1 Interface Flags 19
2.4.2 Common Services 19
2.4.3 Link Object Instances 20
2.5 Setting parameters with scanners
2.5.1 Read out position value
2.5.2 Set preset value
2.5.3 Get preset value 22
3 Diagnostic23
4 Programmable Parameters25
4.1 Encoder parameters for Position Sensor Object
Class 23hex25
4.1.1 Direction counting25
4.1.2 Scaling function control
4.1.3 Resolution per revolution
4.1.4 Total resolution
4.1.5 Preset value

4.1.6 Velocity Format	.27
4.1.7 Velocity Filter	.27
4.1.8 Endless Shaft	.27
5. Installation	28
5.1 Electrical connection	.28
5.2 Ethernet cables	.28
6 Power On	29
7 Installation	29
7.1 Rockwell configuration tools	29
7.1.1 Setting IP-Address (BOOTP/DHCP)	.29
7.1.2 Configuration RSLinx Classic™	.31
7.1.3 RSNetWorx™	.33
7.1.4 Configuration RSLogix 5000	.36
7.2 Schneider configuration tools	43
7.2.1 Setting configuration	.43
7.2.2 Online configuration	.46
7.3 BOOTP/DHCP and IP configuration tool	48
8 FAQ	50
9 Glossar	51
10. Technical Data	53
10.1 Electrical Data	.53
10.2 Mechanical Data	.53
10.3 Minimum (mechanical) lifetime	.53
10.4 Environmental Conditions	.53
10.5 Mechanical Drawings	.53
11 Models/Ordering Description	53
12 Accessories and Documentation	53
13 Revision index	



1. Introduction

Absolute rotary encoders provide a definite value for every possible position. All these values are reflected on one or more code discs. The beams of infrared LEDs are sent through code discs and detected by Opto-Arrays. The output signals are electronically amplified and the resulting value is transferred to the interface.

The absolute rotary encoder has a maximum resolution of 65536 steps per revolution (16 Bit). The Multi-Turn version can detect up to 16384 revolutions (14 Bit). Therefore the largest resulting resolution is 30 Bit = 1.073.741.824 steps. The standard Single-Turn version has 13 Bit, the standard Multi-Turn version 25 Bit. The integrated Ethernet interface of the absolute rotary encoder supports all necessary the EtherNet/IP functions. The protocol supports the programming of the following additional functions in several ways: Code sequence (Complement) Resolution per revolution Total resolution Preset value IP-Address

The general use of absolute rotary encoders with EtherNet/IP interface is guaranteed. The data will transmit in a standard Ethernet frame in the data section, see at the bottom of this side the pink field with the blue frame.

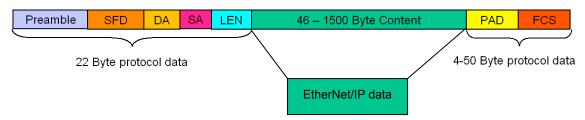
The MAC Address for each encoder is available on the type label.

The IP address can be programmed with DHCP or BOOTP by configuration tools of the PLC.

The physical interface support Autonegotiation and Autocrossing.

General information's about EtherNet/IP are available: www.ethernetip.de (German)

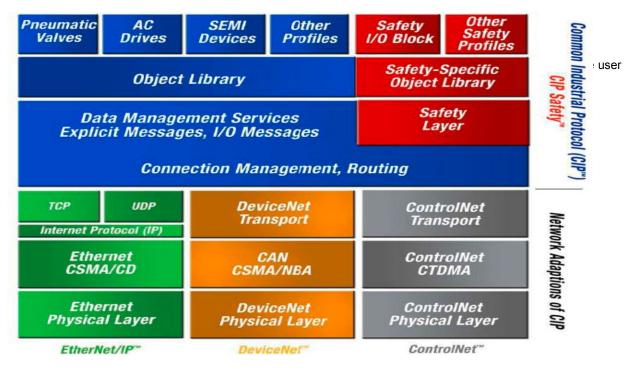
www.odva.org/default.aspx?tabid=67 (English)



Setup of an Ethernet data package on layer 2

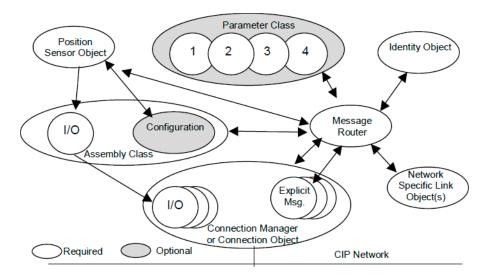


1.1 Control and Information Protocol (CIP)



1.2 Object model

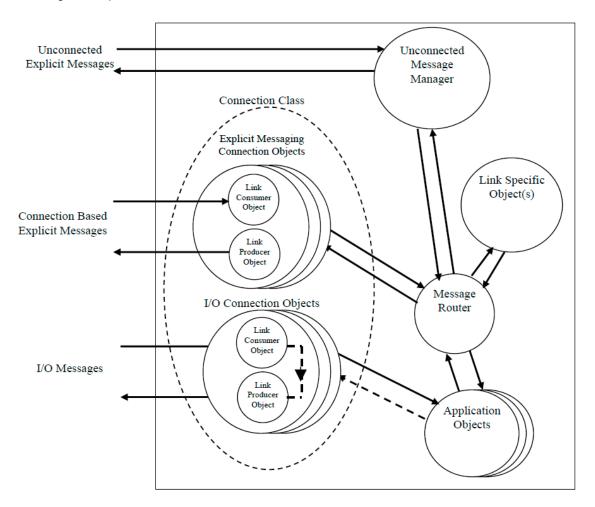
EtherNet/IP describes all data and functions of a device considering an object model. By means of that object-oriented description, a device can be defined complete with single objects. A object is defined across the centralization by associated attributes (e.g. process data), its functions (read- or write access of a single attribute) as well as by the defined behavior. The absolute rotary encoder support the Encoder Device Type: 22_{hex} or Generic Device Type: 0_{hex} . This is programmable, see chapter 4.1.6. All parameters will be used with Big Endian notation.





2. Data Transmission

The data transmission in the EtherNet/IP network is realized by implicit or explicit messaging. Explicit messages are split in unconnected and connection based versions. Unconnected messages will be use i.e. by EtherNet/IP scanners.

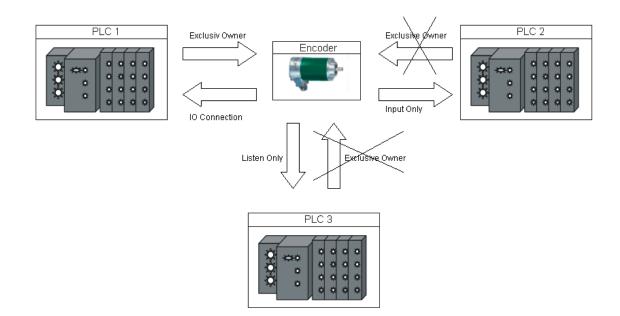




Exclusive-Owner, Input Only Listen Only

It is possible to open 256 connections to the encoder. One could be an Exclusive Owner connection, 255 additional connections can be realized mixed in Input Only or Listen Only. With an Exclusiv Owner connection can be transmit the parameters (cycle time, configuration and Assembly Instances) to the encoder. Input Only connections can only work if all of the parameters are according to the encoder parameters.

Listen Only need an connection of Excusiv Owner or Input Only.



Assembly	Config	Output Instance	Input Instance
Connection Manager	Config	Connection Point 1	Connection Point 2
Exclusiv-Owner	0x64 (106)	0,405)	0x01 Position value
Exclusiv-Owner	0x6A _{hex} (106)	0x69 _{hex} (105)	0x03 Position value + velocity
Innut Only	0.000 (100)	0.404 (100)	0x01 Position value
Input Only	0x6A _{hex} (106)	0x64 _{hex} (100)	0x03 Position value + velocity
Listen Only		0,000 (101)	0x01 Position value
Listen Only	-	0x65 _{hex} (101)	0x03 Position value + velocity
Demo-Scanner	0x68 _{hex} (104)	0x67 _{hex} (103)	0x66 _{hex} (102)



Communication check

File Yiew Network Request I/O Help		Type Data Size Rate Trigger Destination Priority
Request (all fields, but IP addresses are in hex) Send to: 192.168.0.253 Adapter 192.168.0.101 Service (hex) Class (hex) Instance (hex) Attribute (hex) Instance (hex) Attribute (hex) Symbol Tag Request Data. Each byte is a 2 char hex value, separated by a space (i.e. 0a 26 19). Response Response Size (decimal) 2 Image: Comparison of the compar	EIPScan Test Tool Jone Tool Berrove Device Add I/O Module Add I/O Module Add Connection Berrove Connection Stop Class1 Auto Test Stop Class1 Auto Test	Configuration Connection Instance 104 Originator->Target Connection Point 103 Target->Originator Connection Point 102 Connection Tag
Timestamp Message Ti:34:04:003 New connection opened with Instance 1 11:37:42:144 Connection closed with Instance 1 11:49:33:463 Unconnected Test started 11:50:27:712 Unconnected Test stopped with 0 errors Ready	Total Packets: 15954, Rate: 294.08 pkts/sec, Maximum Div	

B EtherNet/IP Scanner Demo - OCD-ENCODER.cfg	
File View Network Request I/O Help	
Image: Service (hex) Class (hex) Instance (hex) Attribute (hex) Symbol Tag Request Data. Each byte is a 2 char hex value, separated by a space (ie. 0a 26 (5)) Response Response Response Size (decimal)	
X Timestamp Message	^
11:37:42:144 Connection closed with Instance 1 11:49:33:463 Unconnected Test started	
11:45/33/453 11:50/27/12 Unconnected Test stopped with 0 errors: Total Packets: 15954, Rate: 294.08 pkts/sec, Maximum Delay: 16 msec	
11:54:26:475 New connection opened with Instance 1	~
	>
Auto Test In Progress: Number of devices: 1, Maximum Delay: 203 msec	NUM //

A



2.1 Implicit Messaging I/O Connection

Provide dedicated, special-purpose communication paths between a producing application and one or more consuming applications for the purpose of moving application-specific data. This is often referred to as implicit messaging. Class 0 and 1 are supported.

2.1.1 I/O Assembly Instances

Instance	Туре	Name
1	Input	Position Value
3	Input	Position Value and Velocity

2.1.1.1 Data Attribute Format

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	0	Position	Position Value (low Byte)							
4	1									
I	2									
	3 Position Value (high byte)									
0 Position Value (low Byte)										
	1									
	2									
3	3	Position	Value (hig	gh byte)						
3	4 Velocity (low Byte)									
5										
	6									
	7	Velocity	(high byte	e)						

2.1.2 Data Mapping

Data Component	Class		Instance	Attribute	
Name	Name	Number	Number	Name	Number
Position Value	Position Sensor	23 _{hex}	1	Position Value	0A _{hex}
Velocity	Position Sensor	23 _{hex}	1	Velocity	18 _{hex}



2.1.3 Data Mapping (Parameter)

On every Forward Open Request, the following parameters, will be sent from the controller to the encoder.

Assembly Instance Configuration: 7, size 12 Bytes

Assembly Instance Configuration: 7, size 12 Bytes							
Configuration Parameter	Class		Instance	Attribute			
Name	Name Name Number		Number	Name	Number		
Direct Counting Toggle	Position Sensor	23 _{hex}	1	Direct Counting Toggle	0C _{hex}		
Scaling Function Control Position Sensor		23 _{hex}	1	Scaling Function Control	0E _{hex}		
Measuring units per Revolution	Position Sensor	23 _{hex}	1	Measuring Units per Span	10 _{hex}		
Total Measuring Range in measuring units	Position Sensor	23 _{hex}	1	Total Measuring Range in measuring units	11 _{hex}		
Velocity Format	Position Sensor	23 _{hex}	1	Velocity Format	19 _{hex}		

2.1.3.1 Data Offset

Byte Offset	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Direction	n Counting	Toggle					
1	Scaling I	Function C	Control					
2	Measurin	ng units pe	er Revoluti	on (low by	te)			
3								
4								
5	Measurin	Measuring units per Revolution (high byte)						
6	Total Me	Total Measuring Range in measuring units (low byte)						
7								
8								
9	Total Me	asuring R	ange in me	easuring u	nits (high l	byte)		
10	Velocity	Velocity Format (low byte)						
11	Velocity	Velocity (high byte)						



2.1.4 Connection Path

Is made up of a byte stream that defines the application object to which a connection instance applies.

This path will be created from the configuration tools and are available in the EDS file too. This

path will sent during power up to the encoder. For some tools it is necessary to use the connection path as parameter:

[20] [04] [24 6A] [2C 69] [2C 01] [80 06 00 01 00100000 00200000 041F]

Segment Groups	Segment	Description
Application Path	<mark>20 04</mark>	Assembly object class
	<mark>24 6A</mark>	Instance segment type with Assembly Instance 0x6A _{hex} (105) (Configuration)
	<mark>2C 69</mark>	Assembly Instance 0x69 _{hex} (106) (Output controller to encoder)
	<mark>2C 01</mark>	I/O Assembly Instance 1 (Position value)
	<mark>80 06</mark>	Data segment with lenght of 6 Bytes
	00 01 00100000 00200000 041F	Configuration Data, see chapter 2.1.3.1 for details

2.2 Explicit Messaging

Provide generic, multi-purpose communication paths between two devices. These connections often are referred to as just Messaging Connections. Explicit Messages provide the typical request/response-oriented network communications. Class 2 and 3 are supported.



2.2.1 CIP Common Services for Position sensor object (Class 0x23_{hex})

Supported Service Code	Service Name	Comment
05 _{hex}	Reset	Boot up of the encoder, the programmed parameter
		from the customer will use again
0E _{hex}	Get_Attribute_Single	Read out attribute from the encoder
10 _{hex}	Set_Attribute_Single	Write attribute to the encoder
15 _{hex}	Restore	Restore the saved parameters. Use instance 0 of posi- tion sensor class to restore all configuration parameter at once. To restore single parameter use instance 1 of position sensor class with attribute number as argu- ment (see next table).
16 _{hex}	Save	Save the parameters from chapter 2.1.3 to the nonvol- atile memory. Use instance 0 of position sensor class to save all configuration parameter at once.



2.2.2 Position Sensor Objects

Instance Attributes (Get: read, Set: write + read)

Class Code: 23hex

Attrib. ID	Access	Name	Data Type	Description
01 _{hex}	Get	Number of Attributes	USINT	Number of supported Attributes
02 _{hex}	Get	Attribute List	Array of USINT	List of supported Attribute
0A _{hex}	Get	Position Value Signed	DINT	Current position signed
0B _{hex}	Get	Position Sensor Type	UINT	Specifies the device type
0C _{hex}	Set	Direction Counting Toggle	Boolean	Controls the code sequence clockwise or counterclockwise
0E _{hex}	Set	Scaling Function Control	Boolean	Scaling function on/off
10 _{hex}	Set	Measuring units per Span	UDINT	Resolution for one revolution
11 _{hex}	Set	Total Measuring Range in Measuring Units	Total Measuring Range in UDINT Total resolution	
13 _{hex}	Set	Preset Value	DINT	Setting a defined position value
18 _{hex}	Get	Velocity Value I DIN I		Current speed in format of attribute 19_{hex} and $2A_{hex}$
19 _{hex}	Set	Velocity Format	ENGUINT	Format of the velocity attributes
29 _{hex}	Get	Operating Status	perating Status BYTE Encoder diagnostic operations	
2A _{hex}	Get	Physical Resolution Span	UDINT	Resolution for one revolution
2B _{hex}	Get	Number of Spans	UINT	Number of revolutions
33 _{hex}	Get	Offset Value	DINT	Shift position value with the calcu- lated value
64 _{hex}	Set	Device Type DINT		Encoder device = 22 _{hex} Generic device = 0 (default)
65 _{hex}	Set	Endless Shaft	DINT Off = 0, On = 1, Auto = 2	
66 _{hex}	Set	Velocity Filter	DINT	Fine = 0, Middle = 1, Raw = 2



2.3 TCP/IP Interface Object

The TCP/IP Interface Object provides the mechanism to configure a device's TCP/IP network interface. With this parameter it is possible i.e. to read or write the device's IP Address and Network Mask.

Class Code: F5hex

Attribute ID	Access	Name	Data Type	Description
01 _{hex}	Get	Status	DWORD	Interface status, details in chapter 2.3.1
02 _{hex}	Get	Configuration Capability	Configuration Capability DWORD Interface capability fla	
03 _{hex}	Set	Configuration Control	DWORD	Interface control flags, details in chapter 2.3.3
04 _{hex}	Get	Physical Link Object	STRUCT of:	Path to physical link object
		Path size	UINT	Size of path
		Path	Padded EPATH	Logical segments identifying the physical link object
05 _{hex}	Set	Interface Configuration	STRUCT of:	TCP/IP network interface configu- ration
		IP Address	UDINT	The device's IP address
		Network Mask	UDINT	The device's network mask
06 _{hex}	Set	Host Name	STRING	

2.3.1 Status Instance Attribute (01hex)

Bit(s)	Called	Definition		
0-3	Interface Configuration Status	Indicates the status of the Interface Configuration attribute.	 0 = The Interface Configuration attribute has not been configured. 1 = The Interface Configuration attribute contains valid configuration obtained from BOOTP, DHCP or nonvolatile storage. 2 = The Interface Configuration attribute contains valid configuration, obtained from hardware settings (e.g.: pushwheel, thumbwheel, etc.) 3-15 = Reserved for future use. 	
4	Mcast Pending	Indicates a pending configuration change in the TTL Value and/or Mcast Config attributes. This bit shall be set when either the TTL Value or Mcast Config attrib- ute is set, and shall be cleared the next time the device starts.		
5-31	Reserved	Reserved for future use and shall be set to zero.		



2.3.2 Configuration Instance Attribute (02_{hex})

Bit(s)	Called	Definition
0	BOOTP Cli-	1 (TRUE) shall indicate the device is capable of obtaining its network configura-
0	ent	tion via BOOTP.
1	DNS Client	Not supported
2	DHCP Client	1 (TRUE) shall indicate the device is capable of obtaining its network configura-
2	DHCP Client	tion via DHCP.
3	DHCP-DNS	Netsurported
3	Update	Not supported
	Configuration	1 (TRUE) shall indicate the Interface Configuration attribute is settable. Some
4	Configuration Settable	devices, for example a PC or workstation, may not allow the Interface Configura-
	Sellable	tion to be set via the TCP/IP Interface Object.
5-31	Reserved	Reserved for future use and shall be set to zero.

2.3.3 Configuration Control Inst. Attribute (04_{hex})

Bit(s)	Called	Definition	
0-3	Startup Con- figuration	Determines how the device shall obtain its initial configuration at start up.	 0 = The device shall use the interface configuration values previously stored (for example, in non-volatile memory or via hardware switches, etc). 1 = The device shall obtain its interface configuration values via BOOTP. 2 = The device shall obtain its interface configuration values via DHCP upon start-up. 3-15 = Reserved for future use.

2.3.4 Physical Link Object (05hex)

This attribute identifies the object associated with the underlying physical communications interface (e.g., an 802.3 interface). There are two components to the attribute: a Path Size (in UINTs) and a Path. The Path shall contain a Logical Segment, type Class, and a Logical Segment, type Instance that identifies the physical link object. The maximum Path Size is 6 (assuming a 32 bit logical segment for each of the class and instance).

The physical link object itself typically maintains linkspecific counters as well as any link specific configuration attributes. If the CIP port associated with the TCP/IP Interface Object has an Ethernet physical layer, this attribute shall point to an instance of the Ethernet Link Object (class code = $F6_{hex}$). When there are multiple physical interfaces that correspond to the TCP/IP interface, this attribute shall either contain a Path Size of 0, or shall contain a path to the object representing an internal communications



interface (often used in the case of an embedded switch).

For example, the path could be as follows:

Path	Meaning
	[20] = 8 bit class segment type; [F6] = Ethernet Link Object class; [24] = 8 bit instance segment type; [01] = instance 1.

2.3.5 Interface Configuration (06hex)

Name	Meaning		
	The device's IP address. Value of 0 indicates no IP address has been configured.		
IP Address	Otherwise, the IP address shall be set to a valid Class A, B, or C address and shall not be		
set to the loopback address (127.0.0.1).			
	The device's network mask. The network mask is used when the IP network has been		
Network partitioned into subnets. The network mask is used to determine whether an			
mask	located on another subnet. Value of 0 indicates no network mask address has been con-		
	figured.		

2.3.6 Host Name

Name	Meaning
	ASCII characters. Maximum length is 64 characters. Shall be padded to an even number
Host Name	of characters (pad not included in length). A length of 0 shall indicate no Host Name is
	configured.



2.4 Ethernet Link Object

Class Cod	Class Code: F6 _{hex}					
Attribute ID	Access	Name	Data Type	Description	Semantics of Values	
01 _{hex}	Get	Revision	UINT	Revision of this object	The minimum value shall be 1. Shall be 2 or great- er if instance attribute 6 is implemented. Shall be 3 if any instance attributes 7-10 are implemented. The maximum value shall be 3.	
02 _{hex}	Get	Max Instance	UINT	Maximum instance num- ber of an object currently created in this class level of the device		
03 _{hex}	Get	Number of In- stances	UINT	Number of object in- stances currently created at this class level of the device	instances at this class	



2.4.0 Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Values
1	Get	Interface Speed	UINT	Interface speed currently in use	Speed in Mbps (e.g., 10, 100
2	Get	Interface Flags	DWORD	Interface status flags	See chapter 2.4.1
3	Get	Physical Address	ARRAY of 6 USINTs	MAC layer address	Displayed format "XX-XX-XX-XX-XX-XX"
		Interface Control	STRUCT of:	Configuration for physical interface	
~	Cat	Control Bits	WORD	Interface Control Bits	See table below
0	6 Set	Forced Inter- face Speed	UINT	Speed at which the interface shall be forced to operate	Speed in Mbps (10 or 100)
7	Get	Interface Type	USINT	Type of interface	 1 = The interface is internal to the device, i.e. in the case of an embedded switch 2 = Twisted-pair (e.g. 100Base-TX)
8	Get	Interface State	USINT	Current state of the inter- face	0 = No link 1 = The interface is enabled and is ready to send and re- ceive data
10	Get	Interface Label	SHORT_S TRING	Human readable identifi- cation	"Internal switch" or "External Port 1" or "External Port 2"

Control Bits

Bit(s)	Called	Definition
0	Auto pogotisto	802.3 link Auto-negotiation: 0 = disabled, 1 = enabled (standard)
U	Auto-negotiate	If Auto-negotiation is disabled then the device shall use the settings indi- cated by the Forced Duplex Mode and Forced Interface Speed bits.
1	Forced Duplex Mode	If Auto-negotiation bit = 0 the Forced Duplex Mode bit indicates whether the interface shall operate in full or half duplex mode. 0 = Half Duplex, 1 = Full Duplex
2-15	Reserved	Shall be set to zero

Example

Use on Transmit data size double (4 bytes) 00000064 for Auto-negotiation = disable on 100 MBaud



2.4.1 Interface Flags

Bit(s)	Called	Definition
0	Link Status	Indicates whether or not the Ethernet 802.3 communications interface is connected to an active network. 0 indicates an inactive link; 1 indicates an active link. The determination of link status is implementation specific. In some cases devices can tell whether the link is active via hardware/driver support. In other cases, the device may only be able to tell whether the link is active by the presence of incoming packets.
1	Half/Full Duplex	Indicates the duplex mode currently in use. 0 indicates the interface is running half duplex; 1 indicates full duplex. Note that if the Link Status flag is 0, then the value of the Half/Full Duplex flag is indeterminate.
2-4	Negotiation Status	 Indicates the status of link auto-negotiation 0 = Auto-negotiation in progress. 1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. Default values are product-dependent; recommended defaults are 10Mbps and half duplex. 2 = Auto negotiation failed but detected speed. Duplex was defaulted. Default value is product-dependent; recommended default is half duplex. 3 = Successfully negotiated speed and duplex. 4 = Auto-negotiation not attempted. Forced speed and duplex.
5	Manual Setting Requires Reset	0 indicates the interface can activate changes to link parameters (auto- negotiate, duplex mode, interface speed) automatically. 1 indicates the device requires a Reset service be issued to its Identity Object in order for the changes to take effect.
6	Local Hardware Fault	0 indicates the interface detects no local hardware fault; 1 indicates a local hardware fault is detected. The meaning of this is product-specific. Examples are an AUI/MII interface detects no transceiver attached or a radio modem detects no antennae attached. In contrast to the soft, possible self-correcting nature of the Link Status being inactive, this is assumed a hard-fault requiring user intervention.
7	Reserved	Shall be set to zero

2.4.2 Common Services

Service Code	Class	Instance*	Service Name	Description of Service
0E _{hex}	Condi- tional	Required	Get_Attribute _Single	Returns the contents of the specified attribute
10 _{hex}	n/a	Conditional	Set_Attribute _Single	Modifies a single attribute



2.4.3 Link Object Instances

Instance	Description
1	Internal interface
2	Intern switch Port 1
3	Intern switch Port 2

2.5 Setting parameters with scanners

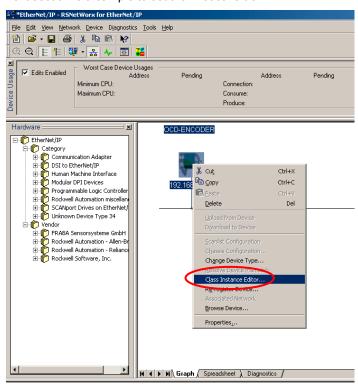
There are several external scanners for EtherNet/IP available. RS-NetWorksTM has one such scanner. In the figure is an example where the IP-Address (FD 00 A8 C0 complies 192.168.0.253), the Subnet (00 FF FF FF com-

plains 255.255.255.0), Gateway (00 00 00 00), DNS1 (00 00 00 00), DNS2 (00 00 00 00) and Domain Name = "" (ASCII Character max length = 48 bytes) was read out of the encoder.

EtherNet/IP Sca	nner Demo - Unbenannt	
<u>File View N</u> etwork	<u>R</u> equest <u>I</u> /O <u>H</u> elp	
Request (all fields, Send to: 192.16 Adapter 192.16 Service (hex) Instance (hex) Member (hex) Symbol Tag Request Data. Ea value, separated t	8.0.200 Class (hex) Class (hex) Class (hex) 5 Attribute (hex) 5 ch byte is a 2 char hex ay a space (i.e. 0a 26 f9). FF FF FF 00 00 00 00 00 00 C	EIPScan Test Tool Host 192.168.0.200 OCD-ENCODER 192.168.0.253
Timestamp 16:45:37:79	Message Ethernet/IP Scanner Library is online	ne
		Þ
Ready		NUM



In RSNetWorx is a scanner available too. In the next section is a sample to set the Preset value.



2.5.1 Read out position value

Get Single Attribute Position sensor value:

Class: 0x23 (Position sensor object) Instance: 0x01

Attribute: 0x0A (Position Value)

Class Instance Editor - [Node 192.168.0.253]	? ×
P	
Execute Transaction Arguments Service Code Ualue Description E Get Single Attribute Service Code Gass: Instance: Attribute: Description E Get Single Attribute Class: Service Code Get Single Attribute Ge	
Iransmit data size: Data sent to the device: Byte Image: Comparison of the device of	
Receive Data Dutnut size format: Data received from the device:	
Output size format: Data received from the device: Double (4 bytes) 6052155 Output radix format: Decimal	*
<u>lose</u> <u>H</u> elp	



? ×

2.5.2 Set preset value

Set Single Attribute Position Preset Value to 1 Class: 0x23 (Position sensor object) Instance: 0x01

🙀 Class Instance Editor - [Node 192.168.0.253] 🛛 🔋	×
Execute Transaction Arguments Service Code Value Description 10 Set Single Attribute Set Single Attribute Image: Set Single Attribute Iransmit data size: Data sent to the device: Double (4 bytes) Image: Set Single Attribute	
Values in decimal	
Receive Data	
Output size format: Data received from the device:	
Double (4 bytes) The execution was completed.	
Output <u>radix format:</u> Decimal	
<u>C</u> lose <u>H</u> elp	

2.5.3 Get preset value

Get Single Attribute Position Value Class: 0x23 (Position sensor object) Instance: 0x01 Attribute: 0x13 (Preset Value) 🗱 Class Instance Editor - [Node 192.168.0.253] . -Execute Transaction Arguments-Service Code Object Address <u>Attribute:</u> A C<u>l</u>ass: 23 Instance: Value Description Get Single Attribute 💌 Send the attribute ID <u>T</u>ransmit data size: Data sent to the device:

Double (4 bytes)	J
	Values in decimal
Receive Data	
Output size format: Dat	a received <u>f</u> rom the device:
Double (4 bytes) 💌 1	<u> </u>
Output <u>r</u> adix format: Decimal	
	<u>C</u> lose <u>H</u> elp



3 Diagnostic

LED	Color	EtherNet/IP name	Description	
Active1	<mark>Yellow</mark>	Natural Otatus Indicator 1	Details is table 2	
Link1	Green	Network Status Indicator 1	Details in table 2	
Active2	<mark>Yellow</mark>	Natural Ctatus Indiantar 2	Details is table 2	
Link2	Green	Network Status Indicator 2	Details in table 2	
Stat1	Green	Madula Otatua Indiantan	Details in table 1	
Stat2	Red	Module Status Indicator	Details in table 1	

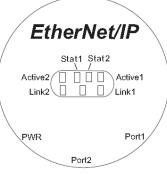


Table 1: Module Status Indicator Stat1/Stat2

LED	Summary	Requirements
Steady Off 🛛 💭	No power	
Steady On 🛛 👸	Device	If the device is operating correctly, the module status indicator shall
Green	operational	be steady green
Flashing 🖌	Standby	If the device has not been configured including the IP-Address, the
Green 1		module status indicator shall be flashing green with 1 Hz
Flashing	Missing IP	If the device does not have an IP-Address, the module status indi-
Green 2		cator shall be flashing green with 4 Hz
Flashing	Minor fault	If the device has detected a recoverable minor fault. I.e. an incor-
Red 🎽		rect or inconsistent configuration
Steady On	Major fault	If the device has detected a non-recoverable major fault
Red		
Flashing	Self-test	While the device is performing its power up testing, the Stat1 and
Red + Green		Stat2 LED shall be flashing red / green



LED		Summary	Requirements
Steady Off	~	No power, no	If the device does not have an IP address or is powered off
		IP address	
Steady	m	Connected	If the device has at least one established connection (even to
Green	-		the Message router)
Flashing		No connection	If the device has no established connections, but has obtained
Green			an IP address
Flashing		Connection	If one or more of the connections in which this device is the
Yellow	Ć.	timeout	target has timed out. This shall be left only if all timed out con-
_			nections are reestablished or if the device is reset
Steady		Duplicate IP	If the device has detected that its IP address is already in use
Yellow	111		
Flashing 🍎 🕯		Self-test	While the device is performing its power up testing, the Stat1
Yellow / Green			and Stat2 LED shall be flashing yellow / green

Table 2: Network Status Indicator Stat2



4 Programmable Parameters

4.1 Encoder parameters for Position Sensor Object Class 23hex

4.1.1 Direction counting

This operating parameter can be used to select the code sequence. The parameter can set with Con-

figuration Assembly and Explicit Messaging

Attribute ID	Default value	Value range	Data Type
0C _{hex}	0 _{hex}	0 _{hex} - 1 _{hex}	Boolean

The parameter code sequence (complement) defines the counting direction of the process value **as seen on the shaft** (clockwise or counter clockwise). The counting direction is defined in the attribute OC_{hex} :

Bit 0	Counting direction	Position values
0	CW	Increase
1	CCW	Decrease
Bit 0	Scaling function on/	off
Bit 0 0	Scaling function on/o	off

4.1.2 Scaling function control

If the Scaling function control is deactivated then complains the output value the physical resolution.

Attribute ID	Default value	Value range	Data Type
0E _{hex}	1 _{hex}	0 _{hex} - 1 _{hex}	Boolean

This parameter can be set with Configuration Assembly and Explicit Messaging

4.1.3 Resolution per revolution

The parameter resolution per revolution is used to program the encoder to set a desired number of steps per revolution. Each value between 1 and the maximum (see type label) can be realized. The parameter can set with Configuration Assembly and Explicit Messaging. Scaling function control **must be switch on** for customer parameters!

Attribute ID	Default value	Value range	Data Type
10 _{hex}	(*)	0 _{hex} - 10000 _{hex}	Double Integer32

(*) see type label, Maximum resolution: 16Bit Encoder: 10,000_{hex} (65,536)

When the value is set larger than 8192 for a 13Bit encoder, the process value of the encoder will not be single stepped and values will be skipped while rotating the shaft. So, it is recommended, to keep the measuring steps per revolution below 8192 measuring steps.



4.1.4 Total resolution

This value is used to program the desired number of measuring steps over the total measuring range. This value must not exceed the total resolution of the encoder with 25 bit = 33,554,432 steps. Please note the value written on the type shield. The parameter can set with Configuration Assembly and Explicit Messaging Scaling function control **must be switch on** for customer parameters!

Attribute ID	Default value	Value range	Data Type
11 _{hex}	(*)	0 _{hex} - 40,000,000 _{hex}	Unsigned Integer 32

(*) see type shieldMaximum total resolution30 Bit Encoder: 40,000,000_{hex} (1,073,741,824)

4.1.5 Preset value

The preset value is the desired position value, which should be reached at a certain physical position of the axis. The position value of the encoder is set to the desired process value by the parameter preset. The preset value must not exceed the parameter total measuring units. The parameter can set with Explicit Messaging. Set the preset value only in standstill! Use the save commando from chapter 2.2.1 to save the preset value in the non volatile memory.

Attribute ID	Default value	Value range	Data Type
13 _{hex}	0 _{hex}	0 _{hex} - total measuring range	Unsigned Integer 32



4.1.6 Velocity Format

Default value for Velocity Format is steps per second. This parameter can be set with Con-

figuration Assembly and Explicit Messaging.

Attribute ID	Default value	Value range	Data length
	1F04 _{hex}	1F04 _{hex}	Steps per second
		1F05 _{hex}	Steps per millisecond
19 _{hex}		1F06 _{hex}	Steps per microsecond
		1F07 _{hex}	Steps per minute
		1F0F _{hex}	RPM

4.1.7 Velocity Filter

To manage the noise of the velocity it is possible to switch between three classes.

Attribute ID	Default value	Value range	Description	Data Type
66 _{hex}	0 _{hex}	0 _{hex} / 1 _{hex} / 2 _{hex}	0 = Fine, 1 = Middle, 2 = Raw	Double Integer

4.1.8 Endless Shaft

Normally the period, i.e. "Total resolution" / "measuring units" per revolution must be an integer and it must fit an integer number of times (integer multiple) into 4096 for an encoder with 12 Bit for the revolutions. So the following equation must apply:

(4096 x measuring units per revolution) / Total resolution = integer

But with this EtherNet/IP encoder it is possible to solve this problem. If the Endless Shaft is activated then this problem will be solved by the encoder. The default value is Auto. In this case the encoder checks if the parameters need the endless shaft. The parameter can be set only with Explicit Messaging.

Note: The internal software routine only works if the encoder is in operation. If it is necessary to turn the encoder shaft more than 1024 revolutions without power supply this can lead to problems (the internal routine will not work without power supply). In this case the rule ahead should be observed even with new devices.

Attribute ID	Default value	Value range	Description	Data Type
65 _{hex}	2 _{hex}	0 _{hex} / 1 _{hex} / 2 _{hex}	0 = Off, 1 = On, 2 = Auto	Double Integer



5. Installation

5.1 Electrical connection

The rotary encoder is connected by a 4 pin M12 connector for the power supply and two 4 pin, D-coded M12 connector for Ethernet.

The Encoder uses a second D-coded connector and provides integrated switch functionality. On or in the packaging of the connector is the mounting description.

Connector Ethernet

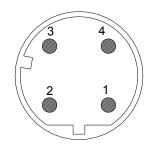
4 pin female, D-coded

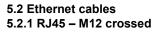
Connector power supply

4 pin male, A-coded

Pin Number	Signal
1	Tx +
2	Rx +
3	Tx -
4	Rx -

Sketch as seen on the encoder



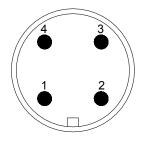


Signal	RJ45 Pin	M12 Pin
Tx+	1	2
Tx-	2	4
Rx+	3	1
Rx-	6	3

5.2.2 RJ45 - M12 straight

Signal	RJ45 Pin	M12 Pin
Tx+	1	1
Tx-	2	3
Rx+	3	2
Rx-	6	4

Pin Number	Signal
1	US (10 - 30 V DC)
2	N.C.
3	GND (0V)
4	N.C.



5.2.3 M12 - M12 straight

Signal	M12 Pin	M12 Pin
Tx+	1	1
Tx-	2	2
Rx+	3	3
Rx-	4	4



6 Power On

After power on the LED's on the absolute rotary **7 Installation**

7.1 Rockwell configuration tools

7.1.1 Setting IP-Address (BOOTP/DHCP)

To set the IP Address there are special tools available. I.e. the BOOTP/DHCP Server is installed with the software package from RSNetWorx[™]. The server scan the network for the MAC Addresses of all products with active BOOTP or DHCP. If one MAC address is selected in the Request History then the IP Address can be set by the "Add to Relation List" button. The MAC Address of each EtherNet/IP encoder is available on the type label. Note: After a power up the encoder send the BOOTP or DHCP request often. But after several time

If the encoder has got his IP-Address, the BOOTP and DHCP must be disabled with the corresponding button. Otherwise the encoder start up to get a new IP-Address again. After setting the IP-Address the Status LED is flashing with 1 Hz. But in this case save the configuration in the File menu, because the products cannot be found by encoder will flash between green and red or yellow.

comes no answer the frequency of requests decrease. A power up after a longer pause could solve the missing requests.

If not all encoders are listed in the BOOTP/DHCP Server then check the following points:

- LED status of the encoder OK?
- Is the Network setting correct?
- Is the BOOTP and/or DHCP enabled?

the BOOTP/DHCP Server. After loading this file the MAC Addresses and IP-Addresses are available and BOOTP or DHCP can be activated by the corresponding button. Possible IP-Range:

Class A-C (0.0.0.0 - 223.255.255.255) without Loopback range (127.x.x.x)

Referenced IP-Address range: 192.168.0.x

5	BOOTP/DHC	P Server	2.3 - E:\bootp.bpc						
E	<u>i</u> le <u>T</u> ools <u>H</u> elp								
Г	Request History								
	Clear History	Add to	Relation List			New Entry			×
	(hr:min:sec)	Туре	Ethernet Address (MAC)	IP Address	Hostname				
	15:41:04	BOOTP	00:0E:CF:03:10:27			Ethernet Address (MAC):	00:0E:CF:03	:10:27	
	15:40:32 15:40:17	BOOTP BOOTP	00:0E:CF:03:10:27 00:0E:CF:03:10:27			IP Address:	192 . 168	. 0 . 252	
	15:40:09	BOOTP	00:0E:CF:03:10:27			Hostname:			-
	15:40:06	BOOTP	00:0E:CF:03:10:27			Description:			-
								Cancel	
L	Relation List								
	New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP								
						a ta rataia canfauration i	n momo		
Ethemet Address (MAC) Type IP Address Hostnat Force selected device to retain configure 00:0E:CF:03:10:27 B0:0TP 192:168:0.252						e to retain configuration			
	00.02.01.00.1	5.21	00011 102.100.0.202						
L	J.					Entries			
	Status Save file complet	·e				Entries			
L	Save nie complet					10120	~		



USER MANUAL

558 E	OOTP/DHCP Server 2.3	3					
<u>F</u> ile	<u>T</u> ools <u>H</u> elp						
Re	Request History						
_	Clear History Add to Relation List						
		hernet Address (MAC)	IP Address	Hostname			
		:0E:CF:03:10:27 :0E:CF:03:10:27	192.168.0.252				
		:0E:CF:03:10:27 :0E:CF:03:10:27					
		:0E:CF:03:10:27					
Ľ							
	lation List						
_	New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP						
	Ethernet Address (MAC)	Type IP Address	Hostname	Description			
(00:0E:CF:03:10:27	BOOTP 192.168.0.252					
						Fables	
	atus nt 192.168.0.252 to Ethernet -	address 00:0E:CE:03:10:27				Entries 1 of 256	
	1. 102.100.0.202 (0 Ethomot	333700 00.02.01.00.10.21				10,200	

After setting the IP-Address with this tool the IP-Address will be available only after the next BOOTP request. If the IP-Address is not known and BOOTP and DHCP are deactivated it is possible with a special tool to find the IP-Address or to activate BOOTP or DHCP. See details in chapter 7.3.



USER MANUAL

7.1.2 Configuration RSLinx Classic™

RSLinx[™] is a complete communication server providing plant-floor device connectivity for a wide variety of Rockwell Software applications such as RSLogix[™], RSNetWorx[™],... To start a new project add first a new RSLinx Classic[™] Driver for EtherNet/IP under *Communications Configuration Drivers* and input the name.

Configure Drivers		? 🛛
Available Driver Types:		Close
RS-232 DF1 devices Ethernet devices Ethernet/IP Driver 1784-KT/KTX[D]/PKTX[D]/PCMK for DH+/DH-485 devices 1784-KT(K) for ControlNet devices DF1 Polling Master Driver 1784-PCC for ControlNet devices 1784-PCIC(S) for ControlNet	Add New	<u>L</u> iese <u>H</u> elp Configure Startup <u>S</u> tart Stop <u>D</u> elete

Add New RSLinx Classic Driver	
Choose a name for the new driver. (15 characters maximum)	ОК
OCD_NET	Cancel



Use *Browse Local Subnet* to find the EtherNet/IP components in the network. The status should be "Running". Then push the *Close* button to

Configure driver: OCD_NET	? 🛛
Ethemet/IP Settings	
Browse Local Subnet C Br	owse Remote Subnet
IP Address:	· · ·
Subnet Mask:	
OK Abbred	chen Übernehmen Hilfe

finish this configuration.

Configure Drivers		? 🛛
Available Driver Types: Ethernet/IP Driver	▼ <u>A</u> dd New	<u>C</u> lose <u>H</u> elp
Configured Drivers:		7
Name and Description	Status	
OCD_NET_A-B Ethernet_RUNNING	Running	Configure
		Star <u>t</u> up
		<u>S</u> tart
		Stop
		<u>D</u> elete



7.1.3 RSNetWorx™

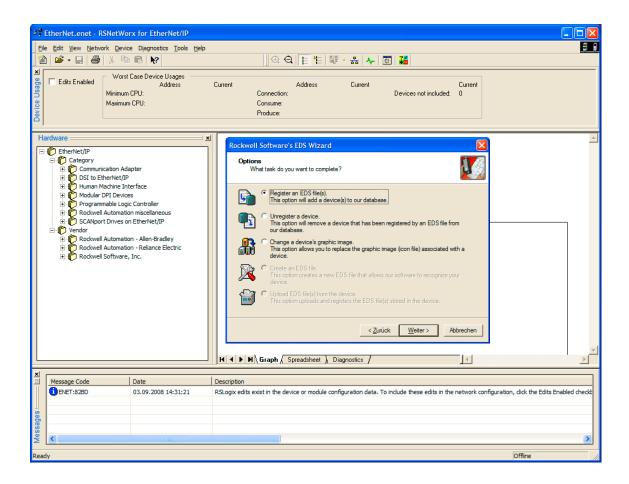
RSNetWorx[™] products provide design and configuration management services for EtherNet/IP. The program defines and configures the devices on the network quickly through

EDS Wizard

The EDS File contains information about device specific parameters as well as possible operating modes of the encoder. With this file you have a data sheet in an electronic format, which can be used to configure the device in the network, for example with RSNetWorxTM from Rockwell. In this sample the PLC uses address 192.168.0.100 and the encoder 192.100.0.252.

a simple software interface. This definition can take place offline using drag and drop operations or online by using RSLinx® to browse a EtherNet/IP network.

To install the EDS file the EDS Wizard has to be started, that can be done in the menu *Tools/EDS Wizard*. If the EDS Wizard is activated successfully the *Register an EDS File(s)* has to be chosen and after that the button *weiter*. In the next step the *Register a directory of EDS files* has to be chosen and with *Browse* the path of the EDS file(s). That is indicated in the next pictures.





Rockwell Software's EDS Wizard		
EDS File Installation Test Results This test evaluates each EDS file for errors i guarantee EDS file validity.	in the EDS file. This test does not	V
the lattice of the set of th		
Wew file	< <u>Z</u> urück <u>W</u> etter >	Abbrechen

Rockwell Software's EDS Wizard						
Registration Bectronic Data Sheet file(s) will be added to your system for use in Rockwell Software applications.						
Register a gingle file Register a ginectory of EDS files Look in subfolders Named:						
E:\EDS\Posital_OCD_Encoer.eds						
If there is an icon file (ico) with the same name as the file(s) you are registering then this image will be associated with the device. To perform an installation test on the file(s), click Next						
< Zurück Weiter > Abbrechen						

Rockwell Software's EDS Wizard					
Change Graphic Image You can change the graphic image that is associated with a device.					
Product Types Change icon Vendor Specific Type COD-ENCODER					
< Zurück Wetter > Abbrechen					

The Wizard finds all EDS files that are discarded in the choosing path and operates a test to check the EDS files on errors. In the next step pictures can be selected for the using nodes. With the button *weiter* the installation can be continued and finished.



work line and set the IP-Address.

Set Ether Net.enet - RSNetWork for EtherNet/IP Ele Edit View Network Device Diagnostics Tools Help Ele Edit View Network Device Diagnostics Tools Help Ele Edit Set Set Device Device Usages Address Current Address Current Minimum CPU: Consume: Produce:
More Case Device Usages Worst Case Device Usages Edits Enabled Address Current Minimum CPU: Consume: Produce:
Hardware CompactLogix System OCD-ENCODER
EtherNet/IP Contrainication Adapter DSt to EtherNet/IP Human Machine Interface Modular DPI Devices Programmable Logic Controller Rodwell Automation - Relance Electric Controller Controller Controller Controller Controller Controller Controller Controller ScAlport Drives on EtherNet/IP Unknown Device Type 34 Controller Contention </th
Message Code Date Description
The same scales 192.168.0.100, slot 00 dees not match its scalist in the offline file.
Check 152.5 03.09.2009 14:99:57 Mode changed to online. The communication threauth is 2004 sec. The online path is C214.4PTOP-2400/OCD_NET,
Control 1:220 U.3.19.2000 11:49:57 Koodyn eutre exist in the device or module configuration data. To include these exists in the network computation, click the Edits Enabled on U.S. Statistical Configuration and Configuration data.
Check 16 JAP O 3.05-2006 11-19:26 Save completed. Save completed. Y
C PHCT 32.00 05.05,2000 14:9357 RSLogix edits exist in the device or module configuration data. To include these edits in the network computation, click the Edits Enabled of RET:8126 C PHCT:8126 03.09,2008 14:48:25 RSLogix edits no longer exist in the device or module configuration data. C PHCT:8126 03.09,2008 14:48:25 Save completed.
Ready Online Not Browsing

Load a saved *.enet file or start a new project. Add the devices per Drag and Drop to the net

> is not necessary to set the IP-Address manually. For using this configuration in RSLogix save the

Optional browse the network with all devices with Button 👯 or Upload from Network. So it

Browse for Network						
The current path is not valid for the communication drivers on this computer. Select a communications path to the desired network.						
computer. Select a communications path to the desired network.						
Autobrowse Refresh						
Workstation, CJA-LAPTOP-2400						
亩ය Linx Gateways, Ethernet □						
😥 🕨 192.168.0.100, 1769-L32E Ethernet Port, 1769-L32E I						
192.168.0.252, OCD-ENCODER, OCD-ENCODER						
<u> </u>						

*.enet file.



7.1.4 Configuration RSLogix 5000

The RSLogix 5000 Series environment offers an easy-to-use, IEC61131-3 compliant interface, symbolic programming with structures and arrays, and a comprehensive instruction set that serves many types of applications. It supports relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs.

In the first step load a configuration or add a new controller and input a name. In this sample is used the CompactLogix5332E.

RSLogix 5000 - OCD_ENCODER [1769-L32E]		
Elle Edit View Search Logic Communications Tools Window !		
Dífline IL ERUN THE PARTY IN P	▼ ∞ ∞ ™ ™ <	
No Forces		
No Edits 🚔 🛛 🖉	H H H H H H H Favorites Bit Timer/Counter Input/Output Compare	
Controller OCD_ENCODER Controller Tags Controller Tault Handler Power-Up Handler Tasks MainTask Main	New Controller X Vendor: Allen-Bradley Jype: 1769-L32E CompactLogix5332E Regision: 15 Cancel Redundancy Enabled Help Name: OCD_ENCODER Descrigtion: X Chassis Type: Knone> Slgt: 0 Safety Partner Slot: Crgate In: E:\ Browse	
Ready		



Start the configuration of the controller or load the *.enep file in the module properties of tab

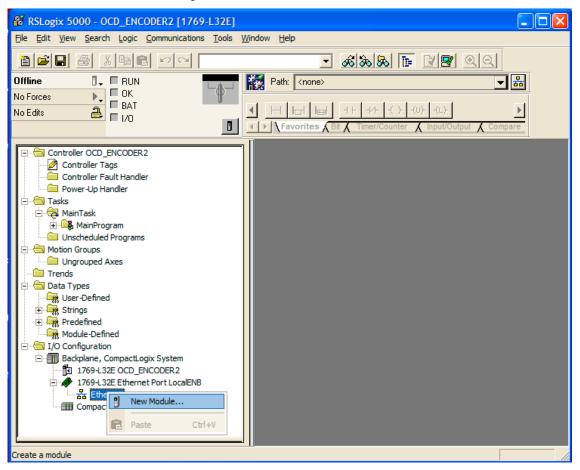
RSNetWorx[™] that was created with RSNetWorx[™].

RSLogix 5000 - OCD_ENCODER [1769-L32E]*	
<u>File E</u> dit <u>V</u> iew <u>S</u> earch Logic <u>C</u> ommunications <u>T</u> ools <u>W</u> indow H	Help
	- 18 18 1 22
Offline D RUN No Forces C RUN No Edits C I/O	Image: Image:
	Z Control 🗗 🗖 🗙
Ready	

Module Properties	s: Controller:1 (1769-L32E Ethernet Port 15.3)					
General* Connection	RSNetWorx* Module Info Port Configuration Port Diagnostics					
EtherNet/IP <u>f</u> ile (.enet):	okumente und Einstellungen\Administrator\Desktop\ <mark>EtherNet.enet</mark>	towse				
Found in:	c:\dokumente und einstellungen\administrator\desktop					
Launch RSNetWorx f	for EtherNet/IP					
<u>i</u>	View and edit the EtherNet/IP network Audit the EtherNet/IP network					
RSNetWorx for EtherNet/IP cannot be launched until pending edits are applied.						
Status: Offline	OK Cancel Apply	Help				



Select the network in the I/O Configuration and add New Module.



For using a Generic Device select the Generic Ethernet Module. Some PLC's support Encoder Devices too. Please check that the matching

Select Module		×
Module	Description	Vendor
1769-L35E Etherne	10/100 Mbps Ethernet Port on CompactLogix5335E	Allen-Bradley 📩
1788-EN2DN/A	1788 Ethernet to DeviceNet Linking Device	Allen-Bradley
1788-ENBT/A	1788 10/100 Mbps Ethernet Bridge, Twisted-Pair Media	Allen-Bradley
1788-EWEB/A	1788 10/100 Mbps Ethernet Bridge w/Enhanced Web Serv.	Allen-Bradley
1794-AENT/A	1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media	Allen-Bradley
Drivelogix5730 Eth	. 10/100 Mbps Ethernet Port on DriveLogix5730	Allen-Bradley
ETHERNET-BRIDGE	Generic EtherNet/IP CIP Bridge	Allen-Bradley
ETHERNET-MODULE	Generic Ethernet Module	Allen-Bradley
EtherNet/IP	SoftLogix5800 EtherNet/IP	Allen-Bradley
PH-PSSCENA/A	Ethernet Adapter, Twisted-Pair Media	Parker Hannif
+ Drives		
		~
•		▶
	<u> </u>	Add Favorite
By Category By Vi	endor Favorites	
	OK Cancel	Help

EDS file complies to the configuration of the encoder. The device type is programmable.



Set the Connection Parameters according the following figure.

Type: Vendor:	ETHERNET-MODULE Generic Ether Allen-Bradley	net Module			
Parent: Name: Description:	LocalENB OCD	Connection Pa	rameters Assembly Instance: 3	Size:	(32-bit)
Comm Forma - Address / H IP Addr C Host N	ess: 192 . 168 . 0 . 252	Output: Configuration Status Input: Status Outpu		12 :	(8-bit)

Set the cycle time.

👪 RSLogix 5000 - OCD_ENCODER [1769-L32E]*	
Eile Edit View Search Logic Communications Tools Window	
Ele Edit View Search Logic Communications Tools Window Offline Offline Image: Search Logic Communications Tools Window Offline Offline Image: Search Logic Communications Tools Window Offline Image: Search Logic Communications Tools Window Offline Image: Search Logic Communications Tools Window Image: Search Logic Communications Tools Window Offline Image: Search Logic Communications Tools Window Image: Search Logic Communications Tools Image: Search Logic Communications Tools Image: Search Logic Communications Tools Image: Search Logic Communication Tools Image: Search Logic Communication Tools Image: Search Logic Communication Tools	
Backplane, Compact.ogix System □ 1769-132E OCD_ENCODER □ 1769-132E Ethernet Port LocalENB □ 1769-1	Status: Offline OK Cancel Apply Help



To read or write data use Logic - Monitor Tags

# RSLogix 5000 - OCD_ENCODER [1769-L32E]*									
Ele Edit View Search Logic Communications Tools Window Help									
Diffine 🛛 🗸 🔲 RUN 🖉 Path: <none></none>									
No Forces	1								
No Edits 🚔 🔣									
	Favor	ites (Bit / Timer/Coun	ter 人	Input/Output	Compare				
		Controller Tags - OCI	D_EN	CODER(cont	roller)				
Controller Tags	Sc	ope: 🗍 OCD_ENCODE	F	Sh <u>o</u> w	Show All				
Power-Up Handler		Name 🛆	Value	+	Force Mask 🛛 🗲	Style	Data Type	De▲	
⊡चचचचच		-OCD:C		{}	{}		AB:ETHERNET		
		+-OCD:C.Data		{}	{}	Hex	SINT[400]		
Unscheduled Programs		-0CD:1		{}	{}		AB:ETHERNET		
E G Motion Groups		-OCD:I.Data		{ }	{}	Decimal	DINT[2]		
Trends		⊕-0CD:I.Data[0]		0		Decimal	DINT		
E S Data Types				0		Decimal	DINT		
User-Defined									
🕀 🙀 Strings									
Predefined									
i									
Backplane, CompactLogix System									
1769-L32E OCD_ENCODER									
1769-L32E Ethernet Port LocalENB									
Ethernet T769-L32E Ethernet Port LocalENB									
ETHERNET-MODULE OCD									
E CompactBus Local									
		Monitor Tags (Ed	it Tage	. /				<u>ل</u> ے .	
			it rag:	·/				<u> </u>	
								11.	



📝 C	ontroller Tags - Compa	actLogix_L	32E(controlle	r)			×
Sc	ope: 📲 CompactLogix_L	. 🗸 🔄 Sh	ow Show	All			
	Name 🛆	Value 🔹 🗲	Force Mask 🗲	Style	Data Type	Description	•
	–−0CD:C.Data	{}	{}	Hex	SINT[400]		
Þ	⊕-0CD:C.Data[0]	16#00		Hex	SINT	Direction Counting Toggle	
	⊕-0CD:C.Data[1]	16#01		Hex	SINT	Scaling Function Control	
	⊕-0CD:C.Data[2]	16#00		Hex	SINT	Measuring Units per Span byte 0 (LSB)	
	⊕-0CD:C.Data[3]	16#20		Hex	SINT	Measuring Units per Span byte 1	
	⊕-0CD:C.Data[4]	16#00		Hex	SINT	Measuring Units per Span byte 2	
	⊕-0CD:C.Data[5]	16#00		Hex	SINT	Measuring Units per Span byte 3 (MSB)	
	⊕-0CD:C.Data[6]	16#00		Hex	SINT	Total Measuring byte 0 (LSB)	
	⊕-0CD:C.Data[7]	16#20		Hex	SINT	Total Measuring byte 1	
	⊕-0CD:C.Data[8]	16#00		Hex	SINT	Total Measuring byte 2	
	⊕-0CD:C.Data[9]	16#00		Hex	SINT	Total Measuring byte 3 (MSB)	
		16#04		Hex	SINT	Velocity 0 (LSB)	
		16#1f		Hex	SINT	Velocity 1 (MSB)	
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
		16#00		Hex	SINT		
	+-0CD:C.Data[22]	16#00		Hex	SINT		
		Tags /		11			

- If the value is 00 then the standard configuration will be used
- If the Paramter are out of range the maximum value of the encoder will be used as parameter
- To change parameters open *Communication Who Active*, *Go Offline*, *File Save*, select controller, *Download*, Run
- These parameter can set by a standard EtherNet/IP scanner tool too.

🕷 Who Active	
Autobrowse Refresh Autobrowse Refresh Autobrowse Refresh Autobrowse Refresh Refresh	<u>G</u> o Online <u>U</u> pload <u>D</u> ownload Update Eirmware <u>C</u> lose
	Help
Path: OCD_NET\192.168.0.100\Backplane\0 Path in Project: <none></none>	Set Project Path



If everything is running then, in the "Errors tab" the message 0 error(s) should appear.

🕷 RSLogix 5000 - OCD_ENCODER [1769-L32E] - [Controller Tags - OCD_ENCODER(controller)]								
🔊 Ele Edit View Search Logic Communications Tools Window Help 🖉 🎽 🗶								
Offline 📴 RUN 🔽 🧱 Patr. (none) 🐨 🖬								
No Forces	Forces							
No Edits BAT		-(U)(L)-	Þ					
	Favorites Bit Timer/Counte	r 🔏 Input/Output	Compare					
		Change Lorphus						
Controller OCD_ENCODER Controller Tags			-	-		IC_DRIVE, AXIS_SERVO, AXIS_SERVO_DRIVE, AXI		
Controller Fault Handler	Name			Style	Data Type	Description		
Power-Up Handler	= OCD:C	{}	{}		AB:ETHERNET			
🖻 🔄 Tasks	- OCD:C.Data	{}	{}		SINT[400]			
🖻 🚭 MainTask	+ OCD:C.Data[0]	16#00		Hex	SINT	Direct Counting Toggle		
🕀 🕞 MainProgram	+ OCD:C.Data[1]	16#01		Hex	SINT	Scaling Function Control		
Unscheduled Programs	+ OCD:C.Data[2]	16#00		Hex	SINT	Measuring Unit per Span Byte 0		
Generation Groups Generation Groups Generation Groups	+ OCD:C.Data[3]	16#00		Hex	SINT	Measuring Unit per Span Byte 1		
Trends	+-OCD:C.Data[4]	16#10		Hex	SINT	Measuring Unit per Span Byte 2		
	+ OCD:C.Data[5]	16#00		Hex	SINT	Measuring Unit per Span Byte 3		
User-Defined	+ OCD:C.Data[6]	16#00		Hex	SINT	Total Measuring Range in Measuring units Byte 0		
🕀 🙀 Strings	+ OCD:C.Data[7]	16#00		Hex	SINT	Total Measuring Range in Measuring units Byte 1		
🕀 🚂 Predefined	+ OCD:C.Data[8]	16#20		Hex	SINT	Total Measuring Range in Measuring units Byte 2		
🗄 🕞 Module-Defined	+ OCD:C.Data[9]	16#00		Hex	SINT	Total Measuring Range in Measuring units Byte 3		
Gonfiguration Gonfiguration Gonfiguration	A Monitor Tags (Edit Tags /			•				
Backplane, CompactLogix System 1769-L32E OCD_ENCODER	The monitor rugs (Lear rugs)							
□ # 1769-L32E Ethernet Port LocalENB	KSLogix 5000 project se					▲		
E thernet								
1769-L32E Ethernet Port LocalENB	Merging remaining topo.	logy and conn	ections to E	therNet/IP pr	oject file C	NDOKUMENTE UND EINSTELLUNGEN A		
ETHERNET-MODULE OCD	Merging chassis at IP a	ddress 192.1	68.0.100: Loc	calENB	-			
CompactBus Local	Merging module at IP as Merging module at IP as	idress 192.16 Idress 192.16	8.0.100, slo 8.0.100, slo	t U: OCD_ENCC t 3: Local	DER			
	Merging module at IP ad	idress 192.16	8.0.252: OCD	C S. ESCUI				
	Merging connection: Sta	andard						
	Complete - 0 error(s),	0 warning(s)						
		,(-,						
						•		
	Errors Search Result	s (Watch /		•		F		
Project file saved.								



7.2 Schneider configuration tools

In the software tool Unity it is possible to configure the parameters of the encoders. EDS file help to change the parameters on an easy way. Select the EtherNet/IP module and start the EtherNet/IP configuration tool.

✤ Unity Pro XL : ocd*	
Eile Edit View Services Tools Build PLC Debu	ug Window Help
] ≌ ⊯ ⊒ ⊕] ि X € ∽ ~ ⊠	# \$ Ø ■ ± \$ # # = A = E \$ \$ \$ 1 u u u v m e 1
te A II B Q →	
Project Browser 🔀	
Eg Structural view	📓 0.2 : TSX ETC 100
Project	PREMIUM ETHERNET/IP MODULE
Configuration	TSXETC 100
0 : TSX RKY 6EX	TSX ETC 100
😑 —— 🔃 0 (1) : TSX P57 56.	Project
Slot A	Network name (10 characters max.): 000
8, Loop	Inputs Outputs
8 Simulation TERminalPort	200 200 200 200
🔍 Ethernet	Max size: 100 Max size: 100
2 : TSX ETC 100	
4	EIP configuration Tool
Derived Data Types	Update application
😑 🛁 🥘 Variables & FB instances 🧮 🚺	EtherNet/IP
Elementary Variables	Ethernet CIP
IO Derived Variables	Task:
Elementary FB Instances	MAST
Motion	
Communication	0.2: TSX ET
×	
Build Import/export	User errors X Search/Replace /
Ready	HMI R/W mode OFFLINE TCPIP:127.0.0.1

7.2.1 Setting configuration

In the first time it is necessary to install the EDS-

File with the wizard.

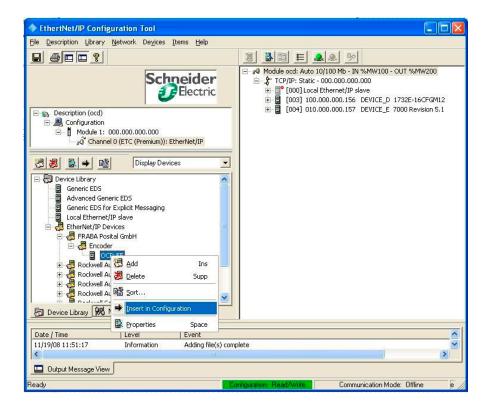
ThertNet/IP Conf	guration Tool		
<u>File Description Library</u>	<u>N</u> etwork De <u>v</u> ices Items <u>H</u> elp		
		B E & P	
	DS Management		00
Description (oc Octigurat Module Octigurat Module Octigurat Module Octigurat Module Octigurat Oct	This Wizard allows you to add EDS files.	EDS	
Date / Time	< Zurück Weiter >	Abbrechen Hilfe	~
11/19/08 11:47:25	Information Upening mode: Upen.		_
<			>
🛄 Output Message Vie	w.		
Ready	Configuration Re	ead/Write Communication Mode: Offline	e



Select the EDS-File, available on our web side, and follow the wizard to the end.

EDS Management	EDS Management
EtherNet/IP>>>	EtherNet/IP>
Select the Location of the EDS File(s):	Product Name Status Major Revision Minor Revision Vendor Name
Add File(s) Add all the EDS from the Directory Directory or File Name : [Browse] D:\WORK\ATD\Development\Projects\Profinet\Firmware\ENCODER_ERTEC200_PDS0	OCD-ENCODER Correctly added. 1 7 FRABA Posital Gm
The EDS files usable in EIP-CT are registered in the EDS base. Select the location of the file(s) and click on Next button to insert the EDS files in the base.	List of the files added in the base. Click on Next to complete the addition.
<⊒urück <u>W</u> eiter> Abbrechen Hilfe	< <u>Z</u> urück <u>W</u> eiter≻ Abbrechen Hilfe

Select the encoder in the Device Library and *Insert in Configuration* (menu opens on right button click of the mouse).





Set the IP-Adress of the encoder in the *General*-Tab. Add a connection for reading the position value or the position value and velocity. More

Device Name :	OCD			
Number :	001 💌 🗆 Link	Parameters	Active Confi	guration : 🔽
Comment :				~
				<u>×</u>
Network Propert	ies			
	Name	Value	Unit	
	► IP Address	192.168.000).155	
	- DHCP Relation			
		FALCE		
	► Enable DHCP	FALSE		
		FALSE		
		FALSE		
Descriptions	► Enable DHCP			
Description :				<u>×</u>
Description :	► Enable DHCP			~
Description : - Ping	► Enable DHCP			<u>_</u>
-Ping	Enable DHCP IP address of the partner			
-Ping	► Enable DHCP			
-Ping	Enable DHCP IP address of the partner Ping Result			

In tab *Connections* under *General* can be checked the cycle time (RPI), the input and output configuration. Under *Configuration*

OCD-EE O'CD-EE O'	Name Connection Bit Health Offset Request Packet Interval (RPI) Time-out Multiplier Input - T->0	Value #### 10 x4	Unit ms
	Input Size Input Node Input Node Input Nype Priority Trigger Type Output - 0->T Output Size Output Mode Output Type	8 Multicast Fixed Scheduled Cyclic 0 Point to Point Fixed	bytes bytes
Add Remove	► Priority	Scheduled	
Add Remove Description Offset of the health bit of this connection #### if the configuration must be save	n in the status byte array of the input a d to display this parameter.	rea. From 0 to 12	17. Valu

details about the different connections are available in chapter 2.

OCD-ENCODER			×
General Connections Online Parameters Port	Configuration EDS File nnections Parameters :		1
OCD-EE JO No conligued connection	Name Value U	nit	
Exclu Exclu	add sive-Owner1: Encoder Positi sive-Owner1: Encoder Positio sive-Owner2: Encoder Positio Only: Encoder Position value Only: Encoder Position value Lancer	on Value on value + V	
Add Remove Description No configured connection	,		×
	<u>o</u> k	Cancel	Help

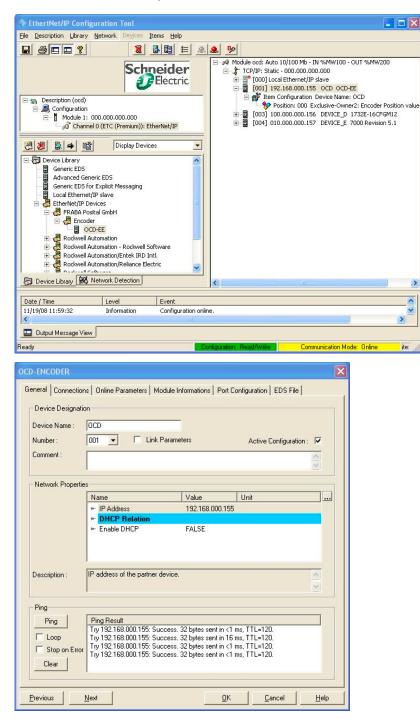
Setting are the offline parameters available, that will be used after the PLC goes in the Run state.

OCD-ENCODER General Connections Online Parameters	Port Conliguration EDS File	×
Configured Connections :	Connections Parameters : Disp	lay by Group 🔽
- OCD-EE	Name	Value Ur
P P Configuration Setting	 No Group Specified Velocity Format Total Measuring Range in Measuring Units Measuring Unit Per Span Scaling Function Control Direction Counting Toggle 	7940 co 33554431 Sb 8192 Sb FALSE FALSE
< >	<	>
Add Remove		
	<u> </u>	el <u>H</u> elp



7.2.2 Online configuration

If the last steps were successful the encoder can go in the status online. In the configuration window in tab General it is possible to test the encoder connection with sending Ping commands to the encoder.

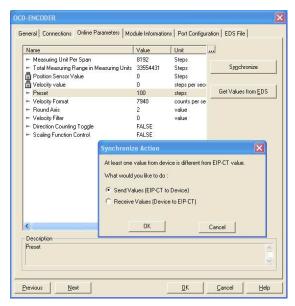




In tab Online Parameters is it possible to change the parameters. In a separate window it is possible to use the wished parameter. There are the minimum, maximum and default values available. With the *Synchronize* button it is possible to send the parameters to the encoder oder read them out from the encoder.

Name	Value	Unit .	
► Measuring Unit Per Span	8192	Steps	
Total Measuring Range in Measuring Units	33554431	Steps	Synchronize
Position Sensor Value	0	Steps	
Velocity value	0	steps per seci	
► Preset	0	steps	Get Values from <u>E</u> DS
► Velocity Format	7940	counts per se	
Round Axis	2	value	
► Velocity Filter	0	value	
Direction Counting Toggle	FALSE		
Scaling Function Control	FALSE		
<		>	
Description			
Preset			*

Name			Value	Unit		
	eset					
P T	alue					- 1
P V PV	- Parameter					
- P		Preset				DS
- R	Description :	Preset				
- V						~
- D - S	Setting					
	Maxim	um :	16777215	-		
	PIGSIN	aur.	IGITIZIO			
	Defa	ult :	0			
	0.1					
	vai	ue:	100	d ste	ps.	
	Minim	um :	Û			
Desi	Previous	Next	OK	Can		Help
Pres	Flexious	Tiew				
						5





7.3 BOOTP/DHCP and IP configuration tool

For EtherNet/IP encoders it is necessary to know the IP-Address. On our website there is a free special tool available that allows scanning the complete network segment for MAC-Addresses of encoders. Our tool will find the devices with deactivated BOOTP and DHCP too.

Connect all devices, turn on the power supply and push the "Search..." button. Select the encoder and push the button for the needed Functionality. After changing the status it is necessary to push the button "Search..." to get the actual status of the encoders.

With this tool is it possible to change the IP-Adress, the Subnet and Gateway too.

This program use UDP Port 4000. Attention: Check that the firewall don't block this port!



Nr.	MAC-Adresse	IP-Adresse	Subnet mask	Serial Nr.	BOOTP/DHCP
1	00:0E:CF:03:10:48	192.168.0.244	255.255.255.0	276520	BOOTP
2	00:0E:CF:03:10:15	192.168.0.240	255.255.255.0	320134	Off
3 4	00:0E:CF:03:10:39 00:0E:CF:03:10:3F	192.168.0.242 192.168.0.243	255.255.255.0 255.255.255.0	328061 329214	BOOTP DHCP
5	00:0E:CF:03:10:1B	192.168.0.241	255.255.255.0	322640	Off
	cted target	03:10:15	Enable BOOTP	Disable	BOOTP/DHCP
		03:10:15	Enable BOOTP Enable DHCP	-	BOOTP/DHCP Reboot
MAC Stat	-Address: 00:0E:CF:			-	
MAC Stat	D-Address: 00:0E:CF:(-	
MAC Stat	D-Address: 00:0E:CF:(-	
MAC Stat IP C IP-A	-Address: 00:0E:CF:(us: Found 5 device(s). onfiguration uddress: 192 , 168				



8 FAQ

8.1 Problem: IP Address unknown and BOOTP/DHCP is deactivated **Solution:**

Download the tool to read out the IP-Address based on the MAC-Address from our web site: http://www.hohner-elektrotechnik.de

8.2 Problem: Replace a rotary encoder in the machine and the controller cannot start the application. Additional the Stat LED is flashing with 4 Hz

Solution: Start the BOOTP/DHCP server to set the IP-Address and deactivate BOOTP and DHCP. See chapter 7.1.1

8.3 Problem: The BOOTP/DHCP Configuration Tool doesn't find the encoders. **Solution:** Check that TCP Port 4000 is not blocked from a firewall.

8.4 Problem: Cannot deactivate BOOT/P or DHCP Background: Firewall and/or WLAN block communication. Solutions:

1. Firewall must not block Port 4000 and 5000

2. Deactivate WLAN and all addional network cards.

8.5 Problem: Error message "Invalid identifier"

Solution: Check that the major revision of the encoder use the same number as the EDS-File. Check the website.

8.6 Problem: IP Address unknown and BOOTP/DHCP is deactivated **Solution:** Download the tool to read out the IP-Address based on the MAC-Address from our web site.

8.7 Problem: Stat LED is flashing with 4 Hz

Background: After replacing of a rotary encoder in the machine the controller cannot start the application. Additional the Stat LED is flashing with 4 Hz

Solution: Start the BOOTP/DHCP server to set the IP-Address and deactivate BOOTP and DHCP.

8.8 Problem: After Power-up the programmed parameter were lost Solution: Use the save command to save all programmed parameters in the non volatile memory (NVM). Only Preset is saved automatically in the NVM.

8.9 Problem: Parameter from Configuration tool i.e. RSLogix overwrite saved values of the encoder **Answer:** Yes, that is according the encoder profile correct. It could be changed according the new Profibus functionality of parameterization

8.10 Problem: Additional transmisson of LLDP frames



Answer: According the used stack version will transmit additional ~1% LLDP frames. This should be not a problem with the total network traffic.

8.11 Problem: Problems with Configuration Tool **Answer:** Check if the Version 1.4 is in use!

8.12 Problem: How many encoders can work with one Rockwell PLC?

Answer: One encoder raise only a traffic of 100 Ethernet-Paket/s. The PLCs can manage 6000-20000 Ethernet-Pakets/s. Rockwell has got two tools:

- EtherNet/IP Capacity Tool

- Integrated Architecture Builder (overdressed for analyzis)

Term	Explanation
10Base-T	Transmission line with 10 Mbit data transmission rate
100Base-T	Transmission line with 100 Mbit data transmission rate
Autocrossing	Allow to use straight or crossover wiring
Autonegotiation	Is an Ethernet procedure by which two connected devices choose common trans-
	mission parameters, such as speed and duplex mode
Baudrate	Transmission rate; it display the transmission bits per second
Big Endian	Variables will use Byte 0 as Low and last Byte as High
Binary	Numeric system with value 0 or 1.
BootP	A UDP network protocol used by a network client to obtain its IP address
	automatically
CAT5	Terminations for transmission rates up to 100 Mbit.
CIP	Control and Information Protocol
DHCP	Dynamic Host Configuration Protocol is a protocol used by networked devices
	(clients) to obtain the parameters necessary for operation in an Internet Protocol
	network. This protocol reduces system administration workload, allowing devices to
	be added to the network with little or no manual configuration.
EIP	EtheNet/IP
EMC	Electromagnetic compatibility, there are rules to verifying devices.
ENIP	EtherNet/IP
Ethernet	Ethernet is a computer network technology based on frames.
Explicit Messages	Communication between i.e. a Ethernet scanner and encoder
Term	Explanation
Fast Ethernet	Transmission technology with 100 Mbit transmission rate.
Flash	Internal memory, saved data will be available after power down.
Implicit Messaging	IO Connection: communication between controller and device

9 Glossar



IP-Address	Allow a logic addressing from computer in a network.
IP-Protocol	The Internet Protocol is widespread in computer networks. It is the implementa-
	tion of the internet layer of the TCP/IP-model
MAC Address	Worldwide explicit address of a device. The encoder uses three MAC
	Adresses: one for internal interface and two for the ports.
Mbit	Transmission rate or baud rate, million bits per second
OCD	Acronym: OPTOCODE, name of an encoder series
OSI-Model	The Open System Interconnection reference model is a open layer model for
	the organization of a communication.
Scanner	Program to send Explicit Messages to the encoder
Switch	A switch is an electronic device to connect computers e.g. network segments in
	a local network. Unlike a hub, a switch uses stacks to avoid network collisions.
TCP	The Transmission Control Protocol is a connection orientated transmission
	protocol, in a network.
UDP	User Datagram Protocol is utilized to send data that does not need to be trans-
	ferred in a reliable way.



We do not assume responsibility for technical inaccuracies or omissions. Specifications are subject to change without notice.

13 Revision index

Revision	Date	Revision
First release	5.6.2008	1.0
Delete section device type	2.7.2009	1.7
Delete save single attributes, Cycle of write parameters from 5,000 Mio ->	1.9.2009	1.8
100.000, 15-30V -> 10-30V, Preset info to save in non volatile memory, add Port		
4000 FAQ		
Change Cycle of write parameters from 100,000 to 5 Mio	14.1.2010	1.9
Add table Control Bits	17.11.2010	1.10
Add information about filter definition, velocity, Unicast	10.1.2013	1.11
Update FAQ		
Delete technical data and drawings		



Hohner Elektrotechnik GmbH

Gewerbehof 1 · 59368 Werne Telefon 02389 - 9878-0 · Telefax 02389 - 9878-27 info@hohner-elektrotechnik.de · www.hohner-elektrotechnik.de