

Your Global Automation Partner

# TBEN-LH-16DIP EtherNet/IP<sup>™</sup> Configuration Guide

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# **1** General Information

### 1.1 About these instructions

The following user manual describes the setup, functions, and use of the TBEN-LH-16DIP station. It helps you to plan, design, and implement the system for its intended purpose.

**Note**\*: Please read this manual carefully before using the system. This will prevent the risk of personal injury or damage to property or equipment. Keep this manual safe during the service life of the system. If the system is passed on, be sure to transfer this manual to the new owner as well.

## 1.2 Explanation of symbols used

#### 1.2.1 Warnings

Action-related warnings are placed next to potentially dangerous work steps and are marked by graphic symbols. Each warning is initiated by a warning sign and a signal word that expresses the gravity of the danger. The warnings have absolutely to be observed:



## DANGER!

DANGER indicates an immediately dangerous situation, with high risk, the death or severe injury, if not avoided.



#### WARNING!

WARNING indicates a potentially dangerous situation with medium risk, the death or severe injury, if not avoided.



#### ATTENTION!

ATTENTION indicates a situation that may lead to property damage, if it is not avoid-ned.



# In NOTES you find tips, recommendations and important information. The notes facilitate work, provide more information on specific actions and help to avoid overtime by not following the correct procedure.

➢ CALL TO ACTION

This symbol identifies steps that the user has to perform.

→ RESULTS OF ACTION

This symbol identifies relevant results of steps

*Italic* Text in *Italic* is associated with the function of the third party software or application (E.g. *Controller Organizer*)



## 1.3 Resources

Following resources have been used for creating configuration examples described in the document:

- TBEN-LH-16DIP Data sheet
- TBEN-Lx User Manual

The Rockwell PLC demo:

- 1756-L72 controller v30
- 1756-EN2TR Ethernet Bridge
- Studio5000 Logic Designer V30

The Omron PLC demo:

- CJ1M controller v2.0
- CJ1W-EIP21 EtherNet/IP communication adapter v1.01
- Network Configurator 3.21

## **1.4 Feedback about these instructions**

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to <u>techdoc@turck.com</u>.

## 1.5 Technical support

For additional support, email inquiries to <a href="mailto:appsupport@turck.com">appsupport@turck.com</a>, or call Application Support at 763-553-7300, Monday-Friday 8AM-5PM CST.

# 2 Getting Started

### 2.1 About this document

The TBEN-LH EtherNet/IP configuration guide provides information about configuration of the TBEN-LH-16DIP including:

- Address switches
- IP address assignment
- Configuration options with Rockwell and Omron PLCs
- CIP Vendor specific objects



NOTE

The device data sheet and technical information is available for download at

#### 2.2 Factory default IP address

The TBEN-LH-16DIP device is shipped with address switches set to 600 (PGM-DHCP). It is factory default position of the rotary switches which is associated with the IP address:

IP Address:	192.168.0.254
Subnet mask:	255.255.252.0
Gateway:	0.0.0.0

The device has limited functionality in this state:

- DHCP client is active and running; use any service to assign IP address
- Web server is active
- Some other services are active
- Device cannot be configured with a PLC

The device responds to the PING command as follows:

and Administrator: Command Prompt	×
C:\Users\bbegic>Ping 192.168.0.254	
Pinging 192.168.0.254 with 32 bytes of data: Reply from 192.168.0.254: bytes=32 time=1ms TTL=128 Reply from 192.168.0.254: bytes=32 time=1ms TTL=128 Reply from 192.168.0.254: bytes=32 time=1ms TTL=128 Reply from 192.168.0.254: bytes=32 time=1ms TTL=128	III
Ping statistics for 192.168.0.254: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 1ms, Maximum = 1ms, Average = 1ms	

Figure 2.1 - Ping

The first step in the device configuration is to assign an operational IP address.

The device DHCP client is running and waiting for an IP address assignment. When IP address is acquired, the DHCP becomes disabled.



## 2.3 Address switches

The device has 3 rotary address switches. The position of the switches (Figure 2.2) determines mode of operation of the device. The *Table 2.1* provides a description of the device action when switches are set to a specific position and the device is powered up.







## NOTE

Protective cover opened - Protection class IP65/IP67/IP69K not warranted

- Screw the protective cover over the rotary coding-switches firmly
- Check if seal of the protective cover is correctly placed

Switch position	Mode	Description
000	Restore	IP address is restored to 192.168.0.254
001,,254	Static rotary mode	Sets the last octet of IP address in range [1254].
300	BOOTP	BOOTP client is active and requesting an IP address
400	DHCP	DHCP client is active and requesting an IP address
500	PGM	Device comes up with the last IP address saved in EEPROM. IP address is programmable.
600	PGM-DHCP	DHCP client is active and requesting an IP address. When IP address is acquired, the device transitions to PGM mode.
900	Factory Reset	Device is reset to the factory default setup.

Table 2.1: Address Modes

#### 2.3.1 Static rotary mode

Sets the last octet of the IP address in the range [xxx = 1,..., 254] e.g. 192.168.0.xxx, 10.10.10.xxx.

#### 2.3.2 BOOTP mode (300) and DHCP mode (400)

The device BOOTP or DHCP client is active, requesting an IP address assignment. From any switch position:

- > Turn OFF device power and set switches to 300 or 400
- Start BOOTP / DHCP server
- > Turn ON device power and assign IP address
- > Wait for the acknowledgement from the server
- Set rotary switches to either the last octet of the IP address or to 500 (PGM)
- > Cycle power

#### 2.3.3 PGM mode (500)

The last known IP address, subnet mask and gateway address are saved in the EEPROM when rotary switches are set to 500. The IP address is programmable and may be programmed using TURCK Service Tool or Web server. The procedure:

- > Assign an IP address using either static rotary mode, or BOOTP/DHCP server
- > When IP address is acquired, change rotary switches position to 500
- > Cycle the power of the device

#### 2.3.4 **PGM-DHCP** mode (600)

When out-of-box device is powered for the first time, while switches are set to 600, the device DHCP client is active and waiting for an IP address assignment. Use any DHCP server to assign the IP address. When IP address is acquired, the device disables its DHCP. The device saves permanently assigned IP address and transitions to the PGM mode.

#### 2.3.5 Factory Reset mode (900)

The factory reset mode resets the device back to the factory default setup and deletes all custom data in the device's internal flash. The procedure:

- Set address switches to 900
- Power-up device and wait 10sec
- > Set switches to either static rotary mode or 300/400/500/600
- > Cycle power

#### 2.3.6 Restore IP Address (000)

Set rotary switches to 000 to restore IP address to 192.168.0.254. The device preserves custom data/setup while restoring IP address.

From any switch position:

- > Set the address switches to the position 000
- Power-up device and wait 10sec
- Set switches to either static rotary mode or 300/400/500/600
- > Cycle power
- > Depending on the position of the rotary switches, the device comes up as previously described.



## 2.4 TURCK Service Tool

The TURCK Service Tool can be downloaded from the TURCK Web site at:

- > Enter "TURCK Service Tool" in the search field
- Download and install the tool



Figure 2.3 – TURCK Web page

The tool has a set of action buttons in the tool bar:

Turcl	k Service Tool, Vers.	3.1.0								
Yc	our Global Autor	nation P	artner				-	ru	RC	K
Search	(F5) Change (F2)	Wink (F	ری Actions (F4)	- Clipt	D - poard	EN . Language	Expert view OFF	X Close		
No.	MAC address	Name	IP address	Netm	Gatew	Mode	Device	Version	Adapter	Protocol
- 1	00:07:46:02:8F:20		<u>192.168.0.254</u>	0.0.0.0	0.0.0.0	PGM_DHCP	TBEN-LH-16DIP	3.0.4.0	192.168.1.48	DCP, Turck
Found 1	L Device.									.::

Figure 2.4 – Service Tool

The tool has following features:

- Scanning for existing devices (F5). All modules are found through use of the protocols DCP (PROFINET Standard) and IBTP (TURCK Service Protocol). With the IBTP protocol extended information such as FW version and operating mode improved scanning are read out of TURCK devices and displayed.
- Setting an IP address (F2)
- Locate device using Wink function (F3)
- Actions menu that resets the device to the factory default or reset network (F4)
- Supports the configuration of PROFINET modules, assigning the PROFINET name
- Clipboard used for Copy: all, IP address or MAC address
- Expert view, when enabled, provides additional functions like DHCP Server, ARGEE and BEEP features by TURCK multiprotocol device
- DHCP server
- ARGEE status
- BEEP status

Frequently used functions of the tool are:

- Search (F5)
- Change (F2)
- DHCP (F6)
- Action (F4)

#### 2.4.1 Search (F5)

The Search function is used to identify TURCK multiprotocol device on the continuous physical network segment including layer 2 of the OSI model switches. The IP address 192.168.0.254 appears when the device is in the PGM-DHCP mode and DHCP client is active. The IP address transitions to 0.0.0.0 when DCHP server is started. The device mode is provided (position of the rotary switches), composite firmware revision, ARGEE loaded program is running, and BEEP status of the device if enabled.

Turck	Service Tool, Vers.	3.1.0							
Yo	ur Global Auton	nation Pa	irtner						
Search	(F5) Change (F2)	Wink (F3	Actions (F4)	Clipboard	, EN Langua	ge Exp	pert view ON	Start DHCP (F	<b>-6)</b> Confi
No.	MAC address	Name	IP address	Netmask	Gatew	Mode	Device		Version
- 1	00:07:46:02:8F:20		<u>192.168.0.254</u>	255.255.252.0	0.0.0.0	PGM_DH	CP TBEN-LH	I-16DIP	3.0.4.0
- 2	00:07:46:0D:77:81		<u>136.129.1.231</u>	255.255.255.0	0.0.0.0	PGM_DH	CP TBEN-S2	-2RFID-4DXP	3.5.1.0
<b>-</b> 3	00:07:46:07:37:B8		<u>192.168.1.100</u>	255.255.255.0	0.0.0.0	PGM_DH	CP TBEN-S2	-4IOL	3.2.5.0
Found 3	Devices.								

Figure 2.5 – Search function

#### 2.4.2 DHCP (F6)

The device IP address may be assigned using the DHCP server provided by the tool. The procedure:

- Search (F5) to discover device with address 192.168.0.254
- Highlight that device
- Start DHCP (F6)
- > Select network adapter in the DHCP server settings page and click Start DHCP

Turck Service Tool,	Vers. 3.1.0		
Your Global ,	DHCP server settings     DHCP feature     Select network adapter.     Set Lease Time,     Start DHCP feature.     Wait for devices to be found.	Start DHCP	(E6) Con
No. MAC addres ■ 100.0746.028 ■ 2 00.0746.027 ■ 3 00.0746.073 Found 3 Devices.	DHCP settings Network adapter Cocal Area Connection (IP = 192.168.0.47) Lease Time (s) Start DHCP Cancel	ce V-LH-16DIP V-S2-2RFID-4DXP V-S2-4IOL	Version 3.0.4.0 3.5.1.0 3.2.5.0

Figure 2.6 – Initialize DHCP server



> Wait until DHCP server locates the device ( IP transitions to 0.0.0.0)

Turck	Service Tool, Vers.	3.1.0							
Yo	ur Global Auton	nation Pa	rtner						
Search	(F5) Change (F2)	Wink (F3	ری) Actions (F4)	Clipboard	, EN Langua	ge Expert	O view ON	Stop DHCP (F	F <b>6</b> ) Conf
No.	MAC address	Name	IP address	Netmask	Gatew	Mode	Device		Version
- 1	00:07:46:02:8F:20		<u>0.0.0.0</u>	0.0.0.0	0.0.0.0	PGM_DHCP	TBEN-LH-	16DIP	3.0.4.0
- 2	00:07:46:0D:77:81		136.129.1.231	255.255.255.0	0.0.0.0	PGM_DHCP	TBEN-S2-	2RFID-4DXP	3.5.1.0
<b>-</b> 3	00:07:46:07:37:B8		<u>192.168.1.100</u>	255.255.255.0	0.0.0.0	PGM_DHCP	TBEN-S2-	4IOL	3.2.5.0
Wait for	devices to be foun	d via DHC	P. Then select d	evice and assig	n IP addre	ess with "Chang	ge (F2)".		

Figure 2.7 – Device DHCP client active view

- Highlight device
- Click Change (F2)
- Assign IP address
- Click Stop DHCP (F6) button

Turck Service Tool, Vers. 3.1.0	Change device configurati
Your Global Automation Par	Device name: IP configuration MAC address IP address 00:07:46:82:56:07 192:168.1.17 Stop DHCP (F6)
No. MAC address Na IP address	Netmask Gateway Version Ar
Wait for devices to be found via DHCP. Then sele	255.255.252.0     0.0.0.0       Image: Set IP configuration temporarily       Status messages:       Set in device       Cancel
	Figure 2.8 – IP Configuration

#### 2.4.3 IP address setup using Web server

The device Web server is a communication interface with the device and offers several setup options. It is necessary to login as administrator to change the IP address.

The procedure:

- > Enter current IP address of the device into a browser
- > If you don't know what is current IP address, use TURCK Service Tool to discover device
- > Enter "password" into *Login* field to get administrator's privilege.

T Station Information × +			
$\leftrightarrow$ $\rightarrow$ C $\triangle$ (i) Not secure   192.168	.0.254/info.html		🕸 🖈 😆 :
🗰 Apps 🕟 Suggested Sites 📃 Imported for	n IE 💪 Google 📙 Health 🚺 MSNBC	🌐 Merriam-Webster's Lo 🛛 🛨 TURCK USA - Capacit	🔂 Google News 🛛 »
Enter current IP address TURCK COM For comm	ase email TURCK Support	Enter password "password"	RCK
TBEN-LH-16DIP		LOGIN	
STATION >	Station Information		
16DIP >	Station Information		
	Туре	TBEN-LH-16DIP	
	Identification Number	100001449	
	Firmware Revision	V3.0.4.0	
	Bootloader Revision	V8.0.1.0	
	EtherNet/IP™ Revision	V2.7.23.0	

Figure 2.9 – Device Web server

- > Open Network Configuration menu, enter new IP address and then Submit
- If your PC network adapter is set to the same subnet as the device's subnet, you are going to see device come up with the new setup

URCK COM For comments or questions, please email TURCK Support					
BEN-LH-16DIP		LOGOUT [ADMIN@192.168.0.47]			
STATION >	Network Configuration				
Station Diagnostics Event Log	Network Settings				
Ethernet Statistics	Ethernet Port 1 setup	Autonegotiate 🔻			
EtherNet/IP™ Memory Map	Ethernet Port 2 setup	Autonegotiate •			
Modbus TCP Memory Map	IP Address	192.168.0.17			
Station Configuration	Netmask	255.255.252.0			
Network Configuration	Default Gateway	0.0.0.0			
BEEP Network Configuration Change Admin Password	SNMP Public Community	public			
16DIP	SNMP Private Community	private			
	MAC Address	00:07:46:02:8f:20			
	LLDP MAC Address 1	00:07:46:02:8f:21			
	LLDP MAC Address 2 Submit	00:07:46:02:8f.22			
	Submit	Reset			

Figure 2.10 – Network Configuration menu



## 2.5 BOOTP/DHCP utility

The BOOTP/DHCP utility may be used while the device is in the PGM-DHCP mode on the first power-up. When the IP address is assigned, the device DHCP client becomes disabled. The procedure:

- Start Rockwell DHCP server
- Select network interface



Figure 2.11 - BOOTP / DHCP tool

> At Tools menu, click at Network Settings

贤 В	ootl	P DHCP EtherNet/IP Commissioning Tool						
File	То	ools Help						
		Network Settings			Clear History			
		Add Relation						
	E	Clear Discovery History	dress	Hostname				
1	0	Delete Relation						
		Enable BOOTP/DHCP						
		Disable BOOTP/DHCP						
		Reset Module's Network Settings to Factory Defaults						
		Properties						
Entered Balations								

Figure 2.12 – Network Settings menu

> Enter Mask and Gateway addresses in the Network Settings dialog

Network Settings	X
Defaults Adapter: ASIX AX887	72 USB2.0 to Fast Ethernet Adapter #2
Server IP address:	192.168.0.47
Subnet Mask:	255 . 255 . 252 . 0
Gateway:	192 . 168 . 0 . 1
Primary DNS:	
Secondary DNS:	
Domain Name:	
Reset Defaults	OK Cancel

Figure 2.13 – Network Settings view

> Enter new IP address in the New Entry dialog

BootP DHCP EtherNet/IP	Commissioning Tool	
File Tools Help		
Add Relation	Discovery History	Clear History
Ethernet Address (1	AAC) Type (hr:min:sec) # IP Address Hostname	
00:07:46:02:8F:20	New Entry	
	Server IP Address: 192.168.0.47	
	Client Address (MAC): 00:07:46:02:8F:20	
	Client IP Address: 192 . 168 . 0 . 17	
Ethorpot Addroop ()	Hostname:	
Ethemet Address (i	Description:	
	OK Cancel	

Figure 2.14 – IP address setup

> Wait for confirmation – assigned IP address appears in the IP Address column

5	BootP DHCP EtherNet/IP Commissioning Tool											
File	e Tools Help											
	Add Relation		Clear History									
	Ethernet Address (MAC)	Туре	(hr:min:sec)	#	IP Addres	s ŀ	lostname					
	00:07:46:02:8F:20	DHCP	10:26:51	102	92.168.0.1	17						
	•			111	1			4				
			Enter	red Rel	ations							
	Ethernet Address (MAC)	Туре	IP Address		Hostname	Descript	tion					
	00:07:46:02:8F:20	DHCP	192.168.0.17									

Figure 2.15 – IP address assignment complete



# 3 Device Overview

The summary of the device installation guidance, connector's assignment, power distribution and grounding requirements are as follows.



## 3.1 Dimensions and connector assignment

Figure 3.1 – Connector assignment

## 3.2 Power connector pin assignment



Figure 3.2 – X1 and X2 connector pinout

## 3.3 IO connector pin assignment



Figure 3.3 – C0...C7 connector pinout

# 3.4 LEDs



Figure 3.4 – LED assignment

Module LED Status								
LED	Color	Status	Description					
ETH1 / ETH2	Green	ON	Ethernet link (100 Mbps)					
		flashing	Ethernet communication (100 Mbps)					
	Yellow	ON	Ethernet link (10 Mbps)					
		flashing	Ethernet communication (10 Mbps)					
		OFF	No Ethernet link					
BUS	Green	ON	Active connection to a master					
		Flashing	Steady flashing: Ready					
			Sequence of 3 flashes in 2 seconds: FLC/ARGEE active					
	Red	ON	IP address conflict or Restore Mode or Modbus timeout					
		Flashing	Blink/Wink command active					
	Green/red	Alternating	Autonegotiation and/or waiting for DHCP/Boot-P addressing					
		OFF	Power off					
ERR	Green	ON	Diagnostics disabled					
	Red	ON	Diagnostics enabled					
			V₂undervoltage diagnosis is parameter-dependent					
PWR	Green	ON	Power supply V, OK					
		OFF	V, power off or below defined tolerance of 18 V					
LED Status I/O								
LED	Color	Status	Description					
LED 0 15	Green	ON	Input active					
	Red	flashing	Power overload at the corresponding port. Both port LEDs are flashing.					
		OFF	Input inactive					

Figure 3.5 – LED status

# 3.5 Grounding

The device is entirely powered of the V1. Power v2 is feed-through. Remove the grounding clip between connectors P1 and P2 when shielded Ethernet cables are used. Ground the network in a single location.



Figure 3.6 – Connector grounding



# 3.6 IO data map

	TBEN-LH-16DIP															
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit O
Word 0	SCS7	SCS6	SCS5	SCS4	SCS3	SCS2	SCS1	SCS0					СОМ		V1	Diag
Word 1	DI15 C7P2	DI14 C7P4	DI13 C6P2	DI12 C6P4	DI11 C5P2	DI10 C5P4	DI9 C4P2	DI8 C4P4	DI7 C3P2	DI6 C3P4	DI5 C2P2	DI4 C2P4	DI3 C1P2	DI2 C1P4	DI1 COP2	DIO COP4

Figure 3.7 – IO data map

Abbreviations:

Diag:	Diagnostics at least on one channel
V1:	Undervoltage V1
COM	Communication error on internal module bus
SCSx:	Short-circuit at connector x [ $x = 0, 1,, 7$ ]
DIx	Discrete input channel x [ $x = 0, 1,, 15$ ]
CxP2	Connector x Pin2 [ $x = 0, 1,, 7$ ]
CxP4	Connector x Pin4 [ $x = 0, 1,,7$ ]

# 4 Configure TBEN-LH-16DIP with Rockwell PLC

The configuration of the TBEN-LH with the Rockwell ControlLogix or CompactLogix PLCs in the RSLogix5000 and / or Studio5000 programming environment may be done using:

- EDS file
- Generic device profile

# 4.1 TBEN-LH-16DIP Configuration using EDS files

#### 4.1.1 Install EDS file

The EDS file is the Electronic Data Sheet or the device configuration file, described in the CIP Library, Volume 1, Common Industrial Protocol (CIP), Edition 3.22, by ODVA. The procedure:

ne procedure:

- Download TBEN-LH-16DIP\_R2.7.EDS file
- In the RSLogix5000 menu bar, expand the Tools drop down menu and click on the EDS hardware Installation Tool



Figure 4.1 – Logix5000 Designer Tools menu

In the Rockwell Automation's EDS Wizard page, click at the Register an EDS file(s) and follow the registration dialog.



Figure 4.2 – Register EDS file(s)



#### 4.1.2 Configure TBEN-LH-16DIP using default connection

- > In the Controller Organizer, right-click on the Ethernet to access a drop-down menu.
- Click New Module... to open the "Select Module Type" dialog page



Figure 4.3 – Add new module

- > Enter the device name in the search area of the "Select Module Type" dialog
- Select TBEN-LH-16DIP from the list, and click Create.

TBEN-LH			Clear	Filters			Hide Filters	*
Module Type Category Filters				•	Module Typ	e Vendor Filters		-
V	Analog				Rockwell Au	tomation/Reliance	Electric	
1	CIP Motion Converter			Rockwell Au	tomation/Spreche	r+Schuh		
1	Communication				SMC Corpora	ation		
1	Communications			V	TURCK			
V	Communications Adapt	ter		-	Zebra Techr	nologies		
•	Catalog Number	Description				Vendor	Category	
	100001449	TBEN-LH-16DIP				TURCK	Communications Ad	apter
	100002195	TBEN-LH-8IOL				TURCK	Communications Ad	apter
•								

Figure 4.4 – Select Module Type dialog page

- Fill in the Name, Description and Ethernet Address of the device
- > Click "Change..." to open the "Module Definition" page
- > Use default connection "AB TBEN-LH-16DIP"; select INT data format from the drop down menu
- > Click "Apply" and follow the dialog to complete the device configuration

🔜 New Module							×
General* Conne	ction Module Info Internet Protoc	ol Port Configura	ation				
Type:	100001449 TBEN-LH-16DIP						
Vendor:	TURCK						
Parent:	EIP_Bridge						
Name:	TBEN_LH_16DIP_conn1		Ethernet Address				
Description:			Private Network:	19	92.168.1.		A. V
			IP Address:		192 . 1	168 . 0	) . 181
		_	⊘ Host Name:				
		*	Module Definition	n*			×
Module Definit	ion 2.007		Revision:	2	•	007 🚔	
Electronic Ke	ying: Compatible Module		Electronic Keying:	Compatib	ble Modu	le	•
Connections:	AB TBEN-LH-16DIP		Connections:				
			Name			Size	
			AB TBEN-LH-16DI	IP II	nput:	2	INT 🗸
		Change		0	Output:	0	CINT
							INT
Status: Creating							DINT REAL

Figure 4.5 – New Module setup dialog page

The "AB TBEN-LH-16DIP" connection selected during the device configuration provides access to device parameters in the configuration tag. It may be used to setup e.g. Quick Connect (QC) feature of the device, which is by default disabled:

Controller Tags - CLX72v30_BL20_2CNT_2PWM_demo(controller)										
Scope: DCLX72v30_BL2C - Show: All Tags				▼ 7.						
Name 🖂 🛆	Value 🗧 🗲	Style	Data Type	Description						
+-Local:2:I	{}		AB:1756_D							
-Local:2:0	{}		AB:1756_D							
-Local:2:S	{}		AB:1756_D							
-TBEN_LH_16DIP_conn1:C	{}		_0030:1000							
-TBEN_LH_16DIP_conn1:C.Eth_1_Custom_Setup_0	0	Decimal	BOOL							
-TBEN_LH_16DIP_conn1:C.Eth_2_Custom_Setup_0	0	Decimal	BOOL							
-TBEN_LH_16DIP_conn1:C.LED_behavior_PWR_at_V2	1	Decimal	BOOL							
TBEN_LH_16DIP_conn1:C.Quick_Connect_0	0	Decimal	BOOL							
-TBEN_LH_16DIP_conn1:I	{}		_0030:1000							
-TBEN_LH_16DIP_conn1:I.ConnectionFaulted	0	Decimal	BOOL							
-TBEN_LH_16DIP_conn1:I.Data	{}	Decimal	INT[2]							
TBEN_LH_16DIP_conn1:I.Data[0]	0	Decimal	INT	TBEN Status						
	0	Decimal	INT	TBEN inputs						

Figure 4.6 – The controller tags



#### 4.1.3 Configure TBEN-LH-16DIP with QC enabled

When the device is configured using a "*TBEN-LH-16DIP\_QC\_ON*" connection, the QC is enabled. This connection does not support configuration parameters.

The procedure:

- Open the device "Module Properties" page
- > Fill in the Name, Description and Ethernet Address of the device
- > Click "Change..." to open the "Module Definition" page
- > Use "TBEN-LH-16DIP\_QC\_ON" connection from the drop down list and select INT data format
- Click "*Apply*" and follow the dialog to complete the device configuration

💷 Module Proper	rties: EIP (100001449 2.007)		
General Conne Type: Vendor: Parent: Name: Description:	iction Module Info Internet Protocol Port Config 100001449 TBEN-LH-16DIP TURCK EIP TBEN_LH_16DIP_conn3 Type TBEN-LH-16DIP	Ethemet Address	
	IDr 100001449 FW V3.0.3.5 EIP V2.7.23.0 QC_ON, Output Assembly 113	<ul> <li>⊘ IP Address:</li> <li>⊘ Host Name:</li> </ul>	
Module Defin Revision: Electronic Ke Connections	ition 2.007 eying: Compatible Module : TBEN-LH-16DIP_QC_ON	Module Definition  Revision: 2  007  Electronic Keying: Compatible Module  Consections:	X
	Change	AB TBEN-LH-16DIP Omron TBEN-LH-16DIP Omron TBEN-LH-16DIP	
Status: Offline		TBEN-LH-16DIP_QC_ON       TBEN-LH-16DIP_QC_OFF         OK         Cancel	łp

Figure 4.7 – QuickConnect enabling connection

The device IO data tag consists of 2 words of input data.

	Controller Organizer 🚽 🗸 🗙		Controller Tags - CLX72v30_BL20_2CNT_2PWM_demo(contr	rolle	er)				
Stan	Controller CLX72v30_BL20_2CNT_2PWM_demo		Seena MICLY72:20 PL2C - Shaw All Tage					-	V
F	🖶 🔲 Tasks	·	Scope. Unicex/2v30_BE2C  Show. Air rags					·	<u> </u>
ge	🚋 🧰 Motion Groups		Name III A	Va	alue 🔸	Style	Data Type	Description	
	Add-On Instructions		+-Local:2:1		{}		AB:1756_D		
	🚋 🗀 Data Types		+ Local:2:0		{}		AB:1756_D		
	Trends		+ Local:2:S		{}		AB:1756_D		
	Logical Model		TBEN_LH_16DIP_conn1:C		{}		_0030:1000		
	i		+ TBEN_LH_16DIP_conn1:I	$\top$	{}		_0030:1000		
	IT56 Backplane, 1756-A7		-TBEN_LH_16DIP_conn3:I	<u> </u>	{}		_0030:1000		
	[] [0] 1/56-L/2 CLX/2v30_BL20_2CN1_2PWM_(		TBEN_LH_16DIP_conn3:I.ConnectionFaulted		0	Decimal	BOOL		
			- TBEN_LH_16DIP_conn3:I.Data		{}	Decimal	INT[2]		
			+ TBEN_LH_16DIP_conn3:I.Data[0]		0	Decimal	INT	TBEN Status	
	100001449 TREN LH 16DIP conpl		+ TBEN_LH_16DIP_conn3:I.Data[1]		0	Decimal	INT	TBEN Inputs	
	100001449 TBEN LH 16DIP conn3		TBEN_LH_16DIP_conn4:1		{}		_0030:1000		_

Figure 4.8 – Input data tag

#### 4.1.4 Configure TBEN-LH-16DIP with QC disabled

When the device is configured using a "*TBEN-LH-16DIP\_QC\_OFF*" connection, the device is switched to QC disabled mode. This connection does not support configuration parameters. The procedure:

- > Open the device "Module Properties" page
- > Fill in the Name, Description and Ethernet Address of the device
- > Click "Change..." to open the "Module Definition" page
- > Use "TBEN-LH-16DIP\_QC\_OFF" connection from the drop down list and select INT data format
- > Click "*Apply*" and follow the dialog to complete the device configuration

I Module Prope	rties: EIP (100001449 2.007)	
General Conne	ection Module Info Internet Protocol Port Configure	ation
Type:	100001449 TBEN-LH-16DIP	
Vendor:	TURCK	
Parent:	EIP	
Name:	TBEN_LH_16DIP_conn4	Ethemet Address
Description:	Type TBEN-LH-16DIP IDr 100001449 FW V3.0.3.5 EIP V2.7.23.0	Private Network: 192.168.1. 184
	QC_OFF, Output Assembly 114	O Host Name:
	-	Module Definition
Module Defin	ition	Revision: 2 - 007
Revision:	2.007	
Electronic Ke	eying: Compatible Module	Electronic Keying: Compatible Module
Connections	TBEN-LH-16DIP_QC_OFF	Connections:
		Name Size
	Change	TBEN-LH-16DIP_QC_OFF Input: 2 Output: 0
Status: Offline		

Figure 4.9 – QuickConnect disabling connection

	Controller Organizer - 4 X	Ø	Controller Tags - CLX72v30_BL20_2CNT_2PWM_dem	o(contre	oller)			
tart P	B-Controller CLX/2050_BL20_2ClV1_2PWM_demo	s	cope: CLX72v30_BL2C - Show: All Tags					•
ge	🚋 🗀 Motion Groups		Name	18 A	Value 🗧 🗧	Style	Data Type	Description
	Add-On Instructions		+-Local:2:1		{}		AB:1756_D	
	🗄 🗀 Data Types		+-Local:2:0		{}		AB:1756_D	
	Trends		+-Local:2:S		{}		AB:1756_D	
	Tr. Logical Model		+-TBEN_LH_16DIP_conn1:C		{}		_0030:1000	
	😑 🖷 I/O Configuration		+-TBEN_LH_16DIP_conn1:I		{}		_0030:1000	
	😑 📼 1756 Backplane, 1756-A7		+-TBEN_LH_16DIP_conn3:I		{}		_0030:1000	
	[] [0] 1/56-L/2 CLX/2v30_BL20_2CN1_2PWM_c		-TBEN_LH_16DIP_conn4:I		{}		_0030:1000	
	□ [1]1/56-ENZIK EIP		-TBEN_LH_16DIP_conn4:I.ConnectionFaulted		0	Decimal	BOOL	
	I 1756-FN2TR FIP		-TBEN_LH_16DIP_conn4:1.Data		{}	Decimal	INT[2]	
	100001449 TREN LH 16DIP copp1		+ TBEN_LH_16DIP_conn4:I.Data[0]		0	Decimal	INT	
	100001449 TBEN LH 16DIP conn3		+-TBEN_LH_16DIP_conn4:I.Data[1]		0	Decimal	INT	
	100001449 TBEN_LH_16DIP_conn4	-						

Figure 4.10 – Input data tag



# 4.2 TBEN-LH-16DIP configuration using generic device profile

#### 4.2.1 Generic device and default configuration connection

The procedure:

- > In the Controller Organizer, right-click on Ethernet to display a drop-down menu.
- > Click New Module to open the "Select Module Type" configuration page
- > Enter "Generic" in the search area, highlight the Generic Ethernet Module and click Create

Gene	eric	Clea	ar Fil	ters	]		Hide Filters	*
V	Module Type Category Fi	ters	*	1	Module Type	Vendor Filters		
✓ ✓ ✓ ✓	Analog CIP Motion Converter Communication Communications Communications Adapter		•	✓ ✓ ✓ ✓	Advanced Ene Advanced Mic BALLUFF Cognex Corpor Dialight	ergy Industries, Inc. ro Controls Inc. (AMC ration	:1)	
Cat	alog Number	Description				Vendor	Category	
	ETHERNET-BRIDGE	Generic EtherNet/IP CIP Bridge				Rockwell Autom	Communication	
	ETHERNET-MODULE	Generic Ethernet Module				Rockwell Autom	Communication	
	ETHERNET-SAFETY-ST	Generic EtherNet/IP Safety and	l Star	ndard	Module	Rockwell Autom	Safety,Other	
•		I	11					•

Figure 4.11 – Generic module selection page

- > Enter the Name, Description and IP Address of the device in the New Module page
- Select the Input Data INT data format in the Comm Format field
- > Enter the Connection Parameters as seen in the following figure
- Click OK and download configuration to the PLC

New Module				<b>X</b>
Type: Vendor: Parent:	ETHERNET-MODULE Generic Ether Rockwell Automation/Allen-Bradley EIP	net Module		
Name:	TBEN_generic_186	Connection Para	Assembly Instance:	Size:
Description.	*	Input:	103	2 (16-bit)
		Output:	254	
Comm Format	: Input Data - INT	Configuration:	106	16 🤶 (8-bit)
<ul> <li>IP Addre</li> </ul>	ss: 192 . 168 . 1 . 186	Status Input:		
⊚ Host Na	me:	Status Output:		
Open Modu	le Properties	ОК	Can	icel Help

Figure 4.12 - TBEN generic module configuration

#### 4.2.2 Generic device and QuickConnect enabled

The procedure:

- > In the Controller Organizer, right-click on Ethernet to display a drop-down menu.
- > Click *New Module* to open the *"Select Module Type"* configuration page
- > Enter "Generic" in the search area, highlight the Generic Ethernet Module and click Create
- > Enter the Name, Description and IP Address in the New Module page
- Select the Input Data INT data format in the Comm Format field
- > Enter the Connection Parameters as seen in the following figure
- Click OK and download configuration to the PLC

Type:	ETHERNET-MODULE Generic Ethernet Module						
Vendor:	Rockwell Automation/Allen-Bradley						
Parent: EIP							
Name: Description:	TBEN_generic_187_QC_ON		Connection Para	Assembly Instance:	Size:		
	QC enabled		Input:	103	4	(16-bit)	
		-	Output:	113			
Comm Format	: Input Data - INT	-	Configuration:	106	0	(8-bit)	
Address / H	lost Name		configuration.			(0 bit)	
IP Address	ess: 192 . 168 . 1 . 1	87	Status Input:				
🔘 Host Na	me:		Status Output:				

Figure 4.13 - TBEN generic module and QC enabled

←       →       C       ①       Not secure   192.168.1.187/info.html       ☆       ①         III Apps       Suggested Sites       Imported From IE       G       Google       Health       MSNBC       Merriam-Webster's Li       TURCK USA - Capacit       ②       Google News         TURCK.COM       For comments or questions, please email TURCK Support       TURCK-COM       For comments or questions, please email TURCK Support       Imported From IE       LOGIN         STATION       >       Station Information       Station Information       Imported From IE       Imported From IE	: »
Image: Apps Suggested Sites Imported From IE Google Health MSNBC Merriam-Webster's Li TURCK USA - Capacit Google News   TURCK COM For comments or questions, please email TURCK Support TBEN-LH-16DIP   Login   Station Information	×
TURCK.COM       For comments or questions, please email TURCK Support       TURCE         TBEN-LH-16DIP       LOGIN         STATION       > Station Information	C Î
TURCK.COM       For comments or questions, please email TURCK Support         TBEN-LH-16DIP       LOGIN         STATION       Station Information	K
TBEN-LH-16DIP LOGIN	
IBEN-LH-16DIP     Login       STATION     > Station Information	
STATION > Station Information	
STATION > Station Information	
16DIP Station Information	
Type TBEN-LH-16DIP	
Identification Number 100001449	
Firmware Revision V3.0.3.5	
Bootloader Revision V8.0.1.0	
EtherNet/IP™ Revision V2.7.23.0	
EtherNet/IP™ Status	
Network topology Ring	
DLR State Fault	

Figure 4.14 - TBEN QuickConnect enabled



#### 4.2.3 Generic device and QuickConnect disabled

The procedure:

- > In the Controller Organizer, right-click on Ethernet to display a drop-down menu.
- > Click New Module to open the configuration page "Select Module Type"
- > Enter "Generic" in the search area, highlight the Generic Ethernet Module and click Create
- > Enter the Name, Description and IP Address in the New Module page
- Select the Input Data INT data format in the Comm Format field
- > Enter the Connection Parameters as seen in the following figure
- Click OK and download configuration

Type: Vendor:	ETHERNET-MODULE G	eneric Etheme -n-Bradley	t Module			
Parent: EIP						
Name: Description:	TBEN_generic_188_QC	OFF	Connection Para	Meters Assembly Instance:	Size:	
2 cccnpacta	QC disabled		Input:	103	4	(16-bit)
		Ŧ	Output:	114		
Comm Format:	Input Data - INT	<b></b>	Configuration:	106	0	(8-bit)
Address / Host Name						<b>(0 D i</b> )
IP Address: 192 . 168 . 1 . 188     Status Input:						
Host Name:     Status Output:						

Figure 4.15 - TBEN generic module and QC disabled

Verify the QuickConnect status using web server; it should be Disabled:

← → C ☆ ③ Not secure   192.168.1.18	37/info.html	\$	₿ :
🗰 Apps 🕟 Suggested Sites 🦳 Imported From IE	G Google 📙 Health 🚺 MSNBC 🌐 Merriam-Webste	er's Li 🗧 TURCK USA - Capacit 📑 Google News	*
TURCK.COM For comments or questions, ple	ase email TURCK Support	TURC	ĸ
TBEN-LH-16DIP		LOGIN	
STATION >	Station Information		
16DIP >	Station Information		
	Туре	TBEN-LH-16DIP	
	Identification Number	100001449	
	Firmware Revision	V3.0.3.5	
	Bootloader Revision	V8.0.1.0	
	EtherNet/IP™ Revision	V2.7.23.0	
	EtherNet/IP™ Status		
	Network topology	Linear	
	DLR State	Normal	
	QuickConnect	Disabled	

Figure 4.16 - TBEN QuickConnect disabled

#### 4.2.4 QuickConnect consideration

When QC is enabled, the device sets ETH1 an ETH2 ports as follows:

- Fixed speed at 100Mb
- Forced duplex at Full-duplex
- ETH1 port set as MDI (straight-through wiring)
- ETH2 port set as MDIX (cross-over wiring)
- Auto-Negotiate and Auto-MDX are disabled

#### The TBEN-LH-16DIP QuickConnect operational time:

Ready-for-connection time = 100msec (time measured from the device power-up to the first ARP)



The incoming Ethernet cable is always connected to ETH1 port. Use ETH2 port to daisy-chain to next node.

#### Verify setup using web server:

← → C ☆ ③ Not secure   192.168.1.1	87/info.html	☆) 🖪 🗄
Apps 🕟 Suggested Sites 📃 Imported From IE	G Google 📙 Health 🚺 MSNBC 🌐 Merriam-Webster	's Li 🖝 TURCK USA - Capacit 👼 Google News 🛛 👋
TURCK.COM For comments or questions, ple	base email TURCK Support	TURCK
TBEN-LH-16DIP		
STATION >	Station Information	
16DIP >	Station Information	
	Туре	TBEN-LH-16DIP
	Identification Number	100001449
	Firmware Revision	V3.0.3.5
	Bootloader Revision	V8.0.1.0
	EtherNet/IP™ Revision	V2.7.23.0
	Network Settings	
	Ethernet Port 1 setup	100BT-FD
	Ethernet Port 2 setup	100BT-FD
	IP Address	192.168.1.187
	EtherNet/IP™ Status	
	Network topology	Ring
	DLR State	Fault
	QuickConnect	Enabled

Figure 4.17 – Network settings while QC



#### Configure TBEN-LH-16DIP with Omron PLC 5

#### 5.1 **Configure TBEN using Omron default connection**

#### 5.1.1 Register EDS file

The procedure:

- Install "TBEN-LH-16DIP\_R2.7\_complex.EDS" file in the Omron Network Configurator using  $\geq$ EDS File> Install drop down menu
- ۶ Follow the dialog to complete registration

G Omron_TBEN_LH_16DIP_Test - Netw	ork Configurator	10 C
File Edit View Network Device	EDS File Tools Option	Help
] 🗅 🚅 🔒 🛢 💂 🖗 🖓 🖓	🔮 Install	e e ×   e : 🗰 🏛   🎨 🏶
🕅 🗑   🖬 紀   🔶 🔷 🔽   🖻	Create	Ē   2↓   <b>\$</b>   Ē
Stewark Configurator	Save As	_
EtherNet/IP Hardware	🙀 <u>F</u> ind	
⊕ - 👝 OMRON Corporation ⊕ - 👰 Omron Generic EIP	<u>≜l</u> _ <u>A</u> dd to Network	
in turck, Inc.	<u>ها P</u> roperty	
BL20-PG-EN-V3	Create <u>E</u> DS Index File	

Figure 5.1 - Network configuration EDS file registration

#### 5.1.2 Configure TBEN

The procedure:

- Add the device to the project
- ≻ Assign IP address



Figure 5.2 – Add new TBEN module

Create a tag set

Edit Tag Set	-					_		×
Name :	TBEN <u>LH</u> 1	6DIP			PLC Status	Not Include	Includ	le
Tag List					CandidateT	ag List		
Name	Over	Size	Bit		Name	Over	Size	Bit
III D00110	)	4Byte						
				<<				
				>>				

Figure 5.3 – Create a Tag Set

#### At the "Edit Connection" page:

- > Select "Omron TBEN-LH-16DIP" in the "Connection I/O Type" field
- Select Input Tag Set field and Connection Type in the Originator Device dialog box
- > Register device

192.168.1.180 TBEN-LH-16DIP Edit Connection	<b>X</b>
It will add a connection configuration to originator device. Please configure the Tag Set each of originator device and target	device.
Connection I/O Type : Omron TBEN-LH-16DIP	•
Originator Device	Target Device
Node Address : 192.168.1.5	Node Address : 192.168.1.180
Comment : CJ1W-EIP21	Comment : TBEN-LH-16DIP
Input Tag Set : Edit Tag Sets	Output Tag Set :
	> Input 103 - [4Bute]
Connection Point to Point connection	
Output Tag Set : Edit Tag Sets	Input Tag Set :
	*
Connection	· · ·
Type : Point to Point connection	
Hide Detail	
Detail Parameter	
Packet Interval (RPI) : 50.0 ms ( 0.5 - 10000.0 ms )	
Timeout Value : Packet Interval (RPI) x 4 🛛 🔻	Connection Name : (Possible to omit)
Connection Structure	
·	
	Regist Close

Figure 5.4 – Register new device



#### 5.1.3 Download configuration

> At the Network drop-down menu select Connect



Download configuration



Figure 5.6 – Network Configurator download

#### 5.1.4 TBEN-LH-16DIP parameters

The device parameters provided by the EDS file allow for on-line parameter setup, download and upload.

arameters		
Parameter Name	Value	
🗉 Gateway		
0001 Device status	0	Click + to expand content
0006 Input Assembly Inst. 103 Size	4 Byte	
0007 Output Assembly Inst. 104 Size	0 Byte	
0008 On I/O connection timeout	switch IO OFF	
Ethernet		
0009 Quick Connect	Disabled	
0010 Ethernet Port 1	AutoNegotiate_A	AutoMDIX
0011 Ethernet Port 2	AutoNegotiate_A	AutoMDIX
Discrete Inputs		
0100 DI - Input value		
0101 Overcurrent VAUX	[]	Read-only oparameter when
🗉 0102 DI - Invert digital input	0	grayed-out letters
0119 DI 0 - Pulse stretching	0	
0120 DI 1 - Pulse stretching	0	
0121 DI 2 - Pulse stretching	0	Pulse stretch> input single is
0122 DI 3 - Pulse stretching	0	stretched for n * 10msec duration
0123 DI 4 - Pulse stretching	0	stretched for it i fornisee duration
0124 DI 5 - Pulse stretching	0	
0125 DI 6 - Pulse stretching	0	
0126 DI 7 - Pulse stretching	0	
0127 DI 8 - Pulse stretching	0	
0128 DI 9 - Pulse stretching	0	
0129 DI 10 - Pulse stretching	0	
0130 DI 11 - Pulse stretching	0	
0131 DI 12 - Pulse stretching	0	
0132 DI 13 - Pulse stretching	0	
0133 DI 14 - Pulse stretching	0	
0134 DI 15 - Pulse stretching	0	

Figure 5.7 – Network Configurator edits



# 5.2 Configure TBEN using QC connections

#### 5.2.1 Enable QC

At the "Edit Connection" page:

- Select "Omron TBEN-LH-16DIP\_QC\_ON" in the "Connection I/O Type" field
- > Select Input Tag Set and Connection Type field set as "Point-to-point" in the Originator Device
- > Register device and verify setup with web server

192.168.1.180 TBEN-LH-16DIP Edit Connection	×
It will add a connection configuration to originator device. Please configure the Tag Set each of originator device and target device	8.
Connection I/O Type : TBEN-LH-16DIP_QC_ON	
Uriginator Device	l arget Device
Node Address : 192.168.1.5	Node Address : 192.168.1.180
Comment : CJ1W-EIP21	Comment : TBEN-LH-16DIP
Input Tag Set : Edit Tag Sets	Output Tag Set :
TBEN_LH_16DIP - [4Byte]	Input_103 - [4Byte]
Type : Multi-cast connection	
Output Tag Set : Edit Tag Sets	Input Tag Set :
Connection Type : Point to Point connection	
Hide Detail	
Detail Parameter	
Packet Interval (RPI) : 50.0 ms ( 0.5 - 10000.0 ms )	
Timeout Value : Packet Interval (RPI) x 4 🔹 🕻	nnection Name : Possible to omit)
Connection Structure	
192.168.1.5 CJ1₩-EIP21 *     192.168.1.5 CJ1₩-EIP21 *     TBEN_LH_16DIP [S] 50.0ms     9 192.168.1.180 TBEN-LH-16DIP     9 Input_103     103	
	OK Cancel

Figure 5.8 – TBEN QC-ON

EtherNet/IP™ Status	
Network topology	Linear
DLR State	Normal
QuickConnect	Enabled

Figure 5.9 – TBEN QuickConnect enabled at web server

#### 5.2.2 Disable QC

At the "Connection configuration" page:

- > Select "Omron TBEN-LH-16DIP\_QC\_OFF" in the "Connection I/O Type" field
- > Select Input Tag Set field and Connection Type field of the Originator Device
- > Register device and verify setup with web server

192.168.1.180 TBEN-LH-16DIP Edit Connection	×
It will add a connection configuration to originator device. Please configure the Tag Set each of originator device and targe	et device.
Connection I/O Type : TBEN-LH-16DIP_QC_OFF	•
Originator Device	Target Device
Node Address : 192.168.1.5	Node Address : 192.168.1.180
Comment : CJ1W-EIP21	Comment : TBEN-LH-16DIP
Input Tag Set : Edit Tag Sets	Output Tag Set :
TBEN_LH_16DIP - [4Byte]	>> Input_103 - [4Byte] -
Connection Type : Point to Point connection	
Output Tag Set : Edit Tag Sets	Input Tag Set :
Connection Type :	*
Hide Detail	
Detail Parameter	
Packet Interval (RPI) : 50.0 ms ( 0.5 - 10000.0 ms )	
Timeout Value : Packet Interval (RPI) x 4	(Possible to omit)     default_001
Connection Structure	
I92.168.1.5 CJ1W-EIP21 *     Implie: TBEN_LH_16DIP [S] 50.0ms     Implie: Participation of the second sec	
	OK Cancel

Figure 5.10 – TBEN QC-OFF

EtherNet/IP™ Status	
Network topology	Linear
DLR State	Normal
QuickConnect	Disabled

Figure 5.11 – TBEN QuickConnect disabled at web server



# 6 TBEN-LH-16DIP with a robot controller

If a robot controller configuration tool does not support EDS file entries, use following TBEN identity data for the device configuration:

- Vendor code = 48
- Vendor name = TURCK
- Product type = 12
- Product code = 20006
- Major revision = 2
- Minor revision = 7
- Product name = "TBEN-LH-16DIP"

The device utilizes an Input Only connection for the production of the data. The controller confirms reception of the input data from the target device and maintains the connection open by production of the Heartbeat to the target device. There is no output data.

Input Only connection (default) point:

- Input assembly instance = 103, data size = 4 bytes
- Output assembly instance = 254, data size = 0

To enable Quick Connect, use following connection point:

- Input assembly instance = 103, data size = 4 bytes
- Output assembly instance = 113, data size = 0

To disable Quick Connect, use following connection point:

- Input assembly instance = 103, data size = 4 bytes
- Output assembly instance = 114, data size = 0

# 7 TBEN-LH-16DIP CIP Object Classes

CLASS CODE	OBJECT TYPE	
01 (0X01)	Identity	
04 (0x04)	Assembly	
06 (0x06)	Connection Manager	
71 (0x47)	DLR	
72 (0x48)	QOS	
245 (0xF5)	TCP/IP Interface Object	
246 (0xF6)	Ethernet Link Object	
Not a class	Unconnected Message Manager	

The TBEN devices support the following CIP object classes:

# 7.1 Class Code: 01 (0x01) – Identity Object

The Identity Object is required on all devices and provides general information about the device.

Attribute	Access	Name	Туре	Value
1	Get	Vendor	UNIT	48
2	Get	Product Type	UNIT	12
3	Get	Product Code	UNIT	Lowest 5 digits of the order number
		Revision:	STRUCT OF:	
4	Get	<ul> <li>Major Revision</li> </ul>	<ul> <li>USINT</li> </ul>	2
		<ul> <li>Minor Revision</li> </ul>	<ul> <li>USINT</li> </ul>	7
5	Get	Device Status	WORD	(2)
				Lower three Bytes of MAC-ID
6	Get	Serial Number	UDINT	e.g. MAC 0x000746000001 is Serial #01
		Product Name:	STRUCT OF	
7	Get	<ul> <li>Length</li> </ul>	<ul> <li>USINT</li> </ul>	"TBEN-I H-16DIP"
		<ul> <li>Name</li> </ul>	<ul> <li>STRING [18]</li> </ul>	



#### 7.1.2 Common Services

Service Code	Class	Instance	Service Name
01 (0x01)	Yes	Yes	Get_Attribute_All
05 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single

#### 7.1.3 Device Status

Bit(s)	Called	Definition
1		Reserved, shall be 0
2	Configured	Configure TRUE indicates the application of the device has been configured to do something different than the "out-of-box" default. This shall not include configuration of the communications.
3		Reserved, shall be 0
4-7	Extended Device Status	As defined by table below. The EDS shall indicate if the device follows the public definition for these bits.
12-15		Reserved, shall be 0

## 7.1.3.1 Bits 4-7: Extended Device Status Description

Bits	Description
0011	No I/O connections established
0110	At least one I/O connection in run mode
0111	At least one I/O connection established, all in idle mode

# 7.2 Class Code 04 (0x04) – Assembly Object

The Assembly Objects bind attributes of multiple objects to allow data to or from each object to be sent or received over a single connection.

#### 7.2.1 Instance Attributes

Instance 101:	Input assembly instance, data size variable
Instance 102:	Output assembly instance, data size variable
Instance 103:	Input assembly instance, data size 4 bytes
Instance 104:	Output assembly instance, data size 0
Instance 106:	Configuration assembly instance data size 14 short integers
Instance 113:	Output Heartbeat assembly, size 0, enables QuickConnect
Instance 114:	Output Heartbeat assembly, size 0, disables QuickConnect
Instance 254:	Output Heartbeat assembly (default), size 0

#### 7.2.1.1 Input assembly instance

Instance No:

Attribute	Access	Name	Туре	Value
3	Get	Input data	ARRAY of BYTE	
4	Get	Input data size	INT	

#### 7.2.1.2 Output assembly instance

Instance No

Attribute	Access	Name	Туре	Value
3	Get	Output data	ARRAY of BYTE	
4	Get	Output data size	INT	

#### 7.2.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0X10)	No	Yes	Set_Attribute_Single



# 7.3 Class Code 06 (0x06) – Connection Manager Object

The Connection Manager Class allocates and manages the internal resources associated with Class 0 and Class 1 connections and Explicit Messaging Connections. The specific instance generated by the Connection Manager is referred to as a *Connection Instance* or a *Connection Object*.

#### 7.3.1 Common Services

Service Code	Class	Instance	Service Name	Service Description
84 (0x54)	No	Yes	FWD_OPEN_CMD	Open Connection request, maximum data size is 511 bytes
78 (0x4E)	No	Yes	FWD_CLOSE_CMD	Close Connection request

#### 7.3.2 Limitations

- Maximum number of TCP Encapsulation sessions: 3
- Maximum number of CIP connections: 8

# 7.4 Class Code 71 (0x47) – Device Level Ring Object

#### 7.4.1 Class Attributes

Attribute	Access	Name	Туре	Value
1	Get	Revision	UINT	

#### 7.4.2 Instance Attributes

Attribute	Access	Name	Туре	Value
1	Get	Network Topology	USINT	0 indicates "Linear" 1 indicates "Ring" See section 5-6.3.3 (Refer to Note)
2	Get	Network Status	USINT	0 indicates "Normal" 1 indicates "Ring Fault" 2 indicates "Unexpected Loop Detected" 3 indicates "Partial Network Fault" 4 indicates "Rapid Fault/Restore Cycle" See section 5-6.3.4 (Refer to Note)
	Ar Get Sup Ad	Active	Array of	IP and/or MAC address of the active ring supervisor
10		Supervisor Address	UDINT	Supervisor IP Address
			Array of USINT	Supervisor MAC Address
12	Get	Capability Flags	DWORD	Describes the DLR capabilities of the device



# NOTE

Description of the attributes 1 and 2 is provided by:

"Volume 2: Ethernet/IP Adaptation of CIP, Edition 1.23, April 2017.

#### 7.4.3 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single



# 7.5 Class Code 72 (0x48) – QOS Object

#### 7.5.1 Instance Attributes

Attribute	Access	Name	Туре	Note
4	Set NV	DSCP Urgent	USINT	DSCP value for CIP transport class 0/1 Urgent priority messages
5	Set NV	DSCP Scheduled	USINT	DSCP value for CIP transport class 0/1 Schedule priority messages
6	Set NV	DSCP High	USINT	DSCP value for CIP transport class 0/1 High priority messages
7	Set NV	DSCP Low	USINT	DSCP value for CIP transport class 0/1 Low priority messages
8	Set NV	DSCP Explicit	USINT	Explicit messages (transport class 2/3 and UCMM) and all other EtherNet/IP encapsulation messages

#### 7.5.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single

# 7.6 Class Code 245 (0xF5) – TCP/IP Interface Object

The TCP/IP Interface Object is used to configure a device's TCP/IP network interface including the device's IP Address, Network Mask, and Gateway Address.

#### 7.6.1 Instance Attributes

Attribute	Access	Name	Туре	Description of Attribute	Value
1	Get	Status	DWORD	Interface Status	(1)
2	Get	Configuration Capability	DWORD	Interface Capability Flag	(2)
3	Get/Start	Configuration Control	DWORD	Interface Control Flag	(3) Set $\rightarrow$ Only 0 possible
		Physical Link Object	Structure of:		
4	Get	Path Size	UINT	Number of 16 bit words	0x02
		Path	Padded EPATH		0x20 0xF6 0x24 0x01
	Interface Configuration	Structure of:	TCP/IP Network Interface Configuration	(4)	
	IP Address	UDINT	Device's IP address	Value of 0 indicates no IP address has been configured. Otherwise, the IP address shall be set to a valid Class A, B, or C address and shall not be set to the loop- back address (127.0.0.1).	
	5 Get	Network Mask	UDINT		Value of 0 indicates no network mask address has been configured.
5		Gateway Address	UDINT	Default gateway address	Value of 0 indicates no IP address has been configured. Otherwise, the IP address shall be set to a valid Class A, B, or C address and shall not be set to the loop- back address (127.0.0.1).
		Name Server	UDINT	Primary server name	Value of 0 indicates no name server address has been configured. Otherwise, the name server address shall be set to a valid Class A, B, or C address.
	Name Server 2	UDINT	Secondary server name	Value of 0 indicates no secondary name server address has been configured. Otherwise, the name server address shall be set to a valid Class A, B, or C address.	
	Domain Name	UDINT	Default domain name	ASCII characters. Maximum length is 48 characters. Shall be padded to an even number of characters (pad not included in length). A length of 0 shall indicate no Domain Name is configured.	
6	Get/Set	Host Name	STRING		(5) ASCII characters. Maximum length is 64 characters. Shall be padded to an even number of characters (pad not included in length). A length of 0 shall indicate no Host Name is configured. See section 5-3.2.2.6.



12	Get/Set	QuickConnect	BOOL	0* - Disable 1 - Enable



# NOTE

The \* symbol is an abbreviation for default setup.

#### 7.6.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

# 7.7 Class Code 245 (0xF6) – Ethernet Link Object

TBEN supports 3 instances on Ethernet Link Object:

- Instance 1 Internal → No configuration can be done on this instance
- Instance 2 Port 1
- Instance 3 Port 2

#### 7.7.1 Class Attributes

Attribute	Access	Name	Туре	Value
1	Get	Revision	UINT	3
2	Get	Max Instance		3
3	Get	Number of Instances		3

#### 7.7.2 Instance Attributes

Attribute	Access	Name	Туре	Note
1	Get	Interface Speed	UDINT	(1) Speed in megabits per second (e.g. 10, 100, 1000, etc.)
2	Get	Interface Flags	DWORD	(2)
3	Get	Physical Address	Array of 6 USINTs	(3)
6	Get/Set	Interface Control	2 WORDs	Allows changing different Ethernet settings on a per port basis
7	Get	Interface type		Internal/External
10	Get	Interface Label		

#### 7.7.3 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	0E) Yes		Get_Attribute_Single



# 7.8 Vendor Specific Classes

As well as supporting the above named CIP Standard Classes, the CIP Ethernet/IP gateway supports the following vendor specific classes:

Class Code	Name	Description
100 (64h)	Gateway Class	Contains data and settings concerning the gateway and the TBEN system as a whole
102 (66h)	Process Data Class	Contains process data
117 (75h)	Digital Versatile Class	Contains parameters for complex digital modules
126 (7Eh)	Misc Parameters Class	QuickConnect support parameters

# 7.9 Class Code 100 (0x64) – Gateway Object

#### 7.9.1 Instance 2 Attributes

The Gateway Class contains all the parameters that concern the TBEN system and the gateway.

Attribute	Access	Name	Туре	Description
109 (6Dh)	Get	STATUS REGISTER2	STRUCT	Gateway – Status: Contains a general gateway/station status.         Bit 15-10 reserved         Bit 09 U <sub>B</sub> under voltage diagnostic (VI<14V)
115 (73h)	Get/Set	ON IO CONNECTION TIMEOUT	ENUM USINT	Reaction to the I/O connection exceeding the time limit. SWITCH IO FAULTED (0): -The modules are switched to Faulted State. SWITCH IO OFF (1): -The gateway switches off the outputs of the modules. SWITCH IO HOLD (2): -The gateway makes no further changes to the data of the I/O modules. The outputs are held.
138 (8Ah)	Get/Set	GW Status Word Enable/Disable	DWORD	0 – disabled 1* - enabled
139 (8Bh)	Get/Set	GW Control Word Enable/Disable	DWORD	0 – disabled 1* - enabled

#### 7.9.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

# 7.10 Class Code 117 (0x75) – Digital Versatile Module Object

This class contains all information and parameters for digital versatile modules. In this class, chosen parameter options can only be deactivated by activating another option of this parameter.

#### 7.10.1 Instance 1 Attributes

Attribute	Access	Name	Туре	Description
111 (6Fh)	Get	MODULE INPUT CHANNEL COUNT	USINT	Contains the number of input channels supported by the module.
112 (70h)	Get	MODULE OUTPUT CHANNEL COUNT	USINT	Contains the number of output channels supported by the module.
113 (71h)	Input data	MODULE INPUT_1	DWORD	Input data of the module (according to channels).
115 (73h)	Get	MODULE OUTPUT_1	DWORD	Output data of the module (according to channels).
119 (77h)	Diagnostic data	SHORT CIRCUIT OUTPUT ERROR_1	DWORD	This attribute contains diagnosis information about output short- circuits (according to channels).
121 (79h)	Get	SHORT CIRCUIT SENSOR ERROR_1	DWORD	This attribute contains diagnosis information about sensor short-circuits (according to channels).
127 (7Fh)	Get/Set	INVERT INPUT DATA_1	DWORD	The input signal is inverted (channel 1 to 32).
133 (85h)	Get/Set	AUTO RECOVERY OUTPUT_1	DWORD	The outputs switch on automatically after an overload.
137 (89h)	Get/Set	RETRIGGERED RECOVERY OUTPUT_1	DWORD	The outputs (channel 1 to 32) have to be retriggered in case of an overload.



#### 7.10.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

# 7.11 Class Code 126 (0x7E) – Miscellaneous Parameters Object

This class contains all information and parameters for objects implemented in the recent firmware releases that do not fit in other VSC objects.

#### 7.11.1 Instance 1 and 2 Attributes

Attribute	Access	Name	Туре	Description
		Ethernet Port Parameters		Similar to Ethernet class parameters but all in one object. This object has 2 instances. The following values are allowed per instance:
				0* – Autonegotiate, AutoMDIX
	Get/Set			1 – 10BaseT, Half Duplex, Linear topology (AutoMDIX diabled)
109 (0011)			DWORD	2 – 10BaseT, Full Duplex, Linear topology (AutoMDIX diabled)
				<ul> <li>3 – 100BaseT, Half Duplex, Linear topology (AutoMDIX diabled)</li> </ul>
				4 – 100BaseT, Full Duplex, Linear topology (AutoMDIX diabled)
112 (70h)	Get	IO Controller Software revision	DWORD	The number of instances of this parameter depends on the number of I/O controllers.



NOTE

The \* symbol is an abbreviation for default setup.

#### 7.11.2 Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

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