Your Global Automation Partner

TURCK

TBEN-LH-8IOL
EtherNet/IP™ Configuration Guide

1218A

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1 General Information

1.1 About these instructions

The following configuration guide describes the setup, functions, and use of the TBEN-LH-8IOL 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-ed.

NOTE

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 Contents

The complementary documentation and files:

- TBEN-LH-8IOL Data sheet
- TBEN-L…-8IOL, IO-Link Master Module
- IO-Link Devices Commissioning
- TBEN-LH-8IOL_R2.7.EDS file

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 **techdoc@turck.com**.

1.5 Technical support

For additional support, email inquiries to appsupport@turck.com, or call Application Support at 763-553-7300, Monday-Friday 8AM-5PM CST.

2 Getting Started

2.1 About this document

The configuration guide provides information about configuration of the TBEN-LH-8IOL including:

- Address switches
- IP address assignment
- Configuration options with Rockwell and Omron PLCs

NOTE

The device data sheet and technical information is available for download at www.turck.us.

2.2 Factory default IP address

The TBEN-LH-8IOL 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
- ARGEE PLC is running

The device responds to the PING command as follows:

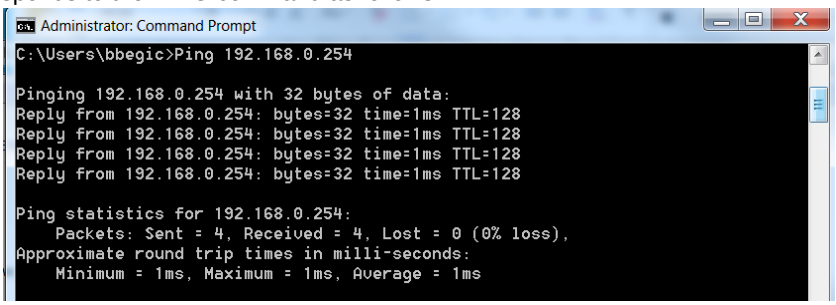

Figure 2.1 - Ping

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.

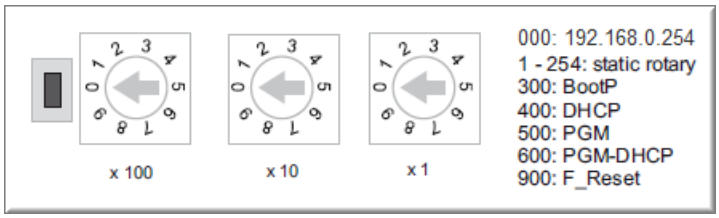

Figure 2.2 – Rotary switches

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 [1…254].
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 (TST)

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

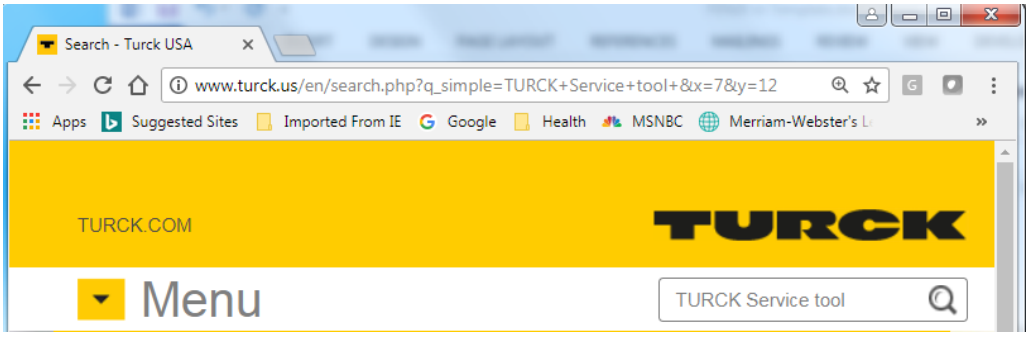

Figure 2.3 – TURCK Web page

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

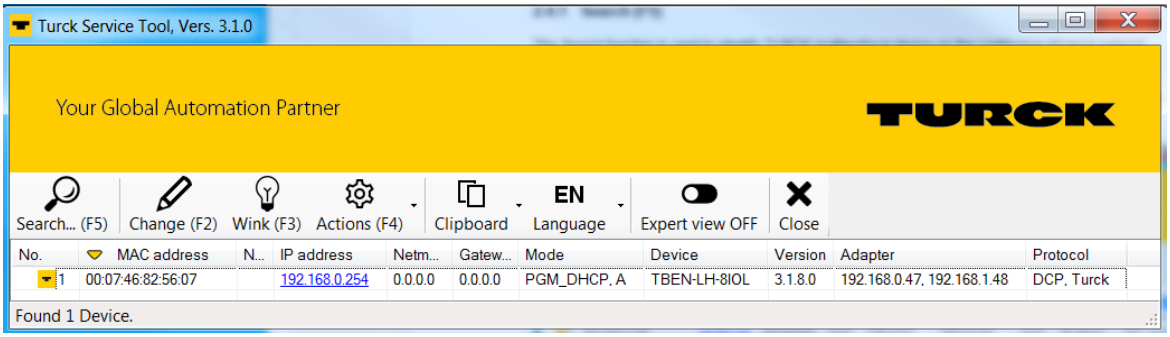

Figure 2.4 – Service Tool

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.

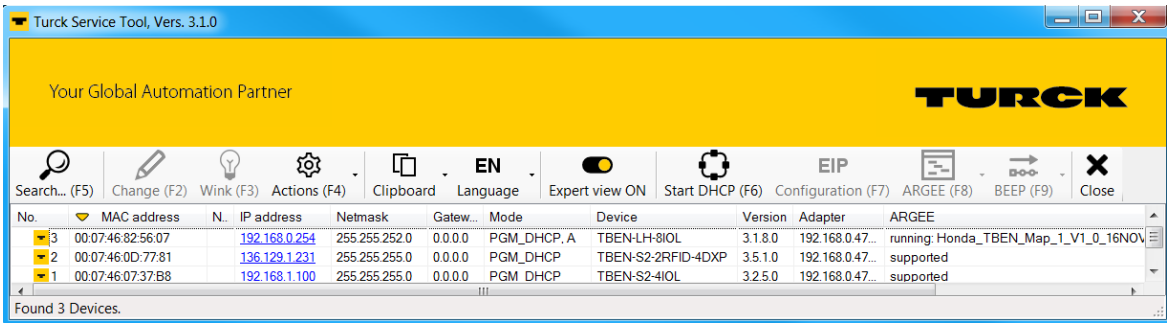

Figure 2.5 – Search function

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*

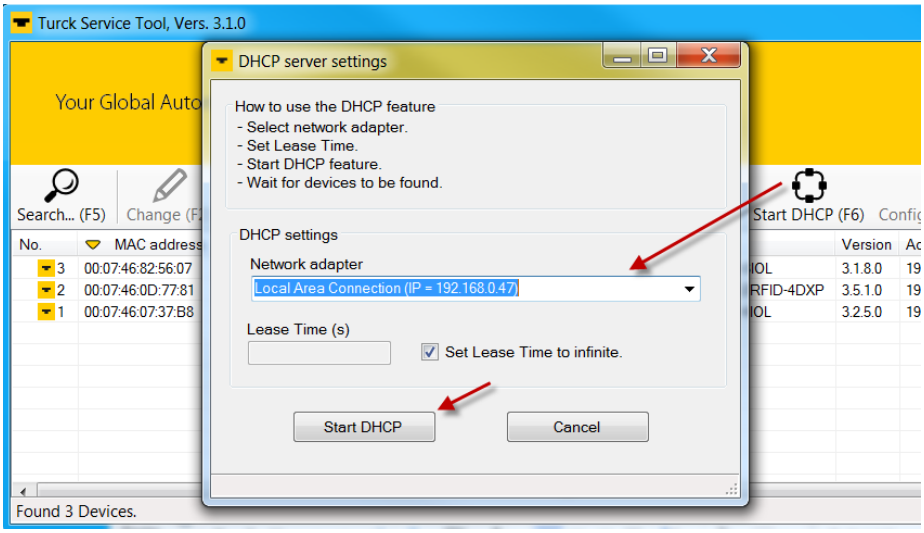

Figure 2.6* – Initialize *DHCP server

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

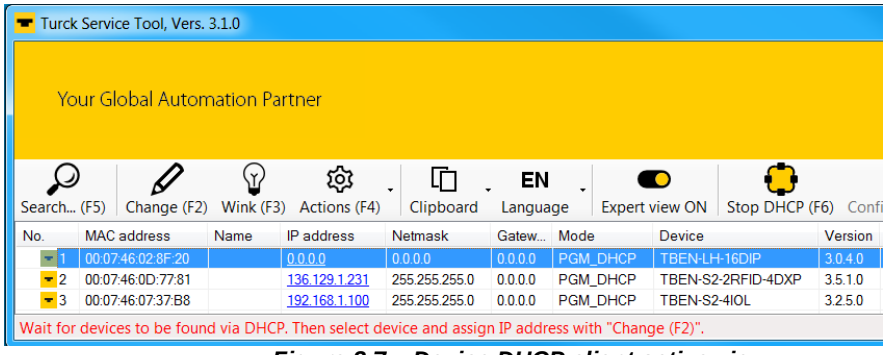

Figure 2.7 – Device DHCP client active view

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

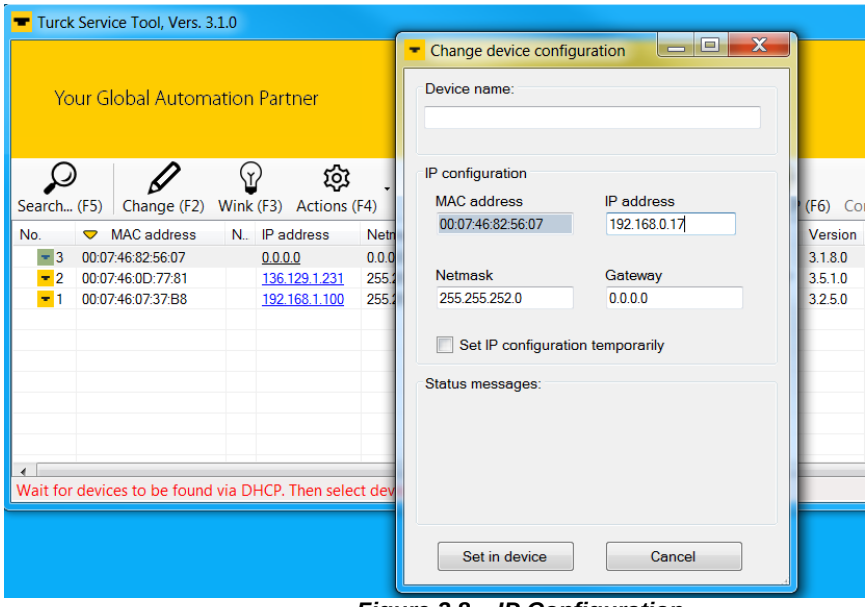

Figure 2.8 – IP Configuration

After the IP address is assigned, the device responds with:

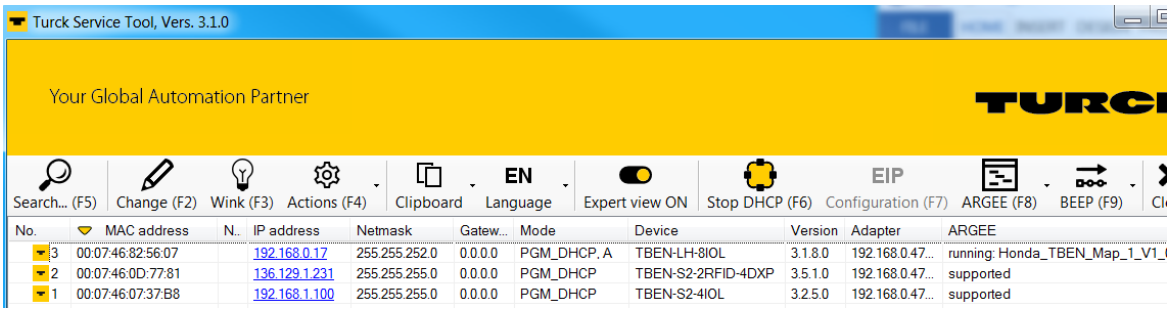

Figure 2.9 – IP address assigned

2.4.3 Set IP address 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 an administrator to change device 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.

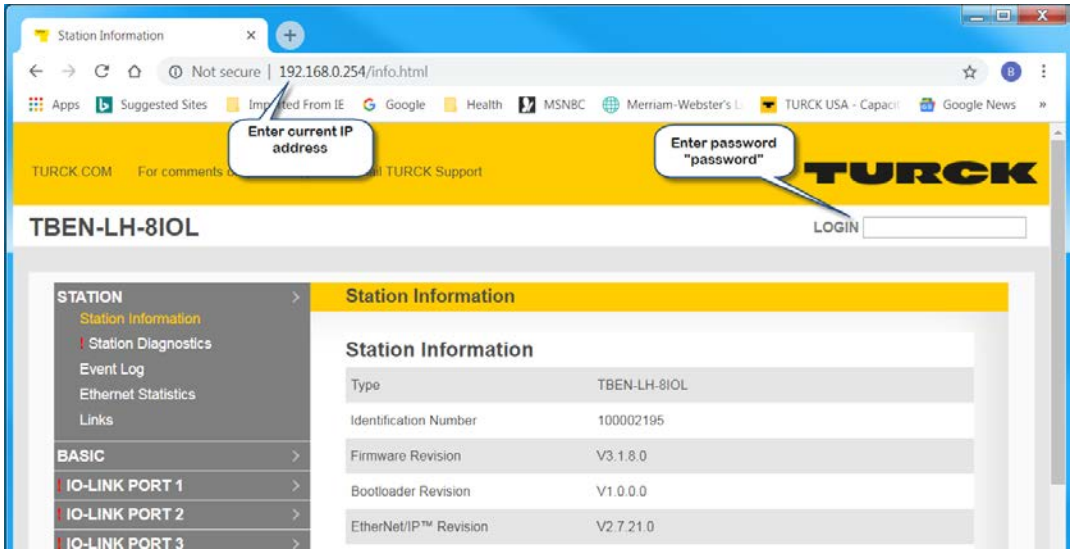

Figure 2.10 – Device Web server

- 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 the device which comes up with the new setup

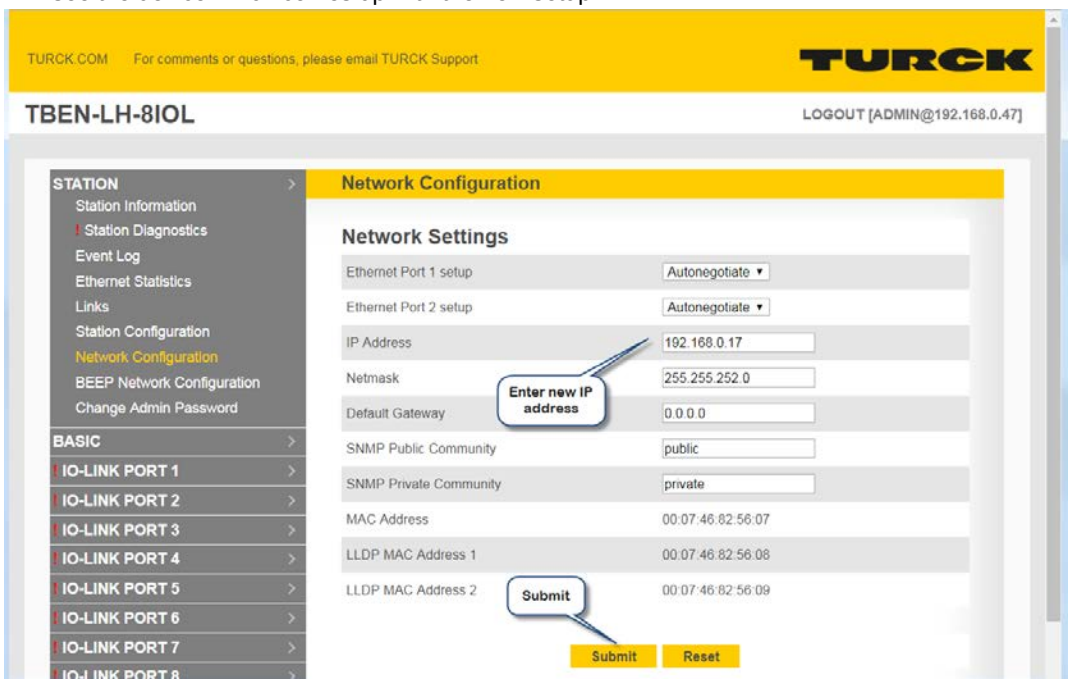

Figure 2.11 – Network Configuration menu

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

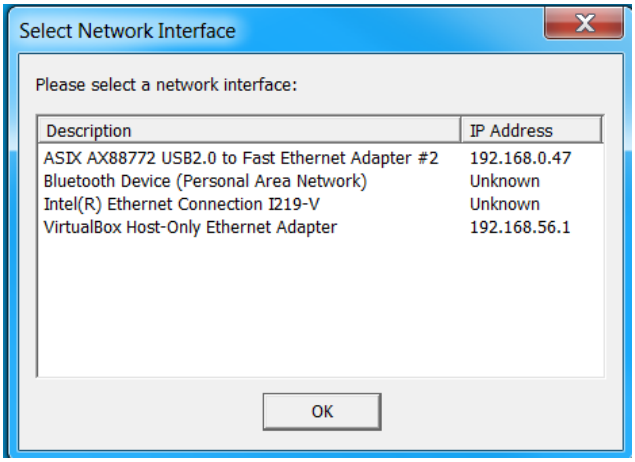

Figure 2.12 – BOOTP / DHCP tool

- At *Tools* menu, click at *Network Settings*

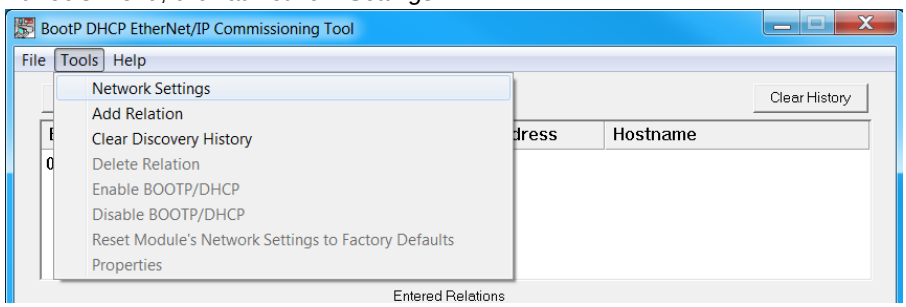

Figure 2.13 – Network Settings menu

- Enter *Mask* and *Gateway* addresses in the *Network Settings* dialog

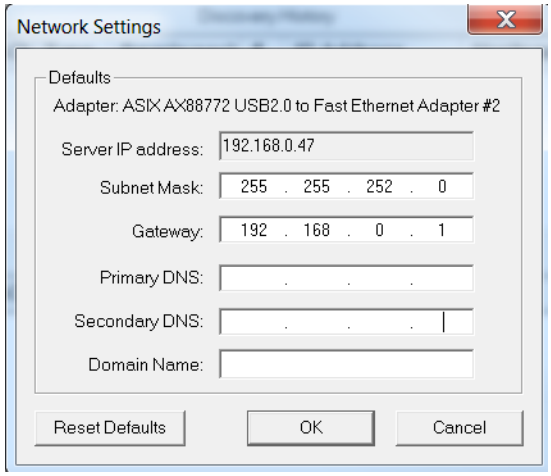

Figure 2.14 – Network Settings view

- Enter new IP address in the *New Entry* dialog

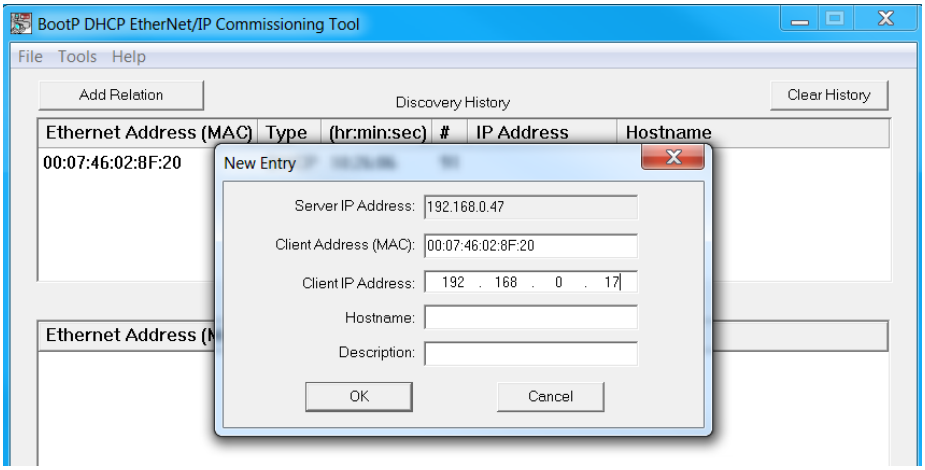

Figure 2.15 – IP address setup

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

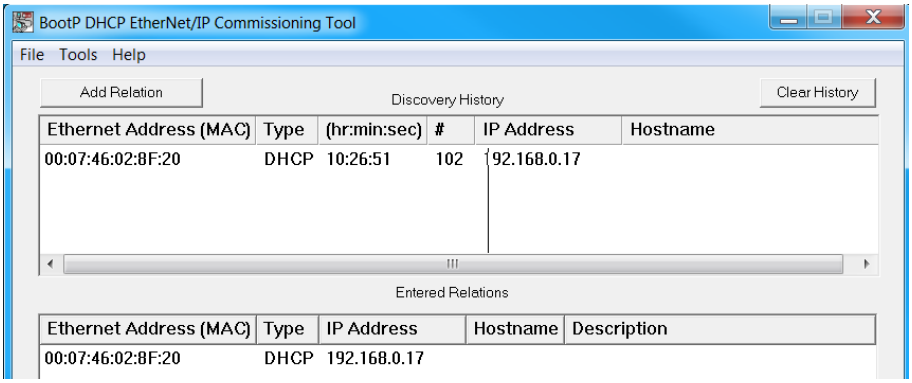

Figure 2.16 – IP address assignment complete

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3 TBEN-LH-8IOL Controls Reference

3.1 Device Overview

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

3.1.1 Dimensions and connector assignment

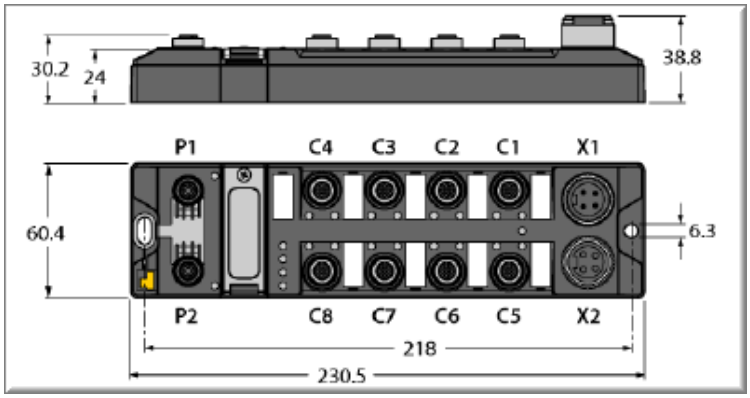

Figure 3.1 – Connector assignment

3.1.2 Power connector pin assignment

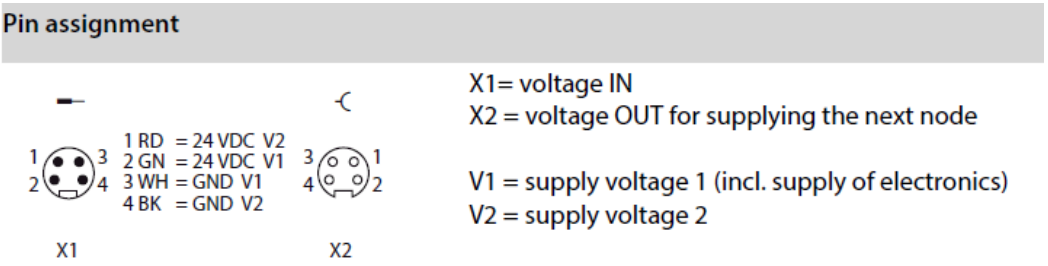

Figure 3.2 – X1 and X2 connector pinout

3.1.3 IO connector pin assignment

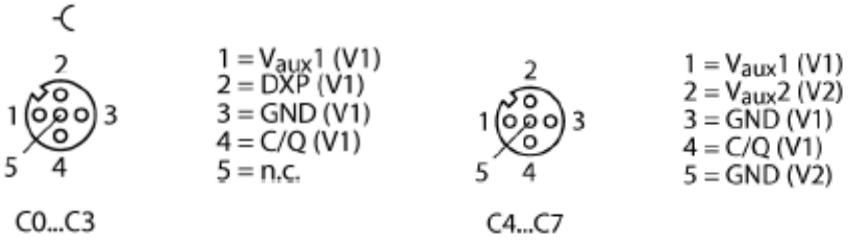

Figure 3.3 – C0…C7 connector pinout

3.1.4 Power supply

Power supply	
Supply voltages	24 V DC from operating voltage
Permissible range	18 … 30 V DC
	IO-Link: 20,4 … 28,8 V DC (acc. to IO-Link standard)
	Total current max. 9 A per module
Operating current	< 120 mA
Sensor/actuator supply V_{AUX1}	Supply from V1 short-circuit proof, max. 4 A for C0 & C4, short-circuit proof, 2 A per group C1 - C4, C5 - C8
Sensor/actuator supply V_{AUX2}	Class B-supply from V2 short-circuit proof, 2 A per connector C0-C7
Potential isolation	≥ 500 V (V2 to Ethernet and V1)
IO-Link	
Number of ports	8
IO-Link specification	V1.0, V1.1 according to IEC 61 61131-9
IO-Link port type	Class A at C0 to C3 Class B at C3 to C7
Frame type	Supports all specified frame types
Process data for IO-Link devices	
– Input data	max. 32 Byte per channel
– Output data	max. 32 Byte per channel
Transmission rate	4,8 kbps (COM 1) 38,4 kbps (COM 2) 230,4 kbps (COM 3)
Transmission cable	Length: max. 20 m standard cables, 3- or 4-wire (depending on the application), unshielded

ATTENTION!

Wrong supply of IO-Link devices
Damage to the electronics

- The IO-Link devices must only be supplied with the voltage provided at the supply terminals of the TBEN

ATTENTION!

Connection of Class A devices to Class B ports
Loss of the galvanic isolation

- Only use Class A devices with signals on pin 1, pin 3 and pin 4 at Class B ports. The connection of Class A devices with signals on pin 2 and pin 5 leads to the loss of the galvanic isolation

3.1.5 LEDs

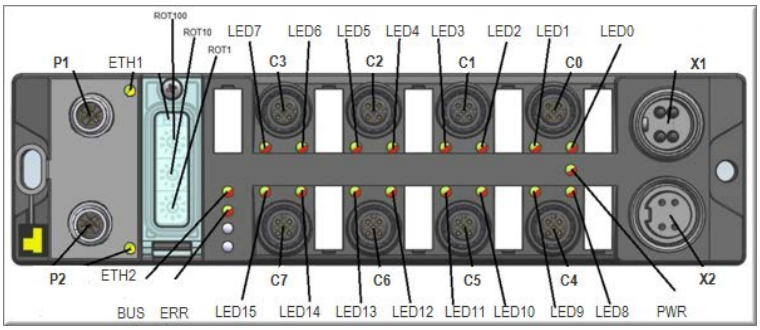

Figure 3.4 – LED assignment

LED	Color	Status	Meaning	Remedy
PWR	green	off	V1 missing or < 17 V DC	Check V1
		on	V1 and V2 OK	-
		blinking	V2 missing or < 14.5 VDC	Check V2
ETHx	green	on	Link established,100 Mbps	
		blinking	Ethernet Traffic, 100 Mbps	
	yellow	on	Link established,10 Mbps	
		blinking	Ethernet Traffic, 10 Mbps	
	-	off	No Ethernet link.	Check the Ethernet connection.
ERR	green	on	No diagnostic message available	
	red	on	Diagnostic message pending	
BUS	green	on	Active connection to a master	-
		blinking	Device is ready for operation	-
	Red	on	IP address conflict or restore mode or timeout	control IP addresses in the network waiting for the device to be ready for operation
		blinking	Blink-/wink-command active	see also description of LED "right to ERR"
	red/ green	on	Autonegotiation and/or waiting for DHCP-/BootP-address assign-ment.	

Figure 3.5 – Module LED behavior

LED	Color	Status	Meaning	Remedy
IOLx	**Channel in IO-Link-mode**			
	green	off	No IO-Link communication, diagnostics deactivated	– connect an IO-Link device – Parameterize the channel as DI if necessary.
		flashing	IO-Link communication active, valid process data	-
	Red	on	No IO-Link communication and/or module error, invalid process data	Possible causes: – Sensor supply is below the admissible range, – IO-Link port is parameterized as simple digital input, – No device connected to the masters,
	Red	flashing	IO-Link communication active and module error, invalid process data	– No input data received from the connected device (only valid for devices with an input data length > 0), – the connected device does not respond on sending output data (only valid for devices with an output data length of > 0). – connected device sends an error: "process data invalid". see also: Start-up problems - frequent failure causes, page 115
	Channel in DI-mode			–
	green	off	-	
	green	on	Input signal active	–
DXPx	green	off	-	
	green	on	In-/ output signal active	
	Red	on	Short circuit at output of the respective channel	
right to ERR	white	flashing	Support for localizing a module if the blink-/wink-command is activated	-

Figure 3.6 – IO LED behavior

3.2 IO data map

3.2.1 General overview

The default data size of the TBEN-LH-8IOL is:

- 292 Byte Input data size, (146INT)
- 296 Byte Output data size, (148INT)

Honda TBEN-LH-8IOL

TURCK

Honda TBEN-LH-8IOL Data Map Overview - 7_APR_2018

Data from RSL/Robot to TBEN

Description	RSLogix Index	Fanuc Starting bit
IOL Channel Disable and C0 to C7 DXP Outputs	0	0
IOL C0 to C7 Mapping	1	16
VAux 1 and VAux 2 Control	2	32
IOL 16 Data Word Enable	3	48
C0 IOL Port 1 Output Data Word 0	4	64
C0 IOL Port 1 Output Data Word 1	5	80
C1 IOL Port 2 Output Data Word 0	6	96
C1 IOL Port 2 Output Data Word 1	7	112
C2 IOL Port 3 Output Data Word 0	8	128
C2 IOL Port 3 Output Data Word 1	9	144
C3 IOL Port 4 Output Data Word 0	10	160
C3 IOL Port 4 Output Data Word 1	11	176
C4 IOL Port 5 Output Data Word 0	12	192
C4 IOL Port 5 Output Data Word 1	13	208
C5 IOL Port 6 Output Data Word 0	14	224
C5 IOL Port 6 Output Data Word 1	15	240
C6 IOL Port 7 Output Data Word 0	16	256
C6 IOL Port 7 Output Data Word 1	17	272
C7 IOL Port 8 Output Data Word 0	18	288
C7 IOL Port 8 Output Data Word 1	19	304
C0 IOL Port 1 Output Data Word 0 - 16WD Enabled	20	320
: : : : : :		
C0 IOL Port 1 Output Data Word 15 - 16WD Enabled	35	560
:-:-:-:-:-:		
C7 IOL Port 8 Output Data Word 0 - 16WD Enabled	132	2112
: : : : : :		
C7 IOL Port 8 Output Data Word 15 - 16WD Enabled	147	2352

Data from TBEN to RSL/Robot

Description	RSLogix Index Value	Fanuc Starting bit
DXP and Cx Input Status	0	0
Diagnostic and IOL Data Valid	1	16
C0 IOL Port 1 Input Data Word 0	2	32
C0 IOL Port 1 Input Data Word 1	3	48
C1 IOL Port 2 Input Data Word 0	4	64
C1 IOL Port 2 Input Data Word 1	5	80
C2 IOL Port 3 Input Data Word 0	6	96
C2 IOL Port 3 Input Data Word 1	7	112
C3 IOL Port 4 Input Data Word 0	8	128
C3 IOL Port 4 Input Data Word 0	9	144
C4 IOL Port 5 Input Data Word 0	10	160
C4 IOL Port 5 Input Data Word 1	11	176
C5 IOL Port 6 Input Data Word 0	12	192
C5 IOL Port 6 Input Data Word 1	13	208
C6 IOL Port 7 Input Data Word 0	14	224
C6 IOL Port 7 Input Data Word 1	15	240
C7 IOL Port 8 Input Data Word 0	16	256
C7 IOL Port 8 Input Data Word 1	17	272
C0 IOL Port 1 Input Data Word 0 - 16WD Enabled	18	288
: : : : : :		
C0 IOL Port 1 Input Data Word 15 - 16WD Enabled	33	528
:-:-:-:-:-:		
C7 IOL Port 8 Input Data Word 0 - 16WD Enabled	130	2080
: : : : : :		
C7 IOL Port 8 Input Data Word 15 - 16WD Enabled	145	2320

Figure 3.7 – IO data map overview

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3.2.2 Input data map

- Input data map overview

Honda TBEN-LH-8IOL

Honda TBEN-LH-8IOL Input Data Overview - 7_APR_2018

Data from TBEN to RSL/Robot

Description	RSLogix Index Value	Fanuc Starting bit	
DXP and Cx Input Status	0	0	DXP Input Bits and Disabled IOL Port 24V Input Bits
Diagnostic and IOL Data Valid	1	16	IOLink Port Data Valid Indicators
C0 IOL Port 1 Input Data Word 0	2	32	IOLink data from TBIL Stations or Stack Lights or valve banks or other 1 or 2 word devices
C0 IOL Port 1 Input Data Word 1	3	48	
C1 IOL Port 2 Input Data Word 0	4	64	
C1 IOL Port 2 Input Data Word 1	5	80	
C2 IOL Port 3 Input Data Word 0	6	96	
C2 IOL Port 3 Input Data Word 1	7	112	
C3 IOL Port 4 Input Data Word 0	8	128	
C3 IOL Port 4 Input Data Word 0	9	144	
C4 IOL Port 5 Input Data Word 0	10	160	
C4 IOL Port 5 Input Data Word 1	11	176	
C5 IOL Port 6 Input Data Word 0	12	192	
C5 IOL Port 6 Input Data Word 1	13	208	
C6 IOL Port 7 Input Data Word 0	14	224	
C6 IOL Port 7 Input Data Word 1	15	240	
C7 IOL Port 8 Input Data Word 0	16	256	
C7 IOL Port 8 Input Data Word 1	17	272	
C0 IOL Port 1 Input Data Word 0 - 16WD Enabled	18	288	Future proofing - RFID or other unplanned devices
: : : : : : : : : : : :			
C0 IOL Port 1 Input Data Word 15 - 16WD Enabled	33	528	
:-:-:-:-:-:-:-:-:-:-:-:			
C7 IOL Port 8 Input Data Word 0 - 16WD Enabled	130	2080	
: : : : : : : : : : : :			
C7 IOL Port 8 Input Data Word 15 - 16WD Enabled	145	2320	

Figure 3.8 – Input data map, overview

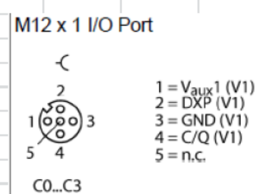
- Input data map, word 0

Honda TBEN-LH-8IOL

Honda TBEN-LH-8IOL Input Data Word 0 - 7_APR_2018

Data from TBEN to RSL/Robot

Description	RSLogix Index Value (Word 0.0 to .15)	Fanuc Starting bit	
DXP and Cx Input Status	0	0	
C0 DXP Input Active	0	0	Set when C0 DXP input (Pin 2) is 24V=ON
C1 DXP Input Active	1	1	:
C2 DXP Input Active	2	2	:
C3 DXP Input Active	3	3	Set when C3 DXP input (Pin 2) is 24V=ON
reserved	4	4	
reserved	5	5	
reserved	6	6	
reserved	7	7	
C0 PIN4 DI	8	8	Set when disabled IOL Port 1 (Pin 4) is 24V=ON
C1 PIN4 DI	9	9	:
C2 PIN4 DI	10	10	:
C3 PIN4 DI	11	11	:
C4 PIN4 DI	12	12	:
C5 PIN4 DI	13	13	:
C6 PIN4 DI	14	14	:
C7 PIN4 DI	15	15	Set when disabled IOL Port 8 (Pin 4) is 24V=ON



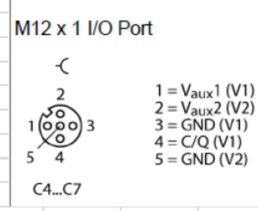


Figure 3.9 – Input data map, word 0

- Input data map, word 1

Honda TBEN-LH-8IOL

Honda TBEN-LH-8IOL Input Data Word 1 - 7_APR_2018

Data from TBEN to RSL/Robot	Word 1.0 to .15		
Description	RSLogix Index Value	Fanuc Starting bit	
Diagnostic and IOL Data Valid	1	16	
Diag	0	16	Diagnostic Active
reserved	1	17	
V1	2	18	V1 out of range
V2	3	19	V2 out of range
FCE	4	20	Forcing Enabled
reserved	5	21	
reserved	6	22	
reserved	7	23	
C0 IOL Port 1 Data Valid	8	24	Set when IOL Port 1 Data is Valid
C1 IOL Port 2 Data Valid	9	25	:
C2 IOL Port 3 Data Valid	10	26	:
C3 IOL Port 4 Data Valid	11	27	:
C4 IOL Port 5 Data Valid	12	28	:
C5 IOL Port 6 Data Valid	13	29	:
C6 IOL Port 7 Data Valid	14	30	:
C7 IOL Port 8 Data Valid	15	31	Set when IOL Port 8 Data is Valid

Figure 3.10 – Input data map, word 1

3.2.3 Output data map overview

Honda TBEN-LH-8IOL

Honda TBEN-LH-8IOL Output Data Overview - 7_APR_2018

Data from RSL/Robot to TBEN

Description	RSLogix Index	Fanuc Starting bit	
IOL Channel Disable and C0 to C7 DXP Outputs	0	0	IOLink channel disable, 24V output control
IOL C0 to C7 Mapping	1	16	Data Mapping for each IOLink Channel
VAux 1 and VAux 2 Control	2	32	Turn off VAux1 and VAux2 power
IOL 16 Data Word Enable	3	48	Enable 16 Data Word IOLink data transfer
C0 IOL Port 1 Output Data Word 0	4	64	IOLink data to TBIL Stations or Stack Lights or valve banks or other 1 or 2 word devices
C0 IOL Port 1 Output Data Word 1	5	80	
C1 IOL Port 2 Output Data Word 0	6	96	
C1 IOL Port 2 Output Data Word 1	7	112	
C2 IOL Port 3 Output Data Word 0	8	128	
C2 IOL Port 3 Output Data Word 1	9	144	
C3 IOL Port 4 Output Data Word 0	10	160	
C3 IOL Port 4 Output Data Word 1	11	176	
C4 IOL Port 5 Output Data Word 0	12	192	
C4 IOL Port 5 Output Data Word 1	13	208	
C5 IOL Port 6 Output Data Word 0	14	224	
C5 IOL Port 6 Output Data Word 1	15	240	
C6 IOL Port 7 Output Data Word 0	16	256	
C6 IOL Port 7 Output Data Word 1	17	272	
C7 IOL Port 8 Output Data Word 0	18	288	
C7 IOL Port 8 Output Data Word 1	19	304	
C0 IOL Port 1 Output Data Word 0 - 16WD Enabled	20	320	Future proofing - RFID or other unplanned devices
: :			
C0 IOL Port 1 Output Data Word 15 - 16WD Enabled	35	560	
:-			
C7 IOL Port 8 Output Data Word 0 - 16WD Enabled	132	2112	
: :			
C7 IOL Port 8 Output Data Word 15 - 16WD Enabled	147	2352	

Figure 3.11 – Output data map, overview

- Output data map, word 0

Honda TBEN-LH-8IOL

TURCK

Honda TBEN-LH-8IOL Output Word 0 - 7_APR_2018

Data from RSL/Robot to TBEN	Word 0.0 to .15	
Description	**RSLogix Index**	**Fanuc Starting bit**
IOL Channel Disable and C0 to C3 DXP Output Bits	0	0
Disable C0 IOL Port 1	0	0
Disable C1 IOL Port 2	1	1
Disable C2 IOL Port 3	2	2
Disable C3 IOL Port 4	3	3
Disable C4 IOL Port 5	4	4
Disable C5 IOL Port 6	5	5
Disable C6 IOL Port 7	6	6
Disable C7 IOL Port 8	7	7
Enable C0 DXP Output	8	8
Enable C1 DXP Output	9	9
Enable C2 DXP Output	10	10
Enable C3 DXP Output	11	11
Activate C0 DXP Output	12	12
Activate C1 DXP Output	13	13
Activate C2 DXP Output	14	14
Activate C3 DXP Output	15	15

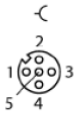
IOLink channel disable, 24V DXP output control

Disable unused IOL Ports so their red diagnostic LED is off. Disabled IOL Ports can be used as standard 24V digital inputs.

Enable DXP 24V outputs available on C0 to C3

Control enabled DXP 24V outputs available on C0 to C3

M12 x 1 I/O Port



1 = V_{aux}1 (V1)
2 = DXP (V1)
3 = GND (V1)
4 = C/Q (V1)
5 = n.c.

C0...C3

Figure 3.12 –Output data map, word 0

- Output data map, word 1

Honda TBEN-LH-8IOL

TURCK

Honda TBEN-LH-8IOL Output Word 1 - 7_APR_2018

Data from RSL/Robot to TBEN	Word 1.0 to .15	
Description	**RSLogix Index**	**Fanuc Starting bit**
IOL C0 to C7 Data Mapping	1	16
C0 IOL Port 1 Mapping B0	0	16
C0 IOL Port 1 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	1	17
C1 IOL Port 2 Mapping B0	2	18
C1 IOL Port 2 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	3	19
C2 IOL Port 3 Mapping B0	4	20
C2 IOL Port 3 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	5	21
C3 IOL Port 4 Mapping B0	6	22
C3 IOL Port 4 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	7	23
C4 IOL Port 5 Mapping B0	8	24
C4 IOL Port 5 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	9	25
C5 IOL Port 6 Mapping B0	10	26
C5 IOL Port 6 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	11	27
C6 IOL Port 7 Mapping B0	12	28
C6 IOL Port 7 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	13	29
C7 IOL Port 8 Mapping B0	14	30
C7 IOL Port 8 Mapping B1 - 00=Direct, 01=Swap 16, 01=Swap 32, 11=Swap All	15	31

B1	B0	
0	0	Direct
0	1	Swap 16
1	0	Swap 32
1	1	Swap All

IOLink Port 1 Map Bits

IOLink Port 8 Map Bits

00	direct **A**	The process data are not swapped. (0×0123 4567 89AB CDEF)
01	swap 16 bit	The bytes are swapped per word. (0×2301 6745 AB89 EFCD)
10	swap 32 bit	The bytes are swapped per double word. (0× 6745 2301 EFCD AB89)
11	swap all	All bytes are swapped. (0×EFCD AB89 6745 2301)

Figure 3.13 – Output data map, word 1

- Output data map, word 2

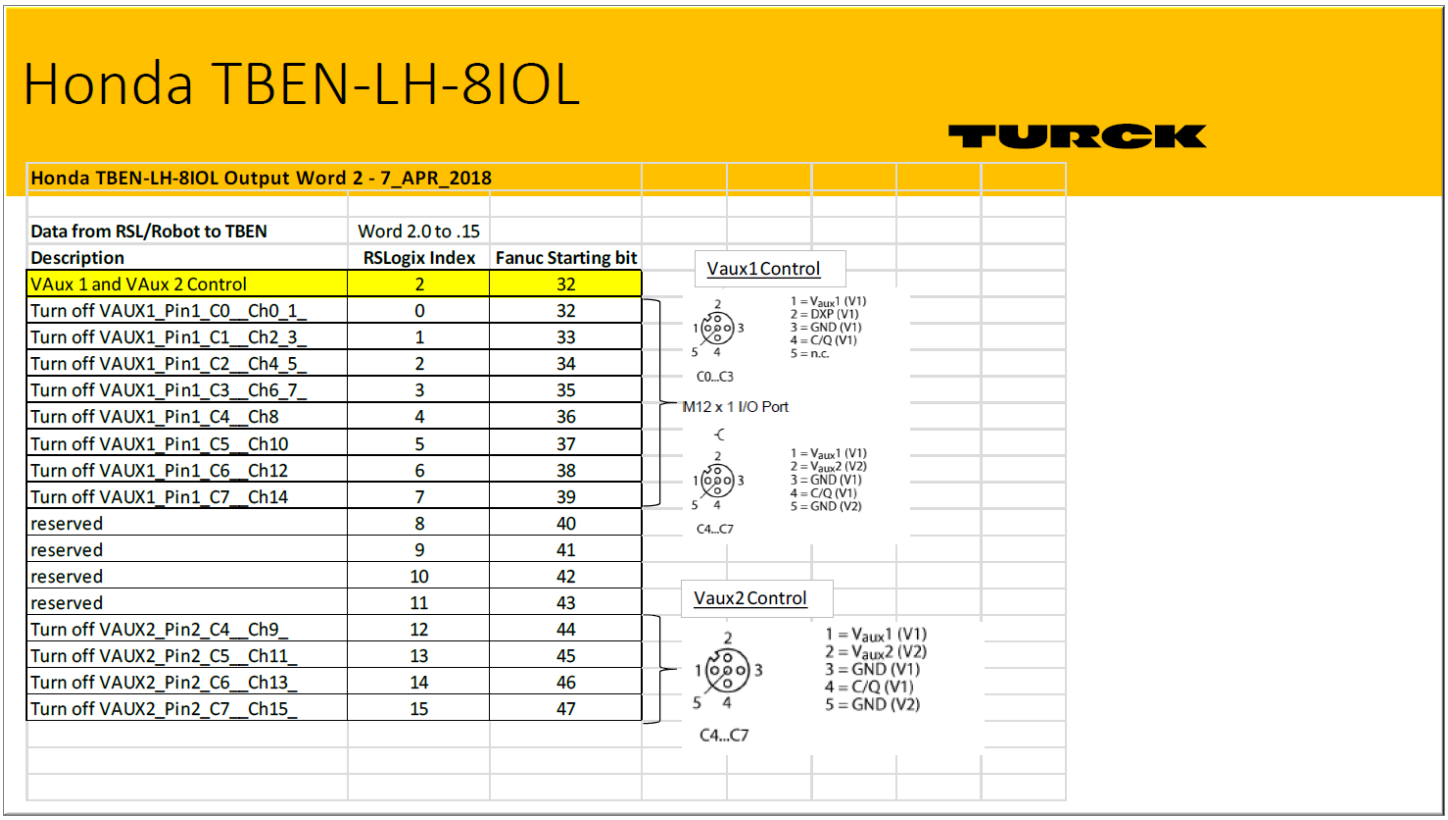


Figure 3.14 – Output data map, word 2

- Output data map, word 3

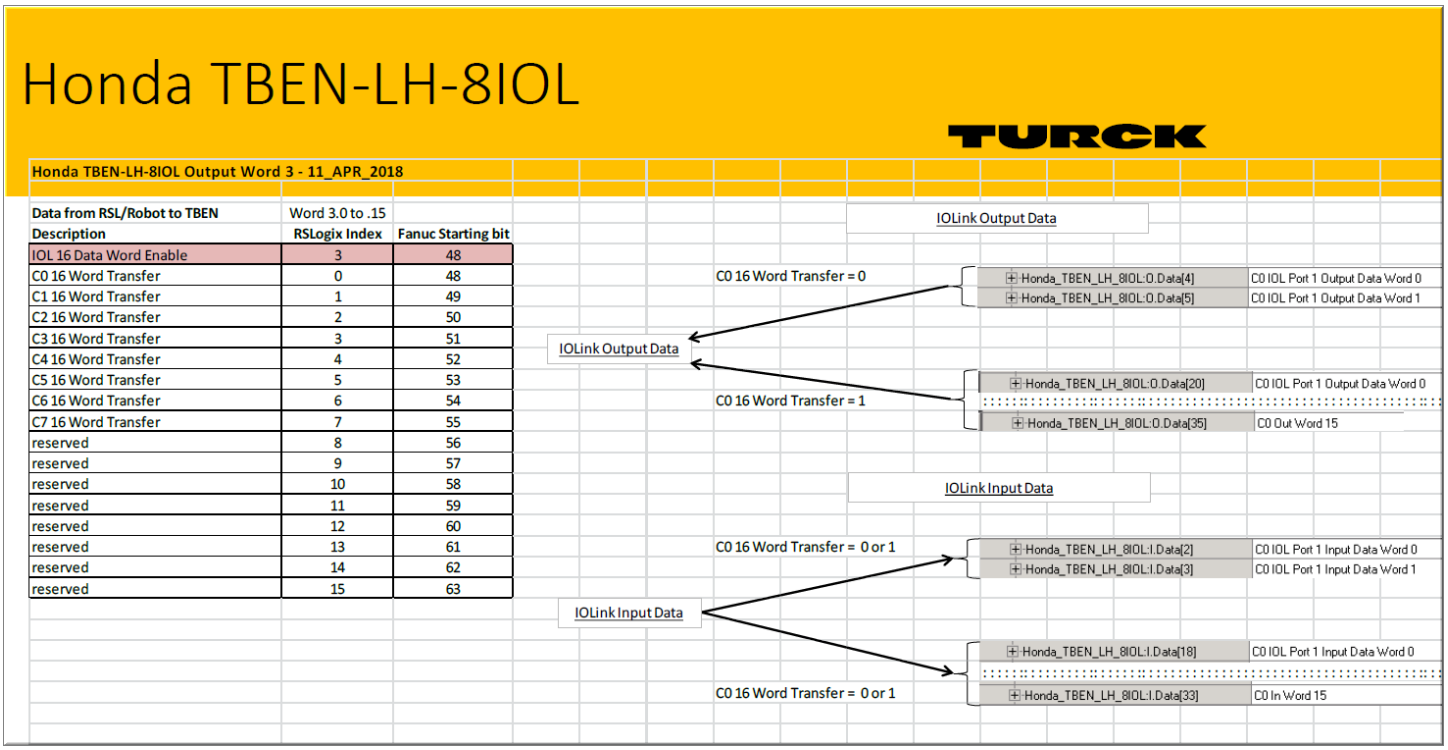


Figure 3.15 – Output data map, word 3

3.3 Application Requirements

Honda TBEN-LH-8IOL

Application Requirements

TURCK

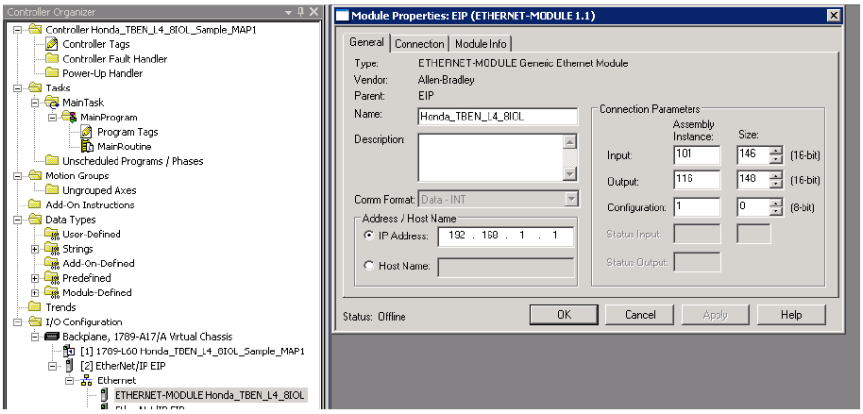
- IOLink Master optimized for use with Omron, RSL5000 and Fanuc Robot
  - Default Network Settings
    - IP Address: 192.168.0.XXX
    - Subnet: 255.255.252.0
  - Reduced Data Footprint
    - 18 words input, 20 words output for simple IOL device integration
    - 146 words input, 148 words output for integration of 32 byte IOL devices
  - Station Configuration in process Output Data
    - No configuration via web-server required
  - Device support including:
    - IO Link TBIL standard 24V device expansion
    - IO Link Valve Bank integration (Class B Power)
    - IO Link Stack Light
    - IO Link RFID
    - Standard 24V inputs on unused IOL Ports
    - Standard 24V In/Out DXP control on C0 to C3
  - Quick Connect and non-Quick Connect supported

Figure 3.16 –TBEN-LH-8IOL application requirements

Honda TBEN-LH-8IOL

TURCK

Integration with RSL5000 using Generic Ethernet Connection
- Connection information included in catalog file



Quick Connect Disabled: Use Output Assembly Instance 116, QC Enabled: Use Output Assembly Instance 115

Figure 3.17 – TBEN-LH-8IOL integration into RSLogix5000

3.4 IO-Link Port Setup

3.4.1 Open Web Server

- Enter IP address of the deice into Web browser

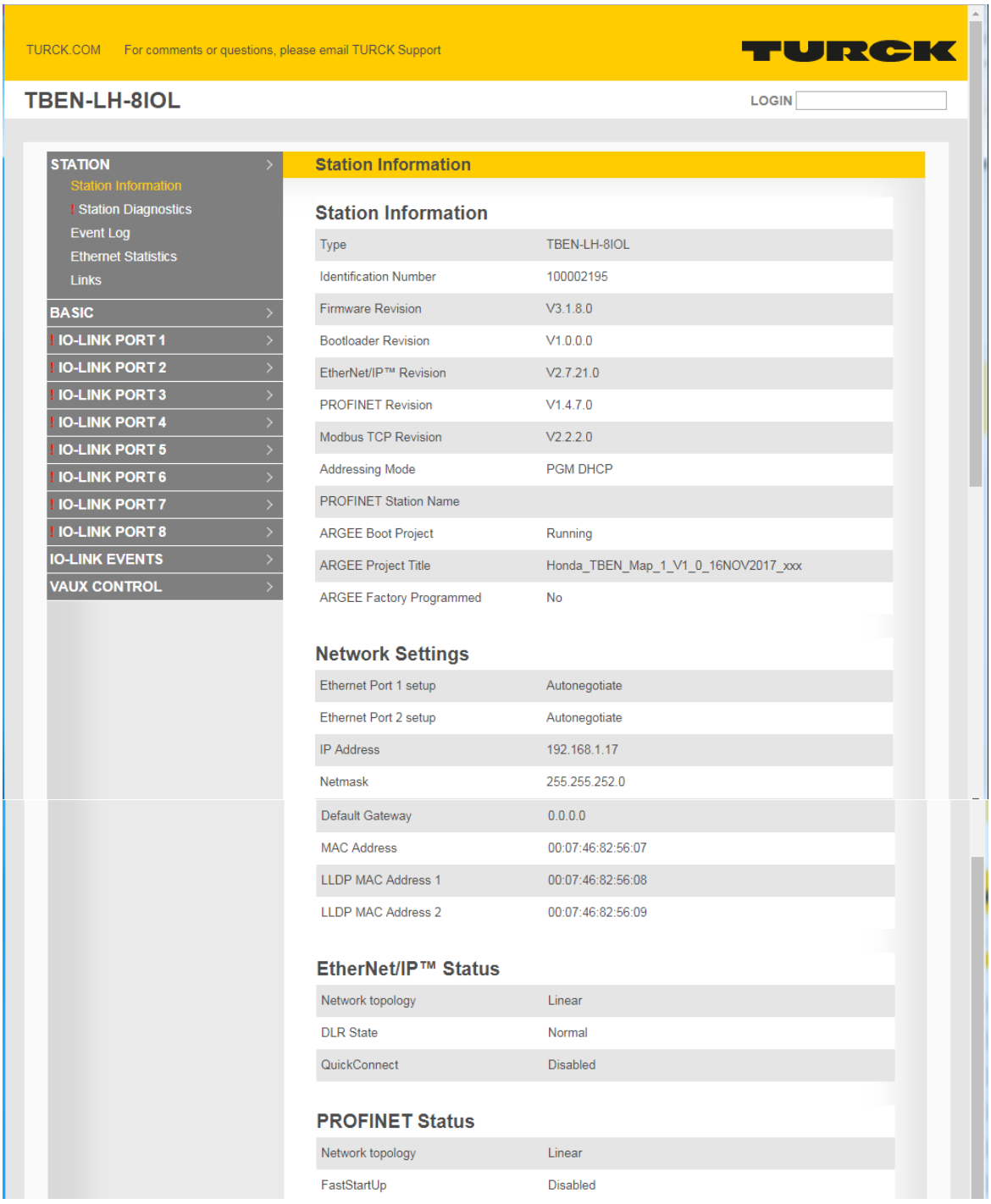


Figure 3.18 – Web server

3.4.2 Administrator access

When someone is logged-in as an administrator, it gains the access to the device IP address setup, the parameters setup and other control functions. The administrator access is controlled by the password, which may be changed.
The procedure:

- Enter “password” into *LOGIN* field

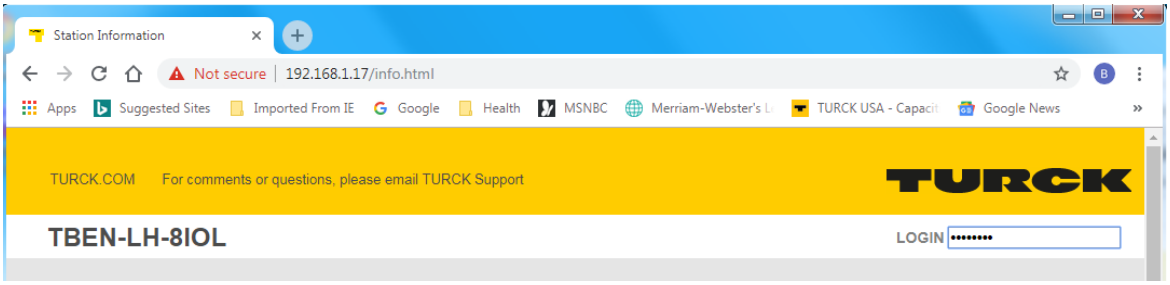


Figure 3.19 – Administrator login

NOTE

If you forget the password, reset the device to the factory defaults (900). Before the reset takes place, save all IOL current setup, as it will be deleted and set to the factory defaults. After the reset, the first thing to do is to assign an IP address to the device.

3.4.3 Basic Parameter Setup

- Activate DXP outputs 1.3.5 and 7 by entering “yes” in the drop down selection dialog
- If DXP output short condition needs to be confirmed by the PLC, enter “yes” in the drop down selection dialog

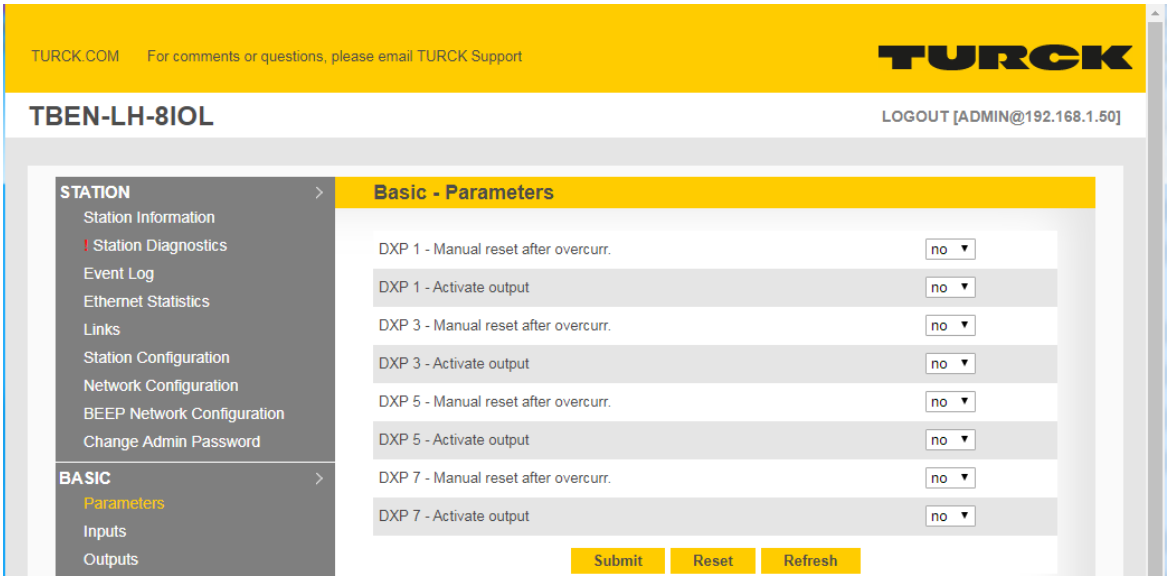


Figure 3.20– Basic parameter setup

3.4.4 IOL Master Default Setup

Refer to the TBEN-Lx…-8IOL User Manual for the description of the IO-Link master's features and setup. The setup made by the Web server is saved in the device permanent memory. If the device is reset to the factory default values, the custom setup will be lost.

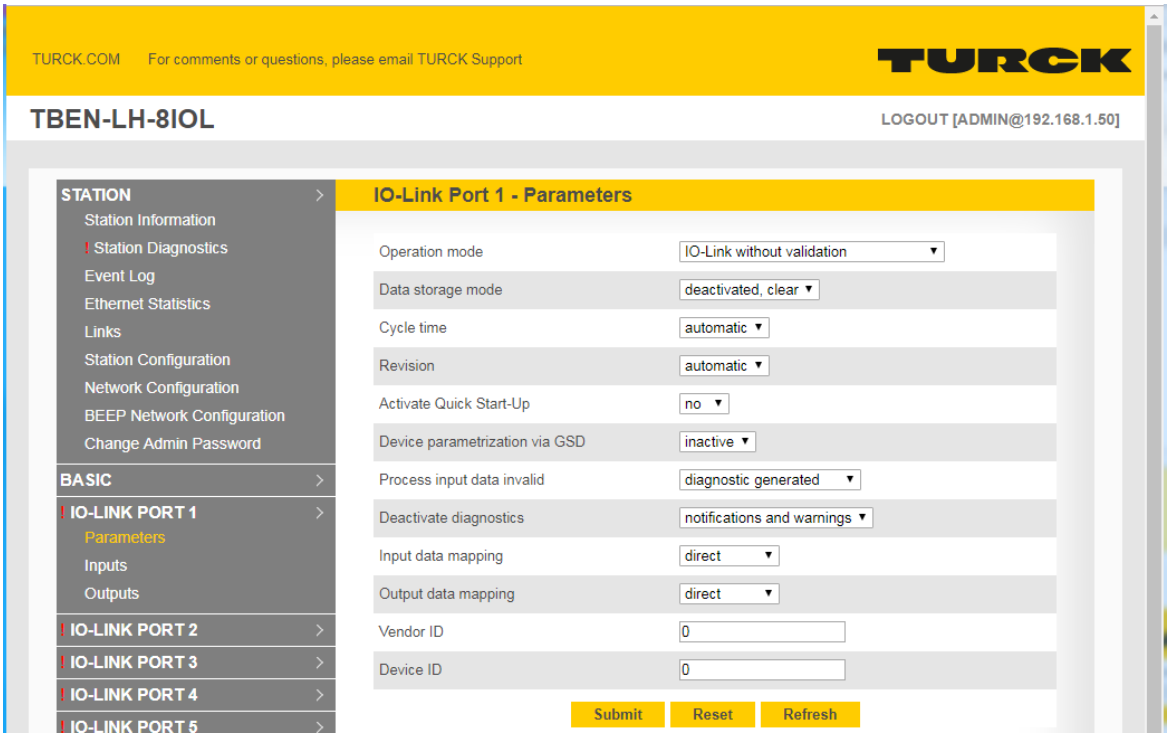


Figure 3.21 – IO-Link master setup page

3.4.5 VAUX Control

The Vaux1 and Vaux2 power is controlled by the ***"VAUX control – Parameters"*** web page:
Available options are:

- 0 = 24 VDC
- 1 = switchable
- 2 = off"

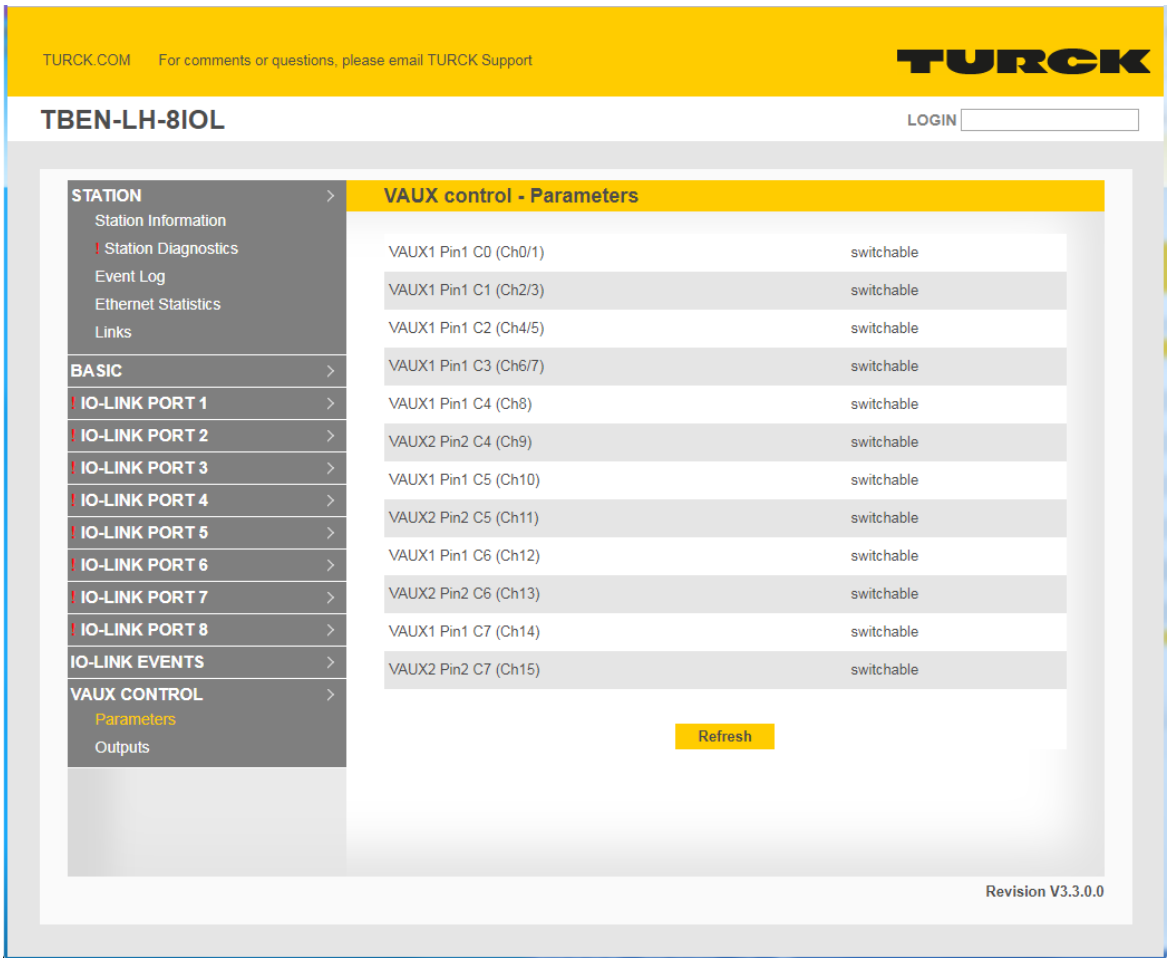


Figure 3.22 –VAUX control page

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4 Configure TBEN-LH-8IOL with Rockwell PLC

The configuration of the TBEN-LH with the Logix5000 controllers, using RSLogix5000 / Studio5000 programming environment may be done using:

- EDS file
- Generic device profile

4.1 TBEN-LH-8IOL 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 "Volume 1, Common Industrial Protocol (CIP), Edition 3.22, by ODVA".
The procedure:

- Download *TBEN-LH-8IOL_R2.7.EDS* file from the TURCK web site
- In the RSLogix5000 menu bar, expand the *Tools* drop down menu and click on the *EDS hardware Installation Tool*

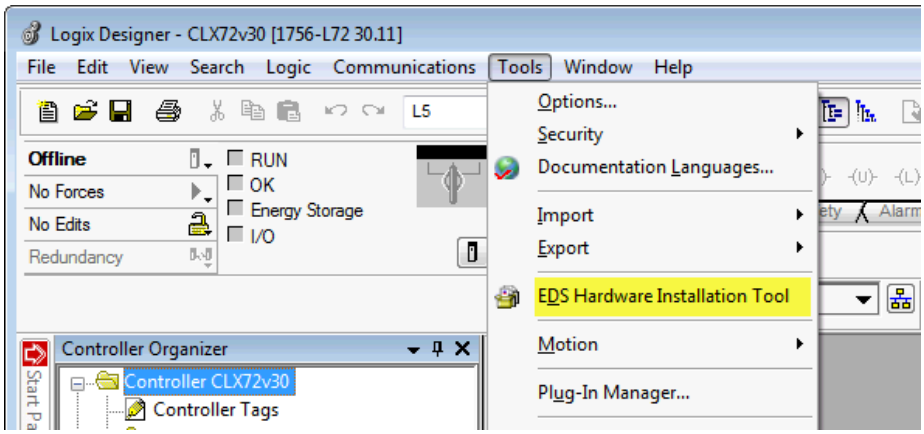

Figure 4.1 – Tools menu

- In the *Rockwell Automation's EDS Wizard* dialog, click at the *Register and EDS file(s)* and *Next*
- Follow the dialog to complete device registration

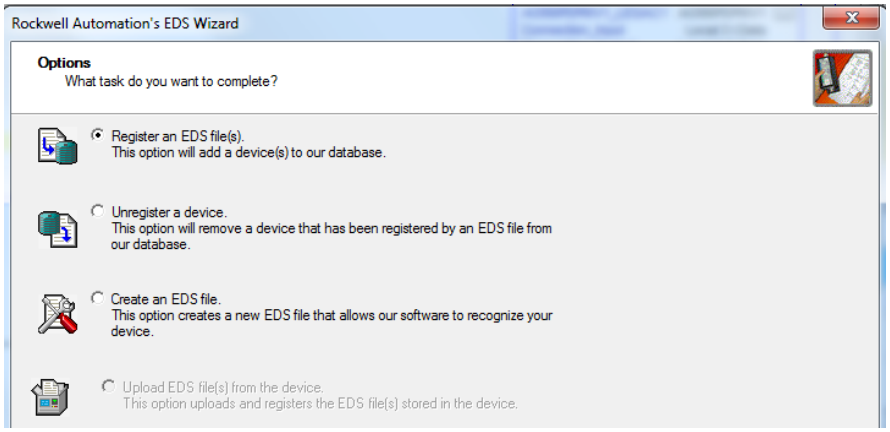

Figure 4.2 – Register an EDS file(s)

4.1.2 Create a new module

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

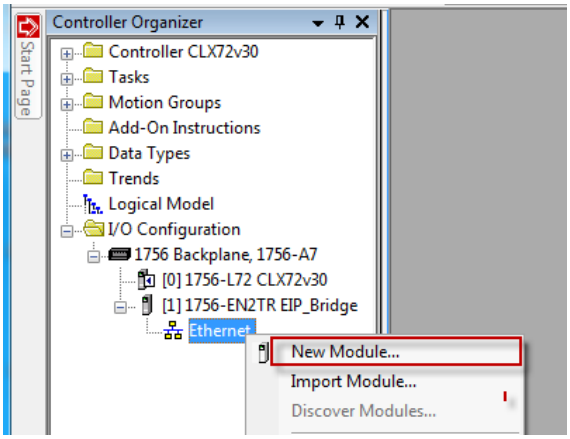

Figure 4.3 – Add new module

- Enter the device name in the search area
- Highlight the device from the list and click *Create*.

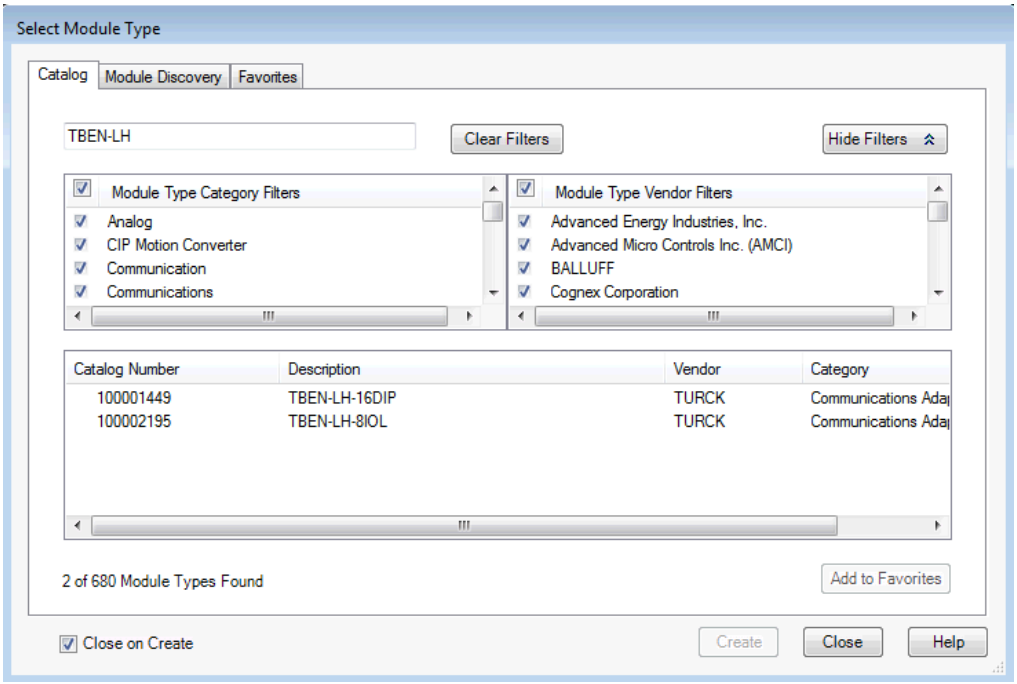

Figure 4.4 – Select Module Type dialog page

4.1.3 Configure TBEN-LH-8IOL using default connection

- Fill in the *Name*, *Description* and *Ethernet Address* of the device

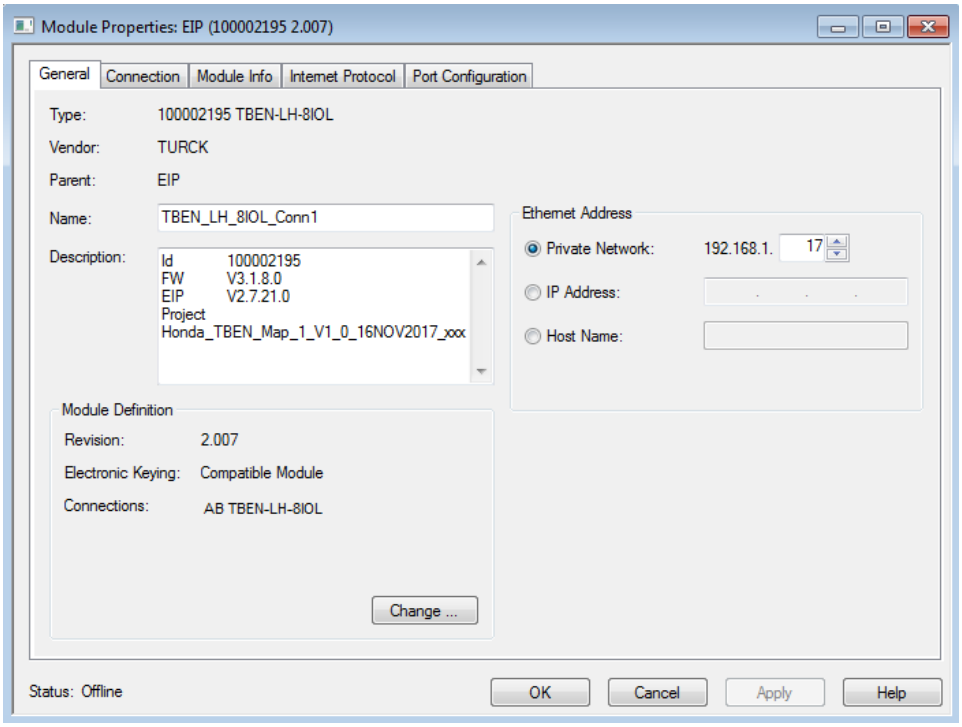

Figure 4.5 –New Module setup

- Click "*Change*…" to open the "*Module Definition"* page, Figure 4.6
- Use default connection *"AB TBEN-LH-8IOL"* ; select INT data format from the drop down menu, per Figure 4.6
- Click *OK* to return to previous dialog page
- Click "*Apply*" and *"OK"*
- Follow the dialog to save configuration, download and go on-line.

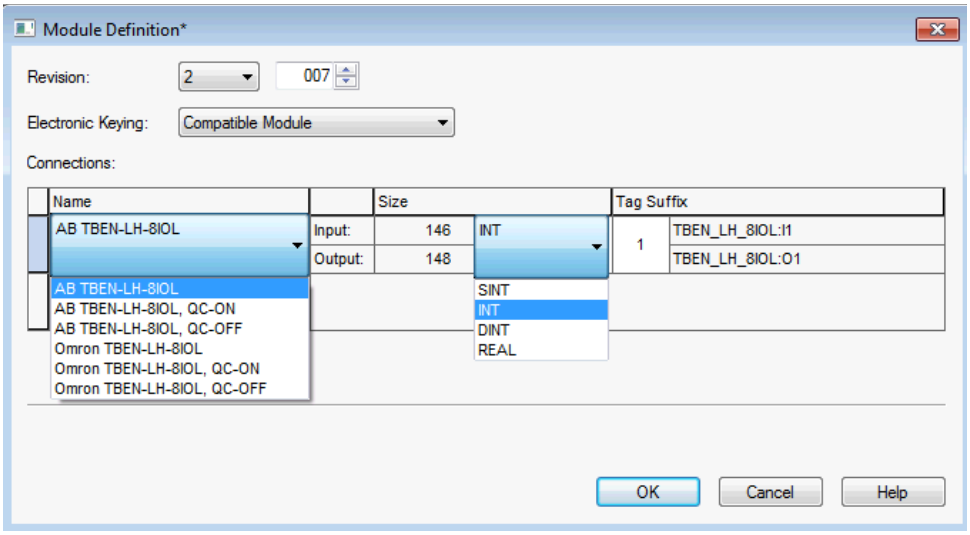

Figure 4.6 – Select connection and data format

4.1.4 Configure TBEN-LH-8IOL_QC_ON Connection

When the device is configured using a "*TBEN-LH-8IOL_QC_ON"* connection, the device is switched to the QuickConnect (QC) mode. The device is "Ready for Connection" at 100msec time after the device power cycle. The actual connection time depends on a controller setup and system architecture.
The QC_ON connection is configured as follows:

- Create a new module as described in the section 4.1.2
- Fill in the *Name*, *Description* and *Ethernet Address* of the device at *New Module* dialog page

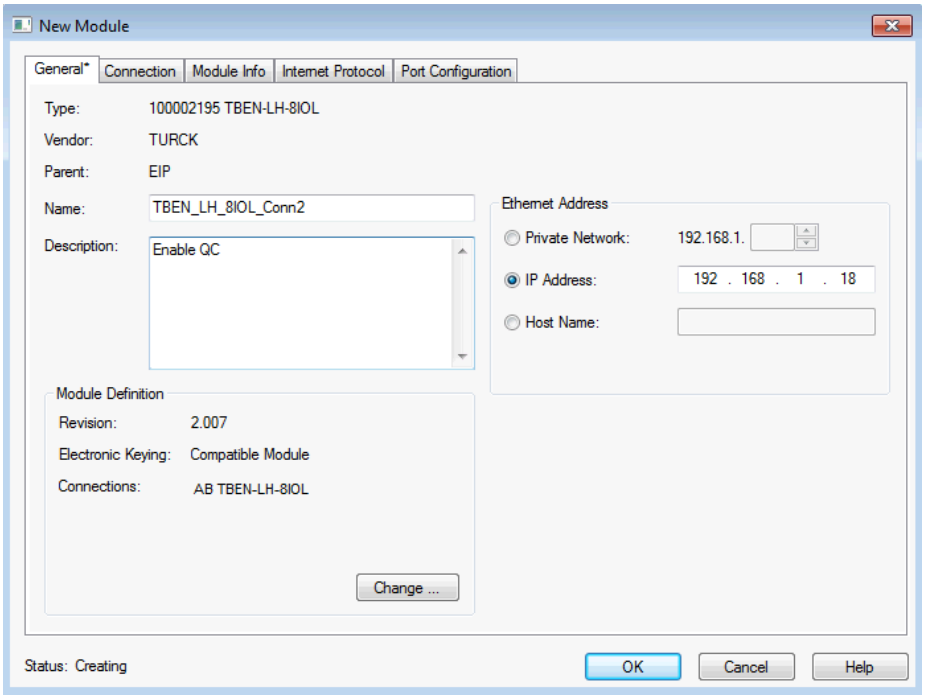

Figure 4.7 – *New Module* configuration

- Click "Change…" to open the "*Module Definition"* page
- Use *"TBEN-LH-8IOL_QC_ON"* connection from the *Connection Name"* drop down list and select INT data format at the *Size* drop down list, per Figure 4.8
- Click *OK* to return to the previous dialog page
- Click "*Apply*" and *"OK* at the *New Module* dialog page
- Follow the dialog to save configuration, download program and go on-line.

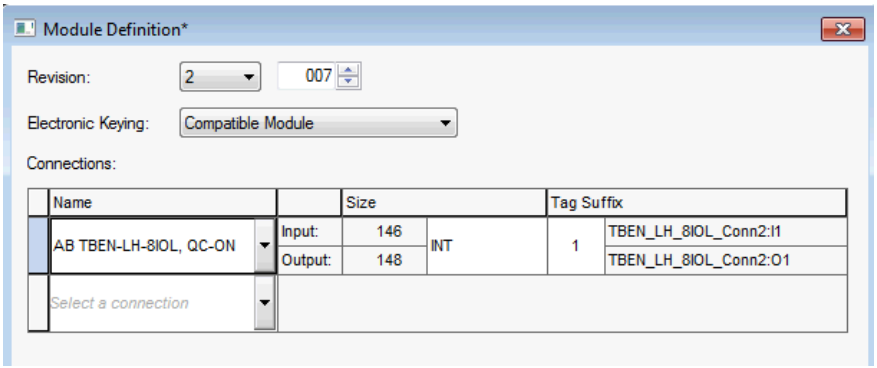

Figure 4.8 – QC_ON Connection setup

When QuickConnect is enabled, the device sets P1 port (ETH1) and P2 port (ETH2) as follows:

- Fixed speed at 100Mb
- Forced duplex at Full-duplex
- P1 port set as MDI (strait-through connection)
- P2 port set as MDIX (cross-over connection)
- Auto-Negotiate and Auto-MDX are disabled

The TBEN-LH-8IOL QuickConnect operational time:

- Ready-to-connect time = 100ms (time measured from the device power-up to the first ARP)
- CIP connection time < 10ms

NOTE

The incoming Ethernet cable is always connected to P1 port. P2 port is used for daisy-chaining next node if required. All daisy-chained nodes have to be QC enabled, and have unique IP address in the system. The QC enabled device does not perform duplicate address check.

Verify setup using the web server:

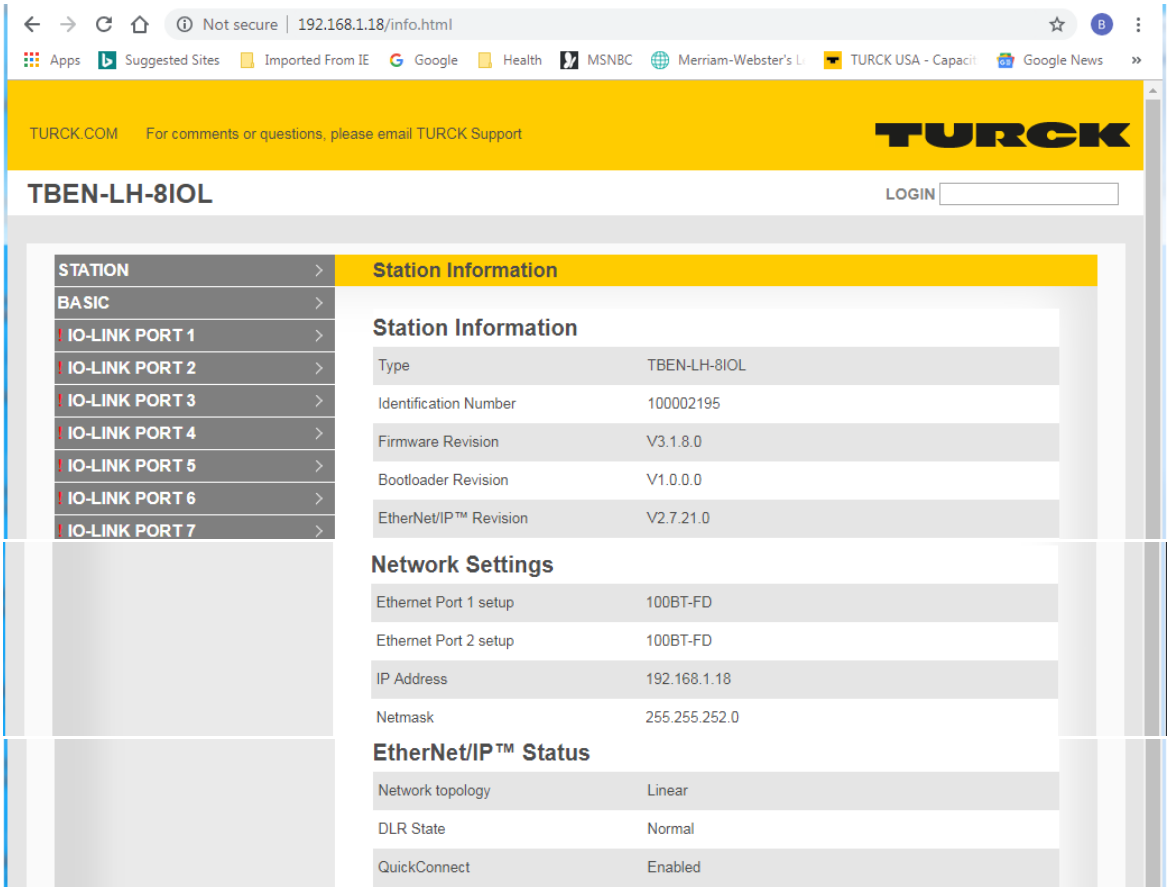

Figure 4.9 - TBEN QC enabled view

4.1.5 Configure TBEN-LH-8IOL_QC_OFF Connection

The "*TBEN-LH-8IOL_QC_OFF"* connection disables QC mode and restores the device Ethernet ports to:

- Autonegotiate
- Auto-MDIX

- Follow the steps described in the section 4.1.2 to create a new module
- Fill in the *Name*, *Description* and *Ethernet Address* of the device at the *New Module* dialog page

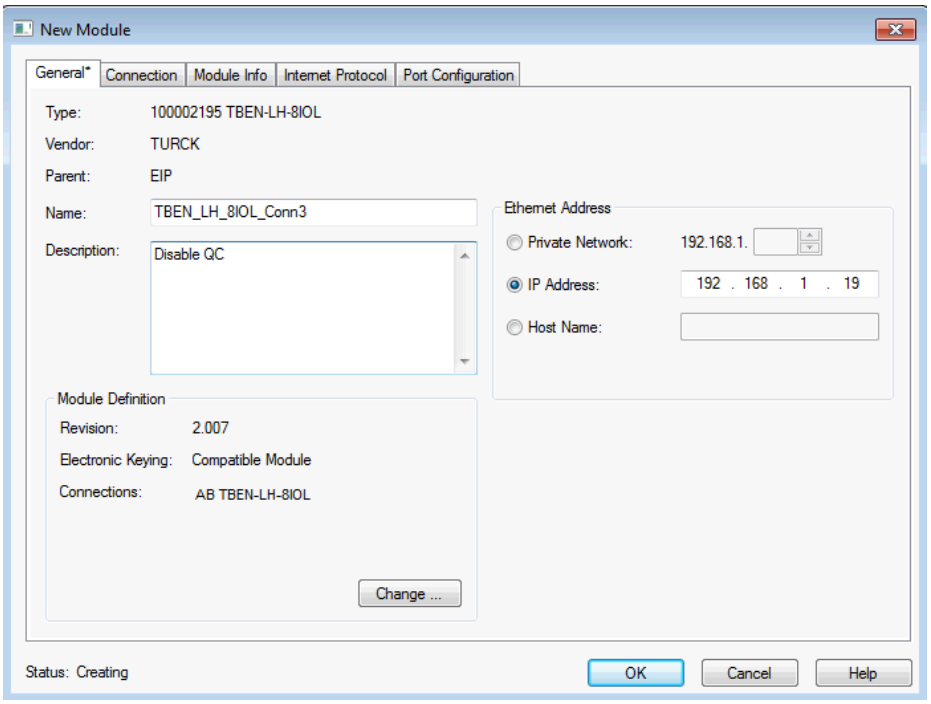

Figure 4.10 – New Module configuration

- Use *"TBEN-LH-8IOL_QC_OFF"* connection from the *Connection Name"* drop down list and select INT data format at the *Size* drop down list, per Figure 4.11
- Click *OK* to return to the previous dialog page
- Click "*Apply*" and *"OK* at the *New Module* dialog page
- Follow the dialog to save configuration, download program and go on-line.

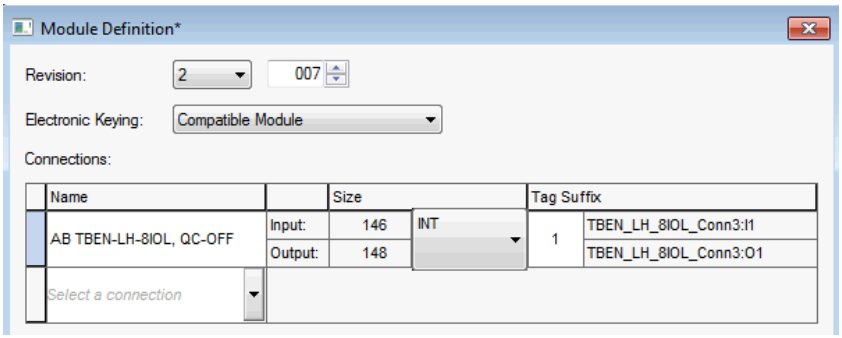

Figure 4.11 – QC_OFF Connection setup

4.2 TBEN-LH-8IOL configuration using generic device profile

4.2.1 Generic device configuration

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*

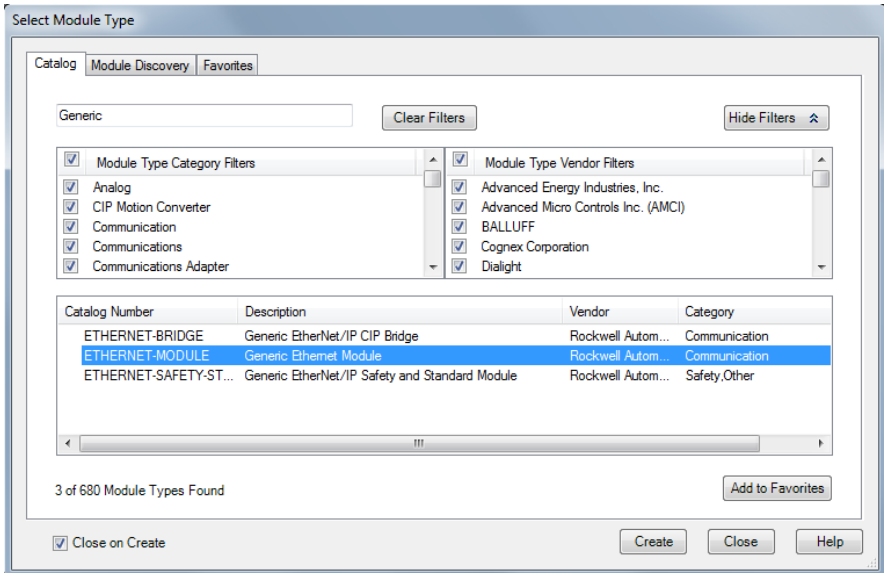

Figure 4.12 – Generic module selection page

- 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

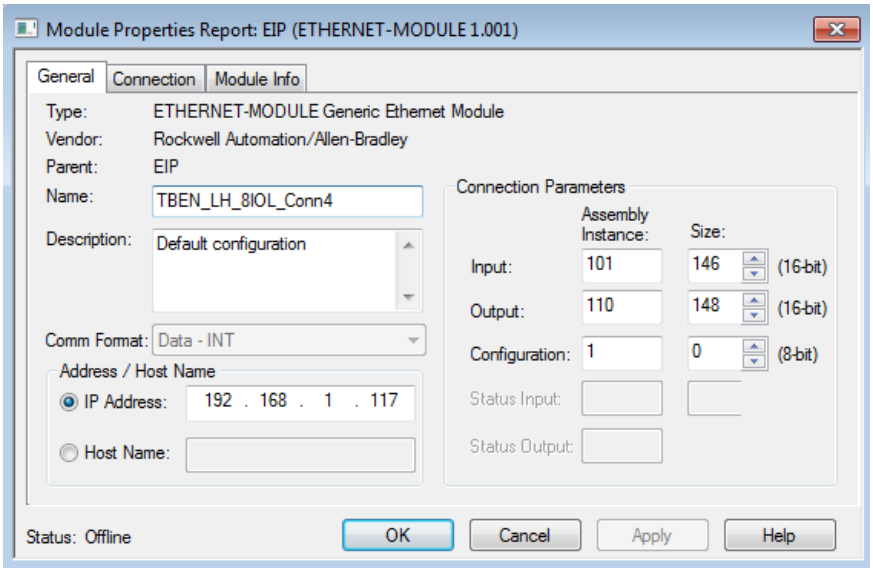

Figure 4.13 – TBEN default configuration

4.2.2 Generic device and QC_ON configuration

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

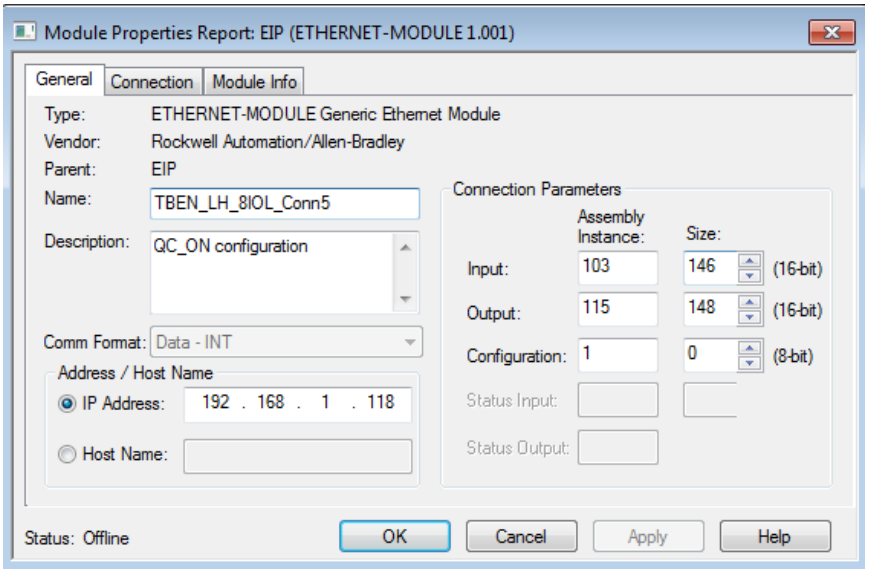

Figure 4.14 – TBEN QC-ON configuration

4.2.3 Generic device and QC_OFF configuration

- Repeat procedure as described above
- Enter the *Connection Parameters* as follows:

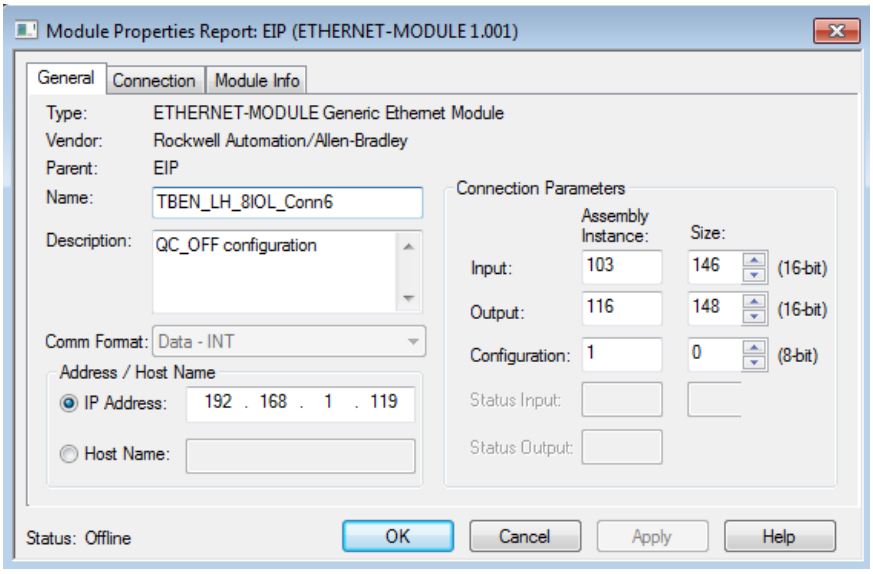

Figure 4.15 – TBEN QC-OFF configuration

5 TBEN-LH-8IOL Configuration with OMRON PLC

The configuration of the TBEN-LH device, using the Omron Network Configurator application, is based on extensive use of the device EDS file. It is assumed that a user is familiar with the Network Configurator functions.

5.1 Get ready environment

5.1.1 Register EDS file

Start *Network Configurator* and get the device and associated tag sets registered:

- Expand "*EDS File*" drop-down menu in the Configurator menu bar, click *"Install"*
- Follow the dialog to install TBEN-LH-8IOL_R2.7.EDS file

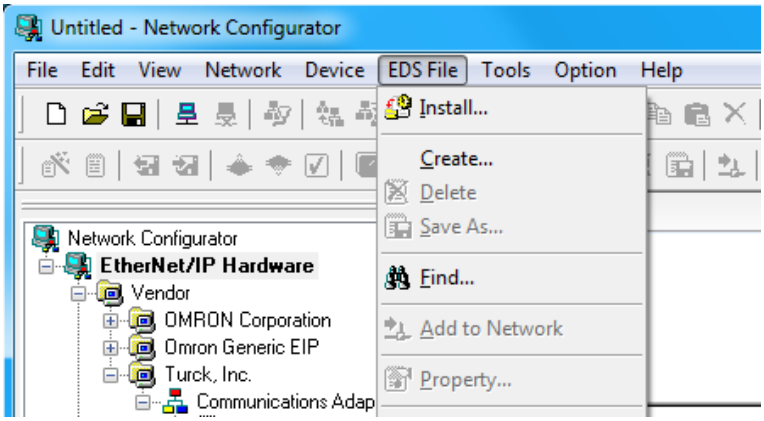

Figure 5.1 – Install EDS file menu

- Expand *TURCK Inc., Communications Adapter*, in the *Hardware List Window*
- Right--click at the TBEN-LH-8IOL, select *Property* pop-up menu
- Verify device identity and EDS file property

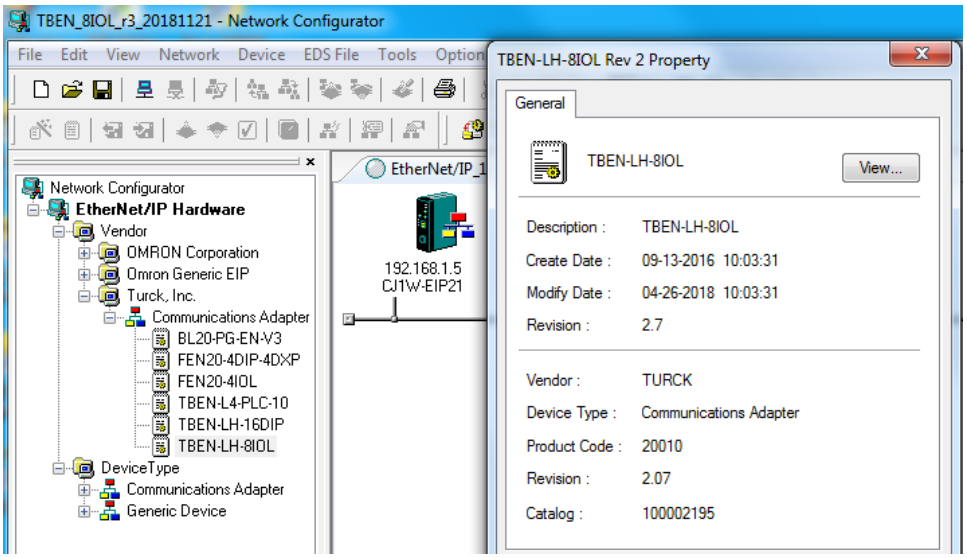

Figure 5.2 – TBEN-LH-8IOL device property page

5.1.2 Add device to the project

- Add Omron CJ1W-EIP21 Communication Adapter from the *Hardware List Window*, drag and drop into the new EtherNet/IP network
- Select TURCK TBEN-LH-8IOL Communication Adapter from the *Hardware List Window*, drag and drop into the new EtherNet/IP network

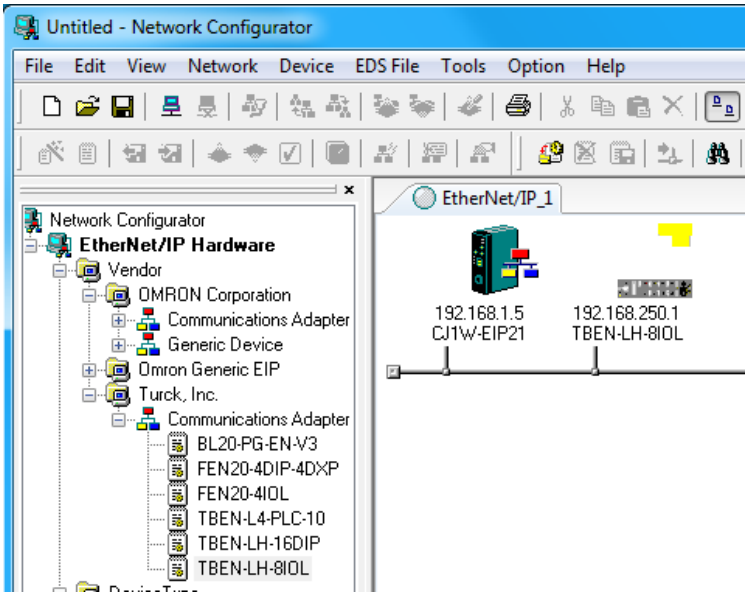

Figure 5.3 – Add new EtherNet/IP adapter

- Right-Click at TBEN to open pop-up window and click *Change Node Address*
- Assign the device IP address

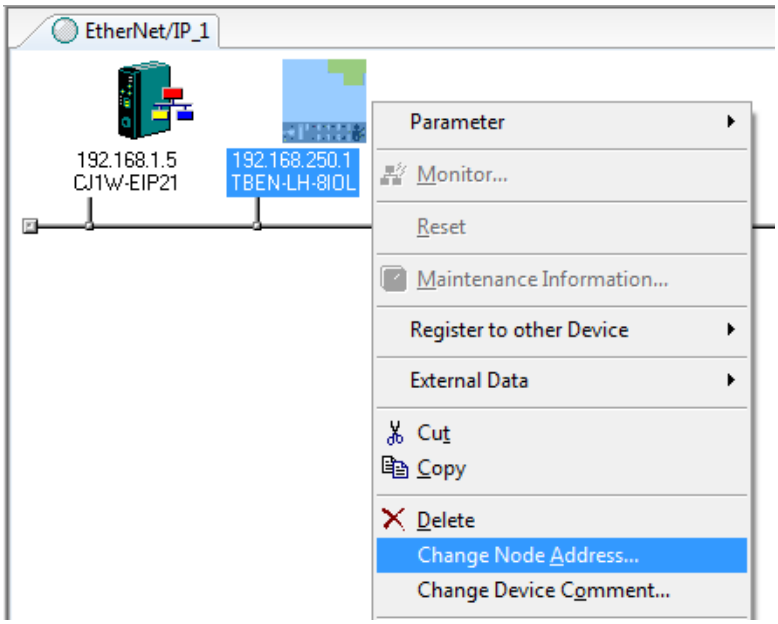

Figure 5.4 – Change Node Address

5.1.3 Register tag sets

- Create the input tag set, TBEN_LH_8IOL_In, starting at offset D0, length 292 bytes

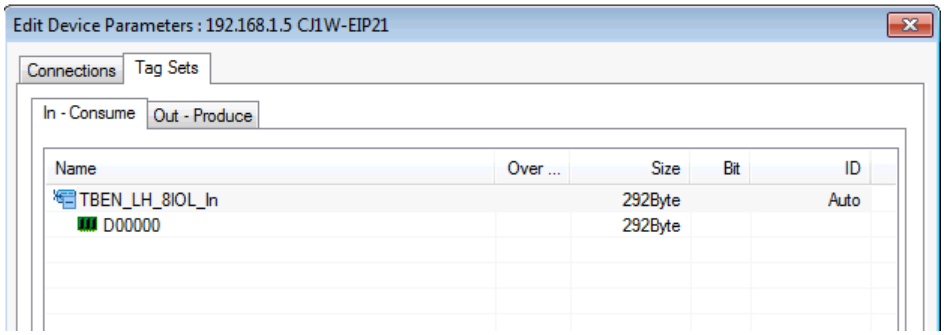

Figure 5.5 – Input data tag

- Create the output tag set, TBEN_LH_8IOL_Out, starting at offset D400, length 296 bytes

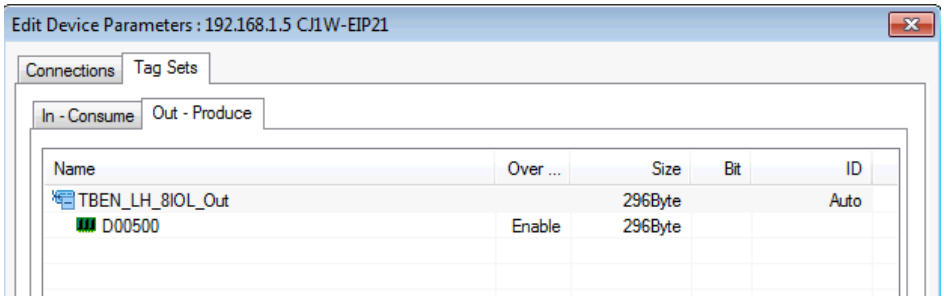

Figure 5.6 – Output data tag

5.1.4 The device connection types

The device supports multiple connection types. Those named “Omron” are used for configuration with Omron PLCs:

Connection Name	Assembly Instance					
	Input		Output		Configuration	
	Instance No	Data size	Instance No.	data size	Instance No.	Data size
AB TBEN-LH-8IOL	101	146	110	148	1	0
AB TBEN-LH-8IOL, QC-ON	101	146	115	148	1	0
AB TBEN-LH-8IOL, QC-OFF	101	146	116	148	1	0
Omron TBEN-LH-8IOL	103	146	110	148	1	0
Omron TBEN-LH-8IOL, QC-ON	103	146	115	148	1	0
Omron TBEN-LH-8IOL, QC-OFF	103	146	116	148	1	0

Table 5.7 – Connection types

Explanation of terms:

- Omron — Connection used by Omron PLC
- TBEN-LH-8IOL — Default connection
- QC-ON — Connection enables QuickConnect feature
- QC-OFF — Connection disables QuickConnect feature

5.2 Configure TBEN-LH-8IOL

5.2.1 Configure TBEN-LH-8IOL using default connection

- Right click at the controller to open pop-up menu
- Highlight *Parameter* in the menu and select *Edit*
- Drag and drop TBEN-LH-8IOL from the *Unregister Device List* into *Register Device List*
- Click at *New…* button to open the *Edit Connection* configuration page
- Click at the *Connection I/O Type* selection field , drop down arrow
- Select *Omron TBEN-LH-8IOL* connection
- The *Target Device* info is auto-populated based on the EDS file definition
- Enter the *Originator Device* IO tag sets and connection type as follows
- Register device

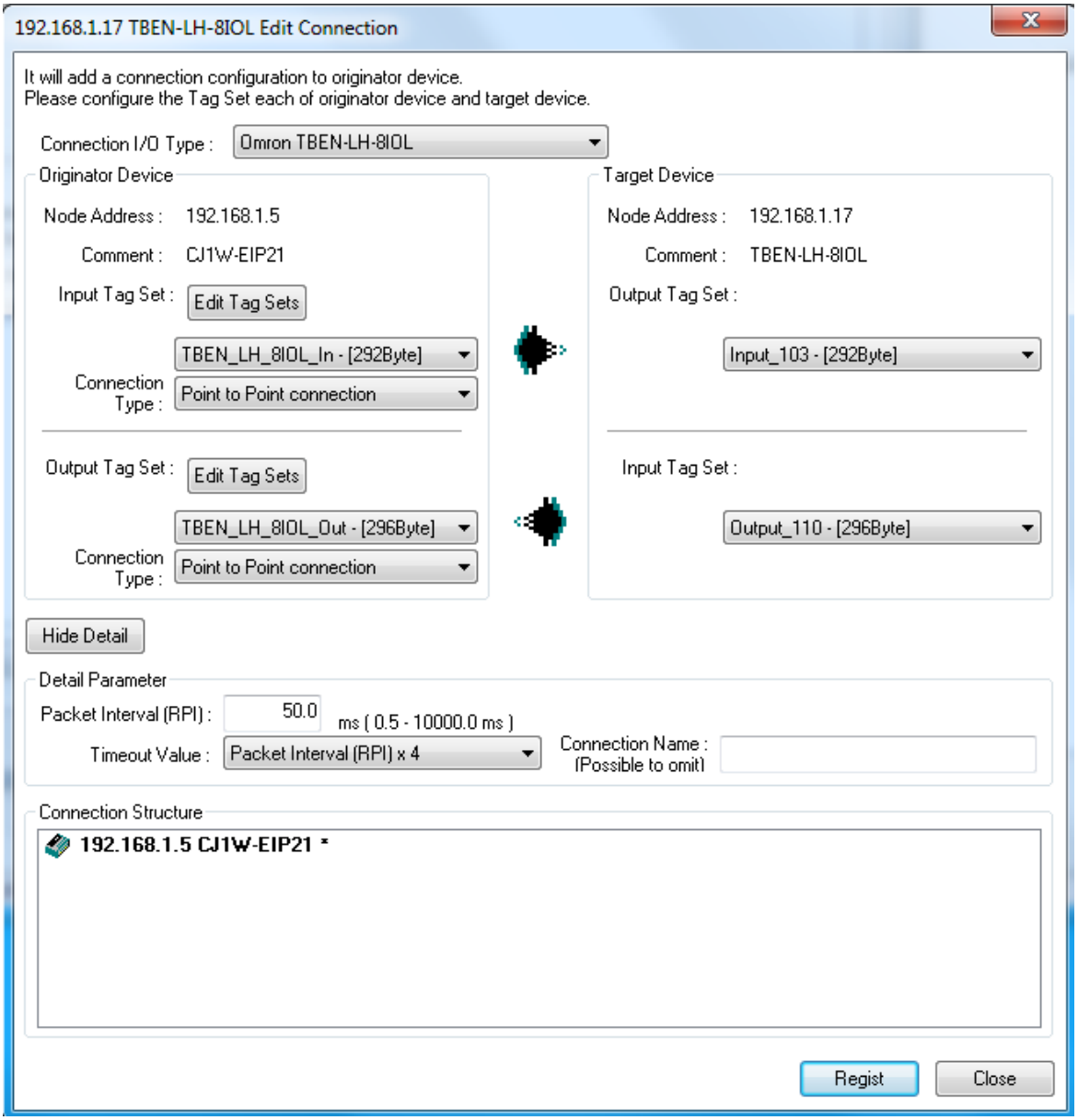

Figure 5.8 – Edit Connection configuration page

5.2.2 Configure TBEN-LH-8IOL using QC-ON connection

The QC-ON connection enables the QuickConnect feature in the device.
The procedure:

- Right click at the controller to open pop-up menu
- Highlight *Parameter* in the menu and select *Edit*
- Drag and drop TBEN-LH-8IOL from the *Unregister Device List* into *Register Device List*
- Click at *New…* button to open the *Edit Connection* configuration page
- Click at the *Connection I/O Type* selection field , drop down arrow
- Select *Omron TBEN-LH-8IOL, QC-ON* connection
- The *Target Device* info is auto-populated based on the EDS file definition
- Enter the *Originator Device* IO tag sets and connection type as follows
- Register device

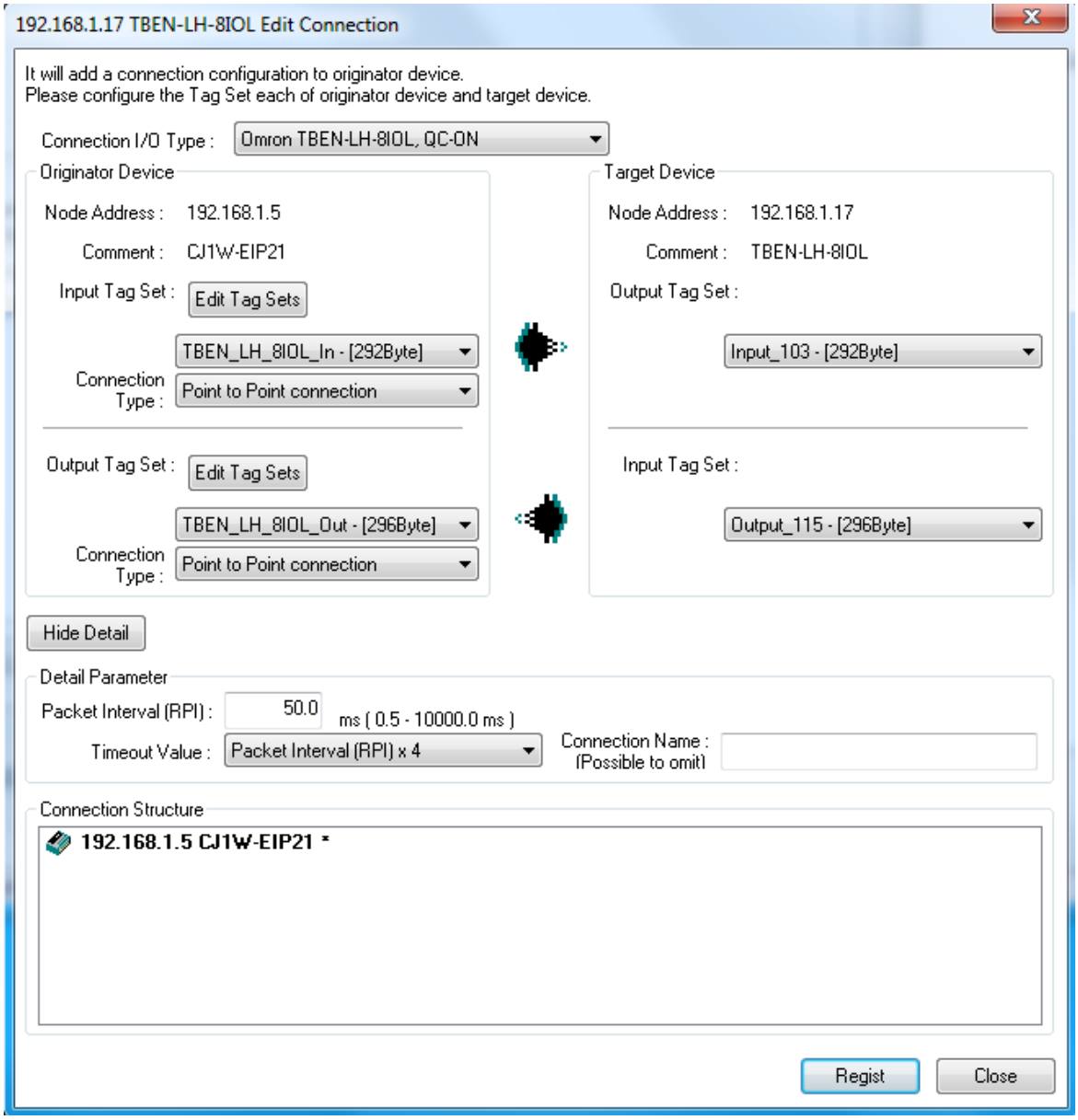

Figure 5.9 – Register device with QC enabled

5.2.3 Configure TBEN-LH-8IOL using QC-OFF connection

The QC-OFF connection disables the QuickConnect feature in the device.
The procedure:

- Right click at the controller to open pop-up menu
- Highlight *Parameter* in the menu and select *Edit*
- Drag and drop TBEN-LH-8IOL from the *Unregister Device List* into *Register Device List*
- Click at *New…* button to open the *Edit Connection* configuration page
- Click at the *Connection I/O Type* selection field , drop down arrow
- Select *Omron TBEN-LH-8IOL, QC-OFF* connection
- The *Target Device* info is auto-populated based on the EDS file definition
- Enter the *Originator Device* IO tag sets and connection type as follows
- Register device

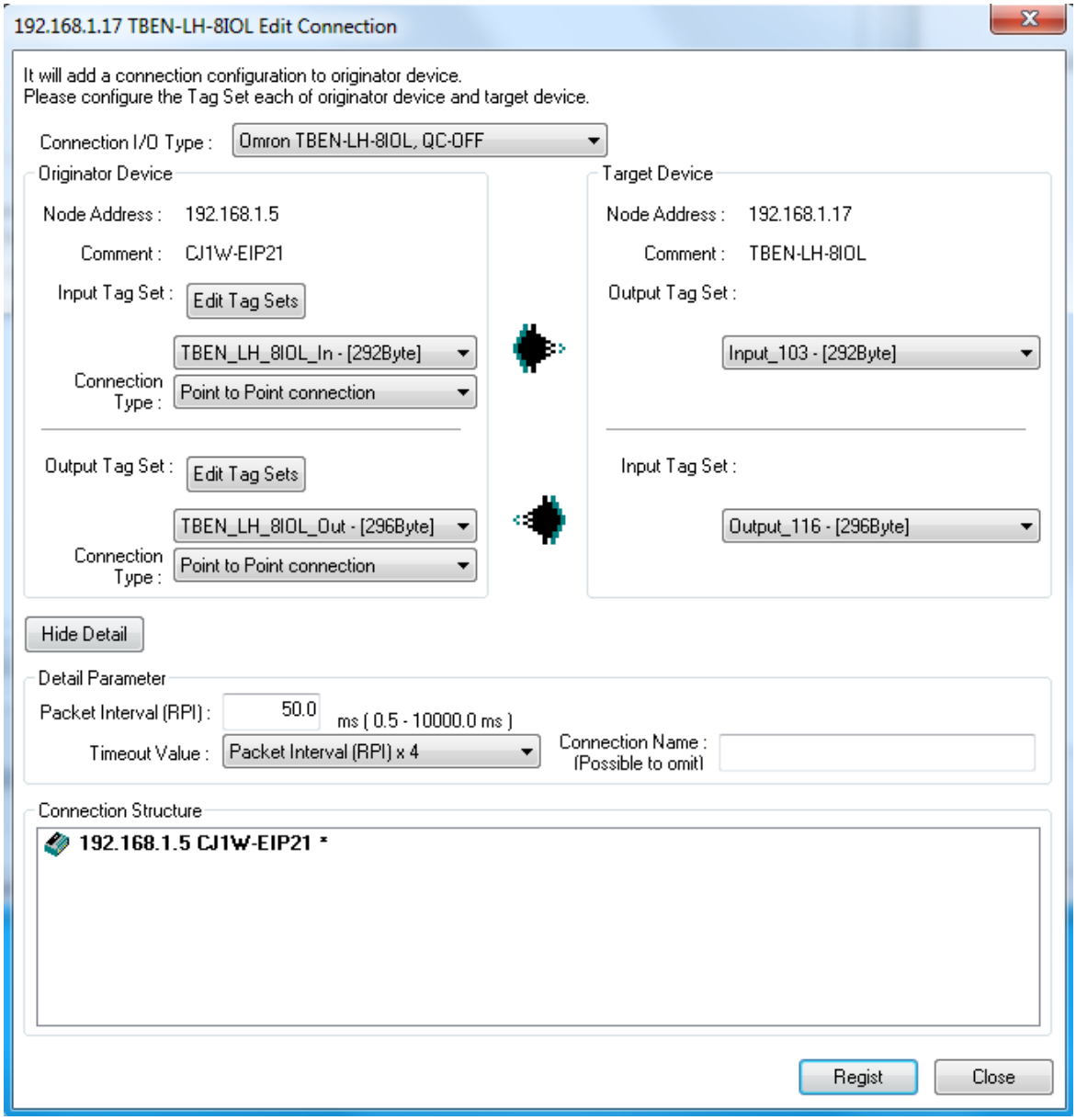

Figure 5.10 – Register device with QC disabled

6 Resources

6.1.1 IO-Link master user manuals, data sheets, IODDs

- TBEN-Lx-8IOL
  https://pdb2.turck.de/us/DE/products/000000170001d3a7000a003a
  https://pdb2.turck.de/us/DE/products/0000001600019e750008003a

- TBEN-S2-4IOL
  https://pdb2.turck.de/us/DE/products/0000003100008dc50003003a

6.1.2 IO-Link slave devices

- The data sheets, configuration files, user manuals
  https://www.turck.us/en/iolink-2577.php

6.1.3 FLC controller

- ARGEE
  https://pdb2.turck.de/us/DE/products/000000370002b2930005003a

- IO-Link IODDs
  https://pdb2.turck.de/us/DE/groups/0000000600003a8a00010023

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