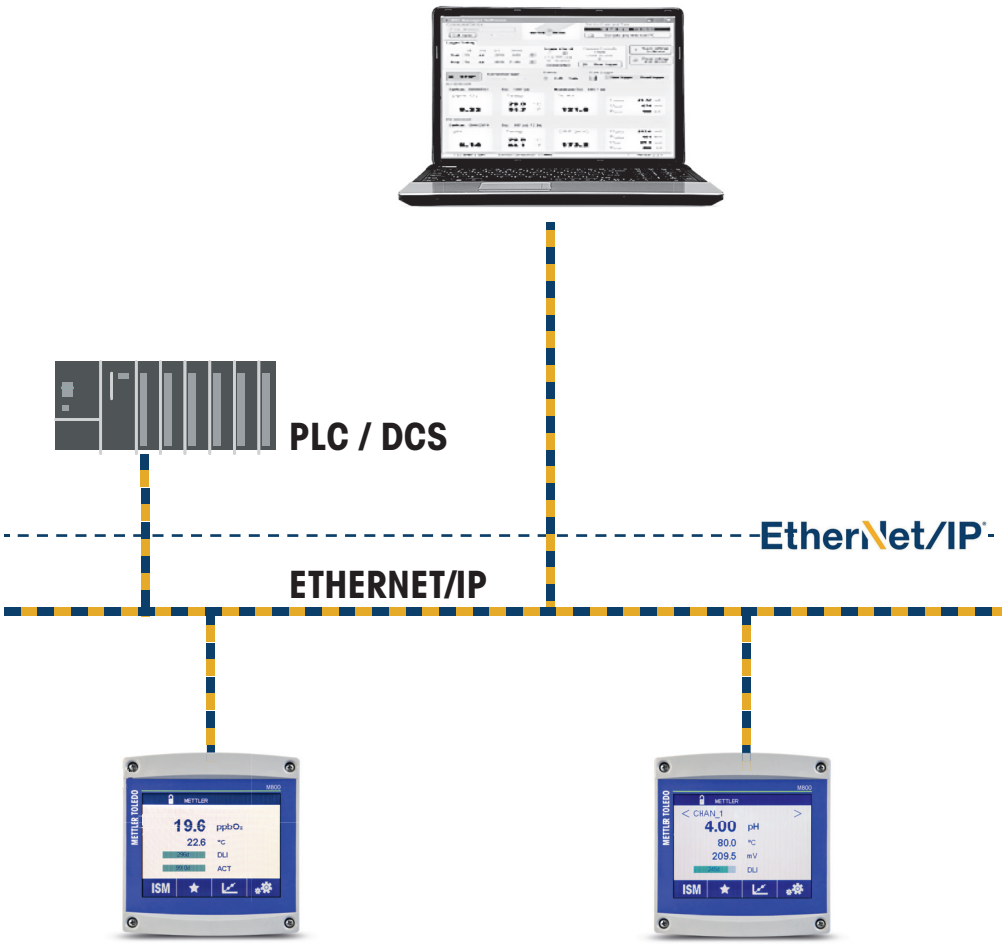
Configuration Setup Guide

Multi-parameter Transmitter M800 EIP

EtherNet/IP Setup Guide



METTLER TOLEDO

Content

1 Introduction

Overview

The M800 EtherNet/IP (EIP) multi-parameter transmitters are online process instruments for measuring various properties of fluids and gases. These include conductivity, dissolved oxygen, O_2 gas, dissolved carbon dioxide, pH/ORP, and turbidity.

The M800 PN transmitters are available in either 1 or 2 channel configurations. Each channel is compatible with digital ISM (Intelligent Sensor Management) sensors.

Product	**Process 1-ch**	**Process 2-ch**	**Water 2-ch**	**Water 2-ch Flow**
Part no.	**30 530 023**	**30 530 024**	**30 530 028**	**30 530 029**
pH/ORP	•	•	•	•
pH/pNa	•	•	•	•
UniCond 2e/4e	•	•	•	•
Conductivity 4e	•	•	•	•
Amp. dissolved oxygen (aDO), ppm/ppb/trace	•/•/•[1]	•/•/•[1]	•/•/•[1]	•/•/•[1]
Amp. oxygen gas (aDO), ppm/ppb/trace	•/•/•[1]	•/•/•[1]	•/•/•[1]	•/•/•[1]
Optical dissolved oxygen (oDO)	•[1] [2]	•[1] [2]	•[1] [2]	•[1] [2]
Dissolved CO_2 (InPro 5000i)	•	•	•	•
Dissolved CO_2 (InPro 5500i)	•[2]	•[2]	•[2]	•[2]
Turbidity (InPro 86x0i)	•	•	•	•
Dissolved ozone (pureO_3)	–	–	–	–
TOC (6000TOCi)	•	•	•	•
Flow	–	–	–	•

Table 1: M800 EIP compatibility matrix.

1) Ingold sensors only

2) 2-channel transmitters: limited to one optical DO or thermal conductivity CO_2 sensor

2 Installation Instructions

This guide is limited to the Ethernet cable installation. Please refer to the M800 Operation Manual for general installation aspects, such as:

- Mechanical installation
- Connection of power
- Connection of sensors
- Connection of relays and other I/O signals

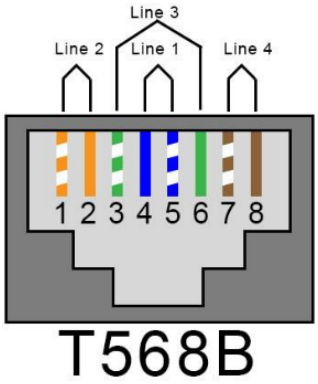
2.1 Ethernet Cable Pinout

The physical interface supports both RJ45 and M12 (included in scope of delivery) connectors. The signal and pin assignment are as specified in the table below:

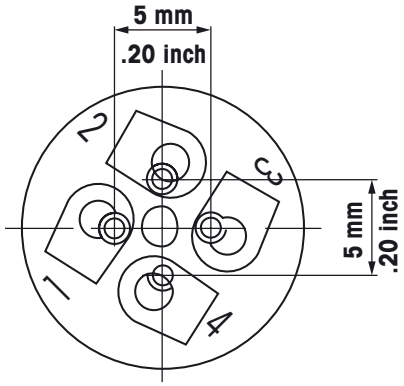
Signal	**Pin (RJ45)**	**Pin (M12)**	**Standard Ethernet Cable**	**Industrial Ethernet Cable**
TxD –	2	3	orange	amber
TxD +	1	1	orange/white	yellow
RxD –	6	4	green	blue
RxD +	3	2	green/white	white

Table 2: Ethernet Cable Pinout

Standard Ethernet Cable



Industrial Ethernet Cable



2.2 Cable Installation

2.2.1 RJ45 Ethernet Cable

1. Use a standard Ethernet cable with RJ45 connector. Always use a shielded cable.
2. Install a M25 gland in one of the respective openings in the transmitter housing. M25 glands are provided as part of the standard scope of delivery.
3. Route the Ethernet cable through M25 gland.
4. Insert the RJ45 connector into the socket.
5. Tighten the M25 gland, ensuring the Ethernet cable does not twist and has plenty of slack between the gland and the RJ45 socket.

2.2.2 RJ45 – M12 Transition Cable

The RJ45 – M12 transition cable is used to add an external M12 Ethernet port to the M800 transmitter. The cable is provided as part of the standard scope of delivery.

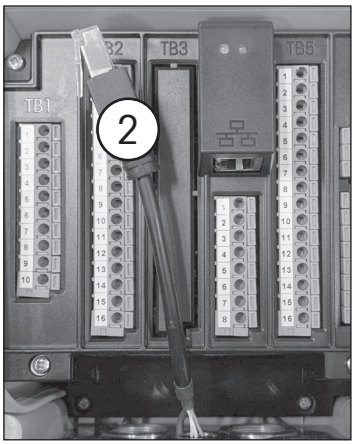
Follow the steps below to install the RJ45 – M12 transition cable:

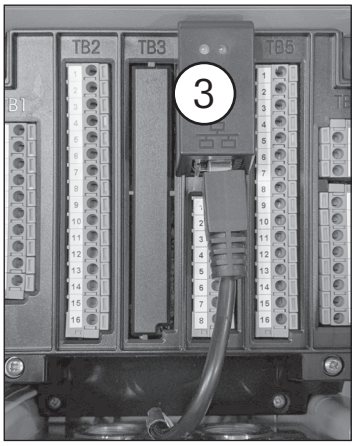
1. Take out the Ethernet cable. Spare part number PN: 30530035

2. Route cable through the M20 gland, as shown below:

3. Tighten the M12 **(1)** gland

4. Insert RJ45 connector **(2)** into the matching socket **(3)**.





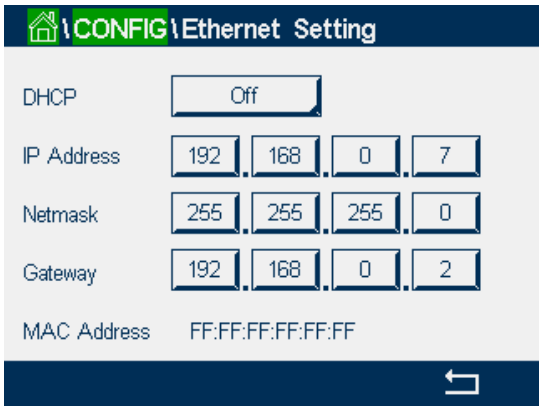
3 Commissioning Instructions

This guide is limited to network commissioning tasks. Please refer to the M800 Operation Manual for general commissioning aspects.

3.1 Transmitter Network Settings

Network settings are accessible under menu.

⌂ \ CONFIG \ Ethernet Setting



The following parameters can be adjusted:

Setting	Description	Default Value
DHCP	The Dynamic Host Configuration Protocol (DHCP) is a network management protocol for automatically assigning an IP address to the M800 transmitter. By means of this setting DHCP can be turned on or off.	Off
IP Address	The transmitters own IP address.	192.168.0.7
Netmask	The Netmask is a 32-bit "mask" used to divide an IP address into subnets and specify the network's available hosts.	255.255.255.0
Gateway	The Gateway IP is a unique address assigned to a device within a network. It serves as a bridge to transmit traffic between the M800 transmitter and the other parts of the network.	192.168.0.2

Table 3: Transmitter Network Settings

Note:

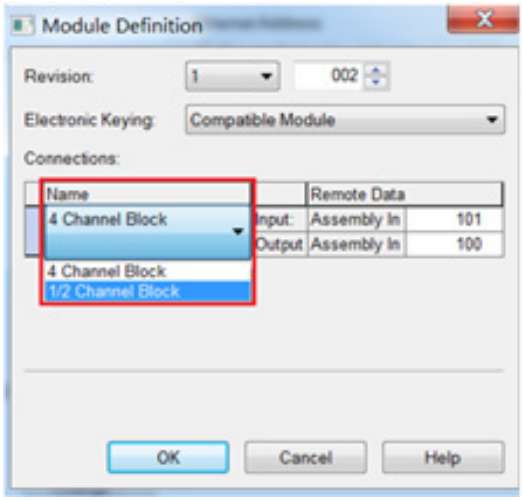
- The transmitter's own MAC address is displayed at the bottom of the screen.
- Optionally use the TCT (Transmitter Configuration Tool) to configure the network settings.

3.2 PLC/DCS Integration

This section explains the process of integrating an M800 transmitter into a Profinet network.

Refer to the Appendix on how to integrate the M800 configuration files into your PLC development environment.

On PLC/DCS side, ensure EtherNet/IP is configured to use 4 Channel Blocks:

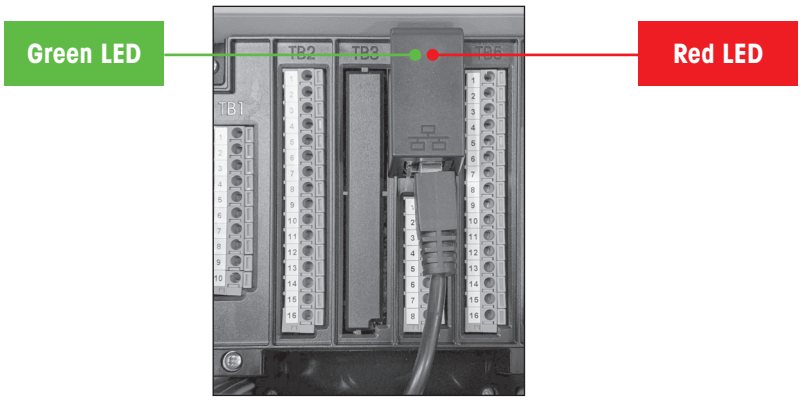


Network integration:

1. Connect the M800 transmitter to the network and apply power.
2. Set IP network parameters via transmitter user interface (see section 3.1 on page 5) or via Transmitter Configuration Tool (TCT).
3. If required, configure other aspects of the transmitter via user interface or TCT. For more information see the M800 series user manual.
4. Upon successful integration of the M800 EtherNet/IP transmitter, the symbol **EIP** (see ○ below) appears on the upper right corner of the transmitter display.

3.3 Status LEDs

Two status LEDs are located inside the transmitter, above the RJ45 connector:



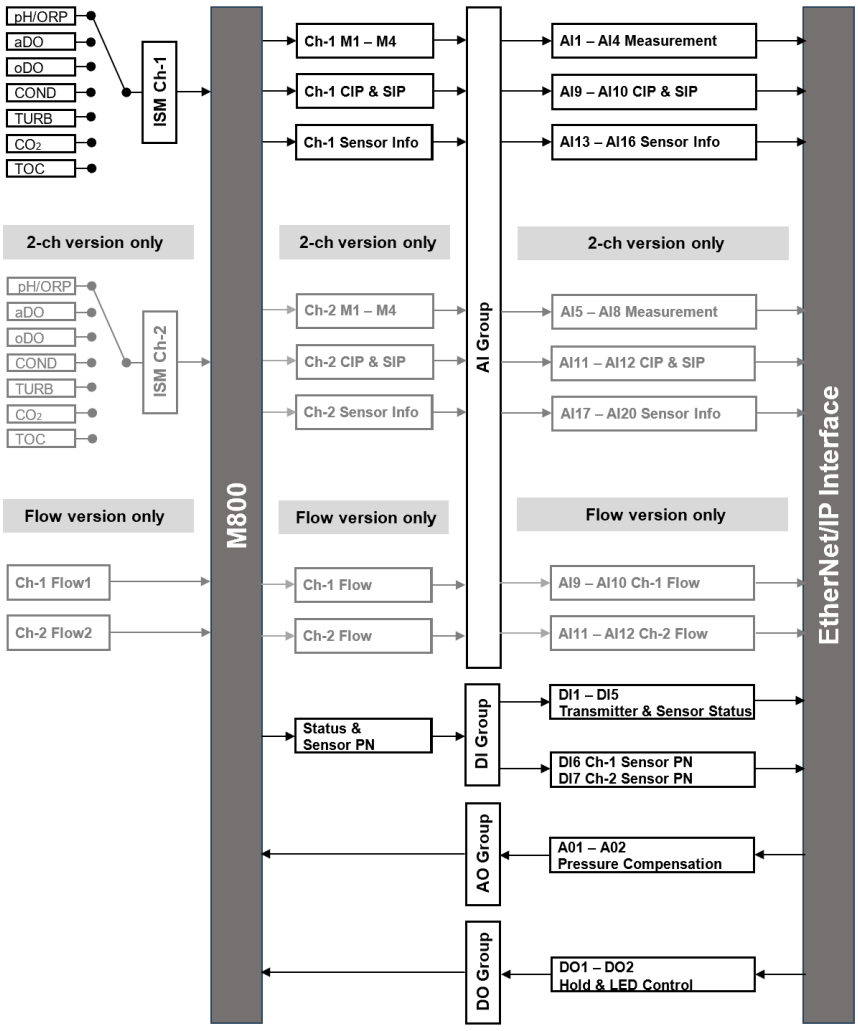
The LEDs provide information about the state of the transmitter and can be used to diagnose network problems:

Green	Red	Status
Off	Off	Check power supply
Off	Flashing (0.5 sec)	Transmitter defective
Off	On	Communication error (PLC/RJ45). Please check the communication cable between transmitter and PLC.
Flashing (0.5 sec)	Off	Communication error (transmitter internal hardware)
Flashing (0.5 sec)	On	Communication error (both of the above)
On	Off	Transmitter operating normally
Flashing (0.3 sec)	Off	Transmitter in bootloader mode. Data transmission is suspended while connected to TCT or FW update tools

Table 4: Status LEDs

4 Function Block Organisation

The diagram below explains how sensor, transmitter and control signals are routed to and from the Profinet interface.



Note:

- Items shown in **black** are present both in 1-channel and 2-channel transmitters.
- Items shown in **grey** are present in 2-channel or "Water" transmitters only.
- Depending on transmitter version ("Process" or "Water"), AI9…12 are either used for CIP & SIP or flow information.

Data transmitted on EtherNet/IP (i.e. between the M800 and the DCS) is organised as shown in the table below. Use the right-most column "reference" to get detail information on data format, units, and the meaning of individual data bits.

Slot	Group	Block	Description	Reference
1	AI	AI 1	ISM Ch-1, M1 value	Section 5.2.1 on page 10
2		AI 2	ISM Ch-1, M2 value	Section 5.2.1 on page 10
3		AI 3	ISM Ch-1, M3 value	Section 5.2.1 on page 10
4		AI 4	ISM Ch-1, M4 value	Section 5.2.1 on page 10
5		AI 5	ISM Ch-2, M1 value	Section 5.2.1 on page 10
6		AI 6	ISM Ch-2, M2 value	Section 5.2.1 on page 10
7		AI 7	ISM Ch-2, M3 value	Section 5.2.1 on page 10
8		AI 8	ISM Ch-2, M4 value	Section 5.2.1 on page 10
9		AI 9	ISM Ch-1, CIP/Flow value	Section 5.2.2 on page 10
10		AI 10	ISM Ch-1, SIP/Flow value	Section 5.2.2 on page 10
11		AI 11	ISM Ch-2, CIP/Flow value	Section 5.2.2 on page 10
12		AI 12	ISM Ch-2, SIP/Flow value	Section 5.2.2 on page 10
13	DI	DI 1	HW and Setpoint	Section 5.4.1 on page 11
14		DI 2	Measurement Status 1	Section 5.4.2 on page 11
15		DI 3	ISM Ch-1, Status	Section 5.4.3 on page 12
16		DI 4	ISM Ch-2, Status	Section 5.4.3 on page 13
17	AI	AI 13	ISM Ch-1, Sensor S/N	Section 5.2.3 on page 11
18		AI 14	ISM Ch-1, Slope	Section 5.2.4 on page 11
19		AI 15	ISM Ch-1, Offset	Section 5.2.4 on page 11
20		AI 16	ISM Ch-1, Operating hrs	Section 5.2.5 on page 11
21		AI 17	ISM Ch-2, Sensor S/N	Section 5.2.3 on page 11
22		AI 18	ISM Ch-2, Slope	Section 5.2.4 on page 11
23		AI 19	ISM Ch-2, Offset	Section 5.2.4 on page 11
24		AI 20	ISM Ch-2, Operating hrs	Section 5.2.5 on page 11
25	DI	DI 5	Measurement Status 2	Section 5.4.2 on page 11
26		DI 6	ISM Ch-1, Sensor P/N	Section 5.4.4 on page 16
27		DI 7	ISM Ch-2, Sensor P/N	Section 5.4.4 on page 16
28	AO	AO 1	Pressure Compensation 1	Section 5.3.1 on page 11
29		AO 2	Pressure Compensation 2	Section 5.3.1 on page 11
30	DO	DO 1	Hold & LED Control 1	Section 5.5.1 on page 17
31		DO 2	Hold & LED Control 2	Section 5.5.1 on page 17

Table 5: Function Block Organisation

Note: Slot size is 4 bytes.

5 Function Block Definition

This section provides details about the structure of AI, AO, DI and DO function blocks used by the M800.

5.1 Basics

Size

The size of each Function Block is 4 bytes, that is the size of "float" or "dword".

Byte Order

The byte order is always "little endian"

Data Types

The following data types are used:

Data Type	Description
Float	32bit floating-point value, IEEE 754 format.
Dword	32bit unsigned integer, ranging from 0…429496729

5.2 Analog Input (AI) Function Blocks

5.2.1 Measurements

Group	Content	Bit	Meaning
AI1…4 (Ch-1) **AI5…8 (Ch-2)**	Measurements	0…31 (float32)	Measurements M1…M4 Units: As selected in the transmitter "Channel Setup" menu and depends on the measurement, e.g. mV, %, °C, DLI, ACT, … Note: M1…M4 are as shown on the transmitter display. Consider selecting/displaying values that are relevant to the DCS Note: Always evaluate measurement status (see section 5.4.2 on page 10) when processing measurements.

Table 6: Measurements

5.2.2 CIP & SIP/Flow

For the M800 Water 2-ch and 4-ch models (P/N 30 530 028 and 30 530 029) flow is transmitted in blocks AI9…12:

Group	Content	Bit	Meaning
AI9/AI10 (Ch-1) **AI11/AI12 (Ch-2)**	Flow	0…31 (float32)	Flow Measurement Units: As selected in the transmitter "Channel Setup" menu, e.g. GPM, m3/hr, … Note: Value is set to 0.0f for "Process" models (P/N 30 530 023 and 30 530 024)

Table 7: Flow

For all other models, sensor CIP and SIP counters are transmitted:

Group	Content	Bit	Meaning
AI9/AI10 (Ch-1) **AI11/AI12 (Ch-2)**	CIP & SIP	0…31 (float32)	Current value of CIP (Clean-in-place) and SIP (Steam-in-place) counters Units: N/A

Table 8: CIP & SIP

5.2.3 Sensor S/N

Group	Content	Bit	Meaning
AI13 (Ch-1) **AI17 (Ch-2)**	Sensor S/N	0…31 (float32)	Sensor serial number Units: N/A

Table 9: Sensor S/N

5.2.4 Calibration Offset & Slope

Group	Content	Bit	Meaning
AI14/AI15(Ch-1) **AI18/AI19 (Ch-2)**	Offset & Slope	0…31 (float32)	Calibration offset (AI15 & AI19) or slope (AI14 & AI18) Units: Depends on the sensor type, e.g. %, mV, …

Table 10: Calibration Offset & Slope

5.2.5 Operating Hours

Group	Content	Bit	Meaning
AI16 (Ch-1) **AI20 (Ch-2)**	Operating Hours	0…31 (float32)	Sensor operating hours Units: Hours

Table 11: Operating Hours

5.3 Analog Output (AO) Function Blocks

5.3.1 Pressure Compensation

Group	Content	Bit	Meaning
AO1 (Ch-1) **AO2 (Ch-2)**	Pressure	0…31 (float32)	Process Pressure Units: mbar Note: Applicable only when the respective channel is configured as "oxygen sensor" and the pressure input is set to "Bus AO1" or "Bus AO2", respectively.

Table 12: Pressure Compensation

5.4 Discrete Input (DI) Function Blocks)

5.4.1 Hardware (HW) & Setpoints

Group	Content	Bit	Meaning
DI1	HW Status	0	Relay 1, status: 0–off 1–on
		1	Relay 2 (encoding as per Relay 1)
		2…7	Reserved
		8	Digital Input 1, status: 0–low 1–high
		9	Digital Input 2 (encoding as per Digital Input 1)
		10	Digital Input 3 (encoding as per Digital Input 1)

Table 13: HW & Setpoints

Group	Content	Bit	Meaning
DI1	HW Status	11	Digital Input 4 (encoding as per Digital Input 1)
		12	Digital Input 5 (encoding as per Digital Input 1)
		13	Digital Input 6 (encoding as per Digital Input 1)
		14	Communication error (M800 internal)
		15	Reserved
	Setpoint Status	16	SP1 Alarm, status: 0 – off 1 – on
		17	SP2 Alarm (encoding as per Alarm 1)
		18	SP3 Alarm (encoding as per Alarm 1)
		19	SP4 Alarm (encoding as per Alarm 1)
		20	SP5 Alarm (encoding as per Alarm 1)
		21	SP6 Alarm (encoding as per Alarm 1)
		22	SP7 Alarm (encoding as per Alarm 1)
		23	SP8 Alarm (encoding as per Alarm 1)
		24	Flow-1 On-Hold, status: 0 – inactive 1 – active
		25	Flow-2 On-Hold (encoding as per Flow-1 On-Hold)
		26	Calibration Control 0 – Local. Calibration is carried out manually on the transmitter 1 – Bus. Calibration is semi-automatic, where the DCS is given the ability to approve/reject calibration-related functions (see bits[31...28] below) Note: This setting can be changed by MT Technical Service personnel only.
		27	Reserved
		28, 29	Remote calibration control (request from transmitter to DCS), Ch-1: 0 – No effect, i.e. the transmitter does not ask for any permissions (default) 1 – Start Calibration. The transmitter asks the DCS for permission to initiate a calibration. The DCS is expected to respond through DO1, bits[4…5]. 2 – Confirm Calibration. The transmitter asks the DCS for permission to save a calibration. The DCS is expected to respond through DO1, bits[4…5]. Note that the newly computed offset/slope is accessible in slot 14 and 15. 3 – Invalid, do not use. Note: Applicable only if Calibration Control (bit[26]) is set.
		30, 31	Remote calibration control (request from transmitter to DCS), Ch-2: 0 – No effect, i.e. the transmitter does not ask for any permissions (default) 1 – Start Calibration. The transmitter asks the DCS for permission to initiate a calibration. The DCS is expected to respond through DO1, bits[12…13]. 2 – Confirm Calibration. The transmitter asks the DCS for permission to save a calibration. The DCS is expected to respond through DO1, bits[12…13]. Note that the newly computed offset/slope is accessible in slot 18 and 19. 3 – Invalid, do not use. Note: Applicable only if Calibration Control (bit[26]) is set.

Table 14: HW & Setpoints

5.4.2 Measurement Status

Group	Content	Bit	Meaning
DI2	Measurement Status 1	0, 1	AI1 (Ch-1, M1), status: 0 – valid 1 – over-range 2 – under-range 3 – invalid
		2, 3	AI2 (Ch-1, M2, encoding as per AI1)
		4, 5	AI3 (Ch-1, M3, encoding as per AI1)
		6, 7	AI4 (Ch-1, M4, encoding as per AI1)
		8, 9	AI5 (Ch-2, M1, encoding as per AI1)
		10, 11	AI6 (Ch-2, M2, encoding as per AI1)
		12, 13	AI7 (Ch-2, M3, encoding as per AI1)
		14, 15	AI8 (Ch-2, M4, encoding as per AI1)
		16, 17	AI9 (Flow-1, CIP & SIP, encoding as per AI1)
		18, 19	AI10 (Flow-1, CIP & SIP, encoding as per AI1)
		20, 21	AI11 (Flow-2, CIP & SIP, encoding as per AI1)
		22, 23	AI12 (Flow-2, CIP & SIP, encoding as per AI1)
		24…31	Reserved

Table 15: Measurement Status

Group	Content	Bit	Meaning
DI5	Measurement Status 2	0, 1	AI13 (Ch-1, M1), status: 0 – valid 1 – over-range 2 – under-range 3 – invalid
		5.4.3	5.4.4 AI14 (encoding as per AI13)
		5.4.5	5.4.6 AI15 (encoding as per AI13)
		5.4.7	5.4.8 AI16 (encoding as per AI13)
		5.4.9	5.4.10 AI17 (encoding as per AI13)
		5.4.11	5.4.12 AI18 (encoding as per AI13)
		12, 13	AI19, status (encoding as per AI1)
		14, 15	AI20, status (encoding as per AI1)
		16…31	Reserved

Table 16: Measurement Status

5.4.3 ISM Channel Status

Note that the "Channel Status" block consists of 2 parts:

- Bits[15…0] provide information about the respective channel and are independent of the type of sensor connected. In other words, the meaning of bits[15…0] are the same, regardless if a pH sensor or a TOC analyser is connected.
- Bits[31…16] provide information specific to the sensor type connected. In other words, the meaning of bits[31…16] are different if a pH sensor or TOC analyser is connected.

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	ISM Channel Status	0…15	Channel-specific status information (see Table 19 on page 14)
		15…31	Sensor type-specific status information (see Tables from 20–26 starting on page 15)

Table 17: ISM Channel Status

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	Channel-specific status information	0	Calibration out of specification (warning): 0–inactive 1–active
		1	Calibration out of specification (error): 0–inactive 1–active
		2	Reserved
		3	Hold in progress: 0–inactive 1–active
		4	Cleaning in progress: 0–inactive 1–active
		5	Reserved
		6	Maintenance required
		7	Calibration required
		8	CIP counter expired
		9	SIP counter expired
		10	Autoclave counter expired
		11	Reserved
		12	Sensor connection status: 0–connected 1–disconnected Note: • This bit is particularly useful during system integration and verification. Simply disconnect and reconnect the sensor from/to the M800 and check if Bit 12 is updated as expected • When disconnected, all values of the AI group will be set to 0.0f
		13	Replace sensor (DLI expired)
		14	Reserved
		15	Reserved

Table 18: ISM Channel Status–Channel Specific

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	pH/ORP-specific status informa	16	Warning: glass impedance changed by more than factor 0.3.
		17	Warning: glass impedance changed by more than factor 3.0.
		18	Warning: reference impedance changed by more than factor 0.3.
		19	Warning: reference impedance changed by more than factor 3.0.
		20	Error: reference impedance > 150kΩ. This may indicate a glass breakage.
		21	Error: reference impedance < 1000Ω. This may indicate a short-circuited sensor reference.
		22	Error: glass impedance > 2000MΩ. This may indicate a glass breakage.
		23	Error: glass impedance < 5MΩ. This may indicate a short-circuited sensor.
		24	Error: glass impedance (pNa) > 2000MΩ
		25	Error: glass impedance (pNa) < 5MΩ
		26	Warning: pNa sensor impedance changed by more than factor 0.3.
		27	Warning: pNa sensor impedance changed by more than factor 0.3.
		28…31	Reserved

Table 19: ISM Channel Status – Sensor Type-Specific: pH/ORP

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	oDO-specific	16	LED status: 0 – off 1 – on
		17	Warning: Change opto-cap
		18	Error: shaft (temperature too high/excessive stray light)
		19	Error: signal (out of range, temperature out of spec.)
		20	Error: sensor hardware (optoelectronics error, board error, underflow/overflow error, board temperature)
		21...31	Reserved

Table 20: ISM Channel Status – Sensor Type-Specific: oDO

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	aDO-specific	16	Error: electrolyte level low (refill the electrolyte)
		17…31	Reserved

Table 21: ISM Channel Status – Sensor Type-Specific: aDO

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	COND-specific	16	Error: dry sensor. The error is generated if the resistance measured is > 200 kΩ (i.e. below 2 µS/cm). This is interpreted as the electrodes not being immersed in liquid. Verify that the sensor is properly immersed in liquid. If yes, and the liquid is not expected to have conductivity < 5 µS/cm, remove sensor from process, clean sensor tip and recalibrate the sensor.
		17	Error: sensor shorted. The error is generated if the resistance drops below a pre-defined minimum value.
		18	Error: cell deviation. The error is generated if the calibrated cell constant differs by more than 5% from factory value. Clean sensor tip and recalibrate sensor. If error persists, reset sensor to factory settings and recalibrate using a 1-point-calibration. If the error still persists, exchange sensor.
		19…31	Reserved

Table 22: ISM Channel Status – Sensor Type-Specific: COND

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	TURB-specific	16	Error: hardware (measurement out of range, LED temperature, LED, detector not working, detector current, board voltage)
		17	Error: stray light too high (background level)
		18	Error: measurement not reliable (humidity, calibration out of range)
		19	Warning: hardware (LED temperature critical)
		20	Warning: measurement not reliable (humidity critical)
		21…31	Reserved

Table 23: ISM Channel Status – Sensor Type-Specific: TURB

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	CO_2 (beverage)-specific	16	Error: hardware
		17	Error: software
		18	Warning: CO_2 out of range
		19	Warning: change membrane
		20	Warning: CO_2 not reliable
		21	Warning: temperature out of range
		22…31	Reserved

Table 24: ISM Channel Status – Sensor Type-Specific: CO_2 (beverage)

Group	Content	Bit	Meaning
DI3 (Ch-1) **DI4 (Ch-2)**	TOC-specific	16…18	Sensor operating mode: 0–TOC is idle 1–TOC is measuring 2…7–reserved, do not use
		19	Lamp status: 0–off or defect 1–on
		20	Warning: sensor malfunction detected (LED on TOC is yellow, e.g. due to insufficient flow)
		21	Failure: sensor not operational (LED on TOC is red, e.g. due to no flow or lamp defect)
		22	Lamp Change Required The bit is set when the remaining lamp life reaches 0 hours.
		23	SST Required The bit is set when the remaining time until the next System Suitability Test (SST) reaches 0 hours
		24	Filter Change Required The bit is set when the remaining time until the next filter replacement reaches 0 hours
		25	Ballast Change Required The bit is set when the remaining time until the next ballast replacement (lamp power supply) reaches 0 hours
		26…31	Reserved

Table 25: ISM Channel Status – Sensor Type-Specific: TOC

5.4.4 Sensor P/N

Group	Content	Bit	Meaning
DI6 (Ch-1) **DI7 (Ch-2)**	Sensor P/N	0…31 (dword)	Sensor part number Units: N/A

Table 26: Sensor P/N

5.5 Discrete Output (DO) Function Blocks

5.5.1 Hold & LED Control

Group	Content	Bit	Meaning
DO1	Hold & LED Control, Ch-1	0	Channel On-Hold: 0–Resume operation 1–Suspend operation (put on HOLD)
		1…3	oDO LED Control: 0–No effect (default, i.e. do not change LED state) 1–LED on 2–LED off 3…7–Invalid, do not use Note: Applicable only when LED mode is set to "Auto" in the respective transmitter menu.
		4, 5	Remote calibration control (reply from DCS to transmitter), Ch-1: 0–No effect (default) 1–Grant approval to start calibration 2–Grant approval to save calibration 3–Reject request. Complete the "reject" command by resetting bits [4, 5] after 10 seconds (= "no effect") Note: Applicable only if DI1 Bit[26] is set.
		6, 7	Reserved
	Hold & LED Control, Ch-2	8	Channel On-Hold: 0–Resume operation (Hold = "off") 1–Suspend operation (put on HOLD)
		9…11	oDO LED Control: 0–No effect (default, i.e. do not change LED state) 1–LED on 2–LED off 3…7–Invalid, do not use Note: Applicable only when LED mode is set to "Auto" in the respective transmitter menu.
		12, 13	Remote calibration control (reply from DCS to transmitter), Ch-2: 0–No effect (default) 1–Grant approval to start calibration 2–Grant approval to save calibration 3–Reject request. Complete the "reject" command by resetting bits [12, 13] after 10 seconds (= "no effect") Note: Applicable only if DI1 Bit[26] is set.
		14, 15	Reserved
	Flow-1	16	Channel On-Hold: 0–Resume operation (Hold = "off") 1–Suspend operation (put on HOLD)
		17…23	Reserved
	Flow-2	24	Channel On-Hold: 0–Resume operation (Hold = "off") 1–Suspend operation (put on HOLD)
		25…31	Reserved

Table 27: Hold & LED Control

Group	Content	Bit	Meaning
DO2 (only for 4-ch version)	Hold & LED Control, Ch-3	0	Channel On-Hold: 0–Resume operation (Hold = "off") 1–Suspend operation (put on HOLD)
		1…3	oDO LED Control: 0–No effect (default, i.e. do not change LED state) 1–LED on 2–LED off 3…7–Invalid, do not use Note: Applicable only when LED mode is set to "Auto".
		4…7	Reserved
		8	Channel On-Hold: 0–Resume operation (Hold = "off") 1–Suspend operation (put on HOLD)
	Hold & LED Control, Ch-4	9…11	oDO LED Control: 0–No effect (default, i.e. do not change LED state) 1–LED on 2–LED off 3…7–Invalid, do not use Note: Applicable only when LED mode is set to "Auto".
		12, 13	Reserved
		16…31	Reserved

Table 28: Hold & LED Control

Appendix – PLC Configuration

A1 Environment

The setup guide was tested on the following equipment:

PLC: **Allen-Bradley 1769-L16ER-BB1B**

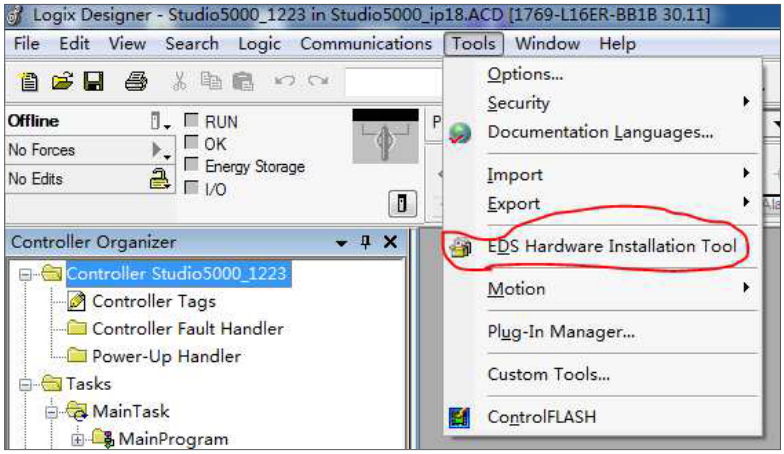
Software: **Studio5000 Logix Designer v30.00.00**

A2 Studio5000 Configuration

A2.1 EDS File Installation

Download the EDS file from the **M800 product page.**

Open Logix Designer and select "Tools" → "EDS Hardware Installation Tool" to register EDS file. Currently, the latest EDS file is "MT_M800 1P_EIP_V1.2_20200107.eds". Please select it and install M800 EIP EDS.

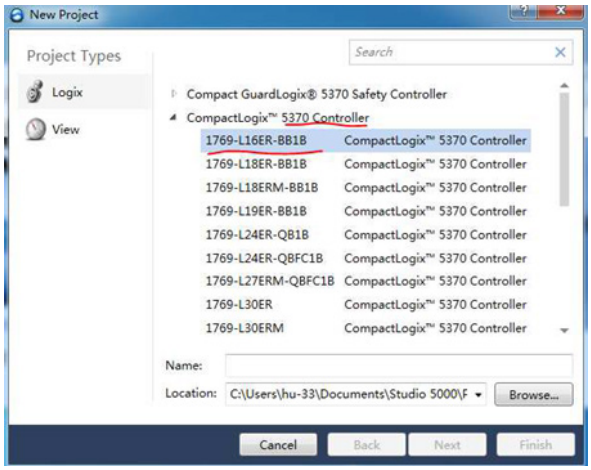


Note: Please confirm that the .ico and .eds files are located all in one folder.

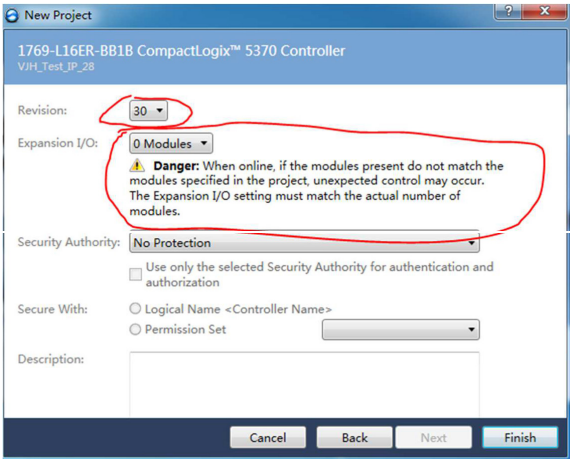
A2.2 Creating a New Project

1. Open Studio5000 and create new project.

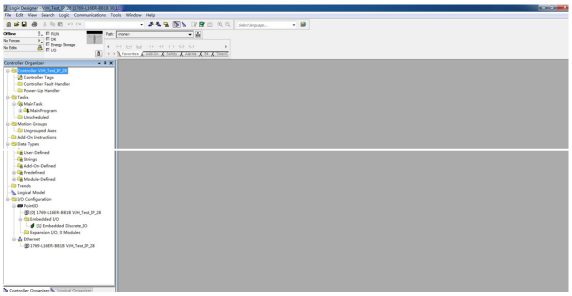
2. Select the PLC module type (we use 1769-L16ER-BB1B)



3. Then, ensure the following settings are correct:
   - Revision: please select version 30, otherwise many functions will be invalid or disabled.
   - Expansion I/O: 0 Modules (please check your PLC module configuration if there is expansion I/O or not)



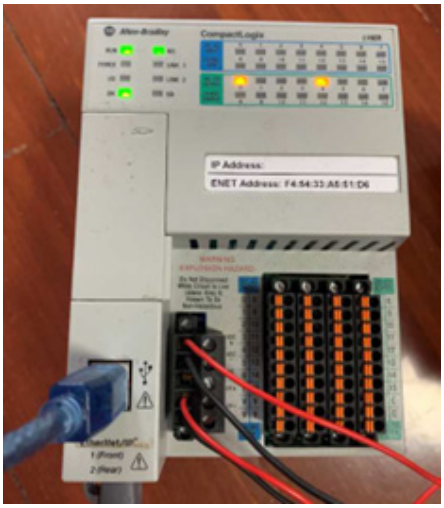
4. Click "Finish", then project create successfully

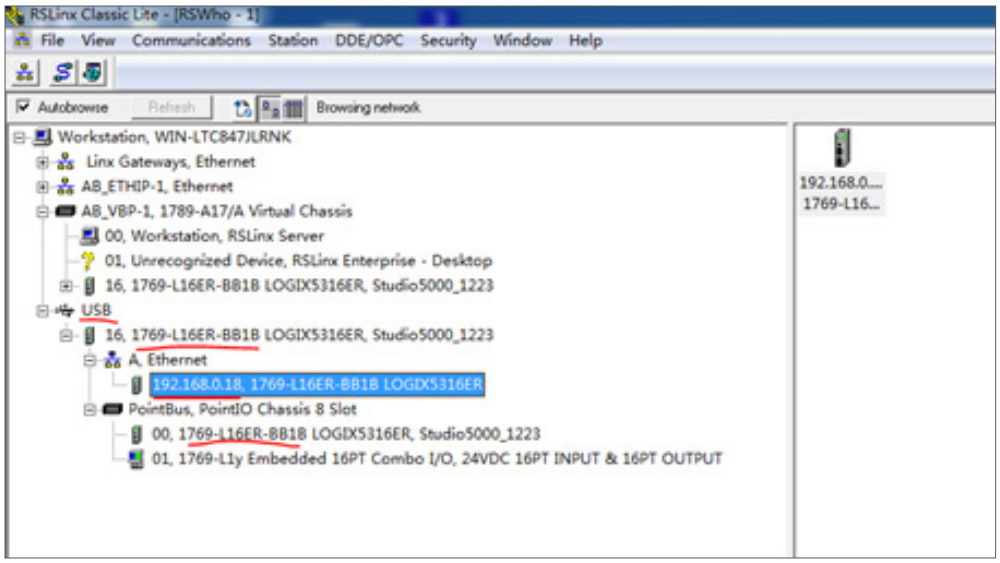


A2.3 PLC IP Address Configuration

1. Use a USB cable to connect the PLC to your PC, then open RSLinx. After a while, RSLinx will recognize the PLC as shown in the screenshot below:

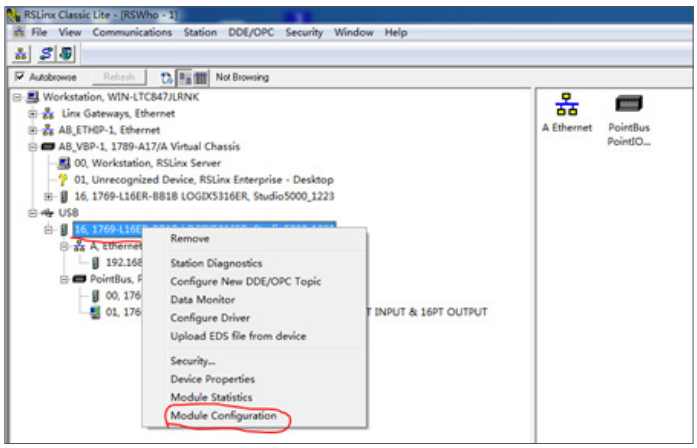
Highly recommended to change switch to REM (remote control) mode (see photo below right).





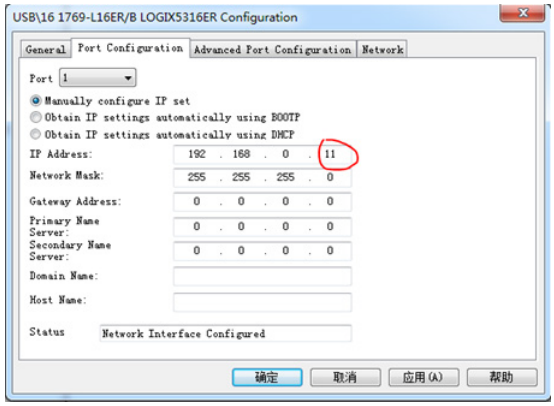
2. Modify IP Address of PLC module:

Click right-hand button on the "1769-L16ER-BB1B", select "Module Configuration":

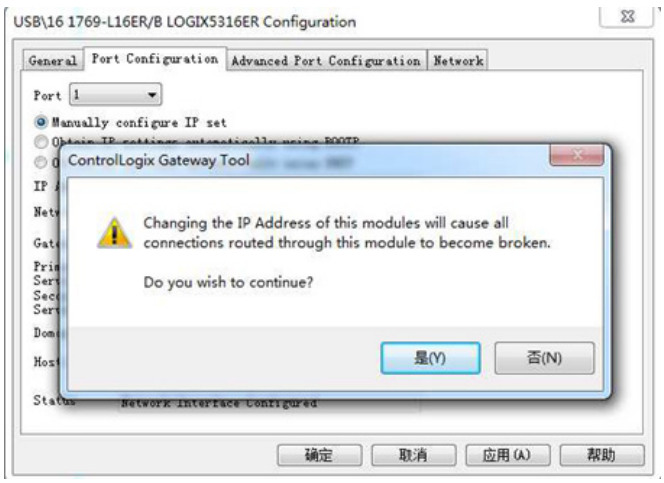


In the pop-up window, switch to the "Port Configuration" tab and enter the IP address to be used (for example, try to change to new IP: 192.168.0.11).

Highly recommended to use "Manually configure IP set" if user is unfamiliar with DHCP.

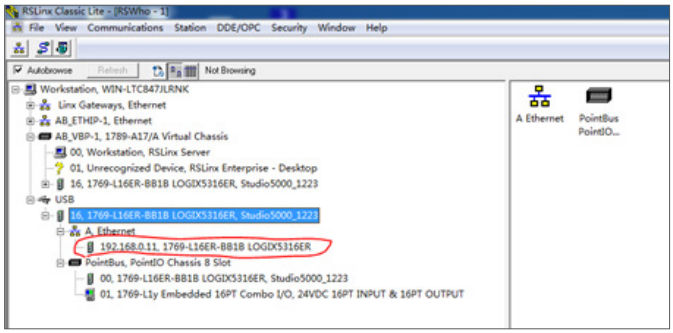


3. Continue to click "Yes" button to accomplish changing the IP Address of this module.



3.

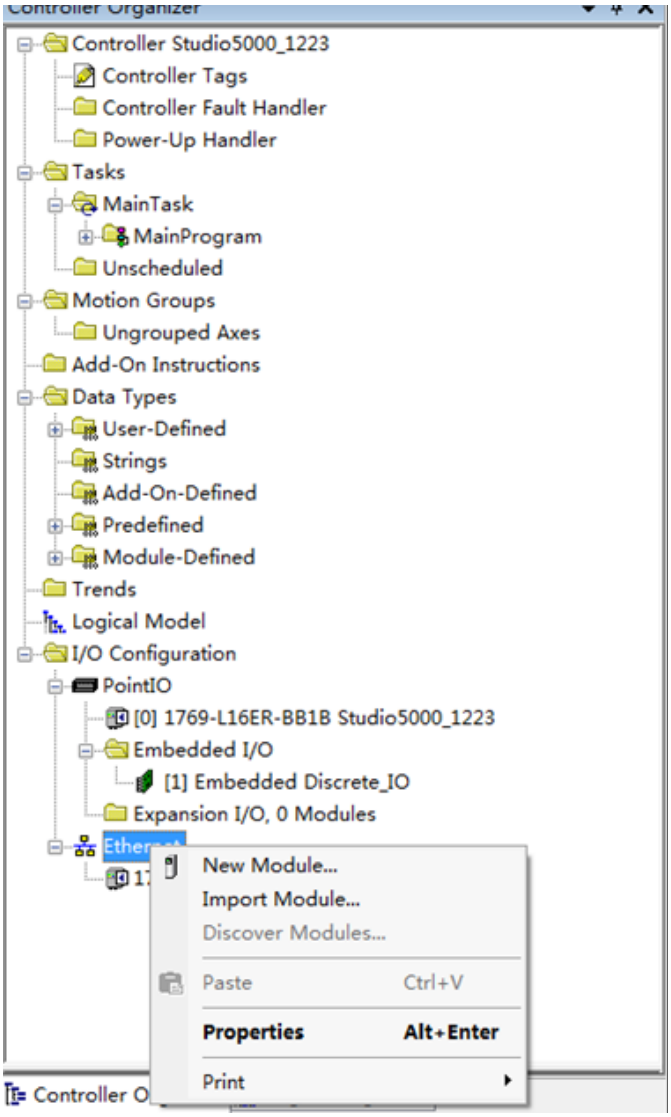
4. After several seconds, refresh the USB connection, the new IP address will be changed successfully and be displayed in the RSLinx (see screenshot below):



A2.4 Device Configuration

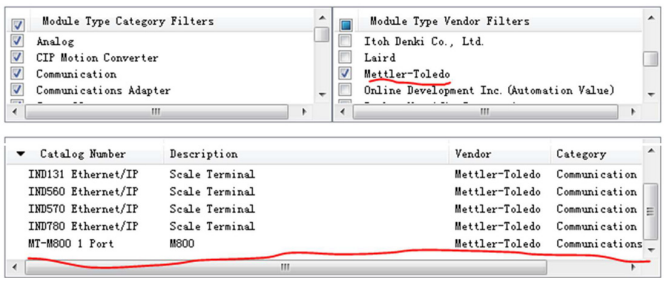
A2.4.1 Add New Module (M800) and Module Settings

1. In the "Controller Organizer"" menu (see screenshot below), select "Ethernet" and click right-hand button to select "New Module".



2. Select M800 module in the pop-window "Module Selection" as shown in the figure below.

Note: Please confirm that M800 EDS file has already been installed.



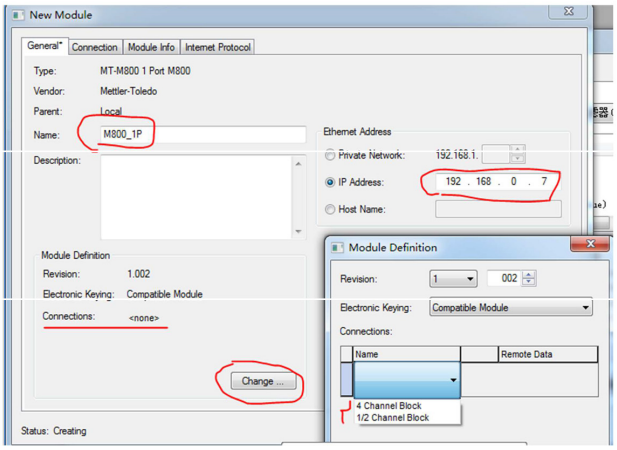
3. Module Settings

In the new pop-window "New Module" to set the module. Please see figures below.

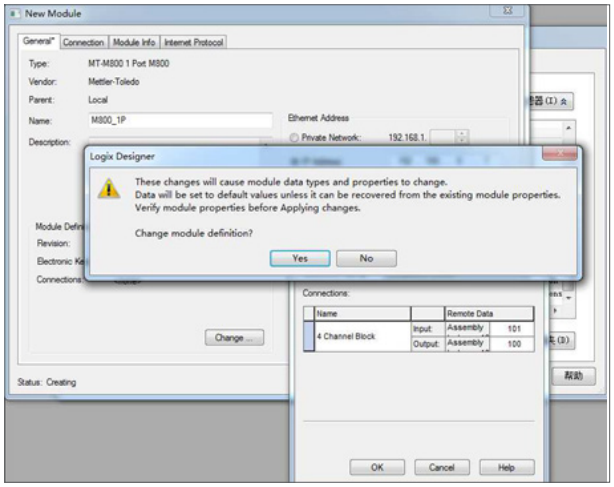
- Name: Type name user wanted, here type "M800 1P"
- IP Address: 192.168.0.7 (it is very important and must be the current IP address of device, EIP recognize the IP address instead of Device Name, it is different with Profinet)
- Connections: Click "change" to select which I/O connection to use.

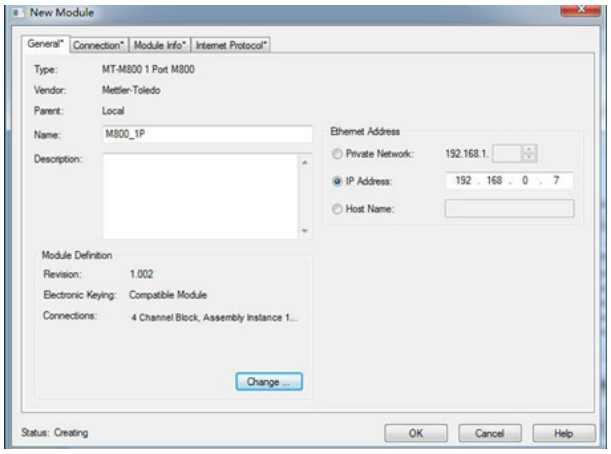
M800 EIP supports 2 I/O connection types:

- ½ Channel Block – supports max 2 channel sensor info.
- 4 Channel Block – supports max 4 channel sensor info.



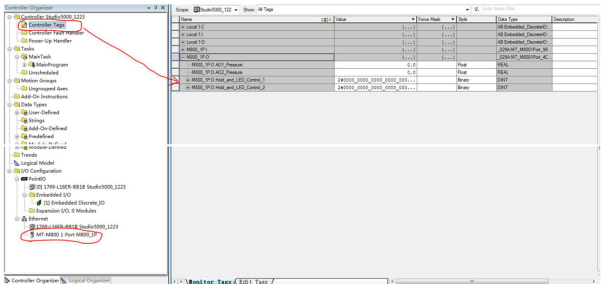
4. Please click "Yes" to finish the module settings.





5. Find "M800" in "Controller Tags"

After having added the M800 module, the user can see a new device "M800 1P" in the list of "I/O Configuration → Ethernet". Also, the user can double-click **Controller Tags** to inspect the M800 input and output parameters:

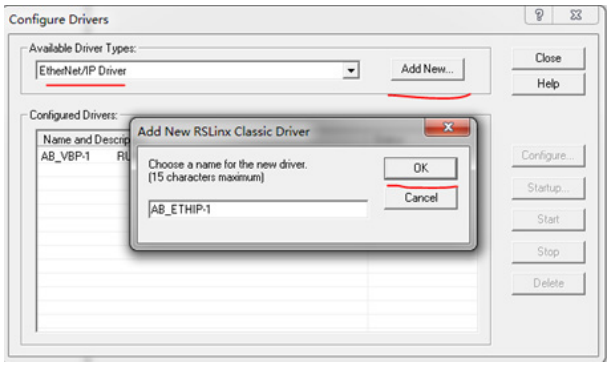


A2.5 Download Project to PLC

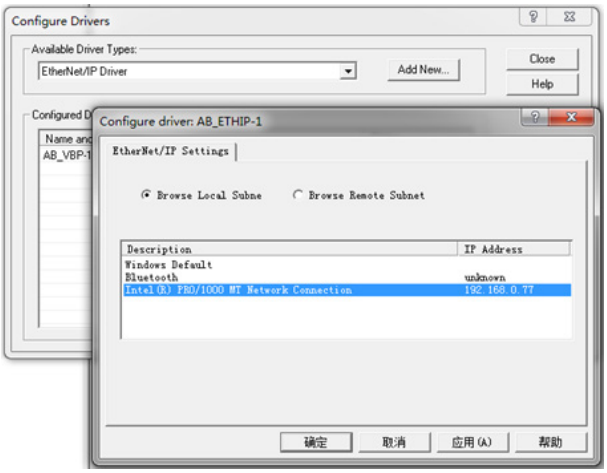
A2.5.1 Add AB_ETHIP Configuration in RSLinx

1. Open RSlinx, select "Communications" → "Configure Drivers"

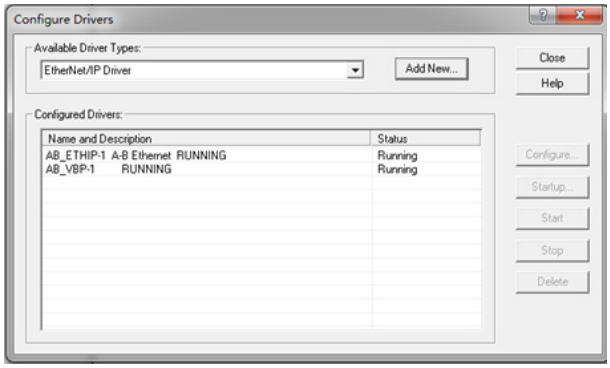
2. Select "EtherNet/IP Driver", then "Add New", click "OK":



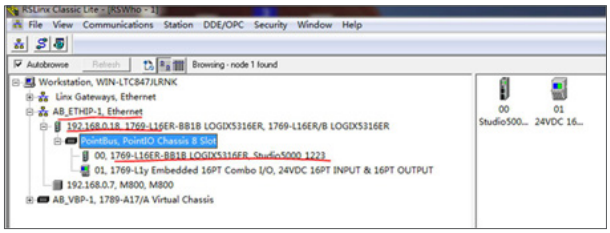
3. In the pop-window, select your current PC connection (in this guide the author uses VM-Ware, so select as screenshot below).



4. In the pop-window, select your current PC connection (in this guide the author uses VM-Ware, so select as screenshot below).

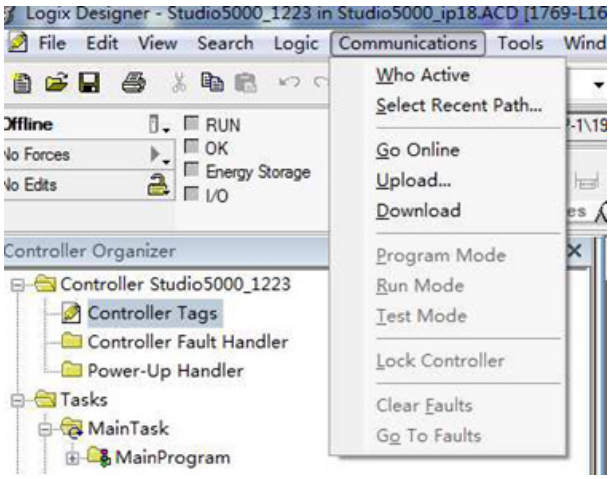


5. Return to the RSLinx menu. All the online/offline devices should be displayed in the AB-ETHIP-1 Ethernet driver, as shown in the screenshot below:

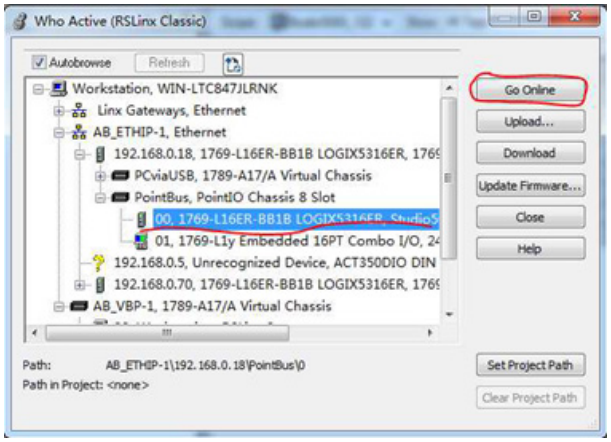


A2.5.2 Download Project

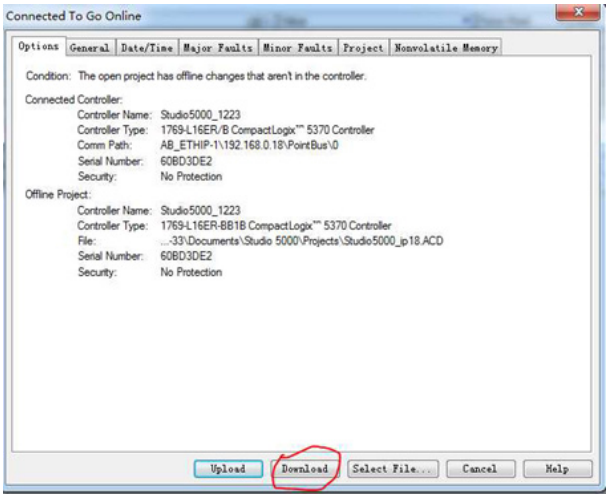
1. Select "Communications" → "Who Active" to find the PLC, please see screenshot below:

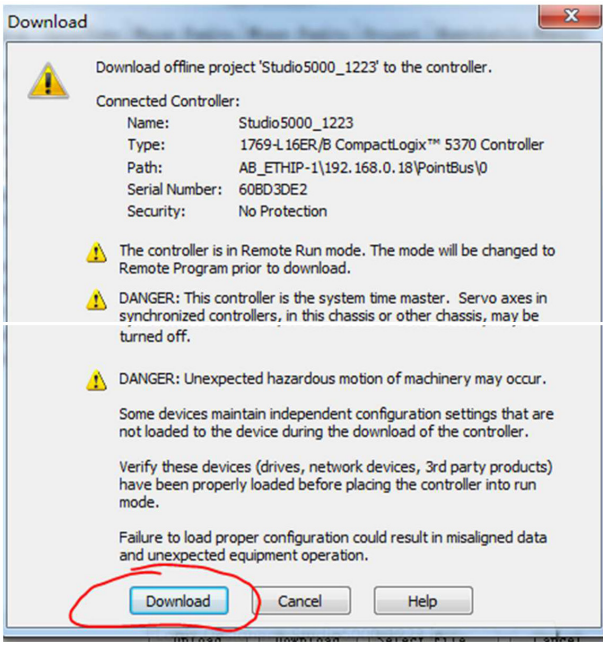


2. Select PLC "1769" then click "Go Online":



3.Click "Download" to download the current Studio5000 project to PLC.



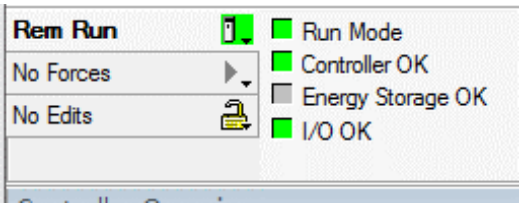


4.Finally, switch PLC to **Remote Control Mode.**

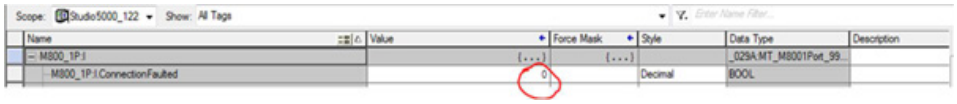
A2.6 Go Online

After switching to "Remote Control Mode", the system is online. The user should check information on left top to see the label to check.

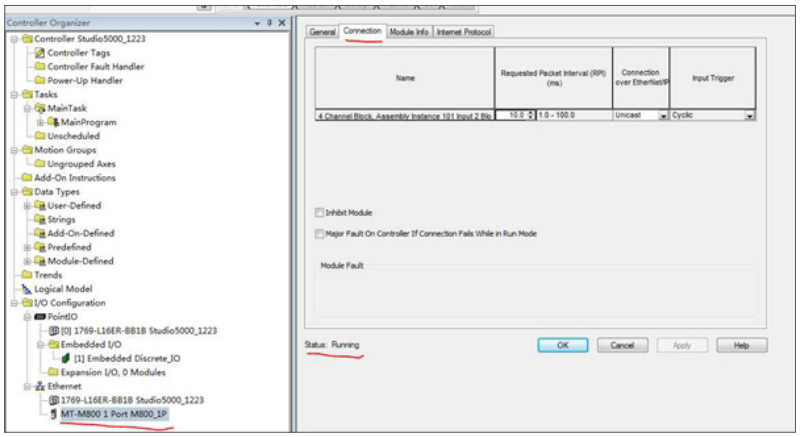
- Run Mode: Rem Run, Remote Run mode, user could control Output parameters (AO/DO).
- Controller OK: PLC run ok
- I/O OK: I/O connection ok.



If I/O connection is ok, user should see ConnectionFaulted = 0 in M800 Tag Input list.

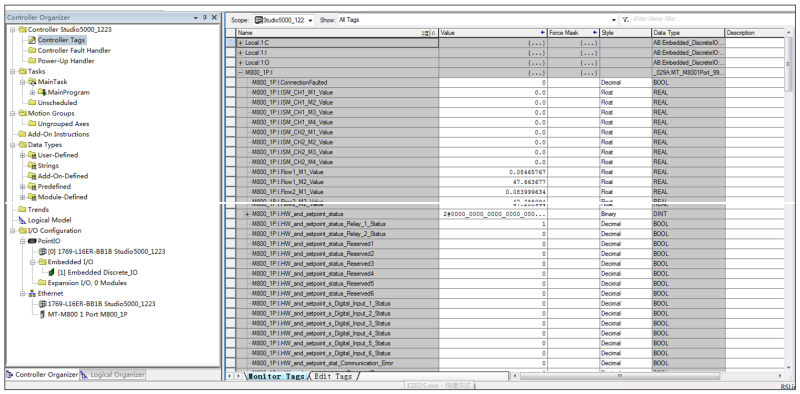


User also should double click "I/O Configurations" → " Ethernet" → "M800" to see the Module Fault information in the Option "Connection" on the right (see screenshot below for detail info):



A3 Display Measurements

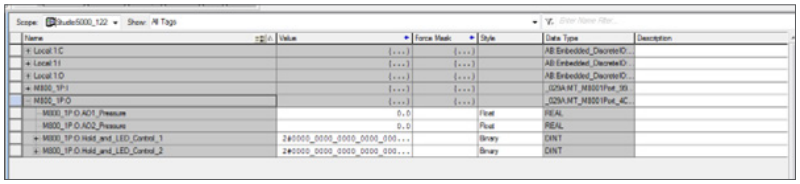
The user can watch measurements through input values in the "Controller Tags" → "M800" on the right (see screenshot below as reference):



A4 Writing AO/DO

To set AO or DO through PLC, select "Controller Tags" → "M800_1P : O":

- AO: input force value, then press "Enter" key
- DO: input force value, then press "Enter" key.



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