

Programmable Logic Controllers

USER'S MANUAL Hardware & Specifications

[CONTENTS](#)

OIS PLUS Operator Interface Stations

Toshiba International Corporation

Thank you for purchasing the OIS PLUS (Operator Interface Stations) product from Toshiba International Corp. OIS PLUS Series products are versatile industrial displays which are configured with Microsoft Windows® based software.

Manual's Purpose and Scope

This manual provides information on how to safely install, operate, and maintain your TIC OIS PLUS. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English equivalent.

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Important Notice

The instructions contained in this manual are not intended to cover all details or variations in equipment types, nor may it provide for every possible contingency concerning the installation, operation, or maintenance of this equipment. Should additional information be required contact your Toshiba representative.

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Any electrical or mechanical modifications to this equipment without prior written consent of Toshiba International Corporation will void all warranties and may void the 3rd party (CE, UL, CSA, etc) safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

Contacting Toshiba's Customer Support Center

Toshiba's Customer Support Center may be contacted to obtain help in resolving any system problems that you may experience or to provide application information.

The center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Support Center's toll free number is US 800-231-1412 Fax 713-466-8773 -- Canada 800-527-1204 -- Mexico 01-800-527-1204.

You may also contact Toshiba by writing to:

Toshiba International Corporation
13131 West Little York Road
Houston, Texas 77041-9990
Attn: PLC Marketing
Or email

Manual Revisions

Please have the following information available when contacting Toshiba International Corp. about this manual.

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<u>Rev No.</u>	<u>Date</u>	<u>Description</u>
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Related Manuals

UM-OISPLUS-E002: Display Programming

UM-OISPLUS-E003: Networking

UM-OISPLUS-E004: Universal Serial (ASCII) Driver

UM-V200-E001: Setup and Operation (for ladder logic programming)

UM-V200-E002: Ladder Logic (how to use the ladder instructions)

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0. General Safety Instructions and Information

- [Warning Labels Within Manual](#)
- [Equipment Warning Labels](#)
- [Preparation](#)
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- [Connection, Protection & Setup](#)
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0.1 Warning Labels Within Manual

DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING**, and **CAUTION** are used in the manual, they will be followed by important safety information that must be carefully adhered to.

DANGER — The danger symbol is an exclamation mark enclosed in a triangle that precedes the word DANGER. The danger symbol is used to indicate an imminently hazardous situation that will result in serious injury, possible severe property and equipment damage, or death if the instructions are not followed.



WARNING — The warning symbol is an exclamation mark enclosed in a triangle that precedes the word WARNING. The warning symbol is used to indicate a potentially hazardous situation that can result in serious injury, or possibly severe property and equipment damage, or death, if the instructions are not followed.



CAUTION — The caution symbol is an exclamation mark enclosed in a triangle that precedes the word CAUTION. The caution symbol is used to indicate situations that can result in minor or moderate operator injury, or equipment damage if the instructions are not followed.



To identify special hazards, other symbols may appear in conjunction with the **DANGER**, **WARNING**, and **CAUTION** symbols. These warnings describe areas that require special care and/or strict adherence to the procedures to prevent serious injury and possible death.

Electrical Hazard — The electrical hazard symbol is a lightning bolt enclosed in a triangle. The electrical hazard symbol is used to indicate high voltage locations and conditions that may cause serious injury or death if the proper precautions are not observed.



Explosion Hazard — The explosion hazard symbol is an explosion image enclosed in a triangle. The explosion hazard symbol is used to indicate locations and conditions where molten exploding parts may cause serious injury or death if the proper precautions are not observed.



0.2 Equipment Warning Labels.

DO NOT attempt to install, operate, maintain, or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

Shown below are examples of warning labels that may be found attached to the equipment. **DO NOT** remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your Toshiba representative for additional labels.

The following are examples of the warning labels that may be found on the equipment and are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed.

Examples of labels that may be found on the equipment.

0.3 Preparation

Qualified Person

A **Qualified Person** is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

- Have carefully read the entire operation manual.
- Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

For further information on workplace safety visit www.osha.gov.

Equipment Inspection

- Upon receipt of the equipment inspect the packaging and equipment for shipping damage.
- Carefully unpack the equipment and check for parts that were damaged from shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Toshiba representative.
- **DO NOT** install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in further equipment damage or personal injury.
- Check to see that the model number specified on the nameplate conforms to the order specifications.
- Modification of this equipment is dangerous and must not be performed except by factory trained representatives. When modifications are required contact your Toshiba representative.
- Inspections may be required before and after moving installed equipment.
- Keep the equipment in an upright position as indicated on the shipping carton.
- Contact your Toshiba representative for assistance if required.

Handling and Storage

- Use proper lifting techniques when moving the OIS; including properly sizing up the load, and getting assistance if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.
- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).
- Store in an upright position as indicated on the shipping carton.
- Include any other product-specific requirements.

Disposal

Never dispose of electrical components via incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

0.4 Installation Precautions

Location and Ambient Requirements

- Adequate personnel working space and adequate illumination must be provided for adjustment, inspection, and maintenance of the equipment (refer to NEC Article 110-34).
- Avoid installation in areas where vibration, heat, humidity, dust, fibers, steel particles, explosive/corrosive mists or gases, or sources of electrical noise are present.
- The installation location shall not be exposed to direct sunlight.
- Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the recommended minimum installation dimensions as shown on the enclosure outline drawings.
- The ambient operating temperature shall be between 0° and 50° C (32° and 122° F).

Mounting Requirements

- Only **Qualified Personnel** should install this equipment.
- Install the unit in a secure upright position in a well-ventilated area.
- A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.
- As a minimum, the installation of the equipment should conform to the NEC Article 110 Requirements For Electrical Installations, OSHA, as well as any other applicable national, regional, or industry codes and standards.
- Installation practices should conform to the latest revision of NFPA 70E Electrical Safety Requirements for Employee Workplaces.

Conductor Routing and Grounding

- Use separate metal conduits for routing the input power, and control circuits.
- A separate ground cable should be run inside the conduit with the input power, and control circuits.
- **DO NOT** connect control terminal strip return marked CC to earth ground.
- Always ground the unit to prevent electrical shock and to help reduce electrical noise.

The Metal Of Conduit Is Not An Acceptable Ground.

0.5 Connection, Protection & Setup

Personnel Protection

- Installation, operation, and maintenance shall be performed by **Qualified Personnel Only**.
- A thorough understanding of the OIS will be required before the installation, operation, or maintenance of the OIS.
- Rotating machinery and live conductors can be hazardous and shall not come into contact with humans. Personnel should be protected from all rotating machinery and electrical hazards at all times. Depending on its program, the OIS can initiate the start and stop of rotating machinery.
- Insulators, machine guards, and electrical safeguards may fail or be defeated by the purposeful or inadvertent actions of workers. Insulators, machine guards, and electrical safeguards are to be inspected (and tested where possible) at installation and periodically after installation for potential hazardous conditions.
- Do not allow personnel near rotating machinery. Warning signs to this effect shall be posted at or near the machinery.
- Do not allow personnel near electrical conductors. Human contact with electrical conductors can be fatal. Warning signs to this effect shall be posted at or near the hazard.
- Personal protection equipment shall be provided and used to protect employees from any hazards inherent to system operation or maintenance.

System Setup Requirements

- When using the OIS as an integral part of a larger system, it is the responsibility of the OIS installer or maintenance personnel to ensure that there is a fail-safe in place (i.e., an arrangement designed to switch the system to a safe condition if there is a fault or failure).
- System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage (i.e., E-Off, Auto-Restart settings, System Interlocks, etc.).
- The programming setup and system configuration of the OIS may allow it to start a motor unexpectedly. A familiarity with Auto-restart settings is a requirement to use this product.
- Improperly designed or improperly installed system interlocks may render the motor unable to start or stop on command.

The failure of external or ancillary components may cause intermittent system operation, i.e., the system may start a motor without warning or may not stop on command.

- There may be thermal or physical properties, or ancillary devices integrated into the overall system that may allow the OIS to start a motor without warning. Signs at the equipment installation must be posted to this effect.
- The operating controls and system status indicators should be clearly readable and positioned where the operator can see them without obstruction.
- Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.

0.6 System Integration Precautions

The following precautions are provided as general guidelines for using an OIS in an industrial or process control system.

- The Toshiba PLC is a general-purpose product. It is a system component and is used in conjunction with other items of industrial equipment such as PLCs, Loop Controllers, Adjustable Speed Drives, etc.
- **A detailed system analysis and job safety analysis should be performed by the systems designer or systems integrator before including the OIS in any new or existing system.** Contact Toshiba for options availability and for application-specific system integration information if required.
- The PLC may be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely. Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards. The adjustable speed drive may start the motor without warning. Signs at the equipment installation must be posted to this effect. A familiarity with Auto-restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. **Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command**
- Control through serial communications can fail or can also override local controls, which can create an unsafe condition. System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage. Use of the built-in system protective features and interlocks of the equipment being controlled is highly recommended (i.e., emergency-off, overload protection, etc.)
- **Never use the PLC units to perform emergency stops.** Separate switches outside the OIS, the PLC, and the ASD should be used for emergency stops.
- Changes or modifications to the PLC program should not be made without the approval of the system designer or systems integrator. Minor changes or modifications could cause the defeat of safety interlocks and permissives. Any changes or modifications should be noted and included with the system documentation.

0.7 3rd Party Safety Certifications.

CE Marking

The V200 Series Programmable Controllers conform to the directive and standards of ISO/IEC Guide 22 and EN 45014.

<i>Conforms to the following Product Specifications</i>		
EMI(Electro Magnetic Interference) :		
Conducted*/Radiated	:	EN61131-2:2007/EN55011
EMS(Electro Magnetic Susceptibility) :		
ESD	:	EN61131-2:2007/EN61000-4-2
RF EM field	:	EN61131-2:2007/EN61000-4-3
Fast Transient	:	EN61131-2:2007/EN61000-4-4
Surge Immunity	:	EN61131-2:2007/EN61000-4-5
Conducted Disturbances	:	EN61131-2:2007/EN61000-4-6
Magnetic Field Immunity **	:	EN61131-2:2007/EN61000-4-8
Voltage dips & Interruptions*	:	EN61131-2:2007/EN61000-4-11
Electrical Safety	:	EN61131-2: 2007

UL Certification

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet UL requirements. The basic standards used to investigate this category are UL 508, the Standard of Safety for Industrial Control Equipment and UL Standard for Safety for Programmable Controllers. V200 Programmable Logic Controllers are certified NRAG & NRAG7 for use in hazardous locations

 ONLINE CERTIFICATIONS DIRECTORY		Home Quick Guide Contact Us UL.com
Search results		
You may choose to Refine Your Search.		
Company Name	Category Name	Link to File
TOSHIBA CORP	Programmable Controllers for Use in Hazardous Locations	NRAG.E184034
TOSHIBA CORP	Programmable Controllers for Use in Hazardous Locations Certified for Canada	NRAG7.E184034

RoHS Product Certification

The OIS PLUSs meet the European Directive on the Restriction of Hazardous Substances (RoHS) in electrical and electronic equipment companies This insures the chemical compliance of the V200.

INTRODUCTION

- ◆ Purpose of this Manual
 - OIS PLUS Basics
 - Hardware Configuration
- ◆ OIS PLUS Overview
- ◆ What is an OIS PLUS
- ◆ How does the OIS PLUS Work?

1.1 Purpose of this Manual

Thank you for purchasing Flexi Panel Series Products. OIS PLUS Series Products are versatile operator interfaces with Microsoft® Windows based configuration Software.

This Manual explains the operation of the OIS PLUS Series and how to implement available features using the OIL-DS Configuration Software. This manual will help you to install, configure and operate your OIS PLUS product.

1.1.1 OIS PLUS Basics

Operator Interface Terminals (OIS PLUSs) provide much more versatility than traditional mechanical control panels. An OIS PLUS allows a plant floor operator to monitor current conditions of a control system and, if necessary, to initiate a change in the operation of the system. OIS PLUSs connect to programmable logic controllers (PLCs) typically through the serial communications port. The OIS PLUS can be programmed to monitor and/or change current values stored in the data memory of the PLC.

OIS PLUSs are having graphics based displays with touch screen and keypad having function keys. Thus OIS PLUS provides much more flexibility in preparing application. Keys can be created in a touch screen OIS PLUS that can be made visible only when needed.

What is a *Project*?

A project is an user created application in OIL-DS Configuration Software. A project contains information such as OIS PLUS model, Network Configuration, Screen information, Task information etc.

What is a *Screen*?

A screen is a visual representation of objects placed on the unit screen. Any partially sized window is usually referred to as a popup screen or window. The user can create his customized screen according to his requirements. Popup windows can also appear on the OIS PLUS display by pressing buttons on the touch screen. The maximum number of screens in an application is only limited by the application memory size. A more in depth discussion on screens is covered in "Screens" section.

What is an *Object*?

An object placed on OIS PLUS screen can perform actions such as displaying text messages, writing a value to a

PLC register, or displaying an alarm. An object can be classified as a text or graphical object.

A text object is used to display the text on the OIS PLUS and can also be used to perform some action. For example, a data entry object tells the OIS PLUS to continuously monitor a PLC register and allows the user to change the value in the register. Some objects can display graphics whose shape depends on the value of a register. These objects may also change the value of a PLC tag. An example is a Bit Button Object that creates a graphic object on the OIS PLUS. When pressed, it activates a bit in the PLC.

1.1.2 Hardware Requirements

The following basic PC hardware configuration is needed to configure and operate your OIL-DS Configuration Software. Minimal PC configuration for Windows2000 / XP/:

DEVICE	RECOMMENDED
Processor	800MHz Pentium processor OR equivalent processor
Operating System	Microsoft Windows 2000 with SP4 Microsoft Windows XP Professional / Home Edition with SP2
RAM	256MB
Hard Disk Space	800MB (including 200MB for the .NET Framework Redistributable)
Display	1024 x 768 High Color 16-bit
Mouse/Keyboard	Required

Minimal PC configuration for Vista/Win7:

DEVICE	RECOMMENDED
Processor	1GHz Pentium processor or equivalent processor
Operating System	Microsoft Windows Vista Home and Vista Business edition
RAM	1GB
Hard Disk Space	800MB (including 200MB for the .NET Framework Redistributable)
Display	1024 x 768 High Color 16-bit
Mouse/Keyboard	Required

These are the minimum system requirements for a computer running the OIL-DS Configuration software.

1.2.1 OIS PLUS Series Overview

OIS PLUS product line provides Human-Machine Interface to the Programmable Logic Controller. These OIS PLUSs communicate with PLCs using their serial communications ports.

Configuration of OIS PLUS unit:

Each OIS PLUS unit has to be configured using the OIL-DS Configuration Software before connecting it to the PLC.

Normal Operation:

Connect OIS PLUS unit to PLC using the correct PLC-OIS PLUS cable. The OIS PLUS can communicate with any device without making any additional hardware settings on the unit.

PLC1

HMI

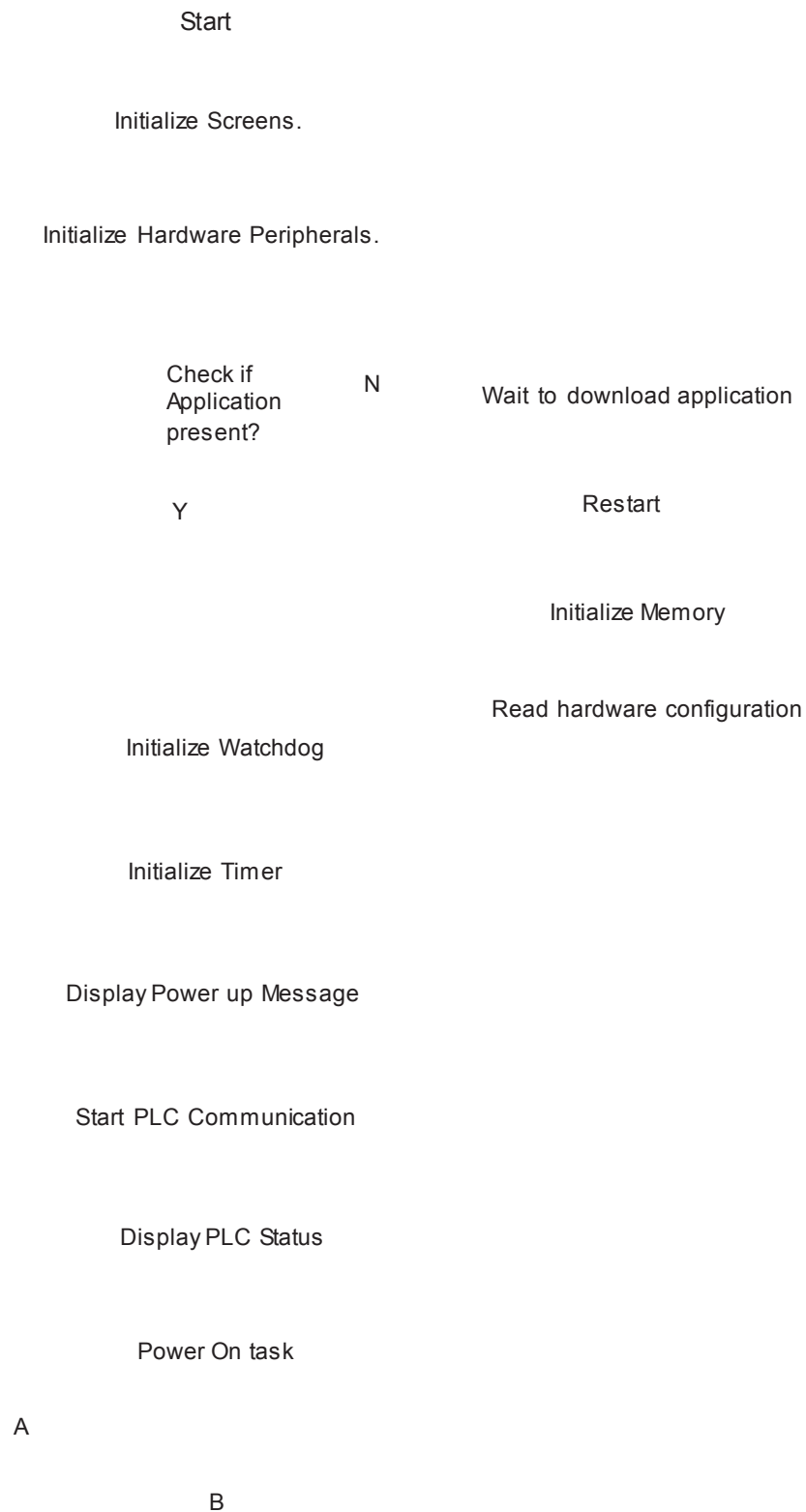
PLC2

H
R



1.2.2 How the OIS PLUS Works

The OIS PLUS follows a specific sequence for performing the tasks defined by the user in the application. The sequence is as shown below:



B

Request
for IBM
Comm?

Y

Complete IBM Communication

N

Restart

Fill Alarm Container

If RTC
changed
by 1 sec

Y

If any groups defined for logging
then lock the data

N

Global Task

If New
screen?

N

D

Y

Upload Block list

After Hiding task (Last screen)

Before showing task

D

Display / Print screen

Display Associated screen

Display If Popup screen

While showing screen task

C

C

While showing task for
Popup screen

Check
Press?

N

Y

Serve Key task

Check
PLC
comm
error?

Y

Reestablish PLC Communication

N

Flush SPI FIFO

A

HARDWARE

- ◆ OIS PLUS Models

 - OIS PLUS Models

 - Comparison between OIS PLUS Models

- ◆ Installation Instructions

 - Panel cut-out for OIS PLUS Models

 - Wiring Diagrams

 - Communication Ports

2.1 OIS PLUS Models

OIS PLUS series models are Human Machine Interfaces. OIS PLUS models need +24VDC power from an external supply. OIS PLUSs are divided into 2 (two) parts as base models and clip-on I/O models.

Base Models included in the OIS PLUS Series are as follows:

Category	Model	Description
OIS10 PLUS	OIS10 PLUS	OIS PLUS Series, 16X2 LCD (Multi color) with local I/Os: 8, Dig. I/P, 8 Dig. O/P (OC PNP Type).
	OIS12	OIS PLUS Series, 16X2 LCD (Multi color), OIS only.
OIS20 PLUS	OIS20 PLUS	OIS PLUS Series, 128X64 LCD (Multi color) with local I/Os: 12 Dig. I/P, 8 Dig. O/P (Relay Type)
OIS40 PLUS	OIS40 PLUS	OIS PLUS Series, 3" mono LCD, tri color back light.
OIS55 PLUS	OIS55E PLUS Not Stocked in Houston	OIS PLUS Series, 3.5" Color TFT with Ethernet and 3 Expansions
	OIS55 PLUS	OIS PLUS Series, 3.5" Color TFT with 3 Expansions
OIS60 PLUS	OIS60E PLUS Not Stocked in Houston	OIS PLUS Series, 5.7" Color TFT with Ethernet and 5 Expansions
	OIS60 PLUS	OIS PLUS Series, 5.7" Color TFT with 5 Expansions
OIS45 PLUS	OIS45E PLUS	OIS PLUS Series, 4.3" Color TFT with Ethernet and 3 Expansions. Without keypad with touch screen
	OIS45 PLUS Not Stocked in Houston	OIS PLUS Series, 4.3" Color TFT with 3 Expansions, Without keypad with touch screen
OIS70 PLUS	OIS70E PLUS	OIS PLUS Series, 7" Color TFT with Ethernet and 5 Expansions. Without keypad with touch screen
	OIS70 PLUS Not Stocked in Houston	OIS PLUS Series, 7" Color TFT with 5 Expansions, Without keypad with touch screen
OIS120A	OIS120 A	OIS PLUS Series, 12.1" Color TFT with Ethernet. Without keypad with touch screen

Clip-on I/O Models are also divided into two parts as: Digital and analog models

Digital Clip-on I/O Models:

TRPDIX1600	16 Digital Inputs (sinking or sourcing)
TRPDOX0016P	16 PNP transistor outputs (Rating: 0.5A)
TRPDOX0016N	16 NPN transistor outputs (Rating: 0.5A)
TRPRO0012R	12 relays (5A per common) outputs (Relay rating: 2Amp)
TRPDIO0808P	8 Digital inputs (PNP or NPN) and 8 PNP transistor outputs (Rating: 0.5A)
TRPDIO0808PHS	8 Digital inputs (PNP or NPN) and 8 PNP transistor outputs (Rating: 0.5A), 4 high speed inputs (single phase & Quadrature), 2 PWM (Rating: 0.3A)
TRPDIO0808N	8 Digital inputs (PNP or NPN) and 8 NPN transistor outputs (Rating: 0.5A)
TRPDIO0808NHS	8 Digital inputs (PNP or NPN) and 8 PNP transistor outputs (Rating: 0.5A), 4 high speed inputs (single phase & Quadrature), 2 PWM (Rating: 0.3A)

Analog Clip-on I/O Models:

TRPAIO0202L	2 Analog inputs [Resolution: 12 bit], (4 to 20mA, 0 to 10V, -10 to +10V, 0 to 20mA) and 2 analog outputs [Resolution 12 bit] (4 to 20mA, 0 to 10V, 0 to 20mA)
TRPAIO0400L	4 Analog inputs [Resolution: 12 bit], (4 to 20mA, 0 to 10V, -10 to +10V, 0 to 20mA)
TRPAIO0402U-16	4 Universal Analog Inputs (RTD, TC, 4-20 mA, 0-20mA, 0-50mV, 0-100mV, 0-5VDC, 0-10VDC), 2 Outputs voltage/current (16 Bit)

Clip-on Comm Ports:

GSM*	GSM Modem
NIO-PB-DPS*	Profibus DP Slave Module
NIO-CAN*	CAN Open Network Module (CAN open as well as J1939)

Note *: For more details, contact factory

2.2 OIS PLUS Feature Matix (based on product codes)

Model	Display	Local I/O	Expansion	Ethernet ports	USB	RTC
OIS10 PLUS	2x16 Text Multi color backlit	8 DC in 6 Relays 2A 2 NPN 0.5A	No	No	Device	Yes
OIS12	2x16 Text Multi color backlit	NA	No	No	Device	Yes
OIS20 PLUS	128x64 Mono 3" Multi color backlit	12 DC in 6 Relays 2A 2 NPN 0.5A 4 0-10 V 10 bit (Analog)	No	No	Device	Yes
OIS40 PLUS	128x64 Mono 3" Multi color backlit	None	No	No	Device	Yes
OIS55E PLUS Not Stocked in Houston	320x240 QVGA 3.5" Color TFT	None	3	Yes	Device and Host	Yes
OIS55 PLUS	320x240 QVGA 3.5" Color TFT	None	3	No	Device and Host	Yes
OIS60E PLUS Not Stocked in Houston	320x240 QVGA 5.7" Color TFT	None	5	Yes	Device and Host	Yes
OIS60 PLUS	320x240 QVGA 5.7" Color TFT	None	5	Yes	Device and Host	Yes

Model	Display	Local I/O	Expansion	Ethernet ports	USB	RTC
OIS45E PLUS	480x272 WQVGA	None	3	Yes	Device and Host	Yes
OIS45 PLUS Not Stocked in Houston	480x272 WQVGA	None	3	No	Device and Host	Yes
OIS70E PLUS	800x480 WVGA	None	5	Yes	Device and Host	Yes
OIS70 PLUS Not Stocked in Houston	800x480 WVGA	None	3	No	Device and Host	Yes
OIS120A	800x600 SVGA	None	None	Yes	Device and Host	Yes

2.3 OIS PLUS Feature Matrix

Based on other specifications

Model	Display	Keys TS	Memory	Ladder Steps	Application memory	Logging	Serial ports
OIS10 PLUS	2x16 Text Multicolor backlit	18 keys No	512K	10K Steps	84K	N.A.	RS232/485
OIS12	2x16 Text Multicolor backlit	18 keys No	512K	10K Steps	84K	N.A.	RS232/485
OIS20 PLUS	128x64 Mono 3" Multi color backlit	18 keys No	512K +1MB	10K Steps	1MB	N.A	1
OIS40 PLUS	128x64 Mono 3" Multi color backlit	No keys	512K +1MB	10K Steps	1MB	N.A	1
OIS55 PLUS	320x240 QVGA 3.5" Color TFT	6 keys Yes	8MB	160K Steps	Up-to 6MB	Yes	1
FP4057M-E	320x240 QVGA 5.7" Mono STN 16 Grey scales	6 keys Yes	8MB	160K Steps	Up-to 6MB	Yes	2
OIS60 PLUS	320x240 QVGA 5.7" Color TFT	6 keys Yes	8MB	160K Steps	Up-to 6MB	Yes	2

Model	Display	Keys TS	Memory	Ladder Steps	Application memory	Logging	Serial ports
OIS45E PLUS	480x272 WQVGA	None Yes	10MB	Yes	Device and Host	Yes	2
OIS70E PLUS	800x480 WVGA	None Yes	10MB	Yes	Device and Host	Yes	2
OIS120A	800x600 SVGA	None Yes	10MB	Yes	Device and Host	Yes	2

2.4 OIS PLUS Specifications

2.4.1 OIS10 PLUS



	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	2 Watt
	CE, UL, RoHS
	IP65 Rated
Ladder Steps	10K Steps
Application Memory	84 KB
Data Register	4096 Words
Retentive Register	300 Words
System Register	256 Words
System Coil	100 Points
Internal Register	256 Words
Input Register	400 Words / 6400 pts max*
Output Register	400 Words / 6400 pts max*
Timer Register	256 Words
Counter Register	100 Words
Configuration Register	1600 Words / 25600 pts max*
Display Type	Multi-color
Display Resolution	16 X 2 Line Text
Number of Ports	2
Type	RS232/485/422 and USB Device port

Miscellaneous	
External Dimension	109 H X 71 W X 35 D mm
Panel Cutout	99.00 mm x 63.00 mm
Weight	220 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

Note: #1 at 25° C

#2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C

*: Depends upon I/O allocation.

Local I/O Specifications for OIS10 PLUS

Digital Inputs	8 Normal inputs Bidirectional type.
Digital outputs	6 Relay outputs, 2 PWM / Normal outputs
Rated Input voltage	NA
Rated Input Current	NA
Input Impedance	NA
Minimum ON voltage	NA
Maximum OFF voltage	NA
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Rated load	2A at 24VDC
High Speed Inputs	X1 and X2
No. of inputs	2 Channels
Max. Input Frequency	25 KHz
Max. Input Count	4294967295
High Speed Outputs	Y6 and Y7
No. of inputs	2 Channels
Max. Output Frequency	5 KHz
Max. Output Count	4294967295

Wiring details are shown on the rear side of the OIS10 PLUS

2.4.2 OIS12



	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	2 Watt
	CE, UL, RoHS
	IP65 Rated
Ladder Steps	10K Steps
Application Memory	84 KB
Data Register	4096 Words
Retentive Register	300 Words
System Register	256 Words
System Coil	100 Points
Internal Register	256 Words
Input Register	400 Words / 6400 pts max*
Output Register	400 Words / 6400 pts max*
Timer Register	256 Words
Counter Register	100 Words
Configuration Register	1600 Words / 25600 pts max*
Display Type	Multi-color
Display Resolution	16 X 2 Line Text
Number of Ports	2 with no local I/Os
Type	RS232/485/422 and USB Device port

Miscellaneous	
External Dimension	109 H X 71 W X 35 D mm
Panel Cutout	99.00 mm x 63.00 mm
Weight	172 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

Note: #1 at 25° C

#2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C

*: Depends upon I/O allocation.

2.4.3 OIS40 PLUS



	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	5 Watt
	CE, UL, RoHS
	IP65 Rated
Ladder Steps	5K Steps
Application Memory	1 MB
Data Register	4096 Words
Retentive Register	300 Words
System Register	256 Words
System Coil	100 Points
Internal Register	256 Words
Input Register	400 Words / 6400 pts max*
Output Register	400 Words / 6400 pts max*
Timer Register	256 Words
Counter Register	100 Words
Configuration Register	1600 Words / 25600 pts max*
Display Type	Multi-color
Display Resolution (HxV) Landscape Model:	128 X 64 Pixels
(HxV) Potrait Model	64 X 128 Pixels
Number of Ports	2
Type	*COM1: RS232 *COM2: RS485/422 and USB Device port

Miscellaneous	
External Dimension	109 H X 71 W X 35 D mm
Panel Cutout	99.00 mm x 63.00 mm
Weight	156 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

Note: #1 at 25° C

#2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C

*: Depends upon I/O allocation.

Note:

*COM1 / COM2: This unit has one DB9 COM port that can be used as COM1 (RS232) and / or COM2 (RS485/RS422).

Special "Y" cable can be provided, if both the ports are to be used simultaneously.

User need to place a separate order to purchase "Y" cable.

Refer Appendix section 15.2

2.4.4 OIS20 PLUS



Voltage Rating	24 VDC
Power Rating	24 VDC +/-15%
	3 Watt
	CE, UL, RoHS
	IP65 Rated
Ladder Steps	10K Steps
Application Memory	1 MB
Data Register	4096 Words
Retentive Register	300 Words
System Register	256 Words
System Coil	100 points
Internal Register	256 Words
Input Register	400 Words / 6400 pts max*
Output Register	400 Words / 6400 pts max*
Timer Register	256 Words
Counter Register	100 Words
Configuration Register	1600 Words / 25600 pts max*
Display Type	Multi-color Mono
Display Resolution	128 X 64 Pixels
Number of Ports	2 with local IOs
Type	RS232/485/422 and USB Device port
Expansion Ports	NA

Miscellaneous	
External Dimension	128 H X 102 W X 45 D mm
Panel Cutout	119.00 mm x 93.00 mm
Weight	320 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

Note: #1 at 25° C

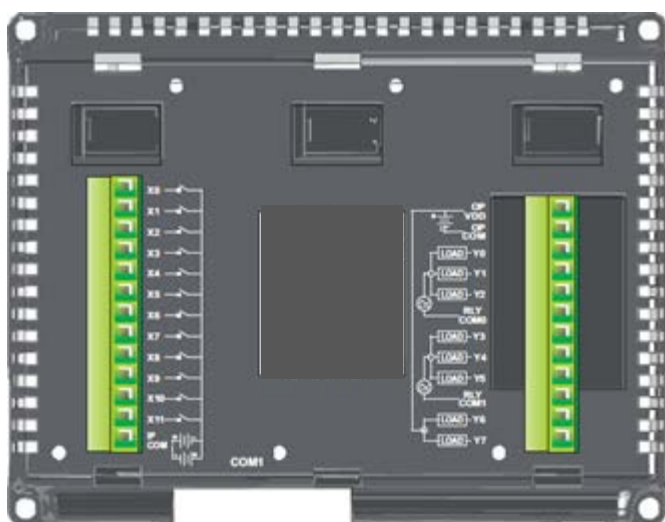
#2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C

*: Depends upon I/O allocation.

Local I/O Specifications of OIS20 PLUS

Digital Inputs	12 Normal inputs Bidirectional type.
Digital outputs	6 Relay outputs, 2 PWM / Normal outputs
Rated Input voltage	NA
Rated Input Current	NA
Input Impedance	NA
Minimum ON voltage	NA
Maximum OFF voltage	NA
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Rated load	2A at 24VDC
High Speed Inputs	X1 and X2
No. of inputs	2 Channels
Max. Input Frequency	25 KHz
Max. Input Count	4294967295
High Speed Outputs	Y6 and Y7
No. of inputs	2 Channels
Max. Output Frequency	5 KHz
Max. Output Count	4294967295

Wiring details are shown on the rare side of the unit OIS20 PLUS



2.4.5 OIS22 PLUS



Voltage Rating	24 VDC
Power Rating	24 VDC +/-15%
	3 Watt
	CE, UL, RoHS
	IP65 Rated
Ladder Steps	10K Steps
Application Memory	1MB
Data Register	4096 Words
Retentive Register	300 Words
System Register	256 Words
System Coil	100 points
Internal Register	256 Words
Input Register	400 Words / 6400 pts max*
Output Register	400 Words / 6400 pts max*
Timer Register	256 Words
Counter Register	100 Words
Configuration Register	1600 Words / 25600 pts max*
Display Type	Multi-color
Display Resolution	128 X 64 Pixels
Number of Ports	2
Type	RS232/485/422 and USB Device port
Expansion Ports	3

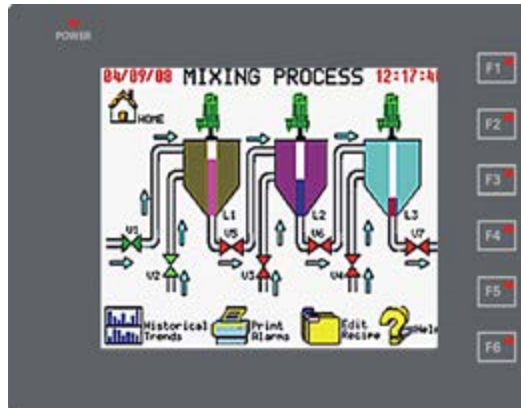
Miscellaneous	
External Dimension	128 H X 102 W X 45 D mm
Panel Cutout	119.00 mm x 93.00 mm
Weight	265 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

Note: #1 at 25° C

#2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C

*: Depends upon I/O allocation.

2.4.6 OIS55 PLUS



	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	4 Watt
	CE, UL, RoHS
	IP65 Rated
Total Memory	8MB
Application Memory	6 MB Max.
Ladder Steps	160K Steps (1 MB Max.)
Data Register	4096 Words
Retentive Register	1400 Words
System Register	256 Words
System Coil	100 points
Internal Register	256 Words
Input Register	400 Words (max.)
Output Register	400 Words (max.)
Timer Register	256 Words
Counter Register	256 Words
Configuration Register	1600 Words (max.)
Time Coils	256 points
Counter Coils	256 points
DisplaySize & Type	3.5" TFT Color Display
Display Resolution	320 X 240 Pixels

Miscellaneous	
External Dimension	128 H X 102 W X 45 D mm
Panel Cutout	119.00 mm x 93.00 mm
Weight	285 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to Surge	Level as per IEC61000-4-5
Immunity to CRF	Level as per IEC61000-4-6
Emission	EN55011
Vibration Tests	Frequency 10Hz to 150hz Displacement +/- 0.35mm Acceleration: 2g Sweep rate : 1 octave per minute Duration : 20 Sweeps / Axis app Axis , X,Y, Z
Shock Test	25 g acceleration with 11 ms 3 Shocks each AXIS (a total of 18 Shocks)

2.4.7 OIS45E PLUS

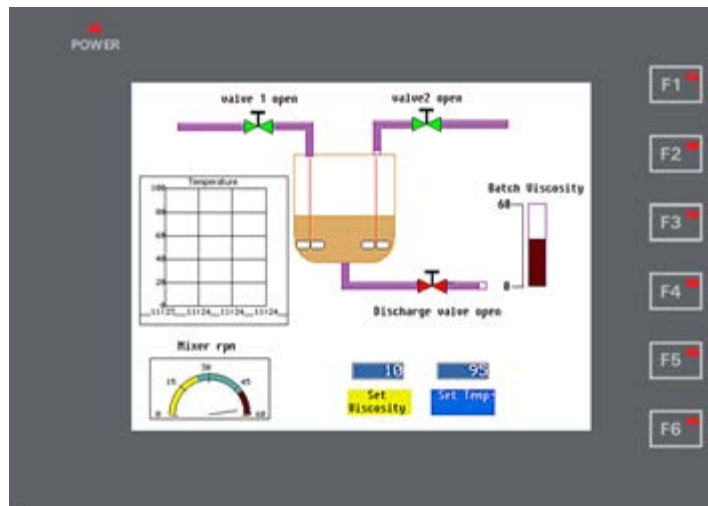


	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	6 Watt
	CE, UL, RoHS
	IP66 Rated
Total Memory	128MB Max. Application
Memory	Up to 10MB Max.
Ladder Steps	320K Steps (2MB Max.)
Data Register	4096 Words
Retentive Register	1400 Words
System Register	256 Words
System Coil	100 points
Internal Register	256 Words
Input Register	400 Words (max.)
Output Register	400 Words (max.)
Timer Register	256 Words
Counter Register	256 Words
Configuration Register	1600 Words (max.)
Time Coils	256 points

Miscellaneous	
External Dimension	128 H X 102 W X 45 D mm
Panel Cutout	119.00 mm x 93.00 mm
Weight	330 gm.
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90%*1RH (Noncondensing) at 40°C
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to Surge	Level as per IEC61000-4-5
Immunity to CRF	Level as per IEC61000-4-6
Emission	EN55011
Vibration Tests	Frequency 10Hz to 150hz Displacement +/- 0.35mm Acceleration: 2g Sweep rate : 1 octave per minute Duration : 20 Sweeps / Axis app Axis , X,Y, Z
Shock Test	25 g acceleration with 11 ms 3 Shocks each AXIS (a total of 18 Shocks)

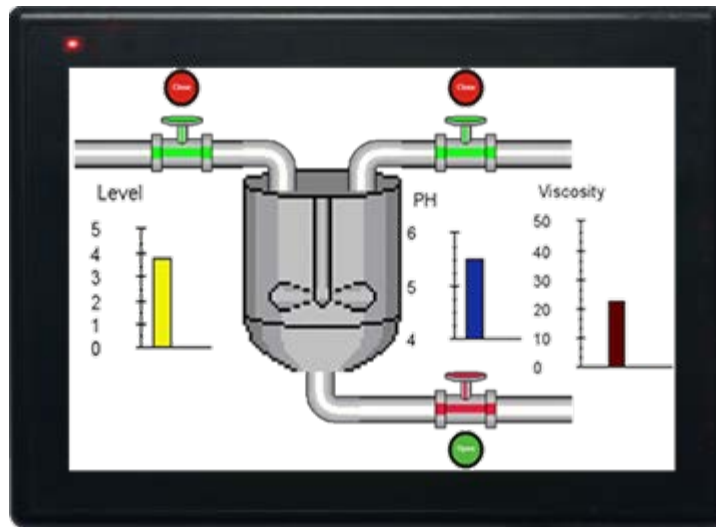
Counter Coils	256 points
Display	
DisplaySize & Type	4.3" WQVGA TFT Color Display
DisplayResolution	480 X 272 Pixels
Touch Screen	Analog Resistive
Communications	
2 COMP Ports	Port 1: RS232 and 1 RS485/422
2 USB Ports	1 USB Device and 1 USB Host
Ethernet Port	1 Ethernet Port
Expansion Port	3

2.4.8 OIS60 PLUS



Power Supply	24 VDC	Communication	
Voltage Rating	24 VDC +/-15%	2 COM Ports	COM1: RS232/485/422 COM2: RS232/485/422
Power Rating	10 Watt	2 USB Ports	1 USB Device and 1 USB Host
Approvals	CE, UL, RoHS	Expansion Port	5
Bezel	IP65 Rated	Miscellaneous	
Memory		External Dimension	195 H X 142 W X 50 D mm
Total Memory	160K Steps	Panel Cutout	184.00 mm x 131.00 mm
Application Memory	Upto 6 MB	Weight	710 gm.
Data Register	4096 Words	Ambient Operating Temperature	0 °C to 50 °C
Retentive Register	1400 Words	Mounting Method	Panel Mounting
System Register	256 Words	Humidity	10% to 90% ^{#1} RH (Noncondensing) 10% to 85% ^{#2} RH (Noncondensing)
System Coil	100 points	Immunity to ESD	Level as per IEC61000-4-2
Internal Register	256 Words	Immunity to Transients	Level as per IEC61000-4-4
Input Register	400 Words (max.)	Immunity to Radiated RF	Level as per IEC61000-4-3
Output Register	400 Words (max.)	Immunity to CF	Level as per IEC61000-4-6
Timer Register	256 Words	Emission	EN61000-6-4
Counter Register	256 Words	<i>Note: #1 at 25° C #2 85% at 40° C and above 40° C, the equivalent absolute humidity is less than 85% at 40° C</i>	
Configuration Register	1600 Words		
Time Coils	256 points		
Counter Coils	256 points		
Display			
Display Type	TFT Color Display		
Display Resolution	320 X 240 Pixels		
Touch Screen	4 wire Analog Resistive		

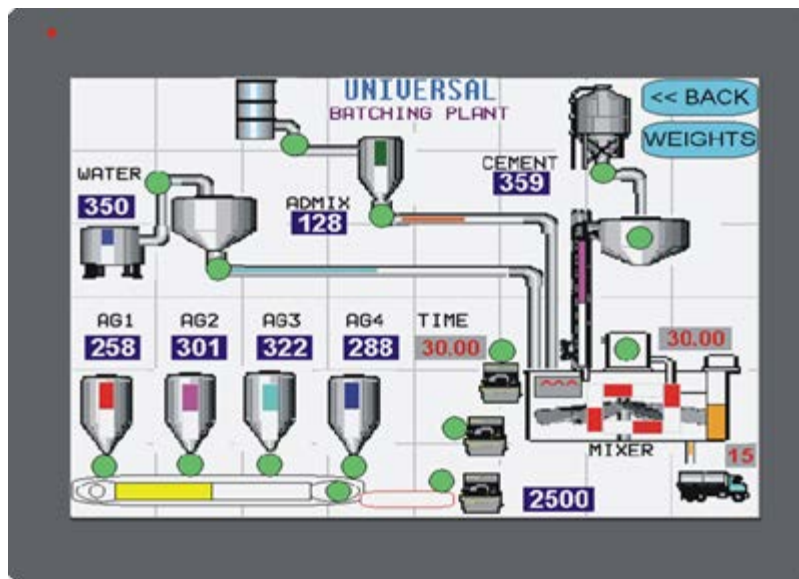
2.4.9 OIS70E PLUS



Power Supply	24 VDC
Voltage Rating	24 VDC +/-15%
Power Rating	9 Watt
Approvals	CE, UL, RoHS
Bezel	IP66 Rated
Memory	
Total Memory	128MB Max.
Application Memory	Up to 10MB
Ladder Steps	320K Steps (2MB Max.)
Data Register	4096 Words
Retentive Register	1400 Words
System Register	256 Words
System Coil	100 points
Internal Register	256 Words
Input Register	400 Words (max.)
Output Register	400 Words (max.)
Timer Register	256 Words
Counter Register	256 Words
Configuration Register	1600 Words
Time Coils	256 points
Counter Coils	256 points
Display	
Display Type	7" WGA TFT Color Display
Display Resolution	800 X 480 Pixels
Touch Screen	Analog Resistive

Communication	
2 COM Ports	COM1: RS232/485/422 COM2: RS232/485/422
2 USB Ports	1 USB Device and 1 USB Host
Ethernet Port	1 Ethernet Port
Expansion Port	5
Miscellaneous	
External Dimension	195 H X 142 W X 50 D mm
Panel Cutout	184.00 mm x 131.00 mm
Weight	---
Ambient Operating Temperature	0 °C to 50 °C
Mounting Method	Panel Mounting
Humidity	10% to 90% ^{#1} RH (Noncondensing) at 40°C
Immunity to ESD	Level as per IEC61000-4-2
Immunity to Transients	Level as per IEC61000-4-4
Immunity to Radiated RF	Level as per IEC61000-4-3
Immunity to CF	Level as per IEC61000-4-6
Emission	EN61000-6-4

2.4.10 OIS120A



Power Supply	24 VDC		
Voltage Rating	24 VDC +/-15%	2 COM Ports	COM1: RS232/485/422 COM2: RS232/485/422
Power Rating	12 Watt	2 USB Ports	1 USB Device and 1 USB Host
Approvals	CE, RoHS	Ethernet Port	1 Ethernet Port
Bezel	IP66 Rated	Expansion Port	None
Memory		External Dimension	312 H X 246 W X 48 D mm
Total Memory	128MB Max.	Panel Cutout	295.00 mm x 227.00 mm
Application Memory	Up to 10MB	Weight	1680 gm.
Data Register	4096 Words	Ambient Operating Temperature	0 °C to 50 °C
Retentive Register	1400 Words	Mounting Method	Panel Mounting
System Register	256 Words	Humidity	10% to 85%#2RH (Noncondensing)
System Coil	100 points	Immunity to ESD	Level as per IEC61000-4-2
Internal Register	256 Words	Immunity to Transients	Level as per IEC61000-4-4
Input Register	400 Words (max.)	Immunity to Radiated RF	Level as per IEC61000-4-3
Output Register	400 Words (max.)	Immunity to CF	Level as per IEC61000-4-6
Timer Register	256 Words	Emission	EN61000-6-4
Counter Register	256 Words		
Configuration Register	1600 Words		
Time Coils	256 points	Note: #1:	
Counter Coils	256 points	Temp < 40°C, 85% RH Max.	
Display		Temp > 40°C, absolute humidity shall be less than 85% RH.	
Display Type	12.1" SVGA TFT Color Display		
Display Resolution	800 X 600 Pixels		
Touch Screen	Analog Resistive		

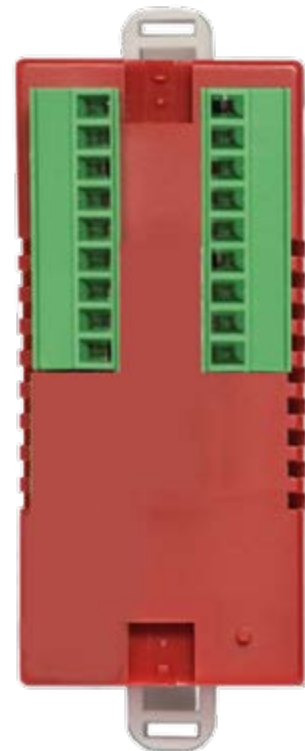
2.5 OIS PLUS Clip-on I/O Modules

Certain displays in the OIS PLUS accept Clip-on I/O modules. Specifications for these modules follow:

2.5.1 TRPDIO0808 (8 inputs, 8 outputs)

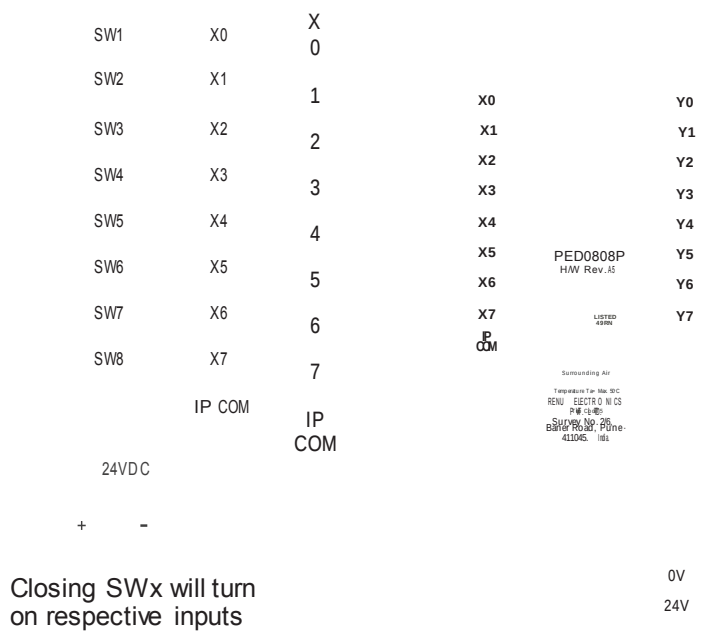
TRPDIO0808P = (PNP Type transistor output) TRPDIO0808N = (NPN Type transistor output)

	3.9VDC, 0.3W from FP base model
	CE, UL
	8 Normal inputs
	Bidirectional type.
	8 PNP type Transistor output.
	8 NPN type Transistor output.
Rated Input voltage	24VDC
Rated Input Current	Upto 5mA
Input Impedance	4.9K ohm
Minimum ON voltage	18.0 VDC
Maximum OFF voltage	5.0 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Output Capacity	500mAmax for PNP and NPN type transistor output
Rated load	500mAat 24VDC
	X0 and X5
No. of inputs	2 Channels
Max. Input Frequency	25 KHz
Max. Input Count	4294967295
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	70 gm.

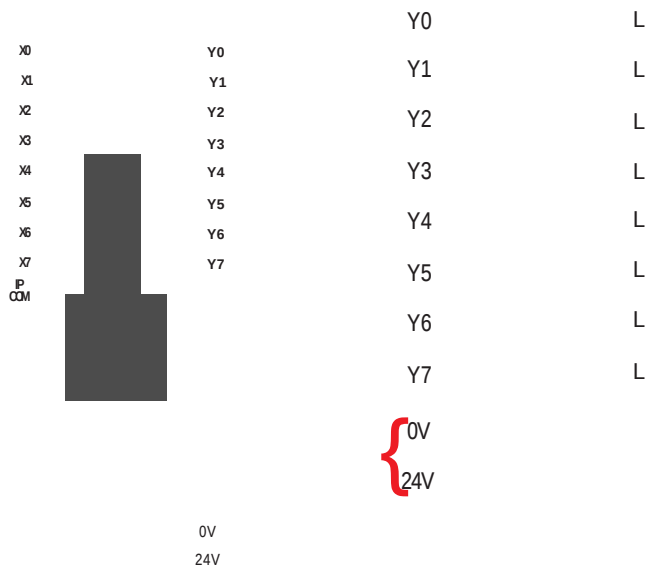


Wiring diagram of GDD288P*S (PNP Type transistor output):

1. Wiring diagram for testing digital inputs:

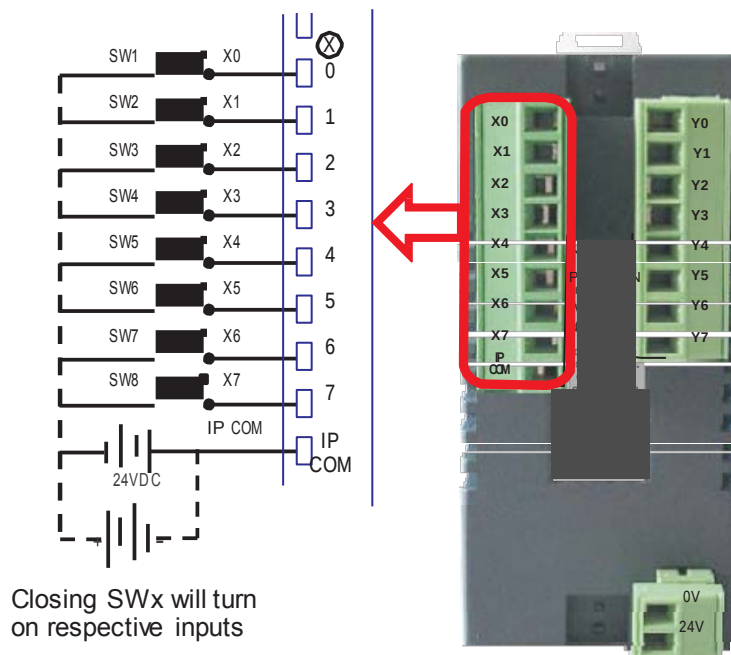


2. Expansion output connections:

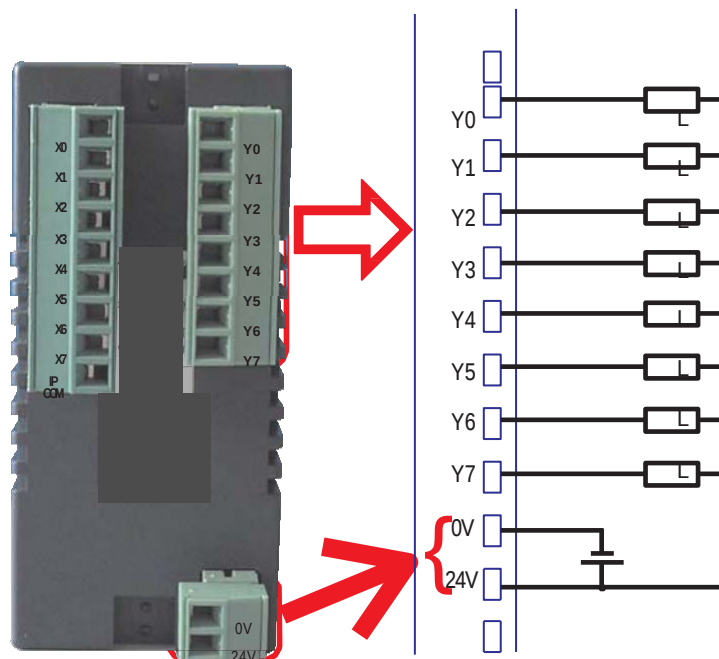


Wiring diagram of TDRDIO0808N (NPN Type transistor output):

1. Wiring diagram for testing digital inputs:



2. Expansion output connections:



2.5.2 TRPHIO0808 (8 inputs, 8 outputs, high speed)

TRPHIO0808N = (NPN Type transistor output) TRPHIO0808P = (PNP Type transistor output)

Number of Inputs	8 Inputs Bi-directional Type (Within which 4 are high speed)
Input Design	According to EN 61131-2 Type 1
Minimum ON Voltage	15 VDC
Maximum ON Voltage	30 VDC
Maximum OFF Voltage	5 VDC
Minimum OFF voltage	-3 VDC
Nominal input voltage	24 VDC
Nominal input current	5mA Typical
Isolation	Optically isolated from internal circuit. High isolation voltage(BV=3750Vr.m.s.)
Input Impedance	4.9K ohm
Turn OFF time	10msec
Turn ON time	10msec

Number of HS Inputs	4
High Speed Channels	X0, X5, X2, X7
Max. input frequency	25KHz
Max. input count	4294967295

Outputs	8 PNP / NPN type (2 are high speed)	0V
Min. ON Output Voltage	22V DC	24V
Max. ON Voltage	24V DC	
Max. OFF Voltage	1V	
Minimum OFF Voltage	0.2V	
Nominal Output voltage	24 V DC	
Nominal Output current	500mA Typical	
per channel		
Isolation	Optically isolated from internal circuit. High isolation voltage(BV=3750Vr.m.s.)	
Short Circuit protection	1. Auto Protection for 6 normal digital output PNP / NPN type channels.	

Nominal load	
- Ohmic	48 Ohm / 12 W
- Lamp	12 W
- Inductive	12 VA (1.2 H, 50 W)
Switching frequency with	
- Inductive nominal load	0.5 Hz (1.2 H, 50 W), maximum

Voltage rating	3.9VDC derived from base unit
Current rating	Up to 80mA
Power rating	0.3W
Input per channel	24VDC, 5mA
Output per channel	500mA, 24VDC

Nominal value	24 V DC
Tolerance	-15% / +20% according to EN 61131-2
Ripple	±5% according to EN61131-2
Permissible range	19.2 V to 30 V
Safety equipment	Surge voltage, protection against polarity
Reversal	
Connection	Via power connectors

Operating Temperature	0 to 55°C
Storage Temperature	-20 to 85°C.
Operating Humidity	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	70 gm.

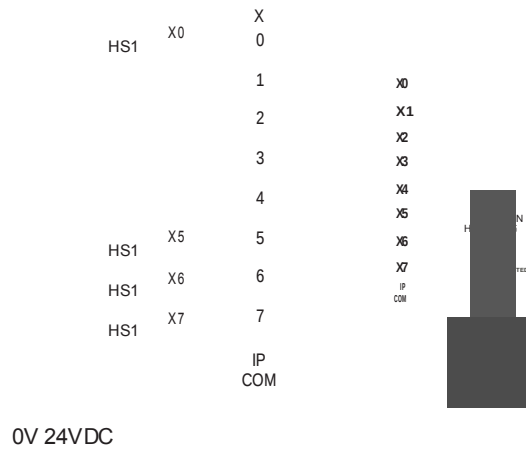


Up Counter Single Phase	Number of channels	4 (X0, X5, X2, X7)
	Physical reset input	X1, X6, X3, X4
	Maximum input frequency (per channel)	25KHz
	Input count register (per channel)	1 (32-bit)
	Preset registers (per channel)	1 (32-bit)
	Configurable forced output	4 (Y1, Y6, Y7, Y0)
	Sampling time	1 to 1000mS
	Hold value	Same as input count register (per channel)
Quadrature Counter	Number of channels	1 (X2 and X7)
	Physical reset input channels	X3
	Maximum input frequency (per channel)	20KHz
	Input count register (per channel)	1 (32-bit)
	Preset registers (per channel)	1 (32-bit)
	Configurable forced output	1 (Y7)
	Quadrature mode	1x, 2x, 4x

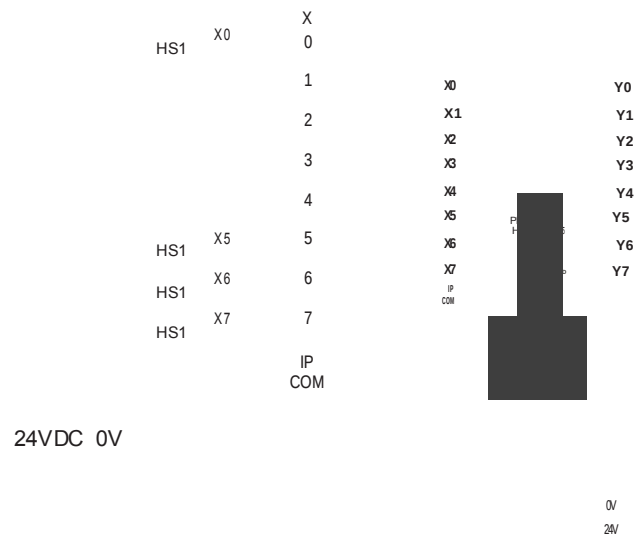
PWM Output		
Number of channels		1 (Y2)
PWM frequency (variable)		10KHz Max
Frequency step		1Hz
PWM duty cycle (variable)		0 to 100%
Duty cycle step		1%
Pulse/DIR mode	Number of pulse channels	1
	Output Channels used	Y2 (Pulse), Y4 (Direction)
	Pulse frequency	10KHz Max (50% duty cycle)
	Frequency step	1Hz
CW/CCW mode	Number of pulse channels	2
	Output Channels used	Y2 (CW), Y4 (CCW)
	Pulse frequency	10KHz Max (50% duty cycle)
	Frequency step	1Hz
Fixed pulse mode (Continuous)	Number of pulse channels	2
	Output Channels used	"Y2 (always continuous pulse) "Y4 (configurable normal or cotinuous pulse)"
	Pulse frequency (variable)	10KHz Max (50% duty cycle)
	Frequency step	1Hz
Fixed pulse mode (Trapezoidal) (Soft start)	Number of pulse channels	1
	Output Channels used	Y2
	Minimum frequency	1Hz to 10KHz
	Maximum frequency (must be>min. freq.)	1Hz to 10KHz
	Accelaration time	0ms to 32767ms
	Deceleration time	0ms to 32767ms
	Pulse count	-2147483648 to 2147483647
	Frequency step	1Hz

Wiring diagram of TRPHIO0808N and TRPHIO0808P:

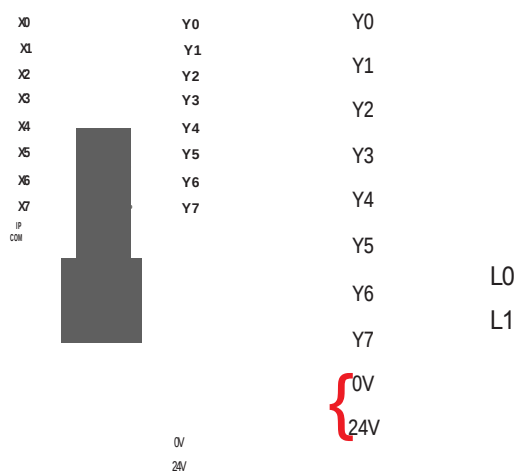
1. High Speed Counter Input Connection (Sink):



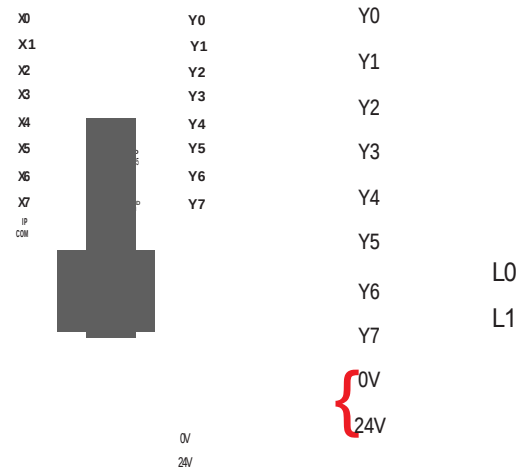
2. High Speed Counter Input Connection (Source):



3. PWM Output Connection (Sink):

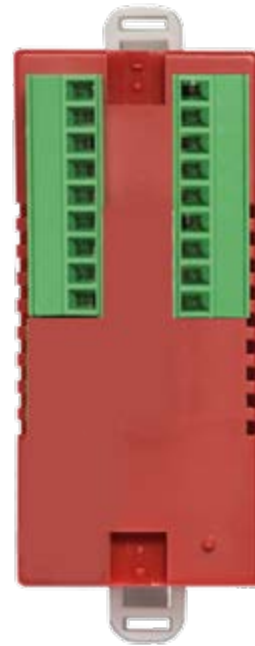


4. PWM Output Connection (Source):

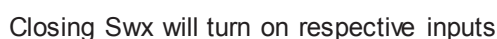


2.5.3 TRPDIX1600 (16 channel bidirectional inputs only)

	3.9VDC, 0.3W from OIS PLUS base model
	CE, UL
	14 Normal inputs (Bidirectional type)
	2 High speed inputs
	N.A. Rated
Input voltage	24VDC
Rated Input Current	Upto 5mA
Input Impedance	4.9K ohm
Minimum ON voltage	15.0 VDC
Maximum OFF voltage	5.0 VDC
Turn ON time	10 msec
Turn OFF time	10 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Output Capacity	N.A.
Rated load	N.A.
No. of inputs	2 Channels (X0 and X5)
Max. Input Frequency	25 KHz
Max. Input Count	4294967295
No. of outputs	N.A.
Max. Output Frequency	N.A.
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	65 gm.



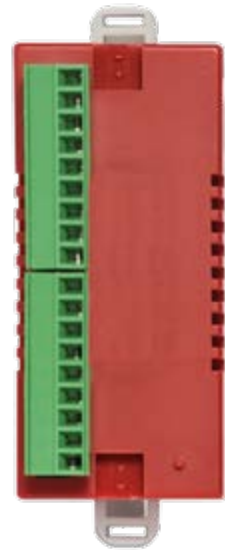
1. Wiring diagram for testing digital inputs (NPN Type):



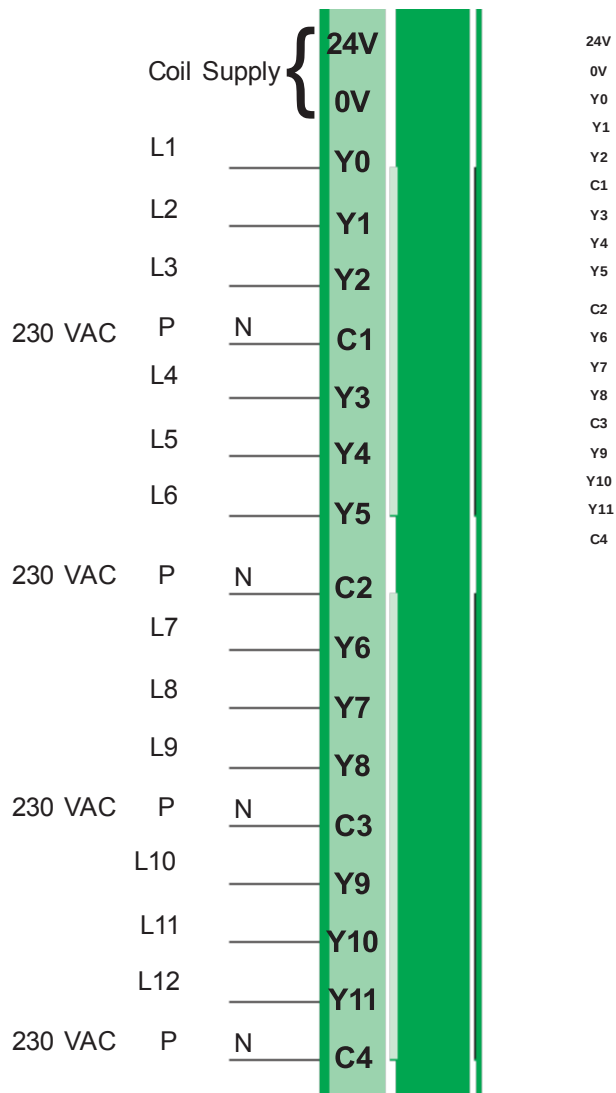
Closing Swx will turn on respective inputs

2.5.4 TRPRO0012R (12 channel relay outputs only)

	3.9VDC, 0.3W from OIS PLUS base model
	CE, UL
	N.A
	12 Relay type outputs
Rated Input voltage	N.A
Rated Input Current	N.A
Input Impedance	N.A
Minimum ON voltage	N.A
Maximum OFF voltage	
Turn ON time	10 msec
Turn OFF time	5 msec
Isolation	Optically isolated from the internal circuit
Connection method	Removable terminals (3.81mm pitch)
Output Capacity	
Rated load	
Contact Rating	2A per contact
	N.A.
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	90 gm.



Wiring Diagram of
TRPRO0012R



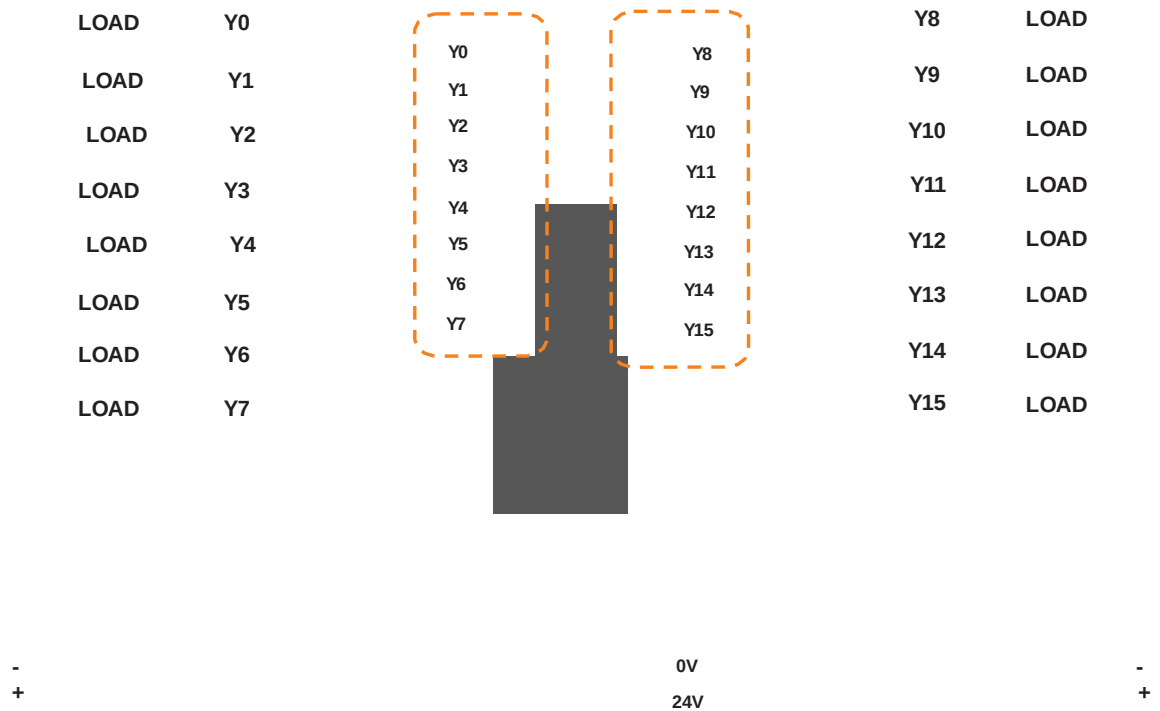
*L1 to L12 are A.C. Load.

2.5.5 TRPDOX0016

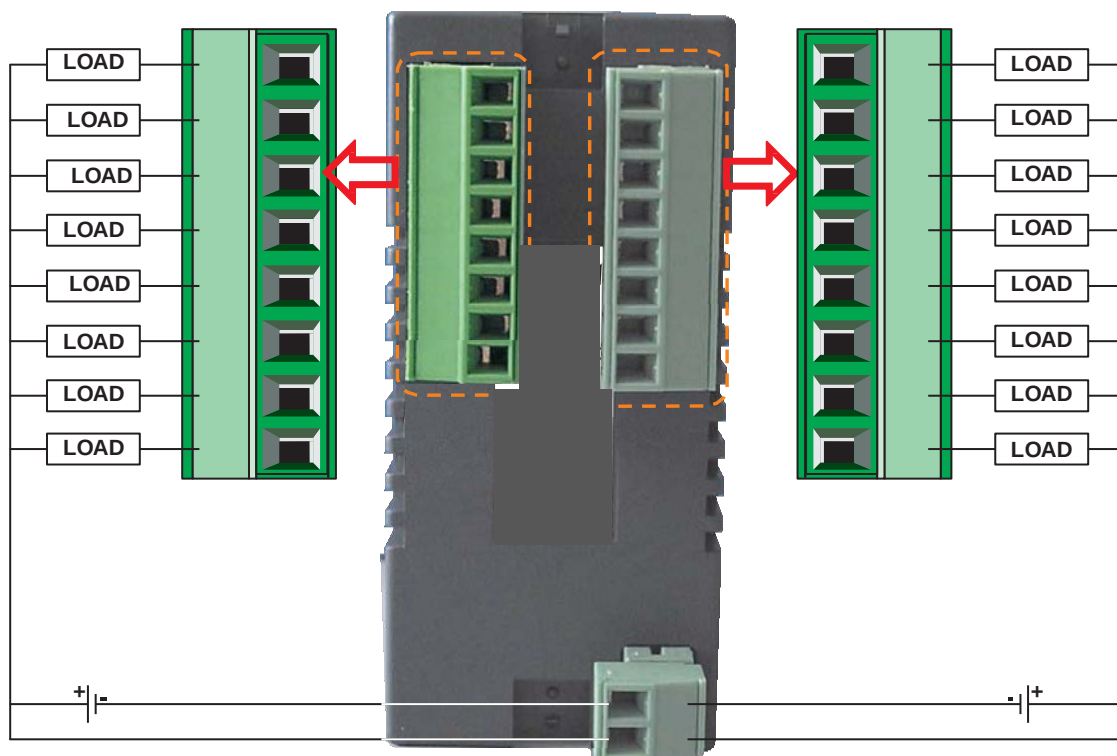
TRPDOX0016P(PNP Type transistor output) TRPDOX0016N (NPN Type transistor output)

	3.9VDC, 0.3W from OIS PLUS base model		
	CE, UL		
	NA	Y0	Y8
	16 PNP type Transistor output.	Y1	Y9
	16 NPN type Transistor output.	Y2	Y10
Rated Input voltage	24VDC	Y3	Y11
Rated Input Current	Upto 5mA	Y4	Y12
Input Impedance	4.9K ohm	Y5	Y13
Minimum ON voltage	15.0 VDC	Y6	Y14
Maximum OFF voltage	5.0 VDC	Y7	Y15
Turn ON time	10 msec		
Turn OFF time	10 msec		
Isolation	Optically isolated from the internal circuit		
Connection method	Removable terminals (3.81mm pitch)		
Output Capacity	500mAmax for PNP and NPN type transistor output		
Rated load	500mAat 24VDC		
	Y0		
No. of outputs	1 Channels		0V
Max. Output Frequency	5 KHz		24V
Max. Output Count	4294967295		
Operating Temperature	0 to 55 deg.C.		
Storage Temperature	-20 to 85 deg.C.		
Operating Humidity	10% to 90% (Non condensing)		
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)		
Weight	For FPED0016P: 75 gm. For OIS PLUSED0016N: 65 gm.		

Wiring Diagram of TRPDOX0016P:



Wiring Diagram of TRPDOX0016N:



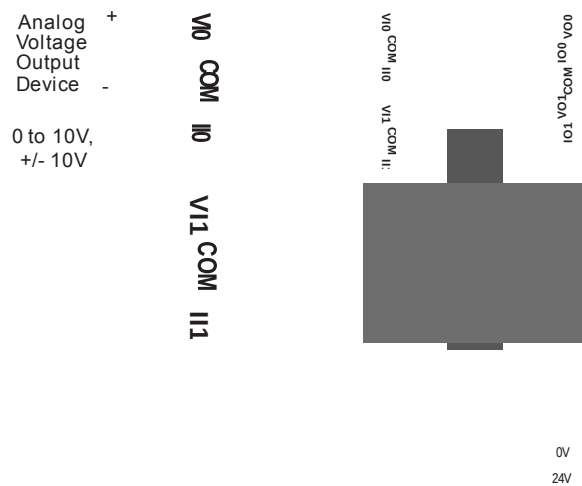
2.5.6 TRPAIO202L (2 AI, 2 AO)

Power	3.9VDC, 0.3W from FP base model
Approvals	CE, UL
Analog Inputs	2 Inputs (4 to 20mA, 0 to 10V, -10 to +10V, 0 to 20mA)
Analog Outputs	2 Outputs (4 to 20mA, 0 to 10V, 0 to 20mA)
Analog Inputs	
Number of inputs	2
Resolution	12 Bit
Voltage Mode:	
Input Range:	-10V to +10V
Value of LSB:	For 0-10V : 2.44mV For +/- 10V : 4.88mV
Input Impedance	200K Ohm
Accuracy	At 25°C: 0.1% of full scale. Overall accuracy (-25°C to 55°C) % Full Scale: 0.3% of full scale
Frequency Limit (-3db):	3.5KHz
Behavior upon sensor failure	Input goes to 0, as if no input is connected
Current Mode	
Input Range	4mA – 20mA, 0mA - 20mA
Value of LSB	3.906uA
Input Impedance	120 Ohm
Accuracy	At 25°C: 0.2% of full scale Overall accuracy (-25°C to 55°C) % Full Scale: 0.8% of full scale
Analog Outputs	
Number of outputs	2
Resolution	12 Bit
Voltage Mode:	
Output Range	0 to +10V
Value of LSB	2.44mV/step
Output Load minimum	1000 Ohm
Accuracy	At 25°C: 0.05% of full scale Overall accuracy (-25°C to 55°C) % Full Scale: ±10ppm/°C
Current Mode:	
Output Range	4mA to 20mA
Value of LSB	3.9uA
Output Load maximum	500 Ohm
Accuracy	At 25°C: 0.13% of full scale Overall accuracy (-25°C to 55°C) % Full Scale: ±10ppm/°C

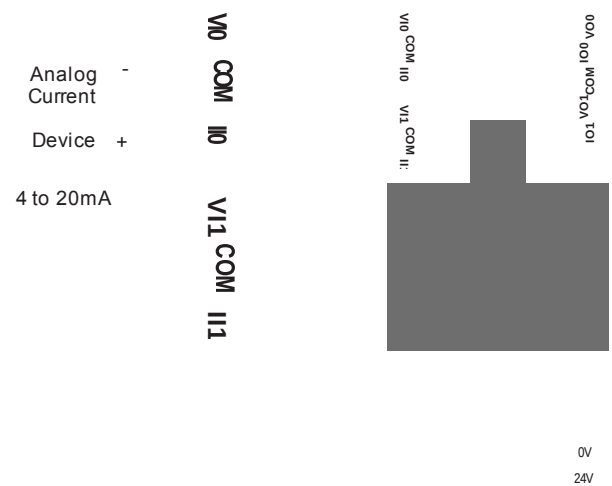


Wiring Diagram of TRPRTX0202L

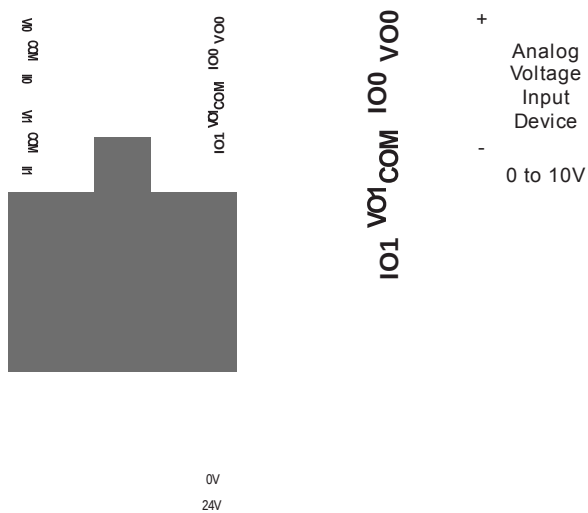
1. Wiring diagram for analog voltage input:



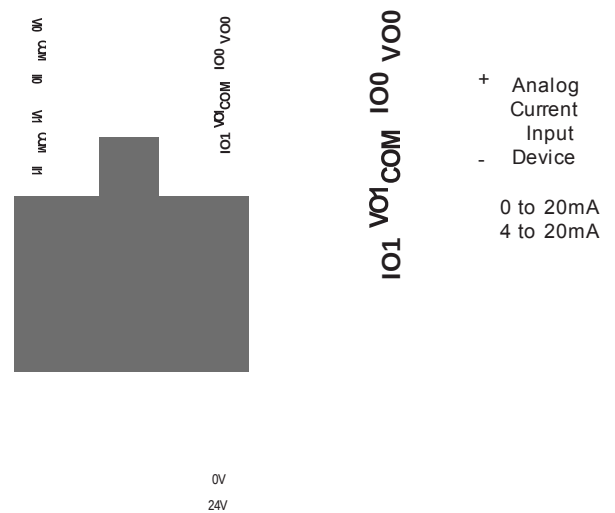
2. Wiring diagram for analog current input:



1. Wiring diagram for analog voltage output:



2. Wiring diagram for analog current output:



2.5.7 TRPAIO0400L (4 AI)

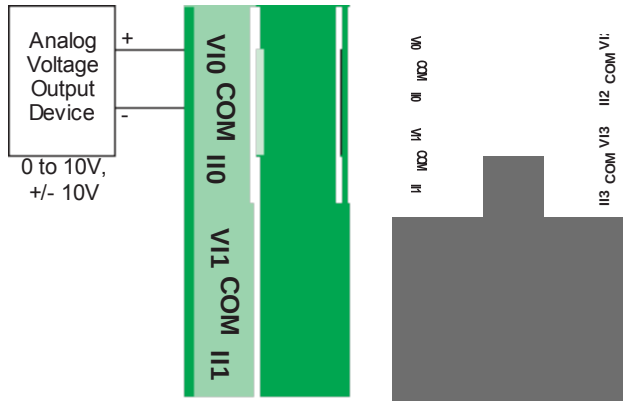
Power	3.9VDC, 0.3W from OIS PLUS base model
Approvals	CE, UL
Digital/Analog Inputs	4 Inputs (4 to 20mA, 0 to 10V, -10 to +10V, 0 to 20mA)
Digital/Analog outputs	N.A.
Analog Inputs	
Number of inputs	4
Resolution	12 Bit
Voltage Mode:	
Input Range:	-10V to +10V
Value of LSB:	For 0-10V : 2.44mV For +/- 10V : 4.88mV
Input Impedance	200 K Ohm
Accuracy	At 25°C: 0.1% of full scale. Overall accuracy (-25°C to 55°C) % Full Scale: 0.3% of full scale
Frequency Limit (-3db):	3.5KHz
Behavior upon sensor failure	Input goes to 0, as if no input is connected
Current Mode	
Input Range	4mA – 20mA, 0mA - 20mA
Value of LSB	3.906uA
Input Impedance	120 Ohm
Accuracy	At 25°C: 0.2% of full scale Overall accuracy (-25°C to 55°C) % Full Scale: 0.8% of full scale

General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	80 gm.

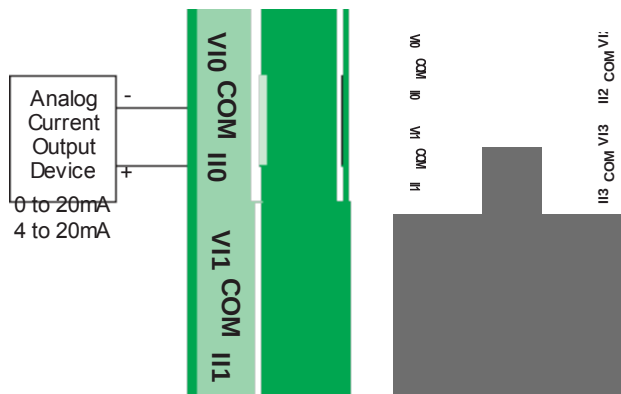


Wiring Diagram of TRPAIO0400L

1. Wiring diagram for analog voltage input:



2. Wiring diagram for analog current input:



2.5.8 TRPAIO0402U-16 (4 AI, 2 AO)

Power	3.75VDC, 0.3W from auxiliary Power supply
Approvals	CE, UL
Analog Inputs	4 Universal Input Channels Voltage Input 0 - 10 V; Current Input 0-20mA, 4-20mA RTD PT100 (alpha1, alpha2), RTD PT1000, Thermocouple (TYPE J, and K) mV(0-100mV, 0-50 mV)
Analog outputs	2 Output channels Voltage 0 - 10 V (Min Load 1000 ohm) or Current 4 - 20 mA (Max load 500 ohm) Current 0 - 20 mA
Analog Inputs	
Number of inputs	4
Resolution	16 Bit
Input range:	
Voltage	0 to 10VDC and 0 to 5VDC
Current	0 to 20mA and 4 to 20mA
Thermocouple	J type -210 to 1200°C K type -200 to 1373°C
mV	0 to 50mV and 0 to 100mV
RTD	a1 (PT100): -200 to 850°C a2 (PT100): -100 to 457°C and PT1000: -200 to 850°C
Overall accuracy	1% of full scale (Max)
Input Impedance	1MOhm for voltage, thermocouple, mV and RTD input 100Ohm for current input (with fuse)
Absolute maximum input	±30VDC, 30mA

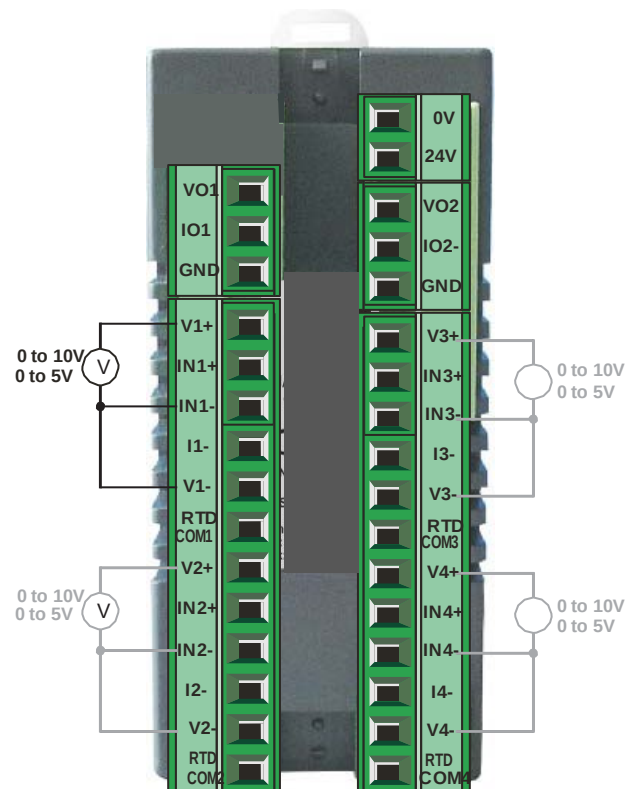
Output Type	Analog (voltage and current), non-isolated
Number	2
Resolution	16 bit
Output range:	
Voltage	0 to 10VDC
Current	0 to 20mA and 4 to 20mA
Overall accuracy	1% of full scale (Max)
Load	1KOhm (Min) for Voltage and 500Ohm (Max) for current

24V DC Auxiliary Power Supply	
Nominal value	24 V DC
Tolerance	-15% / +20% according to EN 61131-2
Ripple	±5% according to EN 61131-2
Permissible range	19.2 V to 30 V
Safety equipment	Surge voltage, protection against polarity Reversal
Connection	3.81mm Pitch removable terminals

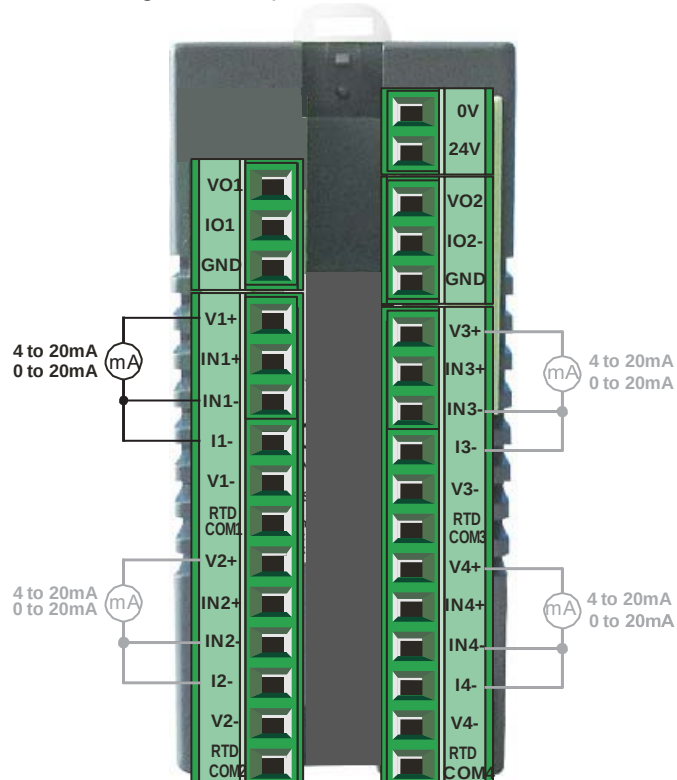
General	
Operating Temperature	0 to 55 deg.C.
Storage Temperature	-20 to 85 deg.C.
Operating Humidity (Non condensing)	10% to 90% (Non condensing)
Mechanical Dimension	79mm X 30mm X 36mm (L X W X H)
Weight	Approx. 90 gm.

Wiring Diagram of TRPRTX0402

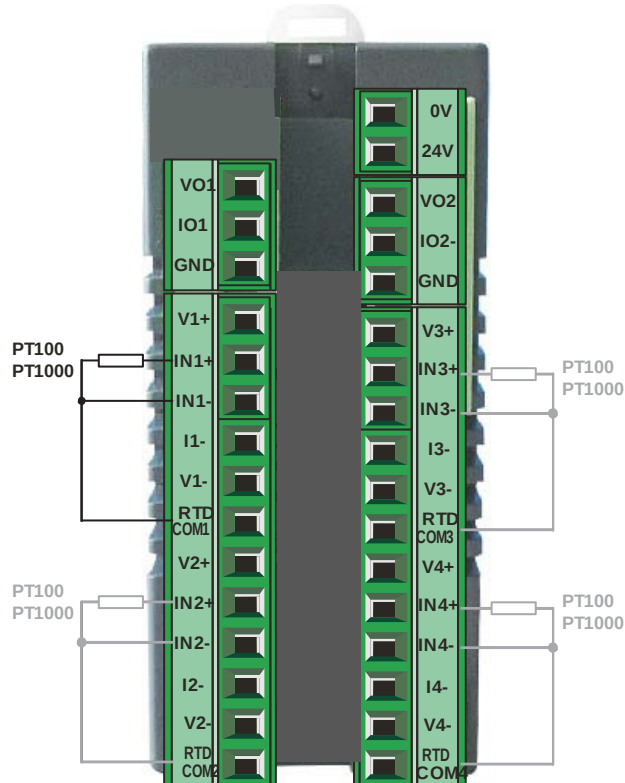
1. Wiring diagram for analog voltage input:



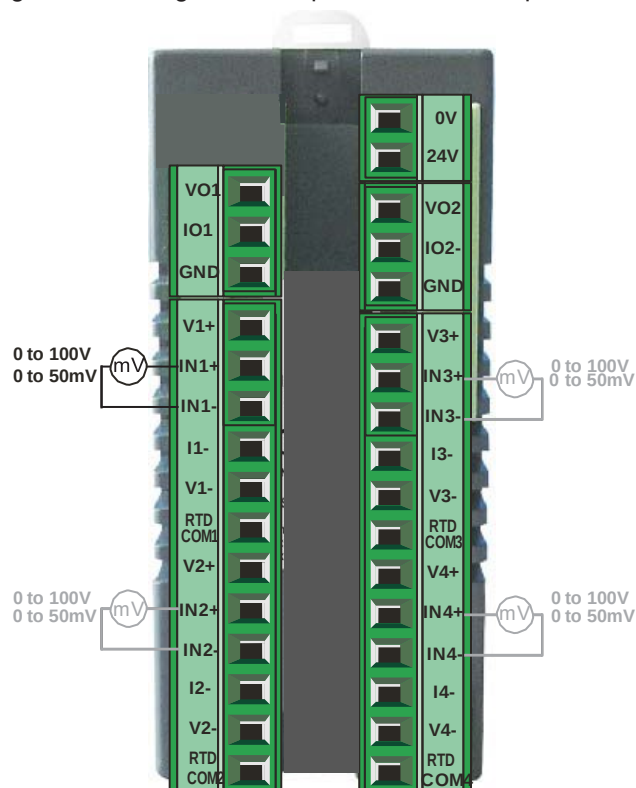
2. Wiring diagram for analog current input:



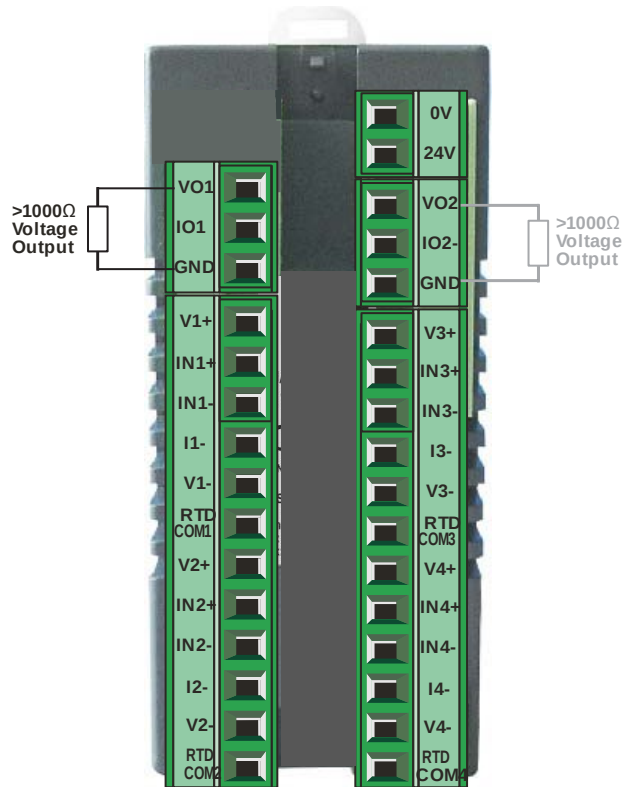
3. Wiring diagram for RTD input:



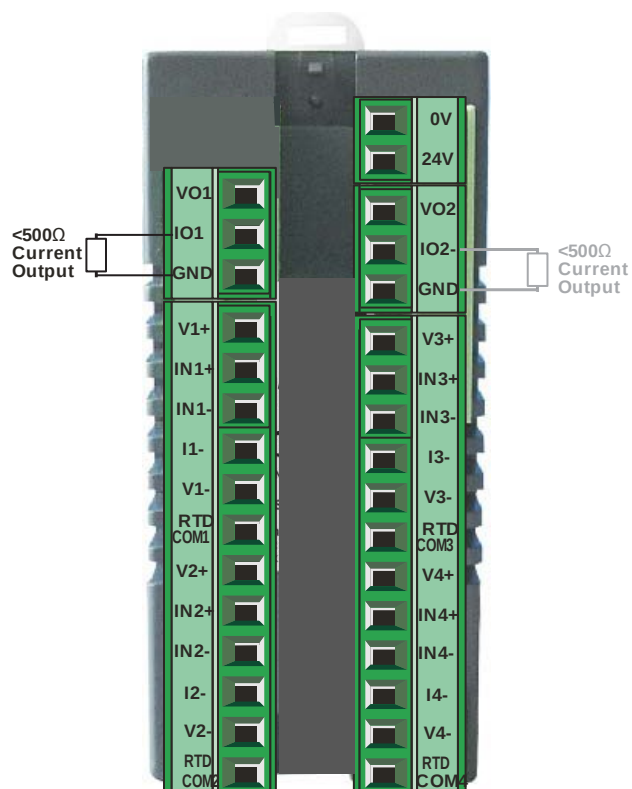
4. Wiring diagram for analog millivolt input and thermocouple:



1. Wiring diagram for voltage output:



2. Wiring diagram for current output



2.6 Installation Instructions

The OIS PLUS should be mounted on a panel. A sealing gasket and mounting clamps are provided with each OIS PLUS unit for proper installation.

Environmental Considerations:

Make sure that the unit is installed correctly and that the operating limits are followed (see Specifications for OIS PLUS). Do not operate the OIS PLUS in areas subject to explosion hazards due to flammable gases, vapors or dusts. A OIS PLUS should not be installed where fast temperature variations are present. Highly humid areas are also to be avoided. High humidity causes condensation of water in the unit.

Location Considerations:

Care should be taken when locating equipment behind the OIS PLUS to ensure that AC power wiring, PLC output modules, contactors, starters, relays and any other source of electrical interference are located away from the OIS PLUS. Particular care should be taken to locate variable speed drives and switching power supplies away from the OIS PLUS.

Panel Mounting

This section presents the dimensional sketches and panel cutouts for OIS PLUS models. (All dimensions are in mm and drawings are not to scale.)

2.6.1 Panel Cut-out and Mounting for OIS45 & 55 PLUS Models

Below given panel cut-out and mounting information is applicable to model with 3.5" LCD and 4.3" LCD.

Panel cut-out:

Note: Maximum panel thickness should be 6.5mm (Tolerance: +0.00mm).

Procedure to mount the unit:

Gasket

Mounting
Clamp

Mounting
Hardware

Mounting Hardware is a set of cap nut, screw & clamp

Figure - 1

Figure - 2

Figure - 3

Figure - 4

Make a cut-out of the required size. Panel cut-out tolerance is +0.00mm. Put the gasket behind the bezel. The gasket may be sealed to the case using adhesive.

FIGURE - 1 There are four (4) slots provided on the unit case to mount the unit.

FIGURE - 2 A set of four (4) mounting hardware is provided with each OIS PLUS3 unit.

(It consists of single cap nut, screw and clamp)

Screw

Clamp

Cap Nut

FIGURE - 3 Insert the clamp into the slot provided on the unit case. hold the unit straight. Tighten the mounting screws evenly to a torque between 0.5 and 0.6 Nm.

2.6.2 Panel Cut-out and Mounting for OIS60 & 70 PLUS Models

Below given panel cut-out and mounting information is applicable to model with 5.7" & 7" LCD.

Panel Cut-out

Note: Maximum panel thickness should be 6.5mm (Tolerance: +0.00mm).

Procedure to mount the unit:

Mounting
Clamp

Gasket

Figure - 1

Mounting
Hardware

Mounting Hardware is a set of cap nut, screw & clamp

Figure - 2

Figure - 3

Figure - 4

Make a cut-out of the required size. Panel cut-out tolerance is +0.00mm. Put the gasket behind the bezel. The gasket may be sealed to the case using adhesive.

FIGURE - 1 There are four (4) slots provided on the unit case to top and bottom surface.

FIGURE - 2 A set of four (4) mounting hardware is provided with each OIS PLUS5 unit.
(It is consist of single cap nut, screw and clamp)

Screw

Clamp

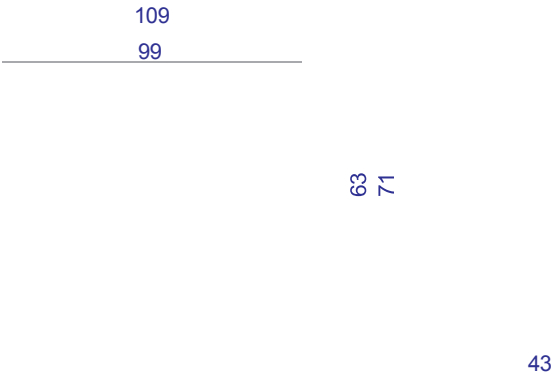
Cap Nut

FIGURE - 3 Insert the clamp into the slot provided on the unit case. hold the unit straight.
Tighten the mounting screws evenly to a torque between 0.5 and 0.6 Nm.

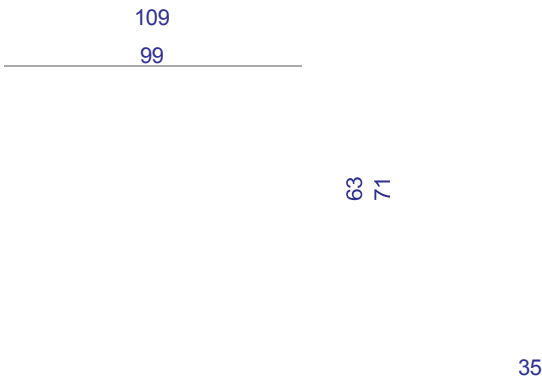
2.6.3 Panel Cut-out and Mounting for OIS10 & 20 PLUS Models

Below given panel cut-out and mounting information is applicable to model with 16x2 Multi color LCD.

Dimensions:

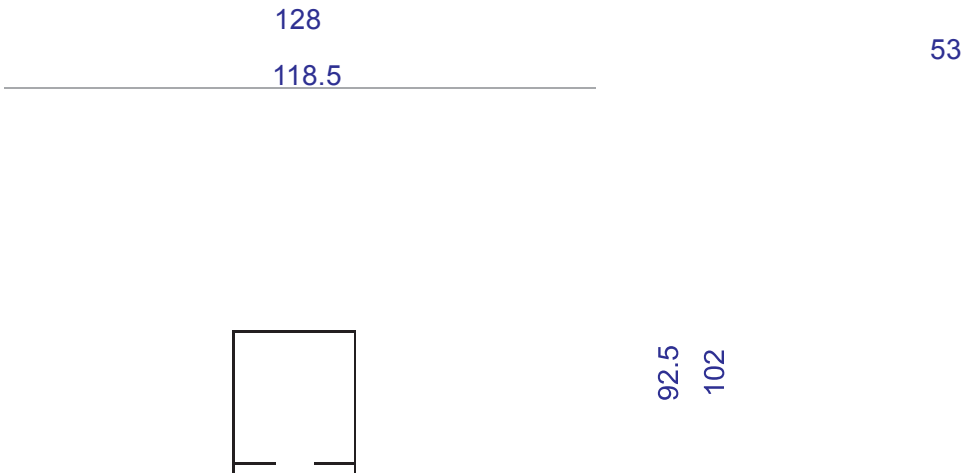


Panel Cutout:



Below given panel cut-out and mounting information is applicable to model with 128X64 Multi color LCD (OIS40 PLUS Models:

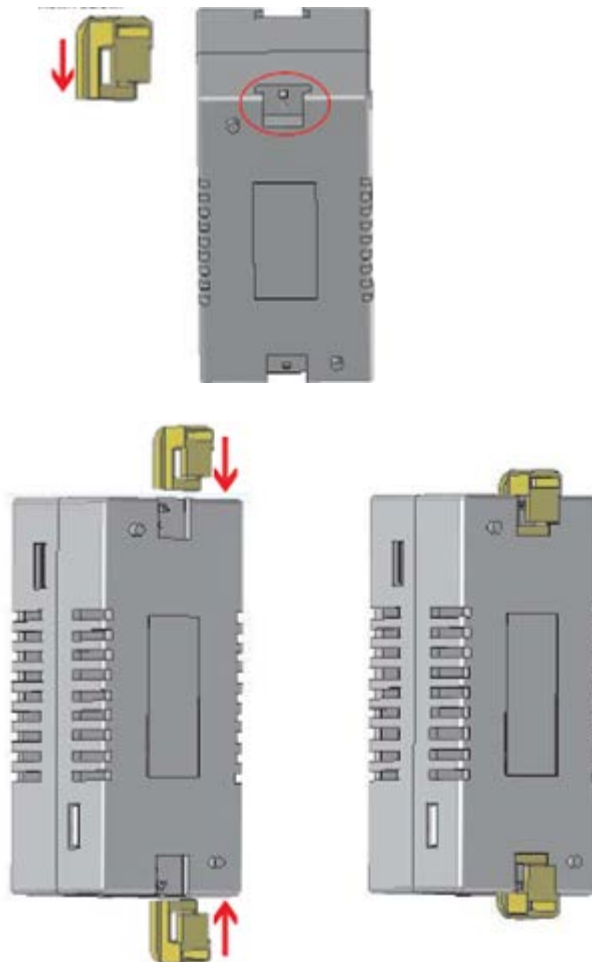
Dimensions:



2.6.4 Mounting for Clip-on I/O Modules

Below given is the mounting information applicable to expansions with OIS PLUS base models. While unpacking the display, note the two (2) locking connectors. User can attach and detach the expansion model with the help of these locking connectors.

While seen from both the sides of the expansion models, there is a slot in which the long part of the locking connector rests as shown below:



On the expansion case two slots are provided which rest on the base model back case as shown in the figure below:

Here, the expansions rest with the base model. Then push down the locking connectors towards each-other. This will lock the expansion finally with the base model.

Please note that along with these two joining (Locking connector as well slots), male connector from the expansion model will be insert into the female counter part on the base model termed as "EXPANSION PORT".

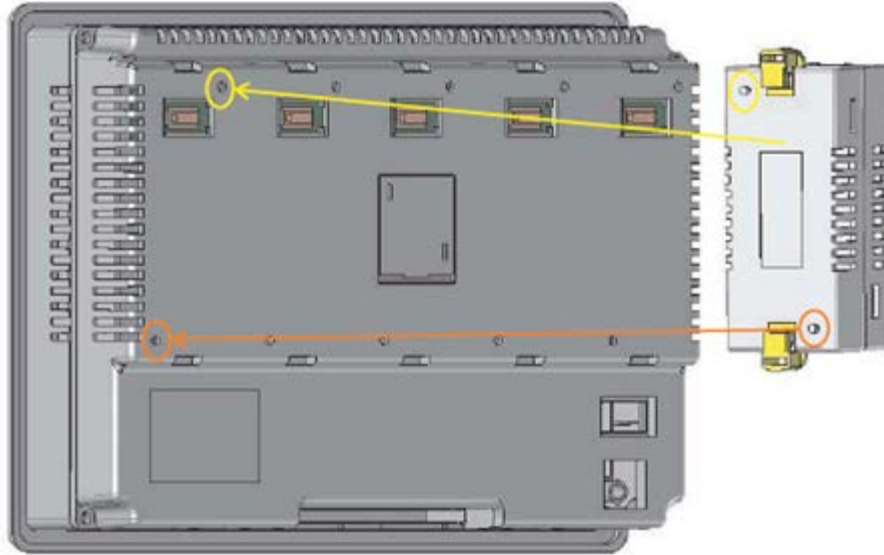
Final Unit:



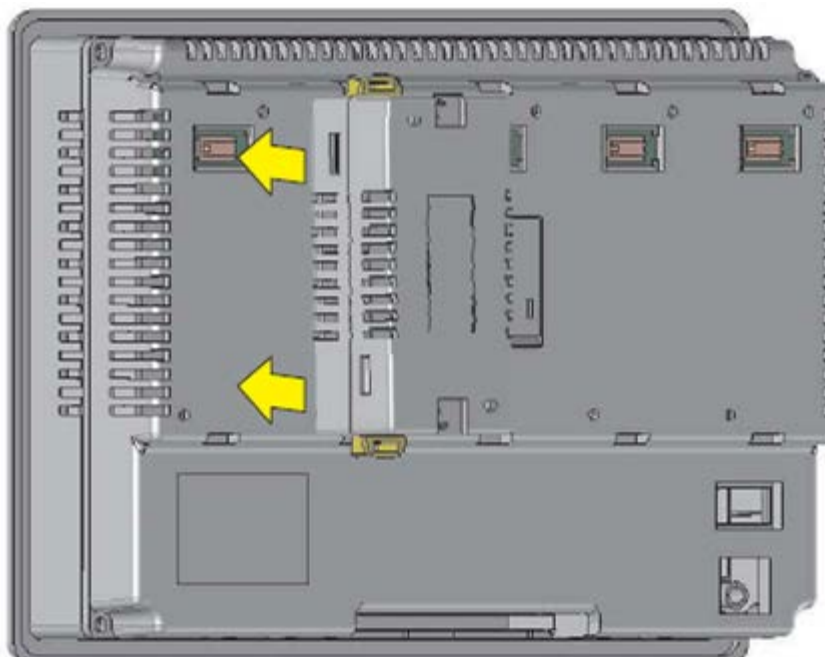
Mounting procedure of the expansion models with OIS PLUS models:

The mounting procedure of the expansions with the OIS PLUS base models is as follows. Below given images will explore it more.

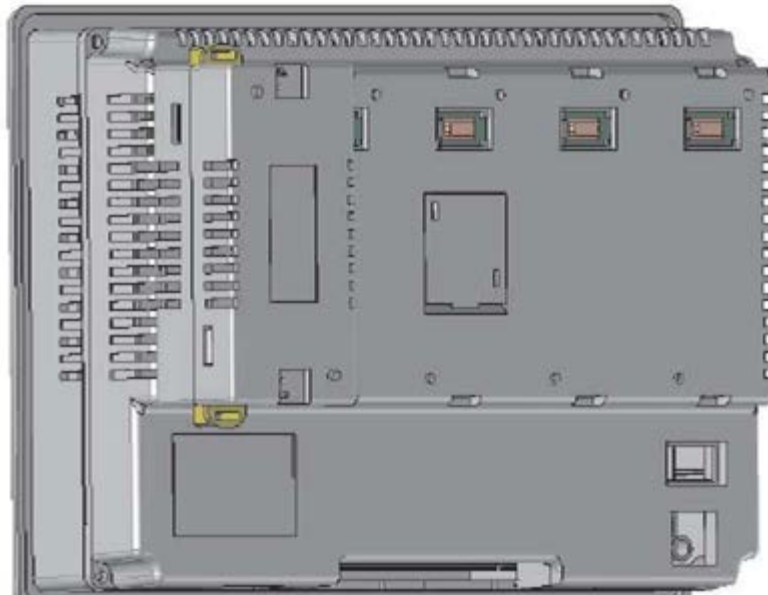
Sep- 1:



Sep- 2:



Step- 3:Final Product:



2.7 Power Supply Wiring Diagram

If wiring is to be exposed to lightening or other electrical surges, use appropriate surge suppression devices. Keep AC, high energy and rapidly switching DC wiring separate from signal wires.

Connecting high voltages or AC power mains to the DC input will make unit unusable and may create an electrical shock hazard to personnel. Such a failure or shock could result in serious personal injury, loss of life and/or equipment damage. DC voltage sources should provide proper isolation from main AC power and similar hazards.

Pin description of the power connector for all OIS PLUS models is as follows:

DC+	DC-	EARTH
24VDC		

2.8 Communication Ports

OIS PLUS communication ports support four types of serial communications plus Ethernet.

2.8.1 Com Port 1:

Available On: All OIS PLUS. It is an integrated RS-232 and RS-485/RS422 communication port. It communicates with external peripherals at baud rates of 4800 - 115.2Kbps with None, Even or Odd parity. RS485/RS422 connection can be used in multi drop communication network. The port can also be used for programming and monitoring the OIS PLUS.

Connector Used: Standard D-Type 9-pin female connector:

5	1
9	6

Pin number	Name	Description
1	TX+	RS485 transmit +
2	TXD	RS232 transmit
3	RXD	RS232 receive
4	RX+	RS485 receive +
5	GND	Ground
6	NC	No connection
7	NC	No connection
8	TX-	RS485 transmit -
9	RX-	RS485 receive -

2.8.2 Com Port 2:

Available On: OIS60 PLUS, OIS70E PLUS, & OIS120A. It is a RS-232/RS-485 communication port. It communicates with external peripherals at baud rate of 4800 -115.2Kbps with None, Even or Odd parity. RS485/RS422 connection can be used in multi drop communication network.

Connector Used: Standard D-Type 9-pin female connector:

5 1
9 6

Pin number	Name	Description
1	TX+	RS485 transmit +
2	TXD	RS232 transmit
3	RXD	RS232 receive
4	RX+	RS485 receive +
5	GND	Ground
6	NC	No connection
7	NC	No connection
8	TX-	RS485 transmit -
9	RX-	RS485 receive -

2.8.3 USB Device Port:

Available On: All OIS PLUS. It is the same as a standard USB printer port. It can be used for programming and monitoring all OIS PLUS.

Connector Used: Standard USB Type B female connector. It is a self-powered USB device, compliant with the USB 2.0 specification.

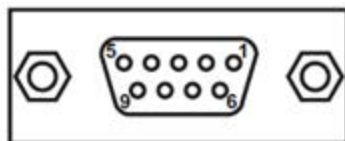


Pin number	Name	Description
1	VBUS	+5V
2	D-	Data -
3	D+	Data+
4	GND	Circuit ground
shell		shield

2.8.4 USB Host Port:

Available On: OIS45E PLUS, OIS55 PLUS, OIS60 PLUS, OIS70E PLUS, & OIS120A

Connector Used: Standard USB Type A female connector. It is a self-powered USB device, compliant with USB 2.0 specification and can source current up to 150 mA. It uses USB memory drives to transfer logged data and historical alarms. It can also be used to upload and download OIS PLUS programs.



Pin number	Name	Description
1	VBUS	+5V
2	D-	Data -
3	D+	Data+
4	GND	Signal Ground
shell		shield

2.8.5 Ethernet Port:

Refer to Ethernet User's Manual, UM-OISPLUS-E003

BASIC I/O ALLOCATION & SETUP

- ◆ I/O Allocation
- ◆ Setup Registers

Different OIS PLUS displays have different types of I/O.

No I/O: OIS12, OIS22, OIS40 PLUS, & OIS120A

Fixed I/O: OIS10 PLUS & OIS20 PLUS

Clip-on I/O: OIS40E PLUS, OIS55 PLUS, OIS60 PLUS, & OIS70E PLUS

Three types of registers are associated with the I/O

XW: Input Registers

YW: Output Registers

MW: Setup Registers

3.1 I/O Allocation

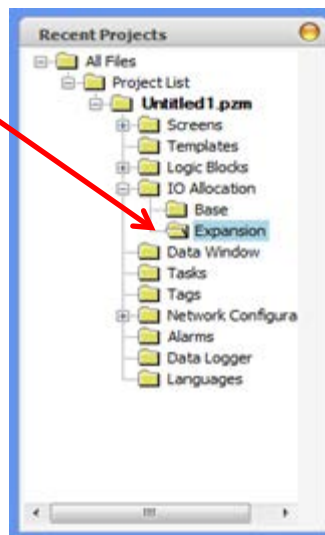
For fixed I/O OIS, the allocation is done when the display is selected. For OIS with clip-on modules, the I/O allocation is done when the module is selected. Each register contains 16 bits. The bits are addressed as follows

1 st Input Register XW0000	Inputs X0000 to X0015
1 st Output Register YW0000	Outputs Y0000 to Y0015

For Clip-on I/O the module will be assigned XW registers, YW registers, or a combination of XW & YW registers depending on the module type.

To determine the I/O address look at the following example using the OIS45E PLUS

Go to the navigation
pane, I/O Allocation
and click on
Expansion



The I/O allocation for the OIS45E PLUS is shown below:

Slot	Name	Address range	Description
Slot1	TRPDIX1600	X [01000 - 01015], [XW0100], [MW0100 - MW0123]	16 Bidirectional Digital Input module
Slot2	TRPROX0012	Y [02000 - 02011], [YW0200], [MW0200 - MW0223]	12 Relay Output Module
Slot3	TRPAIO0202	[XW0300 - XW0301], [YW0300 - YW0301], [MW0300 - ...	2 analog input(0 to 20mA, 4 to 20 mA, 0 to 10V, -10 to 10V input range) and 2 analog output(

For each slot (total of 3 for OIS45E PLUS) it describes:

The name/part number of the I/O module.

The address range of the I/O registers assigned to that module.

A description of the I/O module.

For the input module in slot 1, it shows that the 16 inputs are addressed as X01000 thru X01015. The inputs are in the input register XW0100. The setup registers for this module (if needed) are MW0100 thru MW0123.

For the output module in slot 2, it shows that the 12 outputs are address as Y02000 thru Y02011. The outputs are in the output register YW0200. The setup registers for this module (if needed) are MW0200 thru MW0223.

The module in slot 3 is a combination 2 channel analog input and 2 channel analog output module. No discrete points are present, the analog module only produces a value in a register.

In summary, if there is any question about how the I/O modules are addressed, checked the I/O allocation table shown above.

3.2 Setup Registers

MW Register Allocation Table :

Module	MW Range	Total No Supported
Base	MW0000-MW0059	60
Expansion Slot 1	MW0100-MW0123	24
Expansion Slot 2	MW0200-MW0223	24
Expansion Slot 3	MW0300-MW0323	24
Expansion Slot 4	MW0400-MW0423	24
Expansion Slot 5	MW0500-MW0523	24

Setup Registers for Fixed I/O OIS PLUS

For discrete inputs, the MW registers are used for setting up the high speed counter. The discrete inputs on the fixed I/O OIS and the discrete inputs on the clip-on modules can be setup as 2 discrete high speed inputs or 1 quadrature input.

MW Type	Local CH1	Local CH2
HSC Configuration register	MW0010	MW0020
High Speed Counter (HSC) Register	MW0011	MW0021
	MW0012	MW0022
HSC Preset Register	MW0013	MW0023
	MW0014	MW0024
HSC Enable Bit	MW0015_0 (M00240)	MW0025_0 (M00400)
HSC Reset Bit	MW0015_1 (M00241)	MW0025_1 (M00401)

These are default system tags created when a fixed I/O OIS PLUS is selected.

Setup Registers for I/O OIS PLUS with Clip-on I/O

MW Type	Local CH1	Local CH2
HSC Configuration register	MW0010	MW0020
High Speed Counter (HSC) Register	MW0011 MW0012	MW0021 MW0022
HSC Preset Register	MW0013 MW0014	MW0023 MW0024
HSC Enable Bit	MW0015_0 (M00240)	MW0025_0 (M00400)
HSC Reset Bit	MW0015_1 (M00241)	MW0025_1 (M00401)

Setup Register Allocation for Expansion I/O

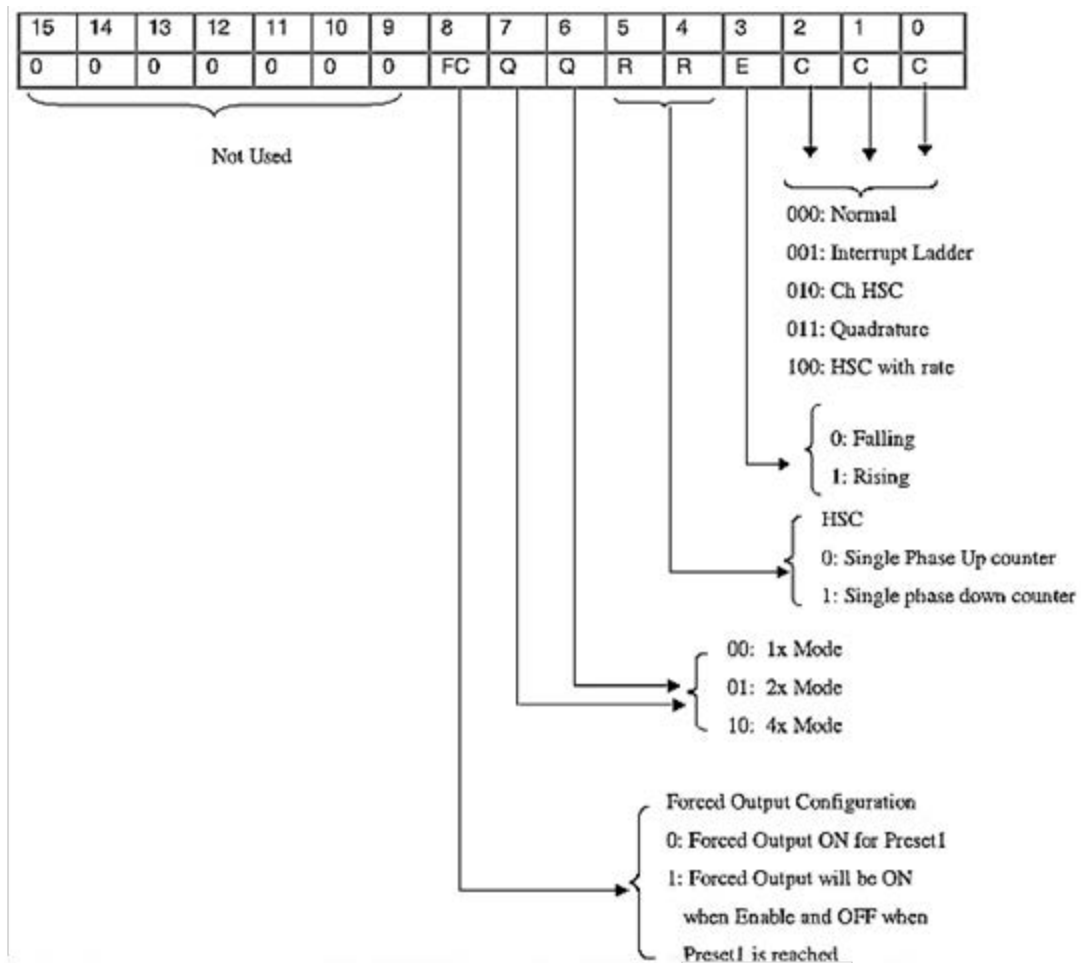
MW Type	Expansion Slot 1		Expansion Slot 2		Expansion Slot 3	
	CH1	CH2	CH1	CH2	CH1	CH2
HSC Configuration Register	MW0100	MW0106	MW0200	MW0206	MW0300	MW0306
High Speed Counter (HSC) Register	MW0101 MW0102	MW0107 MW0108	MW0201 MW0202	MW0207 MW0208	MW0301 MW0302	MW0307 MW0308
HSC Preset Register	MW0103 MW0104	MW0109 MW0110	MW0203 MW0204	MW0209 MW0210	MW0303 MW0304	MW0309 MW0310
HSC Enable Bit	MW0105_0 (M01080)	MW0111_0 (M01176)	MW0205_0 (M02080)	MW0211_0 (M02176)	MW0305_0 (M03080)	M311_0 (M02176)
HSC Reset Bit	MW0105_1 (M01081)	MW0111_1 (M01177)	MW0205_1 (M02081)	MW0211_1 (M02177)	MW0305_1 (M03081)	M311_1 (M02177)

MW Type	Expansion Slot 4		Expansion Slot 5	
	CH1	CH2	CH1	CH2
HSC Configuration Register	MW0400	MW0406	MW0500	MW0506
High Speed Counter (HSC) Register	MW0401 MW0402	MW0407 MW0408	MW0501 MW0502	MW0507 MW0508
HSC Preset Register	MW0403 MW0404	MW0409 MW0410	MW0503 MW0504	MW0509 MW0510
HSC Enable Bit	M405_0 (M04080)	M411_0 (M04176)	M505_0 (M05080)	M511_0 (M05176)
HSC Reset Bit	M405_1 (M04081)	M411_1 (M04177)	M505_1 (M05081)	M511_1 (M05177)

These are default system tags created when an OIS PLUS with clip-on I/O is selected.

Setup Register Details

Setup register MWssrr for the high speed counter is configured as shown below:



When the appropriate setup register is configured as above, the inputs below are associated with high speed counter inputs.

IO Type	Base		Expansion	
	CH1	CH2	CH1	CH2
Input that Counts High Speed Pulses	X1	X2	X0	X5
Output that Turns ON when Counter Reaches Preset	Y0	Y1	Y1	Y6
Reset Input	X4	X5	X1	X6

Setup register configuration for other special functions is covered in the following sections:

Multiple High Speed Counter Inputs:	Sec 4
PWM Outputs	Sec 5
Analog Inputs	Sec 6

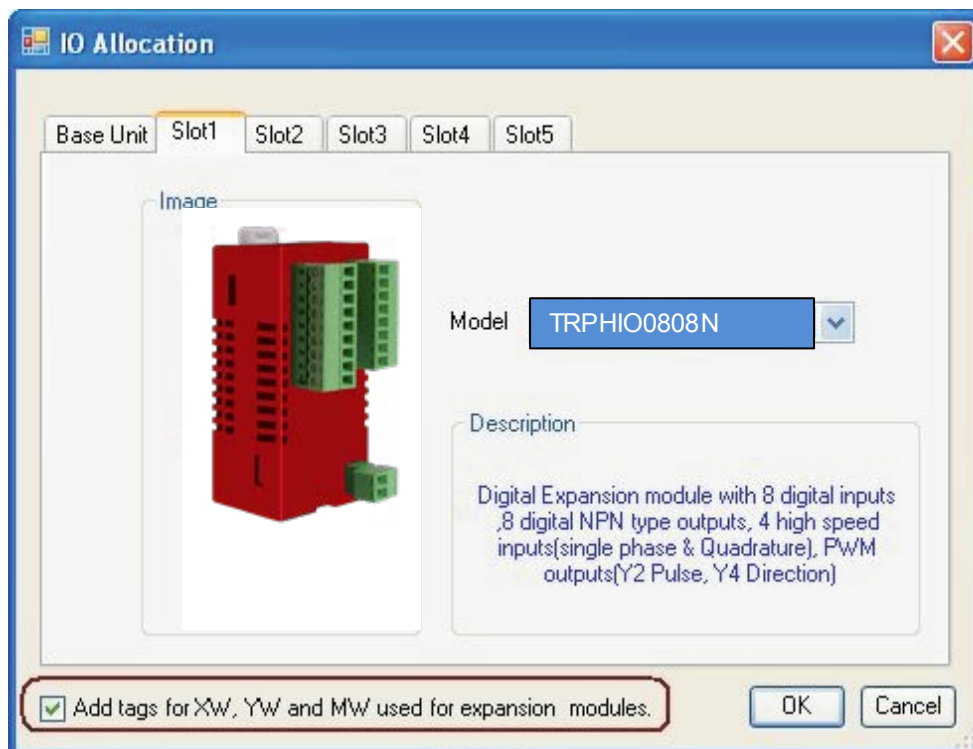
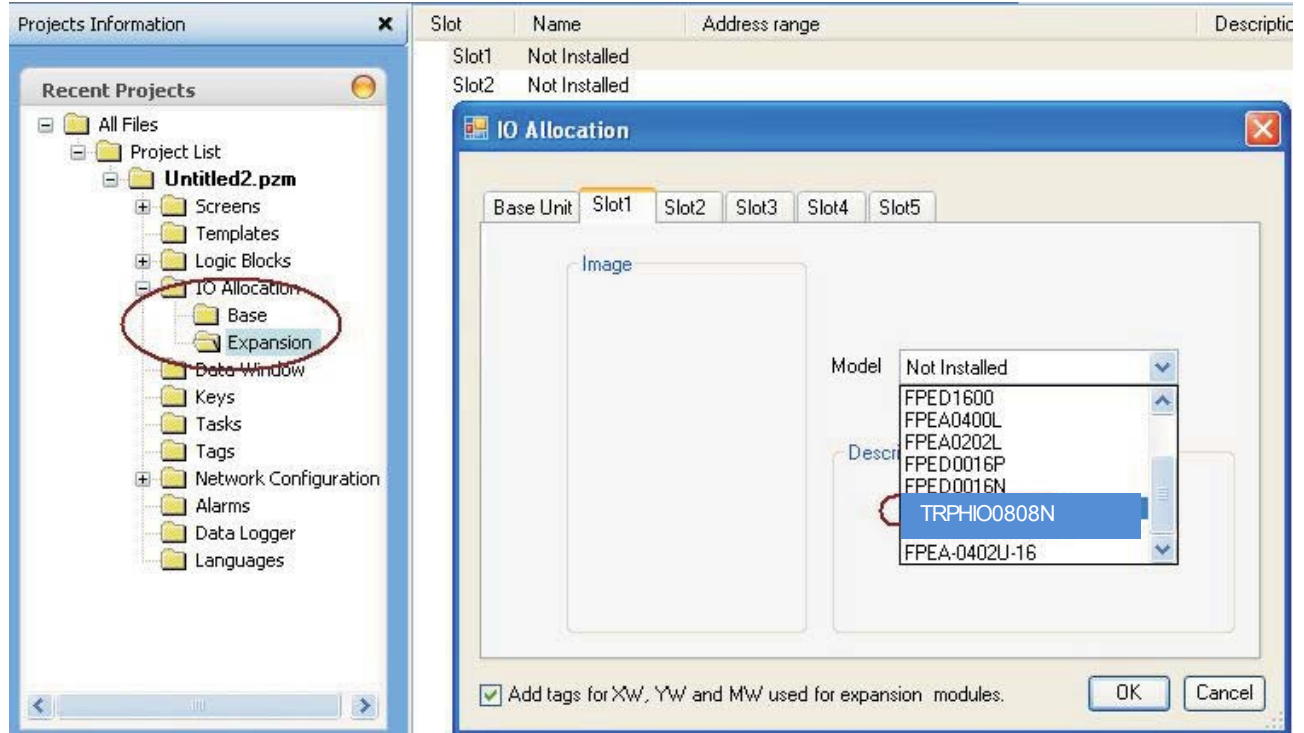
HIGH SPEED COUNTER INPUTS

- ◆ High Speed Counter Setup
- ◆ Single Phase Counter
- ◆ Quadrature Bi-Pulse Counter
- ◆ MW Register Table for High Speed Counter Modules

4.1 High Counter Setup

This chapter explains how to configure and use the HSC (High Speed Counter) inputs for the TRPHIO0808N and TRPHIO0808P clip on I/O modules. These modules have 4 HSC inputs. To configure the HSC inputs, follow the steps given below:

1. Run OIL-DS.
2. Select the OIS PLUS with expansion capability.
3. Select expansion model with HSC from IO allocation window as shown below:



In this docker window,

☒ Add tags for XW, YW and MW used for expansion modules.

This option is “enabled”, by default. Once the user selects the HSC clip-on module, The default tags related to high speed counters will automatically be entered all as shown below:

Tag No	Tag Name	Port	Tag Address	Byte(s)	Node Name	Tag Type
1	HSC Enable Bit (CH1)- Slot01	-	M01080	bit	Operator Panel	User Defined Tag
2	HSC Reset Bit (CH1)- Slot01	-	M01081	bit	Operator Panel	User Defined Tag
3	HSC Interrupt Enable Bit (CH1)- Slot01	-	M01082	bit	Operator Panel	User Defined Tag
4	HSC Preset Reached (CH1)- Slot01	-	M01083	bit	Operator Panel	User Defined Tag
5	HSC Enable Bit (CH2)- Slot01	-	M01176	bit	Operator Panel	User Defined Tag
6	HSC Reset Bit (CH2)- Slot01	-	M01177	bit	Operator Panel	User Defined Tag
7	HSC Interrupt Enable Bit (CH2)- Slot01	-	M01178	bit	Operator Panel	User Defined Tag
8	HSC Preset Reached (CH2)- Slot01	-	M01179	bit	Operator Panel	User Defined Tag
9	HSC Enable Bit (CH3)- Slot01	-	M01272	bit	Operator Panel	User Defined Tag
10	HSC Reset Bit(CH3)- Slot01	-	M01273	bit	Operator Panel	User Defined Tag
11	HSC Interrupt Enable Bit (CH3)- Slot01	-	M01274	bit	Operator Panel	User Defined Tag
12	HSC Preset Reached (CH3)- Slot01	-	M01275	bit	Operator Panel	User Defined Tag
13	HSC Enable Bit (CH4)- Slot01	-	M01368	bit	Operator Panel	User Defined Tag
14	HSC Reset Bit(CH4)- Slot01	-	M01369	bit	Operator Panel	User Defined Tag
15	HSC Interrupt Enable Bit (CH4)- Slot01	-	M01370	bit	Operator Panel	User Defined Tag
16	HSC Preset Reached(CH4)- Slot01	-	M01371	bit	Operator Panel	User Defined Tag
17	Pulse width error flag(CH1)- Slot01	-	M01465	bit	Operator Panel	User Defined Tag
18	ON duty setting error flag(CH1)- Slot01	-	M01466	bit	Operator Panel	User Defined Tag
19	Frequency Setting error flag(CH1)- Slot01	-	M01467	bit	Operator Panel	User Defined Tag
20	Acceleration Time Setting error flag(CH1)- SL...	-	M01468	bit	Operator Panel	User Defined Tag
21	Deceleration Time Setting error flag(CH1)- S...	-	M01469	bit	Operator Panel	User Defined Tag
22	No of Total Pulses Setting error flag(CH1)- SL...	-	M01470	bit	Operator Panel	User Defined Tag
23	Pulse width error flag(CH2)- Slot01	-	M01561	bit	Operator Panel	User Defined Tag
24	ON duty setting error flag(CH2)- Slot01	-	M01562	bit	Operator Panel	User Defined Tag
25	Frequency Setting error flag(CH2)- Slot01	-	M01563	bit	Operator Panel	User Defined Tag
26	Acceleration Time Setting error flag(CH2)- SL...	-	M01564	bit	Operator Panel	User Defined Tag
27	Deceleration Time Setting error flag(CH2)- S...	-	M01565	bit	Operator Panel	User Defined Tag
28	No of Total Pulses Setting error flag(CH2)- SL...	-	M01566	bit	Operator Panel	User Defined Tag
29	Pulse Enable Flag(CH1)- Slot01	-	M01576	bit	Operator Panel	User Defined Tag
30	Pulse Enable Flag(CH2)- Slot01	-	M01577	bit	Operator Panel	User Defined Tag
31	End of Total Pulses(CH1)- Slot01	-	M01784	bit	Operator Panel	User Defined Tag
32	End of Total Pulses(CH2)- Slot01	-	M01785	bit	Operator Panel	User Defined Tag

Using this tag database, a user can setup different modes of the HSC.

4.2 Single Phase Counter

[MWssrr Mode Select Bits = 010]

When the count input is changed from OFF to ON, the count value is increased by 1. When the count value reaches the set value, the count value is reset to 0. This counter operation is enabled while the HSC enable bit is ON. The count value is reset to 0 when the Reset bit is changed from OFF to ON. The count value range is H0000 0000 to HFFFF FFFF (32-bit data).

For example, an application is given below:

1. Selects the high speed expansion model.
2. Create an application as shown in the image here.
3. Define Configuration Register. The value of this configuration register will define the mode of operation of the high speed counter. If the configuration register value is 2, then HSC will work in single phase mode

The chart below shows the value for which HSC can RUN in different modes.

Normal Config	HSC Condition	Value in config register
Normal Input		0
HSC Single phase UP Counter	Forced O/P ON preset reach	2
	Forced O/P OFF preset reach, ON when enable	258
Quadrature 1X mode	Forced O/P ON preset reach	3
	Forced O/P OFF preset reach, ON when enable	259
Quadrature 2X mode	Forced O/P ON preset reach	67
	Forced O/P OFF preset reach, ON when enable	323
Quadrature 4X mode	Forced O/P ON preset reach	131
	Forced O/P OFF preset reach, ON when enable	387

4. Set preset value [number up to which user wants to count] as shown below:

5. Set soft gate to ON as shown below:

6. Define count register, where user can see the counting.

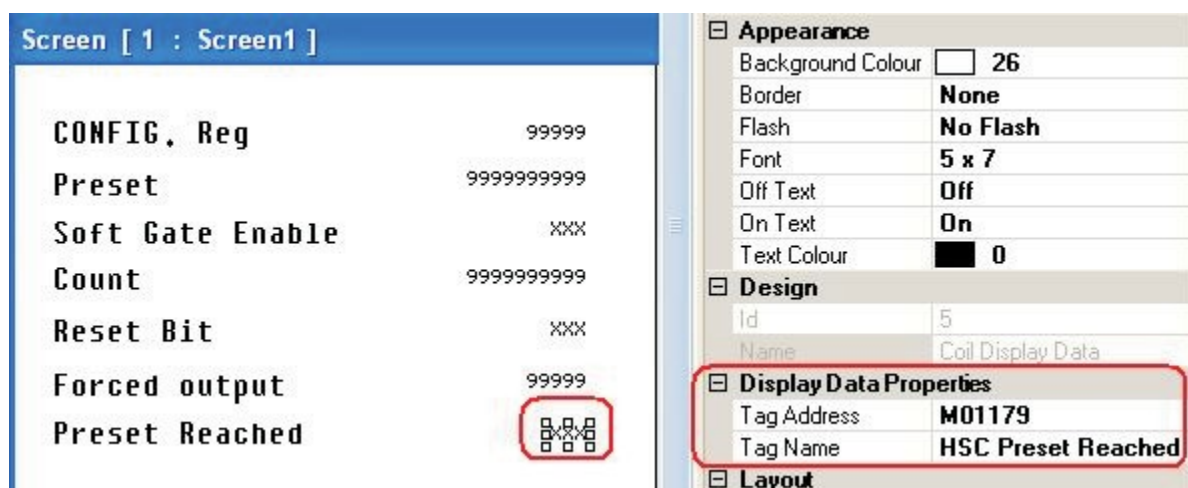
Screen [1 : Screen1]	
CONFIG. Reg	99999
Preset	9999999999
Soft Gate Enable	xxx
Count	9999999999
Reset Bit	xxx
Forced output	99999
Preset Reached	xxx

Font	5 x 7
Format	10,0
Text Colour	0
Design	
Id	25
Name	Register Display Data
Display Data Properties	
Data Type	Unsigned [0 To 4294967295]
Display Leading Zeros	No
Hide Data	No
Tag Address	MW0101
Tag Name	High Speed Counter (HSC)
Layout	
Bottom Right	268, 130

7. Define Reset Bit [to reset the count number entered in PRESET].

8. Define forced output value [count once reach the value, user can set a output may be to ON/OFF LED or to start any process, etc.].

9. When the value of high speed counter register reaches to value of preset register, then HSC Preset Reached bit will be ON.



10. Download the program to the HMI and enter the values with keypad on the screen.

Related registers:

Function	Register/device				Remarks
	Channel 1	Channel 2	Channel 3	Channel 4	
Count input	X0	X5	X2	X7	Count Input channels
Reset input	X1	X6	X3	X4	Physical reset i/p channels
Count Value	MW0101 MW0102	MW0107 MW0108	MW0113 MW0114	MW0119 MW0120	Data range: H0000 0000 to HFFFF FFFF
Preset	MW0103 MW0104	MW0109 MW0110	MW0115 MW0116	MW0121 MW0122	Set count value: Max. 4294967295
Soft gate	MW0105_0	MW0111_0	MW0117_0	MW0123_0	Operation is enabled when bit ON
Reset Bit	MW0105_1	MW0111_1	MW0117_1	MW0123_1	Used to reset the counter value
Preset Reached Bit	M01083	M01179	M01275	M01371	This bit turns on, when counter reaches to preset register value

Note1: When all four channels are used as HSC, IP1 to IP8 cannot be used as normal input devices. However, if either one channel is used, the inputs for unused channel can be used as normal input devices.

Note2: Two words are used for storing the double word (32bit) count/set values.

Lower word will contain Lower 16 bit value and Higher word will contain Higher 16 bit

This register storage scheme is applicable for all the modes.

value. Eg. Count value : MW0101, MW0102

So if count value is (Hex) 87654321

MW0101 = 4321 (Hex)

MW0102= 8765 (Hex)

Note3: Input5, Input6, Input7 and input8 are used as reset inputs for count inputs 1, 2, 3 and 4. So do not use Input5, Input6, Input7 and input8 as normal inputs when expansion module is configured in this mode.

4.3 Quadrature Bi-pulse Counter

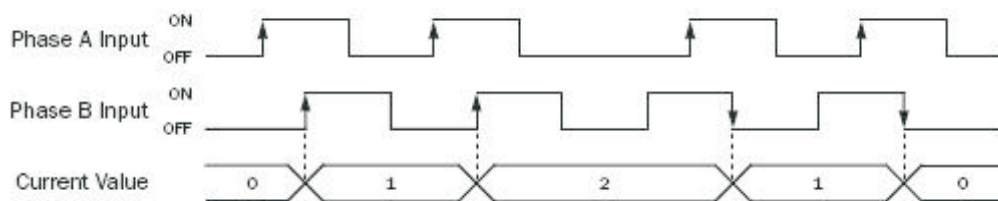
In the Quadrature mode, input X2 is used along with X7. When the count value reaches the Preset, forced output will be activated and preset reached bit will be set ON. This counter operation is enabled while the soft-gate (HSC Enable bit) is ON. The count value is reset to 0 when the reset input turns ON. The preset value can be changed by writing the data into the preset register while the soft-gate is ON/OFF. The count value range is 0 to 4294967295 (32-bit data).

For example, to configure the HSC in quadrature bi-pulse mode, follow the steps defined for single phase counter (3.2). Change in the value of configuration register to 3.

This function counts up or down in the quadrature bi-pulse mode.

a) 1-edge count:

The current value increments or decrements at the rising or falling edge of the phase B input after the phase A input has turned on as shown below:

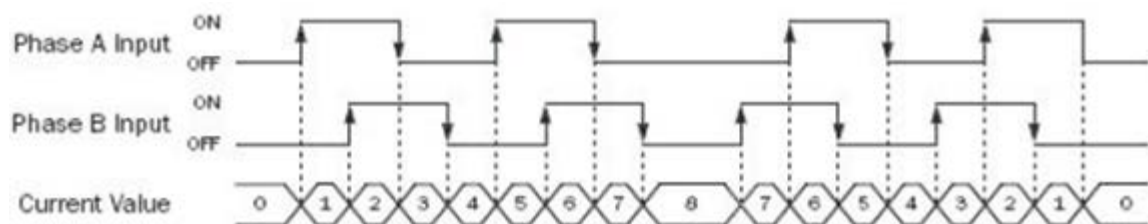


b) 2-edge Count:

The current value increments or decrements at the rising or falling edge of the phase B input after the phase A input has turned on or off as shown below:

c) 4-edge Count:

The current value changes (raise or decrease) at the rising or falling edges of the phase A and B inputs.



Both rising and falling edges of each phase are counted. Consequently, 4 times count value against the pulse frequency is obtained.

Related registers:

<u>Function</u>	<u>Device/Register</u>	<u>Remarks</u>
Phase A	X2	Count Input Channel
Phase B	X7	Count Input Channel
Reset Input	X3	Physical Reset Input
Count Value	MW0107	Data Range H0000 0000 to HFFF FFFF
Preset	MW0108 MW0109	Set Count Value: Max = 4294967295
Soft Gate	M01076	Operation Enabled when Bit is ON
Reset Bit	M01273	Resets the Counter Value
Preset Reached	M01275	Turns on when Counter reaches Preset Value

4.4 MW Register Table for HSC Expansion I/O Modules

High speed inputs:

Number of inputs: 4

Input channels: X0, X5, X2, X7

MW Type	Expansion Slot 1			
	CH1	CH2	CH3	CH4
HSC Configuration register	MW0100	MW0106	MW0112	MW0118
High Speed Counter (HSC) Register	MW0101	MW0107	MW0113	MW0119
	MW0102	MW0108	MW0114	MW0120
HSC Preset Register	MW0103	MW0109	MW0115	MW0121
	MW0104	MW0110	MW0116	MW0122
HSC Enable Bit	MW0105_0 (M01080)	MW0111_0 (M01176)	MW0117_0 (M01272)	MW0123_0 (M01368)
HSC Reset Bit	MW0105_1 (M01081)	MW0111_1 (M01177)	MW0117_1 (M01273)	MW0123_1 (M01369)
HSC Preset Reached	MW0105_3 (M01083)	MW0111_3 (M01179)	MW0117_3 (M01275)	MW0123_3 (M01371)

MW Type	Expansion Slot 2			
	CH1	CH2	CH3	CH4
HSC Configuration register	MW0200	MW0206	MW0212	MW0218
High Speed Counter (HSC) Register	MW0201	MW0207	MW0213	MW0219
	MW0202	MW0208	MW0214	MW0220
HSC Preset Register	MW0203	MW0209	MW0215	MW0221
	MW0204	MW0210	MW0216	MW0222
HSC Enable Bit	MW0205_0 (M02080)	MW0211_0 (M02176)	MW0217_0 (M02272)	MW0223_0 (M02368)
HSC Reset Bit	MW0205_1 (M02081)	MW0211_1 (M02177)	MW0217_1 (M02273)	MW0223_1 (M02369)
HSC Preset Reached	MW0205_3 (M02083)	MW0211_3 (M02179)	MW0217_3 (M02275)	MW0223_3 (M02371)

MW Type	Expansion Slot 3			
	CH1	CH2	CH3	CH4
HSC Configuration register	MW0300	MW0306	MW0312	MW0318
High Speed Counter (HSC) Register	MW0301	MW0307	MW0313	MW0319
	MW0302	MW0308	MW0314	MW0320
HSC Preset Register	MW0303	MW0309	MW0315	MW0321
	MW0304	MW0310	MW0316	MW0322
HSC Enable Bit	MW0305_0 (M03080)	MW0311_0 (M03176)	MW0317_0 (M03272)	MW0323_0 (M03368)
HSC Reset Bit	MW0305_1 (M03081)	MW0311_1 (M03177)	MW0317_1 (M03273)	MW0323_1 (M03369)
HSC Preset Reached	MW0305_3 (M03083)	MW0311_3 (M03179)	MW0317_3 (M03275)	MW0323_3 (M03371)

MW Type	Expansion Slot 4			
	CH1	CH2	CH3	CH4
HSC Configuration register	MW0400	MW0406	MW0412	MW0418
High Speed Counter (HSC) Register	MW0401 MW0402	MW0407 MW0408	MW0413 MW0414	MW0419 MW0420
HSC Preset Register	MW0403 MW0404	MW0409 MW0410	MW0415 MW0416	MW0421 MW0422
HSC Enable Bit	MW0405_0 (M04080)	MW0411_0 (M04176)	MW0417_0 (M04272)	MW0423_0 (M04368)
HSC Reset Bit	MW0405_1 (M04081)	MW0411_1 (M04177)	MW0417_1 (M04273)	MW0423_1 (M04369)
HSC Preset Reached	MW0405_3 (M04083)	MW0411_3 (M04179)	MW0417_3 (M04275)	MW0423_3 (M04371)

MW Type	Expansion Slot 5			
	CH1	CH2	CH3	CH4
HSC Configuration register	MW0500	MW0506	MW0512	MW0518
High Speed Counter (HSC) Register	MW0501 MW0502	MW0507 MW0508	MW0513 MW0514	MW0519 MW0520
HSC Preset Register	MW0503 MW0504	MW0509 MW0510	MW0515 MW0516	MW0521 MW0522
HSC Enable Bit	MW0505_0 (M05080)	MW0511_0 (M05176)	MW0517_0 (M05272)	M0W523_0 (M05368)
HSC Reset Bit	MW0505_1 (M05081)	MW0511_1 (M05177)	MW0517_1 (M05273)	M0W523_1 (M05369)
HSC Preset Reached	MW0505_3 (M05083)	MW0511_3 (M05179)	MW0517_3 (M05275)	MW0523_3 (M05371)

Note: HSC Configuration register, High Speed Counter Register and HSC Preset register are retentive and will be retained at power down for all channels.

PULSE WIDTH MODULATED OUTPUTS

- ◆ Normal Mode PWM Output
- ◆ CW/CCW Mode PWM Output
- ◆ Pulse/DIR Mode PWM Output
- ◆ Fixed Pulse Mode PWM Output
- ◆ MW Register Table for PWM I/O Modules

This chapter explains how to configure and use the PWM (Pulse Width Modulated) outputs for the TRPHIO0808N and TRPHIO0808P clip on I/O modules. These modules have 1 PWM output. The PWM out can be setup for different modes of operation.

This function is used to output a variable duty cycle pulse. The controllable duty cycle is 10 to 100 % (1 % units). The PWM output is enabled when the pulse enable flag is ON. While the pulse enable flag is ON, the duty cycle (ON duty) can be changed by changing the duty setting value (10 to 100). The frequency setting is available in the range of 1 to 10000 Hz (1Hz units) before turning ON the pulse enable flag. Changing frequency is not allowed while the pulse enable is ON. Note that the minimum ON/OFF pulse duration is 100 ms. Therefore; the controllable ON duty range is limited depending on the frequency setting. If the ON duty setting value is not available (within 10 to 100), the pulse width error flag comes ON. PWM output operation is continued but the duty cycle is not guaranteed.

5.1 Normal Mode PWM Output

For example, to configure high speed output in normal mode follow the steps given below:

- 1) Create a new application.
- 2) Add clip-on module in slot1
- 3) Set 'PWM configuration register' on screen
- 4) Put value of 1 in 'PWM configuration register'

- 5) Set 'frequency setting register' on screen and put its value in '5000' (5KHz).

6) Set 'On duty setting register' on screen and put its value as '10%'

7) Set enable flag register on screen and set its status as 'ON'.

8) Set 'Frequency setting error flag' on screen

9) Set 'On duty setting error flag' on screen

10) Download application

This will RUN the operation in normal mode.

When enable flag is 'ON', a pulse is output. Here user can edit duty cycle.

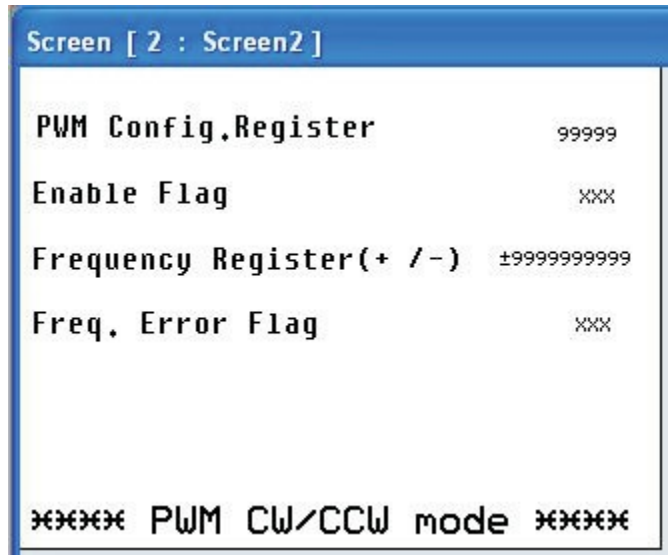
The function selection is done through configuration registers as follows:

Function	Register / device Channel 1	Remarks
PWM pulse	Y2	
Pulse enable flag	M136_0	Output is enabled when ON
Frequency setting register	MW0125 MW0126	Data range: 1 to 10000
ON duty setting register	MW0127 MW0128	Data range: 0 to 100
Pulse width error flag	M129_1	ON at error (reset OFF automatically)
ON duty setting error flag	M129_2	ON at error (reset OFF automatically)
Frequency setting error flag	M129_3	ON at error (reset OFF automatically)

5.2 CW/CCW Mode PWM Output

To configure the high speed output in CW/CCW mode follow the steps below:

- 1) Create a new application.
- 2) Add a clip-on module in slot1
- 3) Set 'PWM configuration register' on screen
- 4) Put value as 3 in 'PWM configuration register'
- 5) Set 'frequency setting register' on screen and put its value as '+5000'
- 6) Set enable flag register on screen and keep its status as 'ON'
- 7) Set 'Frequency setting error flag' on screen



- 8) Download application

This will RUN the operation in CW/CCW mode.

Note:

The value of 'Frequency setting register' should be in between +/-1 to +/-10,000

If value of 'Frequency setting register' is less than 1 or greater than 10,000 then, frequency setting error flag will be 'ON' otherwise it will be OFF.

When CW/CCW mode is selected and if frequency data range is positive, match output 6(MR6) will be selected so that pulses will be out on Y2 and if frequency data range is negative, match output 1(MR1) will be selected so that pulses will be out on Y4.

Function	Register/device	Remarks
CW Pulse	Y2	
CCW Pulse	Y4	
Pulse enable flag	MW0136_0	Output is enabled when ON
Frequency setting register	MW0125 MW0126	Data range: -10000 to -1, 1 to 10000
Frequency setting error flag	MW0129_3	ON at error (Reset OFF automatically)

Timing diagram:

Fig.1 CW/CCW Timing diagram (Positive PWM frequency)

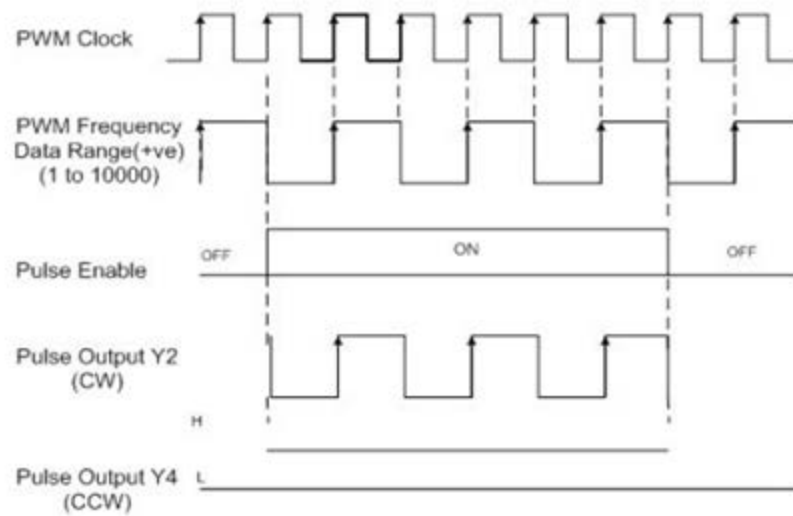
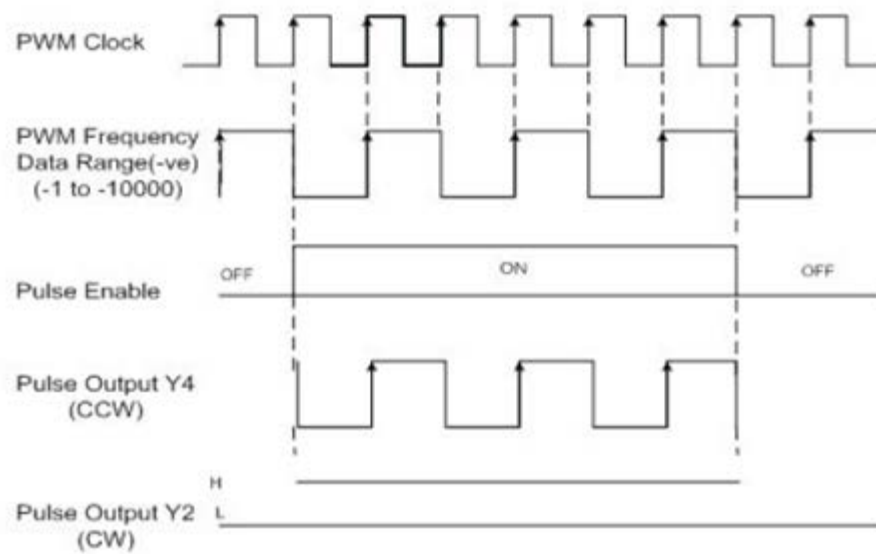


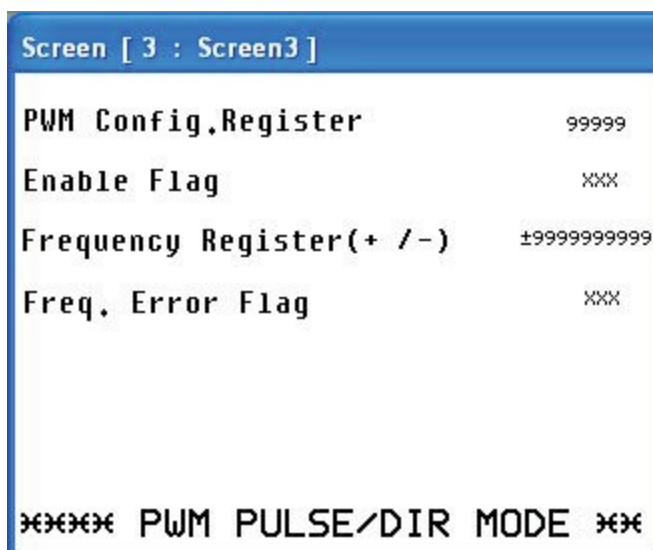
Fig.2 CW/CCW Timing diagram (Negative PWM frequency)



5.3 Pulse/DIR Mode PWM Output

To configure high speed output in Pulse/DIR mode follow the steps below:

- 1) Create a new application
- 2) Add a clip-on module in slot1
- 3) Set 'PWM configuration resister' on screen
- 4) Put value as 7 in 'PWM configuration resister'
- 5) Set 'frequency setting resister' on screen and put its value as '+5000'
- 6) Set enable flag resister on screen and keep its status as 'ON'
- 7) Set 'Frequency setting error flag' on screen



- 8) Download application

This will RUN the operation in Pulse/DIR

mode. Note:

The value of 'Frequency setting resister' should be in between +/-1 to +/-10,000. If value of 'Frequency setting resister' is less than 1 or greater than 10,000 then, frequency setting error flag will be 'ON' otherwise it will be OFF.

In PULSE/DIR mode the pulses will be out on Y2 i.e. Match output6 (MR6). If the frequency data range is negative then direction pin can be set to high through Match output 1(MR1).i.e. direction status can be out on Y4.

Function	Register/device	Remarks
PLS	Y2	
DIR	Y4	
Pulse enable flag	MW0136_0	Output is enabled when ON
Frequency setting register	MW0125 MW0126	Data range: -10000 to -1, 1 to 10000
Frequency setting error flag	MW0129_3	ON at error (Reset OFF automatically)

Timing Diagram

Fig.3 PULSE/DIR Timing diagram (Positive PWM frequency)

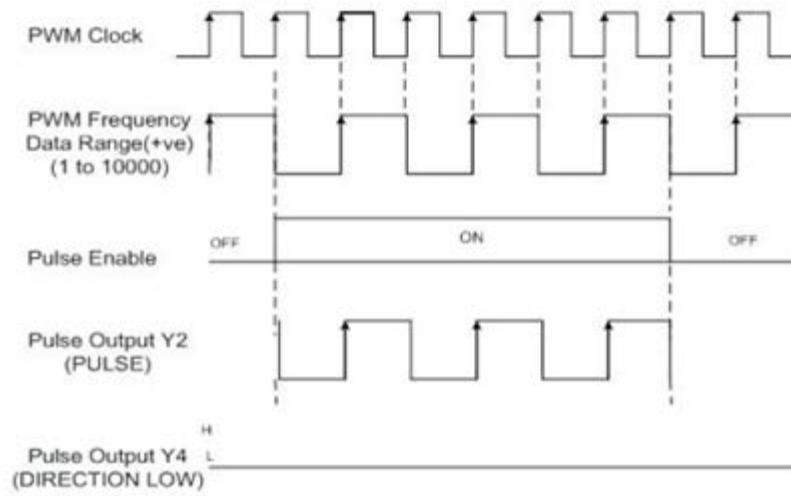
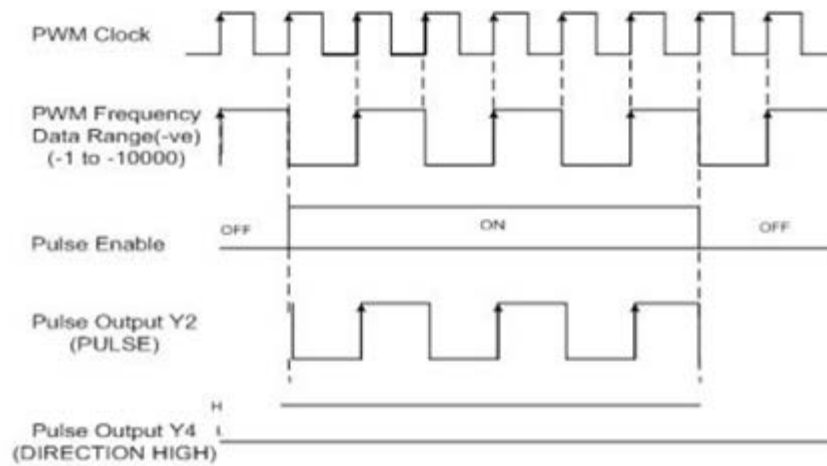


Fig.4 PULSE/DIR Timing diagram (Negative PWM frequency)



5.4 Fixed Pulse Mode PWM Output

To configure high speed output in fixed pulse mode (Trapezoidal / soft start) follow the steps below:

- 1) Create a new application
- 2) Add expansion FPED-HS-0808N in slot1
- 3) Set 'PWM configuration register' on screen
- 4) Put value as 9 in 'PWM configuration register'
- 5) Set 'Minimum frequency setting register' on screen and put its value as '4'
- 6) Set 'Maximum frequency setting register' on screen and put its value as '100'
- 7) Set 'Acceleration time register' and set its value as 32000
- 8) Set 'Deceleration time register' and set its value as 32000
- 9) Set 'Total pulse count' register and set value as 5000
- 10) Set elapsed time on screen

Screen [4 : Screen4]	
PWM Config. Reg	99999
Enable Flag	XXX
Min. Frequency	9999999999
Max. Frequency	9999999999
Acceleration Time	99999
Deceleration Time	99999
Total Pulse Count	9999999999
Elapsed time	9999999999
*** FIXED PULSE MODE ***	

- 11) Download application

This will RUN the operation in fixed pulse mode (trapezoidal / soft start).

Note:

Minimum frequency should be maximum 10,000.

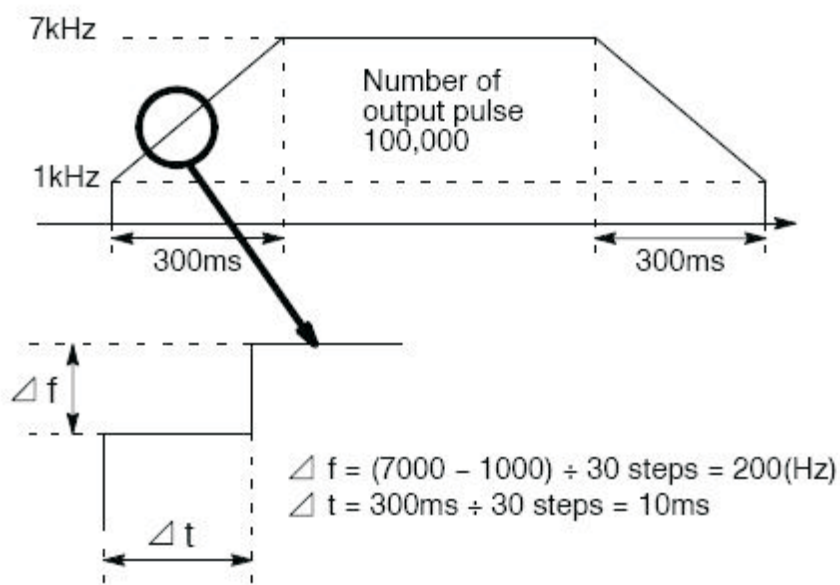
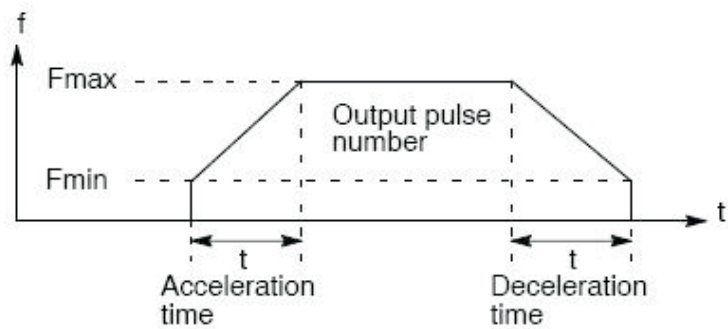
In this mode, fixed number of pulses can be output on the Y2 of expansion of transistor outputs of the unit according to the specified parameter.

The function selection is done using Configuration register MW0124 (for Slot 1).

When the corresponding control flag is off and the execution condition (trigger) is in the on state, a pulse is output from the specified output (Y2).

The control code, minimum frequency, maximum frequency, acceleration time, deceleration time and total number of pulses are specified by a user program as shown in the following table.

The frequency is switched by the acceleration/deceleration time specified for changing from the initial speed to the maximum speed. The acceleration and deceleration is normally done in 30 steps.



5.5 MW Register Table for PMW I/O Modules

MW Register Table:

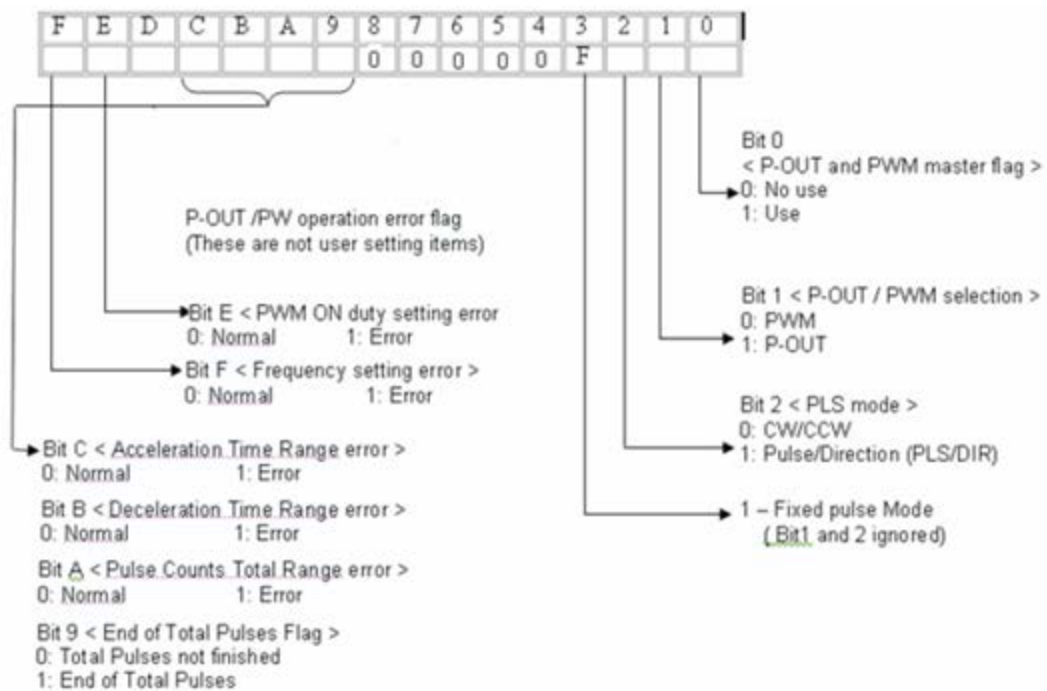
Function	Register/device	Remarks
PWM pulse CH1	Y2	Expansion Y2
Configuration Register	MW0124	Fixed pulse mode configuration register
Pulse Out Enable	MW0136_0 (M01576)	Bit '0' is used for enable High speed output.
MIN Freq CH1	MW0125 MW0126	Data range: 1 to 10000
MAX Freq CH1	MW0127 MW0128	Data range: 1 to 10000
Acceleration Time CH1	MW0137	0 to 32767 (in mSec)
Deceleration Time CH1	MW0139	0 to 32767 (in mSec)
Total Pulse CH1	MW0141 MW0142	0 to + 2147483647
Elapsed value CH1	MW0145 MW0146	0 to + 2147483647 (Read / Write)
Frequency Setting Error Flag CH1	MW0129_3 (M01467)	Turns ON at error (Bit '2' of MW0129 register)
Acceleration Time Setting error flag	MW0129_4 (M01468)	Turns ON at error
Deceleration Time Setting error flag	MW0129_5 (M01469)	Turns ON at error
No of Total Pulses Setting error flag	MW0129_6 (M01470)	Turns ON at error
End of total pulses	MW0049_0 (M01784)	Turns ON at the end of pulses.

High speed outputs:
Number of outputs: 1
Output channels: Y2, Y4

MW Type	Expansion Slot 1	Expansion Slot 2	Expansion Slot 3
	CH1 (Y2)	CH1 (Y2)	CH1 (Y2)
Configuration.	MW0124	MW0224	MW0324
Frequency	MW0125	MW0225	MW0325
Setting register	MW0126	MW0226	MW0326
ON duty setting register	MW0127 MW0128	MW0227 MW0228	MW0327 MW0328
Pulse Enable Flag	MW0136_0 (M01576)	MW0236_0 (M02576)	MW0336_0 (M03576)
Pulse width error flag	MW0129_1 (M01465)	MW0229_1 (M02465)	MW0329_1 (M03465)
ON duty setting error flag	MW0129_2 (M01466)	MW0229_2 (M02466)	MW0329_2 (M03466)
Frequency setting error flag	MW0129_3 (M01467)	MW0229_3 (M02467)	MW0329_3 (M03467)
Acceleration Time Setting error flag	MW0129_4 (M01468)	MW0229_4 (M02468)	MW0329_4 (M03468)
Deceleration Time Setting error flag	MW0129_5 (M01469)	MW0229_5 (M02469)	MW0329_5 (M03469)
No of Total Pulses Setting error flag	MW0129_6 (M01470)	MW0229_6 (M02470)	MW0329_6 (M03470)
End of total pulses	MW0149_0 (M01784)	MW0249_0 (M02784)	MW0349_0 (M03784)

MW Type	Expansion Slot 4	Expansion Slot 5
	CH1 (Y2)	CH1 (Y2)
Configure Register Frequency	MW0424; MW0425	MW0524; MW0525
Setting register	MW0426	MW0526
ON duty setting register	MW0427; MW0428	MW0527; MW0528
Pulse Enable Flag	MW0436_0 (M04576)	MW0536_0 (M05576)
Pulse width error flag	MW0429_1 (M04465)	MW0529_1 (M05465)
ON duty setting error flag	MW0429_2 (M04466)	MW0529_2 (M04466)
Frequency setting error flag	MW0429_3 (M04467)	MW0529_3 (M04467)
Acceleration Time Setting error flag	MW0429_4 (M04468)	MW0529_4 (M04468)
Deceleration Time Setting error flag	MW0429_5 5	MW0529_5 (M04469)
No of Total Pulses Setting error flag	MW0429_6 6	MW0529_6 (M04470)
End of total pulses	MW0449_0 (M04784)	MW0549_0 (M05784)

Configuration Register (Pulse/PWM Output): MWssrr



ANALOG MODULE SETUP

- ◆ Overview
- ◆ TRPAIO0400L (4 AI)
- ◆ TRPAIO0202L (2 AI, 2 AO)
- ◆ TRPRTX0402 (4 AI, 2 AO)

6.1 Overview

OIS PLUS clip-on analog modules can accept a number of different types of inputs and produce different types of outputs. To determine which type of input and which type of output the module used, a profile for the modules must be setup in the MW registers. The group of MW registers assigned to the module is determined by the modules mounting position. The OIL-DS software is used to assigned values to the MW registers. The following table shows the relationship between the MW configuration registers, XW input registers, and the YW output registers.

Register Description		Expansion Slot				
		Slot1	Slot2	Slot3	Slot4	Slot5
Input Registers	Analog Input (CH0) Type- Slotxx	MW0100	MW0200	MW0300	MW0400	MW0500
	Analog Input (CH1) Type- Slotxx	MW0101	MW0201	MW0301	MW0401	MW0501
	Analog Input (CH2) Type- Slotxx	MW0102	MW0202	MW0302	MW0402	MW0502
	Analog Input (CH3) Type- Slotxx	MW0103	MW0203	MW0303	MW0403	MW0503
	Input Register(CH0)- Slotxx	XW0100 XW0101	XW0200 XW0201	XW0300 XW0301	XW0400 XW0401	XW0500 XW0501
	Input Register(CH1)- Slotxx	XW0102 XW0103	XW0202 XW0203	XW0302 XW0303	XW0402 XW0403	XW0502 XW0503
	Input Register(CH2)- Slotxx	XW0104 XW0105	XW0204 XW0205	XW0304 XW0305	XW0404 XW0405	XW0504 XW0505
	Input Register(CH3)- Slotxx	XW0106 XW0107	XW0206 XW0207	XW0306 XW0307	XW0406 XW0407	XW0506 XW0507
Output Registers	Analog Output (CH0) Type- Slotxx	MW0104	MW0204	MW0304	MW0404	MW0504
	Analog Output (CH1) Type- Slotxx	MW0105	MW0205	MW0305	MW0405	MW0505
	Output Register(CH0)- Slotxx	YW0100	YW0200	YW0300	YW0400	YW0500
	Output Register(CH1)- Slotxx	YW0101	YW0201	YW0301	YW0401	YW0501

All analog modules are configured as shown above depending on their slot number. Beyond the above each module must be setup individually.

Note: All settings are in decimal.

6.2 TRPAIO0400L (4 AI)

Analog Input Range: Set in MW register as defined in 6.1 for each channel used.

Sr. No	Input Range	MW Setting for Input Range Type
1	4 to 20mA	0
2	0 to 10V	1
3	-10 to 10V	2
4	0 to 20mA	3

Analog Output Range: None

6.3 TRPAIO0202L (2 AI, 2 AO)

Analog Input Range: Set in MW register as defined in 6.1 for each channel used.

Sr. No	Input Range	MW Setting for Input Range Type
1	4 to 20mA	0
2	0 to 10V	1
3	-10 to 10V	2
4	0 to 20mA	3

Analog Output Range: Set in MW register as defined in 6.1 for each channel used.

Sr. No	Output Range	MW Setting for Output Range Type
1	4 to 20mA	0
2	0 to 10V	1
3	0 to 20mA	3

6.4 TRPRTX0402 (4 AI, 2 AO)

Analog Input Range: Set in MW register as defined in 6.1 for each channel used.

Input Type	Input Range	MW Setting for Input Range Type
Voltage	0 to 10V	1
	0 to 5V	6
Millivolt	0 to 50mV	5
	0 to 100mV	4
mA	4 to 20mA	0
	0 to 20mA	3
RTD	Alpha 1	7
	Alpha 2	8
	PT1000	9
Thermocouple	J	1
	K	4
	E	1
	R	1
	S	1
	B	1
	N	1
	T	1

Analog Output Range: Set in MW register as defined in 6.1 for each channel used.

Output Type	Output Range	MW Setting for Output Range Type
Voltage	0 to 10V	2
	0 to 5V	1
mA	4 to 20mA	5
	0 to 20mA	6

USB HOST OPERATION

- ◆ Downloading from USB Drive to OIS PLUS
- ◆ Uploading from OIS PLUS unit to USB Drive

7.1 Overview

The USB host port can be used to perform a download or an upload of an application to or from a USB memory drive. This enables the user to update the OIS PLUS Series or download logging data without the use of a personal computer. Only the touch screen based OIS PLUS-Series (OIS55 PLUS, OIS60 PLUS, OIS45E PLUS, OIS70E PLUS, & OIS120A) support USB memory drives. The drives must be formatted FAT or FAT32.

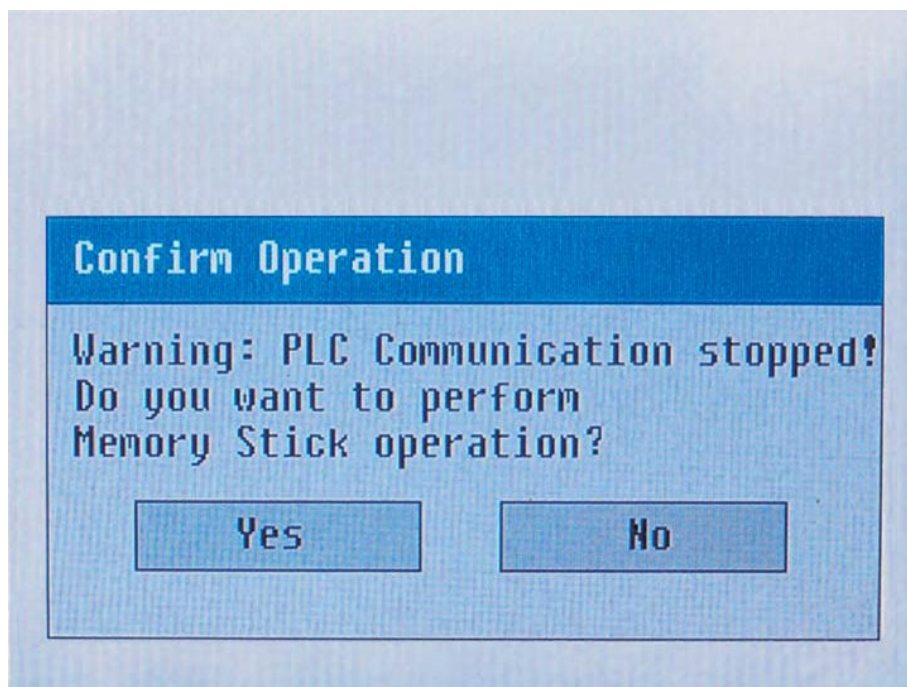
The following USB memory drives are supported:

- (i) Transcend: Model - JF V30 (1 GB)
- (ii) Transcend: Model - JF V30 (2 GB)
- (iii) Transcend: Model - JF V30 (4 GB)
- (iv) Transcend: Model - JF V30 (8 GB)
- (v) SanDisk: Model - Cruzer Micro (2 GB)
- (vi) SanDisk: Model - Cruzer Micro (4 GB)
- (vii) Kingston: Model - DataTraveler (4 GB)
- (viii) PNY: Model - Micro Attache (4 GB)
- (ix) Sony: Model - Micro Vault (2 GB)

Note: Make sure to backup all data on the USB drive before connecting it with the OIS PLUS-Series.

To establish a connection between the USB drive and the OIS PLUS-Series proceed as follows:

- 1 Place the USB drive in the USB host port.
- 2 An **empty** OIS PLUS (no application or no firmware) will automatically start the USB Host function when the OIS PLUS detects a USB drive.
- 3 When running an application setting system bit s037 to 1 will start USB host function provided the USB drive is connected.

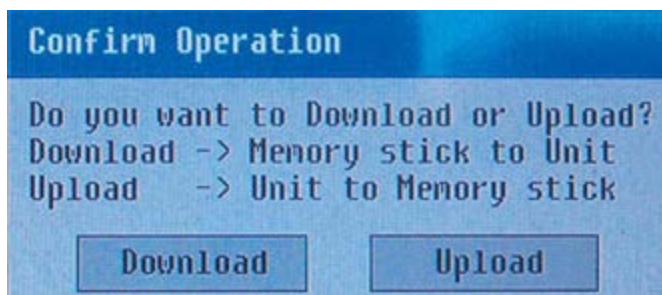


4. Click **YES** to continue. There will be a slight pause.

Please wait...

Enumerating Memory Drive.

5. Click **Download** or **Upload**.



7.2 Downloading from USB Drive to OIS PLUS:

In order to download an application from the USB memory drive to the OIS PLUS, the following files must be present in the USB Drive:

Folder Name: "OIS55 PLUS"
Application File Name: "OIS55 PLUS_APP.PZM",
Firmware File Name: "OIS55 PLUS_FW.ABS",
Font File Name: "FONT_File.BIN",
Ladder File Name: "OIS55 PLUS_LD.BIN"

These files are stored on the computer that created the application. They must be copied to the USB memory drive.

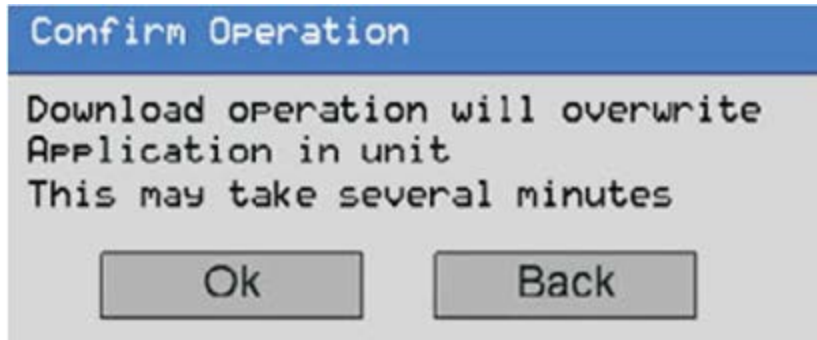
The following data can be downloaded to the OIS PLUS unit.

- Application
- Firmware
- Fonts
- Ladder

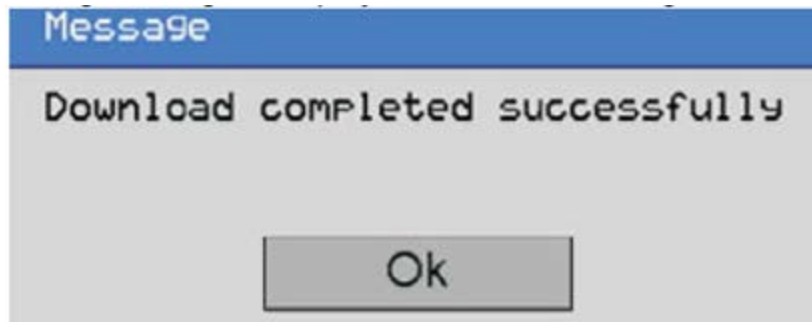
- 1) Connect the USB stick to the unit.
- 2) Click **Download**.



3) Click APPLICATION to erase the old application and download the new application from the USB memory drive to the OIS PLUS.



4) The following message is displayed after downloading:



Click **OK** to finish. Repeat step 3 and 4 for firmware and fonts.

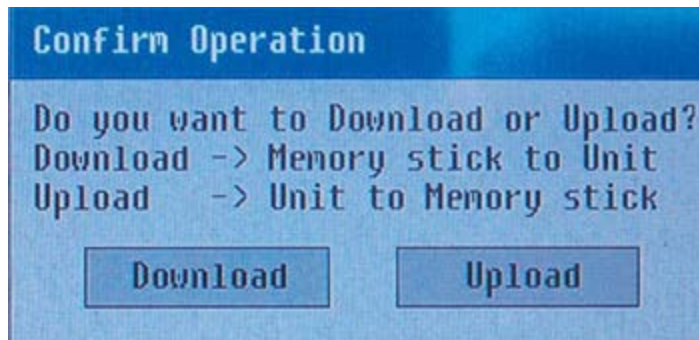
Note: This Download operation can be performed only when proper products folder is available in USB memory drive

7.3 Uploading from OIS PLUS to USB Drive:

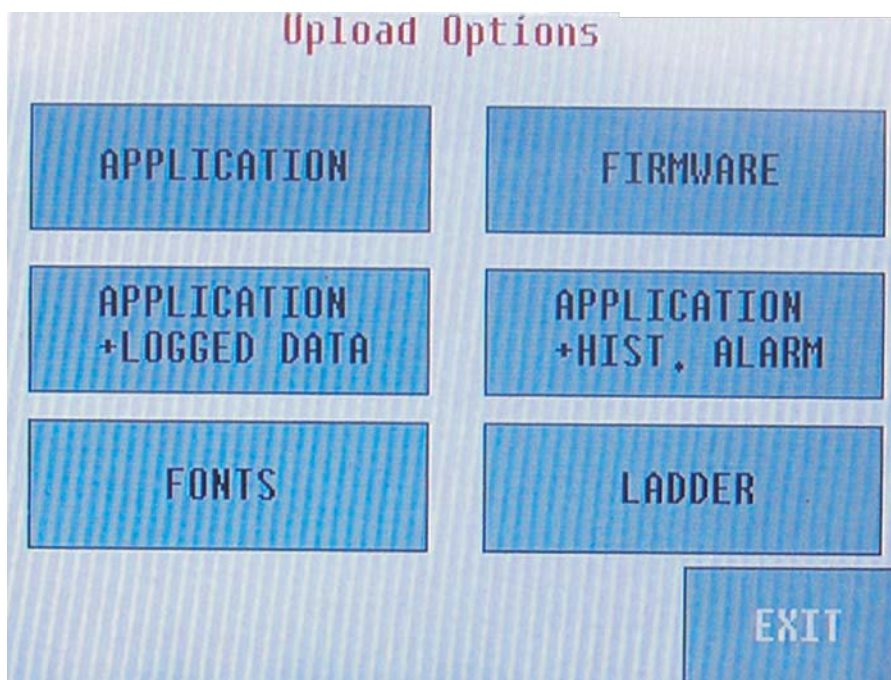
The following data can be uploaded from OIS PLUS unit to the USB drive:

1. Application
2. Firmware
3. Application + logged data
4. Application + Historical alarm data
5. Fonts
6. Ladder

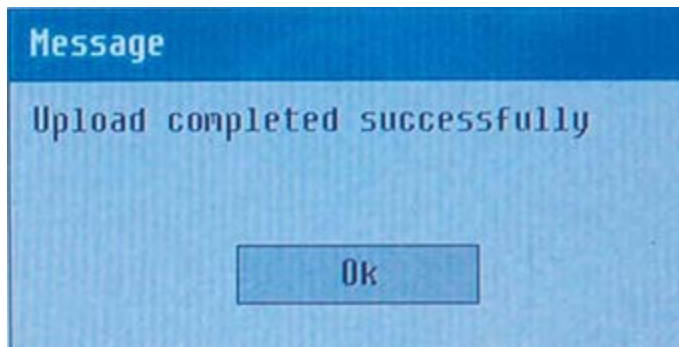
- a) Connect the USB drive to the unit.
- b) Click **Upload**.



- c) Click APPLICATION to upload the new application from the OIS PLUS unit to the USB drive.



d) The following message is displayed after uploading.



Click OK to finish.

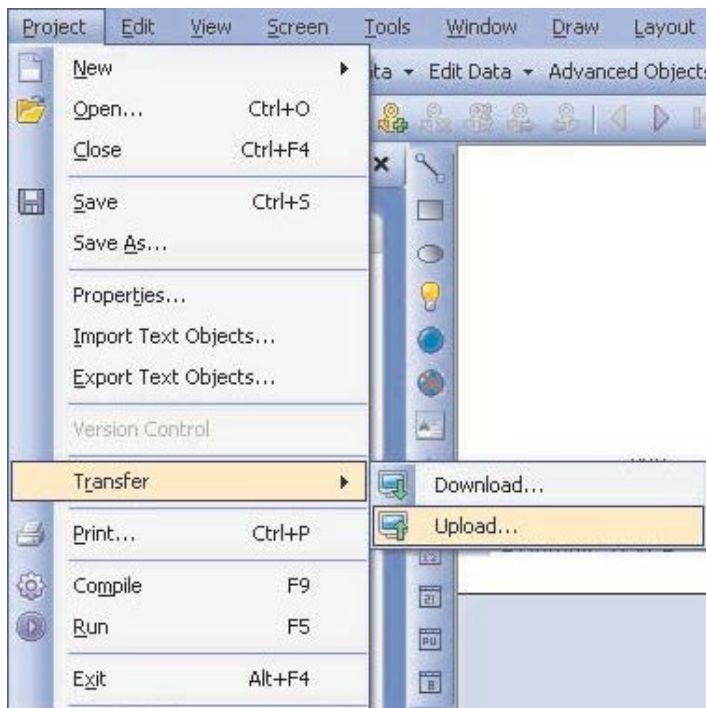
Repeat step 3 and 4 if you need to upload any of the other options to the USB drive.

USB UPLOAD AND DOWNLOAD

- ◆ Upload an Application
- ◆ Download an Application
- ◆ Device Information

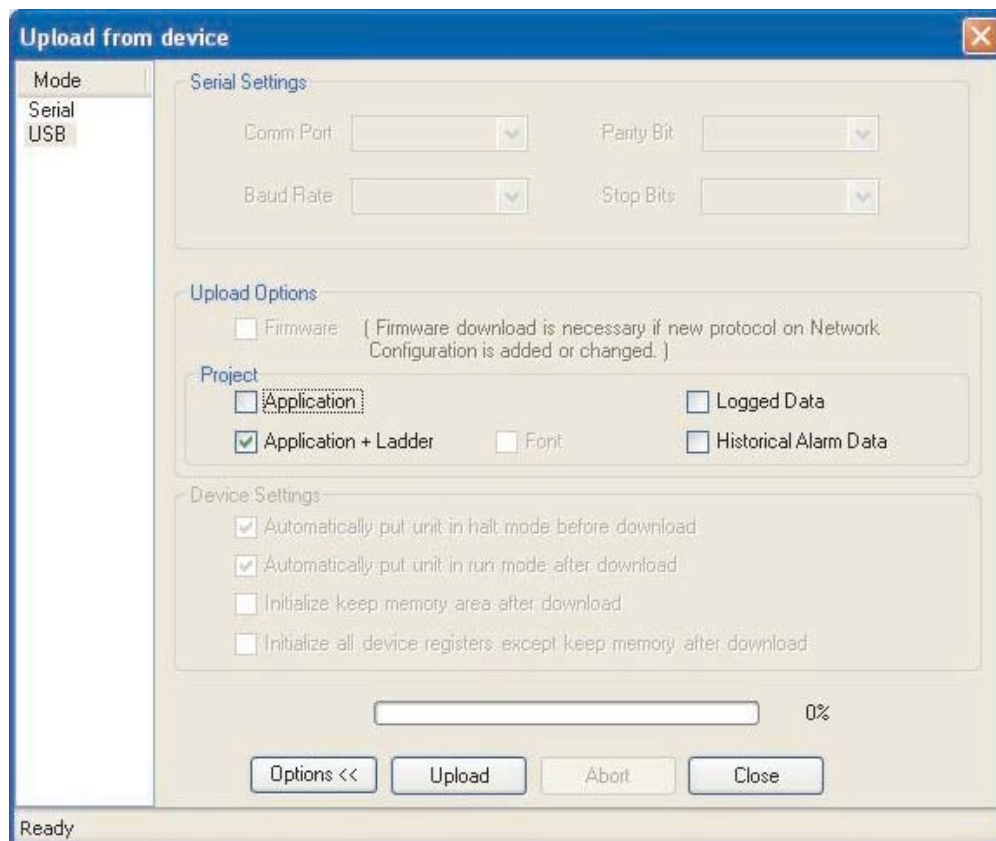
8.1 Upload

An application can be uploaded from the OIS PLUS unit. To upload an application first select the appropriate communication port (serial or USB) for your computer by choosing “**Communication | Com Port**” menu option. To reach this “Communication” docker window; choose “**Project | Transfer | Upload**”. Attach a computer to unit cable. From the “**Communication**” menu, click on the “**Upload...**” selection.



OR

In the Upload dialog, check the “**Application**” radio button and press the “**Upload**” button to begin uploading the application.



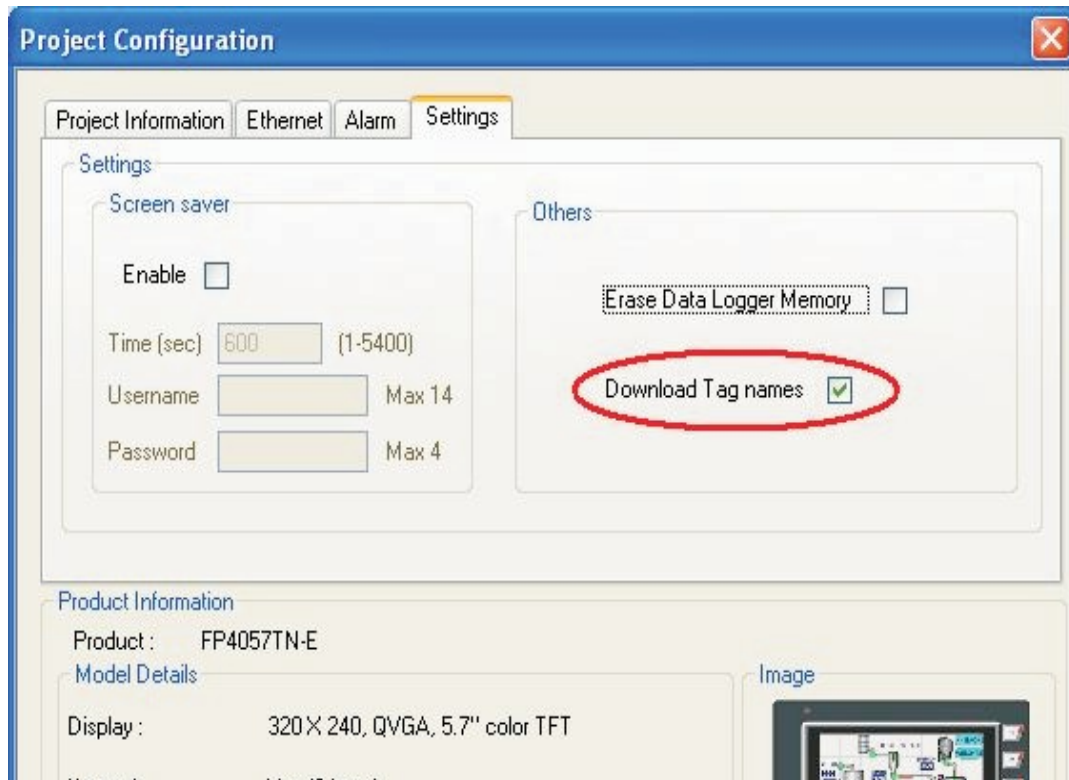
The user has to define which communication port to use for uploading / downloading.

In uploading, the application and the application plus logged data uploads can be performed.

1. Application

If this option is selected, only the application will be uploaded from the unit.

Note that tag and screen names can be uploaded only if the “Download tag names” option in “**Project Configuration | Settings**” was originally selected as shown below:

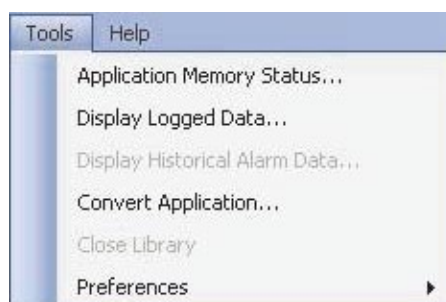


If this option was not selected, then the tag names and screen names are uploaded with default names such as Tag1, Tag2 and Tag3. If the application used ladder logic block tasks, they cannot be uploaded. Ladder block information would only be available from the original application file.

2. Application + Logged data

This option is selected if user wants to upload application and logger data. The application is uploaded first and then the logger data.

The logged data is displayed in a csv format. The data can be viewed by selecting the “**Display Logged Data**” menu option located under “**Tools**” as shown below:



The following errors may occur during uploading:

1 Device not responding

This error indicates that no communication has been established between the computer and the OIS PLUS unit. The probabilities for this situations will be:

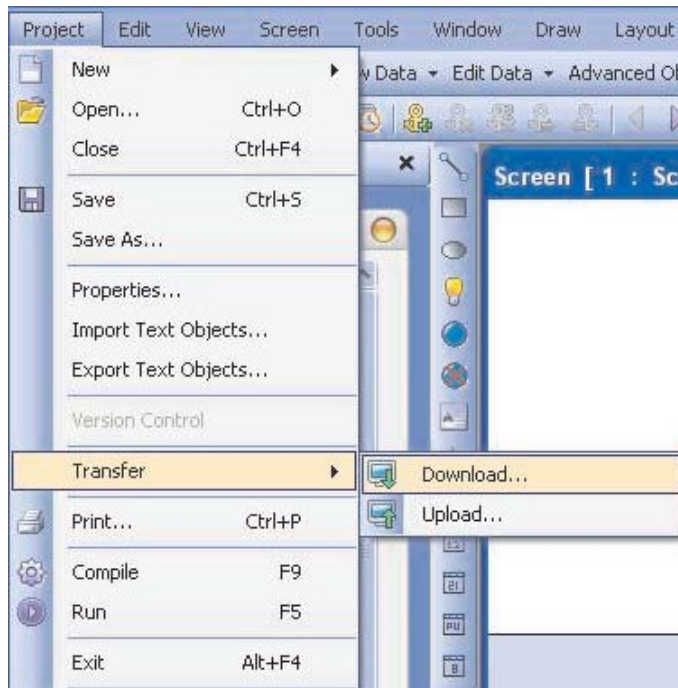
- (i) Unit is not connected to PC.
- (ii) Unit is not connected to selected port (Serial & USB)
- (iii) Selected port is not working
- (iv) Unit power is off.
- (v) Connecting cable (Serial &/or USB is not working)

2 Port is either busy or does not exist

This error occurs if you try to upload in unit while serial port is busy.

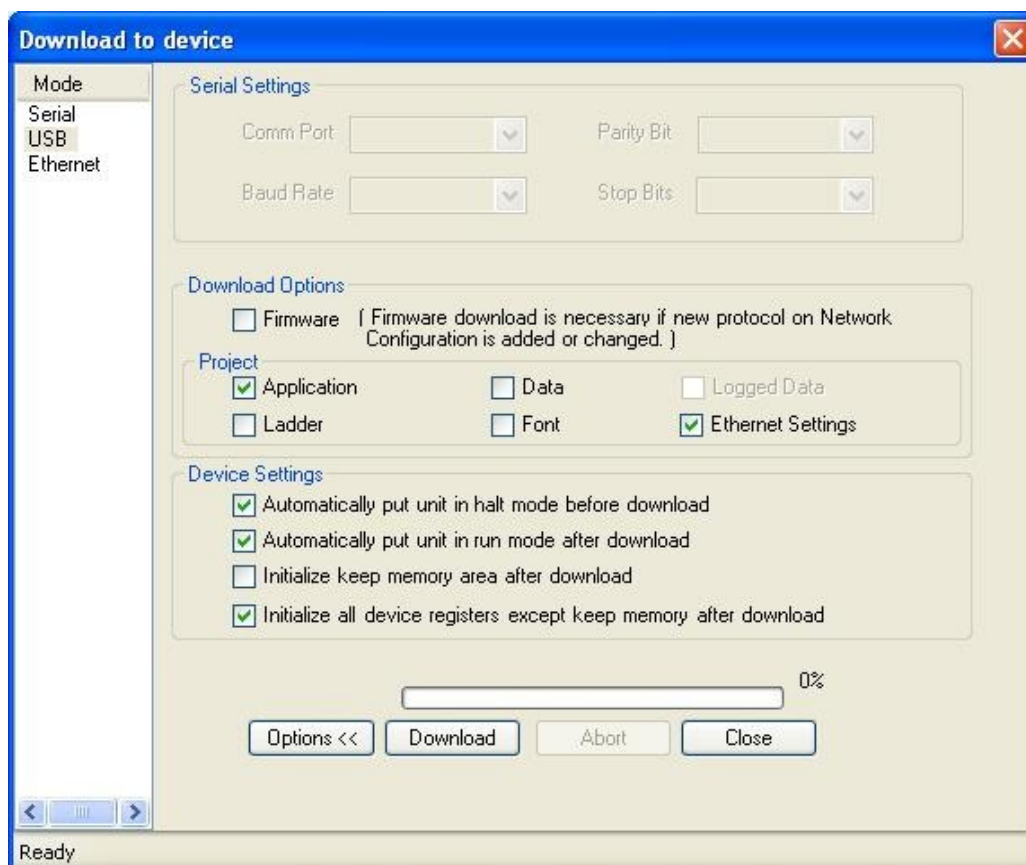
8.2 Download

To download an application into the unit, either click on **“Download”** button from the Tool station or choose **“Project | Transfer”** menu option as shown below:



OR

After linking, the following window will display:



Com Port – Used to select which communication port to use for downloading. By default Com1 is selected. Any changes are stored with the OIS PLUS program.

Download Options

1. Application

Select this option to download the application to the unit.

2. Firmware

Firmware needs to be downloaded when:

1. Before downloading the application for the first time.
2. If a new PLC node is either added or deleted in the Network configuration.
3. Upgrading firmware in the unit to newer version.
4. Before downloading applications created in older versions of software.

3. Font

Select this option to download fonts to unit. This option needs to be selected if the default fonts have been modified.

4. Ladder

Select this option to download ladder blocks to the unit. This option needs to be selected if the ladder logic blocks have been modified.

In the “Device Settings” section, user can see disabled options as:

(i) Initialize keep memory area after download:

This is option provided for user to initialize the Keep Memory Area to default values (Zero) after download, If this option is not selected, the values in this Memory Area will be retained after Download of Program (Firmware / Application / Ladder)

(ii) Initialize all device registers except keep memory after download:

This is option provided for user to initialize the Device Registers (Like D,BW,YW) of HMI except Keep Memory Area (system Parameters) to default Values (Zero), If this option is not selected, the values in this Memory Area will be retained after Download of Program (Firmware / Application / Ladder).

(iii) Initialize keep memory area after download:

If user enables this option, it will clear the keep memory area defined in system parameters, unless it will be kept retentive.

(iv) Initialize all device register except keep memory area after download:

This option is provided to clear all memory area except data from “Keep Memory Area”

Note:

At Power Cycle Only the User specified Keep memory Area is retained and other device Registers are initialized to Zero. Download options are applicable only at the time of Download of Program.

Download Button - Click this button to start the downloading.

Abort Button - Click on this button to stop the downloading.

The following errors may occur during Downloading:

1 Product mismatch

This error occurs if you, prepare an application for one type of OIS PLUS and try to download it to another type.

2 Port is either busy or not exist

This error occurs if you try to upload in unit while serial port is busy.

3. Device not responding

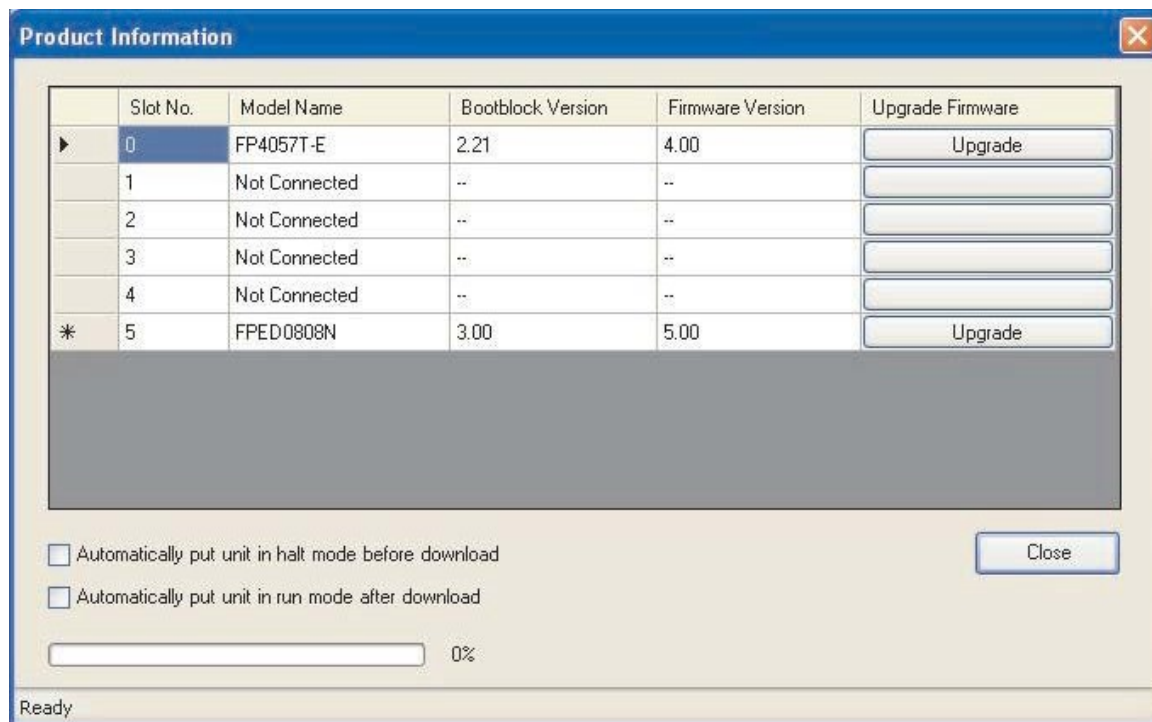
This error indicates that no communication has been established between the computer and the unit. The probabilities for this situations will be:

- (i) Unit is not connected to PC.
- (ii) Unit is not connected to selected port (Serial & USB)
- (iii) Selected port is not working
- (iv) Unit power is off.
- (v) Connecting cable (Serial &/or USB is not working)

8.3 Device Information

Device information is used to detect the information such as model name, bootblock / hardware / firmware version of base and expansion models as well as user can upgrade firmware of expansion modules.

User can select device information from menu View -> Device Information:



Expansion Firmware Upgrade Scheme:

If the firmware version present in connected expansion module is lower as compared to the one present in latest OIL-DS Build, the user if required can upgrade the firmware version of the connected expansion module.

Steps to upgrade the Expansion Module Firmware:

Step 1: Click View -> Device Information.

Step 2: On the expansion module you need to upgrade, click on respective Upgrade button. (Upgrade is only applicable to Expansion Modules by this utility, to upgrade the base firmware use download button).

Step 3: Select proper download mode i.e. automatically put unit in HALT mode before download, so that download can be done successfully.

Step 4: If automatically put unit in run mode after download is ticked, then the unit will be in RUN mode when unit gets soft-restart after expansion download is completed and if it is not enabled, the unit will be in HALT mode after download is completed.

Step 5: Download is possible only when the expansion firmware in modules is of lower version as compared to expansion firmware version present in OIL-DS.

Step 6: After successful download the device information needs to be reopened again to view updated information.

Note:

Once the firmware of expansion is upgraded the older version cannot be installed.

Device Information and Expansion firmware upgrade is applicable on USB port only.

User cannot find the Device information through the view menu if USB cable not connected to the unit.

USB DRIVER INSTALLATION

9.1 USB Driver Installation Guide

Please follow the steps to install the USB driver for TRP Series HMI.

1. Power on the HMI without connecting USB cable to it.

2. Use USB A to B cable to connect HMI to PC.

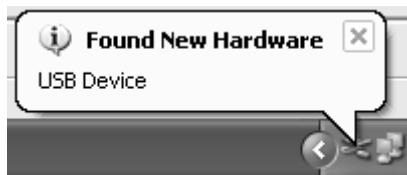
3. Connect B type end of cable to HMI



4. Connect A type end of cable to PC



5. After connecting cable, PC will detect the HMI and will show pop up message on system tray.



6. Windows will automatically open a Found New Hardware Wizard

7. (To avoid search for windows updater to search for this driver on Web)

8. Click to continue.

9. Following window will appear:



10. Select ☒ Install from a list or specific location (Advanced)

11. Click to continue.

12. Following window will appear:



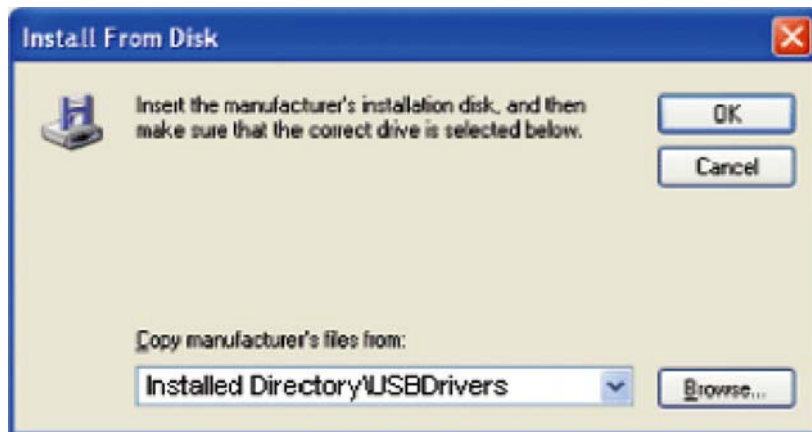
13. Select the ☒ **Don't search. I will choose the driver to install.** option and click **Next >** to continue.
14. Following screen will appear:



15. Select "Show All Devices" and click **Next**.
16. Following screen will appear:



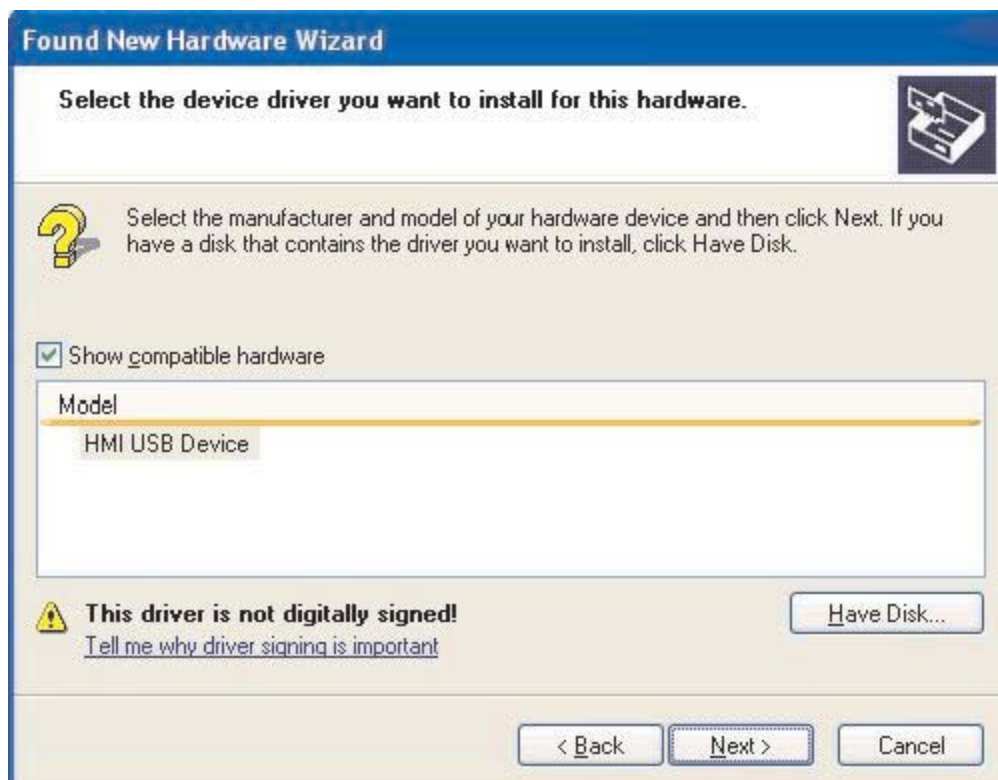
17. Select **Have Disk...** button, which will open a dialogue box as shown below:



18. The USB drivers are provided in the TR PGM software. Click on **Browse...** and select the path ...\\Installed Directory\\USB Drivers

19. Click **OK**

20. Following window will appear:



21. Select **HMI USB Device** from Model and Click to continue.
22. The driver installation will start with following warning:



23. Click on **Continue Anyway** to continue installation.
24. Windows will automatically create a system restore point and will install the driver.
25. After complete installation following window will appear:



26. Click on to end installation.

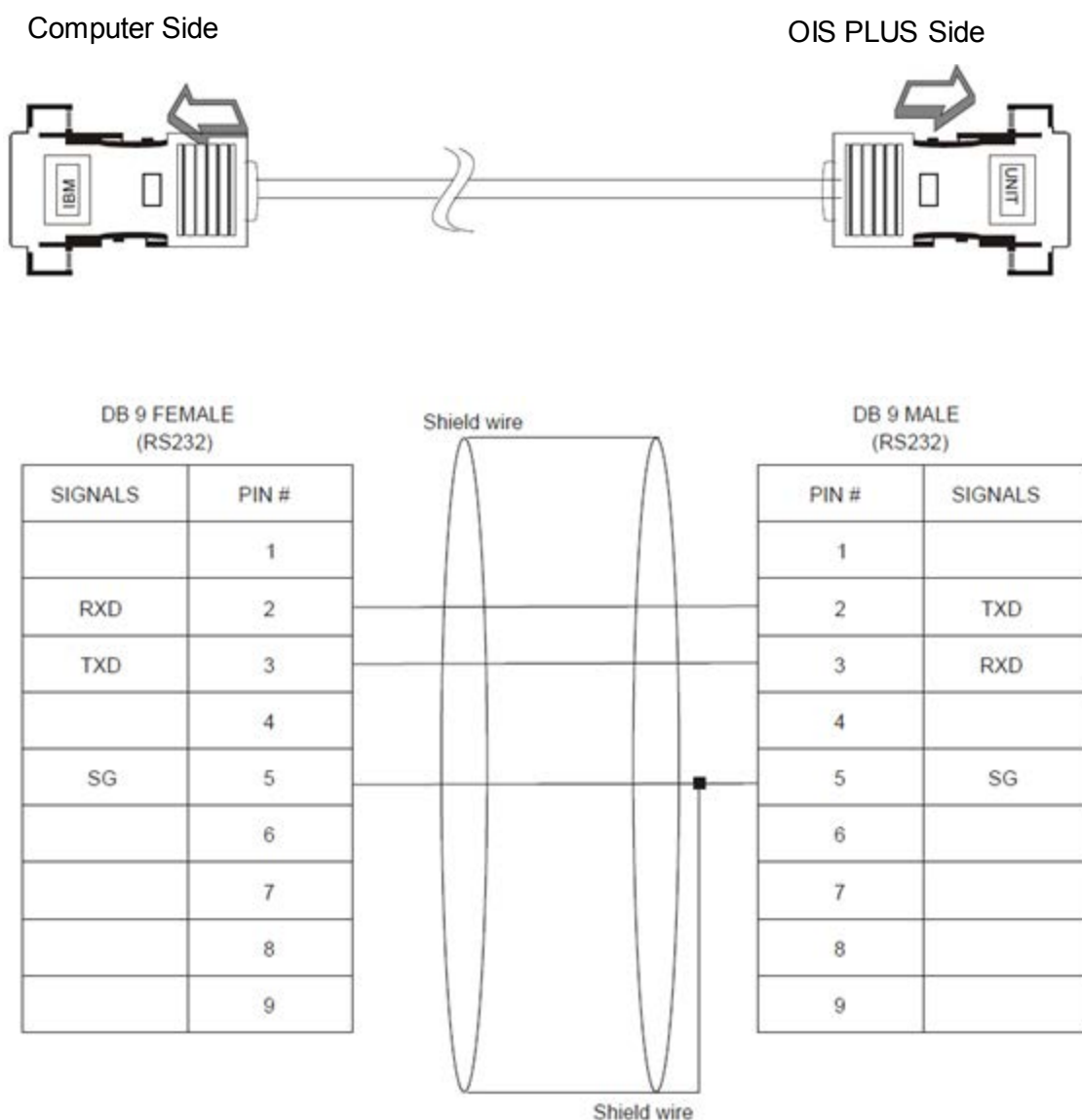
27. Following popup window will appear on system tray to indicate successful installation.



Note: Windows might skip some of the windows, while installing the driver on USB ports.

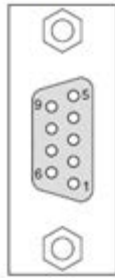
9.2 Cannot Install the HMI USB Driver

All OIS PLUS have at least one Com port. The OIS PLUS can be programmed and monitored thru the COM 1 port using the serial cable IBM-0909-1-00. This cable can be purchased from Toshiba or made as follows:



DO NOT connect any other wires than those shown above. Other pins are used for different purposes and connecting these could interfere with the programming cable.

DB9 FEMALE PINOUTS
(#CNDC100D)



DB9 MALE PINOUTS
(#CNDC101D)

