

# **User Manual**

## **Human Machine Interface**

### **HMI 201, 401, 601, 605 & 1205**

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## ***SERVICE***

If service is required then pack the unit in its original packaging container or, if unavailable, any suitable rigid container. If a substitute container is used, surround the unit with shock absorbing material; damage in shipment is not covered by the warranty. Include a letter with the unit describing the difficulty and Hardware Revision and Software Version. Send to the following address:

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This manual is designed to provide the necessary information for trouble-free installation and operation of your new HMI Series. However, if you need assistance, please call Brainchild Electronic Co. Ltd. at +886-2-27861299 Ext 613 or visit our web site at **www. Brainchild.com.tw**

## ***MANUAL REVISION***

If you contact us in reference to this manual, please include the following document number

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Revision Number	Document Number	Date	Description
Rev 1	UM\HMIA 06,2006	20-06-2006	Manual first edition
Rev 2	UM\HMIB 06,2007	20-06-2007	Minor Modification

# Warranty Certificate

For New product: This product is warranted against defects in materials and workmanship for a period of 12 months from the date of shipment to Buyer.

For Rectified Products: Any product that will be replaced will have Warranty for 6 months or upto Original Product Warranty period whichever is greater.

The warranty is limited to repair or replacement of the defective unit at the option of the manufacturer. This warranty is void if the product has been altered, misused, dismantled, or otherwise abused.

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

MAINTENANCE & SERVICE : There are no parts that can be serviced by the user. Service should be performed on a unit substitution basis only. Do not attempt to remove, replace or service any printed circuit board, components or any hardware/software related with display product. If problem within the display product occurs, contact the factory for service information or repair.

## IMPORTANT

HMI Products are intended to be operator interfaces, to work with PLCs which actually take control actions. It is assumed that the user is well acquainted with the PLC system being used. Never use HMI units to perform emergency STOP applications. It is advised that separate switches be used outside the PLC for ANY emergency Stops.

**Any Mechanical or Electrical Modification to this Unit will void all Warranties.**

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# 1. INTRODUCTION

## 1.1 Purpose of this manual

Thank you for purchasing HMI from Brainchild. HMI Series Products are versatile operator interfaces with Microsoft® Windows based configuration Software.

This Manual explains the operation of the HMI and how to implement available features using the HMI Studio Software. This manual will help you to install, configure and operate your HMI products.

### 1.1.1 HMI Basics

Operator Interface Terminals (HMI) provide much more versatility than traditional mechanical control panels. An HMI 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. HMIs connect to programmable logic controllers (PLCs) typically through the serial communications port. The HMI can be programmed to monitor and/or change current values stored in the data memory of the PLC.

HMIs can have either text or graphics based displays. A text based HMI can display printable text characters but can not print graphics.

Some HMIs use touch screen displays while others use a PCB based keypad. PCB based keypads are best used in applications in which the keypad is likely to become dirty. A touch screen HMI provides much more flexibility than typical PCB based keypad displays. Keys can be created in a touch screen HMI that can be made visible only when needed. The HMIs are available in both text display based HMI and graphics display based HMIs.

What is a *Project*?

A project is an user created application in HMI Studio Software. A project contains information such as HMI model, Network Configuration, Screen information, Task information etc.

What is a *Screen*?

A screen is a visual representation of objects placed on the HMI 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 HMI 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 chapter 4.

What is an *Object*?

An object placed on HMI 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 HMI and can also used to perform some action. For example, a data entry object tells the HMI 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

### 1.1.2 Hardware Requirements

The following basic PC hardware configuration is needed to configure and operate your HMI studio Software.

DEVICE	MINIMUM REQUIREMENT
IBM Compatible PC with Pentium Processor	266MHz Pentium® II or higher Pentium compatible CPU
Operating System	Windows® 2000 and above
System RAM	At least 64 megabytes (MB) of RAM, more memory generally improves responsiveness
Hard Disk	150 MB Free Memory Space
VGA Monitor Colour Setting Resolution	800 x 600 with 24 bit True Color
Serial Port	Serial Port for Downloading
Mouse	Microsoft® Mouse or compatible pointing device
Keyboard	Required

These are the minimum system requirements for running the HMI Studio application.

## 1. INTRODUCTION

### 1.2 HMI Overview

#### 1.2.1 What is a HMI?

HMI Series operator interfaces provide Human-Machine Interface to the Programmable Logic Controller. These HMIs communicate with PLCs using their serial communications ports.

Configuration of HMI:

Each HMI unit has to be configured using the HMI Studio Software before connecting it to the PLC.



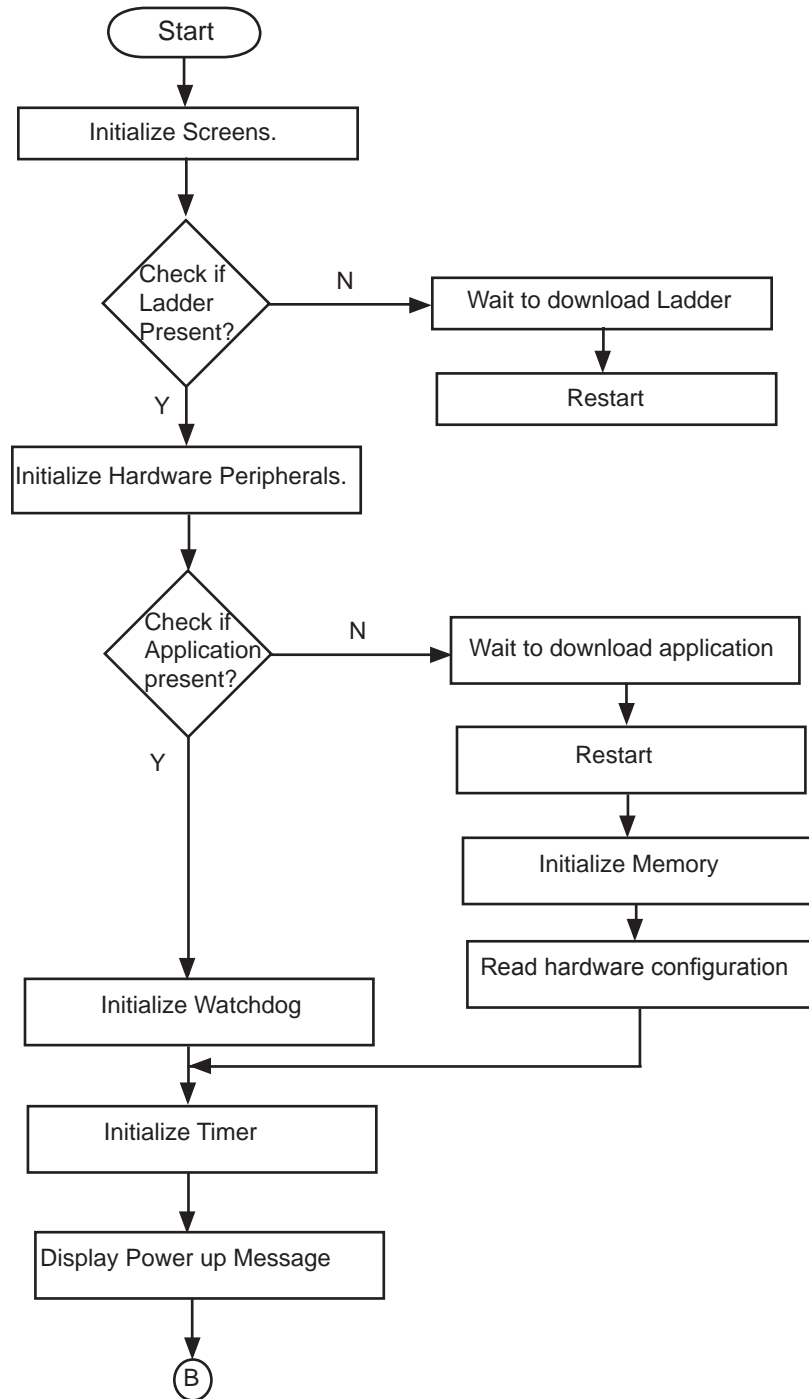
Normal Operation:

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

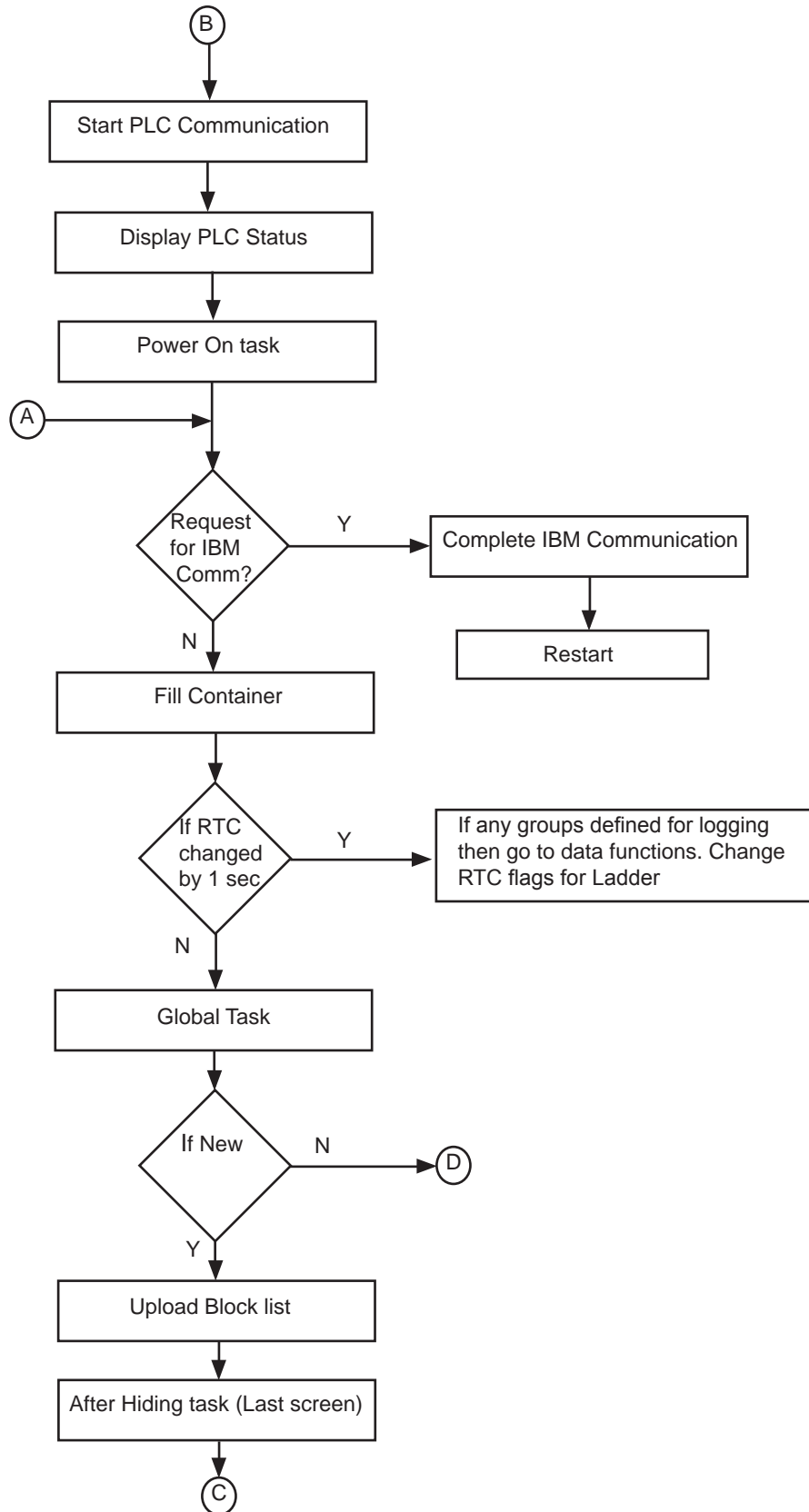


### 1.2.2 How HMI Works?

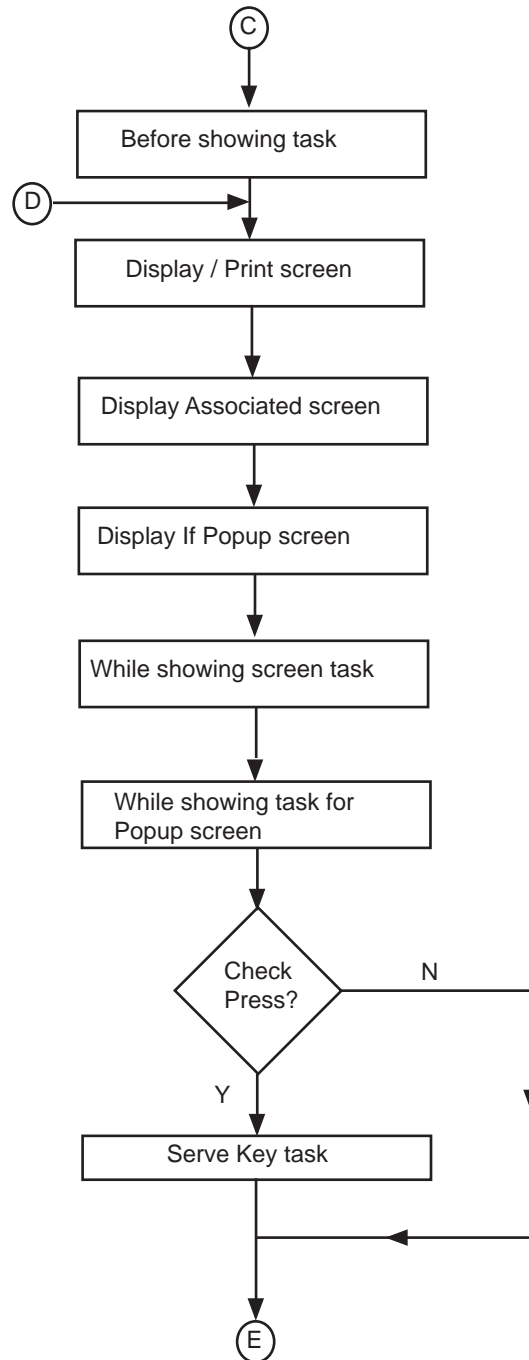
The HMI follows a specific sequence for performing the tasks defined by the user in the application. The sequence is as shown below:



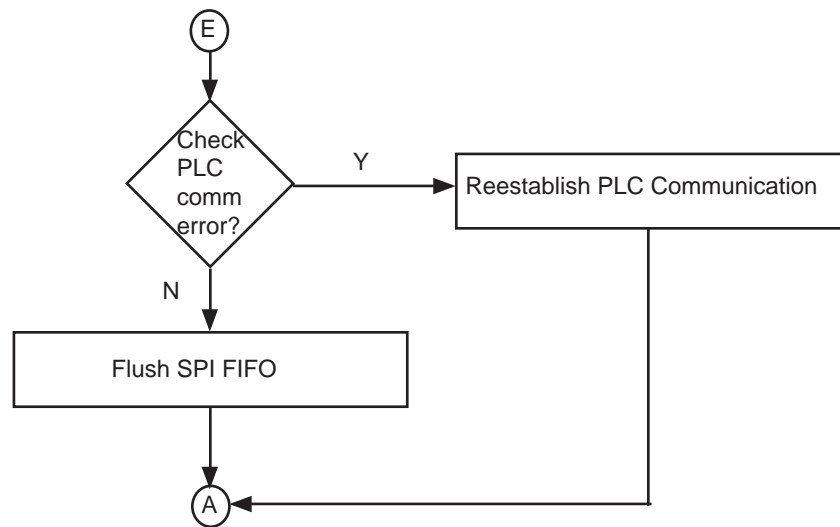
## 1. INTRODUCTION







## 1. INTRODUCTION



### 1.2.3 Specifications of HMI Series

HMI series models are Human Machine Interfaces.

HMI models need +24VDC power from an external supply.

Models available are as follows:

HMI 201	2" Size, Keypad based
HMI 401	4" Size, Touch screen based
HMI 601	5.7" Size, Touch screen based, Monochrome
HMI 605	5.7" Size, Touch screen based, Color
HMI 1205	12.1" Size, Touch screen based, Color

All above HMI models have built in ladder functionality.

All above HMI series models have two serial communication ports. They can communicate with two different PLCs simultaneously.

Detailed specifications for each of the above HMI models are given in the following section.

# 1. INTRODUCTION

## 1.2.4 Comparison Between different HMI models

Model		HMI 201	HMI 401	HMI 601	HMI 605	HMI 1205
Display Type		2 Lines of 16 characters	4.1" Yellow Backlit LCD Graphical Display	5.7" STN CCFL QVGA Graphical Display	5.7" STN CCFL QVGA Graphical Color Display	12.1: TFT CCFL Graphical Color
Resolution		N.A	192 X 62 Pixels	320 X 240 Pixels	320 X 240 Pixels	800 X 600 Pixels
Brightness Control		N.A	Standard Through Pot	Standard Through Pot	Standard Through Pot	Standard Thr. Pot
Touchscreen		N.A	Analog Resistive	Analog Resistive	Analog Resistive	Analog Resistive
Memory	Total	512 KB	512 KB	4 MB	4 MB	32 MB
	Application	120 KB	120 KB	3 MB Maximum*	3 MB Maximum*	25 MB Maximum*
	Ladder	62 KB	62 KB	256 KB	256 KB	2 MB
	Data Logging	N.A.	N.A.	2 MB*	2 MB*	20 MB*
Data Logging		N.A.	N.A.	Yes	Yes	Yes
Trending		N. A.	N.A.	Real Time + Historical	Real Time + Historical	Real Time + Historical
Alarms		Real Time + Historical	Real Time + Historical	Real Time + Historical	Real Time + Historical	Real Time + Historical
ScreenSaver		N.A.	N.A.	Yes	Yes	Yes
Screen		Yes	Yes	Yes	Yes	Yes
Password	Application	Yes	Yes	Yes	Yes	Yes
	External Dimensions	70HX108WX32D	77HX140WX32D	139HX197WX58.5D	139HX197WX58.5D	246HX312WX47D
Dimensions	Panel Cutout	101W X 63H mm	132W X 69H mm	184W X 126H mm	184W X 126H mm	295W X 227H mm

\* **Note:** Total memory can be adjusted among Application memory, Ladder memory and Data logging memory.

## HMI 201

Power Supply	24VDC
Voltage Rating	24 VDC $\pm$ 10%
Power Rating	3W Maximum
Approvals	CE Certified and CUL Listed 58DN
Bezel	IP65 Rated Keypad
Keypad	PCB based Keypad With Tactile Feedback Keys
Number Of Keys	8 Function keys and 12 Numeric keys
Memory	
Total Memory	512KB
Application Memory	120KB
Ladder Memory	62KB
Data Register	1000
Retentive Register	1400
System Register	64
System Coil	100
Internal Coil	5000
Input Coil	100
Output Coil	100
Internal Register	313
Input Register	7
Output Register	7
Timer Register	128
Counter Register	178
Display	LCD Text Display
Display Type	2 lines of 16 characters Backlit LCD
LEDs	10 LEDs



Communication	
Number of Ports	2
Type	RS232 / RS485 / RS422 / CMOS
Miscellaneous	
External Dimension	70 H X 108 W X 32 D mm
Panel Cutout	101.00 mm x 63.00 mm
Battery	Coin Type, 3V Lithium Battery 614-CR1225FH
Battery Backup	Minimum 5 years battery backup for RTC and System data
Operating Temperature	0 °C to 50 °C
Storage Temperature	-25 °C to 80 °C
Mounting Method	Panel Mounting
Clock(RTC)	Real Time Clock Function(Date & Time)
Humidity	10% To 90% (Noncondensing)
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to Transients	Level 3 as per IEC1000-4-4
Immunity to Radiated RF	Level 3 as per IEC1000-4-3
Immunity to Conducted RF	Level 3 as per IEC1000-4-6
Emission	EN55011 CISPR A

# 1. INTRODUCTION

## HMI 401

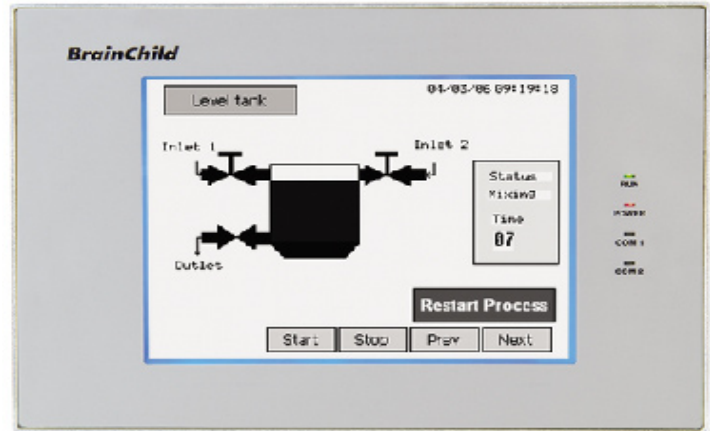
Power Supply	24VDC
Voltage Rating	24 VDC $\pm$ 10%
Power Rating	3.5W Maximum
Approvals	CE Certified & CUL Listed 58DN
Bezel	IP65 Rated
Memory	
Total Memory	512KB
Application Memory	120KB
Ladder Memory	62KB
Data Register	1000
Retentive Register	1400
System Register	64
System Coil	100
Internal Coil	5000
Input Coil	100
Output Coil	100
Internal Register	313
Input Register	7
Output Register	7
Timer Register	128
Counter Register	178
Display	LCD Graphic Display
Display Type	4.1" Yellow Backlit LCD Display
Display Resolution	192 X 64 Pixels
Touch Screen	Analog Resistive
Communication	
Number of Ports	2
Type	RS232 / RS485 / RS422 / CMOS



Miscellaneous	
External Dimension	77 H X 140 W X 32 D mm
Panel Cutout	132 mm x 69 mm
Battery	Coin Type, 3V Lithium Battery 614-CR1225FH
Battery Backup	Minimum 5 years battery backup for RTC and System data.
Operating Temperature	0 °C to 50 °C
Storage Temperature	-25 °C to 80 °C
Mounting Method	Panel Mounting
Clock(RTC)	Real Time Clock Function(Date & Time)
Humidity	10% To 90% (Noncondensing)
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to Transients	Level 3 as per IEC1000-4-4
Immunity to Radiated RF	Level 3 as per IEC1000-4-3
Immunity to Conducted RF	Level 3 as per IEC1000-4-6
Emission	EN55011 CISPRA

## HMI 601

Power Supply	24VDC
Voltage Rating	24 VDC $\pm$ 10%
Power Rating	10W Maximum
Approvals	CE /CSA Certified & UL Listed 58DN
Bezel	IP65 Rated
Memory	
Total Memory	4MB
Application Memory	3264KB
Ladder Memory	128KB
Data Register	1000
Retentive Register	1400
System Register	64
System Coil	100
Internal Coil	5000
Input Coil	100
Output Coil	100
Internal Register	313
Input Register	7
Output Register	7
Timer Register	128
Counter Register	178
Display	Monochrome Graphic Display
Display Type	5.7" STN CCFL QVGA Display
Display Resolution	320 X 240 Pixels
Touch Screen	Analog Resistive
Communication	
Number of Ports	2
Type	RS232 / RS485 / RS422 / CMOS

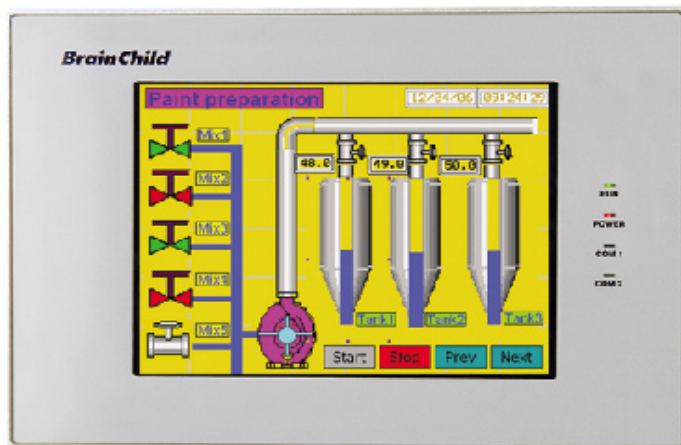


Miscellaneous	
External Dimension	139 H X 197 W X 58.5 D mm
Panel Cutout	184 mm x 126 mm
Battery	Coin Type, 3V Lithium Battery 614-CR1225FH
Battery Backup	Minimum 5 years battery backup for RTC and System data.
Operating Temperature	0 °C to 50 °C
Storage Temperature	-25 °C to 80 °C
Mounting Method	Panel Mounting
Clock(RTC)	Real Time Clock Function(Date & Time)
Humidity	10% To 90% (Noncondensing)
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to Transients	Level 3 as per IEC1000-4-4
Immunity to Radiated RF	Level 3 as per IEC1000-4-3
Immunity to Conducted RF	Level 3 as per IEC1000-4-6
Emission	EN55011 CISPR A

# 1. INTRODUCTION

## HMI 605

Power Supply	24VDC
Voltage Rating	24 VDC $\pm$ 10%
Power Rating	10W Maximum
Approvals	CE Certified & CUL Listed 58DN
Bezel	IP65 Rated
Memory	
Total Memory	4MB
Application Memory	3 MB Maximum
Ladder Memory	128KB
Data Register	1000
Retentive Register	1400
System Register	64
System Coil	100
Internal Coil	5000
Input Coil	100
Output Coil	100
Internal Register	313
Input Register	7
Output Register	7
Timer Register	128
Counter Register	178
Display	Graphical Color Display
Display Type	5.7" STN CCFL QVGA Display
Display Resolution	320 X 240 Pixels
Touch Screen	Analog Resistive
Communication	
Number of Ports	2
Type	RS232 / RS485 / RS422 / CMOS

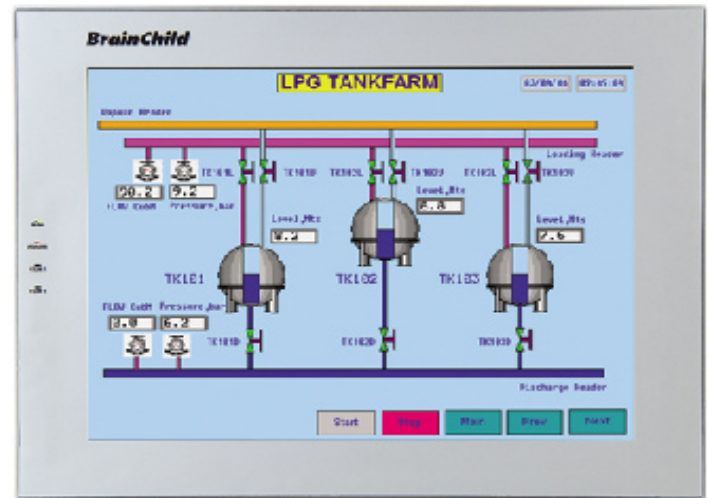


Miscellaneous	
External Dimension	139 H X 197 W X 58.5 D mm
Panel Cutout	184 mm x 126 mm
Battery	Coin Type, 3V Lithium Battery 614-CR1225FH
Battery Backup	Minimum 5 years battery backup for RTC and System data.
Operating Temperature	0 °C to 50 °C
Storage Temperature	-25 °C to 80 °C
Mounting Method	Panel Mounting
Clock(RTC)	Real Time Clock Function(Date & Time)
Humidity	10% To 90% (Noncondensing)
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to Transients	Level 3 as per IEC1000-4-4
Immunity to Radiated RF	Level 3 as per IEC1000-4-3
Immunity to Conducted RF	Level 3 as per IEC1000-4-6
Emission	EN55011 CISPR A



## HMI 1205

Power Supply	24VDC
Voltage Rating	24 VDC $\pm$ 10%
Power Rating	20W Maximum
Approvals	CE Certified and UL Listed 58DN
Bezel	IP65 Rated
Memory	
Total Memory	32 MB
Application Memory	20 MB
Ladder Memory	2 MB
Compact Flash	256 MB
Data Register	1000
Retentive Register	1400
System Register	64
System Coil	100
Internal Coil	5000
Input Coil	100
Output Coil	100
Internal Register	313
Input Register	7
Output Register	7
Timer Register	128
Counter Register	178
Display	Graphical Color Display
Display Type	12.1" TFT CCFL Display
Display Resolution	800 X 600 Pixels
Touch Screen	Analog Resistive
Communication	
Number of Ports	3
Type	RS232/RS485/RS422/CMOS, Ethernet



Miscellaneous	
External Dimension	246 H X 312 W X 47 D mm
Panel Cutout	295 mm X 227 mm
Battery	Coin Type, 3V Lithium Battery 614-CR1225FH
Battery Backup	Minimum 5 years battery backup for RTC and System data.
Operating Temperature	0 °C to 50 °C
Storage Temperature	-25 °C to 80 °C
Mounting Method	Panel Mounting
Clock(RTC)	Real Time Clock Function(Date & Time)
Humidity	10% To 90% (Noncondensing)
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to Transients	Level 3 as per IEC1000-4-4
Immunity to Radiated RF	Level 3 as per IEC1000-4-3
Immunity to Conducted RF	Level 3 as per IEC1000-4-6
Emission	EN55011 CISPR A

## 2. HARDWARE

### 2.1 Unpacking The Unit

Carefully unpack the HMI. Please read all the instructions and cautions that appear on the shipping container. Check that the container includes the mounting clamps, mounting screws, mounting inserts, gasket, and a silica gel bag. The silica gel bag is enclosed to absorb the moisture in the packing. Brainchild Electronics will not accept responsibility for shortages against the packing list unless notified within 30 days. The unit and its accessories were inspected and tested by Brainchild Electronics before shipment. All equipment should be in good working order. Examine the product carefully and notify the carrier immediately if any shipping damage is evident. You are responsible for claim negotiations with the carrier. Save the shipping container and packing material in case the equipment needs to be stored, returned to Brainchild Electronics, or transported for any reason.

### 2.2 Managing Electrostatic Discharge

It is best NOT to remove the rear enclosure of the HMI. When the rear part of the enclosure is removed, the circuitry inside is exposed to possible damage by electrostatic discharge during handling. Minimize the possibility of electrostatic discharge by:

- Discharging personal static by grounding yourself prior to handling the HMI.
- Handling the HMI at a static-free grounded workstation.
- Connecting the frame ground ( ) connector of the HMI to a clean earth ground.
- Placing the HMI in an antistatic bag during transport.

### 2.3 CE Compliance

Brainchild Electronics HMI products have been tested to confirm to European CE requirements per Council Directive. The European Union created these requirements to ensure conformity among products traded in those countries. Specifically, Brainchild Electronics products meet or exceed the noise emission and immunity requirements as set in EN55011 (Emission) and IEC1000-4 (Immunity) standards. These HMI products are designed to withstand electrical noise in harsh industrial environment. They also confirm to requirements that limit electrical emission. However this does not guarantee the products will be totally immune from possible malfunction in cases where severe electrical noise occurs. Therefore, we strongly recommend that you follow the guidelines outlined for proper wiring and grounding to ensure the proper operation of the Brainchild HMI products.

### 2.4 Environmental Rating

Brainchild HMI Products are rated for IP 65 as per IEC Standards. This means that when HMI is properly mounted on the enclosure, the front enclosure will provide a degree of protection to the inside panel from the dust and low pressure jets of water from all the directions i.e. protection against ingress of water. The HMI must be installed according to the instructions given.

### 2.5 Environmental Consideration

Brainchild HMI products are designed to operate at temperature range from 0-50° C. It is intended primarily for indoor installations and may not be suitable for certain outdoor applications. Avoid installing the Brainchild HMI products in environments with severe mechanical vibration or shocks. Do not install the HMI in enclosures with rapid temperature

### 2.6 Safety Precaution

Please observe the following precautions when installing the unit. Failure to comply with these restrictions could result in loss of life, serious personal injury, or equipment damage.



**Warning:** Do not operate the HMI in areas subject to explosion due to flammable gases, vapors, or dusts.



**Warning:** Do not connect the HMI to an AC power source. You will cause permanent damage to the HMI.



**Warning:** Do not attempt to use a DC power supply that does not meet HMI power requirements. You may cause malfunction or permanent damage to HMI.



**Warning:** Do not power the HMI with a DC power supply used for inductive loads or for input circuitry to the programmable logic controller. Severe voltage spikes caused by these devices may damage the HMI.

### 2.7 Installation Instruction

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

#### Environmental Considerations:

Make sure that the HMI unit is installed correctly and that the operating limits are followed (see Specifications for HMI ). Do not operate the HMI in areas subject to explosion hazards due to flammable gases, vapors or dusts. HMI 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 HMI to ensure that AC power wiring, PLC output modules, contactors, starters, relays and any other source of electrical interference are located away from the HMI. Particular care should be taken to locate variable speed drives and switching power supplies away from the HMI.

#### Panel Mounting

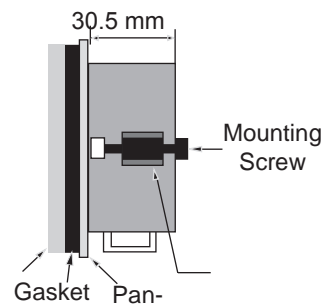
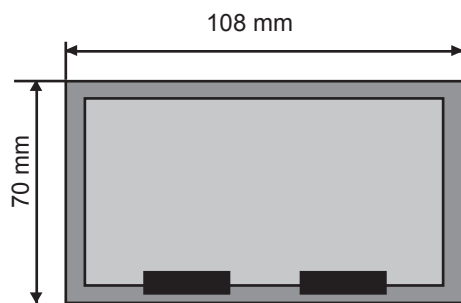
This section presents the dimensional sketches and panel cutouts for HMI products.  
(All dimensions are in mm and drawing are not to scale.)

## 2. HARDWARE

### 2.8 Panel Cutout for HMI Models

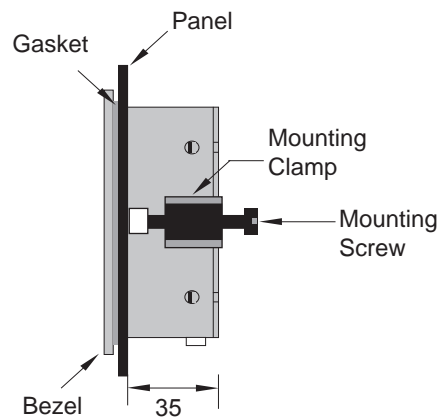
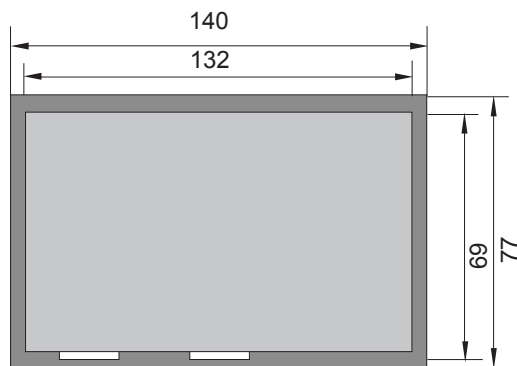
#### HMI 201

Panel cutout: 101.00 mm x 63.00 mm



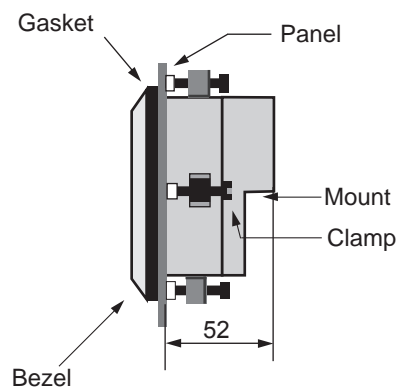
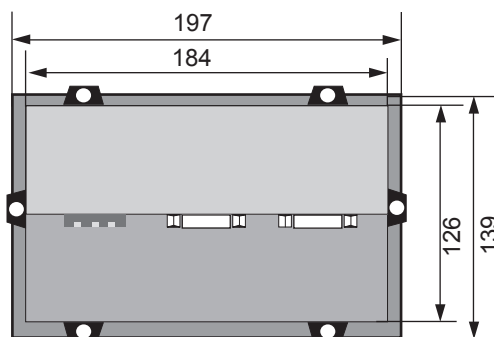
#### HMI 401

Panel cutout: 132 mm x 69 mm



#### HMI 601 and HMI 605

Panel cutout: 184 mm x 126 mm



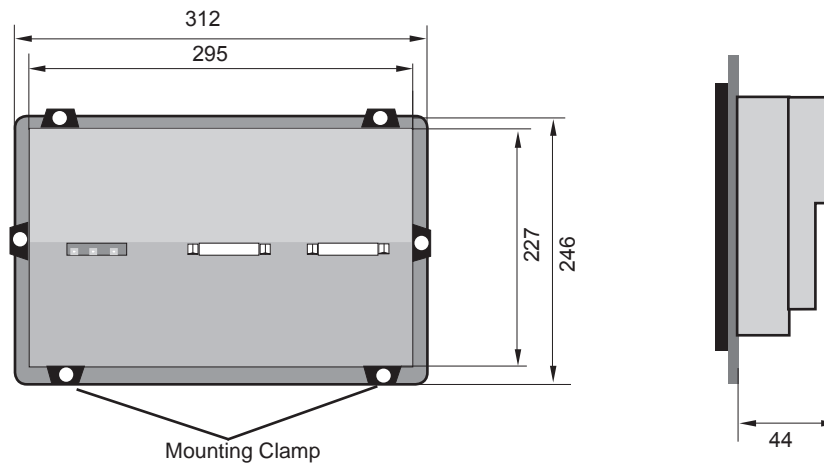
## 2. HARDWARE

Follow the procedure given below for proper mounting:

- 1) Make a cutout of the required size. Panel cutout tolerance is  $\pm 0.1\text{mm}$ .
- 2) Put the gasket behind the bezel (see dimensional sketch for details). The gasket may be sealed to the case using an adhesive.
- 4) Put the HMI unit through the panel cutout.
- 5) Insert the clamps into the case.
- 6) Pullback the clamps until they seat into the retaining slots.
- 7) Tighten the clamping screws in an even pattern until the HMI unit is secured into the panel.

### HMI 1205

Panel Cutout: 295 mm X 227 mm



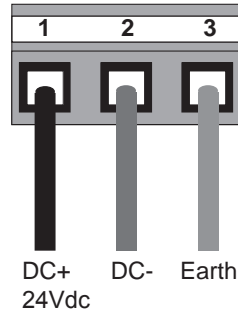
## 2. HARDWARE

### 2.9 Wiring Diagram

If wiring is to be exposed to lightening or 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 HMI models is as follows:



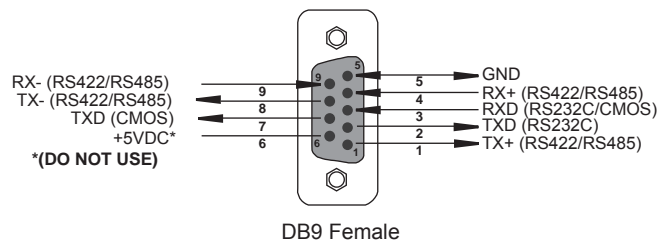
### 2.10 Communication Ports

HMI communication ports support four types of serial communication.

They have two Multisignal communication Ports. Multi-Signal means that each port has RS232, RS422, RS485 and CMOS signal levels.

HMI can simultaneously communicate on both serial ports. The HMI can be programmed from a PC on either port. Both ports can also be used with a serial printer.

Different cables are required to connect the HMI to a specific PLC. Cable details for any particular device are given in the Manual with connection details. The pin description of the communication ports for HMI is as given below:



Pin	Name	Signal Level	Description
1.	TX+	RS422 / RS485	Differential Transmit +, also referred as TXA
2.	TXD	RS232	Transmit
3.	RXD	RS232 / CMOS	Receive
4.	RX+	RS422 / RS485	Differential Receive +, also referred as RXA
5.	GND	-	Signal Ground common to all signals.
6.	+5VDC	-	<b>DO NOT USE</b>
7.	TXD	CMOS	Transmit
8.	TX-	RS422 / RS485	Differential Transmit -, also referred as TXB
9.	RX-	RS422 / RS485	Differential Receive -, also referred as RXB

### 3.1 Connecting the HMI to your Computer

- **Requirements**

1. RS232 interface cable
2. HMI Unit

Cable can be ordered along with HMI or cable can be prepared by the customer as per connection layout explained in chapter no.2

1. Connect the programming cable from computer to HMI. For Ex: COM1
2. Connect a +24VDC power supply to the HMI.
3. Open new project in HMI Studio software.
4. By default, COM1 will be configured for communication with PC.
5. Configure PLC driver in the network configuration, For Ex: COM2.
6. Download the firmware into HMI.

Every PLC will have separate communication driver. The HMI unit cannot communicate with PLC till the required driver is downloaded. When firmware is downloaded from Computer to HMI, PLC communication driver will also be downloaded.

Once, COM2 is configured for PLC and download firmware to HMI, then connect PLC to COM2.

## 3. BEFORE YOU BEGIN

### 3.2 Starting HMI Studio Software

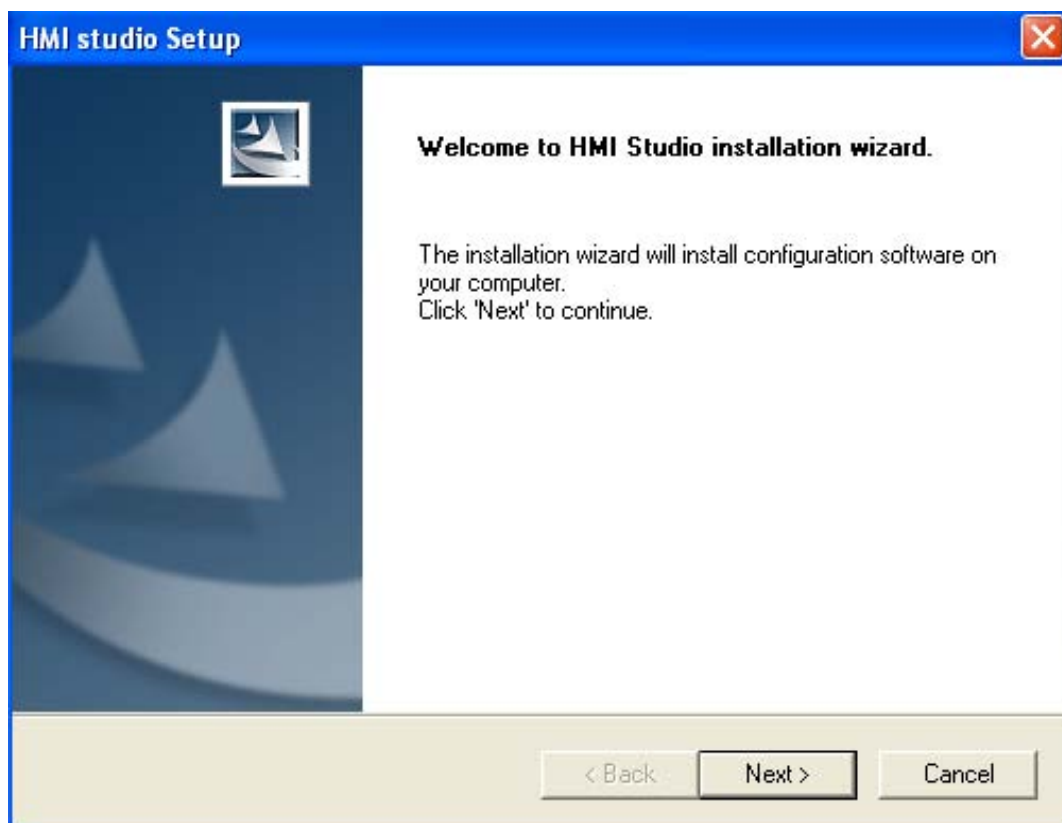
#### 3.2.1 Installing HMI Studio Software

System requirements for installing HMI Studio on your PC:

Windows Version	:	Microsoft® Windows 2000 or higher
Processor	:	266 MHz Pentium® II or higher Pentium-compatible CPU
Hard disk Space	:	150 MB free memory space
Serial Mouse	:	Microsoft® mouse or compatible pointing device
RAM	:	At least 64 megabytes (MB) of RAM; more memory generally improves responsiveness
Display resolution	:	800 X 600 with 24 bit true color
Serial Port	:	One Serial Port for Downloading Required

To install HMI Studio Software:

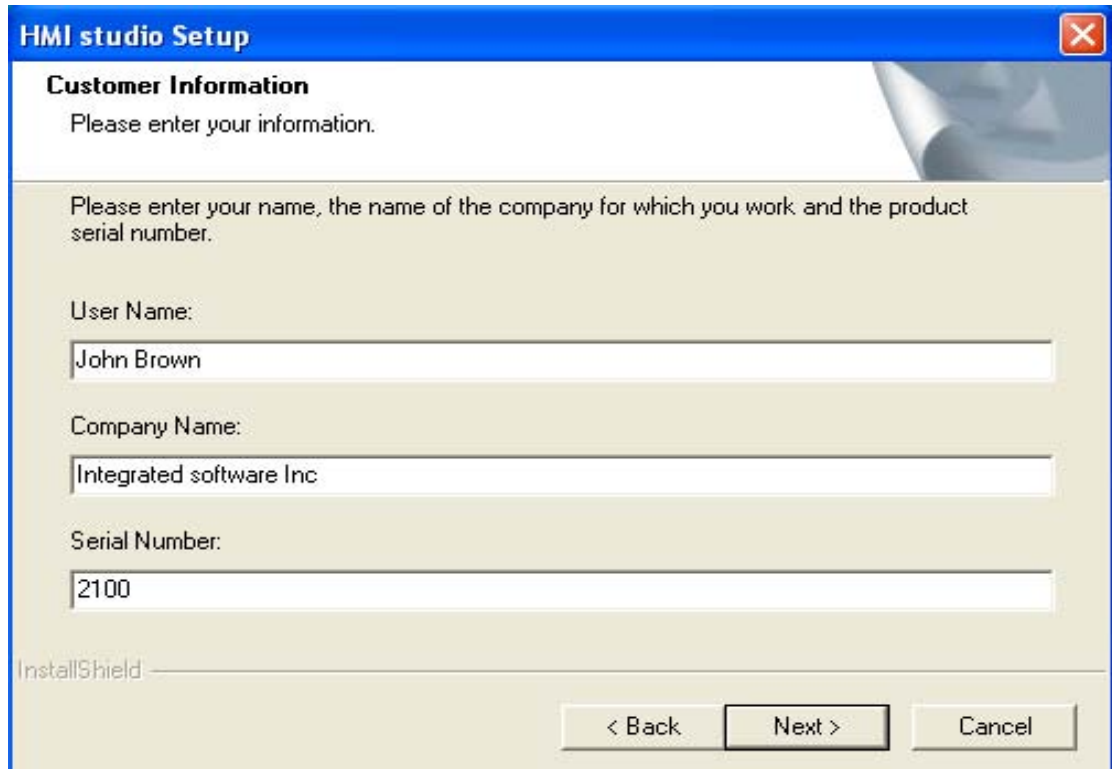
1. Open Microsoft® Windows.
2. Select Run and Pop up window appears. Type the path for installing the Setup.  
This will install HMI Studio Setup Software.
3. When you click on OK, Welcome window appears on the screen. Click on Next.





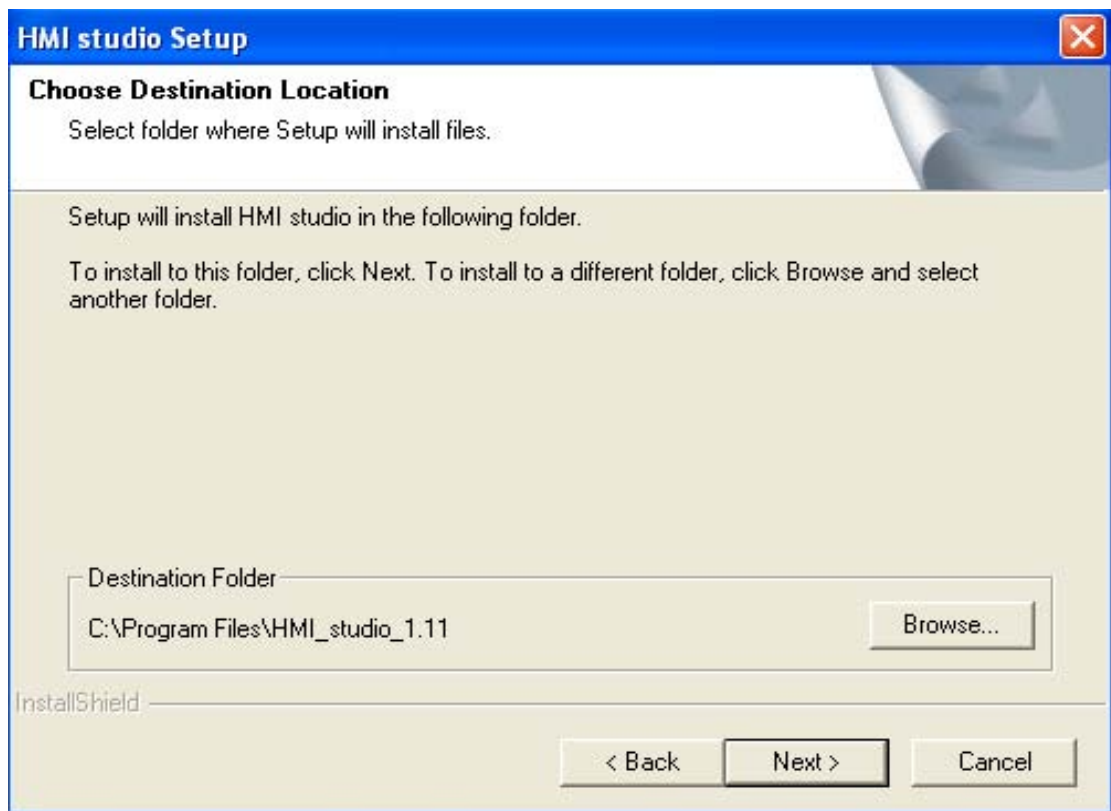
### 3. BEFORE YOU BEGIN

4. Enter user name and company name.



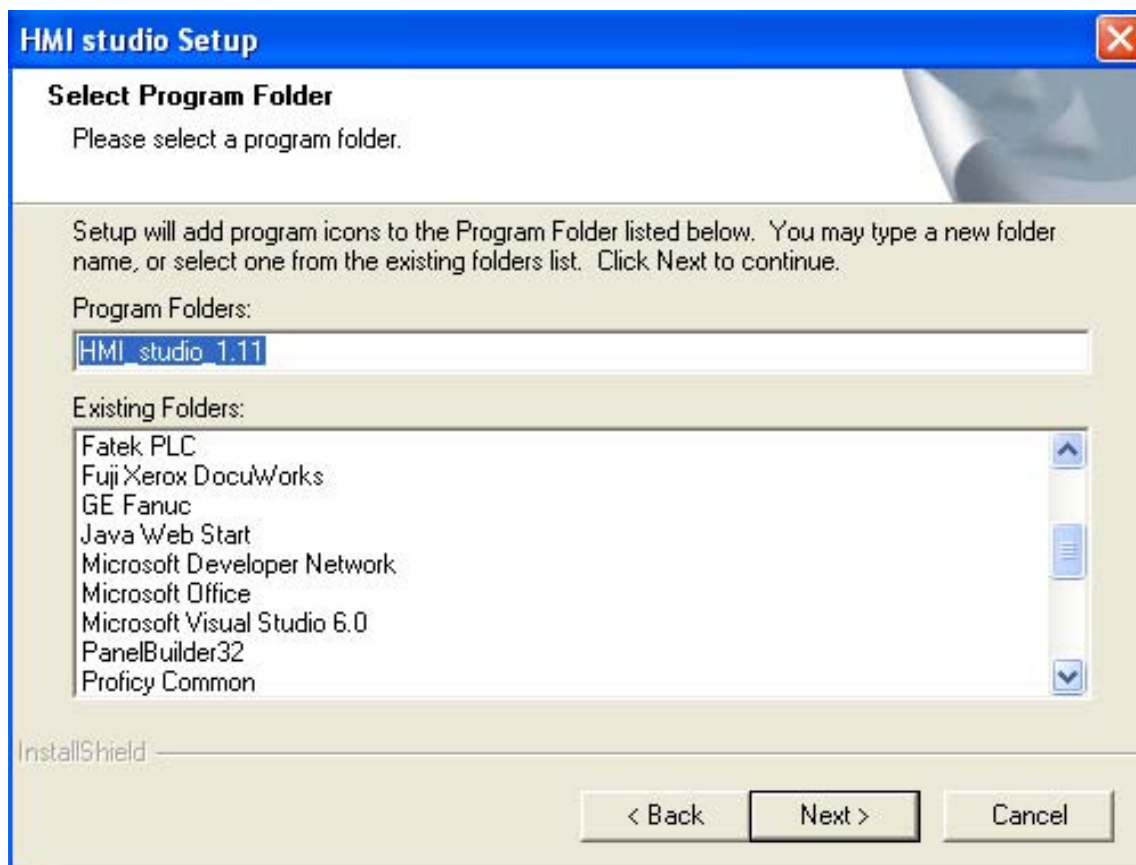
The screenshot shows the 'HMI studio Setup' window with the 'Customer Information' tab selected. The window has a blue title bar with a close button. The main area is light beige with a blue header bar. The text 'Please enter your information.' is displayed. Below it, there are three input fields: 'User Name' with the text 'John Brown', 'Company Name' with the text 'Integrated software Inc', and 'Serial Number' with the text '2100'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'InstallShield' logo is visible in the bottom left corner.

5. Select the destination folder where Setup will install the files.



The screenshot shows the 'HMI studio Setup' window with the 'Choose Destination Location' tab selected. The window has a blue title bar with a close button. The main area is light beige with a blue header bar. The text 'Select folder where Setup will install files.' is displayed. Below it, there is a text box that says 'Setup will install HMI studio in the following folder.' followed by 'To install to this folder, click Next. To install to a different folder, click Browse and select another folder.' Below this, there is a text box labeled 'Destination Folder' containing the path 'C:\Program Files\HMI\_studio\_1.11'. To the right of this text box is a 'Browse...' button. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'InstallShield' logo is visible in the bottom left corner.

### 3. BEFORE YOU BEGIN



6. Installation starts. A dialog box indicating the status of progress of installation will display. A screen is displayed to inform you when installation is completed. This procedure installs HMI Studio Software in Start Menu (in selected folder).

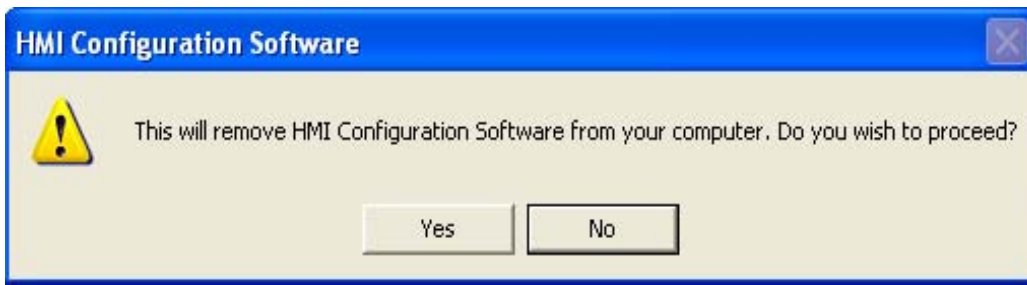
#### 3.2.2 Steps for starting HMI Studio Software

1. In Windows click the Start button.
2. Select Programs.
3. Select HMI\_Studio\_1.11.
4. Select HMI\_Studio\_1.11
5. Select New Application either from Tool station or from File Menu.
6. Select the model and product type that you would like to set by clicking on picture of the product in the list.
7. Define the Unit Settings and Network Configuration.
8. Next step is to define Tag Database and then define the screens according to your application.

#### 3.2.3 Uninstalling HMI Studio Software

1. In Windows click the Start button.
2. Select Programs.
3. Select HMI\_Studio\_1.11
4. Select Uninstall HMI\_Studio\_1.11.

Following screen will display. The screen will ask you for the confirmation for uninstalling HMI\_Studio



7. When you click Yes button, it will uninstall HMI studio configuration from your computer.

### 3.3 Setting Network Configuration

Unit can communicate with any PLC without any changes in the hardware. To communicate with PLC unit needs proper communication driver. Each PLC has a defined protocol for communicating with any device. PLC driver is downloaded into unit alongwith the firmware. This driver enables the unit to talk to a specific PLC.

Using this configuration screen you can set the node address (0 to 255), node name for each port. You can change default values generated by editing these two fields. Protocol selection box displays list of all supported PLCs. By clicking this selection box you can see list of Model Numbers in PLC Model selection Box. Select PLC Name from Protocol drop down list and PLC Model name from Model drop down list.

PLC specific data button is activated only if selected PLC has Special PLC specific data to be set.

Unit can be configured in following ways:

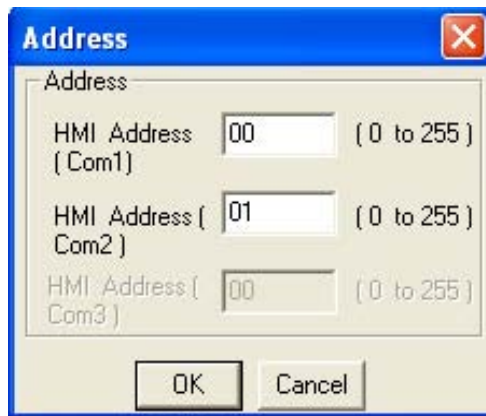
1. For IBM Communication
2. For Serial Printing
3. For PLC Communication

Either of the ports can be configured for the ways mentioned above. Depending on the type of communication, the user may be required to define certain parameters.

The following screen displays the number of nodes connected on COM1, COM2 and COM3 with their node addresses, node name, node type (unit/PLC) and total number of blocks used in application.

Network Configuration						
Node address			Name	HMI / PLC		Blocks
Com1	Com2	Ethernet				
000	001	----	Operator Panel	HMI 605		00028
001	----	----	Com1 : Node1	Allen Bradley DF1 ( MicroLogix (M1000) )		00000
----	002	----	Com2 : Node1	Siemens Step-7 Micro ( S7-200 212 )		00000

### 3. BEFORE YOU BEGIN

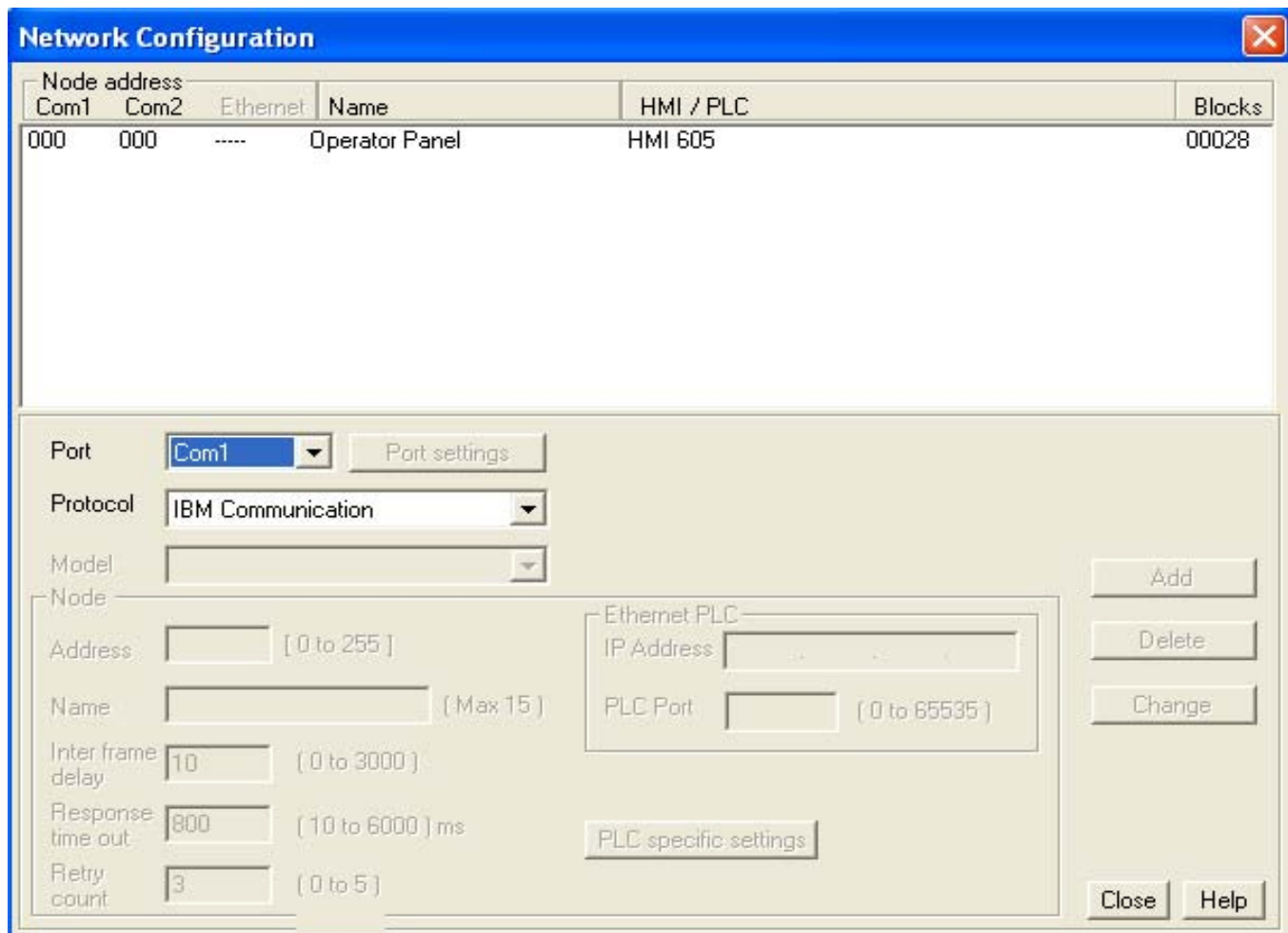


The Address dialog box is used to configure HMI addresses for different communication ports. It contains three input fields for HMI Address (Com1, Com2, Com3) and OK/Cancel buttons.

Address	
HMI Address (Com1)	00 (0 to 255)
HMI Address (Com2)	01 (0 to 255)
HMI Address (Com3)	00 (0 to 255)

**Note:** The HMI default unit address is 0 for COM1, COM2. If the default address of a PLC connected to COM1, COM2 is 0 then the HMI unit address must be changed to a nonzero number.

#### 1. For IBM Communication



The Network Configuration dialog box is used to configure network settings for the HMI. It includes a table for node addresses and a section for configuring the communication port and protocol.

Node address					
Com1	Com2	Ethernet	Name	HMI / PLC	Blocks
000	000	----	Operator Panel	HMI 605	00028

Port: Com1 (dropdown) Port settings (button)

Protocol: IBM Communication (dropdown)

Model: (dropdown)

Node:

Address: [0 to 255]

Name: (Max 15)

Inter frame delay: 10 (0 to 3000)

Response time out: 800 (10 to 6000) ms

Retry count: 3 (0 to 5)

Ethernet-PLC:

IP Address: [0 to 255].[0 to 255].[0 to 255].[0 to 255]

PLC Port: [0 to 65535]

PLC specific settings (button)

Add (button)

Delete (button)

Change (button)

Close (button) Help (button)

### 3. BEFORE YOU BEGIN

These are the default communication settings. If user wants IBM Communication, no other setting is required. In this case both communication ports can be used for downloading or uploading purpose.

#### 2. For Serial Printing

The image shows a 'Network Configuration' dialog box. At the top, there is a table with columns: Node address (Com1, Com2), Ethernet, Name, HMI / PLC, and Blocks. The first row shows '000' for Com1, '000' for Com2, '-----' for Ethernet, 'Operator Panel' for Name, 'HMI 605' for HMI / PLC, and '00028' for Blocks. Below the table, there are settings for 'Port' (set to 'Com1'), 'Protocol' (set to 'Serial printer'), and 'Model' (empty). To the right of these is a 'Port settings' button. Below the 'Port' section, there are fields for 'Node Address' (empty, range [0 to 255]), 'Name' (empty, range [Max 15]), 'Inter frame delay' (set to '10', range [0 to 3000]), 'Response time out' (set to '800', range [10 to 6000] ms), and 'Retry count' (set to '3', range [0 to 5]). To the right of these fields is a 'PLC specific settings' button. Further right, there is a section for 'Ethernet-PLC' with 'IP Address' (empty) and 'PLC Port' (empty, range [0 to 65535]). To the right of this section are 'Add', 'Delete', and 'Change' buttons. At the bottom right are 'Close' and 'Help' buttons.

Node address		Ethernet	Name	HMI / PLC	Blocks
Com1	Com2				
000	000	-----	Operator Panel	HMI 605	00028

Port:  Port settings

Protocol:

Model:

Node Address:  [ 0 to 255 ]

Name:  ( Max 15 )

Inter frame delay:  ( 0 to 3000 )

Response time out:  ( 10 to 6000 ) ms

Retry count:  ( 0 to 5 )

Ethernet-PLC

IP Address:

PLC Port:  ( 0 to 65535 )

PLC specific settings

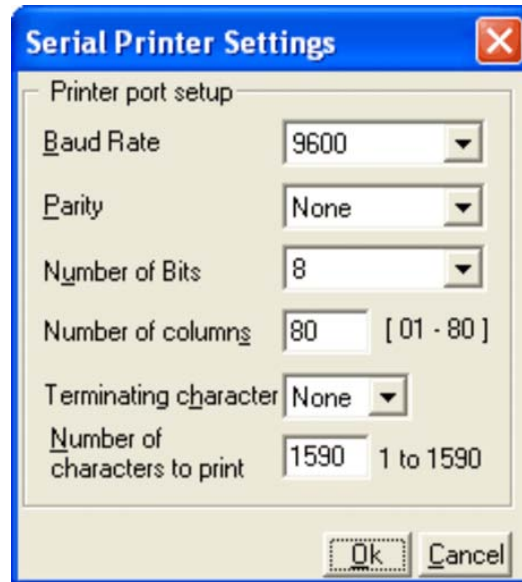
Add Delete Change

Close Help

The user can use either of the ports for serial printing. This is done by selecting Protocol as "Serial Printer". In the above example, the user has configured COM1 for serial printing. However, when this port is not being used for printing, it can be used for IBM communication.

The user can change the serial printing parameters by selecting the "Comm Settings" option.

### 3. BEFORE YOU BEGIN



The following parameters can be modified for serial printing:

Baud Rate: supported baud rates are 4800, 9600, 19.2K, 38.4K, 57.6K and 115.2K.

Parity: Parity can be None, Even or Odd.

Number of bits: Number of bits can be 7 or 8.

Number of Columns: Number of columns can be minimum 1 to maximum 255.

Terminating Character: Can be None, CR (Carriage Return), LF (Line Feed) or CR+LF.

Number of characters to print: Can be from minimum 1 to maximum 256.

Click Ok to set printer setting.

#### 3. For PLC Communication

**Network Configuration**

Node address		Ethernet	Name	HMI / PLC	Blocks
Com1	Com2				
000	000	----	Operator Panel	HMI 605	00028
----	001	----	Com2 : Node1	Allen Bradley DF1 ( MicroLogix (M1000) )	00000

Port:

Protocol:

Model:

Node

Address:  [ 0 to 255 ]

Name:  ( Max 15 )

Inter frame delay:  ( 0 to 3000 )

Response time out:  ( 10 to 6000 ) ms

Retry count:  ( 0 to 5 )

Ethernet PLC

IP Address:  . . .

PLC Port:  ( 0 to 65535 )

**1. Protocol** - User can select desired PLC from the list of available drivers. In the example shown above, user has selected Allen Bradley Micrologix 1000 series PLC at COM2 on DF1 Protocol.

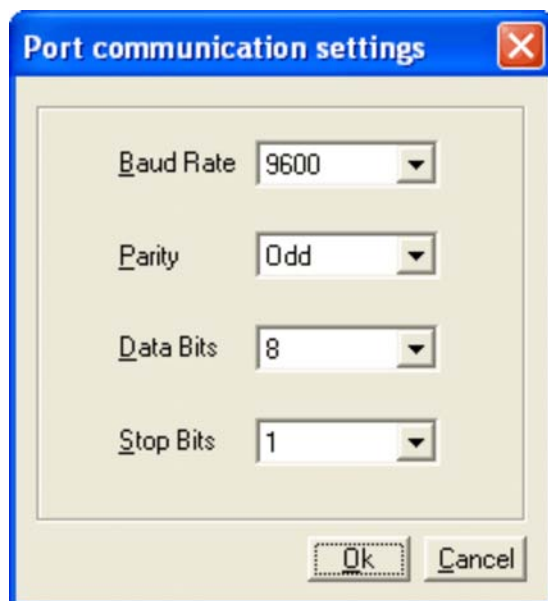
#### 2. Port Settings -

User can set PLC communication parameters like Baud Rate, Parity, Data Bits and Stop Bits.

Click Ok to set the parameters.



### 3. BEFORE YOU BEGIN



The PLC Communication parameters are:

- i. **Baud Rate:** Baud Rate is the measure of number of times per second a signal in a communication channel changes state. For HMI units, Baud rate are 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, 187.5K.
- ii. **Parity:** Parity bit is included to check that data has been transmitted accurately. Parity bits are None, Odd and Even.
- iii. **Data Bits:** Data bits are number of bits used to represent one character of data. Data bits are either 7 or 8.
- iv. **Stop Bits:** Stop bits are inserted into the data frame to inform the receiving end that the transmission of byte of data is complete. Stop bits are either 1 or 2.

**3. Model:** Select the desired PLC model from the drop down list. In the example shown above, the user selected the "Micrologix 1000" model.

**4. Address:** Enter a unique PLC node address ( 0 to 32)

**5. Name:** Specify a name for the node name up to 15 characters in length.

**6. Inter Frame Delay:** Inter Frame Delay is the delay between the response received of last query and the next query that is to be transmitted.

**7. Response timeout:** Response time out is the maximum time in which slave should respond to a master query. If slave does not respond to a master query within this time, the master will declare that the slave has been timed out.

**8. Retry Count:** Retrycount is the number of retry queries master will send to slave, if slave is timed out. When all retries are finished, the master will declare a communication break.

**9. Add Node:** This will add the node to the network.

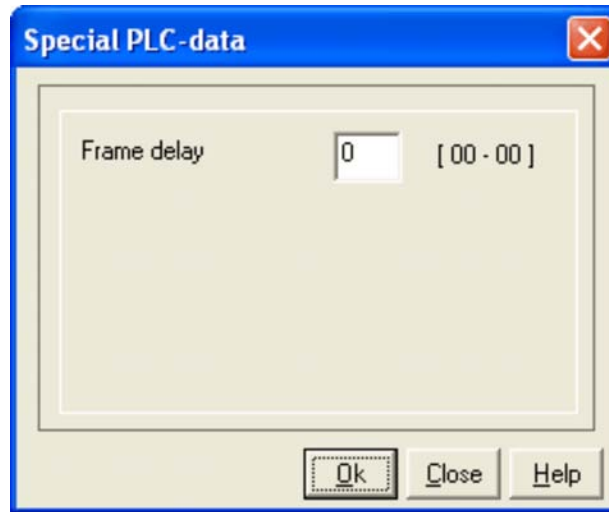
**10. Change Node:** The user can change PLC or PLC related information. This is done by highlighting the node, changing the information and finally clicking the button 'Change a Node'.



**11. PLC specific settings:** This screen is used to configure PLC Specific information. This field is applicable for the following protocols only.

1. Modbus Master
2. Aromat series PLCs.

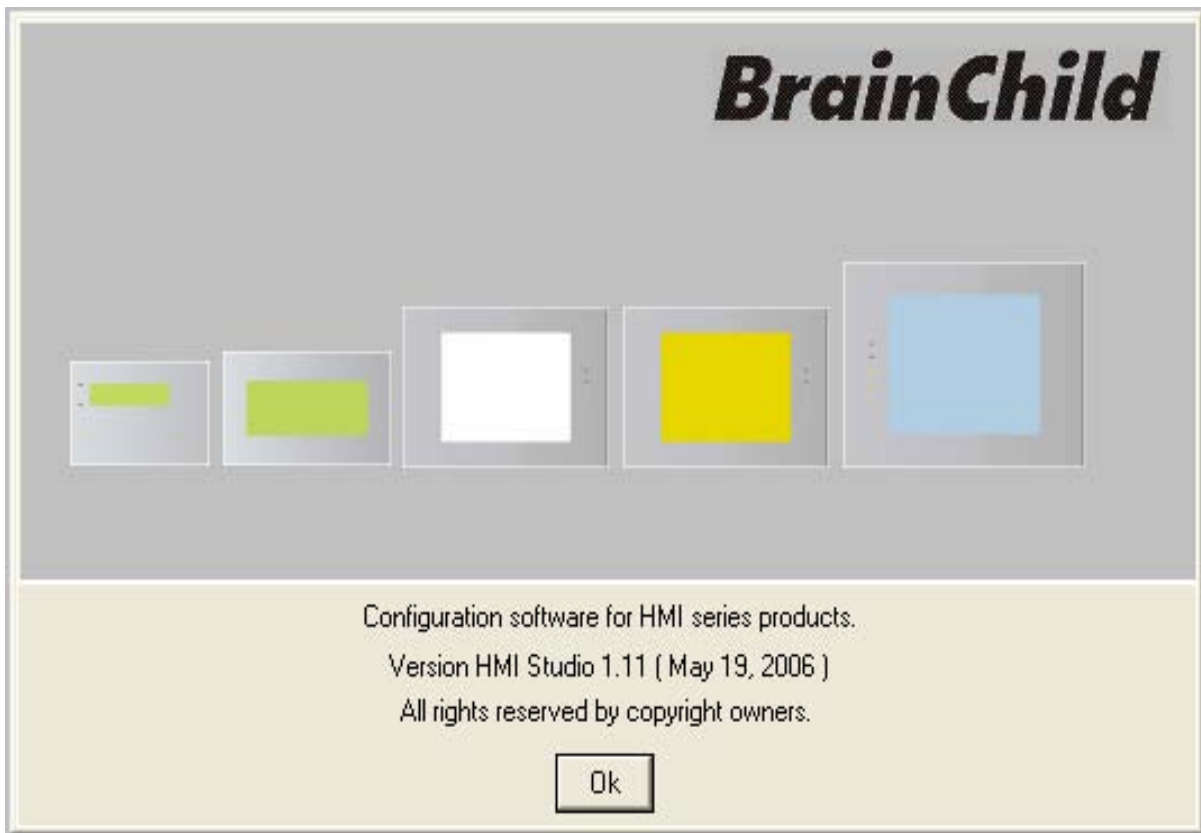
For this protocol Frame delay can be set using the screen as shown below.



## 4. USING HMI STUDIO SOFTWARE

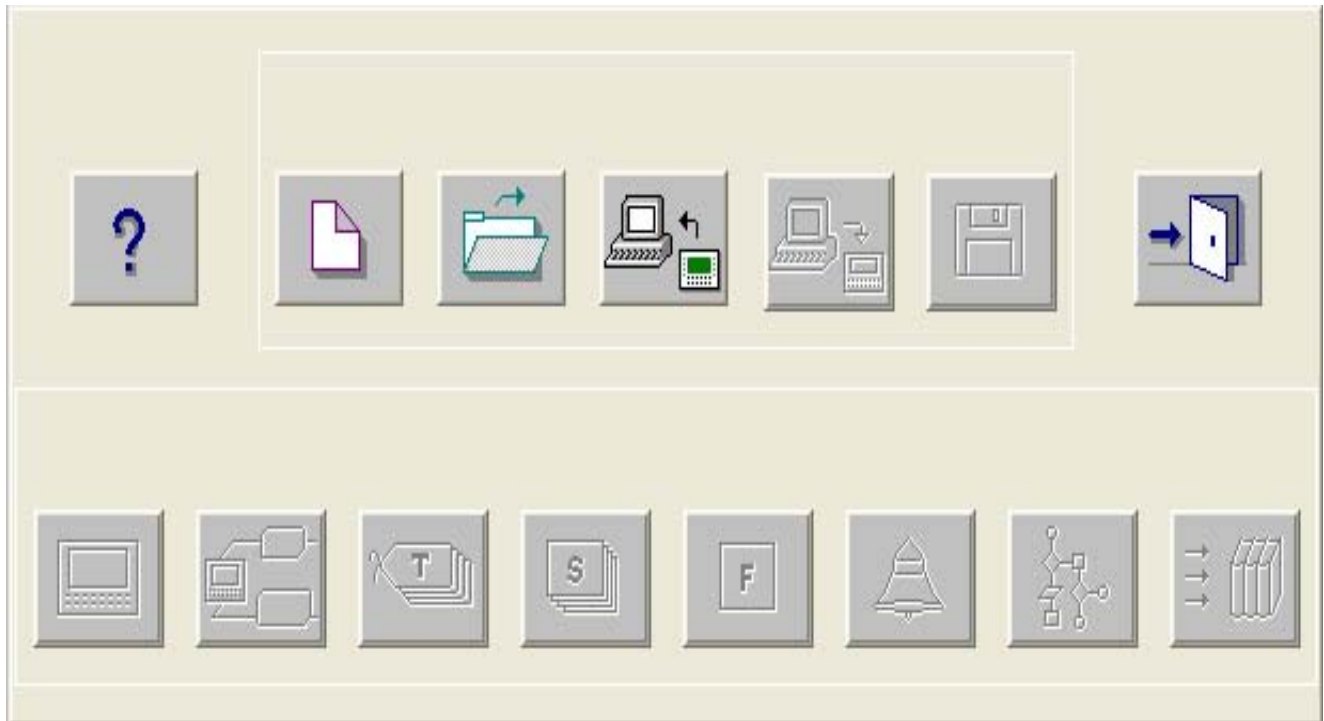
### 4.1 HMI Studio Menu Structure

From Windows Task Bar, click the **Start** button, point to HMI\_Studio\_ 1.11, and then click the HMI\_Studio\_1.11 program.



The program displays a splash screen at start-up. This dialog can be closed by pressing any key, a mouse click, or waiting 10 seconds for it to automatically go to the next screen (i.e. Toolstation).

## 4. USING HMI STUDIO SOFTWARE



The menu bar operates like any standard Windows Menu bar. To open a particular Menu, click it with the mouse or use key along with the **ALT** key. When no application is opened, the menu bar shown above will be displayed.



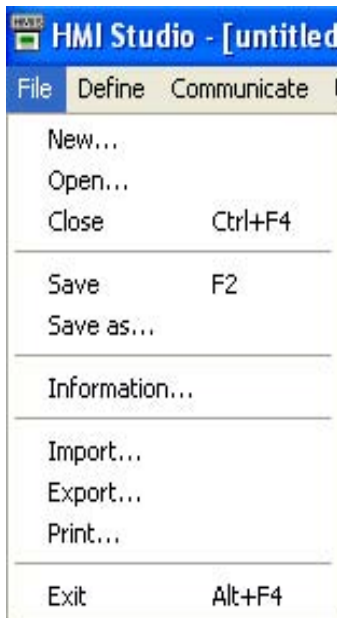
## 4. USING HMI STUDIO SOFTWARE

The Tool-Station consists of icons. When the mouse cursor rests over any icon, a tool-tip is displayed. Click on the icon to select the particular menu.

Now we will study the different Menus in the Menu Bar.

### 4.1.1 File Menu

The file menu handles file related functions including New Application, Close Application, Save Application, Print and Exit HMI studio. Selecting the Information option allows the user to set or change HMI application information such as application title, user name etc.



<b><u>N</u>ew</b>	-	Creates a new application.
<b><u>O</u>pen</b>	-	Opens a saved application.
<b>Clo<u>s</u>e</b>	-	Closes currently opened application.
<b><u>S</u>ave</b>	-	Saves currently opened application.
<b>Save <u>a</u>s</b>	-	Saves the current application with a different name.
<b><u>I</u>nformation</b>	-	Configures application specific information such as application title, author, password etc.
<b>Print<u>t</u></b>	-	Prints current application information such as Project information, Unit settings, nodes, tags, screens, application tasklist, screen tasklist, alarms either by selecting 'All' or selecting specific attributes.
<b>Import</b>	-	Imports all the text data associated with the wizards (on/off text, labels etc.).
<b>Export</b>	-	Exports the data from projects and put it into a user specified file.
<b>Ex<u>i</u>t</b>	-	Exits HMI studio Software.

### 4.1.2 Define Menu

This menu defines the application. In the main window of HMI Studio Software, bottom line of the icons is dedicated for this menu.

Define	Communicate	Utilities	Help
Unit Settings...			F3
Network Configuration...			F4
Tag database...			F5
Screens...			F6
Global Keys...			F7
Alarms...			F8
Application Tasklists...			F9
Ladder Logic Block...			F10
High speed interrupt...			F11
High speed Timer...			
Data Logger...			
Configure PID Block...			
16-Point Linearization...			
Time Proportional PWM Configuration...			
Pulse Output...			
Analog Configuration...			
Analog Totalizer...			
Hide Project Tools			F12

- Unit Settings - Shows the unit's settings. Normally there is no need to change these settings.
- N**etwork Configuration - Defines PLC node, node ID etc.
- T**ag Database - Defines tags to be used in the application.
- S**creens - Defines screens.
- Global **K**eys - Defines global keys.

## 4. USING HMI STUDIO SOFTWARE

<b>A</b> larms	-	Defines alarms in the application.
App <b>l</b> ication Task-List	-	Defines Power-on and Global Tasklist.
Ladder Logic Block	-	Used for development of ladder block.
High Speed Interrupt	-	Used for applications like Rate Measurement, Totalizer.
High Speed Timer	-	Allows ladder program to be executed in parallel to main program.
Data Logger	-	Used to record the information about the surrounding environment.
Configure PID Block	-	Used as feedback controller in process and control applications.
16-Point Linearization	-	Used to linearize a nonlinear variable.
PWM Configuration	-	Used to encode analog output to digital signals.
Pulse Output	-	Used for motion control applications.
Analog Configuration	-	Used for selection of analog input and output channels.
Analog Totalizer fluid.	-	Used mostly with Flow transmitters which gives analog value proportional to flow of fluid.
Hide Project Tools	-	When enabled project toolbar is disabled. By default, project toolbar is enabled.

### 4.1.3 Communicate Menu



Communication <b>P</b> ort	-	Sets COM port for communicating with HMI
<b>D</b> ownload	-	Downloads Application to HMI Unit.
<b>U</b> pload	-	Uploads Application from HMI Unit.
Ethernet Settings	-	Applicable to only HMI 1205. Used to set the Ethernet port.
Communication Mode	-	Applicable to only HMI 1205. Used to set the Communication mode.

### 4.1.4 Utilities Menu

Utilities Menu informs the user about the memory used for the application. This menu has other options like Font Editor, image conversion, clear picture library and load default fonts.

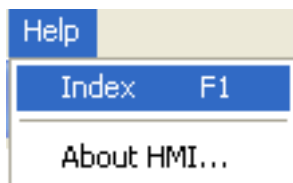


On Line Ladder Monitor	-	Displays statistics of the memory used by the current application.
On Line Screen Monitor	-	Displays statistics of the memory used by the current application.
Display Logged Data	-	Displays the logged data in the Prizm memory.
<b>F</b> ont Editor	-	User can edit the fonts by the Font Editor utility.
Image Conversion to bitmap	-	Converts images from any type of picture format to bitmaps.
<b>HMI</b> Memory status	-	Displays statistics of the memory used by the current application.
<b>C</b> lear Picture Library	-	User can clear the picture library. Close the applications before clearing Picture library.
Convert Application	-	Allows to convert the application of one product to the other product.

## 4. USING HMI STUDIO SOFTWARE

### 4.1.5 Help Menu

The Help menu offers help programming assistance and information about the Prizm version.



**I**ndex - Lists all of the Help topics

**A**bout Prizm Software - Displays the software version number and date.

### 4.2 Creating New Application

A User can create a new application either from Menu Bar or from Tool Bar.

- ♦ Creating a New Application from Menu Bar:  
To create a New Application either choose **File | New** menu option or click on **New Application** icon from Tool-bar.



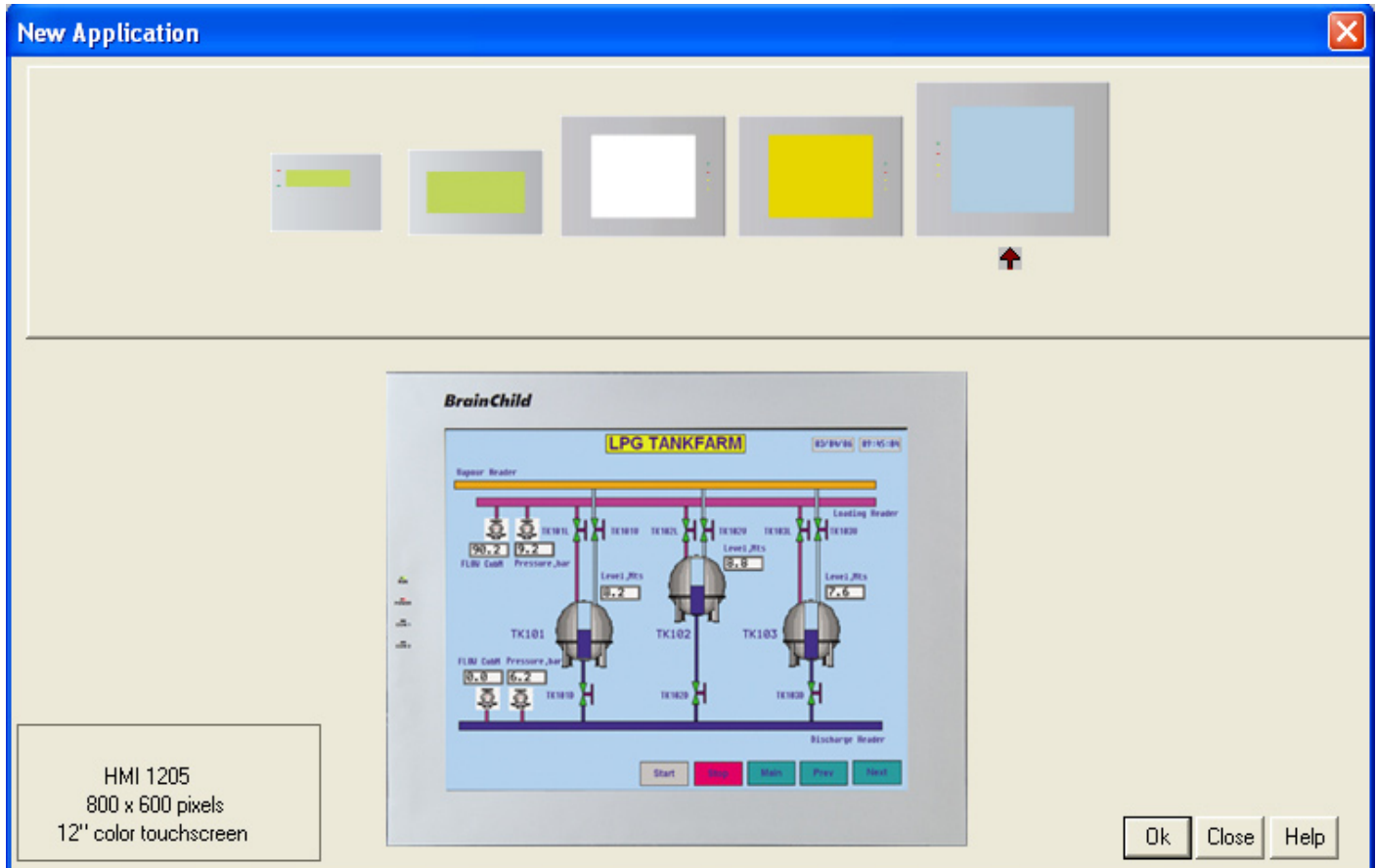
OR



The following screen will appear.



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This screen shows a list of all HMI units. Select the product to be programmed by clicking on the picture of the product in the list. An enlarged picture of the product is also shown below the list.

On clicking Ok button product type selection screen is displayed -



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### Tag Database

This is the central database for the tags that need to be used in the application. Once the tags are defined (as register or coils) and their attributes selected, the tags can be used in the application on screens, tasks, alarms etc. This screen helps you to define Tags associated with defined Nodes. A tag is a register, coil or an individual bit of a register. Select the type of tag from the Tag Type field.

If the type of tag selected is a register then the number of bytes required can also be selected. For displaying or editing a floating point data number, the number of bytes must be 4. The Tag Name field is user definable. A tag is not added to the tag list unless a tag name is defined. Once these fields are defined, click on the Add button. The Block field in the tag database defines the starting address of the tag block followed by the block size.

For example : Tag M0214 is within a block ( M0214 : 1 ) whose starting address is M0214 and block size is 1.

This block size is optimized automatically depending on the address of PLC Tag.

Default block size is either 1 or 16. This setting varies from PLC to PLC.

The attributes of existing tag can be changed by highlighting the tag, making the changes, and clicking the Change Tag button. An existing tag can be removed from tag list by clicking on Delete Tag button. Note that removal of tags is possible only if they are not used in any screen.

The screenshot shows the 'Tags' window in HMI Studio. It contains a table of existing tags and a configuration panel for adding or modifying a tag.

No	Port	Node	Block	Tag	Byte(s)	Tag-Name
00001	00	000	S0001 : 001	S0001	2	Language
00002	00	000	S0002 : 001	S0002	2	Logger memory status
00003	00	000	S0003 : 001	S0003_00	-	Logger memory full status
00004	00	000	S0003 : 001	S0003_01	-	Logger memory clear status
00005	00	000	S0003 : 001	S0003_02	-	RTC Fail
00006	00	000	S0003 : 001	S0003_03	-	Invalid Max/Min Limits
00007	00	000	S0003 : 001	S0003_14	-	Comm1 status
00008	00	000	S0003 : 001	S0003_15	-	Comm2 status
00009	00	000	S0004 : 001	S0004	2	Number of Historical Alarms
00010	00	000	S0005 : 001	S0005	2	Screen trigger register
00011	00	000	S0006 : 001	S0006	2	Screen saver time
00012	00	000	S0010 : 001	S0010	2	RTC Date

Configuration panel:

- Node: [ 000 : Operator Panel ] HMI-unit
- Tag-Type: ☐ Register ☒ Coil or Bit-address
- Size: 1 bit [0000 - 0099]
- Coil: s0000 [0000]
- Tag-Name: [ ] (Max 40 chars)
- Byte(s): [ ]
- Read - Write: ☐ Read ☒ Write

Buttons: Close, Help, Delete, Add, Change, Cancel

## 4. USING HMI STUDIO SOFTWARE

**Add** - Use this button to add a tag. Before clicking this button, the user has to define the following:

1. Node : Where the tag is located.
2. Register, coil or a bit within a register. Registers can be read only or read/write.  
The address limits are shown and vary from PLC model to model.
4. Tag name : Each tag needs to have a unique name. The name can be up to 40 characters in length.
5. Byte(s) : If the selected tag is a register, the tag can be defined as a 1 byte ( either high or low byte), a 2 byte, or a 4 byte tag.

**Change** – Select the tag. Change the information and then click on the Change button.

**Delete** - Select the tag and click on Delete button to delete the tag. Before deleting any tag, the user must delete any references to the tag in screens and tasks. Otherwise it can not be deleted.

### Default System Tags

Note: Please do not attempt to modify read only system tags in the ladder. This could affect the functionality of the product.

#### 1. System Registers

Register/Coil	Tag Name	Read / Write	Description
S0001	Language	Read / Write	Writing the value will change languages used in any wizard
S0002	Logger memory Status	Read Only	Shows the percentage usage of status logger memory. ( 0 to 100 )
S0003_14	Comm1 status	Read Only	0 = Communication Error 1 = Communicating with PLC
S0003_15	Comm2 status	Read Only	0 = Communication Error 1 = Communicating with PLC
S0003_00	Logger memory full status	Read Only	1 = memory full
S0003_01	Logger memory clear status	Read Only	1 = memory clear routine being executed
S0003_02	RTC fail	Read Only	RTC fail
S0003_03	Invalid max/min limits	Read Only	Invalid indirect values entered for wizard
S0004	Number of Historical	Read Only	Shows no of alarms, stored in history
S0005	Screen Trigger	Read / Write	Shows the active screen no. Writing to this register changes which screen is active. Invalid values result in a "Screen Not Defined" message

## 4. USING HMI STUDIO SOFTWARE

Register/Coil	Tag Name	Read / Write	Description
S0006	Screen Saver Time	Read / Write	Time (in seconds) before the screen saver is activated
S0007	Battery voltage	Read Only	Indicates Battery voltages in ## format.
S0010	RTC Day	Read Only	RTC Day in integer format
S0011	RTC Month	Read Only	RTC Month in integer format.
S0012	RTC Year	Read Only	RTC Year in integer format.
S0013	RTC Hour	Read Only	RTC Hour in integer format.
S0014	RTC Minute	Read Only	RTC Minute in integer format.
S0015	RTC Second	Read Only	RTC Second in integer format.
S0016	RTC Day Of week	Read Only	RTC Day of Week in integer format.
S0017	Scan time Register	Read Only	Shows time required to execute Screen, Screen task and Global task in millisecond Use #####.## format for display.

**Note:** S0018 To S0063 are reserved for future use.

### System Coils:

Coil	Tag Name	Read / Write	Description
s0000	Carry Bit	Read Only	Used to store the carry generated during bit wise operation.
s0001	High Speed Timer Control bit	Read / Write	Enable High speed timer through Ladder.
s0003	Minute change pulse	Read Only	1 for every change in minute for one scan cycle.
s0004	Hour change pulse	Read Only	1 for every change in hour for one scan cycle.

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Coil	Tag Name	Read / Write	Description
s0005	Date change pulse	Read Only	1 for every change in date for one scan cycle.
s0006	Month change pulse	Read Only	1 for every change in Month for one scan cycle.
s0007	Year change pulse	Read Only	1 for every change in year for one scan cycle.
s0008	Screen Saver control	Read / Write	0: Disable screensaver 1: Enable screensaver Run Time you can change this bit.
s0009	Beeper On/Off	Read / Write	0: Disable Beeper 1: Enable Beeper Run Time you can change this bit.
s0010	Battery Status	Read Only	0: Battery voltage is OK (above 2.2V) 1: Low Battery( below 2.2V)
s0014	Acknowledge all alarms.	Read Only	0: All alarms are acknowledged 1: All alarms are not acknowledged in the Real and Historical alarms
s0016	Valid key beeper On/Off	Read / Write	1: Enable valid Beeper. 0: Disable valid Beeper Run time you can change this bit.
s0017	Invalid key beeper On/Off	Read / Write	1: Enable Invalid Beeper. 0: Disable Invalid Beeper Run time you can change this bit

**Note:** s0018 - s0099 are reserved for future use.

## 4. USING HMI STUDIO SOFTWARE

### Unit Memory Configuration:

Data Type	Size	Register / Coil	Length	Type	Description
Data Register	D0000-D0999	Register	1,2,4 Bytes	Read / Write	General Purpose Register
Retentive Register	R0000-R01999	Register	1,2,4 Bytes	Read / Write	Nonvolatile registers for storage
System Register	S0000-S0063	Register	1,2,4 Bytes	Varies*	Status and Control Register for unit
System Coil	s0000-s0099	Coil	1 bit	Varies*	Status and control coil for unit
Internal Coil	B0000-B4999	Coil	1 bit	Read / Write	General purpose Internal coils
Input Coil	X0000-X0099	Coil	1 bit	Read Only	Physical input coils
Output Coil	Y0000-Y0099	Coil	1 bit	Read / Write	Physical Output coils
Internal Register	J000-J0312	Register	2Bytes	Read / Write	Each internal register is mapped with Internal coil(B0 to B15)
Input Register	U0000-U0006	Register	2Bytes	Read Only	Each input register is mapped with Input coil (X0-X15).
Output Register	L0000-L0006	Register	2Bytes	Read / Write	Each output register is mapped with output coils(Y0-Y15)
Timer Register	T0000-T0127	Register	2Bytes	Read / Write	Timer Register
Counter Register	C0000-C0177	Register	4Bytes	Read / Write	Counter Registers. Counters 0-127 are Non-Retentive registers and counters 128-177 are Battery Backed Retentive registers.

\* See System tables.

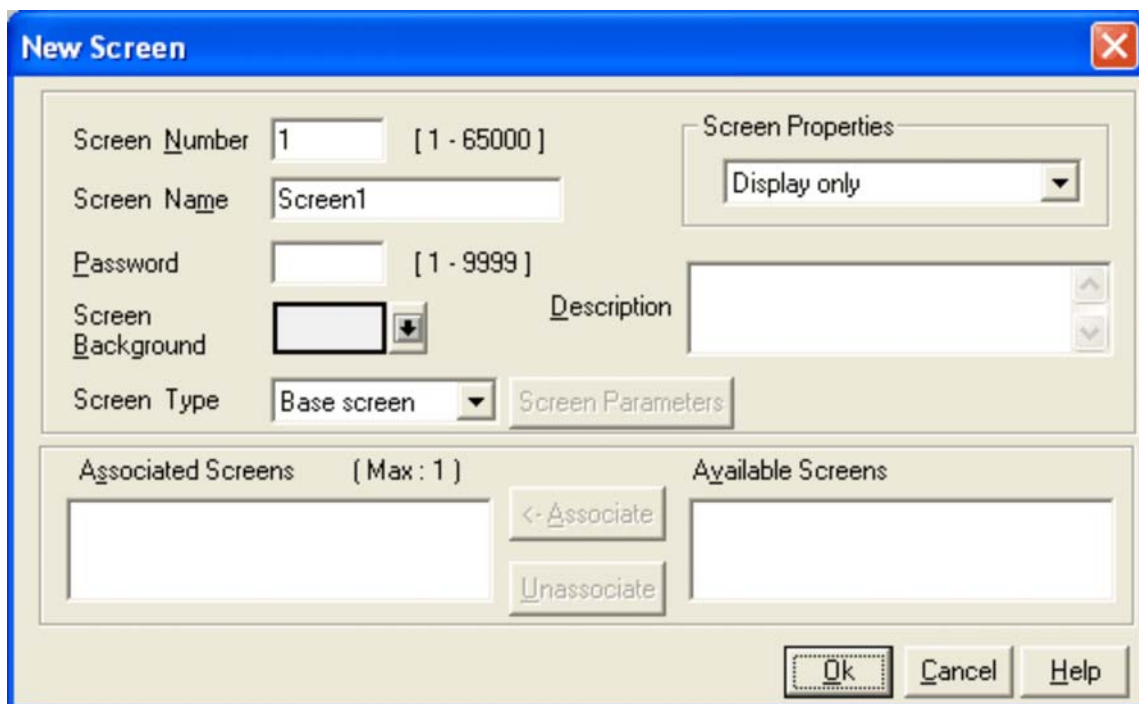
### 4.3 Creating Screens

Screens are the most important part of any application as it displays the information required by the operator. HMI Studio has various objects to make a screen operator-friendly. Click on the Screens icon to define screens.



In the Screens dialog box, enter the screen number, name and password. Select screen properties and screen type.

**Screen Number** : Screen number can be from 1 to 65000. The screen number is unique.  
**Screen Name** : Screen name can be up to 20 characters. It is displayed only in software configuration.  
**Password** : User can protect screen information by giving password to the screen. User can assign any number from 1 to 9999 as screen password.



The 'New Screen' dialog box is shown with the following fields and controls:

- Screen Number**: Text box with '1' and range '[ 1 - 65000 ]'.
- Screen Name**: Text box with 'Screen1'.
- Password**: Text box with range '[ 1 - 9999 ]'.
- Screen Background**: Color selection box with a dropdown arrow.
- Screen Type**: Dropdown menu set to 'Base screen'.
- Screen Properties**: Dropdown menu set to 'Display only'.
- Description**: Large text area.
- Associated Screens**: List box with '( Max : 1 )' and buttons '<- Associate' and 'Unassociate'.
- Available Screens**: Empty list box.
- Buttons**: 'Ok', 'Cancel', and 'Help' at the bottom right.

**Screen Properties** - Screen properties are following:

- Display only** : If the screen property is 'Display only' then the screen information is displayed on LCD.
- Print Only** : Screen, having this property, will not be displayed. Alphanumeric data on the screen goes to serial printer only once and control jumps back to last displayed screen. If user wants to print the data, he has to define the port as 'Serial Printer' port. Either of the ports can be configured for printing. When the print screen is activated, the print data will be sent from the printer port.
- Print Once / display** : If the property of the screen is Print Once / display, first all the Alphanumeric data on the screen goes to serial printer and then the screen is displayed on LCD. If user wants to print the data, he has to define the port as 'Serial Printer' port. Either of the ports can be configured for printing. When the print screen is activated, the print data will be sent from the printer port.

## 4. USING HMI STUDIO SOFTWARE

**Description :** The user can include information about the screen for his reference. This description is only for software configuration and it is not displayed on unit.

**Associated Screens:** An associated screen is useful where one or more objects are common to different screen. The common data is placed in a screen. This screen is associated to other screens.

Advantages of using associated screens -

1. It saves application memory.
2. It saves time of the application programmer.

Notes: 1. Only one screen can be associated to another screen.  
2. No data entry objects can be placed in the screen to be associated.  
3. Executing a PLC task is not supported in the associated screen.

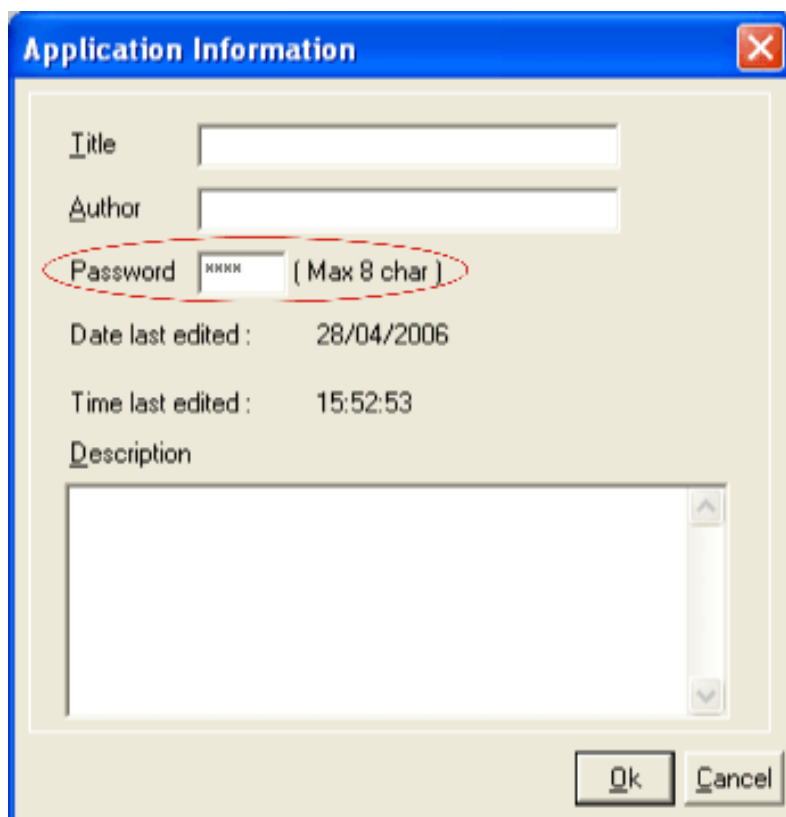
User can 'unassociate' a screen.

**Available Screens** - List of available screens is displayed.

Click 'Ok' button to edit screen.

### 4.3.1 Protecting HMI Application

For the purpose of security, HMI application can be password protected. To make application password protected, define password in application information screen as shown below. Select the **File | Information** menu option and following screen will appear.



The screenshot shows the 'Application Information' dialog box. The 'Password' field is highlighted with a red dashed oval and includes the text '( Max 8 char )'. The 'Date last edited' is 28/04/2006 and the 'Time last edited' is 15:52:53. The 'Description' field is a large text area. The 'Ok' and 'Cancel' buttons are at the bottom right.



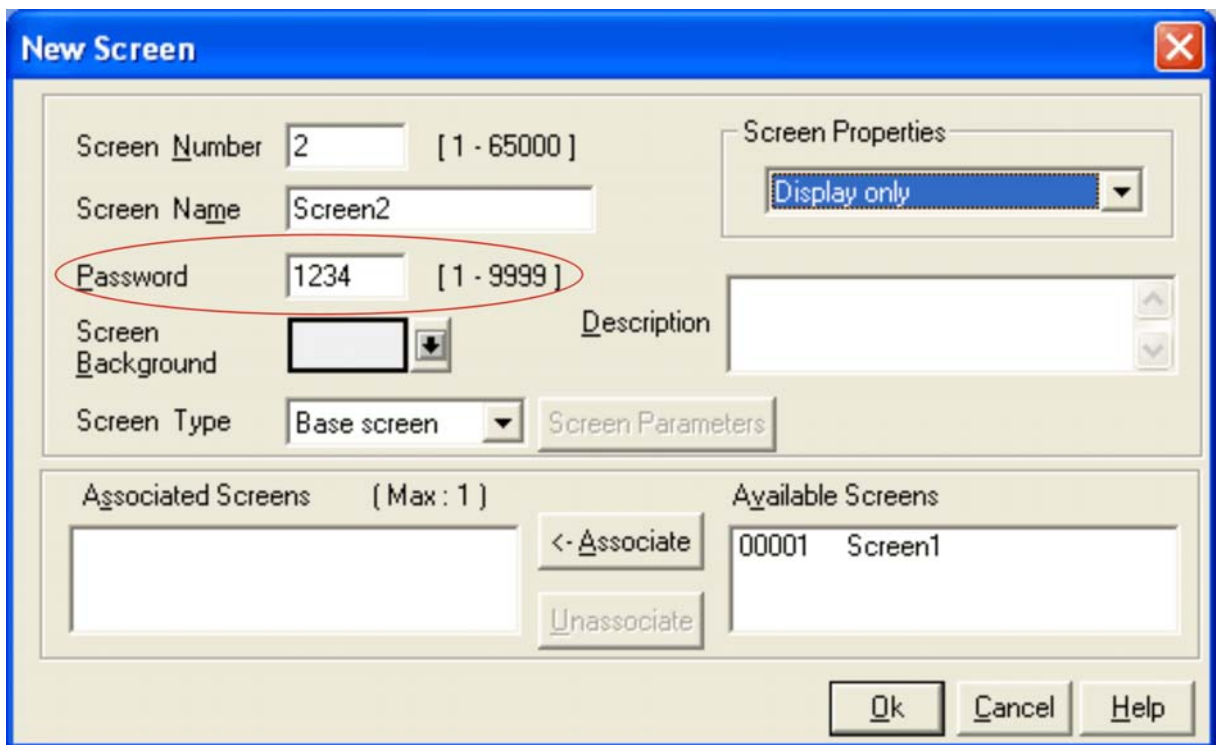
## 4. USING HMI STUDIO SOFTWARE

Define password for application and download or save the application. Following screen will appear either during uploading an application or during opening an application.



### 4.3.2 Protecting HMI Screen

User can also protect a screen by providing screen password in the screen information screen. When user selects a new screen, screen password can be entered in the Password field as shown below.



## 4. USING HMI STUDIO SOFTWARE

When user downloads an application and when he opens the screen with password, software will first ask for the password.

### 4.4 Data Entry Object

Any register or coil from the unit or PLC memory, except Read-only registers and coils, can be edited using the numeric keypad.

Procedure -

1. Click on the Data Entry button from objects toolbar.
2. The mouse pointer will change to the tool shape. Now place the mouse pointer at desired location and click the left mouse button. The data entry dialog box will appear.

Data Entry objects are explained in detail in chapter 5.

### 4.5 Display Data Object

This object is used to display the contents of the register or coil.

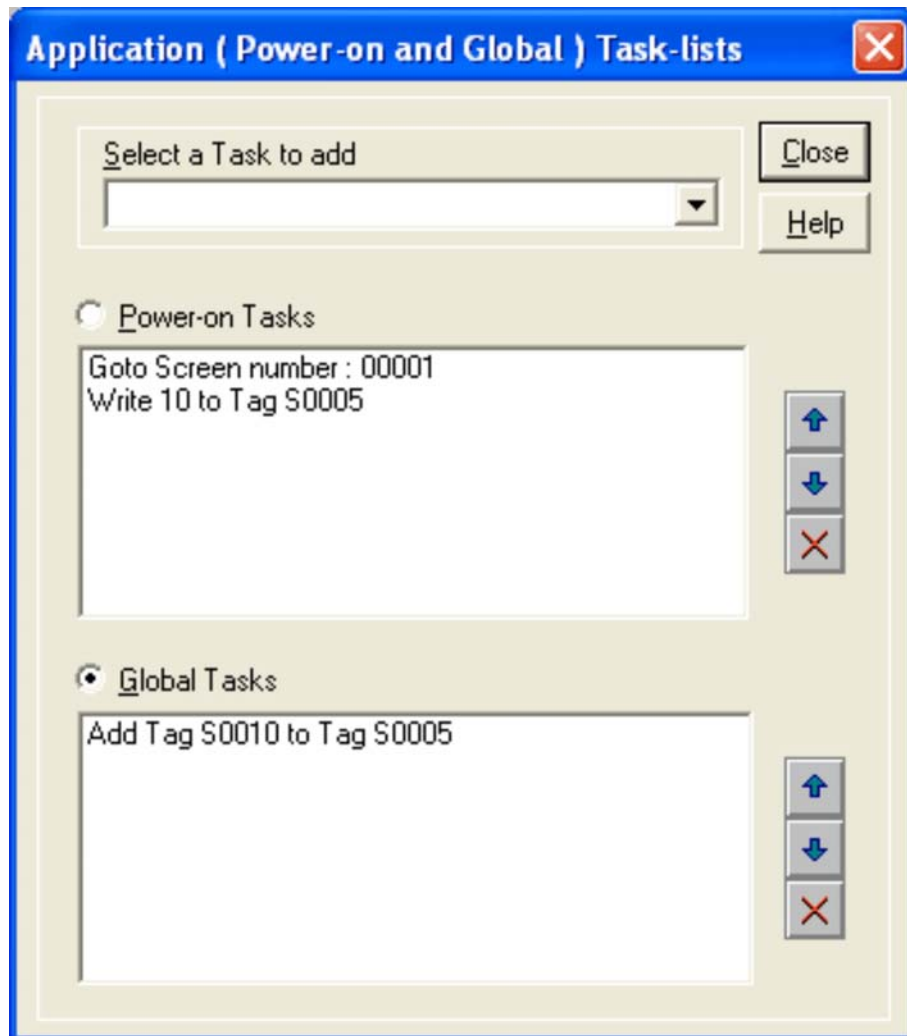
Procedure-

1. Click on 'Display Data' from objects toolbar. The mouse pointer will change to the tool shape.
2. Now place the mouse pointer at desired location and click the left mouse button. The data entry dialog box will appear.

Display data object is explained in detail in chapter 5.

### 4.6 Global And Power On Task

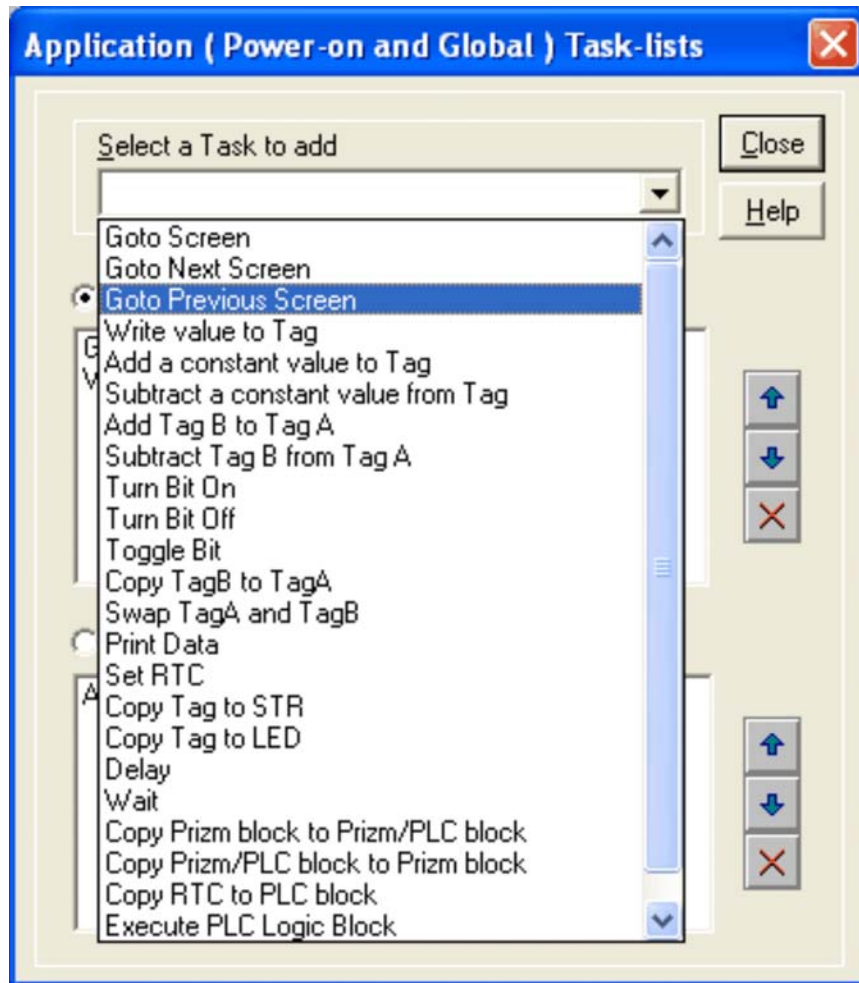
1. **Power-on Tasks** - Tasks specified in this task list are executed only once when the unit is powered on.
2. **Global Tasks** - Tasks specified in the global task list execute continuously as long as the unit has power.



## 4. USING HMI STUDIO SOFTWARE

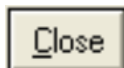
### Select a Task to add

This drop down list allows the user to select a task to be executed. A task list may contain multiple tasks.



Functions of the buttons:

**Close**



-

Accepts selected task.

**Up arrow**



-

Shifts selected task upwards.

**Down arrow**



-

Shifts selected task downwards.

**Delete**



-

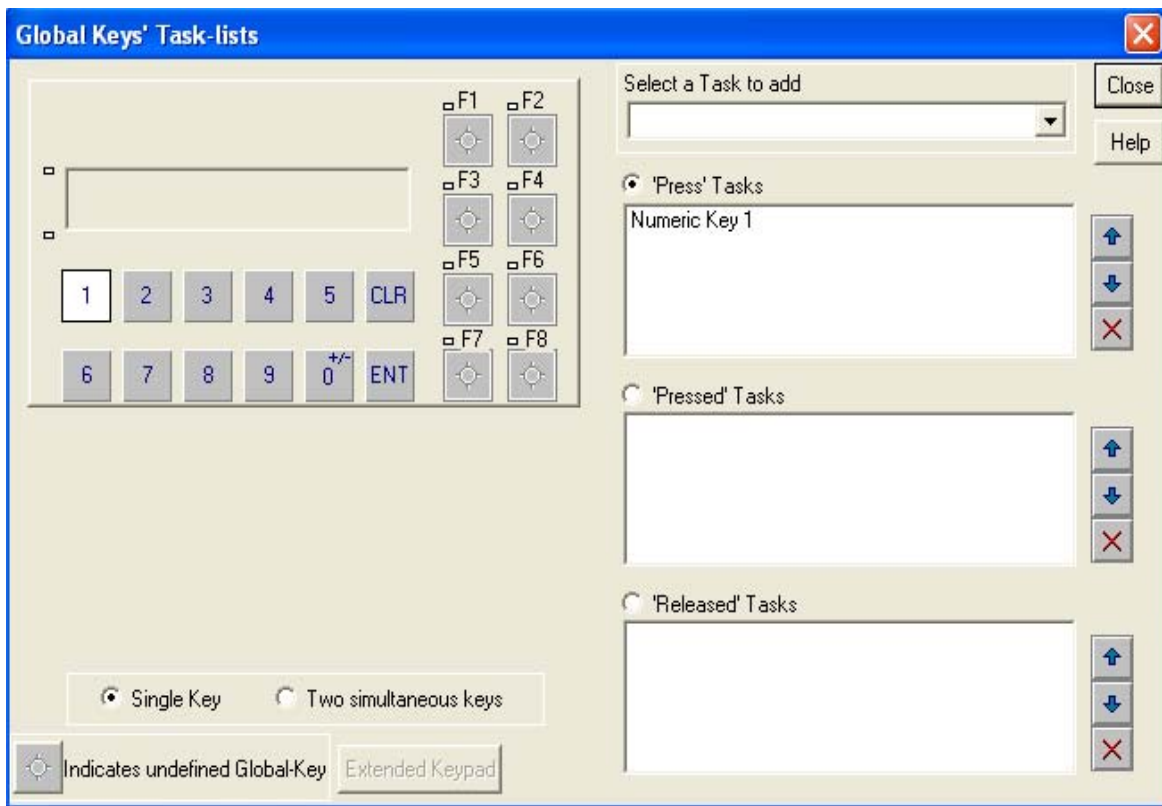
Deleted selected task.

### 4.7 Global Keys

Define tasks for these key events -

- |                       |   |  |
|-----------------------|---|--|
| <b>Press Tasks</b>    | – | These tasks are performed only once when the key is pressed. |
| <b>Pressed Tasks</b>  | – | These tasks are performed as long as the key is pressed.     |
| <b>Released Tasks</b> | – | These tasks are performed when the key is released.          |

Tasks defined for Global Keys are executed for whole application, independent of which screen is being displayed.

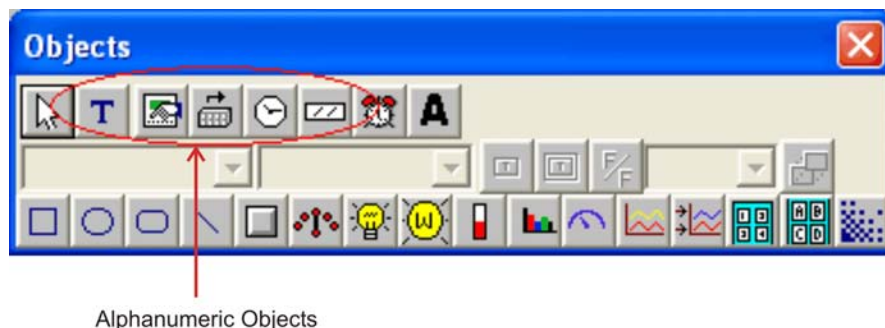


- |                              |   |   |
|------------------------------|---|---|
| <b>Single Key</b>            | - | If this option is selected, a task is defined to one key.                   |
| <b>Two simultaneous keys</b> | - | If this option is selected, a task is defined to a combination of two keys. |

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.1 Alphanumeric Objects

Alphanumeric objects are text objects with certain properties or attributes. By using various attributes, the designer can emphasize the importance of a particular text object. The alphanumeric objects in models with a graphics display have some additional attributes.



Alphanumeric Objects Types:

1. Text Object
2. Data Entry
3. Display Data
4. Time
5. Date

#### 5.1.1 Text Object

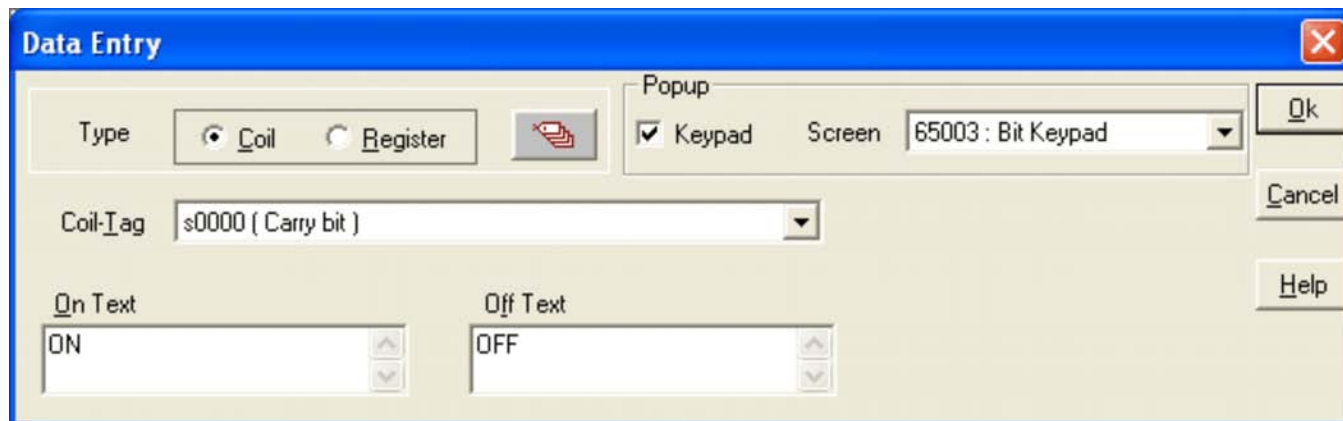
Text object is useful for displaying any message for the operator. Plain text objects do not depend on the PLC.

##### ◆ Procedure

1. Click on the Text button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
2. Now place the mouse pointer at the desired location and mark the area of the text object while holding the left mouse button.
3. A block cursor will blink at the location inside the text outline. Enter the text. The last character will be overwritten if insert mode (Computer Keyboard) is disabled. If it is enabled, the new character will not be accepted.

#### 5.1.2 Data Entry Object

Any read/write register or coil from the unit or PLC memory can be edited using the numeric keypad.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

Select either a Coil or Register data entry type. Coil data entry is selected by default.

1. **Coil-Tag:** Select Coil tag from the list.
2. **On Text:** Enter On text maximum up to 40 characters.
3. **Off Text:** Enter Off text maximum up to 40 characters.
4. **Popup:** To enter data with popup keypad in a touch screen unit, the designer has to select the keypad check box and the popup screen number to be used. If popup data entry is not desired, then a static numeric keypad object needs to be added to the screen .

To edit a register, select **Register Data Entry** .

The screenshot shows the 'Data Entry' dialog box with the following details:

- Type:** Radio buttons for 'Coil' and 'Register' (selected).
- Popup:** Check box for 'Keypad' (checked), and a dropdown for 'Screen' set to '65001 : Numeric Keypad'.
- Register-Tag:** Text field containing 'S0001 ( Language )'.
- Data Type:** Dropdown set to 'Unsigned integer'.
- Format:** Dropdown set to '#####'.
- Low-limit:** Text field containing '0'.
- High-limit:** Text field containing '65535'.
- 1st-operation:** Calculator keypad (NOP, +, -, \*, /) and a range field '[ 0 to 65535 ]'.
- 2nd-operation:** Calculator keypad (NOP, +, -, \*, /) and a range field '[ 0 to 65535 ]'.
- Buttons:** 'Ok', 'Cancel', and 'Help' on the right side.

Register Data Entry dialog box is used to program the following:

1. **Register-Tag:** This is a list of tags available in the application. The list will not display any read only registers that can not be modified.
2. **Data Type:** This selects the type of data to be entered. Choices are Unsigned Integer, Signed Integer, Hexadecimal, BCD, Binary (1 word), Float and ASCII.
3. **Format:** Determines the format of the data to be displayed.
4. **Low-limit:** Data entered can be limited by assigning Low limit.
5. **High-limit:** Data entered can be limited by assigning High limit.
6. **1st-operation:** The designer can have a math operations performed on the data. The default selection is NOP or no operation.
7. **2nd- operation:** The designer can have a math operations performed on the data. The default selection is NOP or no operation.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

8. **Popup:** To enter data with popup keypad in a touch screen unit, the designer has to select the keypad check box and the popup screen number to use. If popup data entry is not desired, then a static numeric keypad object needs to be added to the screen .

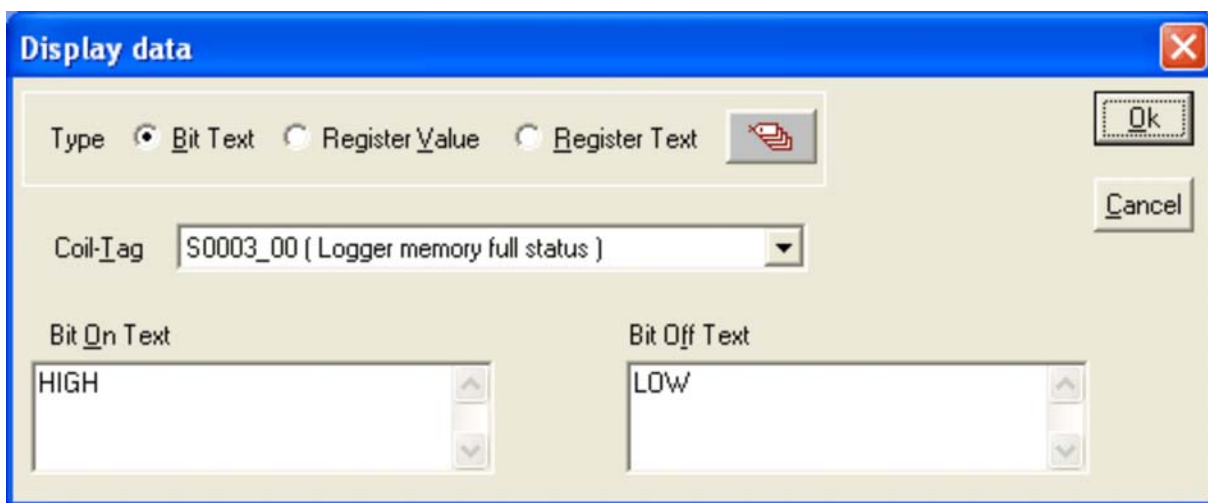
**Note:** Math operations work only on the unsigned values and yield an unsigned result. For example, if the entry value is 25 and the first operation is to divide by 100, the result stored in the tag is zero.

Click 'Ok' button to add the object to the screen.

### 5.1.3 Display Data Object

#### ◆ Procedure

1. Click on 'Display Data' from object toolbar. The mouse pointer will change to the tool shape.
2. Now place the mouse pointer at desired location and click the left mouse button. The data entry dialog box will ap-



#### Type- Bit Text

This object displays text depending on the bit status.

1. **Coil-Tag**- Select Coil tag from the list.
2. **On Text** - Enter On text maximum up to 40 characters.
3. **Off Text** - Enter Off text maximum up to 40 characters.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Type – Register Value

The screenshot shows a 'Display data' dialog box with the following settings:

- Type:** ☐ Bit Text, ☒ Register Value, ☐ Register Text
- Register-Tag:** S0001 ( Language )
- Data Type:** Unsigned integer
- Format:** #####
- Leading zeros blank:** ☒
- 1st-operation:** [NOP] [ + ] [ - ] [ \* ] [ / ] [ ] [ 0 to 65535 ]
- 2nd-operation:** [NOP] [ + ] [ - ] [ \* ] [ / ] [ ] [ 0 to 65535 ]

1. **Register-Tag:** This is a list of tags available in the application. The list will not display any read only registers that can not be modified.
2. **Data Type:** This selects the type of data to be entered. Choices are Unsigned Integer, Signed Integer, Hexadecimal, BCD, Binary (1 word), Float and ASCII.
3. **Format:** Determines the format of the data to be displayed.
4. **Leading zeros blank:** The Leading Zeros blank option determines whether zeros preceding the value will be displayed or not. If this option is enabled then register value will be displayed without leading zeros.
5. **1st-operation:** The designer can have a math operations performed on the data. The default selection is NOP or no operation.
7. **2nd-operation:** The designer can have a math operations performed on the data. The default selection is NOP or no operation.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Type – Register Text

This object displays different text depending on the value or range of values of a register.

**Display data**

Type ☐ Bit Text ☐ Register Value ☒ Register Text

Register-Tag S0001 ( Language )

Low limit	High Limit	Text
100	500	Cycle 1
501	1000	Cycle 2

Define new range

Low Limit High Limit Text

1001 1500 Cycle 3

[ 0 to 65535 ] [ 0 to 65535 ]

Delete Accept Discard Close

1. **Register-Tag** - This is a list of tags available in the application. The list will not display any read only registers that can not be modified.
2. **Show table** - Table shows list of text string defined for different ranges.
3. **Define new range** - User can define new range with low limit, high limit and text in following edit box.
4. **Delete** - User can delete entry from the table.
5. **Accept** - Using this button edited range is accepted and added in the table.
6. **Discard** - Using this button edited limit and text is disabled.

Click 'Close' button to add object to the screen.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.1.4 Time

1. Click on 'Time' from objects toolbar. The mouse pointer will change to the tool shape.
2. Now place the mouse pointer at desired location and click the left mouse button.

Object is placed in default format HH:MM:SS.  
User can change format by double click on object.

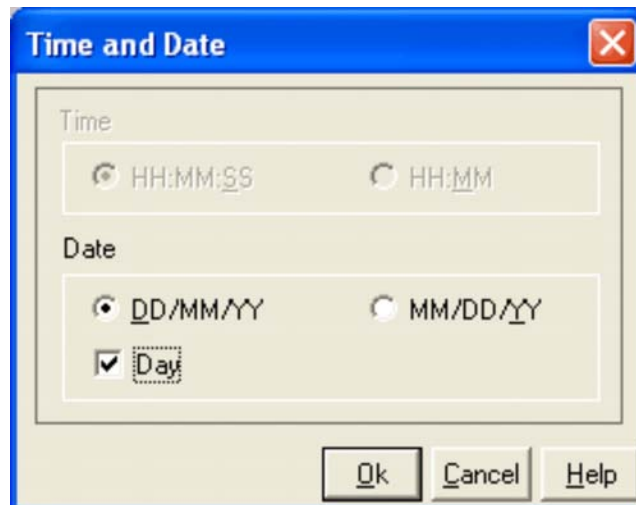


Time is displayed in 24 hour format without leading zeros.

### 5.1.5 Date

1. Click on 'Date' from objects toolbar. The mouse pointer will change to the tool shape.
2. Now place the mouse pointer at desired location and click the left mouse button.

Object is placed in default format DD/MM/YY without leading zeroes.  
User can change format by double click on object.



By selecting the Day check box, the day of the week will be displayed ( 'SUN', 'MON', ... )

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.1.6 Attributes of Alphanumeric Objects

#### Font Size

A text object can have four font sizes: 5x7 Dots, 7x14 Dots, 10x14 Dots and 20x28 Dots. Default font size is 5x7 Dots

#### Text Foreground:

Text foreground can be changed by user. Two options are available: black and white. Default Text Foreground is Black.

#### Text Background

The text background can be changed by the designer. The options are black and white. The default text background is white.

#### Border - Single or Double

Any text object can be highlighted with a single or double border.

#### Unconditional Flash

User can assign flashing attribute to any text object. An object can flash at three different speeds: Slow, Medium and Fast. By default no object is assigned the flashing attribute. If flashing is defined, slow flashing is selected by default.

**Note:** Data Entry objects (Coil and register) do not have flash attribute.

The following attributes are available with a graphic display.

### 5.1.7 Animation Properties:

All objects can have their appearance changed using the animation property. Changes in the value of the tag associated with the animation property control the tag's appearance. There are three types of animation properties. They can be used in combination.

1. Show / Hide Animation
2. Flash Animation
3. Color Animation

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

**Animation Properties** [X]

☒ Show / Hide

Tag: S0001 ( Language )

Show when: ☒ Within Range ☐ Out of Range

Range: Low: 0 High: 65535

0 <= Low <= High  
Low <= High <= 65535

☒ Flash: Slow

Tag: S0001 ( Language )

Flash when: ☒ Within Range ☐ Out of Range

Range: Low: 0 High: 65535

0 <= Low <= High  
Low <= High <= 65535

☒ Color animation

Tag:

Fill color: D 0 ( 0 to 999 )

Line color: D 0 ( 0 to 999 )

[Ok] [Cancel] [Help]

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

1. **Show / Hide Animation:** Object is displayed only when the condition specified by the user is true. For example, shows the object only when the value of tag is between 100 (Low) and 200 (High). When the condition is false, the object is not displayed.

The screenshot shows the 'Animation Properties' dialog box with the following settings:

- Show / Hide:** ☒   
Tag: S0001 ( Language )   
Show when: ☒ Within Range ☐ Out of Range   
Range: Low: 100, High: 200. Formulas:  $0 \leq \text{Low} \leq \text{High}$  and  $\text{Low} \leq \text{High} \leq 65535$ .
- Flash:** ☐ (disabled)
- Color animation:** ☐ (disabled)

1. **Tag** : Select the tag to which Show / hide animation is to be attached.
2. **Show When** : The object is displayed either when condition is within range or out of range, according to user's choice.
3. **Range** : Enter the Low Limit and High Limit in the appropriate fields.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

**2. Flashing Animation:** The designer can select three speeds; Slow, Medium, or Fast. When the condition specified by the user is true, the object will begin flashing. When the condition is false, the object is not flashed.

**Animation Properties**

☐ Show / Hide

Tag: [ ]

Show when: ☒ Within Range ☐ Out of Range

Range: Low [ ] High [ ]  $0 \leq \text{Low} \leq \text{High}$   
 $\text{Low} \leq \text{High} \leq 65535$

☒ Flash: Slow [ ]

Tag: S0001 ( Language ) [ ]

Flash when: ☒ Within Range ☐ Out of Range

Range: Low 100 High 200  $0 \leq \text{Low} \leq \text{High}$   
 $\text{Low} \leq \text{High} \leq 65535$

☐ Color animation

Tag: [ ]

Fill color: D [ ] ( 0 to 999 )

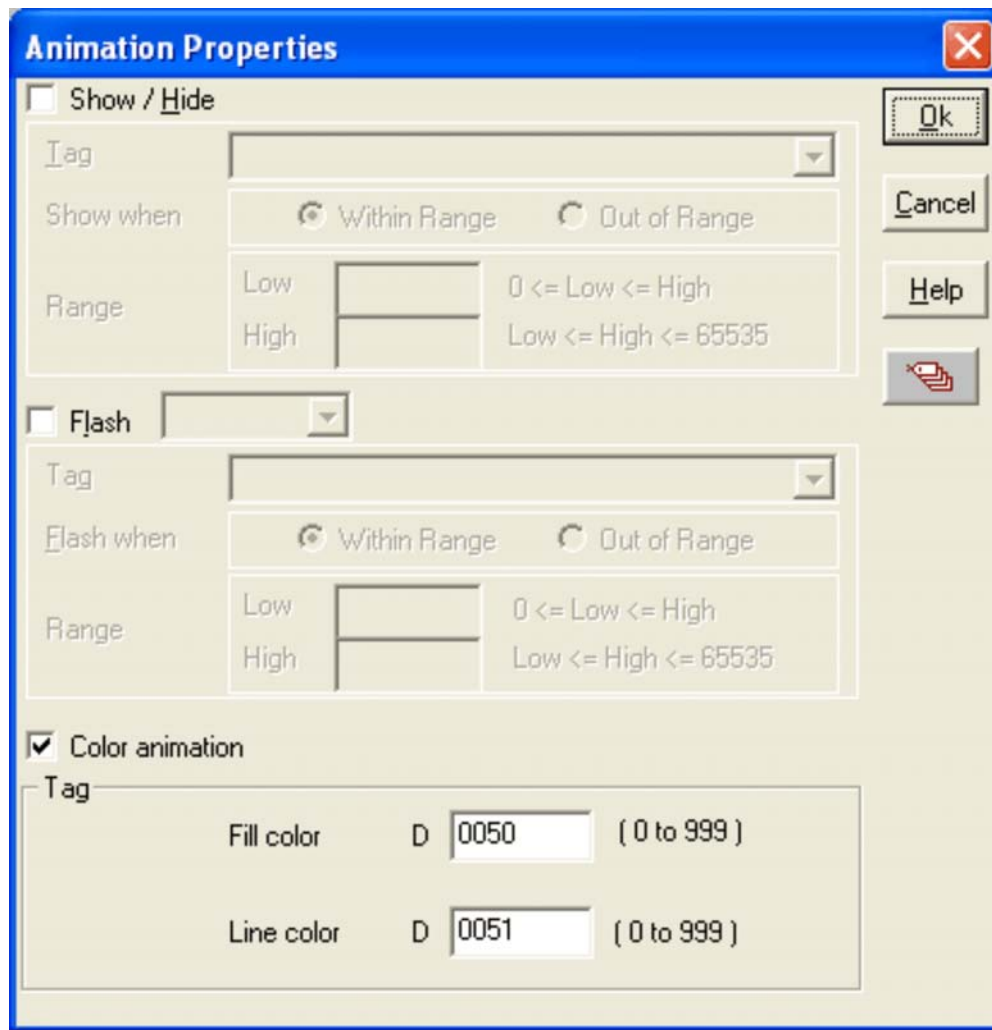
Line color: D [ ] ( 0 to 999 )

Buttons: Ok, Cancel, Help, [Icon]

1. **Flash** : Select the speed at which object is to be flashed.
2. **Tag** : Select the tag to which Flash animation is to be attached.
3. **Flash When** : The object is flashed either when condition is within range or out of range, according to user's choice.
4. **Range** : Enter the Low Limit and High Limit in the appropriate fields.

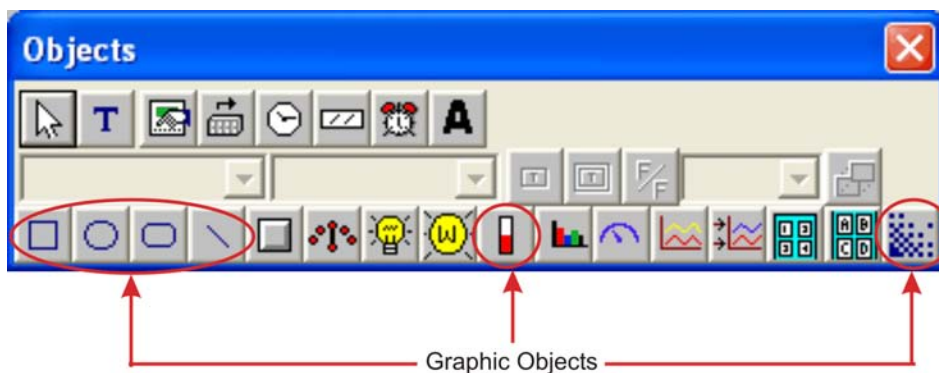
## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

**3. Color Animation:** The designer can change the foreground and background colors of an object. The value of the color index will be taken from foreground and background data registers specified here. For example, the value in D050 changes the foreground color of an object and the value in D051 changes the background color of the object.



### 5.2 Graphic Wizards

Graphic objects can be used to make the screen more user friendly by drawing pictures. Graphic objects are available only in models with graphic screens.





## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

Following are the Graphical Objects :

1. Line
2. Rectangle
3. Ellipse
4. Rounded Rectangle
5. Bargraph
6. Bitmap

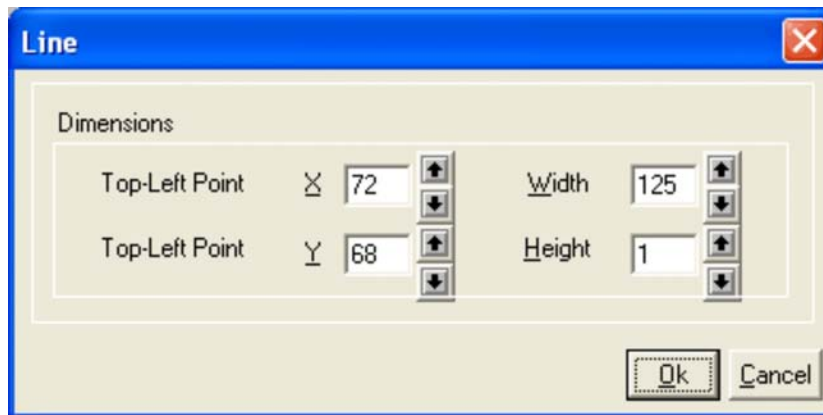
### 5.2.1 Line

Draws a line of required length in any direction and at required location.

#### ◆ Procedure

1. Click on the 'Line' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
2. Now place the mouse pointer at desired location and mark the area of object while holding the left mouse button.
3. Release button to add object on screen.

The dimensions and location can be changed by double clicking on the object

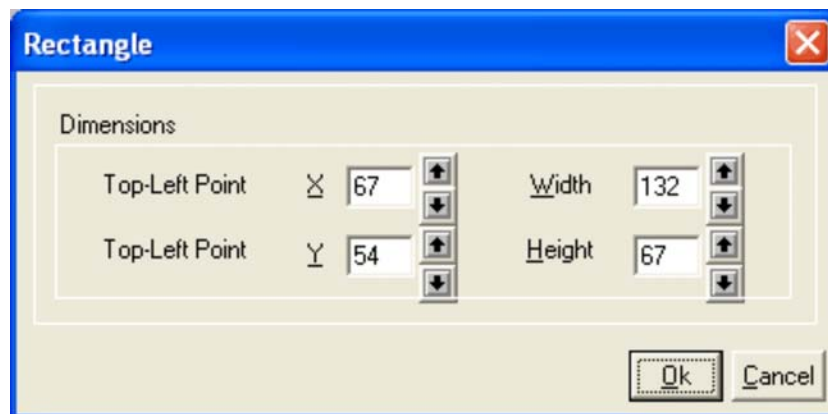


### 5.2.2 Rectangle

Draws a rectangle at the desired location and of required size.

#### ◆ Procedure

1. Click on the 'Rectangle' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
2. Place the mouse pointer at the desired location and mark the area of the object while holding the left mouse button.
3. Release button to add object on screen.



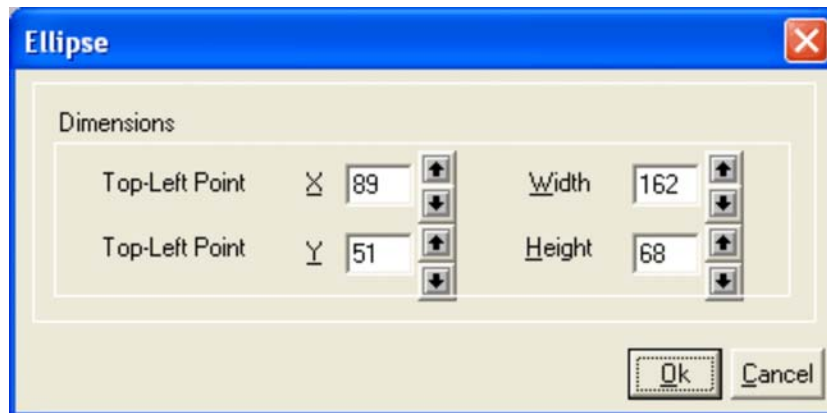
## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.2.3 Ellipse

Draws an ellipse of the size at the insertion location.

#### ◆ Procedure

1. Click on the 'Ellipse' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
  2. Now place the mouse pointer at desired location and mark the area of object while holding the left mouse button.
  3. Release button to add object on screen.
- The designer can change the dimensions and location by double clicking on the object.



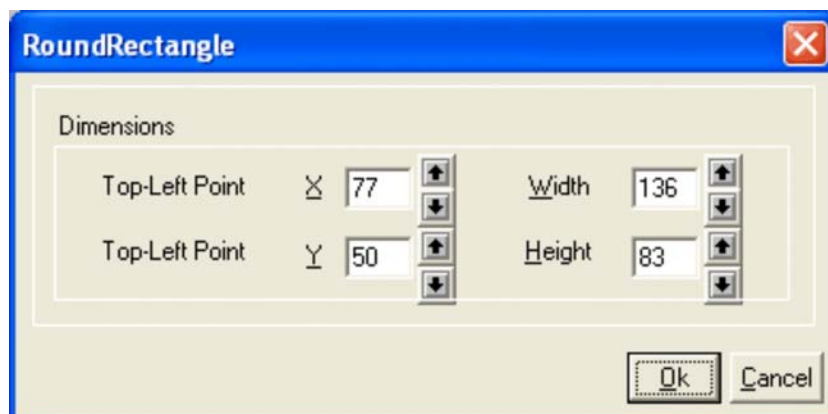
The screenshot shows a dialog box titled "Ellipse" with a close button (X) in the top right corner. The dialog contains a section labeled "Dimensions" with four input fields: "Top-Left Point X" (value 89), "Top-Left Point Y" (value 51), "Width" (value 162), and "Height" (value 68). Each input field has up and down arrow buttons for adjustment. At the bottom right, there are "Ok" and "Cancel" buttons.

### 5.2.4 Rounded Rectangle

Draws a rectangle with rounded corners. The size and location can be varied.

#### ◆ Procedure

1. Click on the 'Round Rectangle' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
  2. Now place the mouse pointer at desired location and mark the area of object while holding the left mouse button.
  3. Release button to add object on screen.
- The designer can change the dimensions and location of the object by double clicking on the object.



The screenshot shows a dialog box titled "RoundRectangle" with a close button (X) in the top right corner. The dialog contains a section labeled "Dimensions" with four input fields: "Top-Left Point X" (value 77), "Top-Left Point Y" (value 50), "Width" (value 136), and "Height" (value 83). Each input field has up and down arrow buttons for adjustment. At the bottom right, there are "Ok" and "Cancel" buttons.

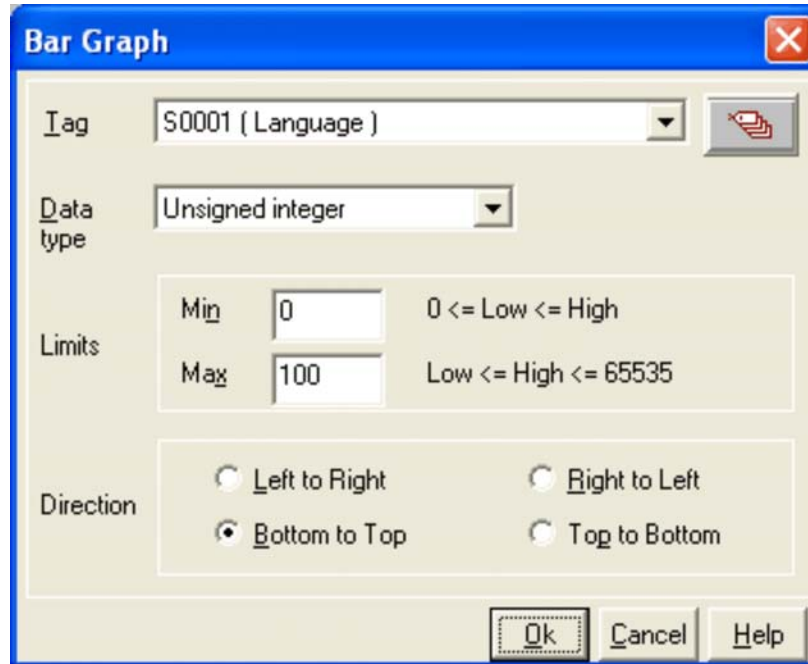
## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.2.5 Bargraph

Bar graphs are register dependent objects which change their bar height or width according to the value in the register.

#### ◆ Procedure

1. Click on the 'Bargraph' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.



1. **Tag:** This is a list of tags available in the application.

2. **Data type:** This selects the type of data to be entered. Choices are Unsigned Integer, Signed Integer, Hexadecimal, BCD, Binary (1 word), Float and ASCII.

3. **Limits:** Limits of bar graph are 0 to 65535 for all data types except signed integer for which range for limits is -32768 to 32767.

4. **Direction:** User can define direction of bar graph from four options.

**Note:** Bar graph supports only show/hide animation.

Click 'Ok' button to add object to the screen.

### 5.2.6 Bitmap

A bitmap can be drawn on the HMI display. The bitmap cannot be larger than the display size of the HMI graphics display. The maximum size bitmap depends on the HMI model.

<b>HMI 401</b>	: Width 192 Pixels, Height 64 pixels
<b>HMI 601/605</b>	: Width 320 Pixels, Height 240 pixels
<b>HMI 1205</b>	: Width 800 Pixels, Height 600 pixels

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 2. Color

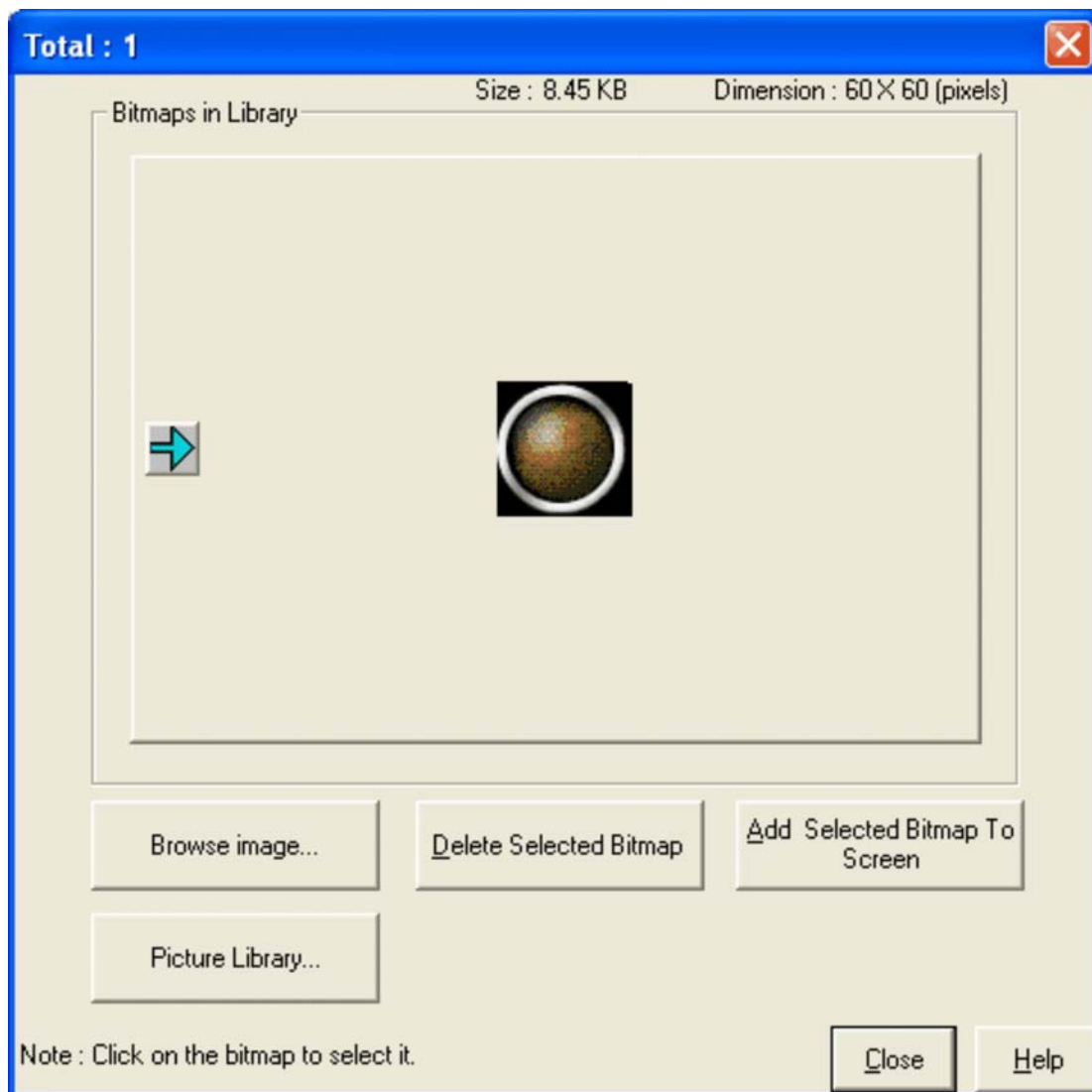
Color specification vary from HMI model to model as specified below:

<b>HMI 401</b>	: 2 color
<b>HMI 601</b>	: 16 colors Gray scales
<b>HMI 605/1205</b>	: 256 color

If the image has more colors than the color specification of the HMI display, then the image cannot be used directly. Use Microsoft® Paint or other photo editing software to convert the image to 256 / 16 or 2 colors as per display specification.

#### ◆ Procedure

1. Click on the 'Bitmap' button in screen Objects Toolbar or Menu option. The shape of the mouse pointer will change.
2. Now place the mouse pointer at desired location window will appears.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

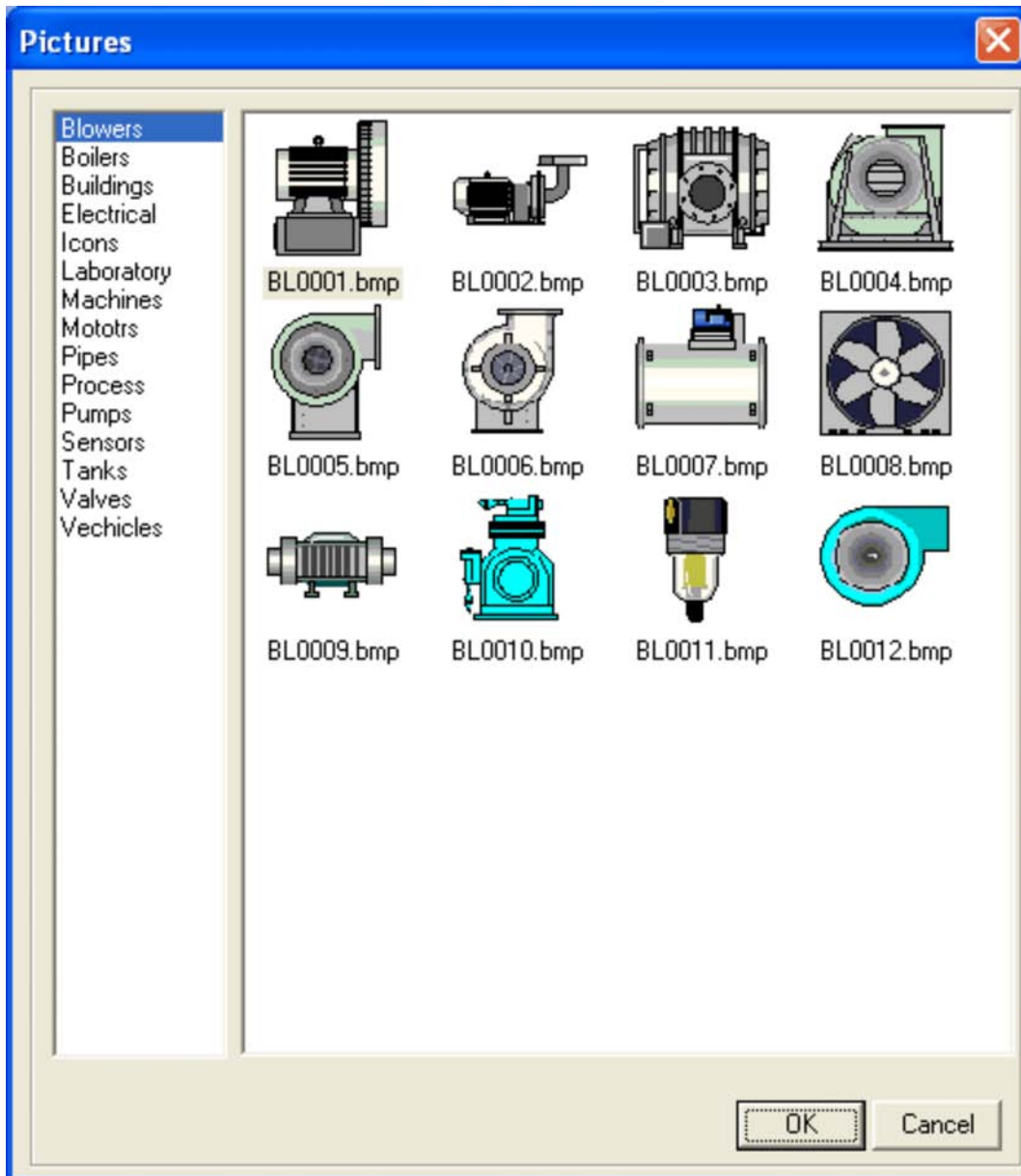
This window shows a list of the currently available bitmaps in the bitmap library.

**Browse Image :** User can add his own bitmap in the library by browsing the folder.

**Delete Selected Bitmap :** User can delete selected bitmap from the library.

**Add Selected Bitmap To Screen :** This will add selected bitmap on the screen at desired location.

**Picture Library :** By clicking on this button, user can select the bitmap from the picture library as shown below.



From this library, user can select the various types of bitmaps like Blowers, Buildings, Valves etc.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

Graphical Objects have certain properties, referred as Attributes. Attributes are useful for suggesting the importance of the particular object.

Basic Graphic Objects have the following attributes:

**Pen Color** : This attribute defines the pattern for drawing the border. For Black and White Graphic display this can either be black or white.

**Fill Color** : This attribute defines the fill color. Any closed object can be filled by the selected color.

**Flash** : All the basic objects can be flashed using this attribute. Flashing can be done at three different speeds: Slow, Medium and Fast.

### 5.3 Wizards

Various wizards included for use in graphical HMI products are:

1. Button object :
  - a. Bit Button
  - b. Word Button
2. Lamp Object:
  - a. Bit Lamp
  - b. Word Lamp
3. Analog Meter
4. Multiple Bargraph
5. Numeric Keypad
6. Trend Display

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.1 Bit Button

The bit button can be used to display the status bit and perform an action based on the task defined for the button.

To draw the object, click on the **Bit Button** icon and place it on the screen.

The screenshot shows the 'Button Page' dialog box with three tabs: 'Button Properties', 'General Attributes', and 'Operation'. The 'Button Properties' tab is active. It contains a large preview area on the left showing a button with the text 'ON'. Below the preview is an 'Update Preview' button. To the right of the preview is a 'Simulate' section showing a button with 'On' and 'Off' states, each with a radio button. Below this is a 'Language' dropdown menu set to 'English (United States)'. Below the preview area is a 'Select' section with a 'Style' dropdown menu set to 'Generic square'. Below the 'Select' section is a 'Text' section with a 'Text' input field containing 'ON' (with a '(Max 21)' limit), a 'Font' button, a 'Language' dropdown set to 'English (United States)', a 'Fill Pattern' dropdown, a 'Text Color' dropdown, a 'Pattern Color' dropdown, and a 'Background' dropdown. To the right of the 'Text' section is a note: 'Note :- The on text, off text and label properties are not applicable for bitmap style of button object. Off state button properties are applicable only if feedback tag in operation page is defined.' Below the note is an 'Off Text' section with a 'Text' input field containing 'OFF' (with a '(Max 21)' limit), a 'Font' button, a 'Language' dropdown set to 'English (United States)', a 'Fill Pattern' dropdown, a 'Text Color' dropdown, a 'Pattern Color' dropdown, and a 'Background' dropdown. At the bottom right are 'OK', 'Cancel', and 'Apply' buttons.

The dialog box window enables the user to select button properties, attributes and operations.

Feed back tag status defines the shape of the button, on text, off text. Operation does not vary on the Feedback tag. The presentation of the button on the display is decided by the feedback tag.

**Note:** If the button style is non rectangular, the coordinates of the bounding rectangle are the coordinates of the object. In that case please press inside or on the exact boundary of the button.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Button Properties:

#### Style

A button can have a number of different styles:

1. Generic square
2. Generic circle
3. Generic rounded rectangle
4. Invisible button
5. From Picture Library
6. User defined image

#### On/Off Text

A button can also be configured with the following properties:

1. **Text** : On / Off text, can be up to 21 characters.
2. **Font** : Select Windows® Font, Font style and Font size. Any font supported in the user's computer is acceptable.
3. **Language** : Display the list of languages depending upon the number of languages configured in the unit settings.
4. **Fill Pattern** : If the display style is a generic square, circle, or rounded rectangle; then the user can define different types of fill patterns for that style.
5. **Text Color** : Color of the text.
6. **Background** : Background color of text.

#### Simulate

The user can simulate the ON and OFF text in various languages as configured in the wizard. These can be previewed in the preview window.

#### General Attributes

##### Label selection

Parameters related to the bit button label can be configured if the Label selection is ON. (Check box 'Label' is selected).

1. **Text** : Label text, can be up to 21 characters.
2. **Font** : User can select windows® Font, Font Style and Font size.
3. **Language** : Display the list of languages depending upon number of languages configured in the Unit settings.
4. **Pattern** : User can select different fill patterns for label.
5. **Text Color** : Color of the text.
6. **Background** : Background color of text.
7. **Label position** : If the "Top" option is selected, then the label is displayed above the button as shown above. If the "Bottom" option is selected, then the label is shown at the bottom of the button.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

**Button Page**

Button Properties | General Attributes | **Operation**

Simulate

On ☒ Off ☐

Language English (United States)

Update Preview

Label selection

☒ Label

Text Button (Max 21) Text Color  Pattern

Language English (United States) Background  Pattern Color

Label Position

☒ Top ☐ Bottom

Protection

Access level to show object 0 (0 to 255)

Border

☒ Border

OK Cancel Apply

### Border

If the 'Border' option is selected (through check box), then the button is shown with the border.

### Simulate

The designer can simulate the ON and OFF text in various languages configured in the wizard, and can see its preview in the preview window.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Operation

The screenshot shows the 'Button Page' configuration window with the 'Operation' tab selected. The window has a blue title bar and a tabbed interface with 'Button Properties', 'General Attributes', and 'Operation'. The 'Operation' tab contains a large preview area on the left showing a button with 'Button' and 'ON' labels, and an 'Update Preview' button. To the right is a 'Simulate' section with 'On' and 'Off' radio buttons (both unselected) and a 'Language' dropdown menu set to 'English (United States)'. Below the preview is an 'Operation' section with a checked 'Feedback Tag' dropdown set to 'S0003\_00 ( Logger memory full status )' and a button icon. Underneath is a 'Task List' section containing an 'Action for Touch Key' button. At the bottom right are 'OK', 'Cancel', and 'Apply' buttons.

### Operation

**Feedback Tag** : If the button has the attribute “Feedback Tag” enabled, then the button shows ON and OFF states as defined in the configuration based on the status of feedback tag. Otherwise, the button displays only the ON state.

### Task List

A bit button can be configured to perform tasks depending on the state of the button. To configure the bit button, click on **Action for Touch Key** button.

1. **Press Tasks** - These tasks are performed only once when the button is pressed.
2. **Pressed Tasks** - These tasks are performed as long as the button is pressed.
3. **Released Tasks** - These tasks are performed when the button is released.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.2 Word Button

The word button performs a set of tasks based on the value of a tag register. Any two-byte tag can be defined as the state tag to control the word button.

To draw the object, click on the **Word Button** icon and place the object on the screen.

#### State Properties

**Word Button**

State Properties

General Attributes

Button Properties

Style Generic square

Size 2x Fill Color

Text Properties

☒ Text

Text Button Font

Language English (United States)

Text Color

Preview

Update Preview

State Tag S0001 ( Language )  Simulate Language English (United States)

State condition and tasks

State No.	Low Limit	High Limit	Task List
1	0	100	Task list for state 1
2	101	200	Task list for state 2
➔ 3	201	300	Task list for state 3

Add new state

Delete state 3

OK

Cancel

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Button Properties

#### Style

A button can have a number of different display styles:

1. Generic square
2. Generic circle
3. Generic rounded rectangle
4. Invisible button
5. From Picture Library
6. User defined image

#### Fill Color

Fills the color for each state of the button.

#### Size

If the style is Check box, Radio button or Toggle switch then user can have button size either 1x or 2x.

#### Text Properties

The designer can select different text strings for each state if the text option is enabled.

1. **Text** : Button text maximum upto 20 characters.
2. **Font** : User can select Windows® Font, Font Style and Font size.
3. **Language** : Display the list of languages depending upon number of languages configured in the Unit settings.
4. **Text Color** : User can select the color of the text.
5. **Background** : User can select the background color of text.

#### State Tag

This tag is used to determine the present state of the word button. This can be either unit tag or PLC tag.

#### State conditions and tasks

This table gives information about the various states defined by the word button with their corresponding low and high limits and the task list for each range. The user can assign tasks to any of the defined states by clicking on the Task List button for the corresponding state. Up to 32 different states can be defined.

#### Add new state

Add a new state by clicking this button.

#### Delete state

Delete an existing state by high lighting it and pressing this button.

#### Simulate

The designer can simulate various languages configured in the wizard. Previews of each language can be simulated.

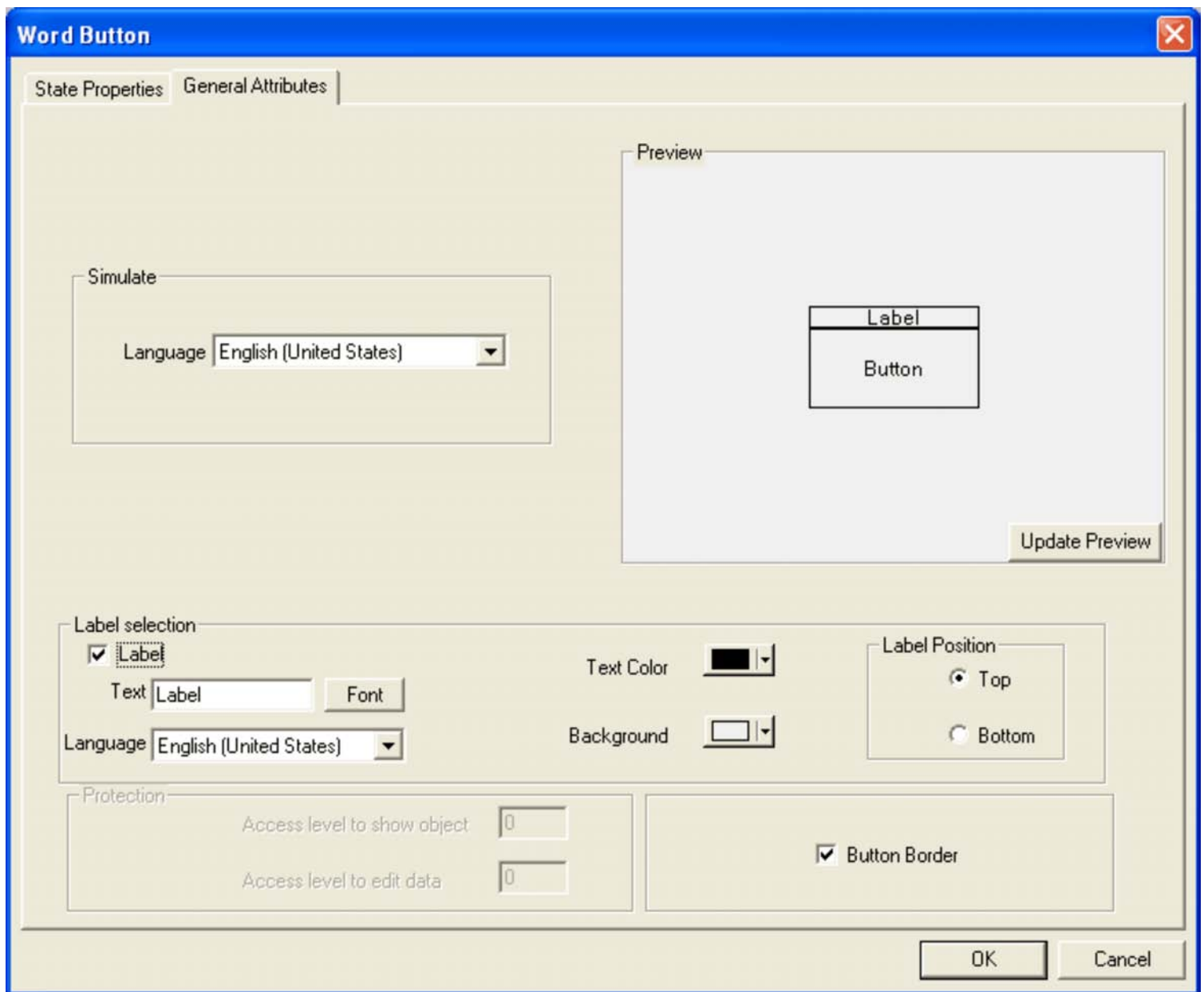
## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### General Attributes

#### Label selection

The word button label can be configured when the Label selection is enabled. (Check box Label is selected).

1. **Text** : Label text maximum upto 14 characters.
2. **Font** : User can select a Windows® font, Font style and the Font size.
3. **Language** : Display the list of languages depending upon number of languages configured in the Unit settings.
4. **Text Color** : User can select color of the text.
5. **Background** : User can select background color of text.
6. **Label position** : If the top option is selected then the label is shown above the button. If the bottom option is selected, then the label is shown at the bottom of the button.



The image shows a 'Word Button' configuration dialog box with a blue title bar and a close button. It has two tabs: 'State Properties' and 'General Attributes', with 'General Attributes' currently selected. The dialog is divided into several sections:

- Simulate**: A section containing a 'Language' dropdown menu set to 'English (United States)'.
- Preview**: A large rectangular area on the right showing a visual representation of the button. It consists of a box with 'Label' written above it and 'Button' written inside it. An 'Update Preview' button is located at the bottom right of this section.
- Label selection**: A section containing a checked checkbox labeled 'Label'. Below it are a 'Text' input field with 'Label' entered, a 'Font' button, and another 'Language' dropdown menu set to 'English (United States)'.
- Text Color**: A color selection area with a black color swatch and a dropdown arrow.
- Background**: A color selection area with a white color swatch and a dropdown arrow.
- Label Position**: A section with two radio buttons: 'Top' (which is selected) and 'Bottom'.
- Protection**: A section at the bottom left with two input fields: 'Access level to show object' and 'Access level to edit data', both containing the value '0'.
- Button Border**: A checkbox labeled 'Button Border' which is checked.

At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Button Border

If the button border is enabled then the button is drawn with a border. This applies only to the “generic” style bit buttons.

### Simulate

This allows the designer to preview what the button will look like. It is enabled when multiple languages are used or if the Feedback Tag check box is checked.

### 5.3.3 Bit Lamp

The bit lamp can be used to display the on/off status of a coil or bit.

To draw the object, click on the **Bit Lamp** button. Place the tool on the screen.

#### Lamp Properties:

A number of predefined lamp styles are available. The On and Off text properties are applicable only for the “generic” styles. The designer may create a custom lamp by selecting the “User defined image” and selecting images for the On and Off properties.

#### Style

1. Generic square
2. Generic circle
3. Generic rounded rectangle
4. From Picture Library
5. User defined Image

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

The screenshot shows the 'Lamp' wizard window with the following sections:

- General Attributes:** A large preview window on the left shows a square labeled 'ON'. Below it is an 'Update Preview' button.
- Simulate:** A section on the right with two radio buttons, 'On' (selected) and 'Off', and a 'Language' dropdown menu set to 'English (United States)'.
- Select:** A section with a 'Style' dropdown menu set to 'Generic square'.
- On Text:** A section with a 'Text' input field containing 'ON', a 'Font' button, a 'Language' dropdown set to 'English (United States)', a 'Fill Pattern' dropdown, a 'Text Color' dropdown set to black, a 'Pattern Color' dropdown set to black, and a 'Background' dropdown set to white.
- Off Text:** A section with a 'Text' input field containing 'OFF', a 'Font' button, a 'Language' dropdown set to 'English (United States)', a 'Fill Pattern' dropdown, a 'Text Color' dropdown set to black, a 'Pattern Color' dropdown set to black, and a 'Background' dropdown set to white.
- Note:** A note box stating: 'Note :- The on text, off text and label properties are not applicable for bitmap style of lamp.'
- Buttons:** 'OK', 'Cancel', and 'Apply' buttons at the bottom right.

### On/Off Text

Configurable parameters:

1. **Text** : On /Off text, can be up to 21 characters.
2. **Font** : User can select Windows® Font , Font Style and Font size.
3. **Language** : Displays the list of languages depending upon number of languages configured in the Unit settings.
4. **Fill Pattern** : If display style is Generic square, Generic circle or Generic rounded rectangle; then user can have different types of fill patterns for that style.
5. **Text Color** : User can select color of the text.
6. **Background** : User can select background color of text.

### Simulate

User can simulate the ON and OFF text in various languages configured in the wizard, and can see its preview in the preview window.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### General Attributes

Use this page to define attributes common to all wizards. A preview of the lamp object is displayed in the upper left corner of this page.

### Label selection

Bit lamp label parameters can be configured if the Label selection is enabled by selecting the “Label” check box.

1. **Text** : Up to 21 characters can be entered for the label.
2. **Font** : This is used to change the standard Windows® Font, Font style and Font size.
3. **Language** : Displays the list of languages configured in the Unit Settings. When a different language is selected, the label text is entered for that language.
4. **Pattern** : Different fill patterns for the label can be selected.
5. **Text Color** : Select the color for the label text. The “color index” can be used for precise color matching.
6. **Background** : Select the color for the text background. The “color index” can be used for precise color matching.
7. **Label Position** : If the “Top” option is selected, the label is shown above the lamp. If the “Bottom” option is selected, the label is shown at the bottom of the lamp.

The screenshot shows the 'Lamp' configuration dialog box with the 'General Attributes' tab selected. The dialog is divided into several sections:

- Preview:** A large area on the left showing a preview of the lamp object. It contains a rectangular label with the text 'Lamp' above 'ON'. Below the preview is an 'Update Preview' button.
- Simulate:** A section on the right containing a 'Simulate' button, 'On' and 'Off' radio buttons, and a 'Language' dropdown menu set to 'English (United States)'.
- Label selection:** A section at the bottom left containing a 'Label' checkbox (checked), a 'Font' button, a 'Text' input field (containing 'Lamp', with '(Max 21)' next to it), a 'Text Color' dropdown (black), a 'Pattern' dropdown (white), a 'Language' dropdown (English (United States)), a 'Background' dropdown (white), and a 'Pattern Color' dropdown (black).
- Label Position:** A section at the bottom right containing 'Top' and 'Bottom' radio buttons, with 'Top' selected.
- Protection:** A section at the bottom left containing an 'Access level to show object' input field (containing '0', with '(0 to 255)' next to it).
- Border:** A section at the bottom right containing a 'Border' checkbox (checked).

At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Border

If the “Border” check box is enabled, the lamp is shown with a border. This is the default condition.

### Simulate

This allows the designer to preview how the button will look like. It is enabled when multiple languages are used or if the Feedback Tag check box is checked.

### Operation

The Feedback Tag determines which bit tag controls the state of the lamp.

**Lamp**

Lamp properties | General Attributes | **Operation**

**Simulate**

Lamp

ON

Update Preview

Language: English (United States)

**Operation**

Feedback Tag: S0003\_00 ( Logger memory full status )

OK Cancel Apply

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.4 Word Lamp

The Word Lamp performs a set of tasks and displays different lamps depending on the value of a register tag. Any two byte tag can be defined as the State Tag. This tag controls the current state of the word lamp.

To draw the object, click on the **Word Lamp** button. Place the tool on the screen.

#### State Properties

The Word Lamp dialog box is divided into several sections. At the top, there are tabs for 'State Properties' and 'General Attributes'. The 'State Properties' tab is active. It contains two main sections: 'Button Properties' and 'Text Properties'. The 'Button Properties' section has a 'Style' dropdown set to 'Generic square' and a 'Fill Color' color picker. The 'Text Properties' section has a 'Text' checkbox checked, a 'Text' input field containing 'Lamp', a 'Font' button, a 'Language' dropdown set to 'English (United States)', and a 'Text Color' color picker. To the right of these sections is a 'Preview' area showing a square button with the text 'Lamp'. Below the preview is an 'Update Preview' button. At the bottom of the dialog, there is a 'State Tag' dropdown set to 'S0001 ( Language )', a 'Simulate Language' dropdown set to 'English (United States)', and a 'State condition and tasks' section. This section contains a table with three columns: 'State No.', 'Low Limit', and 'High Limit'. The table has three rows: row 1 has '1', '0', and '100'; row 2 has '2', '101', and '200'; row 3 has '3', '201', and '300'. A blue arrow points to row 3. To the right of the table are two buttons: 'Add new state' and 'Delete state 3'. At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

State No.	Low Limit	High Limit
1	0	100
2	101	200
3	201	300

#### Style

Each state can use any one of the different types of display styles. Available styles are:

1. Generic square
2. Generic circle
3. Generic rounded rectangle
4. From Picture Library

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5. User defined Image

#### Fill Color

Select the lamp color for each state.

#### Size

If the style is “Lamp”, “Indicator”, or “LED”, the lamp size can be changed from 1x to 2x.

#### Text Properties

Different text strings can be specified for each state if the Text option is enabled.

1. **Text** : Up to 20 characters of text can be displayed.
2. **Font** : Used to change the Windows® Font , Font Style and Font size.
3. **Language** : Displays the list of languages depending upon number of languages configured in the Unit settings.
4. **Text Color** : Select the color of the text.
5. **Background** : Select the text background color.

#### State Tag

This tag is used to determine the present state of the word lamp. This can be either a HMI tag or a PLC tag.

#### State conditions and Tasks

This table is a list of the states defined for the word lamp with their corresponding high and low limits. Up to 32 different states can be defined.

#### Add new state

Clicking this button adds a new state to the list.

#### Delete state

Select a particular state by highlighting it, and use this button to delete it.

#### Simulate

User can simulate various languages configured in the wizard, and can see its preview in the preview window.

#### General Attributes

##### Label selection

If the Word Lamp Style is “Generic”, then the lamp can have a label by enabling the “Label” check box.

1. **Text** : Up to 14 characters of label text can be defined.
2. **Font** : Select the Windows® Font, Font Style and Font size.
3. **Language** : Displays the list of languages configured in the configuration settings.
4. **Text Color** : Selects the color of the text.
5. **Background** : Selects the background text color.
6. **Label position** : If the “Top” option is selected, the label is shown above the lamp. If the “Bottom” option is selected, the label is shown below the lamp.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

Word Lamp

State Properties | General Attributes

Simulate

Language: English (United States)

Preview

Update Preview

Label selection

☒ Label

Text: Label Font

Language: English (United States)

Text Color: [Color Picker]

Background: [Color Picker]

Label Position

☒ Top

☐ Bottom

Protection

Access level to show object: 0

Access level to edit data: 0

☒ Button Border

OK Cancel

If the "Button Border" check box is enabled, the lamp is shown with a border. This is the default condition.

### 5.3.5 Multiple Bargraph

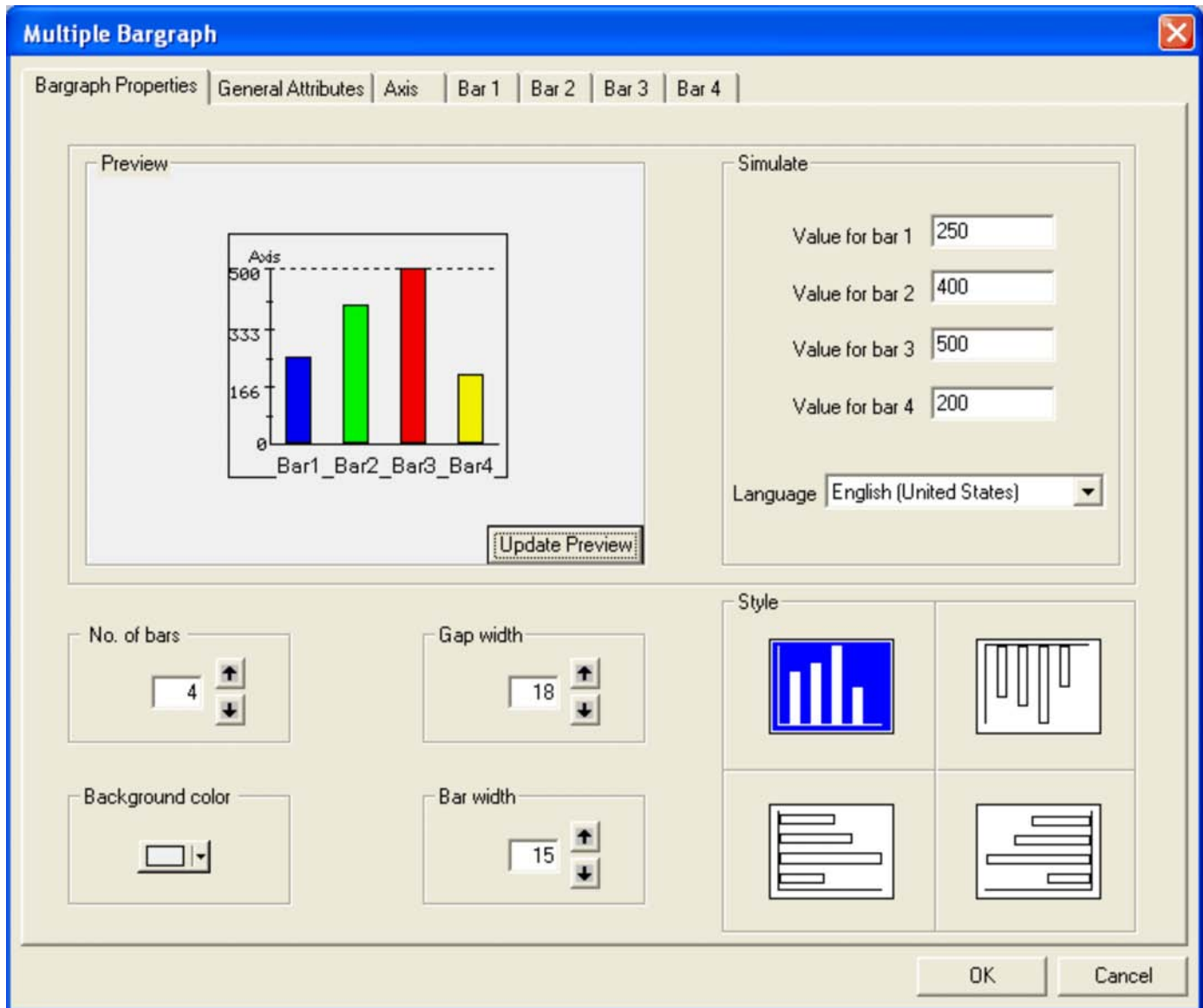
Bar graphs are register dependent objects which change their height or width according to the value in the register.

This wizard can be configured to view multiple bargraphs (up to 4) simultaneously. Each bargraph can be configured with individual colors and limit values.

To draw the object, click on the **Multiple Bargraph** button. Place the tool on the screen and select the number of bars. The style and width for all bars can be specified. Individual bar properties are set for the bar tag, color, as well as the Maximum and Minimum limits.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Bargraph Properties



The dialog box titled "Multiple Bargraph" contains several tabs: "Bargraph Properties", "General Attributes", "Axis", "Bar 1", "Bar 2", "Bar 3", and "Bar 4". The "Bargraph Properties" tab is active. It features a "Preview" window showing a bar graph with four bars (blue, green, red, yellow) on a coordinate system with a y-axis labeled "Axis" and values 0, 166, 333, 500. The x-axis is labeled "Bar1\_Bar2\_Bar3\_Bar4". Below the preview is an "Update Preview" button. To the right of the preview is a "Simulate" section with four input fields for "Value for bar 1" (250), "Value for bar 2" (400), "Value for bar 3" (500), and "Value for bar 4" (200). Below these is a "Language" dropdown menu set to "English (United States)". At the bottom of the dialog are "OK" and "Cancel" buttons. In the center of the dialog, there are four control groups: "No. of bars" (a numeric field with 4 and up/down arrows), "Gap width" (a numeric field with 18 and up/down arrows), "Background color" (a color selection box), and "Bar width" (a numeric field with 15 and up/down arrows). To the right of these controls is a "Style" section with four icons representing different bar graph styles: vertical bars with blue fill, vertical bars with black outline, horizontal bars with blue fill, and horizontal bars with black outline.

#### Number of bars

Enter or select the number of bars you want in a single wizard. Up to four bargraphs can be defined in a single wizard.

#### Background color

This is the background color for the entire bargraph object.

#### Gap width

The Gap Width is the space, in pixels, between any two bars. The minimum gap width is 0 pixels. The maximum is 53 pixels.

#### Bar width

The designer can specify the bar width, in pixels, for all bars. The minimum gap width is 1 pixel. The maximum is 68 pixels.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Style

A multiple bargraph object can have any of four different styles.

### Simulate

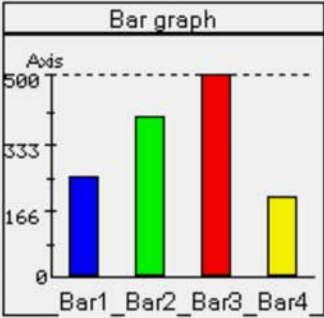
The designer can preview the bargraph by entering suitable values in the corresponding simulate value field. Changing the “Language” displays the text associated with each language.

### General Attributes

**Multiple Bargraph**

Bargraph PropertiesGeneral AttributesAxisBar 1Bar 2Bar 3Bar 4

Preview



Update Preview

Simulate

Value for bar 1250

Value for bar 2400

Value for bar 3500

Value for bar 4200

LanguageEnglish (United States)

Label selection

☒ Label

Font

Text Color

Label Position

TextBar graph

LanguageEnglish (United States)

Background

Top

Bottom

Protection

Access level to show object0

Access level to edit data0

☒ Border

Data TypeUnsigned integer

OK

Cancel

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Label selection

If the “Label” check box is enabled, the designer can specify the following label parameters:

1. **Text** : Label Text. Up to 14 characters of text can be specified for the label.
2. **Font** : Specify the Windows® Font , Font Style and Font size desired.
3. **Language** : Displays the list of languages depending upon number of languages configured in the Unit settings.
4. **Text Color** : Selects the color of the text.
5. **Background** : Selects the background color of the text.
6. **Label position** : If the “Top” option is selected, the label is shown above the bargraph. If the “Bottom” option is selected, the label is shown below the bargraph.

### Border

If the “Border” option is enabled, the bargraph is shown with a border. This is the default condition.

### Data Type

User can have tags of following data types representing values of bargraph :

1. Unsigned integer
2. Signed integer
3. Hexadecimal
4. BCD
5. Float

### Simulate

The designer can simulate the label text of various languages configured in the wizard, and can see a preview in the preview window.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Axis

#### Axis properties

User can enable or disable axis by clicking on the “Axis” option.

#### Axis color

Color of the axis can be defined.

#### Axis label

Parameters related to the axis label can be configured here if the Label selection is enabled.

1. **Text** : Axis label text maximum upto 12 characters.
2. **Language** : Display the list of languages depending upon number of languages configured in the Unit Settings.
3. **Text Color** : Selects the color of the text.
4. **Background** : Selects the background color of text.

#### Display Range

If enabled, minimum and maximum display range of value scale axis can be specified.

#### Divisions

If enabled, major and minor divisions of value scale axis can be specified.

The screenshot shows the 'Multiple Bargraph' dialog box with the following configuration:

- Preview:** A bar graph titled 'Bar graph' with four bars labeled Bar1, Bar2, Bar3, and Bar4. The Y-axis is labeled 'Axis' and has values 0, 166, 333, and 500. The bars have values 250, 400, 500, and 200 respectively.
- Simulate:** Value for bar 1: 250, Value for bar 2: 400, Value for bar 3: 500, Value for bar 4: 200. Language: English (United States).
- Axis Properties:**
  - Axis:** ☒
  - Axis color:** Black
  - Axis label:** ☒ Text: Axis, Text Color: Black, Language: English (United States), Background: White
- Display Range:** ☒ Display Range, Min: 0, Max: 500
- Divisions:** ☒ Divisions, Major: 3 (1-10), Minor: 2 (1-10)

Buttons: OK, Cancel



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

Bar <bar number>

### Bar Properties

1. **Min Tag Value** : Lower limit for the corresponding bargraph.
2. **Max Tag Value** : Higher limit for the corresponding bargraph.
3. **Tag** : A HMI unit tag or a PLC tag controlling the corresponding bargraph.

### Bar Color

1. **Line Color** : Border color for the corresponding bargraph.
2. **Fill Color** : Interior color for the corresponding bargraph..

### Bar Label

Parameters related to the bar label can be configured here if the Bar label selection is enabled.

1. **Text** : Up to 12 characters of axis label text can be defined. Labels may overlap if there is insufficient room..
2. **Language** : Displays the list of languages depending upon number of languages configured in the Unit settings.
3. **Text Color** : Selects the color of the text.
4. **Background** : Selects the background color of text.

**Multiple Bargraph**

Bargraph Properties | General Attributes | Axis | **Bar 1** | Bar 2 | Bar 3 | Bar 4

**Preview**

Bar graph

Axis

500  
333  
166  
0

Bar1\_Bar2\_Bar3\_Bar4

Update Preview

**Simulate**

Value for bar 1: 250

Value for bar 2: 400

Value for bar 3: 500

Value for bar 4: 200

Language: English (United States)

**Bar Properties**

Min Tag Value: 0

Max Tag Value: 500

Tag: S00001 (Language)

**Bar Color**

Line Color: [Black]

Fill Color: [Blue]

**Bar Label**

☒ Bar label

Language: English (United States)

Text: Bar1

Text Color: [Black]

Background: [White]

OK Cancel

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.6 Analog Meter

The Analog Meter wizard is useful to represent parameter values such as temperature or pressure from a PLC tag or HMI tag.

To draw the object, click on the **Analog Meter** button. Place the tool on the screen. This wizard represents the word register on a analog meter. The dialog box has four pages: Meter Foreground properties, Meter Background properties, General Properties, and Operation. Foreground Properties define the number of meter divisions and display range. The Background Properties define needle color, meter style, and range color settings. The General attributes define the label properties and enable or disable the border. The Operation page defines meter start and end angles, control tag and the meter range.

#### Meter Foreground Properties

Meter Foreground properties define the display range and meter divisions.

#### Display Range

If enabled, the values of the minimum display range, maximum display range, and major divisions will be shown on the meter. The limits for the minimum and maximum display range are dependent upon the data type of the tag that is assigned for the meter.

#### Divisions

If enabled, the number of major and minor divisions on the meter scale can be specified.

#### Simulate

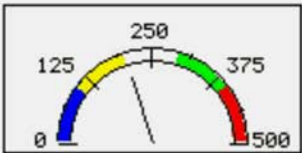
The user can simulate the text for the various languages configured in the wizard, the tag value with its corresponding deflection and see a preview in the window.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

**Analog Meter** [X]

Meter Foreground Properties | Meter Background Properties | General Attributes | Operation

Preview



Update Preview

Simulate

Value

Language

Display Range

☒ Display Range

Min  Max

Divisions

Major  (1-10) Minor  (1-5)

OK Cancel

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Meter Background Properties

Meter Background properties define the color settings for needle and meter style.

**Analog Meter**

Meter Foreground Properties | **Meter Background Properties** | General Attributes | Operation

**Preview**

0 125 250 375 500

Update Preview

**Simulate**

Value: 200

Language: English (United States)

**Meter Background**

☒ Meter Background

Meter Color: [White]

Needle Color: [Black]

Background: [White]

**Style**

☒ Color Range

Color Patches: 5 (Max. 5)

0 100 200 300 400 500

OK Cancel

### Color Range Settings

User can set different color ranges, which will represent the sections along the meter axis depending upon the colors set in the configuration. User can have up to 5 different ranges.

Each color range will have

1. **Color Patches** : User can select number of display ranges from here. He can have up to 5 different display ranges.
2. **Color Selection box** : From this user can select the color out of the available for the corresponding unit.
3. **Color limit ranges** : User can assign different values representing different color ranges.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### General Attributes

#### Label selection

Parameters related to the meter label can be configured here if the Label selection is enabled. (Check box 'Label' is selected).

1. **Text** : Up to 14 characters of label text may be specified.
2. **Font** : Select the Windows® Font, Font Style and Font size.
3. **Language** : Displays the list of languages depending upon number of languages configured in the HMI Unit Settings.
4. **Text Color** : Selects the color of the text.
5. **Background** : Selects the background color of text.
6. **Label position** : If the "Top" option is selected, the label is shown above the meter. If the "Bottom" option is selected, the label is shown below the meter.

#### Border

The screenshot shows the 'Analog Meter' configuration window with the 'General Attributes' tab selected. The window has a blue title bar and a standard Windows-style interface. The main area is divided into several sections:

- Preview**: A large area showing a preview of the analog meter. The meter has a semi-circular scale with markings at 0, 125, 250, 375, and 500. The needle is pointing to 200. Above the scale is a label box containing the text 'Label'. Below the preview is an 'Update Preview' button.
- Simulate**: A section on the right with a 'Value' input field set to '200' and a 'Language' dropdown menu set to 'English (United States)'.
- Label selection**: A section with a checked checkbox labeled 'Label'. Below it are controls for 'Language' (dropdown, 'English (United States)'), 'Text Color' (color picker, black), 'Text' (input field, 'Label'), 'Font' (button), 'Background' (color picker, white), and 'Label Position' (radio buttons, 'Top' is selected).
- Protection**: A section with two input fields: 'Access level to show object' and 'Access level to edit data', both set to '0'. To the right is a checked checkbox labeled 'Meter Border'.

At the bottom right of the window are 'OK' and 'Cancel' buttons.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Operation

#### Meter Operation

1. **Meter Start Angle** : The value indicating the start angle, in degrees, of the meter scale.
2. **Meter End Angle** : The value indicating the end angle, in degrees, of the meter scale.
3. **Start Tag Value** : The minimum value to display on the meter scale.
4. **End Tag Value** : The maximum value to display on the meter scale.
5. **Tag** : A HMI unit tag or PLC tag that the meter uses for needle deflection.

### Data Type

The following data types can be used with the meter -

1. Unsigned integer
2. Signed integer
3. Hexadecimal
4. BCD

The meter object only displays a two byte tag.

### Simulate

The designer can simulate the label text of various languages configured in the wizard and can see a preview in the preview window.

**Analog Meter**

Meter Foreground Properties | Meter Background Properties | General Attributes | **Operation**

**Preview**

Label

125 250 375 500

0

Update Preview

**Simulate**

Value 200

Language English (United States)

**Meter Operation**

Meter Start Angle 0

Meter End Angle 180

Start Tag Value 0

End Tag Value 500

Tag \$0001 (Language)

Data Type Unsigned integer

90 0 180 270

OK Cancel

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.7 Real Time Trend

The Real Time Trend object is a graphical representation of a tag's value in the current time period. The time value comes from the real time clock in the HMI unit. The tag's value is plotted on the Y axis and updated every second.

#### Trend Properties

1. **Number Of Tags** : The trends of up to 4 tags can be displayed.
2. **Show Grid** : The Show Grid check box determines whether or not the background grid is displayed.
3. **Span Time** : The value, in seconds, representing the span of the X axis. The maximum value of span time is 65535 seconds.
4. **Span Time Tag** : If this option is enabled, the Span Time is controlled by the tag specified.
5. **Fill Color** : The background color of the trend object.
6. **Grid Color** : Select the color of the grids for the trend object.

**Trend**

Trend : Properties | Value scale properties | Time scale properties | Tag1 | Tag2

Preview

100  
80  
60  
40  
20  
0

Trend

Update

Simulate

Language English (United States)

Trend Properties

No of tags 2

Time Span 60 Seconds S0001 ( Language )

Fill Color

Grid Color

Error Message

Font 5x7 Text Color

Show Grids

Span time Tag

Label

Language English (United States)

Text Trend

Font... Color

Data Type Unsigned int

OK Cancel Apply

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Error Message

Many of the trend object's properties can be determined at run time through the use a tag. If the value of the tag is out of the proper range for the property, an error message will be displayed. The text display properties can be modified.

1. **Font** : Select the Windows® Font , Font Style and Font size.
2. **Text Color** : Color of the error message to be displayed.

### Label

Parameters related to the trend label can be configured here if the Label selection is enabled. (Check box 'Label' is selected).

1. **Text** : Label text maximum upto 25 characters.
2. **Font** : Select the Windows® Font , Font Style and Font size.
3. **Language** : Display the list of languages depending upon number of languages configured in the Unit settings.
4. **Color** : Color of the text.

### Data Type

The trend object can have the following data types:

1. Unsigned integer
2. Signed integer
3. Hexadecimal
4. BCD
5. Float

Only 2 byte tags are supported.



## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Value Scale Properties

The value scale defines the scaling properties of the Y axis of the trend object.

### Grid Properties

**No of Grids** : Determines the number of horizontal grid lines on the Y axis.

### Limits

If enabled, the Limits selection determines the minimum and maximum values to be displayed on the Y axis.

1. **Minimum** : The smallest displayed value on the Y axis. The range is from 0 to 65,535.
2. **Minimum tag** : If enabled, the minimum is determined by a tag instead of a constant.
3. **Maximum** : The highest displayed value on the Y axis. The range is from 0 to 65535
4. **Maximum tag** : If enabled, the minimum is determined by a tag instead of a constant.
5. **Text color** : The color of the values on the Y scale.

**Trend**

Trend : Properties | **Value scale properties** | Time scale properties | Tag1 | Tag2

Preview

Trend

100  
80  
60  
40  
20  
0

Update

Simulate

English (United States)

**Grid Properties**

No of Grids  [ 1 to 10 ]

☒ Show units Text color

**Limits**

Minimum  [ 0 to 65535 ] ☐ Tag

Maximum  [ 0 to 65535 ] ☐ Tag

OK Cancel Apply

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Time scale properties

#### Grid Properties

**No of Grids** : If the grid option is enabled, up to 10 grids can be selected for the X axis display.

#### Text properties

1. **Scale** : If enabled, the real time grid values are shown along the time scale axis.
2. **Format** : Scale formatting can be either HH:MM:SS or HH:MM.
3. **Color** : Determines the preferred color of the X axis scale information.

The screenshot shows the 'Trend' dialog box with the 'Time scale properties' tab selected. The 'Preview' section displays a line graph with a grid. The 'Simulate' dropdown is set to 'English (United States)'. The 'Time scale properties' section includes 'Grids properties' with 'No of Grids' set to 2, and 'Text Properties' with 'Scale' checked, 'Format' set to 'HH:MM:SS', and 'Color' set to a default color.

**Trend**

Trend : Properties | Value scale properties | Time scale properties | Tag1 | Tag2

Preview

100  
80  
60  
40  
20  
0

Trend

Update

Simulate

English (United States)

Time scale properties

Grids properties

No of Grids  [ 1 to 10 ]

Text Properties

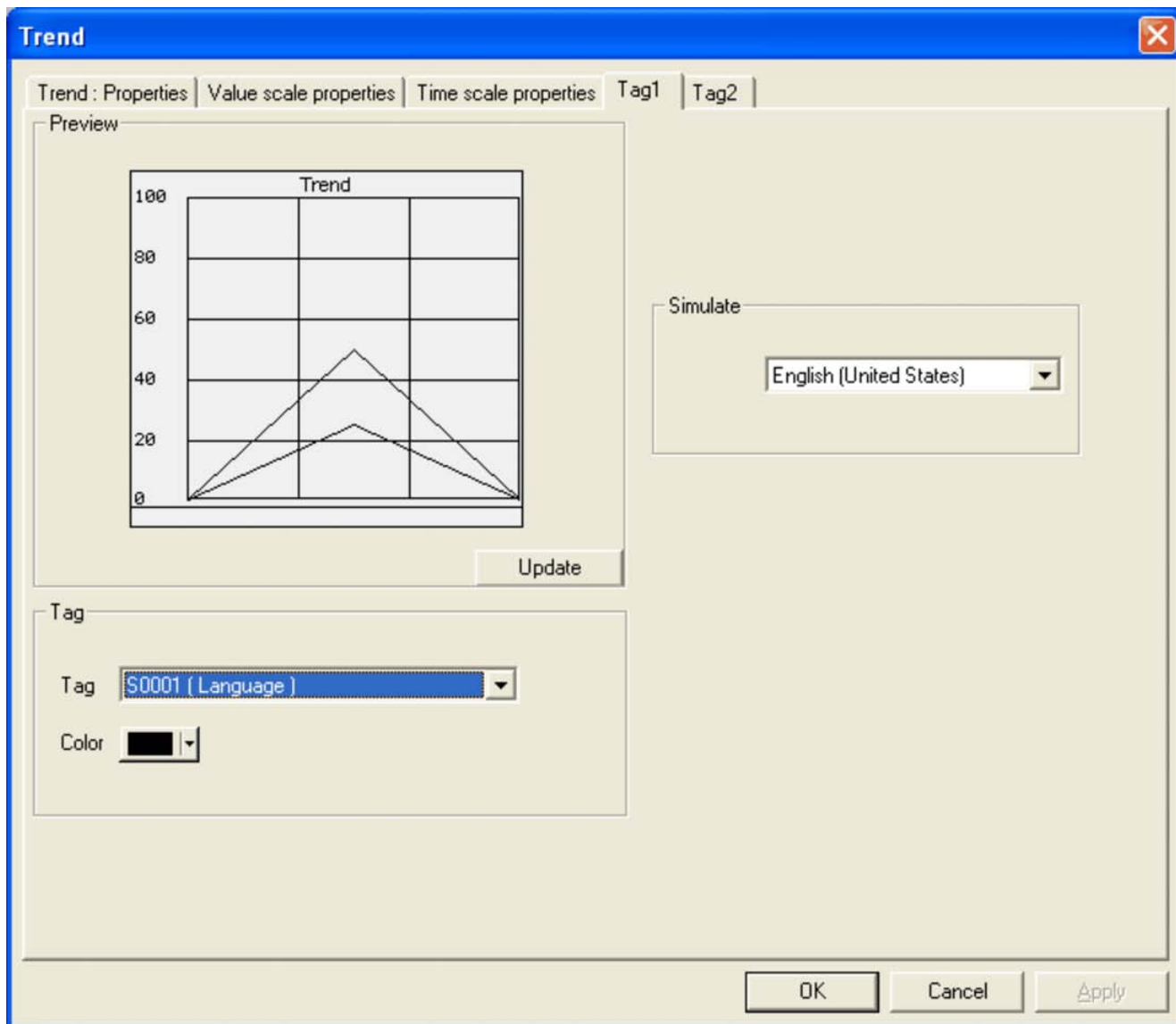
☒ Scale Format

Color

OK Cancel Apply

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### Specific Tag Information

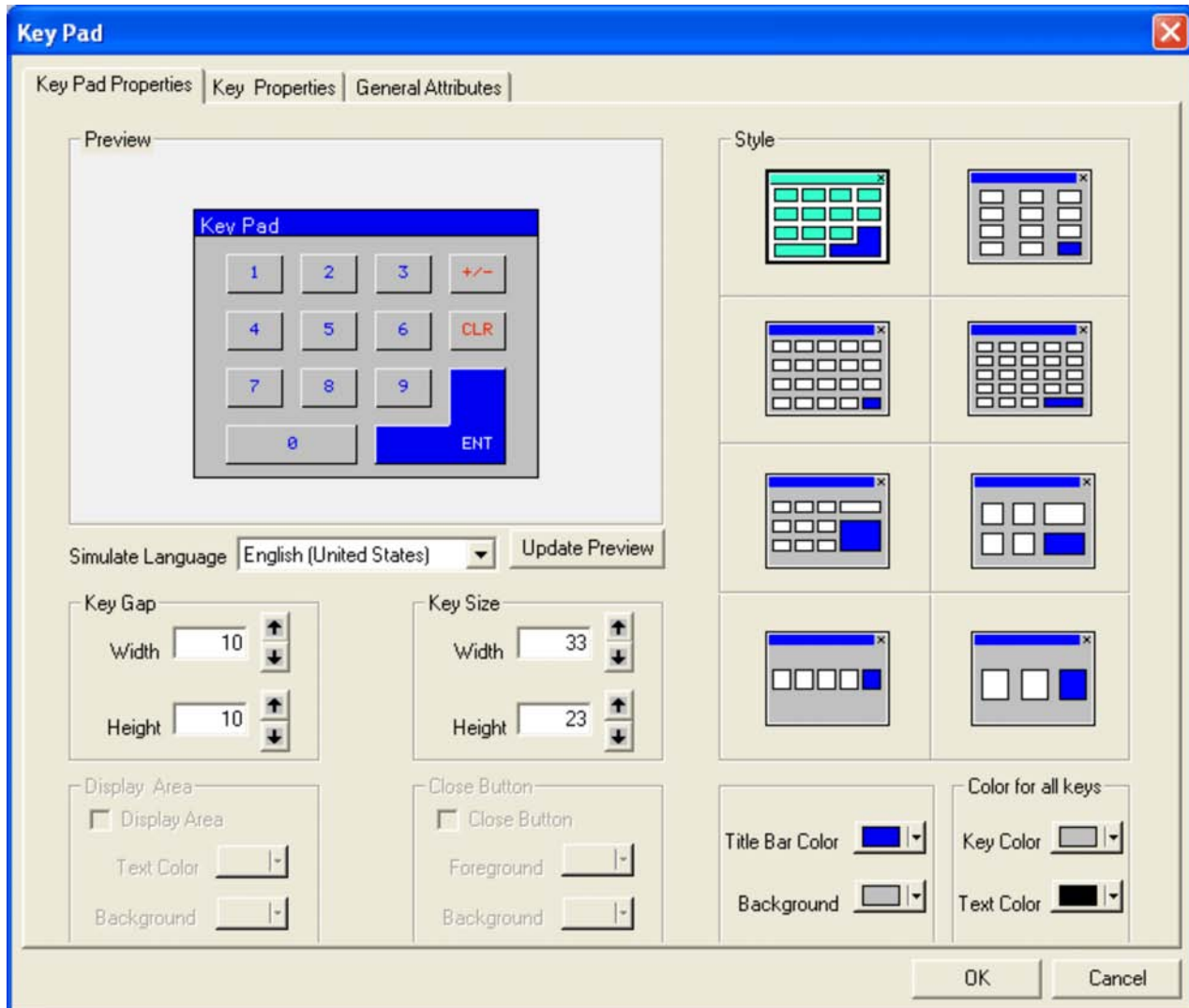


1. **Tag** : Defines a 2 byte tag to be used for the trend information to be plotted.
2. **Color** : Defines the color for the trend information to be plotted.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.8 Numeric Keypad

A numeric keypad is required to enter data in a touch screen product. The user can select either a static or popup keypad. A static keypad is present on the same screen as the data entry objects. If a popup keypad is required, the designer needs to select the popup keypad option and the popup screen desired for the data entry. If you select Static keypad, the **Display Area** check box is always disabled. But if you select Popup keypad, you have choice to enable or disable the Display area according to your application.



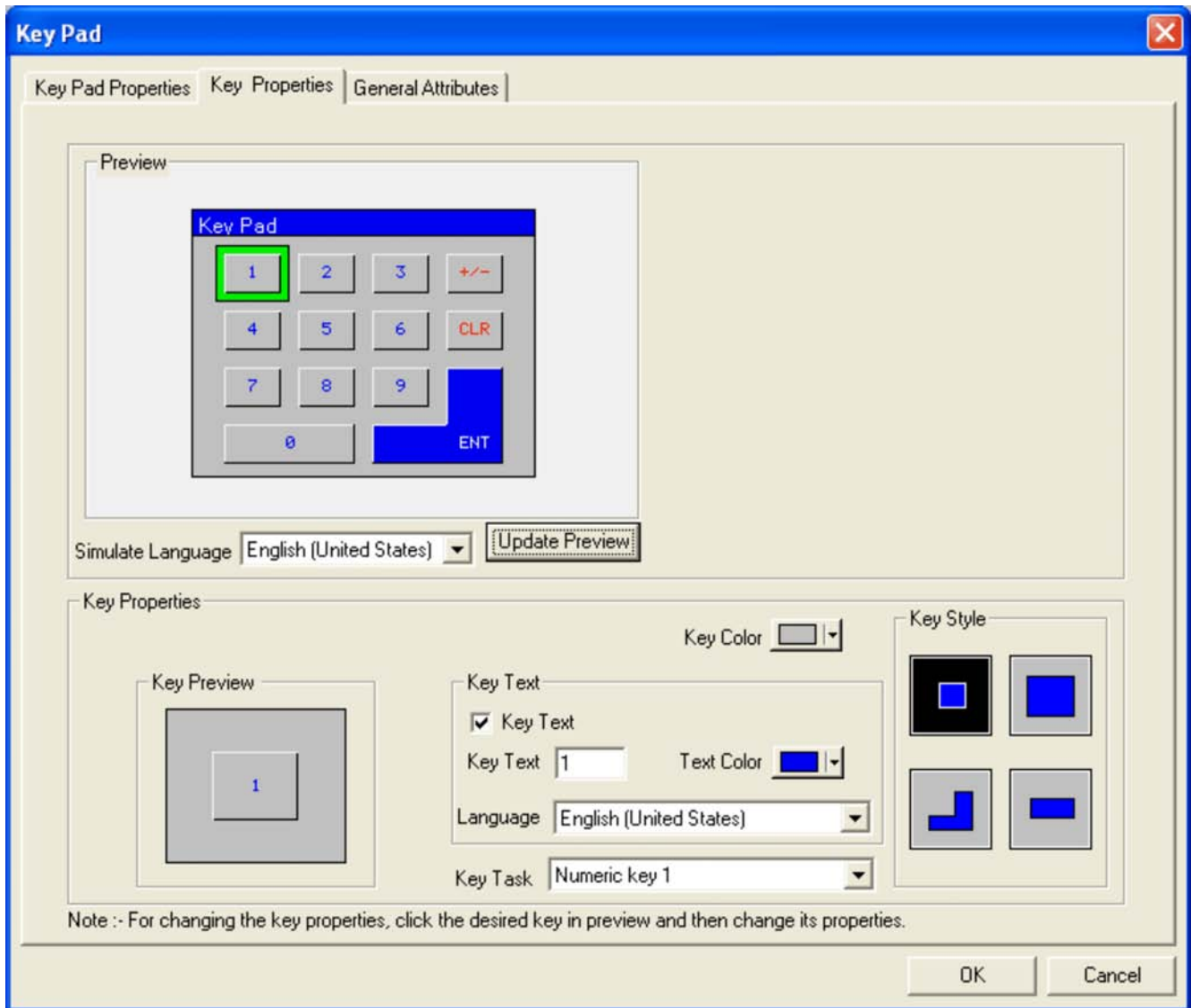
#### Key Pad Properties

1. **Update Preview** : As changes are made, the user can preview the effect.
2. **Simulate Language** : Used to simulate the text of the languages configured for the object in the preview window.
3. **Style** : Used to select the keypad style from the list.
4. **Display Area** : This option is active only for popup keypads.
  - Text Color** : Select the color for the text displayed in value area.
  - Background** : Select the background color in the display area.
5. **Key Gap Width** : Determines the spacing between key widths. The minimum is 7 and the maximum is 48 pixels.
6. **Key Gap Height** : Determines the spacing between key heights. The minimum is 7 and the maximum is 48 pixels.
7. **Key Size Width** : Determines the width of all keys. The minimum is 25 and the maximum is 56 pixels.
8. **Key Size Height** : Determines the height of all keys. The minimum is 15 and the maximum is 147 pixels.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

- 9. **Title Bar Color** : Selects the color for the title bar.
- 10. **Background Color** : Selects the background color of the display area.
- 11. **Color for All Keys** : User can select the color for all the keys.
  - Key Color** : Selects the key color.
  - Text Color** : Selects the color of text to be displayed on display area.

### Key Properties

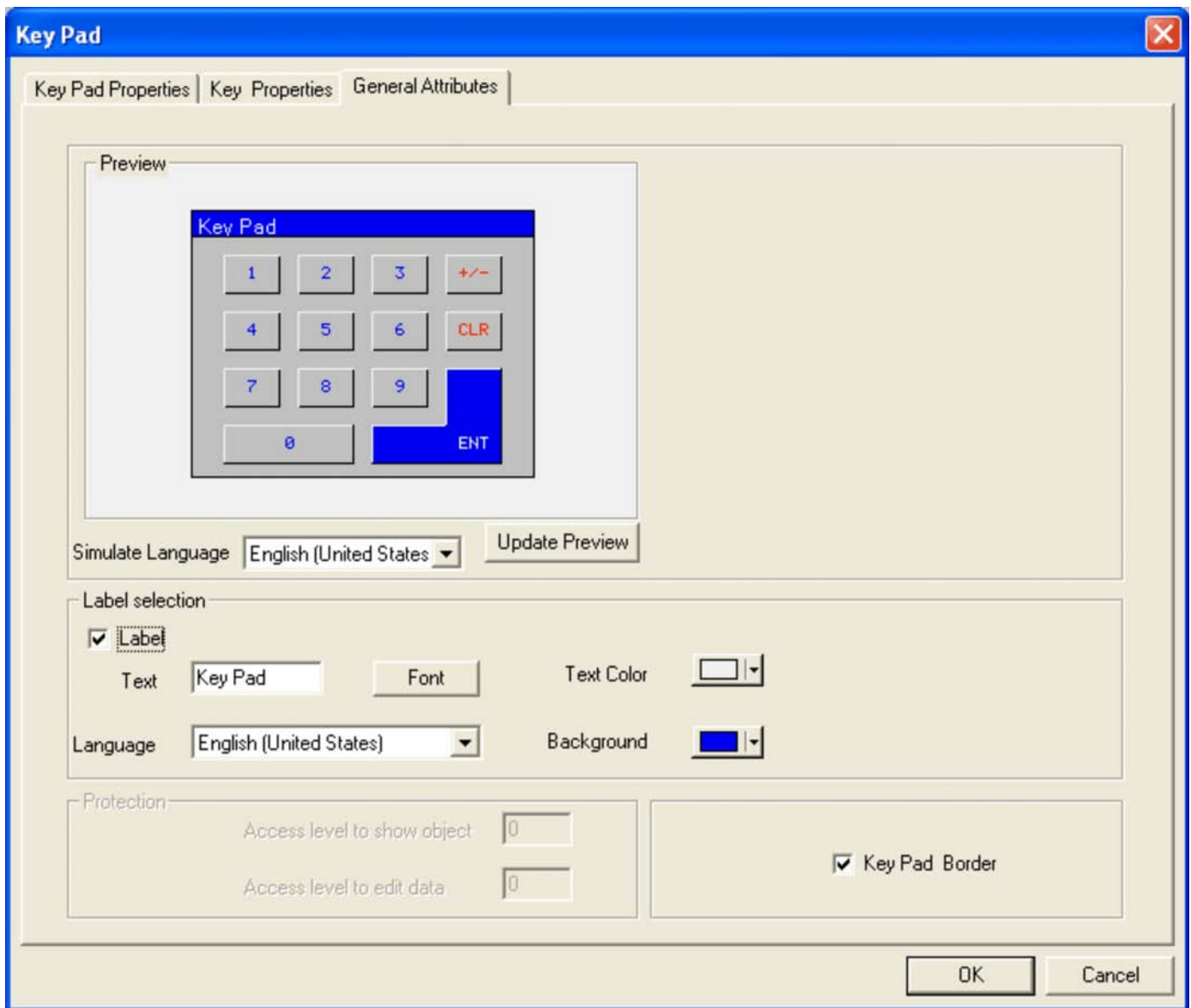


Key properties available to the user :

- 1. **Update preview** : User can check preview of defined keypad.
- 2. **Simulate** : Simulates the text of various languages configured in the object in the preview window.
- 3. **Key Color** : Selects the key color.
- 4. **Key Text check box** : Enables key text and language entry.
- 5. **Text Color** : Selects the key text color.
- 6. **Key Text** : Up to 3 characters can be used for the key text.
- 7. **Language** : Displays language depending upon number of languages configured in the application.
- 8. **Key task** : This determines the task to be performed by the key.

## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### General Attributes



The image shows a 'Key Pad' dialog box with three tabs: 'Key Pad Properties', 'Key Properties', and 'General Attributes'. The 'General Attributes' tab is selected. It contains a 'Preview' section showing a keypad layout with buttons for digits 1-9, 0, '+/-', 'CLR', and 'ENT'. Below the preview is a 'Simulate Language' dropdown set to 'English (United States)' and an 'Update Preview' button. The 'Label selection' section has a checked 'Label' checkbox, a 'Text' field with 'Key Pad', a 'Font' button, a 'Text Color' dropdown, a 'Language' dropdown set to 'English (United States)', and a 'Background' color selector. The 'Protection' section has two disabled input fields for 'Access level to show object' and 'Access level to edit data', both set to '0'. A 'Key Pad Border' checkbox is checked. 'OK' and 'Cancel' buttons are at the bottom right.

1. **Simulate** : Used for simulation of the text for each of the languages defined in the Unit Settings.
2. **Label Selection** : If enabled, this allows the user to determine the attributes of the label.
  - Text** : Up to 20 characters of text can be specified for the keypad label.
  - Font** : Select the Windows® Font and Font Style.
  - Text Color** : Select a text color. The color index may be useful for color matching.
  - Background** : Select a background color. The color index may be useful for color matching.
3. **Update Preview** : This allows the user to preview the design.
4. **Key Pad Border** : Keypad is shown with border if "Keypad Border" option is enabled.

**Note:** Options that are not supported for this model are grayed out.

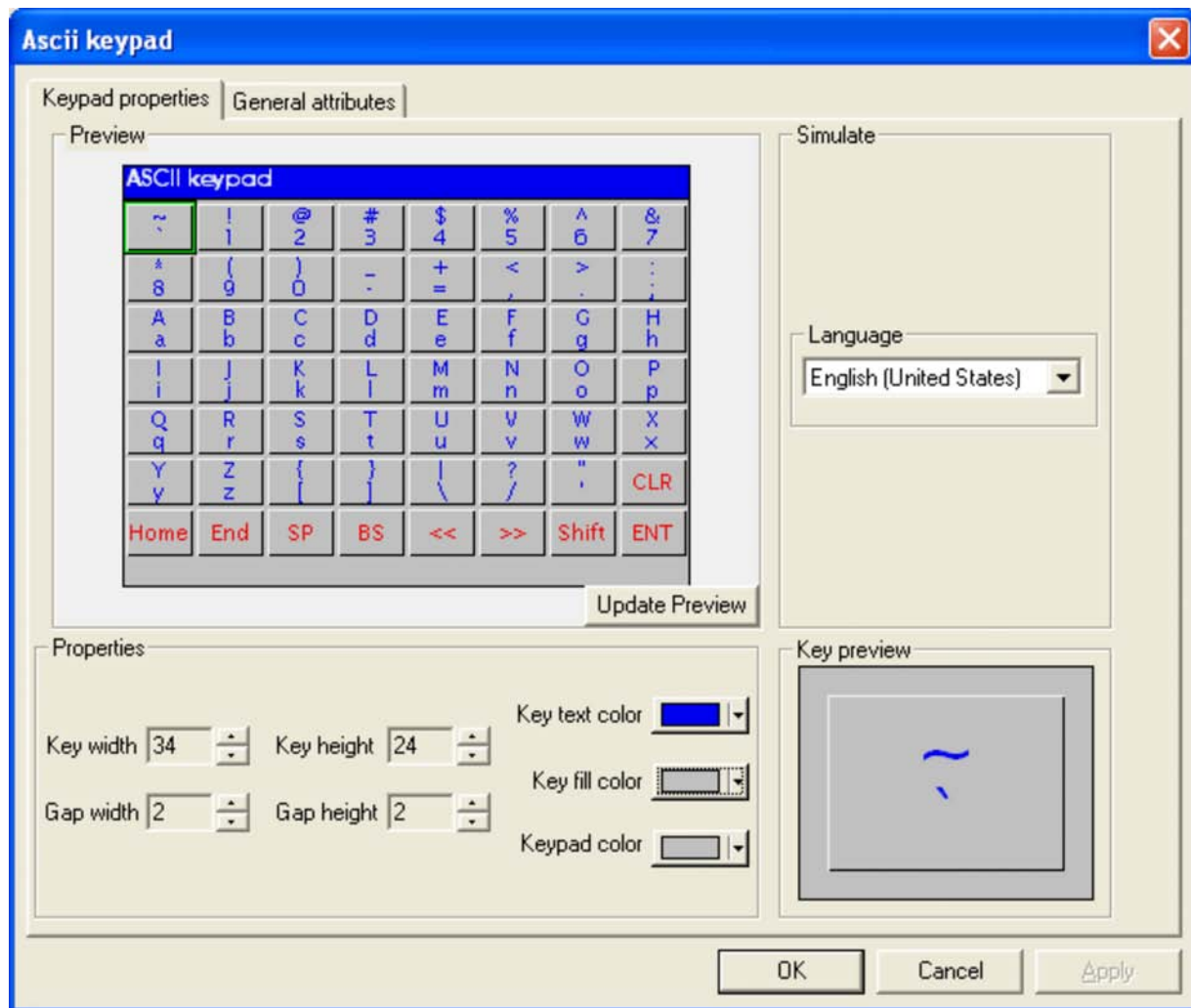
## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### 5.3.9 ASCII Keypad

ASCII keypad is used to enter the data in ASCII format.

#### Key Pad Properties

1. **Key Width** : Determines the width of the keypad. The minimum is 25 and the maximum is 37 pixels.
2. **Key Height** : Determines the height of the keypad. The minimum is 24 and the maximum is 28 pixels.
3. **Gap Width** : Determines the spacing between the key width. The minimum is 2 and the maximum is 3 pixels.
4. **Gap Height** : Determines the spacing between key heights. The minimum is 2 and the maximum is 3 pixels.
5. **Key text color** : Selects the key text color from the color palette.
6. **Key fill color** : Selects the key fill color from color palette.
7. **Keypad color** : Selects the keypad color from color palette.





## 5. REPRESENTING DATA BY OBJECTS AND WIZARDS

### General Attributes

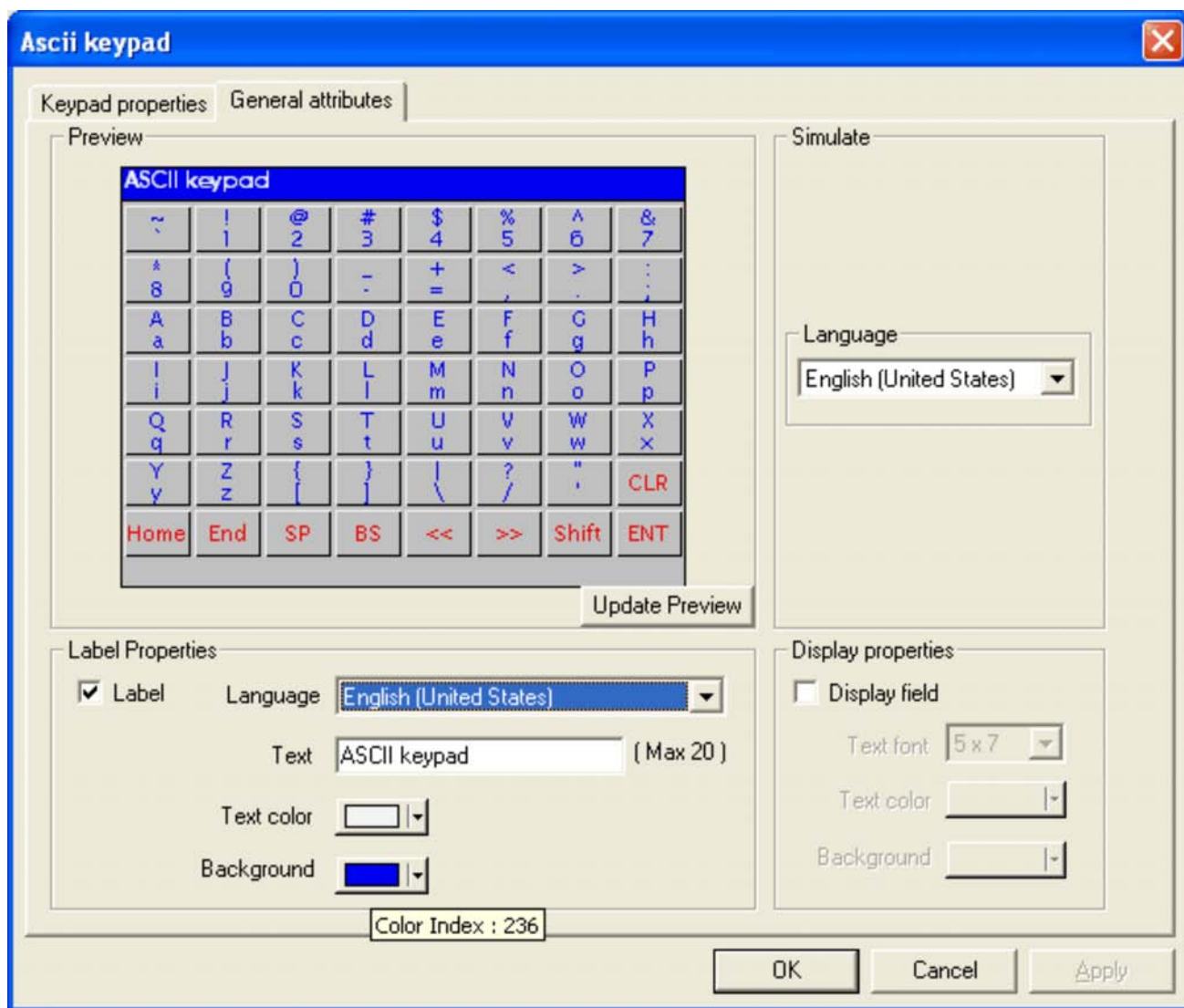
#### Label Properties

1. **Language** : Selects the language for the label. For languages other than English, those languages must be installed on the PC.
2. **Text** : Label text maximum upto 20 characters.
3. **Text Color** : Selects the test color from the color palette.
4. **Background** : Selects the background color from the color palette.

#### Display Properties

1. **Display field** : If this check box is enabled, display area is available.
2. **Text font** : Font of size either 5 X 7 or 10 X 14 can be selected, if Display field is enabled.
3. **Text Color** : Selects the test color from the color palette, if Display field is enabled.
4. **Background** : Selects the background color from the color palette, if Display field is enabled.

**Simulate** : This allows the user to preview the keypad.





### Tasks

A task is something that the HMI needs to accomplish. In various areas, there are “Task Lists” where the designer can specify which tasks need to be performed. The order of the tasks in a task list determines which task is performed when. The task lists will be found in each of the following sections:

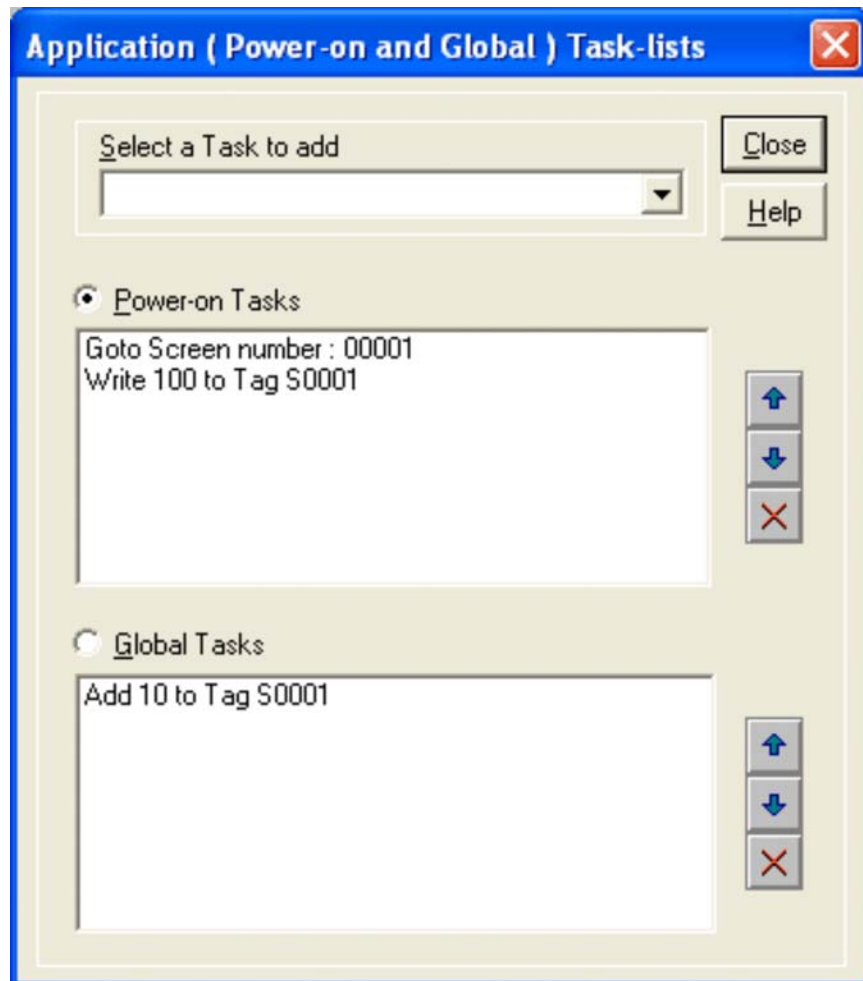
1. Application Task List
2. Screen Task List
3. Key Task List
4. Wizard Task List

#### 6.1 Application TaskList

Using this screen, two types of task lists may be defined.

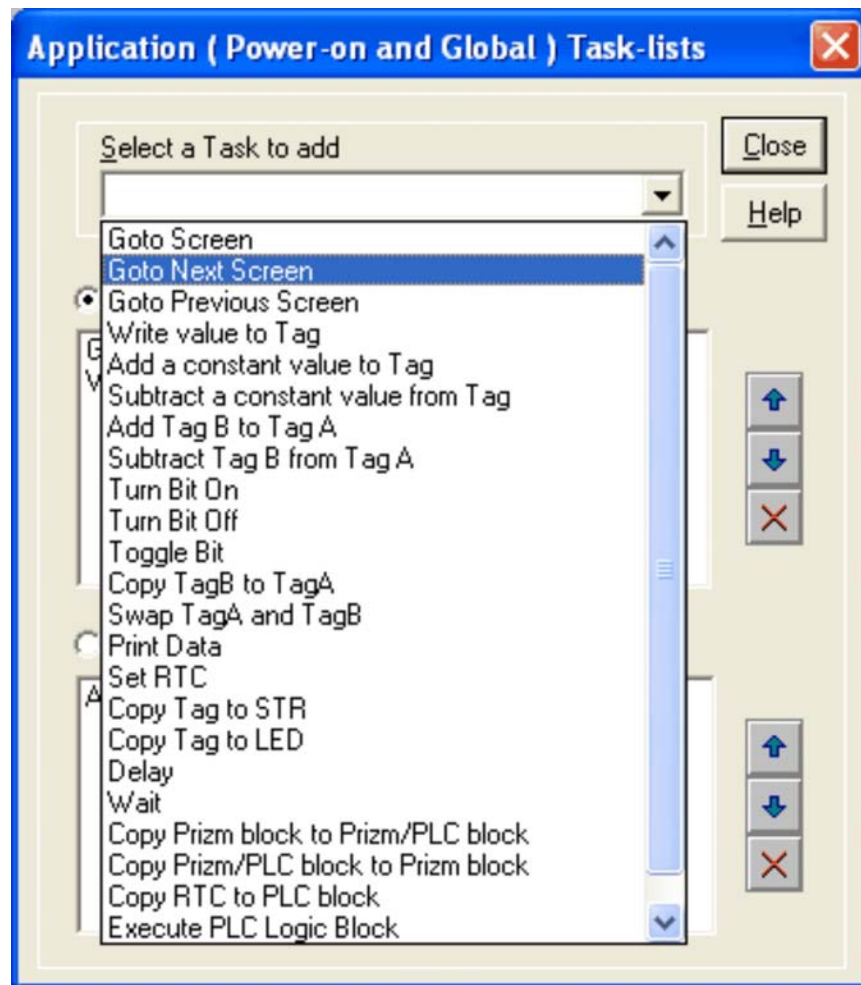
1. **Power On Tasks** : Tasks that are executed once when the HMI unit is powered on.
2. **Global Tasks** : Tasks that are executed every cycle.





Using the Up and Down buttons, the order of task execution can be changed. The Delete button removes a task from the task list.



## 6. TASK MANAGEMENT

Select a Task to add



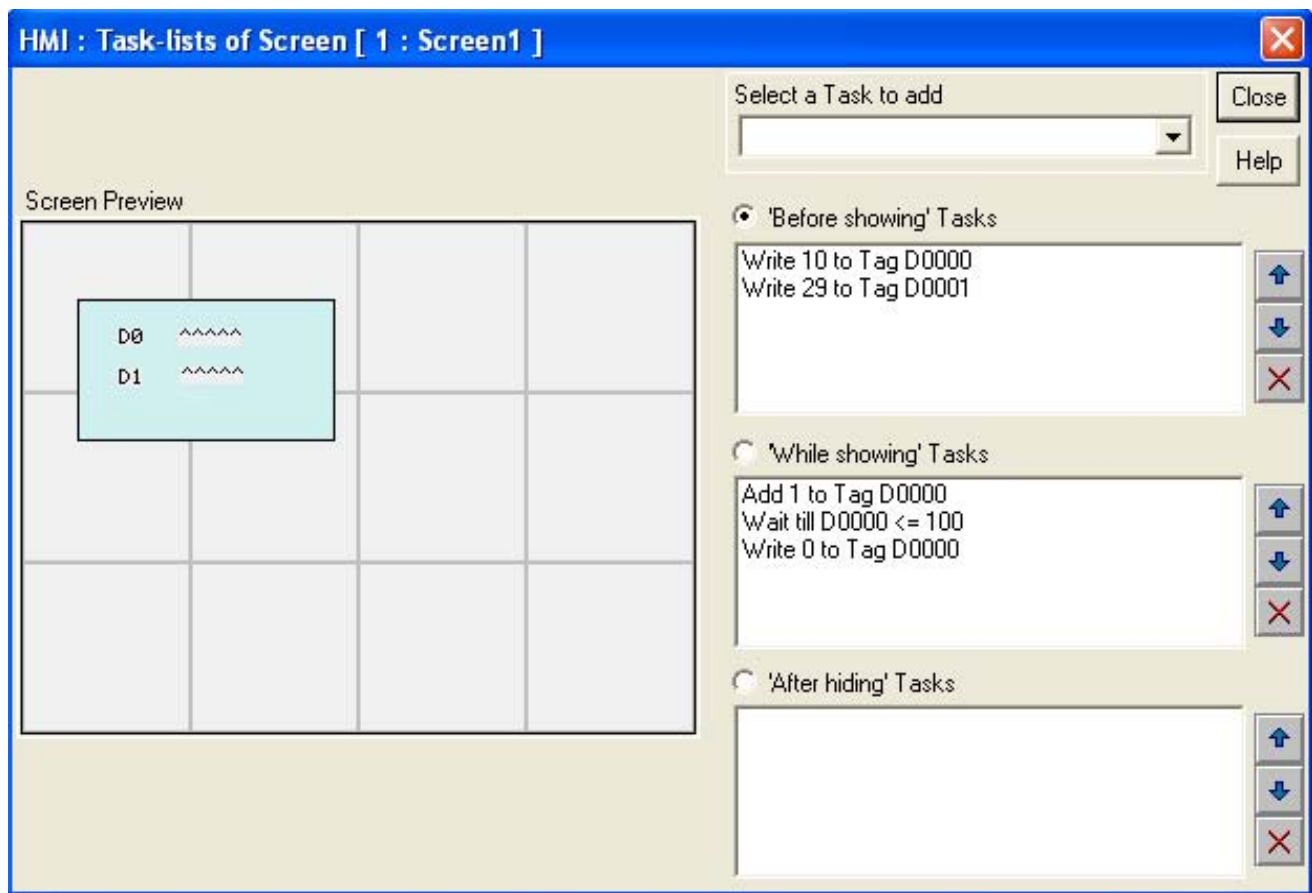
- Close**  : Accepts the selected task and closes the open window.
- Up arrow**  : Selected task is shifted up.
- Down arrow**  : Selected task is shifted down.
- Delete**  : Selected task is deleted.

### 6.2 Screen TaskList

These tasks are related to a specific screen. When a screen is displayed, the tasks defined for that screen are executed.

1. **Before showing Tasks** : These tasks are executed once just before the screen is displayed. Any screen specific initialization can be defined under this option.

2. **While showing Tasks** : These tasks are executed continuously as long as the screen is displayed.



### Example:

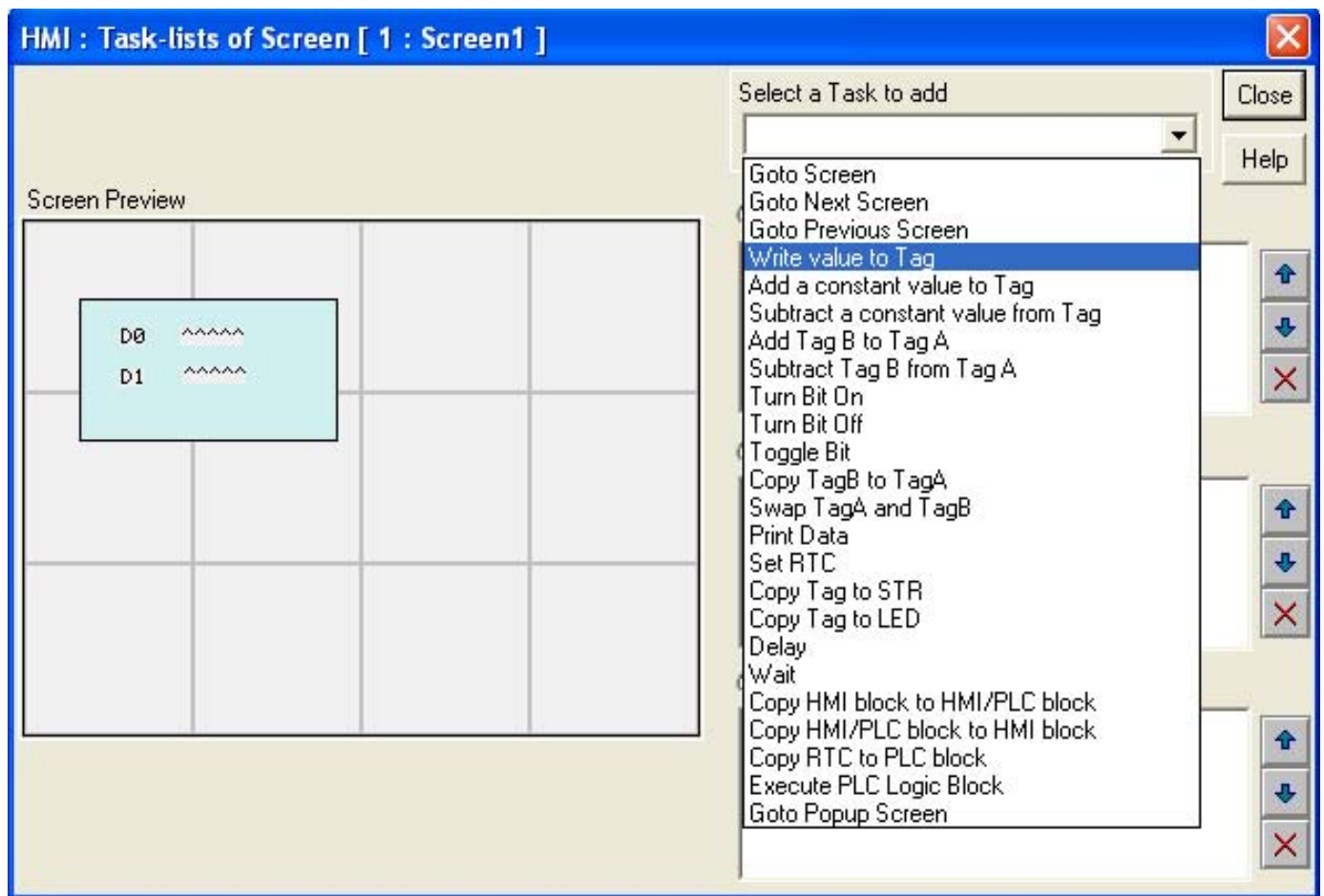
Let's suppose that Screen 1 is currently being displayed. Any tasks in the "While Showing" task list will be performed. An active PLC block sets the screen trigger register to another value. The various task lists will follow this path:

1. While clearing screen 1, the "After Hiding" task list for screen 1 is performed.
2. The "Before Showing" task for screen 2 is performed.
3. Screen 2 is displayed.
4. The "While Showing" task list is performed continuously for Screen 2.
5. When another screen is called for, the "After Hiding" task list of screen 2 is performed.

## 6. TASK MANAGEMENT

### Select a Task to add

User can select a Task from the list of Tasks available.



Close 

- Accepts selected task.

Up arrow 

- Selected task is shifted up.

Down arrow 

- Selected task is shifted down.

Delete 

- Selected task is deleted.

### 6.3 Key Tasklist

User can define task on key events like -

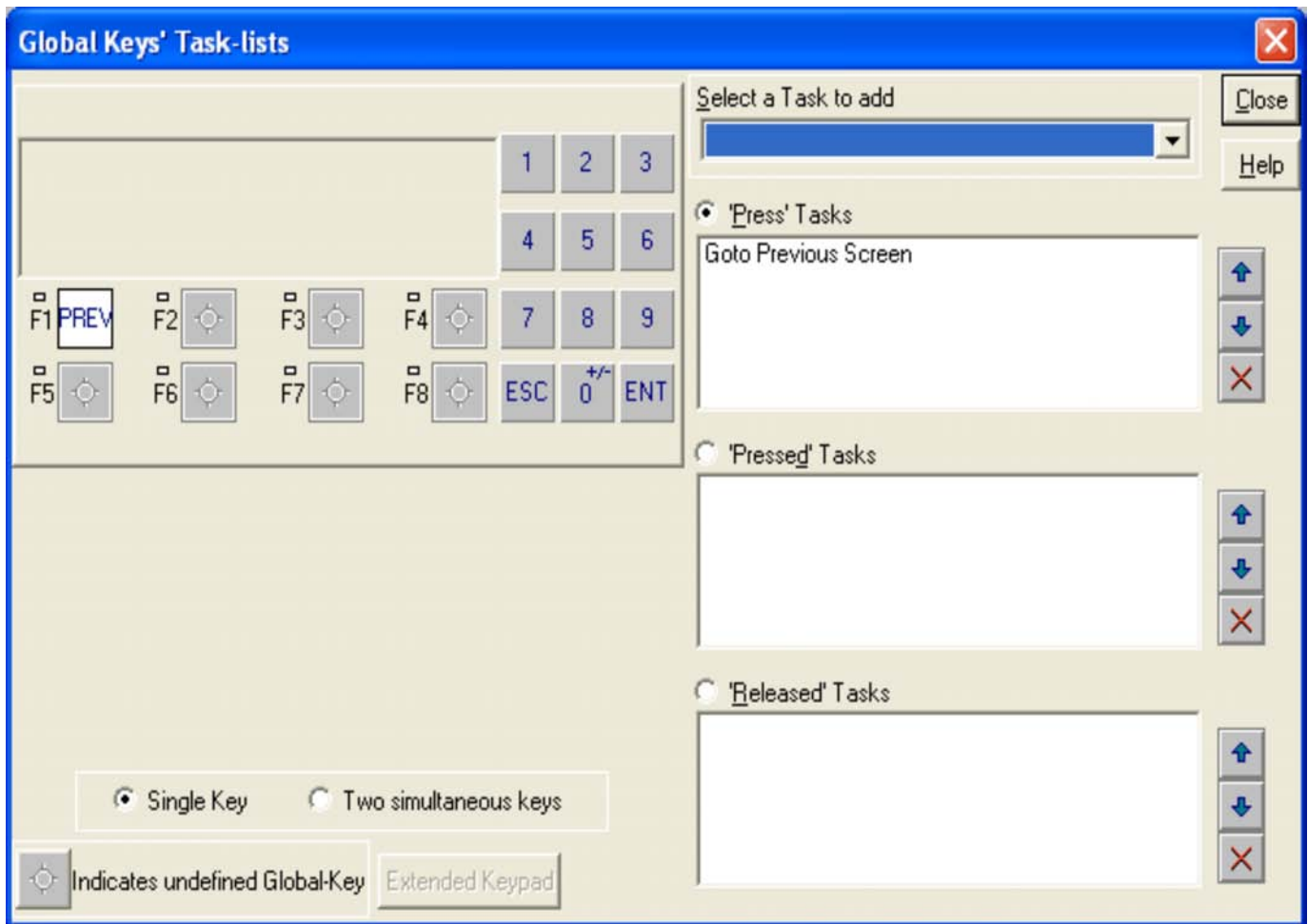
**Press Tasks** : These tasks are performed only once when the key is pressed.

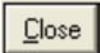



**Pressed Tasks** : These tasks are performed as long as the key is pressed.

**Released Tasks** : These tasks are performed when the key is released.

### 6.3.1 For Keypad Products

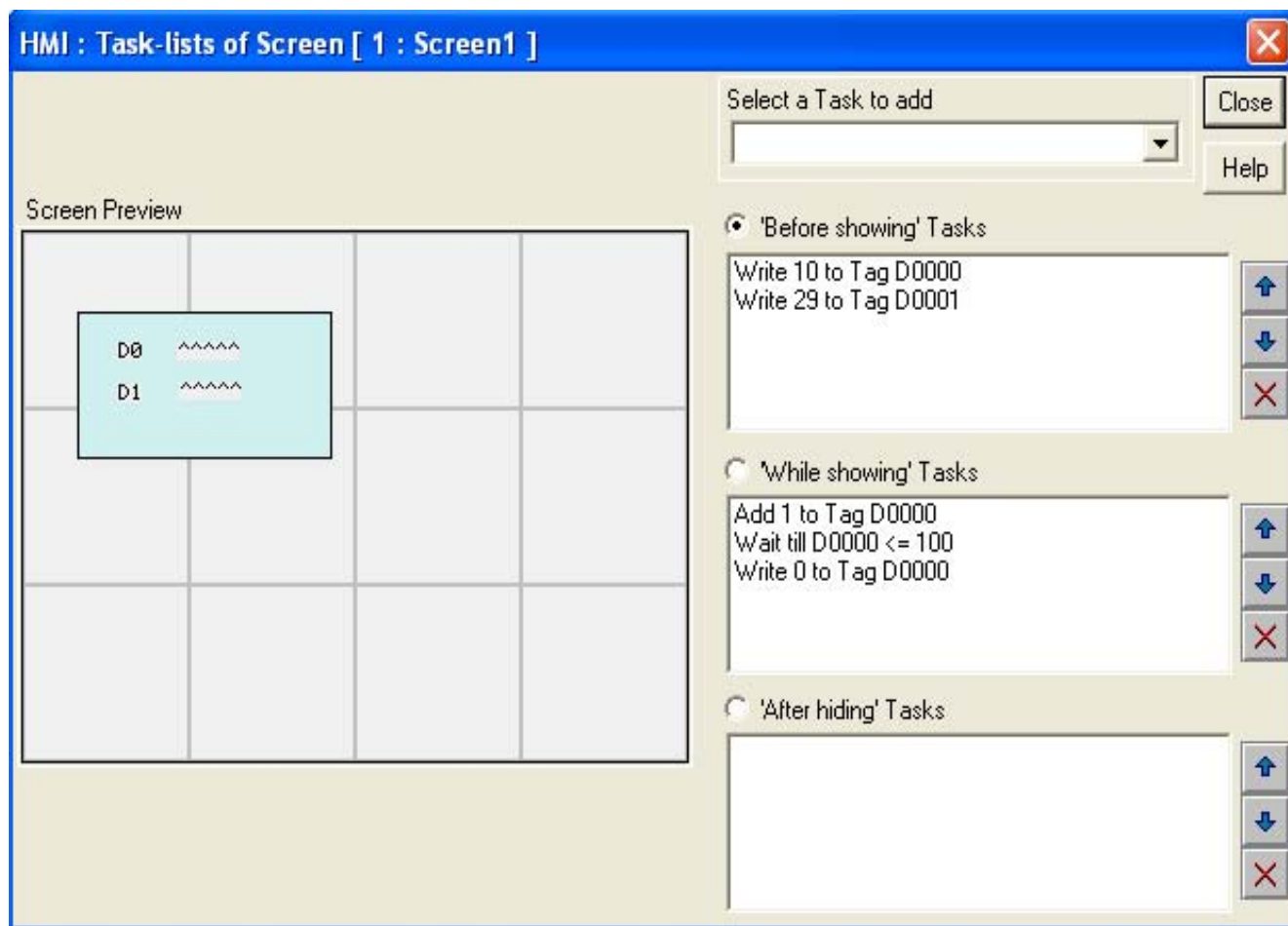
**1. Global Keys Tasklist** - Tasks defined under this option are executed for every HMI cycle regardless of the screen displayed.



- |                              |   |  |
|------------------------------|---|--|
| <b>Close</b>                 |  | : Accepts selected task.               |
| <b>Up arrow</b>              |  | : Selected task is shifted up.         |
| <b>Down arrow</b>            |  | : Selected task is shifted down.       |
| <b>Delete</b>                |  | : Selected task is deleted.            |
| <b>Single Key</b>            |   | : A task defined to one key.           |
| <b>Two simultaneous keys</b> |   | : Use two keys to create a task event. |

## 6. TASK MANAGEMENT

**2. Screen Keys' Tasklist** - Tasks defined under this option are executed only for the currently displayed screen . These are screen dependent tasks.



**Note:** Screen Keys' Tasklist has higher priority over Global Keys' Tasklist when the screen is displayed.

**Three types of screen task are possible**

1. Before showing
2. While showing
3. After hiding

**Before showing:** Tasks defined here are executed before screen is displayed in HM





**While showing:** Tasks defined here are executed in a loop mode while screen is displayed

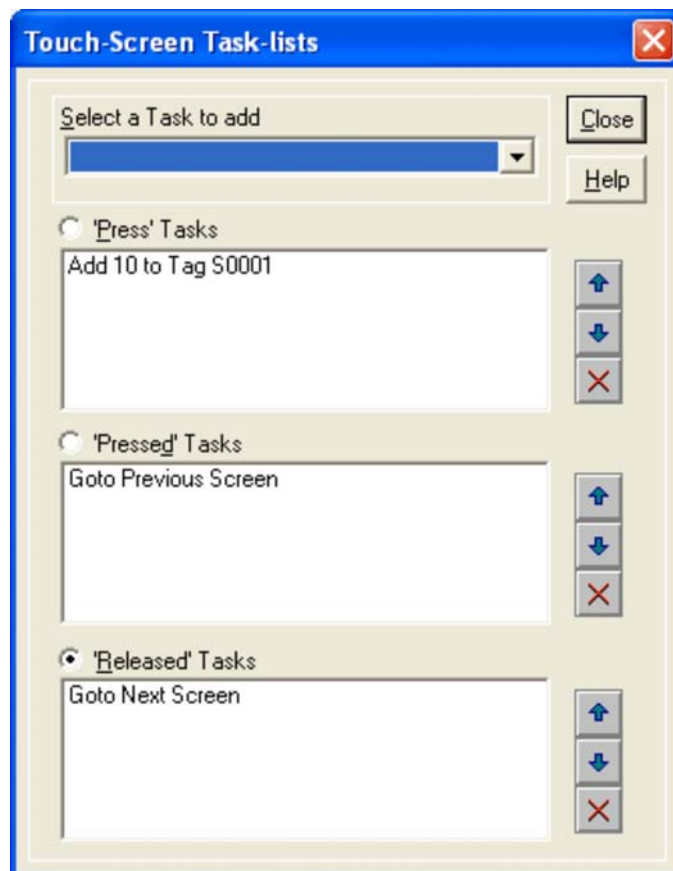
**After hiding:** Tasks defined here are executed before navigating to other screen, i.e., before closing the present screen.

### 6.3.2 For Touch screen Products

#### Touch-Screen Tasklist

To use this task we need a Button object (Bit Button or Word Button) on the screen. When the user touches within the Button area, the associated task is executed.

- |                   |   |                                  |
|-------------------|---|----------------------------------|
| <b>Close</b>      |  | - Accepts selected task.         |
| <b>Up arrow</b>   |  | - Selected task is shifted up.   |
| <b>Down arrow</b> |  | - Selected task is shifted down. |
| <b>Delete</b>     |  | - Selected task is deleted.      |



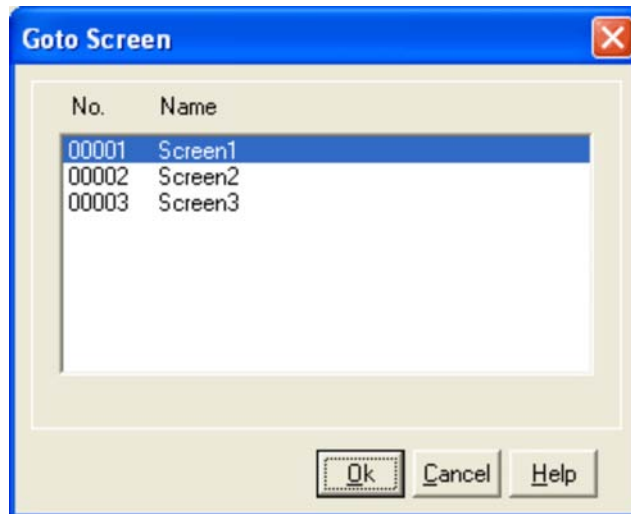
## 6. TASK MANAGEMENT

### 6.4 Description of Tasks

- **Goto Screen**

This task is used to jump to any available screen from list of available screens.

When we add Goto Screen task in the task list, a dialog box is displayed. It shows list of screens defined in the application.



To add this task, select a screen from the list and press 'Ok'. When this task is executed, control jumps to the selected screen.

- **Goto Next Screen**

When this task is executed, control jumps to next available screen. If user defines this task on the last screen, then after execution of this task "Screen not defined " message appears for 2 seconds and control comes back to last screen displayed.

- **Goto Previous Screen**

When this task is executed, control jumps to previous available screen. If user defines this task on the first screen, then after execution of this task "Screen not defined " message appears for 2 seconds and control comes back to last screen displayed.



- Write Value To Tag**

A constant value can be written to a tag using this task, provided the tag is not a read-only tag.

The screenshot shows the 'Tag Operations' dialog box. At the top, the 'Tag' dropdown menu is set to 'D0000 (D0)'. Below this, there are three main sections: 'Register operations', 'Bit operations', and 'Common operations'. In the 'Register operations' section, the radio button for 'Tag = Number' is selected. Below this section is a 'Number' input field containing the value '10'. At the bottom, there is a section for 'Number type' with five radio buttons: 'Unsigned [ 0 to 65535 ]' (selected), 'Signed [ -32768 to 32767 ]', 'Hexadecimal [ 0000 to FFFF ]', 'BCD [ 0 to 9999 ]', and 'Binary [ 16 bits ]'. On the right side of the dialog, there are three buttons: 'Ok', 'Cancel', and 'Help'.

E.g.- Tag = Number

This task is executed on register tag listed under Tag option. User can write only two bytes number in selected tag. If tag is defined as

1 byte - Low byte transfer to low-byte.

2 byte – Low and High bytes transfers respective bytes of tag.

4 byte – Only Low word transfer to tag.

For this task default setting is shown under 'Register operations'. If user change this selection, task will be changed. User can select number type - unsigned int, Signed, Hexadecimal, BCD and Binary.

User can select number type - unsigned int, Signed, Hexadecimal, BCD and Binary.

Click 'OK' to add task in task list.

## 6. TASK MANAGEMENT

- **Add a Constant Value To Tag**

This tag is used for adding a constant value to the current value of the tag.

The 'Tag Operations' dialog box is shown. It has a title bar with a close button. The 'Tag' dropdown menu is set to 'D0000 (D0)'. There are three main sections: 'Register operations', 'Bit operations', and 'Common operations'. In 'Register operations', 'Tag + Number' is selected. In 'Bit operations', 'On' is selected. In 'Common operations', 'Copy Tag B To Tag A' is selected. Below these sections, there is a 'Number' input field with '100' entered. At the bottom, there are radio buttons for 'Unsigned [ 0 to 65535 ]', 'Signed [ -32768 to 32767 ]', 'Hexadecimal [ 0000 to FFFF ]', 'BCD [ 0 to 9999 ]', and 'Binary [ 16 bits ]'. The 'Unsigned [ 0 to 65535 ]' option is selected. On the right side, there are buttons for 'Ok', 'Cancel', and 'Help'.

E.g.- Tag = Tag + Number

This task is executed on register tag listed under Tag option. User can add only two byte number in selected tag.

Tag Type	Operation	Number	Result
1 Byte	+	2 Byte	1 Byte
2 Byte	+	2 Byte	2 Byte
4 Byte	+	2 Byte	Lower 2 Byte

For this task default setting is shown under 'Register operations'. If user change this selection, task will be changed. User can select number type - unsigned int, Signed, Hexadecimal, BCD and Binary. Click 'OK' to add task in task list.

- Subtract a Constant Value From Tag**

This task is used to subtract a constant value from the current value of a tag.

**Tag Operations**

Tag:

Register operations:

- ☐ Tag = Number
- ☐ Tag + Number
- ☒ Tag - Number
- ☐ Tag A = Tag A + Tag B
- ☐ Tag A = Tag A - Tag B

Bit operations:

- ☐ On
- ☐ Off
- ☐ Hold On
- ☐ Hold Off
- ☐ Toggle

Common operations:

- ☐ Copy Tag B To Tag A
- ☐ Swap Tag A and Tag B
- ☐ Copy Tag to STR
- ☐ Copy Tag to LED

Number:

Number type:

- ☒ Unsigned [ 0 to 65535 ]
- ☐ Signed [ -32768 to 32767 ]
- ☐ Hexadecimal [ 0000 to FFFF ]
- ☐ BCD [ 0 to 9999 ]
- ☐ Binary [ 16 bits ]

Buttons: Ok, Cancel, Help

E.g.- Tag = Tag - Number

This task is executed on register tag listed under Tag option. User can subtract only two byte number in selected tag.

Tag Type	Operation	Number	Result
1 Byte	-	2 Byte	1 Byte
2 Byte	-	2 Byte	2 Byte
4 Byte	-	2 Byte	Lower 2 Byte

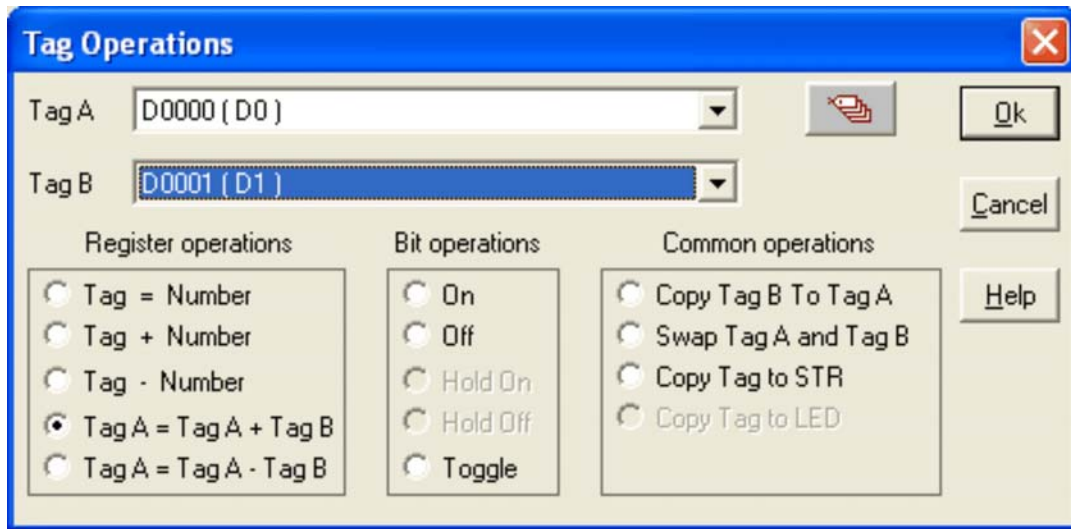
For this task default setting is shown under 'Register operations'. If user change this selection, task will be changed. User can select number type - unsigned int, Signed, Hexadecimal, BCD and Binary.

Click 'OK' to add task in task list.

## 6. TASK MANAGEMENT

- **Add Tag B To Tag A**

This tag is used for addition of two PLC Tags . The result will be stored in tag A.



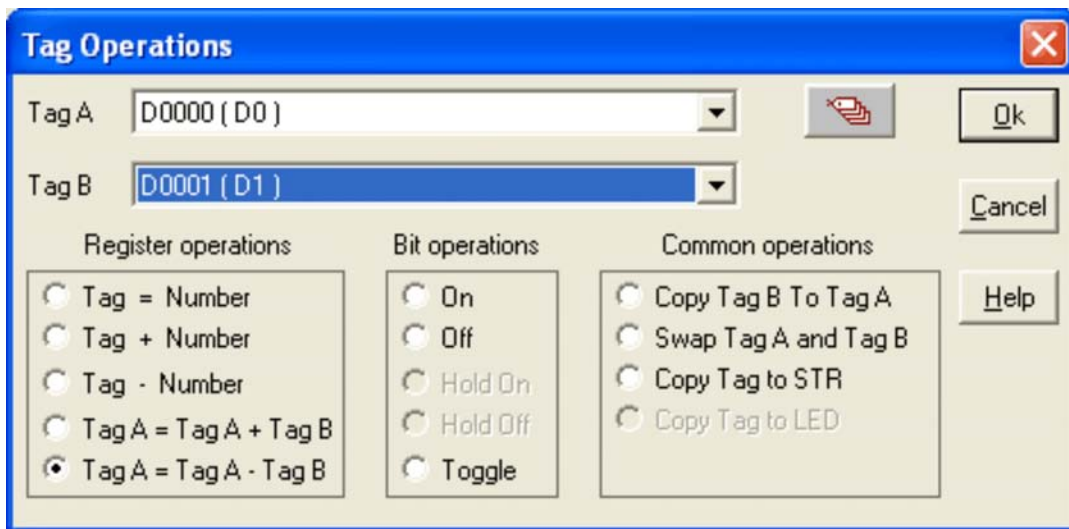
E.g..-  $\text{TagA} = \text{TagA} + \text{TagB}$

This task is applicable for register type tags only.

For successful operation both tag must be of same attributes like data type ( unsigned int, signed int, Hex etc.) and size (1 byte, 2 byte, 4 byte etc.)

- **Subtract Tag B from Tag A**

This task is used for subtracting two PLC tags. The result will be stored in tag A.



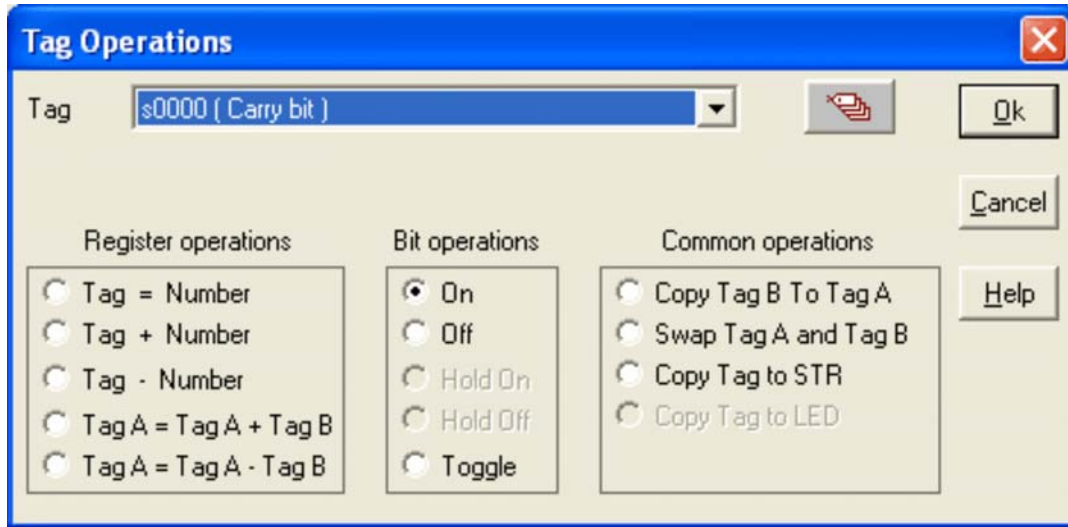
E.g..-  $\text{TagA} = \text{TagA} - \text{TagB}$

This task is executed with selected register type tags only.

For successful operation both tag must be of same data type (unsigned int, signed int, Hex etc.) and size (1 byte, 2 byte, 4 byte etc.)

- **Turn bit On**

This task is used for switching PLC coil or register bit to on state. The bit/coil should be a read-write coil.

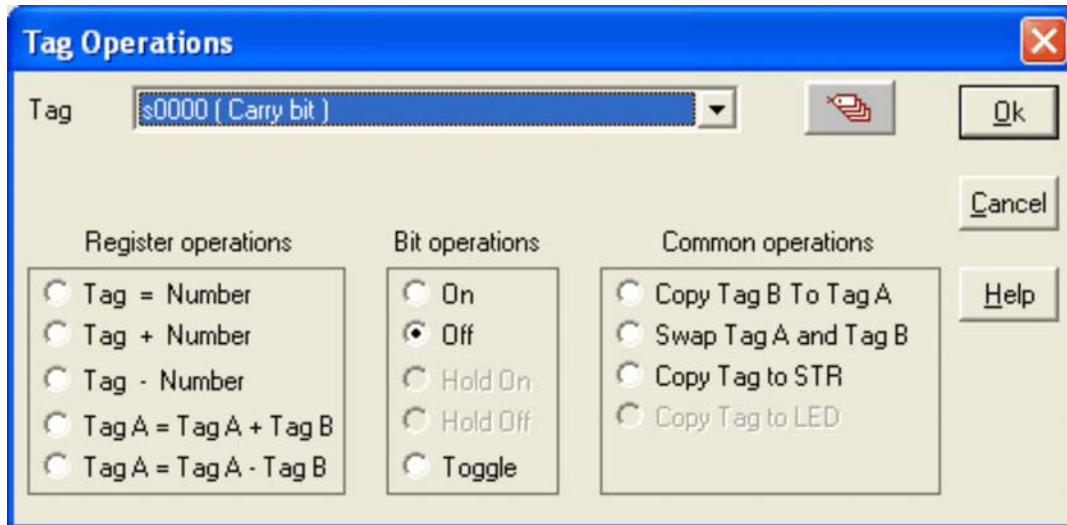


This task is executed on coil or bit-addressed register only. User can select coil or bit-addressed register from tag list. By using this task user can set bit/coil to 1.

For this task default setting is shown under 'Bit operations'. If user change this selection, task will be changed. Click 'OK' to add task in task list.

- **Turn bit Off**

This task is used for switching Plc coil or register bit to off state. The bit/coil should be a read-write coil.



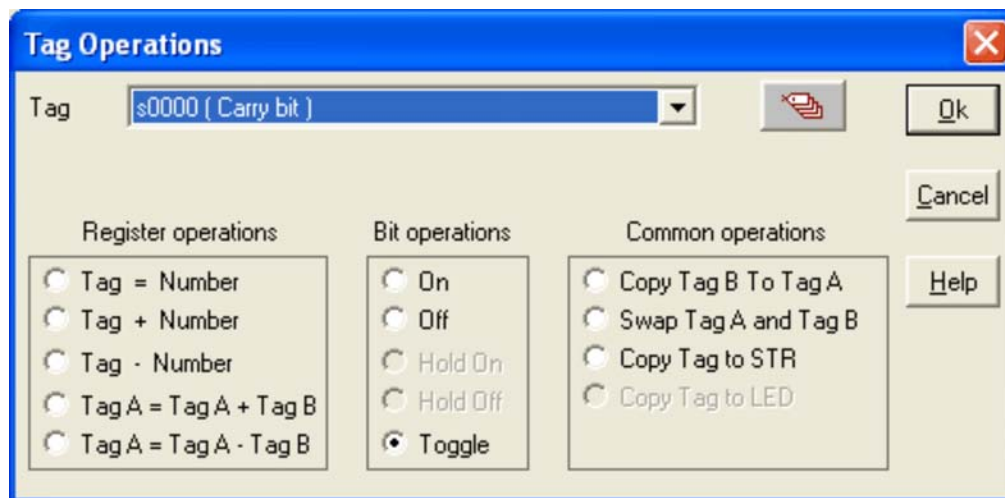
This task is executed on coil or bit-addressed register only. User can select coil or bit-addressed register from tag list. By using this task user can set bit/coil to 0.

For this task default setting is shown under 'Bit operations'. If user change this selection, task will be changed. Click 'OK' to add task in task list.

## 6. TASK MANAGEMENT

- **Toggle bit**

This task is used for toggling state of PLC coil or register bit. The bit/coil should be a read-write coil.

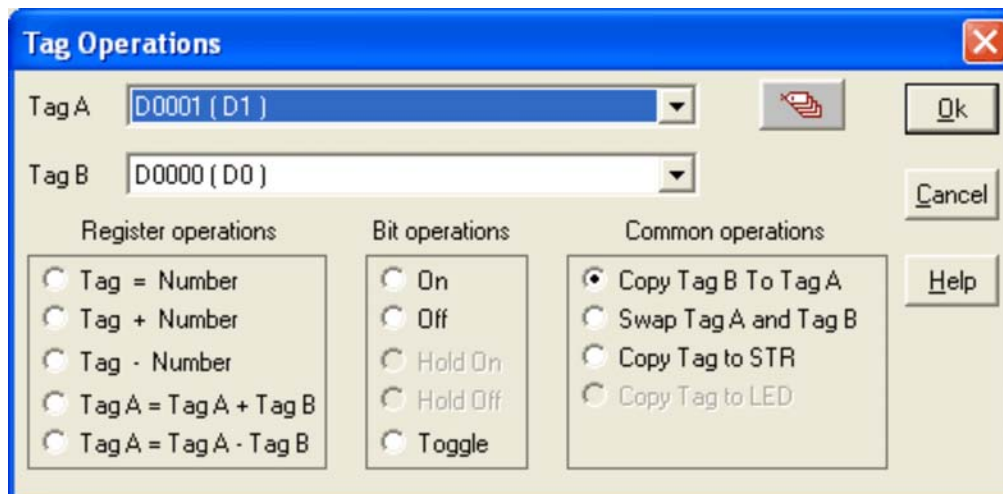


This task is executed on coil or bit-addressed register only. User can select coil or bit-addressed register from tag list. When this task is executed, the bit/coil is set to 1 if it was 0 previously and vice-versa.

For this task default setting is shown under 'Bit operations'. If user change this selection, task will be changed. Click 'OK' to add task in task list.

- **Copy Tag B to Tag A**

This task is used for copying value of one PLC tag to Other PLC tag. The value of tag B will be unchanged. Tag A will be same as tag B.



E.g.- Tag A = Tag B

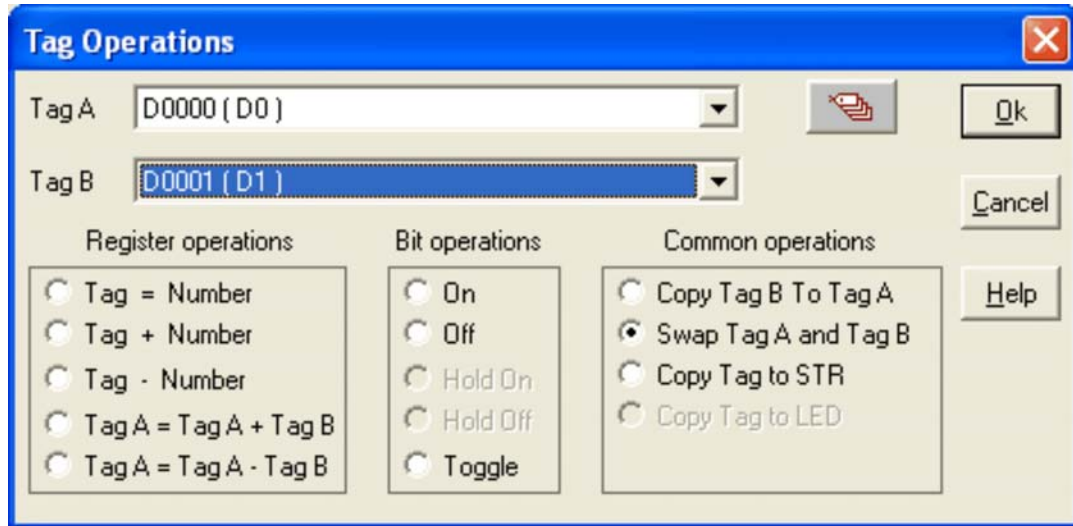
This task is executed on register tags and coil or bit-addressed register listed under Tag option. Both tag type must be of same type; either register type or coil/bit type. If the selected tags are of register type than this command is executed depending on the tag length (i.e. 1 byte, 2 byte, 4 byte ).

For this task default setting is shown under 'Common operations'. If user change this selection, task will be changed. Click 'OK' to add task in task list.



- **Swap Tag A and Tag B**

This task is used for swapping the values of two PLC tags. Tag A value will be copied to tag B and tag B value will be copied to tag A.



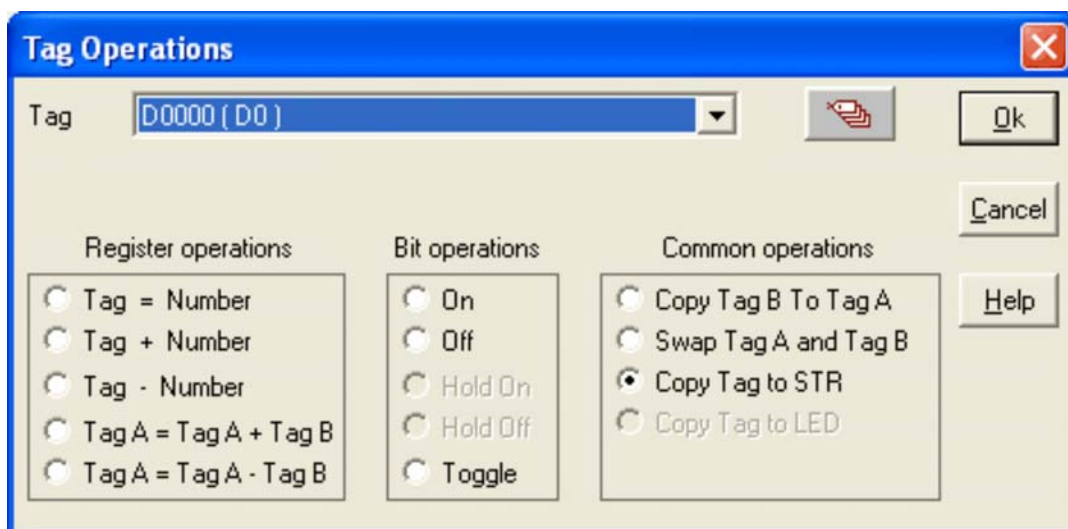
This task is executed on register tags and coil or bit-addressed register listed under Tag option. Both tag type must be of same type; either register type or coil/bit type. If the selected tags are of register type than this command is executed depending on the tag length (i.e. 1 byte, 2 byte, 4 byte ). User can interchange values of Tag A and Tag B by using this command.

For this task default setting is shown under 'Common operations'. If user change this selection, task will be changed.

Click 'OK' to add task in task list.

- **Copy Tag to STR**

This is a very important task which allows user to copy the value of selected PLC Tag to STR i.e. Screen Trigger register. Screen Trigger Register is a system register inside HMI which decides the screen to be displayed. PLC tag can be copied to STR.



## 6. TASK MANAGEMENT

E.g.- STR (Screen Triggering Register) = Tag A

This task is executed on register tags listed under Tag option. Two byte tag value are transferred to STR. This task is used to jump to the screen number specified by value of STR.

For this task default setting is shown under 'Common operations'. If user change this selection, task will be changed. Click 'OK' to add task in task list.

- **Copy tag to LED**

LED's on the keypad of HMI 201 can be turned on/off depending on the value of a tag. The tag should be copied to LED register and the LEDs will display the tag value.

**Note : This task is supported only for HMI 201 Keypad based product.**

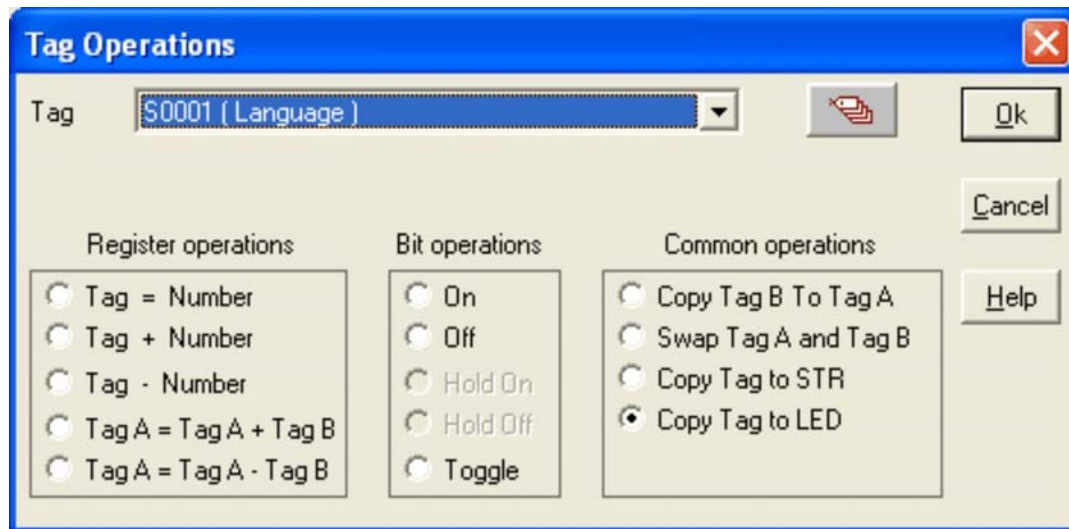
Depending upon the number of LEDs, the 0<sup>th</sup> bit of the tag gets copied into the LED representing the first function key (F1). The first bit of tag gets copied into the LED representing the second function key (F2) and so on.

**Note :** HMI 201 have two Programmable LEDs, which are not associated with the function keys. It is located on left side of HMI

In HMI 201, there are 8 function key LEDs, which will be used to store the first 8 bits ( 0 through 7 ) of the tag. 8<sup>th</sup> and 9<sup>th</sup> bits of the tag get copied into two programmable LEDs shown in the left side.







E.g.- LED = Tag A

LED is a internal unit register mapped to LED's displayed on unit. This task is executed on register tags listed under Tag option. Two byte tag value are transferred to LED register.

For this task default setting is shown under 'Common operations'. If user change this selection, task will be changed.

Click 'OK' to add task in task list.

## 6. TASK MANAGEMENT

- **Delay**

Any task can be delayed using this task. Tags will be updated during this delay. After the delay is completed the next task will be performed.

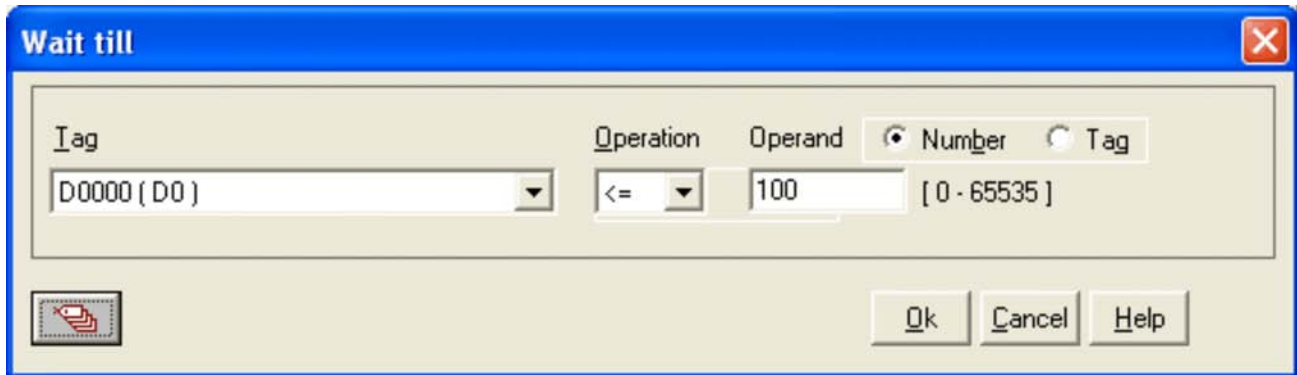


This task is supported for screen 'While showing' only. User can specify delay from 1 sec to max 3600 sec.

**Note:** More than 1 delay task is not supported.

- Wait**

This is a conditional delay. Next task will not be performed till the specified condition is false. Execution remains in wait state till wait condition is true. Task following wait task is executed only after wait condition is false. Operand could be either number between 0 to 65535 or PLC tag.



The 'Wait till' dialog box has a blue title bar with a close button. It contains a 'Tag' dropdown menu with 'D0000 (D0)' selected, an 'Operation' dropdown menu with '<=' selected, and an 'Operand' text box with '100' and a range '[ 0 - 65535 ]'. There are radio buttons for 'Number' (selected) and 'Tag'. At the bottom are 'Ok', 'Cancel', and 'Help' buttons, and a small icon on the left.

This task is supported only in 'While showing' Tasks of the Screen Task-list. Tasks defined after this task are not executed until the condition specified is true.


Here Tag is compared with the Operand. Operand can be a Number (0-65535) or Tag. Operation can be =, !=, <, <=, >, >=.

If Tag to be compared is bit/coil type then it is compared with On/Off state.

Click 'OK' to add task in task list.

- Set RTC**

User can edit RTC (Real Time Clock) registers of the HMI unit. This task increments selected RTC register at a time for one instance. User edit Year / Month / Date / Hour / Minutes / Seconds / Day of the week. User must place a Time / Date object on the screen for editing the RTC. This task is supported in key tasks only.



The 'Real Time Clock settings' dialog box has a blue title bar with a close button. It is divided into two columns: 'Increment' and 'Decrement'. Each column has radio buttons for Year, Month (selected), Date, Hour, Minute, Second, and Day of Week. At the bottom are 'Ok', 'Cancel', and 'Help' buttons.

## 6. TASK MANAGEMENT

By using this task, user can set time and date for Real Time Clock (RTC). This can be done by incrementing or decrementing Year, Month, Date, Hour, Minute, Second or Day of Week. Increment / decrement is done by 1. From these references, RTC counts all parameters with leap year compensation.

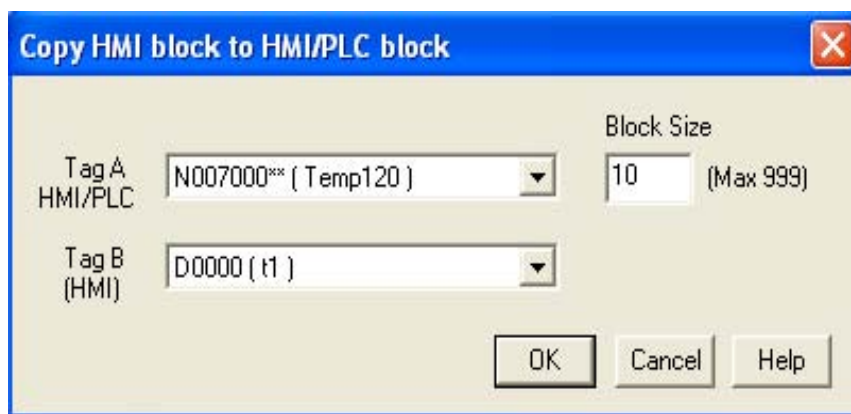
Click 'OK' to add task in task list.

- **Print Data**

This task is supported in key tasks only. Alphanumeric data displayed on current screen can be printed using this task. User has to define the port as 'Serial printer' for executing this task. Any of the two ports can be configured for printing and printing will be done from the port which is configured for printing as mentioned above.

- **Copy HMI Block to HMI/PLC Block**

This task is executed on register tags only. This task is used to copy unit tags to PLC tags. This is two byte copy command. Unit block means any unit tags or retentive memory area.

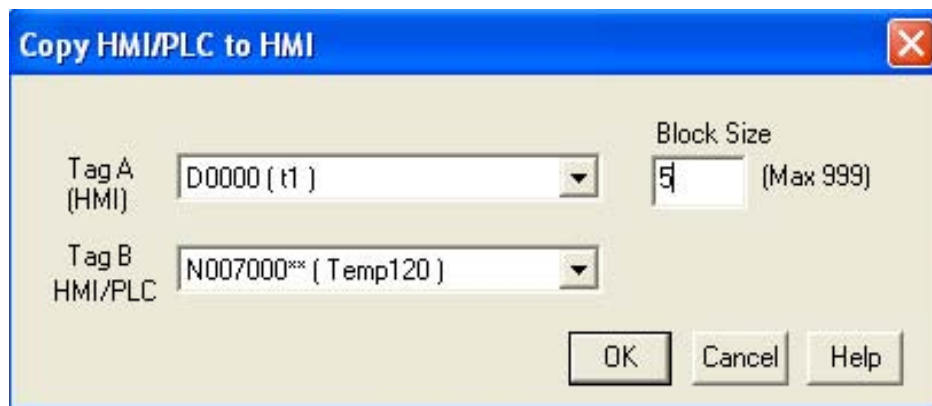


For e.g.- As shown above, tags starting from D0000 (i.e. D0000 to D0009) will be copied to 10 sequential PLC tags starting from N007000 (i.e. N7000 to N7009).

Click 'OK' to add task in task list.

- **Copy PLC Block to HMI Block**

This task is executed on register tags only. This task is used to copy PLC tags to HMI tags. This is two byte copy command. Unit block means any unit tags or retentive memory area.



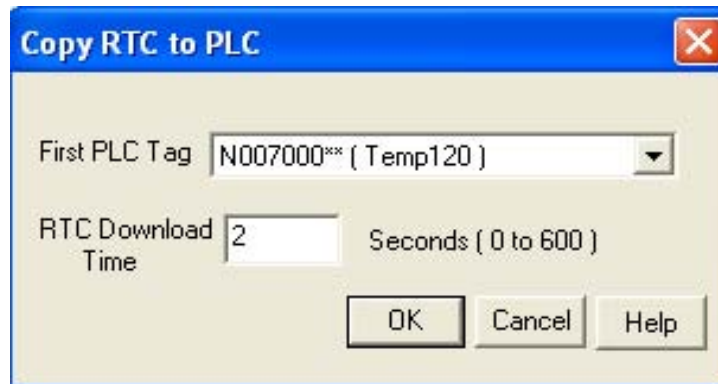
## 6. TASK MANAGEMENT

For e.g.- As shown above, 5 sequential PLC tags starting from N7000 (i.e. N7000 to N7004) will be copied to 5 sequential unit tags starting from D0000 (i.e. D0000 to D0004).

To prevent number of write cycles to EEPROM (retentive memory area), this command is not supported in Global\_task-list and While showing task-list, if retentive register is selected as unit tag.

Click 'OK' to add task in task list.

- **Copy RTC to PLC Block**



This task is supported only in Global task-list. This task copies sequentially 7 RTC parameters from selected tag after every specified RTC Download Time. If this time is specified as 0 seconds then it means this task will be executed as per Global task-list execution time.

Click 'OK' to add task in task list.

7 RTC parameters are copied in the PLC Tags starting from the First PLC Tag (N7000 as shown above) following sequence-

- 1st Tag - Hours
- 2nd Tag - Minutes
- 3rd Tag - Seconds
- 4th Tag - Date
- 5th Tag - Month
- 6th Tag - Year
- 7th Tag - Day of week

- **Goto Popup Screen**



## 6. TASK MANAGEMENT

This task is supported in touch screen products only . User can select screen number from available popup screen list .

Click 'OK' to add task in task list.

When this task is executed selected screen pops up on current screen. At a time only one screen can be popped up. By pressing right most corner 'X' close button you can close popup screen.

- **Keys' Specific Tasks**

This task enables user to define task which are specific for keys. This task is specially useful for editing data in the

**KEYs' specific tasks**

<input checked="" type="radio"/> Clear Data Entry	<input type="radio"/> Numeric Key 0	<input type="radio"/> Numeric Key A	<input type="radio"/> Acknowledge Alarm
<input type="radio"/> Cancel Data Entry	<input type="radio"/> Numeric Key 1	<input type="radio"/> Numeric Key B	<input type="radio"/> Acknowledge All Alarms
<input type="radio"/> Accept Data Entry	<input type="radio"/> Numeric Key 2	<input type="radio"/> Numeric Key C	<input type="radio"/> Previous Alarm
<input type="radio"/> Switch to Next Data Entry	<input type="radio"/> Numeric Key 3	<input type="radio"/> Numeric Key D	<input type="radio"/> Next Alarm
<input type="radio"/> Increase Value by 1	<input type="radio"/> Numeric Key 4	<input type="radio"/> Numeric Key E	<input type="radio"/> Previous Historical Alarm
<input type="radio"/> Decrease Value by 1	<input type="radio"/> Numeric Key 5	<input type="radio"/> Numeric Key F	<input type="radio"/> Next Historical Alarm
<input type="radio"/> Increase Digit by 1	<input type="radio"/> Numeric Key 6		<input type="radio"/> Refresh all Trends
<input type="radio"/> Decrease Digit by 1	<input type="radio"/> Numeric Key 7		<input type="radio"/> Start Logger for all groups
<input type="radio"/> Shift Value to Left	<input type="radio"/> Numeric Key 8		<input type="radio"/> Stop Logger for all groups
<input type="radio"/> Move Cursor to Left	<input type="radio"/> Numeric Key 9		<input type="radio"/> Start Logger of group <input type="text" value="1"/> [1 - 4]
<input type="radio"/> Move Cursor to Right			<input type="radio"/> Stop Logger of group <input type="text" value="1"/> [1 - 4]
<input type="radio"/> Sign Key ( +/- )	<input type="radio"/> Edit Bit On		<input type="radio"/> Clear Log Memory
<input type="radio"/> Sign Key ( +/- ) and 0	<input type="radio"/> Edit Bit Off		<input type="radio"/> Clear Historical Alarm Memory

Ok Cancel Help

## 6. TASK MANAGEMENT

No.	Tasks	Description
1	Clear Data Entry	Clears active data entry value to 0.
2	Cancel Data Entry	Disables data entry
3	Accept Data Entry	Accepts edited data for current data entry and cursor jumps to next data entry object.
4	Switch To Next Data Entry	Disables previous data entry and switches to next data entry.
5	Increase Value by 1	Adds 1 to Tag value in data entry object.
6	Decrease Value by 1	Subtracts 1 from Tag value in data entry object.
7	Increase Digit by 1	This task is executed only on single digit shown by cursor. The digit scrolls between 0 to 9.
8	Decrease Digit by 1	This task is executed only on single digit shown by cursor. The digit scrolls between 0 to 9.
9	Shift Value to Left	Shifts value to left by padding zeros from right side.
10	Move Cursor to Left	Moves the cursor to the left. This task is not scrolling type so cursor moves upto number of digits in the data entry object.
11 upto	Move Cursor to Right	Moves the cursor to the right. This task is not scrolling type so cursor moves number of digits in the data entry object.
12	Sign Key (+/-)	This task operates only on Signed data. On each event sign toggles between + and -.
13 it	Sign Key (+/- and 0)	For the first iteration this task acts as Sign Key. Then for each of the iterations, acts as Numeric key 0.
14	Numeric Key 0	Allows user to enter '0' at cursor location, if selected tag is Register type. For Coil / Bit type, this task acts as 'Edit Bit Off'.
15	Numeric Key 1	Allows user to enter '1' at cursor location, if selected tag is Register type. For Coil / Bit type, this task acts as 'Edit Bit On'.
16	Numeric Key 2	Allows user to enter '2' at cursor location.
17	Numeric Key 3	Allows user to enter '3' at cursor location.
18	Numeric Key 4	Allows user to enter '4' at cursor location.
19	Numeric Key 5	Allows user to enter '5' at cursor location.
20	Numeric Key 6	Allows user to enter '6' at cursor location.
21	Numeric Key 7	Allows user to enter '7' at cursor location.
22	Numeric Key 8	Allows user to enter '8' at cursor location.
23	Numeric Key 9	Allows user to enter '9' at cursor location.
24	Numeric Key A	Allows user to enter 'A' at cursor location.
25	Numeric Key B	Allows user to enter 'B' at cursor location.
26	Numeric Key C	Allows user to enter 'C' at cursor location.

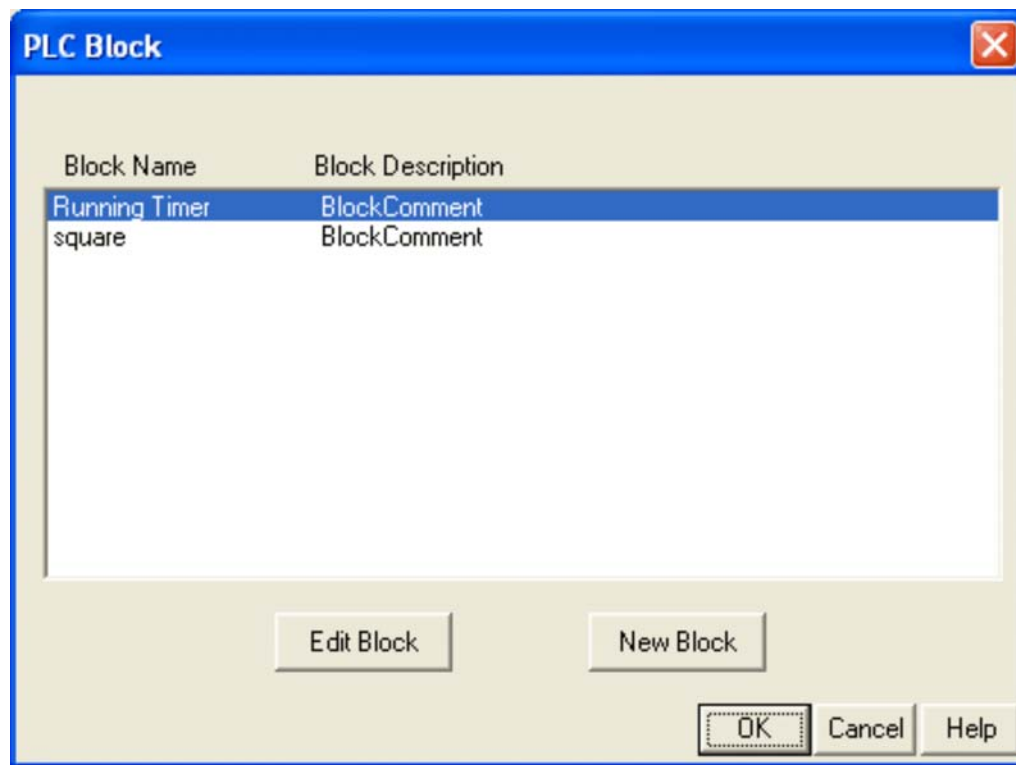
## 6. TASK MANAGEMENT

No.	Tasks	Description
27	Numeric Key D	Allows user to enter 'D' at cursor location.
28	Numeric Key E	Allows user to enter 'E' at cursor location.
29	Numeric Key F	Allows user to enter 'F' at cursor location. <b>Note: Numeric keys A to F are applicable for HEX data entry only.</b>
30	Edit Bit On	This task operates only on coil / bit tags. Coil / bit is set to 1 from this task.
31	Edit Bit Off	This task operates only on coil / bit tags. Coil / bit is set to 0 from this task.
32	Acknowledge Alarm	Acknowledges the first alarm (top position in the Real time alarm window)
33	Acknowledge All Alarms	Unlike Acknowledge Alarm task, this task acknowledges all alarms.
34	Previous Alarm	The alarm display position in the Real time alarm container is shifted one position up.
35	Next Alarm	The alarm display position in the Real time alarm container is shifted one position down.
36	Previous Historical Alarm	The alarm display position in the Historical alarm container is shifted one position up.
37	Next Historical Alarm	The alarm display position in the Historical time alarm container is shifted one position up.
38	Refresh All Trend	Clears all the historical alarms.
39	Start Data Logger for all groups	Starts the data logger for all the four groups.
40	Stop Data Logger for all groups	Stops the data logger for all the four groups.
41	Start Logger for groups	Starts the data logger for the specific groups (in the range of 1 to 4 groups).
42	Stop Logger for groups	Stops the data logger for the specific groups (in the range of 1 to 4 groups).
43	Clear Log Memory	Clears Data Logger Memory
44	Clear Historical Alarm Memory	Clears all the displayed historical alarms from memory.

**Note: Task 1 to Task 31 operates only for data entry object.**



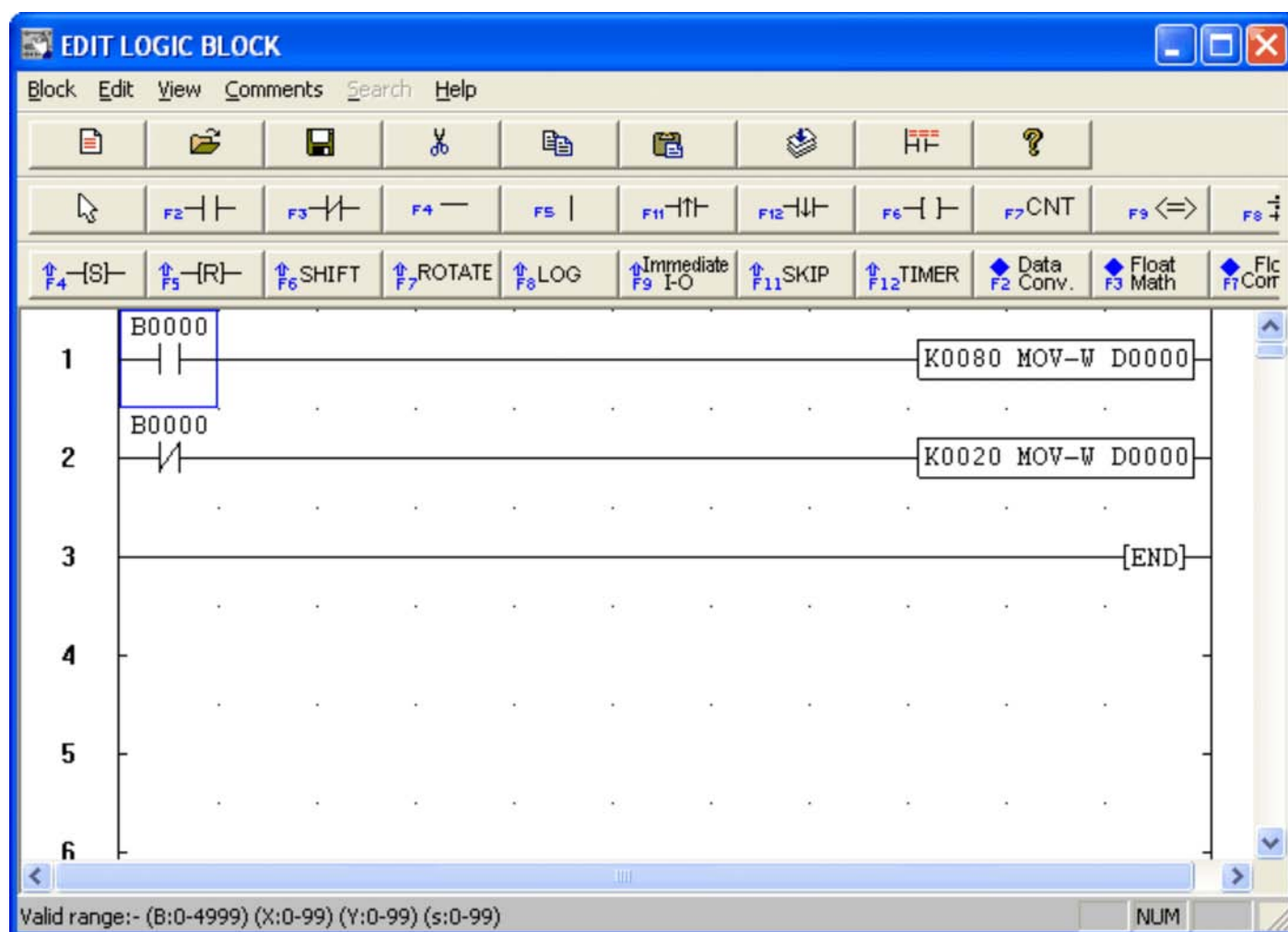
- **Execute PLC Logic Block**



This task is used for ladder logic block execution. New block allows to create new Logic block where as Edit block allows to edit existing Logic block. Click on help button to get more about ladder logic block creation and compilation.

## 6. TASK MANAGEMENT

Clicking on Edit Block opens Ladder window as below.



Note that since ladder compilation is not supported for Windows 95/98, this task can not be used under Windows 95/98/Me.

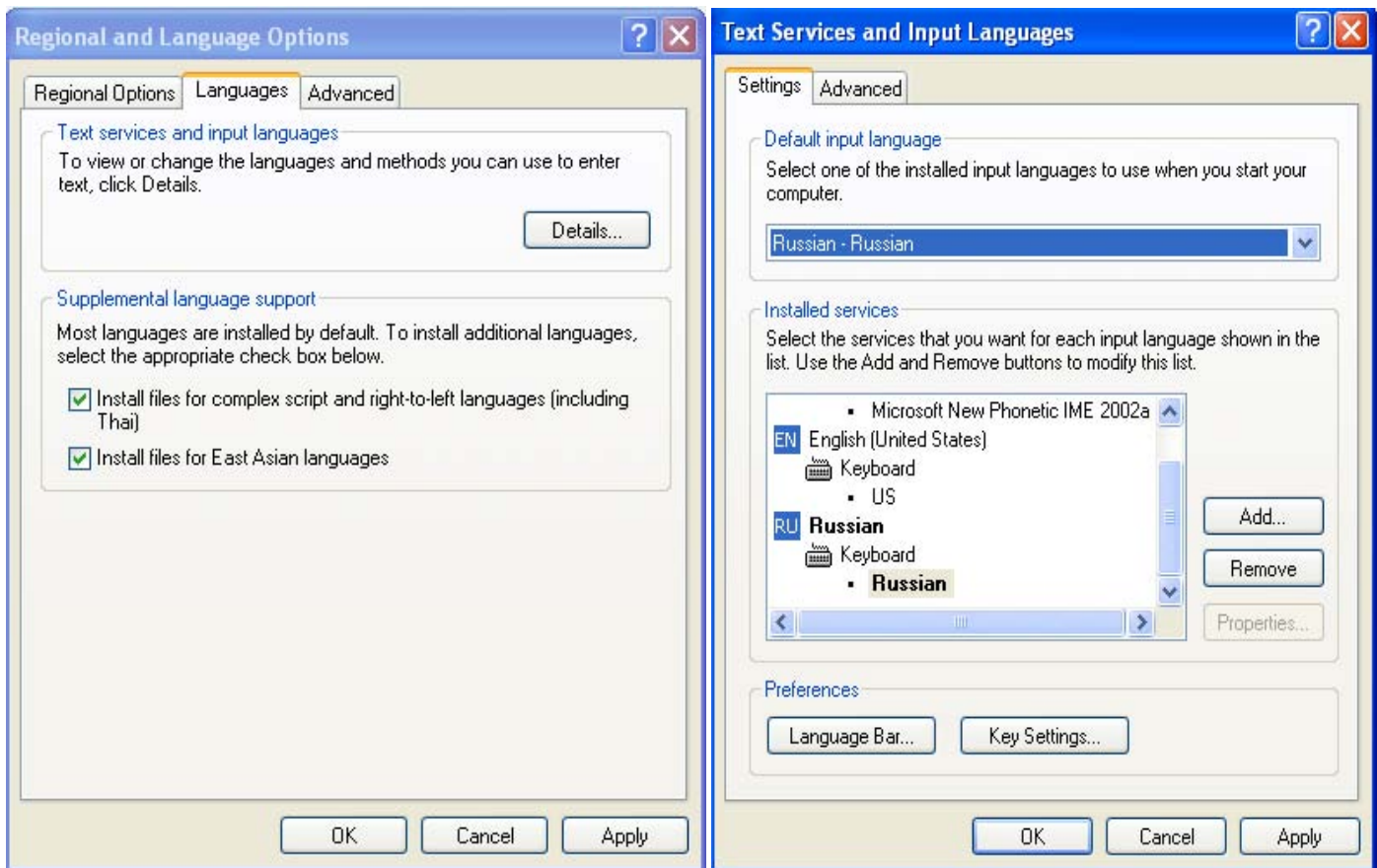
## 7.1 Language Conversion Utility

The purpose of the Language Conversion Utility is to be able to define text objects in language(s) other than the default language, which is English. To understand the concept, consider following example. Suppose a project is created for 2 languages, English and Russian. While creating the project, the text objects are defined only in English since the person who created the project does not know Russian. The first step in the language translation project is to export all of the text objects using the export function in the Prizm software. The next step is to send the exported file and the Language Conversion Utility to someone who will translate the English text objects into Russian. The last step is to import the text objects in the translated project. All of the text objects can now be viewed in Russian as well as English. This utility reads the file exported by the application software and displays the text objects in a grid. Text data for all languages defined by the Unit Settings are loaded. Except for English, the data for any other language can be edited within the grid. When a text object is edited, the appropriate language keyboard is activated.

### Language Conversion Utility – GUI

#### 7.1.1 Set PC for multiple languages

1. Select additional language in the PC being used for configuring HMI.  
My computer - Control panel - Regional settings - Languages - Details  
For ex: Select Russian language.

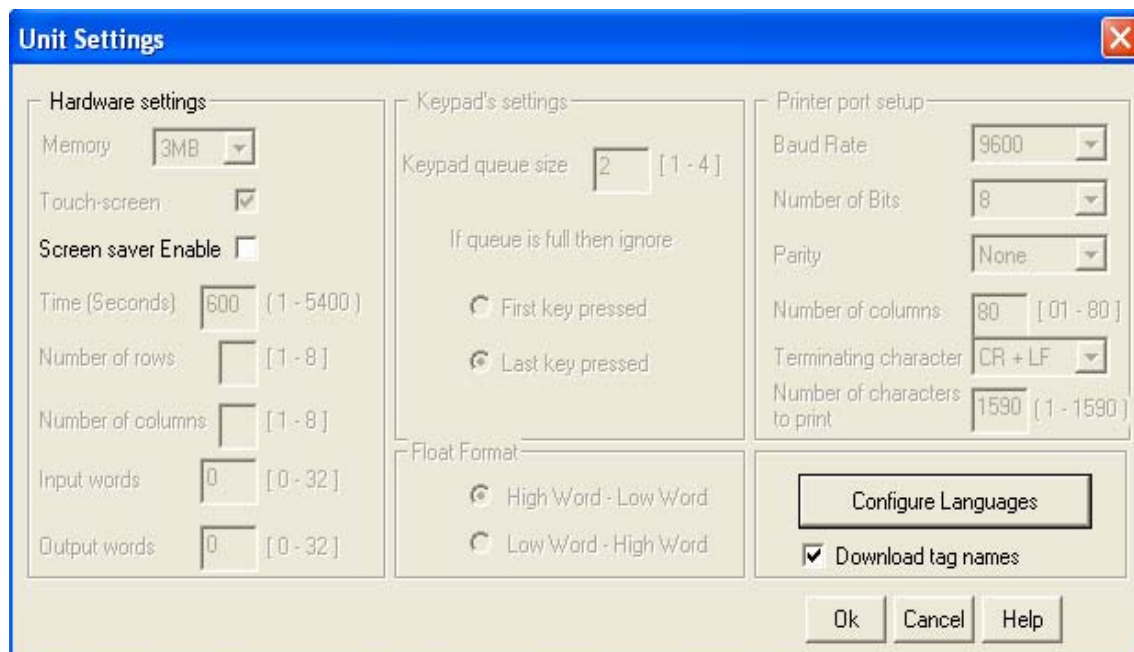


## 7. USING LANGUAGES

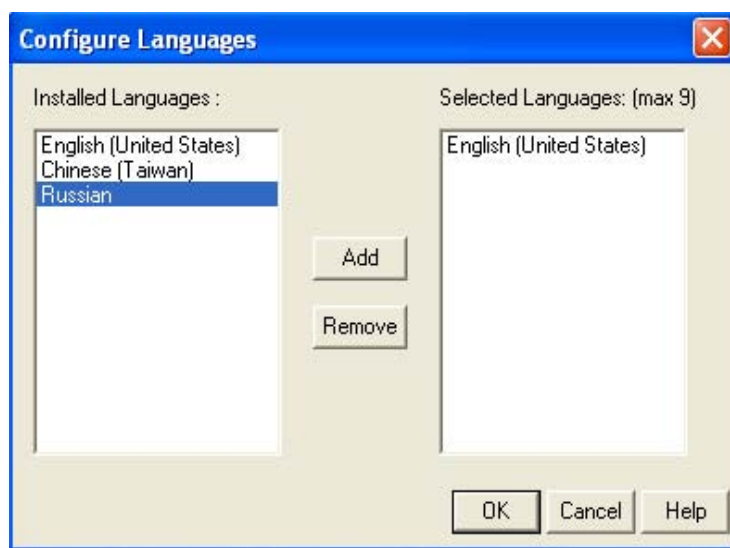
### 7.1.2 Configure multiple languages in HMI Studio software



In the project tools tool bar, click on Unit settings icon. The following screen will appear.

The Unit Settings dialog box is divided into three main sections: Hardware settings, Keypad's settings, and Printer port setup. Hardware settings include Memory (3MB), Touch-screen (checked), Screen saver Enable (unchecked), Time (600 seconds), Number of rows (1-8), Number of columns (1-8), Input words (0-32), and Output words (0-32). Keypad's settings include Keypad queue size (2), a checkbox for 'If queue is full then ignore', and radio buttons for 'First key pressed' and 'Last key pressed'. Printer port setup includes Baud Rate (9600), Number of Bits (8), Parity (None), Number of columns (80), Terminating character (CR + LF), and Number of characters to print (1590). A 'Configure Languages' button is located at the bottom right of the dialog, along with 'Ok', 'Cancel', and 'Help' buttons.

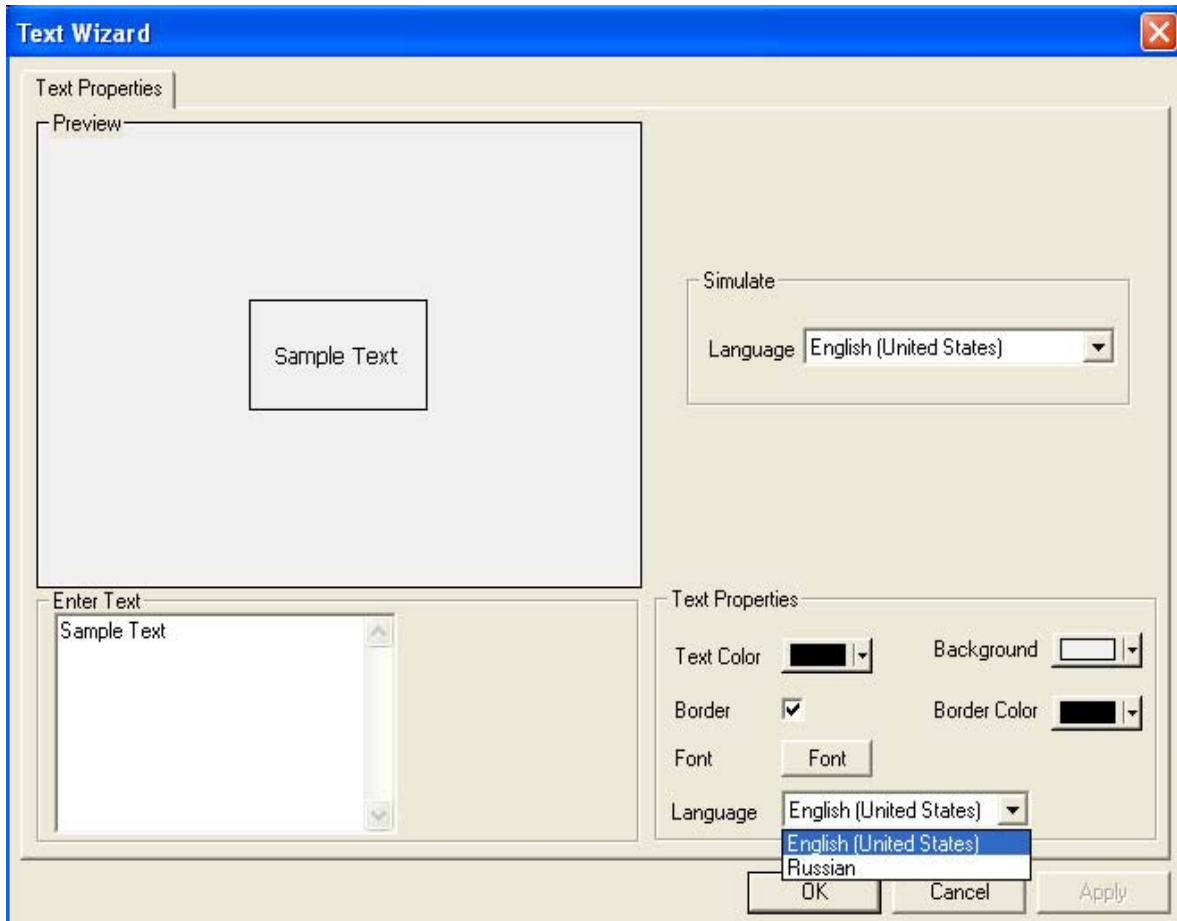
Click on “Configure Languages” push button on above screen. The following screen will appear. The list box on the left side shows which languages are installed on your computer. The list box on the right side lists the languages to be used in the project. The languages must be installed on your computer to appear in the installed languages list. Languages can be installed on a computer by using the Windows task “Add other languages”.

The Configure Languages dialog box has two list boxes: 'Installed Languages' on the left and 'Selected Languages: (max 9)' on the right. The 'Installed Languages' list contains 'English (United States)', 'Chinese (Taiwan)', and 'Russian'. The 'Selected Languages' list contains 'English (United States)'. Between the list boxes are 'Add' and 'Remove' buttons. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

HMI Studio software supports max. 9 languages to display for end user in any project. In the configure language screen above, select the language ex: Russian and press “Add” button. Russian language will move from “Installed Languages” to “Selected Languages”. Then press OK. Now Russian language is configured in HMI Studio software for end user text display.

### 7.2 Multi-Language Text Wizard

The Multi-Language Text Wizard allows the designer to configure text objects for use in a multiple language project. For ex: If Russian language is selected in the following screen at Language, designer can automatically enter text in Russian language and keyboard is automatically selected for Russian language.



#### Text properties

1. **Text** : The object can have a maximum of 150 characters.
2. **Text color** : Sets the text color from the palette.
3. **Background** : Sets the Background text color from the palette.
4. **Border** : If enabled, the text object will have a border.
5. **Border Color** : Sets the color of the border from the palette.
6. **Font** : Selects Windows® Font, Font Style and Font size.
7. **Language** : Displays the list of languages configured in the Unit Settings.

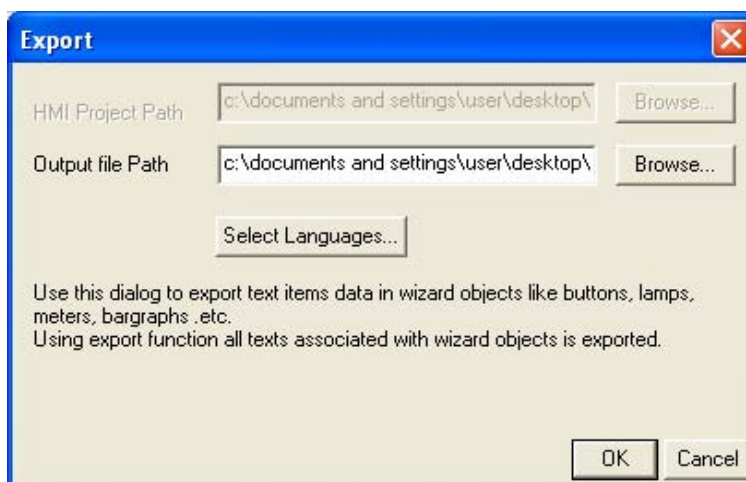
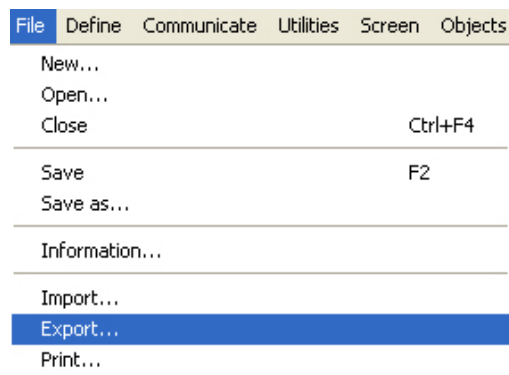
#### Simulate

A user can preview the text configured for each language configured in the wizard in the preview window.

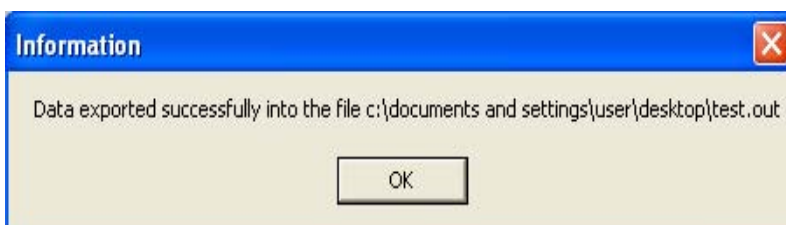
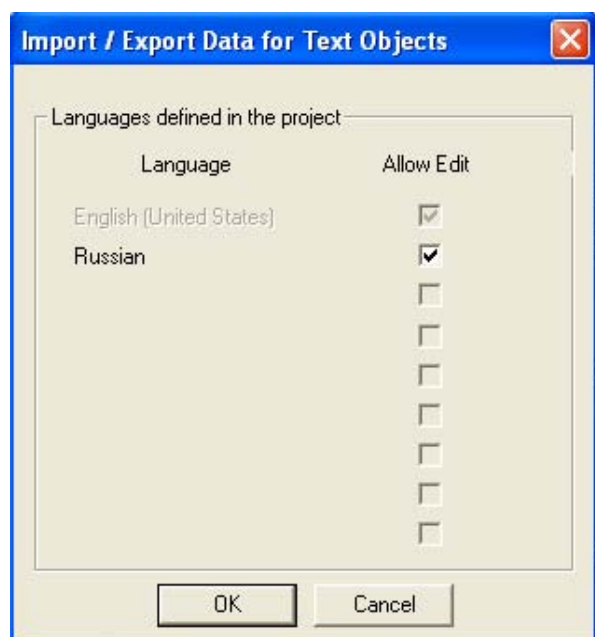
## 7. USING LANGUAGES

### 7.3 Export language conversion text

Once the project is completed by the designer in English language, it is possible to export all the text in the project to another file which is with .out extension. This file should be saved in selected path.

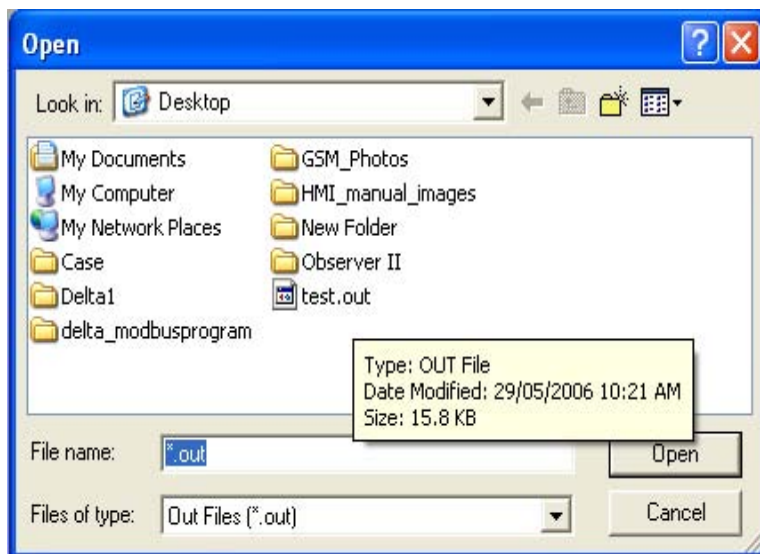
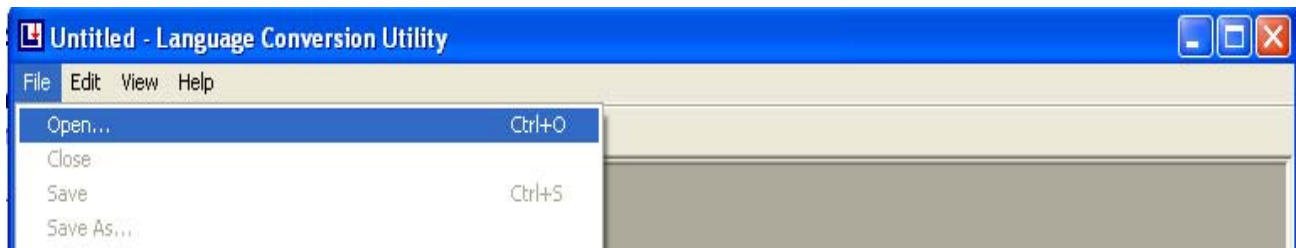


Click on "Selected languages", The following screen will appear. Select language for which language conversion is required and press "OK". Then .out format file will be saved in selected path. This file cannot be opened by double click directly like other files in Windows operating system. These files will be in specific format and can be opened only by the language conversion utility available along with HMI Studio software. Once HMI Studio software is installed in PC, language conversion utility will also be installed in PC by default. This is accessed from the following path Start - Programs- HMI Studio\_1.11 - Language conversion



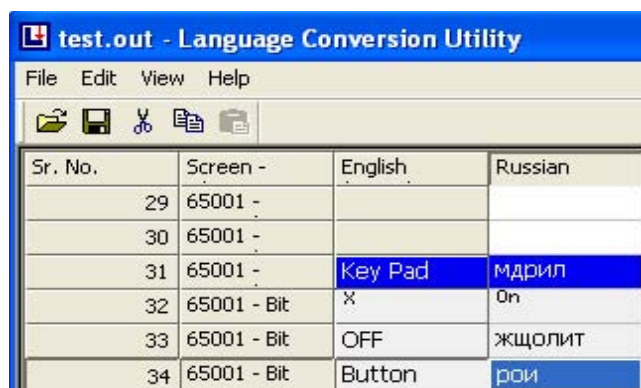
### 7.4 Working with Language conversion utility.

Once the .out file file is available, then this can be opened from Start-Programs-HMI Studio\_1.11- language conversion as follows.





## 7. USING LANGUAGES



Sr. No.	Screen -	English	Russian
29	65001 -		
30	65001 -		
31	65001 -	Key Pad	мдрил
32	65001 - Bit	X	On
33	65001 - Bit	OFF	жщолит
34	65001 - Bit	Button	рои

Once the text is converted from English to Russian as shown above in a separate column, then the file is saved from the Menu bar. The same file now should be imported from the HMI Studio software similar to the file exported earlier.

### 7.5 Displaying Multiple Languages in HMI

System Register S0001 controls the language to be displayed at run time. User can use 'Write value to tag' task for changing value in system register.

**Note :** If S0001 has value other than 1 to 9 then English language is displayed.

**Example:**

If user has configured project for 3 different languages namely English, Russian, Japanese then following tasks can be used to change language at run time.

English - Write value to Tag S0001 with value 1

Russian - Write value to Tag S0001 with value 2

Japanese - Write value to Tag S0001 with value 3

In this way 9 different languages can be displayed in unit at run time.



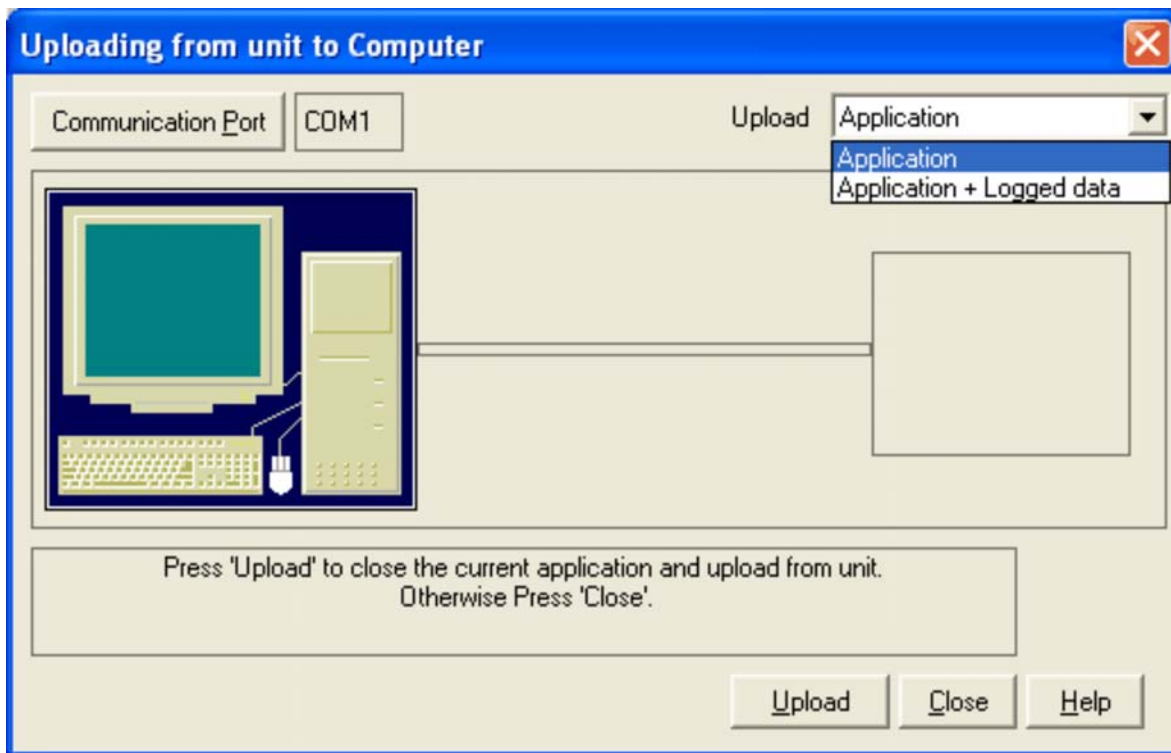
## 8. DOWNLOADING AND UPLOADING FROM UNIT

### 8.1 Upload

An application can be uploaded from the HMI unit to PC. To upload an application first select the appropriate communication port for your computer by choosing “**Communicate | Communication Port**” menu option. Attach a computer to HMI cable. From the “**Communicate**” menu, click on the “**Upload...**” selection.



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



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 Unit Settings was originally selected. 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.

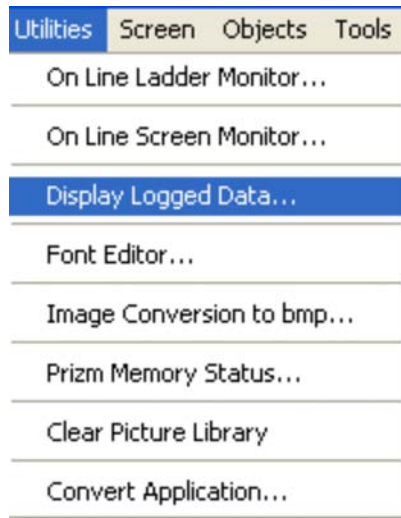
## 8. DOWNLOADING AND UPLOADING FROM UNIT

### 2. Application + Logged data

This option applies only to units that support data logging.

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 “**Utilities**” as shown below.



#### Logged data display

```
Date,Time,Tag,Value
17/08/06,15:35:08,D0005,0
17/08/06,15:35:08,D0006,0
17/08/06,15:35:08,D0007,0
17/08/06,15:35:08,D0008,0
17/08/06,15:35:16,D0005,8
17/08/06,15:35:16,D0006,16
17/08/06,15:35:16,D0007,24
17/08/06,15:35:16,D0008,32
17/08/06,15:35:31,D0005,4
```

Please note that you should first upload application+data in PC which is connected with HMI, Then only you can view logged data. It is possible to view data either from HMI Studio software or alternatively file is stored in the following path

C:\Program Files\HMI\_studio\_1.X\Result.  
Name of the file: LoggedData

## 8. DOWNLOADING AND UPLOADING FROM UNIT

The following errors may occur during uploading:

### 1 Unit is not responding

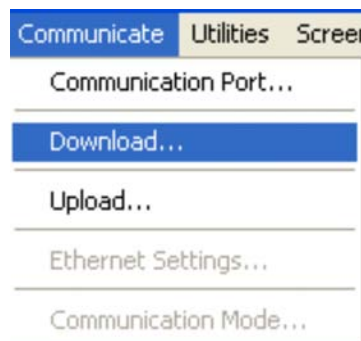
This error indicates that no communication has been established between the computer and the HMI unit. Check the COM port selection and cable connections.

### 2 Unit is not responding after frame number XXXX

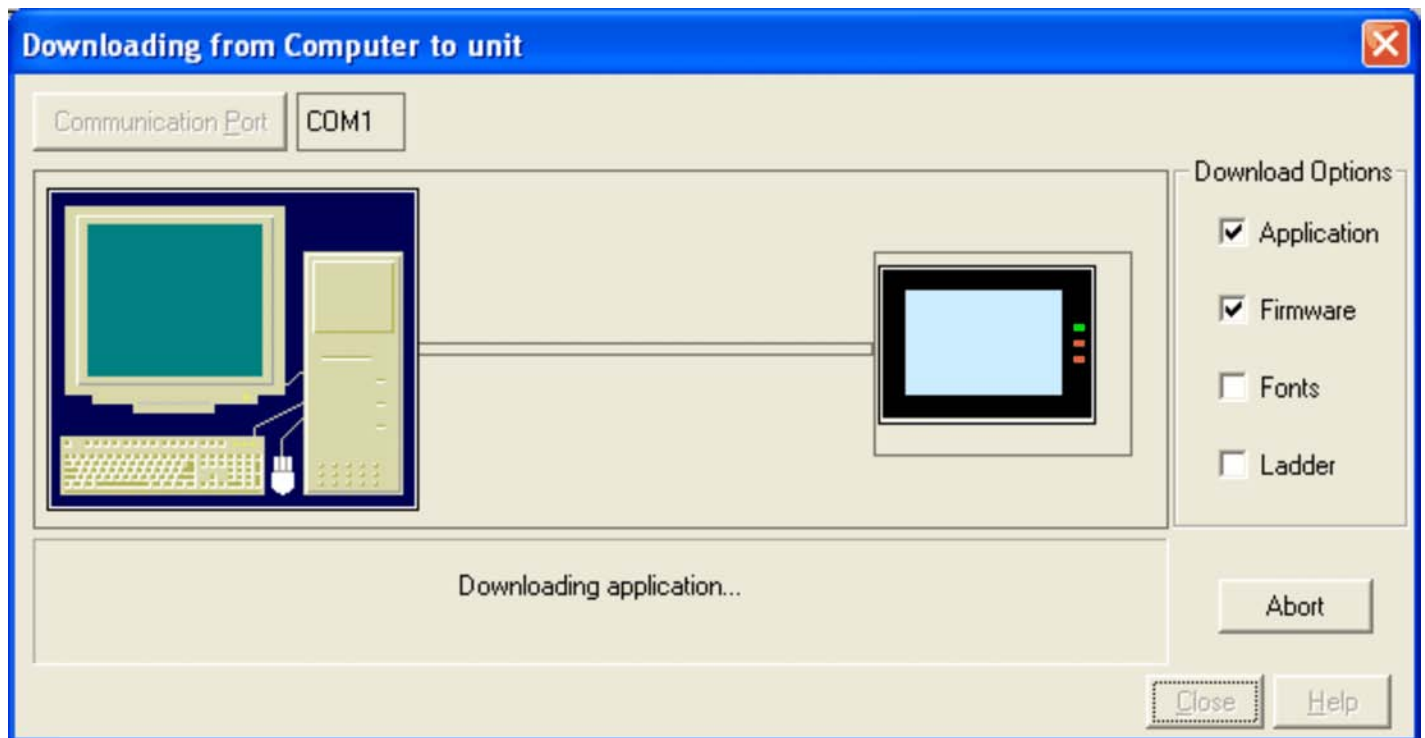
Communication with unit has been lost. Try uploading again. You may need to close the HMI program and restart it.

## 8.2 Download

To download an application into the HMI unit, either click on “**Download**” button from the Toolstation or choose “**Communicate | Download**” menu option and a DOS window will appear for a moment. It is linking the PLC drivers with firmware for the application.



After linking, the following window will display -



## 8. DOWNLOADING AND UPLOADING FROM UNIT

**Communication Port** – Used to select which communication port to be used for downloading. By default Com1 is selected. Any changes are stored with the HMI 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.

**Download Button** - Click this button to start the downloading.

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

### 8.3 Error Catalog

#### 1. HMI is not responding.

This is a communications error. Check the cable, connection, and display type compatibility.

#### 2. Selected HMI model does not match the unit connected on the IBM port.

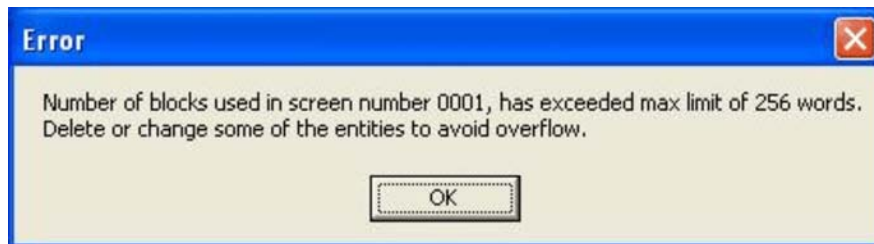
This is product mismatch error. Check that you have defined the correct HMI model in the application and retry.

#### 3. No driver found for selected HMI model.

This error is displayed during firmware download if the driver for the selected PLC node in HMI application was not found. Check whether you have defined correct HMI model and PLC node in your application. If these are correct the error is still displayed, contact your supplier for support.

#### 4. Number of Blocks used in screen number XXXX has exceeded the maximum limit of 256 words. Delete or change some of the entities to avoid overflow.

The number of blocks embedded per screen is limited. For the HMI 1205, HMI 605 and HMI 601 models, the maximum number of blocks that can be embedded is 4096. For HMI 201 and HMI 401, the limit is 256 words. If this number is exceeded, the above error is generated. To avoid this, delete or change some of the tags on the screen, so that the number of words on the screen will be within the maximum limit.



#### 5. Can not download application.

If this error message occurs, the application cannot be downloaded. To make the application downloadable, delete or change some of the tags on screen, so that the number of words on screen will be within the maximum limit.



## 8. DOWNLOADING AND UPLOADING FROM UNIT

### 6. The Firmware size has exceeded the limit.

The Firmware size has exceeded the limit. It can be reduced by -

1. Reducing the number of channels configured in 16-point Linearization.
2. Reducing the number of blocks configured in PID or Time Proportional PWM.
3. Reducing the number of channels configured as High Speed Interrupt or Pulse Output.

## 9.1.1 Alarm Definition

Alarms can be defined in the following screen

The screenshot shows a software window titled "Alarms". It contains a table with three columns: "Number", "History", and "Alarm Text". The table lists two existing alarms: "000" with history "N" and text "Temp High", and "001" with history "Y" and text "Pressure High". Below the table are fields for defining a new alarm: "Groups of Alarms" (a dropdown menu showing "01 [ 000 - 015 ]"), "Tag of group" (a dropdown menu showing "D0000 ( t1 )"), "Alarm Number" (a numeric input field showing "002" with a range "[ 000 - 015 ]"), and "Alarm Text" (a text input field showing "Level low"). There is a checked "History" checkbox and two radio buttons: "History with Acknowledge" (selected) and "History with out Acknowledge". On the right side of the window are buttons for "Ok", "Cancel", "Help", "Delete", "New", "Accept", and "Discard".

Number	History	Alarm Text
000	N	Temp High
001	Y	Pressure High

Groups of Alarms: 01 [ 000 - 015 ]      Tag of group: D0000 ( t1 )

Alarm Number: 002 [ 000 - 015 ]

Alarm Text: Level low

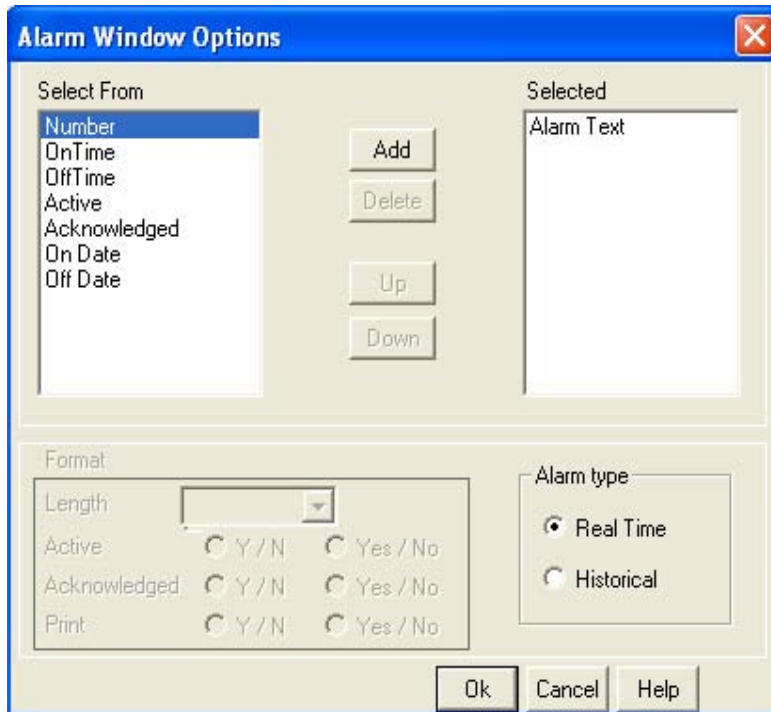
☒ History      ☒ History with Acknowledge  
☐ History with out Acknowledge

1. **Group of alarms** : Each tag must be associated with a unique group of alarms. There can be 16 different groups of alarms.
2. **Tag of group** : A two byte tag for the defined alarm group
3. **Alarm number** : The unique number of the alarm. It corresponds to the bit position bit in the defined alarm tag.
4. **Alarm text** : The text that is displayed in the alarm window when the alarm is active.
5. **History** : If this option is selected, the alarm is logged in historical alarm memory when the alarm is active.
6. **Add button** : Allows a new alarm to be defined in the alarm definition window.
7. **Delete button** : Deletes a selected alarm from the table.
8. **Accept button** : Saves any changes made to the attributes of an alarm.
9. **Discard button** : Cancels any changes made to the attributes of an alarm.

## 9. ALARMS

### 9.1.2 Alarm Object

The alarm window object displays real time or historical alarms in a user-defined format.



#### Select From

This list contains the available columns that can be viewed in an alarm display  
The attributes can be

- |                |   |   |
|----------------|---|---|
| 1. Alarm Text  | : | Text defined for the alarm.   |
| 2. Number      | : | Number defined for the alarm.   |
| 3. Active      | : | The present status of the alarm [Active/inactive].                          |
| 4. Acknowledge | : | The status of the acknowledge attribute for the alarm.                      |
| 5. On time     | : | The time at which the alarm made the transition from an OFF to an ON state. |
| 6. Off time    | : | The time at which the alarm made transition from an ON to an OFF state.     |
| 7. On date     | : | The date at which the alarm made transition from an OFF to an ON state.     |
| 8. Off date    | : | The date at which the alarm made transition from an ON to an OFF state.     |

**Note:** The active and acknowledge attributes are not applicable for historical alarms.

#### Selected

This list gives the attributes that are selected and will appear in an alarm display. To deselect the unwanted attribute(s), highlight them and choose Delete button.



### Alarm type

This is the selection, which specifies whether the current alarm window represents the real time or historical alarms.

**Note:** Historical alarms are Product dependent.

### Format

Enter the format for the highlighted attribute from Selected field.

For **Time** attribute, you can select the format as either HH:MM:SS or MM:SS from the combo box.

For **Alarm Text** attribute, you can enter the length in '**Length**' field.

For **Active** and **Acknowledged** attributes, you can check the desired radio button.

## 10. TRENDING

### 10.1 Real Time Trend

The Real Time Trend object is a graphical representation of a tag's value in the current time period. The time value comes from the real time clock in the HMI unit. The tag's value is plotted on the Y axis and updated every second.

**Trend**

Trend : Properties | Value scale properties | Time scale properties | Tag1 | Tag2

Preview

100  
80  
60  
40  
20  
0

Trend

Update

Simulate

Language English (United States)

Trend Properties

No of tags 2

Time Span 60 Seconds

Fill Color

Grid Color

Error Message

Font 5x7

Text Color

Show Grids

Span time Tag

Language English (United States)

Text Trend

Font...

Color

Data Type Unsigned int

OK Cancel Apply

#### Trend Properties

1. **No. Of Tags** : Up to four tags may be monitored.
2. **Show Grid** : If enabled, grid lines will be shown on the trend display.
3. **Span Time** : The value, in seconds, for the X axis interval. The maximum value for the span time is 65535 seconds.
4. **Span time Tag** : If enabled, a 2 byte tag will determine the span time.
5. **Fill Color** : The background color of the trend object.
6. **Grid Color** : The color of the grids, if enabled, on the trend object.

### Error Message

Many of the trend object's properties can be determined at run time through the use a tag. If the value of the tag is out of the proper range for the property, an error message will be displayed. The text display properties can be modified.

1. **Font** : Font of the error message to be displayed. Select a Windows® Font, Font Style and Font size.
2. **Text Color** : Color of the error message to be displayed.

### Label

If the Label is enable, the following parameters be configured.

1. **Text** : Label text.
2. **Font** : Select a Windows® Font, Font Style and Font size.
3. **Language** : Chooses which language the text is being defined for.
4. **Color** : Color of the text.

### Data Type

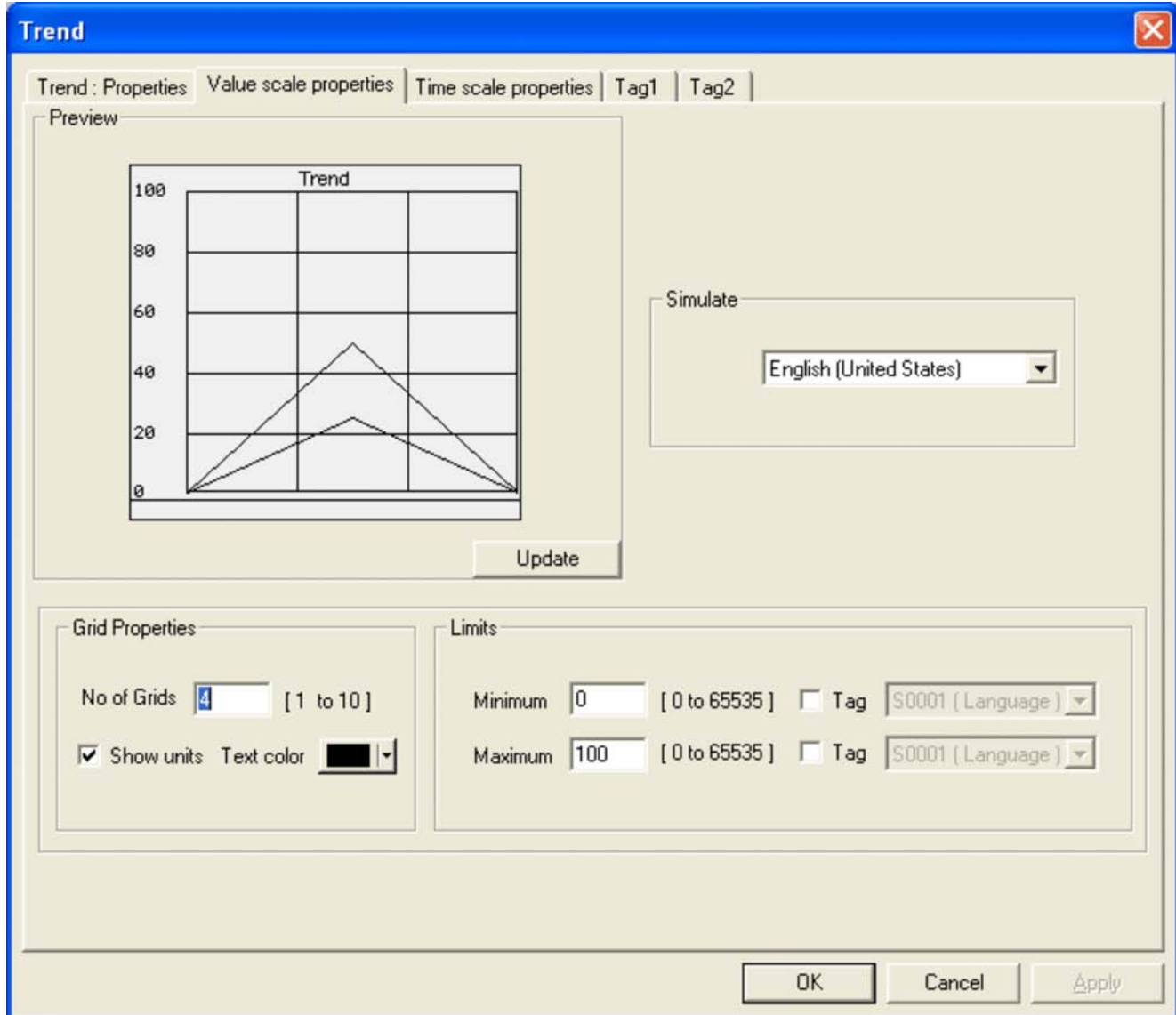
The following data types can be used in the trend object.

1. Unsigned integer
2. Signed integer
3. Hexadecimal
4. BCD
5. Float

## 10. TRENDING

### Value Scale Properties

The value scale defines the scaling properties of the Y axis of the trend object.



#### Grid Properties

**No of Grids** : If enabled, select the number of grid lines to be shown on the Y axis. Up to 10 grids can be shown.

#### Limits

If the Units Selection is enabled, the limits are shown on the trend object along the value scale axis.

1. **Minimum** : The smallest displayed value on the Y axis. The range is from 0 to 65,535.
2. **Minimum tag** : If enabled, the minimum is determined by a tag instead of a constant.
3. **Maximum** : The highest displayed value on the Y axis. The range is from 0 to 65,535
4. **Maximum tag** : If enabled, the maximum is determined by a tag instead of a constant.
5. **Text Color** : The color of the values on the Y scale.

## Time Scale Properties

**Trend**

Trend : Properties | Value scale properties | Time scale properties | Tag1 | Tag2

Preview

Update

Simulate

English (United States)

Time scale properties

Grids properties

No of Grids  [ 1 to 10 ]

Text Properties

☐ Scale    Format     Color

OK    Cancel    Apply

## Grid Properties

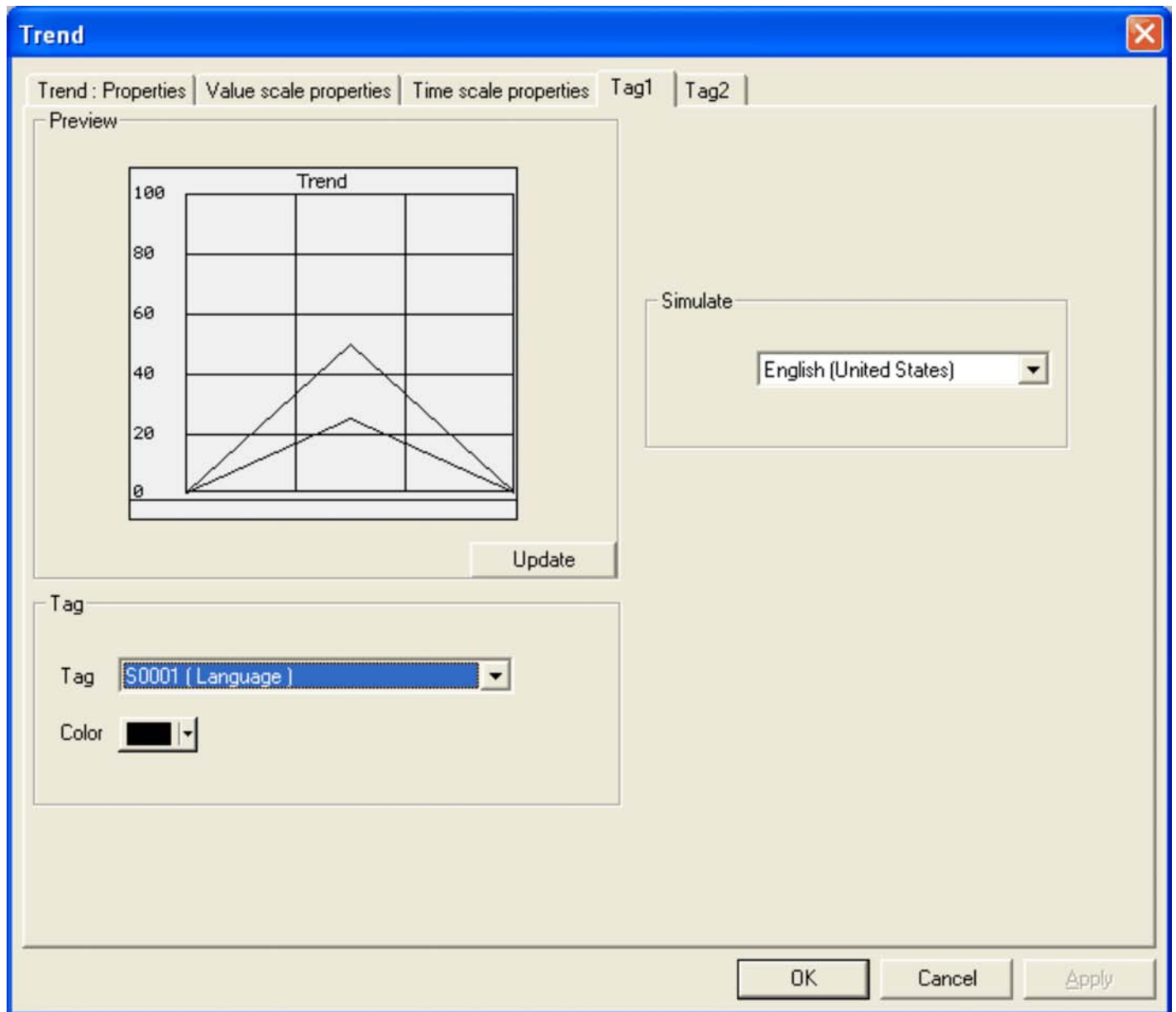
**No of Grids** : If enabled, select the number of grid lines to be shown on the X axis. Up to 10 grids can be shown.

## Text properties

1. **Scale** : If enabled, the real time grid values are shown along the time scale axis.
2. **Format** : Scale formatting can be either HH:MM:SS or HH:MM..
3. **Color** : Determines the preferred color of the X axis scale information.

## 10. TRENDING

### Specific Tag Information

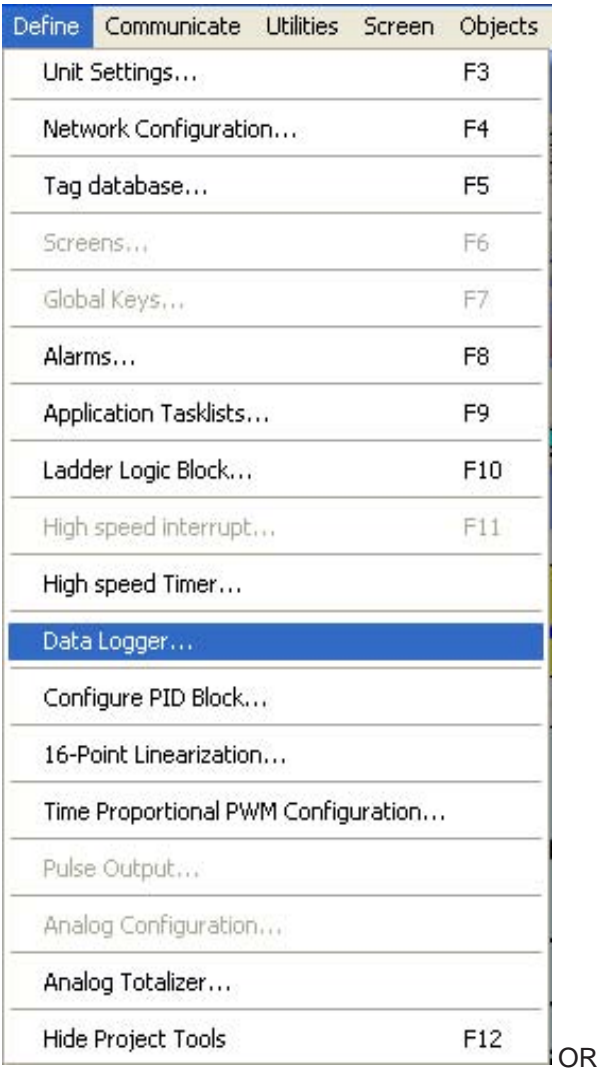


1. **Tag** : Defines a 2 byte tag to be used for the trend information to be plotted.
2. **Color** : Defines the color for the trend information to be plotted.

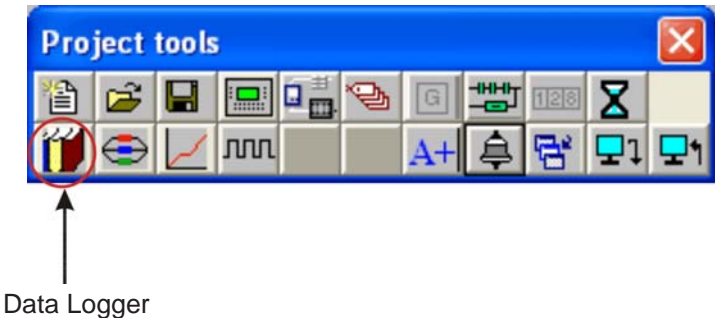
10.2 Data Logger

The Data Logger can be used to record the values of tags over time. The data can be viewed using the Historical Trend Object. It can also be uploaded to a computer for analysis. This feature is available only for HMI 601, 605 and 1205 models.

The Data Logger can be opened from either by choosing **Define | Data Logger** menu option or from the Project tool bar as shown below.

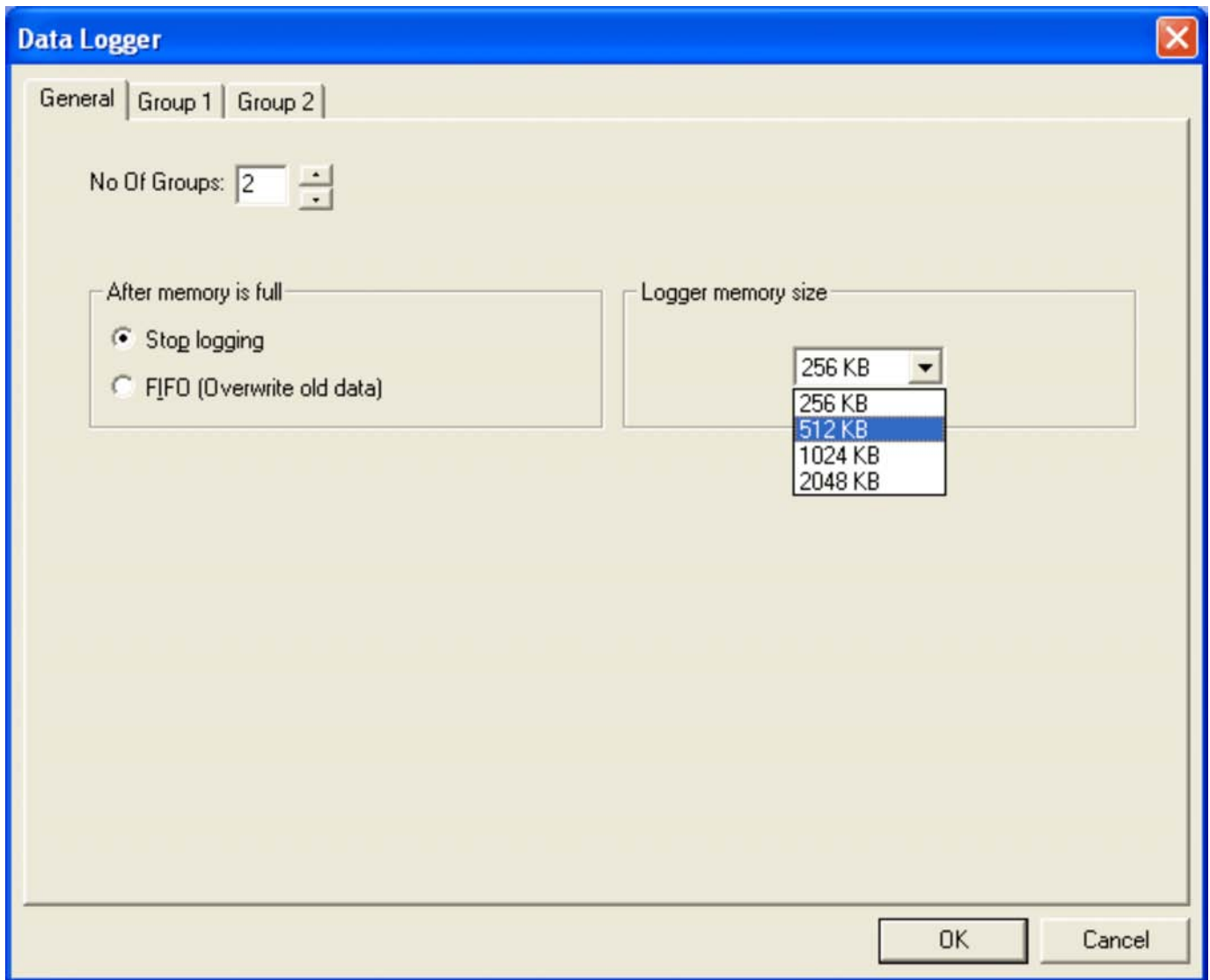


OR



## 10. TRENDING

The Data Logger window will display after clicking on Data logger option.



### Number of Groups

Up to four groups of data to be logged may be defined.

### After Memory is Full

1. **Stop Logging** : In this mode, data logging is stopped when the memory is full. No further data can be logged until the memory is cleared.
2. **FIFO (Overwrite Old Data)** : In this mode, old data will be overwritten by the new data when the memory is full.

### Logger Memory Size

The amount of memory that will be dedicated to data logging is determined from the drop down list.



## Logging Modes

This box allows the user to select one of the following logging modes.

1. **Power Up Mode** : As soon as power is switched ON, data logging for the Data Logger Group will begin.
2. **Start/Stop Time Mode** : In this mode, data logging occurs between the start and stop times. Times are in the HH:MM:SS format.
3. **Key Tasks** : In this mode, data logging can be started and stopped using a bit button having the proper Key's Specific Tasks.

**Data Logger**

General | Group 1 | Group 2

Logging mode: Start/stop time

Log at every: (0-23) Hr, (0-59) Mi, (0-59) Ss. Values: 0, 0, 10

Logger start time: (0-23) Hr, (0-59) Mi, (0-59) Ss. Values: 0, 0, 10

Logger stop time: (0-23) Hr, (0-59) Mi, (0-59) Ss. Values: 0, 0, 50

Defined tags:

- S0001 ( Language )
- S0002 ( Logger memory status )
- S0004 ( Number of Historical Alarms )
- S0005 ( Screen trigger register )
- S0006 ( Screen saver time )
- S0010 ( RTC Date )
- S0011 ( RTC Month )

Tags to be logged:

- S0001 ( Language )
- S0002 ( Logger memory status )
- S0004 ( Number of Historical Alarms )

Add, Delete

OK, Cancel

The time interval for data is set in the 'Log at Every' window. This window is applicable for all the modes. The default time is 10 seconds.

Logger's Start time and Logger's Stop time windows are available only for the Start/ Stop time mode.

For each group, define the tags that should be logged.

## 10. TRENDING

For Key Task mode logging, bit buttons should be created to handle various logging needs. The Key Specific Tasks should be assigned to the button's task list.

**KEYs' specific tasks**

- ☐ Clear Data Entry
- ☐ Cancel Data Entry
- ☐ Accept Data Entry
- ☐ Switch to Next Data Entry
- ☐ Increase Value by 1
- ☐ Decrease Value by 1
- ☐ Increase Digit by 1
- ☐ Decrease Digit by 1
- ☐ Shift Value to Left
- ☐ Move Cursor to Left
- ☐ Move Cursor to Right
- ☐ Sign Key ( +/- )
- ☐ Sign Key ( +/- ) and 0

- ☐ Numeric Key 0
- ☐ Numeric Key 1
- ☐ Numeric Key 2
- ☐ Numeric Key 3
- ☐ Numeric Key 4
- ☐ Numeric Key 5
- ☐ Numeric Key 6
- ☐ Numeric Key 7
- ☐ Numeric Key 8
- ☐ Numeric Key 9
- ☐ Edit Bit On
- ☐ Edit Bit Off

- ☐ Numeric Key A
- ☐ Numeric Key B
- ☐ Numeric Key C
- ☐ Numeric Key D
- ☐ Numeric Key E
- ☐ Numeric Key F

- ☐ Acknowledge Alarm
- ☐ Acknowledge All Alarms
- ☐ Previous Alarm
- ☐ Next Alarm
- ☐ Previous Historical Alarm
- ☐ Next Historical Alarm
- ☐ Refresh all Trends

- ☒ Start Logger for all groups
- ☐ Stop Logger for all groups
- ☐ Start Logger of group  [ 1 - 4 ]
- ☐ Stop Logger of group  [ 1 - 4 ]
- ☐ Clear Log Memory
- ☐ Clear Historical Alarm Memory

Ok Cancel Help

### 10.3 Historical Trend

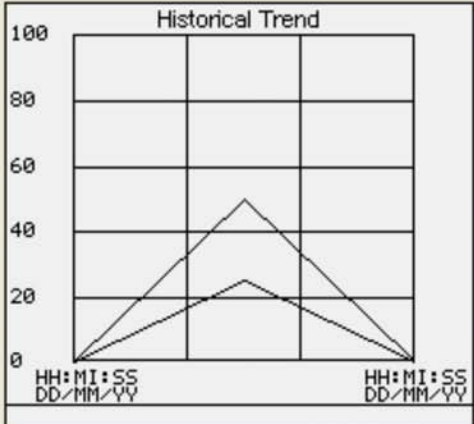
Historical Trend can be enabled only if data logging is defined. You can select Historical Trend either by choosing **Objects | Wizards | Historical Trend** menu option or by clicking **Historical Trend** tool from Objects toolbox.

#### Historical Trend Properties

**Historical Trend**

Historical Trend : Properties | Value scale properties | Time scale properties | Start / End Time Tags | Tag1 | Tag2

Preview



Update

Simulate

Language English (United States)

Trend Properties

No of tags 2 ☒ Show Grids

Fill Color  Grid Color

Error Message

Font 5x7 Text Color

Label

☒ Label

Language English (United States)

Text Historical Trend

Font... Color

Unavailable data

Color

OK Cancel Apply

## 10. TRENDING

### Trend Properties

1. **No. Of Tags** : Up to four tags may be monitored.
2. **Show Grid** : If enabled, grid lines will be shown on the trend display.
3. **Span Time** : The value, in seconds, for the X axis interval.
4. **Span time Tag** : If enabled, a 2 byte tag will determine the span time.
5. **Fill Color** : The background color of the trend object.
6. **Grid Color** : The color of the grids, if enabled, on the trend object.

### Error Message

The trend object offers the unique feature of specifying parameter values during runtime using a tag. The trend object does the value validation check during runtime. If the values are invalid, an error message is shown in the message window.

1. **Font** : Font of the error message to be displayed. Select a Windows® Font , Font Style and Font size.
2. **Text Color** : Color of the error message to be displayed.

### Label

If the Label is enabled, the following parameters can be configured.

1. **Text** : Label text.
2. **Font** : Select a Windows® Font, Font Style and Font size.
3. **Language** : Chooses which language the text is being defined for.
4. **Color** : Color of the text.

### Data Type

The following data types can be used in the trend object.

1. Unsigned integer
2. Signed integer
3. Hexadecimal
4. BCD
5. Float

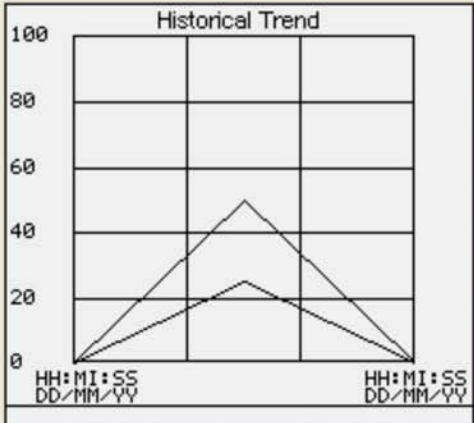
### Unavailable Data

## Value Scale Properties

**Historical Trend**

Historical Trend : Properties | Value scale properties | Time scale properties | Start / End Time Tags | Tag1 | Tag2

Preview



Update

Simulate

Language: English (United States)

Grid Properties

No of Grids: 4 [ 1 to 10 ]

Limits

☒ Units Minimum: 0 [ 0 to 65535 ] ☐ Tag: S0001 ( Language )

Maximum: 100 [ 0 to 65535 ] ☐ Tag: S0001 ( Language )

Text color: [ Black ]

OK Cancel Apply

## Grid Properties

**No of Grids** : If enabled, select the number of grid lines to be shown on the Y axis. Up to 10 grids can be shown.

## Limits

If the Units Selection is enabled, the limits are shown on the trend object along the value scale axis.

1. **Minimum** : The smallest displayed value on the Y axis. The range is from 0 to 65,535.
2. **Minimum tag** : If enabled, the minimum is determined by a tag instead of a constant.
3. **Maximum** : The highest displayed value on the Y axis. The range is from 0 to 65,535
4. **Maximum tag** : If enabled, the maximum is determined by a tag instead of a constant.
5. **Text Color** : The color of the values on the Y scale.

## 10. TRENDING

### Time Scale Properties

The screenshot shows the 'Historical Trend' dialog box with the 'Time scale properties' tab selected. The dialog has a blue title bar and a standard Windows-style window with a close button. The main area is divided into several sections. At the top, there are tabs: 'Historical Trend : Properties', 'Value scale properties', 'Time scale properties' (which is active), 'Start / End Time Tags', 'Tag1', and 'Tag2'. Below the tabs is a 'Preview' section containing a line graph titled 'Historical Trend'. The graph has a vertical axis from 0 to 100 in increments of 20 and a horizontal axis with time labels 'HH:MM:SS DD/MM/YY'. Two lines are plotted: one is a simple triangle peaking at 50, and the other is a more complex line with multiple peaks. Below the graph is an 'Update' button. To the right of the preview is a 'Simulate' section with a 'Language' dropdown menu set to 'English (United States)'. Below the preview and simulate sections are two sub-sections: 'Grids properties' and 'Text Properties'. 'Grids properties' contains a 'No of Grids' input field set to '2' with a range '[ 1 to 10 ]'. 'Text Properties' contains a checked 'Scale' checkbox and a 'Color' dropdown menu showing a black color swatch. At the bottom right of the dialog are three buttons: 'OK', 'Cancel', and 'Apply'.

**Historical Trend**

Historical Trend : Properties | Value scale properties | **Time scale properties** | Start / End Time Tags | Tag1 | Tag2

Preview

Historical Trend

100  
80  
60  
40  
20  
0

HH:MM:SS DD/MM/YY

Update

Simulate

Language English (United States)

Time scale properties

Grids properties

No of Grids 2 [ 1 to 10 ]

Text Properties

☒ Scale Color

OK Cancel Apply

#### Grid Properties

**No of Grids** : If the grid option is enabled, up to 10 grids can be selected for the X axis display.

#### Text properties

1. **Scale** : If enabled, the real time grid values are shown along the time scale axis.
2. **Format** : Scale formatting can be either HH:MM:SS or HH:MM.
3. **Color** : Determines the preferred color of the X axis scale information.

### Start/End Time Tag

This dialogue box allows user to set the start time of the tag with respect to Day, Month, Year along with Hours, Minutes and Seconds and the End time of the tag with respect to the Day, Month, Year along with the Hours, Minutes and Seconds.

**Historical Trend**

Historical Trend : Properties | Value scale properties | Time scale properties | **Start / End Time Tags** | Tag1

Preview

Historical Trend

100  
80  
60  
40  
20  
0

HH:MI:SS DD/MM/YY HH:MI:SS DD/MM/YY

Update

Simulate

Language English (United States)

Start

Day D0000 (D0) Month D0001 (D1) Year D0002 (D2)

Hours D0003 (D3) Minute D0004 (D4) Seconds D0005 (D5)

End

Day D0006 (D6) Month D0007 (D7) Year D0008 (D8)

Hours D0009 (D9) Minute D0010 (D10) Seconds D0011 (D11)

OK Cancel Apply

### Grid Properties

**No of Grids** : If enabled, select the number of grid lines to be shown on the Y axis. Up to 10 grids can be shown.

## 10. TRENDING

### Limits

If the Units Selection is enabled, the limits are shown on the trend object along the value scale axis.

1. **Minimum** : This is the lowest value to be shown on the Y axis. The range is from 0 to 65535.
2. **Minimum tag** : A tag can be used in place of a constant to set the minimum limit.
3. **Maximum** : This is the highest value to be shown on the Y axis. The range is from 0 to 65535.
4. **Maximum tag** : A tag can be used in place of a constant to set the maximum limit.
5. **Text Color** : The color of the limits represented on value scale.

### Specific Tag Information

**Historical Trend**

Historical Trend : Properties | Value scale properties | Time scale properties | Start / End Time Tags | **Tag1**

Preview

Historical Trend

100  
80  
60  
40  
20  
0

HH:MM:SS DD/MM/YY HH:MM:SS DD/MM/YY

Update

Simulate

Language English (United States)

Tag

Tag S0001 ( Language )

Color

OK Cancel Apply

1. **Tag** : Defines a 2 byte tag to be used for the trend information to be plotted.
2. **Color** : Defines the color for the trend information to be plotted.



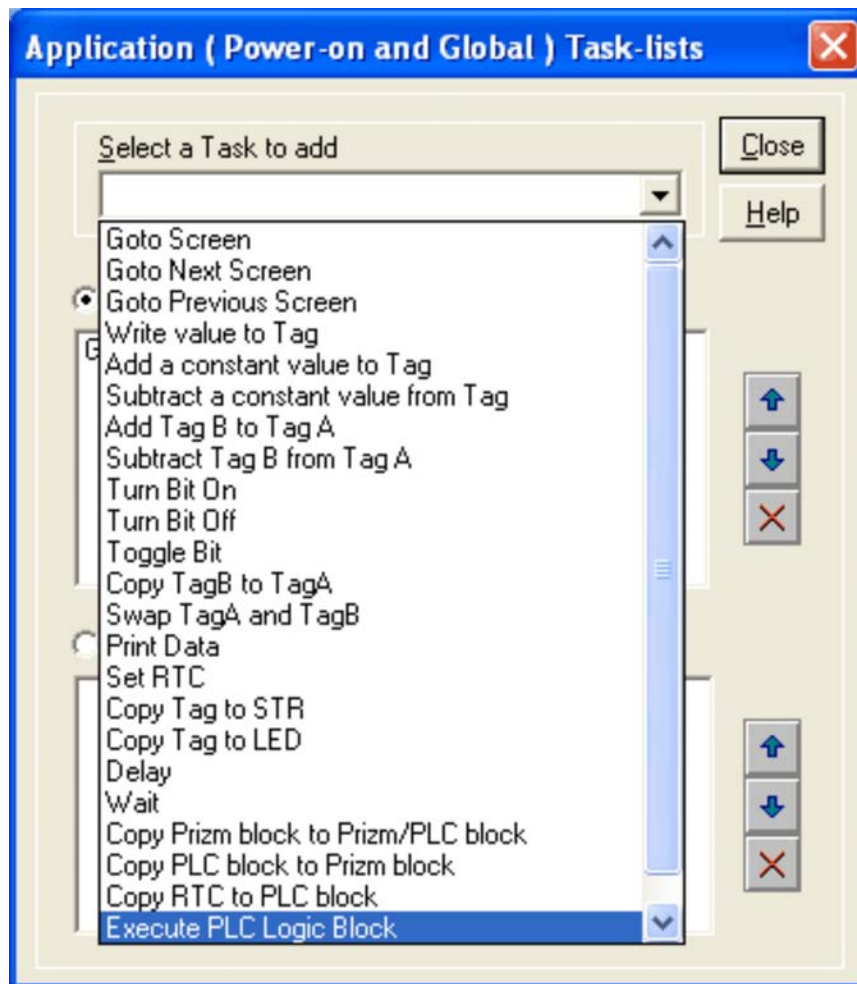
## 11.1 PLC Logic Block

Conditional / logical implementation can be achieved by adding a **Execute PLC Logic Block Task** in the **Screen-Application Task** lists. HMI Studio software allows the user to create a PLC ladder logic program. A ladder block can be added to any HMI unit, independent of the hardware. The ladder block will be executed even if the unit does not have External I/O. Keypads or bit buttons can activate bits in the ladder block. If the HMI is connected with external I/O, it will work as a stand alone controller while still being able to simultaneously communicate with other devices.

Ladder logic blocks are saved in the ladder logic block software library. This allows applications to reuse the ladder block. The ladder block is downloaded with the application.

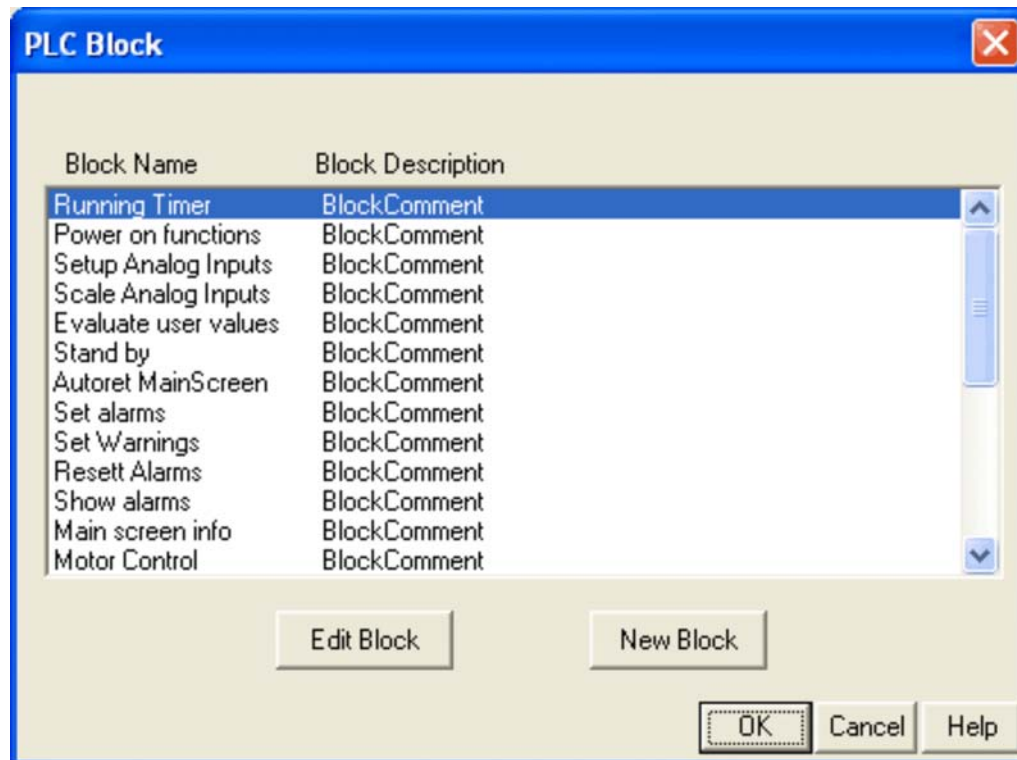
Standard ladder operations include math, data comparison, timers, counters, as well as rotation and shifting of data.

PLC logic blocks can be added to the Global and Power on Tasks in the Application Task List and Screen Tasklists. To add a PLC logic block to the **Power on Tasklist**, go to the **Application Tasklists** and select **Power On Tasklists**. From list of various tasks, select the **Execute PLC Block** task.



Create a new PLC logic block by clicking **New Block**. If a block is to be edited, select the block to be edited and click **Edit Block**.

## 11. LADDER PROGRAMMING



### 11.2 Ladder Instruction Details

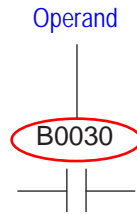
Types of Instructions used for developing a ladder are:

- Inputs
- Outputs
- Timer
- Data Compare (for Word and Double word)
- Math Operation (for Word and double word)
- Data Move
- Transition
- Counters
- Shift (for Word and Double word)
- Rotate (for Word and Double word)
- Logarithmic
- Data Conversion
- End

## 11.2.1 Input Instruction

- Normally Open (NO)**

Normally open (NO) is one of the inputs used in ladder. This instruction checks if the bit specified by the operand is high.



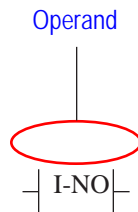
Supported Operands : Internal Coil  
Input Coil  
Output Coil  
System Coil

Valid Ranges : B0000 to B4999  
X0000 to X0099  
Y0000 to Y0099  
s0000 to s0099

**Note:** The user has the freedom to input the value in many ways . For example, to input the value “B0045”, user can type either “B45” or “B045” or “B0045”. The entry will be automatically converted to “B0045”.

- Immediate Normally Open (INO)**

Immediate normally open (INO) is one of the inputs used in ladder. This instruction checks if the bit specified by the operand is high at the instance when this instruction is executed.

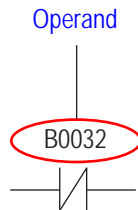


Supported Operands : Input Coil

Valid Ranges : X0000 to X0099

- Normally Close (NC)**

Normally close (NC) is one of the inputs used in ladder. This instruction checks if the bit specified by the operand is low.



Supported Operands : Internal Coil  
Input Coil  
Output Coil  
System Coil

Valid Ranges : B0000 to B4999  
X0000 to X0099  
Y0000 to Y0099  
s0000 to s0099

## 11. LADDER PROGRAMMING

- **Immediate Normally Close (INC)**

Immediate normally close (INC) is one of the inputs used in ladder. This instruction checks if the bit specified by the operand is high at the instance when this instruction is executed.



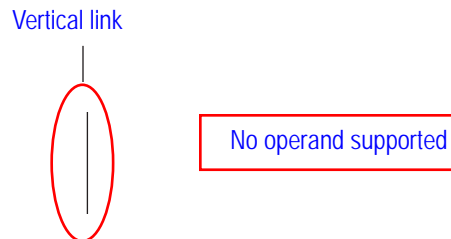
- **Horizontal Link**

Horizontal link is used to join one instruction to other. The horizontal link insures proper contact between various instructions and eliminates open circuit conditions.



- **Vertical Link**

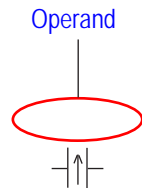
Vertical link is used to add branches in the ladder.



## 11.2.2 Transition

### • Leading Edge

This is a transition input. The instruction is used to detect the leading edge of the logic to the left of the input. The coil assigned to the leading edge should not be used anywhere else in the application.

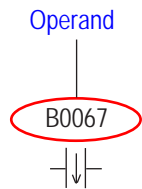


Supported Operands : Internal Coil

Valid Ranges : B0000 to B0499

### • Trailing Edge

This is a transition input. The instruction is used to detect the trailing edge of the logic to the left of the input. The coil assigned to the leading edge should not be used anywhere else in the application.



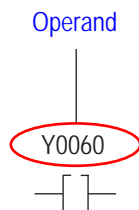
Supported Operands : Internal Coil

Valid Ranges : B0000 to B0499

## 11.2.3 Output Instructions

### • Output

This represents the output of a rung. An output must be preceded with at least one input. This instruction stores a "high" or "low" value in the bit specified by the operand, depending on the state of the rung logic. A physical output is changed after all logic has been processed.



Supported Operands : Internal Coil  
Output Coil  
System Coil

Valid Ranges : B0000 to B4999  
Y0000 to Y0099  
s0000 to s0099

## 11. LADDER PROGRAMMING

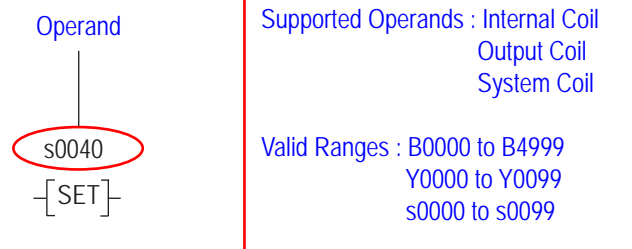
- **Immediate Output**

With an immediate output, the state of a physical output is changed immediately.



- **Set**

The Set instruction is used to turn the specified bit ON. When the input to this instruction is high, the bit specified by the operand is turned ON. It stays ON until a reset instruction is activated. In the case of a physical output, the state is not reflected immediately.



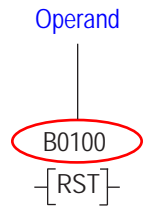
- **Immediate Set**

An immediate set instruction is used to turn the specified bit ON. When the input to this instruction is high, the bit specified by the operand is turned ON and stays on until a reset instruction is activated. In the case of a physical output, the state is reflected immediately.



- Reset**

The reset instruction is used to turn the specified bit OFF. When the input to this instruction is high, the bit specified by the operand is turned OFF. In the case of a physical output, the state is not reflected immediately.

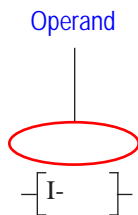


Supported Operands : Internal Coil  
Output Coil  
System Coil

Valid Ranges : B0000 to B4999  
Y0000 to Y0099  
s0000 to s0099

- Immediate Reset**

Immediate set instruction is used to turn the specified bit OFF. When the input to this instruction is high, the bit specified by the operand is turned OFF. In the case of a physical output, the state is reflected immediately.



Supported Operands : Output Coil

Valid Ranges : Y0000 to Y0099

## 11. LADDER PROGRAMMING

### 11.2.4 Timers

Three types of timers are supported in ladder blocks. These are as follows:

1. Non-retentive Timers
2. Retentive Timers
3. Single shot Timers

#### 1. Non-Retentive Timers

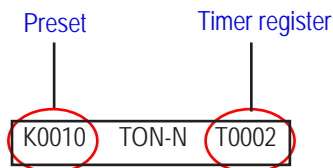
These timers reset the timer count value when the input is detected OFF.

The Non-Retentive type are further classified as

- 1) Non-Retentive TON type
- 2) Non-Retentive TOFF type

##### 1.1 Non-Retentive TON timer

This timer instruction uses three cells. The first cell holds the value of the timer's preset. The third cell holds the timer's current value. The second cell displays the name of the timer. The timer can be either of 10ms or 100ms or 1sec, depending on the number of the timer.



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to k0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For timer register

Supported operands : Timer register

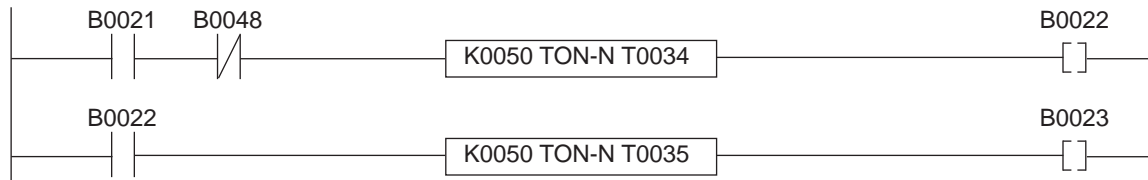
Valid ranges : for 10mS- T0000 to T0030  
for 100mS- T0031 to T0095  
for 1 sec- T0096 to T0127



## 11. LADDER PROGRAMMING

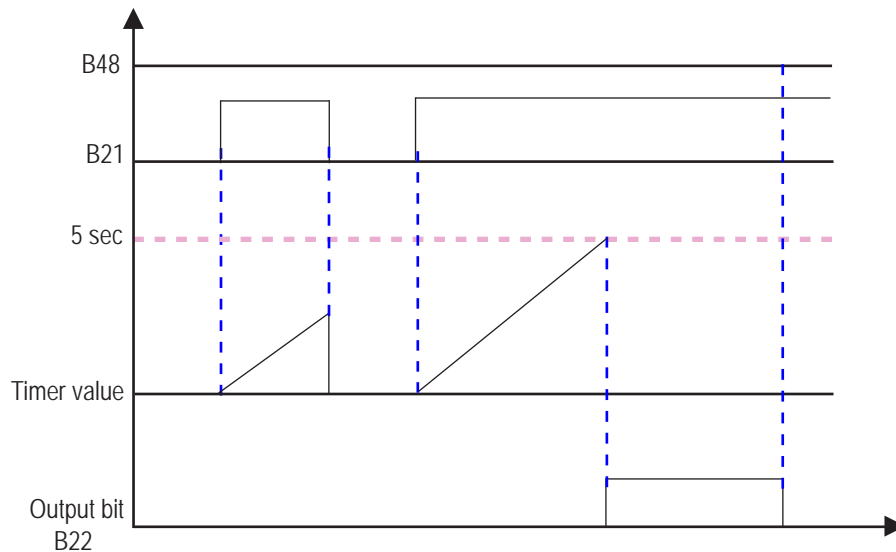
### Example of Non-Retentive Timer:

A Non-Retentive TON timer can be selected in the ladder with the F5 function key or with a right mouse click on the respective timer button. The ladder editor will place the Timer block on the screen. The ladder editor will not allow the user to place a Timer Block in the first cell of any rung. The working of Non-retentive TON type is illustrated with the help of an example.



Internal coils, B21 and B48 are defined as inputs to TON-N timer T34, which is a 100 msec base timer. The output of the timer is B22. K50 in the first cell of the timer block will give a delay of (50 x 100millisecond = 5000 millisecond) or 5 sec. The output bit, B22, will turn on after 5 sec. If either input goes off, the timer count will be reset to zero.

### Timing Diagram

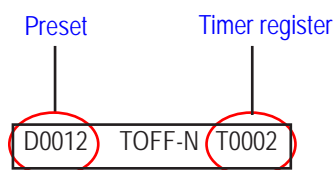


## 11. LADDER PROGRAMMING

### 1.2 Non-Retentive TOFF Timer

The Non-Retentive TOFF timer instruction uses three cells. The first cell holds the value of preset. The third cell is the timer selected. The second cell displays the type of the timer. The timer can be either of 10ms or 100millisecond or 1second, depending on the timer selected.

When the input to the timer becomes active, the output is turned on and the timer register starts decrementing from its preset value. The output turns off when the value in the timer register reaches zero. The timer register is set to the timer preset when a leading edge of the input is detected. Whenever the input to the timer is off, the output of timer is



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to k0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

---

For timer register

Supported operands : Timer register

Valid ranges : for 10mS- T0000 to T0030  
for 100mS- T0031 to T0095  
for 1 sec- T0096 to T0127

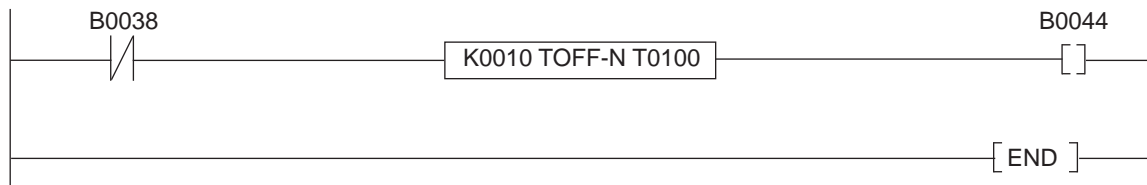
#### Example of Non-Retentive TOFF Timer

A Non-Retentive TOFF type can be selected in the Ladder with the F6 function key or with a right mouse click on the respective timer button cell.

The ladder editor will place the timer block on the screen. A timer block can not be in the first cell of a rung.

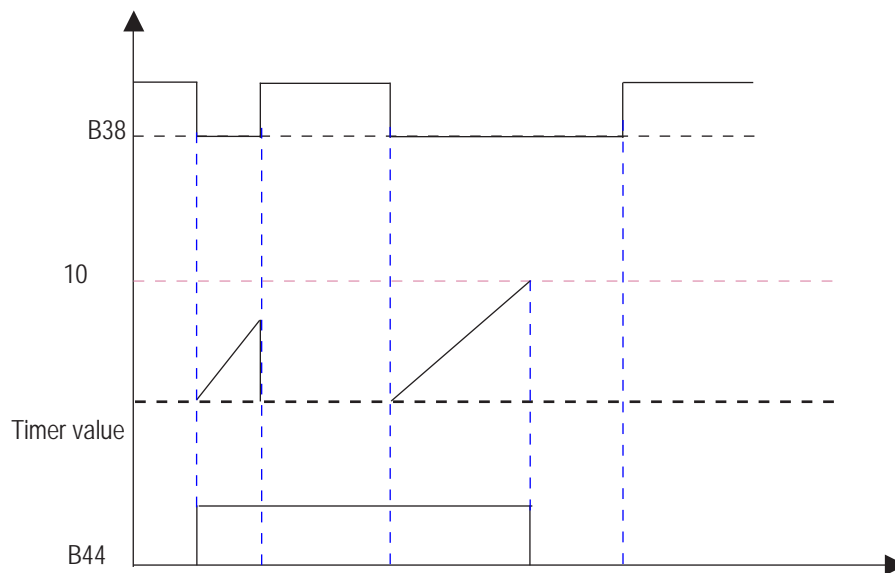
## 11. LADDER PROGRAMMING

The working of a Non-retentive TOFF type is illustrated by the example shown:



The internal coil, B38, is defined as an input to TOFF-N timer T100 which is a 1 sec base timer. The output of the timer is B44. K10 in the first cell of the timer block will give a delay of  $10 \times 1 \text{ sec} = 10 \text{ sec}$ . The output bit, B44, will turn OFF after 10 sec if no transition occurs on B38.

Timing Diagram



### 2. Retentive Timer

A retentive timer will retain the current timer count value if the input goes off before the timer has timed out.

The Retentive type are further classified as :

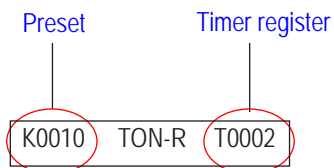
1. Retentive TON Timers
2. Retentive TOFF Timers

#### 2.1 Retentive TON Timers

Timer instruction uses three cells. The first cell holds the value of the preset. The third cell timer number. The second cell displays the timer type. The timer can be a 10 millisecond, 100 millisecond, or 1 second time base, depending on the timer number.

When the input to the timer becomes active, timer register starts decrementing from current value. The output turns on when the value in the timer register reaches zero. If the input turns on and the timer register is zero, the timer is loaded with the preset value. Whenever the input to the timer is off, the output of the timer is off.

## 11. LADDER PROGRAMMING



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For timer register

Supported operands : Timer register

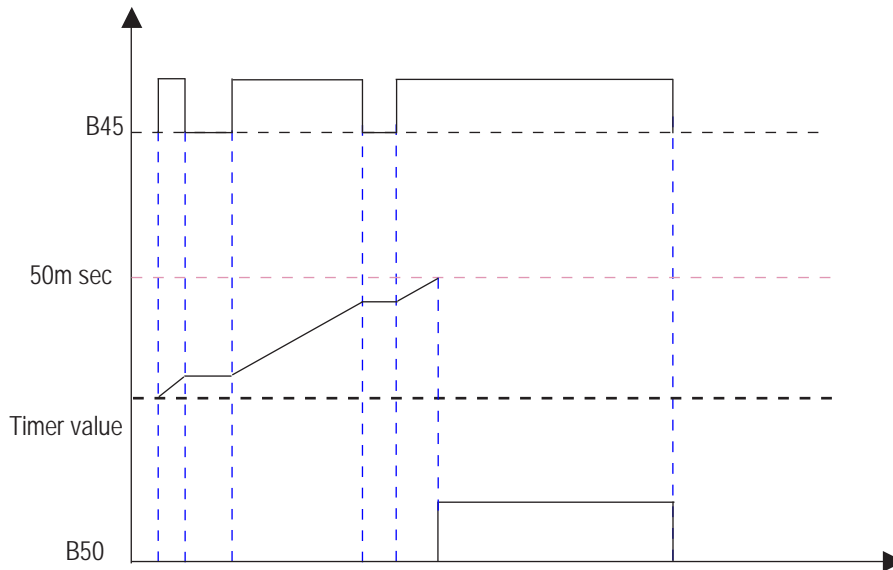
Valid ranges : for 10mS- T0000 to T0030  
for 100mS- T0031 to T0095  
for 1 sec- T0096 to T0127

Example of a Retentive TON Timer:

A Retentive TON type can be selected in the ladder editor with the F2 function key or with a right mouse click on the respective timer button cell. The ladder editor will place the timer block on the screen. A timer block cannot be in the first cell of any rung. The working of the Retentive TON type is illustrated with the help of an example:



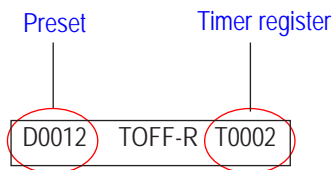
The internal coil, B45, is defined as the input to the TON-R timer, T5, which is a 10 msec base timer. The output of the timer is B50. K5 in the first cell of the timer block will give a delay of  $5 \times 10 \text{ msec} = 50 \text{ msec}$ . The output bit, B50, will turn on after 50 msec.



## 2.2 Retentive TOFF Timer

The Retentive TOFF timer instruction uses three cells. The first cell holds the value of the preset. The third cell is the timer number. The second cell displays the timer type. The timer can be a 10 ms, 100 ms, or 1 sec time base, depending on the timer number.

When the input to the timer becomes active, the timer register starts decrementing from the current value. The output turns off when the value in timer register reaches zero. If the input is on and the timer register is zero, the timer is loaded with the preset value. Whenever the input to the timer is off, the output of the timer is on.



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to k0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For timer register

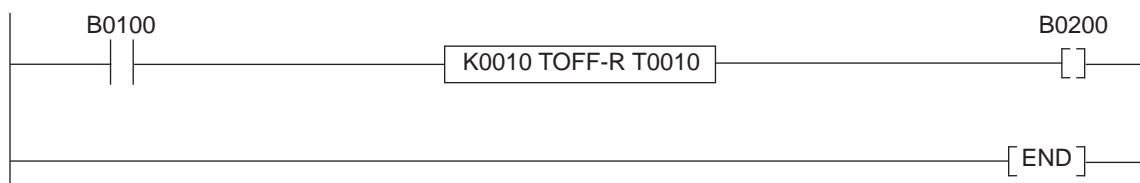
Supported operands : Timer register

Valid ranges : for 10mS- T0000 to T0030  
for 100mS- T0031 to T0095  
for 1 sec- T0096 to T0127

## 11. LADDER PROGRAMMING

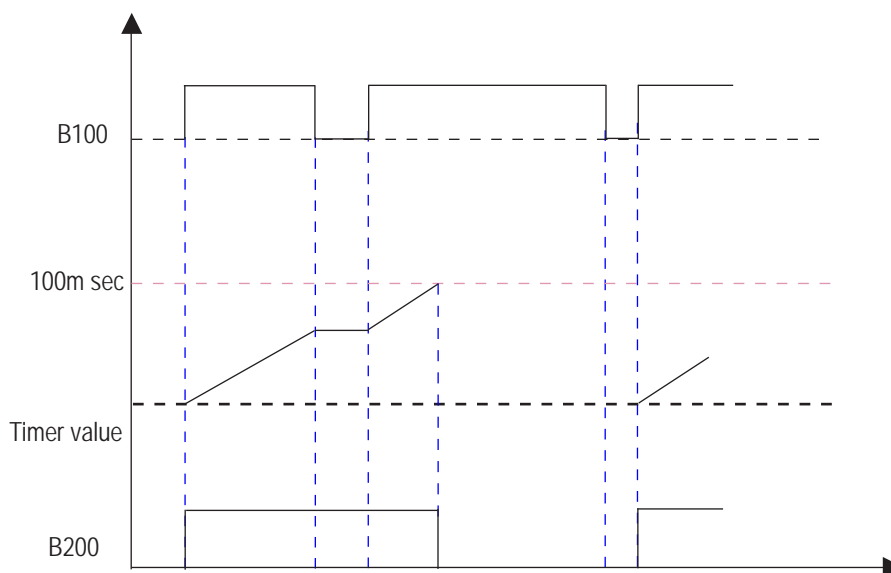
A Retentive TOFF timer can be selected with the F3 function key or with a right mouse click on the respective timer button cell.

The ladder editor will place the Timer block on the screen. The timer block cannot be in the first cell of a rung. The working of the Retentive TOFF timer is illustrated with the help of an example.



The internal coil, B100, is the input to TOFF-N timer, T10, which is a 10 msec base timer. The output of the timer is B200. K10 in the first cell of the timer block will give a delay of  $10 \times 10 \text{ msec} = 100 \text{ msec}$ . The output bit, B200, will turn OFF after 100 msec.

Timing Diagram

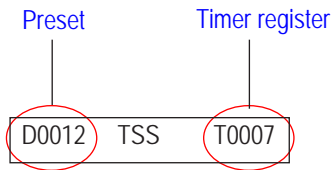


### 3. Single-shot Timer

The Single Shot timer instruction uses three cells. The first cell holds the value of the preset. The third cell is the timer number. The second cell is the type of the timer. The timer can be a 10 ms, 100 ms, or 1 sec time base, depending on the timer number.

On the leading edge of timer input, the timer becomes active and the timer register starts decrementing from its current value. The output turns on when the value in timer register reaches zero. Once the leading edge of the timer input is detected, the timer remains active even if the input turns off. On the leading edge of the input and if the timer register is zero, the timer is loaded with the preset value.

## 11. LADDER PROGRAMMING



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

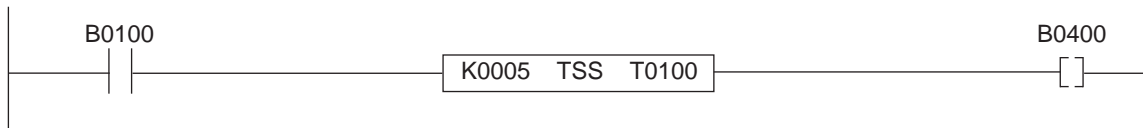
For timer register

Supported operands : Timer register

Valid ranges : for 10mS- T0000 to T0030  
for 100mS- T0031 to T0095  
for 1 sec- T0096 to T0127

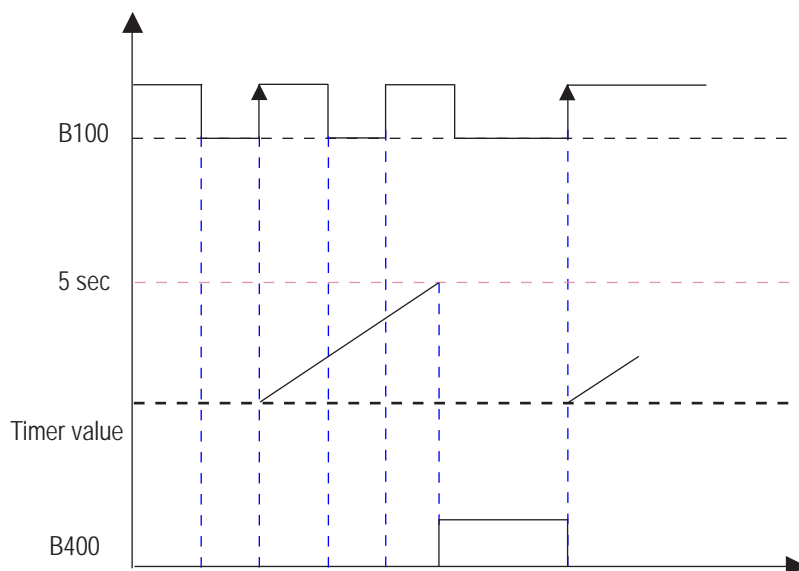
Example of Single Shot Timer:

The single shot timer is triggered by the rising edge of its input. Once triggered any input transitions on the input will be ignored until the output turns ON after the specified time interval.



## 11. LADDER PROGRAMMING

### Timing Diagram



### 11.2.5 Counters

Counters are classified as follows:

1. Up Counters
2. Down Counters
3. Up-Down (or reversible) Counters

Counter registers use a 4 byte (2 word) tag. The value of the counter register is set back to zero after 4294967295 counts.

Counters C0000 to C0127 are non-retentive. Their counter registers will be zero at power up. The counter registers in counters C0128 to C0177 are battery backed. They will retain the value they had prior to the unit being powered down.

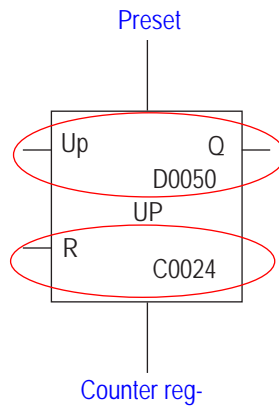
Transition inputs, branching, and timers are not allowed before a counter instruction.

#### 1. Up Counters

An up counter is inserted in two rungs. The top cell is used to enter the value of preset and the bottom cell is used to enter the counter number. It has two inputs: the actual input (top cell), and the reset (bottom cell). On every leading edge of the pulse input, the counter register gets incremented by one. When it reaches its preset value, the output of the counter turns on. It remains on while the counter register is greater than the preset. When the reset input of the counter is turned on, the counter register is set to zero. The counter register remains zero while the reset input is high.



## 11. LADDER PROGRAMMING



For Preset

Supported operands :

- Data register
- Retentive register
- Constant
- System register
- Internal register
- Input register
- Output register

Valid ranges :

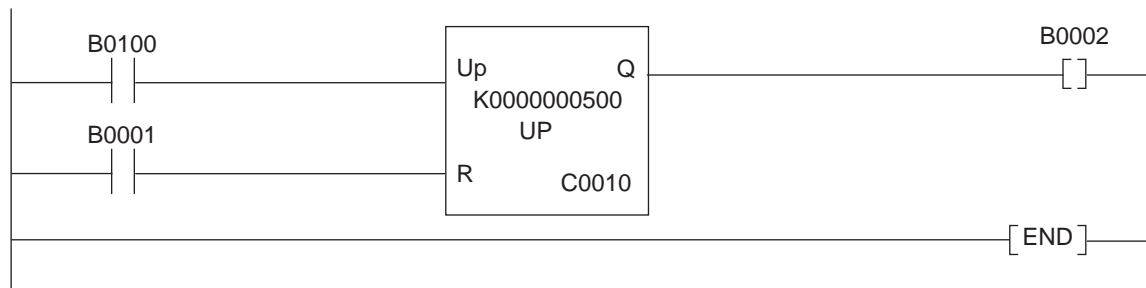
- D0000 to D0999
- R0000 to R0999
- K0000000000 to K4294967295
- @0000 to @0999
- S0000 to S0063
- J0000 to J0312
- U0000 to U0006
- L0000 to L0006

For counter register

Supported operands : Counter register

Valid range : C0000 to C0177

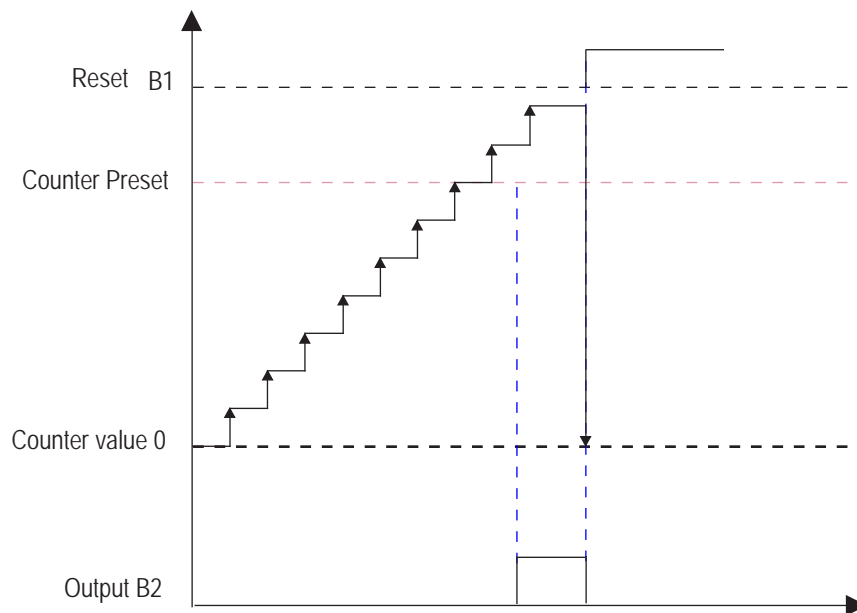
Example of Up Counter



Counter C0010 has a preset value of 500. The counter increments on each off to on transition of the pulse input, B0000. When the counter's value equals the preset value, output B0002 turns on. It will remain on while the counter's value is equal to or greater than the preset. When the reset input, B0001, is detected on, the counter's actual value is set to zero. The actual value register will be continuously set to zero as long as the reset input is on.

## 11. LADDER PROGRAMMING

Timing Diagram



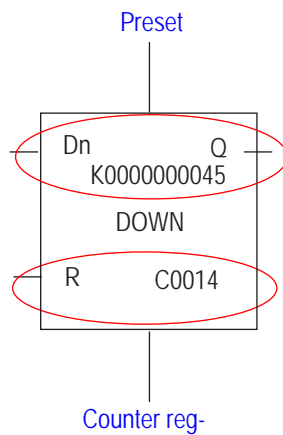
### 2. Down Counters

A down counter is inserted in two rungs. The top cell is used to enter the value of the preset and the bottom cell is used to enter the counter number. It has two inputs - the pulse input (top cell) and the reset (bottom cell) input. On every leading edge of input, the counter register gets decremented by one. When it reaches zero, the output of the counter turns on. When the reset input of the counter turns on, the counter register gets loaded with the preset value and the output is turned off. The register will continuously be loaded with the preset value as long as the reset input is on.

The counter register is a 4 byte (2 word) tag. Down counters do not count below zero.

At power on, the counter register is zero and the counter output will be on. The user has to reset the counter to turn off

## 11. LADDER PROGRAMMING



For Preset

Supported operands :

- Data register
- Retentive register
- Constant
- System register
- Internal register
- Input register
- Output register

Valid ranges :

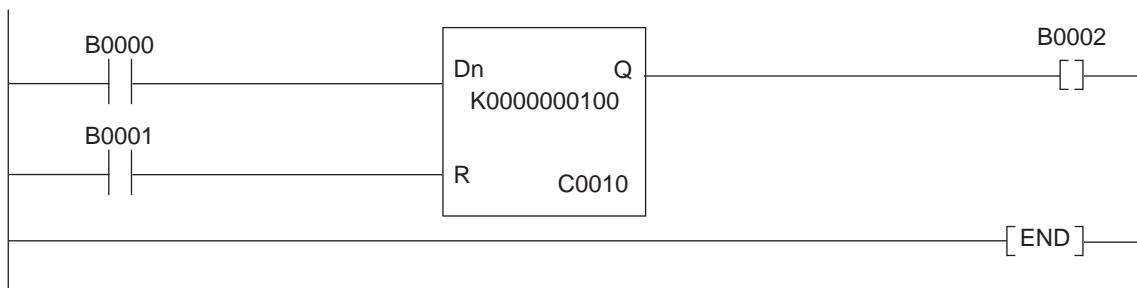
- D0000 to D0999
- R0000 to R0999
- K0000000000 to K4294967295
- @0000 to @0999
- S0000 to S0063
- J0000 to J0312
- U0000 to U0006
- L0000 to L0006

For counter register

Supported operands : Counter register

Valid range : C0000 to C0177

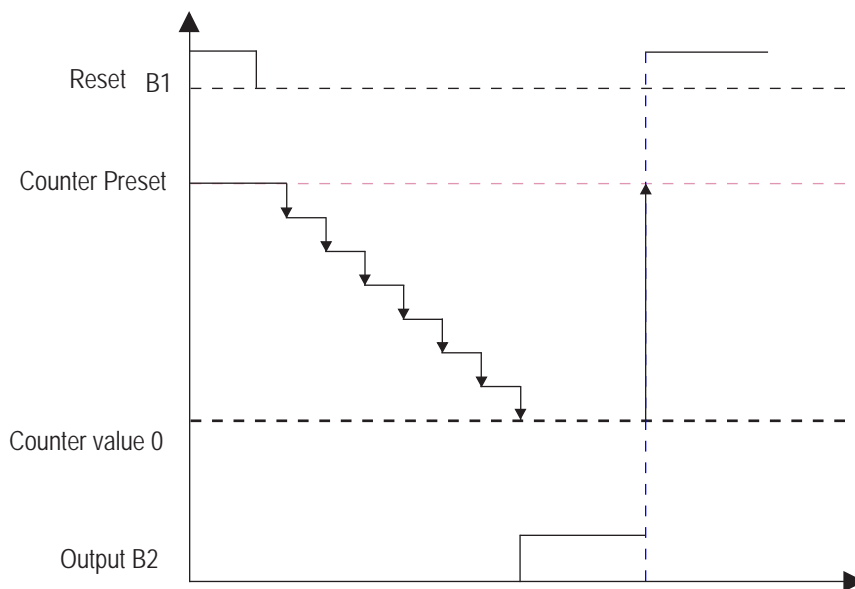
Example of Down Counter:



As shown in the example above, the input to counter C0100 is B0000. The counter ramps down on each off to on transition of input B0000. When the count reaches zero, output B0002 turns on. The counter value will remain zero once it reaches a value of zero. When reset input B0001 is detected high, the counter gets reloaded with the preset value and output will turn off.

## 11. LADDER PROGRAMMING

Timing Diagram



### 3. Up/Down Counter:

An up/down counter is inserted in three rungs. The top cell is used to enter the value of the preset. The bottom cell is the counter number.

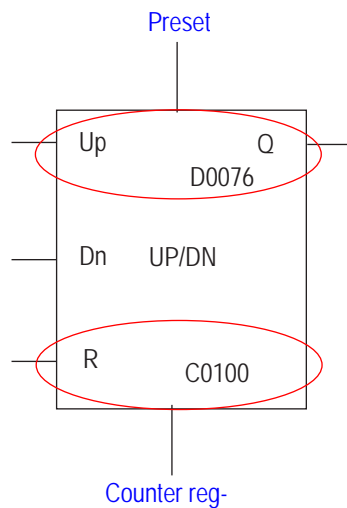
It has three inputs - up pulse input (up - top cell), down pulse input (down - middle cell), and reset input (bottom cell). The counter register gets incremented by one on every leading edge at the up input and decremented by one on every leading edge at the down input. When the reset input turns on, the counter register is set to zero. The counter register will be continuously loaded with zero as long as the reset input is high.

When the counter register is equal to the preset, the counter output turns ON.

On the next up pulse input, the preset value is crossed. The counter rolls back to 1, not 0, so that the pulse is not missed. During this transition, the counter output turns off and the counter continues to count from 1 to the preset value.

While counting down, the counter counts down from the preset value to zero. When the counter value is zero, the output turns on. At the next down pulse input, the counter rolls back up to the preset value and counter value is (Preset

## 11. LADDER PROGRAMMING



For Preset

Supported operands : Data register  
Retentive register  
Constant  
System register  
Internal register  
Input register  
Output register

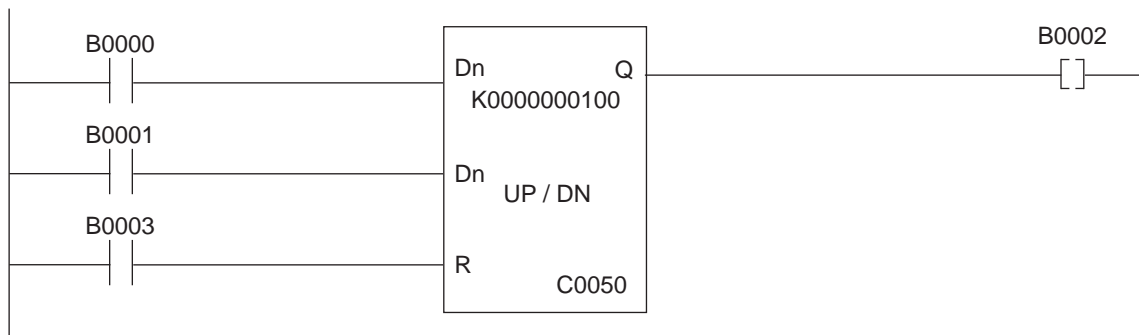
Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000000000 to K4294967295  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For counter register

Supported operands : Counter register

Valid range : C0000 to C0177

Example of UpDown Counter:



As shown in the above example B0000 is defined for UP input, B0001 is defined for Dn input and B0003 is defined as the reset input for the counter C0050. B0002 is defined as output.

The UP preset for the counter is 100 . The counter will count up to 100 on every rising edge of B0000 . When 100 pulses are counted the output B0002 turns ON. On next rising edge of B0000 the counter O/p will get reset and Counter will show a value 1 indicating the pulse was not missed.

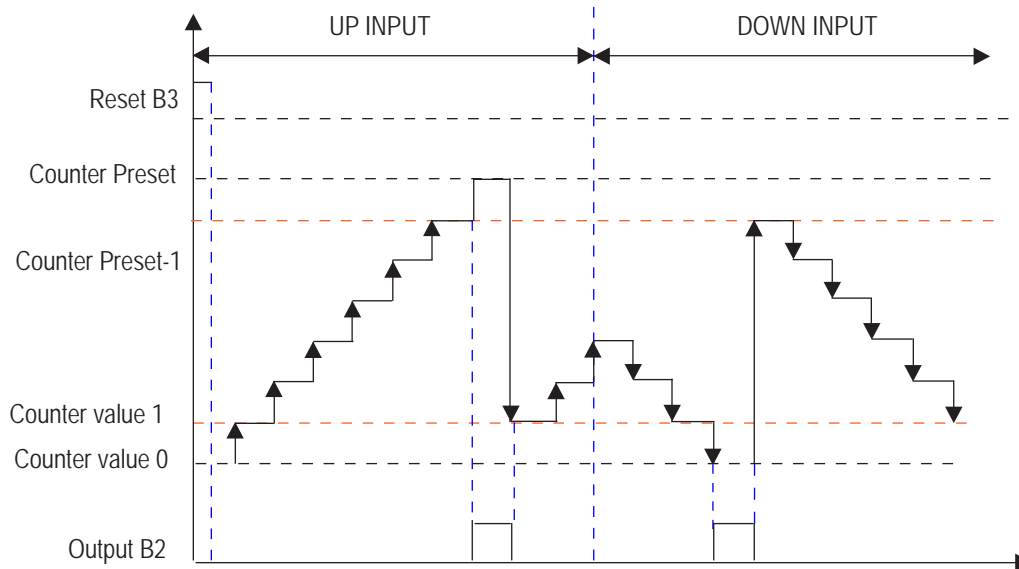
While counting Down, the counter counts down from Preset Value to zero. When counter value is zero ,the output turns ON. At the next Leading Edge on Down Input the counter rolls back up to preset value and counter value is Preset - 1 value so that Pulse is not missed. During this transition the Output turns OFF.

## 11. LADDER PROGRAMMING

Application:

These counters can be used to count the number of revolutions made by the shaft of a motor. The up input would add pulses in the clockwise direction and the down input would subtract pulses for counterclockwise rotation. Each time the output toggles on, a second up/down counter would keep track of the number of full revolutions.

Timing Diagram:

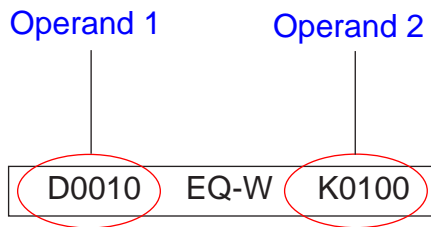


## 11.2.6 Data Compare

### 1. Data Comparison for a word

#### 1.1. Equal to

This instruction uses three cells and operands are inserted in the first and third cell. If the two 16 bit operands are equal, the output coil is set.



For Operand 1

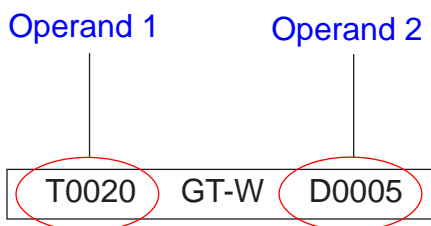
Valid Ranges : D0000 to D0999  
 R0000 to R0999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
 R0000 to R0999  
 K0000 to K9999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

#### 1.2. Greater than

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is greater than operand 2. Operands are 16-bit.



For Operand 1

Valid Ranges : D0000 to D0999  
 R0000 to R0999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

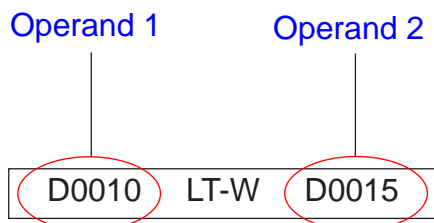
For Operand 2

Valid ranges : D0000 to D0999  
 R0000 to R0999  
 K0000 to K9999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

## 11. LADDER PROGRAMMING

### 1.3 Less Than

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is less than operand 2. Operands are 16 bit.



For Operand 1

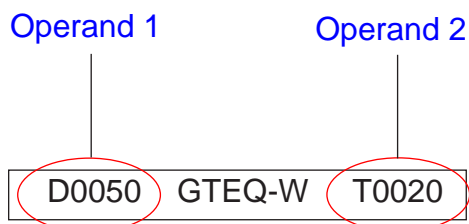
Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

### 1.4 Greater Than or Equal to:

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is greater than or equal to operand 2. Operands are 16 bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

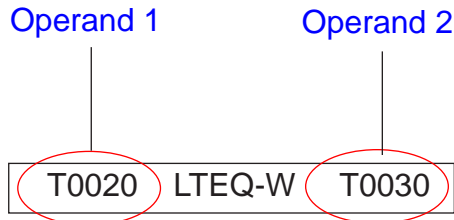
Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006



## 11. LADDER PROGRAMMING

### 1.5 Less than or equal to:

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is less than or equal to operand 2. Operands are 16 bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

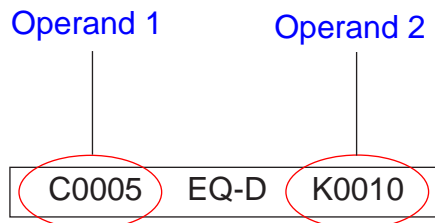
For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

### 2 Data Comparison for Double word

#### 2.1 Equal to

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is equal to operand 2. Operands are 32 bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

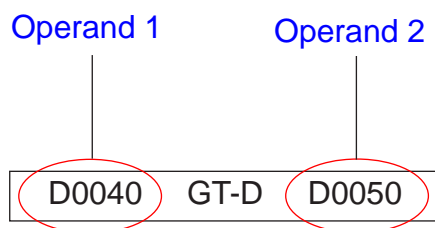
For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

### 2.2 Greater than

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is greater than operand 2. Operands are 32 bit.



For Operand 1

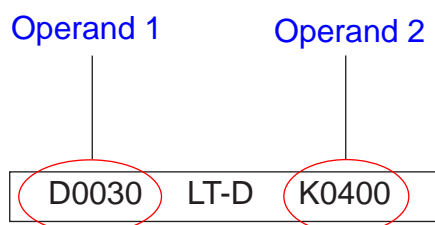
Valid Ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

### 2.3 Less than

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is less than operand 2. Operands are 32-bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

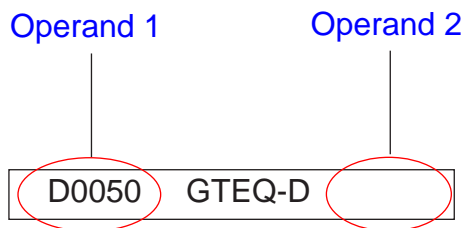
For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

### 2.4 Greater than or equal to

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is greater than or equal to operand 2. Operands are 32 bit.



For Operand 1

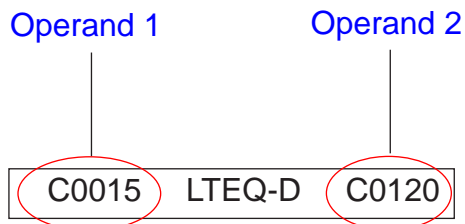
Valid Ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

### 2.5 Less than or equal to

This instruction uses three cells and operands are inserted in the first and third cell. This instruction checks if operand 1 is less than or equal to operand 2. Operands are 32 bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

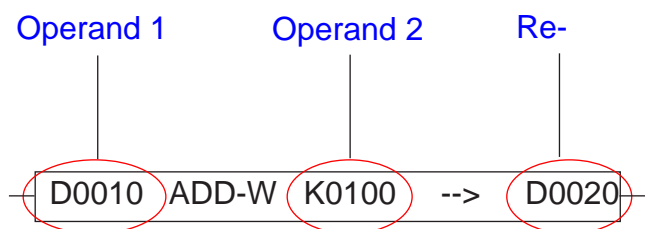
### 11.2.7 Math Operations

These functions perform unsigned integer math operations.

#### 1. Math for a word

##### 1.1 Addition

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction adds two 16 bit operands and stores the result in a 32 bit (4 byte) data register.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

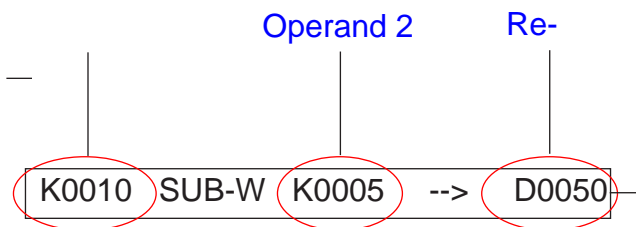
For Result

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

### 1.2 Subtraction

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction subtracts operand 2 from operand 1 and stores the result in a 16 bit (2 byte) data register.

Operand 1



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

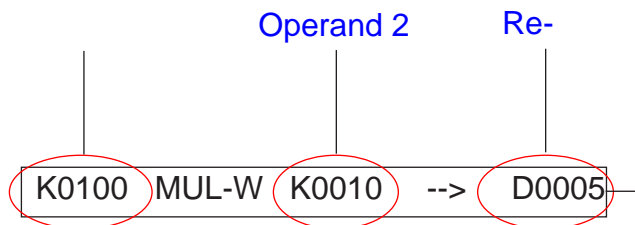
For Result

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

## 11. LADDER PROGRAMMING

### 1.3 Multiplication:

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction multiplies two 16 bit operands and stores the result in a 32 bit (4 byte) data register. LSB of the result is stored in the first tag and MSB is stored in second tag.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Result

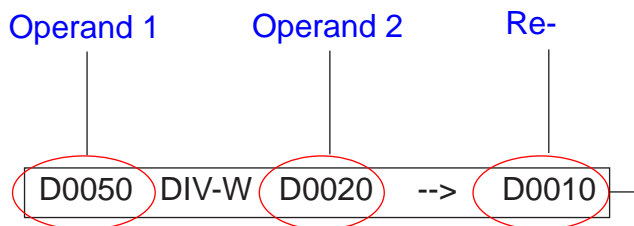
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

## 1.4 Division

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction divides operand 1 by operand 2 and stores the quotient in a 16 bit (2 byte) data register. The remainder is stored in the register following the result register.

Example:

If the quotient is stored in data register D0010, the remainder will be stored in data register D0011.



For Operand 1

Valid Ranges : D0000 to D0999  
 R0000 to R0999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
 R0000 to R0999  
 K0000 to K9999  
 T0000 to T0127  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 U0000 to U0006  
 L0000 to L0006

For Result

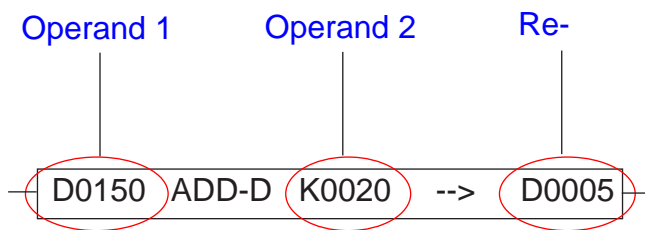
Valid ranges : D0000 to D0999  
 @0000 to @0999  
 S0000 to S0063  
 J0000 to J0312  
 L0000 to L0006

## 11. LADDER PROGRAMMING

### 2 Math For Double Word

#### 2.1 Addition:

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction adds two 32 bit operands and stores the result in a 32 bit (4 byte) data register.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

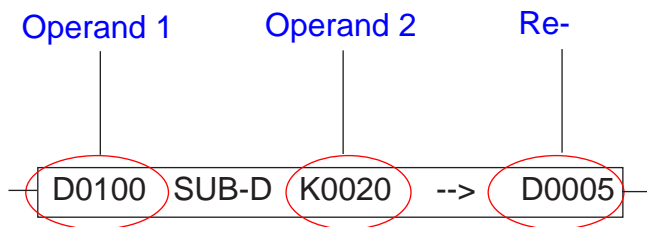
For Result

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063



## 2.2 Subtraction

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction subtracts operand 2 from operand 1 and stores the result in a 32 bit (4 byte) data register.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

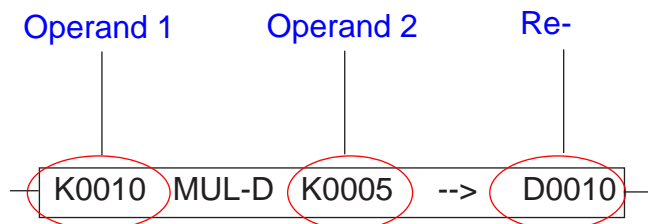
For Result

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

## 2.3 Multiplication

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction multiplies two 32 bit operands and stores the result in a 32 bit (4 byte) data register. LSB of the result is stored in the first tag and MSB is stored in second tag.

## 11. LADDER PROGRAMMING



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Result

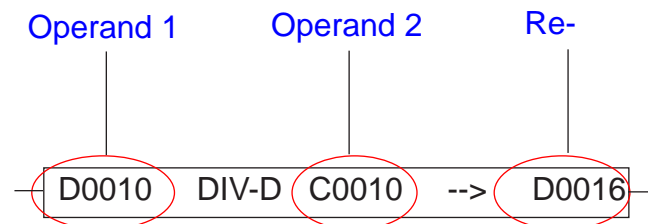
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

### 2.4 Division

This instruction uses five cells. Operands are inserted in the first and third cell and the result is stored in the fifth cell. The instruction divides operand 1 by operand 2 and stores the quotient in a 32 bit (4 byte) data register. The remainder is stored in the two registers following the result register. The quotient and remainder both are 32 bit (4 byte) data registers.

Example:

If the quotient is stored in D0016 then the remainder will be stored in D0018. Since D0016 and D0018 are 4 byte tags,



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Result

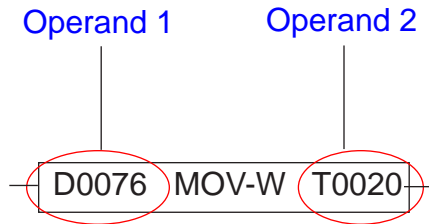
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

### 11.2.8 Data Move

#### 1 Move (For a word)

This instruction uses three cells. Operands are inserted in the first and third cell. This instruction moves a value from operand 1 to operand 2. Both operands are 16 bit.



For Operand 1

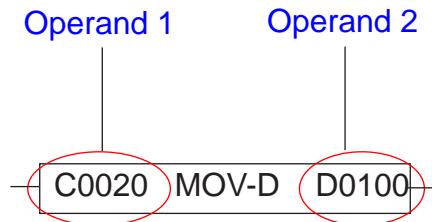
Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
T0000 to T0127  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

#### 2 Move (Double word)

This instruction uses three cells. Operands are inserted in the first and third cell. The instruction moves value from operand 1 to operand 2. Both operands are 32 bit.



For Operand 1

Valid Ranges : D0000 to D0999  
R0000 to R0999  
K0000 to K9999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

For Operand 2

Valid ranges : D0000 to D0999  
R0000 to R0999  
C0000 to C0177  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

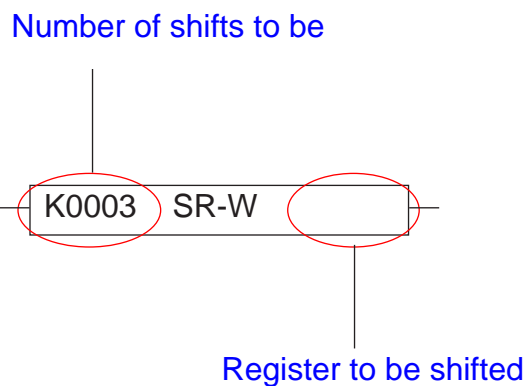
### 11.2.9 Shift Instruction

#### 1. Shift for a word

##### 1.1 Shift Right

The Shift Right (word) instruction performs a 16 bit shift of bits to the on the specified register. The first operand specifies how many times the register is to be shifted right. The LSB of the register is shifted into the carry bit, s0000. If the "Number of shifts to be done" operand is greater than 16, the instruction does nothing. For this instruction to work, the user must take care that the "Number of shifts to be done" is less than or equal to 16.

Note: The operation is performed on leading or trailing edge of the input.



For number of shifts to be done

Supported Operands : Data register  
Constants  
System register  
Internal register  
Input register  
Output register

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For register to be shifted

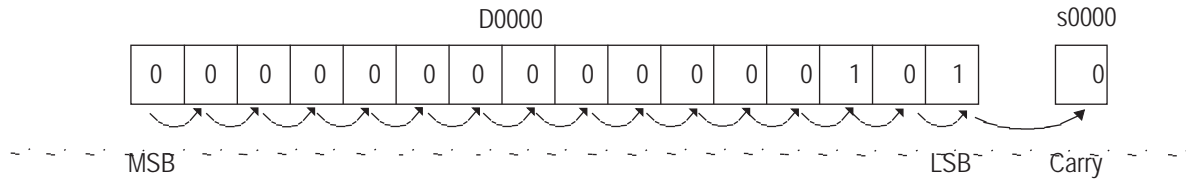
Supported Operands : Data register  
System register  
Internal register  
Output register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

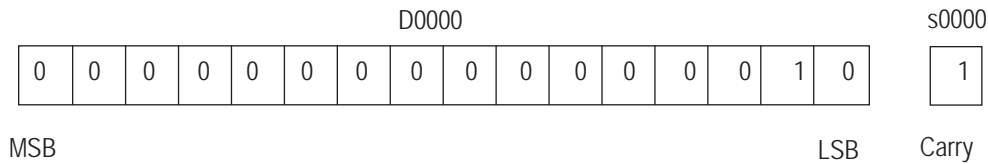
## Example



Suppose D0005 has initial value as decimal 5. On the leading edge of the bit B0100, the right shift will take place as below:-



After the right shift operation is over, the register D0000 will have value decimal 2 with carry bit set as below:-

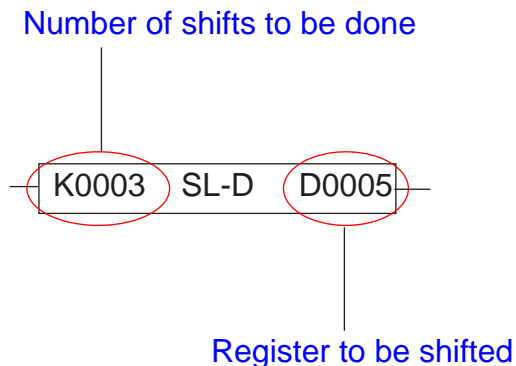


## 2 Shift for a Double word

### 2.1 Shift Left:

The Shift Left (double word) instruction performs a 32 bit shift of bits to the on the specified register. The first operand specifies how many times the register is to be shifted left. The MSB of the register is shifted into the carry bit, s0000. If the “Number of shifts to be done” operand is greater than 32, the instruction does nothing. For this instruction to work, the user must take care that the “Number of shifts to be done” is less than or equal to 32.

Note: The operation is performed on leading or trailing edge of the input.



For number of shifts to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

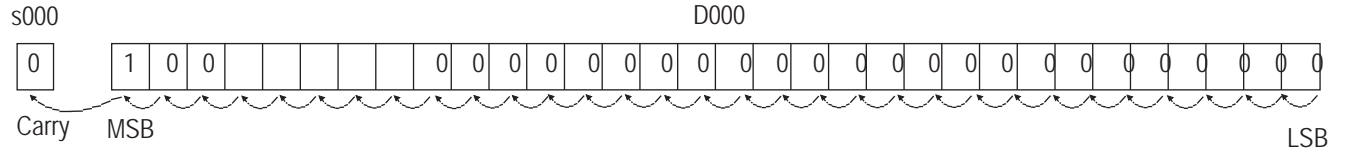
For register to be shifted  
Supported operands : Data register  
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

# 11. LADDER PROGRAMMING

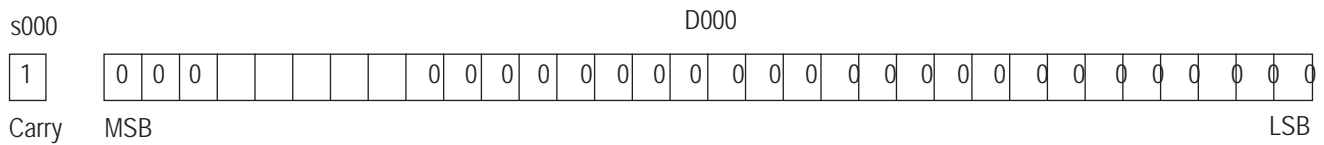
## Example



Suppose initially register D000 has the value 2,147,483,648. Shift left operation will take place on rising edge of B0100 as shown



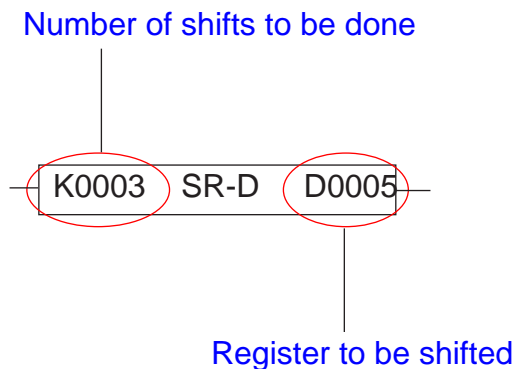
After the left shift operation is over, the register D0000 will have value decimal 0 with carry bit set as shown.



## 2.2 Shift right

The Shift Right (double word) instruction performs a 32 bit shift of bits to the on the specified register. The first operand specifies how many times the register is to be shifted right. The LSB of the register is shifted into the carry bit, s0000.

If the "Number of shifts to be done" operand is greater than 32, the instruction does nothing. For this instruction to work, the user must take care that the "Number of shifts to be done" is less than or equal to 32.



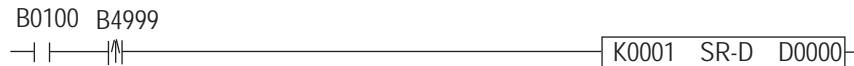
For number of shifts to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

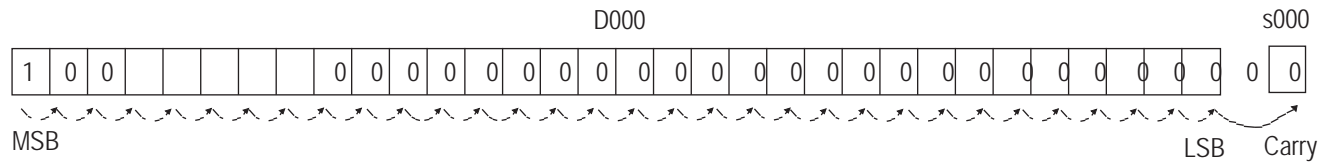
For register to be shifted  
Supported operands : Data register  
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

## 11. LADDER PROGRAMMING

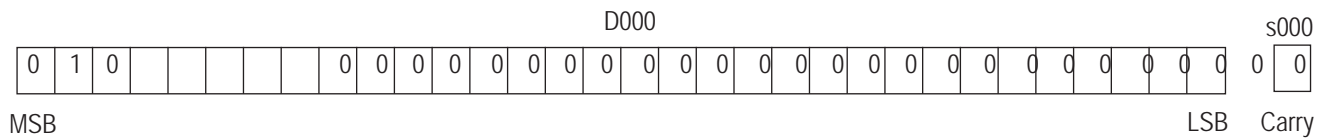
### Example



Suppose initially register D000 has the value 2,147,483,648. Shift right operation will take place on rising edge of B0100 as shown



After the right shift operation is over, the register D0000 will have value decimal 1,073,741,824 as shown.



### 11.2.10 Rotate

## 1. Rotate for a word

### 1.1 Rotate left

The Rotate Left (word) instruction performs a 16 bit rotate left operation on the specified register. The first operand specifies how many times the register is to be rotated left. The MSB of the register is shifted into the carry bit, s0000 at each rotate operation.

If the “Number of rotates to be done” operand is greater than 16, the instruction does nothing. For this instruction to work, the user must take care that the “Number of rotates to be done” is less than or equal to 16.

Note: The operation is performed on leading or trailing edge of the input.

## 11. LADDER PROGRAMMING

Number of rotates to be done



Register to be rotated

For number rotates to be done

Supported operands : Data register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

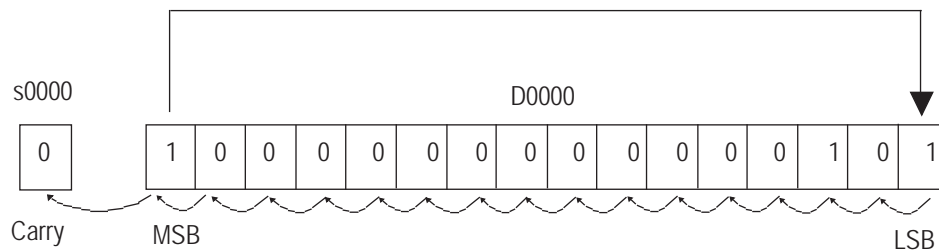
For register to be rotated

Supported operands : Data register  
System register  
Internal register  
Output register

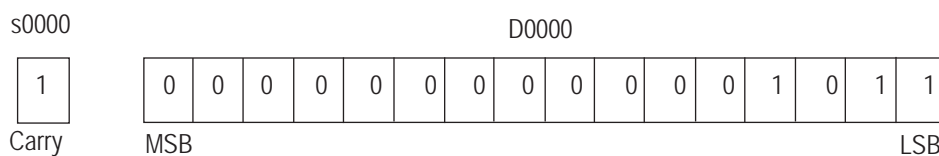
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006



Suppose initially register D000 has the value 32,773. Shift right operation will take place on leading edge of B0100, the rotate will take place as follows:-



After the rotate operation is over, the register D0000 will have value decimal 11 with carry bit set as shown.





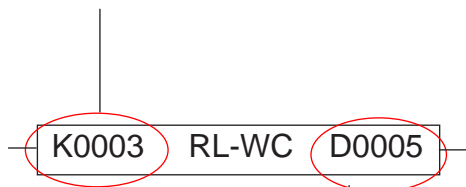
## 1.2 Rotate Left with Carry

The Rotate Left (word) with carry instruction performs a 16 bit rotate left operation on the specified register. The first operand specifies how many times the register is to be rotated left. The carry is copied in the LSB of the register and the MSB of the register is copied into the carry bit, s0000 at each rotate operation.

If the "Number of rotates to be done" operand is greater than 15, the instruction does nothing. For this instruction to work, the user must take care that the "Number of rotates to be done" is less than or equal to 15.

Note: The operation is performed on leading edge or trailing edge of the input.

Number of rotates to be done



Register to be rotated

For number rotates to be done

Supported operands : Data register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For register to be rotated

Supported operands : Data register  
System register  
Internal register  
Output register

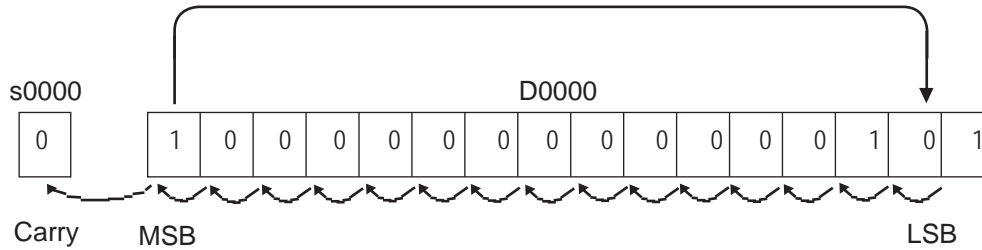
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

## 11. LADDER PROGRAMMING

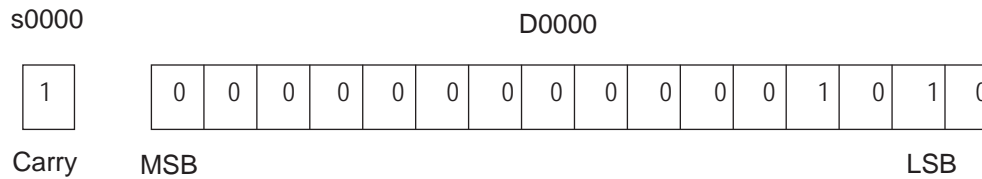
Example



Suppose initially D0000 has value as decimal 32.773. On the leading edge of bit B0100, the rotate will take place as below:



After the rotate operation is over, the register D0000 will have value decimal 11 with carry bit set as below:-



## 1.3 Rotate right

The Rotate Right (word) instruction performs a 16 bit rotate right operation on the specified register. The first operand specifies how many times the register is to be rotated right. The carry bit is copied to the MSB and the LSB of the register is copied into the carry bit, S0000 at each rotate operation.

If the "Number of rotates to be done" operand is greater than 16, the instruction does nothing. For this instruction to work, the user must take care that the "Number of rotates to be done" is less than or equal to 16.

Note: The operation is performed on leading or trailing edge of the input.

Number of rotates to be done



Register to be rotated

For number rotates to be done

Supported operands : Data register  
Constant  
System register  
Internal register  
Input register  
Output register

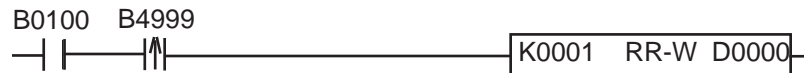
Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For register to be rotated

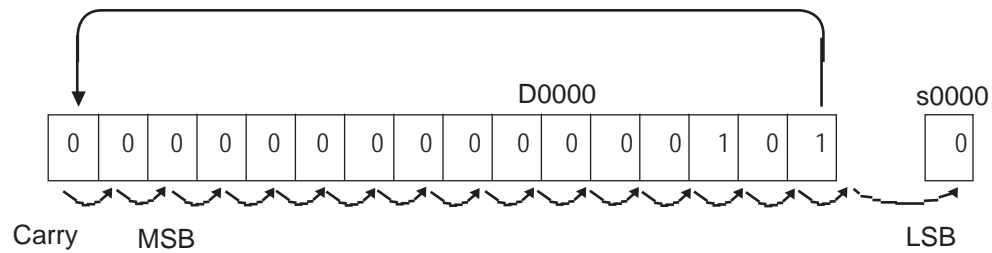
Supported operands : Data register  
System register  
Internal register  
Output register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

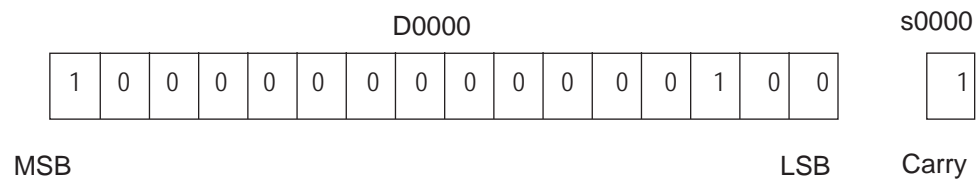
## 11. LADDER PROGRAMMING



Suppose initially D0000 has value as decimal 5. On the leading edge of bit B0100, the rotate will take place as below:



After the rotate operation is over, the register D000 will have value decimal 32,770 with



## 1.4 Rotate right word with carry

The Rotate Right (word) with carry instruction performs a 16 bit rotate right operation on the specified register. The first operand specifies how many times the register is to be rotated right. The carry bit is copied to the MSB and the LSB of the register is copied into the carry bit, s0000, at each rotate operation.

If the "Number of rotates to be done" operand is greater than 15, the instruction does nothing. For this instruction to work, the user must take care that the "Number of rotates to be done" is less than or equal to 15.

Note: The operation is performed on leading or trailing edge of the input.

Number of rotates to be done



Register to be rotated

For number rotates to be done

Supported operands : Data register  
Constant  
System register  
Internal register  
Input register  
Output register

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
U0000 to U0006  
L0000 to L0006

For register to be rotated

Supported operands : Data register  
System register  
Internal register  
Output register

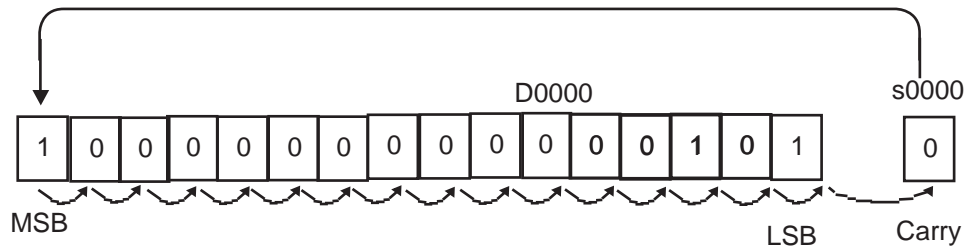
Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063  
J0000 to J0312  
L0000 to L0006

## 11. LADDER PROGRAMMING

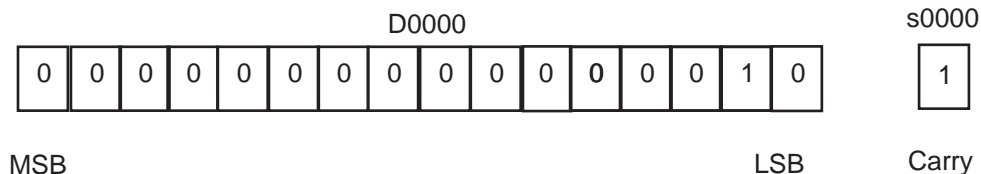
## Example



Suppose initially D0000 has value as decimal 5. On the leading edge of bit B0100, the rotate will take place as below:



After the rotate operation is over, the register D000 will have value decimal 2 with carry bit set as bellow:-



## 2 Rotate With Double Word

### 2.1 Rotate Left:

The Rotate Left (double word) instruction performs a 32 bit rotate left operation on the specified register. The first operand specifies how many times the register is to be rotated left. The MSB of the register is copied in the LSB of register at each rotate. The MSB of the register is copied in the carry bit s0000 at each rotate operation.

If the “Number of rotates to be done” operand is greater than 32, the instruction does nothing. For this instruction to work, the user must take care that the “Number of rotates to be done” is less than or equal to 32.

Note: The operation is performed on leading or trailing edge of the input.

Number of rotates to be done



Register to be rotated

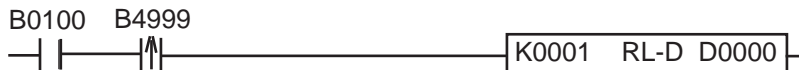
For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

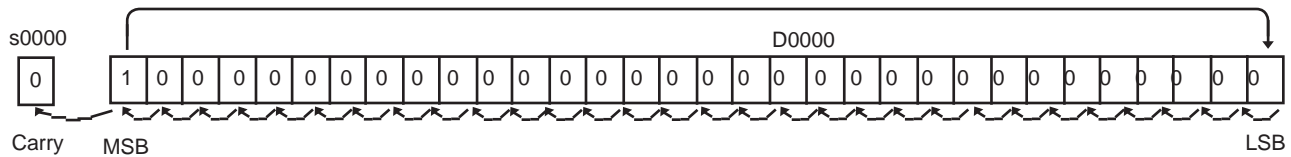
For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

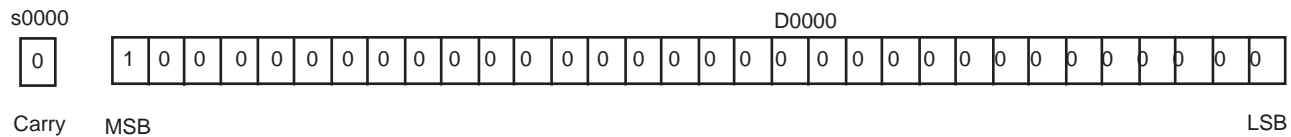
Example



Suppose initially D0000 has value as decimal 2,147,483,648. The rotate left operation will take place on the rising edge of B0100 as below:-



After the rotate operation is over, the register D0000 will have value decimal 1 with carry bit set as below:-



## 2.2 Rotate left double word with carry

The Rotate Left with carry (double word) instruction performs a 32 bit rotate left operation on the specified register. The first operand specifies how many times the register is to be rotated left. The carry bit is copied to the LSB of the register and the MSB of the register is copied to the carry bit, s0000, at each rotate.

If the “Number of rotates to be done” operand is greater than 32, the instruction does nothing. For this instruction to work, the user must take care that the “Number of rotates to be done” is less than or equal to 32.

Note: The operation is performed on leading or trailing edge of the input.

# 11. LADDER PROGRAMMING

Number of rotates to be done



Register to be rotated

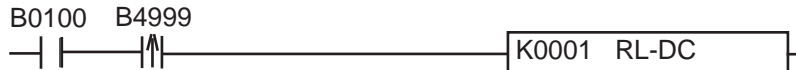
For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

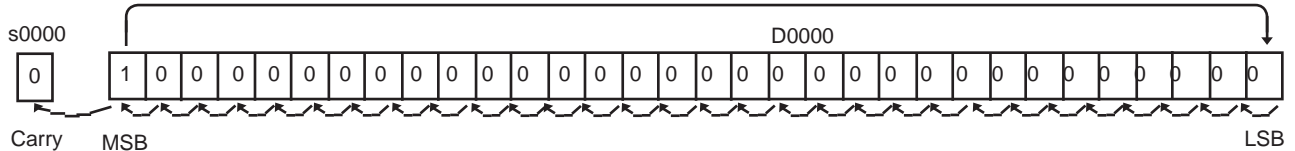
For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

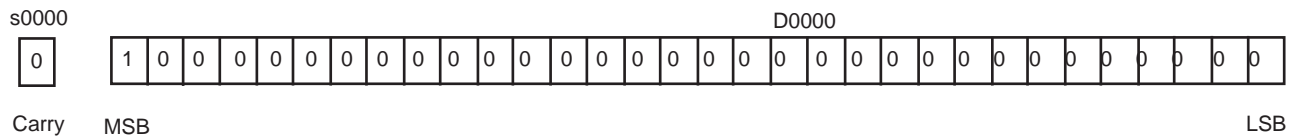
Example



Suppose initially the register D0000 has value as decimal 2,147,483,648. The rotate left operation will take place on the rising edge of B0100 as bellow:-



After the rotate operation is over, the register D0000 will have value decimal 0 with carry bit set as bellow:-



## 2.3 Rotate right

Rotate right (double word) instruction performs a 32 bit rotate right operation on the specified register.

The 'Number of rotates to be done' specifies how many times the register is to be rotated right. The LSB of the register is copied in the MSB of register at each rotate. The LSB of the register is copied in the carry bit s0000 at each rotate operation.

If the 'Number of rotates to be done' is greater than 32 then the instruction does nothing. In order for this instruction to work, the user must take care that the 'Number of rotates to be done' is less than or equal to 32.

Note: The operation is performed on leading or trailing edge of the i/p.



# 11. LADDER PROGRAMMING

Number of rotates to be done



Register to be rotated

For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

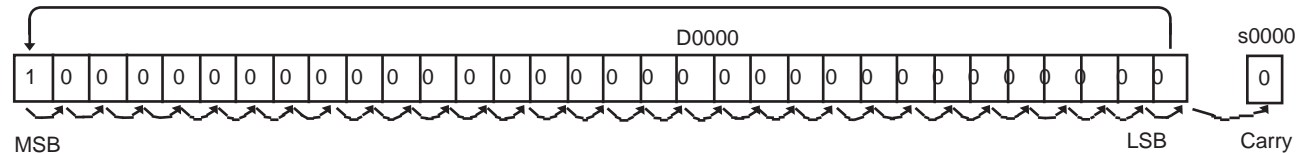
For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

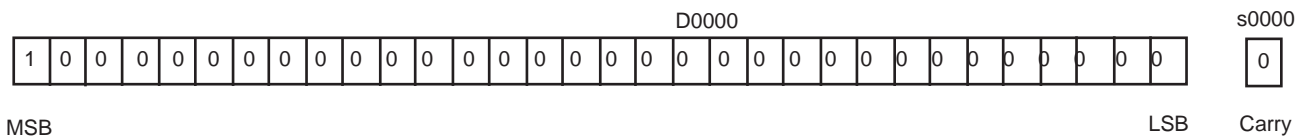
Example



Suppose initially the register D0000 has value as decimal 2,147,483,648. The rotate left operation will take place on the rising edge of B0100 as below:-



After the rotate operation is over, the register D0000 will have value decimal 1,073,741,824 as below:-



## 2. 4 Rotate right double word with carry

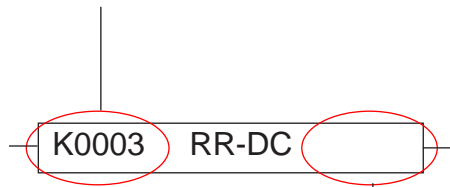
The Rotate Right with carry (double word) instruction performs a 32 bit rotate right operation on the specified register. The first operand specifies how many times the register is to be rotated right. The carry bit is copied to the LSB of the register and the MSB of the register is copied to the carry bit, s0000, at each rotate.

If the “Number of rotates to be done” operand is greater than 32, the instruction does nothing. For this instruction to work, the user must take care that the “Number of rotates to be done” is less than or equal to 32.

Note: The operation is performed on leading or trailing edge of the input.

## 11. LADDER PROGRAMMING

Number of rotates to be done



Register to be rotated

For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999  
S0000 to S0063

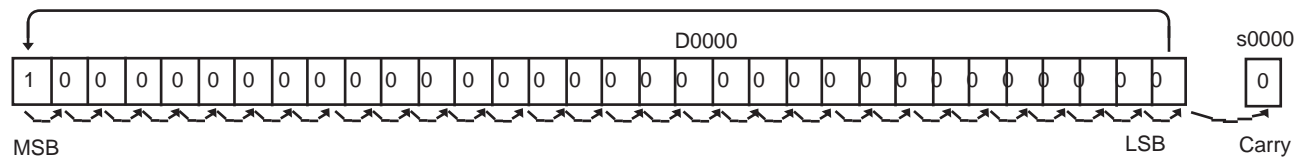
For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999  
S0000 to S0063

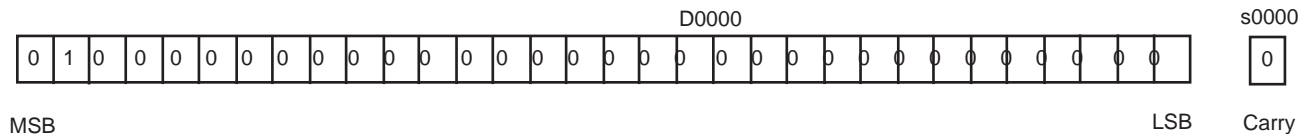
Example



Suppose initially the register D0000 has value as decimal 2,147,483,648. The rotate left operation will take place on the rising edge of B0100 as below:-



After the rotate operation is over, the register D0000 will have value decimal 1,073,741,824 as below:-

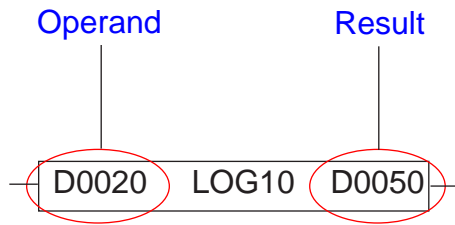


## 11.2.11 Logarithm

Logarithm instructions are used to find either the natural or Base 10 log of a number or the antilog of a number.

### 1. Log (Base 10)

The Log (Base 10) instruction calculates the log (base 10) for the specified operand and stores the calculated value in the result data register. It uses three cells. The first cell holds the value of the operand and the third cell is the result data register. The operand and result data registers are 4 bytes.



For number rotates to be done  
Supported operands : Data register  
Constant

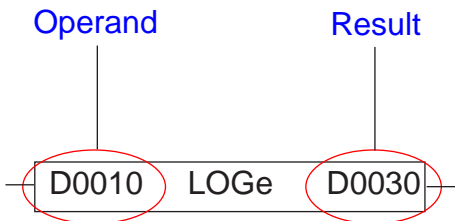
Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999

For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999

### 2. Natural Log

The Natural Log instruction calculates the natural log (to the base e) for the specified operand and stores the calculated value in the result data register. It uses three cells. The first cell holds the value of the operand and the third cell is the result data register. The operand and result data registers are 4 bytes.



For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999

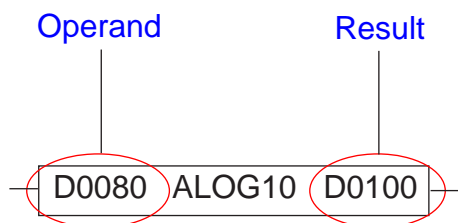
For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999

## 11. LADDER PROGRAMMING

### 3. Antilog (Base 10)

The Natural Log instruction calculates the antilog to the base 10 for the specified operand and stores the calculated value in the result data register. It uses three cells. The first cell holds the value of the operand and the third cell is the result data register. The operand and result data registers are 4 bytes.



For number rotates to be done  
Supported operands : Data register  
Constant

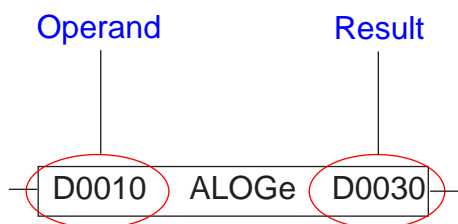
Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999

For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999

### 4. Natural Antilog

The Natural Antilog instruction calculates the natural antilog (to the base e) for the specified operand and stores the calculated value in the result data register. It uses three cells. The first cell holds the value of the operand and the third cell is the result data register. The operand and result data registers are 4 bytes.



For number rotates to be done  
Supported operands : Data register  
Constant

Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999

For register to be rotated  
Supported operands : Data register

Valid ranges : D0000 to D0999  
@0000 to @0999

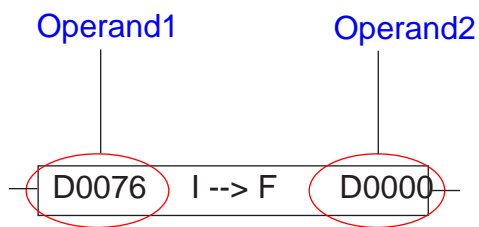
### 11.2.12 Data Conversion

Data conversion instructions are used to convert a value from one data type to another. The ladder editor supports two types of data conversion.

1. Integer to Float Data Conversion
2. Float to Integer Data Conversion

#### 1. Integer to Float:

It is used to convert a 16 bit integer value (operand 1) to 32 bit float value (operand 2).

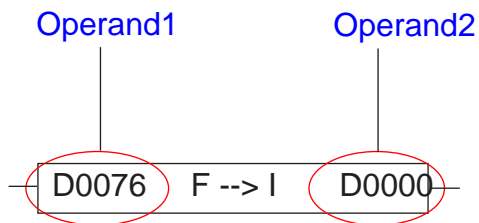


For Operand 1  
Valid Ranges : D0000 to D0999  
K0000 to K9999  
@0000 to @0999

For Operand 2  
Valid ranges : D0000 to D0999  
@0000 to @0999

#### 2. Float to Integer

It is used to convert a 32 bit float value (operand 1) to a 16 bit integer value (operand 2). During conversion the float value is rounded off to the nearest decimal place.



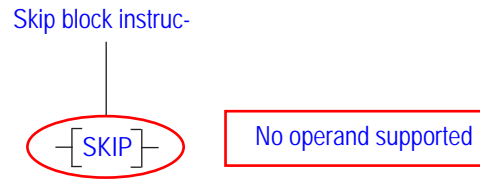
For Operand 1  
Valid Ranges : D0000 to D0999  
@0000 to @0999

For Operand 2  
Valid ranges : D0000 to D0999  
@0000 to @0999

## 11. LADDER PROGRAMMING

### 11.2.13 Skip Block

When this instruction is enabled in the ladder block, all of the following instructions in the block are skipped for execu-



### 11.2.14 End Block

The END instruction is the terminating instruction for a ladder block. Ladder instructions are compiled until the END instruction. Anything after the END is not recognized by the compiler. It is a mandatory instruction. It should be inserted in the last rung of logic block. It can be inserted anywhere in the rung. The editor will move it to the last cell of the rung and add horizontal links.



### 12.1 16-Point Linearization

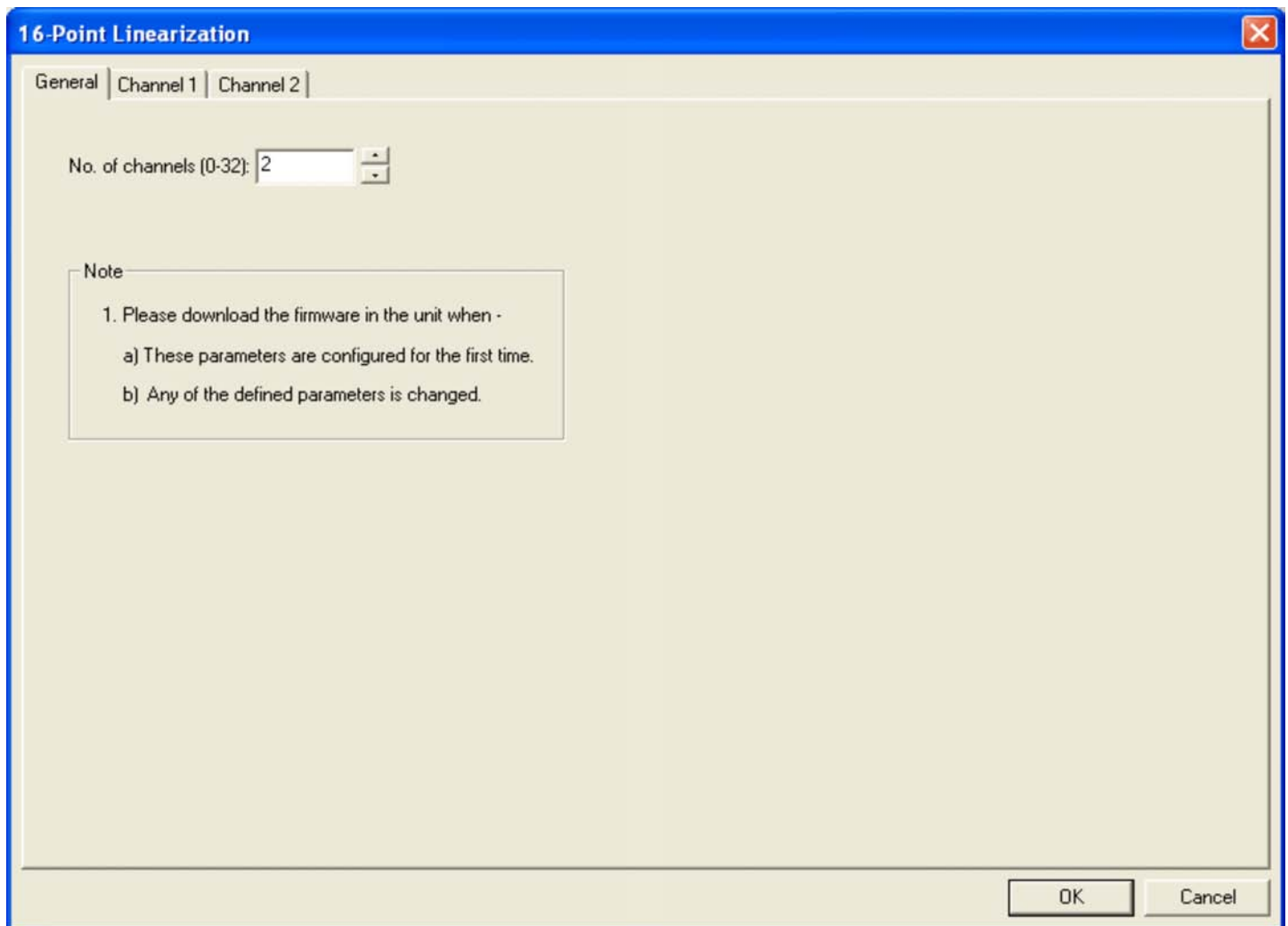
The concept of linearization is implemented using the equation for a straight line,  $Y = mX + C$  between any two points. It enables the user to linearize a nonlinear variable. In the wizard, up to 16 points of linearization can be defined for each of 32 data registers.

In HMI Studio software, 16 point linearization can be configured as shown below.

Define	Communicate	Utilities	Screen	Objects
Unit Settings...				F3
Network Configuration...				F4
Tag database...				F5
Screens...				F6
Global Keys...				F7
Alarms...				F8
Application Tasklists...				F9
Ladder Logic Block...				F10
High speed interrupt...				F11
High speed Timer...				
Data Logger...				
Configure PID Block...				
16-Point Linearization...				
Time Proportional PWM Configuration...				
Pulse Output...				
Analog Configuration...				
Analog Totalizer...				
Hide Project Tools				F12

A left mouse click on the option shown in the circle guides to 16 point linearization Configuration wizard as shown below.

### General



Up to 32 channels can be configured for linearization on the General screen.

For each data register (or channel) that is to be linearized, select the appropriate tab. Change the mode to "Non-linear". Determine which data registers is to be the X axis input and which is the Y axis output. Set the number of points of linearization from 2 to 16. The only data type currently supported is unsigned integer.

The input column represents the X axis data points. They can be fixed by using constant (K values), or they can be variable by using data registers.

The output column represents the corresponding Y axis data points. They can be fixed by using constant (K values), or they can be variable by using data registers.

Between any two pairs of points, the output value will be calculated on a straight line basis. If an input value is less than the minimum input value for the channel, the output will be the minimum. If an input value is greater than the largest defined input value, the output will be the largest defined value.



## 12. SPECIAL FEATURES

### For example

Suppose we have a data register we want to linearize with four points.

0	0
30	400
70	750
100	1000

The data entry would be as follows:

**16-Point Linearization**

General Channel 1 Channel 2

Configuration for Channel no: 1

Mode:

No. of points:

Input tag:

Output tag:

Valid ranges: (D0000 to D0999)

Linearization Table

Valid ranges: (K00000 to K65535) or (D0000 to D0999 [if indirect addresses are used instead of constant K])

Data type:

Point	Input	Output
1	K00000	K00000
2	K00030	K00400
3	K00070	K00750
4	K00100	K01000

OK Cancel

**Note:** Linearization is active at power up. Since a data register is zero at power up, the output will be the corresponding value.

## 12. SPECIAL FEATURES

### 12.2 PID Controller

A feedback controller is designed to generate an output that causes some corrective effort to be applied to a process so as to drive a measurable process variable,  $y(t)$ , towards a desired value, known as the set point or reference. All feedback controllers determine their output by observing the difference, called error, between the setpoint and the actual process variable measurement.

The PID loop is one such type of feedback controller which looks at (a) the current value of the error, (b) the integral of the error over a recent time interval, and (c) the current derivative of the error signal to determine not only how much of a correction to apply, but for how long. Each of those three quantities are multiplied by a “tuning constant” and added together. The PID output,  $c(t)$ , is a weighted sum.

Different manufacturers in the process control industry use different algorithms for their PID controller design. There are three major classifications of PID algorithms that most manufacturers’s algorithm fit under, serial, ideal and parallel. The general equations are:

Ideal Algorithm :	$\text{OUTPUT} = K_c \left[ e < t > + \frac{1}{I} \int e < t > d < t > + D \frac{de < t >}{dt} \right]$
Parallel :	$\text{OUTPUT} = K_p [ e < t > ] + \frac{1}{I} \int e < t > d < t > + D \frac{de < t >}{dt}$
Series : (Interfacing)	$\text{OUTPUT} = K_c \left[ e < t > + \frac{1}{I} \int e < t > d < t > \right] \left[ 1 + D \frac{de < t >}{dt} \right]$

The algorithm implemented in HMI is the ideal type. The parameters entered by the user are as follows:

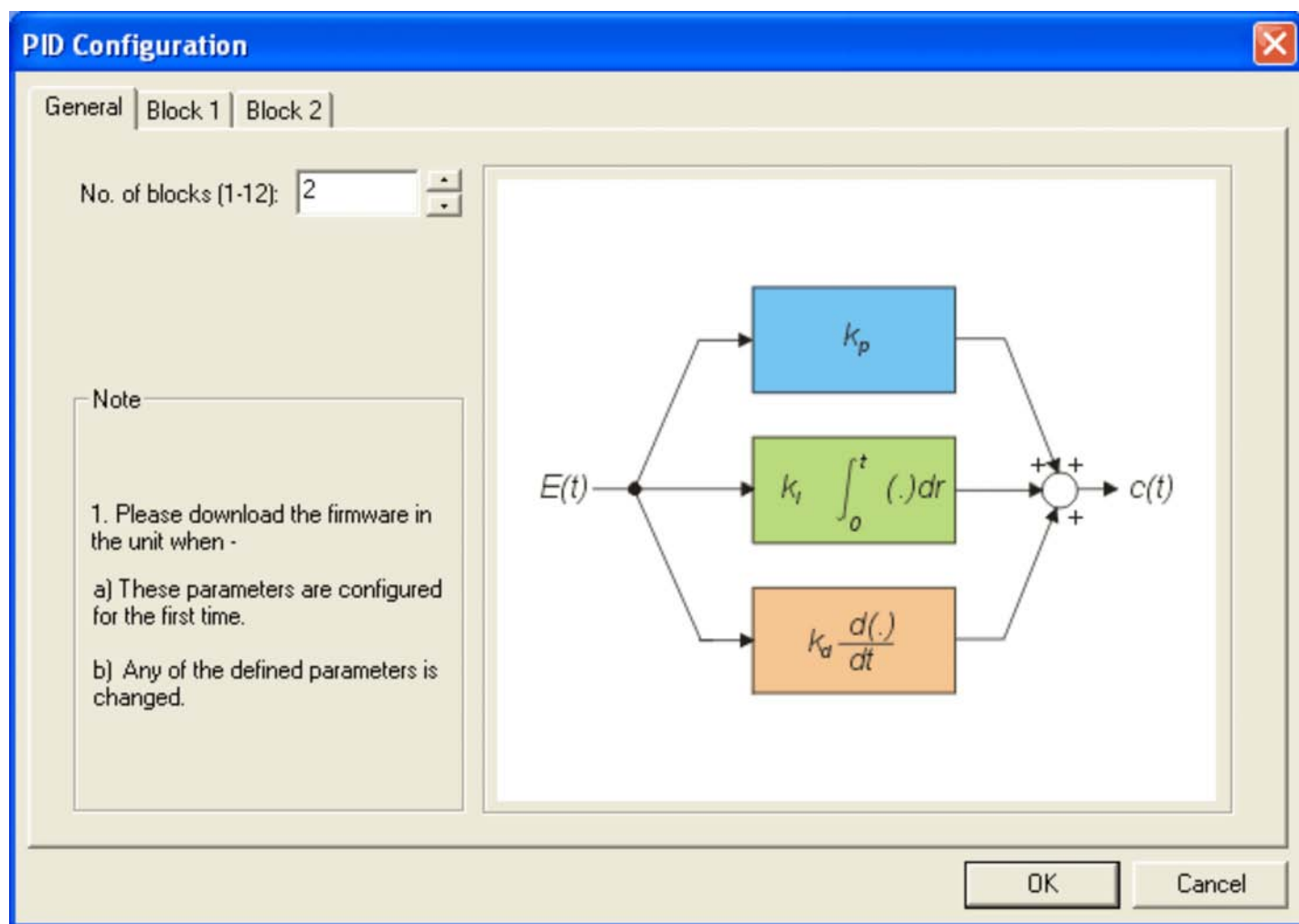
1. Proportional Gain = 100 / Proportional band
2. Integral gain = Proportional gain \* (1 / reset time in sec.)
3. Derivative gain = Proportional gain \* rate time in sec.

A left mouse click on the **Define** menu pops up a drop down list as shown below.

Define	Communicate	Utilities	Screen	Objects
Unit Settings...				F3
Network Configuration...				F4
Tag database...				F5
Screens...				F6
Global Keys...				F7
Alarms...				F8
Application Tasklists...				F9
Ladder Logic Block...				F10
High speed interrupt...				F11
High speed Timer...				
Data Logger...				
Configure PID Block...				
16-Point Linearization...				
Time Proportional PWM Configuration...				
Pulse Output...				
Analog Configuration...				
Analog Totalizer...				
Hide Project Tools				F12

## 12. SPECIAL FEATURES

### General



1. **Number of Blocks** : Determine the number of PID blocks desired. Up to 12 blocks can be defined.

### Specific Block

**PID Configuration**

General | Block 1 | Block 2

Mode:  PID Action:

Enable bit (Bxxxx):

Alarms:

High:  High-High:

Low:  Low-Low:

**PID Parameters**

Set point (Dxxxx):

Process variable (Dxxxx):

Manipulated variable (Dxxxx):

Dead band (Dxxxx):  ( % of Set point )

Proportional gain (Dxxxx):

Reset time (Dxxxx):  ( in sec. )

Derivative gain (Dxxxx):

Sampling time (Dxxxx):  ( in sec. )

OK Cancel

To configure a PID block, determine each of the following.

#### Mode

Mode can be “Auto” or “Manual” . “Auto” mode is not supported in this version.

#### PID Action

This parameter is used to control PID output direction. It can be either “Forward” of “Reverse”.

In case of “Forward” action, if the process variable goes below the set point, the manipulated variable increases and if the process variable goes above set point, the manipulated variable decreases.

In case of “Reverse” action, if the process variable goes below the set point, the manipulated variable decreases and if the process variable goes above set point, the manipulated variable increases.

#### Enable bit

This parameter is used to start and stop the execution of PID block. If this bit is high, the PID block is executed and if it is low, the execution of PID block is stopped. Any internal bit can be used for the enable bit. If the PID block is disabled, the last value of the controlled variable is retained.

## 12. SPECIAL FEATURES

### **Set point**

The set point is the target value for the process.

The set point and process variable must be given in the same type of units (degrees Celsius, bars, meters per second, etc.).

### **Process Variable**

This tag holds the actual value of the process variable. Any data register from D0000 to D0999 can be used.

### **Proportional gain**

The proportional gain is applied to the process error (process error = set point – process variable). It is calculated at every sample period.

### **Integral gain**

The integral gain is applied to the process error (process error = set point – process variable). The value is calculated and added to (or subtracted from) the output value every sample period.

### **Derivative gain**

The derivative gain is applied to the process error (process error = set point – process variable) every sample period. It is calculated based on the change in the process variable since the last update.

### **Proportional gain**

The proportional gain is a multiplier applied to the process error (process error = set point – process variable).

### **Sampling time**

The sampling time determines how often the PID block is updated. The sampling time is given in multiples of seconds.

### **Bumpless scaling factor**

The PID controller will continue to take action from the MV value defined by user, if ramp function is used initially to control the PV value.

The bumpless scaling factor scales the error value to the PID controller. If scaling is not required the user should write 1 in the Bumpless scaling factor register.

The range of Bumpless scaling factor is 1 to 10.

### 12.3 High Speed Timer

The High Speed Timer interrupt allows a ladder program to be executed in parallel to the main program. It will be executed after a predefined time (called the preset), following the setting of the bit s0001, a specific internal bit. By resetting this s0001 bit at the beginning of the interrupt ladder program, this interrupt program will be executed every preset time.

The High Speed Timer interrupt can be used in the following situations:

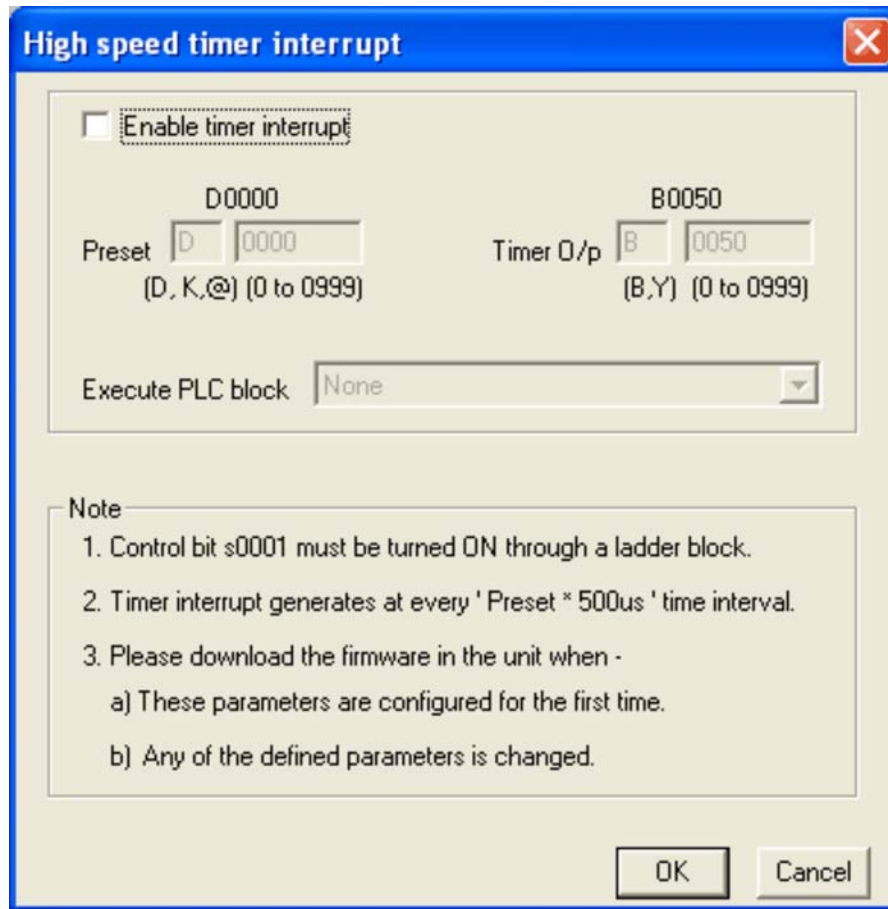
1. Execute a ladder block after a predefined time. For example, execute a block of ladder a short time after an input interrupt occurs.
2. Force the execution of a ladder block on a timed interrupt basis.

Define	Communicate	Utilities	Screen	Objects
Unit Settings...				F3
Network Configuration...				F4
Tag database...				F5
Screens...				F6
Global Keys...				F7
Alarms...				F8
Application Tasklists...				F9
Ladder Logic Block...				F10
High speed interrupt...				F11
High speed Timer...				
Data Logger...				
Configure PID Block...				
16-Point Linearization...				
Time Proportional PWM Configuration...				
Pulse Output...				
Analog Configuration...				
Analog Totalizer...				
Hide Project Tools				F12

It can also be selected through the toolbar icon.

## 12. SPECIAL FEATURES

Once selected, the “High speed timer interrupt” wizard will appear as shown below:



The image shows a software window titled "High speed timer interrupt" with a standard Windows-style title bar (blue with a red close button). The window contains the following elements:

- A checkbox labeled "Enable timer interrupt" which is currently unchecked.
- Two numeric input fields:
  - The first is labeled "D0000" above it and "Preset" to its left. It contains the value "0000". Below the field is the text "(D, K, @) (0 to 0999)".
  - The second is labeled "B0050" above it and "Timer O/p" to its left. It contains the value "0050". Below the field is the text "(B, Y) (0 to 0999)".
- A dropdown menu labeled "Execute PLC block" with "None" selected.
- A "Note" section containing three numbered items:
  1. Control bit s0001 must be turned ON through a ladder block.
  2. Timer interrupt generates at every 'Preset \* 500us' time interval.
  3. Please download the firmware in the unit when -
    - a) These parameters are configured for the first time.
    - b) Any of the defined parameters is changed.
- At the bottom right are "OK" and "Cancel" buttons.

**Enable timer interrupt** – This box needs to be checked to enable the “High speed timer interrupt”. Once checked, all other options are enabled.

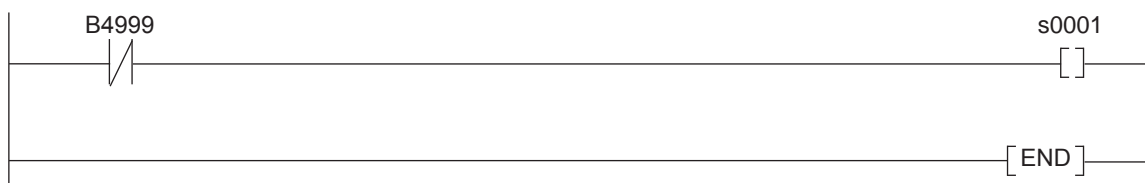
**Preset** – Preset value for timer. The time basis for this timer interrupt is 500 usec. If the preset value is 2 (or if the register Dxxx contains the value 2), the interrupt will be generated after 1000 usec (1 msec).

**Timer O/p** – Output bit indicating through an ON status, that the interrupt has been generated.

**Execute PLC block** – The block of ladder logic when the interrupt is generated.

**IMPORTANT:** The High Speed Timer Interrupt is a single-shot timer, which needs to be enabled by a control bit. The control bit for high-speed timer is s0001. This bit must be turned ON through a ladder block only.

**Note:** If user tries to turn s0001 ON through any other way than a ladder instruction, the high speed timer interrupt will NOT work. The only way the high-speed timer can be enabled is to turn s0001 ON though a ladder block. The ladder can be as simple as:

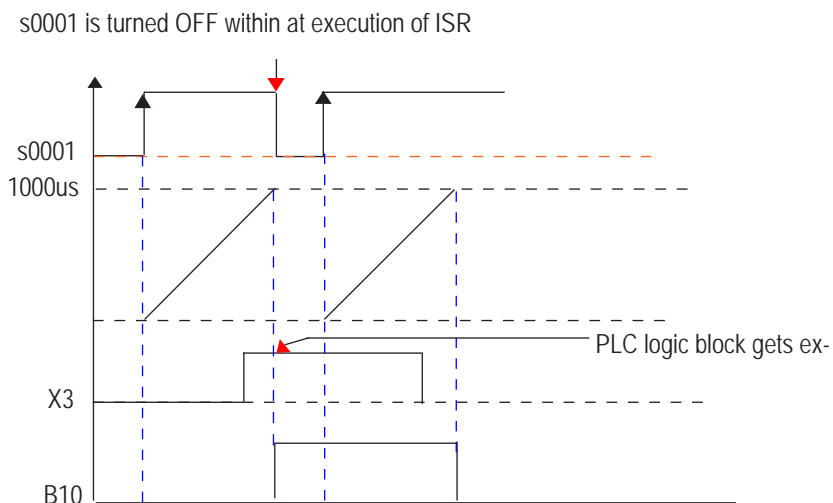




## 12. SPECIAL FEATURES

This ladder block would be added to the “Power-on Tasks”. The high speed timer enable bit, s0001, would be on before the execution of the high speed timer interrupt is evaluated. This is shown below:

If the user wants to use this interrupt to force execute a block of ladder on a timed basis, the first rung on this ladder should turn the control bit s0001 on. Then write the logic to be executed at the timed interrupt. Since the control bit is turned off when the interrupt occurs, the bit must be turned back on for the next interrupt to occur. The ladder block will be executed once per interrupt.



### Note:

For HMI 201 and 401, now the max. preset value is 380.

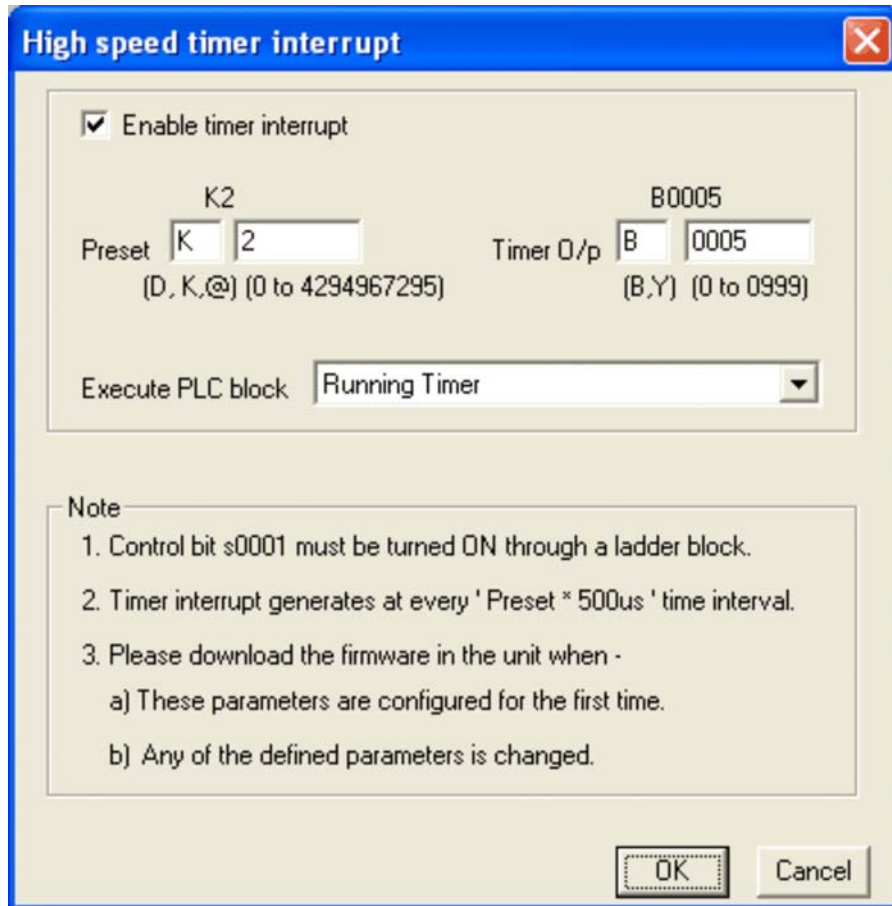
ie.,  $380 \times 500 \text{ micro sec} = 0.19 \text{ sec}$ .

For HMI 601, 605 and 1205, max. preset value is 648, that means  $648 \times 500 \text{ micro sec} = 0.3 \text{ sec}$

## 12. SPECIAL FEATURES

### Example:

Set up the high speed timer interrupt as follows:



The dialog box titled "High speed timer interrupt" contains the following configuration options:

- ☒ Enable timer interrupt
- Preset:   (D, K, @) (0 to 4294967295)
- Timer O/p:   (B, Y) (0 to 0999)
- Execute PLC block:

**Note**

1. Control bit s0001 must be turned ON through a ladder block.
2. Timer interrupt generates at every 'Preset \* 500us' time interval.
3. Please download the firmware in the unit when -
  - a) These parameters are configured for the first time.
  - b) Any of the defined parameters is changed.

Buttons: OK, Cancel

In the example, the timer interrupt is enabled.

1 msec ( $2 * 500 \text{ usec}$ ) after the bit s0001 has been turned on, the interrupt ladder logic included in the PLC block "Start" will run.

Since this logic includes setting bit s0001 (re-enabling the timer interrupt), this ladder logic will execute every 1 msec.

## 12.4 PWM Configuration

Analog voltages or currents are often used to directly control a process. In many other cases, the process control needs to be digital value that turns on and off over time. A home heating system is an excellent example. The difference between the desired temperature and the actual temperature causes the furnace to turn on for a length of time proportional to the difference. This is time proportional PWM.

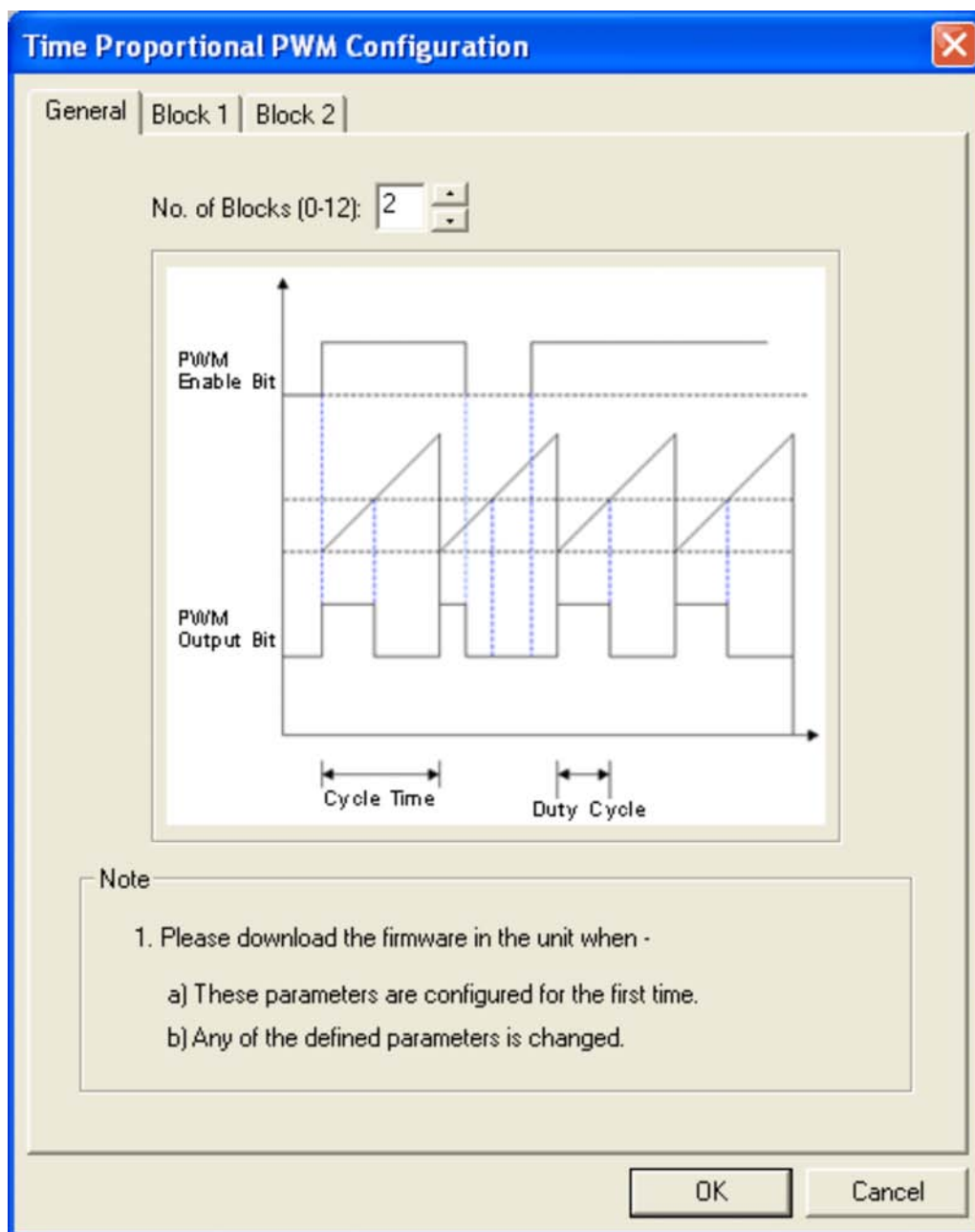
Time proportional PWM can be programmed as follows:

Define	Communicate	Utilities	Screen	Objects
Unit Settings...				F3
Network Configuration...				F4
Tag database...				F5
Screens...				F6
Global Keys...				F7
Alarms...				F8
Application Tasklists...				F9
Ladder Logic Block...				F10
High speed interrupt...				F11
High speed Timer...				
Data Logger...				
Configure PID Block...				
16-Point Linearization...				
Time Proportional PWM Configuration...				
Pulse Output...				
Analog Configuration...				
Analog Totalizer...				
Hide Project Tools				F12

A left mouse click on the option shown in the circle guides to Time Proportional PWM Configuration starts the wizard.

## 12. SPECIAL FEATURES

### General



**Number of Blocks :** Define the number of time proportional PWM blocks. User can define maximum 12 blocks.

## Specific Block

**Time Proportional PWM Configuration**

General | **Block 1** | Block 2

Configuration for Block no: 1

Enable bit: B 0010  
( B0000 - B4999 or X0000 - X0050 )  
or ( Y0000 - Y0050 )

Cycle time (sec.): D 0020  
( D0000 - D0999 or K0000 - K4095 )

Output bit: B 0020  
( B0000 - B4999 or Y0000 - Y0050 )

Duty cycle control register: D 0040  
( D0000 - D0999 or K0000 - K4095 )

**Note**

1. The PwM output is a square wave. Its Duty cycle varies according to value in 'Duty cycle control register', which should vary from 0 to 4095.
2. The PID output tag should be copied in 'Duty cycle control register', if PwM is used in combination with the PID controller.

OK Cancel

1. **Cycle time** : This tag holds the value, in seconds, to control the frequency of the square wave.
2. **Duty cycle control register** : This tag holds the analog value to be encoded digitally. The value in the duty cycle control register determines the on and off time percentage of the output. The range of values in this register is from 0 to 4095. When the value is 0, the output bit off during the entire span of the cycle time. A value of 4095 will correspond to 100% a duty cycle. The output bit will be on during the entire span of the cycle time.
3. **Enable Bit** : This bit enables the Time Proportional PWM controller. It can be controlled anywhere in the application.
4. **PWM Output Bit** : This bit is the output of the Time Proportional PWM controller.

**Working Of PWM**

A value of 5 in the cycle time register, D0200, will correspond to a Cycle-Time of 5 sec. A value of 2047 in the duty cycle register will toggle the output bit, B0200, to be on for 2.5 sec and off for 2.5 sec.

## 12. SPECIAL FEATURES

### 12.5 Analog Totalizer

Analog Totalizer is generally used with Flow Transmitters which gives analog value proportional to flow of fluid, e.g. Steam Flow Transmitters. There are three configuration parameters for Analog Totalizer. The totalizer displays values per hour measurement.

**1. Enable Bit :** This bit Enables or Disables the Totalizer.

**2. Input Tag :** The analog value to be totaled is read in to the Input tag. This tag should be the Unsigned short Data Register (2 Bytes).

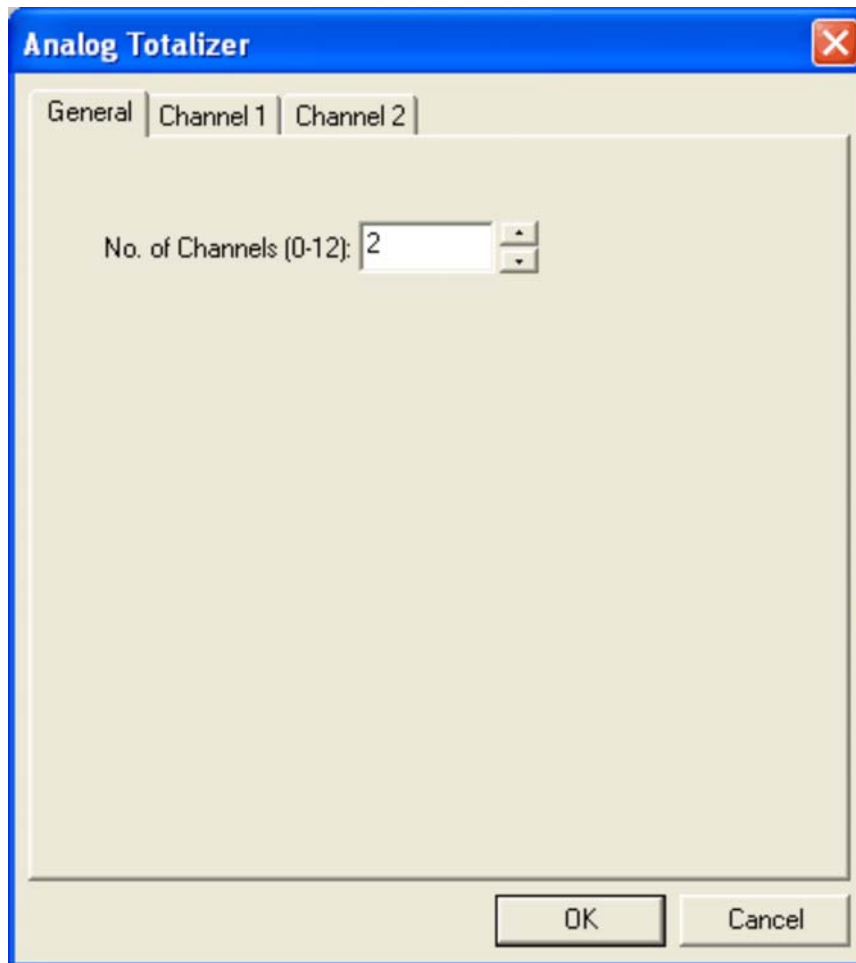
**3. Totalizer Tag :** This tag displays the input value which is totaled per hour. This tag should be Counter as user generally require to save the previous total.

**Example :** If input tag reads 600, then totalizer tag will increment to 600 counts in one hour span or  $600/60 = 10$  per minute.

To enable analog totalizer, select **Define | Analog Totalizer** menu option.

Define	Communicate	Utilities	Screen	Objects
Unit Settings...				F3
Network Configuration...				F4
Tag database...				F5
Screens...				F6
Global Keys...				F7
Alarms...				F8
Application Tasklists...				F9
Ladder Logic Block...				F10
High speed interrupt...				F11
High speed Timer...				
Data Logger...				
Configure PID Block...				
16-Point Linearization...				
Time Proportional PWM Configuration...				
Pulse Output...				
Analog Configuration...				
Analog Totalizer...				
Hide Project Tools				F12

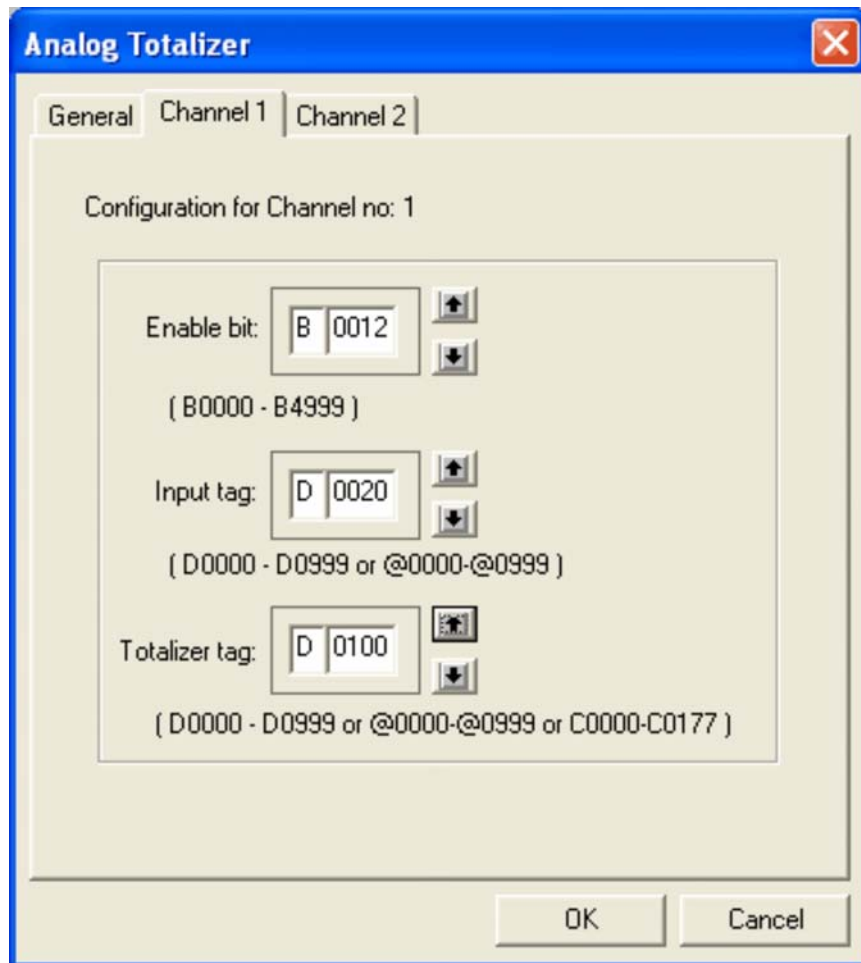
When user selects Analog Totalizer option, following window appears.



User can select maximum 12 channels for totalizer.

## 12. SPECIAL FEATURES

Channels can be configured as shown below.



The image shows a software dialog box titled "Analog Totalizer". It has three tabs: "General", "Channel 1", and "Channel 2". The "Channel 1" tab is selected. Inside the dialog, the text "Configuration for Channel no: 1" is displayed. Below this, there are three configuration fields, each with a label, a text input box, and up/down arrow buttons. The first field is "Enable bit:" with the value "B 0012" and a range "( B0000 - B4999 )". The second field is "Input tag:" with the value "D 0020" and a range "( D0000 - D0999 or @0000-@0999 )". The third field is "Totalizer tag:" with the value "D 0100" and a range "( D0000 - D0999 or @0000-@0999 or C0000-C0177 )". At the bottom right of the dialog are "OK" and "Cancel" buttons.

**Analog Totalizer**

General Channel 1 Channel 2

Configuration for Channel no: 1

Enable bit: B 0012  
( B0000 - B4999 )

Input tag: D 0020  
( D0000 - D0999 or @0000-@0999 )

Totalizer tag: D 0100  
( D0000 - D0999 or @0000-@0999 or C0000-C0177 )

OK Cancel



### 13.1 Printing from HMI unit

Configure printing port by selecting Baud rate, Parity and Number of Bits from Network Configuration.

Network Configuration					
Node address			Name	HMI / PLC	Blocks
Com1	Com2	Ethernet			
000	000	----	Operator Panel	HMI 605	00031

Port:    
 Protocol:   
 Model:   
 Node:

Address:  [ 0 - 255 ]

Name:  ( Max 15 )

Inter frame delay:  ( 0 to 3000 )

Response time out:  ( 10 to 6000 ) ms

Retry count:  ( 0 to 5 )

Ethernet PLC

IP Address:

PLC Port:  ( 0 to 65535 )

1. Presentation of screen on printer page decided by No of Columns, Terminating Char and Max chars per screen.

2. Number Of Columns: By default this field is set to 80. But user can set any value upto column width of printer. Maximum limit is 255.

3. Terminating Char: By default this char is NONE, Options are given below –

NONE : No char.  
 CR : Carriage returns.  
 LF : Line Feed.  
 CR + LF: Carriage return + Line Feed

HMI will send selected terminating character after completion of number of characters decided in No of column field.

4. Max Chars per screen: By default this field shows, max 5x7 font chars present in one screen. User can select how many characters he want to print from screen. Please note that user cant select starting location for printing, it is always Considered as a top left of the screen.

## 13. PRINTING

### Examples:

Considering Printer column width is 80.

1. **No Of Columns** - 80  
**Terminating Char** - NONE

**Result** - After printing 80 chars, carriage of printer comes to next New line automatically.

2. **No Of Columns** - 50  
**Terminating Char** - NONE

**Result** - As there is no terminating char , printer will print continuous 80 char from screen and then carriage of printer comes to next new line automatically.

3. **No Of Columns** - 50  
**Terminating Char** - CR

**Result** - After printing 50 chars carriage will return to starting location of same line.

4. **No Of Columns** - 50  
**Terminating Char** - LF

**Result** - After printing 50 chars, printer will insert 1 blank line of column width. And from same location next 50 chars will print.

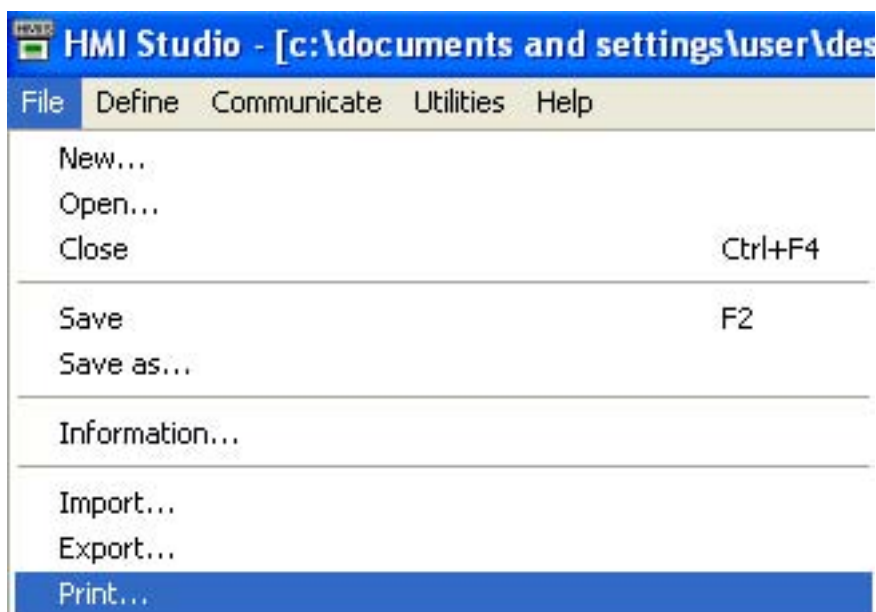
5. **No Of Columns** - 50  
**Terminating Char** - CR + LF

**Result** - After printing 50 chars , printer will insert 1 blank line of column width and carriage will return to home position.

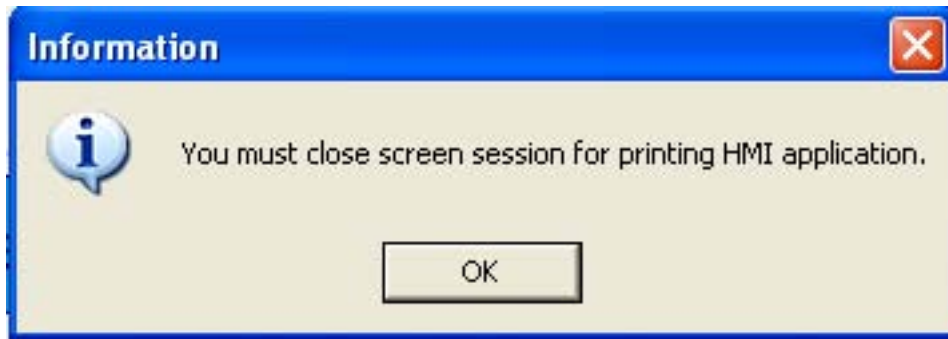
**Note:** Printer can print 5x7 font in same proportion. But if user select higher font size, then number of spaces will be inserted in two characters as per font size.

### 13.2 Printing from HMI Studio Software

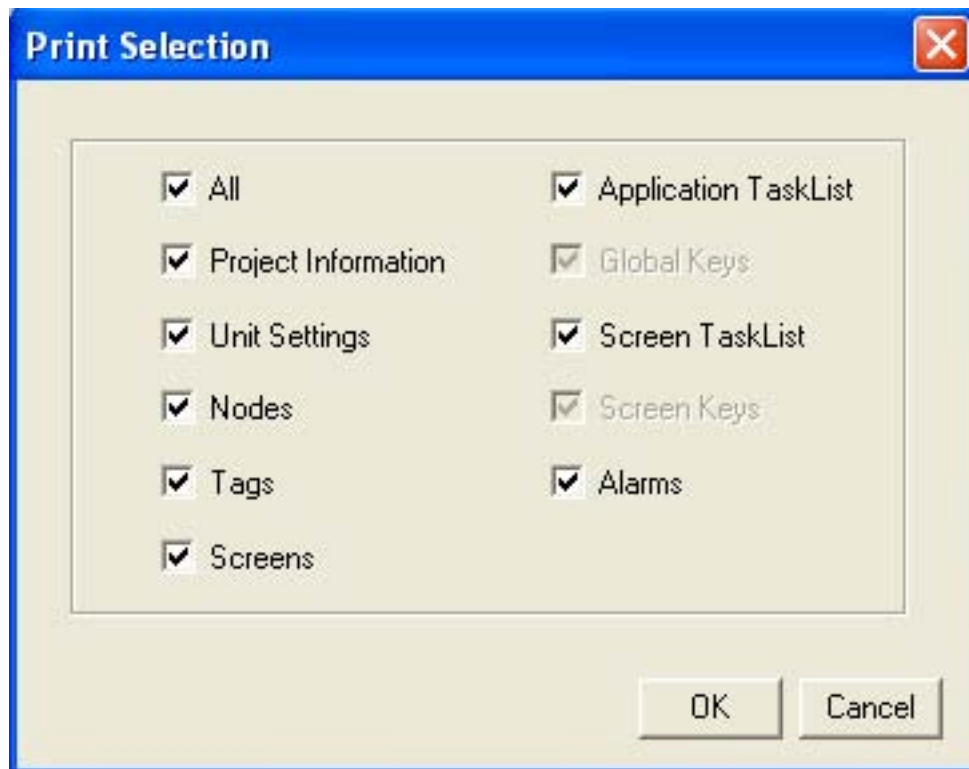
Select the **File | Print** menu option to print the HMI application.



For printing, user should close the screen session first.



Select the items that user wants to print.

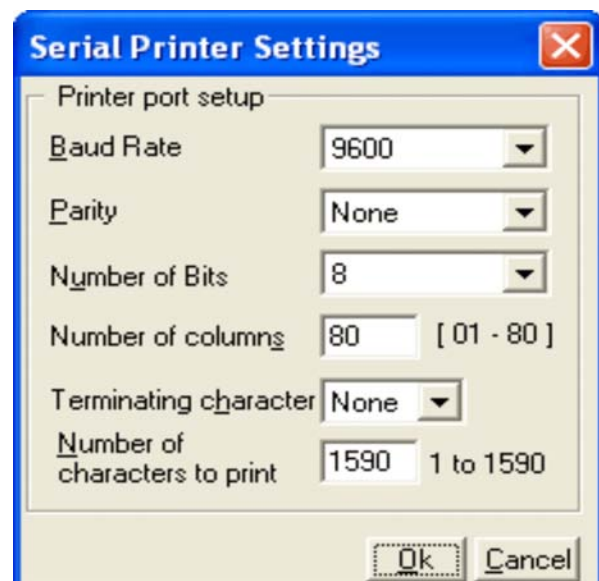


## 13. PRINTING

### 13.3 Printer Port Setup

A printer port can be set through Network Configuration.

Select Serial Printer in the Network Configuration and when you click on Comm Settings, following window appears.



The parameters for setting up the printer are:

1. **Baud Rate:** Supported Baud Rates are 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K.
2. **Parity:** Parity can be None, Even or Odd.
3. **Number of bits:** Number of bits can be 7 or 8.
4. **Number of columns:** Number of columns can be minimum 1 to maximum 255.
5. **Terminating Character:** Terminating character can be None, CR (Carriage Return), LF (Line Feed) or CR+LF.
6. **Number of characters to print:** The range is a minimum of 1 to the maximum of 256 characters.

Click OK to set the parameters.

Note: it is possible to print only Alpha numeric text from HMI to Serial Printer. Serial printer is normally Dot matrix type. We suggest EPSON make LX300+ serial printer. It is not possible to print graphics or images.

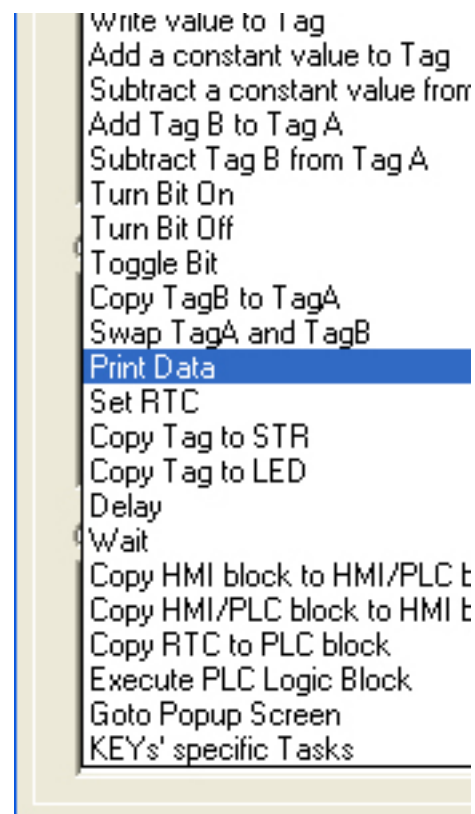
In the task list, "Print Data" function is available. It is possible to select this as task for a button.

Procedure to test Print option:

First connect PC to Printer on DB9 serial port. Do not use LPT1 port in the PC for this purpose. Once printer is working fine on the serial port, then you can connect HMI to Printer as follows.

HMI Side (DB9 Male end)	Serial Printer side
----------------------------	---------------------

Pin No2 (TXD)	RXD
Pin No3 (RXD)	TXD
Pin No5 (GND)	GND



### 14.1 HMI Memory Status

User can see the memory status of his application from Memory Configuration Wizard. It gives information about the available memory of the application, the used memory in the application and the free memory in terms of Bytes, KB and percentage.

Memory Configuration Wizard can be opened from **Utilities | HMI Memory Status** menu.

After selecting Prizm Memory Status following window will be displayed.

**Memory Status**

Application Memory	Bytes	MB	Percentage
Available	3145728	3	100
Used	10132	1	1
Free	3135596	2	99

**Logger Memory**

Alloted : 0

Details	Total	Bytes
Definition Type		
Nodes	1	862
Screens	6	7640
Keys	0	0
Alarms	0	0
Power-on Tasks	1	6
Global Tasks	0	0
Logger	-	0
Blocks to be read	0	0
Tag names	-	0
Other	-	144

**Ladder**

Memory	Bytes	KB
Available	131072	128
Used	5714	5
Free	125358	122

**Global Blocks**

Node Address    Block-Address

Ok

## 14. MISCELLANEOUS

The above window displays the information about Application memory, Logger memory, Ladder memory and the other details like nodes, screens, alarms etc..

**Application Memory:** Shows total available memory, used memory and free memory in Bytes, MB and in percentage.

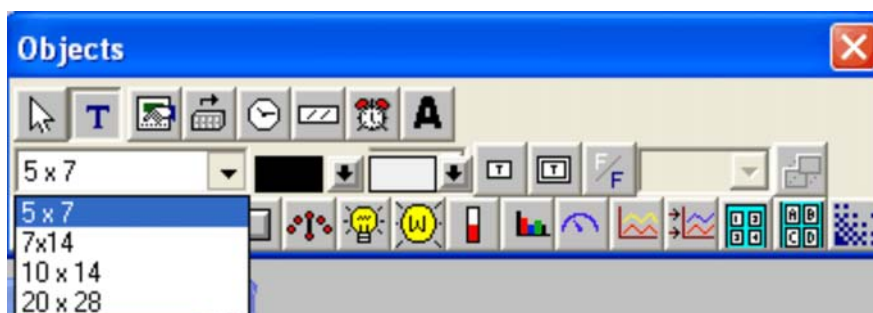
**Logger Memory:** Shows total available logger memory, used memory and free memory.

**Ladder Memory:** Shows total available Ladder memory, used memory and free memory.

### 14.2 Font Editor

The Font Editor is used to edit the different fonts of different sizes of Prizm font. It can edit four types of fonts:

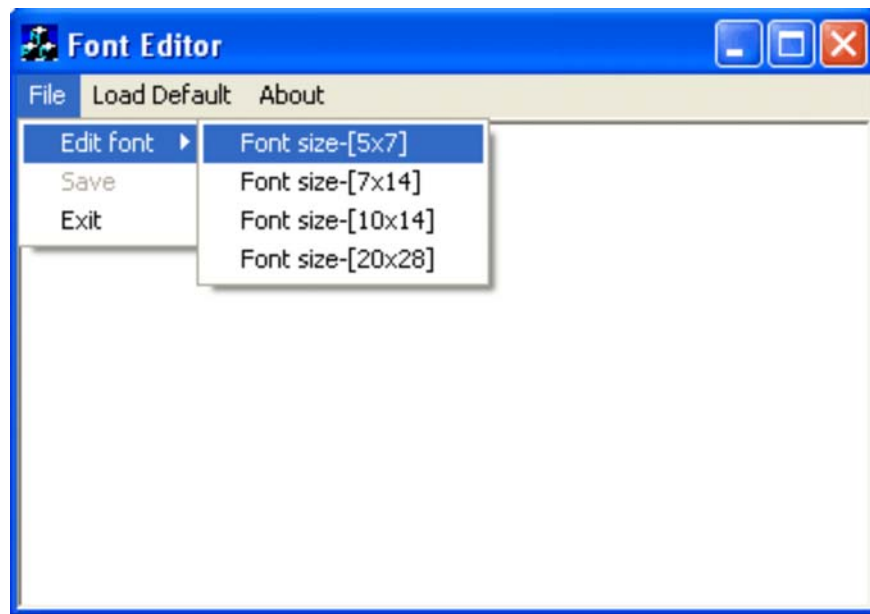
1. 5 X 7
2. 7 X 14
3. 10 X 14
4. 20 X 28



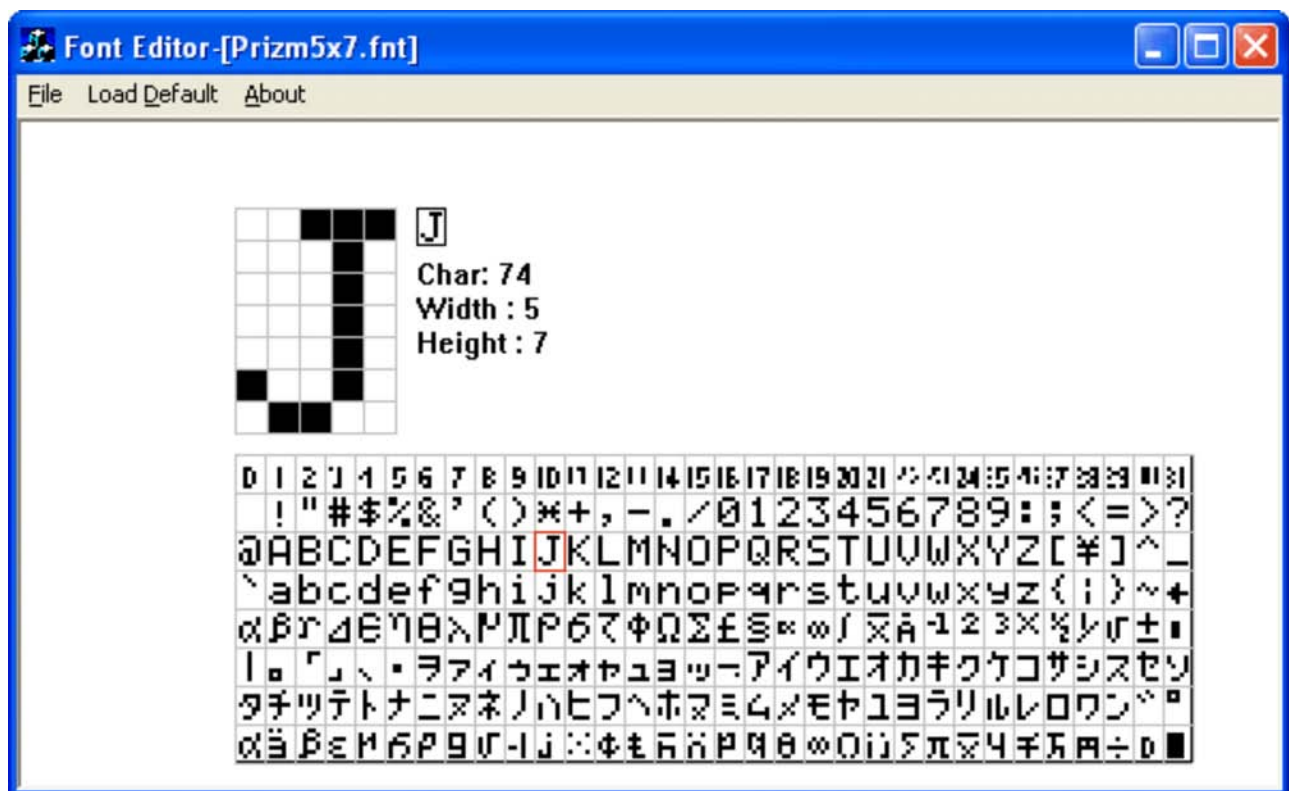
Characters for these fonts can be edited and modified using the font editor utility under the **Utilities Menu**.



When selecting the Font Editor from the utility menu, the screen should be on the lowest zoom level only. If it is not, the software will change the screen to lowest zoom level by displaying the following message.



The following window shows the 256 supported characters for the selected font. Select the character to be modified.



To use the modified font in HMI unit, the fonts must be downloaded to the unit. The font download option is located in the download options list.

## 14. MISCELLANEOUS

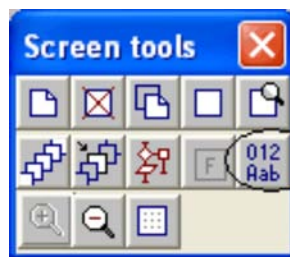
### Character Set

Modified characters can be entered on the screen using the character map. It is located under the **Screen** menu and Screen toolbar. Character set enables in the menu bar once, user try to use "Text" object for charecter entry.

#### Character Set option in menu bar



#### Character Set option in tool bar



This option is enabled only when the user selects the fonts and place the fonts on the screen. If the use selects 10 x 14 fonts, the character set will display only 10x14 fonts.

**Note:** If the user changes the Font of 10x14, only the changes will be reflected in the character set.





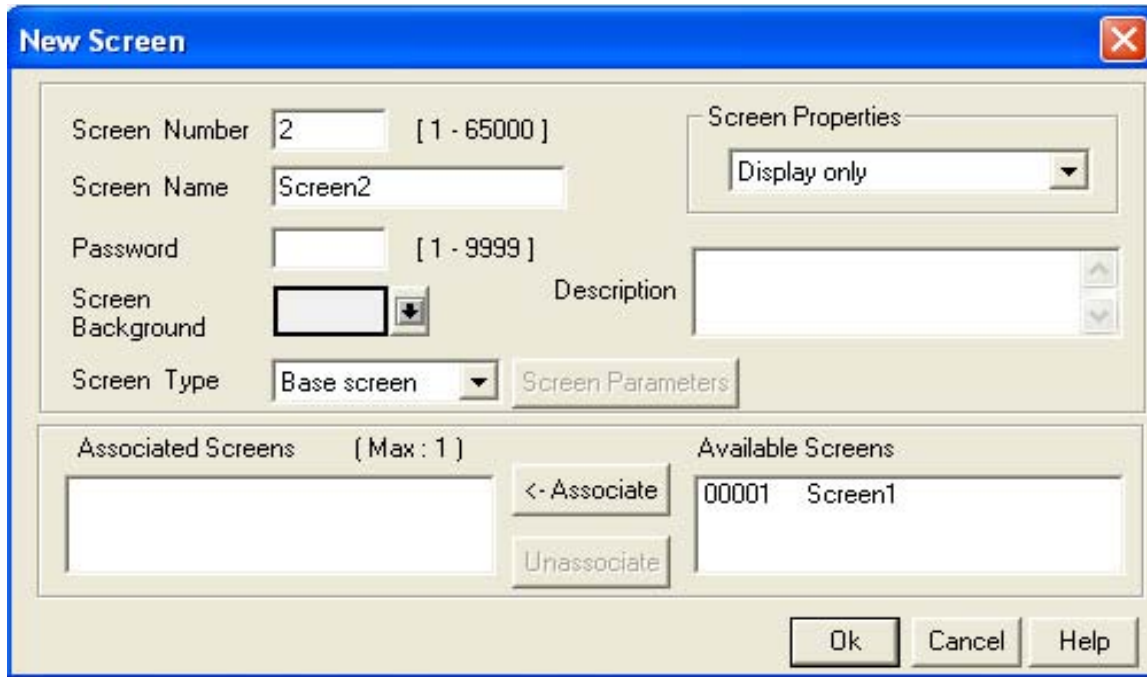
The character set includes all characters from 0 to 255.

**Note:** The first 31 characters are non-ASCII characters. Characters Hex 16 to Hex 31 are reserved by Windows. If these characters are modified; they will not be reflected on computer screen.

## 14. MISCELLANEOUS

### 14.3 Associate a Screen

This option is available in the Screen Information dialogue box.



The "New Screen" dialog box is used to configure a new screen. It features several input fields and buttons. The "Screen Number" field is set to 2, with a range of [1 - 65000]. The "Screen Name" field is set to "Screen2". The "Password" field is empty, with a range of [1 - 9999]. The "Screen Background" field is set to a default background image. The "Screen Type" is set to "Base screen". The "Screen Properties" dropdown is set to "Display only". The "Description" field is empty. The "Associated Screens" section shows a list of associated screens (Max: 1) and buttons for "< - Associate" and "Unassociate". The "Available Screens" section shows a list of available screens, including "00001 Screen1". The dialog box has "Ok", "Cancel", and "Help" buttons at the bottom.

Field	Value
Screen Number	2 [1 - 65000]
Screen Name	Screen2
Password	[1 - 9999]
Screen Background	[Image]
Screen Type	Base screen
Screen Properties	Display only
Description	
Associated Screens (Max: 1)	
Available Screens	00001 Screen1

Any screen can be associated with another screen. The objects on the associated screen will be a part of the other screen. This is especially useful if the same information is duplicated. Objects in the associated screen can not be edited in the screen being edited. Using associated screens conserves memory.

Select a screen which is to be associated from the list of available screens and click on **Associate** button. User can unassociate a screen by clicking on **Unassociate** button. Only one screen can be associated to any specific base screen.

## 14.4 Real Time Clock

The entire HMI series has built in Real Time Clock (RTC). This clock has battery backup. In the absence of power, the battery will retain the clock settings for approximately 8 years.

The time and date information is available through Default System Tags defined in Tag Database.

Tags

No	Port	Node	Block	Tag	Byte(s)	Tag-Name
00010	00	000	S0005 : 001	S0005	2	Screen trigger register
00011	00	000	S0006 : 001	S0006	2	Screen saver time
00012	00	000	S0010 : 001	S0010	2	RTC Date
00013	00	000	S0011 : 001	S0011	2	RTC Month
00014	00	000	S0012 : 001	S0012	2	RTC Year
00015	00	000	S0013 : 001	S0013	2	RTC Hour
00016	00	000	S0014 : 001	S0014	2	RTC Min
00017	00	000	S0015 : 001	S0015	2	RTC Sec
00018	00	000	S0016 : 001	S0016	2	RTC day of week
00019	00	000	S0017 : 001	S0017	2	ScanTime Register
00020	00	000	s0000 : 001	s0000	-	Carry bit
00021	00	000	s0001 : 001	s0001	-	High speed timer control bit

Node [ 000 : Operator Panel ] HMI-unit
System Coil
Read - Write
Tag-Type
Register
Coil or Bit-addressed Register
Size : 1 bit [0000 - 0099]
Coil s0000 0000
Tag-Name
Byte(s)

Close
Help
Delete
Add
Change
Cancel

## 14. MISCELLANEOUS

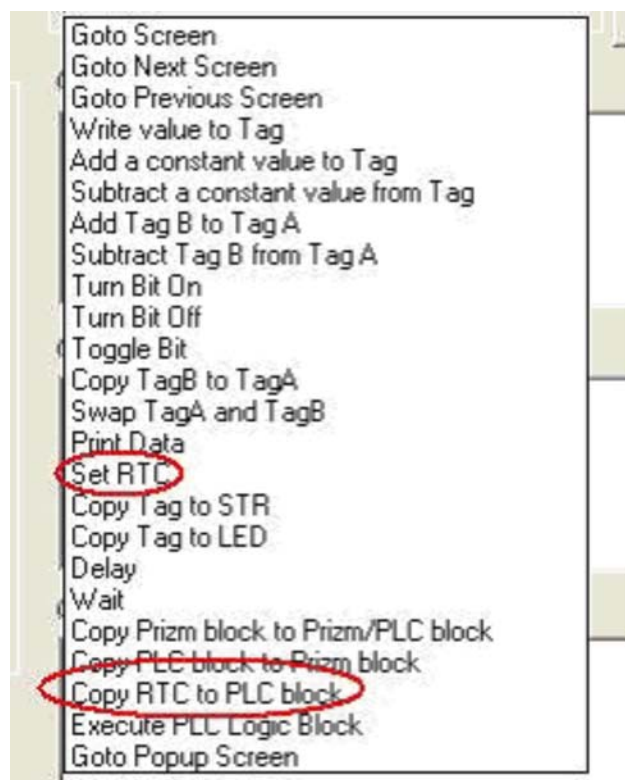
The tags assigned for RTC are as follows:

Sr. No.	Bytes	Tag Name	Permission
1.	2	RTC-Day	Read Only
2.	2	RTC-Month	Read Only
3.	2	RTC-Year	Read Only
4.	2	RTC-Hour	Read Only
5.	2	RTC-Min	Read Only
6.	2	RTC-Sec	Read Only
7.	2	RTC-Day of Week	Read Only

An application can make use of these Default System Tags for displaying and for decision making.

These default system registers are Read only (as shown in table), so you can not write anything to these registers.

**RTC Tasks present in Tasklist:**



1. Set RTC: For details, please refer Chapter 6.

### 14.5 On Line Ladder Monitoring

On Line Ladder Monitoring is used to monitor the tags used in a ladder block, at run time. User can monitor any active block, i.e. a block running in either Power on tasks, Global tasks or Screen tasks.

It can also be used as a tool to debug the ladder. By using On Line ladder monitoring, there is no need to embed the ladder tags on the screen.

#### Step 1 : Configuration of Modbus Slave Driver

In the example given below COM1 is configured as Modbus Slave.

The screenshot shows the 'Network Configuration' dialog box. At the top, there is a table listing network nodes. Below the table, there are configuration fields for the selected node (Com1). The 'Port' is set to 'Com1', 'Protocol' is 'Modbus ( Unit as Slave )', and 'Model' is 'MODBUS Slave (Ev3)'. The 'Node' section includes 'Address' (01), 'Name' (Com1 : Node1), 'Inter frame delay' (10), 'Response time out' (800), and 'Retry count' (0). There is also an 'Ethernet PLC' section with 'IP Address' and 'PLC Port' fields. On the right side, there are buttons for 'Add', 'Delete', 'Change', 'Close', and 'Help'.

Node address		Ethernet	Name	HMI / PLC	Blocks
Com1	Com2				
000	000	-----	Operator Panel	HMI 605	00035
001	-----	-----	Com1 : Node1	Modbus ( Unit as Slave ) ( MODBUS Slave (Ev3) )	00000

Port:

Protocol:

Model:

Node:

Address:  [ 0 - 255 ]

Name:  ( Max 15 )

Inter frame delay:  ( 0 to 3000 )

Response time out:  ( 10 to 6000 ) ms

Retry count:  ( 0 to 5 )

Ethernet PLC:

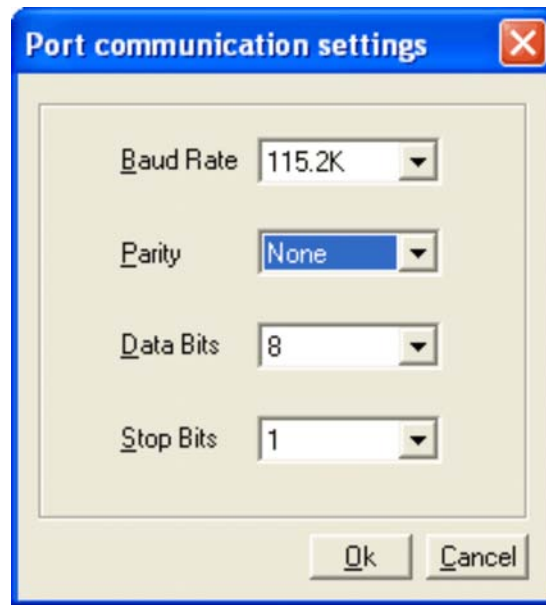
IP Address:

PLC Port:  ( 0 to 65535 )

**Note :** Modbus (Unit as Slave ) Protocol with model MODBUS Slave (EV3) must be configured at either of the ports.

## 14. MISCELLANEOUS

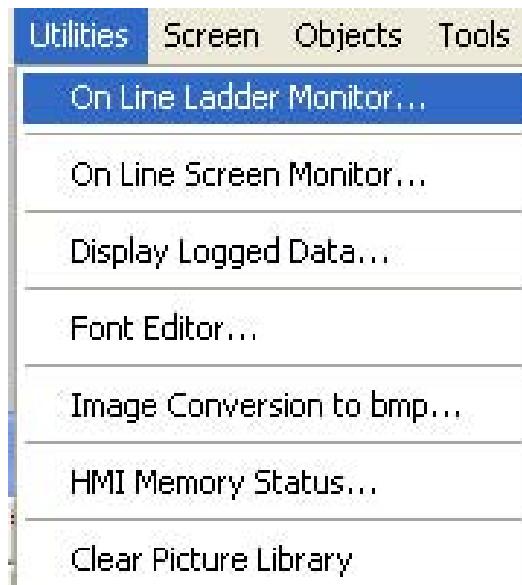
The Port settings should be as follows.



**Note:** Baud Rate must be 115.2 K and Parity must be None.

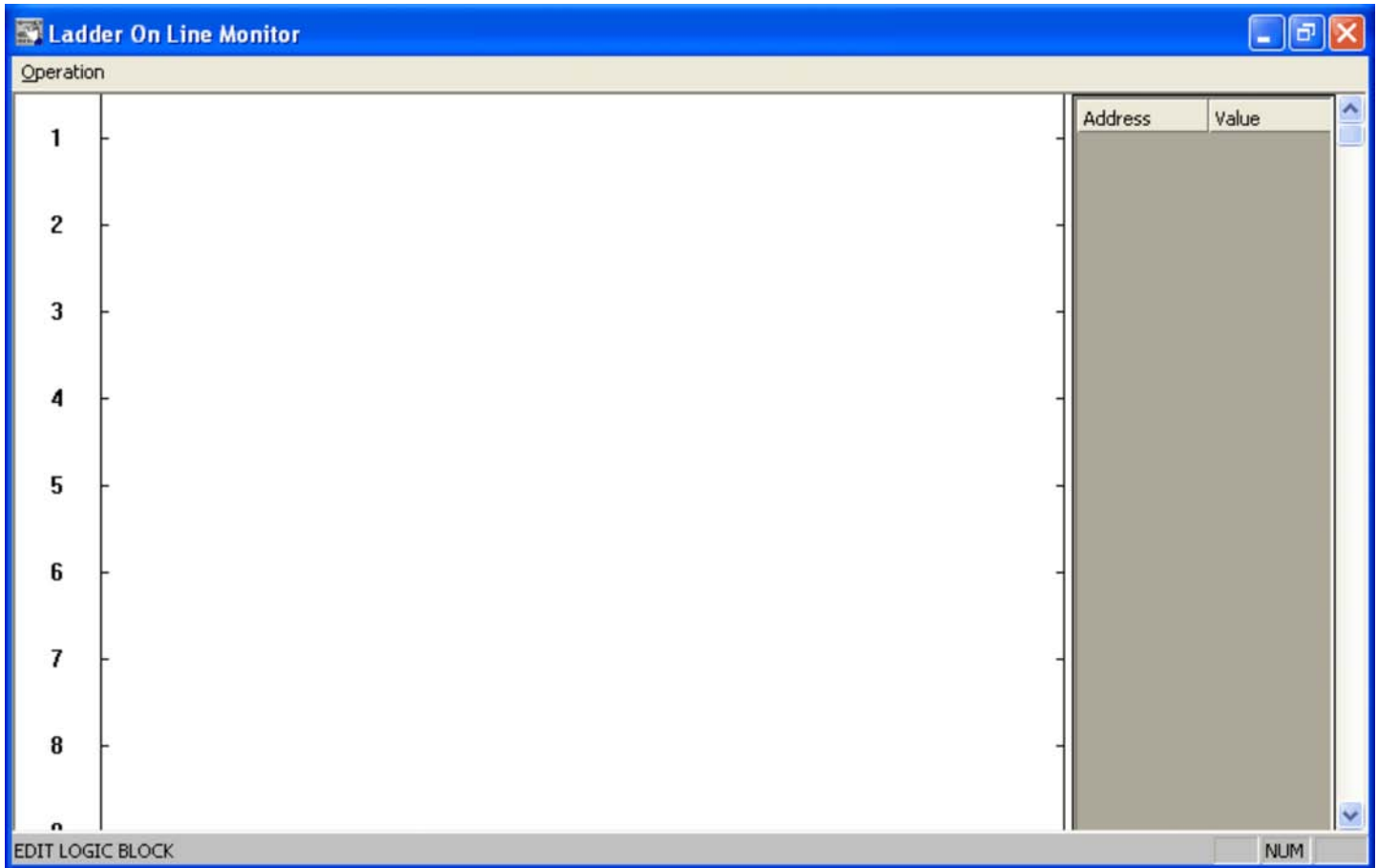
**Step 2 :** Download Application and Firmware in the unit.

**Step 3 :** Invoke the Ladder monitor window by selecting **Utilities | On Line Ladder Monitoring** menu option.



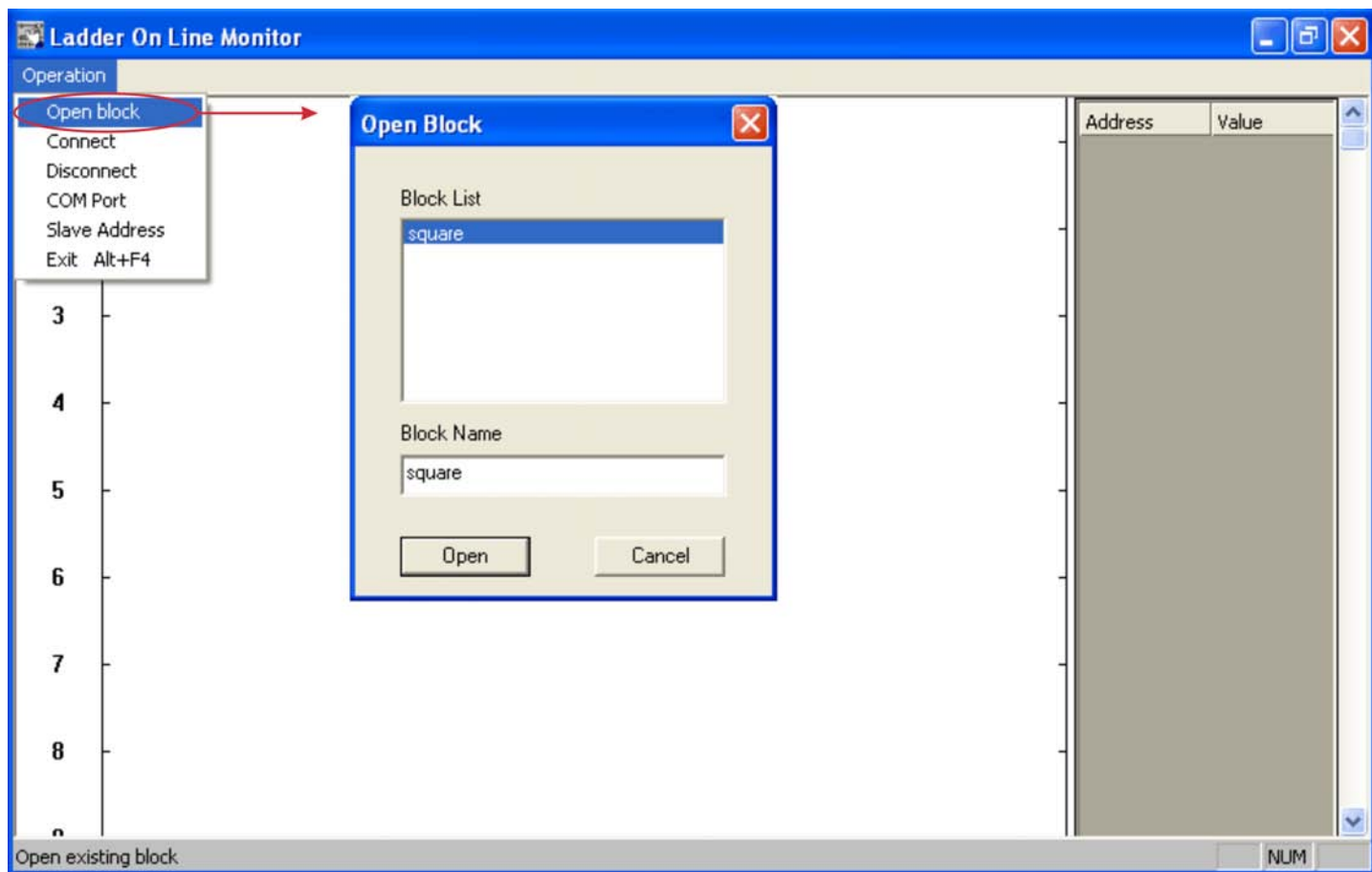
## 14. MISCELLANEOUS

Following window will appear.



## 14. MISCELLANEOUS

**Step 4:** Open the ladder block to be monitored.





## 14. MISCELLANEOUS

In this example, 'Square' block will be opened.

**Ladder On Line Monitor**

Operation

Line	Address	Value
1	B0000	0
2	D0000	0

1 B0000 K0080 MOV-W D0000

2 B0000 K0020 MOV-W D0000

3 [END]

4

5

6

7

8

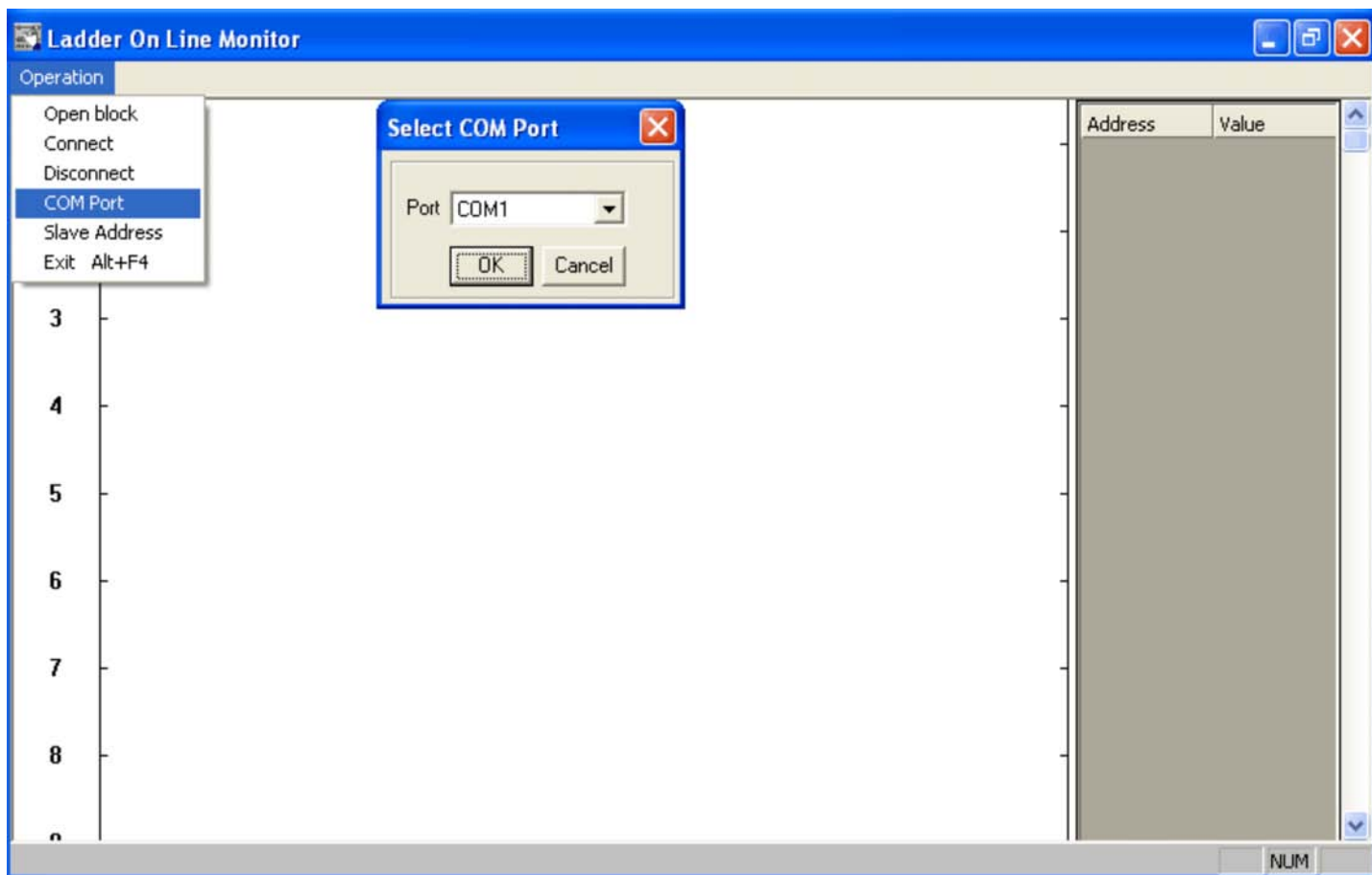
9

EDIT LOGIC BLOCK

NUM

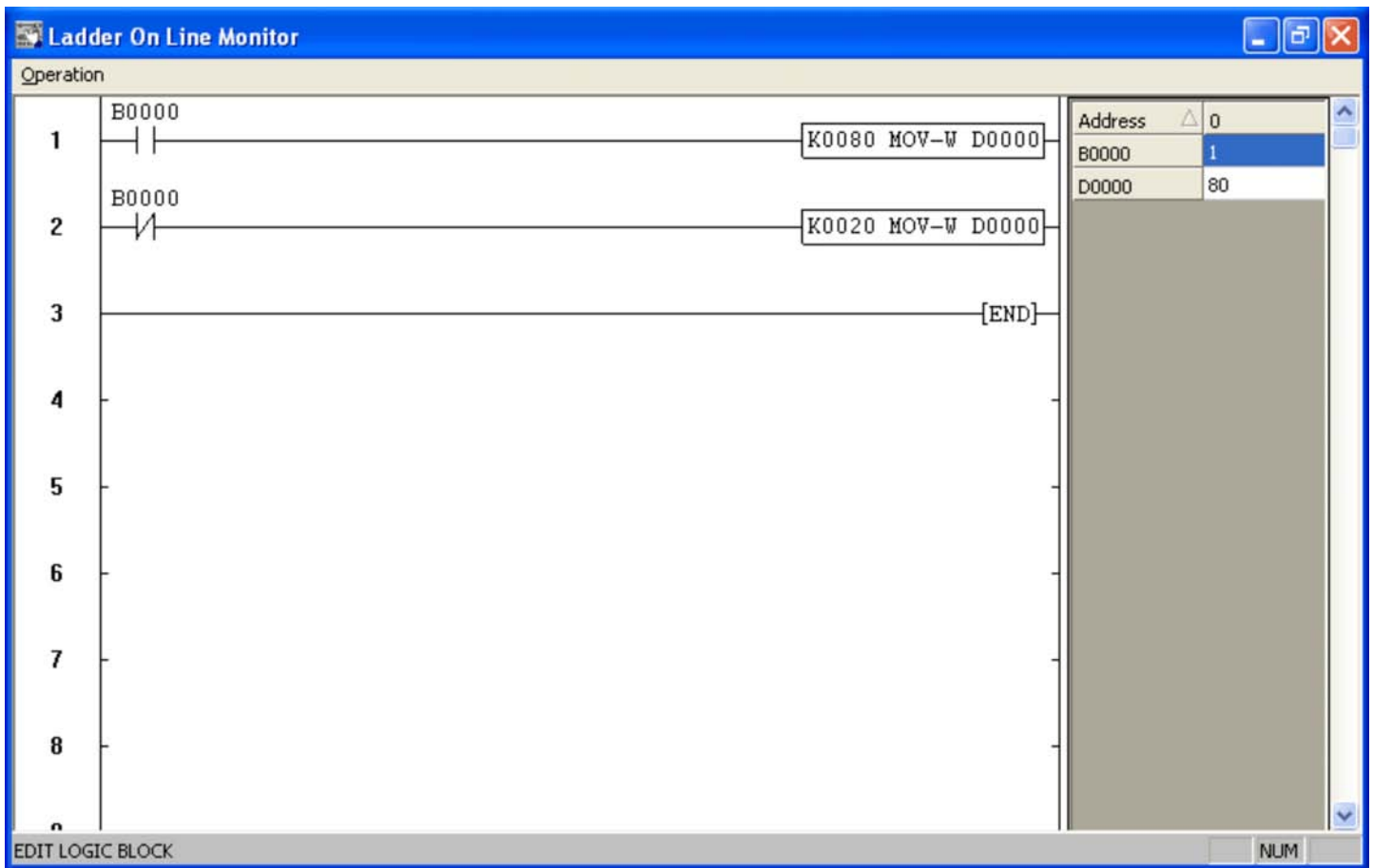
## 14. MISCELLANEOUS

**Step 5:** Select the communication port for the PC.



## 14. MISCELLANEOUS

**Step 6:** Click “Connect” to start the communication. Following window will show the communication.



## 14. MISCELLANEOUS

### 14.6 On Line Screen Monitoring

On Line Screen Monitor is used to monitor all the tags used in a application, at run time. The tags used in the Application task list are automatically added in the monitor window. User can also add the tags to be monitor. It can also be used as a tool to debug the application. By using On Line screen monitoring, there is no need to embed the tags on the screen.

#### Step 1 : Configuration of Modbus Slave Driver

In the example given below COM1 is configured as Modbus Slave.

The image shows a 'Network Configuration' dialog box with a table of nodes and a configuration section below.

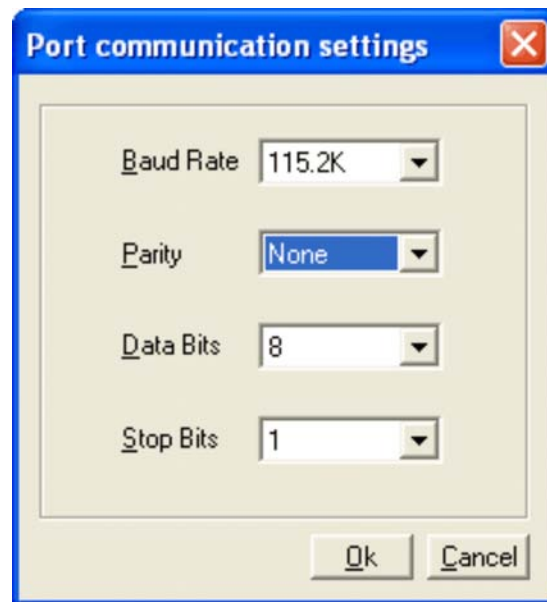
Node address		Ethernet	Name	HMI / PLC	Blocks
Com1	Com2				
000	000	----	Operator Panel	HMI 605	00035
001	----	----	Com1 : Node1	Modbus ( Unit as Slave ) ( MODBUS Slave (Ev3) )	00000

Below the table, the configuration for the selected node (Com1) is shown:

- Port: Com1 (dropdown menu)
- Protocol: Modbus ( Unit as Slave ) (dropdown menu)
- Model: MODBUS Slave (Ev3) (dropdown menu)
- Node: Address: 01 [ 0 - 255 ], Name: Com1 : Node1 ( Max 15 ), Inter frame delay: 10 ( 0 to 3000 ), Response time out: 800 ( 10 to 6000 ) ms, Retry count: 0 ( 0 to 5 )
- Ethernet PLC: IP Address: [ ], PLC Port: [ ] ( 0 to 65535 )
- Buttons: Add, Delete, Change, Close, Help

**Note:** Modbus (Unit as Slave) Protocol with model MODBUS Slave (EV3) must be configured at either of the ports.

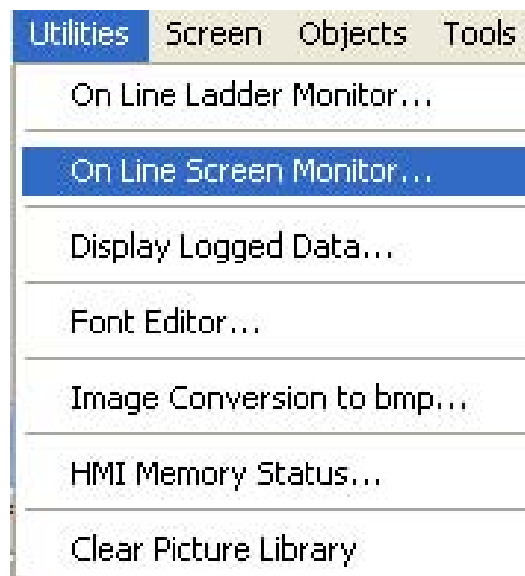
The Port settings should be as follows.



**Note:** Baud Rate must be 115.2 K and Parity must be None.

**Step 2 :** Download Application and Firmware in the unit.

**Step 3 :** Invoke the Screen monitor window by selecting **Utilities | On Line Screen Monitoring** menu option.

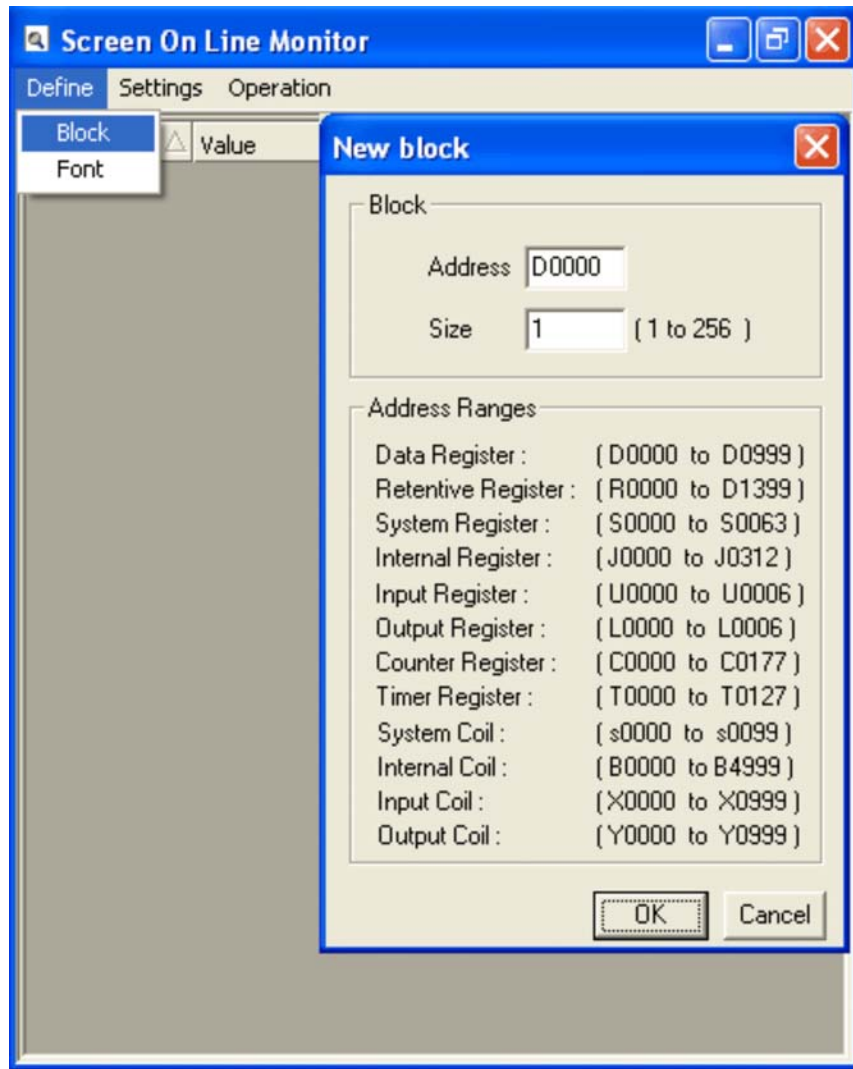


## 14. MISCELLANEOUS

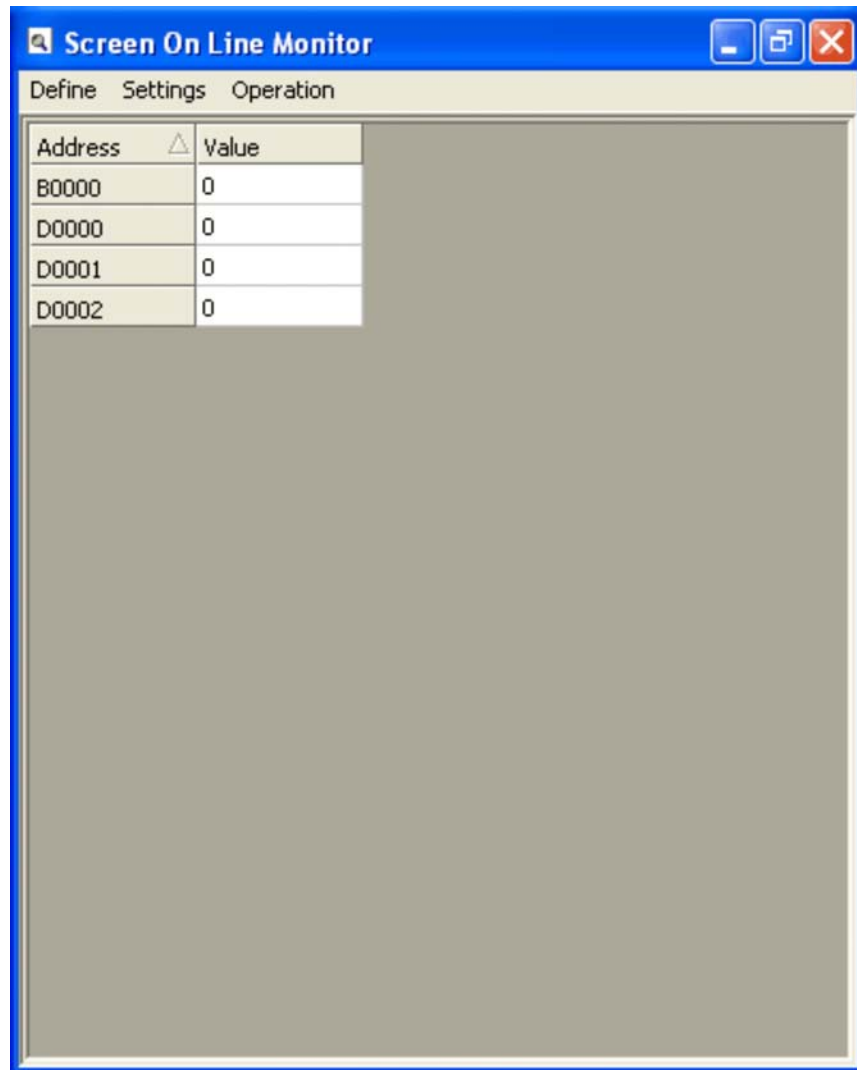
The screen monitor window will be as follows.



**Step 4 :** The tags, which are used with the screen are automatically added in the screen monitor window. User can also monitor the user defined tags by defining the Block. In Block window specify the 'Address' and the 'Size'.

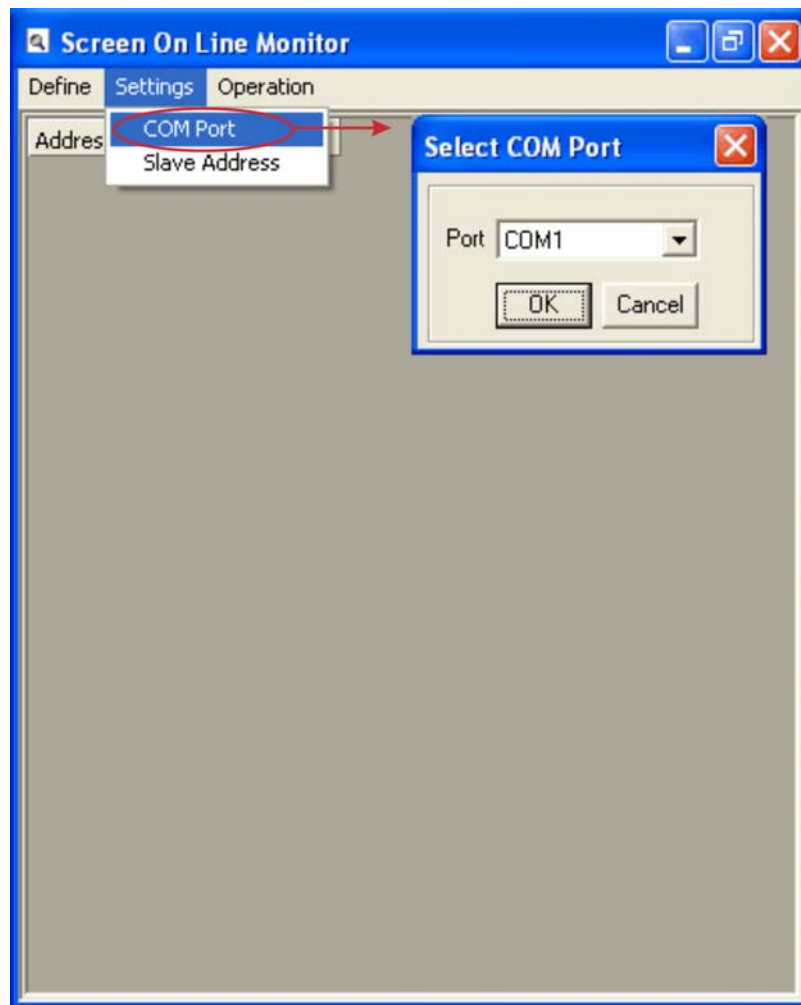


## 14. MISCELLANEOUS



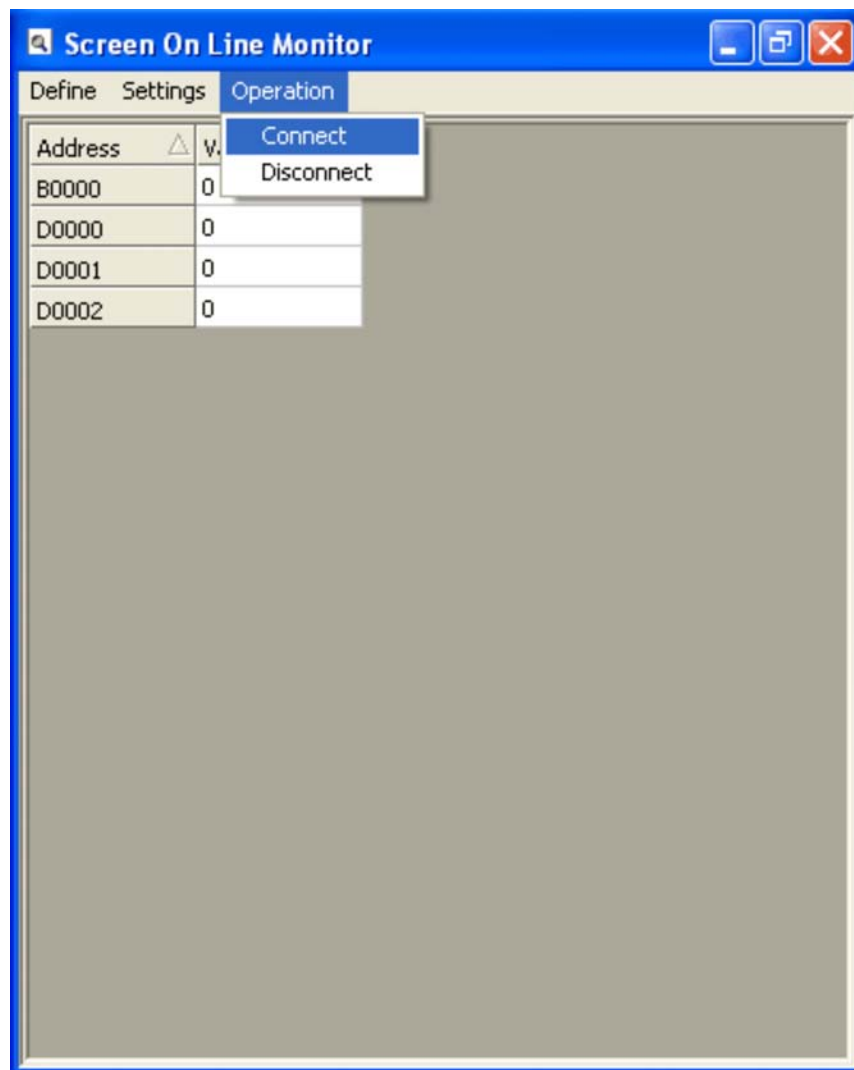


**Step 5 :** Select the communication port for the PC.

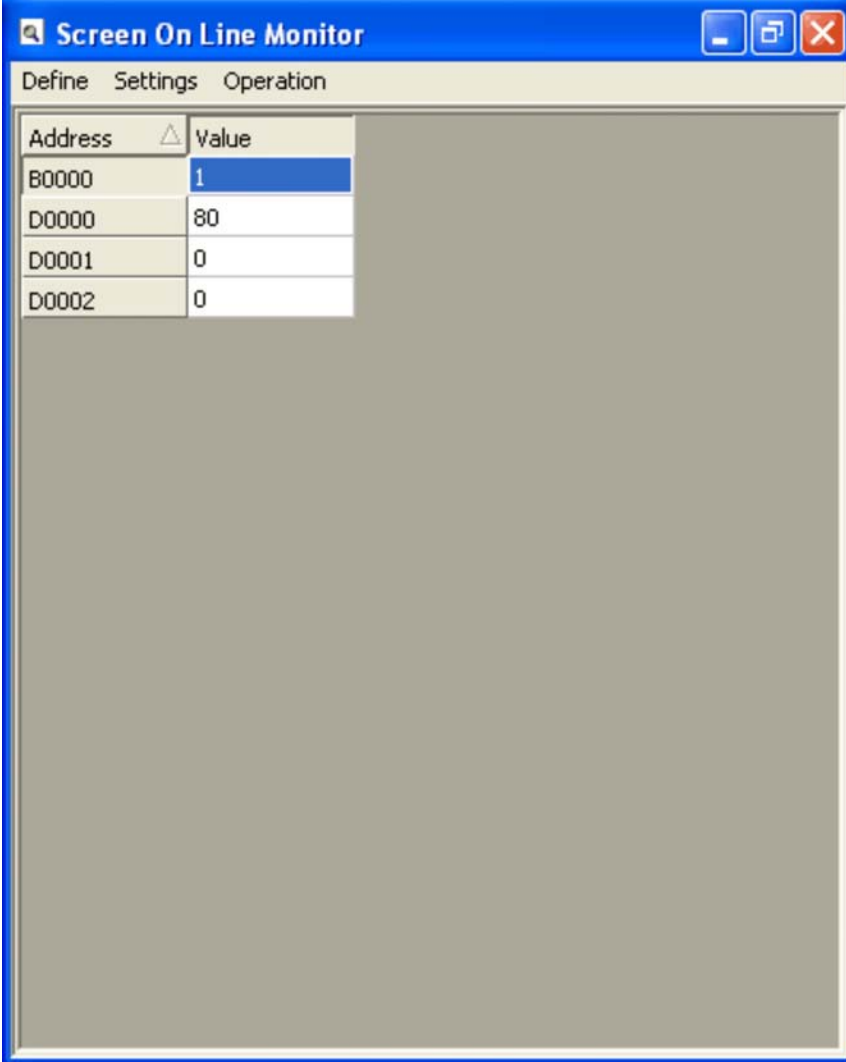


## 14. MISCELLANEOUS

**Step 6** : Click 'Connect' and communication starts.



Following window shows the communication.

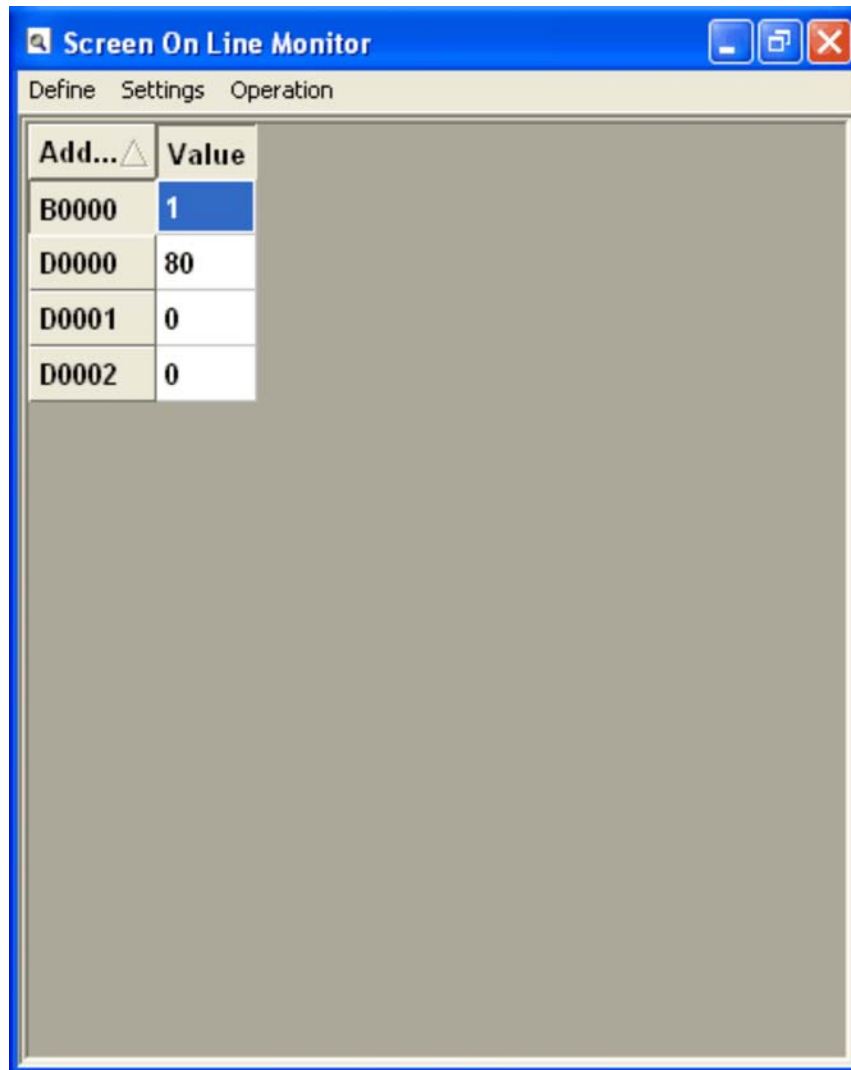
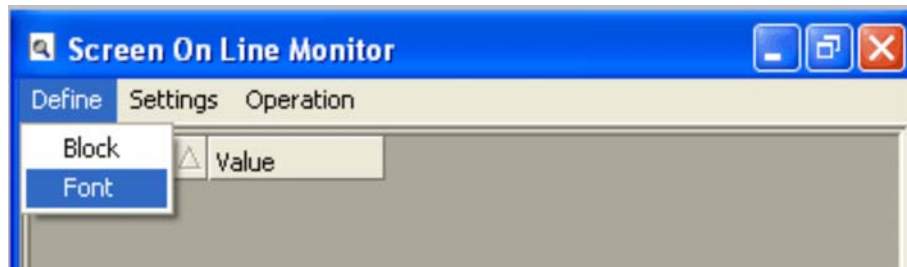


The screenshot shows a window titled "Screen On Line Monitor" with a blue title bar and standard Windows window controls. Below the title bar is a menu bar with "Define", "Settings", and "Operation". The main area contains a table with two columns: "Address" and "Value". The table has four rows of data. The first row is highlighted with a blue background. The "Address" column contains hexadecimal values: B0000, D0000, D0001, and D0002. The "Value" column contains decimal values: 1, 80, 0, and 0.

Address	Value
B0000	1
D0000	80
D0001	0
D0002	0

## 14. MISCELLANEOUS

User can change the font by clicking on Font menu option.



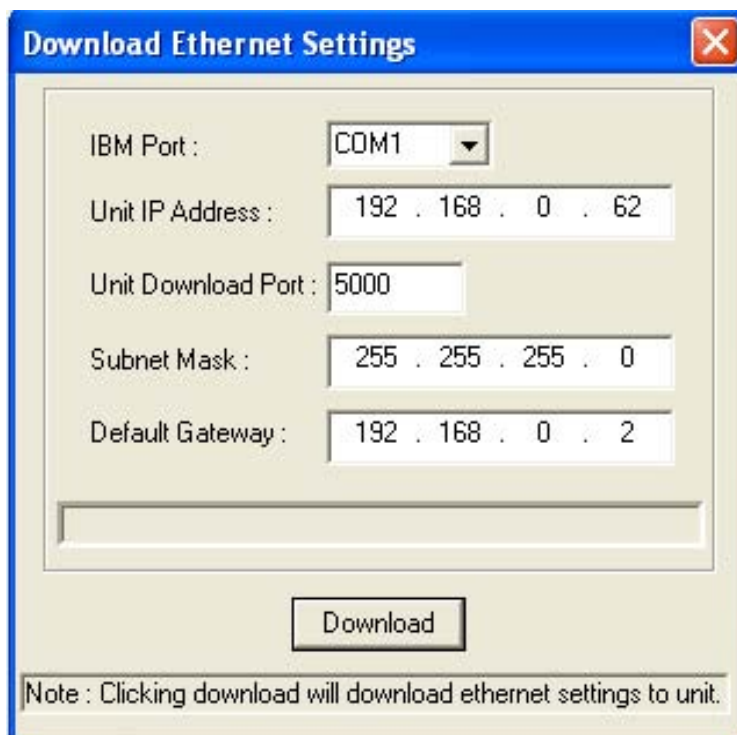
### 14.7 Ethernet Settings

As **Prizm760** supports Ethernet port, Ethernet settings are applicable only for **Prizm760** unit.

To download default Ethernet settings from Prizm configuration software, select **Communicate | Ethernet Setting** menu option as shown below.



When user selects the above option, following window will appear.



## 14. MISCELLANEOUS

**IBM Port:** This is PC's serial port used for downloading the settings.

**Unit IP Address:** HMI unit should have unique IP address. If DHCP ( Dynamic Host Configuration Protocol) server is not present in the network this IP will get assigned to the unit. If DHCP is present in the network, unit will get the IP address assigned by the server, which will be displayed on the unit at power on.

**Unit Download Port:** HMI unit Download Port is a port number on which unit's download server will be configured. User should use this port number for downloading the functionality. Upload server will be automatically configured as Download Port number plus 1. For example if HMI unit download port is 5000, then 5000 port will be used for downloading and 5001 will be used for uploading.

**Subnet Mask:** Subnet Mask should be filled according to the network configuration.

**Default Gateway:** Default Gateway should be filled according to the network configuration.

Now click on Download button, to download the Ethernet setting into the HMI unit.  
While downloading settings following error may occur.

**1. Can not open COM port.**

Check if COM port is already used by some other application.

**2. No response for startup signal.**

Check if the serial cable is properly connected to the unit.

**3. Error in applying settings. Try again!**

Some error in applying settings, try again.

**Note:** If default IP address given to the unit is already in use in the network, Then unit will not be able to communicate over Ethernet port. (Because of IP conflict). If so, the error message of " IP Conflict " will be displayed at the power On. Ask your network administrator for the above addresses

### Mode of Communication

Mode of communication between HMI Studio configuration software and HMI unit can be:

1. IBM Serial Port
2. Ethernet Port (Only if HMI unit supports Ethernet port)

To download / upload over Ethernet port, select the **Communicate | Communicate Mode** menu option as shown

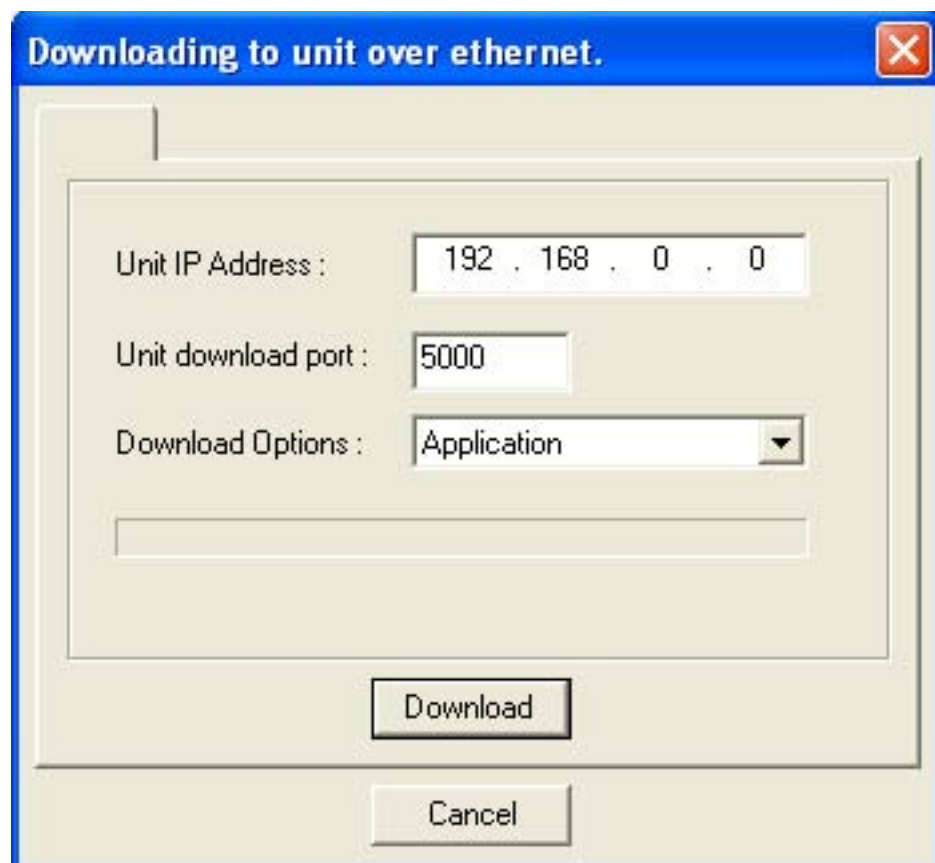


After selecting Communication Mode option, following screen will display.



#### Downloading to HMI unit

When user clicks 'Download' button from Tool station, a DOS window appears for moment to link PLC drivers with firm-ware as per application.



## 14. MISCELLANEOUS

**HMI IP Address :** This is the IP address of HMI unit.

**Download Port :** This is the port number on which HMI download server is configured. (This is done when default settings are downloaded to unit through Ethernet settings serially.)

**Download Option :** User has to select proper option to download

1. Application
2. Firmware
3. Font
4. Ladder
5. Application + Ladder

**Download Button :** Click this button to start the downloading.

While downloading following errors may occur.

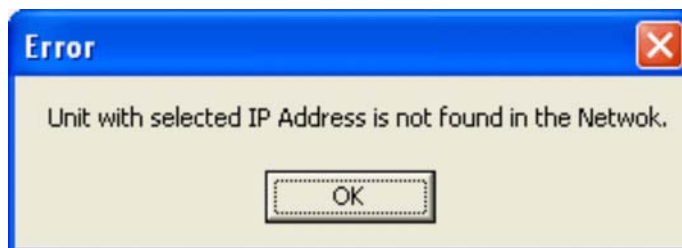
**1. WSAShutdown failed.**

Operating system is not allowing network related programs to run (may be some security feature).

**2. Allocating socket failed.**

Operating system is not allowing network related programs to run (may be some security feature).

**3 Unit with selected IP Address is not found in the Network.**



IP address entered is wrong.

**4 Sending data to the server failed / No data is received receive failed.**

While transferring the file to unit for each frame, unit sends acknowledgment, sending or receiving data from PC failed. Check if the existing network is working or Ethernet cable connection.

**5. Product mismatch.**

Check the product you have selected in configuration software and the one you are using.

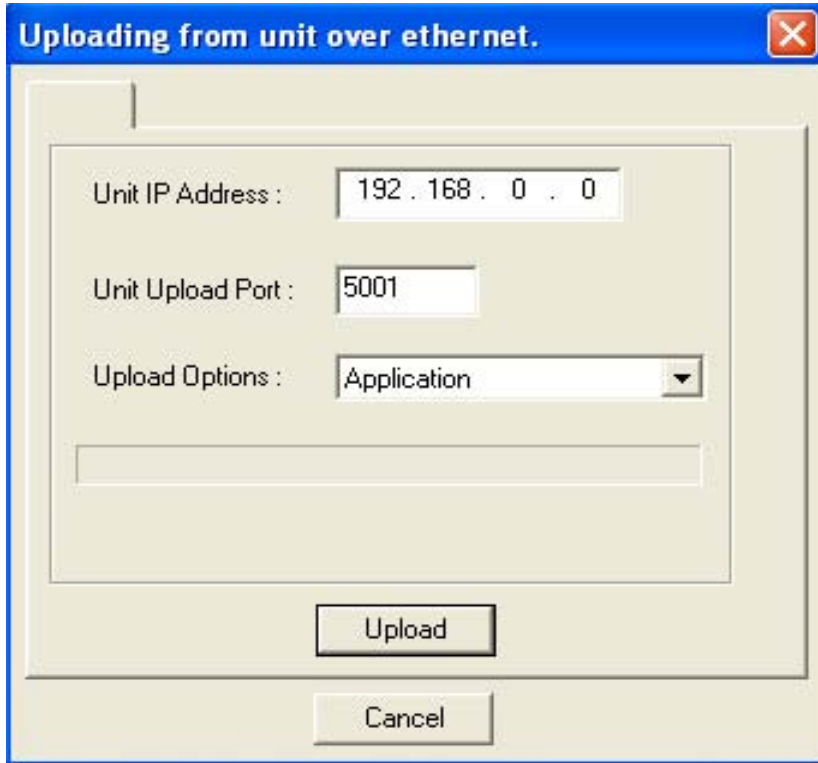
**6. File Not Found.**

File to be transmitted is not found. Files are not created properly.



**Uploading from HMI unit**

When user clicks "Upload" button from Tool station the following window will display.



**1. HMI IP Address :** This is the IP address of HMI unit.

**2. HMI Upload Port :** This the port number on which HMI Upload server is configured. (This is done when default settings are downloaded to unit through Ethernet settings serially. This port is always equal to Download port +1.)

**3. Upload Option :** User has to select proper option to upload

1. Application
2. Application + Logged Data

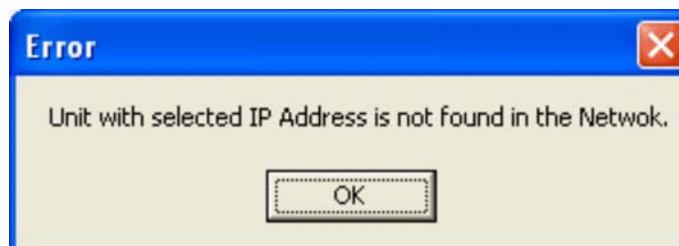
While uploading following errors may occur.

**1 WSASStartup failed.**

Operating system is not allowing network related programs to run (may be some security feature).

**2 Allocating socket failed.**

Operating system is not allowing network related programs to run (may be some security feature).

**3 Unit with selected IP Address is not found in the Network.**

## 14. MISCELLANEOUS

IP address entered is wrong.

### **4 Sending data to the server failed / No data is received receive failed.**

While transferring the file to unit for each frame, unit sends acknowledgment, sending or receiving data from PC failed. Check if the existing network is working or Ethernet cable connection.

### **5. Product mismatch.**

Check the product you have selected in configuration software and the one you are using.

### **6. File Not Found.**

File to be transmitted is not found. Files are not created properly.

#### **Notes:**

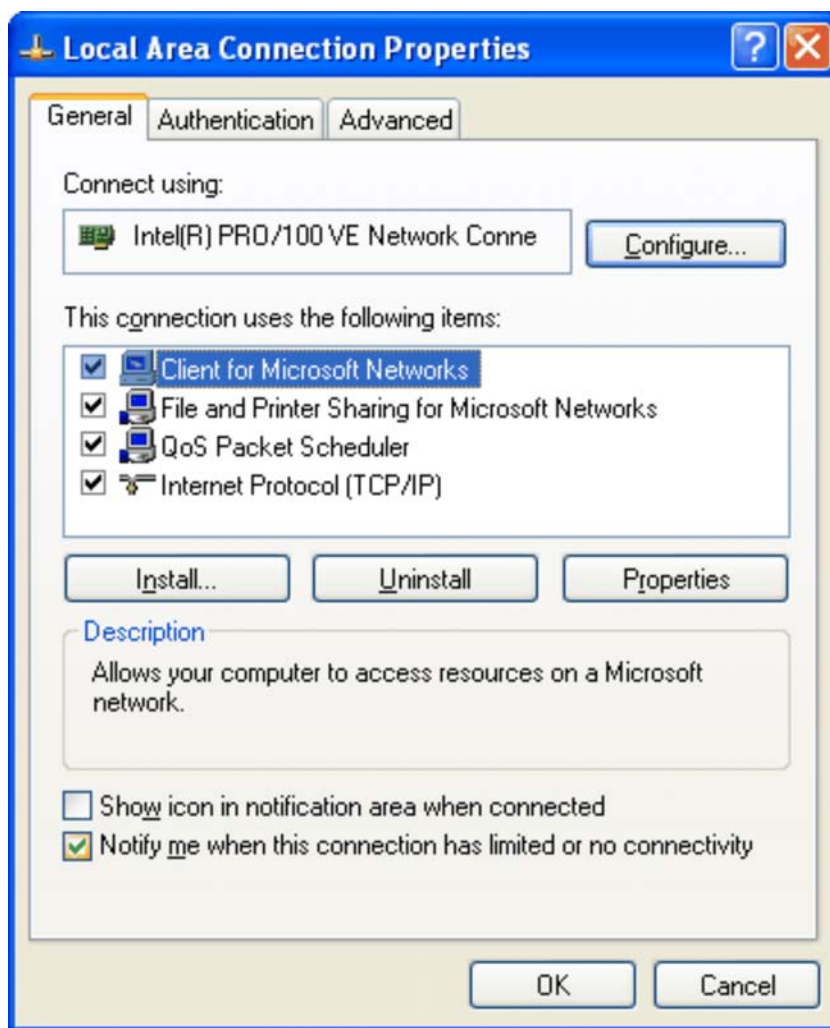
1. For connecting unit and the PC point to point, use standard Ethernet cross over cable.
2. For connecting unit and PC through the switch, use standard Ethernet straight through cable.
3. For Point to point communication over Ethernet, PC should be given static IP address.

**To set the IP address Of PC**

If you are connecting PC and HMI unit with cross cable or if you don't have DHCP or BOOTP server in the network, you have to configure network settings of your PC.

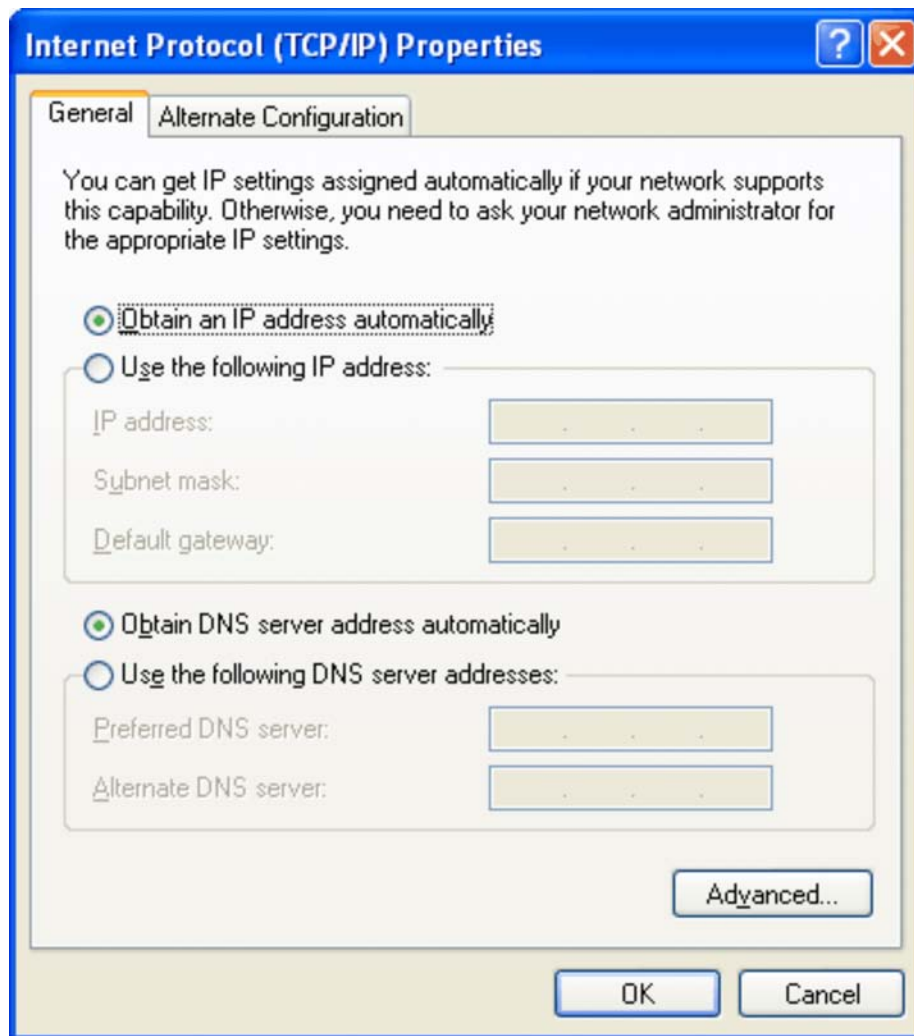
Follow the procedure to configure the Network settings of PC.

1. Click on Start, select Control Panel | Network Connections option.
2. Right click on the Local Area Connection. Select Properties and following window will appear.
3. Select Internet Protocol (TCP/IP) and Click on Properties

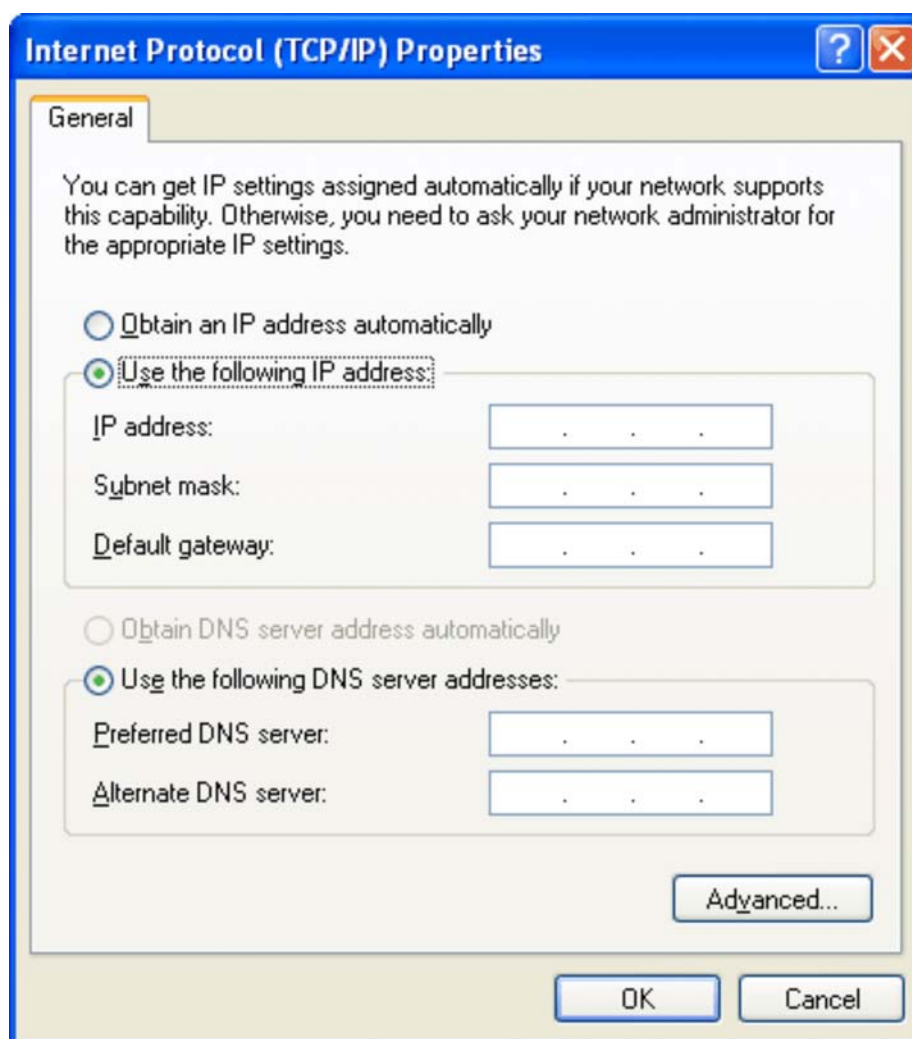


## 14. MISCELLANEOUS

4. Following window will appear.



5. Click on 'Use the following IP address' radio button.



6. Fill the IP address, Subnet mask and Default Gateway in such a way that unit and PC will be in the same network. For example if you using Class C network and unit's default settings are

**IP Address** : 192.168.0.42  
**Subnet Mask** : 255.255.255.0  
**Default Gateway** : 192.168.0.1

Then PC settings should be

**IP Address** : 192.168.0.x  
**Subnet Mask** : 255.255.255.0  
**Default Gateway** : 192.168.0.1

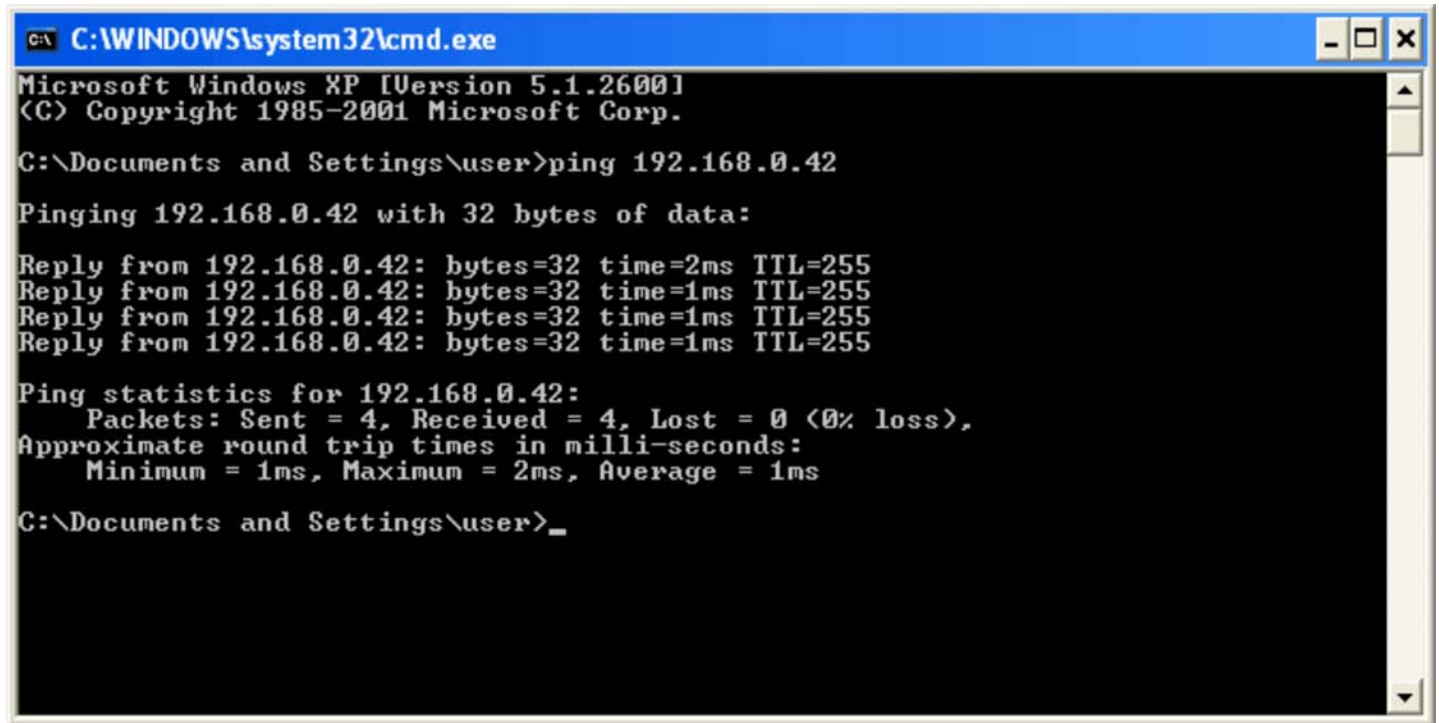
Where x can be any number between 0 to 254 other than 42 and 1. As these addresses are already used by unit and gateway. The window is shown below.

## 14. MISCELLANEOUS

7. To check whether the unit and pc are in the same network go to command prompt.

(To go command prompt run "cmd" command from start menu.)

Type "**ping 192.168.0.42**" (unit's IP address) and if you get reply then both PC and unit are connected.



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\user>ping 192.168.0.42

Pinging 192.168.0.42 with 32 bytes of data:

Reply from 192.168.0.42: bytes=32 time=2ms TTL=255
Reply from 192.168.0.42: bytes=32 time=1ms TTL=255
Reply from 192.168.0.42: bytes=32 time=1ms TTL=255
Reply from 192.168.0.42: bytes=32 time=1ms TTL=255

Ping statistics for 192.168.0.42:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

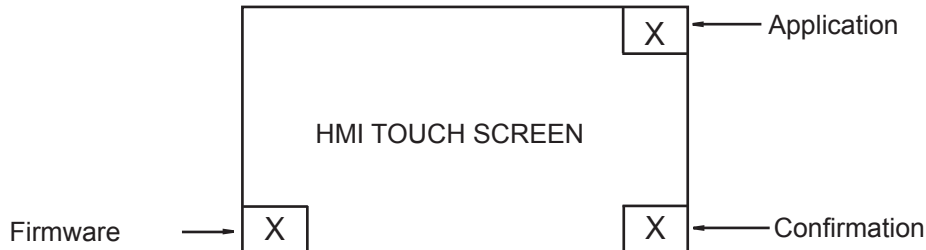
C:\Documents and Settings\user>_
```

### 15.1 Diagnostics

#### 15.1.1 Erase Keys

##### 1. Erase keys for Touch Screen HMI models:

In some cases it may be necessary to erase firmware and/or application. Procedures for erasing firmware and application is given below:



##### 1. Erasing Application for HMI 401:

1. At power ON, press the top right corner of the HMI screen for 2 seconds.
2. Following message is displayed:  
**"Erase Application?? Press Bottom Right corner to confirm.."**
3. Now Press Bottom right corner to confirm Application erase.
4. After application erase is complete following message is displayed:  
**"No setup loaded. Download Application."**

##### 2. Erasing Application For HMI 601, HMI 605 and HMI 1205:

1. Keep pressing Top right corner after power on until RUN LED glows. Then release top right corner...
2. Following message is displayed:  
**" Confirm application erase by pressing at bottom right corner.."**
3. Now Press Bottom right corner to confirm Application erase.

##### 3. Erasing Firmware For HMI 401 touch screen models is as follows:

1. At power ON, press the bottom left corner of the HMI screen for 2 seconds.
2. Following message is displayed:  
**"Erase Firmware?? Press Bottom Right corner to confirm.."**
3. Now Press Bottom right corner to confirm Firmware erase.
4. After firmware erase is complete following message is displayed:  
**"No firmware. Download Firmware.."**

##### 4. Erasing Firmware For HMI 601 and HMI 605 touch screen models is as follows:

1. Keep pressing Bottom Left corner of HMI and power on.. screen will display blank, keep pressing bottom Left corner until RUN LED Glows.
2. Now Press Bottom right corner to confirm Firmware erase.
3. While erasing RUN LED starts blinking.... When it stops, it is confirmed that Firmware is Erased.

## 15. DIAGNOSTICS & MAINTENANCE

If unit stops functioning totally please follow steps given below to recover the unit:

- Erase application.
- Download a demo application. If unit functions properly, maybe the application previously downloaded was wrong.
- If unit still fails to function properly, erase firmware. Download firmware and application again.

### 2. Erase Keys for Keypad based HMI Units:

HMI 201	Application	At Power On: Press 'F2' Key and then press 'ENT' Key
	Firmware	At Power On: Press 'F1' Key and then press 'ENT' key

#### 15.1.2 Touchscreen calibration

Touch screens are factory calibrated. Calibration is stored in a Flash memory. If user faces any of the following problems:

- Any press inside defined object boundary results in three short beeps.
- Undefined area performs a task of some other defined object.

User will have to calibrate the touch screen of the unit. Steps for calibrating the touch screen for HMI models are as below:

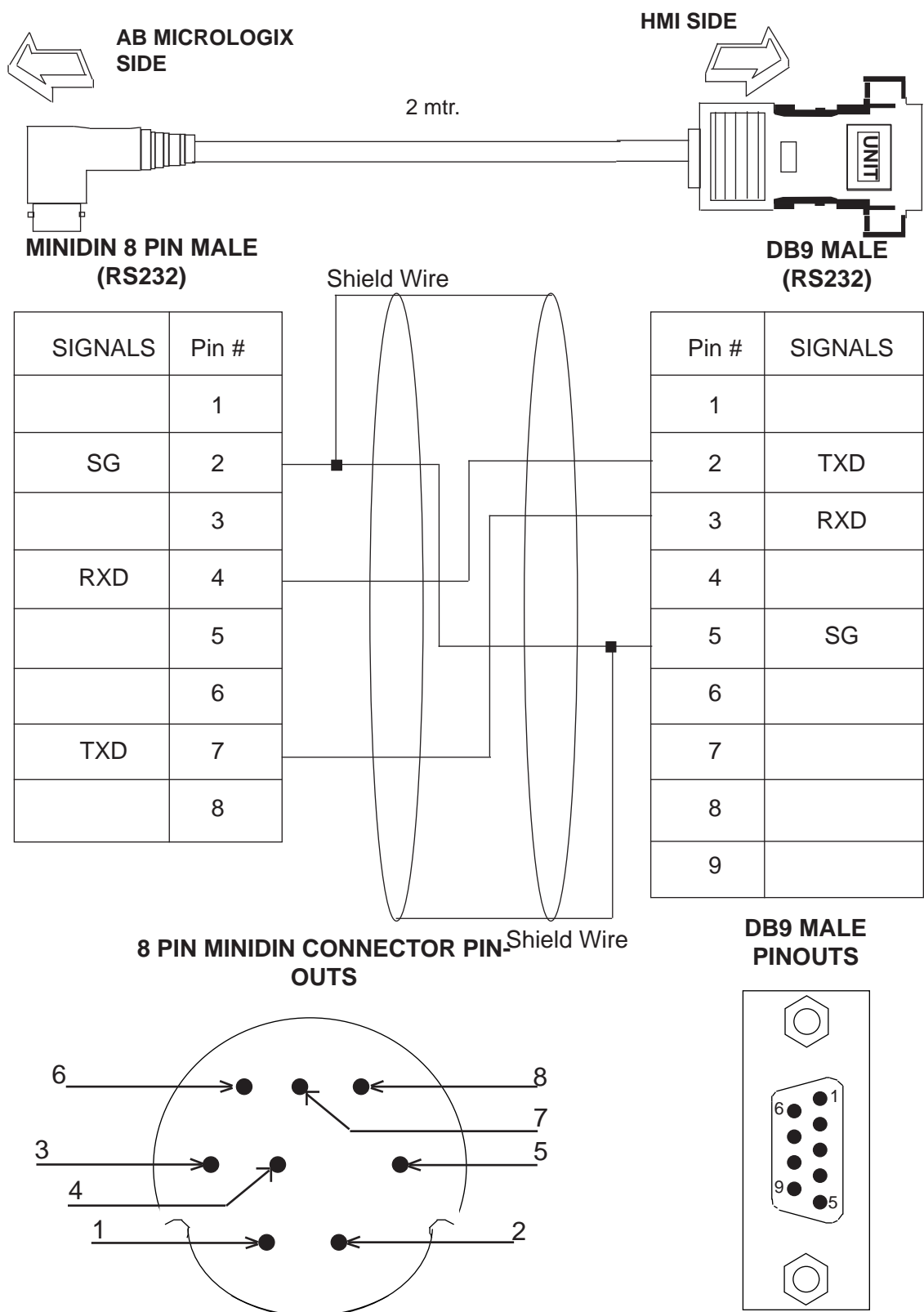
1. At power ON, press the center of the HMI screen for more than 2 to 3 seconds.
2. A cross is shown at the bottom left corner. This cross remains on the screen for approximately 6 seconds. If center of the cross is not pressed in this time, HMI resumes normal operation. Touch the center of the cross with a pointed object (stylus recommended).
3. You will get a next screen showing a cross at the top right of the screen. Again this cross remains on the screen for approximately 6 seconds. If center of the cross is not pressed in this time, HMI resumes normal operation. Touch the center of the cross with a pointed object (stylus recommended). The screen has now been calibrated.
4. Unit will be restarted. Normal function of the HMI can now resume.

### 15.2 Maintenance

- 15.2.1 Clean all sides of the unit using a isopropyl alcohol solution. Use a clean, soft piece of cloth. Do not use a rough cloth as it may produce scratches on the unit. Take proper care while cleaning the keypad of the unit, especially the LCD window. Also take care that the LCD window does not come in contact with the material that has an abrasive surface.
- 15.2.2. Do not use benzene, paint thinner or other volatile solvents. Do not use any chemically treated cloth and wipe.
- 15.2.3. Tighten the mounting brackets evenly. Make sure the panel is not dirty or warped and that it is strong enough to hold the unit.
- 15.2.4. Please note keys on the keypad are only for finger operation. They should not be pressed with pointed tools or any other such items. This will cause key failure or other malfunctioning may occur. Do not apply a force any greater than 30 Newton's to the keys.
- 15.2.5. Always tighten the connector screws after connecting the communication cables.
- 15.2.6. The maximum pull load for cables is 30 Newton's. Do not apply loads greater than this.
- 15.2.7 Do not use sharp objects for pressing any touch screen key.

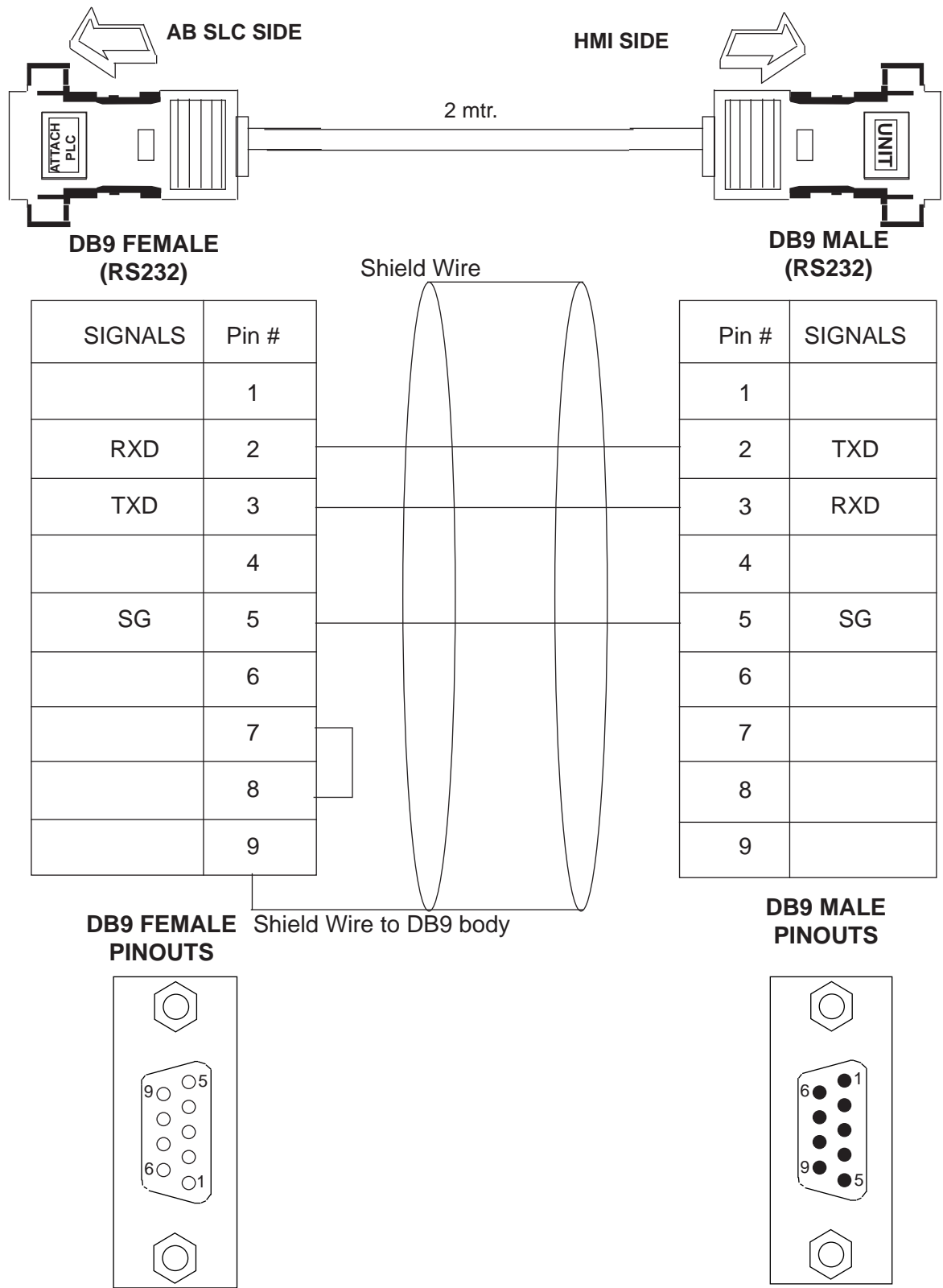


A      **Communication Cable Diagrams**  
1      **AB MICROLOGICS SERIES TO HMI UNIT(CA-027A-00)**

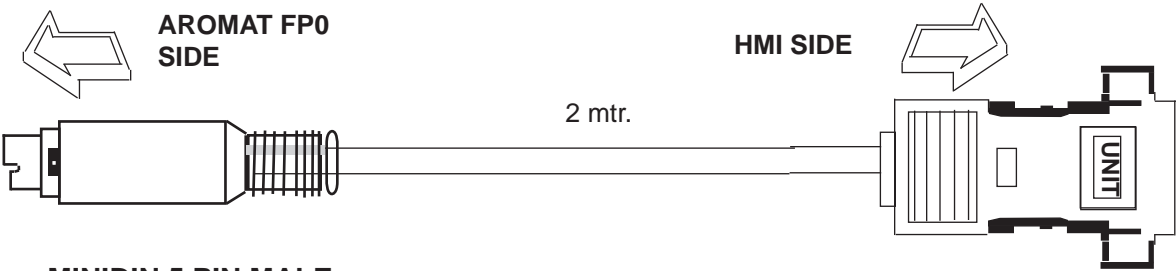


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## 2 AB SLC DF1 PORT TO HMI UNIT(CA-027B-00)



3 AROMAT FP0 / FP M TO HMI UNIT(CA-015A-00)

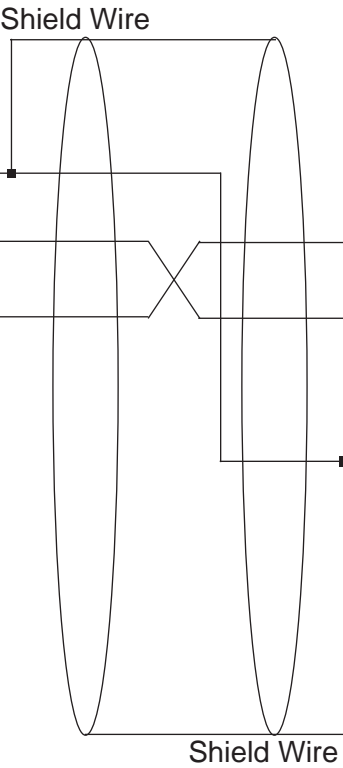


MINIDIN 5 PIN MALE (RS232)

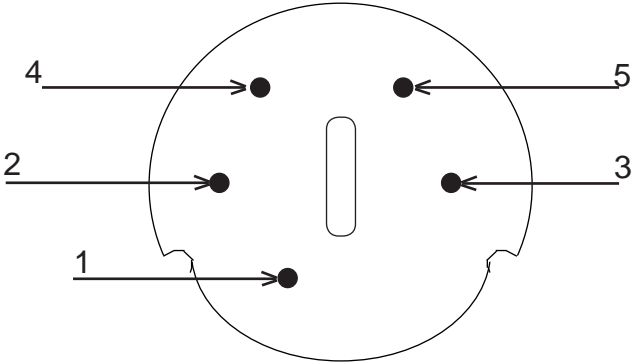
SIGNALS	Pin #
SG	1
TXD	2
RXD	3
	4
	5

DB9 MALE (RS232)

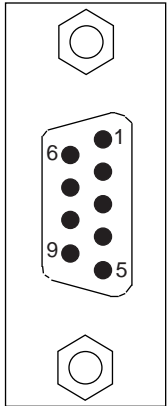
Pin #	SIGNALS
1	
2	TXD
3	RXD
4	
5	SG
6	
7	
8	
9	



5 PIN MINIDIN CONNECTOR PIN-OUTS

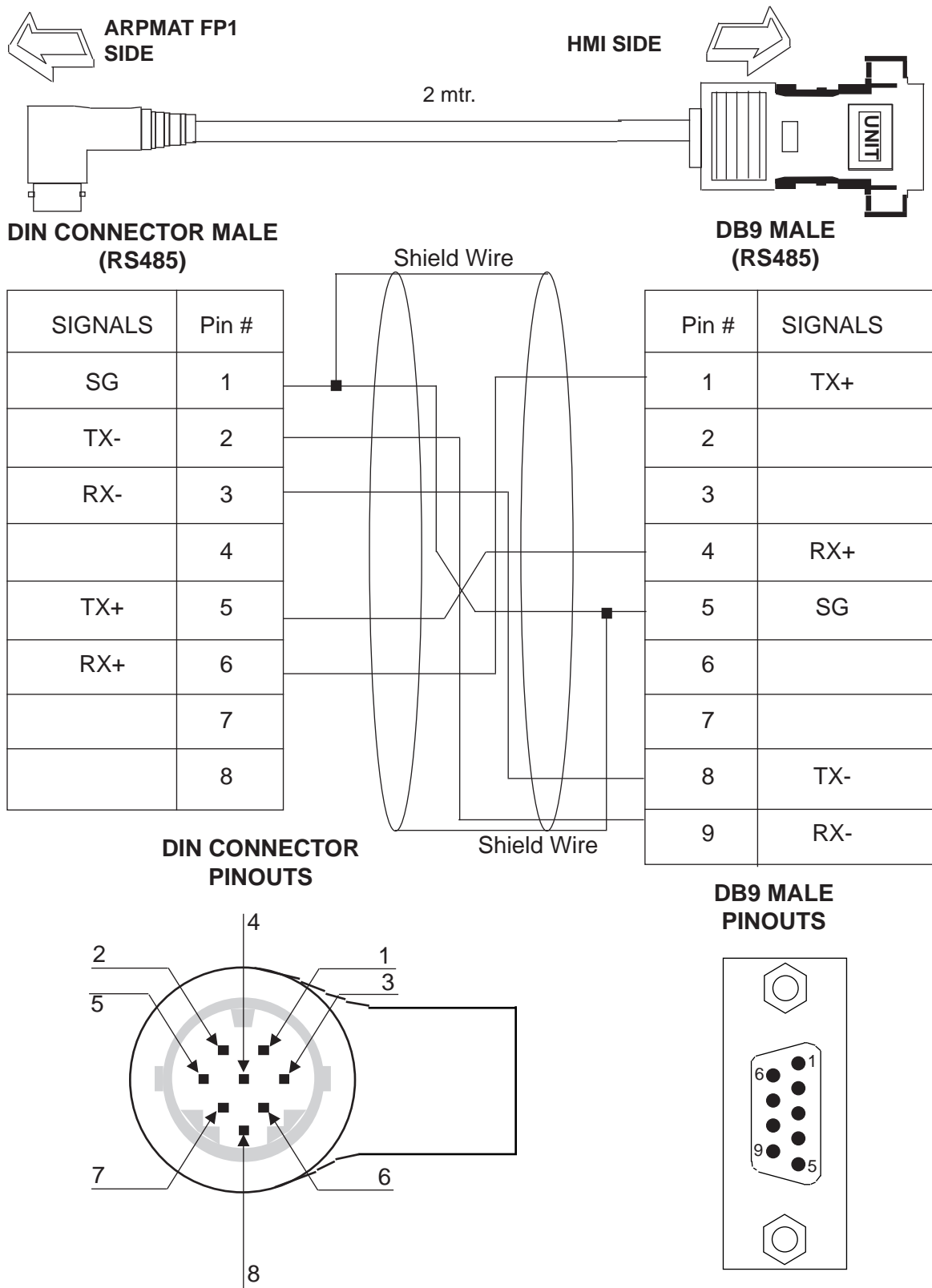


DB9 MALE PINOUTS

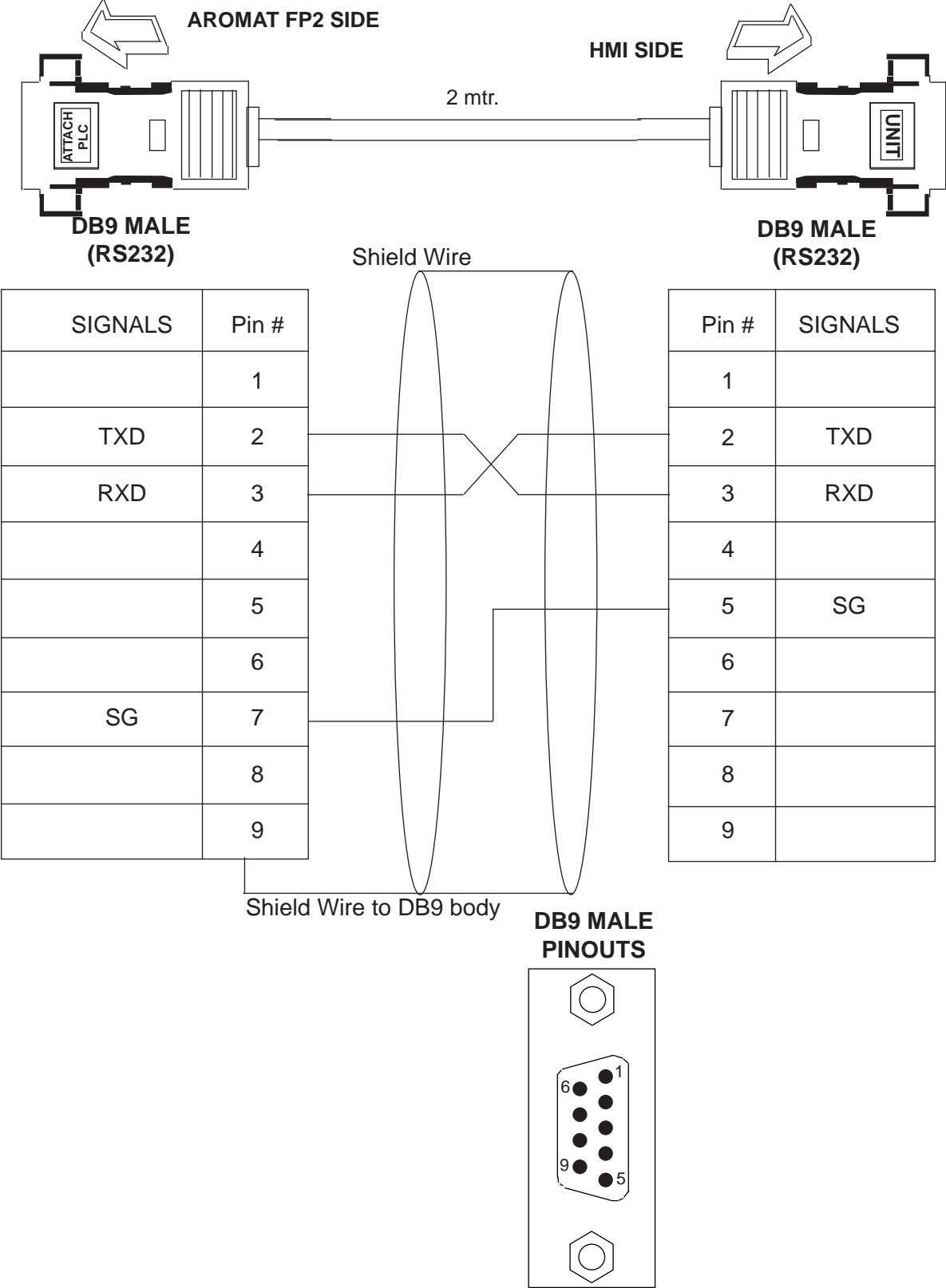


## 16. APPENDIX

### 4 AROMAT FP1 TO HMI UNIT(CA-015B-00)

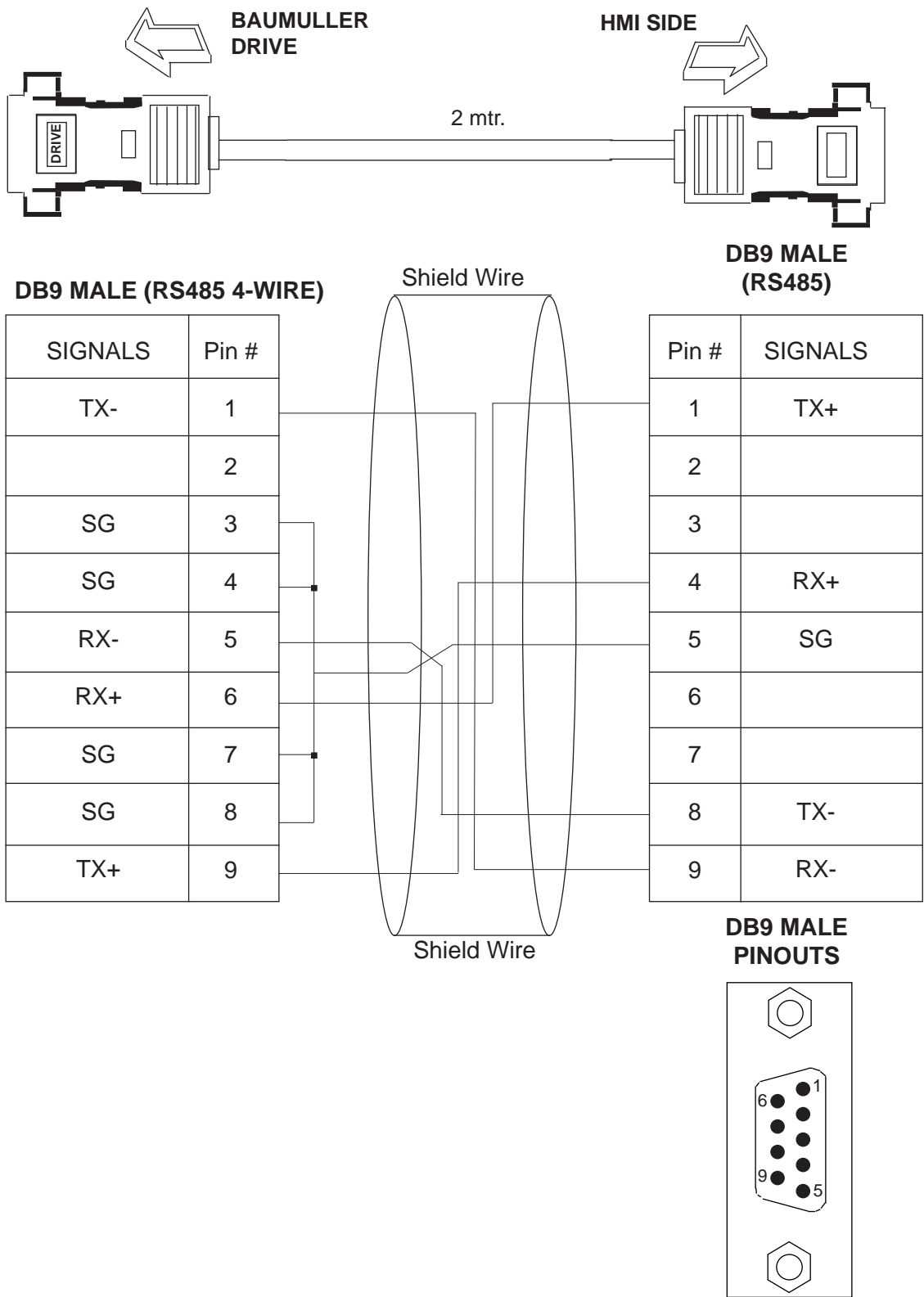


5 AROMAT FP2 TO HMI UNIT(CA-015D-00)

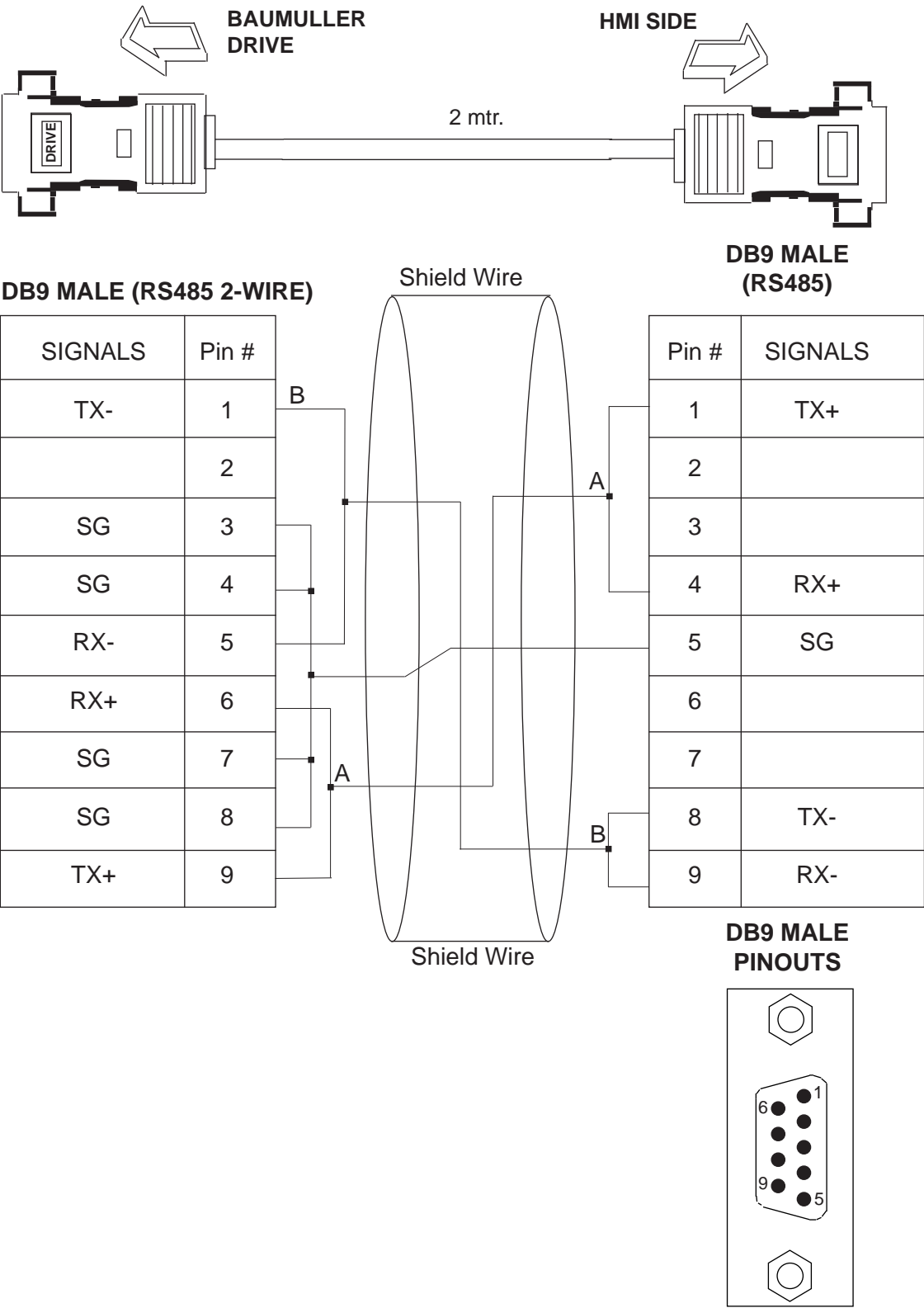


# 16. APPENDIX

## 6 BAUMULLER DRIVE(RS485 4-WIRE) TO HMI UNIT(CA-042A-00)

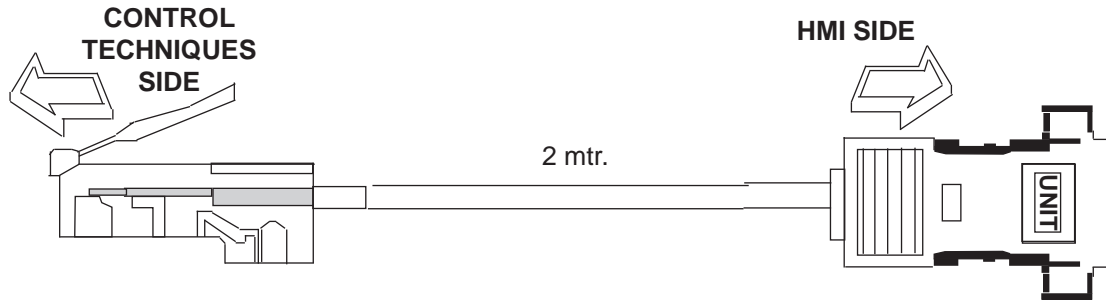


7 BAUMULLER DRIVE(RS484 2-WIRE) TO HMI UNIT(CA-0042B-00)



## 16. APPENDIX

### 8 CONTROL TECHNIQUES TO HMI UNIT(CA-100-00)



**8 PIN MODULAR CONNECTOR  
(RS422)**

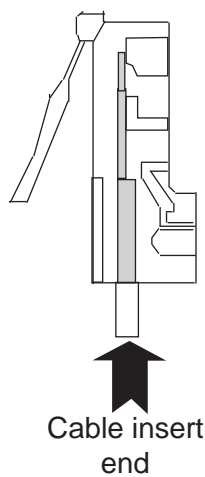
SIGNALS	Pin #
	1
A	2
SG	3
	4
	5
	6
B	7
	8

**DB9 MALE  
(RS422)**

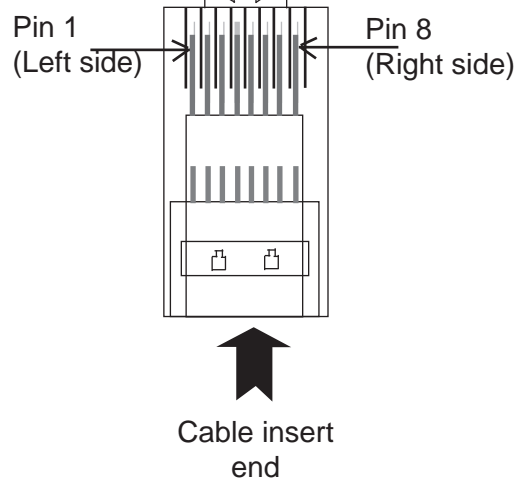
Pin #	SIGNALS
1	TX+
2	
3	
4	RX+
5	SG
6	
7	
8	TX-
9	RX-

**8 PIN MODULAR CONNECTOR  
PINOUTS**

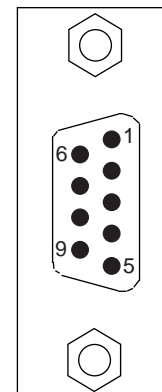
**FRONT VIEW**



**R.H.S. VIEW**

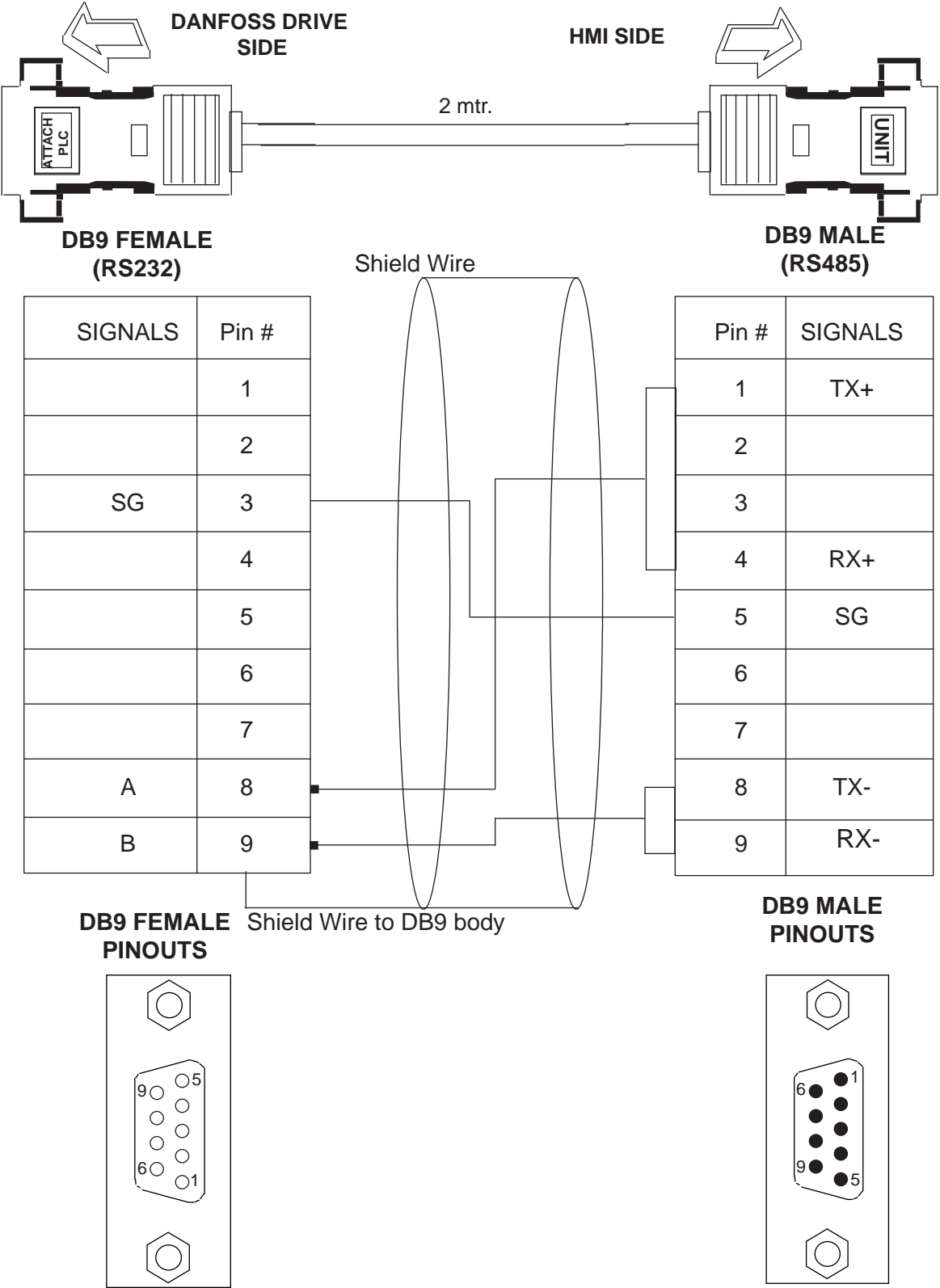


**DB9 MALE  
PINOUTS**



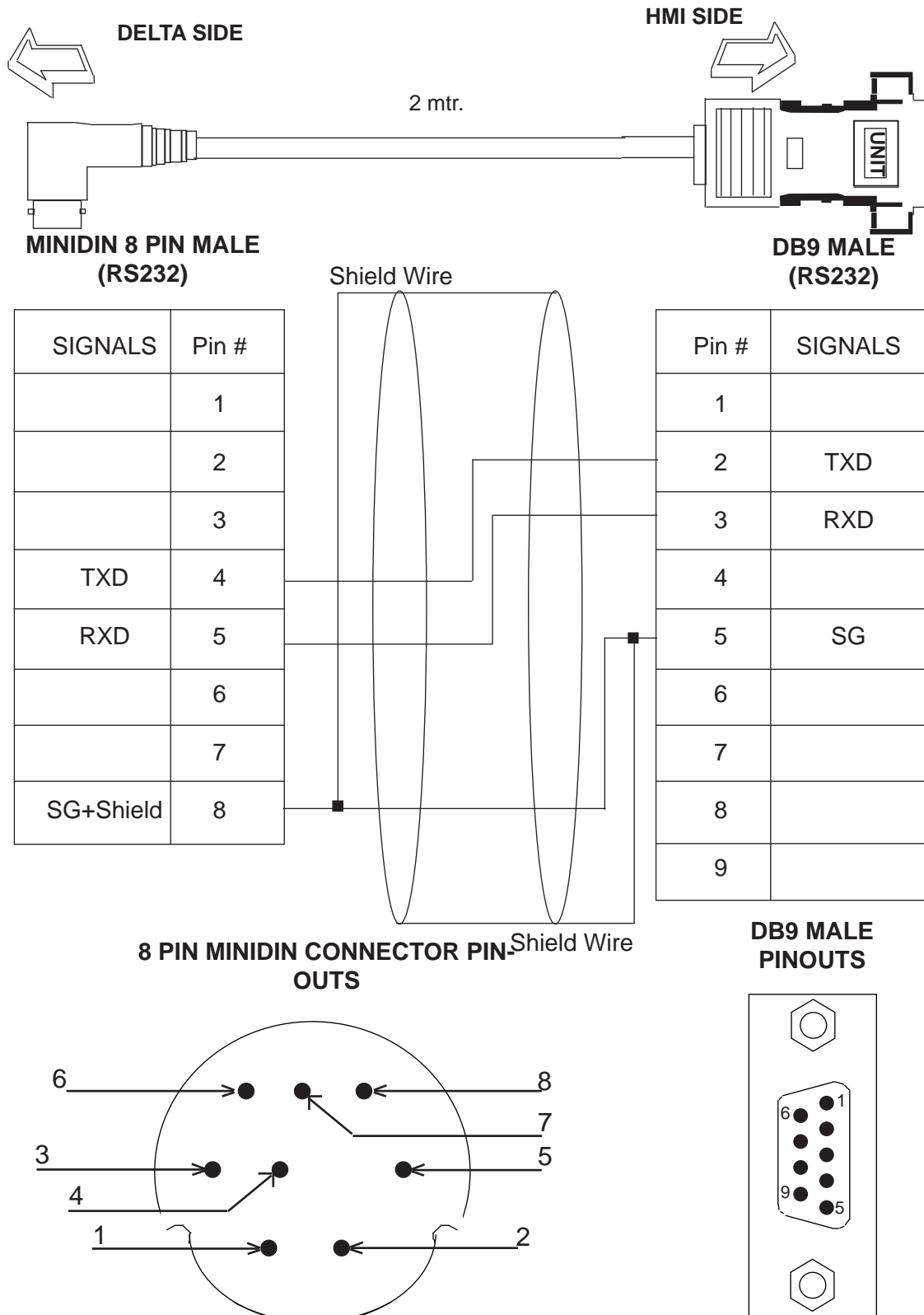


9 DANFOSS DRIVE TO HMI UNIT(CA-101-00)

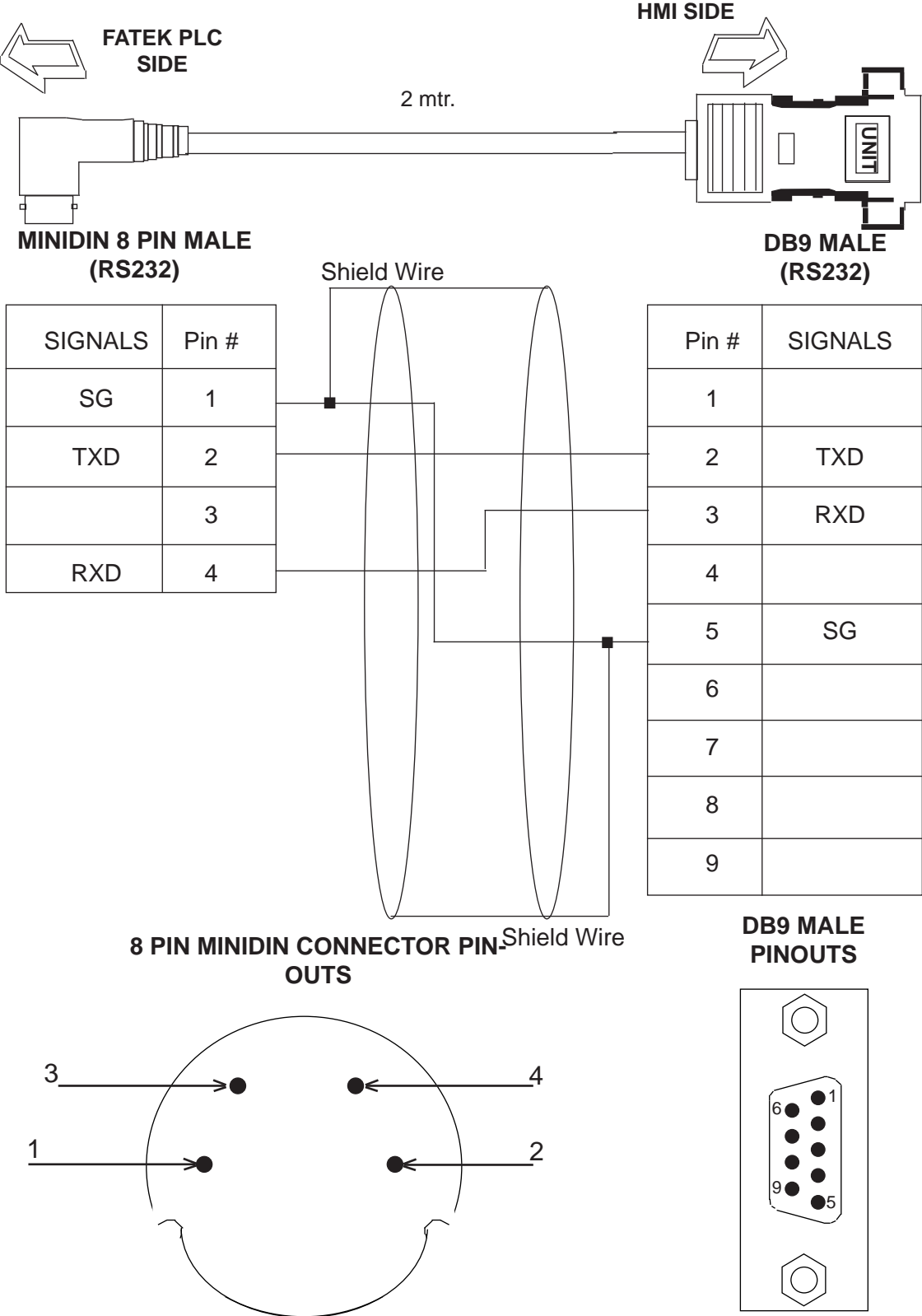


## 16. APPENDIX

### 10 DELTA TO HMI UNIT(CA-044-00)

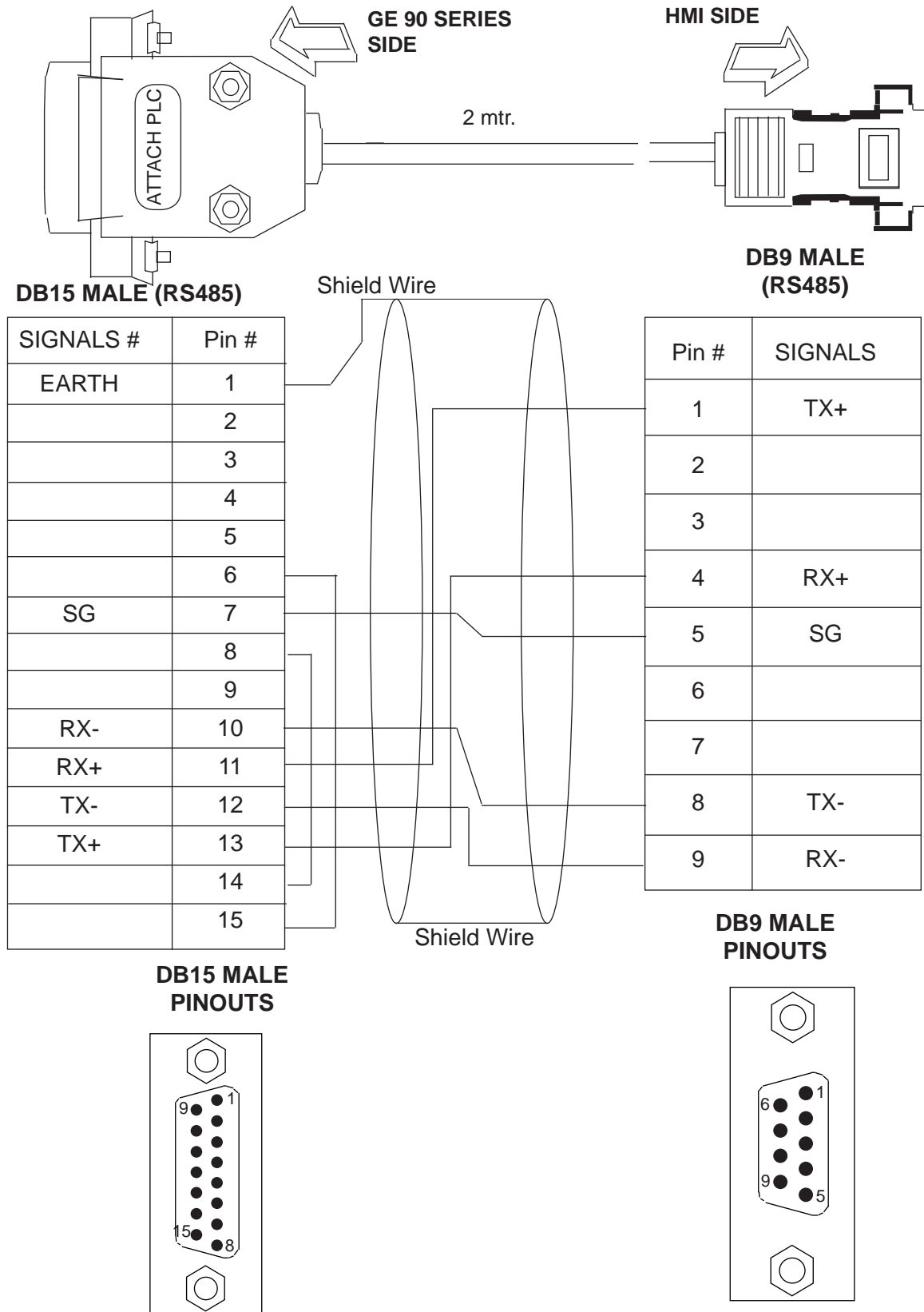


11 FATEK PLC TO HMI UNIT(CA-094A-00)

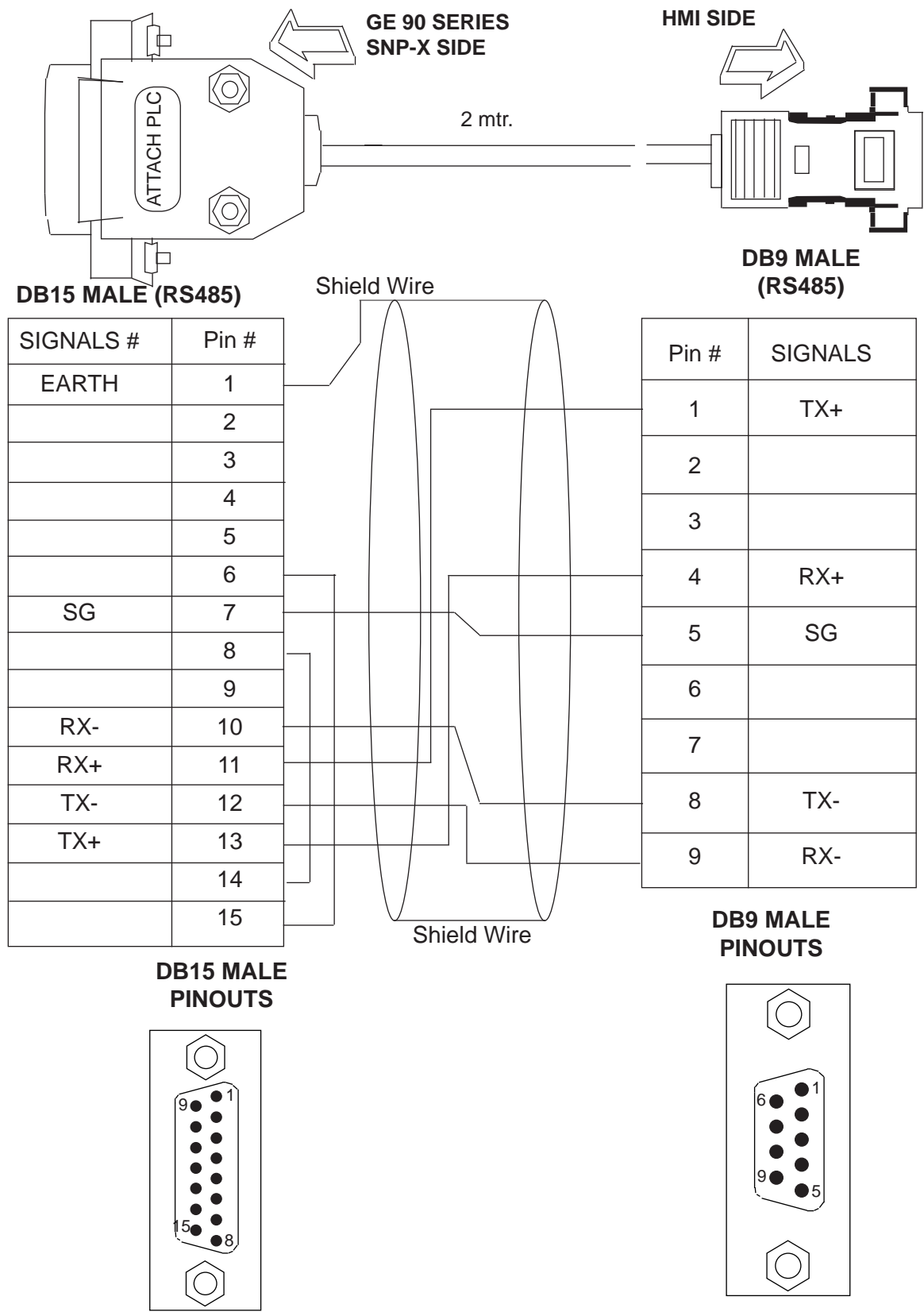


## 16. APPENDIX

### 12 GE90 SERIES PLC TO HMI UNIT(CA-002-00)

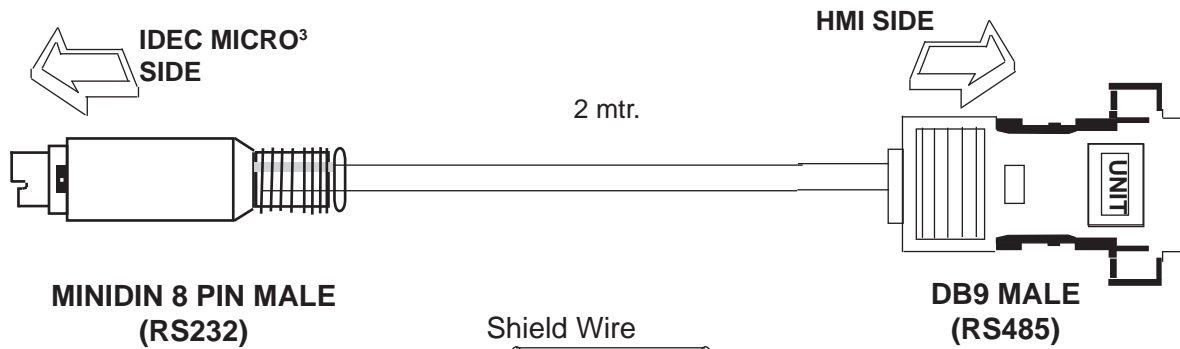


13 GE90 SERIES SNP-X PLC TO HMI UNIT(CA-106-00)



## 16. APPENDIX

### 14 IDEC MICRO<sup>3</sup> TO HMI UNIT(CA-025A-00)



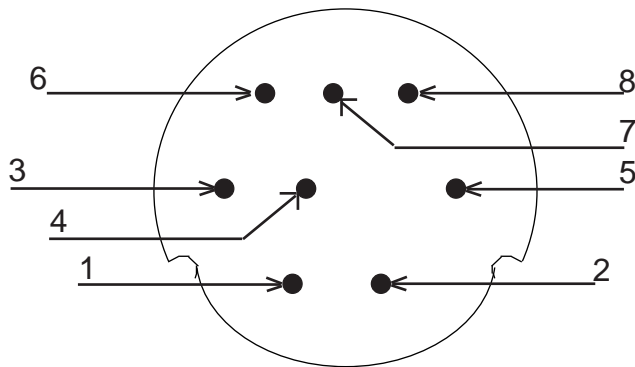
SIGNALS	Pin #
A	1
B	2
	3
	4
	5
	6
SG	7
	8

Shield Wire

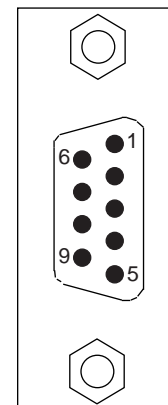
Pin #	SIGNALS
1	TX+
2	
3	
4	RX+
5	SG
6	
7	
8	TX-
9	RX-

Shield Wire

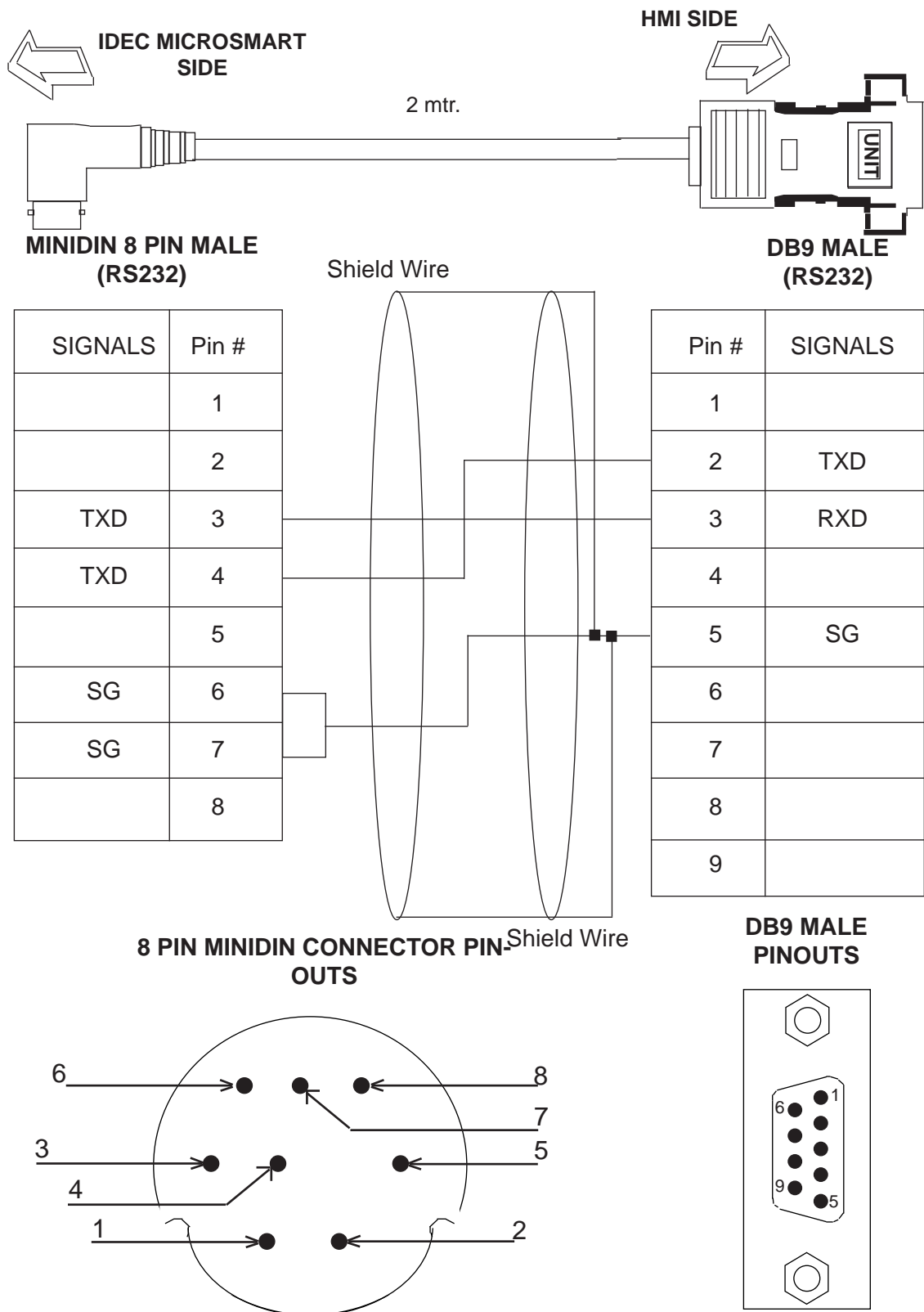
8 PIN MINIDIN CONNECTOR PIN-OUTS



DB9 MALE PINOUTS

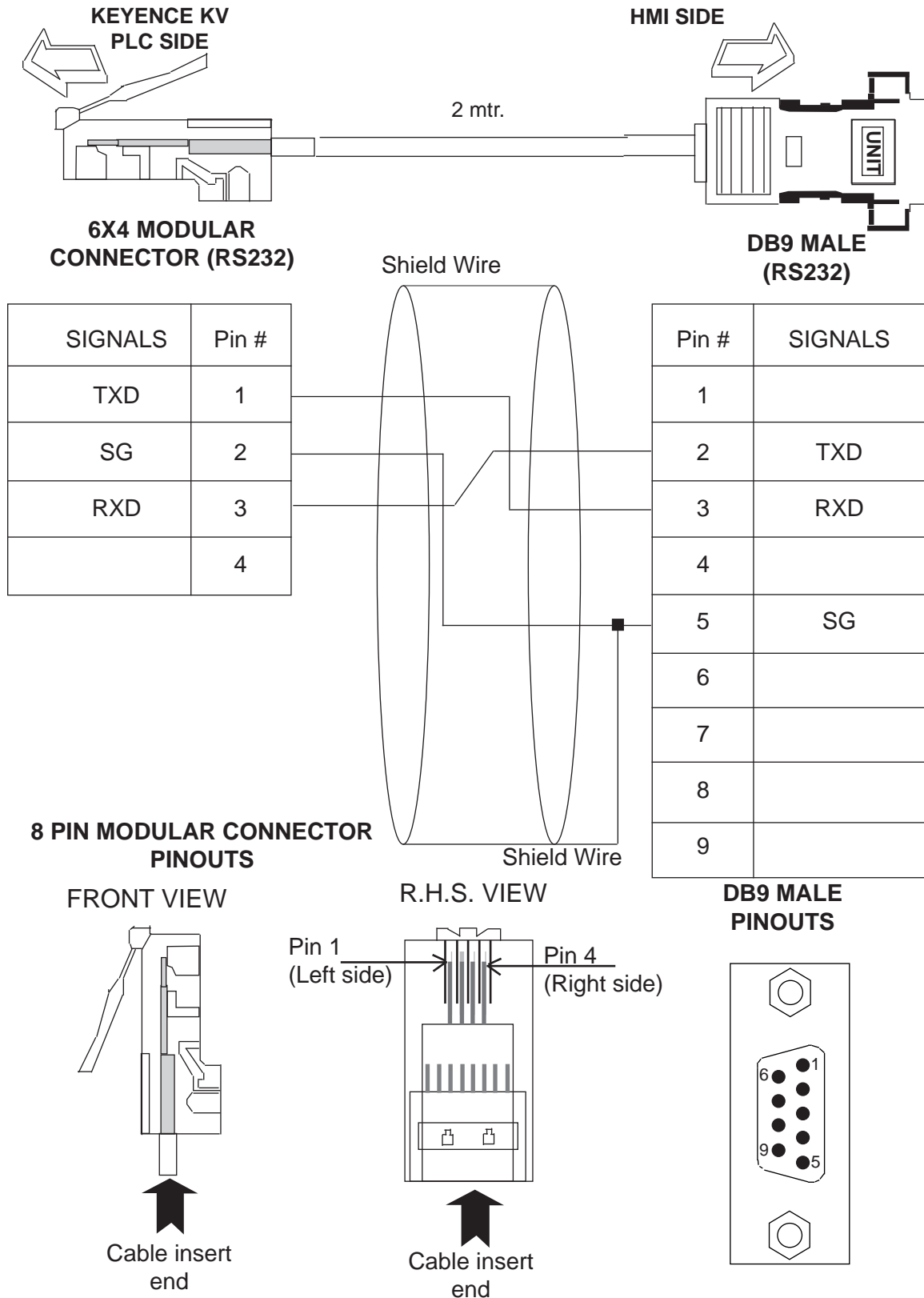


15 IDEC MICROSMART PLC TO HMI UNIT(CA-025B-00)



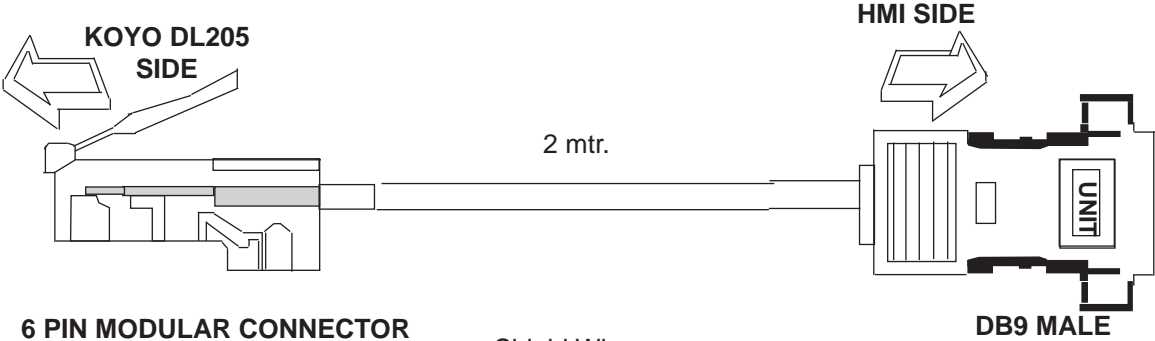
## 16. APPENDIX

### 16 KEYENEC KV PLC TO HMI UNIT(CA-018-00)





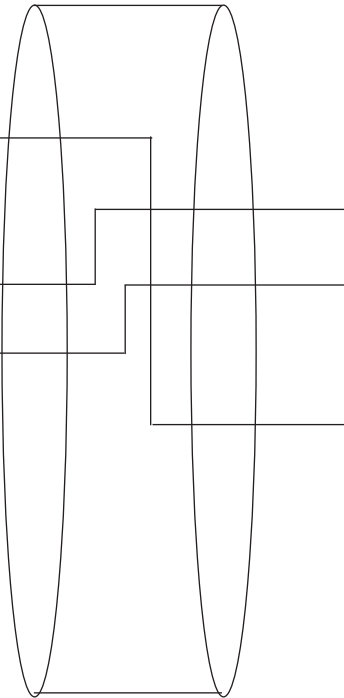
17 KOYO DL205 PLC TO HMI UNIT(CA-023-00)



6 PIN MODULAR CONNECTOR

SIGNALS	Pin #
GND	1
	2
TXD	3
RXD	4
	5
	6

Shield Wire

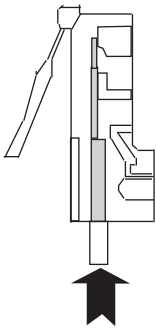


Pin #	SIGNALS
1	
2	TXD
3	RXD
4	
5	SG
6	
7	
8	

6 PIN MODULAR CONNECTOR

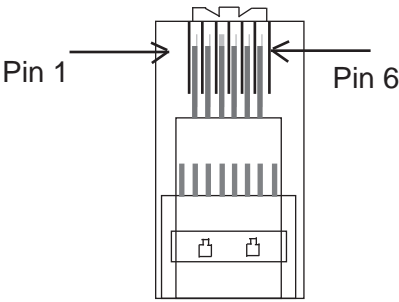
Shield Wire

FRONT VIEW



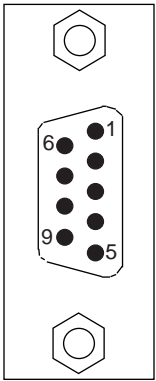
Cable insert

R.H.S. VIEW



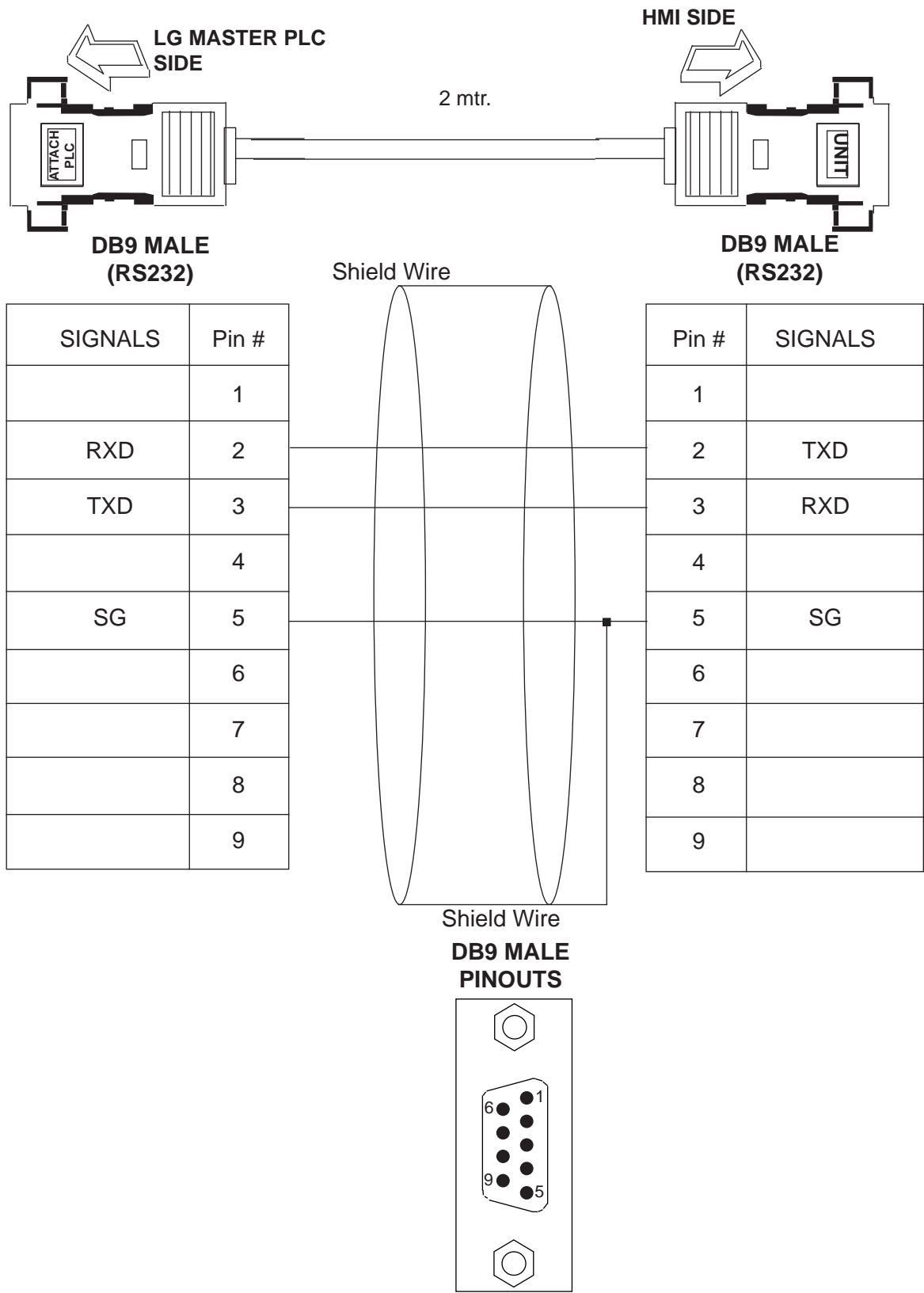
Cable insert

DB9 MALE

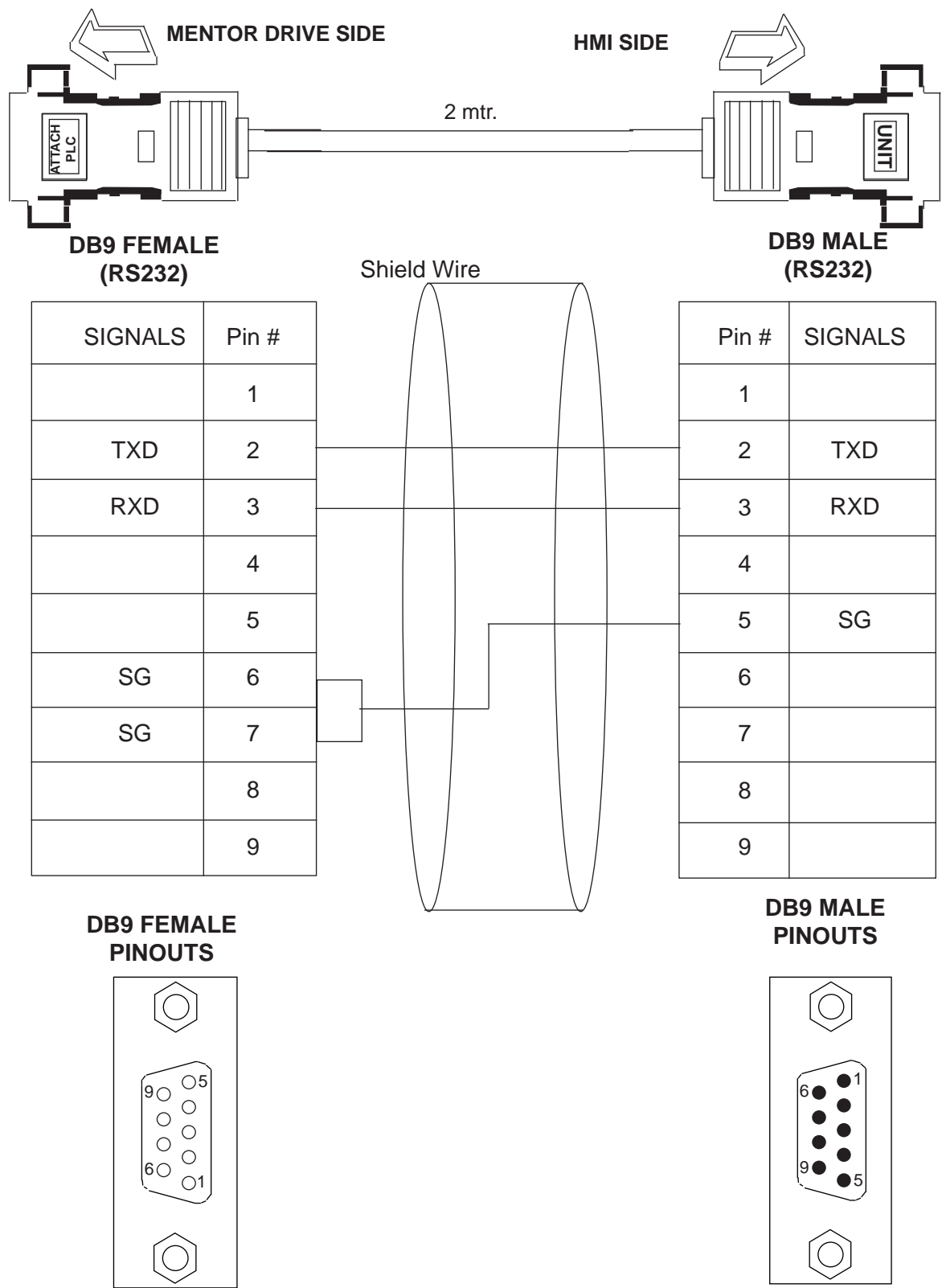


# 16. APPENDIX

## 18 LG MASTER K SERIES PLC TO HMI UNIT(CA-037-00)

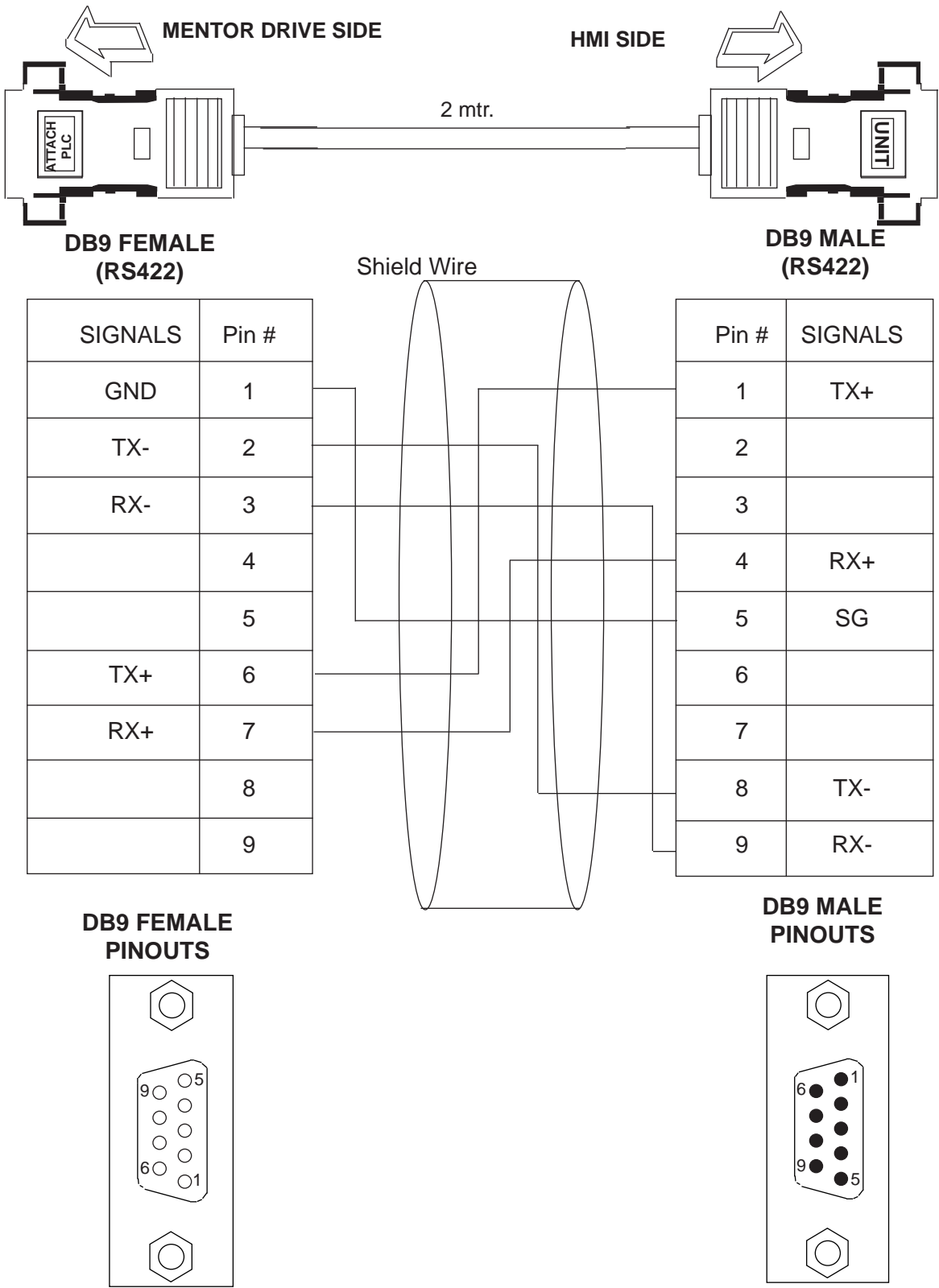


19 MENTOR DRIVE PORT TO HMI UNIT(CA-115A-00)

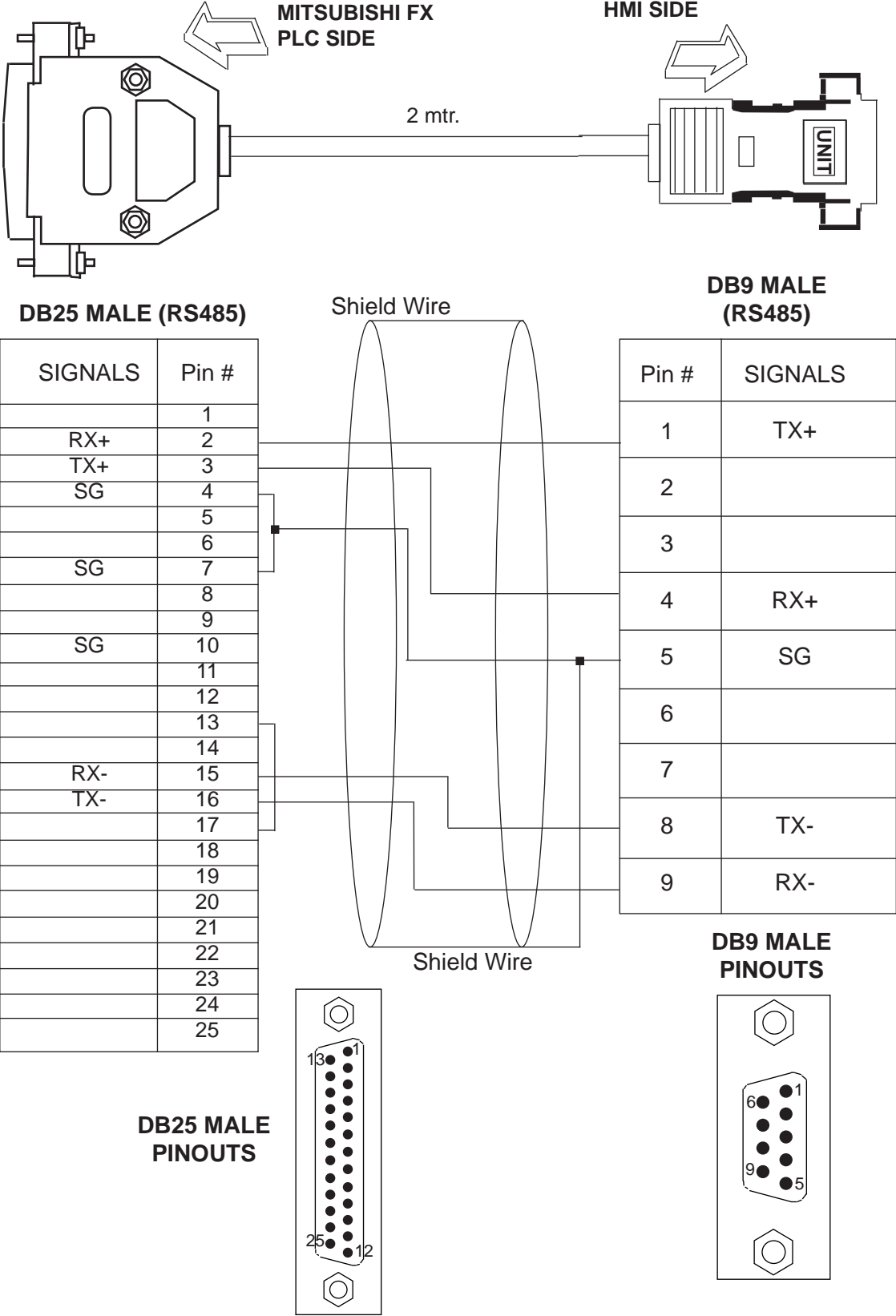


# 16. APPENDIX

## 20 MENTOR DRIVE PORT TO HMI UNIT(CA-115B-00)

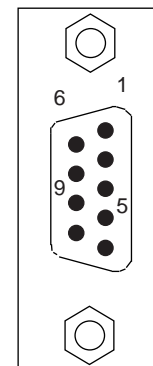
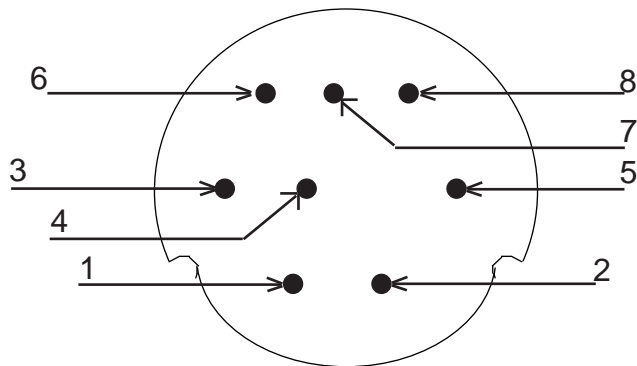
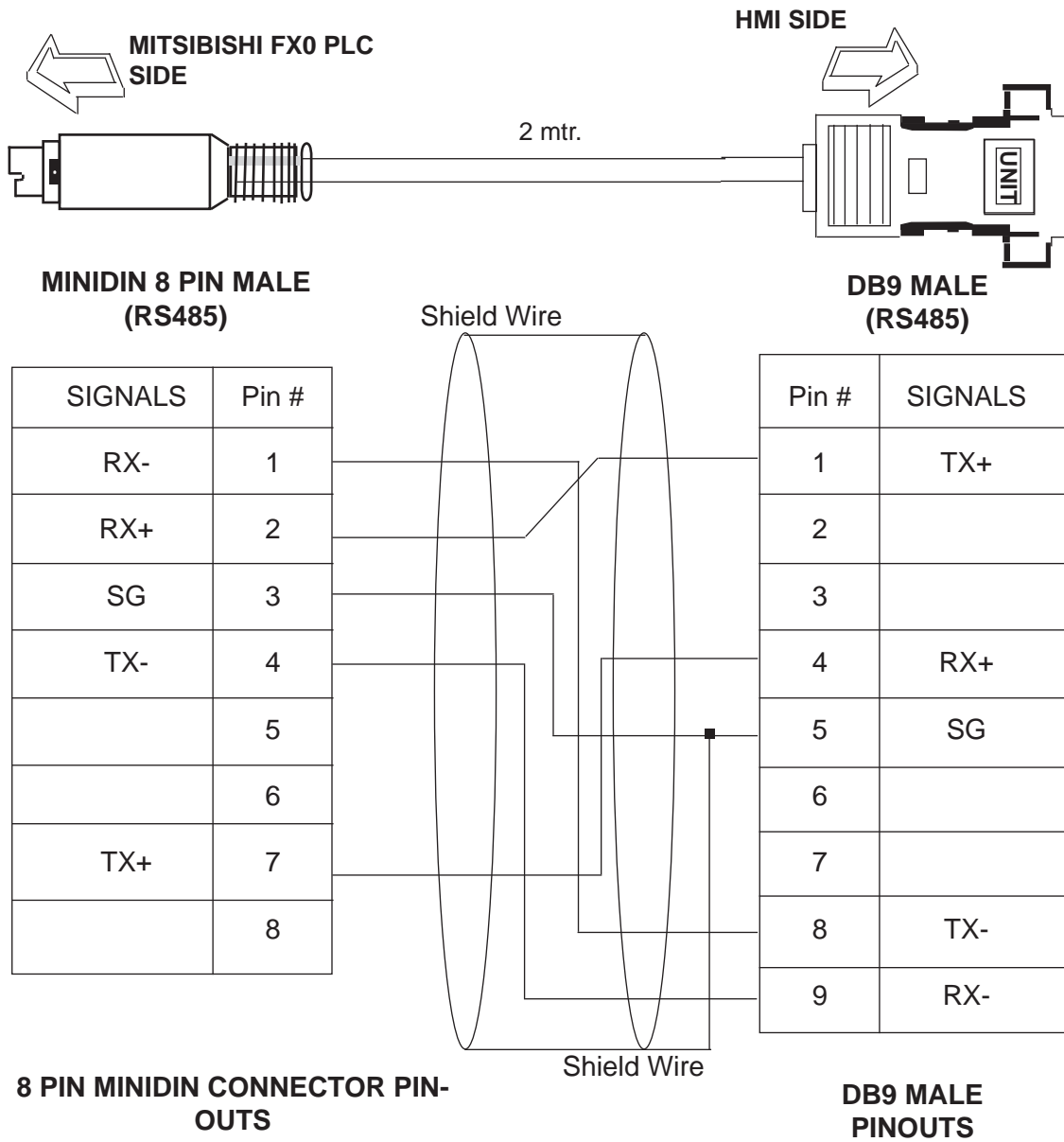


21 MITUBISHI FX SERIES PLC TO HMI UNIT(CA-0008B-00)

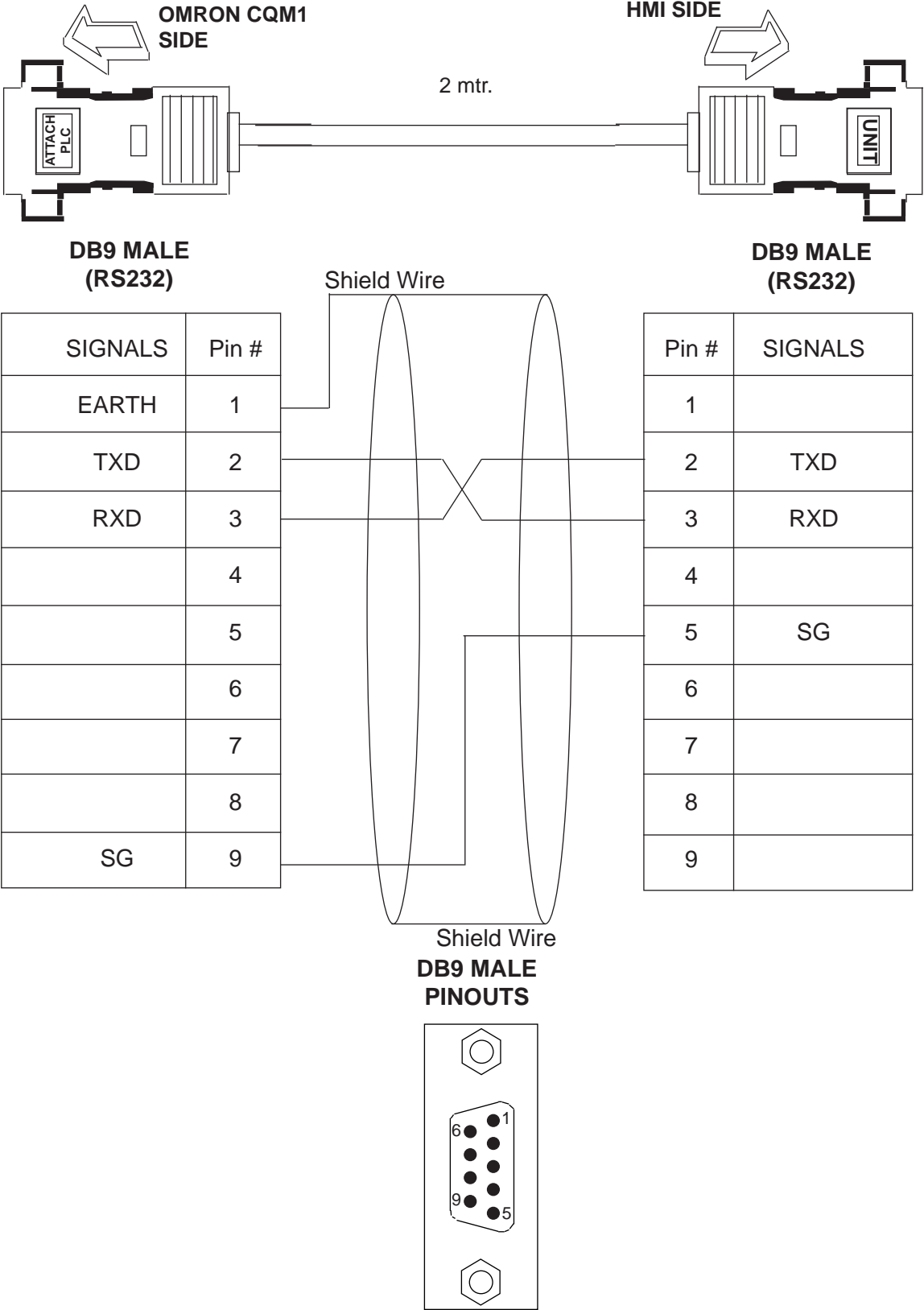


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### 22 MITUBISHI FX0 PLC TO HMI UNIT(CA-0008A-00)

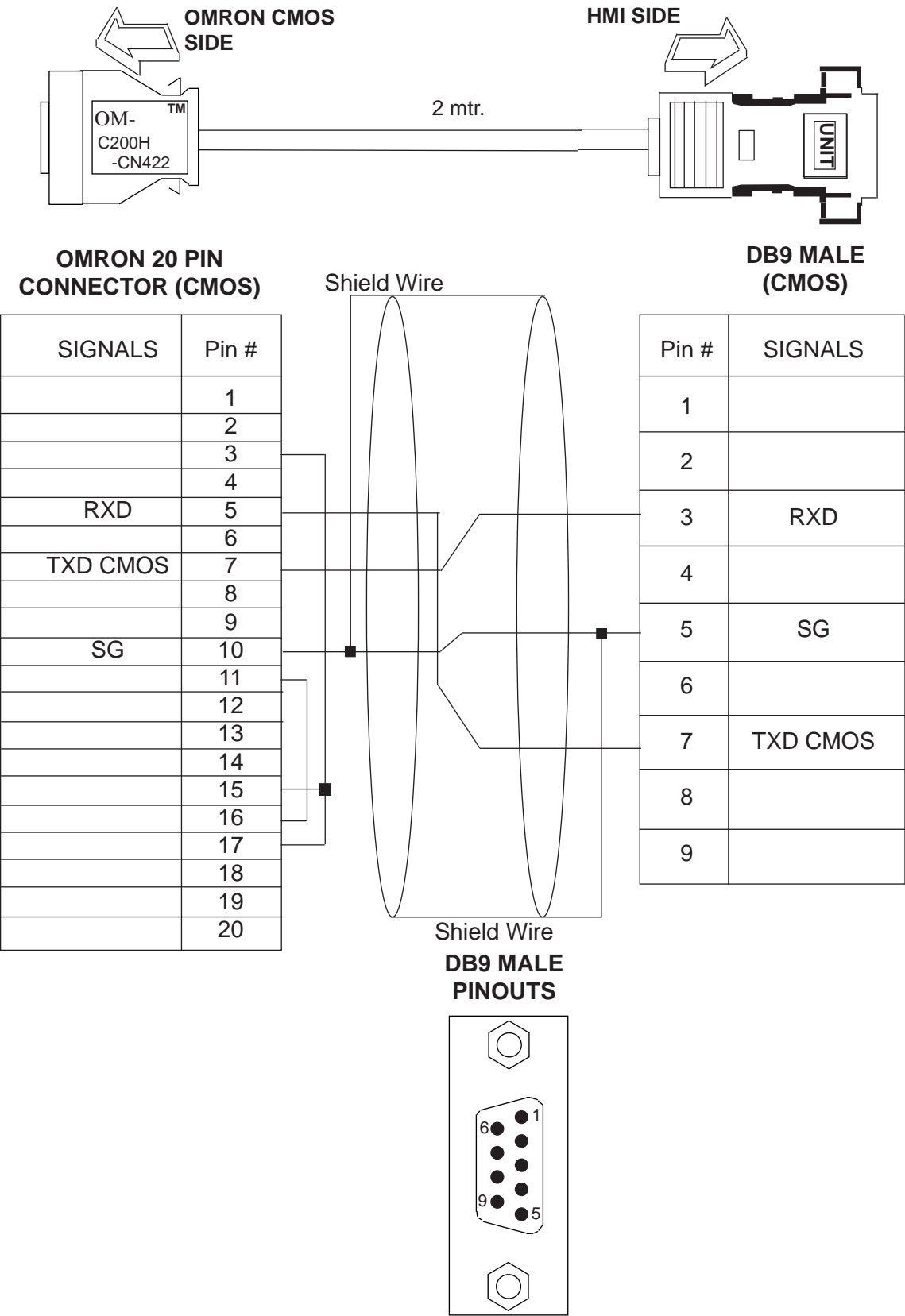


23 OMRON CQM PLC TO HMI UNIT(CA-006B-00)



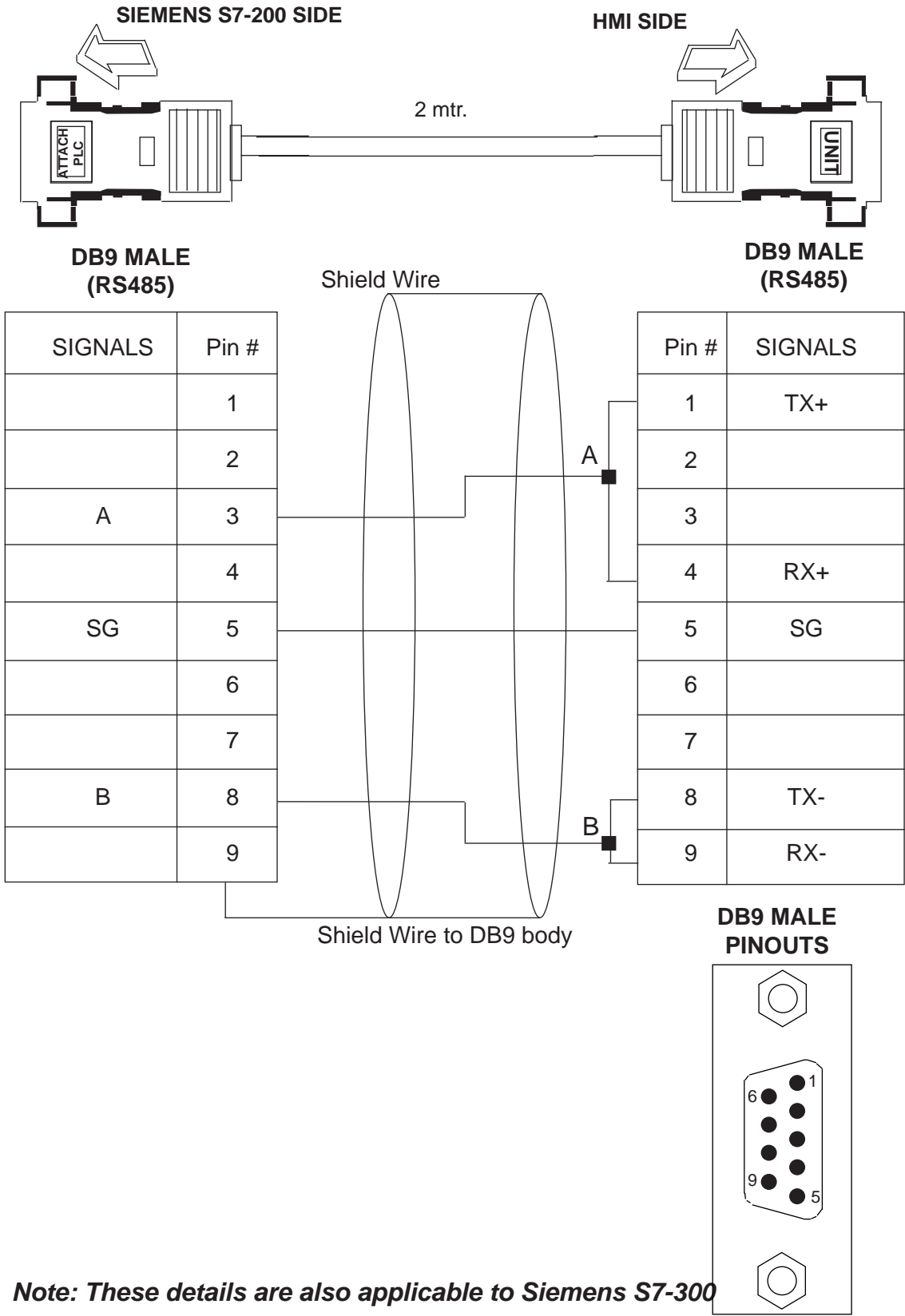
# 16. APPENDIX

## 24 OMRON CQM / CPM CMOS PORT TO HMI UNIT(CA-006A-00)



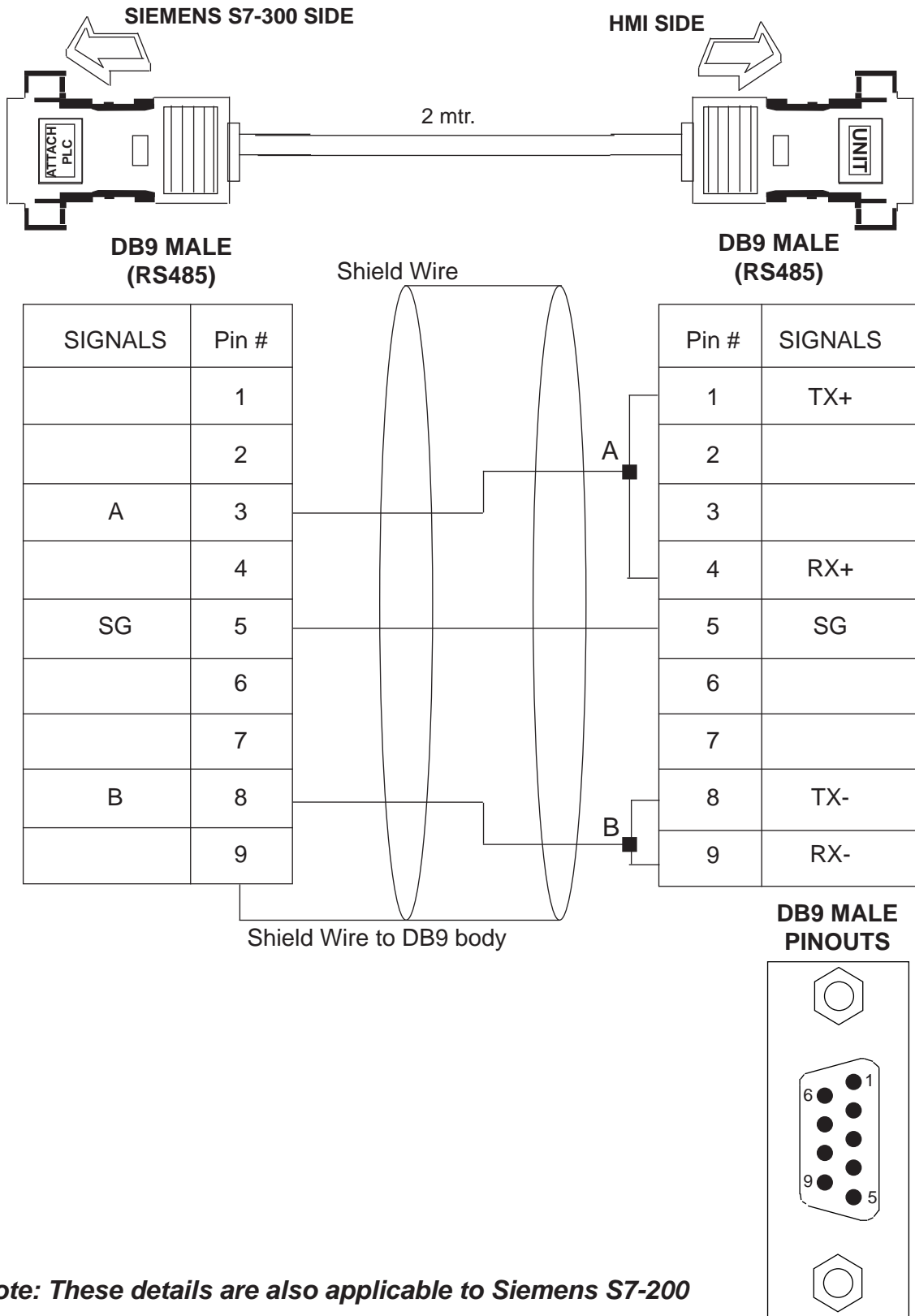


25 SIEMENS STEP 7 MICRO(S7-200) PLC TO HMI UNIT(CA-019-00)



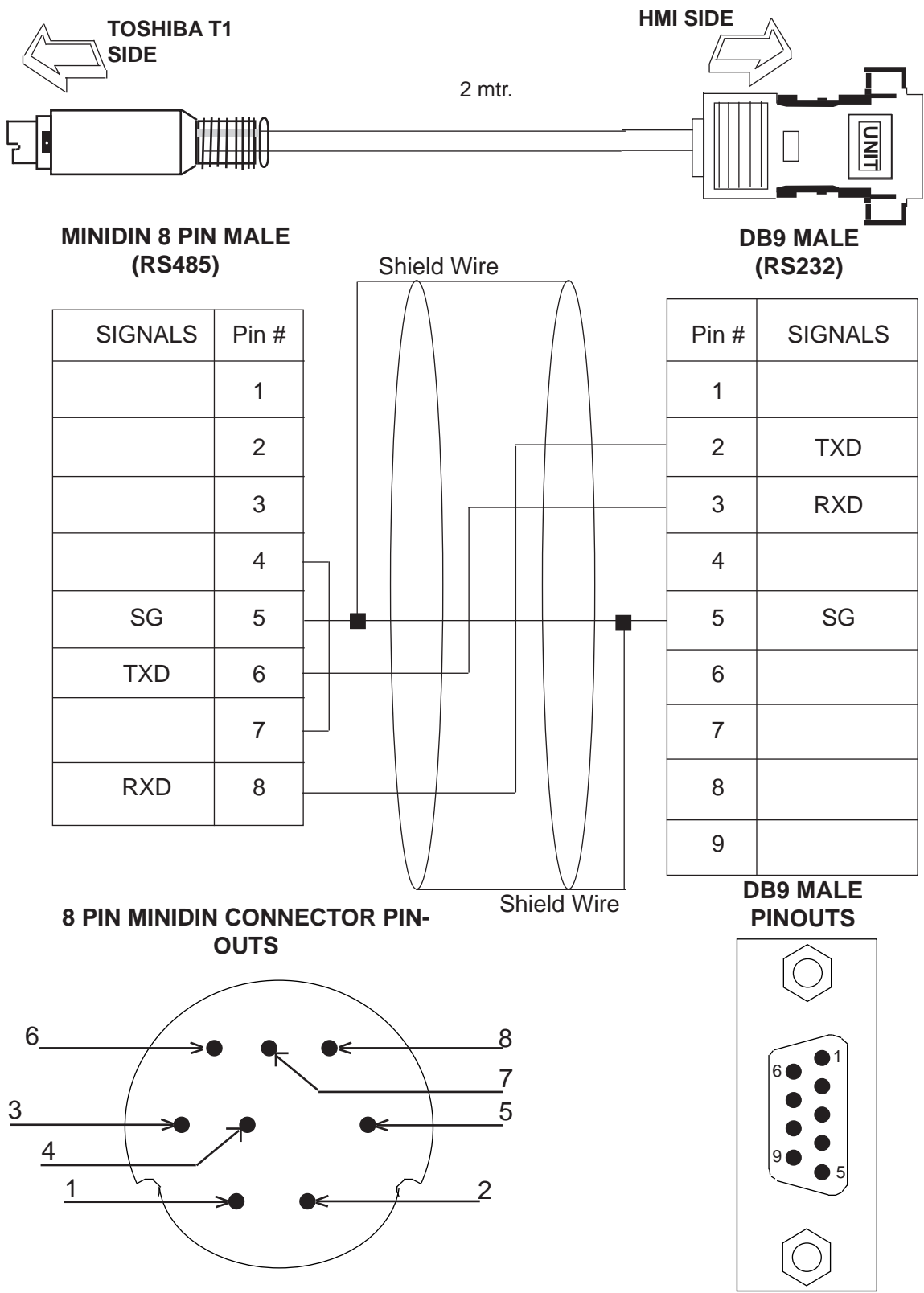
# 16. APPENDIX

## 26 SIEMENS-S7 300 SERIES PLC TO HMI UNIT(CA-029A-00)



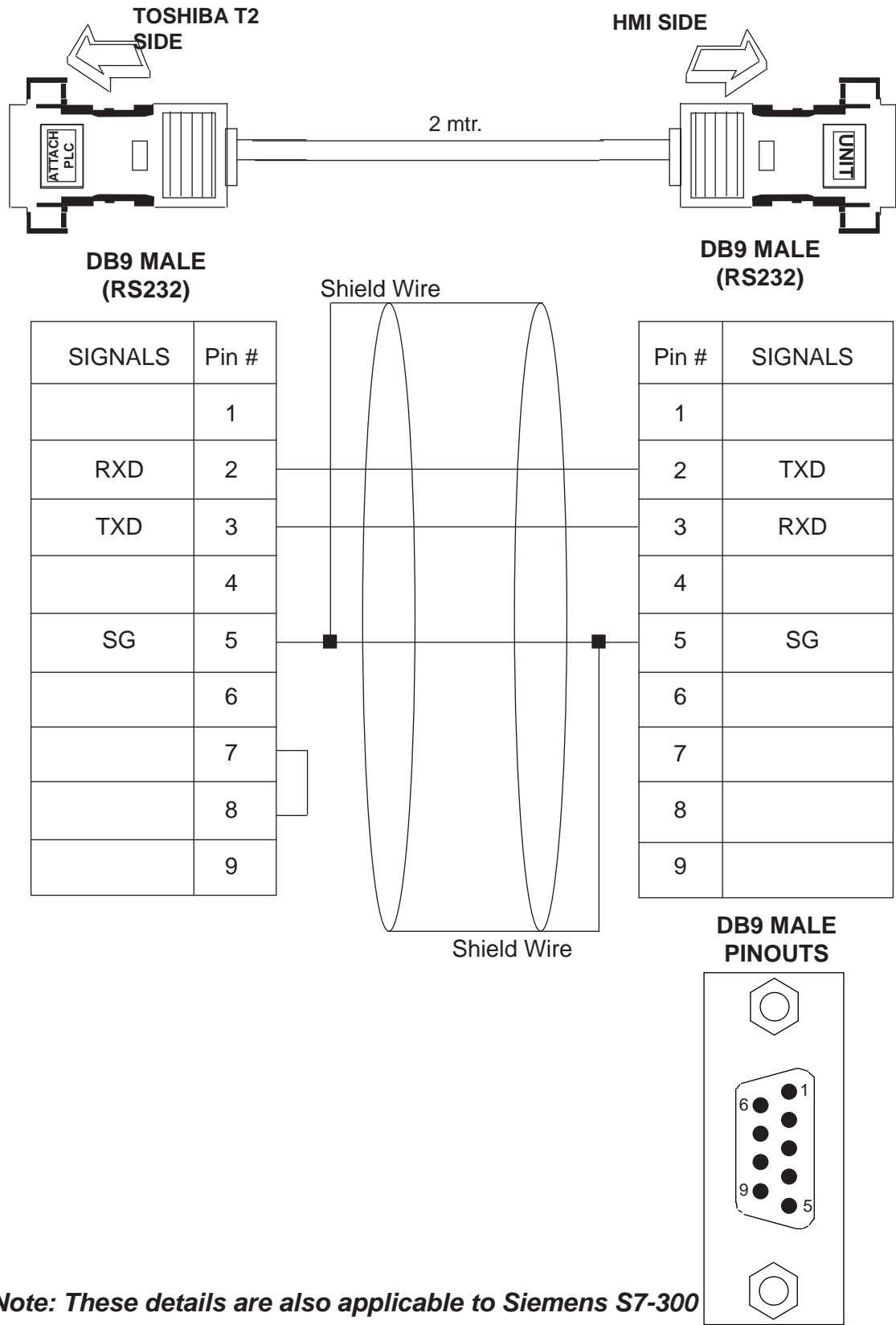
*Note: These details are also applicable to Siemens S7-200*

27 TOSHIBA T1 PLC TO HMI UNIT(CA-019-00)

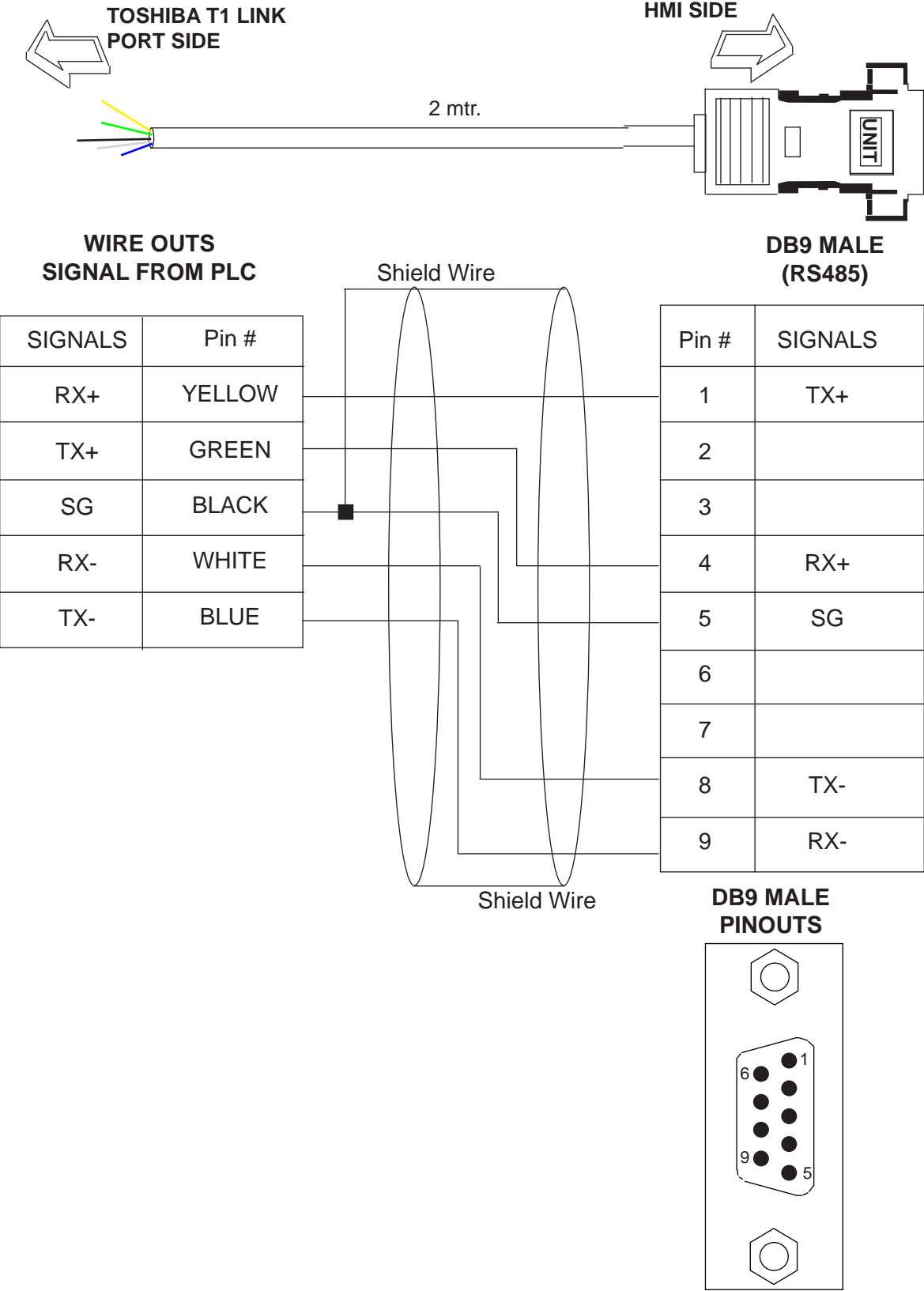


# 16. APPENDIX

## 28 TOSHIBA T2 PLC TO HMI UNIT(CA-019B-00)

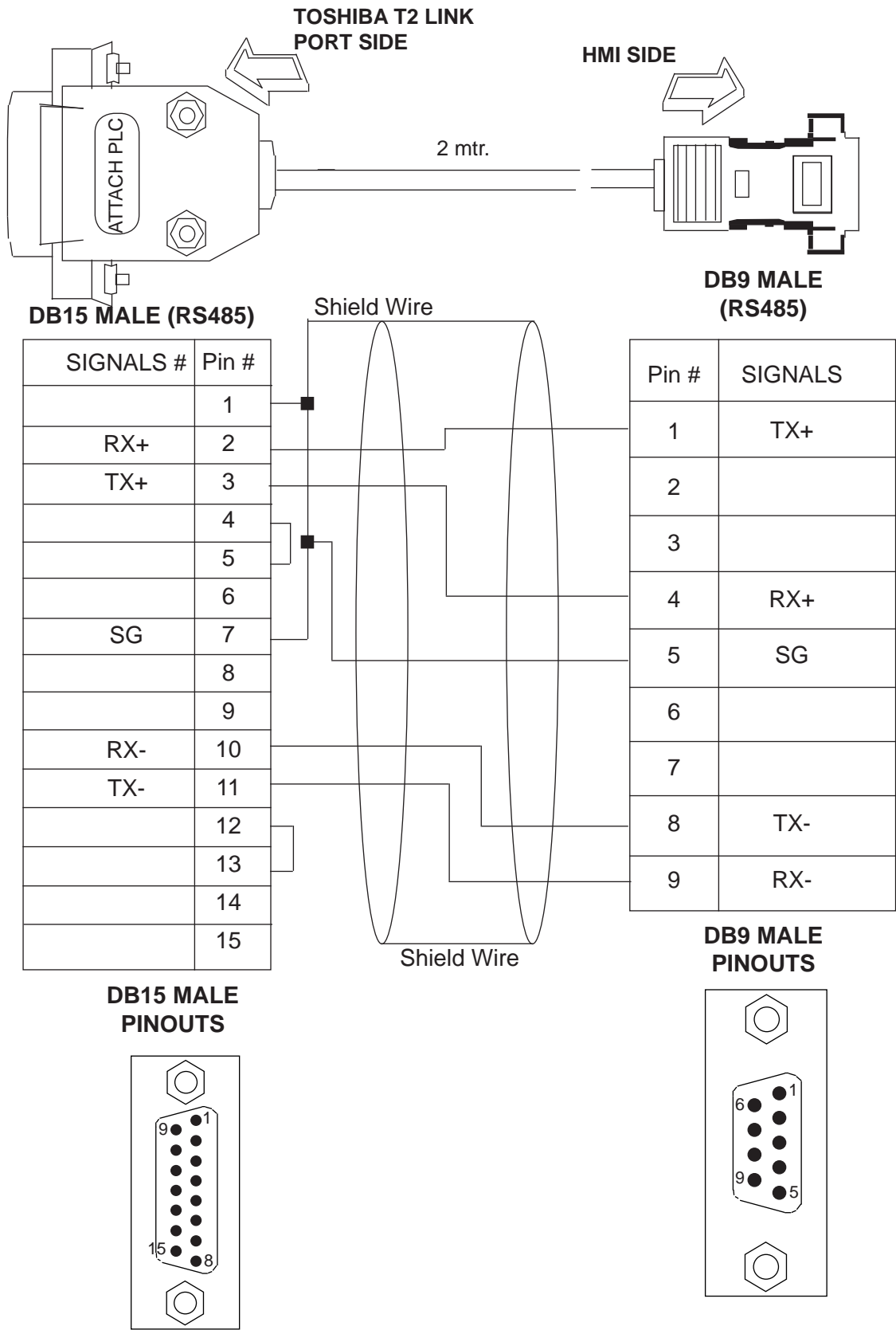


29 TOSHIBA T1 LINK PORT TO HMI UNIT(CA-046A-00)

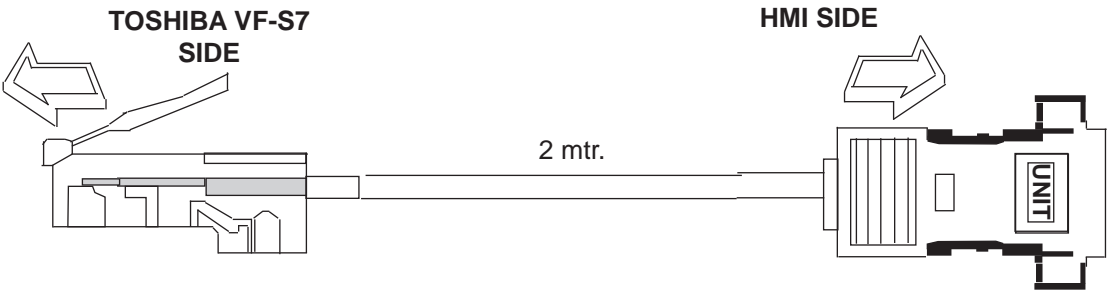


# 16. APPENDIX

## 30 TOSHIBA T2 LINK PORT TO HMI UNIT(CA-046B-00)



31 TOSHIBA INVERTER S SERIES TO HMI UNIT(CA-050-00)



8 PIN MODULAR CONNECTOR (RS232)

SIGNALS	Pin #
	1
SG	2
RXD	3
	4
CMOS TXD	5
	6
	7
	8

DB9 MALE (RS232)

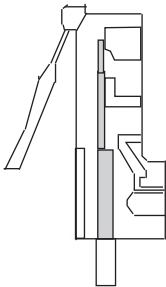
Pin #	SIGNALS
1	
2	
3	RXD
4	
5	SG
6	
7	CMOS TXD
8	
9	

Shield Wire

Shield Wire

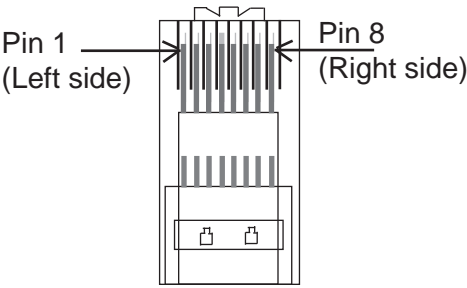
8 PIN MODULAR CONNECTOR

PINOUTS  
FRONT VIEW



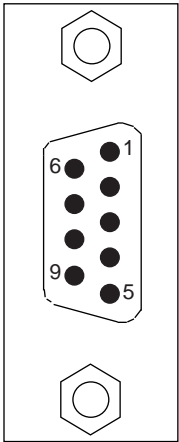
Cable insert  
end

R.H.S. VIEW



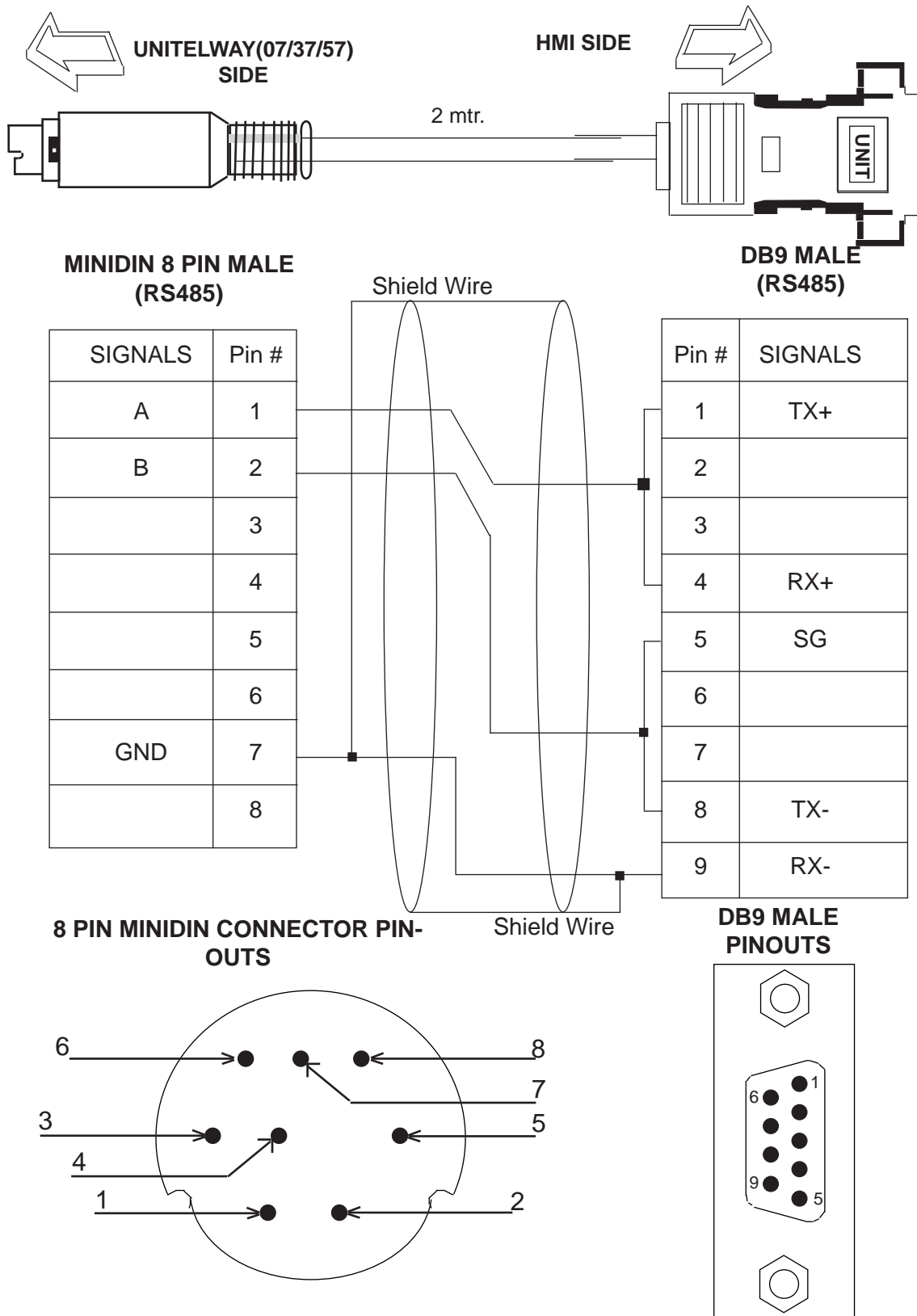
Cable insert  
end

DB9 MALE  
PINOUTS



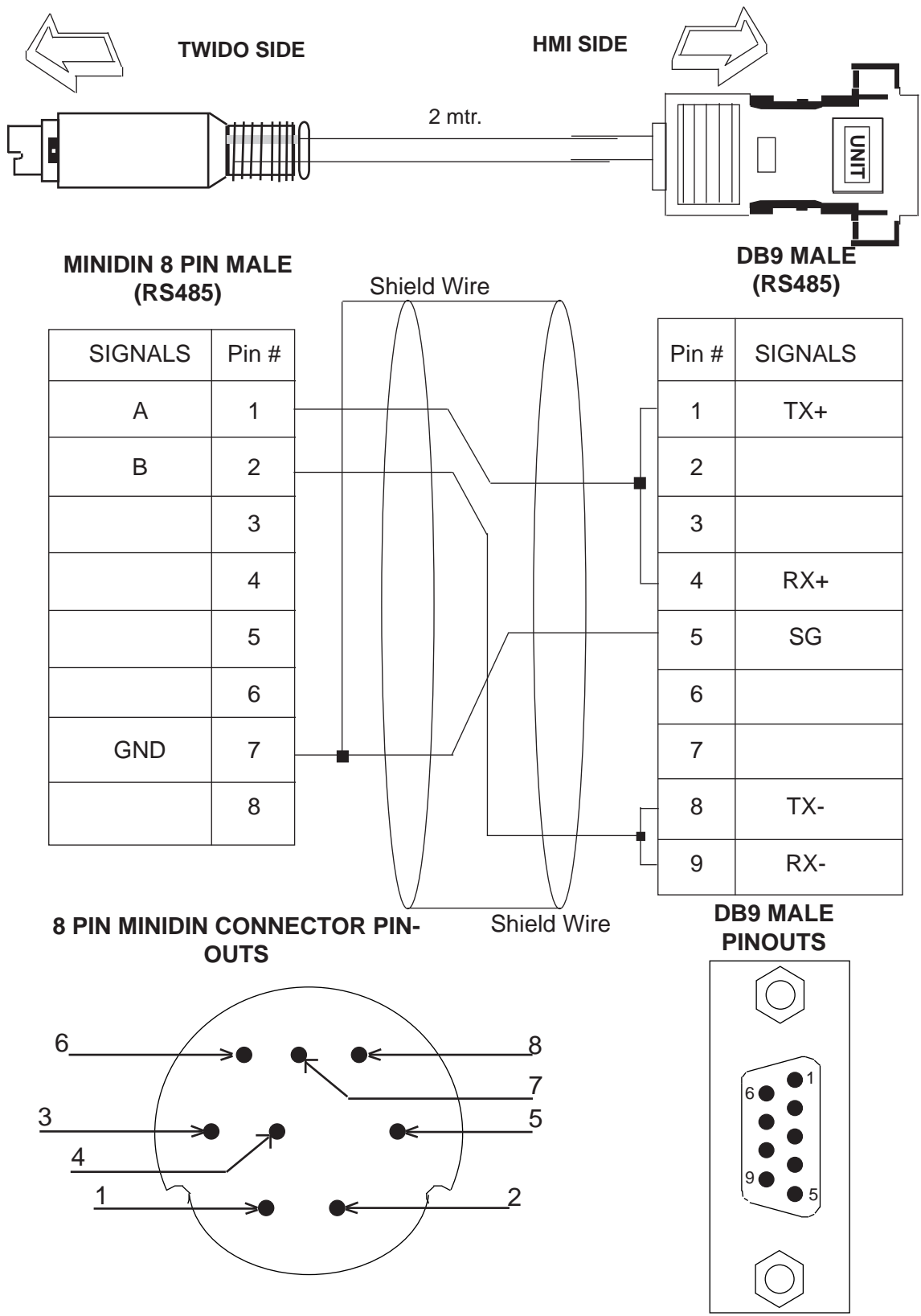
## 16. APPENDIX

### 32 UNITELWAY(07/37/57) PLC TO HMI UNIT(CA-026B-00)





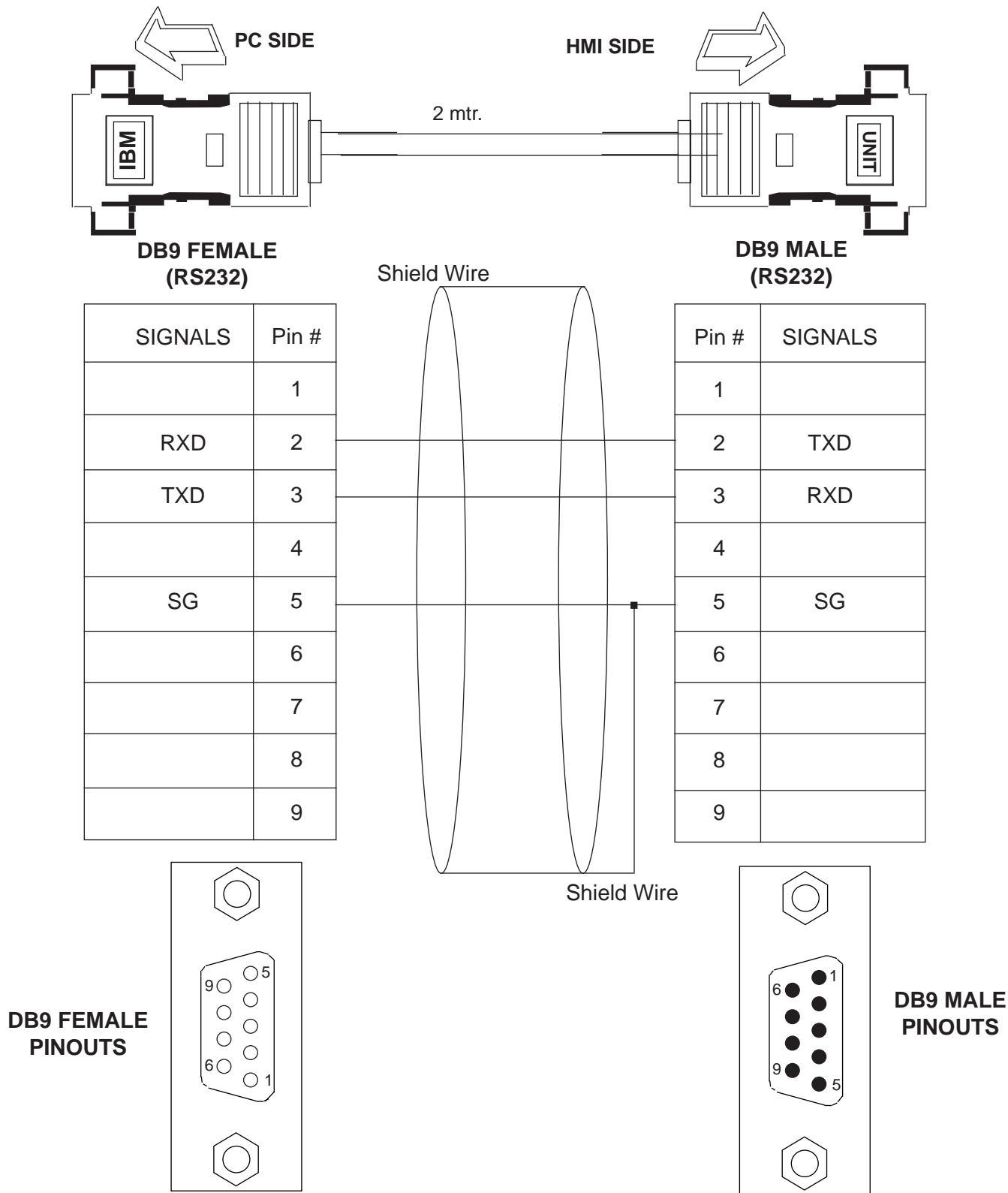
33 TWIDO PLC TO HMI UNIT(CA-078-00)



# 16. APPENDIX

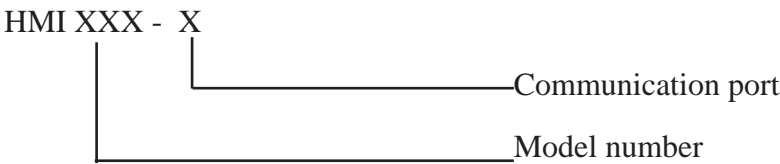
## B IBM Cables

### 1 RS232 Interface cable PC to HMI ( CC95-2), P/N: 352-21202-00



C      **Ordering Options**

**Ordering Numbers For HMI Models**




























Model Name	Product Code	Description
HMI 201	HMI 201-S	2" HMI, Keypad based, Monochrome, 2 serial ports, 9 Pin, Dtype
HMI 401	HMI 401-S	4" HMI, Touch screen, Monochrome, 2 serial ports, 9 Pin, Dtype
HMI 601	HMI 601-S	5.7" HMI,Touch screen, Monochrome, 2 serial ports, 9 Pin, Dtype
HMI 601	HMI 601-E	5.7" HMI,Touch screen, Monochrome, 2 serial ports, 9 Pin, Dtype and Ethernet for Communicatin.
HMI 605	HMI 605-S	5.7" HMI,Touch screen, Color, 2 serial ports, 9 Pin, Dtype.
HMI 605	HMI 605-E	5.7" HMI,Touch screen, Color, 2 serial ports, 9 Pin, Dtype and Ethernet for communication.
HMI 1205	HMI 1201-S	12.1" HMI,Touch screen, Color, 2 serial ports, 9 Pin, Dtype and Ethernet for Communicatin.
HMI 1205	HMI 1205-U	12.1" HMI,Touch screen, Color, 2 serial ports, 9 Pin, Dtype, Ethernet, USB and Compact flash card

## 16. APPENDIX










### D List Of Features

The next chapter will guide you through the creation of your first project. Before you proceed, you may wish to read this brief list of some of the features offered in the HMI.

ICON	NAME	DESCRPITION
	Data Entry	Edits any register or coil from the PLC using HMI Keypad.
	Display Data	Displays the text depending on the bit status or the value of the PLC Data register.
	Time	Displays the time in the format HH:MM:SS or HH:MM
	Date	Displays date in the format DD/MM/YY or in MM/DD/YY
	Alarm	Displays the alarm text when alarm occurs
	Bit Button	Performs the key's specific task or screen tasks.
	Word Button	performs a set of tasks based on the number of logical states defined in the configuration
	Bit Lamp	Lamp object can be used as state indicator for displaying state of PLC coil
	Word lamp	performs a set of tasks based on the number of logical states defined in the configuration
	Single Bargraph	Changes the bar height/width according to the value in the PLC register
	Multiple Bargraph	Changes the bar height/width according to the value in the PLC register
	Analog Meter	Changes its needle position according to the value of PLC register

ICON	NAME	DESCRPITION
	Numeric Keypad	Enters decimal or hex data into the register or 1 or 0 into the coil.
	Bitmap	Used to draw bmp images on the HMI display
	All Screens	Shows the list of available screens
	Screen Task List	Shows the task list of the screen.
	UNIT Settings	Defines HMI unit's hardware configuration settings
	Network Configuration	Defines protocol on both the ports COM1 and COM2
	Tags	It is the central database for the tags that need to be used in the application
	Global keys	Tasks defined under this option are executed for whole application
	Function keys	Using this screen macros of task can be defined for Global keys.
	Application Task List	Defines the tasks for the application
	Download Application	Downloads the application & firmware in the HMI unit
	Upload Application	Uploads application from the HMI memory
	Trend	Shows graphical representation of tag against real time

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ICON	NAME	DESCRIPTION
	Historical Trend	Shows graphical representation of tag against time
	Ladder Logic Block	Used to create ladder for the application
	High speed Counter / Interrupt	Can be used for applications like Rate measurement, Totalizer
	High Speed Timer	Allows a ladder program to be executed in parallel to the main program.
	Data Logger	Locks the data in the HMI's memory
	PID Block	Observes the error and decides the correction factor
	16 Point Linearization	Enables user to linearize the non linear variable
	Time Proportional PWM	Used to encode Analog signal levels digitally
	Pulse Output	Can be used for motor control applications

**E List of Supported Devices**

Sr No	PLC
1	ABB
2	Allen Bradley DF1
3	Aromat FP Series
4	Universal serial ASCII driver
5	Control Techniques
6	Danfoss drive
7	Delta
8	Fatek Plcs
9	GE-90 Series
10	GE-90 series SNP-X
11	Honeywell
12	Idec PLCs
13	Keyence KV Series
14	Koyo DL205
15	LG Master-K 300S
16	LG MASTER-K Series PLCs
17	Mentor drives
18	Mitsubishi FX
19	Modbus ( Unit as Master or Slave)
20	Omron Host link
21	Omron Inverters
22	Siemens Step-7 Micro
23	Siemens-S7 300 Series PLCs
24	Toshiba T Series
25	Toshiba (Link Port) Series PLCs
26	Toshiba Inverters
27	Unitelway (07\37\57)PLCs
28	Yaskawa inverter
29	Yokogawa PLC
30	Brainchild driver

## 16. APPENDIX

### F Technical Support



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