HM*i* Operator Interface

User Manual

January 2007

Important Notice – Please Read

The product discussed in this literature is subject to terms and conditions outlined in Eaton Electrical Inc. selling policies. The sole source governing the rights and remedies of any purchaser of this equipment is the relevant Eaton Electrical Inc. selling policy.

The information contained in this manual is subject to change without notice.

Cover Photo: **HM*i*** Operator Interface

Table of Contents

LIST OF FIGURES . . . vii

LIST OF TABLES . . . xi

CHAPTER 1 — INTRODUCTION

HM*i* Series Human Machine Interface . . . 1-1
Features . . . 1-1
Recommended System Requirements . . . 1-2

CHAPTER 2 — CREATING AND EDITING SCREENS

HM***i***soft Setup . . . 2-1
Getting Started . . . 2-1
Menu Bar and Toolbar (File) . . . 2-5
Menu Bar and Toolbar (Edit) . . . 2-7
Menu Bar and Toolbar (View) . . . 2-12
Menu Bar and Toolbar (Element) . . . 2-19
Menu Bar and Toolbar (Screen) . . . 2-22
Menu Bar and Toolbar (Tools) . . . 2-25
Menu Bar and Toolbar (Options) . . . 2-28
How to Use Multi-Language Function . . . 2-46
How to Use Print Function . . . 2-56
How to Use Hard Copy Function . . . 2-61
Menu Bar and Toolbar (Window) . . . 2-67

CHAPTER 3 — ELEMENT FUNCTION

How to Select an Element . . . 3-1
Property Window Attributes . . . 3-3
General Buttons . . . 3-4
Multistate Buttons . . . 3-6
Set Value Button . . . 3-7
Set Constant Button . . . 3-8
Increment / Decrement . . . 3-9
Goto Screen / Previous Page (Previous View) Buttons . . . 3-10
System Function Button . . . 3-11
Meter Element . . . 3-13
Bar Element . . . 3-14
Pipe Element . . . 3-17
Pie Element . . . 3-20
Indicator . . . 3-21
Data Display . . . 3-23
Numeric Display . . . 3-24
Character Display . . . 3-25
Date Display . . . 3-25
Time Display . . . 3-25
Day-of-Week Display . . . 3-25
Prestored Message . . . 3-26
Moving Sign . . . 3-26
Graph Display . . . 3-27
Static Graphic . . . 3-27
Animated Graphic . . . 3-29

Dynamic Line 3-30
Dynamic Rectangle 3-31
Dynamic Ellipse 3-32
Input Element 3-33
Numeric Entry. 3-34
Character Entry. 3-36
Curve Element 3-36
Trend Graph 3-37
X-Y Chart. 3-39
Sampling Element 3-41
Historical Trend Graph. 3-44
Historical Data Table 3-47
Historical Event Table. 3-49
Alarm Element 3-50
Alarm History Table 3-51
Active Alarm List 3-51
Alarm Frequency Table 3-52
Alarm Moving Sign 3-52
Graphic Element. 3-53
Line 3-53
Rectangle 3-53
Circle 3-54
Polygon 3-55
Arc 3-56
Text 3-57
Scale 3-58
Table 3-60
Keypad Element 3-61

CHAPTER 4 — MACRO FUNCTION

Macro Types 4-2
Macro Editing 4-3
Edit. 4-4
Command 4-5
Keypad Entry 4-5
Macro Operation 4-6
Definition. 4-6
Arithmetic Operation 4-6
+, FADD 4-7
-, FSUB 4-8
*, FMUL. 4-9
/, FDIV 4-10
Get Remainder 4-11
ADDSUMW. 4-12
Logical Operation. 4-12
| Operand 4-13
&& Operand 4-13
^ Operand 4-14
<< Operand 4-15
>> Operand 4-15
Data Transfer 4-15
BMOV 4-16

FILL 4-16
CHR. 4-17
Transfer Floating Point Data 4-17
Data Conversion 4-17
BCD. 4-18
BIN 4-18
B2W 4-19
W2B 4-19
SWAP 4-19
MAX 4-20
MIN. 4-20
A2H. 4-20
H2A. 4-21
FCNV 4-21
ICNV 4-21
Comparison 4-22
GOTO 4-24
CALL..RET 4-25
FOR...NEXT 4-26
END 4-26
Bit Setting 4-27
SETB. 4-27
CLRB. 4-27
INVB 4-28
GETB 4-28
Communication. 4-29
INITCOM 4-29
ADDSUM 4-31
XORSUM 4-32
PUTCHARS 4-32
GETCHARS 4-33
SELECTCOM 4-33
CLEARCOMBUFFER 4-34
CHRCHKSUM. 4-35
Others 4-37
TIMETICK 4-37
GETLASTERROR 4-38
COMMENT. 4-38
Delay 4-39
GETSYSTEMTIME 4-39
SETSYSTEMTIME 4-40
GETHISTORY 4-40
Error Messages 4-41
Error Messages When Editing 4-41
HM*i* Macro Error Messages 4-42
HM*i* Communication Error Messages. 4-42

CHAPTER 5 — CONTROL BLOCK AND STATUS BLOCK

Control Block Designations 5-2
Screen Number Register 5-2
Control Flag Register 5-2
Chart Control Register 5-4

Sampling History Buffer Register . . . 5-5
Clearing History Buffer Register . . . 5-6
Recipe Control Register . . . 5-7
Recipe Designation Register . . . 5-8
System Control Flags . . . 5-8
Status Block . . . 5-10
Status Block Designations . . . 5-10
General Control Status Register . . . 5-10
Screen Number Register . . . 5-11
Chart Status Register . . . 5-11
Sampling History Buffer Status Register . . . 5-12
Cleaning History Buffer Status Register . . . 5-12
Recipe Status Register . . . 5-13
Recipe Number Status Register . . . 5-13
General Control Status Register . . . 5-14

CHAPTER 6 — INTERNAL MEMORY

Internal Register (R/W): $ . . . 6-1
Non-Volatile Internal Register (R/W): $M . . . 6-1
Indirect Address Register (R/W): *$ . . . 6-1
Recipe Number Register (R/W): RCPNO . . . 6-2
Recipe Register (R/W): RCP . . . 6-2
Group Address Access: . . . 6-2
Absolute Address Access: . . . 6-2

APPENDIX A — SPECIFICATIONS

Dimensions and Communication Ports . . . A-2
HMI04xx . . . A-2
HMI06xx . . . A-4
HMI08CE . . . A-6
HMI10CE . . . A-8

APPENDIX B — COMMUNICATION

Pin Definition of Serial Communication . . . B-1
HMI04 COM1 and COM3 . . . B-1
HMI04 COM2 . . . B-1
HMI06, HMI08 and HMI10 COM1 . . . B-1
HMI06, HMI08 and HMI10 COM2 and COM3 . . . B-2
Cable for Download . . . B-3
Communication Settings and Connections between HMi and
Connectable Controllers . . . B-4
Eaton ELC . . . B-6
Allen-Bradley MicroLogix PLC . . . B-8
Allen-Bradley SLC5 PLC . . . B-11
Danfoss VLT 2800 (FC Protocol) . . . B-14
Delta (Servo/AC Drive/PLC/Temperature) Controller (DELTA) and Drive . . . B-17
Facon FB Series PLC . . . B-21
Festo PLC . . . B-23
GE Fanuc 90 Series SNP PLC . . . B-24
HUST CNC Controller . . . B-26
Jetter Nano Series PLC . . . B-27
Jetter JC Series PLC . . . B-29

Keyence KV/KZ Series B-30
Koyo SU/DL Series B-32
Koyo K-Sequence B-33
Lenze LECOM-A/B Protocol B-35
LG Master K120S/200S B-39
LG Glofa GM6 CNET B-40
LG Master-K CNET B-42
LIYAN Electric Ex B-44
M2i Master B-45
M2i Slave B-46
Matsushita FP PLC B-47
Mirle FAMA SC B-49
Mitsubishi FX/FX2N PLC B-50
Mitsubishi A Series AJ71UC24 Communication Module B-52
Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1) CPU Port B-54
Mitsubishi Q Series CPU Port B-57
MKS CT150 . . . . . B-59
Modbus (Master) — 984 RTU / ASCII mode B-60
Modbus Hexadecimal Address (Master) — RTU / ASCII mode B-61
Modbus nW (Master) — RTU / ASCII Mode B-62
Modbus (Slave) — 984 RTU / ASCII mode B-63
Modicon TSX Micro (Uni-Telway) B-66
Modicon TWIDO B-67
NIKKI DENSO NCS-FI/FS Series B-68
Omron C Series PLC B-70
Omron CJ1/CS1 Series PLC B-71
Siemens S7 200 PLC B-73
Siemens S7 300 PLC (with PC Adapter) B-75
Siemens S7 300 PLC (without PC Adapter) B-78
Taian TP02 PLC B-80
Vigor M Series B-82
Yokogawa ACE PLC B-84

List of Figures

Figure 2-1: Starting **HMi** from the Windows Taskbar 2-1
Figure 2-2: Creating a New Application 2-1
Figure 2-3: New Application Screen of **HMi** 2-2
Figure 2-4: Menu Bar 2-3
Figure 2-5: Standard Toolbar 2-3
Figure 2-6: Zoom Toolbar 2-3
Figure 2-7: Text Format Toolbar 2-3
Figure 2-8: Bitmap Toolbar 2-3
Figure 2-9: Element Toolbar 2-3
Figure 2-10: Build Toolbar 2-3
Figure 2-11: Layout Toolbar 2-3
Figure 2-12: Property Table 2-4
Figure 2-13: Editing Screen Preview 2-4
Figure 2-14: Output Window 2-5
Figure 2-15: File Menu Toolbar 2-5
Figure 2-16: Edit Menu Toolbar 2-7
Figure 2-17: Find Options 2-8
Figure 2-18: View Menu Toolbar 2-12
Figure 2-19: Element Menu Toolbar 2-19
Figure 2-20: Screen Menu Toolbar 2-22
Figure 2-21: Tools Menu 2-25
Figure 2-22: Creating a Button Element 2-25
Figure 2-23: Compiling Errors During Compiling Process 2-26
Figure 2-24: Options Menu 2-28
Figure 2-25: Input Starting Address Dialog Box 2-30
Figure 2-26: Length Input Error Message 2-30
Figure 2-27: Group Input Error Message 2-31
Figure 2-28: Input Error Message 2-31
Figure 2-29: Clear Recipe Setup 2-33
Figure 2-30: Error and Warning Message Dialog Box 2-33
Figure 2-31: Print Tab in Configuration Option 2-41
Figure 2-32: Create New Application Screen 2-46
Figure 2-33: Configuration Settings Screen 2-46
Figure 2-34: Multi-Language Configuration 2-47
Figure 2-35: Set Alarm in Different Languages 2-47
Figure 2-36: Input Macro Command 2-48
Figure 2-37: Set "Before Execute Macro 2-49
Figure 2-38: Select Printer 2-56
Figure 2-39: Print Configuration Setup 2-56
Figure 2-40: Screen Properties Screen 2-57
Figure 2-41: Historical Trend Graph and X-Y Chart 2-58
Figure 2-42: Print Successive Data Function Enabled 2-58
Figure 2-43: Screen Print Setup 2-59
Figure 2-44: Report List Selection 2-59
Figure 2-45: Select Print Device 2-60
Figure 2-46: Set the Hard Copy Region 2-61
Figure 3-1: Shortcut Menu Display 3-1
Figure 3-2: Selecting an Element Command from the Menu Bar 3-2
Figure 3-3: Selecting an Element Icon from the Toolbar 3-2

List of Figures, Continued

Figure 3-4: Example of Historical Trend Graph Element . . . 3-46
Figure 3-5: Example of Historical Data Table Element . . . 3-48
Figure 3-6: Historical Event Table . . . 3-50
Figure 4-1: Sub-Macro Screen . . . 4-1
Figure 4-2: Sub-Macros . . . 4-1
Figure 4-3: Start Editing Macro . . . 4-3
Figure 4-4: Toolbar . . . 4-3
Figure 4-5: Macro Command Editing Window . . . 4-4
Figure 4-6: Call a Sub-Macro Program . . . 4-25
Figure 4-7: INITCOM . . . 4-29
Figure 4-8: Variable2 Settings in INITCOM (Communication Protocol) . . . 4-30
Figure 4-9: COM Port . . . 4-30
Figure 4-10: Communication Interface . . . 4-30
Figure 4-11: Data Bit . . . 4-30
Figure 4-12: Parity Bit . . . 4-30
Figure 4-13: Stop Bit . . . 4-30
Figure 4-14: Baud Rate . . . 4-30
Figure 4-15: Flow Control . . . 4-31
Figure 4-16: ADDSUM . . . 4-31
Figure 4-17: XORSUM . . . 4-32
Figure 4-18: PUTCHARS . . . 4-32
Figure 4-19: GETCHARS . . . 4-33
Figure 4-20: SELECTCOM . . . 4-33
Figure 4-21: CLEARCOMBUFFER . . . 4-34
Figure 4-22: CHRCHKSUM . . . 4-35
Figure 4-23: Initial Macro . . . 4-36
Figure 4-24: Communication to ELC Sub-Macro . . . 4-36
Figure 4-25: TIMETICK . . . 4-37
Figure 4-26: GETLASTERROR . . . 4-38
Figure 4-27: COMMENT . . . 4-38
Figure 4-28: Delay . . . 4-39
Figure 4-29: Example of an **HMi** Communication Error Message . . . 4-42
Figure 5-1: Standard Tab . . . 5-1
Figure 5-2: Curve Detail . . . 5-4
Figure 5-3: History Setup . . . 5-5
Figure 5-4: Recipe Setup . . . 5-7
Figure 5-5: System Control Flags . . . 5-8
Figure A-1: HMI04xx Communication Ports . . . A-2
Figure A-2: HMI04xx Cutout Dimensions . . . A-3
Figure A-3: HMI06xx Communication Ports . . . A-4
Figure A-4: HMI06xx Cutout Dimensions . . . A-5
Figure A-5: HMI08CE Communication Ports . . . A-6
Figure A-6: HMI08CE Cutout Dimensions . . . A-7
Figure A-7: HMI10CE Dimensions . . . A-8
Figure A-8: HMI10CE Cutout Dimensions . . . A-9
Figure B-1: 9-Pin D-SUB Male . . . B-3
Figure B-2: RS232 Connection Pinout . . . B-3
Figure B-3: D-SUB 9-Pin to HMi series (Male) to D-SUB 9-pin to PC (Female) . . . B-3
Figure B-4: RS-232 to PC — Grounding and Shielding . . . B-3

List of Figures, Continued

Figure B-5: USB Type B to USB Type A B-4
Figure B-6: USB to PC. B-4
Figure B-7: 9-Pin D-SUB Male Connector B-4
Figure B-8: Eaton MVX9000 Drive RS-485 Connection B-7
Figure B-9: Delta Servo RS-232 Connection B-8
Figure B-10: Allen-Bradley MicroLogix PLC Connections B-10
Figure B-11: Allen-Bradley SLC5 PLC Connector Pinouts B-13
Figure B-12: Danfoss VLT 2800 (FC Protocol) Connector Pinouts. B-15
Figure B-13: Reading a Parameter Communication Address B-19
Figure B-14: Reading a Parameter Communication Address B-19
Figure B-15: Delta Servo RS-232 Connection B-19
Figure B-16: Delta RS-422 Connection B-20
Figure B-17: Delta Servo Controller RS-232 Connection B-20
Figure B-18: Delta Servo Controller RS-485 Connection B-20
Figure B-19: Facon FB Series PLC RS-232 Connections B-21
Figure B-20: Facon FBs Series Port 1 . . . . B-22
Figure B-21: Facon FBs Series Port 0 . . . . B-22
Figure B-22: GE Fanuc 90 Series SNP PLC Connector Pinouts B-25
Figure B-23: HUST CNC Controller Connector Pinouts B-26
Figure B-24: Jetter Nano Series PLC Connector Pinout. B-28
Figure B-25: Jetter JC Series PLC Connector Pinout B-29
Figure B-26: KV Series RS-232 Connections. B-31
Figure B-27: KZ Series RS-232 Connections. B-31
Figure B-28: Koyo SU/DL Series Connector Pinouts B-32
Figure B-29: Koyo K-Sequence Port 0 Communication Cable - RJ-11 . . . . B-34
Figure B-30: Koyo K-Sequence Port 0 Communication Cable - RS-232 . . . . B-34
Figure B-31: Koyo K-Sequence Port 1 Communication Cable - RS-485 . . . . B-34
Figure B-32: Lenze LECOM-A/B Protocol RS-232 Connections B-38
Figure B-33: Lenze LECOM-A/B Protocol RS-485 Connections B-38
Figure B-34: G Master K120S/200S RS-232 Connector Pinouts B-39
Figure B-35: LG Glofa GM6 CNET RS-232 Connector Pinouts B-40
Figure B-36: LG Glofa GM6 CNET RS-422 Connections B-41
Figure B-37: LG Master-K CNET Contacts RS-422 Connections B-43
Figure B-38: LG Master-K CNET Contacts RS-232 Connector Pinouts B-43
Figure B-39: LIYAN Electric EX RS-232 Connector Pinout. B-44
Figure B-40: M2i Communication Address and HMi Internal Registers. B-46
Figure B-41: Matsushita FP PLC RS-232 FP0 Connector Pinout B-48
Figure B-42: Matsushita FP PLC RS-232 FP1 Connector Pinout B-48
Figure B-43: Mirle FAMA SC RS-232 Connector Pinout. B-49
Figure B-44: Mitsubishi FX/FX2N PLC RS-422 Mini DIN Male Connector Pinout B-51
Figure B-45: Mitsubishi FX/FX2N PLC RS-422 D-SUB Connector Pinout. B-51
Figure B-46: Mitsubishi A Series AJ71UC24 RS-422 Connector Pinout. B-53
Figure B-47: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1)
CPU Port RS-422 Connector Pinout. B-56
Figure B-48: Mitsubishi Q Series CPU Port Registers RS-232 Connector Pinout B-58
Figure B-49: MKS CT150 RS-232 Connector Pinout. B-59
Figure B-50: Modbus (Slave) — 984 RTU / ASCII Mode Modbus Address B-63
Figure B-51: Modicon TSX Micro (Uni-Telway) RS-485 Connector Pinout B-66
Figure B-52: NIKKI DENSO NCS-FI/FS Series RS-422 Connector Pinout B-69

List of Figures, Continued

Figure B-53: 1:1 Omron C Series PLC Host Link via RS-232C Converter B-70
Figure B-54: Omron CJ1/CS1 Series PLC CJ1M CPU Module. B-72
Figure B-55: Siemens S7 200 PLC via RS-232 / PPI Multi-Master Cable. B-74
Figure B-56: Siemens S7 200 PLC via PLC Program Port (RS-485). B-74
Figure B-57: Network Communication Structure B-75
Figure B-58: Siemens S7 300 PLC (with PC Adapter) RS-232 Connector Pinout B-77
Figure B-59: Siemens S7 300 PLC (without PC Adapter) RS-485
Connector Pinout via PLC MPI Port B-79
Figure B-60: Taian TP02 PLC RS-422 Connector Pinout B-81
Figure B-61: Taian TP02 PLC RS-485 Connection. B-81
Figure B-62: Vigor M Series RS-232 Programmer Port B-83
Figure B-63: Vigor M Series RS-232 Com Port B-83
Figure B-64: Yokogawa ACE PLC RS-232 Connector Pinout B-85

List of Tables

Table 2-1: File Menu . . . 2-5
Table 2-2: Edit Menu. . . . 2-7
Table 2-3: View Menu . . . 2-12
Table 2-4: Element Menu . . . 2-19
Table 2-5: Screen Menu . . . 2-22
Table 2-6: Tools Menu . . . 2-25
Table 2-7: Options Menu . . . 2-28
Table 2-8: Configuration Options . . . 2-35
Table 2-9: Other Tab in Configuration Option . . . 2-43
Table 2-10: Alarm Setup . . . 2-50
Table 2-11: History . . . 2-53
Table 2-12: Tag Table . . . 2-54
Table 2-13: Picture Bank Browse . . . 2-62
Table 2-14: Text Bank . . . 2-64
Table 2-15: Environment Dialog . . . 2-65
Table 2-16: Menu Bar and Toolbar (Window) . . . 2-67
Table 3-1: Button Elements . . . 3-3
Table 3-2: Property Description of General Buttons . . . 3-4
Table 3-3: Property Description of Multistate Buttons . . . 3-6
Table 3-4: Property Description of Set Value Buttons . . . 3-7
Table 3-5: Property Description of Set Constant Buttons . . . 3-8
Table 3-6: Property Description of Increment / Decrement Buttons . . . 3-9
Table 3-7: Property Description of Goto Screen / Previous Page (Previous View) Buttons . . . 3-10
Table 3-8: System Function Buttons . . . 3-11
Table 3-9: Property Description of System Function Buttons . . . 3-11
Table 3-10: Property Description of Meter Element . . . 3-13
Table 3-11: Property Description of Normal Bar Element . . . 3-14
Table 3-12: Property Description of Deviation Bar Element . . . 3-16
Table 3-13: Property Description of Pipe (1) / Pipe (2) Element . . . 3-17
Table 3-14: Property Description of Pipe (3) Element . . . 3-18
Table 3-15: Property Description of Pipe (4) Element . . . 3-18
Table 3-16: Property Description of Pipe (5) Element . . . 3-19
Table 3-17: Property Description of Pipe (6) / Pipe (7) Element . . . 3-19
Table 3-18: Property Description of Pie Element . . . 3-20
Table 3-19: Property Description of Multistate Indicator Element . . . 3-21
Table 3-20: Property Description of Range Indicator Element . . . 3-21
Table 3-21: Property Description of Simple Indicator Element . . . 3-23
Table 3-22: Function of Data Display Elements . . . 3-23
Table 3-23: Property Description of Numeric Display Element . . . 3-24
Table 3-24: Property Description of Character Display Element . . . 3-25
Table 3-25: Property Description of Data Display Element . . . 3-25
Table 3-26: Property Description of Time Display Element . . . 3-25
Table 3-27: Property Description of Day-of-Week Display Element . . . 3-25
Table 3-28: Property Description of Prestored Message Element . . . 3-26
Table 3-29: Property Description of Moving Sign Element . . . 3-26
Table 3-30: Function of Graph Display Elements . . . 3-27
Table 3-31: Property Description of Static Graphic Element . . . 3-27
Table 3-32: Property Description of Animated Graphic Element . . . 3-29

List of Tables, Continued

Table 3-33: Property Description of Dynamic Line Element 3-30
Table 3-34: Property Description of Dynamic Rectangle Element. 3-31
Table 3-35: Property Description of Dynamic Ellipse Element 3-32
Table 3-36: Function of Input Elements. 3-33
Table 3-37: Property Description of Numeric Entry Element. 3-34
Table 3-38: Property Description of Character Entry Element. 3-36
Table 3-39: Function of Curve Elements 3-36
Table 3-40: Property Description of Trend Graph Element 3-37
Table 3-41: Property Description of X-Y Chart Element. 3-39
Table 3-42: History Setup Dialog Box 3-41
Table 3-43: Property Description of Historical Trend Graph Element 3-44
Table 3-44: Property Description of Historical Data Table Element. 3-47
Table 3-45: Property Description of Historical Event Table Element. 3-49
Table 3-46: Example of Historical Event Table Element. 3-49
Table 3-47: Function of Alarm Elements 3-50
Table 3-48: Property Description of Alarm History Table Element 3-51
Table 3-49: Property Description of Active Alarm List Element 3-51
Table 3-50: Property Description of Alarm Frequency Table Element 3-52
Table 3-51: Property Description of Alarm Moving Sign Element 3-52
Table 3-52: Property Description of Line Graphic Element 3-53
Table 3-53: Property Description of Rectangle Graphic Element 3-53
Table 3-54: Property Description of Circle Graphic Element 3-54
Table 3-55: Property Description of Polygon Graphic Element. 3-55
Table 3-56: Property Description of Arc Graphic Element. 3-56
Table 3-57: Property Description of Text Graphic Element 3-57
Table 3-58: Property Description of Scale Graphic Element 3-58
Table 3-59: Property Description of Table Graphic Element 3-60
Table 3-60: Property Description of Keypad Element. 3-61
Table 3-61: Property Description of Keypad Element. 3-64
Table 4-1: Macro Command Table 4-2
Table 4-2: Macro Definition 4-6
Table 4-3: Arithmetic Command 4-6
Table 4-4: Logical Operation Command 4-12
Table 4-5: Data Transfer Command 4-15
Table 4-6: Data Conversion Command 4-17
Table 4-7: Comparison Command. 4-22
Table 4-8: Bit Setting Command 4-27
Table 4-9: Communication Command. 4-29
Table 5-1: Control Block Designations 5-2
Table 5-2: Designating Screen Number Register (SNIR) - Word 0 5-2
Table 5-3: Control Flag Register (CFR) - Word 1 5-2
Table 5-4: Chart Control Register (CUCR) - Word 2 5-4
Table 5-5: Register for Sampling History Buffer (HBSR) - Control Word 3 5-5
Table 5-6: Register for Clearing History Buffer (HBCR) - Control Word 4 5-6
Table 5-7: Recipe Control Register (RECR) - Control Word 5 5-7
Table 5-8: Register for Designating Recipe Group Number (RBIR) - Control Word 6. . . 5-8
Table 5-9: Internal Memory for Recipe Control 5-8
Table 5-10: System Control Flag Register (SCFR) - Control Word 7 5-9
Table 5-11: Status Block Registers 5-10

List of Tables, Continued

Table 5-12: Status Register for General Control (GCSR) - Status Word 0 5-10
Table 5-13: Status Register for Screen Number (SNSR) - Status Word 1 5-11
Table 5-14: Status Register of Curve Control (CCSR) - Status Word 2 5-11
Table 5-15: Status Register for Sampling History Buffer (HSSR) - Status Word 3 5-12
Table 5-16: Status Register for Clearing History Buffer (HCSR) - Status Word 4 5-12
Table 5-17: Recipe Status Register (RESR) - Status Word 5 5-13
Table 5-18: Status Register for Recipe Number (RBSR) - Status Word 6 5-13
Table 5-19: Status Register 2 for General Control (GCSR2) - Status Word 7 5-14
Table A-1: Model Specifications A-1
Table A-2: COM1 and COM3 Ports A-2
Table A-3: COM2 Port A-3
Table A-4: COM2 and COM3 Ports A-4
Table A-5: COM1 Port A-5
Table A-6: COM2 and COM3 Ports A-6
Table A-7: COM1 Port A-7
Table A-8: COM2 and COM3 Ports A-8
Table A-9: COM1 Port A-9
Table B-1: HMI04 COM1 and COM3 Pinout B-1
Table B-2: HMI04 COM2 Pinout B-1
Table B-3: HMI06, HMI08 and HMI10 COM1 Pinout B-1
Table B-4: HMI06, HMI08 and HMI10 COM2 and COM3 Pinout B-2
Table B-5: Communication Settings and Connections B-4
Table B-6: Eaton ELC Registers B-6
Table B-7: Eaton ELC Contacts B-6
Table B-8: Allen-Bradley MicroLogix PLC Registers B-8
Table B-9: Allen-Bradley MicroLogix PLC Contacts B-9
Table B-10: Allen-Bradley SLC5 PLC Registers B-11
Table B-11: Allen-Bradley SLC5 PLC Contacts B-12
Table B-12: Danfoss VLT 2800 (FC Protocol) Registers B-14
Table B-13: Danfoss VLT 2800 (FC Protocol) Contacts B-14
Table B-14: Delta (Servo/AC Drive/PLC/Temperature) Controller Registers B-17
Table B-15: Delta (Servo/AC Drive/PLC/Temperature) Controller Contacts B-18
Table B-16: Facon FB Series PLC Registers B-21
Table B-17: Facon FB Series PLC Contacts B-21
Table B-18: Festo PLC Registers B-23
Table B-19: Festo PLC Contacts B-23
Table B-20: GE Fanuc 90 Series SNP PLC Registers B-24
Table B-21: GE Fanuc 90 Series SNP PLC Contacts B-24
Table B-22: HUST CNC Controller Registers B-26
Table B-23: HUST CNC Controller Contacts B-26
Table B-24: Jetter Nano Series PLC Contacts B-28
Table B-25: Jetter JC Series PLC Registers B-29
Table B-26: Jetter JC Series PLC Contacts B-29
Table B-27: Keyence KV/KZ Series Registers B-30
Table B-28: Keyence KV/KZ Series Contacts B-30
Table B-29: Koyo SU/DL Series Registers B-32
Table B-30: Koyo SU/DL Series Contacts B-32
Table B-31: Koyo K-Sequence Registers B-33
Table B-32: Koyo K-Sequence Contacts B-33

List of Tables, Continued

Table B-33: The corresponding registers of CCM2 and K-Sequence B-34
Table B-34: Lenze LECOM-A/B Protocol Read/Write Address B-35
Table B-35: Lenze LECOM-A/B Protocol Contacts B-36
Table B-36: LG Master K120S/200S Registers. B-39
Table B-37: LG Master K120S/200S Contacts B-39
Table B-38: LG Glofa GM6 CNET Registers. B-40
Table B-39: LG Glofa GM6 CNET Contacts B-40
Table B-40: LG Master-K CNET Registers B-42
Table B-41: LG Master-K CNET Contacts B-42
Table B-42: LIYAN Electric EX Registers B-44
Table B-43: LIYAN Electric EX Contacts. B-44
Table B-44: M2i Master Registers B-45
Table B-45: Contacts B-45
Table B-46: M2i Slave Registers. B-46
Table B-47: M2i Slave Contacts B-46
Table B-48: Matsushita FP PLC Registers B-47
Table B-49: Matsushita FP PLC Contacts. B-47
Table B-50: Mirle FAMA SC Registers B-49
Table B-51: Mirle FAMA SC Contacts B-49
Table B-52: Mitsubishi FX/FX2N PLC Registers B-50
Table B-53: Mitsubishi FX/FX2N PLC Contacts. B-50
Table B-54: Mitsubishi A Series AJ71UC24 Registers B-52
Table B-55: Mitsubishi A Series AJ71UC24 Contacts. B-52
Table B-56: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1)
CPU Port Registers B-55
Table B-57: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1)
CPU Port Contacts. B-55
Table B-58: Mitsubishi Q Series CPU Port Registers B-57
Table B-59: Mitsubishi Q Series CPU Port Registers Contacts B-58
Table B-60: MKS CT150 Registers B-59
Table B-61: MKS CT150 Contacts. B-59
Table B-62: Modbus (Master) — 984 RTU / ASCII mode Registers B-60
Table B-63: Modbus (Master) — 984 RTU / ASCII mode Contacts B-60
Table B-64: Modbus Hexadecimal Address (Master) — RTU / ASCII Mode Registers . . B-61
Table B-65: Modbus Hexadecimal Address (Master) — RTU / ASCII Mode Contacts . . . B-61
Table B-66: Modbus nW (Master) — RTU / ASCII Mode Registers B-62
Table B-67: Modbus nW (Master) — RTU / ASCII Mode Contacts B-62
Table B-68: Modbus (Slave) — 984 RTU / ASCII Mode Registers B-63
Table B-69: Contacts B-63
Table B-70: Inter Memory Cross-Reference Table B-64
Table B-71: Modicon TSX Micro (Uni-Telway) Registers B-66
Table B-72: Modicon TSX Micro (Uni-Telway) Contacts B-66
Table B-73: NIKKI DENSO NCS-FI/FS Series Registers B-68
Table B-74: NIKKI DENSO NCS-FI/FS Series Contacts B-69
Table B-75: Omron C Series PLC Registers. B-70
Table B-76: Omron C Series PLC Contacts B-70
Table B-77: Omron CJ1/CS1 Series PLC Registers. B-71
Table B-78: Omron CJ1/CS1 Series PLC Contacts B-72
Table B-79: Siemens S7 200 PLC Register B-73

List of Tables, Continued

Table B-80: Siemens S7 200 PLC Contacts B-73
Table B-81: Siemens S7 300 PLC (with PC Adapter) Register B-76
Table B-82: Siemens S7 300 PLC (with PC Adapter) Contacts. B-76
Table B-83: Siemens S7 300 PLC (without PC Adapter) Register B-78
Table B-84: Siemens S7 300 PLC (without PC Adapter) Contacts. B-79
Table B-85: Taian TP02 PLC Registers B-80
Table B-86: Taian TP02 PLC Contacts B-80
Table B-87: Vigor M Series Registers B-82
Table B-88: Vigor M Series Contacts B-82
Table B-89: Yokogawa ACE PLC Registers B-84
Table B-90: Yokogawa ACE PLC Contacts B-85

Chapter 1 — Introduction

HMi Series Human Machine Interface

HMi is manufactured by adopting high-speed hardware to provide a powerful and programmable interface. **HMi**soft software is a user-friendly program editor of **HMi** for Windows. Refer to the following section for an introduction to its features and functions. If you have any suggestions or comments on **HMi**soft software, please do not hesitate to contact us. We look forward to serving your needs and are willing to offer our best support and service to you.

Features

- PLC Serial Drivers Support

  HMi supports more than 20 brands of PLC, including Rockwell, Omron, Siemens, Mitsubishi, etc. All of the newly supported PLC communication protocols can be found on our website (http://www.EatonElectrical.com) for upgrades to meet your requirements. (All other trademarks in this manual are property of their respective companies.)

- Windows Fonts Support

  Simplified Chinese, traditional Chinese and English are supported. **HMi**soft software also provides all fonts used by Windows®.

- Quick Execution and Communication Macro

  HMisoft handles complicated calculations by executing macros. Additionally, users can create a custom protocol via the COM port.

- Rapid USB Upload/Download

  HMisoft shortens the upload/download time by using USB Ver1.1.

- Recipes

  HMi provides a useful recipe editor that is similar to Microsoft Excel. Multiple recipes can be edited simultaneously (size limit is 64K). If you need to download multiple recipes simultaneously, **HMi** can swap internal memory. After you finish editing the recipes, you can download the recipes individually.

- Support Multiple PLCs Connections

  Connect to multiple controllers using the **HMi**'s three communications ports.

  If a PC is connected to an **HMi**, then the **HMi** on-line simulation feature allows users to develop and debug software on a PC connected to **HMi** before downloading to **HMi**.

- Off-line Simulation

  The **HMi** off-line simulation feature allows users to develop and debug software on a stand-alone PC before downloading to **HMi**.

- Multiple Security Protection

  HMi provides passwords to protect the designer's intellectual property rights and also for users to set user priority for important components. Only the users whose priority is higher than the component can use the component.

- USB Host Port (USB Host) Equipped

  HMi has a built-in USB Host interface for the connection to USB disk, card reader and printer with a USB socket. You can save data, copy a program, print the screen immediately and increase the data storage space.

- Multi-language Support

  Eight available languages can be selected and used without installing a multi-lingual operating system. It is easy for the users to switch the desired language via **HMi** or the external controller. Furthermore, Unicode editing is supported, therefore, it is convenient for the user to create and edit more quickly.

Recommended System Requirements

- Intel® Pentium III, 500MHz or greater
- 256MB RAM
- Windows® 2000 & Windows® XP
- 100 MB free hard disk space
- RS232 port
- USB connection

Chapter 2 — Creating and Editing Screens

HM*i*soft Setup

This chapter introduces the general functions of the **HM*i***soft screen editor. Detailed information for each function is discussed in following chapters.

Getting Started

After setup, you can start **HM*i*** from Windows taskbar, click **Start > Programs > Eaton > HM*i***soft (**Figure 2-1**).

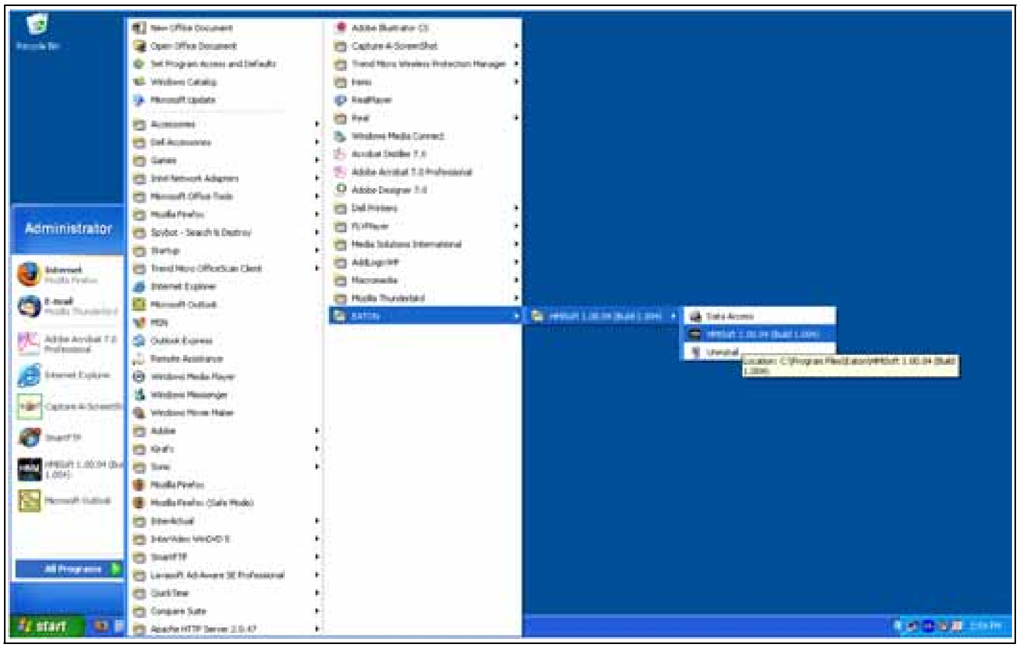


Figure 2-1: Starting HM*i* from the Windows Taskbar

After clicking  or selecting **File > New**, to create a new application, the new application box is displayed in **Figure 2-2**.

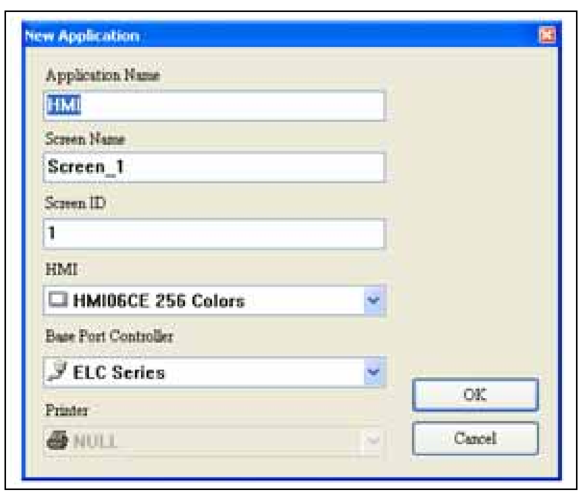


Figure 2-2: Creating a New Application

Enter the Application Name, Screen Name, Screen ID and select connected **HM*i***, controller or printer. Click OK. A new application screen is opened in **HM*i*** (**Figure 2-3**).

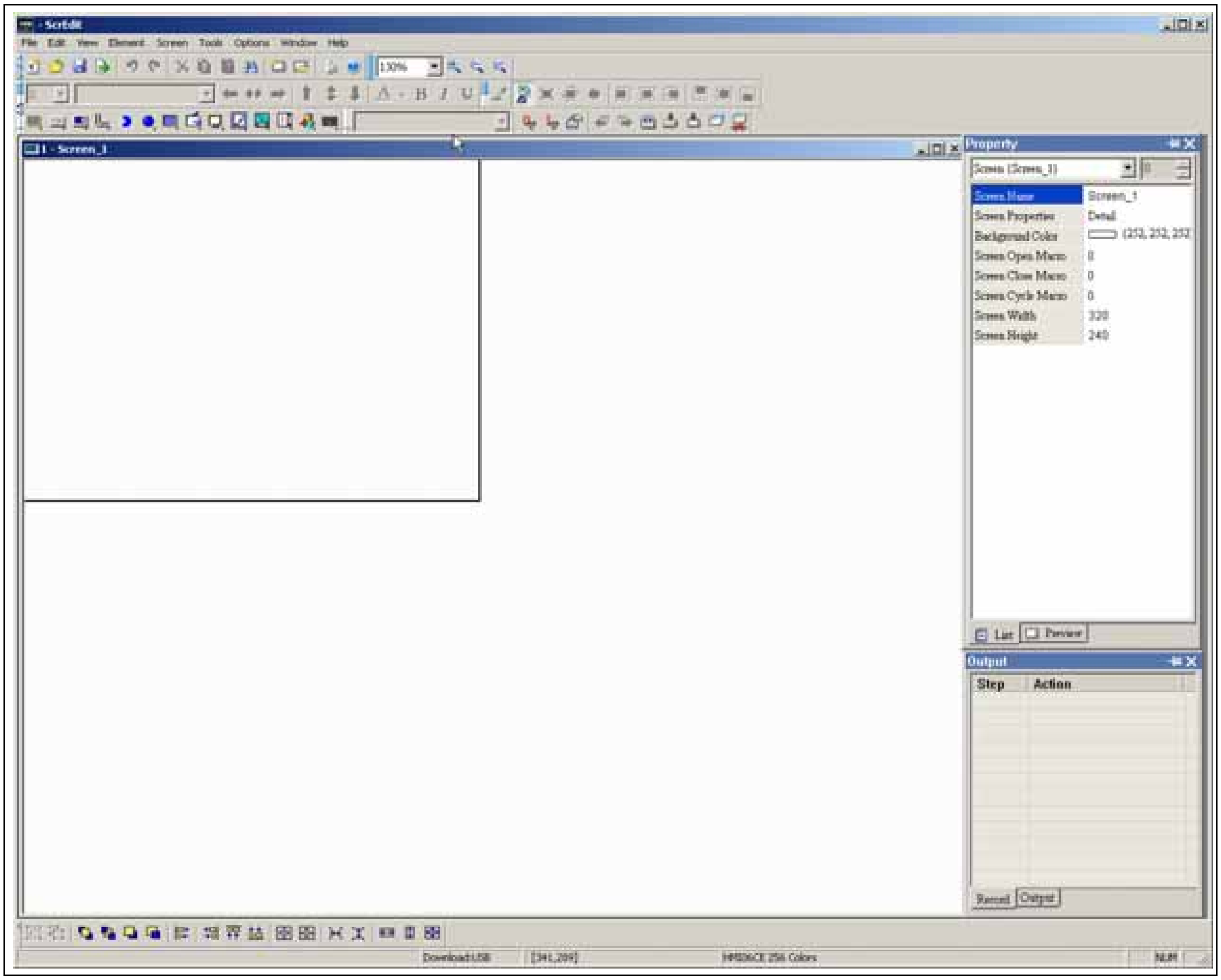


Figure 2-3: New Application Screen of HM*i*

There are five parts in the following **HMi** application window:

- Menu Bar
  There are nine functions for selection: File, Edit, View, Element, Screen, Tools, Options, Window and Help.

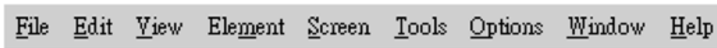


Figure 2-4: Menu Bar

- Toolbar
  The standard toolbar (**Figure 2-5**) is similar to the toolbar in Windows. For example, you can move the Toolbar to the left side of the screen. Also, you can arrange the toolbar position by how you use it. The following tool sets are on the toolbar in **HMi**.

Figure 2-5: Standard Toolbar

Figure 2-6: Zoom Toolbar

Figure 2-7: Text Format Toolbar

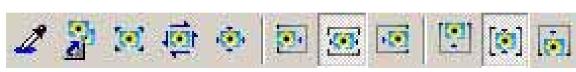


Figure 2-8: Bitmap Toolbar

Figure 2-9: Element Toolbar

Figure 2-10: Build Toolbar

Figure 2-11: Layout Toolbar

- Property Table

  The property table displays the property settings for each element placed on the screen. Right click on the screen to display all elements or click on Element on the menu bar to choose and place an element onto the screen. With the element highlighted, its properties will be displayed in the Property Table (**Figure 2-12**), ready for editing. Chapter 3 details how to use each of the elements in your design.

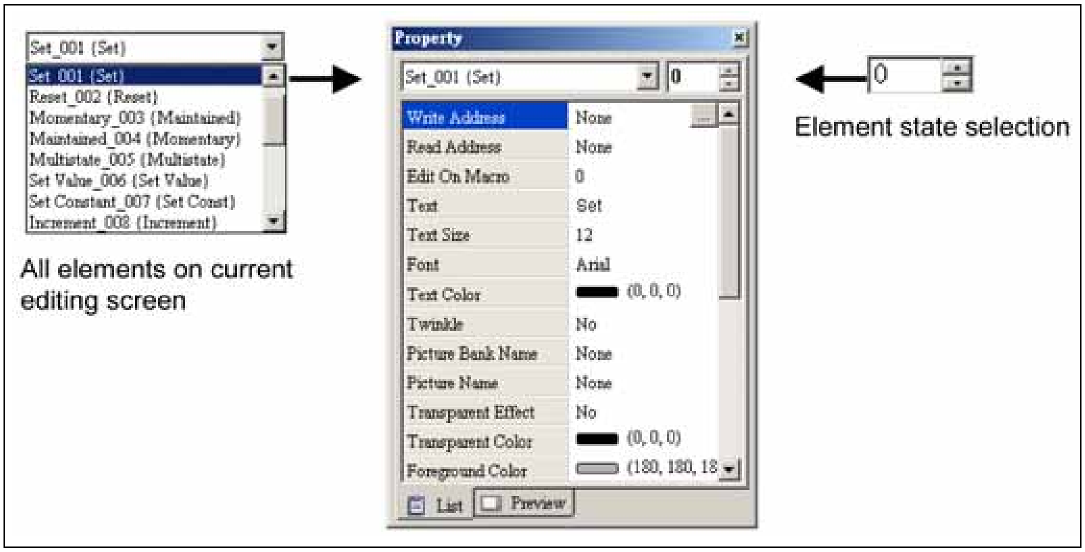


Figure 2-12: Property Table

Figure 2-13 shows the preview tab of the Property Table. This tab shoes each screen, allowing you to switch between them by double clicking on one.

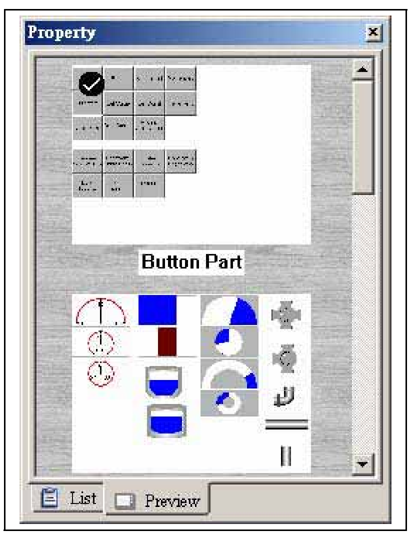


Figure 2-13: Editing Screen Preview

- Output Window

  The Output Window displays all the editing actions and output messages as your design is compiled. As **HMi** is compiling, program errors are automatically detected and an error message is displayed in the Output Window. To get to the error element window, click on the error message.

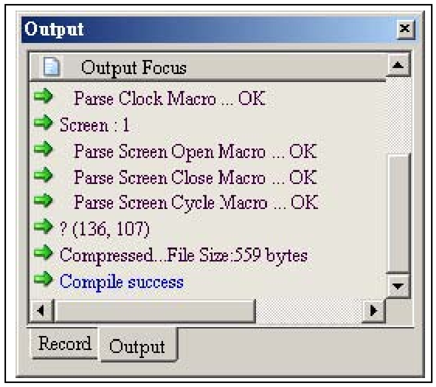


Figure 2-14: Output Window

Menu Bar and Toolbar (File)

HMi provides a convenient pull-down menu for the users to create, edit and manage elements, pictures, graphs, macro programs, recipes and displays. The pull-down menu options of the Menu bar are described as follows:

Figure 2-15: File Menu Toolbar

Table 2-1: File Menu

Icon	*Subject*	*Description*
	New	Open the current application by selecting **File > New**, or clicking , or pressing **Ctrl + N**.
	Open	Open the current application by selecting **File > Open**, or clicking , or pressing **Ctrl + O**.
	Close	Close the application by selecting **File > Close**. If the application file exists, the Saving dialog box opens to prompt you to save the file. If the application is new, you are prompted to save the file with the file extension .dop.
	Save	Save the current application with the file extension .dop by selecting **File > Save**, or clicking , or pressing **Ctrl + S**. If the application is new, you are prompted to save the file with the file extension .dop. If the application already exists, **HMi** will automatically save the application without displaying a dialog box.

Table 2-1: File Menu (continued)

Icon	***Subject***	***Description***
Save As...	Save As	Save the current application to another file name by selecting **File > Save As**. The Save As dialog box is displayed for you to enter the new file name.
Make SMC Screen Data ...	Make SMC Screen Data	Before using this command, compile the data on the editing screen. If you do not compile first, **HM*i*** cannot create the screen data and an error message is displayed. To create the screen data, select **File > Make SMC Screen Data** to copy the compiled application to the SMC card. If the SMC card is inserted in the **HM*i***, **HM*i*** starts up by reading the data on the SMC card.
Open SMC Screen Data ... Ctrl+I	Open SMC Screen Data	You can view and edit the screen data that is stored on the SMC card by using the SMC Screen Data function. To open the screen data file, select **File > Open SMC Screen Data**, or pressing **Ctrl + I**. A dialog box is displayed and you select the file you want to open.
Upload...	Upload	To upload screen data, select **File > Upload**. The password dialog box is displayed. You must enter a password to access the Save as Dialog box. Enter the name of the application to start the upload. When the progress goes to 100%, the upload is complete. To monitor the progress of the upload, access the progress box. To stop the upload, click the Stop button.
Upload Recipe...	Upload Recipe	To upload a recipe, select **File > Upload Recipe**. The password dialog box is displayed. You must enter a password to access the **HM*i***. Enter the name of the recipe to start the upload. When the progress goes to 100%, the upload is complete. To monitor the progress of the upload, access the progress box. To stop the upload, click the Stop button.
Update Firmware	Update Firmware	Use this option to upgrade **HM*i*** firmware or to add a function to **HM*i***.
Password Protect	Password Protect	To enable or disable the password protect option for an application or recipe, select **File > Password Protect**. If the current application or recipe is password protected, a symbol appears in front of the Password Protect command on the pull-down. You must enter a password before the .dop file can be opened. To set a password, select **Option > Workstation Setup**.
Print... Ctrl+P	Print	To print the current screen, select **File > Print**, or click the , or press **Ctrl + P**.
Print Preview	Print Preview	To preview the screen print before sending the image to the printer, select **File > Print Preview**.
Print Setup	Print Setup	To choose the printer and paper options, select **File > Print Setup**.
Exit	Exit	To close all open editing files, select **File > Exit**. If the file is has been changed and not saved, the Saving dialog box is displayed. To cancel the exit from **HM*i***, click the Cancel button.

Menu Bar and Toolbar (Edit)

Figure 2-16: Edit Menu Toolbar

Table 2-2: Edit Menu

Icon	***Subject***	***Description***
Undo Ctrl+Z	Undo	To undo the last action, select **Edit < Undo**, or click the , or press **Ctrl + Z**.
Redo Ctrl+Y	Redo	If you have selected the Undo command by mistake and what to recapture the last action, select **Edit > Redo**, or click the , or press **Ctrl + Y**.
Cut Ctrl+X	Cut	To delete a selected element and save it to the clipboard, select **Edit > Cut**, or click the , or press **Ctrl + X**.
Copy Ctrl+C	Copy	To copy a selected element to the clipboard, select **Edit > Copy**, or click the , or press **Ctrl + C**.
Paste Ctrl+V	Paste	To paste an element from the clipboard, select **Edit > Paste**, or click the , or press **Ctrl + V**.
Delete Del	Delete	To delete a selected element, select **Edit > Delete**, or press the **Del** key.
Select All Ctrl+A	Select All	To select all elements to remove everything, select **Edit > Select All**, or press **Ctrl + A**. When you use Select All, the element in the upper left corner will be filled with a blue and white border as a base element. Additional elements will be filled with a white and black border. The base element is used to align or resize.
Find Ctrl+F	Find Content	To find content that matches the find criteria, select **Edit > Find**, or click the , or press **Ctrl + F**. You can find element text, read address, write address or memory address on the current screen or all screens. Once the content is located, the found content is displayed in the output window. To go to actual location of the found content, click in the output window and **HMi** moves to the location of the found content.

Table 2-2: Edit Menu (continued)

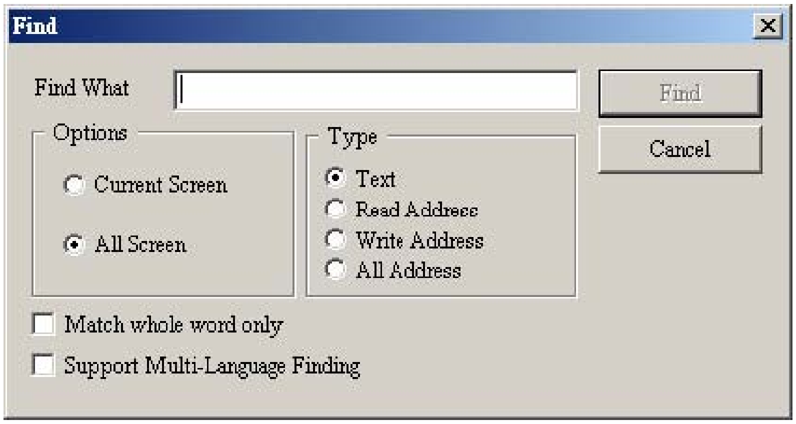
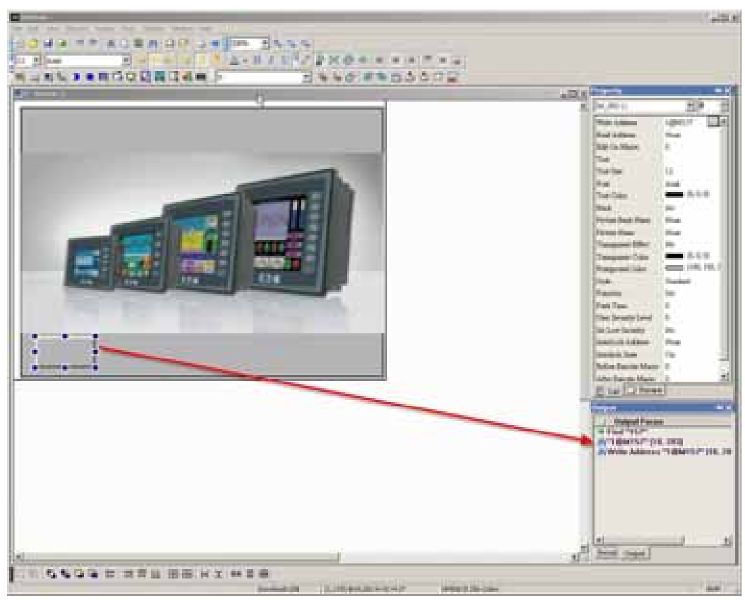
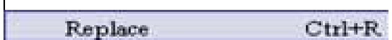
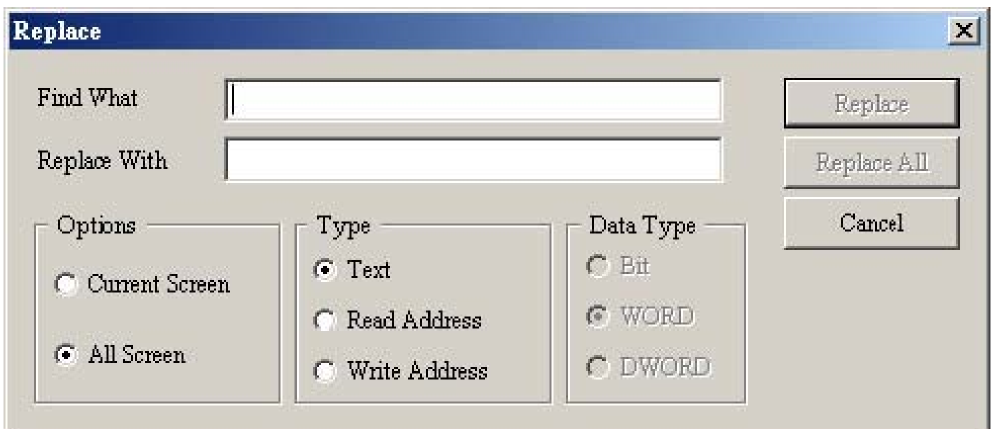
Icon	***Subject***	***Description***
		
Find What	Enter the word or phrase that you want to find.	
Options	Current Screen	If you select the Current Screen button, **HM*i*** only searches the current screen for the data entered into the Find What field. The Output Window display all matching words or phrases. If you double-click the word or phrase, **HM*i*** automatically takes you to the file where the word or phrase resides. See **Figure 2-17**.  **Figure 2-17: Find Options**
	All Screen	If you select the All Screen button, **HM*i*** searches all the screens for the data into the Find What field. The Output Window display all matching words or phrases. If you double-click the word or phrase, **HM*i*** automatically takes you to the file where the word or phrase resides.

Table 2-2: Edit Menu (continued)

Icon	***Subject***	***Description***
Type	Text	To specify the data type as Text, click the Text button.
	Read Address	To specify the data type as Read Address, click the Read Address button.
	Write Address	To specify the data type as Write Address, click the Write Address button.
	All Address	To specify the search to look for all data types, click the All Address button.
Match whole word only	To specify that the search look for an exact match to the data entered into the Find What field, click the Match Whole Word Only box.	
Support Multi-Language Finding	To specify that the search look at all multi-language words to match the data entered into the Find What field, click the Support Multi-Language Finding box.	
	Replace	To replace the content that matches the replace criteria, select **Edit > Replace** or press **Ctrl + R**. You can replace element text, read address, write address or memory address on the current screen or all screens.

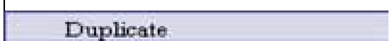
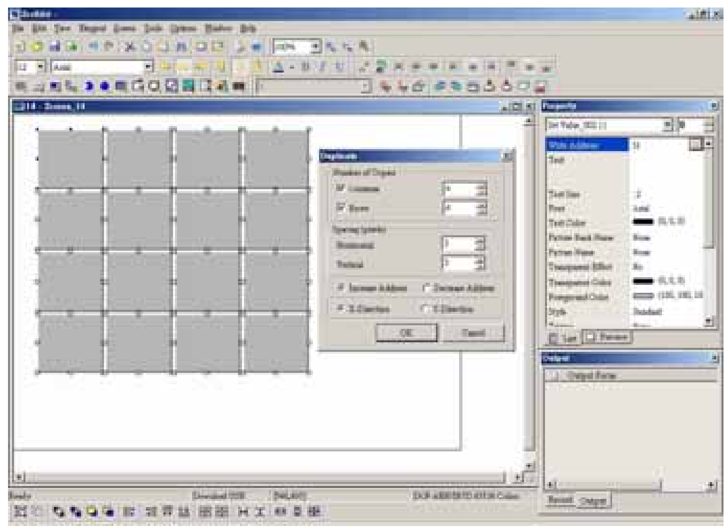


Find What	Enter the word or phrase that you want to replace.	
Replace With	Enter the word or phrase that you want to substitute for the word or phrase entered in the Find What field.	
Options	Current Screen	If you select the Current Screen button, **HM*i*** only searches the current screen for the data that is to be replaced.
	All Screen	If you select the All Screen button, **HM*i*** searches all the screens for the data that is to be replaced.
Type	Text	To specify the data type as Text, click the Text button.
	Read Address	To specify the data type as Read Address, click the Read Address button.
	Write Address	To specify the data type as Write Address, click the Write Address button.
Data Type	Word DWord	If the Read Address button or Write Address button are selected, you need to select if the replacing content is Bit, Word, or Double Word.
Replace Replace All	If you are only replacing a single instance of the data and you have specified your selections on the Replace Dialog box, click the Replace button. If you want to replace all instances of the specified data automatically, click the Replace All button.	

Table 2-2: Edit Menu (continued)

Icon	***Subject***	***Description***
Group	Group	To group two or more elements as a single unit, select **Edit > Group** or click the . The new grouped unit can be moved, but the element size cannot be changed.
Ungroup	Ungroup	To ungroup an element that has been previously grouped, select **Edit> Ungroup** or click the .
Order	Order	To arrange the stacking order of selected elements, select **Edit > Order**, or select one of the specific order icons from the toolbar. To bring a selected element to the top of the stack, click the . To send a selected element to the bottom of the stack, click the . To move the selected element forward one position, click the . To move the selected element forward one position, click the . To move the selected element back one position, click the .
Align	Align	To align an element, select **Edit > Align**, or click one of the Align icons on the toolbar. To move an element to the left, click the . To move an element to the right, click the . To move an element to the top, click the . To move an element to the bottom, click the . To center an element vertically, click the . To center an element horizontally, click the . To space selected elements evenly across the window, click the . To space selected elements evenly from top to bottom, click the .
Make Same Size	Make Same Size	To have a second or additional elements be the same size as the first element, select **Edit > Make Same Size**.

Table 2-2: Edit Menu (continued)

Icon	***Subject***	***Description***
	Text Process	To set and change text direction and import text into **HM*i***, select **Edit > Text Process** or click the Text Process icons on the toolbar. If the Text Process command is enabled, the  is displayed next to the Text Process command. If you are importing text, you can elect to use the Text Bank Edit Font. If you check the box next to the Text Bank Edit Font, the imported text is displayed in the font of the Text Bank. For the settings of the Text Bank, select **Option > Text Bank**.
	Duplicate	To copy one or more elements at the same time, select **Edit > Duplicate**. After you have selected this command, the Duplicate dialog box is displayed.  You enter the number of columns and rows to get the total copy numbers. The minimum entry number must be more than 2 as the original element is included in the total copy number. If you want to copy only the rows, uncheck the box next to columns. If you want to copy only the columns, uncheck the box to rows. To set the spacing between every element, set the pixel count in the Spacing field. To place the copied element by ascending or descending address, click the Ascending Address or Descending Address button. The unit of the address can be Word or Bit. To place the element the copied element by the horizontal (X-direction) or vertical (Y-direction) direction, click the X-Direction or Y-Direction button.

Menu Bar and Toolbar (View)

Figure 2-18: View Menu Toolbar

Table 2-3: View Menu

Icon	***Function***	***Description***
Standard Toolbar		
		
	New	Create a new application
	Open	Open an old application
	Save	Save current edited application
	Export	Export an application to BMP format
	Undo	Undo an action (some actions cannot be undone)
	Redo	Redo an action
	Cut	Cut selected elements
	Copy	Copy selected elements
	Paste	Paste the element that you copy or cut
	Find Content	Find specific text, write address or read address
	New Screen	Create a new screen
	Open Screen	Open an old screen
	Print	Print current application
	Help	Screen editor version

Table 2-3: View Menu (continued)

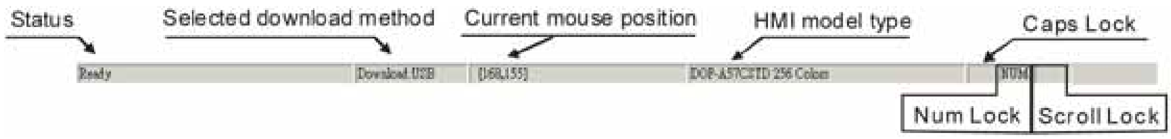
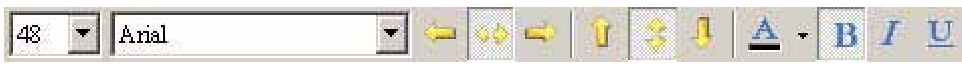
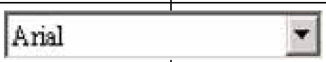
Icon	*Function*	*Description*
Status Toolbar		The Status Toolbar is enabled by default and can be found at the very bottom of the screen. To disable, click View and then click on Status Toolbar to uncheck it.
		
Text Toolbar		
		
	Font Size	Display and change text size
	Font	Select font
	Aligns Left	Align text to left
	Center Horizontal	The space at the right/left sides of text will be the same
	Aligns Right	Align text to right
	Aligns Top	Align text to top
	Center Vertical	The space at the top/bottom sides of text will be the same
	Aligns Bottom	Align text to bottom
	Text Color	Change text color
	Bold	Text bold
	Italic	Text Italic
	Underline	Add line under text

Table 2-3: View Menu (continued)

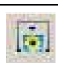
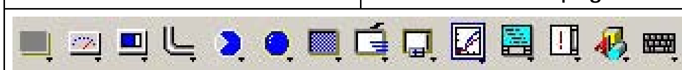
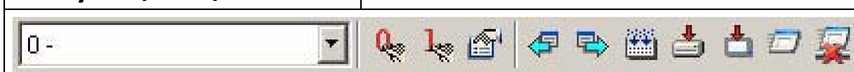
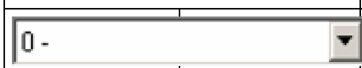
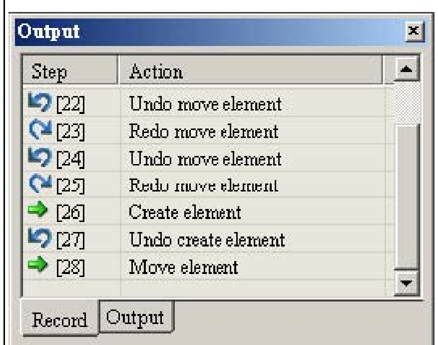
Icon	*Function*	*Description*
Bitmap Toolbar		
		
	Select Transparent Color	Use the suction tool to remove the color of the picture and determine the transparent color of the picture.
	Change Mode for Process All State Picture	If this function is enabled (this icon is pressed), not only the current picture with the current state but also all pictures with all states are stretched, resized or aligned.
	Picture Stretch All	Stretch the selected picture to the whole range of the element.
	Picture Stretch Ration 1: 1	Scale the picture relative to original picture size.
	Picture Actual	Resize the selected picture to the actual picture size.
	Picture Align Left	Align the selected picture to left.
	Picture Align Horizontal Center	The space on the right/left sides of the selected picture are the same.
	Picture Align Right	Align the selected element to right.
	Picture Align Top	Align the selected element to top.
	Picture Align Vertical Center	The space at the top and bottom of the selected element are the same.
	Picture Align Bottom	Align the selected element to bottom.
Element Toolbar		See Table 2-4 on page 19 for detailed description of all element toolbar items.
		
Layout (Build) Toolbar		
		
Current Element State		Text on selected element
		
	View State OFF/1	Switch and view current state OFF/1
	View State ON/1	Switch and view current state ON/1
	Display All Read/Write Address	Display all read/write addresses of all elements

Table 2-3: View Menu (continued)

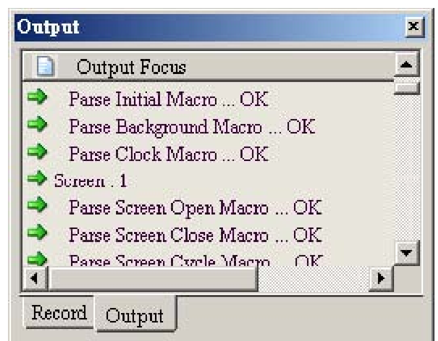
	Previous windows	Select previous windows
	Next windows	Select the next windows
	Compile	Compile current element
	Download Screen Recipe	Download screen data and recipe
	Download Screen Data	Download screen data
	On-line Simulation	Test editing file on PC side and connected to PLC
	Off-line Simulation	Test editing file on PC side and not connected to PLC
Layout Toolbar		
		
	Group	Group the selected elements
	Ungroup	Ungroup the selected elements
	Bring to Top	Move the selected element to the front of all other elements
	Send to Bottom	Move the selected element behind all other elements
	Bring Forward	Move the selected element forward one position
	Send Backward	Move the selected element behind one position
	Align Left	Align the selected elements to left
	Align Right	Align the selected elements to right
	Align Top	Align the selected elements to top
	Align Bottom	Align the selected elements to bottom
	Center Vertically	Set the element to be the vertical position of the work place
	Center Horizontally	Set the element to be the horizontal position of the work place
	Space Evenly For Across	Make all the elements align in a consistent width
	Space Evenly For Down	Make all the elements align in a consistent height
	Make Same Width	Make the selected elements to be the same width

Table 2-3: View Menu (continued)

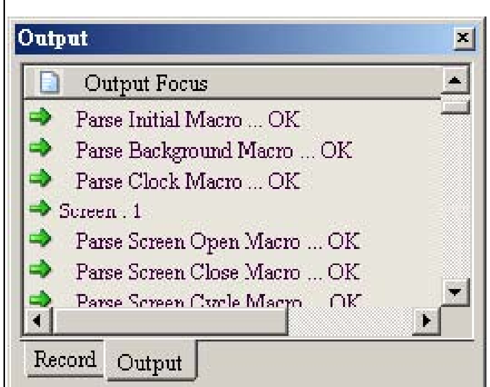
	Make Same Height	Make the selected elements to be the same height
	Make Same Size	Make the selected elements to be the same size
Zoom Toolbar		
		
	Zoom level	Sets zoom level, including 25%, 50%, 75%, 100%, 150%, 200% and 300%
	Zoom in	Increases the magnification level, including 150%, 200% and 300%.
	Zoom out	Decreases the magnification level, including 25%, 50% and 75%.
	Actual Size	Changes element size to actual size (100%).
Property Toolbar		
Property Table		Element property table. Refer to Chapter 3 for a detailed description.
Output Table		When the compile function is enabled, all editing actions and output messages are displayed. Use this information to trace errors.



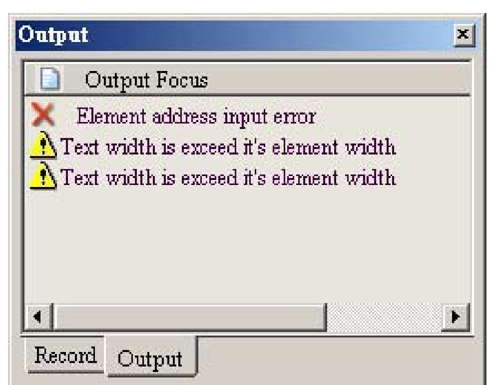
Output Window



Output Window During Editing



Output Result



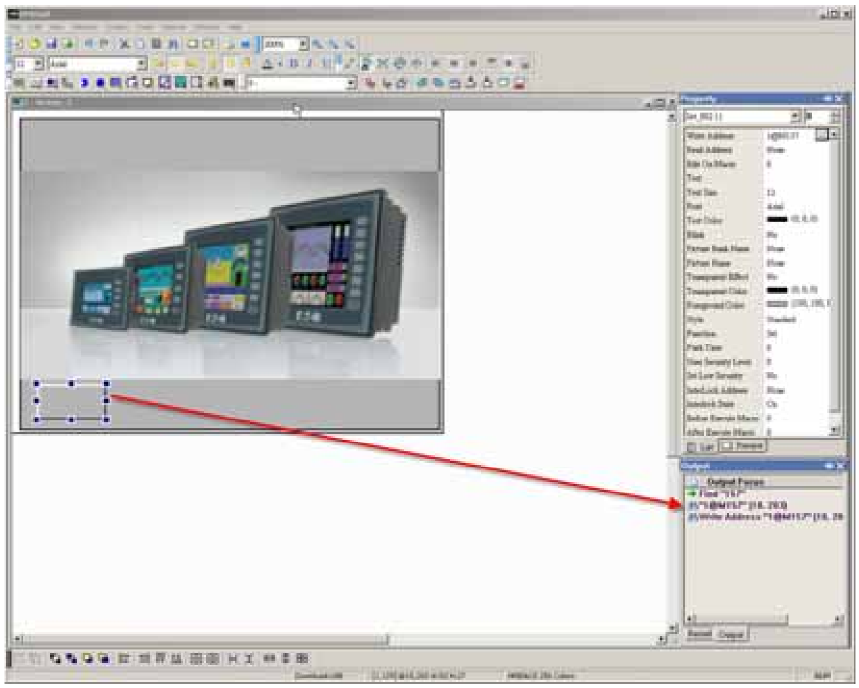
Error Output

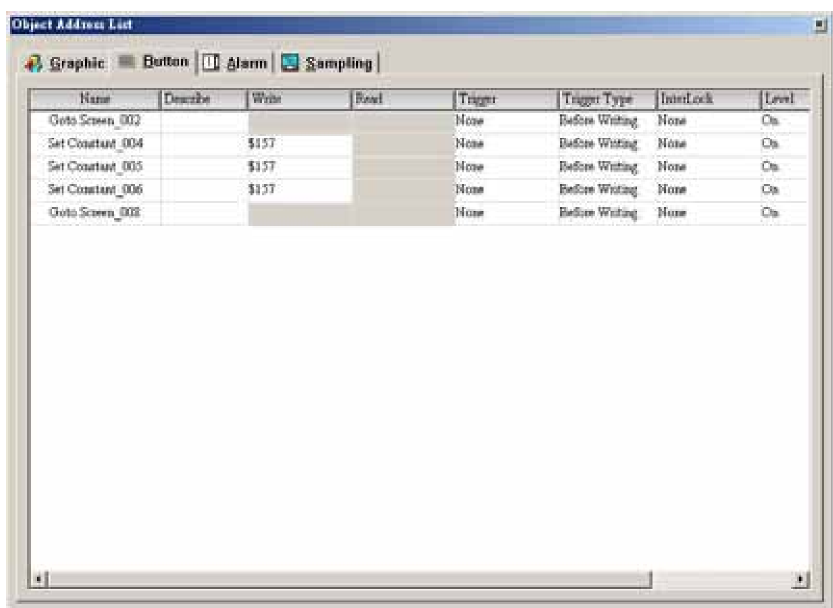
Table 2-3: View Menu (continued)

Icon	***Function***	***Description***
Zoom In	Zoom In	Zoom in to get a close look at the elements on **HM*i*** work place.
Zoom Out	Zoom Out	Zoom out to see more of the elements on **HM*i*** work place.
Actual Size	Actual Size	Return to actual size (100%). This size is relative to the screen size of **HM*i***. No matter zoom in or zoom out command, the zoom level could be 20%, 50%, 75%, 100%, 150%, 200% or 300%. You can also zoom in or out by clicking  or  or selecting the Zoom level.
Full Screen	Full Screen	Full screen provides maximum view to edit in **HM*i***. Full screen view hides all toolbars and docking windows other than the **HM*i*** work place itself.
I/O Screen	I/O Screen	I/O screen provides maximum view to edit in **HM*i*** similar to Full screen. The difference is that the I/O Screen shows the read and write addresses of the element and also shows the referenced macro command.
Grid Setup...	Grid Setup	Grid Setup is a function that can help you to align and position the element easily and precisely. You can set the distance (spacing) between the grid dots. Show Grid: Show the grid dots on the screen. Snap to Grid: Make the elements snap to the grid so that the elements can cross between the grid lines when you move them.
Cross Reference Table ..	Cross Reference Table	When creating and editing various kinds of elements, often the same address is re-used. To avoid this situation, **HM*i*** provides the cross reference table function for your convenience and quick reference. You can view the read/write addresses of the selected element and see its relationship or connection with the addresses of other elements, macro commands or the system control area. The first row of the cross reference table displays the referred element that you selected. The following rows display the elements which have the same write address. You can double-click a specific row and **HM*i*** switches to the corresponding screen of the referred address.

Table 2-3: View Menu (continued)

Icon	***Function***	***Description***
	Element Part List	When the **Element Part List** function is enabled, **HMi** sorts out and classifies all the elements on the current screen. You can click the tab to switch to the classification that you want to view. The related addresses and corresponding properties are listed in each classification (Name, Describe, Write / Read address, Trigger address, Trigger type, Interlock and Level) in each tab. You can double-click the column to let **HMi** select the element automatically and allow you to edit the detailed property of the selected element in the property table.





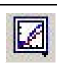
Menu Bar and Toolbar (Element)

Figure 2-19: Element Menu Toolbar

Table 2-4: Element Menu

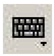
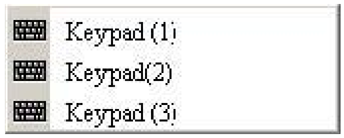
Icon	Subject	Description
Element Menu Toolbar		
	Button	Set, Reset, Momentary, Maintained, Multistate, Set Value, Set Constant, Increment, Decrement, Goto Screen, Previous Page, System DateTime, Password Table Setup, Enter Password, Contrast_Brightness, Low Security, System Menu, Report List
	Meter	Meter(1), Meter(2), Meter(3)
	Bar	Normal, Deviation
	Pipe	Pipe(1), Pipe(2), Pipe(3), Pipe(4), Pipe(5), Pipe(6), Pipe(7)
	Pie	Pie(1), Pie(2), Pie(3), Pie(4), Pie(5)

Table 2-4: Element Menu (continued)

Icon	***Subject***	***Description***
	Indicator	Multistate Indicator Range Indicator Simple Indicator
	Data Display	Numeric Display Character Display Date Display Time Display Day-of-week Display Prestored Message Moving Sign
	Graph Display	State Graphic Animated Graphic Dynamic Line Dynamic Rectangle Dynamic Ellipse
	Input	Numeric Entry Character Entry
	Curve	Trend Graph X-Y Chart
	Sampling	Historical Trend Graph Historical Data Table Historical Event Table
	Alarm	Alarm History Table Active Alarm List Alarm Frequency Table Alarm Moving Sign
	Graphic	Line Rectangle Circle Polygon Arc Text Scale Table

January 2007

Table 2-4: Element Menu (continued)

Icon	*Subject*	*Description*
	Keypad	

Menu Bar and Toolbar (Screen)

Figure 2-20: Screen Menu Toolbar

Table 2-5: Screen Menu

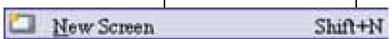
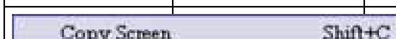
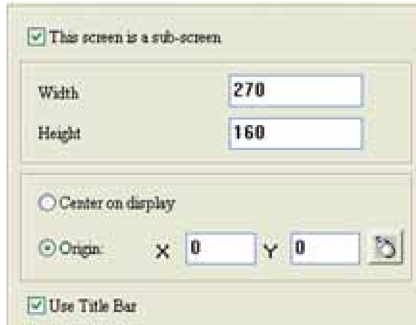
Icon	***Subject***	***Description***
	Screen	In Screen options, **HM*i*** provides some screen editing functions.
	New Screen	Create a new screen. Select **Screen > New Screen** or click , or press **Shift + N** to open a new editing screen. The new screen can be named and numbered by you.
	Open Screen	Open an old screen. Select **Screen > Open Screen** or click , or press **Shift + O**. When choosing Open Screen, you can preview each screen in the Open Screen dialog box.
	Screen Management	When Screen Management function is enabled, you can duplicate, paste and cut the screen using the mouse, just like Microsoft Windows Explorer. In the Screen Management dialog box, right-click to select the **Edit Save Screen** function. For the setting of screen saver, click **Options > Configuration > Other**.
	Cut Screen	Select **Screen > Cut Screen** or press **Shift + T** to cut the whole screen to the clipboard. Note: You cannot undo the action of Cut Screen. It is the same as Delete Screen. The cut screen is lost but it can be pasted from the clipboard to recover.
	Copy Screen	Select **Screen > Copy Screen** or press **Shift + C** to copy the whole screen.
	Paste Screen	To paste the whole screen, select **Screen > Paste Screen** or press **Shift + P**. The screen settings are the same as the original screen, except for the new screen name.
	Delete Screen	Select **Screen > Delete Screen** or press **Shift + D** to delete the current screen or element. Note: After executing Delete Screen, you cannot undo the action.
	Export	To export an application to BMP format, select **Screen > Export** or click , or press **Shift + E**.

Table 2-5: Screen Menu (continued)

Icon	*Subject*	*Description*
Import... Shift+I	Import	You can import a picture to be the ground of the editing screen. Notice that the ground of the editing screen is different than the base screen. The nature of imported picture differs greatly from that of base screen. The imported picture cannot exist in **HM*i*** as an element. However, the base screen can be regarded as an element and then exist in the editing screen after compile operation is completed. The file types of available imported picture can be BMP, JPG and GIF, etc. To import, select **Screen > Import** or press **Shift + I**.
Clear Import Data	Clear Import Data	To free up disk space, clear the imported data that you no longer want to use. Select **Screen > Clear Import Data**.
Screen Open Macro	Screen Open Macro	When the **Screen Open Macro** function is selected, the Macro is executed as the screen is closed. (Refer to Chapter 4 for the usage and editing methods of the function.)
Screen Close Macro	Screen Close Macro	When the **Screen Close Macro** function is selected, the Macro is executed automatically once the screen is closed. Refer to Chapter 4 for the usage and editing methods of the function.
Screen Cycle Macro	Screen Cycle Macro	When **Screen Cycle Macro** function is selected, the Macro is executed periodically after the screen is opened. (The macro is executed periodically by the cycle time setting). Refer to Chapter 4 for the usage and editing methods of the function.
Screen Properties	**Screen Properties**	You can view and choose the properties of the current editing screen by selecting **Screen > Screen Properties** or choosing **Screen Properties** from docking windows.
	Screen Number	The screen number range is 1–65535. Each screen number must be unique.
	Screen Application	Regarded as general view screen. The element created by the users can be downloaded to **HM*i*** after compile operation and display on **HM*i*** LCD display. The input type element, such as Button, Input and Keypad can be pressed on the **HM*i*** display and used to execute print function.

Table 2-5: Screen Menu (continued)

<table>
<tr><th>Icon</th><th>Subject</th><th>Description</th></tr>
<tr><td></td><td>Sub-screen Setting</td><td>The check box next to “This screen is a sub-screen” can be checked only when General View Screen option is selected. Therefore, before setting sub-screen function, ensure the General View Screen option is selected.

</td></tr>
<tr><td></td><td>Screen Width</td><td>Set the width of sub-screen and the unit is Pixel.</td></tr>
<tr><td></td><td>Screen Height</td><td>Set the height of sub-screen and the unit is Pixel.</td></tr>
<tr><td></td><td>Sub-screen Position</td><td>Select “Center on display” to show the sub-screen inn the center position of HMi display.

To position the sub-screen to another position on the HMi display, input the coordinate value directly (X and Y axis) or click to drag the sub-screen to the desired position.</td></tr>
<tr><td></td><td>Title Bar</td><td>When the check box next to “Use Title Bar” is checked, the title bar is displayed when opening the sub-screen.</td></tr>
<tr><td></td><td>Macro Cycle Delay</td><td>Sets Macro Cycle Delay time every time this screen is executed. The range of the macro cycle delay time is between 100 ms to 5 s.</td></tr>
<tr><td></td><td>Fast Refresh Rate</td><td>There are three levels of the Fast Refresh Rate: High, Medium and Low. Use this function to make elements display immediately when switching screens. Only four elements can be renewed in each screen.</td></tr>
</table>

Menu Bar and Toolbar (Tools)

Figure 2-21: Tools Menu

Table 2-6: Tools Menu

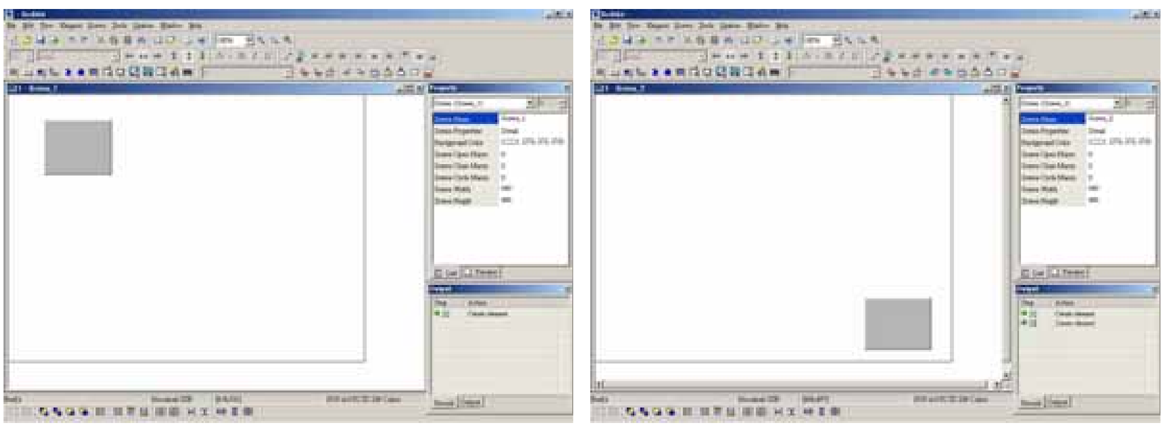
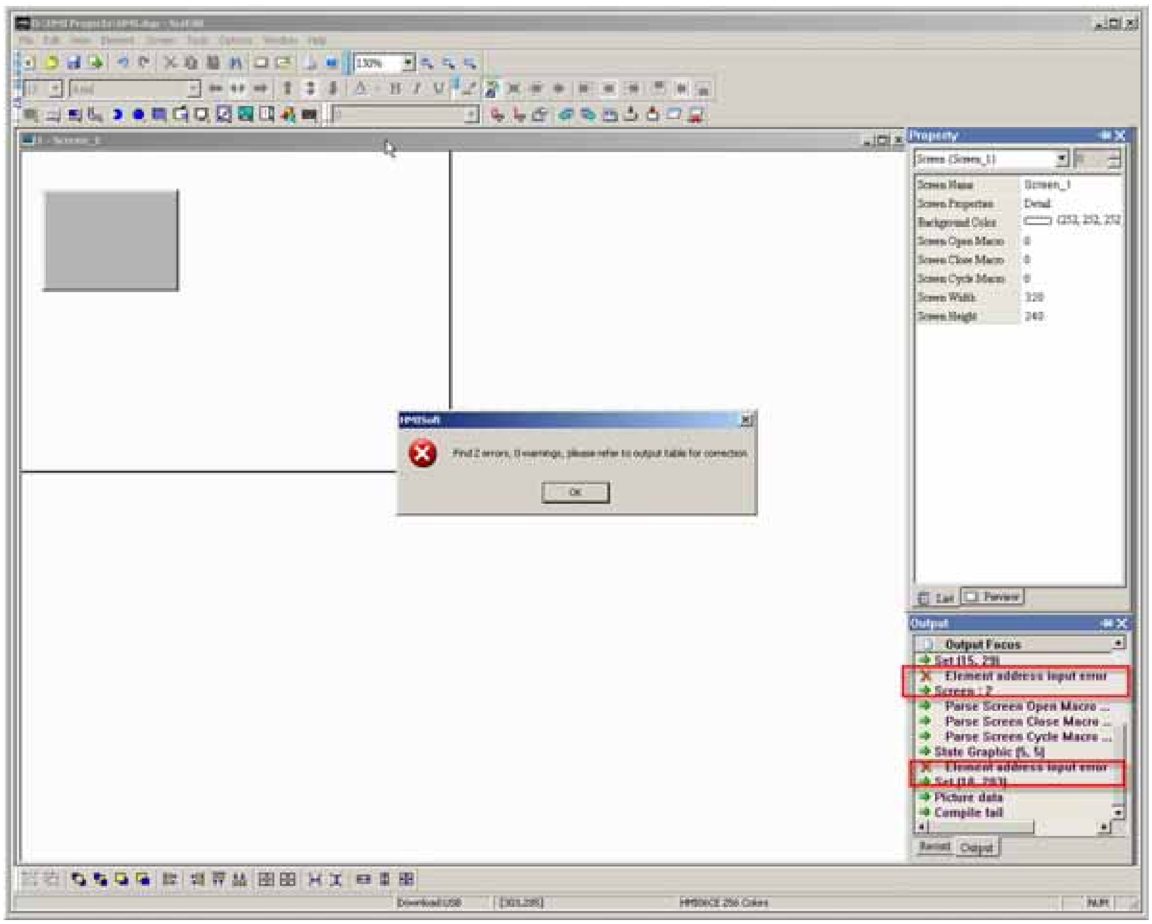
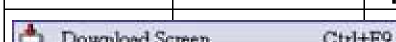
Icon	***Subject***	***Description***
	Compile	To compile the editing screen, select **Tools > Compile** or click  or press **Ctrl + F7**. If this application is a new application, **HMi** reminds you to save before compiling. If this application has been saved or it is an old application, it will compile without a prompt. During compiling, all of the compiling messages, including any errors, will be written to an output field. An object file is produced if there were are no errors during the compile process.
Debug Compiling Error during Compiling Process		
1. Create a new application. 2. Create two editing screens. 3. Create a button element on these two screens respectively and do not change the element default property as shown in **Figure 2-22**.  **Figure 2-22: Creating a Button Element**		

Table 2-6: Tools Menu (continued)

Icon	*Subject*	*Description*
Debug Compiling Error During Compiling Process (continued)		
4. When pressing icon to execute compile operation, the error message dialog box pops up to warn you of any compile error. In **Figure 2-23**, two errors occurred and they are all displayed in the output window.  **Figure 2-23: Compiling Errors During Compiling Process** 5. Once an error occurs, the corresponding message displays in output window. You can click the error message and **HMi** switches to the error element window automatically.		
	Download Screen & Recipe	To download screen data and the recipe to **HMi,** select **Tools > Download Screen & Recipe** or click or press **Ctrl + F8**. If PC cannot connect to **HMi**, the error messages are displayed. To set the download interface, select **Options > Configuration** or select **Options > Environment**. The download interface can be USB or RS-232.
	Download Screen	To download screen data to **HMi**, select **Tools > Download Screen** or click or press **Ctrl + F9**.

January 2007

Table 2-6: Tools Menu (continued)

Icon	***Subject***	***Description***
	Download Recipe	Downloads the recipe to **HM*i***. Select **Tools > Download Recipe** to download only the recipe data. The file extension name of a recipe file is .rcp.
	On Line Simulation	To run the online simulation, select **Tools > On Line Simulation** or click  or press **Ctrl + F4**. To run the online simulation, your PC should be connected to the PLC via the PC communication port (COM1 or COM2).
	Off-Line Simulation	To test the editing screen, the read/write addresses and the Macro to see if they are correct, you can run an off-line simulation. To run the off line simulation, select **Tools > Off Line Simulation** or click  or press **Ctrl + F5**.
	Get Firmware Information	Connects to the **HM*i*** over the USB connection and provides the current firmware version.

Menu Bar and Toolbar (Options)

Figure 2-24: Options Menu

Table 2-7: Options Menu

Icon	*Subject*	*Description*
	Configuration	To access the configuration options, select **Options** > **Configuration**. This dialog box is divided into five tabs: Standard, Communication, Print, Default and Other. These tabs are covered in detail in Table 2-8 on page 35.
	Alarm Setup	To set the alarm, select **Options** > **Alarm Setup**. The alarm setup should set with the alarm function in element settings. **HM*i*** executes the alarm function automatically if both settings are set. When the specified conditions are matched (if condition occurs in specific address, ON enabled or OFF enabled), **HM*i*** displays an Alarm Setup warning dialog box automatically. In this dialog box, Delete, Modify, Import, Export and Close are options. For more information for the settings of Alarm Setup, refer to Chapter 3.
	History Setup	History Setup should be used with sampling elements. Refer to Chapter 3 for more detailed information.
	Recipe Setup	The Recipe function provides the controller a convenient parameter input method. You can transmit the designated parameter to the controller by using **HM*i*** recipe after finishing editing recipe. The recipe can be set and modified through the recipe dialog box and can be saved and used independently without the application, allowing recipes to be used for all brands of models. Before using a recipe, you should enable the recipe function first by selecting **Tools > Recipe**. After the recipe function is enabled, the **Recipe Setup** dialog box pops up and you can start to edit the recipe.

Table 2-7: Options Menu (continued)

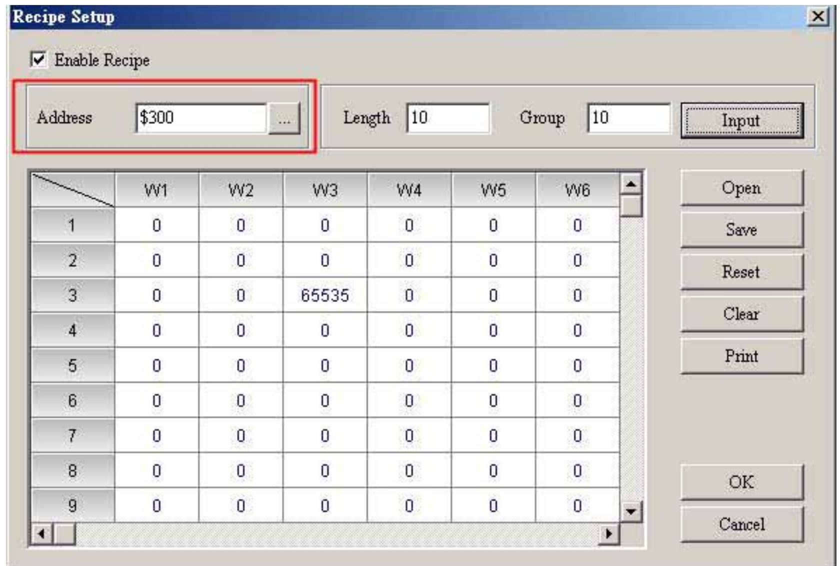
Icon	Subject	Description
	Recipe Setup	
		
	Enable Recipe	When the check box next to "Enable Recipe" is checked, the recipe function is enabled. If the users do not enable this function, the users cannot do this function even if the users have downloaded recipe data.

Table 2-7: Options Menu (continued)

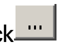
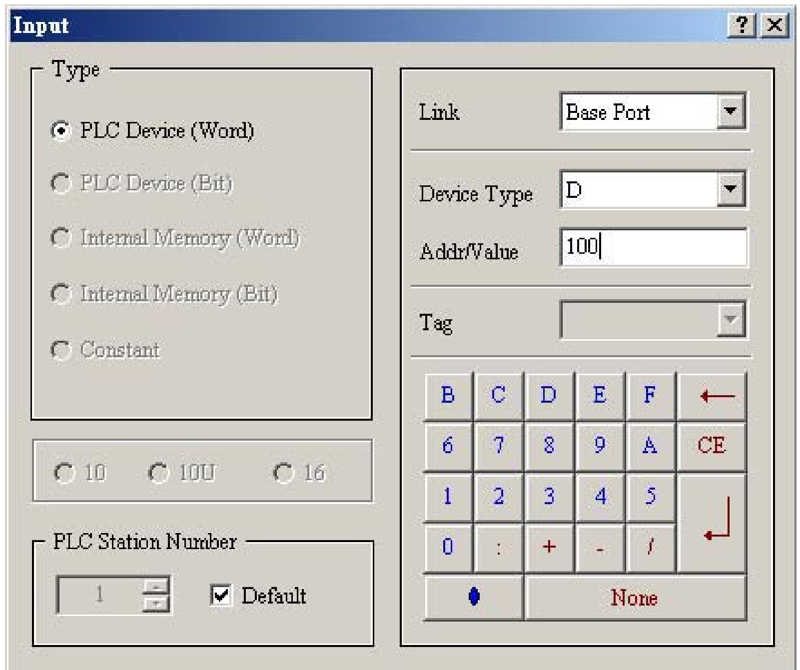
Icon	*Subject*	*Description*
	Address	The users can input the starting address of recipe data here. It can accept the address in PLC input format and internal memory format. The users also can click  to get the address input dialog box shown in **Figure 2-25** to input the starting address.  **Figure 2-25: Input Starting Address Dialog Box**
	Length	Use the length field to set the recipe length. The unit is word and it should be set to more than 0. Otherwise, the following dialog box (**Figure 2-26**) displays.  **Figure 2-26: Length Input Error Message**

Table 2-7: Options Menu (continued)

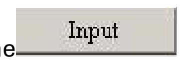
Icon	*Subject*	*Description*
	Group	Use the group field to set the group number of recipe. The group number should be set to more than 0. Otherwise, the following dialog box (**Figure 2-27**) displays on the screen.  **Figure 2-27: Group Input Error Message**
	Input	After setting length and group number of recipe, the users can click the  button to edit the recipe data. The memory size for a recipe is limited. When the Hold Data Place is selected as SRAM, the memory size for recipe is 64K. It indicates that the total recipe size should be less than 64K. (Length x groups should be less than 64 X 1024) If one of them is 0 or exceeds the limit, you will see a warning message (**Figure 2-28**) displayed on the screen.  **Figure 2-28: Input Error Message** Some **HM*i***, such as (HMI08CE) (HMI10CE) support USB host function. It indicates that these models have a built-in USB host interface and the users can input more recipe data via this interface. However, there is still a limit for the input value of recipe length and groups. When Hold Data Place is selected as USB disk, the length x groups should be less than 410241024 (4Mb). You can change the selection of Hold Data Place by selecting **Options > Configuration > Standard**. Refer to Table 2-8 on page 35.

Table 2-7: Options Menu (continued)

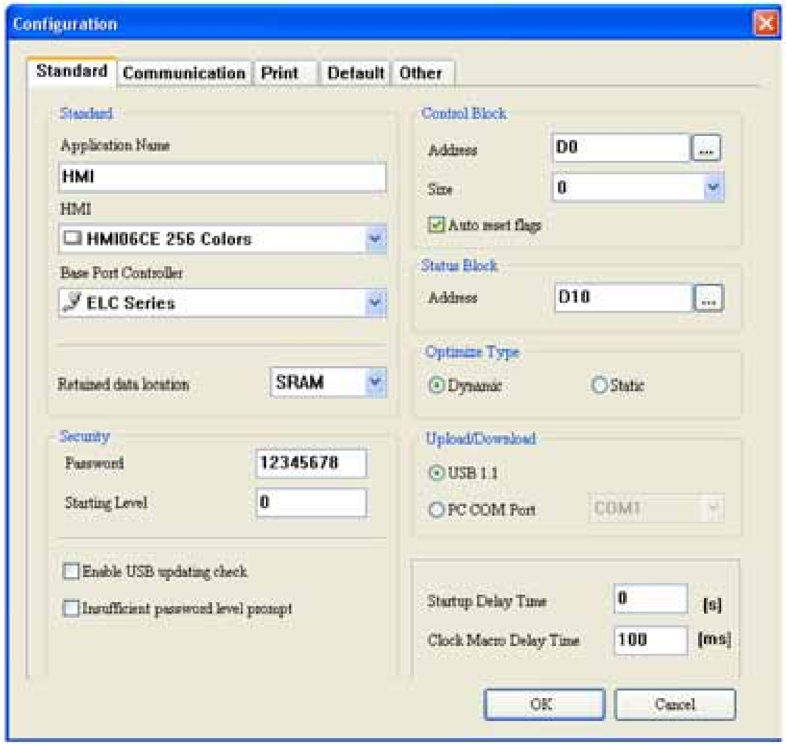
Icon	*Subject*	*Description*
	Input	
	Open	To load recipe data, click . The loaded recipe data does not contain the starting address of recipe data. Therefore, regardless of which PLC brand connecting to **HM*i***, they all can use the same recipe file. It also can open **Windows Excel CSV** files.
	Save	To save the editing recipe data as a file, click When saving the recipe file, the starting address will not be saved. This lets you use the same recipe file in the different PLC brand. You can save the recipe file as **Windows Excel CSV** file.
	Reset	When you click , all related recipe settings and input recipe data are deleted.

Table 2-7: Options Menu (continued)

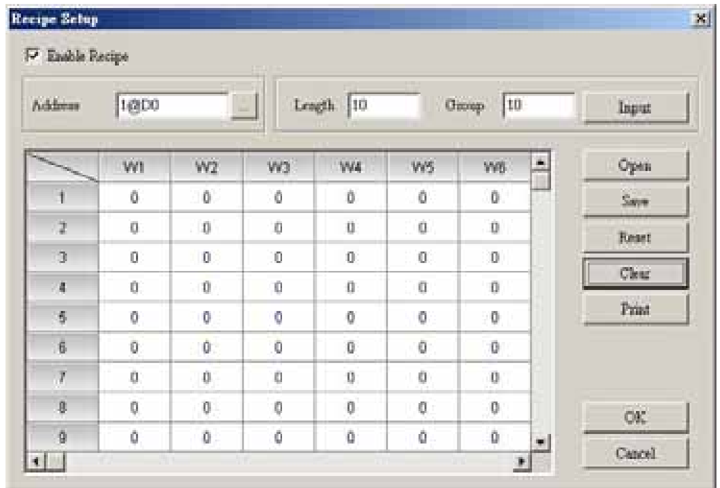
<table>
<tr><th>Icon</th><th>Subject</th><th>Description</th></tr>
<tr><td></td><td>Clear</td><td>All input recipe is cleared to 0 (zero) when clear function is selected. Refer to Figure 2-29.


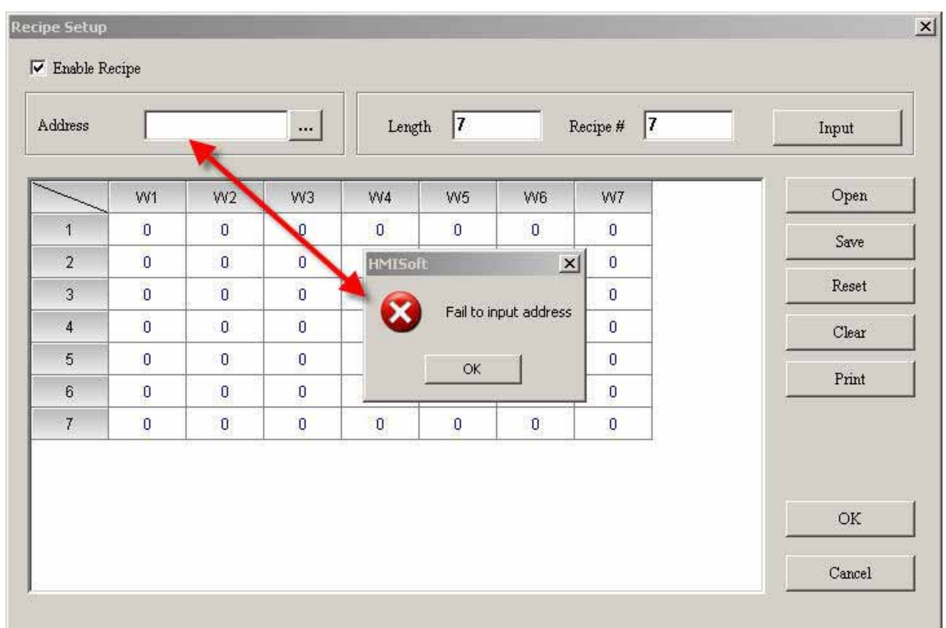
Figure 2-29: Clear Recipe Setup</td></tr>
<tr><td></td><td>Print</td><td>Prints all recipe data on the current screen.</td></tr>
<tr><td></td><td>OK</td><td>After inputting the recipe data, the users can click OK to save the recipe data for transmitting or modifying. At the same time, HMi checks the validity of all input recipe data. If there is invalid input recipe data value, the OK function is not executed successfully. For example, in Figure 2-30, HMi found an error and a warning message dialog box displays on the screen as no input address was entered.


Figure 2-30: Error and Warning Message Dialog Box</td></tr>
<tr><td></td><td>Cancel</td><td>To exit the Recipe Setup dialog box without saving, click Cancel.</td></tr>
</table>

Table 2-7: Options Menu (continued)

Icon	*Subject*	*Description*
Tag Table ...	Tag Table	Use the tag table to replace the specific address with the user-defined words or characters. For example, if the users want to replace the PLC address 1@Y0 with the word "OS", define it in Tag Table option.
Print Typesetting ..	Screen Print Setup	Provides more efficient print layout management function. Refer to the example below on next page.
	Screen Saver Setup	Drag and drop screens to screen saver setup.
Picture Bank	Picture Bank	Use this option to import various pictures to enrich the screens selection. Select **Options** > **Picture Bank** to execute this function.
Text Bank	Text Bank	Input common or frequently used text and terms into the Text Bank. You can select the text from the Text Bank to enter it on the element.
Submacro	Submacro	Use this option to edit a sub-macro that is to be called by another Macro. For the Macro function, refer to Chapter 4 for more details.
Initial Macro	Initial Macro	Use this option to edit initial macro. The initial macro is executed automatically after the power is applied to **HMi** (power on). For the Macro function, refer to Chapter 4 for more details.
Background Macro	Background Macro	Use this option to edit the background macro. For the Macro function, refer to Chapter 4 for more details.
Clock Macro	Clock Macro	Use this option to edit clock macro. After **HMi** is turned on and starting the initial setup, the clock macro is be executed automatically by clock setting time. For the Macro function, refer to Chapter 4 for more details.
Environment	Environment	Use this option to complete the environment settings of Screen Editor.

Table 2-8: Configuration Options

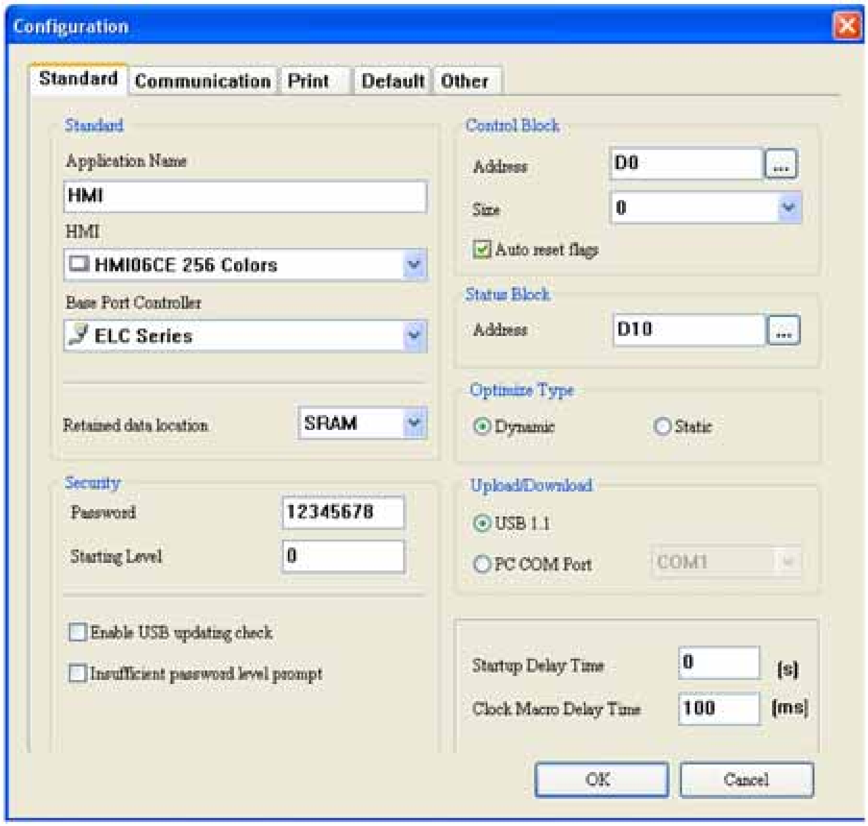
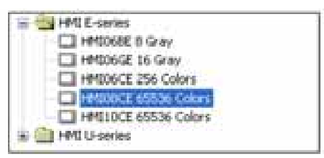
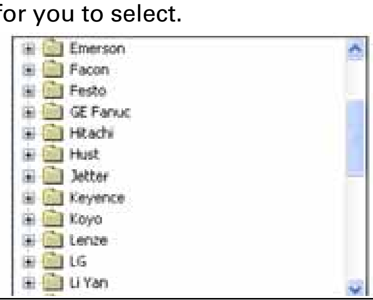
Standard Tab in Configuration Option	
	
Application Name (Standard)	Enter the name of the file for the application.
HM*i* (Standard)	Selects the **HM*i*** series type for different functions and requirements. 
Base Port Controller (Standard)	Sets the connecting external controller: the software provides various controllers sorted by manufacturers for you to select. 
Retained Data Location (Standard)	The backup memory data can be saved in SRAM, SMC and USB Disk only. You can select one of them from the Hold Data Place drop-down list. However, USB Disk selection is only available in some **HM*i*** models. If HMI06BE, HMI06GE and HMI06CE are chosen, the backup memory data only can be saved in SRAM and SMC.

Table 2-8: Configuration Options (continued)

Standard Tab in Configuration Option (continued)		
Password (Security)	Use this option to set the highest priority password. There are 8 levels for the password. This password option is also the password protection for the file (application).	
Starting Level (Security)	Use to set start-up priority. The highest level is 7 and the lowest level is 0.	
Enable USB Updating Check	(Customer supplied)	
Insufficient Password Level Prompt	(Customer supplied)	
Address (Control Block)	Use to set the starting address of system control block.	
Size (Control Block)	The length of control block will be different depending on different function. (For example, the length should be at least 8 Words when using multi-language function.) For more detailed information of system control block, refer to Chapter 5. Notice that the when the control block size is set to 0, the control block function is disabled.	
Auto Reset Flags	If the Auto Reset Flag box is checked, the register in the control block is cleared to 0 when any operation is finished in the control block.	
Address (Status Block)	Use to set the starting address of system status block. The length is constant 6 words. Each word indicates the different status value of **HMi** system. Refer to Chapter 4 for important parameters of system status area. For more detailed information of system status block, refer to Chapter 5.	
Optimize Type	Optimize - Dynamic	When switching the screen, optimize all elements that read addresses on the screen. When this function is selected, all elements that read addresses on the screen will display incorrect values for a short time. The display value will become normal after optimization is completed.
	Optimize - Static	Optimize all elements that read addresses on the screen during compile operation.
Upload / Download	You can select USB or PC communication port (i.e. RS-232) to upload and download.	
Startup Delay Time	Use to set delay time for waiting the startup of external controller (i.e. PLC). The range is between 0 – 255 seconds.	
Clock Macro Delay Time	Use to set interval time when executing clock macro. The range is 100 – 65535 ms.	

Table 2-8: Configuration Options (continued)

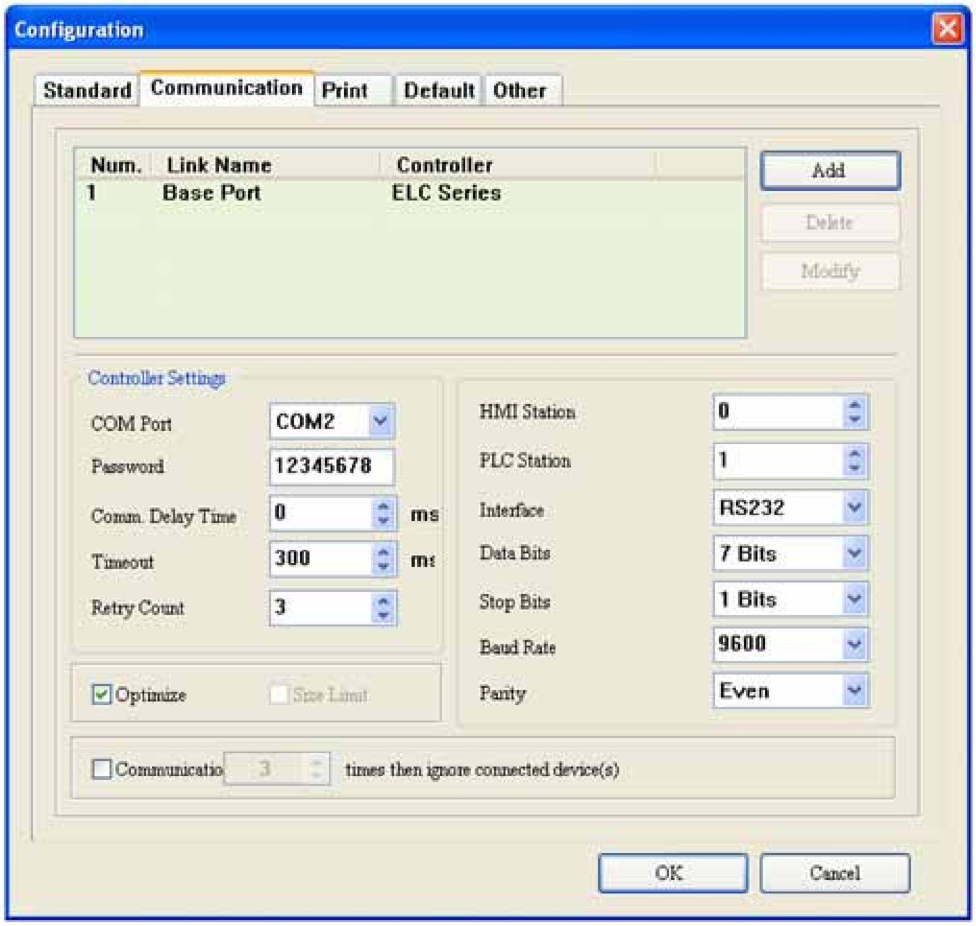
Communication Tab in Configuration Option


Table 2-8: Configuration Options (continued)

Add / Delete Controller Connection	Add	Press Add button to determine the connecting device name and the controller:  Use to set the connecting PLC. Available connecting PLC will be different depending on **HM*i*** type. **HM*i*** can support up to three different controllers simultaneously.
	Delete	Use to delete the existed connecting controller (one application needs to connect at least one controller).
	Modify	Modify the connecting controller or change the controller name.

Table 2-8: **Configuration Options** (continued)

Communication Tab in Configuration Option (continued)		
Controller Settings	COM Port	Use to set the COM port that communicates with **HMi** (COM1 or COM2). COM3 port only supported in some types of **HMi**.
	Password	Passwords are necessary for some connecting controllers before communication.
	Comm. Delay Time	Use to set delay time for waiting the startup of external controller (i.e. PLC). The range is between 0 – 255 ms.
	Timeout	Use to set communication time out time when communicating with the external controller. The range is between 100 – 65535 ms.
	Retry Count	**HMi** will try to send a communication command to the external controller repeatedly if the external controller does not respond during communication. This option is used to set the number of retry count times. A communication error dialog box will not appear unless the number of retry count times is reached. The range is between 0 – 255 times.
	Optimize	Use this option to enable optimization function. If optimization function is enabled, all read addresses of all related elements will be optimized.
	Size Limit	This function is available only when "Optimize – Static" on the Standard tab is selected. It is used to avoid screen updating. The speed may slow down when reading too long continuous address.
	When "Communication Interrupt times then cancel connected" is checked, **HMi** stops communicating with the external controllers after the communication interrupt time is reached. The purpose of this function is to avoid the communication error dialog box will always show on the **HMi** screen when the communication error occurs after **HMi** has retried. The range is between 1 – 255 times.	
	HMi Station	It is used to set **HMi** station number. The range is within 0 – 255.
	PLC Station	It is used to set PLC station number. If PLC does not set station number, it will use this default setting. The range is between 0 – 255.
	Interface	It is used to set communication interface. The default setting is RS232. There are three options RS232, RS422 and RS485.
	Data Bits	There are two options 7 Bits and 8 Bits.
	Stop Bits	There are two options 1 Bits and 2 Bits.
	Baud Rate	Communication baud rate. There are 4800, 9600, 19200, 38400, 57600 and 115200 these options. The users can enter the setting value directly also but the maximum. setting value can not exceed 187500.
	Parity	There are three options: None, Odd and Even.

Table 2-8: Configuration Options (continued)

Print Tab in Configuration Option

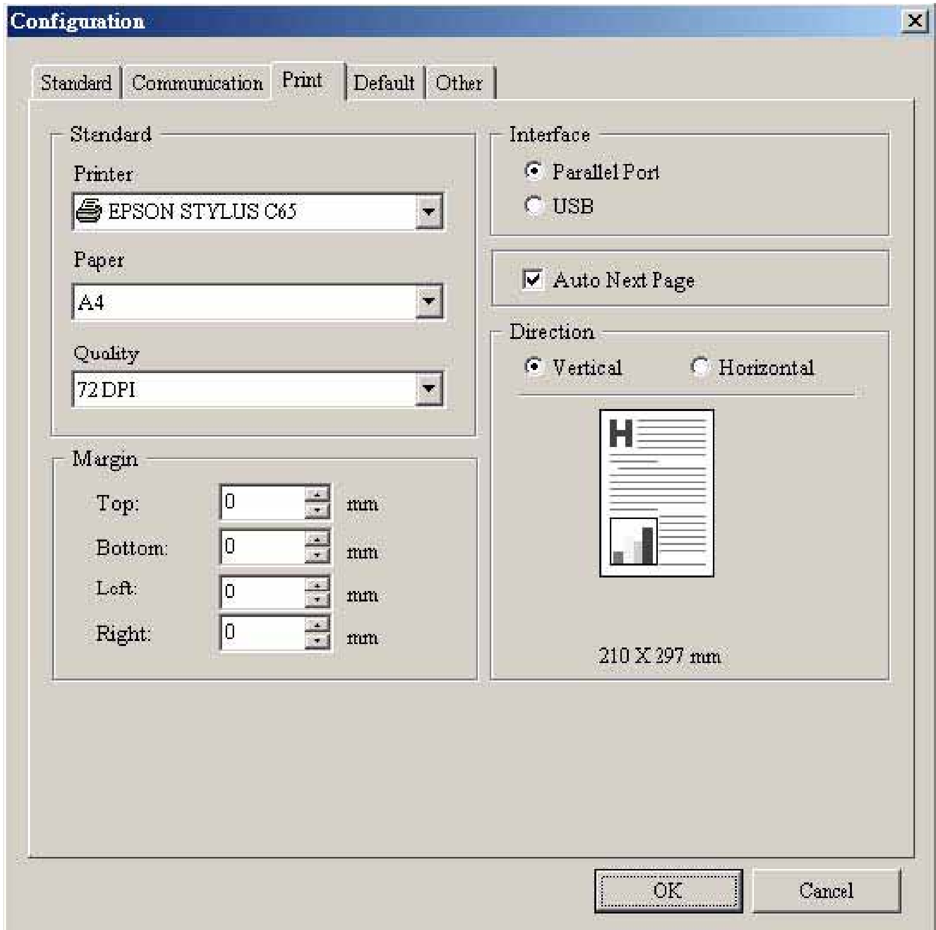


Table 2-8: Configuration Options (continued)

<table>
<tr><td>Apply Print Screen</td><td colspan="2">1. Regarded as the print screen. The printer can print the created element after the compile operation. This option is only available in HMi and only can be enabled after the printer is set. For the setting of the printer, select Option > Configuration > Print (Figure 2-31).

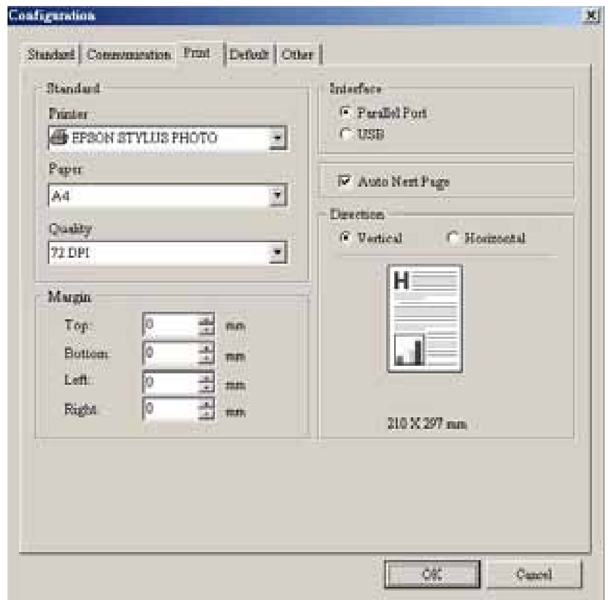
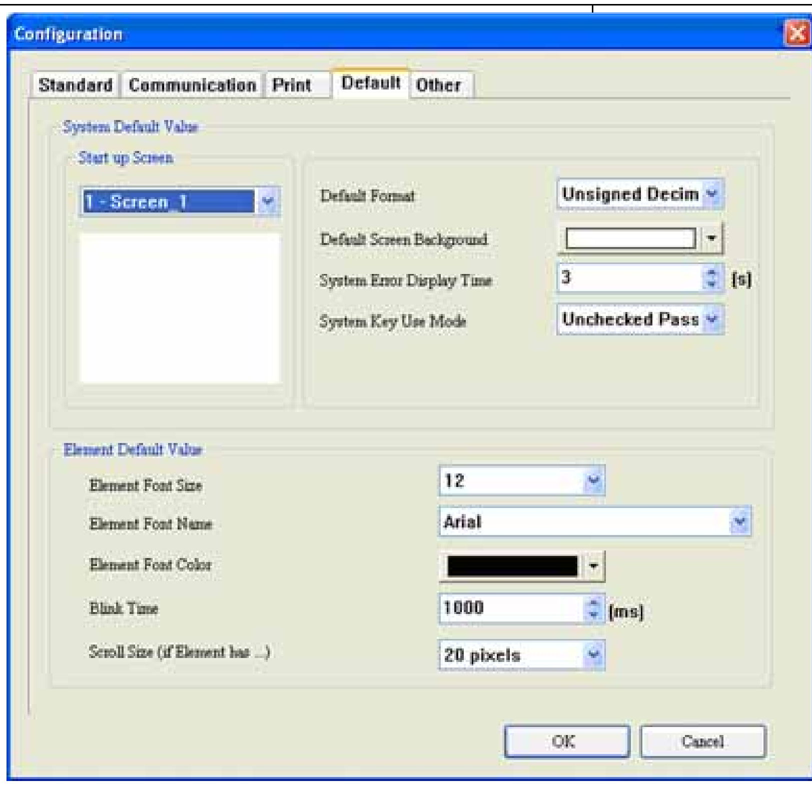
2. When the Apply Print Screen function is selected, the editing range is scaled to the actual paper size. You can only print the elements within the range of the paper size. When you select this option, all history data or sampling records of the editing elements can be printed out. This option is usually used for print typesetting.
You can find printer setting by selecting Option > Configuration > Print. See Figure 2-31.


Figure 2-31: Print Tab in Configuration Option</td></tr>
<tr><td rowspan="3">Standard</td><td>Printer</td><td>Use this option to set the connecting printer. The users can use the drop-down list to specify the printer. The printers in the list are sorted by manufacturer and the users can find the printer easily.

</td></tr>
<tr><td>Paper</td><td>The users can use the Paper drop-down list to select the paper size. The only predefined paper sizes in the list are A4 and Letter.</td></tr>
<tr><td>Quality</td><td>Only 72 DPI option is provided.</td></tr>
<tr><td>Margin</td><td colspan="2">The users can determine the blank space (margins). Users can specify the top, bottom, left and right margins and the unit is mm.</td></tr>
<tr><td>Interface</td><td colspan="2">Interface is used to set the printer interface. The users can specify the communication port of the printer. There are Parallel Port and two USB options.</td></tr>
<tr><td>Auto Next Page</td><td colspan="2">When the “Auto Next Page” option is selected, the printer will print the next page automatically. If the checkbox next to “Auto Next Page” is not checked, the printer will print continuously without breaking for different pages.</td></tr>
<tr><td>Direction</td><td colspan="2">Direction is used to set printing orientation. There are two options: Vertical (Portrait) and Horizontal (Landscape).</td></tr>
</table>

Table 2-8: Configuration Options (continued)

Default Tab in Configuration Option



System Default Value	Start up Screen	Use this option to set the first display screen when **HMi** is powered on and started up.
	Default Format	Sets the default value format when creating elements.
	Default Screen Background	When a new editing screen is created, the users can use this option to set the default screen background color.
	System Error Display Time	Use this option to set the display time of system error message dialog box. The range is 0 – 5 seconds. Note that if the setting value is set to 0, the system error message dialog box will not display on **HMi** screen.
	System Key Use Mode	It is used to set the system key action when the users press the key. There are three options: **Disable**, **Check Password** and **Unchecked Password**.
Element Default Value	Element Font Size	It is used to specify the default element font size when creating an element.
	Element Font Name	It is used to specify the default element font name when creating an element.
	Element Font Color	It is used to specify the default element font color when creating an element.
	Blink Time	It is used to specify the default element blink rate when creating an element.
	Scroll Size (if element has Scroll Size)	(Customer will enter text here)

Table 2-9: Other Tab in Configuration Option

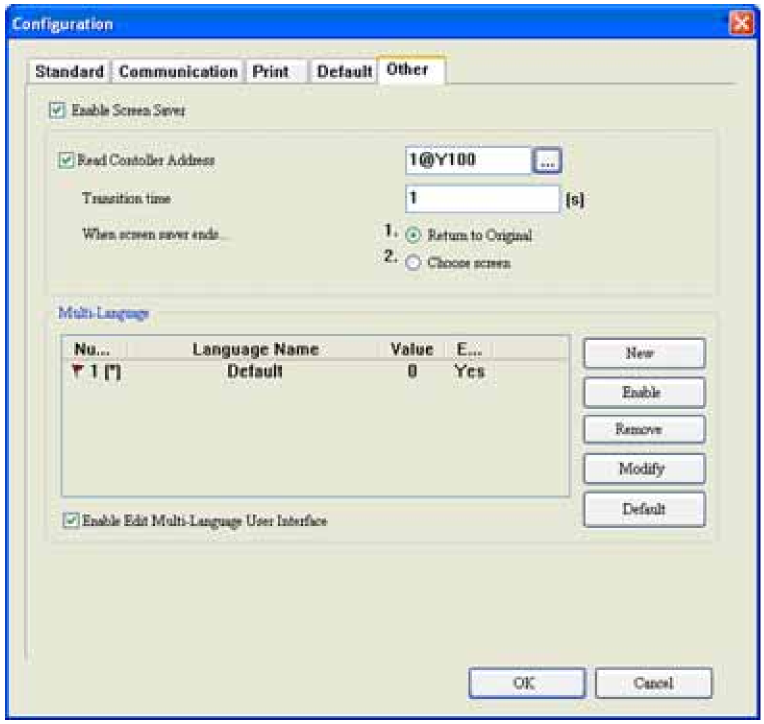
Other Tab in Configuration Option


Table 2-9: Other Tab in Configuration Option (continued)

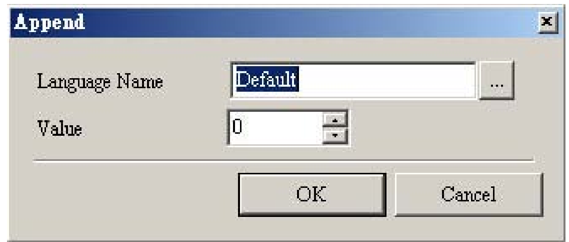
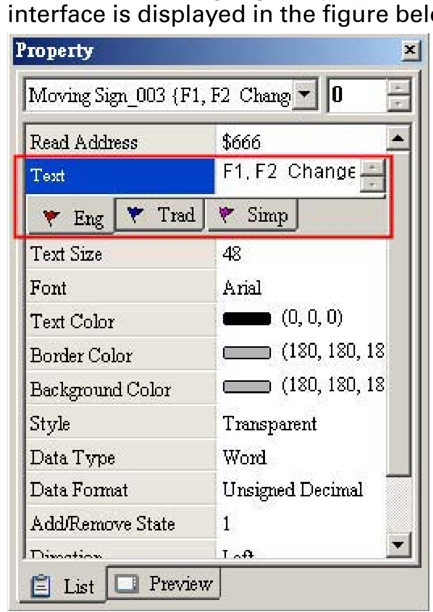
<table>
<tr><th colspan="3">Other Tab in Configuration Option (continued)</th></tr>
<tr><td rowspan="4">Save Screen</td><td>Enable Save Screen</td><td>This option should be selected when the users want to use Edit Save Screen function in Screen Management option. If this option is not selected, even though the users have chosen the Edit Save Screen function, the screen saver will not be started.</td></tr>
<tr><td>Read Controller Address</td><td>1. The users can use this option to enable the screen saver. When the setting value is 0, it indicates that the screen saver function is disabled. If the setting value is a non-zero value, it indicates that the screen saver function is enabled. When the users touch the HMi screen, the screen saver function is ineffective.

2. If this option is not selected, the screen saver will be enabled automatically when the Screen Saver Time set in HMi is reached. If the screen saver function is enabled, the users can touch the HMi screen to disable it.


</td></tr>
<tr><td>Interval Time At Two Save Screen</td><td>Use this option to set the interval time between two screen savers. The range is between 1 – 255 seconds.</td></tr>
<tr><td>Ending of Save Screen Mode</td><td>1. Return Original: Return to the original screen at that time when the screen saver is enabled.

2. Indicate Screen: Specify the screen that will show after the screen saver program ends.</td></tr>
</table>

Table 2-9: Other Tab in Configuration Option (continued)

Other Tab in Configuration Option (continued)		
Multi-Language	New	Press the New button to add a language option.  As shown as the figure above, the users have to enter the language name and setting value. The setting value will be referred by the system when setting multi-language. The range of the setting value is within 0 – 255. The users can press the ... button to change the flag color on the language name tab.
	Enable/Disable	Delta **HM*i*** allows the users to edit multi-language screen, however the users can use this option to determine which languages are supported (enabled) or not supported (disabled) when downloading data to **HM*i***.
	Remove	Remove the existing language. **HM*i*** requires at least one language for an application.
	Modify	Modify the existing language name and setting value.
	Enable Edit Multi-Language User Interface	Use this option to enable multi-language user interface. You can view the multi-language display in the property table. The editing interface is displayed in the figure below: 

How to Use Multi-Language Function

Example:

Create a Screen that has English, Traditional Chinese and Simplified Chinese. To switch the language selection within the screen:

1. Create a new application.
   Select **HM*i*** model "HMI06CE".

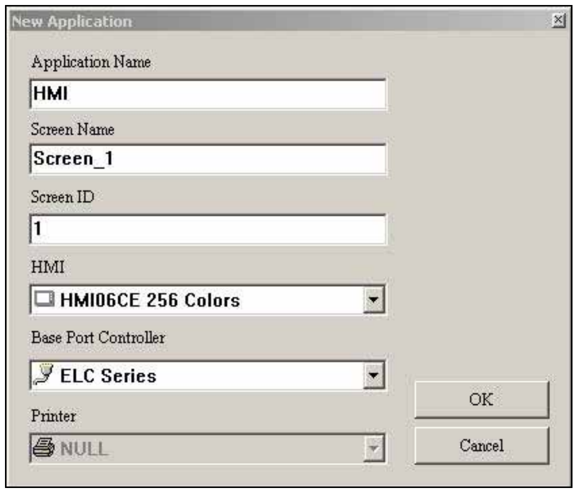


Figure 2-32: Create New Application Screen

2. Create two button elements on the screen: "Set" and "Increment"
3. Control Block (Options > Configuration) Settings
   Set the address as $200 and set the size as 8.

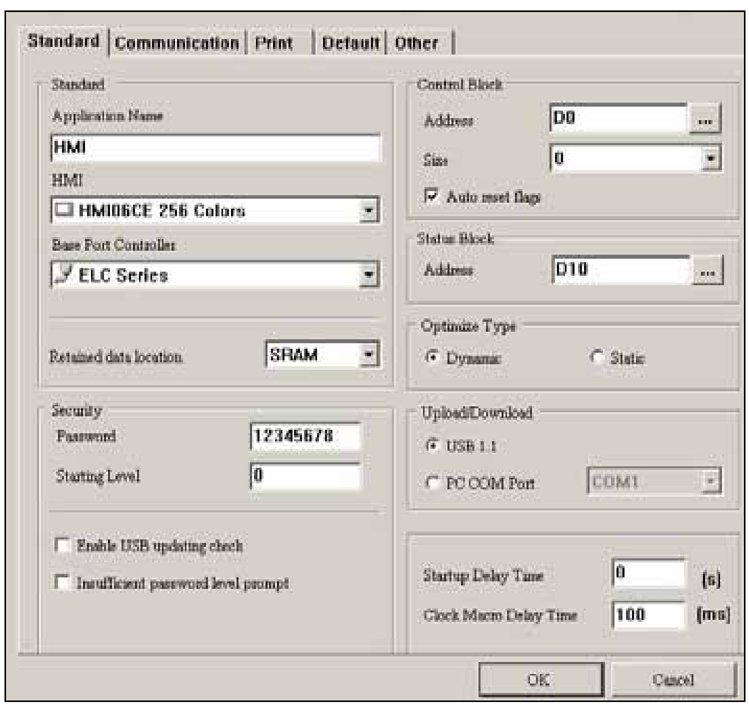


Figure 2-33: Configuration Settings Screen

4. Multi-Language Settings

   Add English (Eng), Traditional Chinese (Trad) and Simplified Chinese (Simp). The setting values are 0, 1 and 2 for each language respectively.

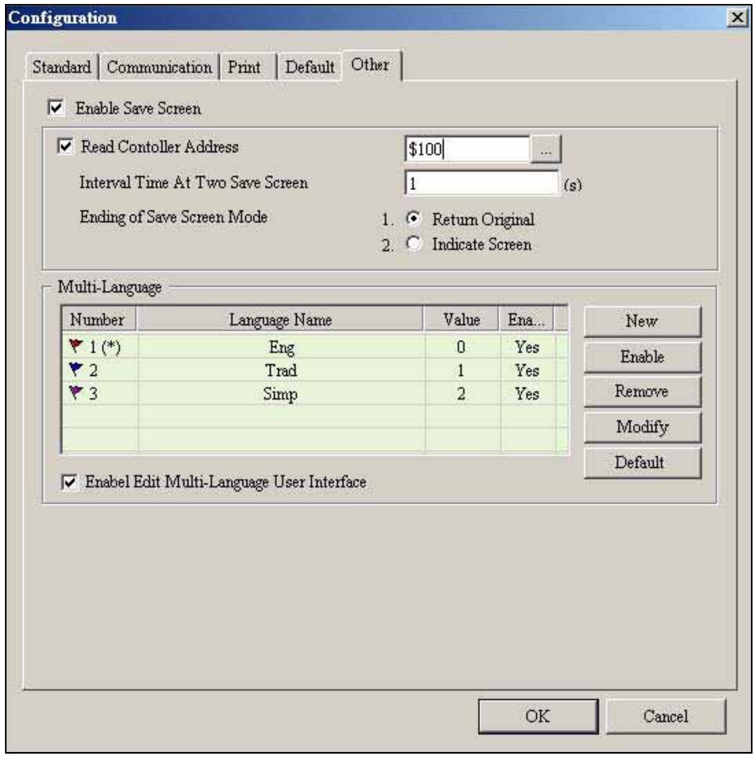


Figure 2-34: Multi-Language Configuration

5. Set the display text of "Set" button element in different languages.

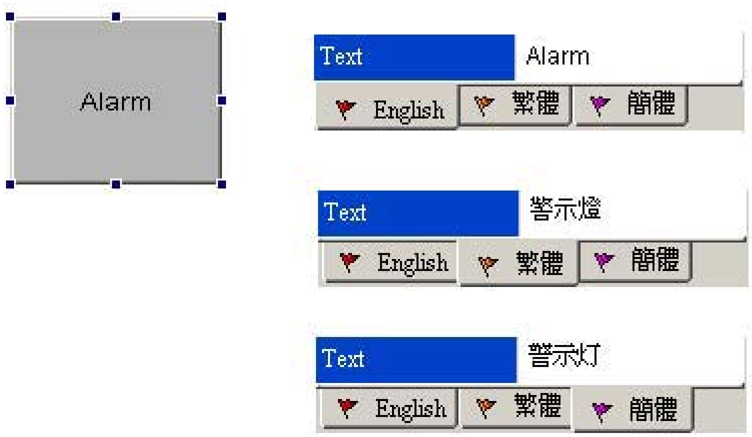


Figure 2-35: Set Alarm in Different Languages

- Double click the English tab and enter "Alarm" in English.
- Double click the Traditional Chinese tab and enter "警示燈" in Traditional Chinese.
- Double click the Simplified Chinese and enter "警示燈" in Simplified Chinese.

6. In property setting of “Increment” button element, set the write address as the **internal memory $207**.

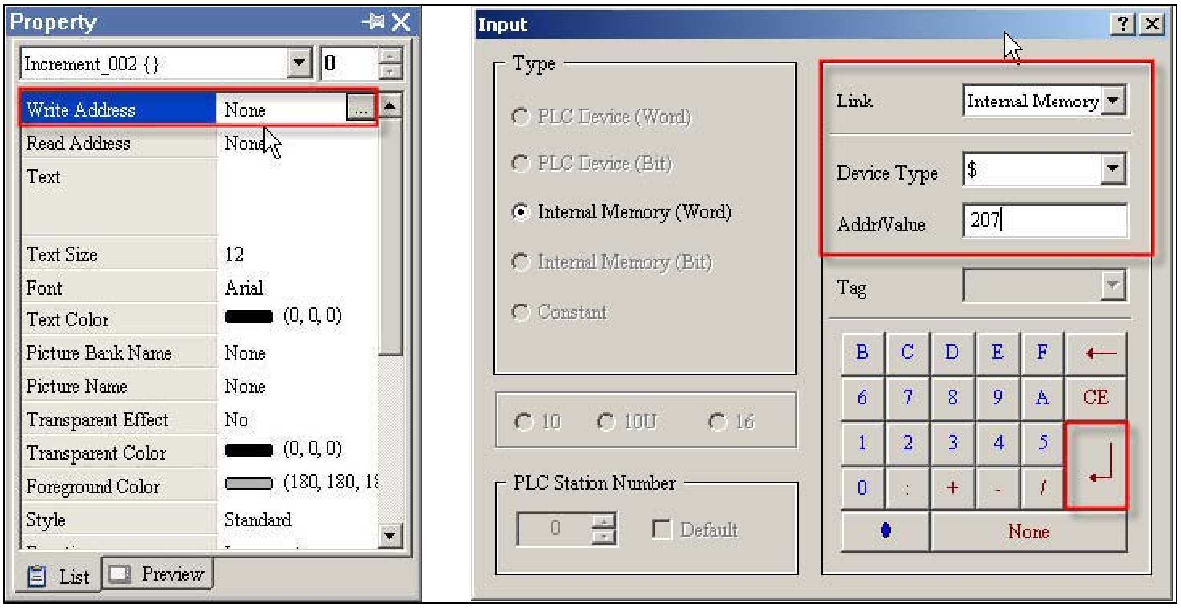


Figure 2-36: Input Macro Command

7. Set the setting value of “Before Execute Macro”. The users can enter the Macro command as **$207=$207%3**.

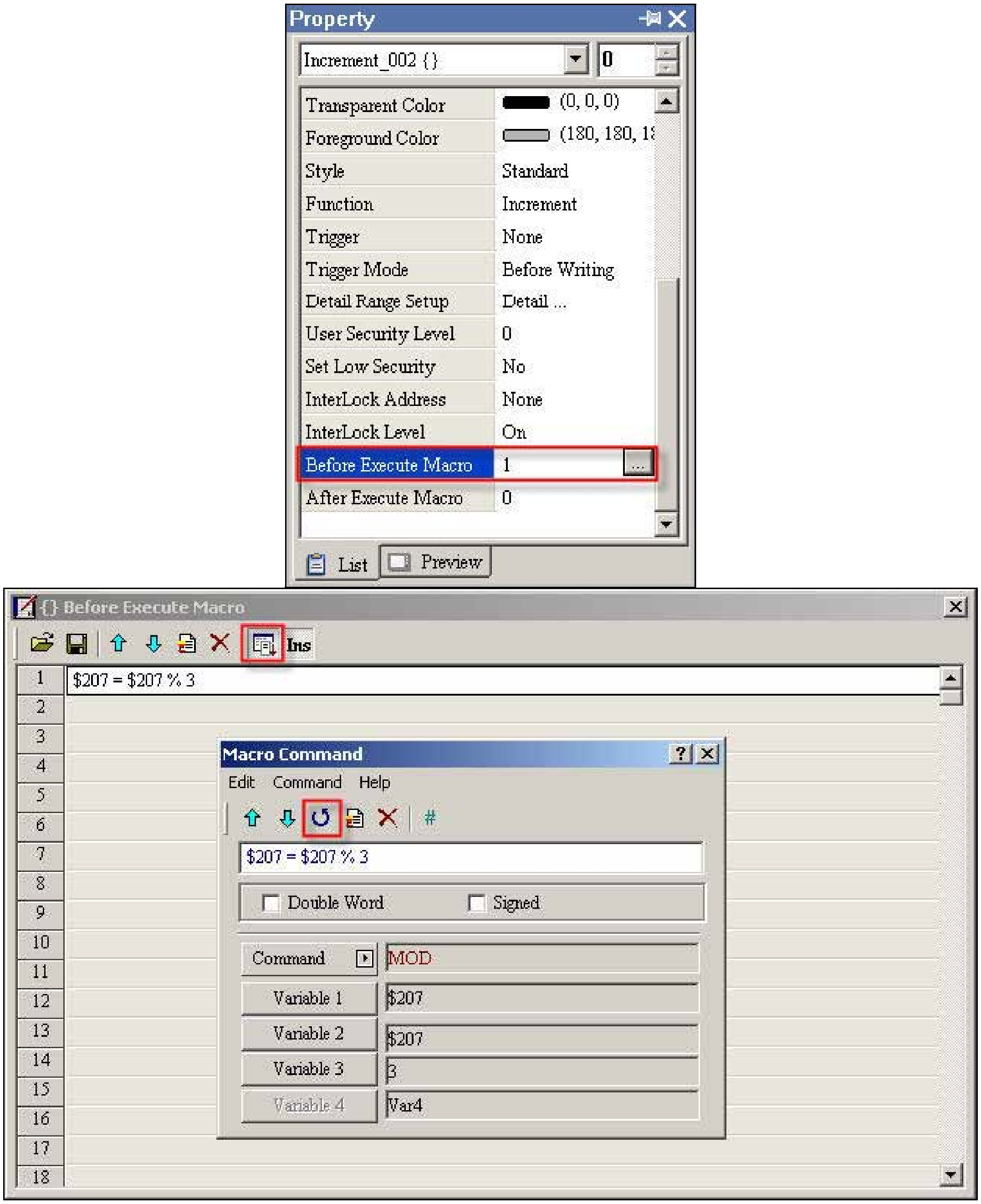


Figure 2-37: Set "Before Execute Macro"

8. Select the **Compile** command and execute **Off Line Simulation**. The text of the "Set" button is changed to a different language by pressing the "Increment" button element.

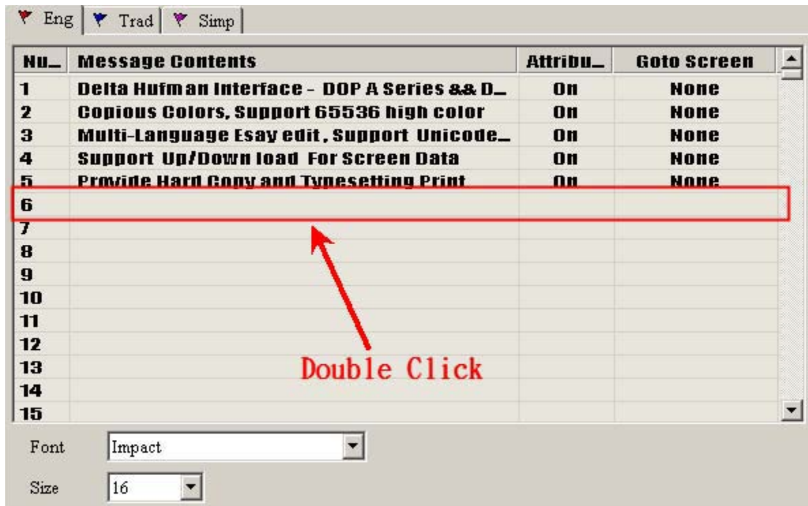
Table 2-10: Alarm Setup

Alarm Setup Dialog Box		
Alarm Setting	Address of Alarm Block	Use this option to set the alarm starting address. It provides 512 alarms, 32 Words.
	Scan Time (second)	Sets how long it takes for the **HM*i*** to scan one time. The unit is seconds.
	Number of Records in History	Use this option to retain a specific number of records. When the number of records exceeds this setting value, **HM*i*** deletes the first record and insert the new record into the last address. For example, if the setting value is set to 100 and the number of records in history exceeds 100, the first record is deleted and the second record will become to the third record, the third record will become to the forth record…and the 100th record will become to 99th record. The new record (101st record) becomes the 100th record.
	Non-volatile	Using this option saves data in SRAM when the power is turned off. The battery of the SRAM provides power when the power is turned off. (In some **HM*i*** models, the users can save data in USB disk or SMC card when the power is turned off and the capacity for saving alarm data depends on the capacity of the USB disk or SMC card.)

Table 2-10: Alarm Setup (continued)

<table>
<tr><th colspan="4">Alarm Setup Dialog Box</th></tr>
<tr><td rowspan="10"></td><td rowspan="5">Alarm Property Setup</td><td colspan="2">The users can double click a row of the alarm message contents table to edit the alarm property.

There are 3 language tabs in Alarm Setup dialog box as multi-language function is also supported here. Click the tab to edit the alarm message contents according to your requirements.



The following Alarm Property Setup dialog box will display after double clicking the row.

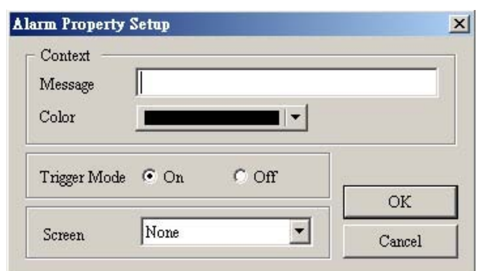
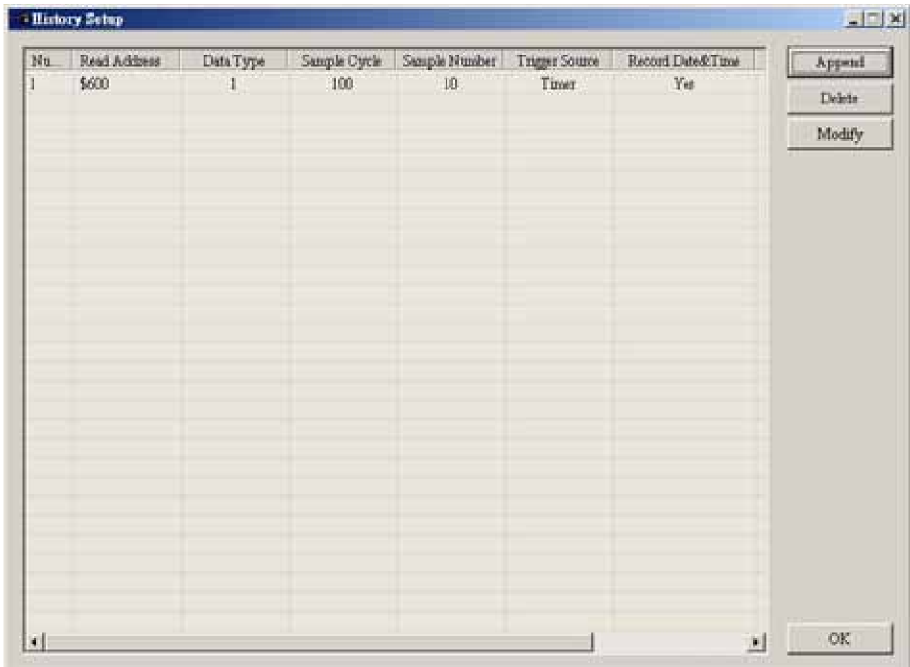
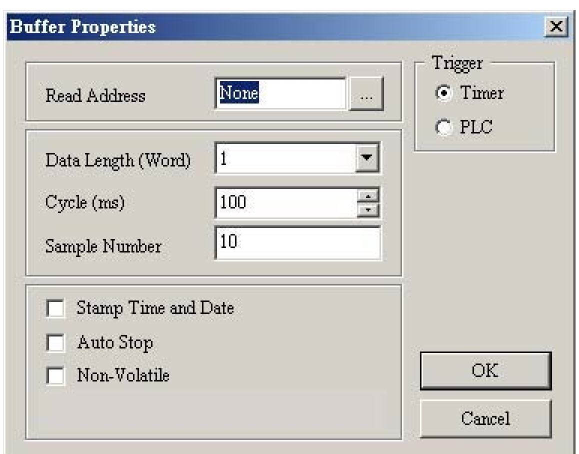

</td></tr>
<tr><td>Message</td><td>Display message when an alarm occurs.</td></tr>
<tr><td>Color</td><td>Display message color when an alarm occurs.</td></tr>
<tr><td>Trigger Mode</td><td>Use this option to determine if the Bit is On or Off when an alarm occurs.</td></tr>
<tr><td>Screen</td><td>Display screen when an alarm occurs.</td></tr>
<tr><td>Delete</td><td colspan="2">Delete the alarm message contents.</td></tr>
<tr><td>Modify</td><td colspan="2">Modify the alarm message contents. You also can double click the mouse to perform this function.</td></tr>
<tr><td>Import</td><td colspan="2">Import the Alarm Describe File into the alarm message contents table.</td></tr>
<tr><td>Export</td><td colspan="2">Export the alarm message contents from HMi and convert them to be Alarm Describe.</td></tr>
</table>

Table 2-10: Alarm Setup (continued)

<table>
<tr><th colspan="4">Alarm Setup Dialog Box</th></tr>
<tr><td rowspan="9">Alarm Moving Sign</td><td>Enable</td><td colspan="2">It is used to enable the alarm moving sign.</td></tr>
<tr><td>Position</td><td colspan="2">It is used to determine the display position of alarm moving sign. It can be Top or Bottom.</td></tr>
<tr><td rowspan="4">Direction</td><td>Left</td><td>Alarm message will move from right to left (Move to left).</td></tr>
<tr><td>Right</td><td>Alarm message will move from left to right (Move to right).</td></tr>
<tr><td>Up</td><td>Alarm message will move from bottom to top (Move to Up).</td></tr>
<tr><td>Down</td><td>Alarm message will move from top to bottom (Move to Down).</td></tr>
<tr><td>Moving points</td><td colspan="2">Set the moving points every time for the alarm moving sign. The unit is Pixel and the range is between 1 – 50 points.</td></tr>
<tr><td>Interval (ms)</td><td colspan="2">Set the interval time every time for the alarm moving sign. The unit is ms and the range is between 50 – 3000 ms.</td></tr>
<tr><td>Background Color</td><td colspan="2">Set the background color of the alarm moving sign.</td></tr>
</table>

Table 2-11: History

<table>
<tr><th colspan="3">History Setup Dialog Box</th></tr>
<tr><td colspan="3">
</td></tr>
<tr><td rowspan="4">Append</td><td colspan="2">

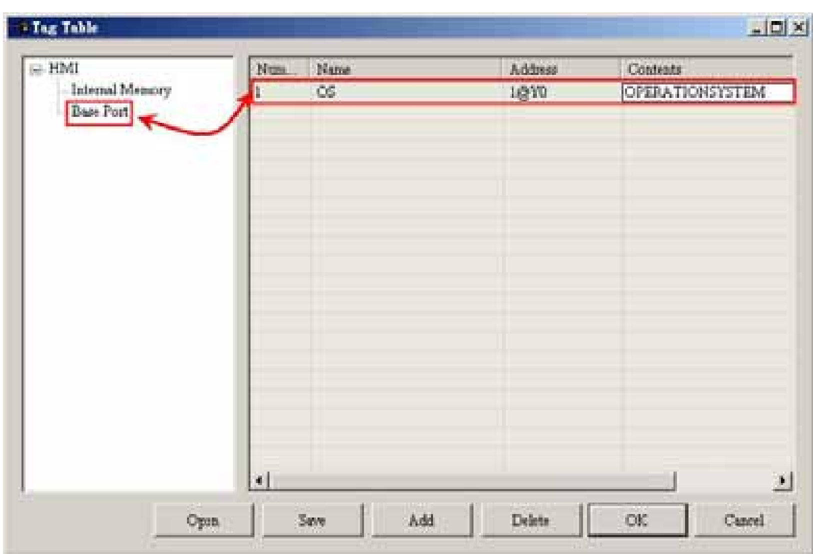
Pressing Append button can add a history data. A maximum of 12 history data can be added. After the Append button is pressed, the following Buffer Properties dialog box is displayed.</td></tr>
<tr><td>Read Address</td><td>Set the starting address for sampling the history data.</td></tr>
<tr><td>Data Length (Word)</td><td>Set the length of the Word the users want to sample. The range is between 1 – 13 continuous words. It indicates that a maximum of 13 continuous words can be sampled.</td></tr>
<tr><td>Cycle (ms)</td><td>Set the sampling cycle time for reading the address (how long it takes to read the address one time). If the Trigger option is PLC, this option will be unavailable. The range of the sampling cycle time
is 0 – 86400000 ms.</td></tr>
</table>

Table 2-11: History (continued)

History Setup Dialog Box		
	Sample Number	This option is used with the Auto Stop option. If the Auto Stop option is selected, **HMi** stops recording the data after the numbers of records have reached the setting value of Sample Number option. If the Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the first record and insert the new record into the last address. For example, if the setting value is set to 100 and the number of records in history exceeds 100, the first record will be deleted and the second record will become the third record, the third record will become the forth record…and the 100th record will become the 99th record. Therefore, the new record (101st record) will become the 100th record.
	Stamp Time and Date	Use this option to determine if the time and date are also recorded during sampling operation.
	Auto Stop	Use this option to determine if **HMi** stops recording when the maximum number of record data is reached.
	Non-Volatile	Using this option can enable to save sampling data in SRAM when the power is turned off. The battery of SRAM provides power when the power is turned off. (In some **HMi** models, the users can save data in USB Disk or SMC card when the power is turned off and the capacity for saving history data depends on the capacity of USB Disk or SMC card.)
	Trigger	There are two options: Timer and PLC.
	OK / Cancel	Press OK button to save the data and exit. Press Cancel to exit without saving data.
Delete	Pressing Delete button will delete the history data.	
Modify	Pressing Modify button can modify the history data.	

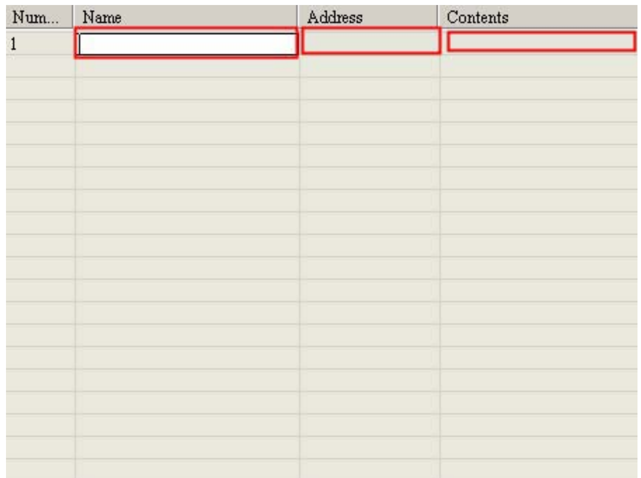
Table 2-12: Tag Table

Tag Table Dialog Box	



Open	Opens a Tag File and import it into **HMi**.

Table 2-12: Tag Table (continued)

Tag Table Dialog Box	
Save	Save the settings or changes made in Tag Table dialog box as a Tag File.
Add	Select the Tag type first: Internal Memory or Base Port (if the users has three or above communication ports, the users will see Link2, Link3 ...and vice versa). Press Add button to add and define Tag data. 
Delete	The users can use the mouse to select one row of the Tag table, and then press Delete button to delete it.
OK	Press OK button to save the settings and exit.
Cancel	Press Cancel to exit without saving.

How to Use Print Function

1. Select Printer: Select **File** > **New** to get into the New Application tab and choose the printer using the Printer drop-down list in New Application tab, or select **Options** > **Configuration** > **Print** to choose a printer.

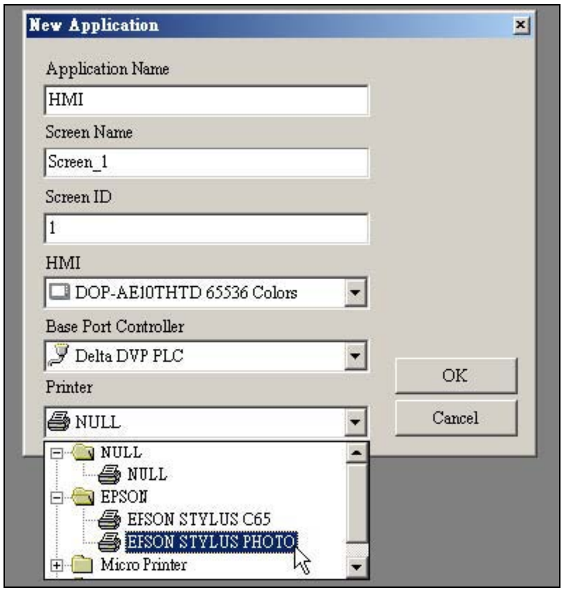


Figure 2-38: Select Printer

2. Configuring Print Setup: Select **Options** > **Configuration** > **Print** to open the Print tab. Use the Print tab to configure the settings of printer, paper, quality and margin, etc.

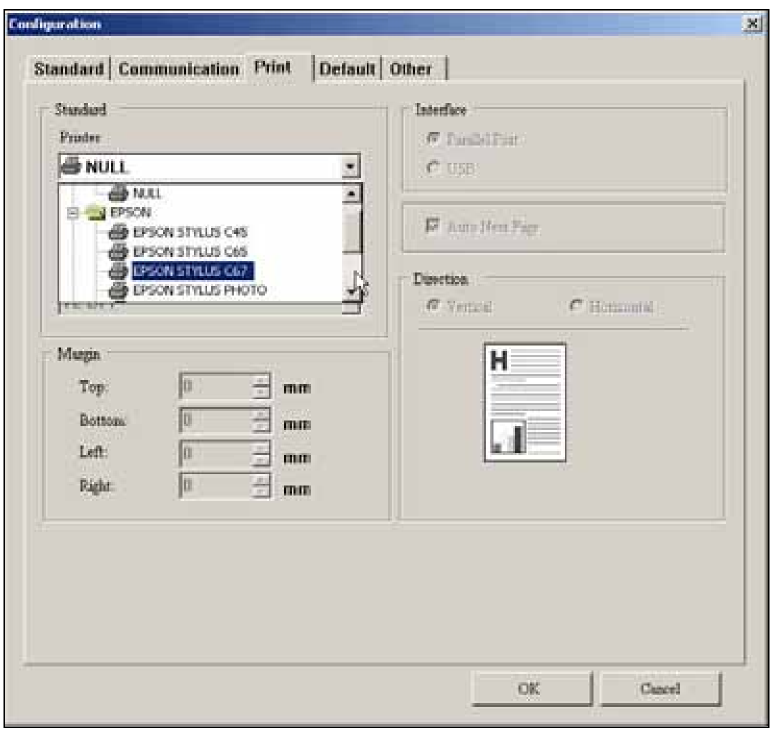


Figure 2-39: Print Configuration Setup

Create a Printed Report

1. Create a new screen by selecting **Screen** > **New Screen**) and set it as **Apply Print Screen** in Screen Properties tab (**Screen** > **Screen Properties**).

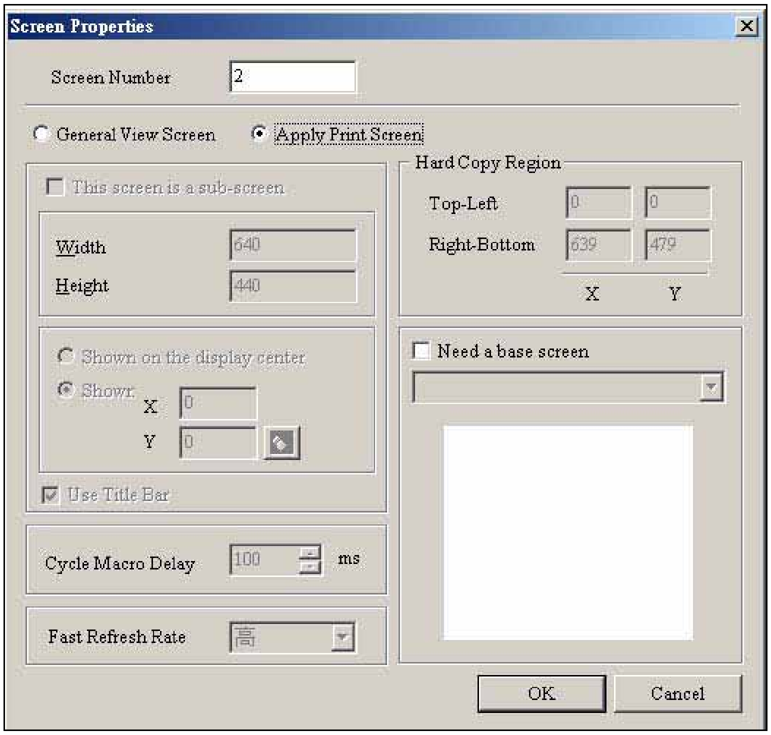


Figure 2-40: Screen Properties Screen

2. Create the element that you want to print. For example, if you want to print a Historical Trend Graph and a X-Y Chart, you can create a Historical Trend Graph (**Element** > **Sampling** > **Historical Trend Graph**) and a X-Y Chart (**Element** > **Curve** > **X-Y Chart**) first and then set their properties in the Property table. The Property table provides the element property setting for each element. For information about each element property settings, refer to Chapter 3.

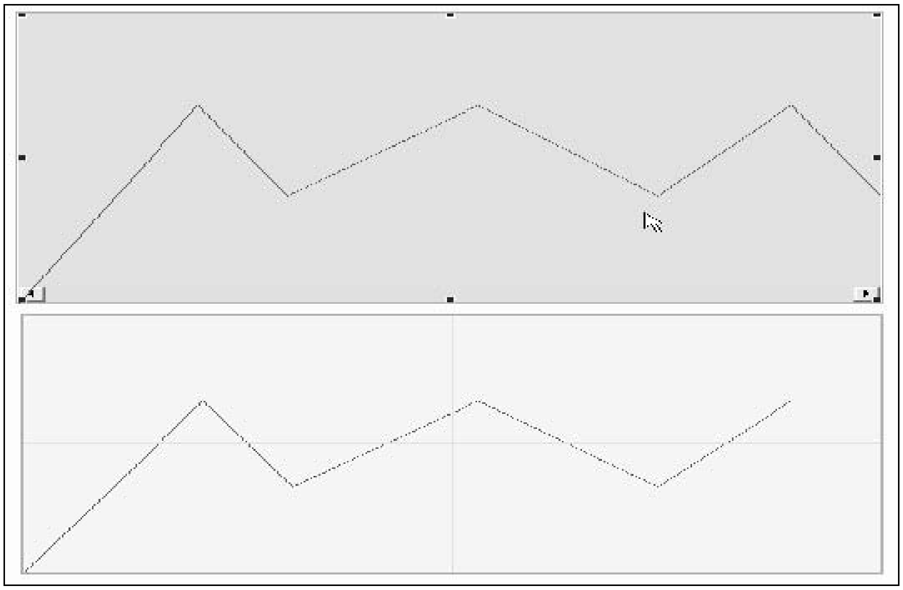


Figure 2-41: Historical Trend Graph and X-Y Chart

3. Choose "Yes" or "No" using the "Print Successive Data" drop-down list to determine whether the Print Successive Data function is selected or not. When "Yes" is selected, it indicates that Print Successive Data function is enabled, and all the sampling records and data for the element will be printed.

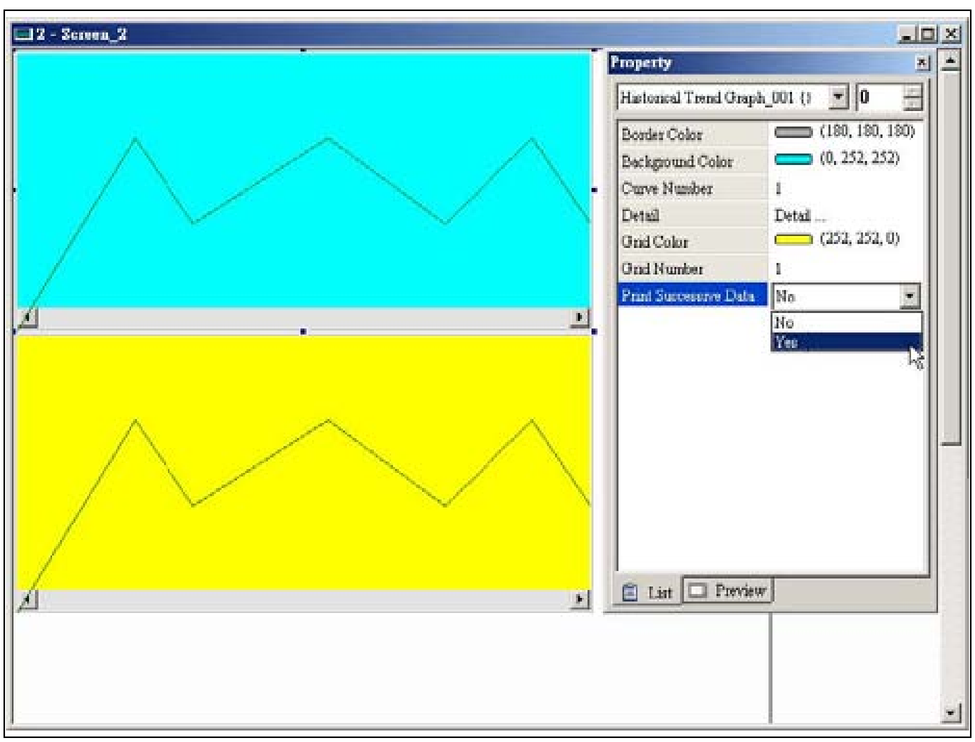


Figure 2-42: Print Successive Data Function Enabled

Print Screen Layout and Output

1. Select **Options** > **Print Typesetting**. Drag the mouse to decide which screen needs to be typeset and printed. The screens on the left are all created screens and the screens on the right are the selected screens. If a “General View Screen” is dragged to the right, it will become “Apply Print Screen” (Screen Properties) automatically.

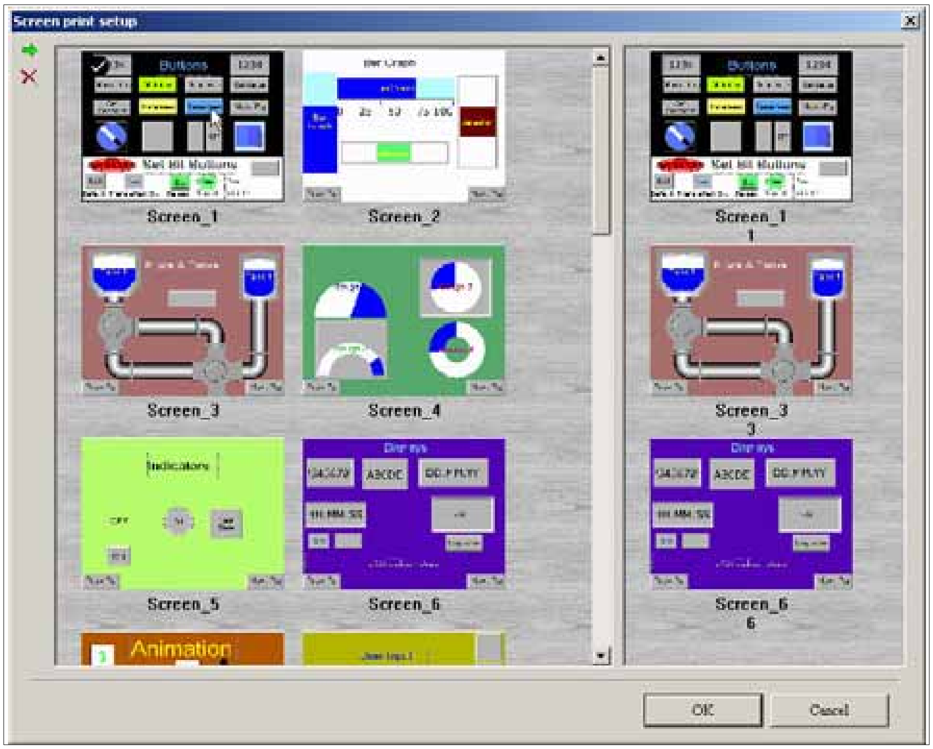


Figure 2-43: Screen Print Setup

2. Right click the mouse or use the function key to create a “Report List” button on a “General View Screen”. Use this “Report List” button to enable the print function.

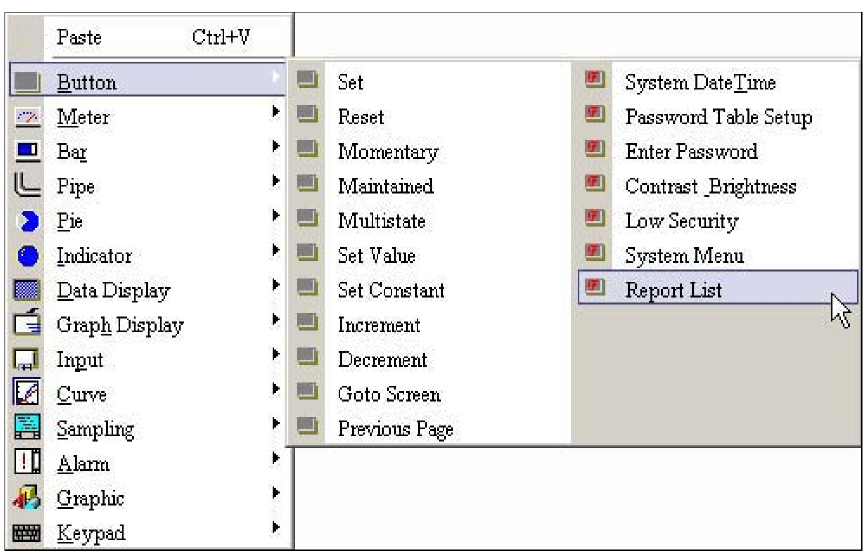


Figure 2-44: Report List Selection

3. Set the properties of the "Report List" option. The Report Device can be SMC, USB disk or Printer. If you select SMC or USB disk, the data will not print out, but the data will be sent to the SMC or USB.

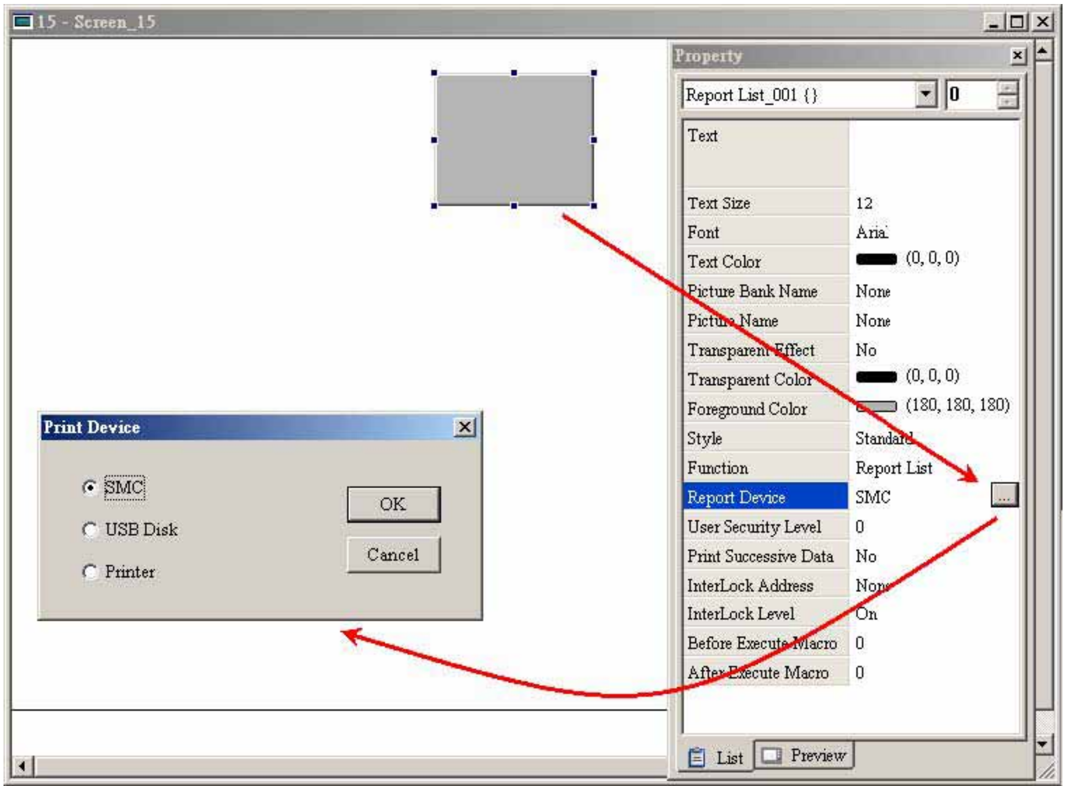


Figure 2-45: Select Print Device

How to Use Hard Copy Function

The Hard Copy function is available only when the screen is a "General View Screen". If **HMi** detects the "Print Typesetting" function is already set for the editing screen, the "Hard Copy" function will be ineffective.

1. Set the Hard Copy Region in Screen Properties tab.

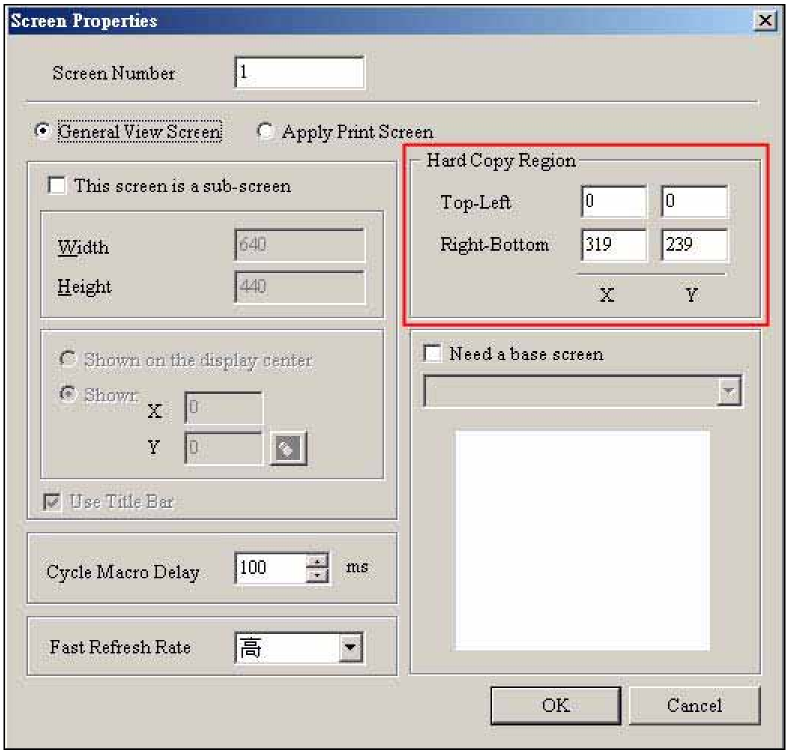
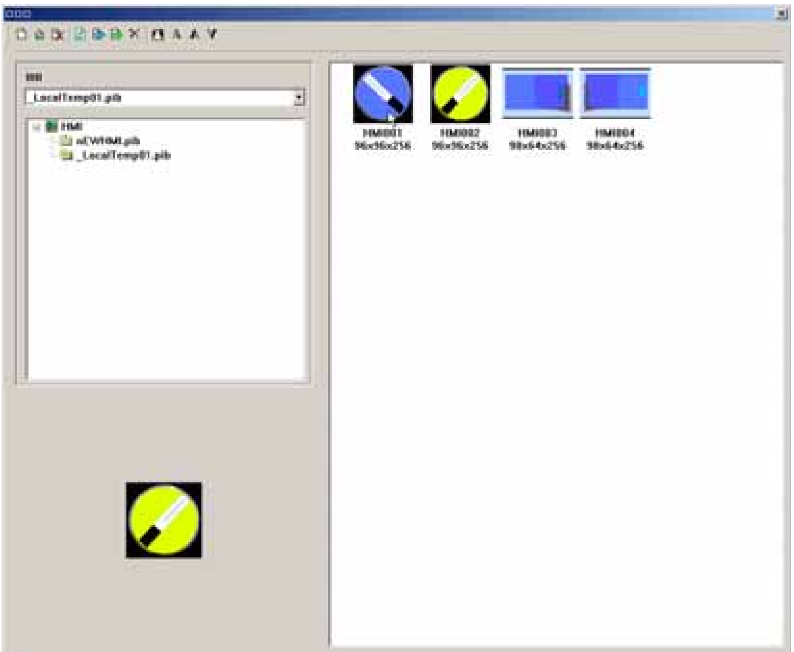


Figure 2-46: Set the Hard Copy Region

2. Enable the Print function.

Table 2-13: Picture Bank Browse

<table>
<tr><th colspan="3">Picture Bank Browse Dialog Box</th></tr>
<tr><td colspan="2">
</td><td>Click the Picture Bank option to browse all pictures saved in Picture Bank. When one picture is selected, you can see the picture in the preview window. Double left-clicking the mouse on the selected picture will display the picture in an actual size view.</td></tr>
<tr><td></td><td>New Picture Bank</td><td>Create a new picture bank. After clicking , the New Picture Bank dialog box is displayed on the screen.

</td></tr>
<tr><td></td><td>Open Picture Bank</td><td>Open a picture bank file (*.pib file).</td></tr>
<tr><td></td><td>Uninstall Picture Bank</td><td>Uninstall the selected picture bank. The uninstalled picture bank will be moved to Recycle Bin.</td></tr>
<tr><td></td><td>Save</td><td>Save the modified picture into the picture bank.</td></tr>
</table>

Table 2-13: Picture Bank Browse (continued)

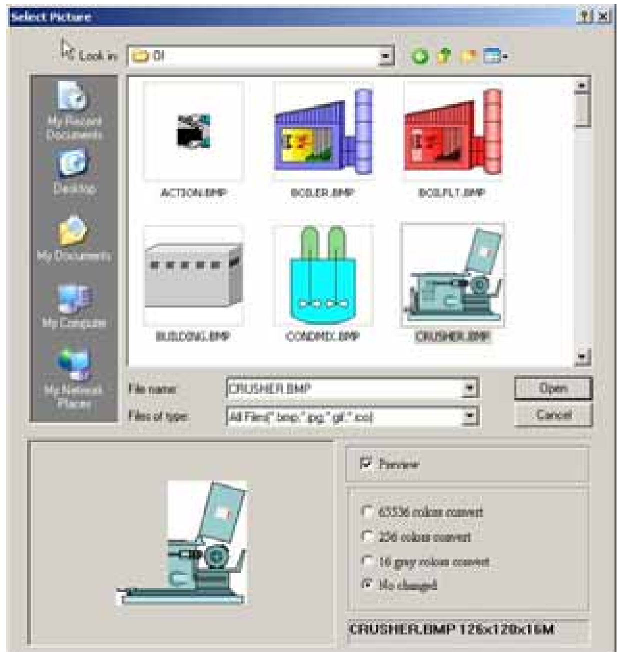
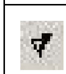
Picture Bank Browse Dialog Box		
Import Picture		Import pictures into the designated picture bank. The formats of the pictures in the picture bank can be BMP, JPG, GIF (static) and ICON pictures. When selecting this function, the dialog box shown will be displayed. The users can then convert the picture color in advance to speed the compile time or choose "No changed" option to retain the original color.
 Export	Export pictures in BMP format from the picture bank.	
 Delete	Delete pictures in the picture bank.	
 Inverse	Inverse the picture color - negative effect	
 Grayscale	Convert the color picture to 256 color grayscale.	
 Horizontal Mirror	Horizontal mirror effect	
 Vertical Mirror	Vertical mirror effect	

Table 2-13: Picture Bank Browse (continued)

<table>
<tr><th colspan="2">Picture Bank Browse Dialog Box</th></tr>
<tr><td>Shortcut Menu</td><td>The users can right-click the mouse to display a shortcut menu shown on the figure below. This shortcut menu shows a list of commands relevant to the picture bank option. This allows the users to manage the pictures in the picture bank more quickly and efficiently.

</td></tr>
</table>

Table 2-14: Text Bank

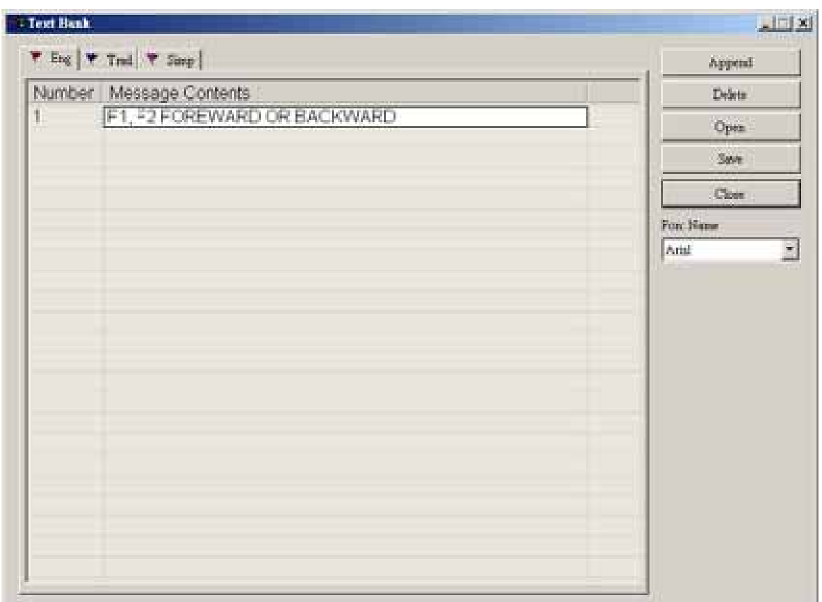
<table>
<tr><th colspan="2">Text Bank Dialog Box</th></tr>
<tr><td colspan="2">
</td></tr>
<tr><td>Append</td><td>Press the Append button to add the text into the Text Bank. The multi-language editing is supported in the Text Bank option. You can input the text or terms in different language and save them in the Text Bank. The multi-language font can also be set at the same time.</td></tr>
<tr><td>Delete</td><td>Press Delete button to remove the input text or terms in Text Bank.</td></tr>
<tr><td>Open</td><td>Press the Open button to open and import the text or terms into Text Bank.</td></tr>
<tr><td>Save</td><td>Press the Save button to save and export the text file.</td></tr>
<tr><td>Close</td><td>Close and exit the text bank dialog box.</td></tr>
</table>

Table 2-15: Environment Dialog

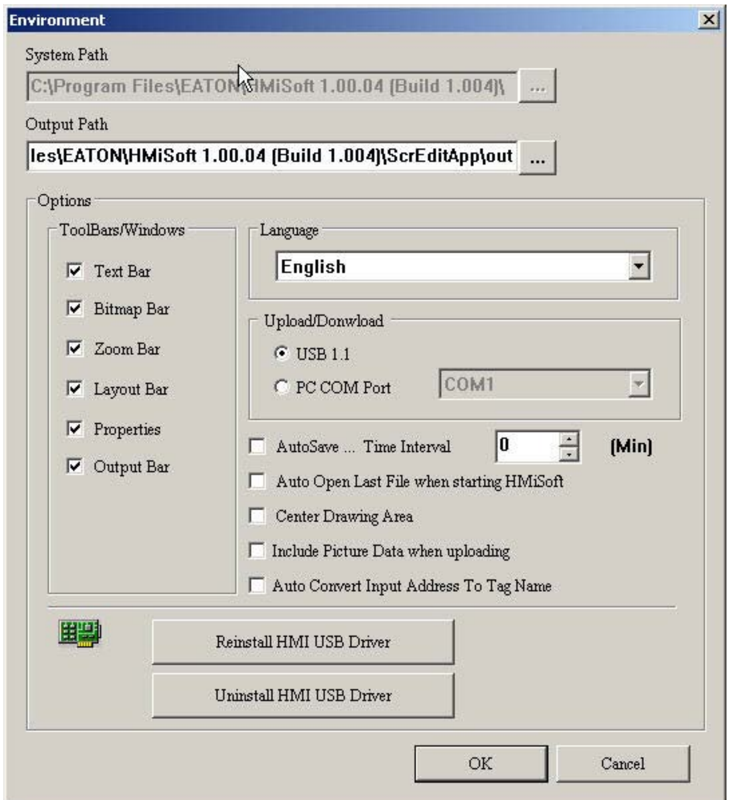
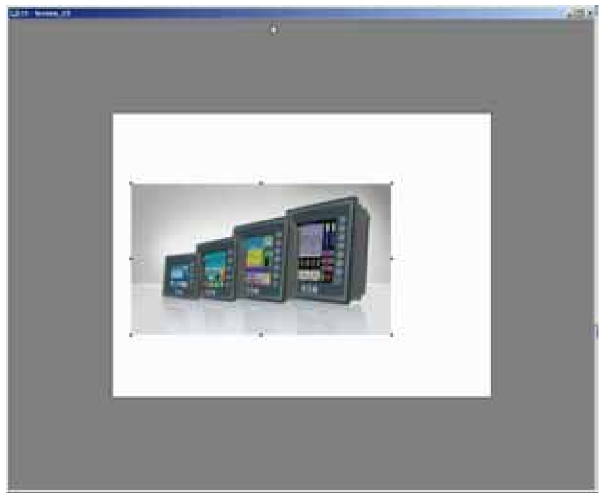
<table>
<tr><td colspan="3">Environment Dialog Box</td></tr>
<tr><td colspan="3">
</td></tr>
<tr><td>System Path</td><td colspan="2">Sets the location where HMi saves the system files, including some system reference data and dynamic link library (*.dll) files. To avoid a system error and failure to find the file, we recommend the users not change this setting if it is not necessary. (This option is disabled by default.)</td></tr>
<tr><td>Output Path</td><td colspan="2">Sets the location where HMi saves the output file after compile operation. Some functions, such as on-line simulation, off-line simulation, file download and upload all refer to the files in this location.</td></tr>
<tr><td rowspan="5">Options</td><td>Toolbars/Windows</td><td>Sets the option to display or not display toolbars or docking windows.</td></tr>
<tr><td>Language</td><td>Choose English, Traditional Chinese or Simplified Chinese from the Language drop-down list.</td></tr>
<tr><td>Upload/Download</td><td>Determines the communication interface for upload and download. It can be USB or PC COM Port.</td></tr>
<tr><td>Auto Saving… Time Interval</td><td>HMi automatically saves the file every specified number of minutes. The unit is M (minute) and the setting range is between 0M – 120M.</td></tr>
<tr><td>Auto Open for Next Execute Application</td><td>HMi automatically opens the specified file every time you start HMi.</td></tr>
</table>

Table 2-15: Environment Dialog (continued)

Environment Dialog Box (continued)		
	Center Drawing Area	When this option is selected, the editing screen will be placed in the center position. 
	Include Picture Data For Uploading	If this option is selected, all pictures are also uploaded when the **HM*i*** upload function is enabled. All uploaded pictures are saved in a file named as "**_LocalTemp01.pib**". The "Picture Bank Name" and the "Picture Name" (set in Property docking window) of the editing elements will refer to and link to this file. If **HM*i*** ends the editing abnormally, the file name will be named as "**_LocalTemp02.pib**," **_LocalTemp03.pib** …", and vice versa when uploading is executed the next time. The last two numbers at the end of the file name will increase progressively.
	Auto Convert Input Address To Tag Name	For example, if you want to replace PLC address 1@Y0 with the word "OS", define it in Tag Table option in advance. When this option is selected, **HM*i*** will automatically convert input address 1@Y0 to the word "OS".
Driver	Reinstall **HM*i*** USB Drive: Press it to reinstall the **HM*i*** USB driver Uninstall **HM*i*** USB Drive: Press it to uninstall the **HM*i*** USB driver	
OK	Press OK button to save the modified settings and exit the Environment dialog box.	
Cancel	Press Cancel button to exit the Environment dialog box without saving.	

Menu Bar and Toolbar (Window)

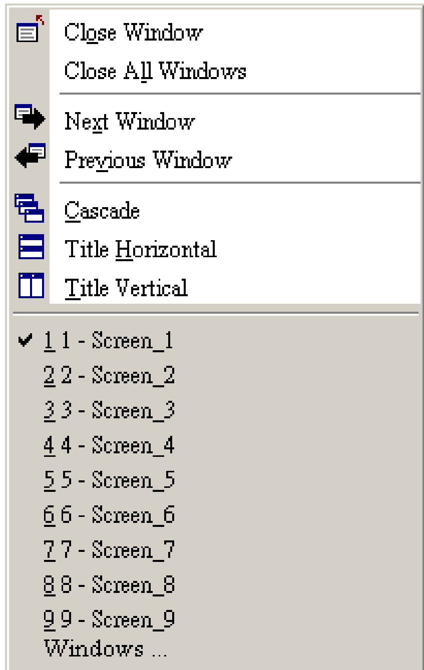


Table 2-16: Menu Bar and Toolbar (Window)

Icon	*Subject*	*Description*
	Close Window	Hide the current window, NOT exit the current window. Execute this function by selecting **Window** > **Close Window**. To display the hidden window, select **Screen** > **Open Screen** to open an old screen.
	Close All Windows	Hide all windows, NOT exit all windows. Execute this function by selecting **Window** > **Close All Windows**. To display the hidden window, select **Screen** > **Open Screen** to open old screens.
	Next Window	Switch the current window to the next window. If the current window is the last window, the current window will not be changed even if this function is executed.
	Previous Window	Switch the current window to the previous window. If the current window is the first window, the current window will not be changed even if this function is executed.
	Cascade	Display all editing windows so they overlap. The title bar of each window is visible but only the top window is fully visible. Execute this function by selecting **Window** > **Cascade**.

Table 2-16: Menu Bar and Toolbar (Window) (continued)

Icon	***Subject***	***Description***
	Title Horizontal	Display all editing windows from top to bottom. Execute this function by selecting **Window** > **Title Horizontal**. The opened windows are displayed horizontally.
	Title Vertical	Display all editing windows from left to right. Execute this function by selecting **Window** > **Title Vertical**. The opened windows are displayed vertically.
	Help	
	About **HM*i***soft	Display the version information of **HM*i***soft.

Chapter 3 — Element Function

This chapter explains how to select an element and the special functions of each element in **HM*i***.

How to Select an Element

Choose one of the following methods to select an element when editing the screens:

- Right-click in the work place to display the shortcut menu (**Figure 3-1**), and then select the desired element.
- Select the Element command from menu bar (**Figure 3-2**).
- Select the Element icon from the toolbar (**Figure 3-3**).

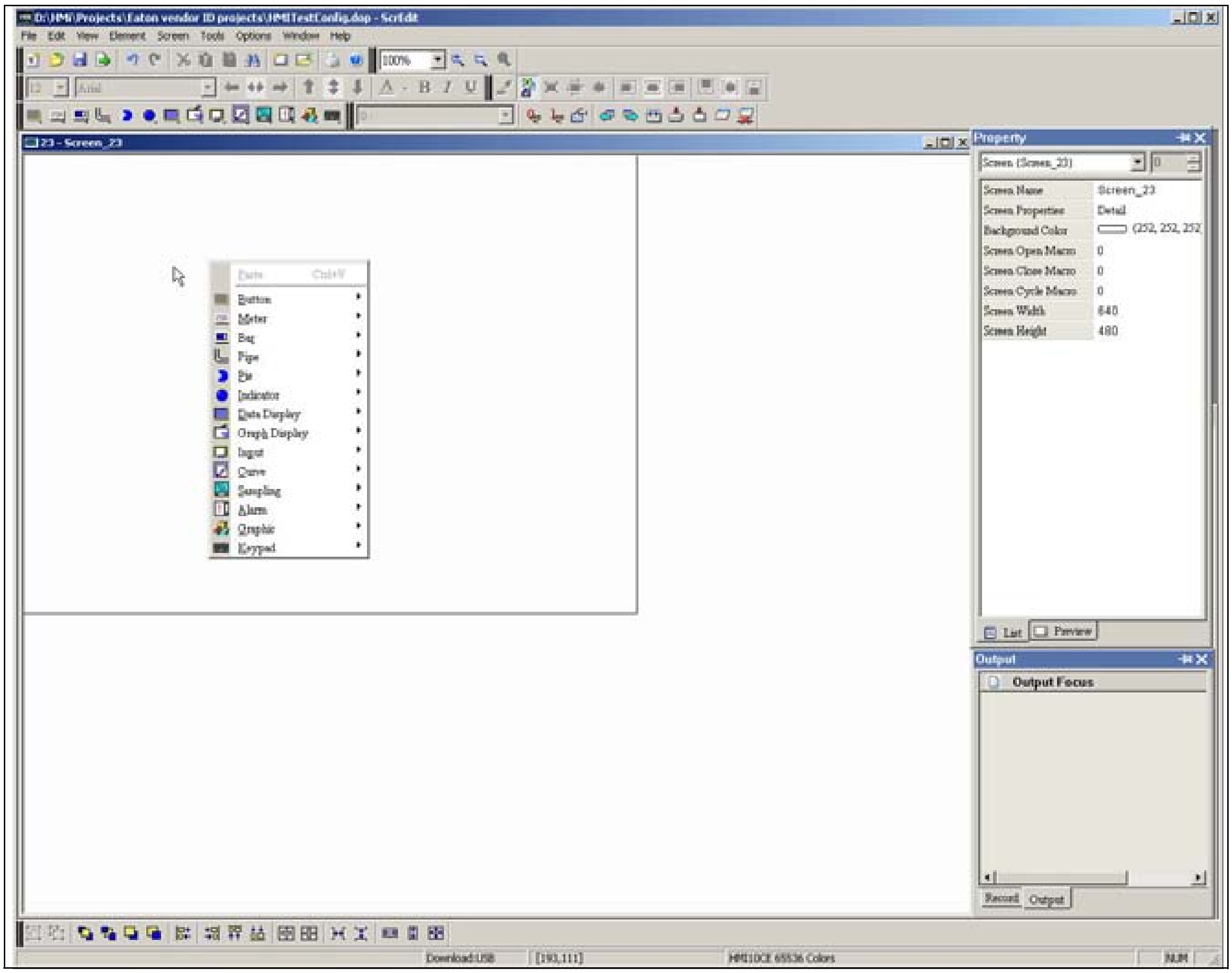


Figure 3-1: Shortcut Menu Display

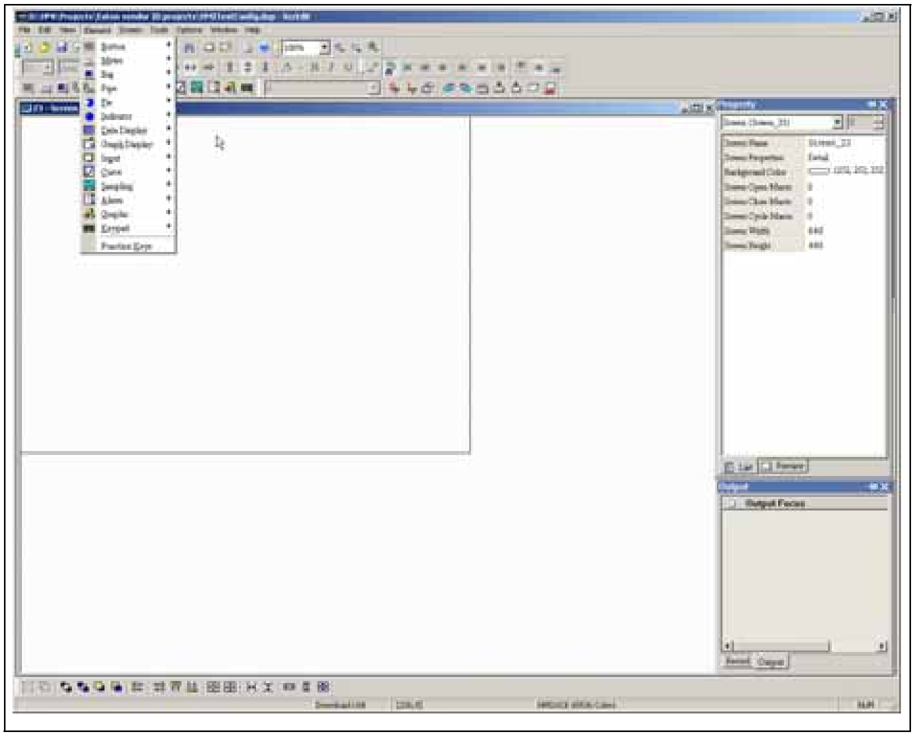


Figure 3-2: Selecting an Element Command from the Menu Bar

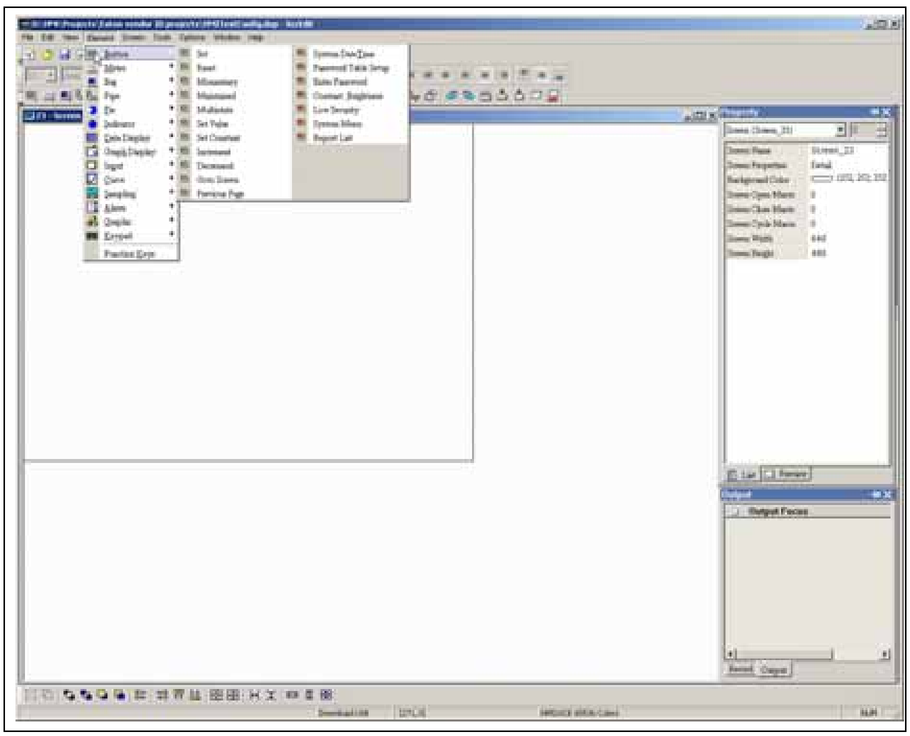


Figure 3-3: Selecting an Element Icon from the Toolbar

After selecting an element, drag it onto the work place to create a new element. To do this, click the starting point on the screen. While holding down the mouse button, move the mouse diagonally to the ending point of the element, then release the mouse button. The element will appear on the screen.

Property Window Attributes

The following properties may be common to many of the objects in this chapter and are discussed here instead of individually.

Button Elements

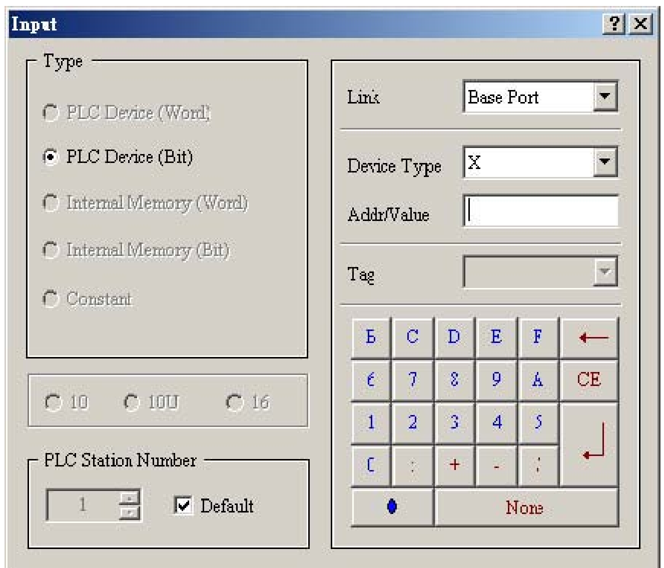
Table 3-1: Button Elements

Button Type	*Macro*	*Read*	*Write*	*Function*
Set	ON	Yes	Yes	Press this button to set the address (Bit) to ON. The address setting remains ON even if you release the button or press it again. If there is an ON Macro, it will be executed simultaneously.
Reset	OFF	Yes	Yes	Press this button to set the address (Bit) to OFF. The setting address setting remains OFF even if you release the button or press it again. If there is an OFF Macro, it will be executed simultaneously.
Momentary	ON OFF	Yes	Yes	Press this button to set the address (Bit) to ON and to execute the ON Macro at the same time. The address setting remains ON when the button is released and OFF when the button is pressed again. If you execute the OFF Macro simultaneously, it remains OFF when the button is released.
Maintained	ON OFF	Yes	Yes	Press this button to set the address (Bit) to ON. The address setting remains OFF when the button is released. If there is an ON / OFF Macro, it executes simultaneously.
Multistate	No	Yes	Yes	There are from 1 to 256 user-defined multistates available. A user can set the execution sequence to the “next state” or the “previous state.” If a user sets the next state, that state becomes state 2. If a user sets to the previous state, then state 2 becomes state 1.
Set Value	No	No	Yes	Press this button, to launch the “Numeric keypad” dialog box, and then you can enter the value setting directly. After you enter the value setting and press ENTER key, **HM*i*** transmits the input value to the address setting.
Set Constant	No	No	Yes	Press this button to cause **HM*i*** to write the specific value into the address setting.
Increment	No	Yes	Yes	Press this button to cause **HM*i*** to add up the values contained within the address setting and the constant value setting, and stores/sends the results back to the address setting.
Decrement	No	Yes	Yes	Press this button to cause **HM*i*** to subtract the constant value setting from the value contained within the address setting, and stores/sends the results back to the address setting.
Goto Screen	No	No	No	Press this button to switch to the screen that you designated.
Previous Page	No	No	No	Press this button to return to the previous screen.

General Buttons

Press one of the general buttons to transmit an ON/OFF signal to the PLC. The four general buttons are: Set button, Reset button, Momentary button and Maintained button. Refer to **Table 3-2** for the property descriptions of the general buttons.

Table 3-2: Property Description of General Buttons

<table>
<tr><th colspan="5">Property Description of General Buttons</th></tr>
<tr><td rowspan="5">Write Address
Read Address</td><td colspan="4">Press the  button next to the Write Address or Read Address to enter the Input dialog box, and then select Write Address or Read Address.


The link type can be ether iBase Port or Internal Memory. If you connect to multi-connections, the new connections are added into the Link drop-down menu by completing the following steps.
1. Select the Link option and Device Type
2. Enter the correct address.
3. Press the Enter key.
The corresponding numeric value will be recorded on the element that you selected.
Device types are described as follows:</td></tr>
<tr><td>$</td><td>Internal Register (SDRAM)</td><td>RCP</td><td>Receipt register</td></tr>
<tr><td>$M</td><td>Non-volatile Internal Register (SRAM)</td><td>RCPNO</td><td>Receipt Number Register</td></tr>
<tr><td>*$</td><td>Indirect Address Register (SDRAM)</td><td>Other</td><td>Other device names supported by other brands PLC. Refer to the user manual of the PLC.</td></tr>
<tr></tr>
<tr><td>Edit On/Off Macro</td><td colspan="4">Edit On and Off Macro is available. For the Macro function, refer to Chapter 4 for more details.</td></tr>
</table>

Table 3-2: Property Description of General Buttons (continued)

<table>
<tr><th colspan="5">Property Description of General Buttons (continued)</th></tr>
<tr><td rowspan="1">Text
Text Size
Font
Text Color</td><td colspan="4">User can select any of the available Windows® fonts. Press the button next to the Font tab to display the Font Detail Setting dialog box.
In the Font Detail Setting dialog box, select the Font Name, Font Size and Ratio. The font can be any Windows® font, the font size determines the height and the ratio determines the width. You may also view the text format in the Preview window. If the multi-language function is used, the user can see the different language tabs and can edit the different language font settings in the Font Detail Setting dialog box.
</td></tr>
<tr><td>Blink</td><td colspan="4">Select Yes to cause the element to blink while in this state.</td></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="4">Select the Picture Bank Name to see the picture banks available. After selecting a picture bank, double click to select a picture.

For information on creating a new or modifying an existing picture bank, see Table 2-13 on page 62.</td></tr>
<tr><td rowspan="3">Transparent Effect
Transparent Color</td><td colspan="4">Use the eyedropper tool to determine the color that will appear transparent in the picture. The color selected will be removed from the element and be changed to the foreground color. The effect on the element before and after this action happens is shown in the figures below.

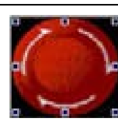
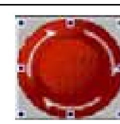
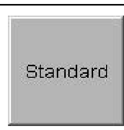
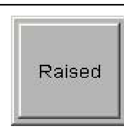
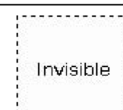
If the color selected has a greater color depth (65536 colors vs. 256) than the HMi screen allows, an error will occur. You can select colors from the drop-down list to specify a transparent color, but there may be chromatic aberration. An example of chromatic aberration is selecting a black color from the drop down list, only to see that the black in the picture does not become transparent. In this case, the black in the picture is a shade different than the black color selected.</td></tr>
<tr><td colspan="2">The effect before this action is executed:</td><td colspan="2">The effect after this action is executed</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="3">Foreground Color
Style</td><td>Standard</td><td>Raised</td><td>Round</td><td>Invisible</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">You can specify the button style and foreground color as shown in the figures above by using this option.</td></tr>
<tr><td>Function</td><td colspan="4">You can modify the element characteristic directly without recreating a new element. The element characteristics that can be modified directly using this option are: Set button, Reset button, Momentary button and Maintained button.</td></tr>
</table>

Table 3-2: Property Description of General Buttons (continued)

Property Description of General Buttons (continued)		
Push Time (second)	Use this option to set the active time of the button. When this option is set, the button will be active after pressing the button longer than the setting time indicated. The range set is between 0 – 10 seconds.	
Data Length	Bit	Multistate button can have two states.
	Word	Multistate button can have 256 states.
	LSB	Multistate button can have 16 states.
Line Color	Used to set the display color of the dynamic line element.	
Line Size	The unit is in Pixels and the range is between 1and 8.	

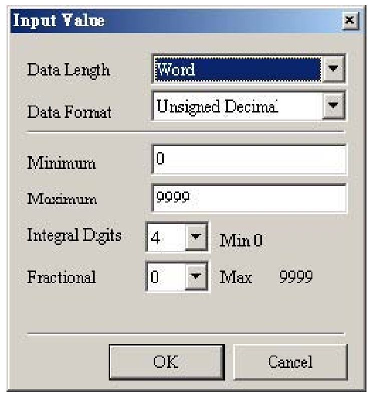
Multistate Buttons

Table 3-3: Property Description of Multistate Buttons

Property Description of Multistate Buttons	
The number state will vary by unit. In Word, the number state may be from 1 to 256; in LSB, the number state is 16; with a Bit, the number state is 2. The unit of the read/write address will vary by the value unit. If the value unit is Word or LSB, the unit of the read/write address will be the Word equivalent. If the value data type is Bit, the unit of read/write address will be Bit. After obtaining the data from the read address, it will increase or decrease gradually according to the next state or previous state and will write the new value to the write address. The change state of this button depends on the read address. If you need to add or delete the total numbers state, edit the values in only element property table.	
Add/Remove State	Sets the number state of multistate buttons. One to 256 states can be set if the unit is Word, 16 states can be set if the unit is LSB, and 2 states can be set if the unit is Bit.
Sequence	Switches the multistate sequence (previous state/next state).

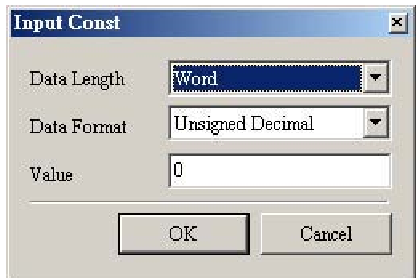
Set Value Button

Table 3-4: Property Description of Set Value Buttons

<table>
<tr><td colspan="4">Property Description of Set Value Buttons</td></tr>
<tr><td colspan="4">Press this button to launch a system built-in numeric keypad (TEN-KEY) that you can use to input the setting value directly. Press the ENTER key to send the input setting value to the corresponding PLC register. The maximum and minimum input setting values are all user-defined. You can also specify the mode to trigger the designated PLC address before or after writing the setting value.</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="3">Turns ON the designated PLC address before or after writing the setting value. Note: this function can be used only to trigger PLC address to turn ON. If the PLC address needs to be triggered again, you must reset the address to OFF.</td></tr>
<tr><td rowspan="10">Detail Range Setup</td><td colspan="3">
</td></tr>
<tr><td>Data Length</td><td colspan="2">There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td rowspan="3">Data Format</td><td colspan="2">Provides different kinds of data format for different data lengths:</td></tr>
<tr><td>Word</td><td>Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr>
<tr><td>Minimum</td><td colspan="2" rowspan="2">Sets the minimum and maximum input setting values to determine the range of input setting value.</td></tr>
<tr><td>Maximum</td></tr>
<tr><td>Integral Digits</td><td colspan="2" rowspan="2">Determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as Floating.</td></tr>
<tr><td>Fractional</td></tr>
<tr><td colspan="3">Press OK when you have input the minimum and maximum value, and then HMi will examine the value by referring to the selected data length, data format, and integral and fractional digits.</td></tr>
</table>

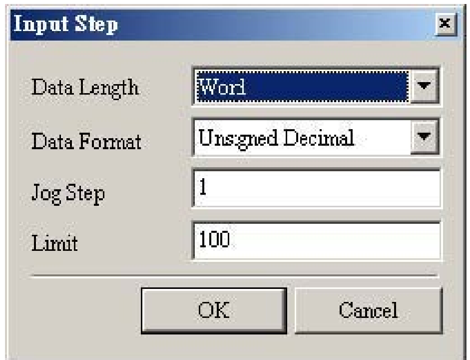
Set Constant Button

Table 3-5: Property Description of Set Constant Buttons

<table>
<tr><td colspan="3">Property Description of Set Constant Buttons</td></tr>
<tr><td colspan="3">Press this button to send the specified constant value to the corresponding PLC register. It has the same function as Set Value button. The users can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="2">Turns ON the designated PLC address before or after writing the value setting. Note: This function can only trigger PLC address to be ON. If the PLC address needs to be triggered again, you must reset the address to OFF.</td></tr>
<tr><td>Detail Range Setup</td><td colspan="2">
</td></tr>
<tr><td rowspan="5"></td><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td rowspan="3">Data Format</td><td>Provides the following data formats:</td></tr>
<tr><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Value</td><td>Press OK when you have entered the constant value, and then HMi will examine the value by referring to the selected data length and data format tables.</td></tr>
</table>

Increment / Decrement

Table 3-6: Property Description of Increment / Decrement Buttons

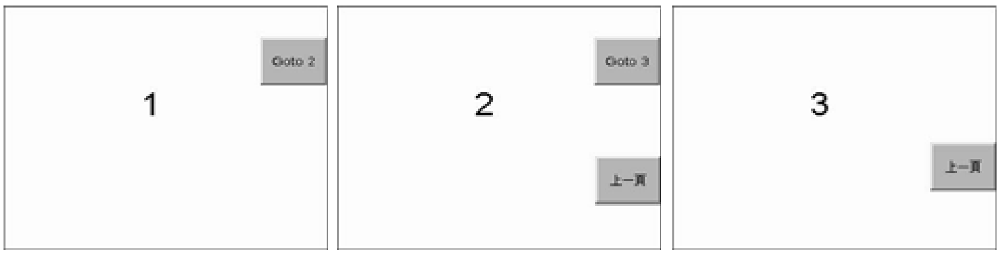
<table>
<tr><td colspan="3">Property Description of Increment / Decrement Buttons</td></tr>
<tr><td colspan="3">Press this button, and the HMi reads the value from PLC and adds or subtracts the set constant values. HMi then writes the result into the corresponding PLC register. If the addition or subtraction result exceeds the limit (minimum and maximum) set in the HMi, the HMi will save the limit value (minimum and maximum) into the corresponding PLC address. IMPORTANT: If the register value is 3 and the minimum value is 100 (default), and the operator presses the button, the new register value will be 100.</td></tr>
<tr><td rowspan="7">Detail Range Setup</td><td colspan="2">
</td></tr>
<tr><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td rowspan="3">Data Format</td><td>Provides the following data formats:</td></tr>
<tr><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Jog Step</td><td>Used to set increasing and decreasing value every time the Increment and Decrement buttons are pressed.</td></tr>
<tr><td>Limit</td><td>Used to set the limit of increment and decrement values. Press the OK button, and HMi will examine the increment and decrement values entered and limit the value, if necessary, by referring to the selected data length and data format.</td></tr>
</table>

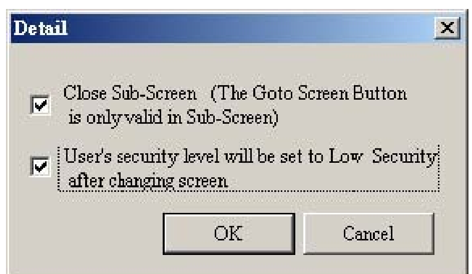
Goto Screen / Previous Page (Previous View) Buttons

Table 3-7: Property Description of Goto Screen / Previous Page (Previous View) Buttons

<table>
<tr><th colspan="3">Property Description of Goto Screen / Previous Page (Previous View) Buttons</th></tr>
<tr><td colspan="3">Select one of the following to switch screens:

Press the Goto button to go the screen specified.
Press the Previous Page button to return to the previous screen.
Press the Previous View button to return to the previous view (comparable to the Back button in Windows® Explorer).



The above screens illustrate the operation of Previous page button. In screen 1, if you press Goto 2 button, the HMi will switch to screen 2. If you press Goto 3 button on screen 2, the HMi will switch to screen 3. Then, if you press the Previous Page button on screen 3, the HMi will return to screen 2. If you press the Previous Page button on screen 2, the HMi will switch to screen 1. (Note: If the function of the button created on screen 2 Previous View rather than Previous Page, when you press the Previous View button on screen 2, HMi will switch to screen 3, not screen 1. This is the difference between Previous Page and Previous View.)</td></tr>
<tr><td rowspan="3">Detail</td><td colspan="2">The Detail dialog box pops up only when the Goto Screen button function is selected.

</td></tr>
<tr><td>Close Sub-Screen</td><td>Select the Close Sub-Screens button to indicate that the Goto Screen button is valid only in Sub-Screen. Select this button to close the current (active) sub-screen.</td></tr>
<tr><td>User’s security level will be set to Low Security after changing screen.</td><td>Select the next button to set the current user’s security level to Low Security. Doing so can prevent user errors.</td></tr>
<tr><td>Goto Screen</td><td colspan="2">In the Open Screen dialog box, you can select the desired screen from left side and the preview screen will display on the right side. After selecting the screen desired and pressing OK button, the HMi will records the designated screen in the Goto button element.</td></tr>
</table>

System Function Button

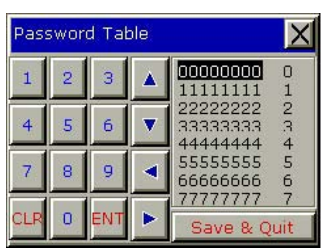
Table 3-8: System Function Buttons

Button Type	***Macro***	***Read***	***Write***	***Function***
System Date Time	No	No	No	Sets **HM*i*** system time and date (year-month-day, hours:minutes:seconds).
Password Table Setup	No	No	No	Sets **HM*i*** password security level.
Enter Password	No	No	No	Provides **HM*i*** password function.
Contrast Brightness	No	No	No	Adjusts **HM*i*** contrast and brightness.
Low Security	No	No	No	Sets the password to the lowest security level (Level is 0).
System Menu	No	No	No	Changes screen to System Menu view.
Report List	No	No	No	Outputs screen data to a specific device and is usually used with the print function.

For property descriptions of system function buttons, refer to **Table 3-9**:

Table 3-9: Property Description of System Function Buttons

<table>
<tr><th colspan="3">Property Description of System Function Buttons</th></tr>
<tr><td rowspan="3">Function</td><td colspan="2">You can modify element characteristics directly without having to recreate a new element. These elements include:</td></tr>
<tr><td>System Date and Time</td><td>Sets the HMi system date and time. Press SYS button on the HMi panel to enter the HMi system setting screen and edit the date and time as shown in the figure below.

</td></tr>
<tr><td>Password Table Setup</td><td>Determines the security access level that can change users passwords. After downloading screen data to the HMi, if the user's security level is lower than the Security Level setting in the property dialog box, the Password Table will not be opened and only the Password Keypad dialog box will display. The user's security must be higher than the setting level to open the Password Table. When opened, users can only view or change passwords with security levels lower than the user's. Users cannot change or view those passwords with higher security settings.


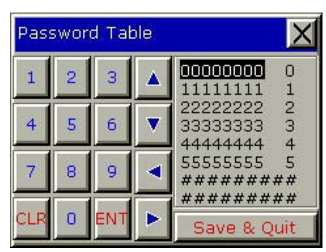
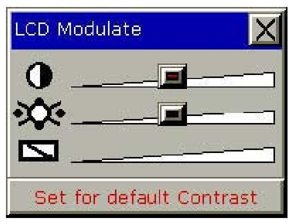

</td></tr>
</table>

Table 3-9: Property Description of System Function Buttons (continued)

Property Description of System Function Buttons (continued)		
Function (continued)	Enter Password	Provides an **HM*i*** password input interface and sets the security level for the password entered. The higher the security level the user enters, the higher security level the user has. 
	Contrast Brightness	Allows you to adjust the **HM*i*** LCD contrast and brightness settings as shown in the following pop-up window. Press the Set for default Contrast button to set the default settings. 
	Low Security	Sets the user security level to the lowest (Level 0). This option forces the user security level to the lowest level to ensure that control system parameters cannot to be modified when the user exits the different screens. Also helps avoid the misoperation that may cause system error. (This function is also provided for in the Goto screen button.)
	System Menu	Returns the **HM*i*** to the System Menu screen. Users can return to the operation screen by activating the Run function to startup the **HM*i*** again.
	Report List	This button has many functions. It can be used flexibly depending on the properties of the Report List option (Refer to **Table 2-9** in Chapter 2 and the following description of Report Devices).
Report Device	Available with the Report List button only. Select to set this option in the property table.  The Report Device window is shown above. The Report Device can be SMC, USB Disk, or Printer. Note that the USB Disk and Printer are provided in the **HM*i*** only.	
	SMC	Outputs history records and alarm data to a SMC card.
	USB Disk	Outputs history records and alarm data to a USB disk.

Meter Element

Table 3-10: Property Description of Meter Element

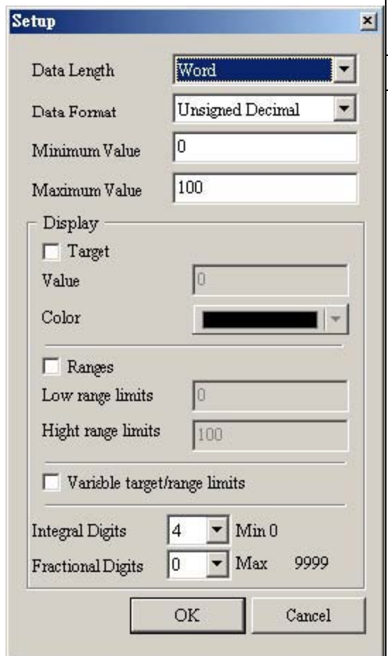
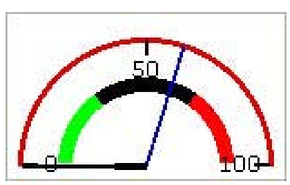
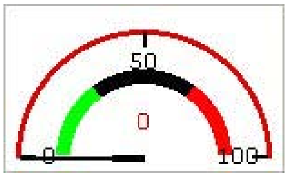
<table>
<tr><td colspan="5">Property Description of Meter Element</td></tr>
<tr><td colspan="5">You can set the Meter Element appearance in the property table, including the style, color (including border color, background color, stitch color, and scale color), the scale region number, etc. Also, the maximum and minimum values along with the high limits and security limits can be defined in the Detail Setup dialog box. It can also be used to calculate the specified address and measure if it exceeds the limit or not. The users can also use various colors.</td></tr>
<tr><td rowspan="8">Detail Setup</td><td rowspan="4" colspan="2">
</td><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td>Data Format</td><td>The following data formats are provided:</td></tr>
<tr><td rowspan="2"></td><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal</td></tr>
<tr><td>Minimum Value
Maximum Value</td><td colspan="3">Sets the minimum and maximum display value.</td></tr>
<tr><td>Target
Value
Color</td><td colspan="3">Set the target value display with this option. If set, the target value and color set will display as illustrated below. The target value at 60 and the color is blue.

</td></tr>
<tr><td>Ranges (Enable range setting)</td><td colspan="3">Refer to the description of Low and High Region Color.</td></tr>
<tr><td>Variable target/ range limits</td><td colspan="3">When the target value and low and high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2, and the address of the target value is Read Address+3.</td></tr>
<tr><td></td><td>Integral Digits
Fractional Digits</td><td colspan="3">Determines the digit number of integer and decimal fractions. The digit number is not a real digit number value but the display format instead.</td></tr>
<tr><td></td><td colspan="4">When users enter the target value, minimum and maximum values, after pressing OK button, HMi will examine the value by referring to the selected data length, data format, integral and fractional digits.</td></tr>
</table>

Table 3-10: Property Description of Meter Element (continued)

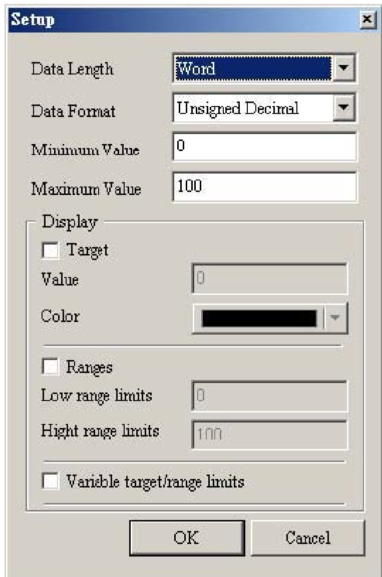
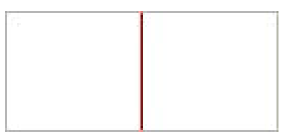
Property Description of Meter Element (continued)	
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If you set the low limit value as 30, the color of the low limit region as green, and then set the high limit value as 70 and the color of high limit region as red, the meter element will be shown as illustrated below: 
Stitch Color	Sets the stitch color of the meter element.
Scale Color	Sets the scale color of the meter element.
Scale Region Number	Sets the scale region number of the meter element. You can use the up or down buttons to increase or decrease the scale region number. The setting range is between 1 and 10.

Bar Element

Table 3-11: Property Description of Normal Bar Element

Property Description of Normal Bar Element		
HM*i* reads the value of the corresponding PLC specific address (register), converts the value to normal bar elements, and then displays it on the screen.		
Display Format	Left	The display viewing direction is from right to the left.
	Right	The display viewing direction is from left to the right.
	Top	The display viewing direction is from bottom to the top.
	Bottom	The display viewing direction is from top to the bottom.

Table 3-11: Property Description of Normal Bar Element (continued)

<table>
<tr><th colspan="5">Property Description of Normal Bar Element (continued)</th></tr>
<tr><td rowspan="8">Detail</td><td colspan="2" rowspan="3">
</td><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td rowspan="2">Data Format</td><td>The following data formats are provided:
Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Minimum Value</td><td colspan="3" rowspan="2">Sets the minimum and maximum display values.</td></tr>
<tr><td>Maximum Value</td></tr>
<tr><td>Target
Value
Color</td><td colspan="3">You can decide to set the target value display using this option. If this option is set, the target value and color set by the users will display on the screen. The HMi will refer to the minimum and maximum value set and draw the proper reference line on the bar element as shown below: (Here we set the target value as 50 and its color as red. The maximum and minimum values are 100 and 0 respectively.)
</td></tr>
<tr><td>Ranges (Enable range setting)</td><td colspan="3">Refer to the description of Low and High Region Color.</td></tr>
<tr><td>Variable target/ range limits</td><td colspan="3">When the target value and low and high limits are a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.</td></tr>
<tr><td></td><td colspan="4">When you enter the target value, low and high limits, and minimum and maximum values, and then press the OK button, the HMi will examine the value by referring to the selected data length and data format.</td></tr>
<tr><td>Low Region Color
High Region Color</td><td colspan="4">This option is available and displayed in the property table only when the “Ranges” option in the Detail dialog box is selected. If you set the low limit value as 30 and the color of low limit region as green, and then set the high limit value as 70 and the color of high limit region as red, the bar element will be shown as illustrated below. (The minimum and maximum input values are 0 and 100 respectively).

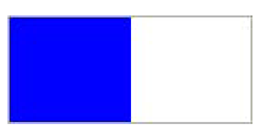
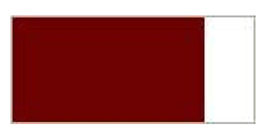
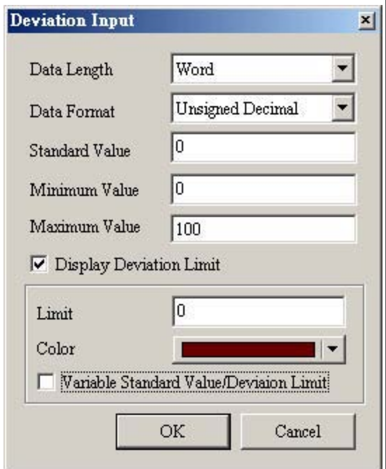
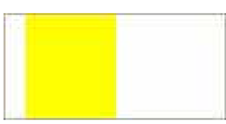
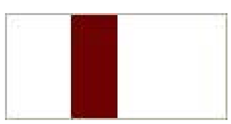
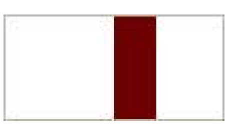
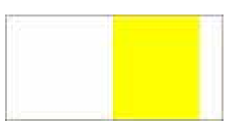
When the value is 20

When the value is 50

When the value is 80</td></tr>
</table>

Table 3-12: Property Description of Deviation Bar Element

<table>
<tr><td colspan="4">Property Description of Deviation Bar Element</td></tr>
<tr><td colspan="4">HMi reads the value of the corresponding PLC specific address (register). Subtract the setting standard value from this read value and you have a deviation value. Then, you can convert the deviation value to the deviation bar element, and then display it on the screen.</td></tr>
<tr><td rowspan="2">Display Format</td><td>Horizontal</td><td colspan="2">The deviation value displays horizontally.</td></tr>
<tr><td>Vertical</td><td colspan="2">The deviation value displays vertically.</td></tr>
<tr><td rowspan="12">Detail</td><td rowspan="4"></td><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td>Data Format</td><td>The following data formats are provided:</td></tr>
<tr><td rowspan="2"></td><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Standard Value</td><td colspan="2">Sets the standard value for calculating the deviation value.</td></tr>
<tr><td>Minimum Value</td><td colspan="2" rowspan="2">Specifies the minimum and maximum values in the deviation bar element.</td></tr>
<tr><td>Maximum Value</td></tr>
<tr><td>Display Deviation Limit</td><td colspan="2">The deviation limit and color can be set only when this option is selected. The deviation value will display in the designated color set by the user. If this option is not selected, the deviation value will be displayed in the foreground color directly on the screen.</td></tr>
<tr><td>Variable Standard Value/ Deviation Limit</td><td colspan="2">When the standard value and the high limit of the deviation value is variable. The address of the standard value is Read Address+1 and the address of deviation limit value is Read Address+2.</td></tr>
<tr><td colspan="3">When you enter the standard value, the minimum and maximum value, and the deviation limit after pressing the OK button, HMi will examine the value by referring to the selected data length and data format.</td></tr>
<tr><td colspan="3">For example, if the data length is set to Word, the data format is set to Unsigned Decimal, standard value is set to 50, the minimum value is set to 0, the maximum value is set to 100, and the deviation limit is set to 20, the deviation bar element will be shown as illustrated below:

When the value is 10

When the value is 20

When the value is 70

When the value is 90</td></tr>
</table>

Pipe Element

Table 3-13: Property Description of Pipe (1) / Pipe (2) Element

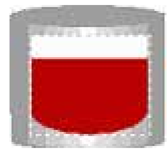
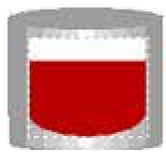
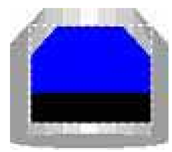
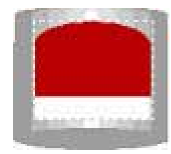
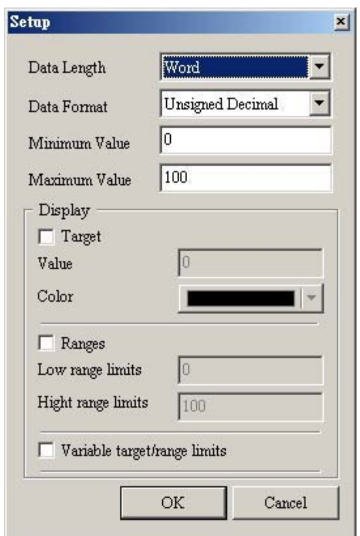
<table>
<tr><td colspan="5">Property Description of Pipe (1) / Pipe (2) Element</td></tr>
<tr><td colspan="5">HMi reads the value of the corresponding PLC specific address (register), converts the value to the Pipe (1) / Pipe (2) element, and then displays it on the screen.</td></tr>
<tr><td rowspan="2">WaterMark Color
Inside Tube Color</td><td colspan="4">Sets the watermark color and inside tube color of the Pipe (1) and Pipe (2) element.
Pipe (1) ElementPipe (2) Element
 </td></tr>
<tr><td colspan="2">The watermark color is blue.
The inside tube color is black.</td><td colspan="2">The watermark color is red.
The inside tube color is white.</td></tr>
<tr><td rowspan="2">Style</td><td colspan="2">Standard</td><td colspan="2">Rotation 180</td></tr>
<tr><td colspan="2"> </td><td colspan="2"> </td></tr>
<tr><td rowspan="9">Detail Setup</td><td rowspan="4" colspan="2">
</td><td>Data Length</td><td>There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td>Data Format</td><td>The following data formats are provided:</td></tr>
<tr><td rowspan="2"></td><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Minimum Value</td><td colspan="3" rowspan="2">Sets the minimum and maximum capacity of the pipe element.</td></tr>
<tr><td>Maximum Value</td></tr>
<tr><td>Target
Value
Color</td><td colspan="3">You can display the target value using this option.</td></tr>
<tr><td>Ranges (Enable range setting)</td><td colspan="3">Refer to the description of Low and High Region Color.</td></tr>
<tr><td>Variable target/ range limits</td><td colspan="3">When the target value and low and high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.</td></tr>
<tr><td></td><td colspan="4">When you enter the target value, low and high limit, minimum and maximum value, after pressing the OK button, HMi will examine the value by referring to the selected data length and data format.</td></tr>
</table>

Table 3-13: Property Description of Pipe (1) / Pipe (2) Element (continued)

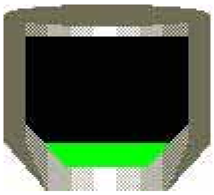
Property Description of Pipe (1) / Pipe (2) Element (continued)			
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If you set the low limit value as 30 and the color of the low limit region as green, and then set the high limit value as 70 and the color of the high limit region as red, the pipe element is illustrated below. (The minimum and maximum input values are 0 and 100 respectively.):		
	 When the value is 20	 When the value is 50	 When the value is 80

Table 3-14: Property Description of Pipe (3) Element

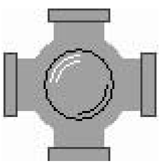
Property Description of Pipe (3) Element	
It is used to connect to several pipes. The Pipe (3) element is shown below: 	
Pipe Gauge	Sets the pipe gauge. The selectable range is from 1 – 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels, etc.

Table 3-15: Property Description of Pipe (4) Element

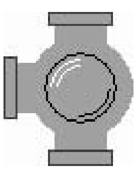
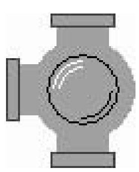
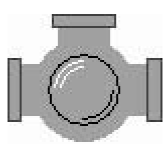
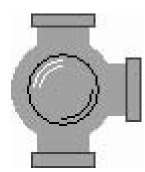
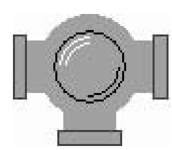
Property Description of Pipe (4) Element				
It is used to connect to several pipes. The Pipe (4) element is shown below: 				
Style	Standard	Rotation 90	Rotation 180	Rotation 270
				
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 – 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels, etc.			

Table 3-16: Property Description of Pipe (5) Element

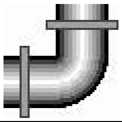
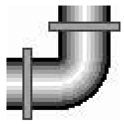
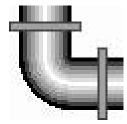
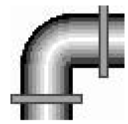
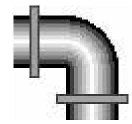
Property Description of Pipe (5) Element				
It is used to connect to several pipes. Pipe (5) element is shown as the figure below: 				
Style	Standard	Rotation 90	Rotation 180	Rotation 270
				
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 – 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels, etc.			

Table 3-17: Property Description of Pipe (6) / Pipe (7) Element

Property Description of Pipe (6) / Pipe (7) Element	
Horizontal and vertical pipes. It is used to display the direction of water flow.	
Read Address	Sets the read address. The link type can be Base Port or Internal Memory. (Refer to **Table 3-2: Property Description of General Buttons**.)
Mobile Cursor Color	When any data appears in the read address, the mobile cursor will display. You can use this option to set the mobile cursor color.
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 – 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels, etc. Valid numeric options are 0 = cursor off 1 = cursor on in one direction 2 = cursor on in opposite direction

Pie Element

Table 3-18: Property Description of Pie Element

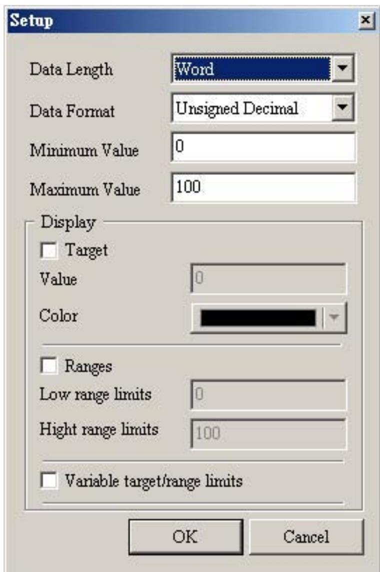
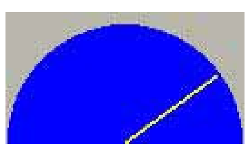
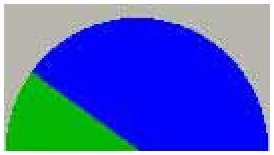
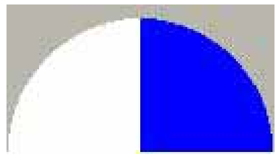
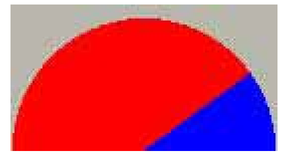
Property Description of Pie Element			
You can select from four kinds of Pie elements. You can use the element property table to set minimum and maximum values, low and high limits, element color, etc. You can display the size of the specific address and quickly judge its quantity by the increment and decrement measure of the area. If the value of the address is less than the lower limit or higher than the highest limit, you can change its color to show clearly for the users to recognize and give a warning to the users.			
Detail Setup		Data Length	There are 16-bit Word and 32-bit Double Word options.
		Data Format	The following data formats are provided:
			Word/Double Word
			1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Minimum Value	Sets the minimum and maximum values of the pie element.	
	Maximum Value		
	Target Value Color	You can decide to display the target value by using this option. If set, the target value and color you set will display on the screen. The **HMi** refers to the minimum and maximum values and draws the proper reference line on the bar element as shown in the figure below: (Here we set the target value as 80 and its color is yellow.) 	
	Ranges (Enable range setting)	Refer to the description of Low and High Region Color.	
	Variable target/range limits	When the target values and low and high limit are a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.	
	When you enter the target value, low and high limits, and minimum and maximum values, after pressing the **OK** button, the **HMi** will examine the value by referring to the selected data length and data format.		

Table 3-18: Property Description of Pie Element (continued)

Property Description of Pie Element (continued)			
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If you set the low limit value as 30 and the color of the low limit region as green, and then set the high limit value as 70 and the color of high limit region as red, the pie element will be shown as illustrated below: (The minimum and maximum input values are 0 and 100 respectively.)		
	 When the value is 20	 When the value is 50	 When the value is 80

Indicator

Table 3-19: Property Description of Multistate Indicator Element

Property Description of Multistate Indicator Element		
Multistate indicator provides a method to designate the state of some specific addresses. It sends a state change message to the user whether Bit, LSB, or Word. If this address is a significant indicator, important message or important alarm, it can be used to inform the users by changing the state display method or different text setting. You can provide users with more information according to the changes of different states to ensure that users can handle the corresponding situation at the first notice.		
Data Length	Bit	Indicator element can have 2 states.
	Word	Indicator element can have 256 states.
	LSB	Indicator element can have 16 states.
Data Format	Provides BCD, Signed Decimal, Unsigned Decimal and Hex; four data formats can define the read memory content.	
Add/Remove State	Sets the state numbers of the multistate indicator. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

Table 3-20: Property Description of Range Indicator Element

Property Description of Range Indicator Element	
Range indicator provides a method to indicate the state of some specific address. It sends a state change message to the user whether Bit, LSB or Word. The **HM*i*** reads the value of the corresponding PLC specific address (register) and compares this value with the lower limit value and then, displays the corresponding state of comparison result on the **HM*i*** screen.	
Add/Remove State	Sets the state numbers of the range indicator. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.

Table 3-20: Property Description of Range Indicator Element (continued)

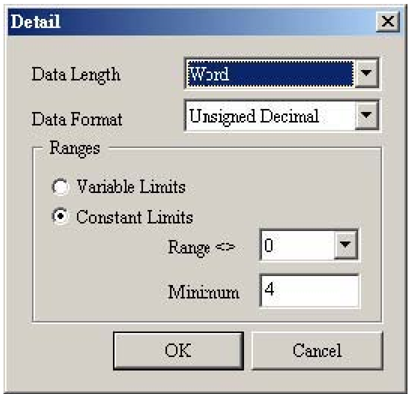
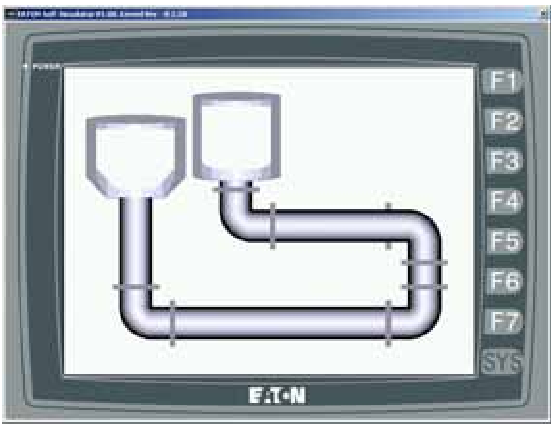
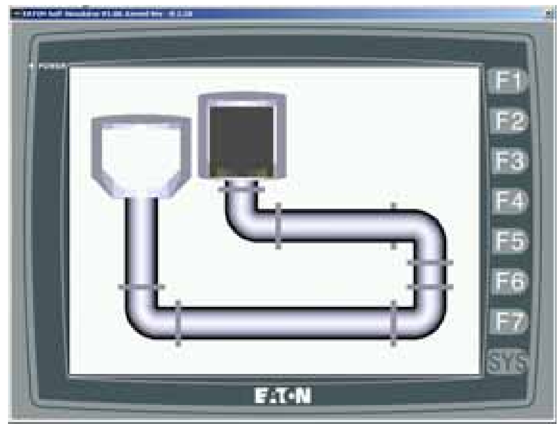
<table>
<tr><th colspan="7">Property Description of Range Indicator Element (continued)</th></tr>
<tr><td rowspan="9">Detail</td><td colspan="2" rowspan="4">
</td><td>Data Length</td><td colspan="3">There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td>Data Format</td><td colspan="3">The following data formats are provided:</td></tr>
<tr><td rowspan="2"></td><td colspan="3">Word/Double Word</td></tr>
<tr><td colspan="3">1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal</td></tr>
<tr><td rowspan="5">Range</td><td rowspan="4">Constant Limits</td><td colspan="4">When selecting this option, you can use the 5 default states to set the range. If there is n numbers of states, it indicates that there is Range n-1 for the users to use. The users can specify the foreground color of state 0, 1, 2, 3 and 4 as red, green, blue, yellow, and purple respectively.</td></tr>
<tr><td>Range 0
100
x>=100</td><td>Range 1
50
100>x>=50</td><td>Range 2
33
50>x>=33</td><td>Range 3
22
33>x>=22</td></tr>
<tr><td colspan="4">Range 4 does not get setup because the values for Range 4 cover those less than 22 in our example. When the value of read address is higher than 100, the range indicator will display in red. When the value of the read address is higher than 50, the range indicator will display in green, etc. Under 22 in the read address, the foreground color would be purple (range 4). Remember, each range must be setup in the dialog box. Range 0 is always the highest range.</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Variable Limits</td><td colspan="4">When selecting this option, you can use the Range n-1 when n represents the total state numbers and n-1 represents the total range numbers. For example, if the read address is $0, and the total state number of the element is 5, it indicates that there is Range 0–4 for the users to use. Then, the lower limit value of Range 0 is $1, the lower limit value of Range 1 is $2, etc.</td></tr>
</table>

Table 3-21: Property Description of Simple Indicator Element

<table>
<tr><th colspan="2">Property Description of Simple Indicator Element</th></tr>
<tr><td colspan="2">For your convenience, a simple indicator provides two states (ON/OFF), which allow you to change the base picture quickly. In the following example, there are simple indicator elements on the top of the pipe element. The simple indicator elements will change as shown as the right figure below. The color selected for the ON state will be XOR (exclusively OR'd) with the color beneath the indicator to create a contrasting color. So the result my look different than the color originally selected.



</td></tr>
<tr><td>XOR Color</td><td>It is used to set XOR color of base picture.</td></tr>
</table>

Data Display

Table 3-22: Function of Data Display Elements

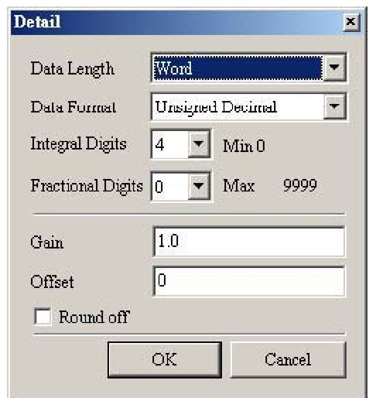
Element Type	*Function*
Numeric Display	Displays the value of the specific address.
Character Display	Displays the text or character of the specific address.
Date Display	Displays the date stored in the **HM*i***.
Time Display	Displays the time stored in the **HM*i***.
Day-of-week Display	Displays the day-of-week stored in the **HM*i***.
Prestored Message	Displays the message according to the value stored in the read address.
Moving Sign	Displays the message by moving sign according to the value stored in the read address.

Numeric Display

Table 3-23: Property Description of Numeric Display Element

<table>
<tr><td colspan="4">Property Description of Numeric Display Element</td></tr>
<tr><td colspan="4">This element reads the value of the setting address and displays the read value immediately in the format you set.</td></tr>
<tr><td>Leading Zero</td><td colspan="3">The following figures show the difference between the Leading Zero option. (Note that the integral digit is set to 4.)


If YES is selected, the numeric value appears as shown.


If NO is selected, the numeric value appears as shown.</td></tr>
<tr><td rowspan="9">Detail</td><td colspan="3">
</td></tr>
<tr><td>Date Length</td><td colspan="2">There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td rowspan="3">Data Format</td><td colspan="2">The following data formats are provided:</td></tr>
<tr><td>Word</td><td>Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr>
<tr><td>Integral Digits
Fractional Digits</td><td colspan="2">Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as Floating.</td></tr>
<tr><td>Gain (m)
Offset (b)</td><td colspan="2">The users can use the equation y = (m) x (read address value) + (b) to determine the display numeric value (y). For example, if Gain value (m) is 2 and Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9.</td></tr>
<tr><td>Round off</td><td colspan="2">If this option is selected, after the operation of the equation above, all numeric values can be rounded off and displayed on the screen.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Fast Refresh</td><td colspan="3">If this option is selected, the element can be displayed immediately when switching the screen. Note that only 4 elements (including display element and input element) can be fast refreshed on one screen.
You can set the Fast Refresh Rate by clicking Screen > Screen Properties.
The three levels of the Fast Refresh Rate are: High, Medium and Low.</td></tr>
</table>

Character Display

Table 3-24: Property Description of Character Display Element

Property Description of Character Display Element	
Use this element to read the value of the specific addresses, convert them to text or character, and display them on the screen. The read value must be in ASCII format, or you will not be able see the display text or character. The maximum string length is 28 words.	
String Length	The range is between 1–28 words.  If we set the read address as Internal Memory 0, i.e. $0, the string length is 5, and set Screen Open Macro as follows: $0 = 65 $1 = 66 $2 = 67 $3 = 68 $4 = 69 Then, the screen above will display. Note that character display element reads the Byte value, and the data length of the internal memory $0 address is Word, therefore, when reading the Internal Memory $0, the display character will be **A(65)_(0) B(66)_(0) C(67)_(0)**… etc. In order to display ABCDE, the values would have been: $0=16961 (65+66*256) $1=17475 (67+68*256) $2=17989 (69+70*256)
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. *Note that only 4 elements (including display element and input element) can be fast refreshed on one screen.* You can set the Fast Refresh Rate by clicking **Screen > Screen Properties**. The three levels of the Fast Refresh Rate are: High, Medium and Low.

Date Display

Table 3-25: Property Description of Data Display Element

Property Description of Data Display Element	
Displays **HMi** system date. Three date formats can be selected:	
Date Format	**MM/DD/YY, DD/MM/YY,** or **DD.MM.YY**

Time Display

Table 3-26: Property Description of Time Display Element

Property Description of Time Display Element	
Displays **HMi** system time. Two time formats can be selected:	
Time Format	**HH:MM:SS** and **HH:MM**

Day-of-Week Display

Table 3-27: Property Description of Day-of-Week Display Element

Property Description of Day-of-Week Display Element
Displays the days of the week. The default setting of the Day-of-Week display element is set to 7 indicating that there are 7 states for this element. Each state has a predefined day description, such as SUN, MON… SAT. You can change it directly in the property table.

Prestored Message

Table 3-28: Property Description of Prestored Message Element

Property Description of Prestored Message Element		
Displays the state content of the corresponding PLC contact or register directly. You can set the number and text for each state. The element is perfect for decoding fault codes in drives, PLCs, etc. Simply designate the fault code address as the read address then assign the fault code text to the fault code value.		
Data Type	Bit	Has two states.
	Word	Has 256 states.
	LSB	Has 16 states.
Data Format	Provides four kinds of data format to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal, and Hex.	
Add/Remove State	Sets the state numbers of prestored message elements. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

Moving Sign

Table 3-29: Property Description of Moving Sign Element

Property Description of Moving Sign Element		
A Moving Sign is one that uses movement, lighting, or special display to depict and display the state content of the corresponding PLC contact or register. You can determine the display of the moving sign by setting the direction, moving points, and interval (ms) in the property table.		
Data Type	Bit	Can have two states.
	Word	Can have 256 states.
	LSB	Can have 16 states.
Data Format	Provides four kinds of data formats to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal, and Hex.	
Add/Remove State	Sets the state numbers of the moving sign element. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
Direction	Left	Viewed from right to the left.
	Right	Viewed from left to the right.
	Top	Viewed from bottom to the top.
	Bottom	Viewed from top to the bottom.
Moving Points	Sets the movement of the moving sign. The unit is Pixel and the range is between 1 – 50 Pixels.	
Interval time)	Sets the interval time between two movements. The unit is ms and the range is between 50 – 3000 ms.	

Graph Display

Table 3-30: Function of Graph Display Elements

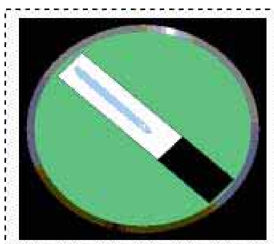
Element Type	*Icon*	*Function*
State Graphic		Used to create and display one or more state pictures on certain positions of the **HMi** screen. Different pictures can be shown on the screen according to the different states.
Animated Graphic		Used to create and display an animated picture on any position of the **HMi** screen. You can control the X and Y direction to move and show the animated pictures freely. Different pictures can be shown on the screen according to the different states.
Dynamic Line		Used to draw and display a dynamic line on the **HMi** screen. You can control the X and Y direction to move the dynamic line element and change its size freely.
Dynamic Rectangle		Used to draw and display a dynamic rectangle on the **HMi** screen. You can control the X and Y direction to move the dynamic rectangle element and change its size freely.
Dynamic Ellipse		Used to draw and display a dynamic ellipse on the **HMi** screen. You can control the X and Y direction to move the dynamic ellipse element and change its size freely.

Static Graphic

Table 3-31: Property Description of Static Graphic Element

Property Description of Static Graphic Element		
When **HMi** is connected to PLC, you can create static graphic elements to read the value of several read addresses controlled by PLC. The read value of each state can be converted and transmitted to the static graphic elements and displayed on the **HMi** screen.		
Data Length	Bit	Can have 2 states.
	Word	Can have 256 states.
	LSB	Can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	Sets the state numbers of static graphic element. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
Auto Change	No	When this option is selected, the value of the read address will be regarded as the state number, which means that the state number is determined by the value of the read address. For example, if the value of the read address $0 is 0, it will switch to 0th state; if the value of the read address $0 is 5, it will switch to 5th state.
	Yes	When this option is selected and the value of the read address is not zero, the static graphic element will change automatically.
	Variation	When this option is selected, the property of the Read Address will be the condition of the changing element. The element will change automatically according to Read Address+1. If the value of the Read Address+1 is not zero, the static graphic element will change automatically. Otherwise, it will not change.

Table 3-31: Property Description of Static Graphic Element (continued)

Property Description of Static Graphic Element (continued)	
Transparent	If Yes is selected, this element will be displayed in transparent color. Refer to the following examples: • *The transparent color has not yet been set.* • *The element transparent color has been set.* • *The transparent color of the whole drawing has been set.* Note: If Yes is selected (set to Transparent), the foreground color option is disabled.  The transparent color has not yet been set.  The element transparent color has been set.  The transparent color of the whole drawing has been set. Note: If Yes is selected (set to Transparent), the foreground color option is disabled.

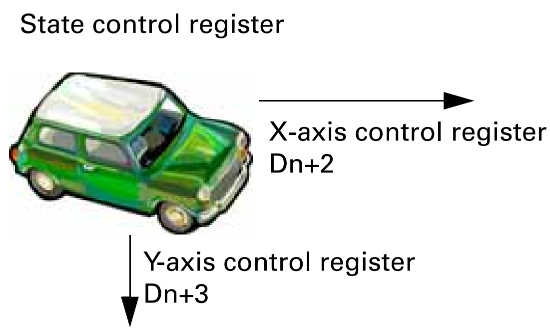
Animated Graphic

Table 3-32: Property Description of Animated Graphic Element

Property Description of Animated Graphic Element		
When **HMi** is connected to PLC, you can create animated graphic elements to read the value of several read addresses controlled by PLC. The read value of each state can be converted and transmitted to the animated graphic elements and displayed on the **HMi** screen. The movement and moving positions can also be controlled and shown on the **HMi** screen.		
Read Address	Used to set the read address. The link type can be Base Port or Internal Memory. (Refer to **Table 3-2: Property Description of General Buttons**.)	
	Read Address	Use the Read Address value to switch the state of the animated graphic element.
	Read Address+1	Use the Read Address+1 value for the horizontal axis position of the animated graphic element.
	Read Address+2	Use the Read Address+2 value for the vertical axis position of the animated graphic element.
Clear Picture	Use to clear the previous animated graphic element when moving the element or changing the state of the element.	
Data Length	Word	Can have 256 states.
	LSB	Can have 16 states.
Data Format	Provides four kinds of data formats to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal, and Hex.	
Add/Remove State	Used to set the state numbers of an animated graphic. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

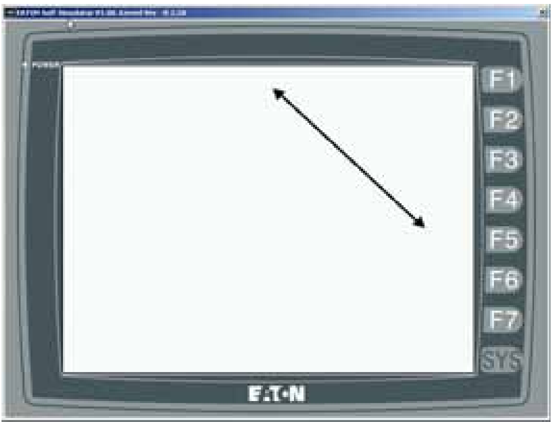
Example of an Animated Graphic element:

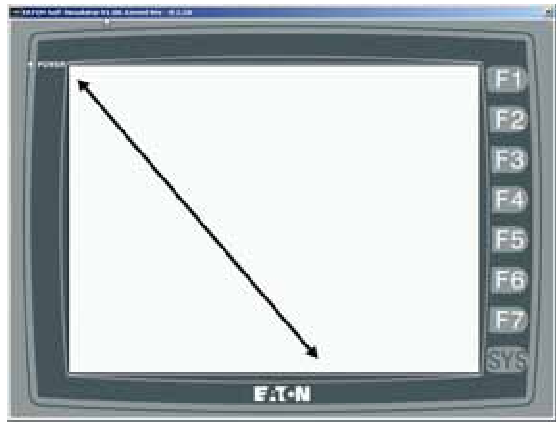
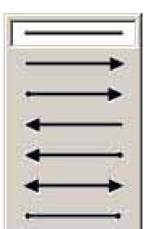
The designated read address = D100. The internal memory value and each state should be as follows:



Dynamic Line

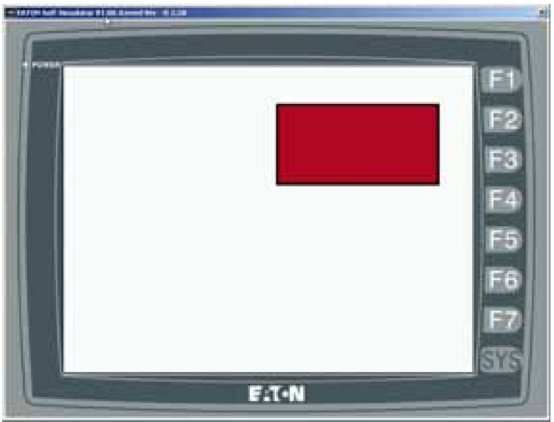
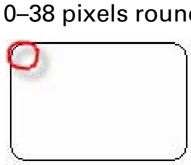
Table 3-33: Property Description of Dynamic Line Element

<table>
<tr><td colspan="3">Property Description of Dynamic Line Element</td></tr>
<tr><td colspan="3">The dynamic line element can be changed and moved depending on the value of the corresponding PLC contact or register.



</td></tr>
<tr><td rowspan="7">Read Address</td><td colspan="2">Used to set the read address. The link type can be Base Port or Internal Memory. (Refer to Table 3-2: Property Description of General Buttons.)</td></tr>
<tr><td rowspan="2">Read Address</td><td>Used to represent the left-top horizontal position (Left) of the element. The value of the Read Address can be used only when the Variable Position option is set to Yes.</td></tr>
<tr><td>When the Variable Position option is set to No and the Variable Color option is set to Yes, the value of the Read Address is used to represent the line color and the range is from 0–255.</td></tr>
<tr><td>Read Address +1</td><td>Used to represent the left-top vertical position (Top) of the element. The value of the Read Address+1 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +2</td><td>Used to represent the right-bottom horizontal position (Right) of the element. The value of the Read Address+2 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +3</td><td>Used to represent the right-bottom vertical position (Bottom) of the element. The value of the Read Address+3 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +4</td><td>Used to represent the line color and the range is from 0–255. The value of the Read Address+4 can be used only when Variable Color option is set to Yes.</td></tr>
<tr><td>Data Format</td><td colspan="2">Provides four kinds of data formats to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal and Hex.</td></tr>
<tr><td>Line Style</td><td colspan="2">The following line styles can be selected.
</td></tr>
<tr><td>Variable Position</td><td colspan="2">(Refer to the description of Read Address above)</td></tr>
<tr><td>Variable Color</td><td colspan="2">(Refer to the description of Read Address above)</td></tr>
</table>

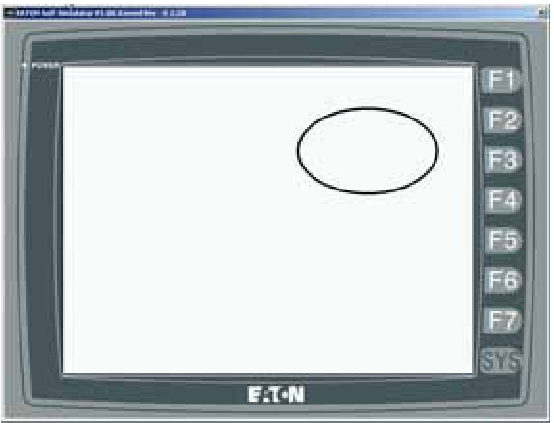
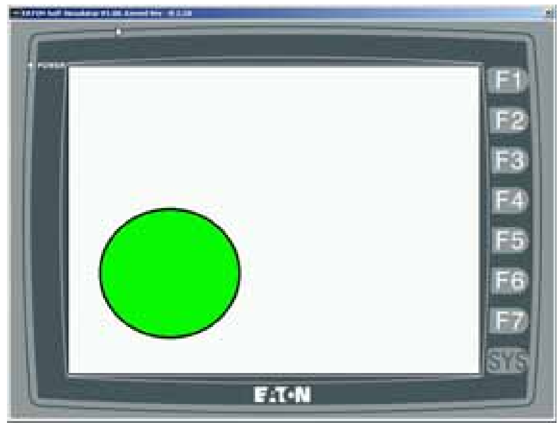
Dynamic Rectangle

Table 3-34: Property Description of Dynamic Rectangle Element

<table>
<tr><td colspan="3">Property Description of Dynamic Rectangle Element</td></tr>
<tr><td colspan="3">The dynamic rectangle element, including element size and color can be changed and moved depending on the value of the corresponding PLC contact or register.
</td></tr>
<tr><td rowspan="7">Read Address</td><td colspan="2">Used to set the read address. The link type can be Base Port or Internal Memory. (Refer to Table 3-2: Property Description of General Buttons.)</td></tr>
<tr><td>Read Address</td><td>Used to represent the left-top horizontal position (Left) of the element. The value of the Read Address can be used only when the Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +1</td><td>Used to represent the left-top vertical position (Top) of the element. The value of the Read Address+1 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +2</td><td>Used to represent the right-bottom horizontal position (Right) of the element. The value of the Read Address+2 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +3</td><td>Used to represent the right-bottom vertical position (Bottom) of the element. The value of the Read Address+3 can be used only when Variable Position option is set to Yes.</td></tr>
<tr><td>Read Address +4</td><td>Used to represent the rectangle foreground color and the range is from 0–255. The value of the Read Address+4 can be used only when Variable Color option is set to Yes.</td></tr>
<tr><td colspan="2">Note that when the Variable Position option is set to No, the internal memory address of the Variable Size option will increase by one (one increment). (The Read Address will represent the right-bottom horizontal position (Right) of the element. Read Address+1 will represent the right-bottom vertical position (Bottom) of the element. Read Address+2 will represent the foreground color of the element.)</td></tr>
<tr><td>Data Format</td><td colspan="2">Provides four kinds of data formats to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal and Hex.</td></tr>
<tr><td>Round Radius</td><td colspan="2">0–38 pixels round radius are provided for selection.
</td></tr>
<tr><td>Variable Position</td><td colspan="2">(Refer to the description of Read Address above.)</td></tr>
<tr><td>Variable Size</td><td colspan="2">(Refer to the description of Read Address above.)</td></tr>
<tr><td>Variable Color</td><td colspan="2">(Refer to the description of Read Address above.)</td></tr>
</table>

Dynamic Ellipse

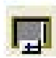
Table 3-35: Property Description of Dynamic Ellipse Element

<table>
<tr><td colspan="3">Property Description of Dynamic Ellipse Element</td></tr>
<tr><td colspan="3">The dynamic ellipse element, including element size and color can be changed and moved depending on the value of the corresponding PLC contact or register.
</td></tr>
<tr><td rowspan="7">Read Address</td><td colspan="2">It is used to set the read address. The link type can be Base Port or Internal Memory. (Refer to Table 3-2: Property Description of General Buttons.)</td></tr>
<tr><td>Read Address</td><td>Used to represent the horizontal position of the element center point. The value of the Read Address can be used only when Variable Central Point option is set to Yes.</td></tr>
<tr><td>Read Address +1</td><td>Used to represent the vertical position of the element center point. The value of the Read Address+1 can be used only when Variable Central Point option is set to Yes.</td></tr>
<tr><td>Read Address +2</td><td>Used to represent the horizontal radius of the element.The value of the Read Address+2 can be used only when Variable Radius option is set to Yes.</td></tr>
<tr><td>Read Address +3</td><td>Used to represent the vertical radius of the element. The value of the Read Address+3 can be used only when Variable Radius option is set to Yes.</td></tr>
<tr><td>Read Address +4</td><td>Used to represent the ellipse foreground color and the range is from 0–255. The value of the Read Address+4 can be used only when Variable Color option is set to Yes.</td></tr>
<tr><td colspan="2">Note that when Variable Central Point option is set to No, the internal memory address of Variable Radius option will increase by one (one increment). (The Read Address will represent the horizontal radius of the element. Read Address+1 will represent the vertical radius of the element. Read Address+2 will represent the foreground color of the element.)</td></tr>
<tr><td>Data Format</td><td colspan="2">Provides four kinds of data formats to define the read memory content, including: BCD, Signed Decimal, Unsigned Decimal, and Hex.</td></tr>
<tr><td>Variable Central Point</td><td colspan="2">Refer to the description of Read Address above.</td></tr>
<tr><td>Variable Radius</td><td colspan="2">Refer to the description of Read Address above.</td></tr>
<tr><td>Variable Color</td><td colspan="2">Refer to the description of Read Address above.</td></tr>
</table>

Input Element

Set write and read address for the users to input and display address value. Write and read address can be the same or different.

Table 3-36: Function of Input Elements

Element Type	*Icon*	*Function*
Numeric Entry		Used to input and display the numeric value of specific PLC addresses.
Character Entry		Used to input and display the characters of specific PLC addresses.

Numeric Entry

Table 3-37: Property Description of Numeric Entry Element

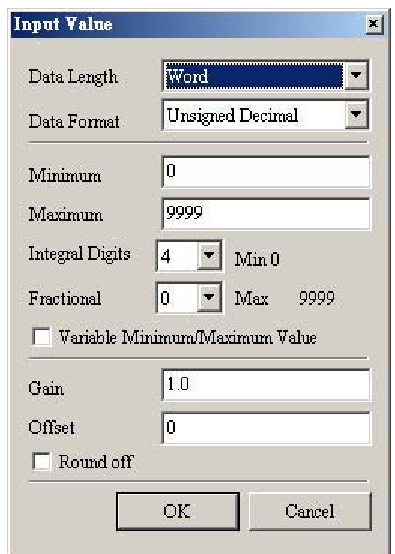
<table>
<tr><th colspan="4">Property Description of Numeric Entry Element</th></tr>
<tr><td colspan="4">After selecting this numeric entry element on the screen, a built-in numeric keypad (TEN-KEY) will display and you can use it to enter the setting value directly. When you press the ENTER key, HMi will send the setting value entered to the corresponding PLC register. The maximum and minimum setting values are all user-defined. You can also specify the mode to trigger the designated PLC address before or after writing the setting value.</td></tr>
<tr><td rowspan="3">Leading Zero</td><td colspan="3">The following figures show the difference when a user selects the Leading Zero option. Note that the integral digits is set to 4.</td></tr>
<tr><td>
</td><td colspan="2">If YES is selected, the numeric value will display as shown.</td></tr>
<tr><td>
</td><td colspan="2">If NO is selected, the numeric value will display as shown.</td></tr>
<tr><td>Detail</td><td colspan="3">
</td></tr>
<tr><td></td><td>Date Length</td><td colspan="2">There are 16-bit Word and 32-bit Double Word options.</td></tr>
<tr><td></td><td rowspan="3">Data Format</td><td colspan="2">The following data formats are provided:</td></tr>
<tr><td></td><td>Word</td><td>Double Word</td></tr>
<tr><td></td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr>
<tr><td></td><td>Minimum</td><td colspan="2" rowspan="2">You can set the minimum and maximum input setting values to determine the range of input setting value.</td></tr>
<tr><td></td><td>Maximum</td></tr>
<tr><td></td><td>Integral Digits</td><td colspan="2" rowspan="2">Used to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as Floating.</td></tr>
<tr><td></td><td>Fractional Digits</td></tr>
</table>

Table 3-37: Property Description of Numeric Entry Element (continued)

<table>
<tr><th colspan="3">Property Description of Numeric Entry Element (continued)</th></tr>
<tr><td rowspan="6">Detail (continued)</td><td colspan="2">When the Variable Minimum/Maximum Value option is selected, it indicates that the minimum value is determined by Read Address+1, and the maximum value is determined by Read Address+2.</td></tr>
<tr><td>Gain (m)</td><td rowspan="2">You can use y = (m) x (read address value) + (b) this equation to determine the display numeric value (y). For example, if the Gain value (m) is 2 and the Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9.</td></tr>
<tr><td>Offset (b)</td></tr>
<tr><td>Round off</td><td>If selected after the operation of the equation above, all numeric values can be rounded off and displayed on the screen.</td></tr>
<tr><td colspan="2">When you have entered the minimum and maximum values and pressed the OK button, the HMi examines the value by referring to the selected data length, data format, and integral and fractional digits.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Input Mode</td><td colspan="2">The three popup options are: Touch Popup, Active Non-Popup and Touch Non-Popup, and the default setting is Touch Popup. For the description of the Non-Popup input modes, refer to Keypad Element on page 3-61.</td></tr>
<tr><td>Display Asterisk (*)</td><td colspan="2">If YES is selected, the screen displays the following figure when the setting value is entered.

</td></tr>
<tr><td>Fast Refresh</td><td colspan="2">If this option is selected, the element can be displayed immediately after switching the screen. Note that only 4 elements (including the display element and the input element) can be fast refreshed on one screen. You can set the Fast Refresh Rate by clicking Screen > Screen Properties. The three levels of the Fast Refresh Rate are: High, Medium and Low.</td></tr>
</table>

Character Entry

Table 3-38: Property Description of Character Entry Element

Property Description of Character Entry Element	
You can set write and read the address to enter the data of the specific address by text or character and display them on the screen. The display text or character must be entered in ASCII format. Write and read addresses can be the same or different. (The maximum string length is 28 words.)	
Character Length	The range is between 1 – 28 words. The default setting is 4words.
Input Mode	The three popup options are: Touch Popup, Active Non-Popup and Touch Non-Popup, and the default setting is Touch Popup. For the description of the Non-Popup input modes, refer to *Keypad Element on page 3-61*.
Display Asterisk (*)	If YES is selected, the screen displays the following figure when the text or character is entered. 
Fast Refresh	If this option is selected, the element can be displayed immediately after switching the screen. Note that only 4 elements (including the display element and the input element) can be fast refreshed on one screen. You can set the Fast Refresh Rate by clicking **Screen > Screen Properties**. The three levels of the Fast Refresh Rate are: High, Medium and Low.
Set Low Security	Used to force the current security setting to the lowest level after the button is pressed. This can prevent the operator errors.

Curve Element

Table 3-39: Function of Curve Elements

Element Type	***Icon***	***Function***
Trend Graph		Used to display the change value of the read address by trend graph. The trend graph can only display and set changes to the Y-axis.
X-Y Chart		Used to display the change value of the read address by trend graph. The trend graph can display and set the changes to the X-axis and Y-axis.

Trend Graph

Table 3-40: Property Description of Trend Graph Element

<table>
<tr><th colspan="3">Property Description of Trend Graph Element</th></tr>
<tr><td colspan="3">The first step for setting a trend graph is to set the curve number in the Curve Field Total option (range is 1–4) in property table. Then, set the read address, read format, curve width and color in Detail Setup option to complete the setup.

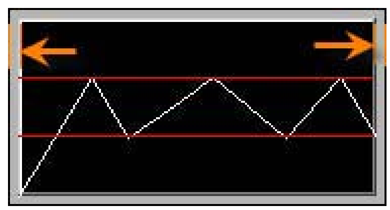
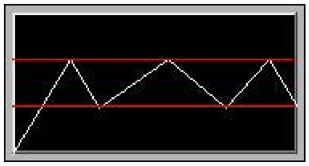
The HMi graphs a series of values in consecutive memory locations set by a starting address. For example, if there are 100 sampling points and four curves, there will be 100 X 4 = 400 points. If the HMi is connected to Eaton ELC, suppose that the read address is D0, it will read 400 words (D0–D399) after the address is triggered. Setting the Y-axis of curve 1 is D0–D99, the Y-axis of curve 2 is D100–D199, the Y-axis of curve 3 is D200–D299, and Y-axis of curve 4 is D300–D399. If the value exceeds the maximum value, it will be displayed with maximum value. If the value is less than minimum value, it will be displayed with minimum value. After setting the curves, you should set the address of the control block to trigger the read data of the trend graph, the trend graph drawing, and clear the curve. Refer to Chapter 5 for the settings of the control block.</td></tr>
<tr><td>Curve Field Total</td><td colspan="2">1–4 curves can be set and displayed.</td></tr>
<tr><td rowspan="10">Detail Setup</td><td>Sample Number</td><td rowspan="2">When the Sample Number is a constant, the maximum sample number is defined as follows:
1. When the element style is selected as Standard, the maximum sample number is the element width and the unit is pixels.
2. When the element style is selected as Raised or Sunken, the maximum sample number is the element width minus the border width (the value of the border width is 14 pixels). The border width is shown as the place where the arrow sign ends.

Note that when the sample number is a constant, the Maximum Sample Number option is disabled.
When the Sample Number is a variable value, the system refers to the value of the Read Address+1 and regards the value as the Maximum Sample Number. Then, the Maximum Sample Number option will be enabled.
If the read value is more than the set Maximum Sample Number, the system takes the set Maximum Sample Number as the actual Maximum Sample Number.</td></tr>
<tr><td>Maximum Sample Number</td></tr>
<tr><td rowspan="2">Read Format</td><td>Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Sample Flag</td><td>Used to set triggers and clear flags. When a sample flag is triggered, it will start to read data and draw the graph. The sample flag is located within the control block. Refer to Chapter 5 for the settings of the control block.</td></tr>
<tr><td>Minimum</td><td rowspan="2">Used to set the minimum and maximum value of the display data, i.e., the minimum and maximum value of the Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum values.</td></tr>
<tr><td>Maximum</td></tr>
<tr><td>Curve Width</td><td>Used to display the curve width. The range is between 1 and 8, and the unit is a pixel.</td></tr>
<tr><td>Curve Color</td><td>Used to display the curve color.</td></tr>
</table>

Table 3-40: Property Description of Trend Graph Element (continued)

Property Description of Trend Graph Element *(continued)*	
Grid Color Grid Number in Horizontal	Refer to the figure below. The grid color is set to red, and the horizontal grid number direction is set to 3. 

X-Y Chart

Table 3-41: Property Description of X-Y Chart Element

Property Description of X-Y Chart Element	
The **HM*i*** will convert a series of address values to a X-Y chart on the screen. For example, if there are 100 sample points and four curves, there will be 100 x 4 x 2 = 800 points. If the **HM*i*** is connected to Eaton ELC and the read address of the X-axis is D0 and the read address of the Y-axis is D500, it will read 800 words (D0–D399 and D500–D899) after the address is triggered, setting the following curves: • *Setting the X-axis of curve 1 to D0–D99 and the Y-axis of curve 1 to D500–D599* • *Setting the X-axis of curve 2 to D100–D199 and the Y-axis of curve 2 to D600–D699* • *Setting the X-axis of curve 3 to D200–D299 and the Y-axis of curve 3 to D700–D799* • *Setting the X-axis of curve 4 is D300–D399 and the Y-axis of curve 4 to D800–D899* If the value exceeds maximum value, it will be displayed with maximum value. If the value is less than minimum value, it will be displayed with minimum value. After setting the values, you should set the address of the control block to trigger the read data and drawings of the X-Y chart. Refer to Chapter 5 for the settings of the control block.	
Connect Two Points	If the Yes option is selected when drawing the X-Y chart on the screen, the space between two points on the X-Y chart will be connected by lines.
Curve Field Total	1–4 curves can be set and displayed.

Table 3-41: Property Description of X-Y Chart Element (continued)

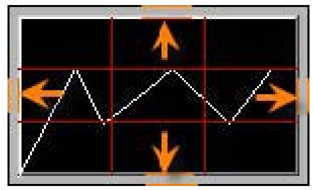
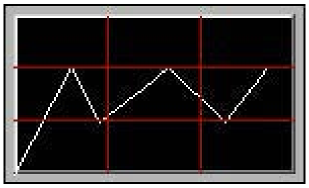
Property Description of X-Y Chart Element (continued)		
Detail Setup	Sample Number Maximum Sample Number	When the Sample Number is a constant: The maximum sample number is defined as follows: 1. When the element style is selected as Standard, the maximum sample number is the element width and the unit is a pixel. 2. When the element style is selected as Raised or Sunken, the maximum sample number is the element width minus the border width (the value of the border width is 14 pixels). The border width is shown as the place where the arrow sign ends.  Note that when the sample number is a constant, the Maximum Sample Number option is disabled. When the Sample Number is a variable value, the system will refer to the value of Read Address+1 and regard the value as the maximum sample number. Then, the Maximum Sample Number option will be enabled. If the read value is more than the set maximum. Sample Number, the system will take the set Maximum Sample Number as the actual maximum sample number.
	Read Format	**Word** 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Horizontal Read Address	Used to set the read address of the horizontal data. The link type can be Base Port or Internal Memory.
	Vertical Read Address	Used to set the read address of the vertical data. The link type can be Base Port or Internal Memory.
	Sample Flag	Used to set triggers and clear flags. When a sample flag is triggered, it will start to read data and draw the X-Y chart. This sample flag is located within the control block. Refer to Chapter 5 for the settings of the control block.
	Horizontal Minimum Horizontal Maximum	Used to set the minimum and maximum values of the horizontal display data, i.e., the minimum and maximum value of the X-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum values.
	Horizontal Minimum Horizontal Maximum	Used to set the minimum and maximum value of the vertical display data, i.e., the minimum and maximum value of the Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value.
	Curve Width	Used to display the curve width. The range is between 1 and 8 and the unit is a pixel.
	Curve Color	Used to the display curve color.

Table 3-41: Property Description of X-Y Chart Element (continued)

Property Description of X-Y Chart Element (continued)	
Grid Color	Refer to the figure below. The grid color is set to red, and the grid number in both the horizontal and vertical direction is set to 2. 
Horizontal Line Number	
Vertical Line Number	

Sampling Element

The sampling element is designed to display the history data by history graph or table and can be updated immediately for the users to use and read more easily. The History Setup should be used with sampling elements (see **Table 2-11** in Chapter 2 for more about the History Setup function). You can click **Option > History Setup** to execute this function.

Table 3-42: History Setup Dialog Box

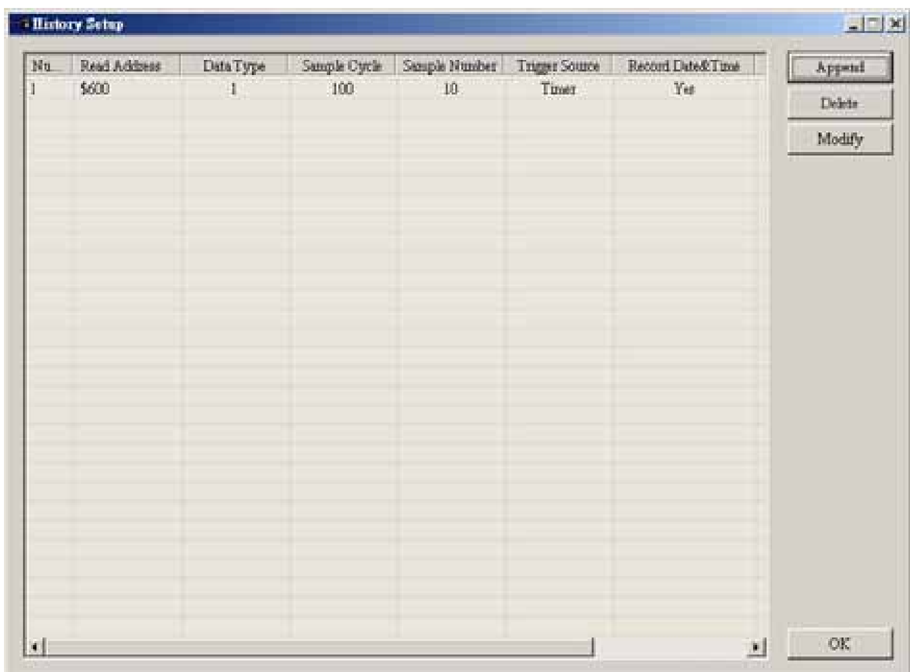
History Setup Dialog Box


Table 3-42: History Setup Dialog Box (continued)

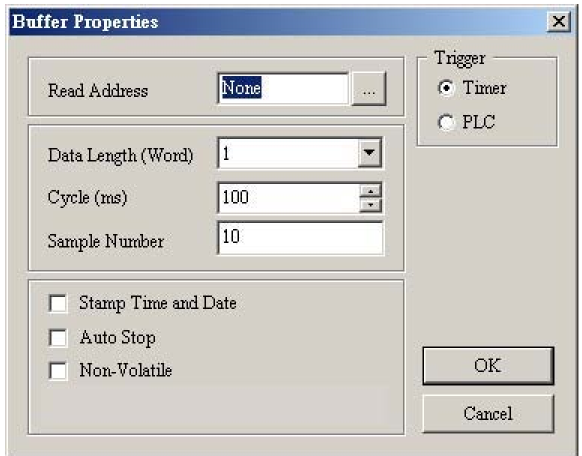
History Setup Dialog Box (continued)		
Append	Pressing the Append button allows you to add history data. After you press the Append button, the following Buffer Properties dialog box displays. 	
	Read Address	Used to set the starting address for sampling the history data.
	Data Length (Word)	Used to set how many Words users want to sample. The range is between 1–13 continuous Words, indicating that the maximum of 13 continuous words can be sampled. For example: If the setting value of the Data Length is set to 6, it indicates that there are 6 continuous Words (M100, M101, …, M105) that can be sampled. The Sample Number option sets the maximum sample number. If the Sample Number option is set to 100, the system will sample 6 words x 100 = 600 numbers of data each time.
	Cycle (ms)	Used to set the sampling cycle time for reading addresses (how long is it to read address one time). If the trigger option is PLC, the cycle time is not used. The range of the sampling cycle time is between 1– 86400000 ms.
	Sample Number	Used with the Auto Stop option. If the Auto Stop option is selected, the **HM*i*** will stop recording the data after the number of records has reached the setting value of the Sample Number option. If the Auto Stop option is not selected, when the record number of data exceeds the setting value of the Sample Number option, it will delete the first record and insert the new record into the last address. For example, if the setting value is set to 100 and the number of records in history exceeds 100, the first record will be deleted and the second record will become the third record, the third record will become the fourth record…and the 100th record will become the 99th record. Therefore, the new record (101st record) will become the 100th record.
	Stamp Time and Date	Use this option to determine if the time and date are also recorded during sampling operation.
	Auto Stop	Use this option to determine if the **HM*i*** stop recording when the maximum number of record data is reached.
	Non-Volatile	Using this option can enable to save sampling data in SRAM when the power is turned off. (The SRAM is powered by battery when the power is turned off.) In some **HM*i*** models, the users can save data in USB disk or SMC card when the power is turned off, and the capacity for saving history data depends on the capacity of USB disk or SMC card.
	Trigger	There are Timer and PLC two options. It means that the sampling action is controlled by the Timer of the **HM*i*** or the external controller, i.e. PLC. When PLC option is selected, it indicates that the trigger bit designated by the register for sampling history buffer in the control block controlling the sampling action.
	OK / Cancel	Press the OK button to save the data and exit. Press Cancel to exit without saving data.

Table 3-42: History Setup Dialog Box (continued)

History Setup Dialog Box (continued)	
Delete	Pressing the Delete button can delete a history data.
Modify	Pressing the Modify button can modify a history data.

Historical Trend Graph

Table 3-43: Property Description of Historical Trend Graph Element

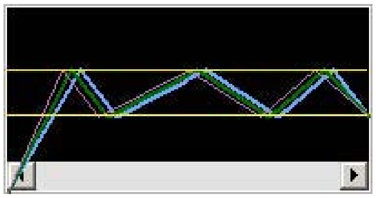
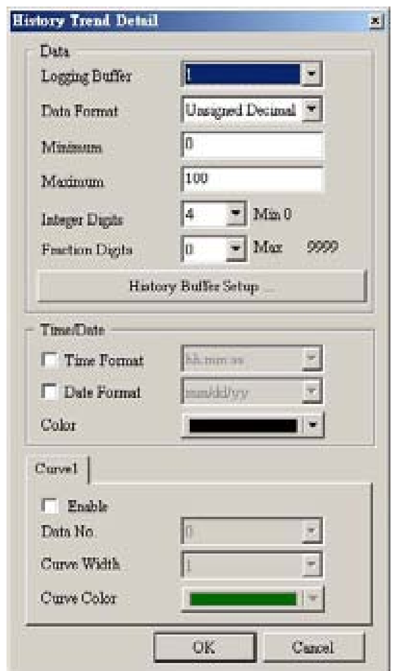
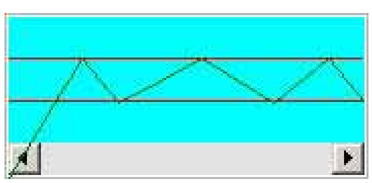
<table>
<tr><td colspan="3">Property Description of Historical Trend Graph Element</td></tr>
<tr><td colspan="3">Convert the history data to trend graph with continuous curves and display on HMi screen.</td></tr>
<tr><td>Border Color
Background Color</td><td colspan="2">The element background color below is set to black and the border color is set to gray.
</td></tr>
<tr><td>Curve Number</td><td colspan="2">1–8 curves can be set and displayed.</td></tr>
<tr><td rowspan="2">Detail</td><td colspan="2">
</td></tr>
<tr><td>Logging Buffer</td><td>Use this option to set the number (No.1 – No.X) of history buffers for reading the data of PLC corresponding address. You can press the History Buffer Setup button or click
Option > History Setup to set the corresponding PLC address.</td></tr>
</table>

Table 3-43: Property Description of Historical Trend Graph Element (continued)

Property Description of Historical Trend Graph Element (continued)		
Detail (continued)	Data Format	**Word**
		1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Floating
		Note that if the data format selected is Floating, the Data Length option in the History Setup dialog box must be greater than or equal to 2 words.
	Minimum Maximum	Used to set the minimum and maximum value of the display data, i.e. the minimum and maximum value of the Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value.
	Integral Digits Fractional Digits	Used to determine the digit number of integer and decimal fraction. The digit number is only the display format. The display will show a decimal number only when the data format is selected as Floating.
	Time/Date	
	Time Format	Can be in the following formats: **HH:MM:SS**, or **HH:MM**
	Date Format	Can be in the following formats: **MM/DD/YY**, **DD/MM/YY** or **DD.MM.YY**
	Color	When the time or date format is selected, you can use this option to designate the display color.
	Curve (No.1 – 8)	
	Enable	If selected, the following curve options are enabled and can be set.
	Data No.	Used to set the reading Word data when triggered. For example, if the Data Type (Length) option in the History Setup dialog box is set to 3words, 0 – 2 data numbers can be selected in this option. When 1 is selected, Curve 1 reads the data of the Read Address+1 set in the History Setup dialog box. Note that if the data format is selected as Floating, and the Data Type (Length) option in the History Setup dialog box is an odd numbers of words, be sure to set the Data No. as an even number.
	Curve Width	Used to the display curve width. The range is between 1 and 8 and the unit is pixel.
	Curve Color	Used to the display curve color.
Grid Color Grid Number	Refer to the figure below. The grid color is set to red and the grid number in horizontal direction is set to 3. 	

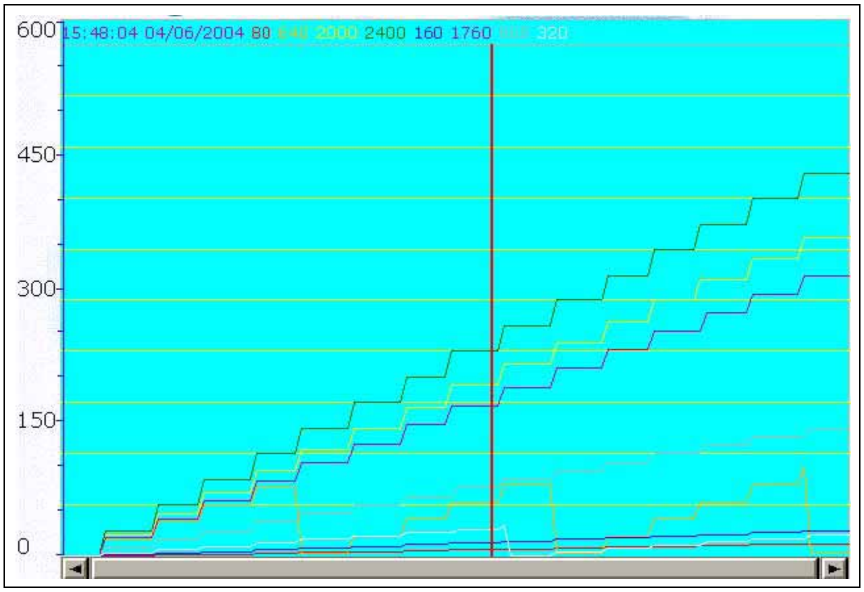


Figure 3-4: Example of Historical Trend Graph Element

Historical Data Table

Table 3-44: Property Description of Historical Data Table Element

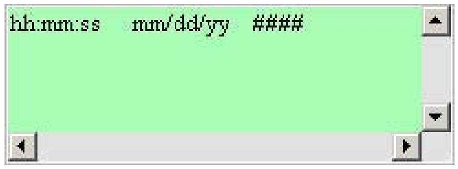
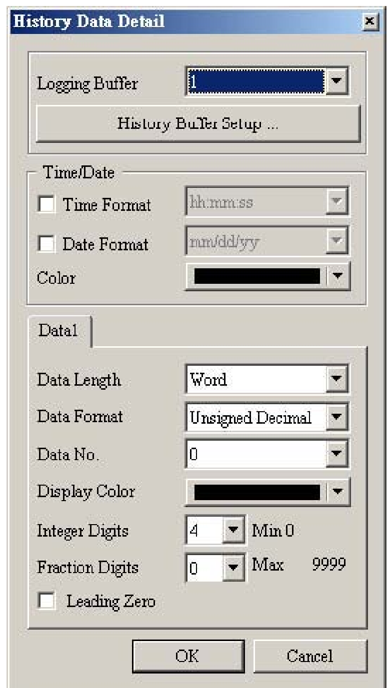
Property Description of Historical Data Table Element		
Converts the history data to numeric data and displays on the **HMi** screen in a data table. The read address in the History Setup dialog box needs to be set and the data length should be in several words. The range of data length is between 1–8words. The Data No. in the History Data Detail dialog will also correspond to the selected Data Type (Length). For example, if the value of Data Type (Length) is set to 5, the Data No. selection will be 5 also. The maximum of Data Field Number is 8. This number will also be related to Data No.		
Border Color Background Color	The element background color below is set to green and the border color is set to gray.  	
Data Field Number	1–8 data fields can be set.	
Detail	 	
	Logging Buffer	Use to set the number (No.1 – No.X) of the history buffer for reading the data of the corresponding PLC address. You can press the History Buffer Setup button or click **Option > History Setup** to set the corresponding PLC address.
	Time/Date	
	Time Format	Can be in the following formats: **HH:MM:SS**, **HH:MM**
	Date Format	Can be in the following formats: **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY**
	Color	When the time or date format is selected, you can use this option to designate the display color.
	Data No. (No. 1–8)	
	Date Length	There are 16bits Word and 32bits Double Word two options.

Table 3-44: Property Description of Historical Data Table Element (continued)

Property Description of Historical Data Table Element (continued)			
Detail (continued)	Data Format	The following data format are provided:	
		Word	**Double Word**
		1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary	1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary 7. Floating
	Data No.	Used to set the reading Word data when triggered every time. For example, if the Data Type (Length) option in the History Setup dialog box is set to 3 words, there are 0 – 2 data numbers can be selected in this option. When selecting 1, it indicates that this Curve 1 reads the data of the Read Address+1 set in History Setup dialog box. Note that if the data format is selected as “Floating”, and the Data Type (Length) option in the History Setup dialog box is an odd numbers of words, ensure to set the Data No. as an even number.	
	Display Color	Used to the display data color.	
	Integral Digits Fractional Digits	Use to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as Floating.	

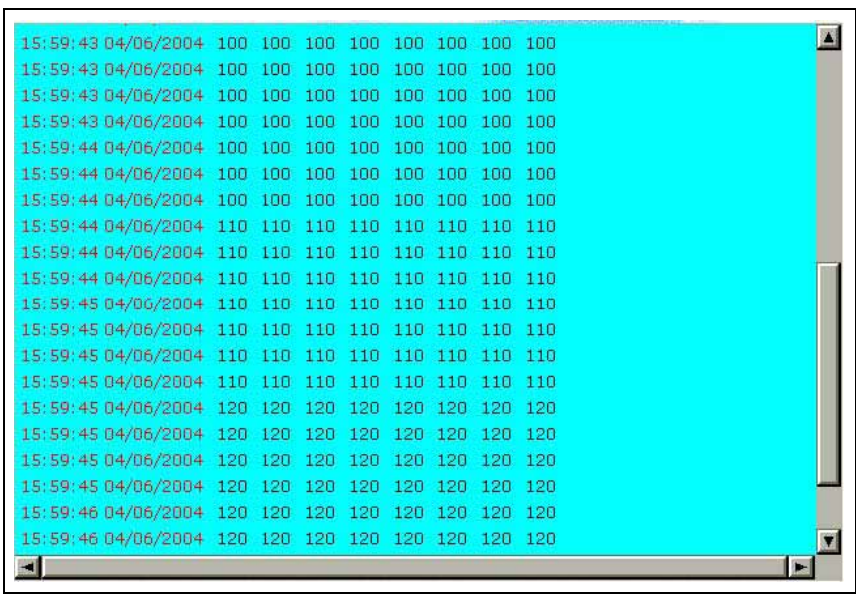


Figure 3-5: Example of Historical Data Table Element

Historical Event Table

Table 3-45: Property Description of Historical Event Table Element

<table>
<tr><th colspan="3">Property Description of Historical Event Table Element</th></tr>
<tr><td colspan="3">Convert the read history data to text or character and display on the HMi screen by an event table. The users can set display message, color and the HMi will display message on screen after reading data.</td></tr>
<tr><td rowspan="2">Data Length</td><td>Word</td><td>It can have 256 states.</td></tr>
<tr><td>LSB</td><td>It can have 16 states.</td></tr>
<tr><td>Data Format</td><td colspan="2">This option can be set only when the data length is selected as Word. It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.</td></tr>
<tr><td>Add/Remove State</td><td colspan="2">It is used to set the state numbers of historical event table element. If the data length of the value is in Word, 1–256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.</td></tr>
<tr><td rowspan="6">Detail</td><td>Logging Buffer</td><td>Use this option to set the number (No.1 – No.X) of history buffer for reading the data of PLC corresponding address. The users can press the History Buffer Setup button or click Option > History Setup (Choosing History Setup command from menu bar) to set the corresponding PLC address.</td></tr>
<tr><td>Data No.</td><td>It is used to set the reading Word data when triggering every time. For example, if the Data Type (Length) option in the History Setup dialog box is set to 3 words, there are 0–2 data numbers can be selected in this option. When selecting 1, it indicates that this Curve 1 reads the data of the Read Address+1 set in History Setup dialog box.</td></tr>
<tr><td colspan="2">Time/Date</td></tr>
<tr><td>Time Format</td><td>Can be in the following formats: HH:MM:SS, HH:MM</td></tr>
<tr><td>Date Format</td><td>Can be in the following formats: MM/DD/YY, DD/MM/YY and DD.MM.YY</td></tr>
<tr><td>Color</td><td>When the time or date format is selected, the users can use this option to designate the display color.</td></tr>
</table>

Table 3-46: Example of Historical Event Table Element

1. D1000=0 X Axis servo position ready
2. D1000=1 Y Axis servo position ready
3. D1000=2 Z Axis servo poistion ready
4. D1000=3 Rotation Inveiter Poistion ready
5. D1000=4 Motion controller home ready
6. D1000=5 Water motor over load
7. D1000=6 Oil pump over load

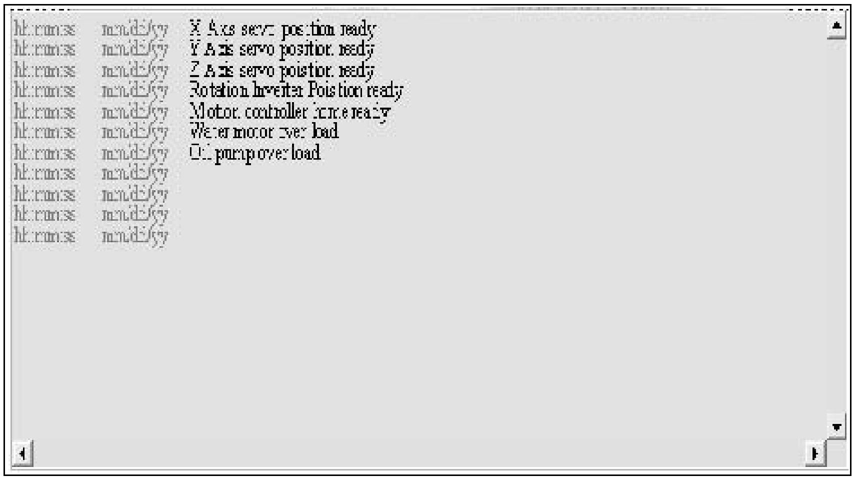


Figure 3-6: Historical Event Table

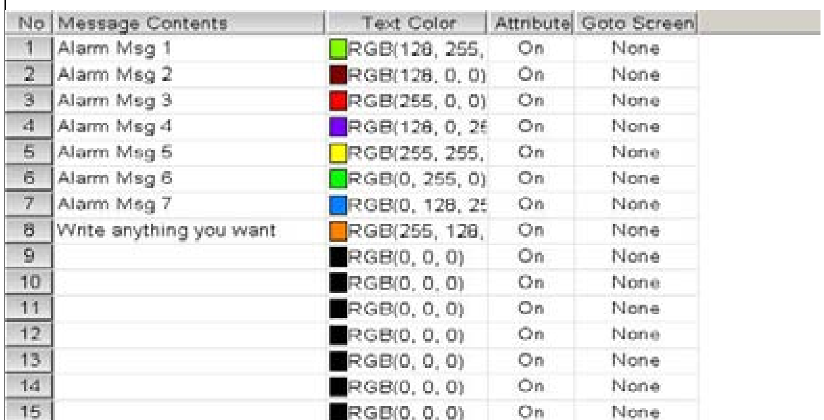
Alarm Element

Table 3-47: Function of Alarm Elements

Element Type	***Icon***	***Function***
Alarm History Table		The **HM*i*** monitors and reads the read address in a fixed time automatically. If one Bit contact of the address is ON, the alarm message will be converted to the Alarm History Table element and display on the screen.
Active Alarm List		The **HM*i*** displays the current alarm message by using the Active Alarm List element on the screen if some certain Bit contact of the corresponding address is ON.
Alarm Frequency Table		The **HM*i*** monitors and reads the read address set. If some certain Bit contact of the address is ON, the ON frequency of the contact will be converted to the Alarm Frequency Table element and display on the screen.
Alarm Moving Sign		The **HM*i*** only displays the current alarm message by using the Alarm Moving Sign element on the screen if some certain Bit contact of the corresponding address is ON.

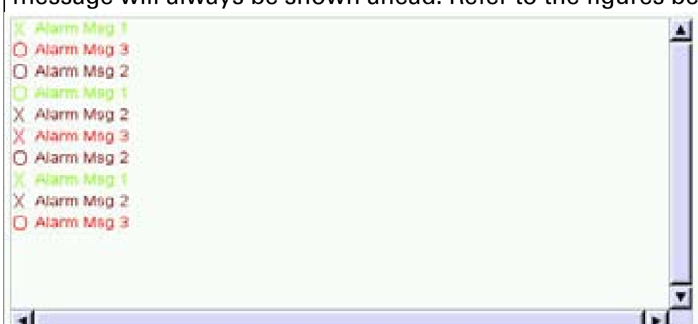
Alarm History Table

Table 3-48: Property Description of Alarm History Table Element

<table>
<tr><th colspan="3">Property Description of Alarm History Table Element</th></tr>
<tr><td colspan="3">The HMi monitors and reads the read address in a fixed time automatically. If one Bit contact of the address is ON, the alarm message will be converted to the Alarm History Table element and display on the screen.</td></tr>
<tr><td rowspan="4">Detail</td><td>Time Format</td><td>Can be in the following formats: HH:MM:SS, HH:MM.</td></tr>
<tr><td>Date Format</td><td>Can be in the following formats: MM/DD/YY, DD/MM/YY and DD.MM.YY.</td></tr>
<tr><td>Alarm Number</td><td>If selected, when the alarm occurs, the alarm number that is designated in the Alarm Setup dialog box will also be shown in front of the alarm message. Refer to the figures below:

<table>
<tr><th>No</th><th>Message Contents</th><th>Text Color</th><th>Attribute</th><th>Goto Screen</th></tr>
<tr><td>1</td><td>Alarm Msg 1</td><td>RGB(128, 255,</td><td>On</td><td>None</td></tr>
<tr><td>2</td><td>Alarm Msg 2</td><td>RGB(128, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>3</td><td>Alarm Msg 3</td><td>RGB(255, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>4</td><td>Alarm Msg 4</td><td>RGB(128, 0, 2[illegible]</td><td>On</td><td>None</td></tr>
<tr><td>5</td><td>Alarm Msg 5</td><td>RGB(255, 255,</td><td>On</td><td>None</td></tr>
<tr><td>6</td><td>Alarm Msg 6</td><td>RGB(0, 255, 0)</td><td>On</td><td>None</td></tr>
<tr><td>7</td><td>Alarm Msg 7</td><td>RGB(0, 128, 2[illegible]</td><td>On</td><td>None</td></tr>
<tr><td>8</td><td>Write anything you want</td><td>RGB(255, 128,</td><td>On</td><td>None</td></tr>
<tr><td>9</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>10</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>11</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>12</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>13</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>14</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
<tr><td>15</td><td></td><td>RGB(0, 0, 0)</td><td>On</td><td>None</td></tr>
</table></td></tr>
<tr><td>Color</td><td>When time or date format is selected, the users can use this option to designate the display color.</td></tr>
</table>

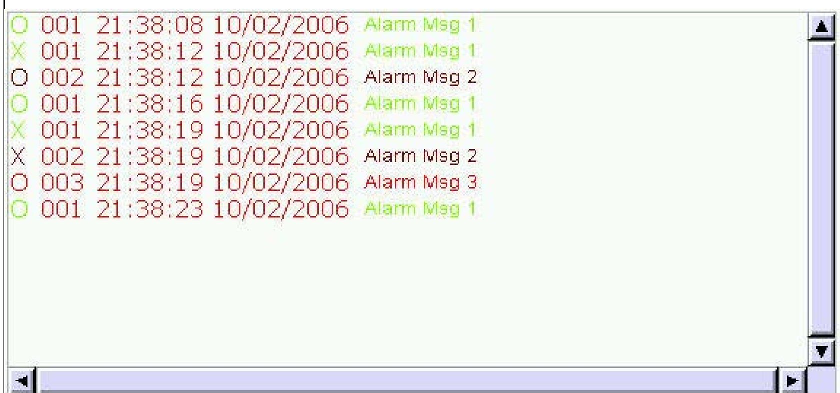
Active Alarm List

Table 3-49: Property Description of Active Alarm List Element

<table>
<tr><th colspan="3">Property Description of Active Alarm List Element</th></tr>
<tr><td colspan="3">The HMi will only display the current alarm message by using Active Alarm List element on the screen if some certain Bit contact of the corresponding address is ON.</td></tr>
<tr><td rowspan="4">Detail</td><td>Time Format</td><td>Can be in the following formats: HH:MM:SS, HH:MM.</td></tr>
<tr><td>Date Format</td><td>Can be in the following formats: MM/DD/YY, DD/MM/YY and DD.MM.YY.</td></tr>
<tr><td>Alarm Number</td><td>If selected, when the alarm occurs, the alarm number for the alarm message will always be shown ahead. Refer to the figures below:

</td></tr>
<tr><td>Color</td><td>When the Time and Date these two options are selected, the users can designate the display color by using this option.</td></tr>
</table>

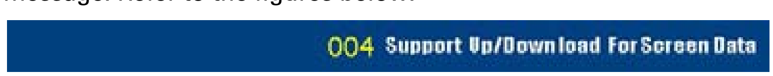
Alarm Frequency Table

Table 3-50: Property Description of Alarm Frequency Table Element

Property Description of Alarm Frequency Table Element		
The **HMi** monitors and reads the read address set. If some certain Bit contact of the address is ON, the ON frequency of the contact will be converted to the Alarm Frequency Table element and display on the screen.		
Detail	Time Format	Can be in the following formats: **HH:MM:SS**, **HH:MM**.
	Date Format	Can be in the following formats: **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY**.
	Alarm Number	If selected, when the alarm occurs, the time and date when the alarm occurred will also be shown in front of the alarm message. Refer to the figure below:
	Display for Counting Zero	Use to decide to show the message on the Alarm Frequency Table element when the occurring times of the alarm message is zero. 
	Color	When the Time and Date options are selected, you can designate the display color by using this option.

Alarm Moving Sign

Table 3-51: Property Description of Alarm Moving Sign Element

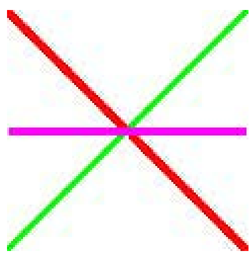
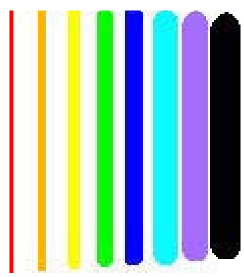
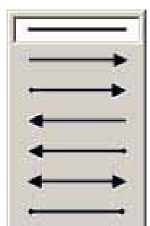
Property Description of Alarm Moving Sign Element		
The **HMi** displays the current alarm message by using the Alarm Moving Sign element on the screen if certain Bit contacts of the corresponding address is ON.		
Moving Points	Used to set the movement of the moving sign. The unit is Pixel and the range is between 1 – 50 Pixels.	
Interval time)	Used to set the interval time between two movements. The unit is ms and the range is between 50 – 3000 ms.	
Detail	Time	Provide **HH:MM:SS** and **HH:MM** two kinds of display format.
	Date	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of display format.
	Alarm Number	If selected, when the alarm occurs, the alarm number that is designated in the Alarm Setup dialog box will also be shown in front of the alarm message. Refer to the figures below: 
	Color	When the Time and Date options are selected, you can designate the display color by using this option.

Graphic Element

Perhaps you need some graphics that are not provided. Therefore, the following basic graphic elements are for you to use to create your own graphs or drawings.

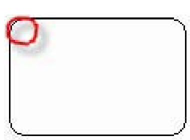
Line

Table 3-52: Property Description of Line Graphic Element

Property Description of Line Graphic Element	
Click to draw and edit the line graphic element. Click where you want to start the line, and drag it across the work place on the screen. Then, release the mouse button to finish the line. When selecting this line graphic element, you can see a rectangle range. This is designed for you to move and adjust the line more quickly and conveniently. You can set line color, size, and style freely in the property table. The range out of the line graphic element itself will be displayed in transparent color.  Line direction  Line width (1 to 8)	
Line Style	The following line styles can be selected. 

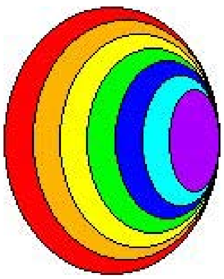
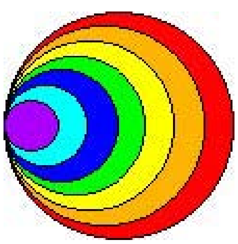
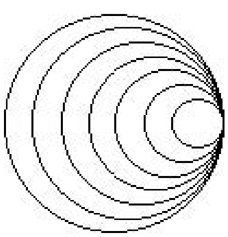
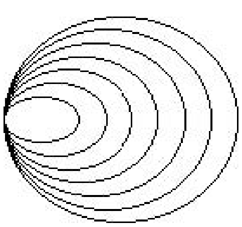
Rectangle

Table 3-53: Property Description of Rectangle Graphic Element

Property Description of Rectangle Graphic Element	
Click to draw and edit the rectangle graphic element. Drag the mouse across the work place on the screen until the rectangle is the size that you want. Release the mouse button to finish. You can import the picture into the rectangle from the picture bank and set the rectangle color, size, and style in the property table. This option is a good choice when you need to simply import a picture.	
Transparent	When selected, the element displays with the border only; there is no color in the element. The Foreground Color option will also be disabled.
Round Radius	0–38 pixels round radius are provided for selection. 

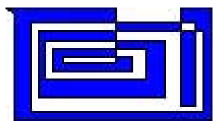
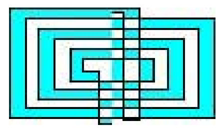
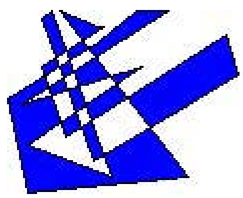
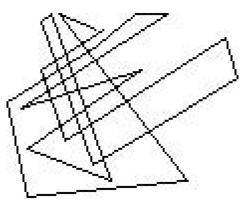
Circle

Table 3-54: Property Description of Circle Graphic Element

Property Description of Circle Graphic Element	
You can draw an ellipse or circle using this option. Drag the mouse across the work place on the screen until the ellipse or circle is the size that you want. Then, release the mouse button to finish. If the width and height of the circle graphic element are the same size, the circle graphic element will be a round shape circle. If the width and height of the circle graphic elements are not the same size, the element will be an ellipse. When selecting this circle graphic element, you can see a rectangle range; this is designed for you to move and adjust the circle more quickly and conveniently. Changing the size of the rectangle range changes the size of circle graphic element. The range outside of the circle graphic element will be displayed in transparent color. The Transparent option appears in the element property table. Once Yes is selected, the element will display only with the border; no color appears in the element. If any other element is under this circle graphic element, it will be visible on the screen.	
	An ellipse with a Transparent setting in the property table is set to No
	A circle with a Transparent setting in the property table is set to No
	A circle with a Transparent setting in the property table is set to Yes
	An ellipse with a Transparent setting in the property table is set to Yes

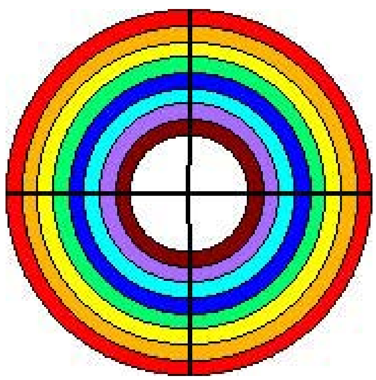
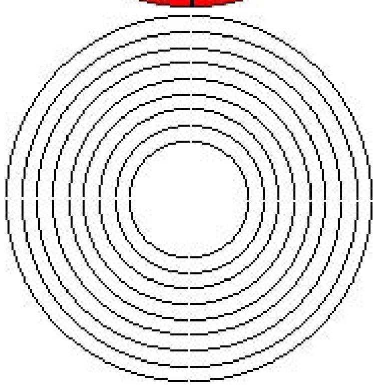
Polygon

Table 3-55: Property Description of Polygon Graphic Element

Property Description of Polygon Graphic Element	
Click to determine each node of the polygon graphic element. You can click where you want to place the first node and drag it across the work place on the screen until the next node is decided. Click the mouse again to determine the position of the next node. Repeat the above process until the polygon is the size that you want. Then, right-click the mouse button to finish. When selecting this polygon graphic element, you will see a rectangle range, which is designed for you to move and adjust the polygon more quickly and conveniently. Changing the size of the rectangle range will change the size of circle graphic element. The range out of the circle graphic element itself will be displayed in transparent color. The Transparent option is in the element property table. Once Yes is selected, the element will display with the border and no color in the element. If any other element is under the circle graphic element, it will be visible on the screen.	
Line Color	Used to set the line color of the polygon graphic element.
Foreground	Used to set the display color of the polygon graphic element. Refer to the figures below:   The foreground color is set to blue. The foreground color is set to turquoise.
Transparent	When selected, the element displays with the border and no color in the element. The Foreground Color option will also be disabled. Refer to the figures below: A polygon with a Transparent setting in the property table is set to No.  A polygon with a Transparent setting in the property table is set to No  A polygon with a Transparent setting in the property table is set to Yes

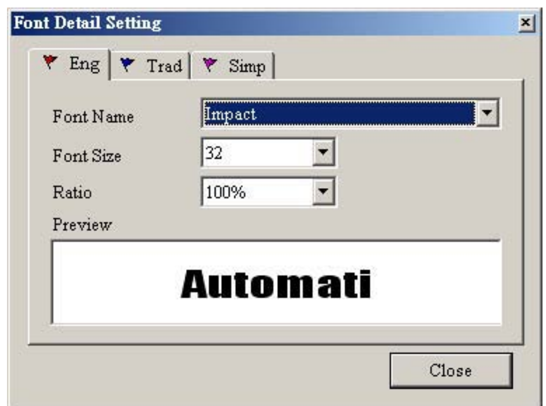
Arc

Table 3-56: Property Description of Arc Graphic Element

<table>
<tr><th colspan="2">Property Description of Arc Graphic Element</th></tr>
<tr><td colspan="2">Click to draw and edit the arc graphic element. You can click where you want to start the arc and drag it across the work place on the screen. Then, release the mouse button to finish the arc. The Transparent option is in the element property table. Set to Yes indicates that this element is an arc. If set to No, this element is a sector. The range of the circle graphic element will be displayed in transparent color.</td></tr>
<tr><td colspan="2"> When “Transparent” is set to No
 When “Transparent” is set to Yes</td></tr>
<tr><td>Transparent</td><td>When selected, the element displays with the border and no color in the element. The Foreground Color option will be disabled.</td></tr>
</table>

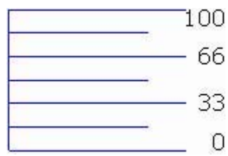
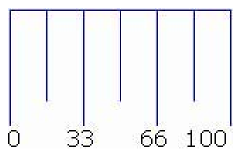
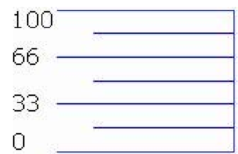
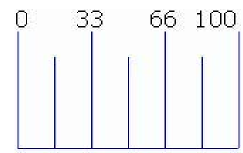
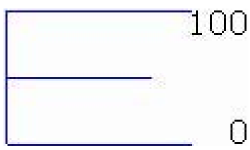
Text

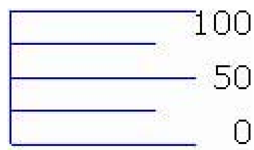
Table 3-57: Property Description of Text Graphic Element

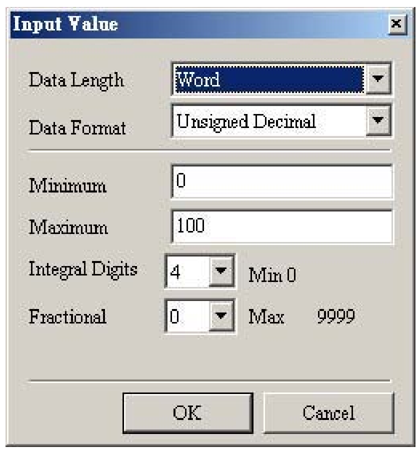
Property Description of Text Graphic Element	
Used to create a text frame, and to add and edit the text on the screen. You can drag the mouse across work place until the text frame is the size that you want, and then release the mouse button to finish. Then, add and edit the text in the text frame. The foreground color is the color of the text frame with Transparent set to No.	
Text Text Size Font Text Color	User can select any of the available **Windows®** fonts. Press the  button next to the Font tab to display the Font Detail Setting dialog box. In the Font Detail Setting dialog box, select the **Font Name**, **Font Size** and **Ratio**. The font can be any **Windows®** font, the font size determines the height and the ratio determines the width. You may also view the text format in the Preview window. If the multi-language function is used, the user can see the different language tabs and can edit the different language font settings in the Font Detail Setting dialog box. 
Foreground Color	Used to set the text frame color. Refer to the figure below. The foreground color of this text graphic element is set to blue. 
Transparent	When selected, the element will display the text only; there is no color in the element. The Foreground Color option will also be disabled.

Scale

Table 3-58: Property Description of Scale Graphic Element

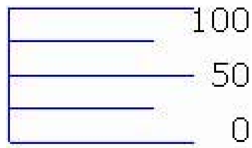
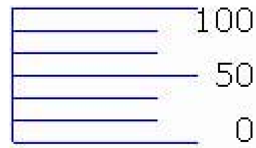
<table>
<tr><td colspan="5">Property Description of Scale Graphic Element</td></tr>
<tr><td colspan="5">You can change the scale direction, main and sub-scale number, and grid color in the property table to create a special and unique scale graphic element. The Display Mark option can be used to determine if the scale value displays next to the scale or not. The minimum and maximum of the scale value can be set in the Detail Setup option.</td></tr>
<tr><td>Text Size
Text Color</td><td colspan="4">You can set the text size and text color provided by the HMi to determine the text display on the element.</td></tr>
<tr><td rowspan="2">Style</td><td>Standard</td><td>Rotation 90</td><td>Rotation 180</td><td>Rotation 270</td></tr>
<tr><td>
</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Main Scale</td><td colspan="4">Refer to the figures below:




When the main scale number is set to 2 When main scale number is set to 3</td></tr>
<tr><td>Display Mark</td><td colspan="4">Used to determine if the scale value display next to the scale or not.</td></tr>
<tr><td rowspan="9">Detail Setup</td><td colspan="4">
</td></tr>
<tr><td>Date Length</td><td colspan="3">There are 16-bit Word and 32-bit Double Word two options.</td></tr>
<tr><td rowspan="3">Data Format</td><td colspan="3">The following data format are provided:</td></tr>
<tr><td colspan="3">Word/Double Word</td></tr>
<tr><td colspan="3">1. BCD
2. Signed Decimal
3. Unsigned Decimal</td></tr>
<tr><td>Minimum</td><td colspan="3" rowspan="2">You can set the minimum and maximum input setting value to determine the range of input setting value.</td></tr>
<tr><td>Maximum</td></tr>
<tr><td>Integral Digits
Fractional Digits</td><td colspan="3">Use to determine the digit number of integer and decimal fractions. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format selected is Floating.</td></tr>
<tr><td colspan="4">When the users have input the minimum and maximum values and pressed the OK button, the HMi will examine the value by referring to the selected data length, data format, integral and fractional digits.</td></tr>
</table>

January 2007

Table 3-58: Property Description of Scale Graphic Element (continued)

Property Description of Scale Graphic Element ***(continued)***	
Grid Color	Used to set the grid color of the scale graphic element.
SubScale Number	When the main scale number is set to 3 and the subscale number is also used, the scale graphic element will display as the shown below:   When subscale number is set to 1 When main scale number is set to 2

Table

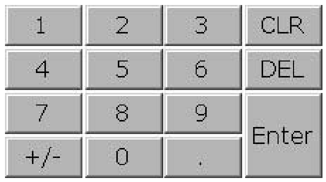
Table 3-59: Property Description of Table Graphic Element

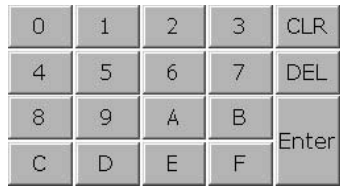
Property Description of Table Graphic Element			
You can change the cell numbers of the table and the appearance and color in the property table to create a special and unique table graphic element. If used with other elements, each element will display more completely on the screen.			
Background Color	Used to set the display color of the table scale element.		
Detail Setup	Header	Row Header	Used to set the color of the first row of the table. You can enable or disable this option by selecting the check box next to the Row Header.
		Col Header	Used to set the color of the first column of the table. You can enable or disable this option by selecting the check box next to the Col Header.
	Interlacing	Rows	Used to set the color of the interlacing rows of the table. You can enable or disable this option by selecting the check box next to "Rows".
		Columns	Used to set the color of the interlacing rows of the table. You can enable or disable this option by selecting the check box next to the Rows.
		Row Header	Used to the color of the interlacing row header of the table. You can enable or disable this option by selecting the check box next to the Row Header.
		Columns Header	Used to the color of the interlacing column header of the table. You can enable or disable this option by selecting the check box next to the Columns Header.
	Cell Setting	Sep. Rows Evenly	Used to distribute the rows of the table evenly.
		Sep. Col Evenly	Used to distribute the columns of the table evenly.
Border Color	Used to set the border color of the table.		
Grid Color	Used to set the grid color of the table.		
Number of Rows	The range is between 1–99.		
Number of Columns	The range is between 1–99.		

Keypad Element

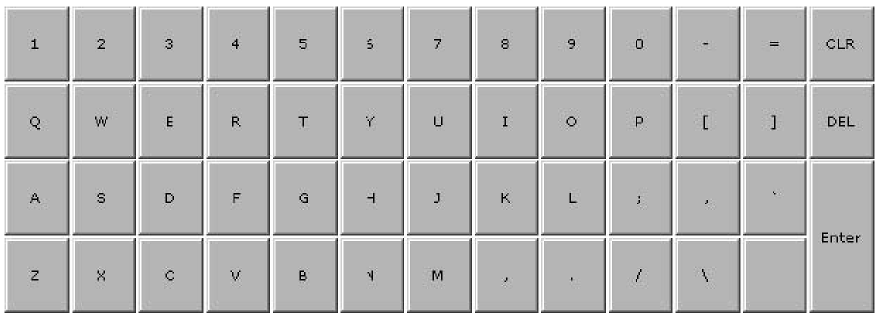
Table 3-60: Property Description of Keypad Element

Property Description of Keypad Element
Provides three kinds of default keypad elements for selection. You can select decimal, hexadecimal, or characters according to different application requirements.



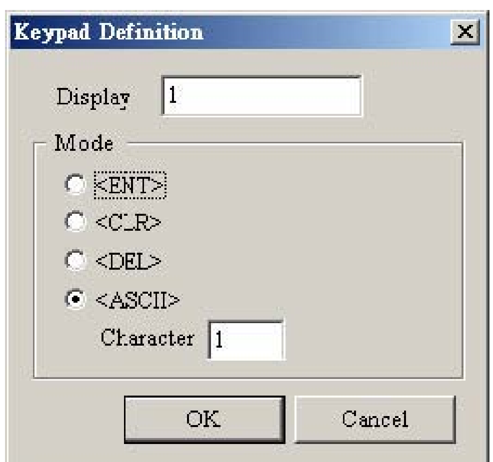


Keypad (1) Decimal Keypad (2) Hexadecimal Keypad



Keypad (3) Character Keypad

You can redefine the display text for each button shown on the keypad. The other buttons, such as **<ENT>** (Enter), **<CLR>** (Clear), **<DEL>** (Delete) and **<ASCII>** (Input Character) can also be renamed flexibly. Refer to the figure below:



The keypad is displayed in a Group on the screen. You can use the Ungroup command from the Edit menu bar to ungroup all the buttons. You can then move and change the button size freely. You can redefine the display text shown on the button in the property table. When the Text option is entered as number 1, the display text on the button will appear as 1. If you redefine it as number 2, the display text also appears as 2. If it is redefined as the character A, the display text will also be changed to A. If it is changed to the character %, the display text will be changed to % and vice versa.

The input character will be sent to the Active Numeric Entry element or the Active Character Entry element. For these two kinds of elements, you have to set the Input Mode to Active and set the InterLock Address. Refer to **Table 3-37: Property Description of Numeric Entry Element** and **Table 3-38: Property Description of Character Entry Element**.

Table 3-60: Property Description of Keypad Element (continued)

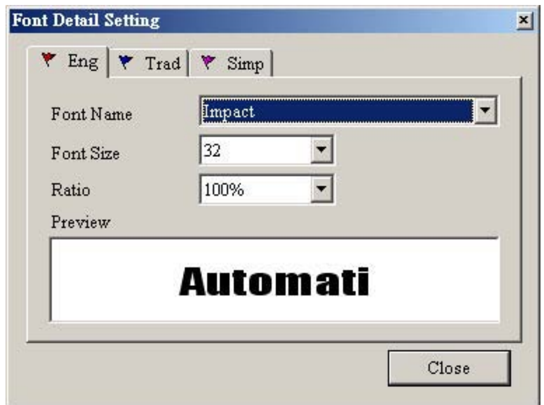
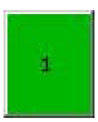
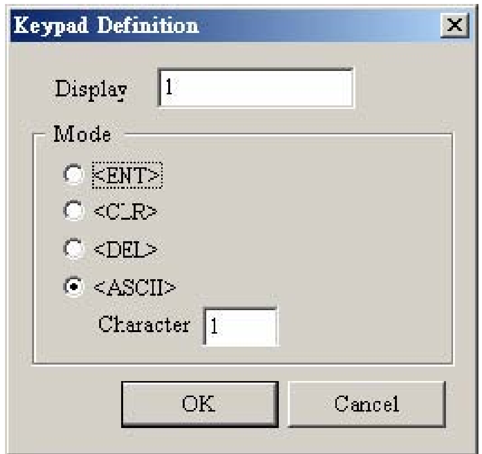
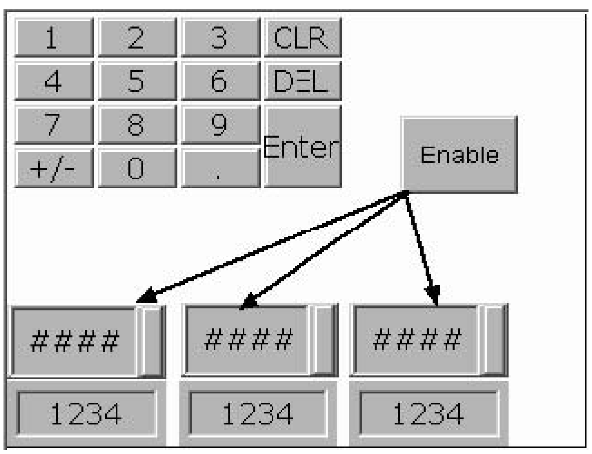
Property Description of Keypad Element (continued)	
Text Text Size Font Text Color	User can select any of the available **Windows®** fonts. Press the  button next to the Font tab to display the Font Detail Setting dialog box. In the Font Detail Setting dialog box, select the **Font Name**, **Font Size** and **Ratio**. The font can be any **Windows®** font, the font size determines the height and the ratio determines the width. You may also view the text format in the Preview window. If the multi-language function is used, the user can see the different language tabs and can edit the different language font settings in the Font Detail Setting dialog box. 
Picture Bank Name Picture Name	Refer to **Table 3-2: Property Description of General Buttons**.
Transparent Effect Transparent Color	Refer to **Table 3-2: Property Description of General Buttons**.
Foreground Color Style	The two options are Standard and Raised.  When the style is selected as Standard and the foreground color is set to green.  When the style is selected as Raised and the foreground color is set to red.

Table 3-60: Property Description of Keypad Element (continued)

Property Description of Keypad Element (continued)			
Detail Setup	The users can redefine the buttons of the keypad		
		Display	Display text or character
		Mode	The are following modes provided: 1. <ENT> Enter 2. <CLR> Clear 3. <DEL> Delete 4. <ASCII> Character

Example for Creating a Keypad Element:

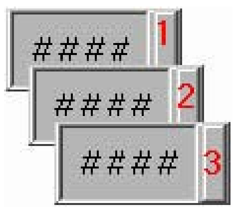
1. Create the following elements first:



The elements created are: one Keypad element, one Momentary button, three numeric entry elements, and three numeric display elements.

2. Related Element Property Description:

Table 3-61: Property Description of Keypad Element

Element	*Property Description*
Keypad (1)	Reserve the default value. You can also change the display text.
Momentary button	The write address is set to Internal memory $10.1. The main function is used to enable the following numeric entry elements and let them receive the input value.
Numeric Entry (Left)	The write address is set to Internal memory $0, Input Mode is set to Active and the InterLock Address is set to $10.1. When the Momentary button is pressed, the numeric entry element will prepare to receive the input value. After you press the Enter button, the numeric entry element will blink and it indicates that the numeric entry element is receiving the input value. When the value is received completely, the numeric entry element will stop blinking. In the figure below, the Numeric Entry (Left) will blink first. When the input value is transferred to the next element, the next element will blink as will the next etc. Refer to the following figure:  The element blinking order is determined by the order of creating elements.
Numeric Entry (Middle)	The write address is set to Internal memory $1, Input Mode is set to Active and the InterLock Address is set to $10.1.
Numeric Entry (Right)	The write address is set to Internal memory $2, Input Mode is set to Active and the InterLock Address is set to $10.1.
Numeric Display (Left)	The read address is set to Internal memory $0.
Numeric Display (Middle)	The read address is set to Internal memory $1.
Numeric Display (Right)	The read address is set to Internal memory $2.

In addition to the Active Mode described in example above, there is also a Touch Non-Popup Mode. The Mode is selected in the property dialogue box of the entry element as seen in Table 3-37 on page 34 and Table 3-38 on page 36. If the element is selected to Touch Non-Popup Mode, the operator must touch the element to activate the keypad. After the operator presses the enter button, the value is written to the entry element's write address.

Chapter 4 — Macro Function

The **HM*i*** has a provision in it that allows for Macro editing in a language that is very similar to BASIC that allows for commenting your code as well. Using the Macro function, a user can manipulate data and also perform some forms of logic directly inside the **HM*i***. After editing a Macro, you can test the Macro validity via either an on-line or off-line simulation on the PC before downloading the results to **HM*i***. Each macro is capable of containing 512 lines of code with a maximum of 128 characters per line. See **Figure 4-1** and **Figure 4-2**.

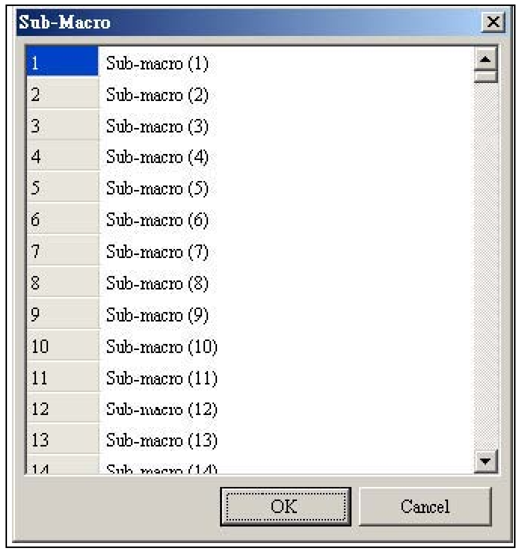


Figure 4-1: Sub-Macro Screen

A sub-macro is labeled 1 through 512 by default. If a user wishes to rename a sub-macro they can change the name of the sub-macro to a more user-friendly description.

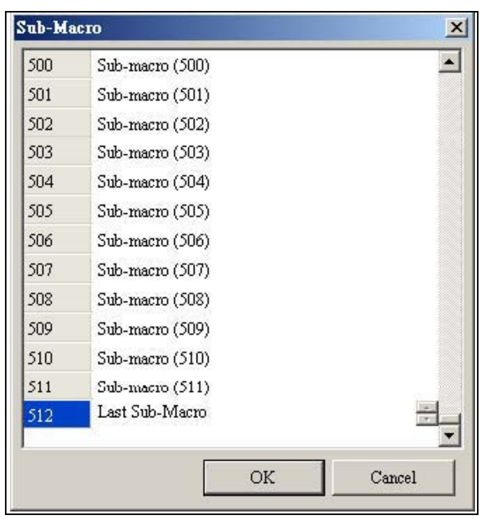


Figure 4-2: Sub-Macros

To call a specific sub-macro, a CALL command is used. For example, if you are to call "Last Sub-Macro" simply use a CALL 512 command from any other macro.

Macro Types

Table 4-1: Macro Command Table

Macro Name	*Numbers*	*Remark*
Screen Open Macro	1	The Screen Open Macro will be executed only ONCE when you open a screen (or switch to a new screen) and the screen elements will not be displayed until after the Screen Open Macro has completed execution. Therefore, it is important that the user pay close attention when designing the Screen Open Macro to avoid infinite loops (programs that cannot be ended) as it may cause a system delay or even prevent executing the screen's elements permanently. Writing long macros is not recommended and should be avoided if at all possible. Pay close attention on using loops and make sure to test the Macro with on-line/off-line simulation before downloading to **HMi** to ensure expected performance and operation.
Screen Close Macro	1	The Screen Close Macro will be executed only ONCE when you close the screen and no other macros will be executed until the Screen Close Macro is completed. Therefore, it is important that the user pay close attention when designing the Screen Close Macro to avoid infinite loops (programs that cannot be ended) as it may cause a system delay.
Screen Cycle Macro	1	The macro will be executed continuously when the screen is open, therefore, writing long macros is not recommended and should be avoided for this type of macro.
Initial Macro	1	There is only one Initial Macro in a program and it is executed just prior to the startup screen being displayed. This macro is very useful when setting initial values in the **HMi** or in a PLC.
Background Macro	1	The purpose of the Background Macro is to execute one or more commands simultaneously since it runs in a separate task. If another Macro is executed, such as the Cycle Macro, it will not have any influence on the Background Macro although they appear to be executed almost simultaneously. This type of macro does not require to be run in a loop since it will operate continuously.
Clock Macro	1	The Clock Macro will be executed continuously, finish the executed ONCE, and then will be executed again at the Clock cycle time set in the Standard tab of the Configuration window under Options. This type of macro is similar to a Cycle Macro therefore, writing long macros is not recommended and should be avoided.
On Macro	1	You can use the On Macro for each specific button element (Bit). It is called the On Macro because the Macro is executed once upon the button element (Bit) changing from OFF to ON.
Off Macro	1	You can use the Off Macro for each specific button element (Bit). It is called the Off Macro because the Macro is executed once upon the button element (Bit) changing from ON to OFF.
Sub-macro	512	There are 512 sub-macros for editing that can be used to write repeated actions or functions to save macro editing time. To call a sub-macro simply, use a CALL command from within a macro; an example would be CALL 1 to call the first sub-macro.

Macro Editing

After choosing the desired Macro command from the menu bar, you can start editing the Macro by clicking any line shown in **Figure 4-3**. The Macro command dialog box will pop up when any line is clicked. The Macro editing window will be different by clicking position. For your convenience, the left most number is the line number.

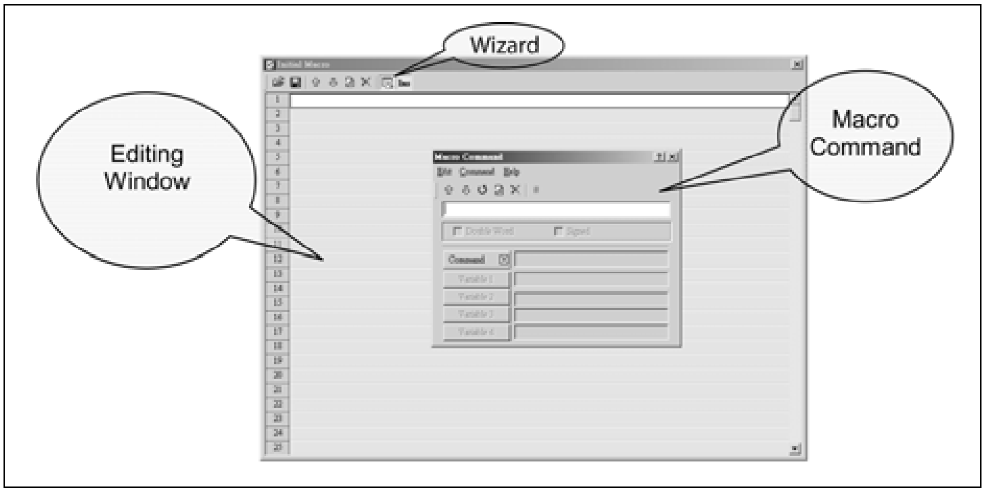


Figure 4-3: Start Editing Macro

You can also use the icons on the toolbar (**Figure 4-4**) for Macro editing.

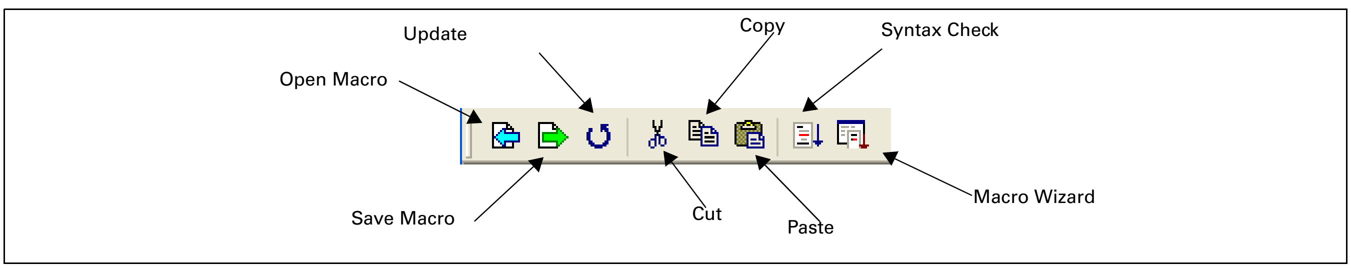


Figure 4-4: Toolbar

Figure 4-5 shows that 512 lines (numbered from 1 to 512) are available for editing the Macro. Blank lines in the program mean that lines will be set to comment lines after updating as shown in **Figure 4-3**.

To open up the Macro Command dialog box, click on the Wizard icon and the following box will pop up (**Figure 4-5**). Simply click on the Command button to choose the command needed for the macro. Refer to the following sections for Macro editing methods. If a PLC address is used in the macro, the address will be in brackets to distinguish it from internal memory.

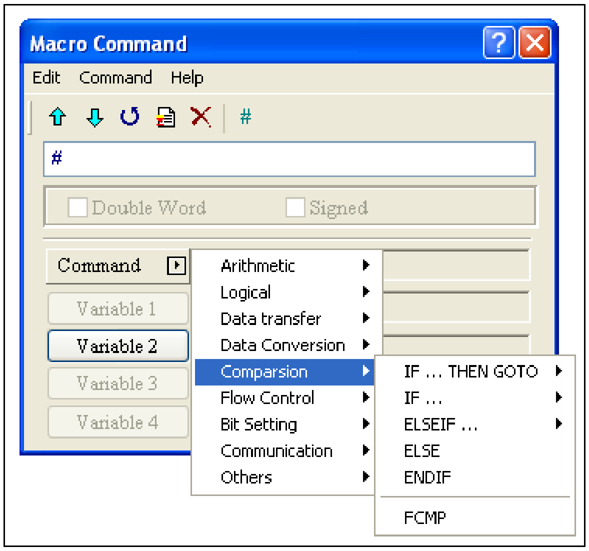


Figure 4-5: Macro Command Editing Window

Edit

You can edit the Macro via the edit option in the Macro Command dialog box.

Up
Move from the selected line to the previous line of the macro.

Down
Move from the selected line to the next line of the macro.

Update
Update the current edited line of the macro after a change is made or line is entered. The modification will not be updated if the Update button is not pressed after editing.

Insert
Insert a line between the current line and the line after the selection. The inserted line will be a duplicate of the line selected.

Delete
Delete the selected line.

Comment
This will insert a comment mark (#) in front of the line to mark the line as a comment. Choosing Comment again will remove the comment mark.

Command

You can use commands to edit the macro. The command and equation can be typed directly, or chosen from the menu bar or selected by clicking the Command button.

Keypad Entry

For the convenience of editing the macro, the **HM*i*** allows you to edit the Macro by keying in the commands manually. The **HM*i*** will check the validity automatically, if there are any errors, a warning dialog box will pop up to warn you. It is not critical that the user place the correct amount of spaces between commands and operands, when the line is updated the **HM*i*** will automatically adjust the spacing and warn of formatting errors.

Macro Operation

Definition

Table 4-2: Macro Definition

WORD	A word consists of 16 bits of continuous data. This is used to represent 16 bits of data or 0x0000 to 0xFFFF hexadecimal or 0 to 65535 decimal.
DWORD, DW	A double-word consists of 32 bits of continuous data. This is used to represent 32 bits of data or 0x000000 to 0xFFFFFF hexadecimal or 0 to 4,294,967,295 decimal.
BYTE	A byte is two nibbles or 8 bits of data. This can be used to represent 8 bits of data or 0x00 to 0xFF hexadecimal or 0 to 255 decimal.
Signed	A signed value is a numeric value with polarity, which is used to represent both positive and negative values. A byte, word or double-word can be signed.

By default memory is assigned to a word and unsigned decimal, if the user needs to change the format in the display then the element must be set up accordingly.

Arithmetic Operation

Arithmetic Operation can be performed in either integer or floating point where a user can't mix integer and floating point in the same line. The operands (values) can either be internal memory or a constant. To use a PLC value that value must first be put into internal memory.

Table 4-3: Arithmetic Command

Command		***Equation***	***Description***	***Remark***
Integer Operation	+	**V1=V2 + V2**	Addition	The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded. Double Word memory will take two registers; for example, if you choose to make $2 a double word, it will assign register $2 and $3 to the value.
	-	**V1=V2 - V3**	Subtraction	
	*	**V1 = V2 * V3**	Multiplication	
	/	**V1 = V2 / V3**	Division	
	%	**V1 = V2% V3**	Get Remainder	
Floating Point Operation	FADD	**V1=FADD(V2, V3)**	Addition	Floating Point Operation is the operation of signed 32 Bit data. Floating Point memory will take two registers, for example, if you choose to make $2 a Float, it will assign register $2 and $3 to the value. If the user needs to display 3 decimal places then set Fractional to 3 and Integral to 4 in the Detail Property of the element; the sum of the Fractional and Integral Digits can't be larger then 7. Make sure to set up the minimum value to -XXXX if the user plans on entering negative numbers, by default the minimum value is set o 0.
	FSUB	**V1=FSUB(V2, V3)**	Subtraction	
	FMUL	**V1=FMUL(V2, V3)**	Multiplication	
	FDIV	**V1=FDIV(V2, V3)**	Division	
	FMOD	**V1=FMOD(V2, V3)**	Get Remainder	

+, FADD

Addition

Equation: V1 = V2 + V3[(Signed | DW)]
V1 = FADD(V2, V3) (Signed
DW)

Perform the addition on V2 and V3, and store the addition result in V1.

Example:

Add a value of 1 to $2 and store the value in $2

$2 = $2 + 1

Add a value of $1 to $2 and store the value in $3.

$3 = $2 + $1

Add a value of $1 (double word) to a value of $3 (double word) and store it in $5

$5 = $1 + $3 (DW)

Add a value of $1 (signed) to a value of $2 (signed) and store it in $3

$3 = $1 + $2 (SIGNED)

Add a value of 1.9 to $4 and store the value in $4 (this is a floating point operation)

$4 = FADD($4, 1.9)

Add the floating point values of $1 and $3 and store the value in $5

$5 = FADD($1, $3)

-, FSUB

Subtraction

Equation: V1 = V2 - V3[(Signed | DW)]

V1 = FSUB(V2, V3) (Signed DW)

Perform the subtraction of V2 and V3, and store the subtraction result in V1.

Example:

Subtract a value of 1 from $2 and store the value in $2

$2 = $2 - 1

Subtract a value of $1 from $2 and store the value in $3.

$3 = $2 - $1

Subtract a value of $1 (double word) from a value of $3 (double word) and store it in $5

$5 = $1 - $3 (DW)

Subtract a value of $1 (signed) from a value of $2 (signed) and store it in $3

$3 = $1 - $2 (SIGNED)

Subtract a value of 1.9 from $4 and store the value in $4 (this is a floating point operation)

$4 = FSUB($4, 1.9)

Subtract the floating point values of $1 from $3 and store the value in $5

$5 = FSUB($1, $3)

*, FMUL

Multiplication

Equation: V1 = V2 * V3[(Signed | DW)]
V1 = FMUL(V2, V3) (Signed DW)

Perform the multiplication of V2 and V3, and store the multiplication result in V1.

Example:

Multiply $2 by 2 and store the value in $2

$2 = $2 * 2

Multiply the value of $2 by $1 and store the value in $3

$3 = $2 * $1

Multiply a value of $1 (double word) by a value of $3 (double word) and store it in $5

$5 = $1 * $3 (DW)

Multiply a value of $1 (signed) by a value of $2 (signed) and store it in $3

$3 = $1 * $2 (SIGNED)

Multiply the value of $4 by 1.5 and store the value in $4 (this is a floating point operation)

$4 = FMUL($4, 1.5)

Multiply the floating point value of $1 by $3 and store the value in $5

$5 = FMUL($1, $3)

/, FDIV

Division

Equation: V1 = V2 / V3[(Signed | DW)]

V1 = FDIV(V2, V3) (Signed DW)

Perform the division of V2 and V3, and store the division result in V1. The value contained within V3 cannot be equal to 0 (zero).

Example:

Divide $1 by $2 and store the value in $3

$3 = $1 / $2

Divide a value of $1 (double word) by a value of $3 (double word) and store it in $5

$5 = $1 / $3 (DW)

Divide a value of $1 (signed) by a value of $2 (signed) and store it in $3

$3 = $1 / $2 (SIGNED)

Divide the value of $4 by 1.5 and store the value in $4 (this is a floating point operation)

$4 = FDIV($4, 1.5)

Divide the floating point value of $1 by $3 and store the value in $5

$5 = FDIV($1, $3)

Get Remainder

Equation: V1 = V2 % V3[(Signed | DW)]
V1 = FMOD(V2, V3) (Signed DW)

Perform the division of V2 and V3, and store the remainder in V1. The value contained within V3 cannot be equal to 0 (zero).

Example:

The remainder of 10 / 4 = 2 and here is how 2 is calculated. 10 / 4 = 2.5, (remainder 0.5), so 4 / 2 (remainder) = 0.5 which is the decimal remainder.

Divide $1 by $2 and store the remainder value in $3

$3 = $1 % $2

Divide a value of $1 (double word) by a value of $3 (double word) and store the remainder in $5

$5 = $1 % $3 (DW)

Divide a value of $1 (signed) by a value of $2 (signed) and store the remainder in $3

$3 = $1 % $2 (SIGNED)

Divide the value of $4 by 1.5 and store the remainder in $4 (this is a floating point operation)

$4 = FMODV($4, 1.5)

Divide the floating point value of $1 by $3 and store the remainder in $5

$5 = FMOD($1, $3)

ADDSUMW

Repeated Addition

Equation: V1 = ADDSUMW(V2, V3)[(DW)]

Perform the addition on V3 consecutive registers starting at register V2 and store the repeated addition result in V1.

Example:

$2 = 1

$3 = 2

$4 = 3

$5 = 3

$1 = ADDSUMW($2, $5) V2 = $2 V3 = 3, then the equation will sum $2, $3, $4 (3 registers starting at $2)

Add up the values contained within the internal memory address $2, $3, $4 and #5 (3 Words started from address #2) and the grand total is stored in the address $1. The value of the grand total is equal to 6.

Logical Operation

There are six logical operations which include OR, AND, XOR, NOT, Shift-left and Shift-right. There are three operands for each operation and each operand can be internal memory or constant, but it is internal memory only when outputting. The unit can be Word and Double Word. Refer to **Table 4-4: Logical Operation Command** and examples below for more information.

Table 4-4: Logical Operation Command

<table>
<tr><th>Command</th><th>Equation</th><th>Description</th><th>Remark</th></tr>
<tr><td>|</td><td>V1 = V2 | V3</td><td>Logical OR operation</td><td rowspan="6">The calculation result can be stored as WORD and DWORD.</td></tr>
<tr><td>&&</td><td>V1 = V2 && V3</td><td>Logical AND operation</td></tr>
<tr><td>^</td><td>V1 = V2 ^ V3</td><td>Logical XOR operation</td></tr>
<tr><td>NOT</td><td>V1 = NOT V2</td><td>Logical NOT operation</td></tr>
<tr><td><<</td><td>V1 = V2 << V3</td><td>Logical Shift-left operation</td></tr>
<tr><td>>></td><td>V1 = V2 >> V3</td><td>Logical Shift-right operation</td></tr>
</table>

| Operand

Logical OR operation

Equation: V1 = V2 | V3[(DW)]

Perform the logical OR operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F000Hex

$4 = 0F00Hex

$2 = $2 | $4 Store the result of $2 in FF00Hex

Double Word is $2 = $2 | $4 (DW)

A	*B*	*F*
0	0	0
0	1	1
1	0	1
1	1	1

&& Operand

Logical AND operation

Equation: V1 = V2 && V3[(DW)]

Perform the logical AND operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F000Hex

$4 = 0F00Hex

$2 = $2 && $4 Store the result of $2 in 0000ex

Double Word is $2 = $2 && $4 (DW)

A	*B*	*F*
0	0	0
0	1	0
1	0	0
1	1	1

^ Operand

Logical XOR operation

Equation: V1 = V2 ^ V3[(DW)]

Perform the logical XOR operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F100Hex

$4 = 0F00Hex

$2 = $2 ^ $4 Store the result of $2 in FE00Hex

Double Word is $2 = $2 ^ $4 (DW)

A	***B***	***F***
0	0	0
0	1	1
1	0	1
1	1	0

Logical NOT operation

Equation: V1 = NOT V2 [(Signed | DW)]

Perform the logical NOT operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F100Hex

$4 = NOT $2 Store the result of $$ in 0EFFHex

Double Word is $4 = NOT $2 (DW)

<< Operand

Logical Shift-left operation

Equation: V1 = V2 << V3[(DW)]

Shift V2 (WORD/DWORD) data to left (number of bit is V3). The result of this calculation is stored in V1.

Example:

$2 = F100Hex

$2 = $2 << 4 $2 shift-left 4 bits and becomes 1000Hex

Double Word is $2 = $2 << 4 (DW)

>> Operand

Logical Shift-right operation

Equation: V1 = V2 >> V3[(DW)]

Shift V2 (WORD/DWORD) data to right (number of bit is V3). The result of this calculation is stored in V1.

Example:

$2 = F100Hex

$2 = $2 >> 4 $2 shift-right 4 bits and becomes 0F10Hex

Double Word is $2 = $2>>4 (DW)

Data Transfer

There are five commands for data transfer, including =, BMOV, FILL, CHR and FMOV. Refer to **Table 4-5: Data Transfer Command** and examples below for more information.

Table 4-5: Data Transfer Command

Command	***Equation:***	***Description***	***Remark***
MOV	**V1 = V2**	Transfer data	Data type for V1 can be P, M or C
BMOV	**BMOV(V1, V2, V3)**	Block move	Data type for V1 and V2 only can be P, M
FILL	**FILL(V1, V2, V3)**	Fill the memory	
CHR	**CHR(V1, V2)**	Convert text to ASCII code	V2 is a text string
FMOV	**V1 = FMOV(V2)**	Transfer floating point data	

P: PLC address, M: Internal memory, C: Constant

Transfer Data

Equation: V1 = V2[(Signed DW | DW)]

Transfer data from V2 to V1. No data change within A2 after executing MOV command.

Example:

The data within the internal memory address $0 is assigned the constant 4.

$0 = 4

The data within the internal memory address #4 is assigned the same as the data within the internal memory address $2.

$4 = $2

Double Word is $4 = $2 (DW)

BMOV

Block Move Copy Block

Equation: BMOV(V1, V2, V3)

BMOV (V1, V2, V3) means to move sequential data of V3 in length from address V2 to address V1 in block. Data format is word. If the block length is more than internal memory or max number of PLC register, there will be an error when compiling.

Example:

Move the data in $0, $1, $2, $3, $4 to $10, $11, $12, $13 in order.

Total the same 4 Words.

$0 = 1

$1 = 2

$2 = 3

$3 = 4 BMOV($10, $1, 4) After executing BMOV command, $10=1, $11=2, $12=3, $13=4.

FILL

Fill the Memory

Equation: FILL(V1, V2, V3) [(Signed)]

FILL(V1, V2, V3) means to fill address V1 with data in address V2 for a sequential V3 number of registers. If the block length is more than internal memory or max number of PLC register, there will be an error when compiling.

Example:

$5 = 10

FILL($0, $5, 4)

Executing FILL command to fill $0, $1, $2, $3 with constant 10.

CHR

Convert Text to ASCII code

Equation: CHR(V1, V2)

CHR(V1, V2) means to convert text in address V2 to ASCII code and store in V1. The max length is 128 words.

Example:

CHR($1, "AB12")

After executing CHR command, 4241ex will be stored in $1 and 3130ex will be stored in $2.

Transfer Floating Point Data

Equation: V1 = FMOV(V2) (Signed DW)

Transfer floating point data from V2 to V1.

Example:

Transfer constant 44.3 to the internal memory address $0.

$0 = FMOV(44.3) (SIGNED DW)

Transfer the same data of PLC 1@X0 to the internal memory address $0.

$0 = FMOV(1@X0) (SIGNED DW)

Data Conversion

Table 4-6: Data Conversion Command

Command	***Equation***	***Description***
BCD	**V1 = BCD(V2)**	Converts BIN Data into BCD
BIN	**V1 = BIN(V2)**	Decimal value conversion
W2D	**V1 = W2D(V2)**	Convert WORD to DWORD
B2W	**V1 = B2W(V2, V3)**	Convert BYTE to WORD
W2B	**V1 = W2B(V2, V3)**	Convert WORD to BYTE
SWAP	**SWAP (V1, V2, V3)**	Swap BYTE data
XCHG	**XCHG (V1, V2, V3)**	Exchange data
MAX	**V1 = MAX(V2, V3)**	Get Maximum value
MIN	**V1 = MIN(V2, V3)**	Get Minimum value
A2ex	**V1 = A2H(V2)**	Convert ASCII code to 4-digit integer
H2A	**V1= H2A (V2)**	Convert hexadecimal integer to ASCII code
FCNV	**V1= FCNV (V2)**	Convert integer to floating point value
ICNV	**V1= ICNV (V2)**	Convert floating point value to integer

BCD

Convert BIN Data into BCD Value

Equation: V1 = BCD(V2) [(DW)]

The binary data in V2 is converted into a BCD value and stored in V1.

Example:

The binary data in $4 is 5564. After executing BCD command, the binary data in $4 is converted to 5564H.

$4 = 5564

$4 = BCD($4)

BIN

Converts BCD Data into BIN Value

Equation: V1 = BIN(V2) [(DW)]

The BCD data in V2 is converted into binary value and stored in V1.

Example:

The BCD (hexadecimal) data in $4 is 5564H. After executing BIN command, the BCD data in $4 is converted to 5564.

$4 = 5564Hex

$4 = BIN($4)

Convert WORD to DWORD

Equation: V1 = W2D(V2) [Signed]

The WORD value in V2 is converted into DWORD value, and stored in V1.

Example:

The WORD value in decimal format in $4 is -7. After executing W2D command, the value in $7 is converted to -7.

$4 = -7

$7 = W2D($4)(Signed)

B2W

Convert BYTE to WORD

Equation: V1 = B2W(V2, V3)

Convert V3 number of BYTE data from V2 to V3 number of WORD values and start storing the result in V1. The high byte will be filled with 0.

Example:

Assume that the value of $200 is 12, this will convert 12 BYTES (6 WORDS) to 12 WORDS starting at $300 and store the result in $100 to $112.

$100=B2W($200, $300)

W2B

Convert WORD to BYTE

Equation: V1 = W2B(V2, V3)

Convert V3 number of WORD data from low-byte of V2 to BYTE format and store the result in V1. This will discard high-byte of V2.

Assume that the value of $200 is 12, this will convert 12 WORDS starting from the low-byte of $300 and convert these 12 WORDS into 12 BYTES (6 WORDS) and store the result in $100 to $106.

$100= W2B($200, $300)

SWAP

Swap BYTE Data

Equation: SWAP (V1, V2, V3)

Swap high-byte and low-byte of V3 number of words starting at V2 and save it in memory starting at V1.

Example:

Swap the high-byte and low-byte of $10, $11, $12, $13, $14 and store the result in $1, $2, $3, $4 $5 in order.

SWAP($1, $10, 5)

If $11 = 1234Hex, after executing SWAP command, $2 = 3412Hex.

Exchange Data

Equation: XCHG (V1, V2, V3)[(DW)]

Exchange V3 number of words of data starting at V2 with the same number of words starting at V1.

Example:

Exchange the data of $10, $11, $12, $13, $14 and the data of $1, $2, $3, $4, $5 in order.

XCHG($1, $10, 5)

If $11 = 1234Hex and $2 = 5678Hex, $2 = 1234Hex and $1 = 5678Hex after executing XCHG command.

MAX

Get Maximum Value of a Range of Data

Equation: V1 = MAX(V2, V3)[(Signed DW | DW)]

Get the maximum value from V2 and V3 and store the result in V1.

Example:

$0 = 0

$1 = 2

$2 =10

$0 = MAX($1, $2)

The result is $0 = 10

MIN

Get Minimum Value of a Range of Data

Equation: V1 = MIN(V2, V3)[(Signed DW | DW)]

Get the minimum value from V2 and V3 and store the result in V1.

Example:

$0 = 0

$1 = 2

$2 =10

$0 = MIN($1, $2)

The result is $0 = 2

A2H

Converts 4 ASCII Code to a Four-Digit Integer in Hexadecimal Format

Equation: V1 = A2H(V2)

Convert a single ASCII code of V2 and the next 3 words (4 WORDS) to a hex value and stores the result in V1.

Example:

$10 = 0034Hex (ASCII 4)

$11 = 0033Hex (ASCII 3)

$12 = 0036Hex (ASCII 6)

$13 = 0038Hex (ASCII 8)

$1 = A2H($10) After executing A2H command, the data in $1 will be converted to 4368Hex.

H2A

Converts a Hexidecimal Value V2 to Four Single ASCII Values (4 WORDS) Starting at V1.

Equation: V1 = H2A(V2)

Convert V2 (1 WORD in hexadecimal format) to the ASCII (4 WORDS) code and store the result in V1.)

Example:

$2 = 1234Hex

$10 = H2A($2)

After executing H2A command,

$10=0031Hex (ASCII 1)

$11=0032Hex (ASCII 2)

$12=0033Hex (ASCII 3)

$13=0034Hex. (ASCII 4)

FCNV

Convert integer to floating point value

Equation: V1= FCNV (V2)(Signed DW)

Convert an integer in V2 to floating point value and store in V1.

Example:

$3 = 100

$1 = FCNV($3)(Signed DW)

The result is $1 = 100.0

ICNV

Convert floating point value to integer

Equation: V1= ICNV (V2)

Convert a floating point value in V2 to integer and store in V1.

Example:

$3 = 100.6

$1 = ICNV ($3) (SIGNED DW)

The result is $1 = 100

Comparison

IF…THEN GOTO LABEL …

Equation: IF expression THEN GOTO LABEL identifier

If the command of expression is true, then it will go to LABEL identifier perform the program.

Refer to the following table for the command of expression:

Table 4-7: Comparison Command

Command	*Description*	*Remark*
V1 == V2	V1 is equal to V2	V1 and V2 should be internal memory, a constant or a PLC address.
V1 != V2	V1 is not equal to V2	
V1 > V2	V1 is greater than V2	
V1 >= V2	V1 is greater than or equal to V2	
V1 < V2	V1 is smaller than V2	
V1<= V2	V1 is smaller than or equal to V2	
V1 && V2 == 0	Perform AND command on V1 and V2 and the result of AND operation is equal to 0	
V1 && V2 != 0	Perform AND command on V1 and V2 and the result of AND operation is not equal to 0	
V1== ON	V1 is ON	
V1== OFF	V1 is OFF	

Simple Compare Statements Example:

If $2 is equal to 10, go to LABEL 1.

IF $2 == 10 THEN GOTO LABEL 1

If $2 is not equal to 10, go to LABEL 1.

IF $2 != 10 THEN GOTO LABEL 1

If $2 is greater than 10, go to LABEL 1.

IF $2 > 10 THEN GOTO LABEL 1

If $2 is greater than or equal to 10, go to LABEL 1.

IF $2 >= 10 THEN GOTO LABEL 1

If $2 is less than 10, go to LABEL 1.

IF $2 < 10 THEN GOTO LABEL 1

If $2 is less than or equal to 10, go to LABEL 1.

IF $2 <= 10 THEN GOTO LABEL 1

Check if a bit is either ON or OFF

Equation: IF V1 == {ON | OFF} THEN GOTO LABEL identifier

If V1 is ON or OFF, it will go to LABEL identifier. V1 is PLC address.

Example:

IF 1@X0 == ON THEN GOTO LABEL 1

IF $0.0 == ON THEN GOTO LABEL 1

IF…THEN CALL …

Equation: IF V1 == V2 THEN CALL macro

If V1 is equal to V2 then call a macro. V1 and V2 should be internal memory or constant. This operation cannot be performed on bit memory.

Example

If $2 is equal to 10, then it will call sub-macro 1.

IF 10 == $2 THEN CALL 1

IF…ELSE…ENDIF
Equation:

IF expression1

Statement1

ELSEIF expression2

Statement2

ELSE

Statement3

ENDIF

This is logical determination from multiple conditions. If expression1 is true, Statement1 will be executed. If expression1 is false, it will run expression2. If expression2 is true, Statement2 will be executed. If both expression1 and expression2 are false, Statement3 will be executed.

For the command of expression, Refer to **Table 4-7: Comparison Command** (Comparison command table).

Example:

If $1< 100, $1 = $1 + 1 is executed. Otherwise $1 = $1 + 10 is executed.

IF $1 < 100

$1 = $1 + 1

ELSE

$1 = $1 + 10

ENDIF

If $1 i< 5 then $2 = 5, if $1 > 10 then $2 = 10 otherwise $2 = $1.

IF $1 < 5

$2 = 5

ELSEIF $1 > 10

$2 = 10

ELSE

42 = $1

ENDIF

There are five types for flow control: GOTO, LABEL, CALL...RET, FOR…NEXT and END.

GOTO

Unconditionally go to a specific Label. GOTO command will jump to designated label like Label V1 unconditionally.

Equation: GOTO LABEL V1

Go to the internal designated Label V1 in the program unconditionally.

Example:

Go to the position of designated Label 2 and continue to execute the program unconditionally.

GOTO LABEL 2

...

...

...

LABEL 2

LABEL

Label such as Label V1

Equation: LABEL V1

A label value is unique per macro and it can't be used more then once in a single macro. The same label number can be used in other macros, an example would be that a user can use LABEL 1 in every macro written, however a user can only use LABEL 1 once per individual macro.

CALL..RET

Call Sub-Macro Program

Equation: CALL V1

V1 represents the sub-macro number. The sub-macro number could be 001 – 512 and V1 should be internal memory address or constant.

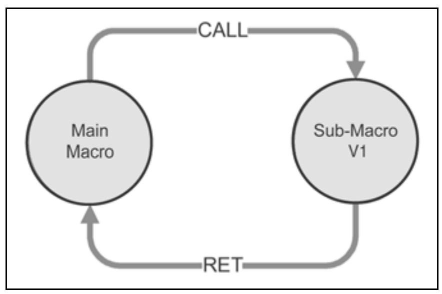


Figure 4-6: Call a Sub-Macro Program

The rights of macro control will be transferred to sub-macro after CALL V1 command is executed. V1 needs to return through RET command. The RET command will transfer the rights of macro control to the next command of CALL command. The sub-macro number could be 001 – 512 and the users also can name it freely. In the sub-macro program, the users also can CALL another sub-macro but the levels for CALL sub-macro should be less than 6 levels due to memory limit and also for avoiding unexpected error.

FOR…NEXT

Program Loop
Equation:

FOR V1 Statement NEXT

It is for nested loops. ”FOR” is the start of the loop and ”NEXT” is the end of the loop. The nested loop can be up to 5 levels max. V1 can be the internal memory or constant. When this command is executed, the number of V1 Statement will be executed continuously. Statement is the combination of a section of macro commands and also can be within the nested loop. The users can change the V1 value through command, but the number of times cannot be changed.

Example:

$10 = 10

$1 = 0

FOR $10

$1 = $1 + 1

NEXT

After the operation, the result is $1 = 10

If a $10 = 2 is inserted between the FOR and the NEXT in the above macro, the FOR … NEXT loop will still loop 10 times even though $10 is changed to a value of 2 the first pass through the loop.

END

End the macro

Equation: Statements1 END Statements2

End command is used to end the macro program and all statements after the END command will not be executed. If this command is in a main macro then the program will go to the first line again and begin execution, if this command is in a sub-macro then the sub-macro will end and the program will return to the previous program.

Example:

$1 = 10

$1 = $1 + 1

END

$1 = $1 + 1

After the operation, the result is $1 = 11, not $1 = 12 as the END command has ended the macro program.

Bit Setting

There are four settings for BIT settings: SETB, CLRBL, INVB and GETB.

Table 4-8: Bit Setting Command

Command	*Equation*	*Description*
SETB	SETB V1	Set V1 Bit to be ON
CLRBL	CLRB V1	Set V1 Bit to be OFF
INVB	INVB V1	Set V1 Bit to be inversed
GETB	V1 = GETB V2	Get V2 Bit value and store in V1

SETB

Sets Specific Bit to be ON.

Equation: SETB V1

Set V1 Bit

Example:

Set a value of 0 to the 0 number of bit within the internal memory $0.

$0 = 0000Hex

SETB $0.0

The result is $0 = 0001Hex

CLRB

Sets Specific Bit to be OFF.

Equation: CLRB V1

Reset V1 Bit

Example:

Set a value of 0 to the 0 number of bit within the internal memory $0.

$0 = FFFFHex

CLRB $0.0

The result is $0 = FFFEHex

INVB

Sets Specific Bit to be Inversed. ON to OFF, OFF to ON

Equation: INVB V1

Set V1 Bit to be inversed. ON to OFF, OFF to ON

Example:

Set a value of 0 to the 0 number of bit within the inversed internal memory $0.

$0 = FFFEHex

INVB $0.0

The result is $0 = FFFFHex

GETB

Get bit value

Equation: V1 = GETB V2

Get V2 Bit value and store in V1

Example:

Get the 3rd Bit value within $0 and store it to the 5th Bit within $10.

$2 = FFFEHex

$10 = 0

$10.5 = GETB $0.3

The result is $10 = 4

Communication

The examples below were written to communicate to an ELC, however, this type of macro may be more useful when communicating to bar code readers, weigh scales, RFID readers and instruments of the sort. This example will use Modbus communications and therefore requires check sums to be entered into the character strings which the user would have to calculate and enter into the string.

Table 4-9: Communication Command

Command	Equation	Description
INITCOM	V1= INITCOM (V2)	Initial setup COM port
ADDSUM	V1=ADDSUM(V2, V3)	Use addition to calculate checksum
XORSUM	V1 = XORSUM(V2, V3)	Use XOR to calculate checksum
PUTCHARS	V1 = PUTCHARS(V2, V3, V4)	Output characters by COM port
GETCHARS	V1 = GETCHARS(V2, V3, V4)	Get characters by COM port
SELECTCOM	SELECTCOM(V1)	Select COM port
CLEARCOMBUFFER	CLEARCOMBUFFER(V1, V2)	Clear COM port buffer
CHRCHKSUM	V1 = CHRCHKSUM(V2, V3, V4)	Calculate the length of texts and checksum

INITCOM

INITCOM: Initial setup COM port to start communication and set communication protocol.

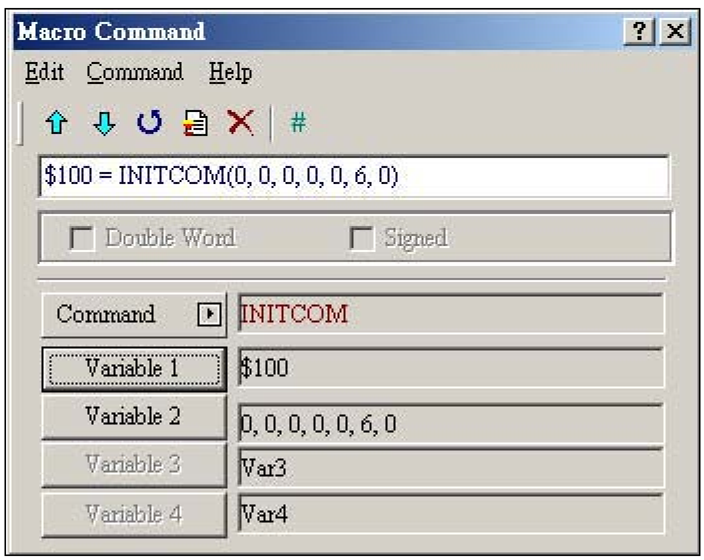


Figure 4-7: INITCOM

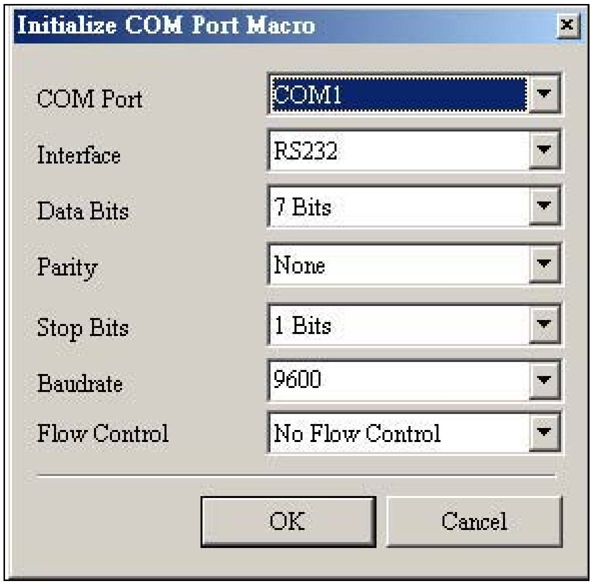


Figure 4-8: Variable2 Settings in INITCOM (Communication Protocol)

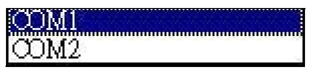


Figure 4-9: COM Port

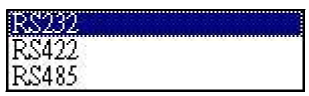


Figure 4-10: Communication Interface

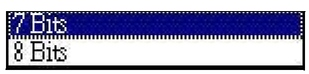


Figure 4-11: Data Bit

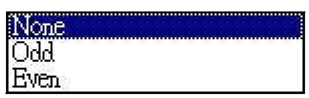


Figure 4-12: Parity Bit

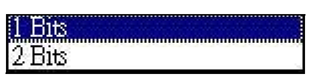


Figure 4-13: Stop Bit

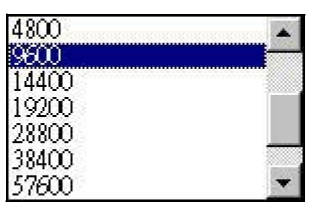


Figure 4-14: Baud Rate

Flow Control: Select from one of the below options for using flow control.

No Flow Control: Flow control function is disabled.

CTS/RTS: Flow control for hardware. It uses handshaking signal to control receiving and sending data. The control is achieved via internal modem or external modem that connect to **HM*i*** by a connecting cable.

DSR/DTR: Flow control for hardware also. It is used when PC and **HM*i*** are connected directly by a cable.

XON/XOFF: Flow control for software. Only used for 2400bps modem. The control method is to generate control code by software and add it in the transmission data.

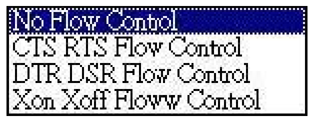


Figure 4-15: Flow Control

ADDSUM

ADDSUM — It uses addition to calculate checksum. V1=ADDSUM(V2, V3). V1 is the value after calculation, V2 is the starting address for calculation and V3 is data length.

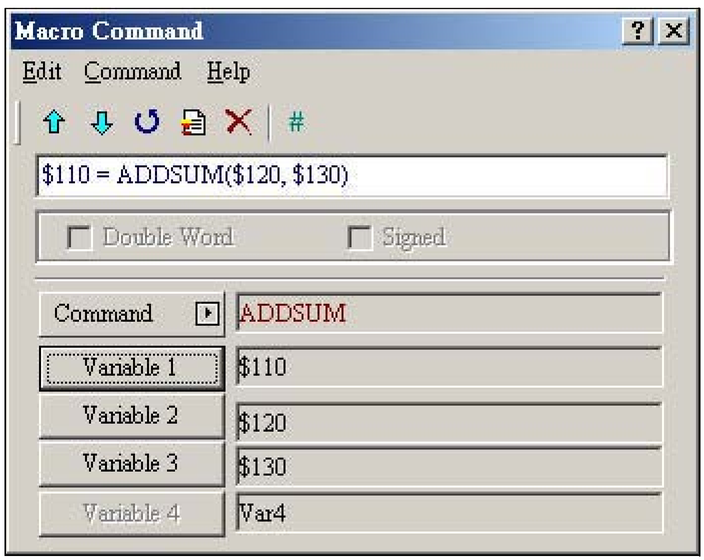


Figure 4-16: ADDSUM

XORSUM

XORSUM — It uses XOR to calculate checksum. V1=XORSUM (V2, V3) V1 is the value after calculation, V2 is the starting address for calculation and V3 is data length.

Figure 4-17: XORSUM

PUTCHARS

PUTCHARS — Output characters by COM port. V1= PUTCHARS (V2, V3, V4). V1 is the response value after communication, V2 is the starting address of transmission data, V3 is data length, and V4 is the allowance communication time (unit is ms). The result will be stored in V1.

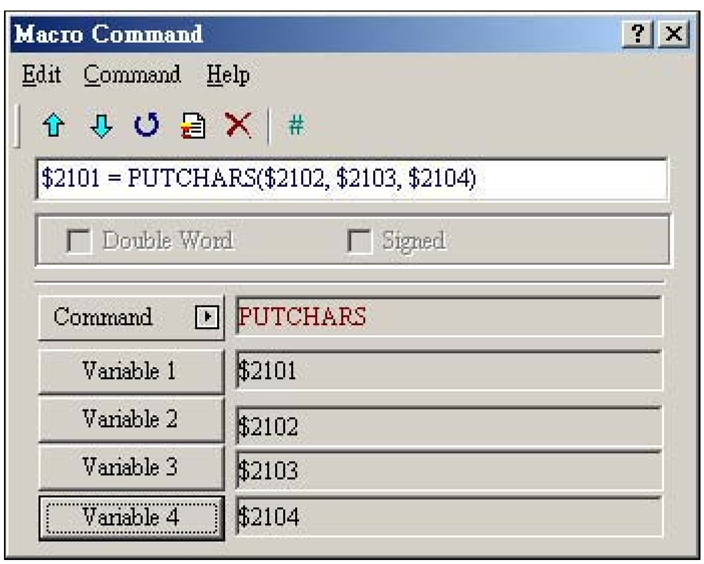


Figure 4-18: PUTCHARS

GETCHARS

GETCHARS — Get characters by COM port. V1= GETCHARS (V2, V3, V4). V1 is the response value after communication, V2 is the starting address of transmission data, V3 is data length, and V4 is the allowance communication time (unit is ms). The result will be stored in V1.

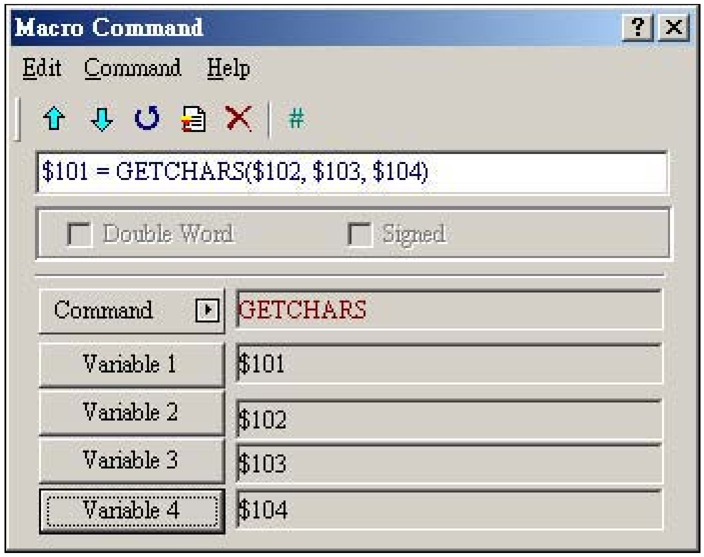


Figure 4-19: GETCHARS

SELECTCOM

SELECTCOM — Used to select COM port. When not connecting PLC (set PLC to NULL) in Options > Configuration in ***HMi***, the users can use two COM ports (0:COM1, 1:COM2) at the same time. (All communication commands will be processed via the COM port the users select after executing this command. Different macros will not support each other or have any interference.)

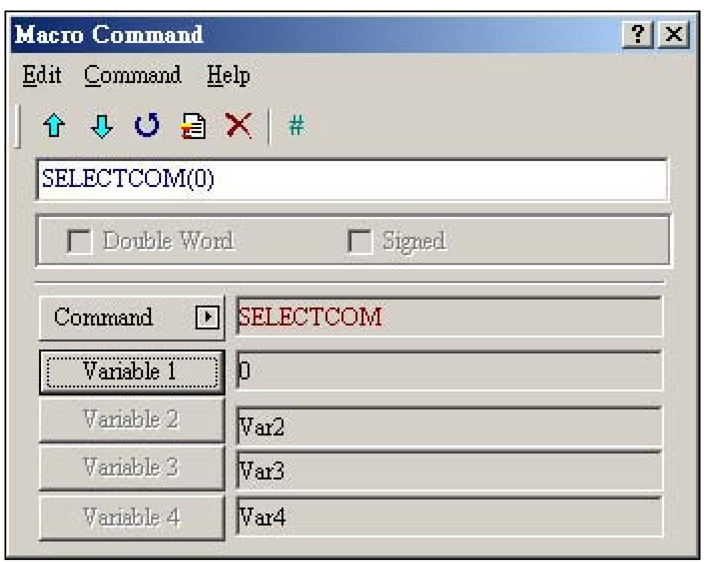


Figure 4-20: SELECTCOM

CLEARCOMBUFFER

Clear COM port buffer.

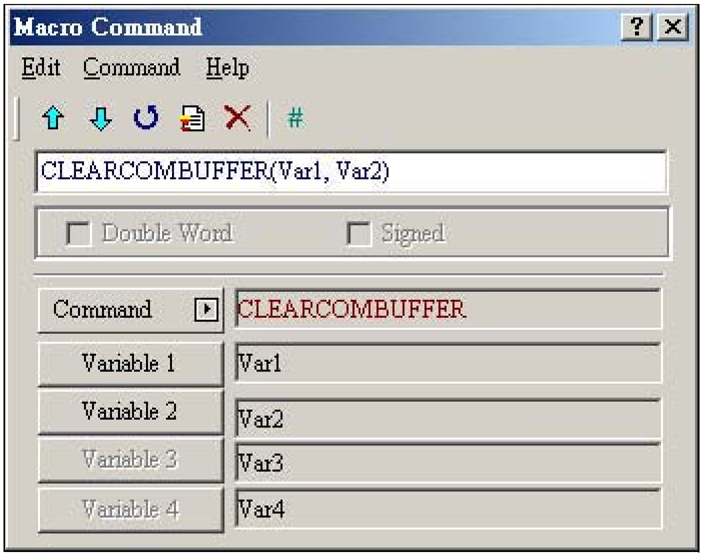


Figure 4-21: CLEARCOMBUFFER

Equation: CLEARCOMBUFFER(V1, V2)

V1 is the number of communication port. It represents as constant 0(COM1) or 1(COM2).

V2 is the type of buffer area. It represents as constant 0 (receiving buffer area) or 1 (sending buffer area).

Example:

Clear sending buffer area of COM2

CLEARCOMBUFFER(1, 0)

CHRCHKSUM

Calculate the data length of texts or characters and checksum.

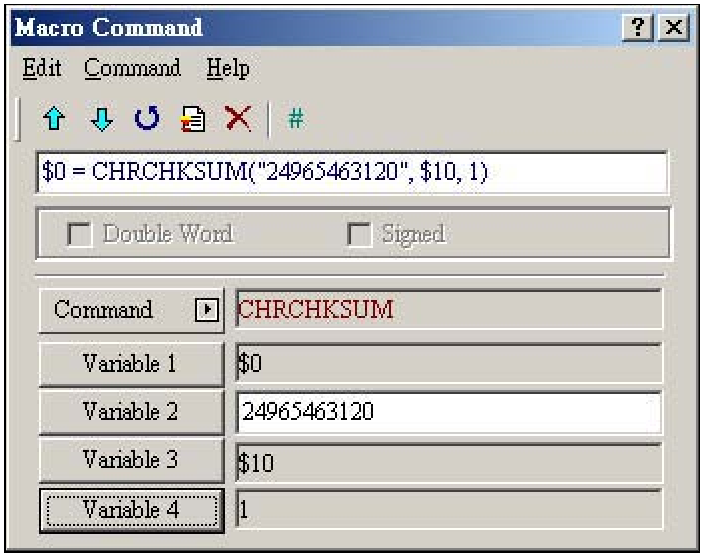


Figure 4-22: CHRCHKSUM

Equation: V1 = CHRCHKSUM(V2, V3, V4)

V1 is the internal memory address that stores the text length of V2.

V2 is the string of text.

V3 is the internal memory address that stores the checksum of V2.

V4 is the data length of the checksum that stores in V3. 0 represents Byte and 1 represents Word.

Operation of checksum:

Convert format of each data characters to ASCII code and add them up. For example, convert ’2’ to ASCII code ‘31H’, convert ’4’ to ASCII code ‘34H’ and the checksum is 31Hex + 34Hex = 65H.

Example:

Calculate the data length of "24" and checksum

$0 = CHRCHKSUM("24", $10, 2)

After the above operation, 2 is stored in $0 and 2 represents the data length is 2 bytes. The checksum stored in $10 is 65H.

Sample Example of sending and reading a string from an ELC

Example 1 in **Figure 4-23** demonstrates how to initialize communications to an ELC.

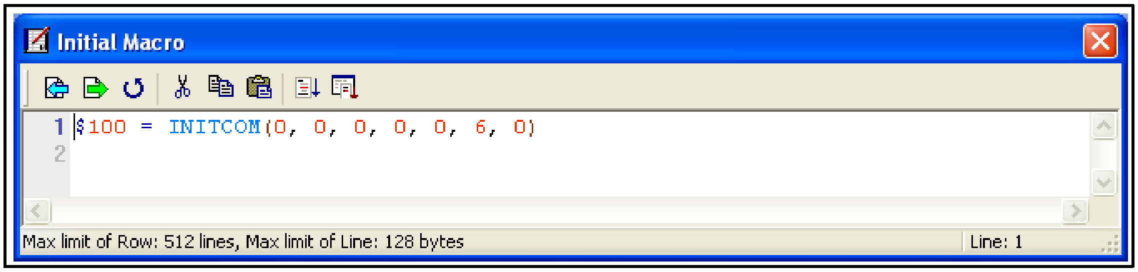


Figure 4-23: Initial Macro

Example 2 of Eaton ELC in **Figure 4-24** shows the communication macro using the background macro.

Line 1 selects the communication port to communicate to (COM1)

Line 3 will create the Modbus string to talk to device #1 and force a single coil to ON.

Lines 5 and 7 are the Modbus header and footer information.

Line 9 sends the data

Line 11 will read the data back

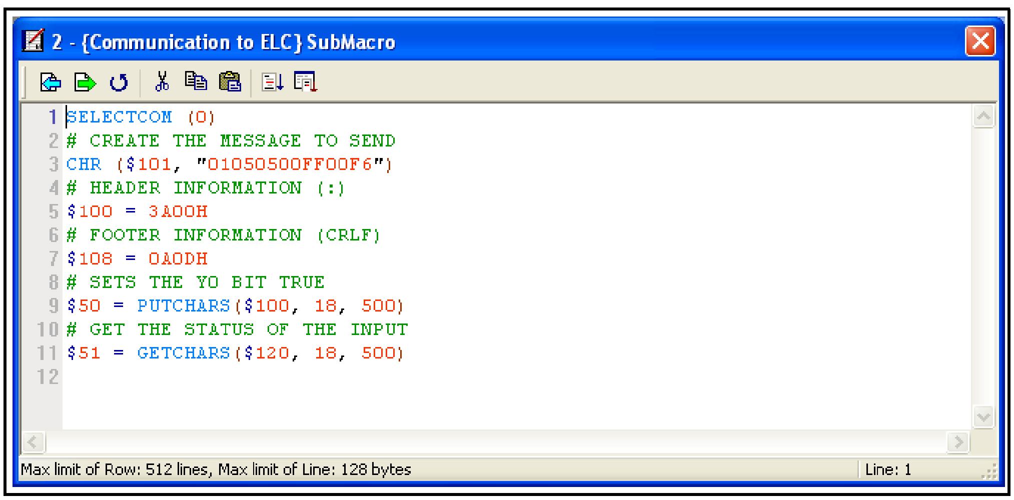


Figure 4-24: Communication to ELC Sub-Macro

Others

Command	Equation	Description
TIMETICK	**V1 = TIMETICK**	Get the time from system startup to present
GETLASSERROR	**V1 = GETLASTERROR**	Get last error value
#	**#V1**	Comment
delay	**delay V1**	System delay
GETSYSTEMTIME	**V1 = GETSYSTEMTIME**	Get system time
SETSYSTEMTIME	**SETSYSTEMTIME(V1)**	Set system time
GETHISTORY	**V1 = GETHISTORY (V2, V3, V4, V5, V6)**	Get history data

TIMETICK

TIMETICK — Get the time from system startup to present and put into the specific address. An increment of 1 means 100 ms is added.

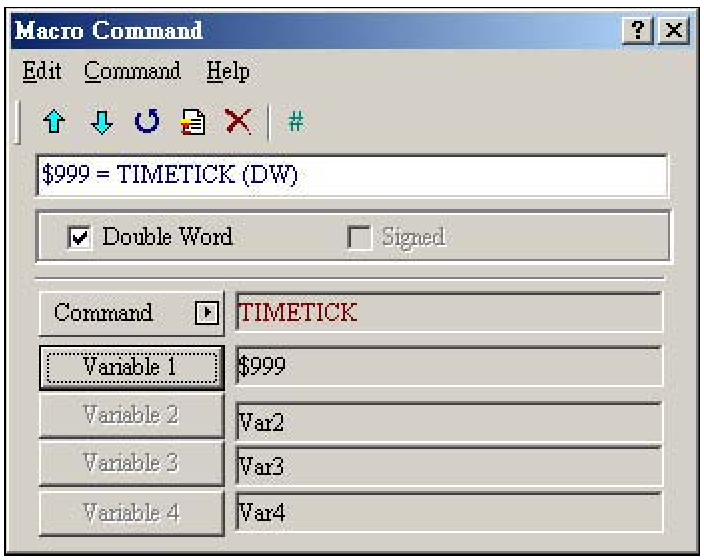


Figure 4-25: TIMETICK

GETLASTERROR

GETLASTERROR — Get last error value. If no error occurred, the result of GETLASTERROR will be 0. Even if each Macro is executed simultaneously, the error messages will not interfere one another. For error code information, refer to *Error Messages on page 4-41*.

Figure 4-26: GETLASTERROR

COMMENT

COMMENT — Makes the macro readable. Using this command will not affect the macro function. You only need to put # in front of the equation and the macro will become readable. If you want to change the comment back to the equation, just remove the # symbol.

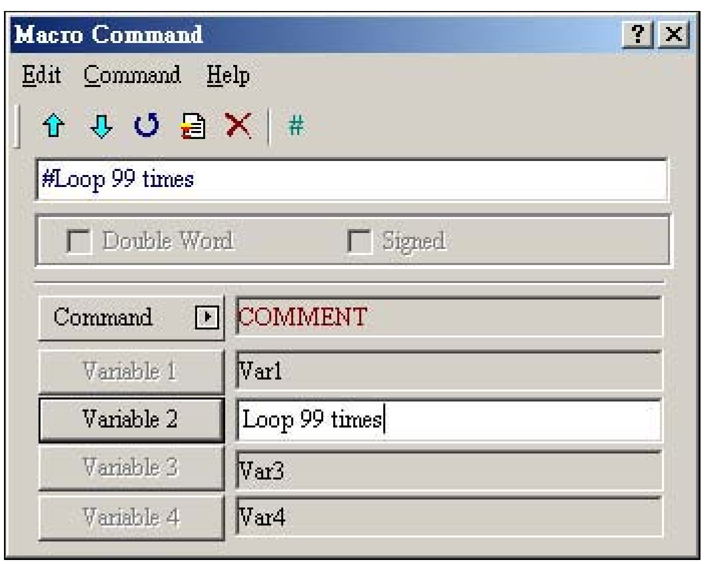


Figure 4-27: COMMENT

Delay

Delay — Delays the user setting time by system. Because **HM*i*** is a multiplexer system, a system delay may occur. Therefore, time set will be increased due to a System Busy condition and the condition that setting the time forward will not happen. The unit of delayed time is ms.

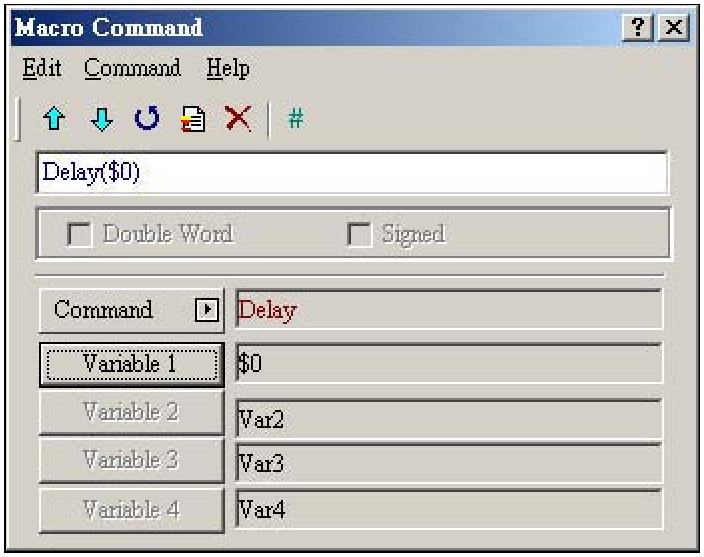


Figure 4-28: Delay

GETSYSTEMTIME

Get system time

Equation: V1 = GETSYSTEMTIME

V1 is the starting address of continuous 7Words within the internal memory address.

V1	Year
V1 + 1	Month
V1 + 2	Date
V1 + 3	Week
V1 + 4	Hour
V1 + 5	Minute
V1 + 6	Second

Example:

Now the system time is 2006/01/04 Wed 09:26:25. Use this command to get the current system time and store in $1–$7.

$1 = GETSYSTEMTIME

Get $1 = 2006, $2 = 01, $3 = 4, $4 = 3, $5 = 9, $6 = 26, $7 = 25

SETSYSTEMTIME

Set system time

Equation: SETSYSTEMTIME(V1)

V1 is the starting address of continuous 7Words within the internal memory address.

V1	Year
V1 + 1	Month
V1 + 2	Date
V1 + 3	Week
V1 + 4	Hour
V1 + 5	Minute
V1 + 6	Second

Example:

Set the current system time as 2006/01/04 Wed 09:26:25.

$1 = 2006

$2 = 1

$3 = 4

$4 = 3

$5 = 9

$6 = 26

$7 = 25

SETSYSTEMTIME($1)

GETHISTORY

Get History Data

Equation: V1 = GETHISTORY (V2, V3, V4, V5, V6)

V1 is the internal memory address where store the data length.

V2 is the internal memory, constant, the buffer number of history buffer area.

V3 is the internal memory, constant, the starting address for sampling.

V4 is the internal memory, constant, the points for reading

V5 is the internal memory, PLC address, the address where store the data

V6 is the internal memory, constant, the data type for reading

0: Data, 1: Time, 2: Time and Data

Error Messages

When compiling, Error Messages will show in the output window, which are easy to find. Some errors occur because of user carelessness, others because users fail to enter some commands, but they may be difficult to find in long Macro. To help the users debug and find problems, the **HMi** Macro provides error messages to show what the error is. To prevent logic errors, you should be aware of what you are doing and try to avoid making this kind of mistake.

Error Messages When Editing

Code – 100: LABEL cannot be found
There is no such LABEL that GOTO designates.

Code – 101: Recursion occurs
This error message usually occurs in a sub-macro. The ability of a sub-macro to CALL itself is called recursion, no matter if it is called directly or indirectly. Basically, recursion cannot be adopted for a sub-macro. You can use GOTO or FOR (infinite times) to replace it.

Code – 102: More than 3 nested FOR is used
This error message statements are to warn you not to use more than 3 nested FOR commands. The purpose is to avoid insufficient memory. The users can use GOTO or IF to replace it.

Code – 103: Sub-macro does not exist
This error message means that there is no sub-macro in the program. For example, CALL 5 means CALL sub-macro 5. If you do not edit sub-macro 5 in the program, this error message will display to warn the users. The purpose is to warn the users to be more careful when editing (reduce input error or avoid forgetting to edit the corresponding sub-macro) and prevent unexpected error.

Code – 104: Number of NEXT is less than the number of FOR
Numbers of NEXT and FOR should match. This error code is used to remind you to find out the missing NEXT.

Code –105: Number of FOR is less than the number of NEXT
Numbers of FOR and NEXT should match. This error code is used to remind the user if there is any missing FOR.

Code–106: Repeated LABEL
This error message means that there are repeated LABELs in the same Macro. The program will be confusing with that. This may be caused by carelessness (an input error or forgetting to edit the corresponding sub-macro), and you will get an error message during editing to help you avoid unexpected error.

Code–107: There is RET in Macro
This error message means that there is RET command in Macro. The RET command should be used for sub-macro to return program. But in Macro, it should use END not RET.

HM*i* Macro Error Messages

The users can read error messages by macro. Once there is an error and the users execute a correct command before reading error messages, the error message will be overwritten. When executing each macro, each Macro error message will not be influenced by other macros.

Code–10: GOTO Error
This message means that there is a GOTO error in the macro.

Code–11: Stack Overflow
This message means that the stack in the macro is full. This may be caused by using too many sub-macros or executing different macros at the same time. This message appears to help avoid insufficient memory.

Code–12: CALL Empty Sub-macro
This is a CALL sub-macro error. The sub-macro that is called should not be an empty sub-macro. This message is to avoid unexpected errors.

Code–13: Data Read Error
This is a data read error. Sometimes this may be caused by a memory data error, but most of the time it is a PLC data read error.

Code–14: Data Write Error
This is a data write error. Sometimes this may be caused by a memory data error, but most of the time is PLC data write error.

Code–15: Divisor is 0
This error message means that the devisor is 0 when performing a division operation.

HM*i* Communication Error Messages

Figure 4-29: Example of an HM*i* Communication Error Message

Communication Busy
Error Message: Com ? Station ?: Communication Busy ...

Unknown Code
Error Message: Com ? Station ?: Receive Unknow Code ...

No Response from Controller
Error Message: Com ? Station ?: Controller No Response ...

HMi CheckSum Error
Error Message: Com ? Station ?: Check Sum Error in **HM*i*** Message ...

Controller CheckSum Error
Error Message: Com ? Station ?: Check Sum Error in Controller Message ...

Incorrect Command

Error Message: Com %d Station %d: Command Can Not be Executed ...

Incorrect Address

Error Message: Com ? Station ?: Address Fault ...

Incorrect Value

Error Message: Com ? Station ?: Value is Incorrect ...

Controller is Busy

Error Message: Com ? Station ?: Controller is Busy ...

CTS Signal Fail

Error Message: Com ? Station ?: CTS Signal Fail ...

No Such Resource in Controller

Error Message: Com ? Station ?: No Such Resource ...

No Such Service in Controller

Error Message: Com ? Station ?: No Such Service ...

Must Retry

Error Message: Com ? Station ?: Must Retry ...

HMi Station Number Error

Error Message: Com ? Station ?: **HMi** Station Number Error ...

Controller Station Number Error

Error Message: Com ? Station ?: Controller Station Number Error ...

UART Communication Error

Error Message: Com ? Station ?: UART Communication Error ...

Other Communication Error

Error Message: Com? Station ?: Other Communication Error ...

Chapter 5 — Control Block and Status Block

For two-way communication between the **HM*i*** and all PLC brands, the address of the **HM*i*** control block and status block must be defined. These settings are located in the **Configuration** dialog box under the **Standard** tab.

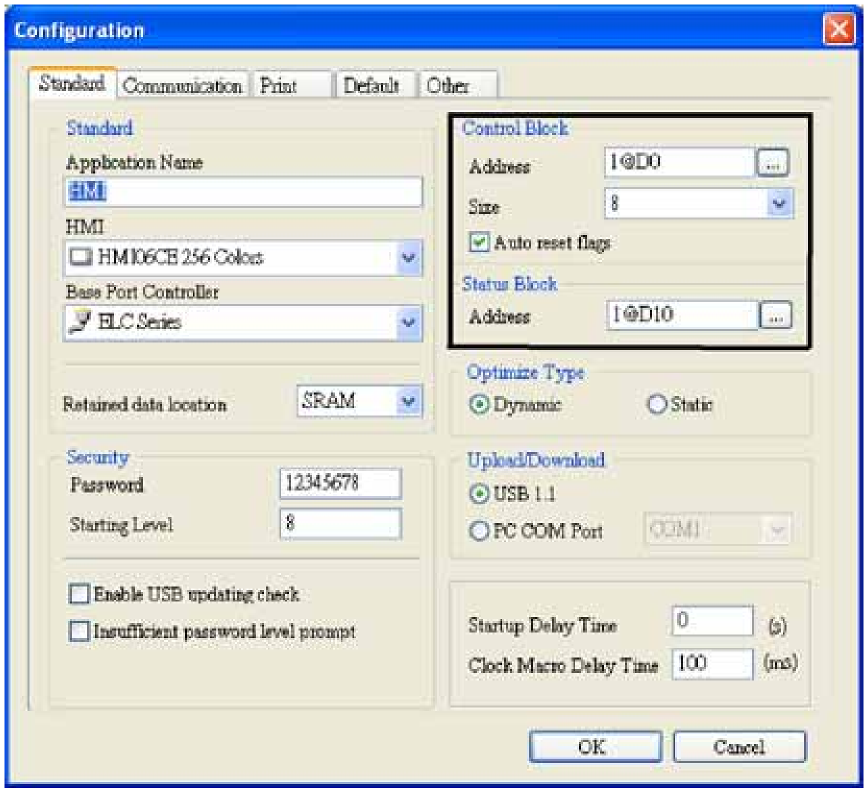


Figure 5-1: Standard Tab

Checking of the **Auto reset flags** will automatically reset the control block flags (Bits) after the desired procedure has been executed. If this box is unchecked, the user will be required to reset the flags.

The control block is the way a PLC is used to control the **HM*i*** and consists of 8 continuous words. When using the control block features, it is best that the length of the control block be set to 8 regardless if the user will be using all the features or not. When the control block is set to a length of zero, the control block is disabled.

The function and explanation of each WORD is listed below. In the following table and in all following examples we assume that the users use the Eaton ELC, so the available starting addresses in the control block are Dn – Dn+7 (D0 – D7).

Note: It is understood that most instances require the control and status block to be mapped to PLC memory. It is possible though, that either the control or status block can be mapped to internal $ memory in the HMi.

Control Block Designations

Table 5-1: Control Block Designations

Word Number	*Register Number*	*Address*	*Example*
0	Register for designating Screen Number (SNIR)	Dn	D0
1	Control Flag Register (CFR)	Dn+1	D1
2	Curve Control Register (CUCR)	Dn+2	D2
3	Register for Sampling History Buffer (HBSR)	Dn+3	D3
4	Register for Clearing History Buffer (HBCR)	Dn+4	D4
5	Recipe Control Register (RECR)	Dn+5	D5
6	Register for designating Recipe Group Number (RBIR)	Dn+6	D6
7	System Control Flag Register (SCFR)	Dn+7	D7

Screen Number Register

Table 5-2: Designating Screen Number Register (SNIR) - Word 0

Word	*Function*	*Description*
0	Designate screen number	This register is used to designate which screen the PLC wants the **HM*i*** to be displaying.

To use the SNIR register, write a value of the screen number the user wishes to have displayed into this register; the **HM*i*** will change to that screen.

Note: The SNIR register will automatically reset the user inputted value to a value of 0 once the target screen is reached. Due to the SNIR value being reset automatically by the **HM*i***, *if the value in the PLC for the SNIR is latched, then the user will not be able to navigate screen in the* **HM*i***.

Control Flag Register

Table 5-3: Control Flag Register (CFR) - Word 1

Bit Number	*Function*	*Description*
0	Enable / disable communication	Bit 1 = ON, **HM*i*** communication is disabled. Bit 1 = OFF, **HM*i*** communication is enabled.
1	Enable / disable back light	Bit 1 = ON, **HM*i*** back light is disabled. Bit 1 = OFF, **HM*i*** back light is enabled.
2	Enable / disable buzzer	Bit 2 = ON, **HM*i*** alarm is activated. Bit 1 = OFF **HM*i*** alarm is deactivated.
3	Clear alarm buffer	Set Bit 3 from OFF to ON to clear the alarm buffer, the trigger is change of state requiring the OFF to ON transition. To trigger this function again, toggle this bit from OFF to ON.
4	Clear alarm counter	Set Bit 4 from OFF to ON to clear the alarm counter, the trigger is change of state require the OFF to ON transition. To trigger this function again, toggle this bit from OFF to ON.
5–7	Reserved	
8	Setting user level bit0	The PLC can set the user level by using Bit 8, Bit 9 and Bit 10. The setting level is from level 0 to level 7. MSB: Bit 10 and LSB: Bit 8.
9	Setting user level bit1	
10	Setting user level bit2	
11–15	Reserved	

Bit 0 is used to enable or disable the **HM*i*** communications, by default this value is set to 0 which is enabled. By checking the **Communication Interrupt** check box under the **Communication** tab of the **Configuration** dialog box when communications is lost this bit will set ON automatically and the user can clear it to re-enable communications. If the **Communication Interrupt** check box is unchecked, this flag is disabled.

Bit 1 is used to enable or disable the **HM*i*** back light. When the back light is disabled the screen is not viewable, however the elements are still active and pressing the screen can activate the elements. It is important that if the back light is disabled, that the user be aware that the screen, even though not viewable, is still active.

Bit 2 is used to turn the audible alarm either on or off. When this bit is true, the alarm will sound and when this bit is false the alarm will be silent. If the user wished to enable or disable the "beep" when the screen is pressed then this is performed by pressing an holding the **SYS** button on the **HM*i*** and disabling the **Buzzer** under **Settings**.

Bit 3 is used to clear the alarm buffer. When an alarm history table is used, setting of this bit will clear all contents inside of that table. The bit is automatically reset after the bit is set and the table is cleared.

Bit 4 is used to clear the alarm counter. When an alarm frequency table is used, setting of this bit will clear the values for the alarms. The bit is automatically reset after the bit is set and the table counters are cleared.

Bits 8 - 10 are used to set the user level of the **HM*i***. Since the user level is the high byte of the word, simply use a masked write from the PLC to set to level 0 to 7. Whatever the value represented in the bits will be the user level of the **HM*i*** and the only place to change the user level will be the PLC. If certain elements need to have specific user level, set that level in the element since the PLC sets the user level globally in the **HM*i***.

Chart Control Register

This register is used to activate and clear chart (Trend Graph or X-Y Chart) elements. Each element has a **Sample Flag** associated with it, 1 though 4, which are controlled by either the sampling flag or clear flag bits.

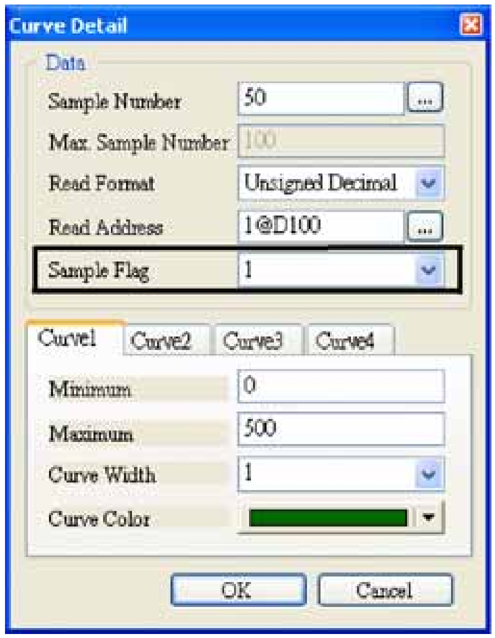


Figure 5-2: Curve Detail

Table 5-4: Chart Control Register (CUCR) - Word 2

Bit Number	***Function***
0	Chart sampling flag 1
1	Chart sampling flag 2
2	Chart sampling flag 3
3	Chart sampling flag 4
4–7	Reserved
8	Chart clear flag 1
9	Chart clear flag 2
10	Chart clear flag 3
11	Chart clear flag 4
12–15	Reserved

A chart is controlled by Bits 0 to 3 in the CUCR. Each chart has to be assigned to a sampling flag where the sample flag is setup in the detail property of the element. To activate the chart, set the corresponding bit in the CUCR. For example to activate the chart assigned to sampling flag 3, set bit 2 in the CUCR. Once the chart has finished being populated the bit will automatically be reset back to 0. Typically, if the trigger is from the **HM*i***, use a set bit, if from the PLC then use a rising edge or one shot type instruction to set the bit.

To clear the chart, simply perform a momentary contact closure on the clear flag, for example if sampling flag 2 was set to perform the data capture, then use chart clear flag 2 (Bit 9) to clear the associated tread or chart. The clear chart bit will automatically reset after the chart is clear.

Sampling History Buffer Register

The history buffer can be controlled by a PLC if the **Trigger Source** in the history buffer setup is set to **PLC** from **Timer**. When this is performed, the history buffer control word is used to enable and disable the specific history item. For example, if item 2 of the history setup is reading one or more address from a PLC and the trigger source is set to PLC, setting Bit 1 in the history buffer control word will enable the capture and display of the data to the **HM*i***. The bit has to be held high to capture the data and then when it is set low the capture will end. The data is resident and displayed on the **HM*i*** after the capture is stopped and the data capture can be restarted at any time.

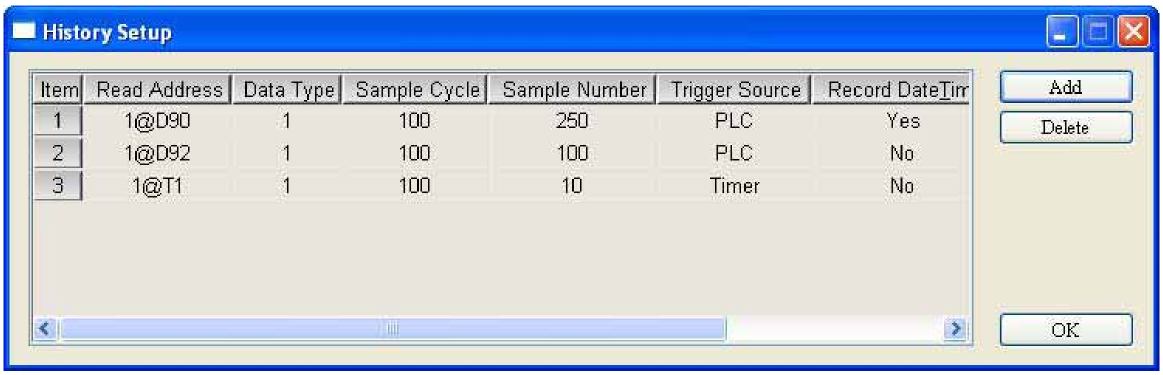


Figure 5-3: History Setup

Table 5-5: Register for Sampling History Buffer (HBSR) - Control Word 3

Bit Number	***Function***
0	Control flag for Sampling History Buffer 1
1	Control flag for Sampling History Buffer 2
2	Control flag for Sampling History Buffer 3
3	Control flag for Sampling History Buffer 4
4	Control flag for Sampling History Buffer 5
5	Control flag for Sampling History Buffer 6
6	Control flag for Sampling History Buffer 7
7	Control flag for Sampling History Buffer 8
8	Control flag for Sampling History Buffer 9
9	Control flag for Sampling History Buffer 10
10	Control flag for Sampling History Buffer 11
11	Control flag for Sampling History Buffer 12
12–15	Reserved

Clearing History Buffer Register

The history buffer when controlled by a PLC can also be cleared by the PLC. In the example above, item 4 was controlled by the PLC, to clear the buffer, after the data capture is stopped, simply set Bit 1 of word 4; when the buffer is cleared the bit will automatically be reset to zero.

Table 5-6: Register for Clearing History Buffer (HBCR) - Control Word 4

Bit Number	*Function*
0	Clear flag of history buffer 1
1	Clear flag of history buffer 2
2	Clear flag of history buffer 3
3	Clear flag of history buffer 4
4	Clear flag of history buffer 5
5	Clear flag of history buffer 6
6	Clear flag of history buffer 7
7	Clear flag of history buffer 8
8	Clear flag of history buffer 9
9	Clear flag of history buffer 10
10	Clear flag of history buffer 11
11	Clear flag of history buffer 12
12–15	Reserved

Recipe Control Register

This register is used when recipes are enabled in the **HMi**, in this example the PLC address to store the recipe in is D200 with 3 elements (length) and 5 recipes (recipe #).

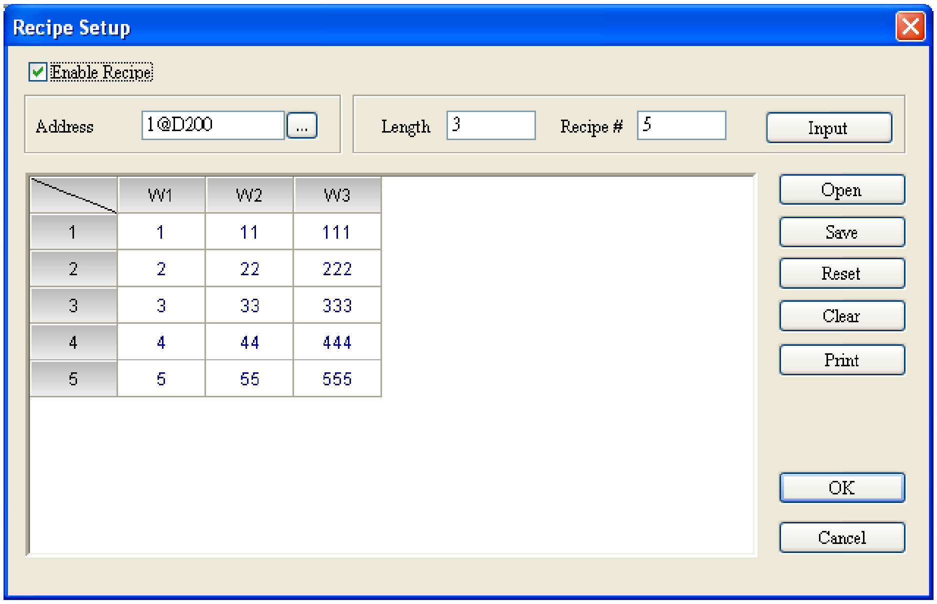


Figure 5-4: Recipe Setup

There are recipe memory locations in **HMi** that keep track of the current recipe chosen (RCPNO) and the values of W1 to Wn (RCP0 to RCPn-1). These internal memory registers are available to read and edit once the recipe is enabled (check box on the Recipe Setup dialog box). There is more about how these memory locations function in the Recipe section of the user manual.

Table 5-7: Recipe Control Register (RECR) - Control Word 5

Bit Number	***Function***
0	Change recipe group number
1	Read recipe (PLC >> **HMi**)
2	Write recipe (**HMi** >> PLC)
3–15	Reserved

Bit 0 is used to select the recipe that is to be loaded, this will load the values from the designated recipe to the internal memory (RCPx) locations. Once the recipe values are loaded into the internal memory locations the recipe can be written to the PLC. This should be a momentary contact.

Bit 1 is used read the recipe from the PLC and place it in the RCP0 to RCPn-1 memory locations. This is useful when it is required to edit the recipe values and save them in the HMi or to verify the running parameters in the PLC. This should be a momentary contact.

Bit 2 is used to write the recipe values from RCP0 to RCPn-1to the PLC. This should be a momentary contact.

*Note: The proper sequence to write a recipe from **HMi** to the PLC is to first select the recipe to load using the Register for Designating Recipe Group Number. Second to load that recipe to internal memory using B0 of the Recipe Control Register. Finally to write the recipe to the PLC using B2 of the Recipe Control Register.*

Recipe Designation Register

This register is used to specify the recipe to download to the PLC.

Table 5-8: Register for Designating Recipe Group Number (RBIR) - Control Word 6

Word	*Function*	*Description*
6	Designate recipe number	This is the recipe number that is loaded into the RCP0 to RCPn-1 memory locations when B0 of the Recipe Control Register is set. This value must be set prior to selecting the recipe.

In the example above, if the value in RBIR is set to 4 and B0 of the RECR is set then the following values will be written to internal memory.

Table 5-9: Internal Memory for Recipe Control

Internal Memory	*Value*
RCPNO	4
RCP0	4
RCP1	44
RCP2	444

System Control Flags

The System Control Flags are used to control multi-language within **HM*i***. For example, if language value 3 is German, when Bit 3 of this control word is set all the text in **HM*i*** will change to the text entered in the **German** portion of the **Text** property for each element.

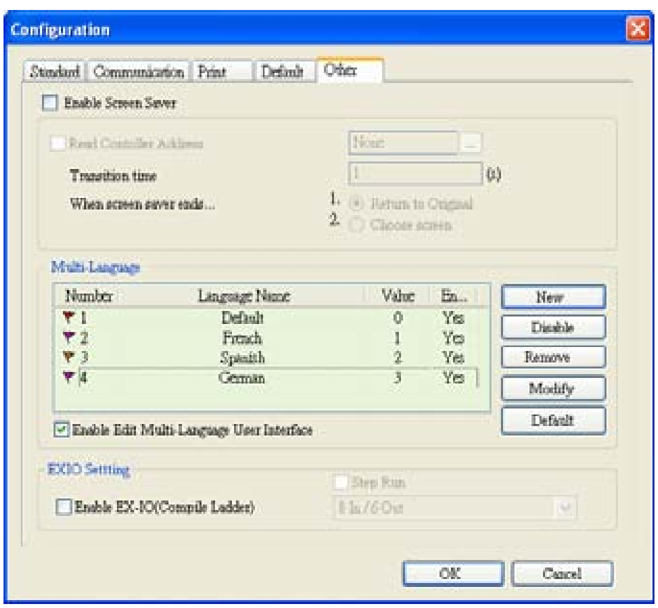


Figure 5-5: System Control Flags

This control register is also used to control the printer when a printer is connected to the **HM*i***.

Table 5-10: System Control Flag Register (SCFR) - Control Word 7

Bit Number	*Function*
0	Multi-language setting value Bit 0
1	Multi-language setting value Bit 1
2	Multi-language setting value Bit 2
3	Multi-language setting value Bit 3
4	Multi-language setting value Bit 4
5	Multi-language setting value Bit 5
6	Multi-language setting value Bit 6
7	Multi-language setting value Bit 7
8	Printer flag
9	Printer form feed flag
10–15	Reserved

- Printer Flag: When this flag is triggered to ON, the current display or editing screen can be printed out. When this flag is set to OFF, the printer function is disabled.
- Printer Form Feed Flag: When this flag is triggered to ON, the printer will retract the paper and align the paper for the next run automatically. When this flag is set to OFF, the printing form feed function is disabled.

Status Block

For two-way communication between **HMi** and all PLC brands, the address of the **HMi** control block and status block must be defined. These settings are located in the **Configuration** dialog box under the **Standard** tab.

The status block is the way a PLC is used to get feedback from **HMi** and consists of 8 continuous words (or of the number of words chosen in the control block length).

The function and explanation of each WORD is listed below. In the following table, we assume that the users use the Eaton Logic Controller (ELC). Our example will assign the status block to D10, therefore the status block will use registers D10 to D17 (same as the control block length).

Status Block Designations

Table 5-11: Status Block Registers

Word Number	*Register*	*Address*	*Example*
0	Status Register for General Control (GCSR)	Dm	D10
1	Status Register for Screen Number (SNSR)	Dm+1	D11
2	Status Register for Curve Control (CCSR)	Dm+2	D12
3	Status Register for Sampling History Buffer (HSSR)	Dm+3	D13
4	Status Register for Clearing History Buffer (HCSR)	Dm+4	D14
5	Recipe Status Register (RESR)	Dm+5	D15
6	Status Register for Recipe Number (RBSR)	Dm+6	D16
7	Status Register 2 for General Control (GCSR2)	Dm+7	D17

General Control Status Register

Table 5-12: Status Register for General Control (GCSR) - Status Word 0

Bit Number	*Function*
0	Screen Switch Status - When the screen status is switched, this Bit will be set to ON, after the screen switch is completed, this Bit will be OFF.
1–2	Reserved
3	Clear Status of Alarm Buffer - When the **HMi** clears the alarm buffer (clear status of alarm buffer function is enabled), this Bit will be set to ON, after this function is completed, this Bit will be OFF.
4	Clear Status of Alarm Counter
5-7	Reserved
8	User Level (Bit0)
9	User Level (Bit1)
10	User Level (Bit2)
11	Reserved
12–15	Reserved

Screen Number Register

Table 5-13: Status Register for Screen Number (SNSR) - Status Word 1

Word	*Function*	*Description*
1	Currently Open Screen Number	This register is used to echo back to the user the screen that is currently open on the **HMi**. This register will reset upon reaching the desired screen.

Chart Status Register

The curve status register is used to give the user feedback as to the status of the chart (trend graph and X-Y chart) elements.

Table 5-14: Status Register of Curve Control (CCSR) - Status Word 2

Bit Number	*Function*
0	Sampling status of chart 1
1	Sampling status of chart 2
2	Sampling status of chart 3
3	Sampling status of chart 4
4–7	Reserved
8	Clear status of chart 1
9	Clear status of chart 2
10	Clear status of chart 3
11	Clear status of chart 4
12–15	Reserved

- Curve Sampling Status Flag - When sampling a chart, the chart sampling status flag for that chart will be set to be ON (Bit 0 - Bit 3 is set to ON). After the sampling operation is completed, the chart sampling status flag will be set to OFF.
- Curve Clear Status Flag - When clearing a chart, the chart clear status flag for that chart will be set to be ON (Bit 8 - Bit 11 is set to ON). After the clear operation is completed, the chart clear status flag will be OFF.

Sampling History Buffer Status Register

The sampling history buffer status register is used to give the user feedback as to the activity of the history buffer.

Table 5-15: Status Register for Sampling History Buffer (HSSR) - Status Word 3

Bit Number	*Function*
0	Sampling Status of History Buffer 1
1	Sampling Status of History Buffer 2
2	Sampling Status of History Buffer 3
3	Sampling Status of History Buffer 4
4	Sampling Status of History Buffer 5
5	Sampling Status of History Buffer 6
6	Sampling Status of History Buffer 7
7	Sampling Status of History Buffer 8
8	Sampling Status of History Buffer 9
9	Sampling Status of History Buffer 10
10	Sampling Status of History Buffer 11
11	Sampling Status of History Buffer 12
12-15	Reserved

- Sampling History Buffer Flag: When sampling the history buffer, the sampling history buffer flag will be set to be ON (Bit 0 – Bit 11 is set to ON). After the sampling operation is completed, the sampling history buffer flag will be OFF.

Cleaning History Buffer Status Register

Table 5-16: Status Register for Clearing History Buffer (HCSR) - Status Word 4

Bit Number	*Function*
0	Clear Status of History Buffer 1
1	Clear Status of History Buffer 2
2	Clear Status of History Buffer 3
3	Clear Status of History Buffer 4
4	Clear Status of History Buffer 5
5	Clear Status of History Buffer 6
6	Clear Status of History Buffer 7
7	Clear Status of History Buffer 8
8	Clear Status of History Buffer 9
9	Clear Status of History Buffer 10
10	Clear Status of History Buffer 11
11	Clear Status of History Buffer 12
12–15	Reserved

- Clear History Buffer Flag: When clearing the history buffer, the clear history buffer flag will be set to be ON, after the buffer is cleared, the clear history buffer flag will be OFF.

Recipe Status Register

When the recipe feature is used, this feedback will provide user feedback as to the status of the recipe choosing, uploading or downloading progress.

Table 5-17: Recipe Status Register (RESR) - Status Word 5

Bit Number	*Function*
0	Change Status of Recipe Number
1	Recipe Read Status (PLC >> **HMi**)
2	Recipe Write Status (**HMi** >> PLC)
3–15	Reserved

- Change Status of Recipe Number Flag - This bit will be ON when Bit 0 of the RECR is triggered and then will change to OFF when the values from the recipe number are loaded into the internal memory RCPx locations.
- Recipe Read Status Flag - This bit will be true while the **HMi** is uploading a recipe from the PLC and then will change to OFF when the upload is complete.
- Recipe Write Status Flag - This bit will be true while the **HMi** is downloading a recipe to the PLC and then will change to OFF when the download is complete.

Recipe Number Status Register

This register will update to show the recipe number chosen when Bit 0, Bit 1 or Bit 2 of the RECR is triggered. This register will automatically clear after one of the following events has been performed; recipe loaded to internal memory, recipe uploaded or recipe downloaded.

Table 5-18: Status Register for Recipe Number (RBSR) - Status Word 6

Word	*Function*	*Description*
6	Current recipe number	When the recipe number register RCPNo is changed via the recipe register (RECR), the status register for the recipe number (RBSR) (Dm+6) will be updated.

General Control Status Register

Table 5-19: Status Register 2 for General Control (GCSR2) - Status Word 7

Bit Number	***Function***
0	Multi-language status value Bit 0
1	Multi-language status value Bit 1
2	Multi-language status value Bit 2
3	Multi-language status value Bit 3
4	Multi-language status value Bit 4
5	Multi-language status value Bit 5
6	Multi-language status value Bit 6
7	Multi-language status value Bit 7
8	Printer status flag
9	Printer form feed status flag
10–15	Reserved

- Multi-Language Status Value: You can determine the current multi-language value shown on the **HM*i*** from the multi-language status value.
- Printer Status Flag - When this flag is triggered to ON, it indicates that the printer is printing current display or editing screen. When this flag is set to OFF, the printer function is disabled.
- Printer Form Feed Status Flag - When this flag is triggered to ON, it indicates that the printer is retracting the paper and aligning the paper for the next run automatically. When this flag is set to OFF, the printing form feed function is disabled.

Chapter 6 — Internal Memory

Internal Register (R/W): $

Word access:	$n (n: 0–65535)
Bit access:	$n.b (n: 0–65535, b: 0–15)

The **HM*i*** provides 65536 16-bit internal registers ($0 – $65535).

Non-Volatile Internal Register (R/W): $M

Word access:	$Mn (n: 0–1023)
Bit access:	$Mn.b (n: 0–1023, b: 0–15)

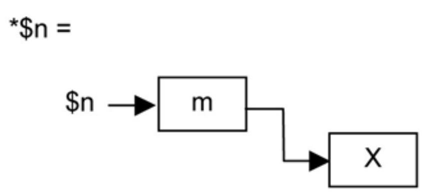
The **HM*i*** provides 1024 16-bit non-volatile internal registers ($M0 – $M1023).

Indirect Address Register (R/W): *$

Word access:	*$n (n: 0–65535)

Enter the address for the indirect address register.

Where *$n =



For example, if $n = m; $m = X; then *$n = X (the value of m cannot exceed 65535).

Recipe Number Register (R/W): RCPNO

The recipe number register is a 16-bit register that is used to designate the recipe group number (Recipe Number). The minimum recipe group number should be 1 and the maximum group number is determined as recipes are edited.

The PLC upload/download function will read/write a group of recipes according to the setting of recipe number register. The length of each group of recipes is determined when editing the recipes.

HMi provides a space of 64K Words maximum to store the recipes.

Recipe Register (R/W): RCP

The recipe length is L and the recipe group number is N.

Word access:	RCPn (n: 0–NxL+(L-1))
Bit access:	RCPn.b (n: 0–NxL+(L-1), b: 0–15)

The recipe register is used to save the recipe that downloads from **HMi** after finishing.

The two methods to read/write these registers are (assume that you have set the recipe length is L and the number of recipe groups is N):

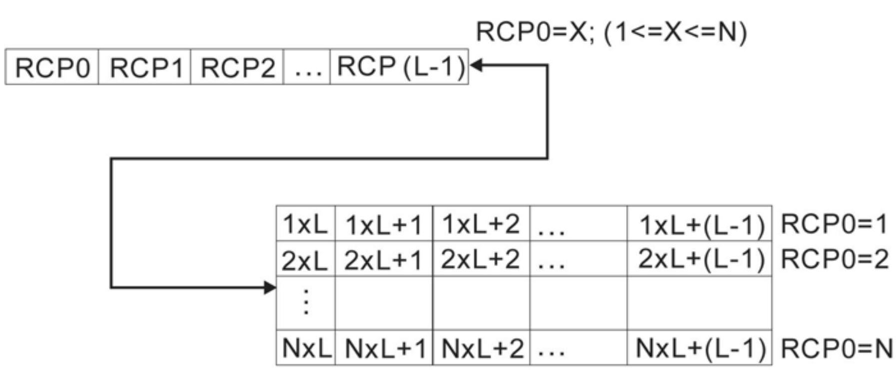
Group Address Access:

This method is accessed by RCPNO and RCP0–RCP (L-1).

For example: If RCPNO=3, **HMi** will read RCPNO 3 data out and save it in RCP0–RCP (L-1). Then the PLC can read RCPNO 3 data from the group address. RCP0–RCP (L-1) can be regarded as a common area.

Absolute Address Access:

This method is used to access the data when the data address is greater than RCP (L-1). For example, the starting address of the first recipe is RCP (1XL), the starting address of second recipe is RCP (2XL) and vice versa. Therefore, you want to access the mth word of nth recipe, you can use the equation: RCP(nxL+m).



Appendix A — Specifications

Table A-1: Model Specifications

Model	HMI04BU	HMI04GU	HMI06BE	HMI06GE	HMI06CE	HMI08CE	HMI10CE
Display Type	STN	STN	STN	FSTN	STN	TFT-LCD	
Display Color	8 Blues	16 Grays	8 Blues	16 Grays	256 Colors	65536 Colors	
Screen Pixels	320 x 240 pixels					640 x 480 pixels	
Backlight Life	Approximately 20,000 hours at 25°C		Approximately 50,000 hours at 25°C			Approximately 30,000 hours at 25°C	
Display Size	3.75 in (77 x 58 mm)		5.7 in (118.2 x 89.4 mm)			8.0 in (162.2 x 121.7mm)	10.4 in (215.2 x 162.4mm)
MCU	32-bit RISC Micro-controller / 202.8MHz						
ROM	1 Mb		3 Mb			7 Mb	
Backup Memory (SRAM)	128 kb (non-volatile internal memory)		512 kb (non-volatile internal memory)				
External Memory Card	V1.1 USB Memory Disk		Smart Media Card			Smart Media Card / V1.1 USB Memory Disk	
USB for Download	USB CLIENT Version 1.1 and COM1, COM2						
Serial Communication (UART)	COM1 (RS-232),COM2 and COM3 (RS-232C/422/485)						
Function Keys	4 User-defined keys					6 User-defined keys	7 User-defined keys
RTC	Built-in						
Lithium Battery	3V Lithium CR2032 x 1						
Buzzer	85dB						
Operation Voltage	DC +24V (-10%–+20%)						
Power Consumption	2.64W max		7.2W max			14W max	15W max
Cooling Method	Natural air circulation						
Waterproof and Agency Approval	IP45 NEMA 4X CE, UL		IP65 / NEMA4 and CE, UL, C-tick				
Operating Temperature	0°C to 50°C						
Storage Temperature	-20°C to +60°C						
Ambient Humidity	10% – 90% RH (0–40), 10%–55% RH (41–50)						
Vibration Resistance	IEC61131-2 compliant When vibration is NOT continuous: 5Hz-9Hz 3.5mm, 9Hz-150Hz 1G X, Y, Z directions for 10 times						
W x H x D mm Dimensions / Panel Cutout	140.8 x 104.8 x 44.8 mm		184.1 x 144.1 x 47 mm / 172.4 x 132.4 mm			243.1 x 178.1 x 52.4 mm / 231.4 x 166.4 mm	297.1 x 222.1 x 51.1 mm / 285.2 x 210.2 mm
Weight	315 g		768 g			1147 g	1721 g

***** Compatible with general Expansion Memory Card (4M–128M) available in the market***

Dimensions and Communication Ports

HMI04xx

Note: Units: inch (mm)

HMI04xx Communication Ports

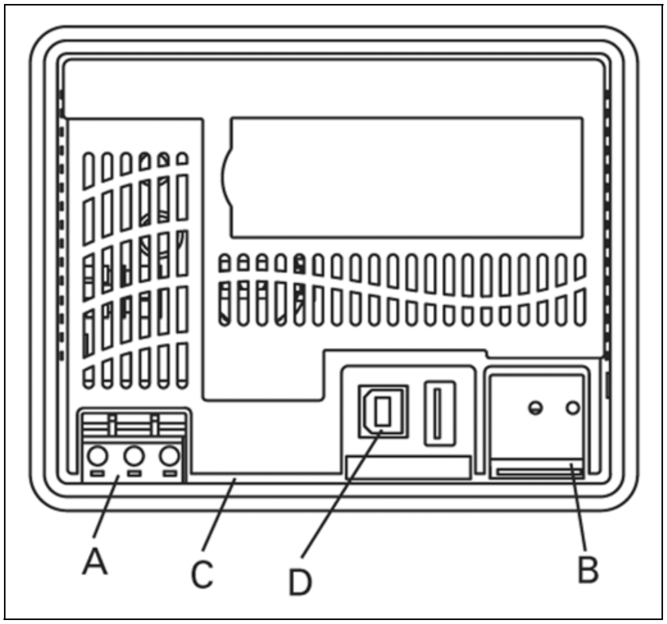


Figure A-1: HMI04xx Communication Ports

A — Power Input Terminal
B — COM 2
C — COM 1
D — USB

HMI04xx Pinouts

Table A-2: COM1 and COM3 Ports

COMM Port	PIN	MODE 1	MODE 2
		RS-232	RS-422
COM1	1	N.C.	N.C.
	2	RXD	RXD1
	3	TXD	TXD1
	4	N.C.	N.C.
	5	GND	GND
COM3	6	N.C.	N.C.
	7	RTS	TXD2
	8	CTS	RXD2
	9	N.C.	N.C.

Table A-3: COM2 Port

	MODE 1	MODE 2
PIN	RS-232	RS-422
R-1	RXD-	D-
R+	RXD+	D+
T-	TXD-	D-
T+	TXD+	D+
G	GND	GND

HMI04xx Cutout Dimensions

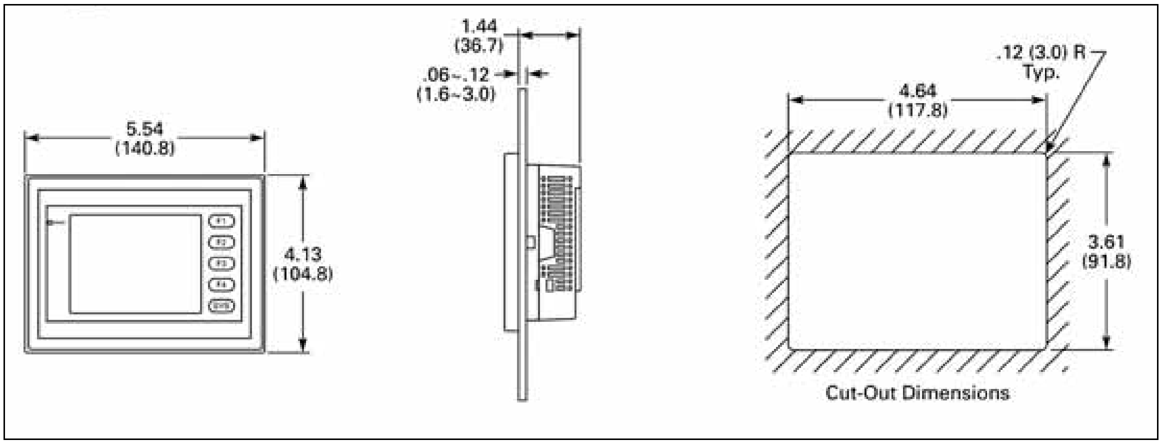


Figure A-2: HMI04xx Cutout Dimensions

Installation:

Notice	Avis	Aviso
Do not exceed 0.5 N torque or plastic box may be damaged.		

HMI06xx

Note: Units: inch (mm)

HMI06xx Communication Ports

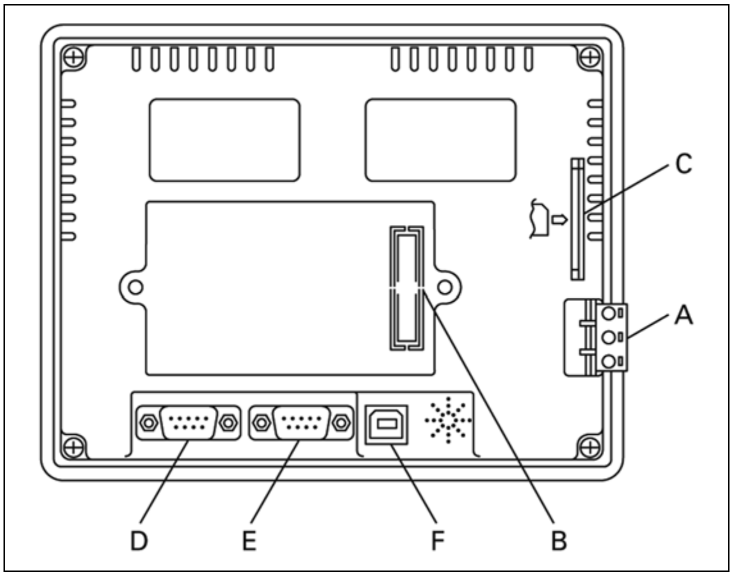


Figure A-3: HMI06xx Communication Ports

A — Power Input Terminal
B — Expansion Slot
C — Memory Card
D — COM 2
E — COM 1
F — USB

HMI06xx Pinouts

Table A-4: COM2 and COM3 Ports

COMM Port	PIN	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6
		RS-232	RS-422	RS-485	RS-232*2	RS-422*2	RS485*2
COM2	1	N.C.	RXD-	D-	N.C.	RXD1-	D1-
	2	RXD	RXD+	D+	RXD1	RXD1+	D1+
	3	TXD	TXD+	D+	TXD1	TXD1+	D1+
	4	N.C.	TXD-	D-	N.C.	TXD1-	D1-
	5	GND	GND	GND	GND	GND	GND
COM3	6	N.C.	RTS-	N.C.	N.C.	TXD2-	D2-
	7	RTS	RTS+	N.C.	TXD2	TXD2+	D2+
	8	CTS	CTS+	N.C.	RXD2	RXD2+	D2+
	9	N.C.	CTS-	N.C.	N.C.	RXD2-	D2-

Table A-5: COM1 Port

PIN	Contact RS-232
1	N.C.
2	RXD
3	TXD
4	N.C.
5	GND
6	N.C.
7	RTS
8	CTS
9	N.C.

HMI06xx Cutout Dimensions

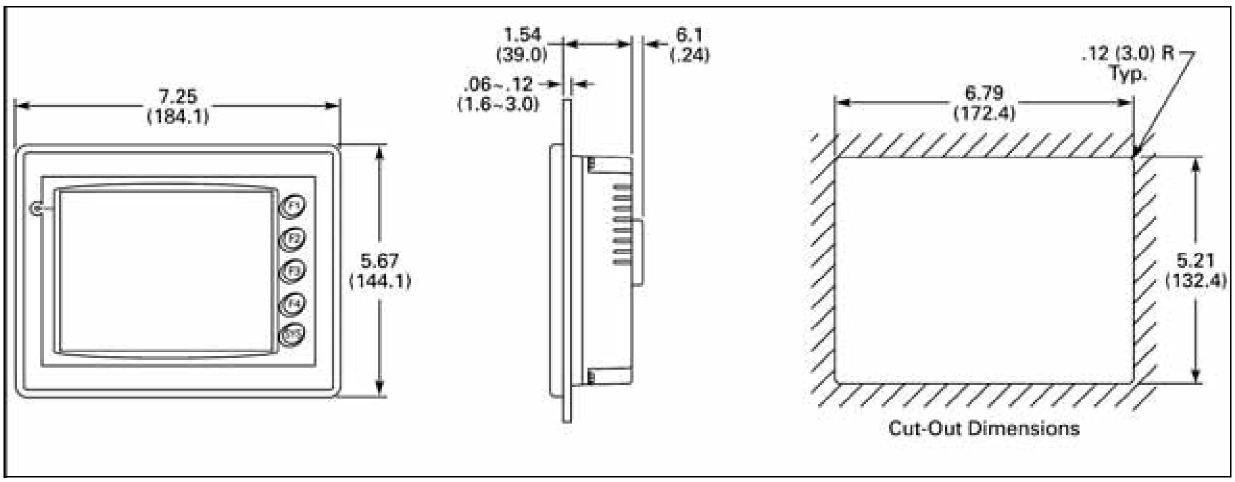


Figure A-4: HMI06xx Cutout Dimensions

Installation:

Notice	Avis	Aviso
Do not exceed 0.5 N torque or plastic box may be damaged.		

HMI08CE

Note: Units: inch (mm)

HMI08CE Communication Ports

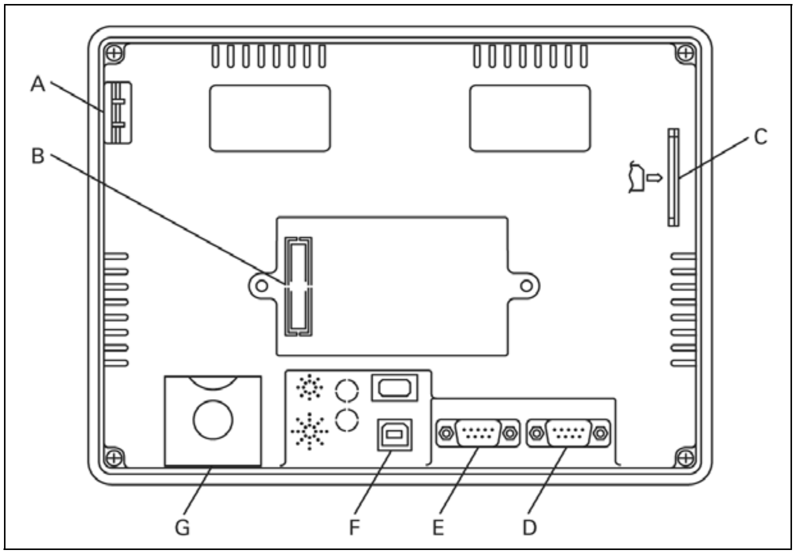


Figure A-5: HMI08CE Communication Ports

A — Power Input Terminal
B — Expansion Slot
C — Memory Card
D — COM 2
E — COM 1
F — USB
G— Battery Cover

HMI08xx Pinouts

Table A-6: COM2 and COM3 Ports

COMM Port	PIN	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6
		RS-232	RS-422	RS-485	RS-232*2	RS-422*2	RS485*2
COM2	1	N.C.	RXD-	D-	N.C.	RXD1-	D1-
	2	RXD	RXD+	D+	RXD1	RXD1+	D1+
	3	TXD	TXD+	D+	TXD1	TXD1+	D1+
	4	N.C.	TXD-	D-	N.C.	TXD1-	D1-
	5	GND	GND	GND	GND	GND	GND
COM3	6	N.C.	RTS-	N.C.	N.C.	TXD2-	D2-
	7	RTS	RTS+	N.C.	TXD2	TXD2+	D2+
	8	CTS	CTS+	N.C.	RXD2	RXD2+	D2+
	9	N.C.	CTS-	N.C.	N.C.	RXD2-	D2-

Table A-7: COM1 Port

	Contact
PIN	RS-232
1	N.C.
2	RXD
3	TXD
4	N.C.
5	GND
6	N.C.
7	RTS
8	CTS
9	N.C.

HMI08CE Cutout Dimensions

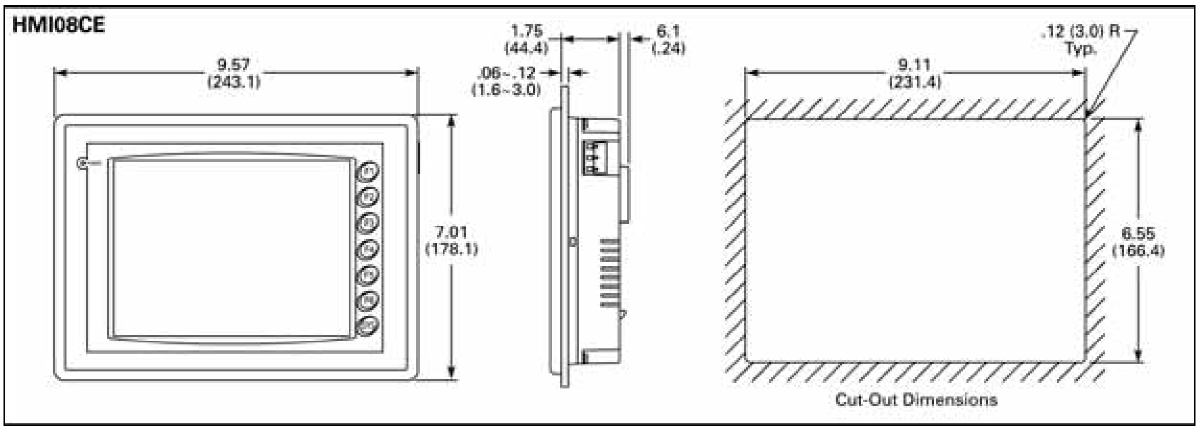


Figure A-6: HMI08CE Cutout Dimensions

Installation:

Notice	Avis	Aviso
Do not exceed 0.5 N torque or plastic box may be damaged.		

HMI10CE

Note: Units: inch (mm)

HMI10CE Communication Ports

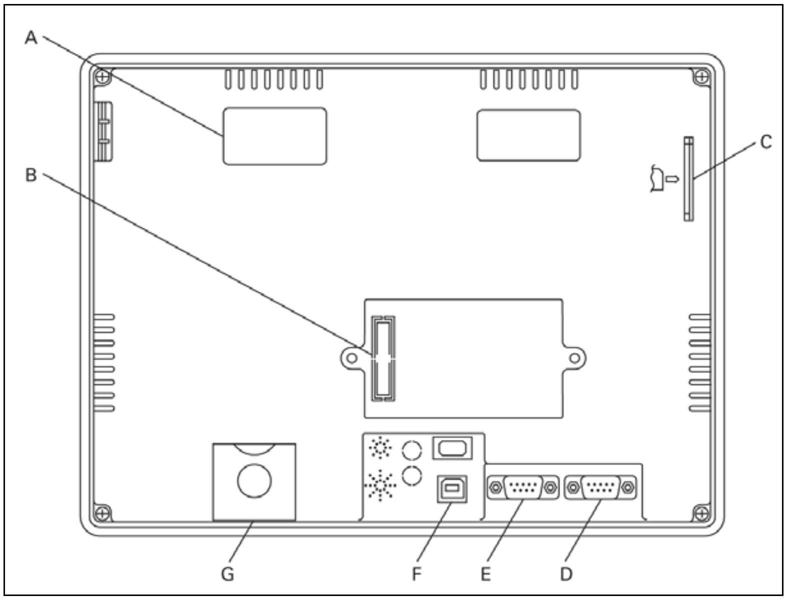


Figure A-7: HMI10CE Dimensions

A — Power Input Terminal
B — Expansion Slot
C — Memory Card
D — COM 2
E — COM 1
F — USB
G— Battery Cover

HMI10xx Pinouts

Table A-8: COM2 and COM3 Ports

COMM Port	PIN	MODE 1 RS-232	MODE 2 RS-422	MODE 3 RS-485	MODE 4 RS-232*2	MODE 5 RS-422*2	MODE 6 RS485*2
COM2	1	N.C.	RXD-	D-	N.C.	RXD1-	D1-
	2	RXD	RXD+	D+	RXD1	RXD1+	D1+
	3	TXD	TXD+	D+	TXD1	TXD1+	D1+
	4	N.C.	TXD-	D-	N.C.	TXD1-	D1-
	5	GND	GND	GND	GND	GND	GND
COM3	6	N.C.	RTS-	N.C.	N.C.	TXD2-	D2-
	7	RTS	RTS+	N.C.	TXD2	TXD2+	D2+
	8	CTS	CTS+	N.C.	RXD2	RXD2+	D2+
	9	N.C.	CTS-	N.C.	N.C.	RXD2-	D2-

Table A-9: COM1 Port

	Contact
PIN	RS-232
1	N.C.
2	RXD
3	TXD
4	N.C.
5	GND
6	N.C.
7	RTS
8	CTS
9	N.C.

HMI10CE Cutout Dimensions

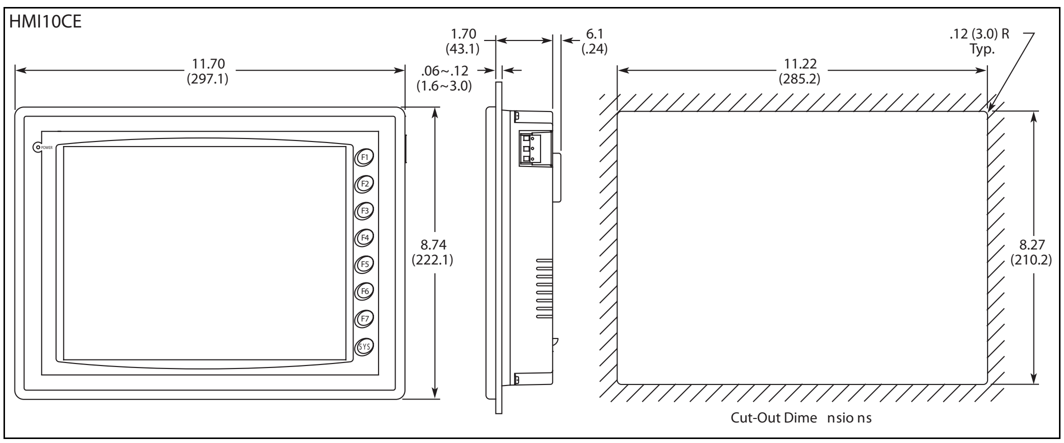


Figure A-8: HMI10CE Cutout Dimensions

Installation:

Notice	Avis	Aviso
Do not exceed 0.5 N torque or plastic box may be damaged.		

January 2007

Appendix B — Communication

Pin Definition of Serial Communication

HMI04 COM1 and COM3

Table B-1: HMI04 COM1 and COM3 Pinout

COMM Port	PIN	MODE 1	MODE 2
		RS-232	RS-422
COM1	1	N.C.	N.C.
	2	RXD	RXD1
	3	TXD	TXD1
	4	N.C.	N.C.
	5	GND	GND
COM3	6	N.C.	N.C.
	7	RTS	TXD2
	8	CTS	RXD2
	9	N.C.	N.C.

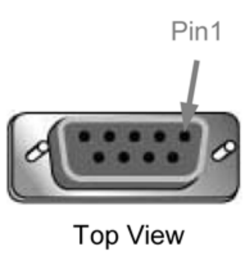
HMI04 COM2

Table B-2: HMI04 COM2 Pinout

PIN	MODE 1	MODE 2
	RS-232	RS-422
R-1	RXD-	D-
R+	RXD+	D+
T-	TXD-	D-
T+	TXD+	D+
G	GND	GND

HMI06, HMI08 and HMI10 COM1

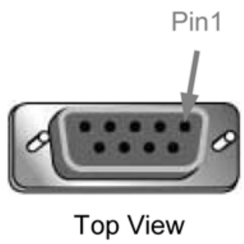
Table B-3: HMI06, HMI08 and HMI10 COM1 Pinout



Pin	*Contact*
1	N.C.
2	RXD
3	TXD
4	N.C.
5	GND
6	N.C.
7	RTS
8	CTS
9	N.C.

HMI06, HMI08 and HMI10 COM2 and COM3

Table B-4: HMI06, HMI08 and HMI10 COM2 and COM3 Pinout



COMM Port	***Pin***	***MODE1***	***MODE2***	***MODE3***	***MODE 4***	***MODE 5***	***MODE 6***
		RS-232	RS-422	RS-485	RS-232*2	RS-422*2	RS485*2
COM2	1	N.C.	RXD-	D-	N.C.	RXD1-	D1-
	2	RXD	RXD+	D+	RXD1	RXD1+	D1+
	3	TXD	TXD+	D+	TXD1	TXD1+	D1+
	4	N.C.	TXD-	D-	N.C.	TXD1-	D1-
	5	GND	GND	GND	GND	GND	GND
COM3	6	N.C.	RTS-	N.C.	N.C.	TXD2-	D2-
	7	RTS	RTS+	N.C.	TXD2	TXD2+	D2+
	8	CTS	CTS+	N.C.	RXD2	RXD2+	D2+
	9	N.C.	CTS-	N.C.	N.C.	RXD2-	D2-

January 2007

Cable for Download

The cable header used to connect to the **HM*i*** series is 9-pin D-SUB male.

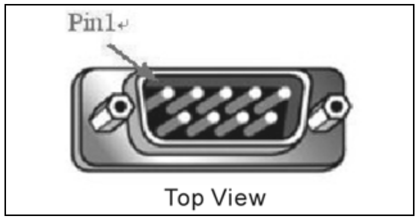


Figure B-1: 9-Pin D-SUB Male

Refer to the following tables for the connection to each device.

RS-232 Connection

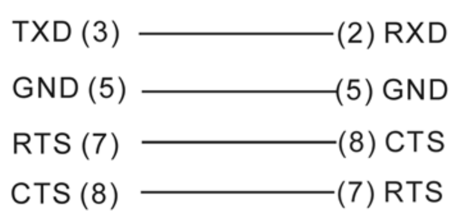
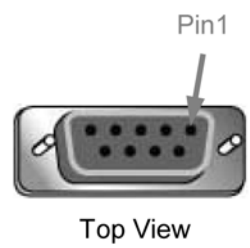
HMi** Series* ***9-pin D-SUB male (RS-232)	***PC*** ***9-pin D-SUB female (RS-232)***	***PC*** ***9-pin D-SUB female (RS-232)***
		

Figure B-2: RS232 Connection Pinout

Figure B-3: D-SUB 9-Pin to HM*i* series (Male) to D-SUB 9-pin to PC (Female)

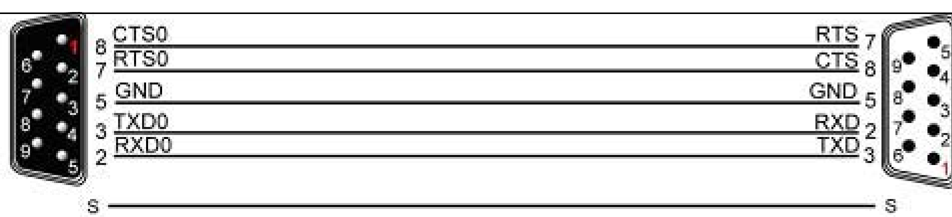


Figure B-4: RS-232 to PC — Grounding and Shielding

USB Connection

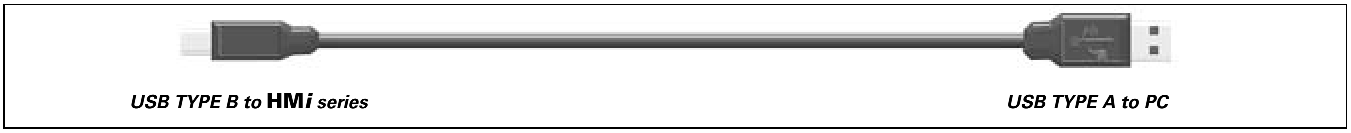


Figure B-5: USB Type B to USB Type A

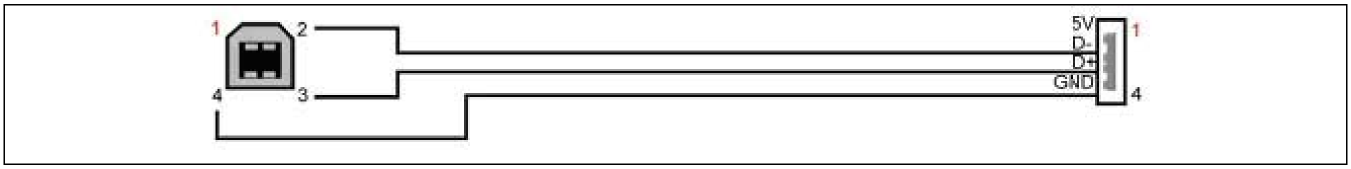


Figure B-6: USB to PC

Communication Settings and Connections between HM*i* and Connectable Controllers

The cable header used to connect to the **HM*i*** series is 9-pin D-SUB male.

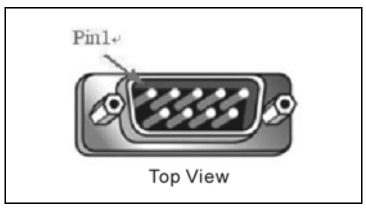


Figure B-7: 9-Pin D-SUB Male Connector

Table B-5: Communication Settings and Connections

Brand	***Controller Name / Series Name***
Eaton	Baud rate: 9600, 7, Even, 2 ASCII. Controller station number: 1. Control area/state area: D0 / D10.
Allen-Bradley	MicroLogix PLC
	SLC5 PLC
Danfoss	VLT 2800 (FC Protocol)
Delta	Delta Controller For Servo/AC drive/Temperature Controller/PLC (984 RTU mode / ASCII mode)
	Delta DVP PLC
Facon	Facon PLC
Festo	Festo_PLC
GE Fanuc	90 Series SNP PLC
Hust	Hust CNC Controller
Jetter	Nano Series PLC
	JC Series PLC
Keyence	KV/KZ Series
Koyo	SU/DL Series
	K-Sequence
Lenze	LECOM-A/B Protocol
LG	Master K120S/200S
	Glofa GM6 CNET
	Master-K CNET

Table B-5: Communication Settings and Connections (continued)

Brand	***Controller Name / Series Name***
LI YAN	LYPLC EX
M2i	M2i Master
	M2i Slave
Matsushita	FP Series
Mirle	FAMA SC
Mitsubishi	FX / FX2N
	A Series/J71UC24
	Mitsubish A2A/A2AS/A2USH A1SH/A3N/A2ASH CPU Port
	Q Series CPU Port
MKS	CT150
Modbus	Modbus (Master) --- 984 RTU / ASCII mode
	Hexadecimal Address (Master) --- RTU / ASCII mode
	nW (Master) --- RTU / ASCII mode
	Modbus (Slave) --- RTU / ASCII mode
Modicon	TSX Micro (Uni-Telway)
	TWIDO
NIKKI DENSO	NCS-FI/FS Series
Omron	C Series
	CJ1/CS1 Series
Siemens	S7 200
	S7-300 (with PC Adapter)
	S7-300 (without PC Adapter)
Taian	TP02 PLC
Vigor	M Series
Yokogawa	ACE PLC

Eaton ELC

A. HM*i factory settings*

Baud rate: 9600, 7, Even, 2 ASCII

Controller station number: 1

Control area/state area: D0 / D10

B. Definition of Controller Read/Write Address

Table B-6: Eaton ELC Registers

Register Type	Format	Read/Write Range	
		Word No.	Bit No.
X_Data	Xn	n: 0 – 360(octal)	N/A
Y_Data	Yn	n: 0 – 360(octal)	N/A
M_Data	Mn	n: 0 – 1520, 1536 – 4080	N/A
S_Data	Sn	n: 0 – 1008	N/A
T_Register	Tn	n: 0 – 255	N/A
C_Register	Cn	n: 0 – 199	N/A
D_Register	Dn	n: 0 – 4095, 4096 – 9999	N/A
HC_Register	Cn	n: 200 – 255	N/A

Note:

1. (W) is "Word".
2. (DW) is "Double Word".
3. X_Data / Y_Data / M_Data / S_Data: Address must be 0 or a multiple of 16 (X0, X20, X40, etc.).

C. Contacts

Table B-7: Eaton ELC Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
X_Data	Xn	N/A	n: 0 – 377(octal)
Y_Data	Yn	N/A	n: 0 – 377(octal)
M_Data	Mn	N/A	n: 0 – 1520
			1536 – 4080
S_Data	Sn	N/A	n: 0 – 1023
T_Coil	Tn	N/A	n: 0 – 255
C_Coil	Cn	N/A	n: 0 – 255

Eaton MVX9000 Drive

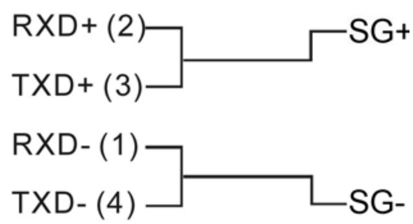
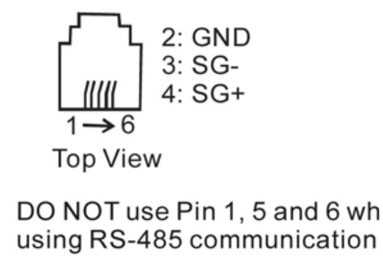
HM*i* Series ***9-pin D-SUB male (RS-485)***	***Controller*** ***RJ-11 cable connector (RS-485)***	***Controller*** ***RJ-11 cable connector (RS-485)***
		

Figure B-8: Eaton MVX9000 Drive RS-485 Connection

- When connecting to MVX drives, connect Pin 5 (GND) of a **HM*i*** and Pin 2 (GND) of a MVX drive.

Allen-Bradley MicroLogix PLC

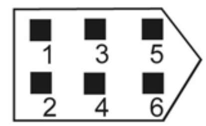
HMi ***Series*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***CN3 cable connector (RS-232)***	***Controller*** ***CN3 cable connector (RS-232)***
RXD+ (2)	(5) TX+	
RXD- (1)	(6) TX-	
TXD+ (3)	(3) RX+	
TXD- (4)	(4) RX-	

Figure B-9: Delta Servo RS-232 Connection

A. HM*i factory setting*

Baud rate: 19200, 8, None, 1

PLC station number: 1

Control area/state area: B3:0/B3:10

B. Definition of Controller Read/Write Address

Table B-8: Allen-Bradley MicroLogix PLC Registers

		Read/Write Range		
			Bit No.	
Register Type	***Format***	***Word No.***	***Low Byte***	***High Byte File No.***
Output file	O:n	n: 0 – 3	N/A	0
Input file	I:n	n: 0 – 3	N/A	1
Status file	S2:n	n: 0 – 65	N/A	2
Bit file	B3:n	n: 0 – 255	N/A	3
Timer flag	T4:n	n: 0 – 255	N/A	4
Timer Preset Value	T4:n.PRE	n: 0 – 255	N/A	4
Timer Accumulator Value	T4:n.ACC	n: 0 – 255	N/A	4
Counter flag	C5:n	n: 0 – 255	N/A	5
Counter Preset Value	C5:n.PRE	n: 0 – 255	N/A	5
Counter Accumulator Value	C5:n.ACC	n: 0 – 255	N/A	5
Control file	R6:n	n: 0 – 255	N/A	6
Control Size of Bit Array	R6:n.LEN	n: 0 – 255	N/A	6
Control Reserved file	R6:n.POS	n: 0 – 255	N/A	6
Integer file	N7:n	n: 0 – 255	N/A	7

- Bit No: There is no Low byte. High byte stores the file number.
- Data Size: Word (16 bits)
- For T4, C5 and R6, the words must be read separately.
- If reading multiple Words at one time, the communication speed of the PLC will be slow.

Note: If the communication fails, cycle the power on the MicroLogix PLC.

Table B-9: Allen-Bradley MicroLogix PLC Contacts

		Read/Write Range		
			Bit No.	
			Low Byte	***High Byte***
Contact Type	***Format***	***Word No.***	***Bits***	***File No.***
Output	O:n/b	n: 0 – 3	b: 0 – 15	0
Input	I:n/b	n: 0 – 3	b: 0 – 15	1
Status	S2:n/b	n: 0 – 65	b: 0 – 15	2
Bit	B3:n/b	n: 0 – 255	b: 0 – 15	3
Timer	T4:n/b	n: 0 – 255	b: 0 – 15	4
	T4:n/EN	n: 0 – 255	15	
	T4:n/TT	n: 0 – 255	14	
	T4:n/DN	n: 0 – 255	13	
Timer Preset Value	T4:n.PRE/b	n: 0 – 255	b: 0 – 15	4
Timer Accumulator Value	T4:n.ACC/b	n: 0 – 255	b: 0 – 15	4
Counter flag	C5:n/b	n: 0 – 255	b: 0 – 15	5
	C5:n/CU	n: 0 – 255	15	
	C5:n/CD	n: 0 – 255	14	
	C5:n/DN	n: 0 – 255	13	
	C5:n/OV	n: 0 – 255	12	
	C5:n/UN	n: 0 – 255	11	
	C5:n/UA	n: 0 – 255	10	
Counter Preset Value	C5:n.PRE/b	n: 0 – 255	b: 0 – 15	5
Counter Accumulator Value	C5:n.ACC/b	n: 0 – 255	b: 0 – 15	5
Control	R6:n/b	n: 0 – 255	b: 0 – 15	6
	R6:n/EN	n: 0 – 255	15	
	R6:n/DN	n: 0 – 255	13	
	R6:n/ER	n: 0 – 255	11	
	R6:n/UL	n: 0 – 255	10	
	R6:n/IN	n: 0 – 255	9	
	R6:n/FD	n: 0 – 255	8	
Control Size of Bit Array	R6:n.LEN/b	n: 0 – 255	b: 0 – 15	6
Control Reserved	R6:n.POS/b	n: 0 – 255	b: 0 – 15	6
Integer	N7:n/b	n: 0 – 255	b: 0 – 15	7

- Bit No: Low byte stores the Bit address. High byte stores the file number.

C. Connections (Connector Pinouts)

HM*i Series* *9-pin D-SUB male (RS-232)*	***Controller* *8-pin Mini DIN male (RS-232)***	***Controller* *8-pin Mini DIN male (RS-232)***
RXD (2)	(7) TXD	
TXD (3)	(4) RXD	
GND (5)	(2) GND	
	(3) RTS	
	(6) CTS	

Figure B-10: Allen-Bradley MicroLogix PLC Connections

Allen-Bradley SLC5 PLC

A. HM*i factory setting*

Baud rate: 19200, 8, None, 1

PLC station number: 1

Control area/state area: B3:0/B3:10

Note: Error Check uses CRC (Cyclical Redundancy Check).

B. Definition of Controller Read/Write Address

Table B-10: Allen-Bradley SLC5 PLC Registers

		Read/Write Range		
		Word No.	*Bit No.*	
			Low Byte	*High Byte*
Register Type	*Format*	*Element No.*		*Slot or File No.*
Output file	O:n O:s.n	n: 0 – 30	N/A	Slot No. s = 0 s: 0 – 255 File No. = 0
Input file	I:n I:s.n	n: 0 – 30	N/A	Slot No. s = 0 s: 0 – 255 File No. = 1
Status file	S2:n	n: 0 – 255	N/A	File No. = 2
Bit file	Bf:n	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 3.
Timer flag	Tf:n	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 4.
Timer Preset Value	Tf:n.PRE	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 4.
Timer Accumulator Value	Tf:n.ACC	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 4.
Counter flag	Cf:n	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 5.
Counter Preset Value	Cf:n.PRE	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 5.
Counter Accumulator Value	Cf:n.ACC	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 5.
Control file	Rf:n	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 6.
Control Size of Bit Array	Rf:n.LEN	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 6.
Control Reserved file	Rf:n.POS	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 6.

Register Type	Format	Read/Write Range Word No. Element No.	Bit No. Low Byte	Bit No. High Byte Slot or File No.
Integer file	Nf:n	n: 0 – 255	N/A	f: 10 – 255 If f is ignored, file no. defaults to setting 7.

- Bit No: There is no low byte. The high byte stores the file number.

Table B-11: Allen-Bradley SLC5 PLC Contacts

Contact Type	Format	Read/Write Range Word No. Element No.	Bit No. Low Byte Bits	Bit No. High Byte Slot or File No.
Output	O:n/b O:s.n/b	n: 0 – 30	b: 0 – 15	Slot No. s = 0 s: 0 – 255 File No. = 0
Input	I:n/b I:s.n/b	n: 0 – 30	b: 0 – 15	Slot No. s = 0 s: 0 – 255 File No. = 1
Status	S2:n/b	n: 0 – 31	b: 0 – 15	2
Bit	Bf:n/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 3.
Timer	Tf:n/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 4.
	Tf:n/EN	n: 0 – 255	15	
	Tf:n/TT	n: 0 – 255	14	
	Tf:n/DN	n: 0 – 255	13	
Timer Preset Value	Tf:n.PRE/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 4.
Timer Accumulator Value	Tf:n.ACC/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 4.
Counter flag	Cf:n/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 5.
	Cf:n/CU	n: 0 – 255	15	
	Cf:n/CD	n: 0 – 255	14	
	Cf:n/DN	n: 0 – 255	13	
	Cf:n/OV	n: 0 – 255	12	
	Cf:n/UN	n: 0 – 255	11	
	Cf:n/UA	n: 0 – 255	10	
Counter Preset Value	Cf:n.PRE/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 5.
Counter Accumulator Value	Cf:n.ACC/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 5.

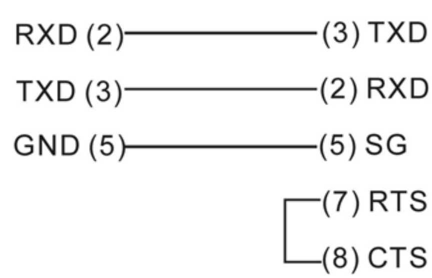
		Read/Write Range		
		Word No.	***Bit No.***	
			Low Byte	***High Byte***
Contact Type	***Format***	***Element No.***	***Bits***	***Slot or File No.***
Control	Rf:n/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 6.
	Rf:n/EN	n: 0 – 255	15	
	Rf:n/DN	n: 0 – 255	13	
	Rf:n/ER	n: 0 – 255	11	
	Rf:n/UL	n: 0 – 255	10	
	Rf:n/IN	n: 0 – 255	9	
	Rf:n/FD	n: 0 – 255	8	
Control Size of Bit Array	Rf:n.LEN/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 6.
Control Reserved	Rf:n.POS/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 6.
Integer	Nf:n/b	n: 0 – 255	b: 0 – 15	f: 10 – 255 If f is ignored, file no. will be default setting 7.

- Bit No: The low byte stores the Bit address. The high byte stores the file number.

Note: You need to assign Slot No.(s) to Device O and I. If no slot is assigned, **HM*i*** *uses the default setting 0.*

C. Connections (Connector Pinouts)

HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB female (RS-232)***	***Controller*** ***9-pin D-SUB female (RS-232)***



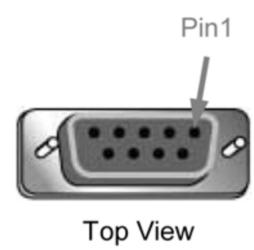


Figure B-11: Allen-Bradley SLC5 PLC Connector Pinouts

Danfoss VLT 2800 (FC Protocol)

A. HM*i factory setting*

Baud rate: 9600, 8, Even, 1, RS-485

PLC station number: 1

Control area/state area: None / None.

Note:

1. **HM*i*** can be connected to VLT-2800, 5000, 6000 and 7000 controllers.
2. Each data length format of the Danfoss AC drive parameter is not fixed, therefore, “Multiple Duplicate” function is not provided.
3. The maximum supported alarm number is 16. If the alarm number is over 16, a fault occurs.
4. **HM*i*** does not support the “optimum read/write” characteristic.
5. If the selected element is a string, the minimum data length should be more than 2.

B. Definition of Controller Read/Write Address

Table B-12: Danfoss VLT 2800 (FC Protocol) Registers

		Read/Write Range		
			Bit No.	
			Low Byte	*High Byte*
Register Type	***Format***	***Word No.***		***Index No.***
Parameter	Pn:I	n: 0 – 999	0	I: 0 – 31
Control Word	CTRWD	0	N/A	N/A
Status Word	STAWD	0	N/A	N/A

- Index no: If the index no. is not used, the default setting will be 0. The default setting of the index no. for parameter P606 – P617 is 1.
- If you are using a Danfoss controller, you must input the index no. Pay close attention to the setting range of the index no. If the setting range is set to start at 0, a parameter read and write failure will occur. For example, the index no. setting range of the parameter P615 is 1 to 20. If you do not input the index no., the system assumes the index number is 0 (default setting) and a fault will occur as you read or write the parameter.
- CTRWD: Write-only. (This parameter cannot be used on devices which display the value or input value. Use the setting value/setting constant (button) or macro function.)
- STAWD: Read-only.
- Control & Status Word: Refer to the explanation on the next page (page B-15).

Table B-13: Danfoss VLT 2800 (FC Protocol) Contacts

		Read/Write Range		
		Word No.	*Bit No.*	
			Low Byte	*High Byte*
Contact Type	***Format***	***Element No.***	***Bits***	***Index No.***
Parameter	Pn:I.b	n: 0 – 999	b: 0 – 31	I: 0 – 31

- Bit No: The low byte stores the Bit address. The high byte stores the index number.

January 2007

C. Connections (Connector Pinouts)

HMi Series ***9-pin D-SUB male (RS-485)***	***Controller*** ***RS-485 cable connector***

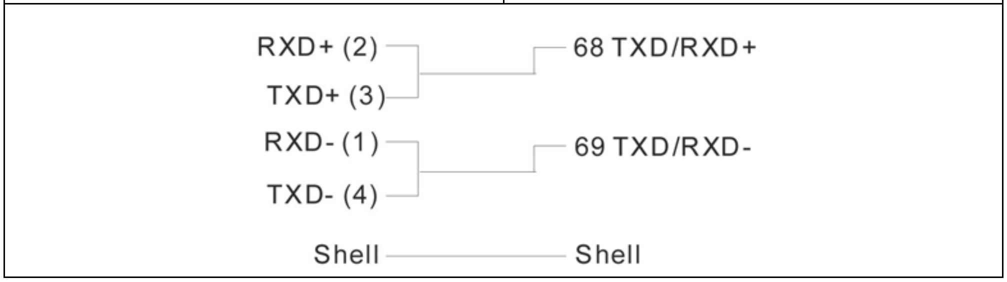


Figure B-12: Danfoss VLT 2800 (FC Protocol) Connector Pinouts

D. Explanation of Control Word and Status Word

Bit	***Bit = 0***	***Bit = 1***
15	No Function	Reversing
14	Choice of Setup 2 (msb)	
13	Choice of Setup 1 (lsb)	
12	No Function	Relay 04 activated
11	No Function	Relay 01 activated
10	Data Not Valid	Valid
9	Ramp 1	Ramp2
8	Jog 1 OFF	ON
7	No Function	Reset
6	Ramp Stop	Start
5	Hold	Ramp Enable
4	Quick-Stop	Ramp
3	Coasting	Enable
2	DC Brake	Ramp
1	Preset reference choice msb	
0	Preset reference choice msb	

- When Bit 10 = 1 (Data Valid), the Control Word is valid.

Bit	***Bit = 0***	***Bit = 1***
15	Timer OK	Above limit
14	Torque OK	Above limit
13	Voltage OK	Above limit
12	Temperature OK	Over-Temp, auto-start pending
11	Not Running	Running
10	Out of Range	Frequency OK
9	Local Control	Bus Control
8	Speed ≠ reference	Speed = reference
7	No Warning	Warning
6	Reserved	
5	Reserved	
4	Reserved	
3	No Fault	Trip
2	Coasting	Enabled
1	VLT not ready	Ready
0	Control not ready	Ready

Delta (Servo/AC Drive/PLC/Temperature) Controller (DELTA) and Eaton Electrical MVX Drive

A. HM*i factory setting*

Baud rate: ASCII: 9600, 7, None, 2

RTU: 9600, 8. None, 2

Controller station number: 1

Control area/state area: None

Note:

1. This driver can support all Delta products, i.e. AC drive, PLC, Servo, Temperature Controller and Modbus standard connection in addition to the Eaton Electrical MVX drive. You can easily set and communicate with these devices using this driver.
2. If you are using the Modbus standard connection:
   The Modbus / ASCII (Master), Modbus / 984 RTU (Master), Modbus / ASCII Hex Address (Master) and Modbus / RTU Hex Address (Master) are compatible with the new Delta controller ASCII and Delta controller RTU. To change the driver settings, change the "Controller" Option to select the controller that you want to use.

B. Definition of Controller Read/Write Address

Table B-14: Delta (Servo/AC Drive/PLC/Temperature) Controller Registers

Register Type	Format	Read/Write Range Word No.	Bit No.	Data Length
Servo communication address	SERVO-n	n: 0 – 0700h	N/A	Word
AC drive communication address	INVERTER-n	n: 0 – 2299h	N/A	Word
TCntrl communication address	TEMP_CTRL-n	n: 0 – 6000h	N/A	Word
WORD_DEVICE_X	PLC_Xn	n: 0 – 360(octal)	N/A	Word
WORD_DEVICE_Y	PLC_Yn	n: 0 – 360(octal)	N/A	Word
WORD_DEVICE_M	PLC_Mn	n: 0 – 1520	N/A	Word
		1536 – 4080	N/A	Word
WORD_DEVICE_S	PLC_Sn	n: 0 – 1008	N/A	Word
WORD_DEVICE_T	PLC_Tn	n: 0 – 255	N/A	Word
WORD_DEVICE_C	PLC_Cn	n: 0 – 199	N/A	Word
WORD_DEVICE_D	PLC_Dn	n: 0 – 4095	N/A	Word
		4096 – 9999	N/A	Word
WORD_DEVICE_HC	PLC_HCn	n: 200 – 255	N/A	Double Word
PLC communication address Module	PLC_Modulen	n: 4000 – 4499h	N/A	Word
Output Registers	RW-n	n: 0 – FFFFh	N/A	Word
Input Registers	R-n	n: 0 – FFFFh	N/A	Word
Output Registers	Wn	n: 40001 – 50000	N/A	Word
Input Registers	Wn	n: 30001 – 40000	N/A	Word

Note:

1. The addresses of Servo, AC drive, TCNTRL (Temperature controller) and PLC Module are in hexadecimal format. PLC Word Device X and Y are in octal format. Other PLC Word Device M, S, T, C, D and HC are in decimal format.
2. WORD_DEVICE_ X / WORD_DEVICE_Y / WORD_DEVICE_M / WORD_DEVICE_S: The address must be 0 or a multiple of 16.

Table B-15: Delta (Servo/AC Drive/PLC/Temperature) Controller Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
Servo communication address	SERVO-n.b	n: 0 – 0700h	b: 0 – f
AC drive communication address	INVERTER-n.b	n: 0 – 2299h	b: 0 – f
TCntrl communication address	TEMP_CTRL-n.b	n: 0 – 6000h	b: 0 – f
Servo Digital Input	SERVO_DI-n	N/A	n: 1 – 8
Servo Digital Output	SERVO_DO-n	N/A	n: 1 – 5
WORD_DEVICE_X	PLC_Xn	N/A	n: 0 – 377(octal)
WORD_DEVICE_Y	PLC_Yn	N/A	n: 0 – 377(octal)
WORD_DEVICE_M	PLC_Mn	N/A	n: 0 – 1535
			1536 – 4095
WORD_DEVICE_S	PLC_Sn	N/A	n: 0 – 1023
WORD_DEVICE_T	PLC_Tn	N/A	n: 0 – 255
WORD_DEVICE_C	PLC_Cn	N/A	n: 0 – 255
TCntrl Bit communication address	TEMP_CTRLB-n	N/A	n: 800 – 8FFh
Discrete Outputs	RWB-n	N/A	n: 0 – FFFFh
Discrete Inputs	RB-n	N/A	n: 0 – FFFFh
Discrete Outputs	Bn	N/A	n: 1 – 10000
Discrete Inputs	Bn	N/A	n: 10001 – 20000

Note:

1. The addresses of Servo, AC drive, TCNTRL (Temperature controller) and PLC Module are in hexadecimal format.
2. PLC Word Device X and Y are in octal format. Other PLC Word Device M, S, T, C, D and HC are in decimal format.
3. Servo Digital Input and Servo Digital Output are only for Servo.
4. For Delta AC drive:

   The Delta AC drive needs to set the communication address for **HM*i*** read/write address setting (hexadecimal format for **HM*i***). For detailed information about communication address of Delta AC drive, refer to the User Manual for the specific Delta AC drive series.

   Example 1: Parameter 9-01 of Delta VFD-S drive Transmission Speed needs to be set to INVERTER901 in **HM*i***. (Decimal 9 is converted to 09 in hexadecimal and 01 is converted to 01 in hexadecimal. Therefore, setting INVERTER901 to **HM*i*** discards the first 0).

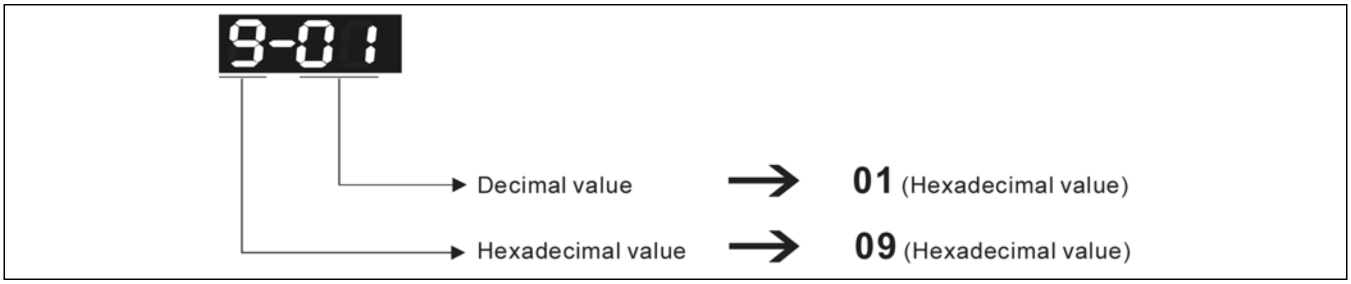


Figure B-13: Reading a Parameter Communication Address

The communication address of parameter 9-01 is 0901H.

Example 2: If the set parameter 8-17 (Lower Bound of DC Braking Start-up Frequency) of Delta VFD-S drive is desired, you need to set INVERTER811 in **HM*i*** (8 is converted to 08 in hexadecimal and 17 is converted to 11 in hexadecimal. Therefore, setting the INVERTER811 to **HM*i*** discards the first 0).

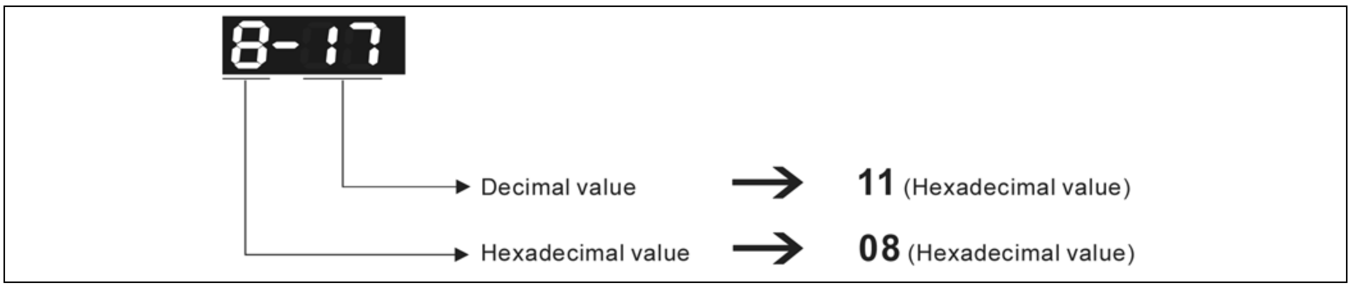


Figure B-14: Reading a Parameter Communication Address

The communication address of parameter 8-17 is 0811H.

5. For Delta Servo drive:

- The **HM*i*** Read/Write address setting needs to input the communication address listed in SERVO "User Manual".
- The Servo Digital Input and Servo Digital Output are only for Servo.

6. For Delta Temperature Controller (DTA series):

   The **HM*i*** can be set up to connect to several Delta temperature controllers on standard Modbus networks by using RTU transmission mode. However, the communication delay time may be increased. Therefore, 5 ms or longer is highly recommended.

C. Connections (Connector Pinouts)

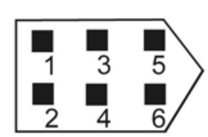
HM*i* *Series* ***9-pin D-SUB male (RS-232)***	***Controller*** ***CN3 cable connector (RS-232)***	***Controller*** ***CN3 cable connector (RS-232)***
RXD+ (2) RXD- (1) TXD+ (3) TXD- (4)	(5) TX+ (6) TX- (3) RX+ (4) RX-	

Figure B-15: Delta Servo RS-232 Connection

HM*i* Series ***9-pin D-SUB male (RS-422)***	***Controller*** ***CN3 cable connector (RS-422)***	***Controller*** ***CN3 cable connector (RS-422)***

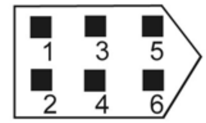
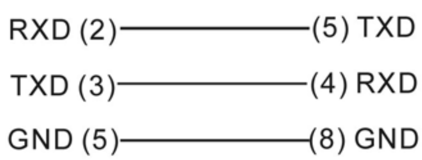


Figure B-16: Delta RS-422 Connection

Delta Controller

Connections (Connector Pinouts)

HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***8-pin Mini DIN male (RS-232)***	***Controller*** ***8-pin Mini DIN male (RS-232)***



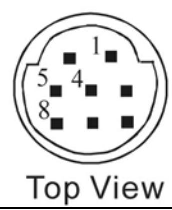


Figure B-17: Delta Servo Controller RS-232 Connection

HMi Series ***9-pin D-SUB male (RS-485)***	***Controller*** ***8-pin Mini DIN male (RS-485)***

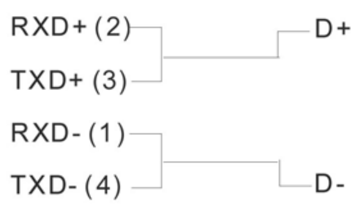


Figure B-18: Delta Servo Controller RS-485 Connection

Facon FB Series PLC

A. HMi factory settings

Baud rate: 9600, 7, Even, 1

Controller Station number: 1

Control area/state area: R0 / R10

B. Definition of Controller Read/Write Address

Table B-16: Facon FB Series PLC Registers

Register Type	Format	Read/Write Range		Data Length
		Word No.	Bit No.	
Input Relay	WXn	n: 0 – 9992	N/A	Byte
Output Relay	WYn	n: 0 – 9992	N/A	Byte
Internal Relay	WMn	n: 0 – 9992	N/A	Byte
Step Relay	WSn	n: 0 – 9992	N/A	Byte
Data Register	Rn	n: 0 – 65534	N/A	Word
Data Register	Dn	n: 0 – 65534	N/A	Word
Timer Present Value	RTn	n: 0 – 9999	N/A	Word
Counter Present Value	RCn	n: 0 – 9999	N/A	Word
Data Register	DRCn	n: 200 – 255	N/A	Double Word

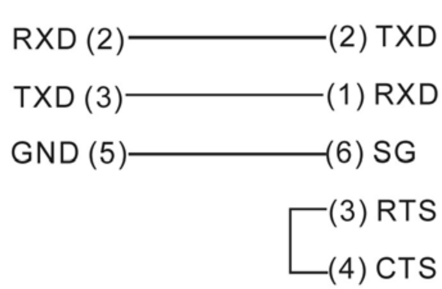
- Input Relay / Output Relay / Internal Relay / Special Relay: The address must be a multiple of 8.

Table B-17: Facon FB Series PLC Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
Input Relay	Xn	N/A	n: 0 – 9999
Output Relay	Yn	N/A	n: 0 – 9999
Internal Relay	Mn	N/A	n: 0 – 9999
Step Relay	Sn	N/A	n: 0 – 9999
Timer Flag	Tn	N/A	n: 0 – 9999
Counter Flag	Cn	N/A	n: 0 – 9999

C. Connections (Connector Pinouts)

HMi Series 9-pin D-SUB male (RS-232)	Controller 15-pin male (RS-232)	Controller 15-pin male (RS-232)



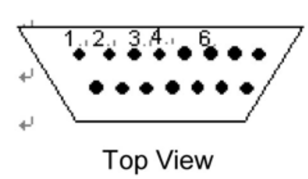


Figure B-19: Facon FB Series PLC RS-232 Connections

Connecting to CB (Communication Board) or CM (Communication Module)

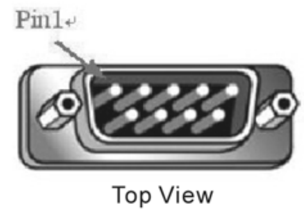
HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***
RXD (2)	(2) TXD	
TXD (3)	(3) RXD	
GND (5)	(5) GND	
	(8) RTS	
	(7) CTS	

Figure B-20: Facon FBs Series Port 1

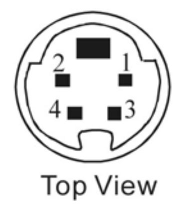
HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***4-pin Mini DIN male (RS-232)***	***Controller*** ***4-pin Mini DIN male (RS-232)***
RXD (2)	(4) TXD	
TXD (3)	(2) RXD	
GND (5)	(1) GND	
	(3) +5V	

Figure B-21: Facon FBs Series Port 0

Festo PLC

A. HMi factory settings

Baud rate: 9600, 8, None, 1

Controller Station number: 0 (no PLC station number in protocol for this PLC)

Control area/state area: R0 / R10

Note: Connectable PLC: FEC-FC Model

B. Definition of Controller Read/Write Address

Table B-18: Festo PLC Registers

Register Type	Format	Word No.	Bit No.	Data Size
WORD_DEVICE_IW	Iwn	n: 0 – 255	N/A	Word
WORD_DEVICE_OW	Own	n: 0 – 255	N/A	Word
WORD_DEVICE_FW	FWn	n: 0 – 9999	N/A	Word
WORD_DEVICE_TW	TWn	n: 0 – 255	N/A	Word
WORD_DEVICE_CW	CWn	n: 0 – 255	N/A	Word
WORD_DEVICE_R	Rn	n: 0 – 255	N/A	Word
WORD_DEVICE_TP	TPn	n: 0 – 255	N/A	Word
WORD_DEVICE_CP	CPn	n: 0 – 255	N/A	Word

Table B-19: Festo PLC Contacts

Register Type	Format	Word No.	Bit No.
BIT_DEVICE_I	In.b	n: 0 – 255	b: 0 – 15
BIT_DEVICE_O	On.b	n: 0 – 255	b: 0 – 15
BIT_DEVICE_F	Fn.b	n: 0 – 9999	b: 0 – 15
BIT_DEVICE_T	Tn	N/A	n: 0 – 255
BIT_DEVICE_C	Cn	N/A	n: 0 – 255
BIT_DEVICE_TON	TONn	N/A	n: 0 – 255
BIT_DEVICE_TOFF	TOFFn	N/A	n: 0 – 255

- BIT_DEVICE_T / BIT_DEVICE_C / BIT_DEVICE_TON / BIT_DEVICE_TOFF: Only one bit can be changed at a time.

C. Connections

Note:

1. Communication port of the PLC: COM port
2. Use the dedicated cable for FESTO controllers and a cable for transferring TTL to RS-232, connect to the 6-pin RJ-12 connector at the PLC side.

GE Fanuc 90 Series SNP PLC

A. HM*i factory settings*

Baud rate: 19200, 8, ODD, 1

Controller Station number: 0 (no PLC station number in protocol, therefore, only 1(**HMi**) to 1 (PLC) communication is allowed)

Control area/state area: %R1 / %R10

Note:

1. There is no PLC station number in the protocol, therefore, only 1 (**HMi**) to 1 (PLC) communication is allowed.
2. If the PLC has the "Check Password" function enabled, set the password by clicking Option > Configuration > Communication. You can find Controller Settings and set the PLC password on the Communication Tab in the Configuration dialog box. Enter a 4-digit password (If a password of more than 4 digits is entered, only the first 4 digits will be valid).

B. Definition of Controller Read/Write Address

Table B-20: GE Fanuc 90 Series SNP PLC Registers

		Read/Write range		
Register Type	***Format***	***Word No.***	***Bit No.***	***Data Length***
Discrete Inputs	%In	n: 1 – 12288	N/A	Word (the multiple of 16 + 1)
Discrete Outputs	%Qn	n: 1 – 12288	N/A	Word (the multiple of 16 + 1)
Discrete Temporaries	%Tn	n: 1 – 256	N/A	Word (the multiple of 16 + 1)
Discrete Internals	%Mn	n: 1 – 12288	N/A	Word (the multiple of 16 + 1)
%SA Discretes	%SAn	n: 1 – 128	N/A	Word (the multiple of 16 + 1)
%SB Discretes	%SBn	n: 1 – 128	N/A	Word (the multiple of 16 + 1)
%SC Discretes	%SCn	n: 1 – 128	N/A	Word (the multiple of 16 + 1)
%S Discretes	%S-n	n: 1 – 128	N/A	Word (the multiple of 16 + 1)
Genius Global Data	%Gn	n: 1 – 7680	N/A	Word (the multiple of 16 + 1)
Registers	%Rn	n: 1 – 16384	N/A	Word
Analog Inputs	%AIn	n: 1 – 8192	N/A	Word
Analog Outputs	%AQn	n: 1 – 8192	N/A	Word

Table B-21: GE Fanuc 90 Series SNP PLC Contacts

		Read/Write range	
Contact Type	***Format***	***Word No.***	***Bit No.***
Discrete Inputs	%In	N/A	n: 1 – 12288
Discrete Outputs	%Qn	N/A	n: 1 – 12288
Discrete Temporaries	%Tn	N/A	n: 1 – 256
Discrete Internals	%Mn	N/A	n: 1 – 12288
%SA Discretes	%SAn	N/A	n: 1 – 128
%SB Discretes	%SBn	N/A	n: 1 – 128
%SC Discretes	%SCn	N/A	n: 1 – 128
%S Discretes	%-Sn	N/A	n: 1 – 128
Genius Global Data	%Gn	N/A	n: 1 – 7680

C. Connections (Connector Pinouts)

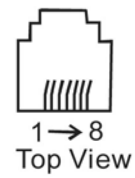
HM*i Series* ***9-pin D-SUB male (RS-232)***	***Controller*** ***RJ-45 cable connector (RS-232)***	***Controller*** ***RJ-45 cable connector (RS-232)***
RXD (2)	(5) TXD	
TXD (3)	(6) RXD	
GND (5)	(4) GND	

Figure B-22: GE Fanuc 90 Series SNP PLC Connector Pinouts

HUST CNC Controller

A. HMi factory settings

Baud rate: 9600, 7, EVEN, 2

Controller station number: 0

Control area/state area: W0 / W10

B. Definition of Controller Read/Write Address

Table B-22: HUST CNC Controller Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Word Register	Wn	n: 0 – 13500	N/A	Word
Double Word Register	Dn	n: 0 – 13500	N/A	Double Word

Note: The unit for Hust CNC controller is D Word and Wn is the low word of Dn.

Table B-23: HUST CNC Controller Contacts

Contact Type	*Format*	*Read/Write range*	
		Word No.	*Bit No.*
BIT_DEVICE_B	Bm.n	m: 0 – 13500	n: 0 – 31
BIT_DEVICE_I	In	N/A	n: 0 – 255 (8 DW)
BIT_DEVICE_O	On	N/A	n: 0 – 255 (8 DW)
BIT_DEVICE_C	Cn	N/A	n: 0 – 255 (8 DW)
BIT_DEVICE_S	Sn	N/A	n: 0 – 255 (8 DW)
BIT_DEVICE_A	An	N/A	n: 0 – 1023 (32 DW)

C. Connections (Connector Pinouts)

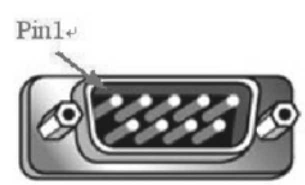
HMi ***Series*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***
RXD (2)	(2) TXD	 Top View
TXD (3)	(3) RXD	
GND (5)	(5) SG	
	(8) RTS	
	(7) CTS	

Figure B-23: HUST CNC Controller Connector Pinouts

Jetter Nano Series PLC

A. HM*i factory settings*

Baud rate: 9600, 8, EVEN, 1 (RS-232)

Controller station number: 0 (no PLC station number in protocol, therefore, only 1 (**HMi**) to 1 (PLC) communication is allowed)

Control area/state area: WR0 / WR10

Note:

1. There is no PLC station number in protocol, only 1 (**HMi**) to 1 (PLC) communication is allowed.
2. Only 1 Bit or 1 Word will be transferred for each communication.
3. In general, each register occupies maximum of 24 bits. However, some registers only occupy 8 bits.
4. Because the initial start up time of this controller is longer, it is recommended to set the **HMi** startup delay time to 10 seconds.
5. When the register R is used for Double Word device, set its format as signed format. (The default format in Screen Editor is the assigned format).

B. Definition of Controller Read/Write Address

Registers

- Only the first 16 bits are used for WRn registers.
- Only the first 24 bits are used for Rn registers. The highest 8 bits (Bit 24 – 31) are set to 0 by the default setting.
- 24-bit Integer: In decimal format, the range is -8388608 – +8388607. In hexadecimal format, the range is 0x000000 – 0xFFFFFF.

Note:

The difference between WRn and Rn:

- When using devices where the data length is in Word, only Bit 0 – 15 are valid for both of WRn and Rn registers.
- When using devices where the data length is in Double Word:
  If the read/write address format is set to WRn, the Bit 0 – 15 of WRn register is the low word of a read/write value, the Bit 0 – 15 of WRn+1 register is the high word of a read/write value.
  If the read/write address format is set to Rn, only Bit 0 – 23 are valid for Rn registers.
  (Notice: As the Jetter controller is a 24-bit format controller, the valid setting range is 24 bits. If you exceed this range, HMi will stop the read/write operation and display ".....Value is Incorrect" on the screen. Do not set any bit for Bit24 – Bit31 as Bit24 – Bit31 cannot be written.
- When using devices where the data length is in m Words:
  If the read/write address format is set to WRn, the Bit 0 – 15 of WRn register is the lowest word of a read/write value and the
  Bit 0 – 15 of WRn+m-1 register is the highest word of a read/write value.
  If the read/write address format is set to Rn, the Bit 0 – 23 of Rn register is the lowest word of a read/write value and the Bit 0 – 23 of Rn+1 register is the highest word of a read/write value.
  Each register is regards as a "Double Word". The value of Bit24 – Bit31 is 0.

Table B-24: Jetter Nano Series PLC Contacts

		Read/Write Range		
Contact Type	***Format***	***Word No.***	***Bit No.***	
Input Relay	Inbb	n: 1 – 32	bb:	01 – 08
Output Relay	Onbb	n: 1 – 32	bb:	01 – 08
Flag Relay	Fn	N/A	n:	0 – 32767

C. Connections (Connector Pinouts)

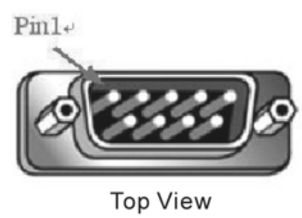
HM*i* *Series* *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*
RXD (2)	(2) TXD	
TXD (3)	(3) RXD	
GND (5)	(7) GND	

Figure B-24: Jetter Nano Series PLC Connector Pinout

- The pinout of the Jetter controller cable is different than the standard cable. Pay close attention to avoid a mistake.

Jetter JC Series PLC

A. HMi factory settings

Baud rate: 9600, 8, EVEN, 1 (RS-232)

Controller station number: 0 (no PLC station number in protocol for this PLC)

Control area/state area: WR0 / WR10

Note:

1. Only 1 (**HMi**) to 1 (PLC) communication is allowed for this PLC.
2. Only 1 Bit or 1-2 Words will be transferred for each read and write command.

B. Definition of Controller Read/Write Address

Table B-25: Jetter JC Series PLC Registers

Register Type	Format	Read/Write Range		
		Word No.		Bit No.
16 Bits Register	WRn	n:	0 – 32767	N/A
32 Bits Register	Rn	n:	0 – 32767	N/A

The characteristics of WRn and Rn of JC series are the same as the Nano series. Refer to page **B-27**.

Table B-26: Jetter JC Series PLC Contacts

Contact Type	Format	Read/Write Range		
		Word No.	Bit No.	
Input Relay	Inbb	n: 1 – 32	bb:	01 – 16
Output Relay	Onbb	n: 1 – 32	bb:	01 – 16
Flag Relay	Fn	N/A	n:	0 – 32767

C. Connections (Connector Pinouts)

HMi Series 9-pin D-SUB male (RS-232)	Controller 8-pin Mini DIN male (RS-232)	Controller 8-pin Mini DIN male (RS-232)

RXD (2) ———— (8) TXD

TXD (3) ———— (4) RXD

GND (5) ———— (2) GND

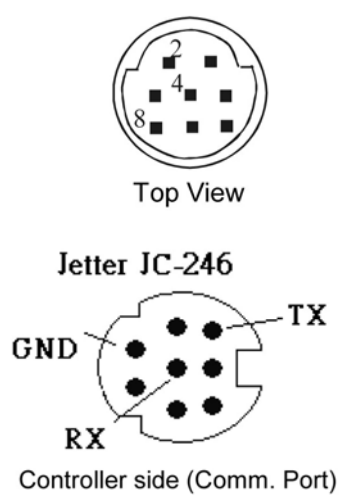


Figure B-25: Jetter JC Series PLC Connector Pinout

Keyence KV/KZ Series

A. HM*i factory settings*

Baud rate: 9600, 8, EVEN, 1 (RS-232)

Controller station number: 0 (no PLC station number in protocol, therefore, only 1 (**HMi**) to 1 (PLC) communication is allowed)

Control area/state area: DM-0 / DM-10

Note:

1. Only 1 (**HMi**) to 1 (PLC) communication is allowed for this PLC.
2. Only 1 Bit or 1 Word can be transferred for each communication. (The communication speed is slow.)

B. Definition of Controller Read/Write Address

Table B-27: Keyence KV/KZ Series Registers

Register Type	*Format*	*Read/Write Range*			*Data Length*
		Word No.		*Bit No.*	
Timer	T-nnn	nnn:	0 – 199	N/A	Word
Counter	C-nnn	nnn:	0 – 199	N/A	Word
High-speed counter	CTH-n	n:	0 – 1	N/A	Word
High-speed counter comparator	CTC-n	n:	0 – 3	N/A	Word
Data memory	DM-nnnn	nnnn:	0 – 1999	N/A	Word
Temporary data memory	TM-nn	nn:	0 – 31	N/A	Word
Timer preset value	PT-nnn	nnn:	0 – 199	N/A	Word
Counter preset value	PC-nnn	nnn:	0 – 199	N/A	Word
CTC preset value	PCTC-n	n:	0 – 3	N/A	Word

Table B-28: Keyence KV/KZ Series Contacts

Contact Type	*Format*	*Read/Write Range*		
		Word No.	*Bit No.*	
Relay	R-nnnbb	nnn: 0 – 69	bb:	00 – 15
Timer	T-nnn	N/A	nnn:	0 – 199
Counter	C-nnn	N/A	nnn:	0 – 199
High-speed counter comparator	CTC-n	N/A	n:	0 – 3

Note:

When using the protocol format of KV series and connecting to KZ-80T PLC, some errors occur. Refer to the following descriptions:

1. Readable Timer address is not continuous. For example, T-0 – T-9 can be read, T10 cannot be read, T11 – T20 can be read, T21 – T50 cannot be read, …etc.
2. Counter cannot be read. For example:
   Registers: C- (Counter), CTH- (High-speed counter), CTC- (High-speed counter comparator), PC- (Counter preset value), PCTC- (CTC preset value) cannot be read.
   Contacts: C- (Counter), CTC- (High-speed counter comparator) cannot be read.

C. Connections (Connector Pinouts)

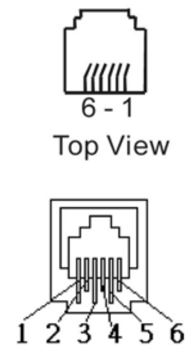
HM*i Series* ***9-pin D-SUB male (RS-232)***	***Controller*** ***RJ-11 cable connector (RS-232)***	***Controller*** ***RJ-11 cable connector (RS-232)***
RXD (2) ——— (3) SD TXD (3) ——— (5) RD GND (5) ——— (4) SG		 PLC side (Comm. Port)

Figure B-26: KV Series RS-232 Connections

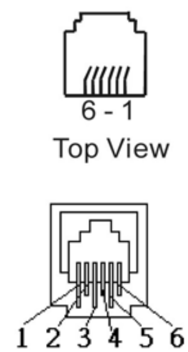
HM*i Series* ***9-pin D-SUB male (RS-232)***	***Controller*** ***RJ-11 cable connector (RS-232)***	***Controller*** ***RJ-11 cable connector (RS-232)***
RXD (2) ——— (5) SD TXD (3) ——— (3) RD GND (5) ——— (4) SG		 PLC side (Comm. Port)

Figure B-27: KZ Series RS-232 Connections

Note: Communication cable: The pins of SD and RD of KZ-80T and KV Series are reversed.

Koyo SU/DL Series

A. HMi factory settings

Baud rate: 9600, 8, ODD, 1 (RS-232)

Controller station number: 1

Control area/state area: V1400 / V1410

B. Definition of Controller Read/Write Address

Table B-29: Koyo SU/DL Series Registers

Register Type	*Format*	*Read/Write Range*			*Data Length*
		Word No.		*Bit No.*	
Timer Accumulated	Vn	n:	0 – 177 (octal)	N/A	Word
Counter Accumulated	Vn	n:	1000 – 1177 (octal)	N/A	Word
V Memory	Vn	n:	1400 – 7777 (octal)	N/A	Word
Linker Relays	Vn	n:	40000 – 40037 (octal)	N/A	Word
Input Status	Vn	n:	40400 – 40423 (octal)	N/A	Word
Output Status	Vn	n:	40500 – 40523 (octal)	N/A	Word
Control Relays	Vn	n:	40600 – 40635 (octal)	N/A	Word
Stage	Vn	n:	41000 – 41027 (octal)	N/A	Word
Timer Status	Vn	n:	41100 – 41107 (octal)	N/A	Word
Counter Status	Vn	n:	41140 – 41147 (octal)	N/A	Word
Special Relay 1	Vn	n:	41200 – 41205 (octal)	N/A	Word
Special Relay 2	Vn	n:	41216 – 41230 (octal)	N/A	Word

Table B-30: Koyo SU/DL Series Contacts

Contact Type	*Format*	*Read/Write Range*		
		Word No.	*Bit No.*	
Linker Relays	GXn	N/A	n:	0 – 777 (octal)
Input Status	Xn	N/A	n:	0 – 477 (octal)
Output Status	Yn	N/A	n:	0 – 477 (octal)
Control Relays	Cn	N/A	n:	0 – 737 (octal)
Stage	Sn	N/A	n:	0 – 577 (octal)
Timer Status	Tn	N/A	n:	0 – 177 (octal)
Counter Status	CTn	N/A	n:	0 – 177 (octal)
Special Relay 1	SPn	N/A	n:	0 – 137 (octal)
Special Relay 2	SPn	N/A	n:	320 – 617 (octal)

C. Connections (Connector Pinouts)

HMi Series *9-pin D-SUB male (RS-232)*	*Controller* *RJ-11 cable connector (RS-232)*	*Controller* *RJ-11 cable connector (RS-232)*
RXD(2) TXD(3) GND(5)	(4)TXD (3)RXD (1)GND (6)GND	

Figure B-28: Koyo SU/DL Series Connector Pinouts

Koyo K-Sequence

A. HMi factory settings

Baud rate: 9600, 8, ODD, 1 (RS-232)

Controller station number: 1

Control area/state area: R1400 / R1420

*Note: If the read / write address exceeds the valid range, the **HMi** will stop the read/write operation and display "....Error 6..... Command Can Not be Executed...." on the screen.*

B. Definition of Controller Read/Write Address

Table B-31: Koyo K-Sequence Registers

Register Type	Format	Read/Write Range			Data Length
		Word No.		Bit No.	
Input Status	Xnnnn	nnnn:	0 – 1760 (octal)	N/A	Word
Output Status	Ynnnn	nnnn:	0 – 1760 (octal)	N/A	Word
Link Relays	GXnnnn	nnnn:	0 – 3760 (octal)	N/A	Word
Relays	GQnnnn	nnnn:	0 – 3760 (octal)	N/A	Word
Relays	Mnnnn	nnnn:	0 – 3760 (octal)	N/A	Word
Stage	Snnnn	nnnn:	0 – 1760 (octal)	N/A	Word
Timer Status	Tnnn	nnn:	0 – 360 (octal)	N/A	Word
Control Relays	Cnnn	nnn:	0 – 360 (octal)	N/A	Word
Special Relay 1	SPnnn	nnn:	0 – 760 (octal)	N/A	Word
Register	Rnnnnn	nnnnn:	0 – 41237 (octal)	N/A	Word
Register	Pnnnnn	nnnnn:	0 – 37777 (octal)	N/A	Word

• nnnn: It is in octal format and must be a multiple of 16 except for R and P.

Table B-32: Koyo K-Sequence Contacts

Contact Type	Format	Read/Write Range		
		Word No.	Bit No.	
Input Status	Xnnnn	N/A	nnnn:	0 – 1777 (octal)
Output Status	Ynnnn	N/A	nnnn:	0 – 1777 (octal)
Linker Relays	GXnnnn	N/A	nnnn:	0 – 3777 (octal)
Relays	GQnnnn	N/A	nnnn:	0 – 3777 (octal)
Control Relays	Mnnnn	N/A	nnnn:	0 – 3777 (octal)
Stage	Snnnn	N/A	nnnn:	0 – 1777 (octal)
Timer Status	Tnnn	N/A	nnn:	0 – 377 (octal)
Counter Status	Cnnn	N/A	nnn:	0 – 377 (octal)
Special Relay 1	SPnnn	N/A	nnn:	0 – 777 (octal)

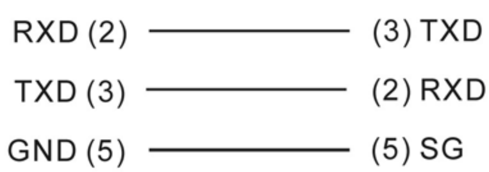
C. Connections (Connector Pinouts)

HM*i* Series *9-pin D-SUB male (RS-232)*	***Controller*** *RJ-11 cable connector (RS-232)*	***Controller*** *RJ-11 cable connector (RS-232)*

Figure B-29: Koyo K-Sequence Port 0 Communication Cable - RJ-11

- If pin 6 is not grounded, a communication error may occur when connecting to a CKD SM 24R controller. Ensure that pin 6 is well grounded. There is no problem when connecting to SN32DRA controller as pin 6 does not have to be grounded.

HM*i* Series *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*



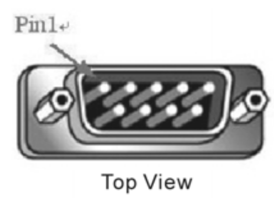


Figure B-30: Koyo K-Sequence Port 0 Communication Cable - RS-232

HM*i* Series *9-pin D-SUB male (RS-485)*	**HM*i*** *9-pin D-SUB male (RS-485)*

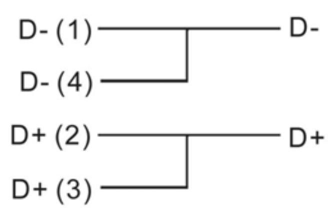


Figure B-31: Koyo K-Sequence Port 1 Communication Cable - RS-485

Table B-33: The corresponding registers of CCM2 and K-Sequence

Address Corresponding Relationship		
CCM2	***K sequence***	***SN32DRA***
V	R	R
X	X	I
Y	Y	Q
C	M	M
S	S	S
T	T	T
CT	C	C
SP	SP	SP

Lenze LECOM-A/B Protocol

A. HMi factory settings

Baud rate: 9600, 7, EVEN, 1 (Baud rate: 1200/2400/4800/9600/19200)

Controller station number: 1 (1–99)

Control area/state area: None / None

Note:

1. Pay close attention to each pin definition of cable connectors.
2. Do not use the general RS-232 5-pin cable. If pin 2, 3, 5, 7, 8 are all connected to the drive, the drive can not recognize the communication signal and cannot identify what kind of communication it is.
3. For more detailed information for the pin definition of the cable connectors, refer to the C. Connections (Connector Pinouts) in page **B-25**.
4. The **HMi** communication data format (the communication data written into the drive) must be correct. The Word "m" in the following table is used to specify the **HMi** communication data format.
5. The **HMi** display data format (Property table/Setting value...etc.) must be correct.
6. When using the broadcast function, check to see if the selected device is available. The broadcast function can be activated only when you select the "write only" device for the broadcast station number (select the setting value/setting constant [button] and then the broadcast function can be used). If choosing other devices, the system will ask you to read back the drive setting value to validate that you have selected the correct device. If you select an incorrect device, the fault message "Controller Station Number Error…" displays on the **HMi** screen.
7. The **HMi** supports 82XX frequency AC drives and 93XX servo drives.

B. Definition of Controller Read/Write Address

Table B-34: Lenze LECOM-A/B Protocol Read/Write Address

Note: Registers (n, m, y are in decimal)

Register Type	Format	Read/Write Range			Data Length
		Word No.	Bit No.		
			Low Byte	High Byte subcode	
Parameter without subcode	CWn	n: 1 – 10000	N/A	N/A	Word
	CWn.m	n: 1 – 10000	m: 0 – 23	N/A	Word
Parameter with subcode	CWn/y	n: 1 – 10000	N/A	y:1 – 255	Word
	CWn/y.m	n: 1 – 10000	m: 0 – 23	y:1 – 255	Word
Parameter without subcode	CDn	n: 1 – 10000	N/A	N/A	DoubleWord
	CDn.m	n: 1 – 10000	m: 0 – 23	N/A	DoubleWord
Parameter with subcode	CDn/y	n: 1 – 10000	N/A	y:1 – 255	DoubleWord
	CDn/y.m	n: 1 – 10000	m: 0 – 23	y:1 – 255	DoubleWord

Note:

1. m : **HMi** communication data format
2. The value of m represents the different communication data format:

- If the m value is undefined, the **HMi** uses the ASCII hexadecimal format (VH) (4 or 8 numbers.)
- m >= 23: ASCII hexadecimal format (VH) (4 or 8 numbers).
- m = 0 – 10: unsigned, ASCII decimal format (VD)
  m represents decimal place, For example:
  m=0 and no decimal place
  m=1 and one decimal place (tenth)
  m=2 and two decimal place (hundredth)
- m = 11 – 20: signed, ASCII decimal format (VD)
  m represents decimal place, For example:
  m=11 and one decimal place (tenth)
  m=12 and two decimal place (hundredth)
- m = 21: signed, ASCII decimal format (VD)
  without decimal place
- m = 22: ASCII hexadecimal format (VH) 2 numbers
  When using this format, the write value will be limited to the range of 0–0xFF (low byte).
  For example, when you enter 0x1234 during communication, the actual write value is 0x34, not 0x1234.

Table B-35: Lenze LECOM-A/B Protocol Contacts

Register Type	*Format*	*Read/Write Range*		
		Word No.	*Bit No.*	
			Low Byte	*High Byte subcode*
Parameter without subcode	CBn.b	n: 1 – 10000	b: 0 – 31	N/A
Parameter with subcode	CBn/y.b	n: 1 – 10000	b: 0 – 31	1 – 255

Note: (n, b, y are in decimal)

Only the VH type parameter can provide the Bit read/write function.

CBn.b, CWn (CWn.m), CDn (CDn.m): read/write address is the same (address n).

Note:

1. Because the data format of this controller is in ASCII; (a. VS (String format), b. VO (Octet string format data blocks), c. VH (ASCII hexadecimal format) (1, 2, 4 bytes), d. VD (ASCII decimal format) (positive, negative, decimal,..) and the data format is not the same as the **HMi** standard data format, you need to validate that the **HMi** communication data format matches the controller data format or an error may occur.
2. Registers: can only read/write the data in ASCII hexadecimal format (VH), ASCII decimal format (VD) (i.e. either VH or VD data format can be set via communication).
   Contacts: can only read/write the data in ASCII hexadecimal format (VH).
   The **HMi** display data format (Property table/Setting value...etc.) should also be correct.
   a. Registers: To read/write the data in VH or VD, the **HMi** needs to set the communication data format (refer to d., e. and f.). String format (VS), and Octet string format for data blocks (VO) can not be used. If the controller returns the data in VS or VO format, the **HMi** displays "......Value Is Incorrect" on the screen.
   b. Contacts: To read/write the data of ASCII hexadecimal format (VH), only the VH type parameter can provide Bit read/write function. If the controller returns the data in another format, the **HMi** displays "......Value Is Incorrect" on the screen.

c. Do not write the nonexistent Bit address, or the **HMi** displays "....Write .... Command Can Not be Executed" on the screen.
For example: CW470/1. The valid value of CW470/1 is within the range of 0 – 0xFF, therefore Bit 8 –31 do not exist. Although the **HMi** displays the value of Bit 8 –31 as 0, you cannot write or set the value.
d. The settings of ASCII hexadecimal format (VH) and ASCII decimal format (VD) should be correct. If the VD data is set in VH format in the **HMi** (m value is undefined, or m=22 or 23) or the VH data is set in VD format in **HMi** (m=0 – 21) as the **HMi** writes the data, the **HMi** displays "....Write .... Command Cannot be Executed" on the screen or tells you that the write value is incorrect.
e. The decimal place of ASCII decimal format (VD) should be set correctly or the write value will not be correct. The decimal place displayed on **HMi** should also be correct or the display value will be incorrect.
f. ASCII hexadecimal format (VH): 2 numbers (m = 22). The value is limited to 2 numbers. Using this format the write value will be limited within the range of 0 – 0xFF (low byte) automatically.

3. Station Number and Broadcast:

- The valid station number is from 0 to 99. If the number exceeds this range, **HMi** will stop the read/write operation and display "Controller Station Number Error ..."on the screen.
- 00 indicates the global broadcasting number (1–99).
- 10, 20, 30, 40, 50, 60, 70, 80, 90 are the local broadcasting numbers.
The affected ranges are: 11–19, 21–29, 31–39, 41–49, 51–59, 61–69, 71–79, 81–89 and 91–99 respectively. Select the setting value/setting constant (button) to use the broadcast function. If you select the wrong device, the system will be confused while reading back the drive setting value via the broadcast function and the fault message "Controller Station Number Error..." displays on the **HMi** screen.
- 82XX frequency AC drives and 93XX servo drives all use the LECOM-A/B protocol.

4. Explanation of Communication Error Address:

- Registers: display CW n, CWy n, CD n, CDy n (in this order)
- Contacts: display CB n, CByn (in this order, where n is the address value)

5. **HMi** data format explanation:

- Some controller parameters are in Word and some are in Double Word. Therefore, there are two kinds of data format: Word (CWn (CWn.m), CWn/y (CWn/y.m) and Double Word (CDn (CDn.m), CDn/y(CDn/y.m).
- For the Bit No., the **HMi** only reads or writes 32Bit (Bit0 – Bit31) parameters in VH format.
- CWn(CWn.m), CDn(CDn.m), or CBn.b: read/write address is the same (address n), but
when symbol is set to CW, read/write value is the low word of parameters (n),
when symbol is set to CD, read/write value is the Double Word of whole parameters (n),
when symbol is set to CB, read/write value is the Bit (b) No. of parameters (n).
(m : **HMi** communication data format)
- CWn/y(CWn/y.m), CDn/y(CDn/y.m), CBn/y.b: read/write address, which the y subcode is the same (address n), but:
when symbol is set to CW, read/write value is the low word of parameters (n),
when symbol is set to CD, read/write value is the Double Word of whole parameters (n),
when symbol is set to CB, read/write value is the Bit (b) No. of parameters (n).
(m : **HMi** communication data format)
- Using the **HMi**

  a. When using devices where the unit is in Word (e.g. numeric devices [numeric value display, numeric value input...], the read/write value will be the same no matter whether the read/write address format is set to CWn or CDn as read/write value is the low word of parameters (n).

  b. When using devices that the unit is in Double Word (e.g. numeric devices [numeric value display, numeric value input], if the read/write address format is set to CWn, the read/write value is coming from the low word of the CWn and CWn+1 addresses. (The low word of CWn is regarded as "low word" and the low word of CWn+1 is regarded as "high word", and then combining "low word" and "high word" to a Double Word.)
  If the read/write address format is set to CDn, the read/write value is the whole Double Word of CDn (1 address).

  c. When using character device (e.g. character display, character input...), if the read/write address format is set to CWn, the read/write value is coming from the low word of the CWn, CWn+1, CWn+2, ... address.
  If the read/write address format is set to CDn, the read/write value is the whole Double Word of CDn, CDn+1, CDn+2,... address.

d. When using “Multiple Duplicate” function, if the Word and Bit addresses exceed the valid range, the Word and Bit addresses will be set to 0 automatically. When you are compiling, an error can occur if the valid range is exceeded.
e. CBn.b, CBn/y.b are added for you to be able to read and write Bit No. of parameters in VH format more easily.
f. The **HM*i*** can only read or write 1 parameter for each communication.

C. Connections (Connector Pinouts)

Pin 2, 3, 5 are for RS-232 communication. Pin 7, 8 are for RS-485 communication.

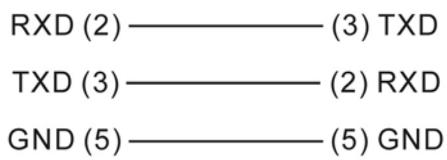
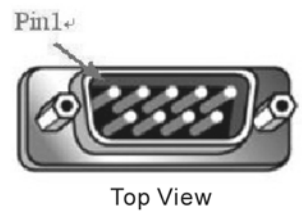
<table>
<tr><th>HMi Series
9-pin D-SUB male (RS-232)</th><th>Controller
9-pin D-SUB male (RS-232)</th><th>Controller
9-pin D-SUB male (RS-232)</th></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
</table>

Figure B-32: Lenze LECOM-A/B Protocol RS-232 Connections

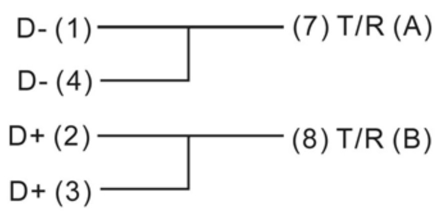
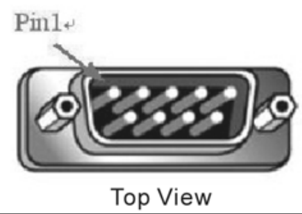
<table>
<tr><th>HMi Series
9-pin D-SUB male (RS-485)</th><th>Controller
9-pin D-SUB male (RS-485)</th><th>Controller
9-pin D-SUB male (RS-485)</th></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
</table>

Figure B-33: Lenze LECOM-A/B Protocol RS-485 Connections

LG Master K120S/200S

A. **HM*i*** *factory settings*

Baud rate: 38400, 8, None, 1. (RS-232)

Controller station number: 0 (no PLC station number in the protocol for this PLC)

Control area/state area: DW0 / DW10

B. Definition of Controller Read/Write Address

Table B-36: LG Master K120S/200S Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
WORD_DEVICE_PW	PWn	n: 0 – 15	N/A	Word
WORD_DEVICE_MW	MWn	n: 0 – 191	N/A	Word
WORD_DEVICE_KW	KWn	n: 0 – 31	N/A	Word
WORD_DEVICE_LW	LWn	n: 0 – 63	N/A	Word
WORD_DEVICE_FW	FWn	n: 0 – 63	N/A	Word
WORD_DEVICE_TW	TWn	n: 0 – 255	N/A	Word
WORD_DEVICE_CW	CWn	n: 0 – 255	N/A	Word
WORD_DEVICE_DW	DWn	n: 0 – 9999	N/A	Word

Table B-37: LG Master K120S/200S Contacts

Contact Type	*Format*	*Word No.*	*Bit No.*
BIT_DEVICE_P	Pnb	n: 0 – 15	b: 0 – f
BIT_DEVICE_M	Mnb	n: 0 – 191	b: 0 – f
BIT_DEVICE_K	Knb	n: 0 – 31	b: 0 – f
BIT_DEVICE_L	Lnb	n: 0 – 63	b: 0 – f
BIT_DEVICE_F	Fnb	n: 0 – 63	b: 0 – f
BIT_DEVICE_T	Tn	N/A	n: 0 – 255
BIT_DEVICE_C	Cn	N/A	n: 0 – 255

C. Connections (Connector Pinouts)

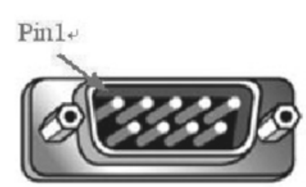
HM*i* *Series* *9-pin D-SUB male (RS-232)*	*Controller* *9-pin D-SUB male (RS-232 for LG K120S/200S)*	*Controller* *9-pin D-SUB male (RS-232 for LG K120S/200S)*
RXD (2)——(3) TXD TXD (3)——(2) RXD GND (5)——(5) GND		 Top View

Figure B-34: G Master K120S/200S RS-232 Connector Pinouts

Note: If connecting to Pin 4 (RXD), Pin 7 (TXD) and Pin5 (SG), the CNet protocol is used. *See LG Master-K CNET on page B-42.* The 120S/200S protocol and CNet protocol cannot be used simultaneously. You must select either the 120S/200S protocol or the CNet protocol.

LG Glofa GM6 CNET

A. **HM*i*** *factory settings*

Baud rate: 19200, 8, None, 1 (RS-232)

Controller station number: 0

Control area/state area: %MW0 / %MW10

Note: The **HM*i*** *default setting is predefined for the CPU Port. If you want to connect to CNET communication module, the baud rate should be changed to 38400, 8, None, 1. (RS-422 / RS-485)*

B. Definition of Controller Read/Write Address

Table B-38: LG Glofa GM6 CNET Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
Input Image	IWb.s.w	w(word):0 – 3 s(slot): 0 – 7	b(base): 0 – 1	Word
Input Image	IDb.s.w	w(word):0 – 1 s(slot): 0 – 7	b(base): 0 – 1	DWord
Output Image	QWb.s.w	w(word):0 – 3 s(slot): 0 – 7	b(base): 0 – 1	Word
Output Image	QDb.s.w	w(word):0 – 1 s(slot): 0 – 7	b(base): 0 – 1	DWord
Internal Memory	MWn	n: 0 – 4095	N/A	Word
Internal Memory	MDn	n: 0 – 2047	N/A	DWord

Table B-39: LG Glofa GM6 CNET Contacts

Contact Type	*Format*	*Word No.*	*Bit No.*
Input Image	IXb.s.n	s(slot): 0 – 7	n(bit): 0 – 63 b(base): 0 – 1
Output Image	QXb.s.n	s(slot): 0 – 7	n(bit): 0 – 63 b(base): 0 – 1
Internal Memory	MXn	N/A	n: 0 – 65535

C. Connections (Connector Pinouts)

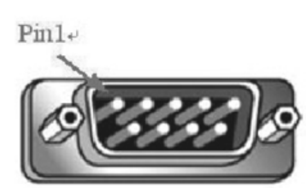
HM*i* *Series* *9-pin D-SUB male (RS-232)*	*Controller* *9-pin D-SUB male (RS-232)*	*Controller* *9-pin D-SUB male (RS-232)*
RXD (2)	(7) TXD	 Top View
TXD (3)	(4) RXD	
GND (5)	(5) GND	

Figure B-35: LG Glofa GM6 CNET RS-232 Connector Pinouts

HMi ***Series*** ***9-pin D-SUB male (RS-422)***	***Controller*** ***Cable Connector (RS-422)***
RXD+ (2)	SDA
RXD- (1)	SDB
TXD- (4)	RDA
TXD+ (3)	RDB
GND (5)	SG

Figure B-36: LG Glofa GM6 CNET RS-422 Connections

LG Master-K CNET

A. HM*i factory settings*

Baud rate: 38400, 8, None, 1 (RS-422)

Controller station number: 0

Control area/state area: DW0 / DW10

Note: The **HM*i*** *default setting is predefined for the G6L-CUEC CNET communication module.*

B. Definition of Controller Read/Write Address

Table B-40: LG Master-K CNET Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
I/O relay	PWn	n: 0 – 31	N/A	Word
Auxiliary relay	MWn	n: 0 – 191	N/A	Word
Keep relay	KWn	n: 0 – 31	N/A	Word
Link relay	LWn	n: 0 – 63	N/A	Word
Special relay	FWn	n: 0 – 63	N/A	Word (Read Only)
Timer elapsed value	TWn	n: 0 – 255	N/A	Word
Counter elapsed value	CWn	n: 0 – 255	N/A	Word
Data register	DWn	n: 0 – 9999	N/A	Word

Table B-41: LG Master-K CNET Contacts

Contact Type	*Format*	*Word No.*	*Bit No.*
I/O relay	PXnb	n: 0 – 31	b: 0 – F
Auxiliary relay	MXnb	n: 0 – 191	b: 0 – Fy
Keep relay	KXnb	n: 0 – 31	b: 0 – F
Link relay	LXnb	n: 0 – 63	b: 0 – F
Special relay	FXnb	n: 0 – 63	b: 0 – F
Timer contact relay	TXb	N/A	b: 0 – 255
Counter contact relay	CXb	N/A	b: 0 – 255

C. Connections (Connector Pinouts)

HMi Series 9-pin D-SUB male (RS-422)	Controller Cable Connector (RS-422)
RXD+ (2)	SDA
RXD- (1)	SDB
TXD- (4)	RDA
TXD+ (3)	RDB
GND (5)	SG

Figure B-37: LG Master-K CNET Contacts RS-422 Connections

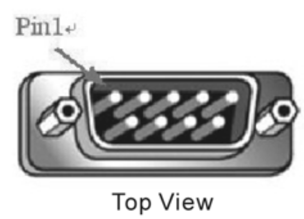
HMi Series 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)
RXD (2)	(7) TXD	
TXD (3)	(4) RXD	
GND (5)	(5) GND	

Figure B-38: LG Master-K CNET Contacts RS-232 Connector Pinouts

LIYAN Electric Ex

A. HMi factory settings

Baud rate: 9600, 7, EVEN, 1

Controller station number: 0

Control area/state area: D0 / D10

B. Definition of Controller Read/Write Address

Table B-42: LIYAN Electric EX Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	***Bit No.***	
Auxiliary Relay	Mn	n: 0 – 3064	N/A	Byte
Special Auxiliary Relay	Mn	n: 8000 – 8248	N/A	Byte
Status Relay	Sn	n: 0 – 992	N/A	Byte
Input Relay	Xn	n: 0 – 360(octal)	N/A	Byte
Output Relay	Yn	n: 0 – 360(octal)	N/A	Byte
Timer PV	Tn	n: 0 – 255	N/A	Word
16-bit Counter PV	Cn	n: 0 – 199	N/A	Word
32-bit Counter PV	Cn	n: 200 – 255	N/A	Double Word
Data Register	Dn	n: 0 – 7999	N/A	Word
Special Data Register	Dn	n: 8000 – 8255	N/A	Word

Note: Auxiliary Relay / Special Auxiliary Relay / Status Relay / Input Relay / Output Relay: The address must be a multiple of 8.

Table B-43: LIYAN Electric EX Contacts

Contact Type	*Format*	*Read/Write Range*	
		Word No.	***Bit No.***
Auxiliary Relay	Mn	N/A	n: 0 – 3071
Special Auxiliary Relay	Mn	N/A	n: 8000 – 8255
Status Relay	Sn	N/A	n: 0 – 999
Input Relay	Xn	N/A	n: 0 – 377(octal)
Output Relay	Yn	N/A	n: 0 – 377(octal)
Timer Flag	Tn	N/A	n: 0 – 255
Counter Flag	Cn	N/A	n: 0 – 255

C. Connections (Connector Pinouts)

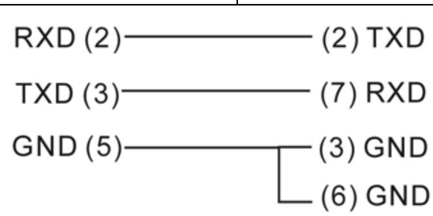
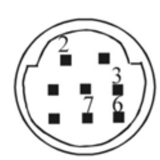
HM*i* *Series* *9-pin D-SUB male (RS-232)*	*Controller 8-pin Mini DIN male (RS-232)*	*Controller 8-pin Mini DIN male (RS-232)*
		 Top View

Figure B-39: LIYAN Electric EX RS-232 Connector Pinout

M2i Master

A. HMi factory settings

Baud rate: 38400, 8, None, 1

Controller station number: 1

Control area/state area: SB0 / SB10

B. Definition of Controller Read/Write Address

Table B-44: M2i Master Registers

Register Type	Format	Read/Write Range		Data Length
		Word No.	Bit No.	
Word Address	SBn	n: 0000 – FFFF	N/A	Word

Table B-45: Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
Bit Address	SBn.b	n: 0000 – FFFF	b: 0 – F

M2i Slave

A. HM*i factory settings*

Baud rate: 38400, 8, None, 1

Controller station number: 1 (no function)

Control area/state area: SB0 / SB10

Note:

1. The **HM*i*** station number is the Slave station number. (The default setting is 0.)
2. The relationship between the M2i communication address and the **HM*i*** internal registers are in the following illustration:

Modbus address		*Data definition in HMi*
SB0000 ~ SB7FFF	→	\$0 ~ \$32767
SB8000 ~ SB83FF	→	\$M0 ~ \$M1023
SB8400	→	RCPNO
SB8500 ~ SBFFFF	→	RCP0 ~ RCP31487

Figure B-40: M2i Communication Address and HM*i* Internal Registers

B. Definition of Controller Read/Write Address

Table B-46: M2i Slave Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
Word Address	SBn	n: 0000 – FFFF	N/A	Word

Table B-47: M2i Slave Contacts

		Read/Write Range	
Contact Type	*Format*	*Word No.*	*Bit No.*
Bit Address	SBn.b	n:0000 – FFFF	b: 0 – F

C. Connections (Connector Pinouts):

Refer to *Pin Definition of Serial Communication on page B-1* for details.

Matsushita FP PLC

A. HMi factory settings

Baud rate: 9600, 8, ODD, 1

Controller station number: 238

Control area/state area: DT0 / DT10

B. Definition of Controller Read/Write Address

Table B-48: Matsushita FP PLC Registers

Register Type	Format	Read/Write Range		Data Length
		Word No.	Bit No.	
Internal Relay Special Internal Relay	WRn	n: 0 – 886, 900 – 910	N/A	Word
Link Relay	WLn	n: 0 – 639	N/A	Word
External Input Relay	WXn	n: 0 – 511	N/A	Word
External Output Relay	WYn	n: 0 – 511	N/A	Word
Timer/Counter PV	EVn	n: 0 – 3071	N/A	Word
Timer/Counter SV	SVn	n: 0 – 3071	N/A	Word
Data Register	DTn	n: 0 – 32764	N/A	Word
Link Data Register	LDn	n: 0 – 8447	N/A	Word
File Register	FLn	n: 0 – 32764	N/A	Word
Special Data Register	DT9_n	n: 0 – 511	N/A	Word

- DT9_0 – DT9_511 are applicable for FP0 T32C, FP2, FP2SH, FP10SH controllers. (The special data registers are all within the range of DT90000 – DT9XXXX.)
- The actual transmitted address of DT9_n is 90000 + n (for DT). For example, the actual transmitted address of DT9_1 is 90001 (for DT) and the actual transmitted address of DT9_2 is 90002 (for DT), and vice versa.

Table B-49: Matsushita FP PLC Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
Internal Relay Special Internal Relay	Rnb	n: 0 – 886 n: 900 – 910	b: 0 – f b: 0 – f
Link Relay	Lnb	n: 0 – 639	b: 0 – f
External Input Relay	Xnb	n: 0 – 511	b: 0 – f
External Output Relay	Ynb	n: 0 – 511	b: 0 – f
Timer Flag Contact	Tn	N/A	n: 0 – 3071
Counter Flag Contact	Cn	N/A	n: 0 – 3071

- Increase the range of read / write address for FP2SH / FP10SH controllers.

C. Connections (Connector Pinouts)

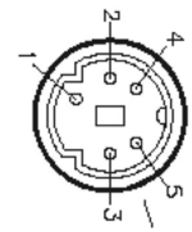
***HMi** Series* *9-pin D-SUB male (RS-232)*	*Controller* *5-pin Mini DIN male (RS-232 for FP0)*	*Controller* *5-pin Mini DIN male (RS-232 for FP0)*
RXD (2)	(2) TXD	Top View
TXD (3)	(3) RXD	
GND (5)	(1) SG	

Figure B-41: Matsushita FP PLC RS-232 FP0 Connector Pinout

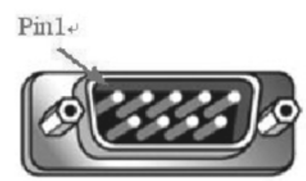
***HMi** Series* *9-pin D-SUB male (RS-232)*	*Controller* *9-pin D-SUB male (RS-232 for FP1)*	*Controller* *9-pin D-SUB male (RS-232 for FP1)*
RXD (2)	(2) TXD	Top View
TXD (3)	(3) RXD	
GND (5)	(7) GND	
	(4) RTS	
	(5) CTS	

Figure B-42: Matsushita FP PLC RS-232 FP1 Connector Pinout

Mirle FAMA SC

A. **HM*i*** *factory settings*

Baud rate: 9600, 7, EVEN, 1

Controller station number: 0

Control area/state area: 40100 / 40200

B. Definition of Controller Read/Write Address

Table B-50: Mirle FAMA SC Registers

Register Type	Format	Read/Write Range		Data Length
		Word No.	Bit No.	
Output Registers	Wn	n: 40001 – 50000	N/A	Word
Input Registers	Wn	n: 30001 – 40000	N/A	Word

- The Input Registers parameter is "read only".

Table B-51: Mirle FAMA SC Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
Discrete Outputs	Bn	N/A	n: 1 – 10000
Discrete Inputs	Bn	N/A	n: 10001 – 20000

- The Discrete Inputs parameter is "read only".

C. Connections (Connector Pinouts)

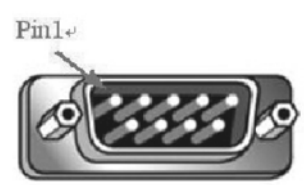
HM*i* *Series* 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)
RXD (2)	(3) TXD	 Top View
TXD (3)	(2) RXD	
GND (5)	(5) SG	

Figure B-43: Mirle FAMA SC RS-232 Connector Pinout

Mitsubishi FX/FX2N PLC

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 1

Controller Station number: 0 (no PLC station number in protocol, therefore, only 1 (**HM*i***) to 1 (PLC) communication is allowed)

Control area/state area: D0 / D10

Note:

1. If connecting to a Mitsubishi FXxN series PLC, use the FX2N and FX series communication protocol.
2. If connecting to a Mitsubishi FX series PLC, use the FX series communication protocol.
3. Some registers of Mitsubishi PLCs are "read only". However, when you write these "read only" registers, the PLCs will not report any communication error to the **HM*i*** and can cause an error condition in the **HM*i***. Care must be taken when editing the PLC program. This error condition can easily occur if you use the FX series protocol when connecting to a FXxN series PLC.
4. If connecting to a Mitsubishi FXxN series PLC, the FX2N protocol is the preferred protocol.

B. Definition of Controller Read/Write Address

Table B-52: Mitsubishi FX/FX2N PLC Registers

Register Type	***Format***	***Read/Write Range***		***Data Length***
		Word No.	***Bit No.***	
Auxiliary Relay	Mn	n: 0 – 3064	N/A	Byte
Special Auxiliary Relay	Mn	n: 8000 – 8248	N/A	Byte
Status Relay	Sn	n: 0 – 992	N/A	Byte
Input Relay	Xn	n: 0 – 360(octal)	N/A	Byte
Output Relay	Yn	n: 0 – 360(octal)	N/A	Byte
Timer PV	Tn	n: 0 – 255	N/A	Word
16-bit Counter PV	Cn	n: 0 – 199	N/A	Word
32-bit Counter PV	Cn	n: 200 – 255	N/A	Double Word
Data Register	Dn	n: 0 – 7999	N/A	Word
Special Data Register	Dn	n: 8000 – 8255	N/A	Word

- Auxiliary Relay/ Special Auxiliary Relay/ Status Relay/ Input Relay /Output Relay: The address must be a multiple of 8.

Table B-53: Mitsubishi FX/FX2N PLC Contacts

Contact Type	***Format***	***Read/Write Range***	
		Word No.	***Bit No.***
Auxiliary Relay	Mn	N/A	n: 0 – 3071
Special Auxiliary Relay	Mn	N/A	n: 8000 – 8255
Status Relay	Sn	N/A	n: 0 – 999
Input Relay	Xn	N/A	n: 0 – 377(octal)
Output Relay	Yn	N/A	n: 0 – 377(octal)
Timer Flag	Tn	N/A	n: 0 – 255
Counter Flag	Cn	N/A	n: 0 – 255

C. Connections (Connector Pinouts)

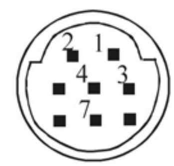
HMi Series *9-pin D-SUB male (RS-422)*	***Controller*** *8-pin Mini DIN male (RS-422)*	***Controller*** *8-pin Mini DIN male (RS-422)*
RXD+ (2)	(7) TXD+	 Top View
RXD- (1)	(4) TXD-	
TXD+ (3)	(2) RXD+	
TXD- (4)	(1) RXD-	
GND (5)	(3) SG	

Figure B-44: Mitsubishi FX/FX2N PLC RS-422 Mini DIN Male Connector Pinout

HMi Series *9-pin D-SUB male (RS-422)*	***Controller*** *25-pin D-SUB male (RS-422)*
Pin 2 (RXD+)	Pin3 (TXD+)
Pin 1 (RXD-)	Pin16 (TXD-)
Pin 4 (TXD-)	Pin 15 (RXD-)
Pin 3 (TXD+)	Pin 2 (RXD+)

Figure B-45: Mitsubishi FX/FX2N PLC RS-422 D-SUB Connector Pinout

Mitsubishi A Series AJ71UC24 Communication Module

A. HM*i factory settings*

Baud rate: 9600, 8, ODD, 1

Controller Station number: 0

Control area/state area: D0 / D10

Note:

1. This driver uses the CheckSum parameter.
2. Set PLC Mode switch to position 5.
3. If the OUTPUT Relay (Y) and Special Data Relay (SM) are set to 1, the PLC will stop communication and will not recover automatically. You will need to reset the PLC.

B. Definition of Controller Read/Write Address

Table B-54: Mitsubishi A Series AJ71UC24 Registers

		Read/Write Range		
Register Type	***Format***	***Word No.***	***Bit No.***	***Data Length***
Input	Xn	n: 0 – 7FF	N/A	Word (multiple of 16)
Output	Yn	n: 0 – 7FF	N/A	Word (multiple of 16)
Link Relay	Bn	n: 0 – FFF	N/A	Word (multiple of 16)
Internal Relay	Mn	n: 0 – 8191	N/A	Word (multiple of 16)
Special Internal Relay	SMn	n: 9000 – 9255	N/A	Word (9000 + multiple of 16)
Latch Relay	Ln	n: 0 – 2047	N/A	Word (multiple of 16)
Annunciator	Fn	n: 0 – 2047	N/A	Word (multiple of 16)
Timer Value	TNn	n: 0 – 999	N/A	Word
Counter Value	CNn	n: 0 – 999	N/A	Word
Data Register	Dn	n: 0 – 8191	N/A	Word
Special Data Register	SDn	n: 9000 – 9255	N/A	Word
File Register	Rn	n: 0 – 8191	N/A	Word
Link Register	Wn	n: 0 – FFF	N/A	Word

Table B-55: Mitsubishi A Series AJ71UC24 Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
Input	Xn	N/A	n: 0 – 7FF
Output	Yn	N/A	n: 0 – 7FF
Link Relay	Bn	N/A	n: 0 – FFF
Internal Relay	Mn	N/A	n: 0 – 8191
Special Internal Relay	SMn	N/A	n: 9000 – 9255
Latch Relay	Ln	N/A	n: 0 – 2047
Annunciator	Fn	N/A	n: 0 – 2047
Timer Contact	TSn	N/A	n: 0 – 999
Timer Coil	TCn	N/A	n: 0 – 999
Counter Contact	CSn	N/A	n: 0 – 999
Counter Coil	CCn	N/A	n: 0 – 999

C. Connections (Connector Pinouts)

HMi* Series** ***9-pin D-SUB male (RS-422)	***Controller*** ***Cable Connector (RS-422)***
RXD+ (2)	SDA
RXD- (1)	SDB
TXD+ (3)	RDA
TXD- (4)	RDB

Figure B-46: Mitsubishi A Series AJ71UC24 RS-422 Connector Pinout

Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1) CPU Port

A. **HM*i*** *factory settings*

Baud rate: 9600, 8, ODD, 1

Controller Station number: 0 (no PLC station number in the protocol for this PLC)

Control area/state area: D0 / D10

Note:

1. This driver supports all Mitsubishi A series CPU ports. The Mitsubishi A series CPU port can be divided into the following five categories by using the CPU code (used during communication):
   - A0J2...
   - A1N...
   - A1S (/ A2S / A2N ...)
   - A3N (/ A1SH / A2SH ...)
   - A2A (/ A2AS / A2USH ...)

   The **HM*i*** can support the A2USH CPU port (same as A2A, A2AS CPU port) and the A1SH CPU port (same as A3N, A2ASH CPU port.
2. L and M: The communication address of L is the same as communication address of M.
3. PX and X:
   In the Mitsubishi A2A PLC, the communication address of PX and X are the same.
   In the Mitsubishi A series PLCs, X is from the odd address and PX is from the even address. This is the only place where the PX and the X differ.
4. X, Y, B, M, SM, L, F, PX ----(Word),
   X, Y, B, M, SM, L, F, PX ----(Bit),
   When the PLC station number is set to 255, only the values of even addresses will be read/written.
   When the PLC station number is set to other number (not 255), all values of all addresses will be read/written.
5. R address: R address will be different according to the size of File Register responded from PLC.

   For example, A2USH: 1K: 3800 – 4000H

   2K: 3000 – 4000H

   3K: 2800 – 4000H

   4K: 2000 – 4000H

   5K: 4000 – 6800H(cy)

   6K: 4000 – 7000H(cy)

   File Register: The PLC must be started correctly or the read / write value will be incorrect.
6. Maximum read/write registers and relays for communication once
   128 Words (256 bytes) Registers
   64 Words (128 bytes) Relays

B. Definition of Controller Read/Write Address

Table B-56: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1) CPU Port Registers

		Read/Write Range		
Register Type	***Format***	***Word No.***	***Bit No.***	***Data Length***
Input	Xn	n: 0 – 7FF	N/A	Word (multiple of 16)
Output	Yn	n: 0 – 7FF	N/A	Word (multiple of 16)
Link Relay	Bn	n: 0 – FFF	N/A	Word (multiple of 16)
Internal Relay	Mn	n: 0 – 8191	N/A	Word (multiple of 16)
Special Internal Relay	SMn	n: 9000 – 9255	N/A	Word (9000 + multiple of 16)
Latch Relay	Ln	n: 0 – 8191	N/A	Word (multiple of 16)
Annunciator	Fn	n: 0 – 2047	N/A	Word (multiple of 16)
Timer Value	TNn	n: 0 – 2047	N/A	Word
Counter Value	CNn	n: 0 – 1023	N/A	Word
Data Register	Dn	n: 0 – 8191	N/A	Word
Special Data Register	SDn	n: 9000 – 9255	N/A	Word
File Register	Rn	n: 0 – 8191	N/A	Word
Link Register	Wn	n: 0 – FFF	N/A	Word
Input Card Register	PXn	n: 0 – 7FF	N/A	Word (multiple of 16)

Table B-57: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1) CPU Port Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
Input	Xn	N/A	n: 0 – 7FF
Output	Yn	N/A	n: 0 – 7FF
Link Relay	Bn	N/A	n: 0 – FFF
Internal Relay	Mn	N/A	n: 0 – 8191
Special Internal Relay	SMn	N/A	n: 9000 – 9255
Latch Relay	Ln	N/A	n: 0 – 2047
Annunciator	Fn	N/A	n: 0 – 2047
Timer Contact	TSn	N/A	n: 0 – 2047
Timer Coil	TCn	N/A	n: 0 – 2047
Counter Contact	CSn	N/A	n: 0 – 1023
Counter Coil	CCn	N/A	n: 0 – 1023
Input Card Register	PXn	N/A	n: 0 – 7FF

C. Connections (Connector Pinouts)

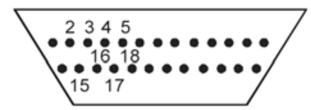
HM*i* Series ***9-pin D-SUB male (RS-422)***	***Controller*** ***25-pin D-SUB male (RS-422)***	***Controller*** ***25-pin D-SUB male (RS-422)***
Pin 2 (RXD+)	Pin 3 SDB (TXD+)	
Pin1 (RXD-)	Pin 16 SDA (TXD-)	
Pin 4 (TXD-)	Pin 15 RDA (RXD-)	
Pin 3 (TXD+)	Pin 2 RDB (RXD+)	
Pin 7 (RTS+)	Pin 4 CTS+	
Pin 8 (CTS+)	Pin 5 RTS+	
Pin 6 (RTS-)	Pin 17 CTS-	
Pin 9 (CTS-)	Pin 18 RTS-	

Figure B-47: Mitsubishi A2A/A2AS/A2USH A1SH/A3N/A2ASH (CPU-S1) CPU Port RS-422 Connector Pinout

Explanation:

How to set File Register (R) for Mitsubishi A serial PLC:

1. Start the MELSOFT series GX Developer.
2. Open the Project Data List windows (View option).
3. Double-click Parameter \ PLC Parameter, and open the Setting window.
4. Set the Memory Capacity \ File Register (0 – 8).
5. Press the End button on the bottom and complete the setting.
6. Execute the OnLine\Write to the PLC.
7. Enable the Parameter \ PLC/Network and the File register \ Main option (check the check box next to “Parameter \ PLC/Network” and “File register \ Main”).
8. Press the Execute button.

Mitsubishi Q Series CPU Port

A. HM*i factory settings*

Baud rate: 19200, 8, ODD, 1

Controller Station number: 0 (no PLC station number in the protocol for this PLC)

Control area/state area: D-0 / D-10

Note:

1. There is no PLC station number in the protocol, therefore only 1 (**HMi**) to 1 (PLC) communication is allowed.
2. If communication baud rate is not correct, the **HMi** will set the PLC baud rate automatically.
3. This driver supports the Mitsubishi Q00 and Q00J series with password protection models.

B. Definition of Controller Read/Write Address

Table B-58: Mitsubishi Q Series CPU Port Registers

		Read/Write Range		
Register Type	***Format***	***Word No.***	***Bit No.***	***Data Length***
Input	X-n	n: 0 – 1FFF	N/A	Word (multiple of 16)
Output	Y-n	n: 0 – 1FFF	N/A	Word (multiple of 16)
Direct Input	DX-n	n: 0 – 1FFF	N/A	Word (multiple of 16)
Direct Output	DY-n	n: 0 – 15	N/A	Word (multiple of 16)
Latch Relay	L-n	n: 0 – 8191	N/A	Word (multiple of 16)
Annunciator	F-n	n: 0 – 2047	N/A	Word (multiple of 16)
Edge Relay	V-n	n: 0 – 2047	N/A	Word (multiple of 16)
Step Relay	S-n	n: 0 – 8191	N/A	Word (multiple of 16)
Link Relay	B-n	n: 0 – 1FFF	N/A	Word (multiple of 16)
Special Link Relay	SB-n	n: 0 – 7FF	N/A	Word (multiple of 16)
Internal Relay	M-n	n: 0 – 8191	N/A	Word (multiple of 16)
Special Internal Relay	SM-n	n: 0 – 2047	N/A	Word (multiple of 16)
Timer Value	TN-n	n: 0 – 2047	N/A	Word
Retentive Timer Value	SN-n	n: 0 – 2047	N/A	Word
Counter Value	CN-n	n: 0 – 1023	N/A	Word
Data Register	D-n	n: 0 – 12287	N/A	Word
Special Data Register	SD-n	n: 0 – 2047	N/A	Word
Index Register	Z-n	n: 0 – 15	N/A	Word
File Register	R-n	n: 0 – 32767	N/A	Word
File Register	ZR-n	n: 0 – 32767	N/A	Word
Link Register	W-n	n: 0 – 1FFF	N/A	Word
Special Link Register	SW-n	n: 0 – 7FF	N/A	Word

- Xn, Yn, DXn, Bn, SBn, Wn, SWn : n is in hexadecimal.

Table B-59: Mitsubishi Q Series CPU Port Registers Contacts

Contact Type	Format	Read/Write Range	
		Word No.	**Bit No.**
Input	X-n	N/A	n: 0 – 1FFF
Output	Y-n	N/A	n: 0 – 1FFF
Direct input	DX-n	N/A	n: 0 – 1FFF
Direct output	DY-n	N/A	n: 0 – 15
Latch Relay	L-n	N/A	n: 0 – 8191
Annunciator	F-n	N/A	n: 0 – 2047
Edge Relay	V-n	N/A	n: 0 – 2047
Step Relay	S-n	N/A	n: 0 – 8191
Link Relay	B-n	N/A	n: 0 – 1FFF
Special Link Relay	SB-n	N/A	n: 0 – 7FF
Internal Relay	M-n	N/A	n: 0 – 8191
Special Internal Relay	SM-n	N/A	n: 0 – 2047
Timer Contact	TS-n	N/A	n: 0 – 2047
Timer Coil	TC-n	N/A	n: 0 – 2047
Retentive timer Contact	SS-n	N/A	n: 0 – 2047
Retentive timer Coil	SC-n	N/A	n: 0 – 2047
Counter Contact	CS-n	N/A	n: 0 – 1023
Counter Coil	CC-n	N/A	n: 0 – 1023

- Xn, Yn, DXn, Bn, SBn : n is in hexadecimal.

C. Connections (Connector Pinouts)

HM*i* ***Series*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***6-pin Mini DIN male (RS-232)***	***Controller*** ***6-pin Mini DIN male (RS-232)***

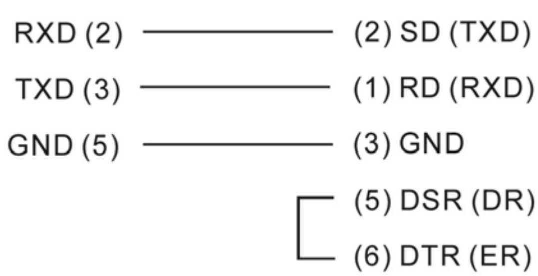


Figure B-48: Mitsubishi Q Series CPU Port Registers RS-232 Connector Pinout

MKS CT150

A. HMi factory settings

Baud rate: 9600, 7, E, 1 (RS-232)

Controller Station number: 11

Control area/state area: None / None

B. Definition of Controller Read/Write Address

Table B-60: MKS CT150 Registers

Register Type	Format	Read/Write Range	
		Word No.	Bit No.
Data In Register	Cn	n: 0 – 25	N/A
Setup Register	Cn	n: 40 – 43 45 – 50 90 – 97	N/A
Error Count	Err_CNT	0	N/A
LV Value	LV_VAL	0	N/A
Printmark Error	PRTMARK_ERR	0	N/A
Batch Counter	BAT_CNT	0	N/A
Waste Counter	WASTE_CNT	0	N/A
Line Speed	LINE_SPD	0	N/A
Actual Cutting Length	ACT_CUT_LEN	0	N/A

Table B-61: MKS CT150 Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
	Cn.b	n: 0 – 50	B: 0 – 15
Reset	RST	N/A	0
Jog Trim+	JOGTRIM_INC	N/A	0
Jog Trim-	JOGTRIM_DEC	N/A	0
Read PI	READ_PI	N/A	0
Activate Data	ACT_DATA	N/A	0
Store Eeprom	STR_EEPROM	N/A	0
Start/Stop	START_STOP	N/A	0
Reset Mark Counter	RSTMARK_CNT	N/A	0

C. Connections (Connector Pinouts)

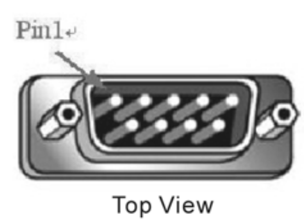
HMi Series 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)	Controller 9-pin D-SUB male (RS-232)
RXD (2)	(3) TXD	
TXD (3)	(2) RXD	
GND (5)	(5) SG	

Figure B-49: MKS CT150 RS-232 Connector Pinout

Modbus (Master) — 984 RTU / ASCII mode

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 1 (ASCII)
9600, 8, EVEN, 1 (RTU)

Controller station number: 0

Control area/state area: W40100 / W40200

B. Definition of Controller Read/Write Address

Table B-62: Modbus (Master) — 984 RTU / ASCII mode Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Output Registers	Wn	n: 40001 – 50000	N/A	Word
Input Registers	Wn	n: 30001 – 40000	N/A	Word

• The Input Registers parameter is read only.

Table B-63: Modbus (Master) — 984 RTU / ASCII mode Contacts

Contact Type	*Format*	*Read/Write Range*	
		Word No.	*Bit No.*
Discrete Outputs	Bn	N/A	n: 1 – 10000
Discrete Inputs	Bn	N/A	n: 10001 – 20000

• The Discrete Inputs parameter is read only.

C. Connections (Connector Pinouts)

See Pin Definition of Serial Communication on page B-1.

Modbus Hexadecimal Address (Master) — RTU / ASCII mode

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 1 (ASCII)
9600, 8, EVEN, 1 (RTU)

Controller station number: 0

Control area/state area: RW-0 / RW-10

Note:

1. The valid communication address starts at 0 and the format is hexadecimal. The valid range is 0 to 65535 (i.e. 0 – FFFF in hexadecimal).
2. Difference in "Standard Modbus" communication (protocol is the same):
   The usage of setting communication address is different.
   The range of communication address is different
   The "Standard Modbus" communication is in decimal format. The starting addresses are 40001, 30001, 1, 10001 and contains 10000 addresses respectively (40001 – 50000, 30001 – 40000, 1 – 10000, 10001 – 20000).
   The Modbus Hexadecimal Address (Master) is in hexadecimal format. The starting addresses are all from 0 and there is an 65536 addressing space (from 0 to FFFF) in each PDU (protocol data unit).

B. Definition of Controller Read/Write Address

Table B-64: Modbus Hexadecimal Address (Master) — RTU / ASCII Mode Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Output Registers	RW-n	n: 0 – FFFF	N/A	Word
Input Registers	R-n	n: 0 – FFFF	N/A	Word

- RW- : Can Read and Write
  Convert the address to decimal format and add 40001. The address becomes the corresponding "Standard Modbus" communication address.
- R- (Input Registers) : Read only
  Convert the address to decimal format and add 30001. The address becomes the corresponding "Standard Modbus" communication address.

Table B-65: Modbus Hexadecimal Address (Master) — RTU / ASCII Mode Contacts

Contact Type	*Format*	*Read/Write Range*	
		Word No.	*Bit No.*
Discrete Outputs	RWB-n	N/A	n: 0 – FFFF
Discrete Inputs	RB-n	N/A	n: 0 – FFFF

- RWB- : Can Read and Write
  Convert the address to decimal format and add 1. The address becomes the corresponding Standard Modbus communication address.
- RB- (Discrete Inputs) : Read only
  Convert the address to decimal format and add 10001. The address becomes the corresponding Standard Modbus communication address.

Note: Only first 10000 addresses can be converted to Standard Modbus communication addresses.

Modbus nW (Master) — RTU / ASCII Mode

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 1 (ASCII)
9600, 8, EVEN, 1 (RTU)

Controller station number: 1

Control area/state area: W40100 / W40200

Note:

1. This driver can read consecutive communication addresses on the screen via one Modbus command. For example, if there are 6 devices on the screen, and the **HMi** reads the data of the addresses W40140, W40141, W40142, W40145, W40146, W40150, the **HMi** will read it three times. The **HMi** will read W40140 3 Words the first time, read W40145 2 Words the second time and read W40150 1 Word on the third time.
2. Check the check box next to the "Optimize" (Optimization for reading) selection in the "Communication" tab in the "Configuration" dialog box in the "Options" menu (Options > Configuration > Communication). If the "Optimize" selection is unchecked, do not select "Data Length Limit".

B. Definition of Controller Read/Write Address

Table B-66: Modbus nW (Master) — RTU / ASCII Mode Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Output Registers	Wn	n: 40001 – 50000	N/A	Word
Input Registers	Wn	n: 30001 – 40000	N/A	Word

- The Input Registers parameter is read only.

Table B-67: Modbus nW (Master) — RTU / ASCII Mode Contacts

Contact Type	*Format*	*Read/Write Range*	
		Word No.	*Bit No.*
Discrete Outputs	Bn	N/A	n: 1 – 10000
Discrete Inputs	Bn	N/A	n: 10001 – 20000

- The Discrete Inputs parameter is read only.

C. Connections (Connector Pinouts)

See Pin Definition of Serial Communication on page B-1.

Modbus (Slave) — 984 RTU / ASCII mode

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 1 (ASCII)
9600, 8, EVEN, 1 (RTU)

Controller station number: 0 (Station number is not used in the protocol)

Control area/state area: W40100 / 40200

Note:

1. The **HM*i*** station number is the Slave station number (the default setting is 0).
2. The relationship between Modbus address and **HM*i*** internal registers is described in the following table:

W40001 ~ W41024	→	$0 ~ $1023	Internal register
W42001 ~ W43024	→	$M0 ~ $M1023	Non-volatile internal register
W44001	→	RCPNO	Receipt number register
W45001 ~ ...	→	RCP0 ~ RCPn	Receipt register
B00001 ~ B01024	→	$2000.0 ~ $2063.15	Internal register (Bit)
B01025 ~ B02048	→	$M200.0 ~ $M263.15	Non-volatile internal register (Bit)

Figure B-50: Modbus (Slave) — 984 RTU / ASCII Mode Modbus Address

B. Definition of Controller Read/Write Address

Table B-68: Modbus (Slave) — 984 RTU / ASCII Mode Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Output Registers	Wn	n: 40001 – 50000	N/A	Word

Table B-69: Contacts

Contact Type	*Format*	*Read/Write Range*	
		Word No.	*Bit No.*
Discrete Outputs	Bn	N/A	n: 1 – 2048

C. Connections (Connector Pinouts)

See Pin Definition of Serial Communication on page B-1.

D. Cross-Reference Table (Inter Memory of HMi and Modbus Reference Address)

Table B-70: Inter Memory Cross-Reference Table

Inter Memory of HMi	*Modbus Reference Address*	*Supporting Modbus Function*	*Address of Function*
$0	40001	03H, 06H, 10H	0000H
$1	40002	03H, 06H, 10H	0001H
. . .			
$1023	41024	03H, 06H, 10H	03FFH

$M0	42001	03H, 06H, 10H	07D0H
$M1	42002	03H, 06H, 10H	07D1H
. . .			
$M1023	43024	03H, 06H, 10H	0BCFH

RCPNO	44001	03H, 06H	0FA0H

RCP0	45001	03H, 06H, 10H	1388H
RCP1	45002	03H, 06H, 10H	1389H
. . .			

$2000.0	00001	01H, 05H, 0FH	0000H
$2000.1	00002	01H, 05H, 0FH	0001H
. . .			
$2000.15	00016	01H, 05H, 0FH	000FH
$2001.0	00017	01H, 05H, 0FH	0010H
. . .			
$2063.0	01009	01H, 05H, 0FH	03F0H
. . .			
$2063.15	01024	01H, 05H, 0FH	03FFH

$M200.0	01025	01H, 05H, 0FH	0400H
$M200.1	01026	01H, 05H, 0FH	0401H
. . .			
$M200.15	01040	01H, 05H, 0FH	040FH
$M201.0	01041	01H, 05H, 0FH	0410H
. . .			
$M263.0	02033	01H, 05H, 0FH	07F0H

Inter Memory of HMi	*Modbus Reference Address*	*Supporting Modbus Function*	*Address of Function*
. . .			
$M263.15	02048	01H, 05H, 0FH	07FFH

For example:

1. Read internal memory $100 of **HMi** (**HMi** station number: 1)
   : 01 03 00 64 00 01 97 CR LF
   Write the value of 1000 into internal memory $100 of **HMi** (**HMi** station number: 1)
   : 01 06 00 64 03 E8 AA CR LF
2. Read internal memory $M100 of **HMi** (**HMi** station number: 1)
   : 01 03 08 34 00 01 BF CR LF
   Write the value of 888 into internal memory $M100 of **HMi** (**HMi** station number: 1)
   : 01 06 08 34 03 78 42 CR LF
3. Read internal memory $2000.15 of **HMi** (**HMi** station number: 1)
   : 01 01 00 0F 00 01 EE CR LF
   Set the internal memory $2000.15 of **HMi** to ON (**HMi** station number: 1)
   : 01 05 00 0F FF 00 EC CR LF
   Set the internal memory $2000.15 of **HMi** to OFF (**HMi** station number: 1)
   : 01 05 00 0F 00 00 EB CR LF
4. Read internal memory $M201.0 of **HMi** (**HMi** station number: 1)
   : 01 01 04 10 00 01 E9 CR LF
   Set the internal memory $M201.0 of **HMi** to ON (**HMi** station number: 1)
   : 01 05 04 10 FF 00 E7 CR LF
   Set the internal memory $M201.0 of **HMi** to OFF (**HMi** station number: 1)
   : 01 05 04 10 00 00 E6 CR LF

Modicon TSX Micro (Uni-Telway)

A. **HM*i*** *factory settings*

Baud rate: 9600, 8, ODD, 1

Controller station number: 2

Control area/state area: %MW0 / %MW10

Note:

1. The **HM*i*** station needs to be adjusted to 1 – 8.
2. The PLC station and the **HM*i*** station can be the same.
3. The internal memory and relative parameters in the PLC must be set correctly, otherwise, it cannot communicate except %S.

B. Definition of Controller Read/Write Address

Table B-71: Modicon TSX Micro (Uni-Telway) Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
WORD_DEVICE_ Internal	%MWn	n: 0 – 65534	N/A	Word
WORD_DEVICE_ System	%SWn	n: 0 – 127	N/A	Word
WORD_DEVICE_ Input	%KWn	n: 0 – 65534	N/A	Word

Note: %KWn is read only.

Table B-72: Modicon TSX Micro (Uni-Telway) Contacts

Contact Type	*Format*	*Word No.*	*Bit No.*
BIT_DEVICE_ Internal	%Mn:b	n:0 – 65534	b:0 – 15
BIT_DEVICE_ System	%Sn	-	n:0 – 127
BIT_DEVICE_ Internal1	%Mn	-	n:0 – 65534

- %Mn: b is the Bit address that corresponds to WORD_DEVICE_ Internal (%MWn).
- %Mn is the PLC internal relay address.
- The read/write range of WORD_DEVICE_ Internal / BIT_DEVICE_ Internal depends on the PLC used memory.

C. Connections (Connector Pinouts)

Note: The RS-232 requires you to use a specific cable of Modicon Uni-Telway. (RS-232) --- TSX PCX 1031

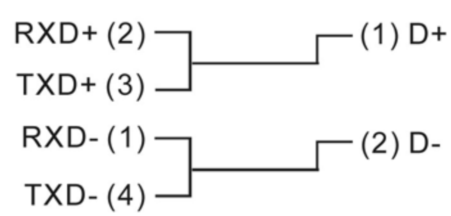
<table>
<tr><th>HMi Series
9-pin D-SUB male (RS-485)</th><th>Controller
8-pin Mini DIN male (RS-485)</th><th>Controller
8-pin Mini DIN male (RS-485)</th></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
</table>

Figure B-51: Modicon TSX Micro (Uni-Telway) RS-485 Connector Pinout

Modicon TWIDO

Functions the same as Modbus (Master) --- 984 RTU on page **B-60**.

NIKKI DENSO NCS-FI/FS Series

A. **HM*i*** *factory settings*

Baud rate: 9600, 8, ODD, 2

Controller station number: 1 (valid station number: 0 – 99)

Control area/state area: None

Note: The valid station number is in the range of 0 to 99. If the station number is out of this range, **HM*i*** *will subtract 100 from the station number until the station number is within the valid range.*

B. Definition of Controller Read/Write Address

Table B-73: NIKKI DENSO NCS-FI/FS Series Registers

Register Type	*Format*	*Word No.*	*Bit No.*	*Data Size*
WORD_DEVICE_ RRegister	RW-n	n: 0 – 3999	N/A	Word
WORD_DEVICE_ RRegister	RW-n	n: 8000 – 9999	N/A	Word
WORD_DEVICE_ DStatus	XW-n	n: 0 – 8	N/A	Word
WORD_DEVICE_ DStatus	DW-n	n: 0 – 129	N/A	Word
WORD_DEVICE_ RRegister	RD-n	n: 0-3999	N/A	Double Word
WORD_DEVICE_ RRegister	RD-n	n: 8000-9999	N/A	Double Word
WORD_DEVICE_ DStatus	DD-n	n: 0-129	N/A	Double Word

Note:

For **HM*i*** to be compatible with this controller, the **HM*i*** provides various types of data:

1. RW-n, RD-n, RB-nb have corresponding relationships (just the data format is different). They all refer to the same address n.
   DW-n, DD-n have corresponding relationships (just the data format is different). They all refer to the same address n.
   XW-n, XB-nb have corresponding relationships (just the data format is different). They all refer to the same address n.

   (In the above format name, the second alphabet character represents the data format: W represents Word, D represents Double Word and B represents Bit)
2. The data size of RW-n and DW-n is defined as Word in the **HM*i*** and each data address is regarded as an individual Word address. The data order uses "Little Endian" architecture which means that the low word of the number is stored in memory at the lowest address, and the high word at the highest address. Intel processors (those used in PCs) use "Little Endian" byte order.

   For example, if you set the starting address as RW900 and the data size is Double Word, the read/write value will be a Double Word which contains RW900 (low word) and RW901(high word).

   In the actual application case, if you set the data size of RW-n, DW-n as Word, there is no data order reverse problem. However, if you set the data size of RW-n, DW-n as Double Word, when the controller uses the "Big Endian" architecture (which means that the high word of the number is stored in memory at the lowest address, and the low word at the highest address, such as Motorola processors and those used in Apple® Mac™-Series computers), a data order reverse problem will occur.
3. The data size of RD-n, DD-n is defined as Double Word in the **HM*i*** and every two data addresses is regarded as an individual Double Word address. The data order used is the "Big Endian" architecture (see above).

For example, if set the starting address as RD900 and the data size is Double Word, the read/write value will be a Double Word which contains RW900(high word) and RW901(low word).

In this case, if you set the data size of RD-n, DD-n as Double Word, there is no data order reverse problem and the data displayed in the **HMi** and in the controller will be the same. However, if you set the data size of RD-n, DD-n as Word, only the low word will display and the high word will be set to 0. For example, if you set the starting address as RD900 and the data size is Word, only the value of RD901(low word) will display. If the write value is 100, the **HMi** will set the value of RD901(high word) to 0 and write the value 100 into RD901(low word).

4. X-nb and DW-n both have a corresponding relationship: Read DW-n, Write X-nb

DW-0	—	X-0b, (b=0–F)
DW-1	—	X-1b, (b=0–F)
DW-2	—	X-2b, (b=0–F)
DW-4	—	X-3b, (b=0–F)
DW-104	—	X-4b, (b=0–F)
DW-105	—	X-5b, (b=0–F)
DW-106	—	X-6b, (b=0–F)
DW-107	—	X-7b, (b=0–F)
DW-108	—	X-8b, (b=0–F)

5. DW-n and DD-n are read only. If you write any value into them, **HMi** displays the error message “Command Can Not be Executed…. ” on the screen.

Table B-74: NIKKI DENSO NCS-FI/FS Series Contacts

Contact Type	*Format*	*Word No.*	*Bit No.*
BIT_DEVICE_ RRegister	RB-nb	n: 0 – 3999	b:0 – F
BIT_DEVICE_ RRegister	RB-nb	n: 8000 – 9999	b:0 – F
BIT_DEVICE_ BitControl	XB-nb	n:0 – 8	b:0 – F

C. Connections (Connector Pinouts)

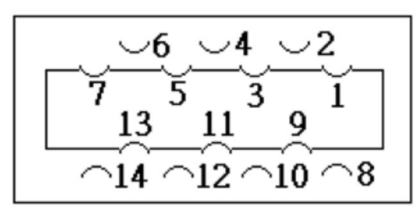
HMi *Series* *9-pin D-SUB male (RS-422)*	*Controller* *14-pin special male (RS-422)*	*Controller* *14-pin special male (RS-422)*
RXD- (1)	(9) TXD (B)	Cable (PLC side (J1), male).
RXD+ (2)	(2) TXD (A)	
TXD+ (3)	(4) RXD (A)	
TXD- (4)	(11) RXD (B)	
GND (5)	(14) GND	Top View

Figure B-52: NIKKI DENSO NCS-FI/FS Series RS-422 Connector Pinout

Omron C Series PLC

A. HM*i* factory settings

Baud rate: 9600, 7, EVEN, 2

Controller station number: 0

Control area/state area: DM0 / DM10

B. Definition of Controller Read/Write Address

Table B-75: Omron C Series PLC Registers

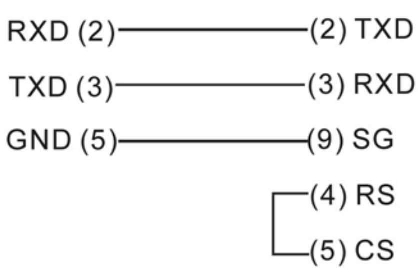
		Read/Write Range		
Register Type	***Format***	***Word No.***	***Bit No.***	***Data Length***
IR area	IRn	n: 0 – 511	N/A	Word
HR area	HRn	n: 0 – 99	N/A	Word
AR area	ARn	n: 0 – 27	N/A	Word
LR area	LRn	n: 0 – 63	N/A	Word
TC area	TCn	n: 0 – 511	N/A	Word
DM area	DMn	n: 0 – 6655	N/A	Word

Table B-76: Omron C Series PLC Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
IR area	IRnb	n: 0 – 511	b: 00 – 15
HR area	HRnb	n: 0 – 99	b: 00 – 15
AR area	ARnb	n: 0 – 27	b: 00 – 15
LR area	LRnb	n: 0 – 63	b: 00 – 15
TC area	TCn	N/A	n: 0 – 511

C. Connections (Connector Pinouts)

HM*i Series* *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*	***Controller*** *9-pin D-SUB male (RS-232)*



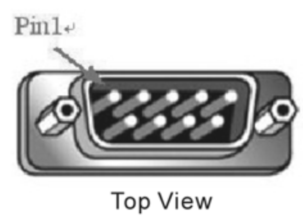


Figure B-53: 1:1 Omron C Series PLC Host Link via RS-232C Converter

Omron CJ1/CS1 Series PLC

A. HM*i factory settings*

Baud rate: 9600, 7, EVEN, 2 (RS-232)

Controller station number: 0

Control area/state area: D0 / D10

Note:

The definition of the Communication Error Message:

1. Word Device:
   The Device Name and Address Value will display. For example, if using CIO, H, A, D, E, T, C, W, EM, IR, DR, TK, **HMi** will display CIOn, Hn, An, Dn, Em.n, Tn, Cn, Wn, EMn, IRn, DRn, TKn respectively, where "n" is the Address Value.
2. Bit Device:
   The Device Name and Word Address Value will display, but the Bit Address Value will not. For example, if using CIO, H, A, D, E, T, C, W, EM, IR, DR, TK, **HMi** will display CIOBn, HBn, ABn, DBn, EBm.n, TBn, CBn, WBn, EMBn, IRBn, DRBn, TKBn respectively, where"n" is the Word Address Value.

B. Definition of Controller Read/Write Address

Table B-77: Omron CJ1/CS1 Series PLC Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
CIO area	CIOn	n: 0 – 9999	N/A	Word
Hold area	Hn	n: 0 – 999	N/A	Word
Auxiliary area	An	n: 0 – 999	N/A	Word
DM area	Dn	n: 0 – 65535	N/A	Word
EM area	Em.n	M: 0 – 12 (bank no.) n: 0 – 65535	N/A	Word
Timer PVs	Tn	n: 0 – 9999	N/A	Word
Counter PVs	Cn	n: 0 – 9999	N/A	Word
Work area	Wn	n: 0 – 999	N/A	Word
EM Current Bank area	EMn	n: 0 – 65535	N/A	Word
Index Register	IRn	n: 0 – 99	N/A	Double Word
DR area	DRn	n: 0 – 99	N/A	Word
TK area	TKn	n: 0 – 1022 (Even No.)	N/A	Byte

- CJ1M Models: An A0-A477 is read only.

Table B-78: Omron CJ1/CS1 Series PLC Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
CIO area	CIOBnbb	n: 0 – 9999	bb: 00 – 15
Hold area	HBnbb	n: 0 – 999	bb: 00 – 15
Auxiliary area	ABnbb	n: 0 – 999	bb: 00 – 15
DM area	DBnbb	n: 0 – 65535	bb: 00 – 15
EM area	EBm.nbb	n: 0 – 65535 m: 0 – 12 (bank no.)	bb: 00 – 15
Timer area	TBn	N/A	n: 0 – 9999
Counter area	CBn	N/A	n: 0 – 9999
Work area	WBnbb	n: 0 – 999	bb: 00 – 15
EM Current Bank area	EMBnbb	n: 0 – 65535	bb: 00 – 15
Index Register	IRBnbb	n: 0 – 99	bb: 00 – 31
DR area	DRBnbb	n: 0 – 99	bb: 00 – 15
TK area	TKBnbb	n: 0 – 1022 (Even No.)	bb: 00 – 15

Note:

1. The following addresses cannot be written:

- IRn and DRn are not valid if you write them. The **HM*i*** will not display any error message if the write operation is done.
- An and Abnbb: Some ranges of An and Abnbb (Auxiliary area) are "read only".
- TKn / TKBnbb / TBn / CBn / EMBnbb / IRBnbb / DRBnbb: Writing to these addresses is not allowed. If the write operation is done, an error will occur and **HM*i*** displays the error message "Command Can Not be Executed…" on the screen of **HM*i***.

2. The unit of IR address is "Double Word".
3. The unit of TK address is "Byte" and it should be even number.

C. Connections (Connector Pinouts)

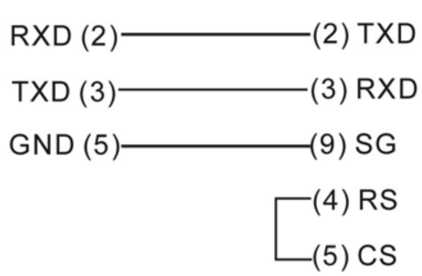
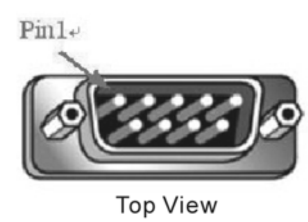
HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***	***Controller*** ***9-pin D-SUB male (RS-232)***
		

Figure B-54: Omron CJ1/CS1 Series PLC CJ1M CPU Module

Siemens S7 200 PLC

A. HMi factory settings

Baud rate: 9600, 8, EVEN, 1

Controller station number: 2

Control area/state area: VW0 / VW10

B. Definition of Controller Read/Write Address

Table B-79: Siemens S7 200 PLC Register

Register Type	Format	Read/Write Range Word No.	Read/Write Range Bit No.
Timer	Tn	n: 0 – 255	N/A
Analog Input Word	AIWn	n: 0 – 30	N/A
Counter	Cn	n: 0 – 255	N/A
Analog Output Word	AQWn	n: 0 – 30	N/A
Input Image	IWn	n: 0 – 14	N/A
Input Image	IDn	n: 0 – 12	N/A
Output Image	QWn	n: 0 – 14	N/A
Output Image	QDn	n: 0 – 12	N/A
Special Bits	SMWn	n: 0 – 199	N/A
Special Bits	SMDn	n: 0 – 197	N/A
Internal Bits	MWn	n: 0 – 98	N/A
Internal Bits	MDn	n: 0 – 96	N/A
Data Area	VWn (DBWn)	n: 0 – 9998 (n: 0 – 9998)	N/A
Data Area	VDn	n: 0 – 9996	N/A
Special S	SWn	n: 0 – 99	N/A
Special S	SDn	n: 0 – 97	N/A

Table B-80: Siemens S7 200 PLC Contacts

Contact Type	Format	Read/Write Range Word No.	Read/Write Range Bit No.
Timer Bit	Tn	N/A	n: 0 – 255
Counter Bit	Cn	N/A	n: 0 – 255
Input Image	In.b	n: 0 – 15	b: 0 – 7
Output Image	Qn.b	n: 0 – 15	b: 0 – 7
Special Bit	SMn.b	n: 0 – 200	b: 0 – 7
Internal Bit	Mn.b	n: 0 – 99	b: 0 – 7
Data Area Bit	Vn.b	n: 0 – 9999	b: 0 – 7
Special S Bit	Sn.b	n: 0 – 100	b: 0 – 7

C. Connections (Connector Pinouts)

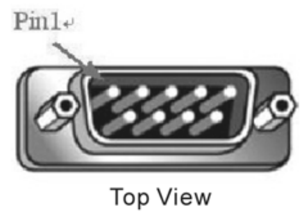
HM*i Series* *9-pin D-SUB male (RS-232)*	***Controller* *9-pin D-SUB male (RS-232)***	***Controller* *9-pin D-SUB male (RS-232)***
RXD (2) TXD (3) GND (5)	(2) RD (3) TD (5) GND	

Figure B-55: Siemens S7 200 PLC via RS-232 / PPI Multi-Master Cable

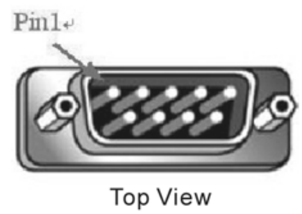
HM*i Series* *9-pin D-SUB male (RS-485)*	***Controller* *9-pin D-SUB male (RS-485)***	***Controller* *9-pin D-SUB male (RS-485)***
RXD+ (2) TXD+ (3) RXD- (1) TXD- (4) GND (5)	(3)TXD/RXD+ (8)TXD/RXD- (5)SG	

Figure B-56: Siemens S7 200 PLC via PLC Program Port (RS-485)

Siemens S7 300 PLC (with PC Adapter)

A. HM*i factory settings*

Baud rate: 38400, 8, ODD, 1 (RS-232)

Controller station number: 2

If the communication is via the PC adapter, the PLC station is not used. Therefore, only 1 (**HM*i***) to 1 (PLC) communication is allowed.

Control area/state area: DBW0 / DBW20

Note:

1. The PLC DB memory (DBm.DBWn, DBm.DBDn, DBm.DBXn.b) must be open so that **HM*i*** can read/write.
2. The reason for using the PC adapter:

   When communicating via the PC adapter, the baud rate is 187.5 K baud on the PLC side. The network structure is faster and more dependable.

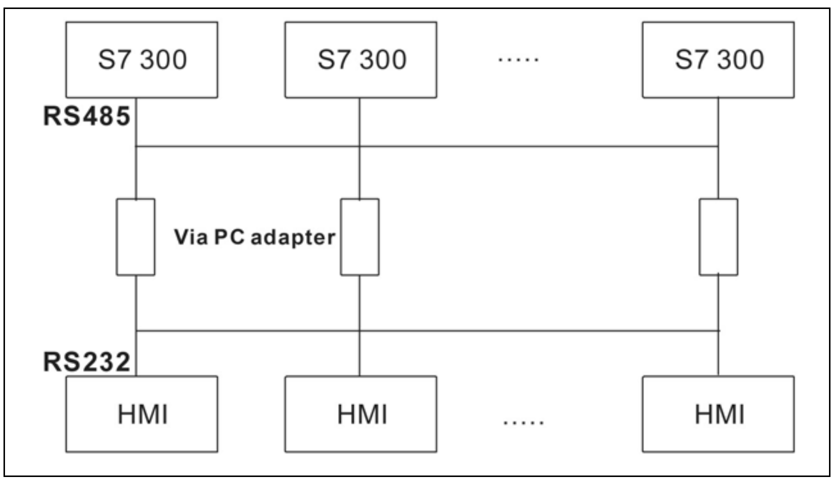


Figure B-57: Network Communication Structure

   Connecting the **HM*i*** with the Siemens S7 300 PLC without the PC adapter is not recommended as efficient and network structure of S7 300 is compromised. See *Siemens S7 300 PLC (without PC Adapter) on page B-78* for information.
3. Baud rate setting:

- Set the PLC baud rate to 187.5 K or higher (**HM*i*** cannot use 19.2K).
- When using the PC adapter, set the baud rate of both sides:
  a. The "PLC side" needs to be set to the same baud rate as PLC side (set the PLC baud rate to 187.5 K and higher as **HM*i*** cannot use 19.2K).
  b. The "**HM*i*** side" can use 38.4K or 19.2K by using the switch on the cable (you only have these two choices).
  c. The **HM*i*** baud rate needs to set the same as the baud rate of **HM*i*** side of PC adapter (38.4K or 19.2K) (protocol setting is still 8, ODD, 1).
  d. There is no setting for PLC station and **HM*i*** station.
  e. PC Adapter: The power LED will be lit when **HM*i*** is connected to PLC (power supply of PC adapter is from PLC). If communication is OK, the communication LED will blink, otherwise, it will be off.

B. Definition of Controller Read/Write Address

Table B-81: Siemens S7 300 PLC (with PC Adapter) Register

Register Type	Format	Read/Write Range	
		Word No.	***Bit No.***
Input Image	IWn	n: 0 – 65534	N/A
Input Image	IDn	n: 0 – 65532	N/A
Output Image	QWn	n: 0 – 65534	N/A
Output Image	QDn	n: 0 – 65532	N/A
Internal Bits	MWn	n: 0 – 65534	N/A
Internal Bits	MDn	n: 0 – 65532	N/A
Data Area	DBm.DBWn	n: 0 – 65534	m: 1 – 255
	DBm.DBDn	n: 0 – 65532	m: 1 – 255
Data Area (DB10)	DBWn	n: 0 – 65534	N/A
	DBDn	n: 0 – 65532	N/A
	VWn	n: 0 – 65534	N/A
Timer Counter	VDn Tn Cn	n: 0 – 65532 n: 0-65535 n: 0-65535	N/A N/A N/A

Note: The valid number of digits for the value of the T(Timer) and C(Counter) is 3-digits. If you enter a number that exceeds 3 digits, only the first 3 digits are valid (decimal format). The other digits of the value for the T(Timer) will be replaced as 0 and the other digits of the value for the C(Counter) will be abandoned. For example, if you enter the value "12345", the actual write value for the T(Timer) will be "12300" and the actual write value for the C(Counter) will be "123"

Table B-82: Siemens S7 300 PLC (with PC Adapter) Contacts

Contact Type	Format	Read/Write Range	
		Word No.	***Bit No.***
Input Image	In.b	n: 0 – 65535	b: 0 – 7
Output Image	Qn.b	n: 0 – 65535	b: 0 – 7
Internal Bit	Mn.b	n: 0 – 65535	b: 0 – 7
Data Area Bit	DBm.DBXn.b	n: 0 – 65535	b: 0 – 7 m = 1 – 255
Data Area Bit (10 DB)	DBXn.b	n: 0 – 65535	b: 0 – 7
	Vn.b	n: 0 – 65535	b: 0 – 7

Note:

1. For all contacts when performing "Multiple Duplicate" function:

- If the parameter exceeds 65535, it will be read as 0.
- If it is less than 0, it will be read as 655XX.

January 2007

C. Connections (Connector Pinouts)

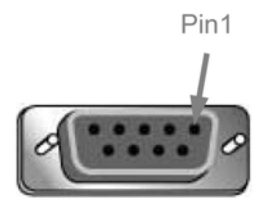
HMi ***Series*** ***9-pin D-SUB male***	***Controller*** ***9-pin D-SUB female***	***Controller***
RXD (2)	(3) TXD	
TXD (3)	(2) RXD	
GND (5)	(5) GND	
RTS (7)	(8) CTS	
CTS (8)	(7) RTS	

Figure B-58: Siemens S7 300 PLC (with PC Adapter) RS-232 Connector Pinout

Siemens S7 300 PLC (without PC Adapter)

A. HM*i factory settings*

Baud rate: 19200, 8, EVEN, 1 (RS-485)

Controller station number: 2

Control area/state area: DBW0 / DBW20

Note:

1. Only 1 (**HMi**) to 1 (PLC) communication is allowed.
2. The PLC baud rate should be changed to 19200 (8, EVEN, 1).
3. In order to read/write to the following addresses, DB addresses must be enabled. (The related addresses are: DB.DBW, DB.DBW, DBW, DBD, VW, VD, DB, DBX, DBX, V)
4. The **HMi** station must be set to 0 – 15. If it is out of this range, the **HMi** station will be changed to 15 automatically. The PLC station number must be set to 0 – 15.
5. The communication cable is the same as the S7 200 series (RS-485).
6. If the **HMi** is not connected to communication cable after 5 seconds, **HMi** will display an error message on the screen. To reconnect using the communication cable, you will need to cycle power on the **HMi** again and the communication can be re-established.
7. After power is connected to the **HMi**, the **HMi** handshakes with the PLC before the connection is established. The initial connection will take extra time for the handshake. In normal conditions, the connection should be made within 5 seconds.
8. This protocol is a multi-step and recurrent communication protocol (**HMi** needs to communicate with PLC back and forth to complete one command). This causes the communication speed of the S7 300 PLC (without the PC adapter) to be slower than that of the other controllers. It is recommended to use the PC Adapter when connecting to a Siemens S7 300 PLC.

B. Definition of Controller Read/Write Address

Table B-83: Siemens S7 300 PLC (without PC Adapter) Register

		Read/Write Range	
Register Type	***Format***	***Word No.***	***Bit No.***
Input Image	IWn	n: 0 – 65534	N/A
Input Image	IDn	n: 0 – 65532	N/A
Output Image	QWn	n: 0 – 65534	N/A
Output Image	QDn	n: 0 – 65532	N/A
Internal Bits	MWn	n: 0 – 65534	N/A
Internal Bits	MDn	n: 0 – 65532	N/A
Data Area	DBm.DBWn DBm.DBDn	n: 0 – 65534 n: 0 – 65532	m: 1 – 255 (Note 1) m: 1 – 255 (Note 1)
Data Area (DB10)	DBWn DBDn VWn VDn	n: 0 – 65534 n: 0 – 65532 n: 0 – 65534 n: 0 – 65532	N/A N/A N/A N/A
Timer	Tn	n: 0 – 65535	N/A
Counter	Cn	n: 0 – 65535	N/A

Note:

1. High Byte of Bit No.

- The required number of digits for the value of the T(Timer) and C(Counter) is 3 digits. If you enter a number that exceeds 3 digits, only the first 3 digits are valid (decimal format). The other digits of the value for the T(Timer) will be replaced as 0 and the other digits of the value for the C(Counter) will be abandoned. For example, if you enter the value "12345", the actual write value for the T(Timer) will be "12300" and the actual write value for the C(Counter) will be "123".

Table B-84: Siemens S7 300 PLC (without PC Adapter) Contacts

		Read/Write Range	
Contact Type	***Format***	***Word No.***	***Bit No.***
Input Image	In.b	n: 0 – 65535	b: 0 – 7 (Note 2)
Output Image	Qn.b	n: 0 – 65535	b: 0 – 7 (Note 2)
Internal Bit	Mn.b	n: 0 – 65535	b: 0 – 7 (Note 2)
Data Area Bit	DBm.DBXn.b	n: 0 – 65535	b: 0 – 7 (Note 2) m = 1 – 255 (Note 3)
Data Area Bit (DB 10)	DBXn.b Vn.b	n: 0 – 65535 n: 0 – 65535	b: 0 – 7 (Note 2) b: 0 – 7 (Note 2)

Note:

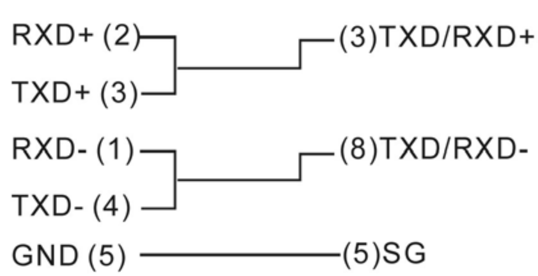
1. Low Byte of Bit No.
2. High Byte of Bit No.
3. For all timers, counters and contacts when performing "Multiple Duplicate" function:

- If the range exceeds 65535 when increasing, it will be read as 0.
- If it is less than 0, it will be read as 655XX.

C. Connections (Connector Pinouts)

The communication cable is the same as the S7 200 series (RS-485). *See Siemens S7 200 PLC on page B-73.*

HM*i* Series ***9-pin D-SUB male (RS-485)***	***Controller*** ***9-pin D-SUB male (RS-485)***	***Controller*** ***9-pin D-SUB male (RS-485)***



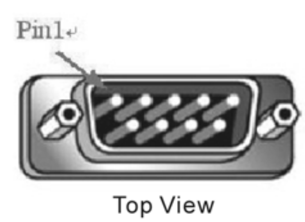


Figure B-59: Siemens S7 300 PLC (without PC Adapter) RS-485 Connector Pinout via PLC MPI Port

Taian TP02 PLC

A. HMi factory settings

Baud rate: 19200, 7, None, 1

Controller station number: 1

Control area/state area: V1 / V10

B. Definition of Controller Read/Write Address

Table B-85: Taian TP02 PLC Registers

Register Type	Format	Read/Write Range		Data Length
		Word No.	Bit No.	
WORD_DEVICE_X	Xn	n: 1 – 384	N/A	Word
WORD_DEVICE_Y	Yn	n: 1 – 384	N/A	Word
WORD_DEVICE_C	Cn	n: 1 – 2048	N/A	Word
WORD_DEVICE_V	Vn	n: 1 – 1024	N/A	Word
WORD_DEVICE_D	Dn	n: 1 – 2048	N/A	Word
WORD_DEVICE_WS	WSn	n: 1 – 128	N/A	Word
WORD_DEVICE_WC	WCn	n: 1 – 912	N/A	Word

- WORD_DEVICE_X / WORD_DEVICE_Y / WORD_DEVICE_C: The address must be 1 or a multiple of 16+1.

Table B-86: Taian TP02 PLC Contacts

Contact Type	Format	Read/Write Range	
		Word No.	Bit No.
BIT_DEVICE_X	Xn	N/A	n: 1 – 384
BIT_DEVICE_Y	Yn	N/A	n: 1 – 384
BIT_DEVICE_C	Cn	N/A	n: 1 – 2048
BIT_DEVICE_SC	SCn	N/A	n: 1 – 128

- BIT_DEVICE_SC: Only 1 Bit can be transferred for each read command.

C. Connections (Connector Pinouts)

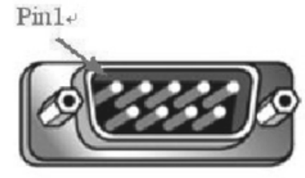
HM*i* Series ***9-pin D-SUB male (RS-422)***	***Controller*** ***9-pin D-SUB male (RS-422)***	***Controller*** ***9-pin D-SUB male (RS-422)***
RXD+ (2)	(3) TXD+	
RXD- (1)	(8) TXD-	
TXD+ (3)	(2) RXD+	
TXD- (4)	(7) RXD-	

Figure B-60: Taian TP02 PLC RS-422 Connector Pinout

HM*i* Series ***9-pin D-SUB male (RS-232)***	***Controller*** ***RS-485 (T/R+, T/R-)***
RXD+ (2) TXD+ (3)	T/R+
RXD- (1) TXD- (4)	T/R-

Figure B-61: Taian TP02 PLC RS-485 Connection

Vigor M Series

A. HMi factory settings

Baud rate: 19200, 7, EVEN, 1

Controller station number: 0

Control area/state area: D0 / D10

Note:

1. Controller station number: 0 for PROGRAMMER PORT; 1 for COM PORT.
2. The VB series also can use this driver.

B. Definition of Controller Read/Write Address

Table B-87: Vigor M Series Registers

Register Type	*Format*	*Read/Write Range*		*Data Length*
		Word No.	*Bit No.*	
Input Relay	Xn	n: 0 – 770 (Octal)	N/A	Word (multiple of 8)
Output Relay	Yn	n: 0 – 770 (Octal)	N/A	Word (multiple of 8)
Auxiliary Relay	Mn	n: 0 – 5112	N/A	Word (multiple of 8)
Special Relay	Mn	n: 9000 – 9248	N/A	Word (9000 + multiple of 8)
Step Relay	Sn	n: 0 – 992	N/A	Word (multiple of 8)
Timer Present Value	Tn	n: 0 – 255	N/A	Word
16-bit Counter Present Value	Cn	n: 0 – 199	N/A	Word
32-bit Counter Present Value	Cn	n: 200 – 255	N/A	Word
Data Register	Dn	n: 0 – 8191	N/A	Word
Special Data Register	Dn	n: 9000 – 9248	N/A	Word

Table B-88: Vigor M Series Contacts

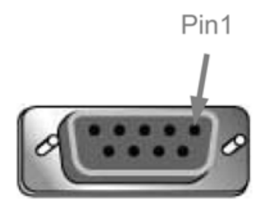
Contact Type	*Format*	*Read/Write range*	
		Word No.	*Bit No.*
Input Relay	Xn	N/A	n: 0 – 777(Octal)
Output Relay	Yn	N/A	n: 0 – 777(Octal)
Auxiliary Relay	Mn	N/A	n: 0 – 5119
Special Relay	Mn	N/A	n: 9000 – 9255
Step Relay	Sn	N/A	n: 0 – 999
Timer Contact	Tn	N/A	n: 0 – 255
Counter Contact	Cn	N/A	n: 0 – 255
Timer Coil	TCn	N/A	n: 0 – 255
Counter Coil	CCn	N/A	n: 0 – 255

C. Connections (Connector Pinouts)

<table>
<tr><th>HMi Series
9-pin D-SUB male (RS-232)</th><th>Controller
USB TAPE A Connector</th><th>Controller
USB TAPE A Connector</th></tr>
<tr><td colspan="2">RXD (2) ——— (3) TXD
TXD (3) ——— (2) RXD
GND (5) ——— (4) GND</td><td>

Top View</td></tr>
</table>

Figure B-62: Vigor M Series RS-232 Programmer Port

<table>
<tr><th>HMi Series
9-pin D-SUB male (RS-232)</th><th>Controller
9-pin D-SUB female (RS-232)</th><th>Controller
9-pin D-SUB female (RS-232)</th></tr>
<tr><td colspan="2">RXD (2) ——— (3) TXD
TXD (3) ——— (2) RXD
GND (5) ——— (5) GND</td><td>

Top View</td></tr>
</table>

Figure B-63: Vigor M Series RS-232 Com Port

Yokogawa ACE PLC

*A. **HMi** factory settings*

Baud rate: 9600, 8, EVEN, 1 (ASCII code)

Controller station number: 1

CPU NO. : 1.

Control area/state area: D1 / D10

Note:

1. The CheckSum and End characters (CR, LF) are not used during communication. Therefore, the controller should be set to “Not using CheckSum and End character”.
2. The CPU number is set in the **HMi** as the station number. To set the CPU number, set the **HMi** station number in the “General” tab in the ”Configuration” dialog box of the “Options” menu (Options > Configuration > General). The default setting of the **HMi** station number is regarded as the CPU number. The default setting of **HMi** station number is 0 and must be changed to a legal value.

B. Definition of Controller Read/Write Address

Table B-89: Yokogawa ACE PLC Registers

Register Type	*Format*	*Word No.*	*Data Size*
WORD_DEVICE_X	Xn	n: 201 – 65464	Word
WORD_DEVICE_Y	Yn	n: 201 – 65464	Word
WORD_DEVICE_I	In	n: 1 – 16384	Word
WORD_DEVICE_E	En	n: 1 – 4096	Word
WORD_DEVICE_L	Ln	n: 1 – 65488	Word
WORD_DEVICE_M	Mn	n: 1 – 9984	Word
WORD_DEVICE_TP	TPn	n: 1 – 3072	Word
WORD_DEVICE_CP	CPn	n: 1 – 3072	Word
WORD_DEVICE_D	Dn	n: 1 – 8192	Word
WORD_DEVICE_B	Bn	n: 1 – 32768	Word
WORD_DEVICE_W	Wn	n: 1 – 65499	Word
WORD_DEVICE_Z	Zn	n: 1 – 512	Word
WORD_DEVICE_V	Vn	n: 1 – 64	Word
WORD_DEVICE_R	Rn	n: 1 – 4096	Word
WORD_DEVICE_TS	TSn	n: 1 – 3072	Word
WORD_DEVICE_CS	CSn	n: 1 – 3072	Word

- WORD_DEVICE_X / WORD_DEVICE_Y: The last two digits of the address must be 1 or a multiple of 16+1 and less than 65.
- WORD_DEVICE_I / WORD_DEVICE_E / WORD_DEVICE_L / WORD_DEVICE_M: The address must be 1 or a multiple of 16+1.
- WORD_DEVICE_X / WORD_DEVICE_Y / WORD_DEVICE_L / WORD_DEVICE_W: The valid address is not consecutive.

Table B-90: Yokogawa ACE PLC Contacts

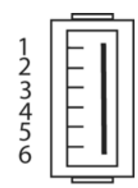
Contact Type	*Format*	*Bit No.*
BIT_DEVICE_X	Xn	n: 201 – 65464
BIT_DEVICE_Y	Yn	n: 201 – 65464
BIT_DEVICE_I	In	n: 1 – 16384
BIT_DEVICE_E	En	n: 1 – 4096
BIT_DEVICE_L	Ln	n: 1 – 65488
BIT_DEVICE_M	Mn	n: 1 – 9984
BIT_DEVICE_TU	TUn	n: 1 – 3072
BIT_DEVICE_CU	CUn	n: 1 – 3072

- BIT_DEVICE_X / BIT_DEVICE_Y : The last two digits of address must be less than 65 (1 – 64).
- BIT_DEVICE_X / BIT _DEVICE_Y / BIT _DEVICE_L : The valid address is not consecutive.
- Multiple Duplicate:
  The next Bit address of X264 is X301 (invalid addresses X265 – X300 are skipped)
  The next Bit address of X364 is X401.
  The address of Y is the same as X.
  (The Word addresses of X and Y are also auto skip invalid addresses)

C. Connections (Connector Pinouts)

The connector needs to use specific cable of YOKOGAWA ACE PLC.

HMi *Series 9-pin D-SUB male (RS-232)*	*Controller (6-pin) (RS-232 for YOKOGAWA)*	*Controller (6-pin) (RS-232 for YOKOGAWA)*
RXD (2)	(1) TXD	
TXD (3)	(2) RXD	
GND (5)	(5) GND	



Top View

Figure B-64: Yokogawa ACE PLC RS-232 Connector Pinout

Company Information

Eaton's electrical business is a global leader in electrical control, power distribution, and industrial automation products and services. Through advanced product development, world-class manufacturing methods, and global engineering services and support, Eaton's electrical business provides customer-driven solutions under brand names such as Cutler-Hammer®, Powerware®, Durant®, Heinemann®, Holec® and MEM®, which globally serve the changing needs of the industrial, utility, light commercial, residential, and OEM markets. For more information, visit **www.EatonElectrical.com**.

Eaton Corporation is a diversified industrial manufacturer with 2005 sales of $11.1 billion. Eaton is a global leader in electrical systems and components for power quality, distribution and control; fluid power systems and services for industrial, mobile and aircraft equipment; intelligent truck drivetrain systems for safety and fuel economy; and automotive engine air management systems, powertrain solutions and specialty controls for performance, fuel economy and safety. Eaton has 60,000 employees and sells products to customers in more than 125 countries. For more information, visit **www.eaton.com**.

Eaton Electrical Inc.
1000 Cherrington Parkway
Moon Township, PA 15108-4312
USA
tel: 1-800-525-2000
www.EatonElectrical.com

Printed in USA
Publication No. MN04802014E
January 2007