

PROGRAMMABLE LOGIC CONTROLLER

MODEL

ALPHA2

QUICK START MANUAL



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1. INTRODUCTION

The Alpha2 Series Controllers provides supervisory control for use in the home, office, factory, or wherever you need it. The Alpha2 Series Controllers offers flexible I/O control for varied applications including:

- Automation of lights, air-conditioning, or watering systems
- The opening and shutting of gates
- Easy security systems
- Domestic animal and pet food distribution systems
- Control of stockyards and greenhouses

However, the Alpha2 Series Controllers is not designed to be used in the following applications:

- Applications where high reliabilities such as nuclear power control, railway facilities, airline facilities, vehicles, combustion equipment and medical equipment are required.
- Applications in life critical situations

1.1 AVAILABLE MODELS

Model No	AL2-10MR-A	AL2-10MR-D	AL2-14MR-A	AL2-14MR-D	AL2-24MR-A	AL2-24MR-D
Power Supply	100-240V AC~	24VDC	100-240V AC~	24VDC	100-240V AC~	24VDC
Input Type	100 - 240V AC~	24VDC Sink/ Source	100 - 240V AC~	24VDC Sink/ Source	100 - 240V AC~	24VDC Sink/ Source
No. Inputs	6	6	8	8	15	15
Output Type	Relay					
No. Outputs	4	4	6	6	9	9
Dimensions mm (in)	71.2 x 90 x 52 (2.8 x 3.54 x 2.05)		124.6 x 90 x 52 (4.91 x 3.54 x 2.05)			
Weight kg (lbs)	0.21 (0.47)	0.20 (0.44)	0.30 (0.66)		0.35 (0.77)	0.30 (0.66)

1.2 CAUTION

CAUTION: Persons trained in the local and national electrical standards must perform all tasks associated with wiring the Alpha2 Series Controller.

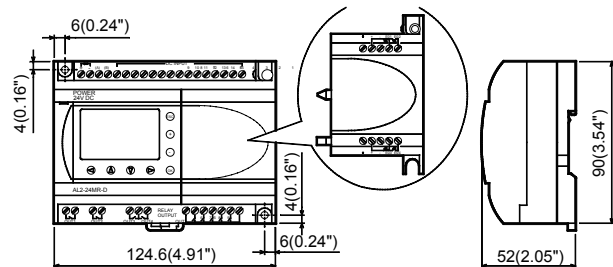
- Disconnect all terminals from power supply before removing the cover.
- Turn off the power before performing any wiring operations.
- Input and output cables should not be run through the same multicore cable or share the same wire.
- Input and output cable length must be less than 30m (98' 5").
- The wire should be used a single cable, used a crimp terminal, or carefully twist stranded wires together. Do not connect a soldered wire end to the Alpha2 Series Controller.
- To avoid damaging the wire, tighten to a torque of 0.5 - 0.6 N•m.
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.
- The connectors must be covered to prevent contact with "live" wires.
- The Alpha2 Series Controller must be installed in distribution box or a control cabinet.
- Leave a minimum of 10mm of space for ventilation between the top and bottom edges of the Alpha2 Series Controller and the enclosure walls.

- The Alpha2 Series is not designed to be used in life critical or fail safe applications.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- Please read this entire manual for further information.

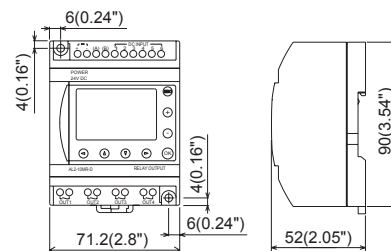
2. DIMENSIONS

Unit of Measure: mm (inch)

AL2-14MR-_, AL2-24MR-_



AL2-10MR-_

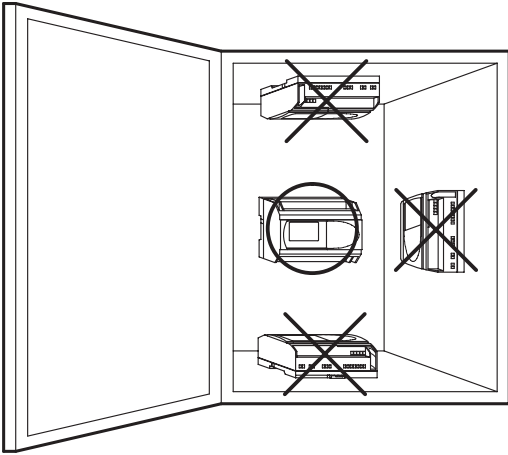


3 INSTALLATION

■ MOUNTING NOTES

The Alpha2 Series' safe design means the user can install it almost anywhere but please take the following points into consideration.

- Do not install in areas with excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration. Do not place in water or let water leak onto the controller.
- Do not allow debris to fall inside the unit during installation.
- Keep as far as possible from high-voltage cables and power equipment.
- The Alpha2 Series Controller must be installed in a distribution box or a control cabinet.

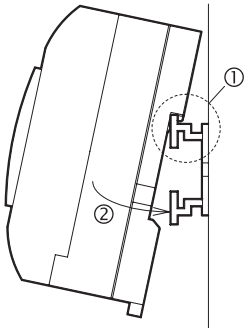


- Use size M4 screws when mounting by screw holes.
- The connectors must be covered to prevent injury from contact with “live” wires.
- Leave a minimum of 10mm of space for ventilation between the top and bottom edges of the Alpha2 Series Controller and the enclosure walls.
- Do not disassemble the Alpha2 Series controller.

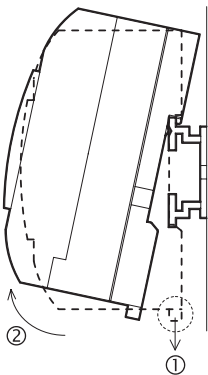
■ DIN RAIL MOUNTING OF MAIN UNIT

Units can be snap mounted to 35mm DIN rail (DIN EN 50022). To release pull the spring loaded clips away from the rail and slide the unit off and up.

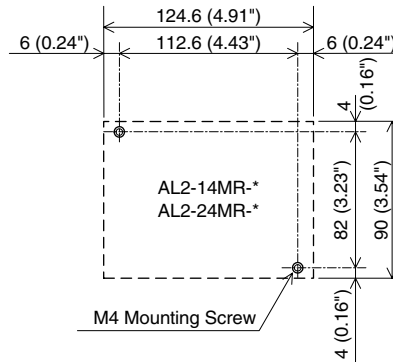
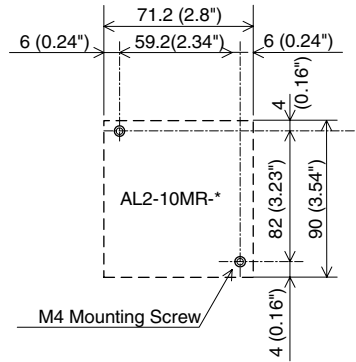
INSTALL: Align the upper side of the Alpha2 DIN rail mounting groove with the DIN rail (#1) and push it onto the rail (#2).



REMOVE: Pull the DIN rail hook (#1) and remove the Alpha2 series main unit (#2).



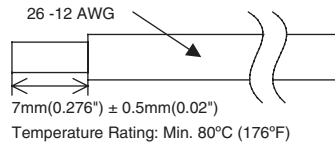
■ DIRECT MOUNTING OF MAIN UNIT



Note: The Alpha2 Series controller must be used with either the communication cable or connector cover installed. Otherwise, the exposed socket can cause damage to the controller or an electric shock to the operator.

4. WIRING DIAGRAMS

■ END PROCESSING OF CABLE

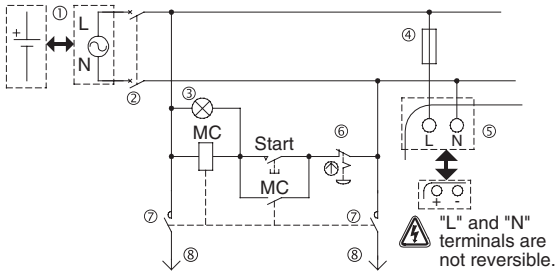


Wire the inputs and outputs using 26 - 12 AWG wire (0.13 mm² - 3.31 mm²). To avoid damaging the wire, tighten to a torque of 0.5 - 0.6 N•m.

Stranded cable: Remove sheath, twist core wires, then connect cable (or use a crimp terminal).

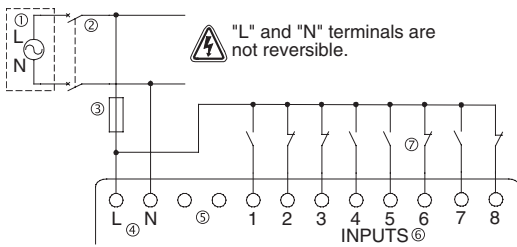
Single cable: Remove sheath, then connect cable.

■ RECOMMENDED POWER WIRING DIAGRAM



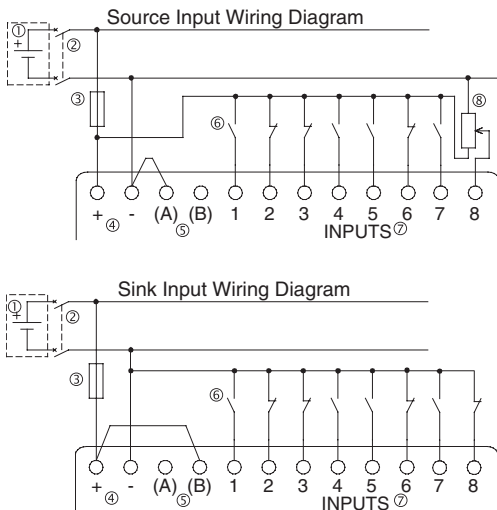
1. Power Supply
2. Circuit Isolation Device
3. Power On Pilot Indicator
4. Circuit Protection Device - Limit to 1.0A
5. Alpha2 Main Unit
6. Emergency Stop
7. Magnetic Switch Contact
8. Power Supply for Loads

■ AL2-__MR-A INPUT WIRING



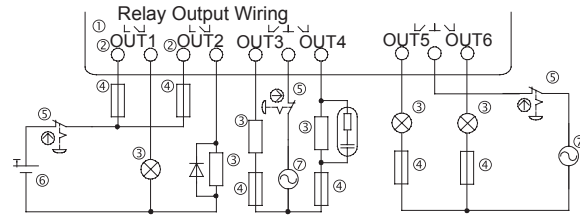
1. AC Power Supply, 100 - 240V AC~ 50/60 Hz
2. Circuit Isolation Device
3. Circuit Protection Device - Limit to 1.0A
4. AC Power Terminals
5. Unused Terminals
6. Input Terminals
7. Digital Input Switches

■ AL2-__MR-D (SINK/SOURCE) INPUT WIRING



1. DC Power Supply, 24V DC
2. Circuit Isolation Device
3. Circuit Protection Device - Limit to 1.0A
4. DC Power Terminals
5. Sink/Source Input Wiring Terminals
6. Sensor Input Switches
7. Input Terminals
8. Analog Input (DC Source input only)

■ AL2-__MR- OUTPUT WIRING



1. Alpha2 Main Unit
2. Mutually exclusive outputs
3. Output Devices
4. Circuit Protection Device - See Table below to determine fuse size
5. Emergency Stop
6. DC Power Supply
7. AC Power Supply

■ CIRCUIT PROTECTION (FUSE)

Circuit Voltage	Relay Circuit Protection (Fuse)	
	AL2-10MR-_, AL2-24MR- (O01 - O04) AL2-14MR- (O01 - O06)	AL2-24MR- (O05 - O09)
5VDC	10A / Circuit	3A / Circuit
12VDC		
24VDC		
100VAC~		
240VAC~		

5. SPECIFICATIONS

POWER REQUIREMENTS AND INPUT SPECIFICATIONS

Item	Description	
Power Supply	AL2-__MR-A: 100 - 240 VAC~, +10% -15%, 50/60 Hz AL2-__MR-D: 24VDC, +20% -15%	
Max. Momentary Power Failure	AL2-__MR-A: 10ms AL2-__MR-D: 5ms	
In-Rush Current	AL2-__MR-A: ≤ 6.5A (3.5A), 240VAC~ (120VAC~) AL2-__MR-D: ≤ 7.0A, 24VDC	
Fuse	Rating AL2-__MR-A: 250V 1A AL2-24MR-D: 250V 500mA AL2-14MR-D: 250V 500mA AL2-10MR-D: 250V 1A	
Typical Power Consumption	AL2-10MR-A, 240VAC~	I/O all On - 3.5 W; I/O all Off - 1.85 W
	AL2-10MR-A, 120VAC~	I/O all On - 3.0 W; I/O all Off - 1.55 W
	AL2-10MR-D, 24VDC	I/O all On - 2.5 W; I/O all Off - 0.75 W
	AL2-14MR-A, 240VAC~	I/O all On - 4.5 W; I/O all Off - 2.0 W
	AL2-14MR-A, 120VAC~	I/O all On - 3.5 W; I/O all Off - 1.5 W
	AL2-14MR-D, 24VDC	I/O all On - 4.0 W; I/O all Off - 1.0 W
	AL2-24MR-A, 240VAC~	I/O all On - 5.5 W; I/O all Off - 2.5 W
	AL2-24MR-A, 120VAC~	I/O all On - 4.5 W; I/O all Off - 2.0 W
AL2-24MR-D, 24VDC	I/O all On - 5.0 W; I/O all Off - 1.0 W	

INPUT SPECIFICATIONS

Description	AL2-__MR-A (AC Inputs)	AL2-__MR-D (DC Inputs)	
		Source Type	Sink Type
Input Voltage	100 - 240V AC~, +10 -15%, 50/60 Hz	24V DC, +20% -15%	
Input Current AL2-10MR-__	I01 - I06	0.13mA, 120 VAC~ 0.25mA, 240 VAC~	6.0mA, 24VDC
Input Current AL2-14MR-__ AL2-24MR-__	I01 - I08	0.15mA, 120V AC~ 0.29mA, 240 VAC~	5.5mA, 24VDC
	I09 - I15		
Input Impedance	≥ 800kΩ	-	
Off → On / On → Off	I01 - I15	≥ 80V / ≤ 40V	≥ 18V / ≤ 4V ≤ 4V / ≥18V
Response Time	35-85ms, 120 VAC~ 25-130ms, 240VAC~	10 - 20ms	
Isolation Circuit	None	None	

ANALOG INPUT SPECIFICATIONS (AL2-**MR-D, SOURCE TYPE ONLY)

Description	Analog Input Specification
Number of Analog Input	AL2-10MR-D: 6 (I01 - I06) AL2-14MR-D, AL2-24MR-D: 8 (I01 - I08)
Input Voltage	0 - 10V DC
Analog Input Range	0 - 500 (10000/500 mV)
Conversion Speed	8ms
Input Impedance	142kΩ ± 5%
Overall Accuracy	± 5%, 0.5VDC
Temperature Drift	± 3 LSB

GENERAL SPECIFICATIONS

Description	Specifications
Operating Temperature	(-25) - 55°C / (-13) - 131°F, Displayed: (-10) - 55°C / 14 - 131°F
Storage Temperature	(-30) - 70°C / (-22) - 158°F
Humidity	35 - 85% relative humidity, no condensation
Device and RTC Backup	20 days (25°C / 77°F) by capacitor
RTC Accuracy	5 s / day (25°C / 77°F)
Noise Immunity	1000 Vpp, 1 μs, 30 - 100Hz, tested by noise simulator
Dielectric Withstand Voltage	3750V AC~ > 1 min per EN60730-1 between the following points: Power/Input Terminals and Relay Output Terminals Relay Output Terminal and Relay Output Terminal All Terminals and the DIN 43880 Control box or equivalent
Insulation Resistance	7 MΩ, 500VDC per EN60730-1 between the following points: Power/Input Terminals and Relay Output Terminals; Relay Output Terminal and Relay Output Terminal; All Terminals and the DIN 43880 Control box or equivalent
Vibration Resistance - Direct Mounting	Conforms to IEC 68-2-6; 10-57 Hz: 0.15 mm Constant Amplitude 57-150 Hz: 19.6 m/s ² Acceleration Sweep Count for X, Y, Z: 10 times (80 minutes in each direction)
Vibration Resistance - DIN Rail Mounting	Conforms to IEC 68-2-6; 10-57 Hz: 0.075 mm Constant Amplitude 57-150 Hz: 9.8 m/s ² Acceleration Sweep Count for X, Y, Z: 10 times (80 minutes in each direction)
Shock Resistance	Conforms to IEC 68-2-27: 147m/s ² Acceleration, Action Time: 11 ms 3 times in each direction X, Y, Z
Type of Action	EN60730-1, Section 6.4.3 - Type 1C (Relay Output)
Software Class	EN60730-1, Section H6.18 - Class A
Purpose of Control	EN60730-1, Section 2.2 - Electrical Control
Construction of Control	EN60730-1, Section 6.15 - Incorporated Control
Whether the Control is Electric	EN60730-1, Section H2.5.7 - Electronic Control
Safety Class	II
Protection	IP20
Temperature for the Ball Pressure Test	75°C (167°F)
Pollution Degree	2
Operation Ambiance	To be free of corrosive gases. Dust should be minimal
Electrical Isolation	Reinforced primary / secondary insulation
Grounding	None
EC Directive: EMC	EN61131-2:2007; EN60730-1:2011
EC Directive: LVD	EN61131-2:2007; EN60730-1:2011
Certification of UL/cUL	File number: E95239

OUTPUT SPECIFICATIONS

Description	Relay Specification	
Switched Voltage	250VAC~ or less, 30VDC or less	
Max. Resistive Load	AL2-10MR-__ (O01 - O04)	8A/COM
	AL2-14MR-__ (O01 - O06)	
	AL2-24MR-__ (O01 - O04)	2A/point (4A/COM)
	AL2-24MR-__ (O05 - O09)	
Contact Life Cycle / Resistance Load	AL2-10MR-__ (O01 - O04)	100,000 Cycles at 8 Amps / 240VAC~ or 24VDC
	AL2-14MR-__ (O01 - O06)	
	AL2-24MR-__ (O01 - O04)	100,000 Cycles at 2 Amps / 240VAC~ or 24VDC
	AL2-24MR-__ (O05 - O09)	
Minimum Load	50mW (10mA at 5VDC)	
Max. Inductive Load	AL2-10MR-__ (O01 - O04)	249 VA (1/3 hp) / 125VAC~, 373 VA (1/2 hp) / 250VAC~
	AL2-14MR-__ (O01 - O06)	
	AL2-24MR-__ (O01 - O04)	93 VA (1/8 hp) / 125VAC~, 93 VA (1/8 hp) / 250VAC~
	AL2-24MR-__ (O05 - O09)	
Response Time	≤ 10 ms	
Operation Indication	Liquid Crystal Display	
Isolation Circuit	By Relay	

6. SYSTEM MENU

6.1 MENU OPTIONS INSTRUCTIONS

There are Systems Menus to help guide the user through the options available in the Alpha2. The Top Menu has a Run Mode that is accessed while the Alpha2 is in operation or a Stop Mode that is accessed when the Alpha2 is idle.

The Edit Menu and the Function Block Edit Menu can be accessed when in either ProgEdit or Monitor. These menus can be used to create and/or change programs steps or values.

Use the “OK” key to enter a programming option or to enter data into memory. Set all the data on the screen before using the “OK” key to write the data to the system memory. The “ESC” key will move the screen back to a higher menu option. It will cancel any data input that has not been accepted with the “OK” key.

6.2 THE STOP MODE

6.2.1 TOP MENU

When the Alpha2 is first turned On, the Input/Output Image Table will appear. Press the “OK” and “ESC” keys simultaneously to move to the TopMenu. (If the TopMenu cannot be accessed the Menu Key has been set to “Not Use”).

- **RUN** Places the controller in Run mode.
- **PARAMETER** Provides a simple method to edit Time Switches (TSm), Short Message Receive (SMRm) and Call Detect (CDm) from the Top Menu.
- **PROGEDIT** Allows program editing/creation on the display using the front panel keys. The current memory will be overwritten as changes are made to the program. Programs can be saved in the AL-PCS software.
- **CLOCKSET** Set the Real Time Clock or input a daily clock adjustment.
- **LANGUAGE** Choose from 7 onscreen languages: English, German, French, Italian, Spanish, Swedish, or Russian.
- **OTHERS...**
 - ▶ **VERSION** Displays CPU Version of the Alpha2 Series Controller.
 - ▶ **SCAN TIME** Monitor the Current, Maximum, or Minimum program scan times. Upon controller reset current, Maximum and Minimum values for scan times are reset to 0.
 - ▶ **PASSWORD** Restrict entry to the ProgEdit and Monitor mode with a four digit password.
 - ▶ **DISPPASS** Set up to three Passwords for Display function blocks.
 - ▶ **MENU KEY** Two settings are possible, “Not Use” or “OK + ESC”: “Not Use” is designed so that unauthorized people cannot access the Alpha2 Top Menu in Run mode. If the “OK + ESC” key setting is selected, simultaneously depress the “OK” and the “ESC” keys to access the Top Menu.
 - ▶ **SUMMERTIME** Choose the preferred daylight savings time: Cancel, Manual On, Date Type, UK type, US type, or EU type.
 - ▶ **SERIAL COM** Choose the type of communication to be used for the right hand side serial communication port - Not Use, Modem, GSM or Other Com.
 - ▶ **LIGHT TIME** Set the backlight off delay time.
 - ▶ **PROGCLEAR** Completely clears the system memory including Password protected programs

6.3 THE RUN MODE TOP MENU

When the Alpha2 program is running, the LCD defaults to the Image Table screen. According to the Menu Key setting, proceed to the Stop Mode of the Top Menu by using the “OK” and the “ESC” keys or reset the controller by powering down.

- **STOP** Takes the Alpha2 out of Run mode.
- **SETUP TS** Provides a simple method to edit Time Switches from the Top Menu.
- **MONITOR** Monitor the program settings while in the Run mode and perform limited editing to FB parameters. The existing programming steps cannot be modified.

TOP MENU is not Displayed in Run Mode The menu key should be operated to access the Top Menu. Push the keys “OK” and “ESC” at the same time.

CAUTION: Perform the forced stop operation only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately. If proper precautions are not taken, damage to the equipment or machine failure may occur.

■ FORCED STOP OPERATION

1. Turn the Alpha2 series power supply off.
2. Turn the power ON again while pushing the “OK” and “ESC” keys simultaneously. The option to place the controller in Stop mode will be available for approximately five seconds. Press the “OK” key to enter the Stop Mode. If no key is pressed, the controller will default back into the Run mode.
3. Press “ESC” key. The “Run Mode Top Menu” is displayed

6.4 THE EDIT MENU

The Edit Menu can be entered when the Alpha2 is in the ProgEdit or Monitor main programming screen. If entering options or connecting FBs, these procedures have to be finished or canceled before the Edit Menu can be entered. Press the “ESC” key at any place in the main programming screen to enter the Edit Menu.

- **PROGSIZE** Shows the numbers of FBs used and percentage of program memory used.
- **JUMP** Leads to a screen that shows available places to go in the program. “M” - system bits; “I” - system Inputs; “O” - System Outputs; “K” - Keys (1-8); “E” - ASi Inputs; “A” - ASi Outputs; “N” - Control bits; “EI” - External Board inputs; “EO” - External Board outputs; and “B” - Function Blocks existing in the program. Choose the desired block with the arrow keys and press the “OK” key to jump to that spot in the program.
- **NEW FB** Create a new Function Block from one of the available FBs.
- **EXIT** Exits to the Top Menu.
- **MNEMONIC** Gives a mnemonic display of the current programming rung. Enter the programming mode by pressing the “OK” key or return to the Edit Menu using the “ESC” key. (Not available in Monitor Mode).

6.5 THE FUNCTION BLOCK EDIT MENU

The **Function Block Edit Menu** can be entered only while in the ProgEdit or Monitor mode. Move to the Function Block to edit and press the “OK” key when the Function Block number is flashing.

- **SETUP FB** Set variables in the Function Blocks for your application.
- **CHANGE NO** Change the Function Block Number
- **DELETE FB** Delete Selected Function Block

6.6 OPTION SCREEN SETUP

Various options have been provided for ease of use or for safety purposes. All of the options in this section can be accessed from either the Run or the Stop Menu.

6.6.1 CHANGE THE LANGUAGE SETTING

1. Turn the Alpha2 On.
2. Press the "OK" and "ESC" buttons simultaneously to go to the TopMenu or reset the controller.
3. Scroll to the "LANGUAGE" option and press the "OK" key. The TopMenu entry "LANGUAGE" is common for all languages.
4. Scroll to the desired language and press the "OK" key. The languages available are English, German, French, Italian, Spanish, Swedish, and Russian
5. Use the "ESC" key to exit to the Topmenu.

6.6.2 ClockSET

■ TO SET THE CLOCK

1. From the TopMenu, scroll to "ClockSet" and press the "OK" key.
2. From the options that appear, choose "ClockSet" and press the "OK" key.
3. Use the arrow keys to move to an area that needs to be changed.
4. Adjust with the "+" or "-" keys.
5. Repeat steps 3-4 until ALL changes have been completed.
6. Press the "OK" key to accept all the changes or the "ESC" to discards the changes.
7. Press the "ESC" key to return to the Top Menu.

■ TO SET THE DAILY CORRECTION

1. From the TopMenu, scroll to "ClockSet" and press the "OK" key.
2. From the options that appear, choose "Correct" and press the "OK" key.
3. Set the daily correction time with the "+" or "-" keys.
4. Press the "OK" key to accept the value and press the "ESC" key to return to the Top Menu.

CAUTION: When setting the Real Time Clock or inputting a daily clock adjustment please change the mode to Stop.

NOTE: The date setting can be displayed as yyyy/mm/dd, dd/mm/yyyy, or mm/dd/yyyy by manipulating the "+" and "-" keys.

6.6.3 PASSWORD

The password consists of four digits and will prohibit entry into the ProgEdit, Monitor, Disp Pass and Serial Com modes only. All other menu options can be accessed when a Password is used.

■ TO ENTER A PASSWORD

1. Select "Others..." Menu Option.
2. Select "Password" from the "Others..." Menu Options

3. Use the "+" and "-" keys to enter the desired password.
4. Press the "OK" key to accept and activate the password.
5. A key symbol will now be displayed at the top of the Alpha2 display.

■ TO CANCEL A PASSWORD

1. Select the "Others..." Menu Option.
2. Select "Password" from the "Other" Menu Options. "Cancel Password" should appear on the top of the screen.
3. Use the "+" and "-" keys to enter the current password.
4. Press the "OK" key to accept and deactivate the password.
5. The key symbol will be removed from the Alpha2 display.

NOTE: The Password can also be set/deleted from the AL-PCS software or deleted by the "PROGCLEAR" command

6.7 BLOCK ITEMS

Each block item contains an individual diagram that shows the block number, available number of input pins, the output pin if applicable, and the block mnemonic. Connections between blocks can be viewed at the pin locations when connected blocks are shown individually on the LCD.

6.7.1 Input Blocks

The Input Blocks consist of System Inputs (I01 - I15), Key Inputs (K01-K08), System Bits (M01-M24) or Link Inputs (E01 - E04). The input number is shown in the top right hand corner, the type of input in the lower right hand corner, and the output pin is shown on the far right of the block. Input Blocks provide information to the Function Blocks or Outputs.

6.7.2 Function Blocks

The individual Function Blocks are described in detail in Chapter 9. The number and block mnemonic are shown in the top right and bottom right locations respectively.

6.7.3 Output Blocks

Output Blocks have one input and one output pin. They only have the capacity for one input signal through the input pin. The Output Block number and Mnemonic are shown in the top right and lower right hand corner of the diagram respectively.

6.7.4 Connected Blocks

Blocks that are connected can be shown simultaneously onscreen. The block providing the output signal will be shown on the left of the screen. The input pin accepting the signal will flash. Any input pin that is already connected will be shown as a solid triangle.

7. DIRECT PROGRAMMING

The Alpha2 can be programmed using the front panel keys on the Alpha2 series controller. The following sections will describe how to connect/disconnect function blocks, set program parameters, add Function Blocks, and move around within the program.

The ProgEdit mode in the Stop Menu has full programming capability.

The Monitor mode in the Run Menu has the capability to manipulate Function Block values and settings but cannot edit, change, or delete the existing programk.

7.1 BLOCK AVAILABILITY

- The number of System Inputs and Outputs is determined by the type of controller being programmed. Configurations include 6 In/4 Out, 8 In/6 Out and 15 In/9 Out.
- Up to 200 Function Blocks can be used in a program or 5000 bytes of memory. The Function Blocks must be added in the course of programming.
- The 8 Keys and the 24 system M bits are automatically available for every program.
- Inputs, Outputs, System Memory Bits, Extended Inputs, Extended Outputs, AS-i Outputs, Control Bits, and Keys do not count in the Function Block total.

7.2 CONNECTING BLOCKS

- Any block that has an output pin can be connected to any block that has an (unused) input pin.
- System Inputs, Keys, and Memory M bits have output pins only.
- Function Blocks and Outputs both contain input and output pins (the Display and TimeSwitch Blocks are exceptions).
- Blocks can be connected beginning with an output pin, from “left to right” on the display, or beginning with an input pin, from “right to left” on the display.

7.2.1 To connect the blocks from the left to right

1. Select the block providing the data to be output and move to the right until the output pin is flashing. Press the “+” button to “add” a block.
2. Choices will appear on the right side of the screen that include System Outputs (if available), existing Function Blocks that have free input pins, and the option to add a new function block (AddFB, see section 7.4.2). Scroll to the preferred option and select using the “OK” key.
3. The block accepting the signal will display as many of its input pins as possible. Pins that have been used will show as filled triangles; pins that are open will show as “>” signs. A “Connect” prompt will appear on-screen. The current input choice will flash. Scroll to the desired pin and press the “OK” key to accept. The process is complete.

7.2.2 To connect the blocks from the right to left

1. Select the block that will be receiving the signal and move left until an input pin is flashing. Scroll to the desired unused input pin (“>”). Press the “+” key to begin the connection process.
2. Because output pins may have multiple connections, all the Keys, Function Blocks, System Inputs, Outputs will show on the left of the screen as well as an option to “AddFB”. Scroll to the preferred option and Press the “OK” key.
3. The chosen connection will be flashing on-screen along with the “Connect” prompt. Press the “OK” key to accept.

7.3 DISCONNECT TWO BLOCKS

1. Move to the connection that is to be disconnected.
2. Enter “-” as the disconnect command.
3. A “Disconnect” prompt will appear on-screen. Press the “OK” key to accept the disconnect

7.4 METHODS TO CREATE A FUNCTION BLOCK

7.4.1 New FB

To use the New FB option, proceed to the Edit Menu (Chapter 6.4) using the “ESC” key. Scroll to the New FB option and press the “OK” key. Scroll to the desired Function Block and press the “OK” key to create a New FB. The block will appear on the Function Block Diagram board.

7.4.2 AddFB

When connecting a Function Block, scroll to the AddFB prompt and press the “OK” key. This invokes the Function Block list. Scroll to the desired Function Block and choose by pressing the “OK” key. The Function Block will be shown on the screen with the connecting block.

7.5 FUNCTION BLOCK EDITING

7.5.1 Setup Function Block

Each Function Block has its own individual parameters outlined in Chapter 9. The Function Blocks might have multiple data screens that can be altered. As with other menu options, the “ESC” key will move the screen back to a higher menu option without changing the option parameters for that screen. If there are multiple data screens in an option, enter the required data and accept each screen using the “OK” key. Use the “ESC” key to exit the Function Block.

7.5.2 Change No. of a Function Block

The current FB number is shown on-screen when the option is selected. Scroll up or down with the “+” or “-” keys to find an open FB number. Press the “OK” key to accept the new number.

7.5.3 Delete FB

This menu option will Delete the current Function Block. After the Delete FB is chosen, confirm the delete operation with “OK” or use the “ESC” key to cancel the function. All connections to the Function Block will be removed with the block.

7.6 MOVEMENT BETWEEN FUNCTION BLOCKS

7.6.1 Movement Between Unconnected Blocks

Movement between System Inputs, System Outputs, Keys, and M bits can be accomplished with the “+” and “-” keys. When the block number is flashing on-screen, press the “+” or “-” key to scroll through the block numbers. The scroll will go through to the next block after reaching the highest or lowest number for that block.

7.6.2 Movement Between Connected Blocks

The arrow keys are used to move between connected blocks.

7.6.3 The Jump Command

- The “ESC” key can be used to enter the Edit Menu at any time when a function block is displayed on the LCD screen. (The “ESC” key will cancel in-process commands first. Keep pressing the “ESC” key until the Edit Menu is displayed).
- From the Edit Menu, select the Jump Command. Choose any system Memory Bit, Input, Output, Key, AS-i Input, AS-i Output, Extended Input, Extended Output, or existing Function Block by using the front panel keys.
- Press “OK” to “Jump” to the chosen block in the programming mode.

7.7 USING KEYS AS INPUTS

The keys on the controller can be used as Manual Inputs. The programmed Key(s) will give an output signal for as long as the key is depressed.

7.8 THE MONITOR MODE

Function Block values and Output status can be manipulated from the Monitor option. When placed in the Run mode, the Alpha2 defaults back to the I/O status screen. Press the "ESC and OK" keys together to enter the Top Menu and then enter Monitor. The program will now be displayed on-screen.

7.8.1 Monitor/Update Function Block Values

- Move to the function block to monitor and enter Setup FB. The Function Block Values can be updated and monitored.
- Changes to current values will be valid only while in Monitor Mode.
- Changes to Set point data and the comparison values will be written to the system memory.

7.8.2 Forcing Outputs ON/OFF

Outputs can be forced ON/OFF if there is no direct conflict with the program. To force an Output On, proceed to the Output name and number and press the "OK" key. A solid rectangle will appear underneath the block number to signify that the block is ON. Input pins will have a smaller solid block next to their arrow to show that they are activated.

Type	Symbol	Forcing Condition
Input	I	1
	EI	1
	E	2
Output	O	2
	EO	2
	A	2
Key	K	3
System Bit	M	3
Control Bit	N	2
Function Block	B	3

1. It is possible to force ON/OFF, however, the status is decided by hardware control.
2. It is possible to force ON/OFF, however, the status is decided by programming control.
3. It is possible to force ON/OFF. Only some FB, however, the status is decided by programming control.

Note: It is not possible to Add or Delete Function Blocks while in the Monitor mode.

8. PROGRAMMING USING AL-PCS

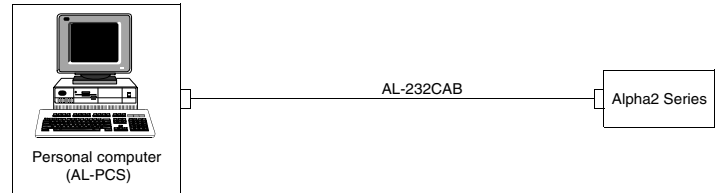
8.1 OUTLINE

The software package AL-PCS is a programming tool designed to be used with the Alpha Series Simple Application Controllers (Alpha2 series). The AL-runs on Microsoft® Windows® 95, Windows® 98, Windows® Me, WindowsNT® Workstation 4.0, Windows® 2000, Windows® XP, Windows Vista® and Windows® 7 (hereafter referred to collectively as Windows®). The software has been designed to be both powerful and user friendly. While many of the software features can be

learned intuitively, a detailed help file has been incorporated into the software to assist users in finding answers to their questions.

8.2 SYSTEM CONFIGURATION

■ DIRECT CONNECT WITH AL-PCS



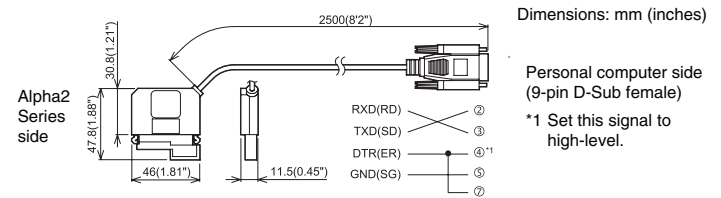
■ AL-232CAB

The AL-232CAB is an RS-232C cable used to connect an Alpha2 series controller and a personal computer that is running the programming software (AL-PCS).

NOTE: AL-232CAB cable cannot be used for any other applications.

AL-232CAB cable rises about 40mm (1.57") above the top panel when connecting to an Alpha2 series controller.

EXTERNAL DIMENSIONS

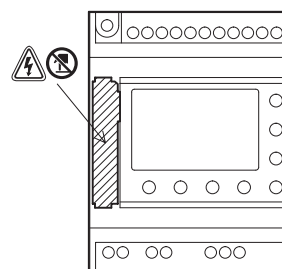


■ CONNECTED TO AL-232CAB CABLE

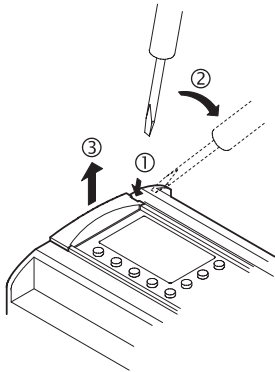
Remove cover. Be careful of personal safety when removing the Alpha2 cover.

CAUTION: Turn off the power supply when you install or detach the AL-232CAB cable.

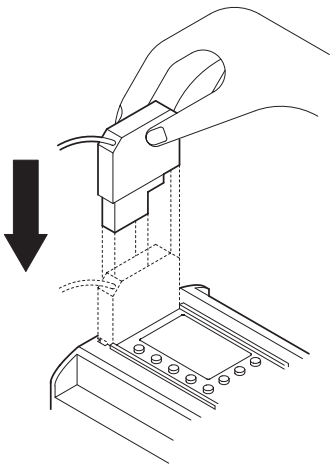
- Install the cover after removing the AL-232CAB cable.
- When installing the connector cover of Alpha2 series, be careful not to pinch your finger.
- Please hold the protective case when detaching the cable. DO NOT pull on the cord.
- DO NOT touch the following part when removing the cover or this cable.



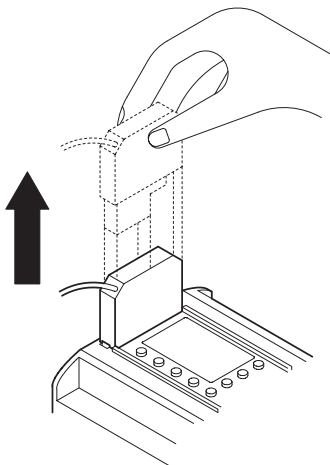
Removing the cover



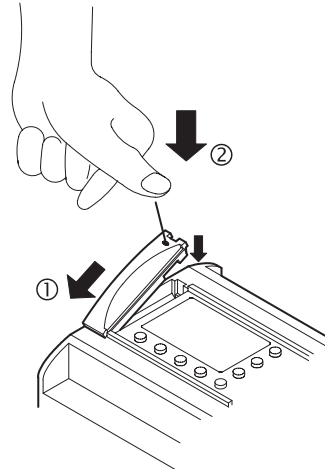
Connecting the AL-232CAB cable



Removing the AL-232CAB cable



Installing the cover



8.3 INSTALLING AND STARTING AL-PCS

This section describes how to install the AL-PCS programming software package and to connect the Alpha2 Series Controller to the Personal Computer. The Operation System requirements are outlined and the equipment necessary to make all proper connections are detailed.

8.3.1 System Requirements

The AL-PCS is designed to be installed on a computer that meets or exceeds the following specifications. Please check whether your personal computer meets these requirements prior to the software installation.

Personal Computer Requirements

Item	Description
Operating System	Microsoft® Windows® 95, Windows® 98, Windows® Me, WindowsNT® workstation 4.0, Windows® 2000, Windows® XP*2, Windows Vista® *2 and Windows® 7 *2
CPU *1	Pentium 133 MHz or more (recommended)
Hard Disk	10 MB of free capacity
Memory *1	32 MB or more (recommended)
CD-ROM Drive	Required for Setup
Pointing Device	Mouse or other pointing device
Display *1	SVGA (800 x 600) 256 colors or more (recommended)
RS-232C Serial Interface	1 port or more The RS-232C serial interface must be assigned to a COM port (COM1 to COM10)

1. Take care that the used computer meets or exceeds the CPU, memory and display specifications outlined by the OS.
2. Only the 32 bit version of this operating system is supported.

8.3.2 Installing AL-PCS

Note that this software cannot be run from the install CD. It must be installed onto hard-drive and subsequently run from the drive.

To install AL-PCS:

1. Restart Windows®, and do not start-up any other applications.
2. Insert the SW0D5C-ALVLS-E CD into CD-ROM drive.
3. Execute "setup.exe."
4. During the SW0D5-ALVLS-E Setup dialog box, click "NEXT" whenever ready thus proceeding to the next panel.

- If the destination folder need to be changed for the AL-PCS component files, click “Browse;” and use the browser to locate the appropriate destination.
- Click “NEXT;”
- If the Program folders need to be changed for the AL-PCS, enter the program folder name. Note: When using on Windows Vista® and Windows® 7, If the destination folder changes to an arbitrary folder (user created), it is not necessary to start the program via “Run as Administrator.” For starting AL-PCS refer to section 8.4.
- Click “NEXT” to begin the installation. When the process is complete, a message will follow indicating the successful installation of the AL-PCS software.
- Select “Yes, I want to restart my computer now;” and Click “Finish” to restart your computer.

8.4 STARTING AL-PCS

This software cannot be run from the install CD. It must be installed onto hard-drive and subsequently run the software from the drive.

■ TO START AL-PCS:

Click the “Start” menu, choose “Program” → “Mitsubishi Alpha Controller”, and click the name of the program you want to start.

NOTE: “All Programs” appears in Windows® XP, Windows Vista® and Windows® 7. It is possible to also double-click a program icon (shortcut) to begin start-up.

CAUTION: Starting AL-PCS on Windows Vista® and Windows® 7.

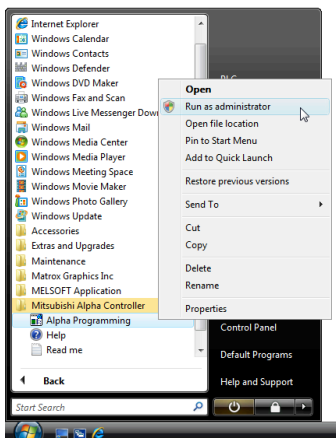
When starting on Windows Vista® and Windows® 7, AL-PCS must be started by following method.

- If it starts by other methods, AL-PCS does not operate correctly.
- Run AL-PCS as an administrator**
When starting by the Start menu and program icon (shortcut), it starts by “Run as Administrator” in the menu of a right-click. (Refer to the section below on “How to run AL-PCS as an administrator”).
- Installation to the arbitrary folder (user created)**
The installation destination of AL-PCS is installed in the arbitrary folder (user created). The starting method is the same as Windows® XP.

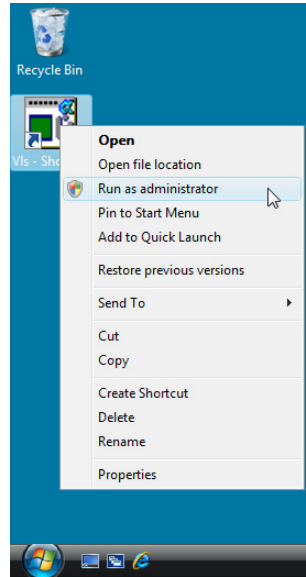
■ HOW TO RUN AL-PCS AS AN ADMINISTRATOR

When starting through the Start menu or through a program icon (shortcut), right-click on the program icon or menu item and select “Run as Administrator.”

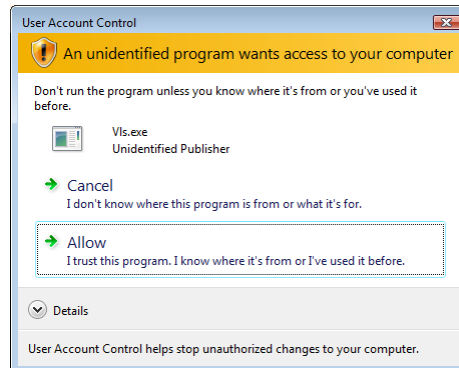
START MENU



SHORTCUT

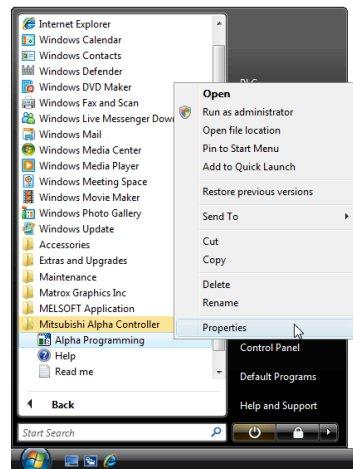


NOTE: When user account control is enabled in Windows Vista® and Windows® 7 the following dialog box appears when starting. Click “Allow.”

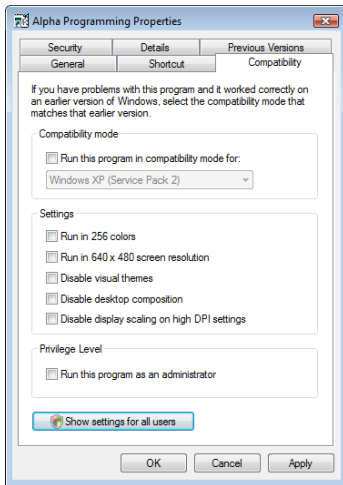


NOTE: With Windows Vista® and Windows® 7, all users can run AL-PCS as an administrator by the following method.

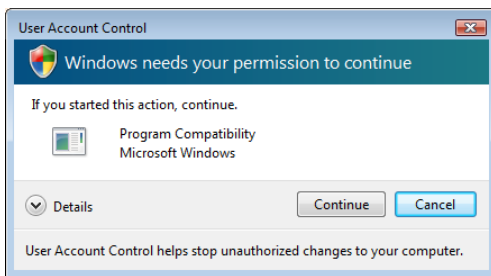
- Right-click the “Alpha Programming” in Start menu, and choose “Properties;” “Alpha programming Properties” dialog box appears.



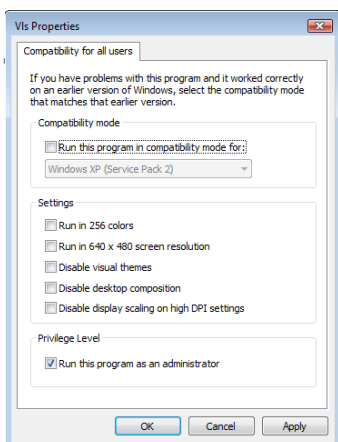
2. Select “Compatibility” tab, and then click “Show settings for all users” button. “VIs Properties” dialog box appears.



- NOTE:** “User Account Control” dialog box appears when user account control is enabled. Click “Continue” button.



3. Click “Run this program as an administrator” check-box to add check mark, and then click “OK” button. “VIs Properties” dialog box closes.
4. Click “OK” button to complete setting. “Alpha programming Properties” dialog box closes.



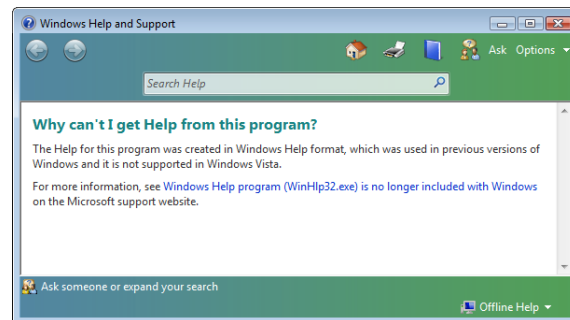
8.5 USING THE HELP FILES IN AL-PCS

The AL-PCS includes a powerful package of help files to guide the user through the programming options. Use the F1 key, or click the help icon, or use the Help pull down menu to access the help files.

NOTE: When using Windows Vista® and Windows® 7
When Help is run using Windows Vista® and Windows® 7, the following “Windows Help and Support” screen may appear, and the Help screen is not displayed.

Perform the following procedure to install “WinHlp32.exe” which is needed to display the Help screen. (**NOTE:** The personal computer needs to be connected to the internet.)

1. Click the Help button.
2. The screen shown below opens. Click the displayed link.



3. The Microsoft Support Knowledge Base page opens. (<http://support.microsoft.com/kb/917607/en-us>)
Follow the instructions and download the Windows Help program for Windows Vista® and Windows® 7 (WinHlp32.exe).
4. Install the downloaded file.

■ THE F1 KEY

The F1 key will provide specific help on a highlighted object.

Click a system component on the FBD base to highlight it and press the F1 Key to bring up a dialog screen. To receive Help on a command, move to the command with the mouse until the instruction is highlighted. Use F1 to access the Help dialog box before using the command.

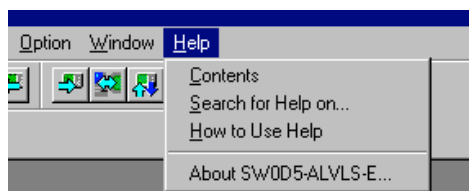
THE CONTEXT HELP

The Context Help command can provide help with Toolbars and associated commands. When choosing the Toolbar's Context Help button or pushing the "Shift" + "F1" key, the mouse pointer will change to an arrow and question mark. Then click on the item needing clarification in the application window. The Help topic will be shown for the item you clicked.

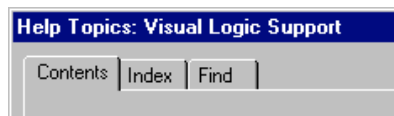


HELP IN MENU BAR

It is possible to also get Help by clicking "Contents" and "Search for Help on..." (Help menu). Upon entering the Help menu the options list will be shown.



When "Search for Help On..." or "How to Use Help..." is chosen, three tabs will appear on top of the window. These tabs can be used in addition to the Help files available on the display.



THE CONTENTS COMMAND OR TAB

The contents menu allows the user to choose from the following categories or chapters. When an option is chosen, the main topics available for that category pop up on screen. Choose the desired topic to bring up a dialog box. Words or phrases that are highlighted in green contain additional information in another dialog box. Click on the highlighted text to view its dialog box.



SEARCH FOR HELP ON...

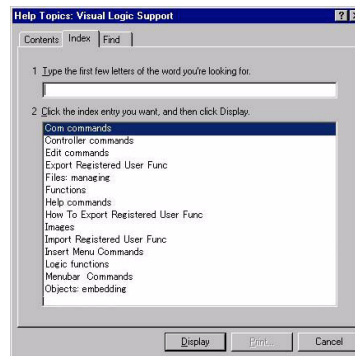
It is possible to search the informations and instruction for using AL-PCS or various pieces of reference information from the desired categories.

To search for Help:

1. Clicking "Search for Help On..." in the help menu to bring up the opening Help window.
2. Click on the desired category to bring up information and instructions for using AL-PCS or various pieces of reference information.

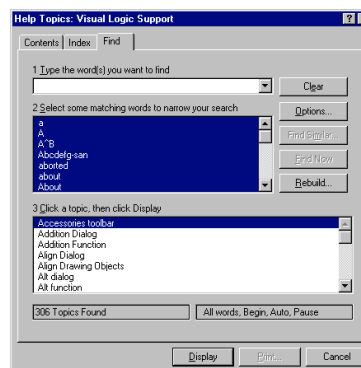
THE INDEX TAB

The windows provides information on index topics. Type the first few letters of the required topic or scroll to the topic in the index list.



THE FIND TAB

The Find tab generates a list of key words on the AL-PCS and lets you search for help on those words. A matching words directory gives an option to narrow the number of matches found. A third directory lists the topics in which your word appears.



FIND SETUP WIZARD

At first, the Find tab needs to be setup. Perform the setup in accordance with the Find Setup Wizard.

To setup Find tab:

1. Choose "Minimize database size (recommend)"; and click "NEXT"
2. Click "Finish" to start creating the word list of AL-PCS.

■ HOW TO USE HELP

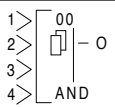
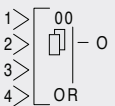
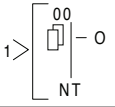

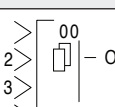
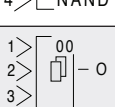
Gives detailed information on “How to Use Help” and Customize the Help settings for the users convenience. Topics include finding, copying, viewing, and printing help files and manipulating the data in dialog boxes. Learn how to change the color or font size of a dialog box, add comments, or bookmark especially useful information.

9. FUNCTION BLOCKS

9.1 LOGIC FUNCTION BLOCKS

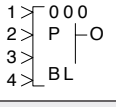
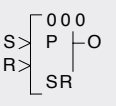
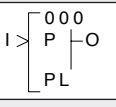
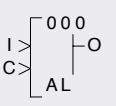
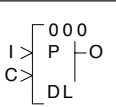
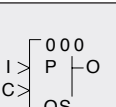
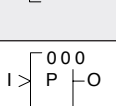
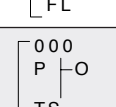
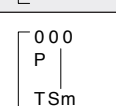
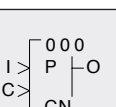
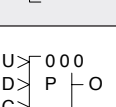
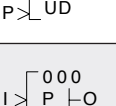
- Logic Function Blocks operate by reading whether signals are ON or OFF and then setting the status of their Outputs accordingly.
- There are six types of logic blocks available in the Alpha2 Series - AND, OR, NAND, NOT, NOR, XOR.
- Analog signals cannot be processed by the Logic blocks.
- The logic FB have no parameters.

Boolean Logic Function Blocks

Logic Block State	Logic Block Displayed	Description	Memory Use
AND		This function executes logical AND operation on given input signals. The input signals connected should be of bit input type only. 4 Bit input pins and 1 Bit output pin. If all the inputs are ON then the output is ON, otherwise output is OFF.	19 Byte
OR		This function executes logical OR operation on given input signals. The input signals connected should be of bit input type only. 4 Bit input pins and 1 Bit output pin. If all the inputs are OFF then output is OFF, otherwise output is ON.	19 Byte
NOT		This function executes logical NOT operation on given input signal. The input signal connected should be of bit input type only. 1 Bit input pin and 1 Bit output pin. Output is negation of Input given.	10 Byte
XOR		This function executes logical XOR operation on given input signals. The input signals connected should be of bit input type only. 2 Bit input pins and 1 Bit output pin. If both inputs are either OFF or ON then output is OFF, otherwise output is ON.	13 Byte
NAND		This function executes logical NAND operation on given input signals. The input signals connected should be of bit input type only. 4 Bit input pins and 1 Bit output pin. If all the inputs are ON then output is OFF, otherwise output is ON.	19 Byte
NOR		This function executes logical NOR operation on given input signals. The input signals connected should be of bit input type only. 4 Bit input pins and 1 Bit output pin. If all the inputs are OFF then output is ON, otherwise output is OFF.	19 Byte

9.2 ADDITIONAL FUNCTION BLOCKS

The Alpha2 series controller is fundamentally based on function block programming. The blocks provide a wide range of possible operations and have been preprogrammed for ease of use. Some Function Blocks have parameters that can be tailored to meet individual requirements in the programs.

Logic Block State	Logic Block Displayed	Description	Memory Use
Boolean [BL]		The Boolean Function Block uses Boolean algebra to control the ON/OFF state of an output. An operational expression consists of either the AND, OR, XOR or NOT form.	*1
Set/Reset [SR]		The Set/Reset Function Block either holds an output ON (set) or releases the output OFF (reset.) Priority can be given to either input pin if both inputs have been energized simultaneously. The default priority setting is dedicated to the reset input pin.	14 Byte
Pulse [PL]		The Pulse Function Block sends a single pulse to the output pin if the input pin receives either an “ON to OFF”, “OFF to ON” or “ON to OFF” And OFF to ON” input operation.	10 Byte
Alternate [AL]		The Alternate Function Block is used to reverse the ON and OFF state of the output as and when the input pin receives a signal. The output will be set ON when the input pin goes high and remain ON until the input receives the second rising edge.	13 Byte
Delay [DL]		The Delay Function Block provides an ON delay timer and an OFF delay timer. Time intervals for either situation can be set. The time unit can be set to 10ms, 100ms or 1s increments.	19 Byte
One Shot [OS]		The One Shot Function Block awaits a signal supplied to the input pin thereafter setting the output according to the specified time. The timing parameters control the state of the output (depending on the priority setting). The time unit can be set to 10ms, 100ms or 1s increments.	17 Byte
Flicker [FL]		The Flicker Function Block changes the ON and OFF state of the output according to a preset flicker time. The time unit can be set to 10ms, 100ms or 1s increments.	19 Byte
Time Switch [TS]		The Time Switch Function Block uses a predefined time schedule to control the ON and OFF status of the output.	*2
Time Switch m [TSm]		The Time Switch maintenance Function Block uses a predefined time schedule to control the ON and OFF status of the output. The function block can be setup from the TopMenu “Parameter” via the front panel keys.	*2
Counter [CN]		The Counter Function Block increments the current value by one as and when the input pin receives a signal. When the current value reaches the set value the output is set ON. The counter current value is reset as and when the clear pin receives an input.	16 Byte
U/D Counter [UD]		The Up/Down Function block positively or negatively increments the counter until a set value is reached thereby setting the output ON. A preset signal can also equal the set value regardless of the current value for the function block and thereby setting the output ON.	22 Byte
Compare [CP]		The Compare Function Block monitors the current value of the input pin in relation to a preset expression. The expression consists of =, >, >=, <, <= or <>. If the compared value satisfies the expression subsequently the output pin is set on.	17 Byte

Logic Block State	Logic Block Displayed	Description	Memory Use
Offset Gain [OG]		The Offset Gain Function Block is based upon a linear function $Y=A/B \cdot X+C$ to which the value obtained from an analog input (X:A01-A08) is set.	22 Byte
Display [DP]		The Display Function Block is used as an interface between the user and the devices held within the controller. Current values, timer messages, user-defined messages can be read.	*4
Zone Compare [ZC]		The Zone Compare Function Block identifies whether the input value lies within a specified upper and lower limited zonal area and if so changes the status of the output accordingly.	20 Byte
Schmitt Trigger [ST]		The Schmitt Trigger Function Block compares an input value to preset high and low limits. The output is ON when the input value reaches the high limit and then falls below the lower limit. The function only processes the data when the function block is receiving an input signal.	19 Byte
Hour Meter [HM]		The Hour Meter Function Block holds the output status ON for a maximum of 32767 hours, 59 minutes and 59 seconds. If the input pin is turned OFF the elapsed time will hold its value until either the clear pin resets the time or the input pin is turned ON again.	19 Byte
Speed Detect [SPD]		The Speed Detect Function Block is used to count the incoming pulses max. 20Hz for a set period of time. The upper and lower limits can be set from -32768 to +32767 and the Period interval's set range is 1 to 32767 in 10ms increments.	25 Byte
PWM [PWM]		The Pulse Width Modulation Function Block changes the output status according to a set period of time with a minimum of 100ms and a maximum of 3276700ms in increments of 100ms. The percentage duty for the function controls the amount of elapsed time before the output status is changed.	16 Byte
PID		The PID Function Block is the Alpha2 implementation of PID, a control method used to obtain stable control over a system variable. It is equipped with an Autotuning function, which automatically adjusts the Function Block parameters for the specific application.	52 Byte
Retentive Alternate [RAL]		The Alternate Function Block is used to reverse the ON and OFF state of the output as and when the input pin receives a signal. The output will be set ON when the input pin goes high and remain ON until the input receives the second rising edge. When the power is turned OFF the function block will use the last alternation operation to control the output.	13 Byte
Addition [ADD]		The ADD Function Block is used to summate two input values	20 Byte
Subtraction [SUB]		The SUB Function Block is used to subtract two input values.	20 Byte
Multiplication [MUL]		The MUL Function Block is used to multiply two input values.	20 Byte
Division [DIV]		The DIV Function Block is used to divide two input values.	20 Byte

Logic Block State	Logic Block Displayed	Description	Memory Use
Calculation [CAL]		The CAL Function Block is used to perform a calculation from the combination of different Arithmetic function blocks.	*3
Shift [SFT]		This Shift Function Block is used to transfer the Shift Input status just before the Input signal is set ON. It has a bit input pin, a shift input pin, a set input pin, a reset input pin and a bit output pin.	19 Byte
Random One Shot [ROS]		The Random One Shot Function Block emits a random length single pulse to the output.	19 Byte
Delayed One Shot [DOS]		The Delayed One Shot Function Block emits a single pulse after a controlled delay to the output.	20 Byte
Delayed Alternate [DAL]		The Delayed Alternate Function Block alternates the status of the output with each pulse after a controlled delay.	16 Byte
Retentive Set/Reset [RSR]		The Set/Reset Function Block either holds an output ON (set) or releases the output OFF (reset.) Priority can be given to either input pin if both inputs have been energized. The default priority setting is dedicated to the reset input pin. When the power is turned OFF the function block will use the last set or reset operation to control the output.	14 Byte
Control Display [CDP]		The Control Display Function allows the user to control the LCD image screens. The function block can only be set in AL-PCS software for Alpha2 Series Controllers. When control bit N04 is ON, it is possible to control the displayed User Screen.	*5
Connect [_ B]		The Connect function block is an internal device used to show the memory used by input bits, system bits, AS-interface bits, and the operation keys. No function block appears on screen or is shown as being used in the "Memory Configuration Usage" dialog box. The purpose is only to calculate the memory that is used by the bits listed above.	10 Byte
System Outputs		Control for external devices through relays and transistors.	10 Byte

1. Number of bytes used = 19 + 1 x (Characters in equation)
2. Number of bytes used = 8 + 4 x (Number of time switches)
3. Number of bytes used = 30 + 1 x (Characters in equation)
4. Number of bytes used is decided by the displayed item.

Displayed Item	Number of Bytes, Alpha2 Series	
Characters	16 + 1 x (Each character displayed)	
Analog, FB Value	Value	17
	Graph	23
Time, Date	14	
Time Switch	17	

5. Number of bytes used = 32 + 3 x (Number of screen)
6. Number of bytes used = 12 + 1 x (Characters in E-Mail address)
7. Number of bytes used = 37 + (Number of characters of setup commands)

10. TROUBLESHOOTING

10.1 INPUT STATUS ERROR

- Place the Alpha2 controller in the Stop mode.
- Cycle the power to the equipment connected to the input terminals and check if the input status is displayed correctly.
- If it is not correctly displayed, check the points below.
 1. Check the wiring for the power supply and the inputs.
 2. Check if the equipment used for the inputs corresponds to the specifications in this manual.

NOTES ON USE

Do not connect a wire with a soldered end to an Alpha2 series terminal due to poor contact and the possibility of the wire shearing.

10.2 OUTPUT STATUS ERROR

- Place the Alpha2 controller in the Stop mode.
- Force the outputs ON/OFF and check the operation of the outputs.
- Check that the program is written to perform per the desired results.
- If there is still an error, check the points below:
 1. Check the wiring for the power supply and the outputs.
 2. Check if the equipment used for the outputs corresponds to the specification in this manual.

NOTES ON USE

Perform the forced ON/OFF operations only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately. If proper precautions are not taken, damage to the equipment or machine failure may occur.

10.3 TOP MENU IS NOT DISPLAYED

The menu key should be operated to access the Top Menu. Push the keys "OK" and "ESC" at the same time. If the menu call key is not set, use either the programming software to the Stop mode or do the forced stop operation.

The Top Menu cannot be accessed from the keys. However, by cycling the power supply and pressing the "OK + ESC" keys simultaneously during the power up, the Top Menu will appear.

FORCED STOP OPERATION

1. Turn the Alpha2 series power supply off.
2. Turn the power ON again while pushing the "OK" and "ESC" keys simultaneously. The option to place the controller in Stop mode will be available for approximately five seconds. Press the "OK" key to enter the Stop Mode. If no key is pressed, the controller will default back into the Run mode.
3. Push "ESC" key. The "Top Menu" is displayed.

CAUTION: Perform the forced stop operation only after thoroughly checking that it is safe to do so. Damage to the machine or controller or a safety issue could arise if the forced ON/OFF is performed inappropriately. If proper precautions are not taken, damage to the equipment or machine failure may occur.

10.4 CANNOT ENTER RUN MODE

When the Alpha2 series will not switch to Run mode, check the following.

1. The message "Input Error" or "Output Error" is displayed on the screen. The program has more points of input and/or output than is allowed in the controller body.
 - a) When making the program with the programming software. The content of the program and the model are checked with the programming software. Write the program to the Alpha2 series controller.
2. The program data has an error.

When the program cannot be displayed with "ProgEdit" in "TopMenu", it is possible that the program data was damaged. Delete the program and then write or install a new program.

10.5 INCORRECT CLOCK DATA

When approximately 20 days or more have passed since power was supplied to the Alpha2 series, the time data is lost. In this case, the time data should be set.

10.6 THE "?" APPEARS ON THE DISPLAY

The "?" mark is displayed when an unacceptable key is pressed according to the screen data. Confirm the acceptable options and press the appropriate key.

10.7 CANNOT USE AN OPERATION KEY

Check the movement of the operation keys according to the following procedures when the Alpha2 series will not accept a key operation. If the steps outlined in instructions (1) - (5) below can be performed, the keys are operating properly. Please check if the key(s) are used in the program.

1. Place the controller in the Stop mode.
2. Scroll through the Top Menu with "▲" key or "▼" key.
3. Move the cursor to "ClockSet" with "▲" key or "▼" key, and push the "OK" key twice. The "ClockSet" screen is displayed.
4. Try to change the month/year data using the "◀" key, "▶" key, "+" key and "-" key.
5. Push the "ESC" key.

10.8 INCORRECT LCD DISPLAY

Check the following items.

- If the character is displayed in reverse and the entire screen is black, then the Alpha2 controller display has been damaged.
- An Unexpected Display Configuration is Shown

When the display does not appear as expected, please check the following points in the program.

1. Adjust the position where each display function begins. Two separate displays might have an overlapping display area that causes the undesired result.
2. The character fails to display
 - ▶ Check if the input pin to the Display Function Block is On.
 - ▶ Check whether there is a conflict with another display.

10.9 CANNOT COMMUNICATE WITH AL-PCS

Check the following items.

1. Check cable (AL-232CAB) connection. Refer to section 8.2 for the connection method.
2. Check the power supply supplied to the Alpha2 series. Check the wiring for the power supply. Be sure the specifications in this manual are met.
3. Check whether the COM port of the PC matches the “communication port” settings in the programming software.

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