ENT SENIOR DESIGN PROJECT REPORT

Ultrasonic Tension Controller for Web Tensioning

Submitted to

Professor Goodman & Professor Cooney

Engineering Technology Department

by

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&

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12 July 2018

Ultrasonic Tension Controller for Web Tensioning

ABSTRACT

The design of the Ultrasonic Tension Control package provides an industrial package to a previously vulnerable product. The previous design utilized a microcontroller which took analog feedback from an ultrasonic sensor to control brake pressure to a tensioning system to wind or unwind different products. The system still uses an ultrasonic sensor but uses a programmable logic controller (PLC) and variable frequency drive (VFD) to control the winding and unwinding speed. By using more industrial components, the system is more durable and resistant to shock, temperature, or other extreme environments. The introduction of a touch screen is also favorable and provides a convenient interface for operators to run the full process or troubleshooting to be done on a screen that puts the system into a manual mode. Future design considerations include putting the design into a smaller footprint for further cost reduction. Also the ability to automatically detect the type of variable frequency drive connected would be beneficial to prevent the user from incorrectly entering data.

Ultrasonic Tension Controller for Web Tensioning

TABLE OF CONTENTS

Ultrasonic Tension Controller for Web Tensioning

REVISION HISTORY

Version	Date	Revised by	Description
1.0	18 June 2018	Nicholas L Archer	Initial version/rough draft
1.1	20 June 2018	Nicholas L Archer	System Wide Design Decisions Draft
1.2	9 July 2018	Nicholas L Archer	Completed Report
1.3	12 July 2018	Nicholas L Archer	Completed Report with Graphical Representation of Testing

Ultrasonic Tension Controller for Web Tensioning

1. INTRODUCTION

The ultrasonic tension control is a product used by industry to control the tension on large rolls of materials for process handling. The original design was very outdated and there were several customers requesting that the package be updated to a modern design – including the components used, the method of control, the appearance, and the interface. This resulted in a research and development project to use current technology and design standards. The project was updated to use a microcontroller based system with a touch screen interface in a smaller package. The project was a success but there were several drawbacks including durability of the product. Overall, there was less market demand than originally thought; however, the customers that still needed an updated design were willing to invest a larger amount of money. The project then moved into a design that used off-the-shelf components common to the industry. The design changes from the original to the first updated, and from the first update to the current design are discussed in the body of this report.

1.1 Problem Statement

The original version of the Proportion-Air UTC-1 model was composed entirely of through-hole analog components which are used on a large printed circuit board (PCB). The design utilizes an old design which had potentiometers to control the upper and lower limits. Since the product had not been redesigned in several decades, it was difficult to maintain largely due to part obsolescence.

The first update of the project reduced the footprint of the circuit board by over 50% and still had the same functionality as the original. The idea was to implement a touch screen for the operator to interface with that would communicate upper and lower limits to the microprocessor. Other functionality was intended to be on the serial line of communications but this was not implemented functionally. Eventually the system reverted back to using analog feedback and a simple display which could not have user inputs to control the limits. The initial resign did allow for a clear visual representation of the distance and if the device was winding, unwinding, or powered on. There was also convenient locations for LED indicators and voltage test points for troubleshooting – the original system lacked a convenient way to troubleshoot which was important.

This redesign kept the general ideas of the initial redesign but on an industrial level. The touch screen was successfully implemented which allowed for power indication with the screen being on as well as the emergency stop button being illuminated. Further indication would be inside the control panel with the power supply status light, PLC power light, and VFD keypad screen. The touch screen provided the convenient interface with the operator that was desired for the original design and clearly shows what the distance is and how that relays to the amount of material left

to be wound or unwound. In the automatic mode, instead of varying the pressure applied to a break to adjust the speed; the VFD automatically changes speed and varies the needed frequency to maintain that speed based on load – this is one of the biggest pros to using a variable frequency drive. The redesign also includes more convenient methods of circuit protection – circuit breakers are used for the main power and branch circuits which can be reset instead of having to replace a fuse only on the main line. This isolates potential problems to one area of the circuit and protects the rest of the devices. The last major revision is the grounding – the previous version used a large ground plane through the printed circuit board. In the industrial version, standard protective earth grounding is used as well as RS485 serial communications which operates with a differential as opposed to true ground reference. This means that the variable frequency drive can emit electrical noise with little-to-no effect on the communication line.

1.2 System Overview

This project was originally intended to be a sellable and producible product for the original project sponsor which was Proportion-Air. The system was upgraded to a more modern design and then upgraded again to the current model which is a more industrial design while maintaining the modern ideas for control scheme. The goal was to increase interest in the product and increase sales by providing a modern product with better user interface, easier troubleshooting, and in a smaller package. The original sponsor of the project was Proportion-Air but has evolved into a self-funded project to potentially market to customers. The idea and control scheme was changed so dramatically that it does not represent the original product in any way but has all of the functionality (and much more). This project is used at many different customer facilities including companies that I am familiar with including: JP Lamborn, Nucor Steel, North American Stainless, Coast Controls, and other smaller shops that have the same material handling process.

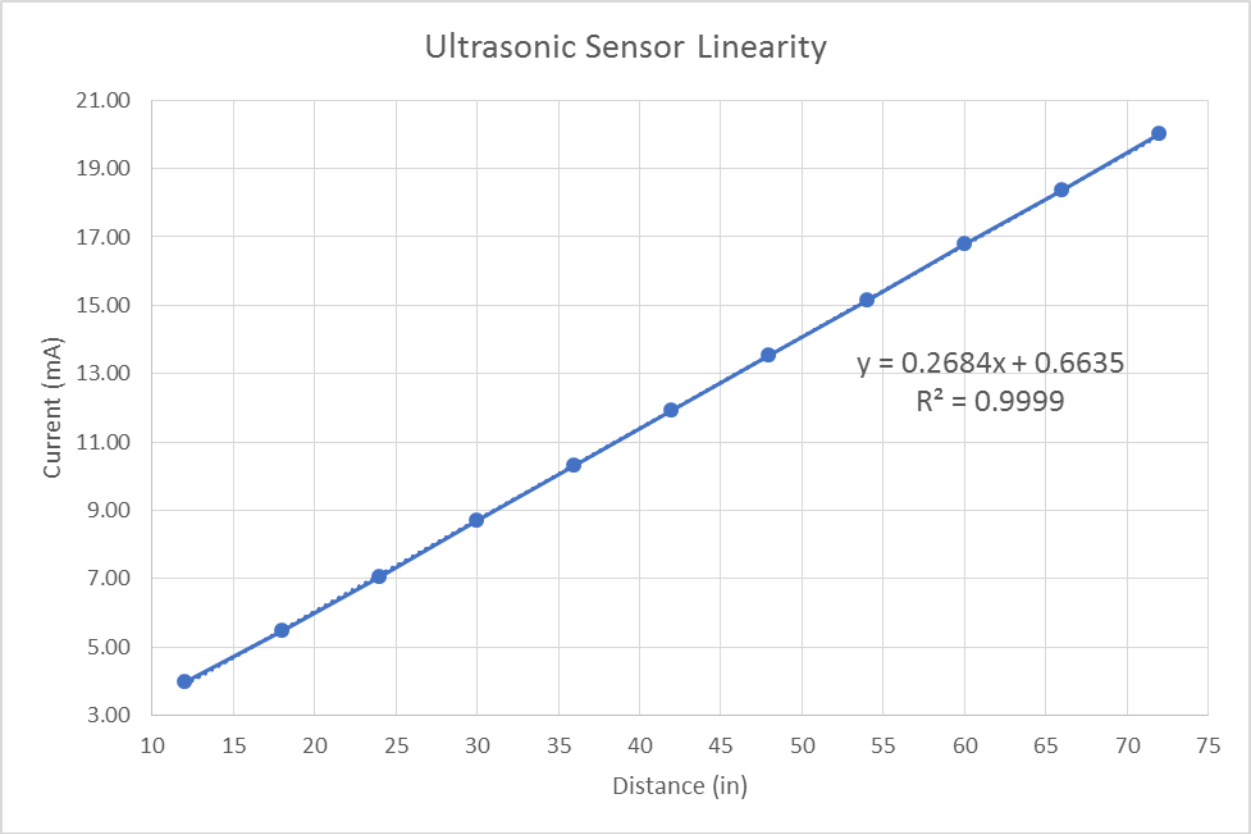
2. REFERENCED DOCUMENTS

Table 1: Reference Documents

Title	Document Reference Number	Comment
System Requirement Specification	SRS001 rev.1	Submitted
Interface Requirements Specifications	IRS001 rev.1	Submitted
Bill of Materials	BOM001 rev.2	Submitted
Process Flow Diagram	PFD001 rev.1	Submitted
Instrumentation Product Specifications Sheets	ISDS001- ISDS010 rev.1	Manufacturers Specifications
Electrical Schematic	SP-E-500000 (PAGES 1&2)	As-Built
Electrical Panel Design and Layout	SP-E-500000 (PAGE3)	As-Built
Enclosure Door Design and Layout	SP-E-500000 (PAGE4)	As-Built
PLC Code	PLC001 rev. 1	Completed Revision A
PLC Tag List	TAG001 rev. 1	Completed Revision A
HMI Screens	HMI001 rev. 1	Completed Revision A
HMI Tag List	TAG002 rev. 1	Submitted

The testing results will be displayed in this section. The first graph displays the linearity measured from the ultrasonic sensor:

Ultrasonic Tension Controller for Web Tensioning



The next graph shows the test results from the frequency setpoint as a relation to the output speed:

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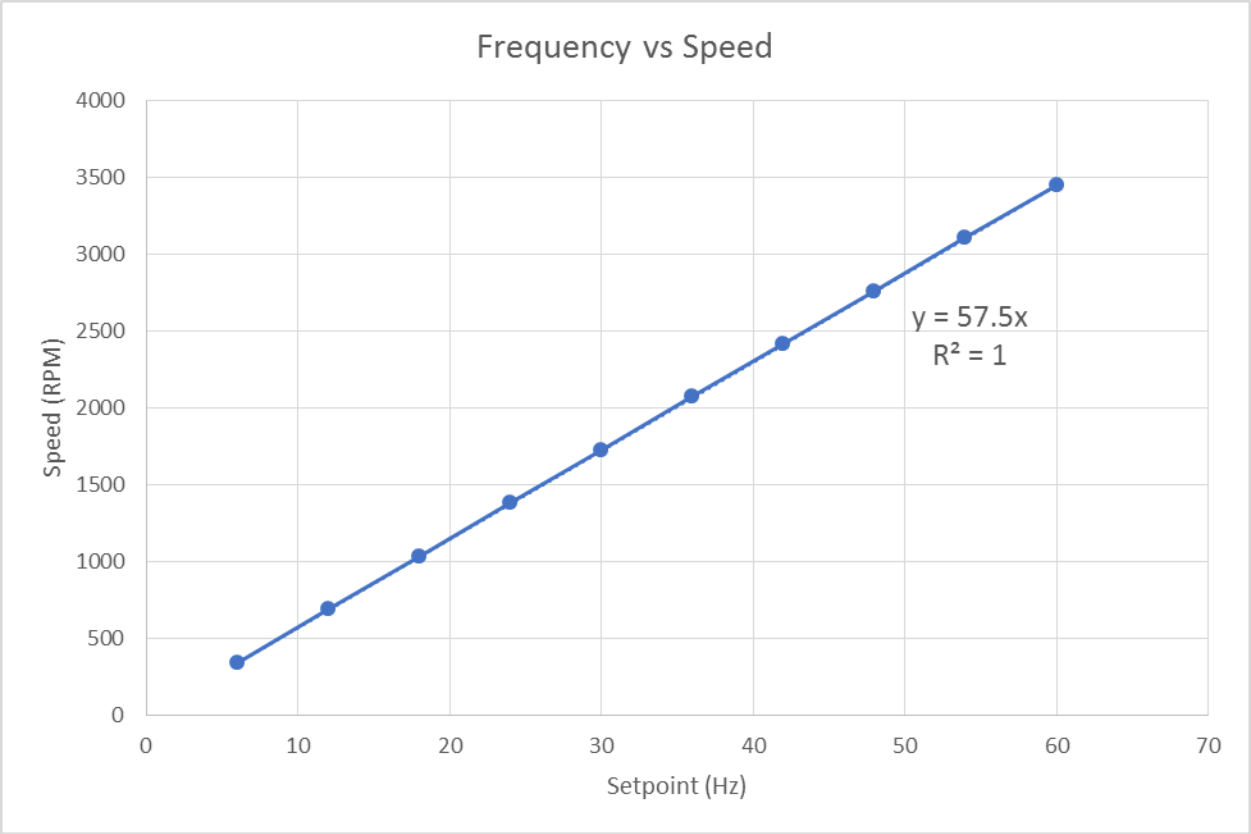
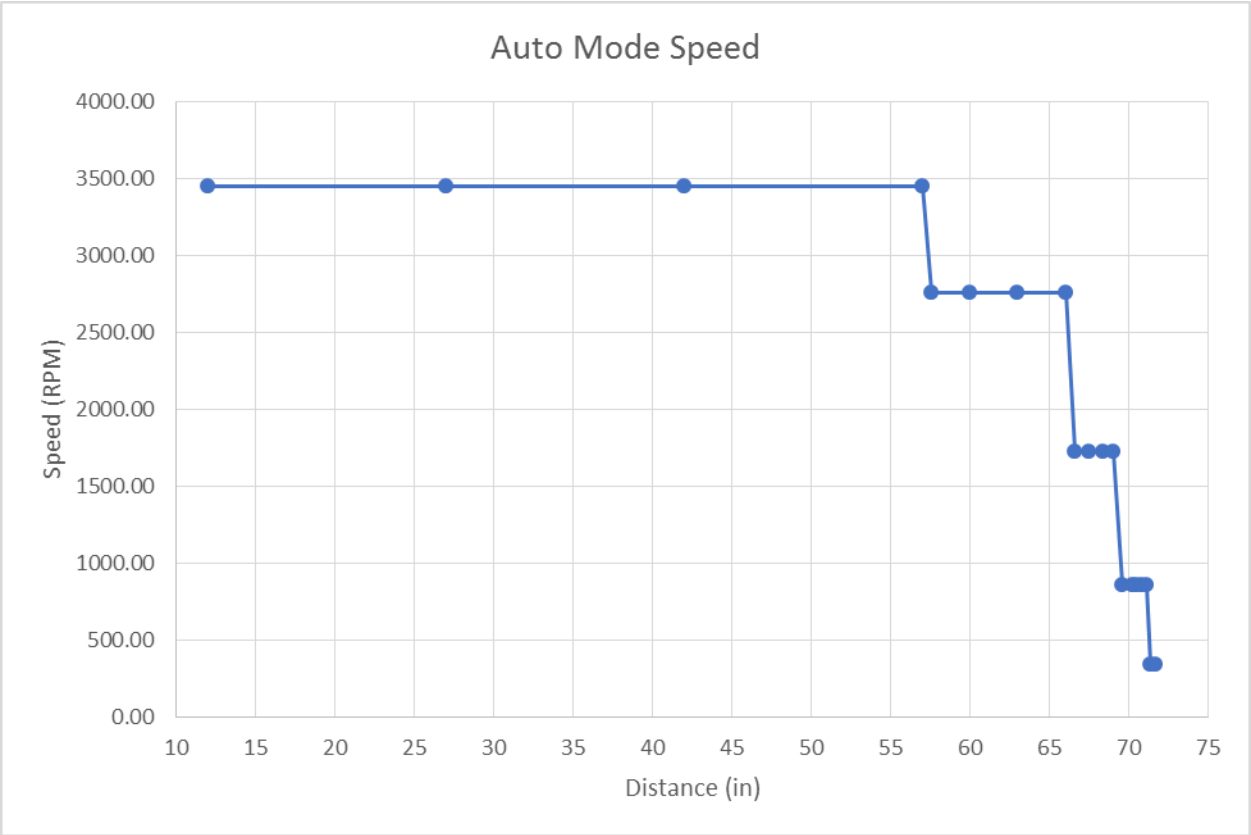


The third graph shows the automatic response of the system in “auto” mode as a speed as it relates to the distance sensed by the ultrasonic sensor:

Ultrasonic Tension Controller for Web Tensioning



3. SYSTEM-WIDE DESIGN DECISIONS

The system operation is meant to take inputs from the touch screen, communicate through tags to the PLC, the PLC then makes decisions to send information to the VFD.

3.1 Auto Mode

The auto mode is for use when the following conditions have been met:

1. The ultrasonic sensor has been calibrated so that the core (empty) roll diameter outputs 4mADC (including distance mounted away from the roll).
2. The ultrasonic sensor has been calibrated so that the full roll diameter outputs 20mADC (including distance mounted away from the roll).
3. The touch screen has the core roll diameter input to the system in inches (including distance mounted away from the roll).

Ultrasonic Tension Controller for Web Tensioning

4. The touch screen has the full roll diameter input to the system in inches (including distance mounted away from the roll).
5. The user has defined the process as “wind” or “unwind”
6. The ultrasonic sensor is installed in a fixed, permanent location pointing at the roll corresponding to the distances calibrated and input to the HMI.
7. The system is clear of any personnel or any other safety hazard as determined by the customer.
8. System is in a condition to operate.

This section will operate as follows:

1. Auto mode is initially off as defined by a button in the top center indicated by a red box with black text reading “AUTO OFF”.
2. By pressing the AUTO OFF button, the auto mode will turn on and the system will begin to run.
3. The current speed of the motor, the distance, the wind/unwind condition, and a completion gauge as a percent of roll will be displayed.
4. The motor will run at 100% of speed or 60Hz frequency command for the first 75% of the process.
5. The motor will run at 80% of speed or 48Hz frequency command between 75% to 90% completion of the process.
6. The motor will run at 50% of speed or 30Hz frequency command between 90% to 95% completion of the process.
7. The motor will run at 25% of speed or 15Hz frequency command between 95% to 97.5% completion of the process.
8. The motor will run at 10% of speed or 6Hz frequency command between 97.5% to 99% completion of the process.
9. The motor will stop at 99% completion.
10. Operator will press and hold the “<10% JOG” button to manually complete the process. While pressing this button, the motor will continue to run at 10% of speed or 6Hz frequency command. This will be allowed until the user releases the jog button.

3.1 Hardware

Hardware components are identified in the BOM. Schematics are located in the wiring diagrams.

3.2 Software

The software in this projects consists of PLC software in the CLICK software programming environment and HMI software in the C-More Micro software programming environment. Code and layout can be found in the appendices.

3.3 Interface

The interface of the system is through an on/off switch and an HMI which has functionality described above.

4. SYSTEM ARCHITECTURAL DESIGN

4.1 System Components

- a. All components are identified in the bill of materials.
- b. The static relationship of each component can be found in the flow diagram.
- c. The purpose of each component in this project is identified below:
    - PLC: Assist in communications between the VFD and HMI. Also receives an analog input from a distance sensor to control the speed output of the VFD
    - Power supply: Takes the 120VAC input power and converts to 24VDC which can be used to power the PLC
    - Circuit breakers: Provide branch protection to the HMI and PLC. Input circuit breaker protects the overall system and the VFD.
    - Terminal blocks: provide connection points for each component
    - Relay: Provides the ability to turn on the motor contactor with 24VDC
    - ZipLink Communication module: Provides multiple connection points for the serial RS485 communication line
    - VFD: Takes commands from the PLC and provides a variable speed output to a motor. Also makes other adjustments such as acceleration time, deceleration time, start, stop & fault.
    - Motor Contactor: Allows the high current to pass for the motor. Could not run through the e-stop and selector switch directly because of the high current draw of the motor.
- d. All component model numbers are identified in the BOM.

4.2 User Setup and Operation

Setup for the project is defined as follows:

1. Male plug for a standard 120VAC outlet is provided.
2. Cable from VFD to motor is provided.
3. Ultrasonic sensor cable is provided and installed.

Ultrasonic Tension Controller for Web Tensioning

4. Mount ultrasonic sensor at desired location. Default setup is 12” minimum and 72” maximum. Specifications should be given prior to shipment to be programmed into the PLC.
5. To run the system in auto mode, the user should select auto mode and then press “run”
6. To run the system in maintenance mode, this screen will be selected and the user will be prompted for a password. Once password is entered, all motor outputs will be set manually.
7. The selector switch on the face is for ON/OFF selection.
8. The E-Stop button on the face will turn all components off when pressed.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of this project show that the second iteration of the new web tensioning system was a success. The system works in a very simple fashion and is still set up in a robust package. The customer gives the specifications of their system and the values are programmed into the system to provide a "plug-and-play" solution. When set up correctly, the auto screen will display the distance as well as that information as a percentage of the completed process. The auto screen allows the user to start and stop the system as well as complete the process when it is below 10% left to complete. This allows the user to prepare for the process to be completed and load another material roll to reduce amount of downtime between processes.

The device has three methods to disconnect power: turning off the selector switch, pressing the emergency stop button, and turning off the main circuit breaker. DC components can be shut off independently through the two-pole circuit breaker. These circuit breakers also protect the system from becoming damaged in an over-current scenario.

Future iterations will provide labels for the door components so that the user knows which position is on/off and identify that the red button is actually an emergency stop.

Another future feature will be LEDs on the door to show the user when the machine is winding or unwinding. This will be an identifier to ensure that the system is operating properly based on the desired condition.

Components were changed from analog circuits originally to digital components in the second iteration and are switch to industrial style digital components in this second re-design. This removes the need for the owner of the intellectual property to continually do software updates and worry about component obsolescence as this is taken care of by the manufacturers of the individual components.

The desired input power remains the same as the previous iterations and could be selected differently initially by the customer. The type of motor used could also be changed prior to design to fit 230VAC or 460VAC depending on the customer's requirements/application.

Overall this iteration was much more successful and provides a great basis for future engineering to be done. Because most of the project is changed through software, the option to stock is available if the demand for product continues to increase in the future.

Ultrasonic Tension Controller for Web Tensioning

NOTES

This section shall contain any general information that aids in understanding this document (e.g., background information, glossary, rationale). This section shall contain an alphabetical listing of all acronyms, abbreviations, and their meanings as used in this document and a list of any terms and definitions needed to understand this document.

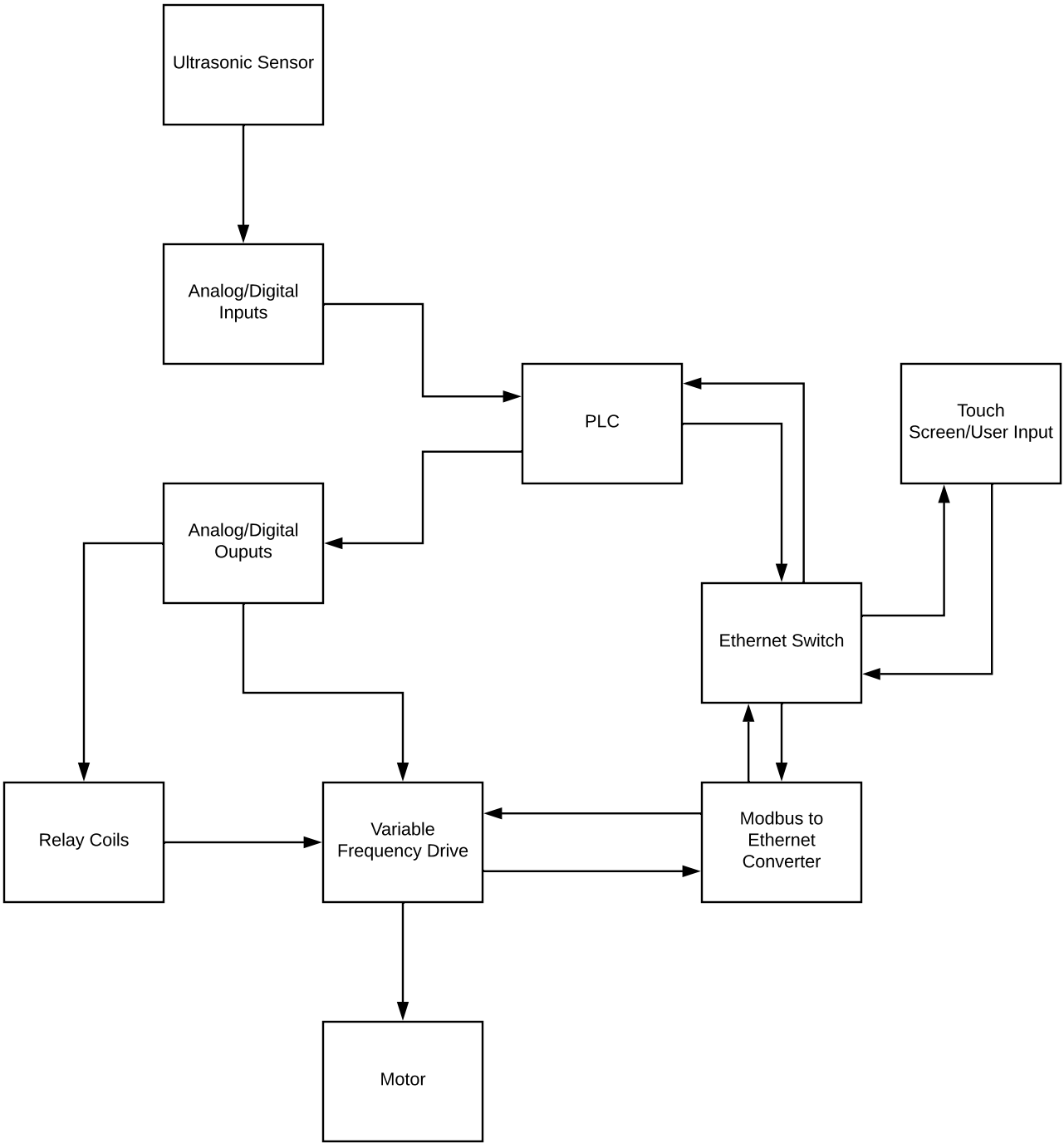
Ultrasonic Tension Controller for Web Tensioning

APPENDIXES

BOM Name: Senior Project
BOM Note: Nicholas Archer & Robert Adair - ECET491

Item Code	Qty	Description	Price	Total Price
FAZ-C15-1-NA-SP	1	Eaton miniature circuit breaker, current-limiting, 15A, 277 VAC / 48 VDC, 1-pole, C curve, thermal magnetic, 14kA SCCR, 35mm DIN rail mount.	$18.50	$18.50
PSB24-060-P	1	RHINO switching power supply, 24 VDC (adjustable) output, 2.5A, 60W, 120/240 VAC or 120-375 VDC nominal input, 1-phase, plastic housing, IP20, 35mm DIN rail mount, screw terminals.	$28.00	$28.00
EA-ECOM	1	C-more Micro communication expansion module, (1) RJ45 10/100 Mbps Ethernet port. For use with EA3 series 6in, 8in and 10in HMIs. For programming and PLC communications.	$50.00	$50.00
GS-EDRV-CBL-2	1	ZIPLink GS drive cable, RJ12 to RJ12, 6.5ft/2m cable length. For use with GS series drives and GS-EDRV communications module.	$5.50	$5.50
EA3-T6CL	1	C-more Micro EA3 series touch screen HMI, 6in color TFT LCD, 320 x 240 pixel, QVGA, LED backlight, supports (2) serial and (1) USB port.	$299.00	$299.00
MTR2-P50-3BD36	1	IronHorse standard performance AC induction motor, general purpose, 1/2hp, 3-phase, 230/460 VAC, 3600rpm, TEFC, 56C frame, rolled steel, rigid base/C-face mount.	$91.00	$91.00
GS1-10P5	1	GS1 series AC micro drive, 120 VAC, 1/2hp with 1-phase input, V/Hz mode, RS-485, Modbus, 5kA SCCR.	$117.00	$117.00
KN-L5-BLANK	1	Konnect-It marking tag, 5 x 5mm, blank. Package of 500. For use with Konnect-It terminal block.	$11.00	$11.00
KN-10J12	1	Konnect-It terminal block jumper, screw-down type, 10-pole. Package of 5. For use with KN-T12 or KN-D12 series block.	$7.50	$7.50
KN-ECT6GRY-25	1	Konnect-It terminal block end cover, gray. Package of 25. For use with KN-T12 to KN-T6 series terminal blocks.	$4.00	$4.00
KN-EB7-10	1	Konnect-It screw-down end bracket, 10mm wide. Package of 10. For use with 35mm DIN rail.	$6.00	$6.00
GCX3300	1	Selector switch, 22mm, 2-position, maintained, 1 N.O. contact(s), plastic base, plastic bezel, Operator: black, knob, 30mm, round, plastic.	$7.25	$7.25
C0-12ARE-1-D	1	CLICK Ethernet Analog PLC, 24 VDC required, Ethernet and serial ports, Discrete Input: 4-point, AC, Analog Input: 4-channel, current, Discrete Output: 4-point, relay, Analog Output: 2-channel, current.	$189.00	$189.00
FAZ-C1-2-NA	1	Eaton miniature circuit breaker, current-limiting, 1A, 480Y / 277 VAC / 96 VDC, 2-pole, C curve, thermal magnetic, 10kA SCCR, 35mm DIN rail mount.	$36.00	$36.00
KN-T12GRY-25	1	Konnect-It single-level terminal block, accepts wire size 26 - 12 AWG, gray, 20A, 600V rated (UL), 35mm DIN rail mount. Package of 25. For use with jumpers KN-2J12, KN-3J12, KN-4J12 and KN-10J12.	$6.00	$6.00
THHN14GYL	1	Type THHN wire, 14 AWG, 19-stranded, bare copper, green with yellow stripe insulation, 600V, 500ft spool. Alternate part ID: 139100705440.	$67.00	$67.00
C5E-STPBK-S3	1	Cat5E straight-through patch cable, STP (overall foil shield), (2) RJ45 male connectors, 3ft cable length, black. For use with 10/100/1000 Mbps networks.	$4.50	$4.50
B161406	1	Hubbell-Wiegmann enclosure, NEMA 12/13, 16 x 14 x 6in (HxWxD), wall mount, carbon steel, ANSI 61 gray, light-textured polyester powder finish, lift-off cover, (2) plated steel clamps.	$120.00	$120.00

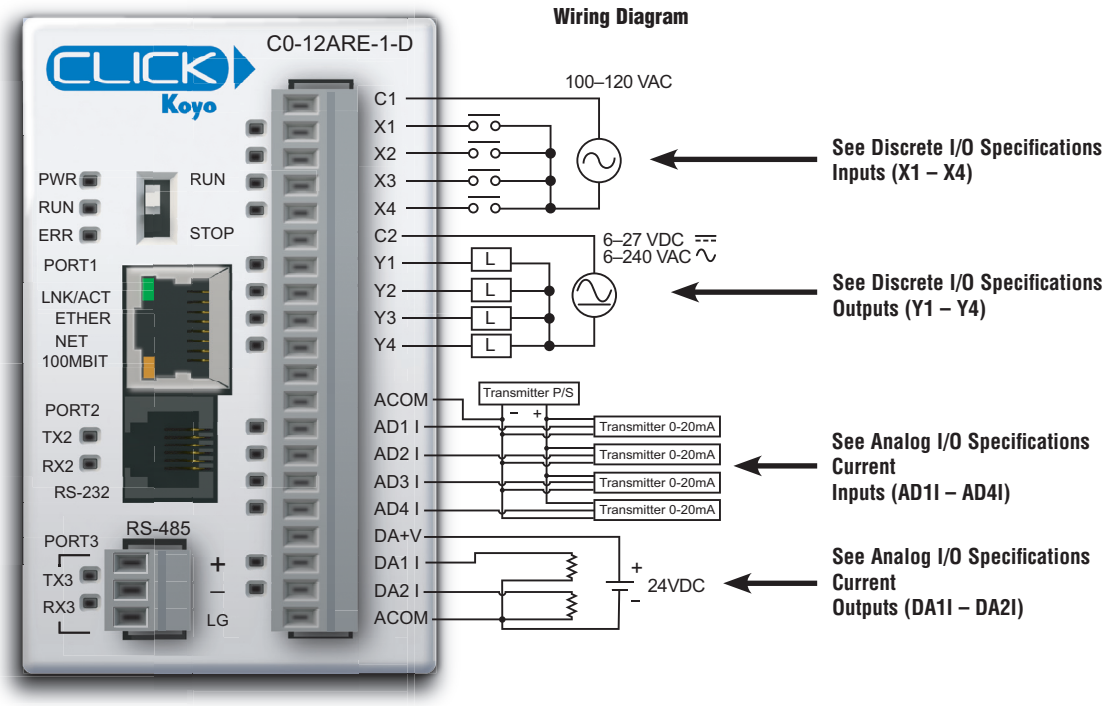
P1614	1	Hubbell-Wiegmann subpanel, 14.88 x 12.88in, 14 gauge carbon steel, white, polyester powder coat finish. For use with Bxxx and BN4xxx enclosures.	$12.00	$12.00


Ultrasonic Sensor
Analog/Digital Inputs
PLC
Touch Screen/User Input
Analog/Digital Ouputs
Ethernet Switch
Relay Coils
Variable Frequency Drive
Modbus to Ethernet Converter
Motor

Ethernet Analog PLC

C0-12ARE-1-D $189.00

4 AC Input (Sink/Source)/4 Relay Output;
4 Analog Current Input
2 Analog Current Output Micro PLC



NOTE: *There are no ZIPLink pre-wired PLC connection cables and modules for the Analog PLCs (cannot mix discrete I/O and analog I/O signals in a ZIPLink cable).*

NOTE: *When using Ethernet Analog PLCs, you must use CLICK programming software version V2.20 or later.*

General Specifications	
Current Consumption at 24VDC	160mA
Terminal Block Replacement Part No.	C0-16TB
Weight	5.4 oz (154g)

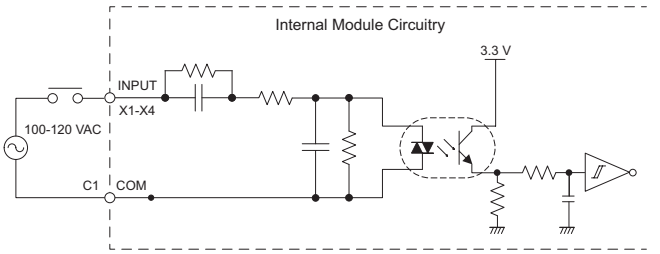
Ethernet Analog PLC

C0-12ARE-1-D (cont'd)

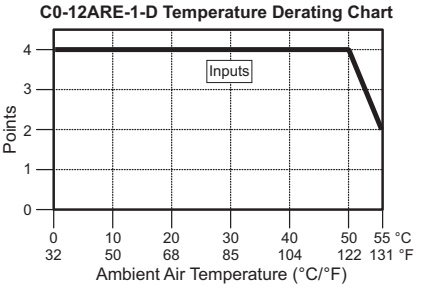
X1 - X4

Discrete I/O Specifications - Inputs	
Inputs per Module	4
Operating Voltage Range	100–120 VAC
AC Frequency	47–63 Hz
Input Current	Typ 8.5 mA @ 100VAC (50Hz) Typ 10mA @100VAC (60Hz)
Max. Input Current	16mA @ 144VAC
Input Impedance	15kΩ @ 50Hz 12kΩ @ 60Hz
ON Voltage Level	> 60VAC
OFF Voltage Level	< 20VAC
Minimum ON Current	5mA
Maximum OFF Current	2mA
OFF to ON Response	< 40ms
ON to OFF Response	< 40ms
Status Indicators	Logic Side (4 points, green LED
Commons	1 (4 points/common)

Equivalent Discrete Input Circuit



C0-12ARE-1-D Temperature Derating Chart

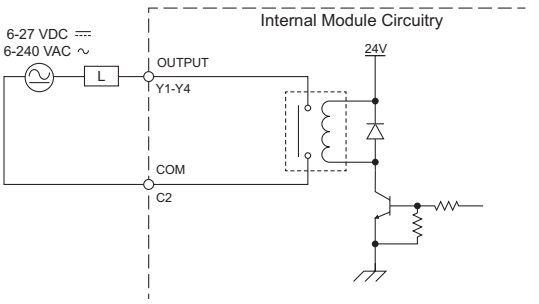


Y1 - Y4

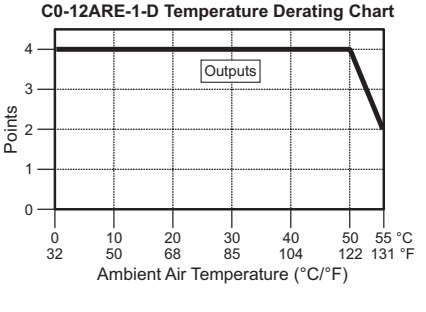
Discrete I/O Specifications - Outputs	
Outputs per Module	4
Operating Voltage Range	6–27 VDC, 6–240 VAC
Output Type	Relay, form A (SPST)
AC Frequency	47–63 Hz
Maximum Current	1A/point (resistive)
Minimum Load Current	5mA @ 5VDC
Maximum Inrush Current	3A for 10ms
OFF to ON Response	< 15ms
ON to OFF Response	< 15ms
Status Indicators	Logic Side (4 points, red LED)
Commons per Module	1 (4 points/common)

Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	**Load Current: 1 A**
30VDC Resistive	300,000 cycles
30VDC Solenoid	50,000 cycles
120VAC Resistive	500,000 cycles
120VAC Solenoid	200,000 cycles
ON to OFF = 1 cycle	

Equivalent Discrete Output Circuit



C0-12ARE-1-D Temperature Derating Chart



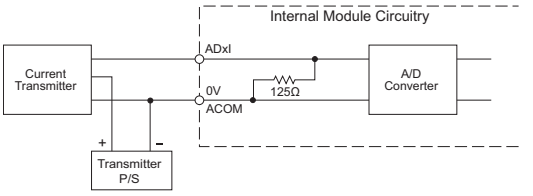
Ethernet Analog PLC

C0-12ARE-1-D (cont'd)

AD1I - AD4I

Analog Specifications - Current Input	
Inputs per Module	4 (current)
Input Range	0–20 mA (sink)
Resolution	12 bit
Conversion Time	50ms
Input Impedance	125Ω
Input Stability	±2 LSB maximum
Full-Scale Calibration Error	±2% maximum
Offset Calibration Error	±0.1 mA maximum
Accuracy vs. Temperature Error	±100ppm / °C maximum

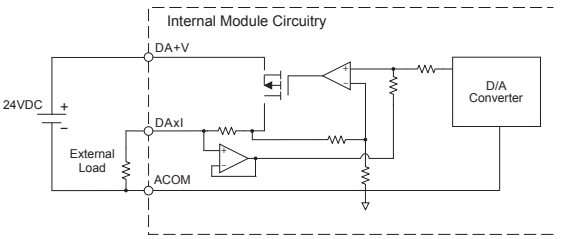
Analog Current Input Circuit



DA1I - DA2I

Analog Specifications - Current Output	
Outputs per Module	2 (current)
Output Range	4–20 mA (source)
Resolution	12 bit
Conversion Time	2.5 ms
Load Impedance	250Ω Typ (200Ω to 800Ω)
Loop Supply Voltage	DC 24V Typ (21.6–26.4 V)
Full-Scale Calibration Error	±2% maximum
Offset Calibration Error	±25mA maximum
Accuracy vs. Temperature Error	±120ppm / °C maximum
External DC Power Required	21.6–26.4 VDC

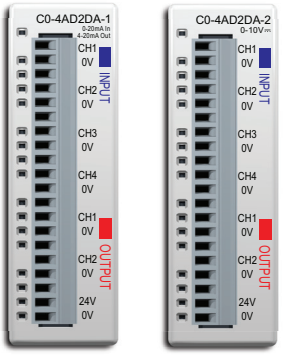
Analog Current Output Circuit



Choosing Expansion I/O Modules

Analog I/O Modules (continued)

Analog Combo I/O Modules



C0-4AD2DA-1 C0-4AD2DA-2

Analog Combo I/O Modules			
Part Number	**Analog Input Type**	**Analog Output Type**	**External Power Required**
C0-4AD2DA-1	4 channel, current (0-20 mA), 13 bit	2 channel, current sourcing (4-20 mA), 12 bit	24 VDC
C0-4AD2DA-2	4 channel, voltage (0-10 V), 13 bit	4 channel, voltage (0-10 V), 12 bit	24 VDC

General Specifications For All CLICK PLC Products

These general specifications apply to all CLICK PLCs, optional I/O modules, and optional power supply products. Please refer to the appropriate I/O temperature derating charts under both the PLC and I/O module specifications to determine best operating conditions based on the ambient temperature of your particular application.

General Specifications	
Power Input Voltage Range	20–28 VDC
Maximum Power Consumption	5W (No 5V use from communication port)
Maximum Inrush Current	30A (less than 1ms)
Acceptable External Power Drop	Max 10ms
Operating Temperature	Analog, analog combo I/O modules only: 32°F to 140°F (0°C to 60°C); All other modules: 32°F to 131°F (0°C to 55°C), IEC 60068-2-14 (Test Nb, Thermal Shock)
Storage Temperature	–4°F to 158°F (–20°C to 70°C) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)
Ambient Humidity	30% to 95% relative humidity (non–condensing)
Environmental Air	No corrosive gases. Environmental pollution level is 2 (UL840)
Vibration	MIL STD 810C, Method 514.2, EC60068-2-6 JIS C60068-2-6 (Sine wave vibration test)
Shock	MIL STD 810C, Method 516.2, IEC60068-2-27, JIS C60068-2-27
Noise Immunity	Comply with NEMA ICS3-304, Impulse noise 1µs, 1000V EN61000-4-2 (ESD), EN61000-4-3 (RFI), EN61000-4-4 (FTB) EN61000-4-5 (Surge), EN61000-4-6 (Conducted) EN61000-4-8 (Power frequency magnetic field immunity) RFI: No interference measured at 150 and 450 MHz (5w/15cm)
Emissions	EN55011:1998 Class A
Agency Approvals	UL508 (File No. E157382, E316037); CE (EN61131-2)
Other	RoHS

CLICK Specifications

PLC Unit Specifications

Basic, Standard and Analog PLC Unit Specifications			
	Basic PLC	**Standard PLC**	**Analog PLC**
Control Method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method
I/O Numbering System	Fixed in Decimal	Fixed in Decimal	Fixed in Decimal
Ladder Memory (steps)	8000	8000	8000
Total Data Memory (words)	8000	8000	8000
Contact Execution (boolean)	< 0.6us	< 0.6us	< 0.6us
Typical Scan (1k boolean)	1-2 ms	1-2 ms	1-2 ms
RLL Ladder Style Programming	Yes	Yes	Yes
Run Time Edits	No	No	No
Scan	Variable / fixed	Variable / fixed	Variable / fixed
CLICK Programming Software for Windows	Yes	Yes	Yes
Built-in Communication Ports	Yes (two RS-232 ports)	Yes (two RS-232 ports and one RS-485 port)	Yes (two RS-232 ports and one RS-485 port)
FLASH Memory	Standard on PLC	Standard on PLC	Standard on PLC
Built-in Discrete I/O points	8 inputs, 6 outputs	8 inputs, 6 outputs	4 inputs, 4 outputs
Built-in Analog I/O Channels	No	No	2 inputs, 2 outputs
Number of Instructions Available	21	21	21
Control Relays	2000	2000	2000
System Control Relays	1000	1000	1000
Timers	500	500	500
Counters	250	250	250
Interrupt	Yes (external: 8 / timed: 4)	Yes (external: 8 / timed: 4)	Yes (external: 4 / timed: 4)
Subroutines	Yes	Yes	Yes
For/Next Loops	Yes	Yes	Yes
Math (Integer and Hex)	Yes	Yes	Yes
Drum Sequencer Instruction	Yes	Yes	Yes
Internal Diagnostics	Yes	Yes	Yes
Password Security	Yes	Yes	Yes
System Error Log	Yes	Yes	Yes
User Error Log	No	No	No
Memory Backup	Super Capacitor	Super Capacitor + Battery	Super Capacitor + Battery
Battery Backup	No	Yes (battery sold separately; part # D2-BAT-1)	Yes (battery sold separately; part # D2-BAT-1)
Calendar/Clock	No	Yes	Yes
I/O Terminal Block Replacement	ADC p/n C0-16TB	ADC p/n C0-16TB	ADC p/n C0-16TB
Communication Port & Terminal Block Replacement	N/A	ADC p/n C0-3TB	ADC p/n C0-3TB
24 VDC Power Terminal Block Replacement	ADC p/n C0-4TB	ADC p/n C0-4TB	ADC p/n C0-4TB

CLICK Specifications

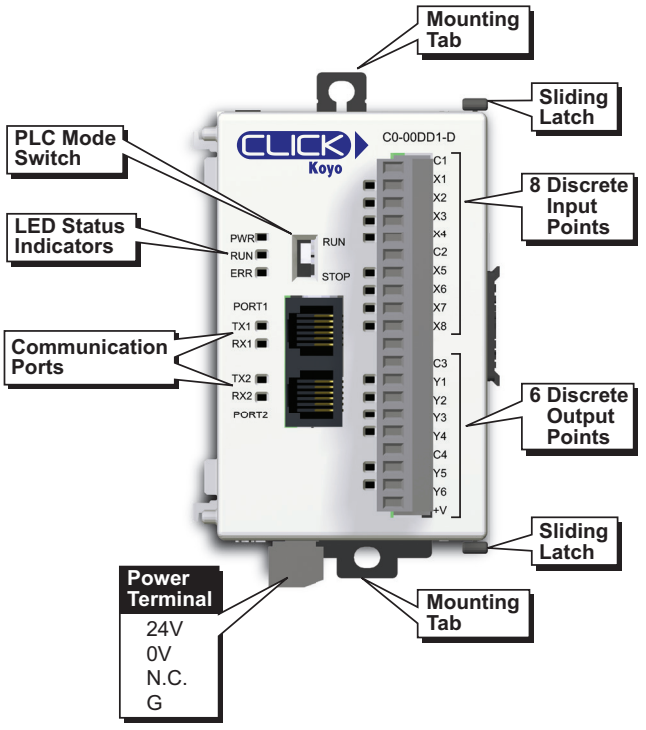
PLC Units Specifications (continued)

Ethernet Basic, Standard and Analog PLC Unit Specifications			
	Ethernet Basic PLC	**Ethernet Standard PLC**	**Ethernet Analog PLC**
Control Method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method
I/O Numbering System	Fixed in Decimal	Fixed in Decimal	Fixed in Decimal
Ladder Memory (steps)	8000	8000	8000
Total Data Memory (words)	8000	8000	8000
Contact Execution (boolean)	< 0.2 µs	< 0.2 µs	< 0.2 µs
Typical Scan (1k boolean)	< 1ms	< 1ms	< 1ms
RLL Ladder Style Programming	Yes	Yes	Yes
Run Time Edits	Yes	Yes	Yes
Scan	Variable / fixed	Variable / fixed	Variable / fixed
CLICK Programming Software for Windows	Yes	Yes	Yes
Built-in Communication Ports	Yes (one Ethernet port and one RS-232 port)	Yes (one Ethernet port, one RS-232 port and one RS-485 port)	Yes (one Ethernet port, one RS-232 port and one RS-485 port)
FLASH Memory	Standard on PLC	Standard on PLC	Standard on PLC
Built-in Discrete I/O points	8 inputs, 6 outputs	8 inputs, 6 outputs	4 inputs, 4 outputs
Built-in Analog I/O Channels	No	No	2 or 4 inputs; 2 outputs
Number of Instructions Available	21	21	21
Control Relays	2000	2000	2000
System Control Relays	1000	1000	1000
Timers	500	500	500
Counters	250	250	250
Interrupt	Yes (external: 8 / timed: 4)	Yes (external: 8 / timed: 4)	Yes (external: 8 / timed: 4)
Subroutines	Yes	Yes	Yes
For/Next Loops	Yes	Yes	Yes
Math (Integer and Hex)	Yes	Yes	Yes
Drum Sequencer Instruction	Yes	Yes	Yes
Internal Diagnostics	Yes	Yes	Yes
Password Security	Yes	Yes	Yes
System Error Log	Yes	Yes	Yes
User Error Log	No	No	No
Memory Backup	Super Capacitor + Battery	Super Capacitor + Battery	Super Capacitor + Battery
Battery Backup	Yes (battery part # D2-BAT-1)	Yes (battery part # D2-BAT-1)	Yes (battery part # D2-BAT-1)
Calendar/Clock	Yes	Yes	Yes
I/O Terminal Block Replacement	ADC p/n C0-16TB	ADC p/n C0-16TB	ADC p/n C0-16TB
Communication Port & Terminal Block Replacement	N/A	ADC p/n C0-3TB	ADC p/n C0-3TB
24 VDC Power Terminal Block Replacement	ADC p/n C0-4TB	ADC p/n C0-4TB	ADC p/n C0-4TB

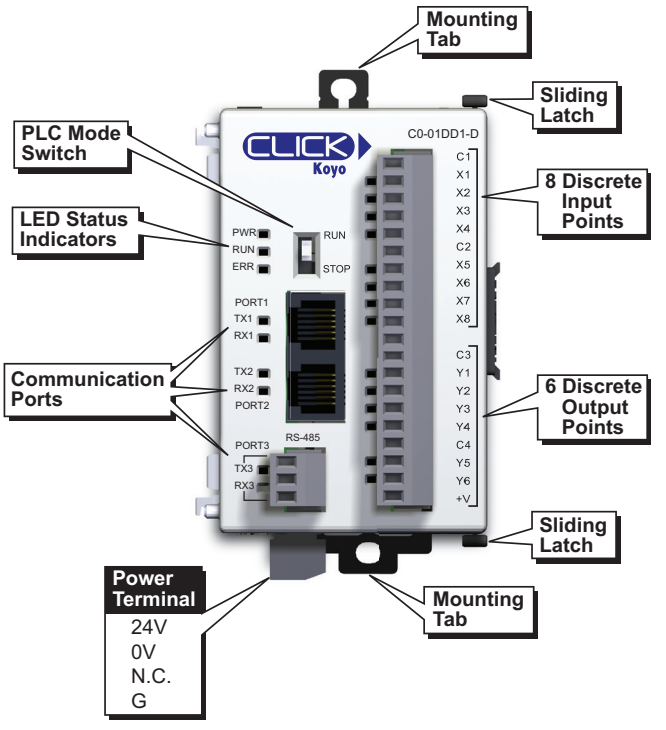
CLICK Specifications

PLC Features

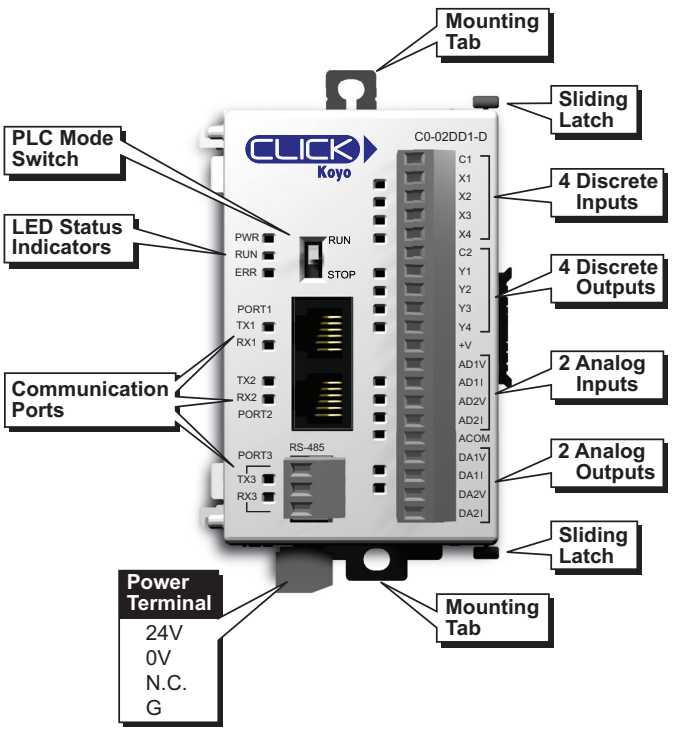
Basic PLCs



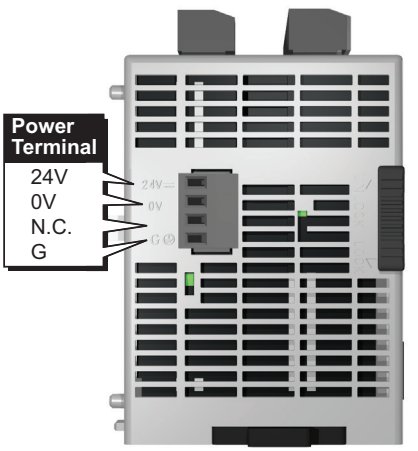
Standard PLCs



Analog PLCs



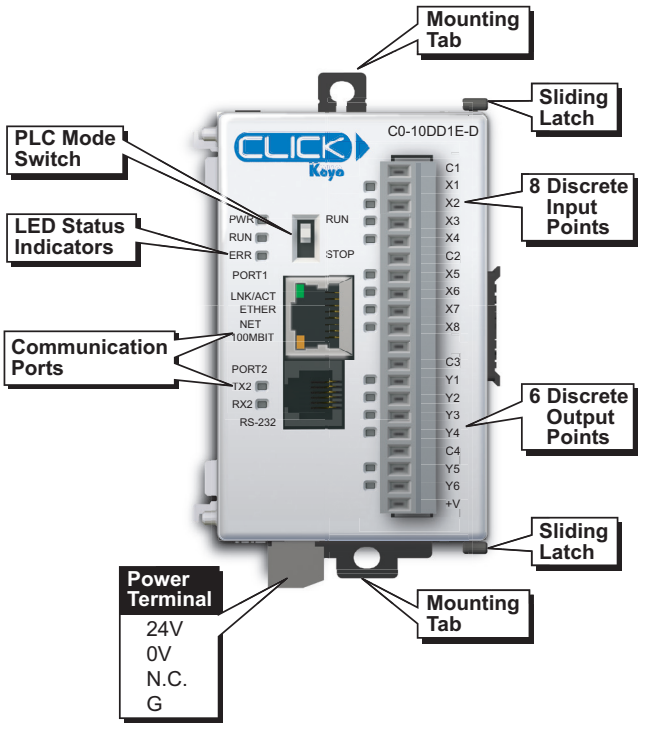
Bottom of PLC (Same on all models)



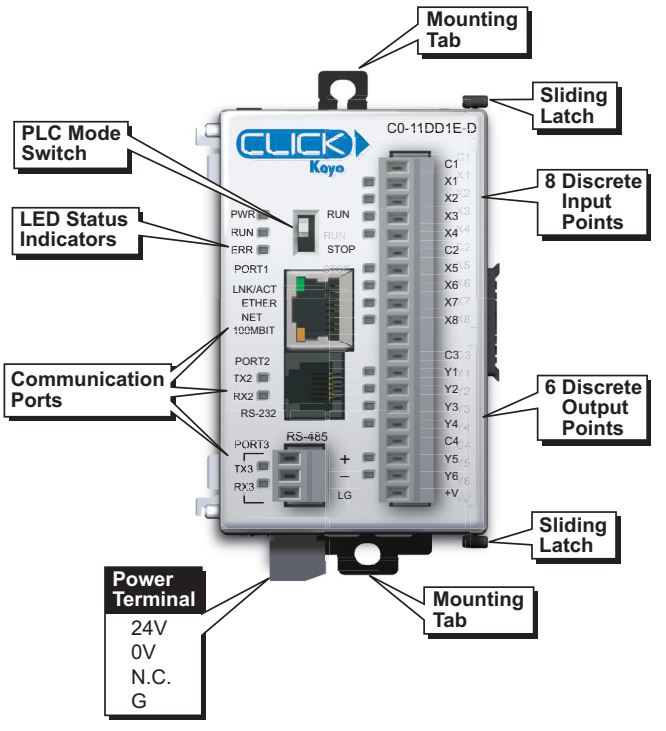
CLICK Specifications

PLC Features (continued)

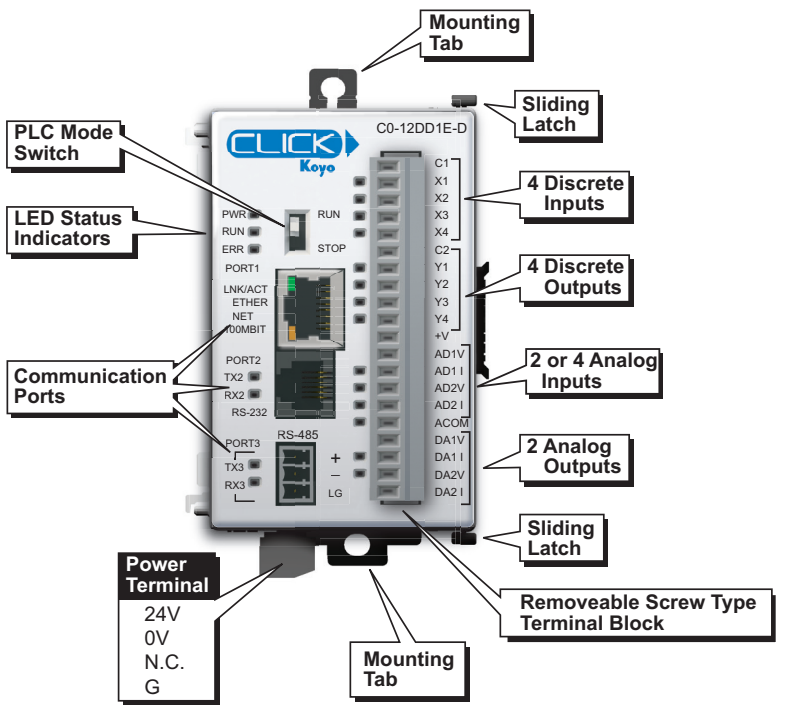
Ethernet Basic PLCs



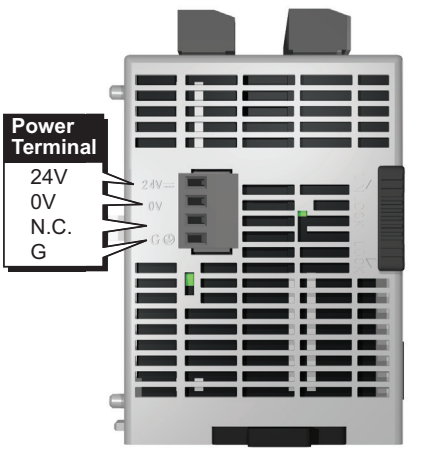
Ethernet Standard PLCs



Ethernet Analog PLCs



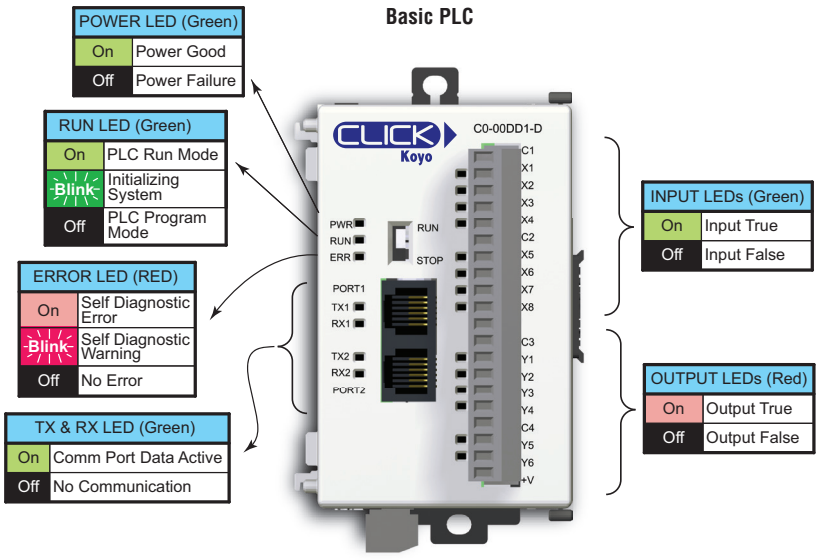
Bottom of Ethernet PLC (Same on all models)



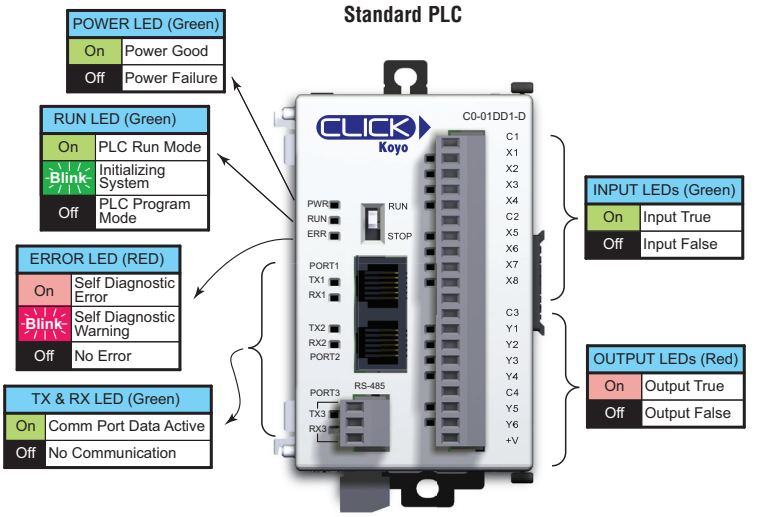
CLICK Specifications

PLC LED Status Indicators

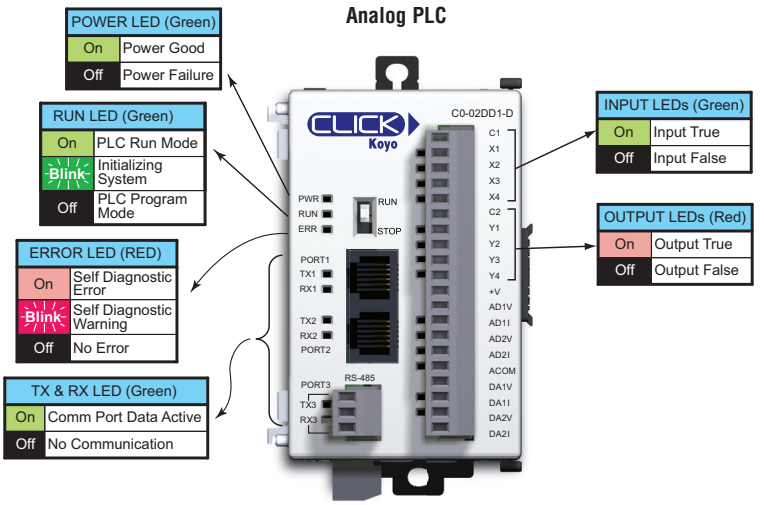
Basic PLC



Standard PLC



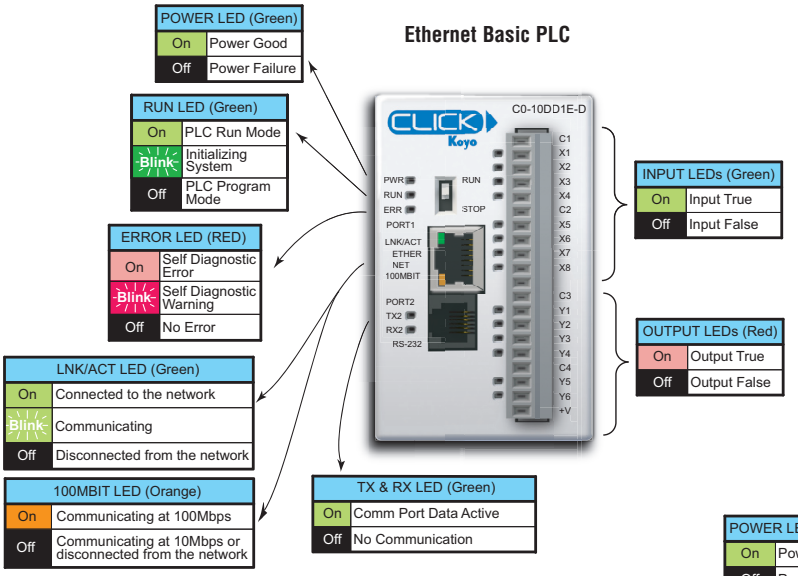
Analog PLC



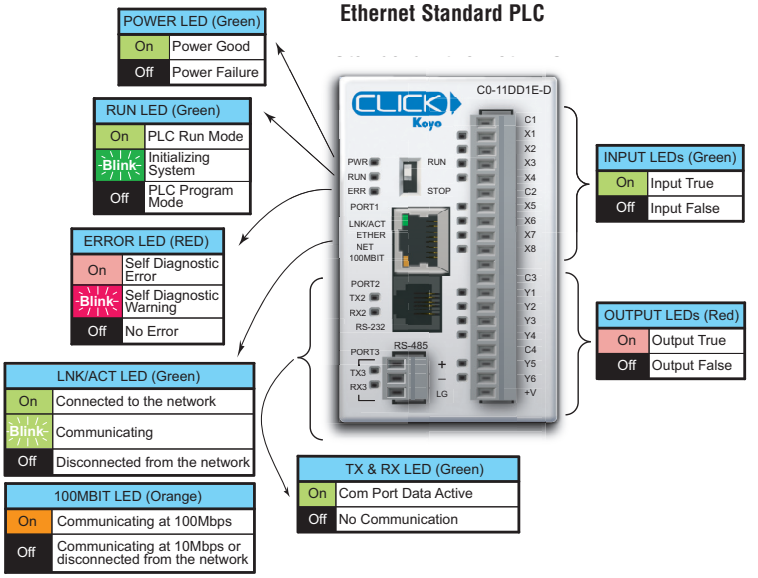
CLICK Specifications

PLC LED Status Indicators

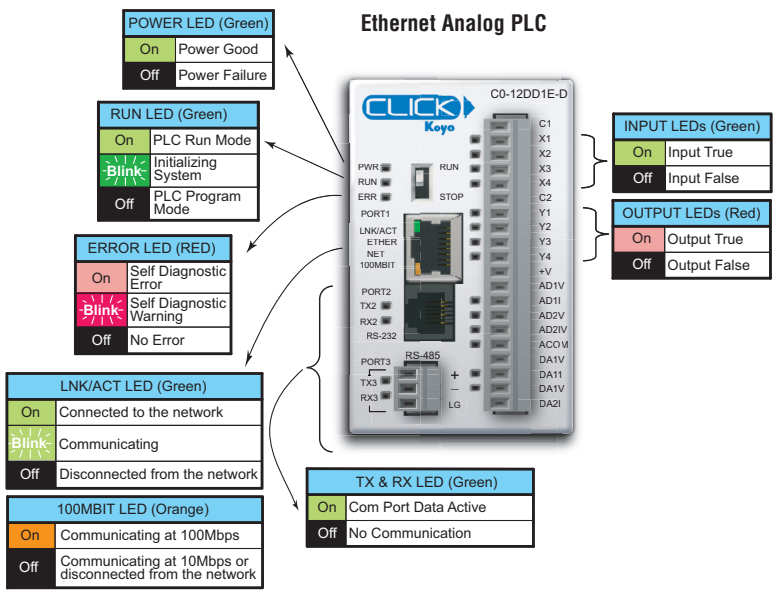
Ethernet Basic PLC



Ethernet Standard PLC



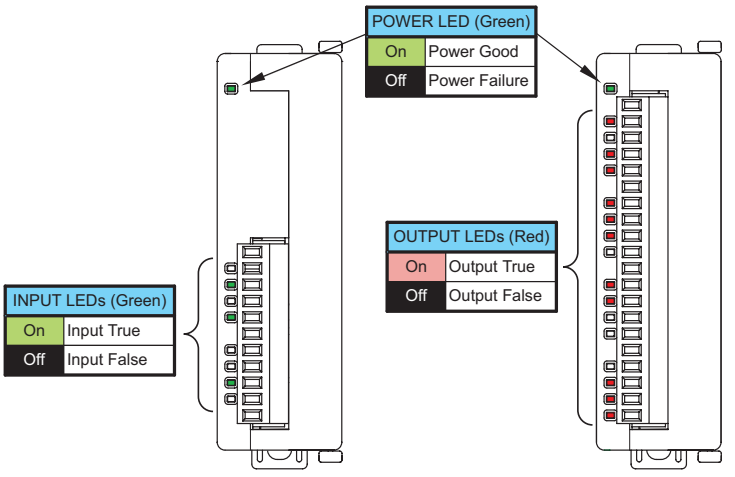
Ethernet Analog PLC



CLICK Specifications

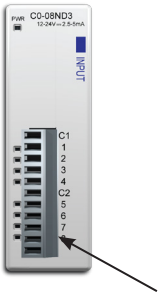
I/O Module LED Status Indicators

I/O Module LED Status Indicators



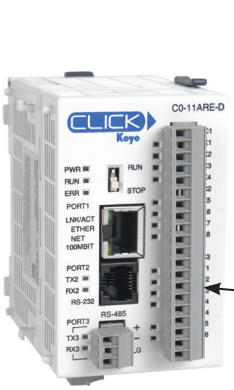
Note: There are no LED indications on the Analog I/O modules.

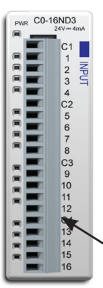
I/O Terminal Block Specifications for PLCs and I/O Modules



11-Pin Terminal Block, C0-8TB

11-pin Terminal Block Specifications	
Connector Type	Pluggable Terminal Block
Number of Pins	11
Pitch	3.50 mm
Wire Range	28–16 AWG
Wire Strip Length	7 mm
Screw Size	M2.0
Screw Torque	Analog, analog combo I/O modules only: 1.7 lb·in; All other modules: 2.0 to 2.2 lb·in
ADC Part Number	C0-8TB





20-Pin Terminal Block, C0-16TB

20-pin Terminal Block Specifications	
Connector Type	Pluggable Terminal Block
Number of Pins	20
Pitch	3.50 mm
Wire Range	28-16 AWG
Wire Strip Length	7 mm
Screw Size	M2.0
Screw Torque	Analog, analog combo I/O modules only: 1.7 lb·in; All other modules: 2.0 to 2.2 lb·in
ADC Part Number	C0-16TB

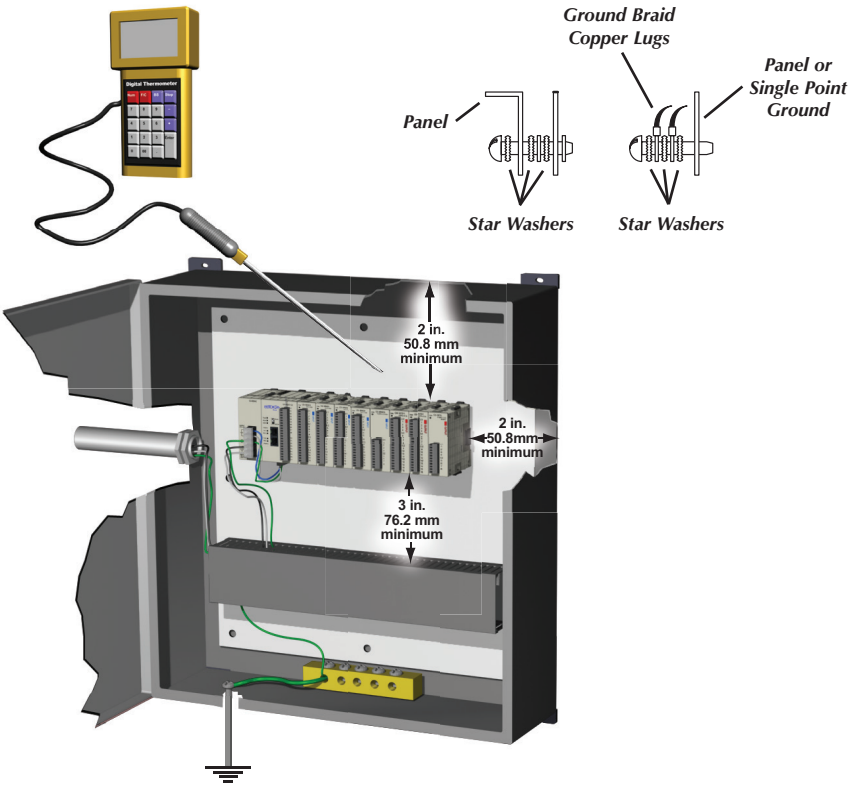
Product Dimensions and Installation

It is important to understand the installation requirements for your CLICK system. Your knowledge of these requirements will help ensure that your system operates within its environmental and electrical limits.

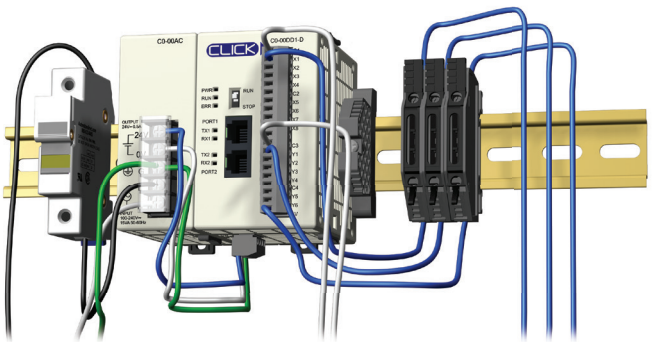
Plan for Safety

This catalog should never be used as a replacement for the user manual.

You can purchase, download free, or view online the user manuals for these products. Manual C0-USER-M is the user manual for the CLICK PLC. The user manual contains important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

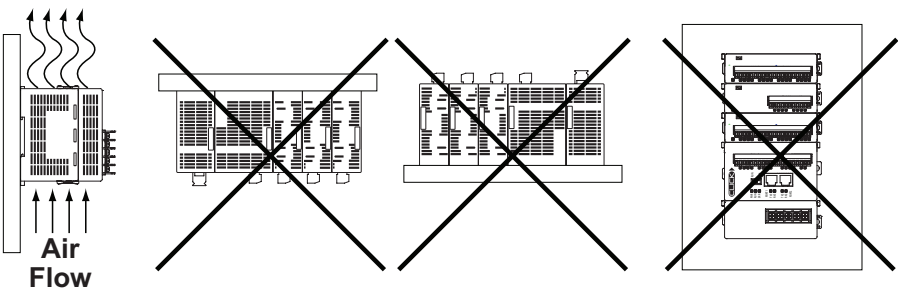


NOTE: THERE IS A MIMIMUM CLEARANCE REQUIREMENT OF 2 INCHES(51 MM) BETWEEN THE CLICK PLC AND THE PANEL DOOR OR ANY DEVICES MOUNTED IN THE PANEL DOOR. THE SAME CLEARANCE IS REQUIRED BETWEEN THE PLC AND ANY SIDE OF THE ENCLOSURE. A MINIMUM CLEARANCE OF 3 INCHES (76 MM) IS REQUIRED BETWEEN THE PLC AND A WIREWAY OR ANY HEAT PRODUCING DEVICE.



Mounting Orientation

CLICK PLCs must be mounted properly to ensure ample airflow for cooling purposes. It is important to follow the unit orientation requirements and to verify that the PLC's dimensions are compatible with your application. Notice particularly the grounding requirements and the recommended cabinet clearances.

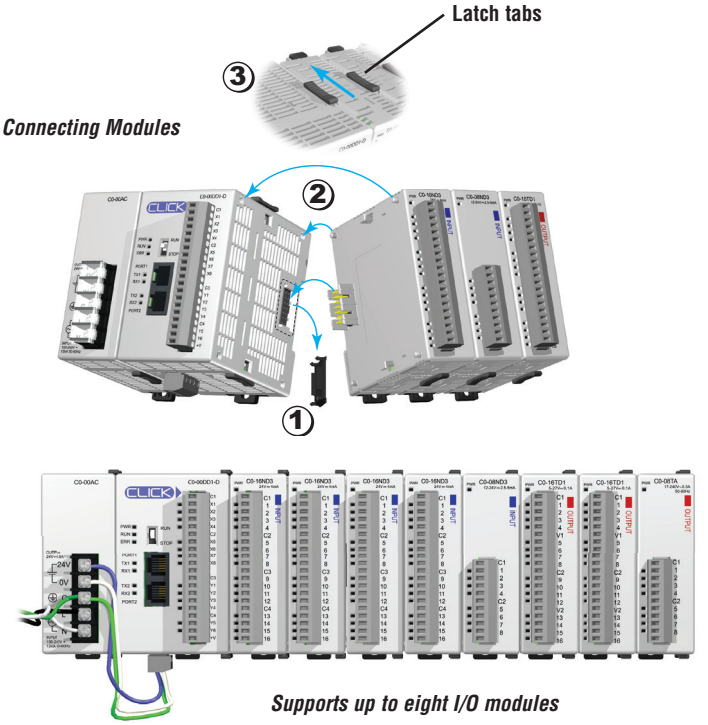


Product Dimensions and Installation

Connecting the Modules Together

CLICK PLCs, I/O modules and power supplies connect together using the extension ports that are located on the side panels of the modules (no PLC back-plane/base required).

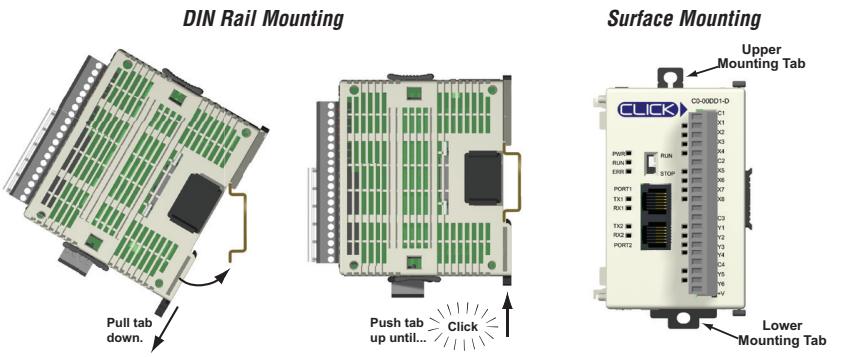
1. Remove extension port covers and slide the latch tabs forward.
2. Align the module pins and connection plug, and press the I/O module onto the right side of the PLC.
3. Slide the latch tabs backward to lock the modules together.



Mounting

The CLICK PLC system, which includes the CLICK power supplies, PLC units, and I/O modules, can be mounted in one of two ways.

1. DIN rail mounted
2. Surface mounted using the built-in upper and lower mounting tabs.



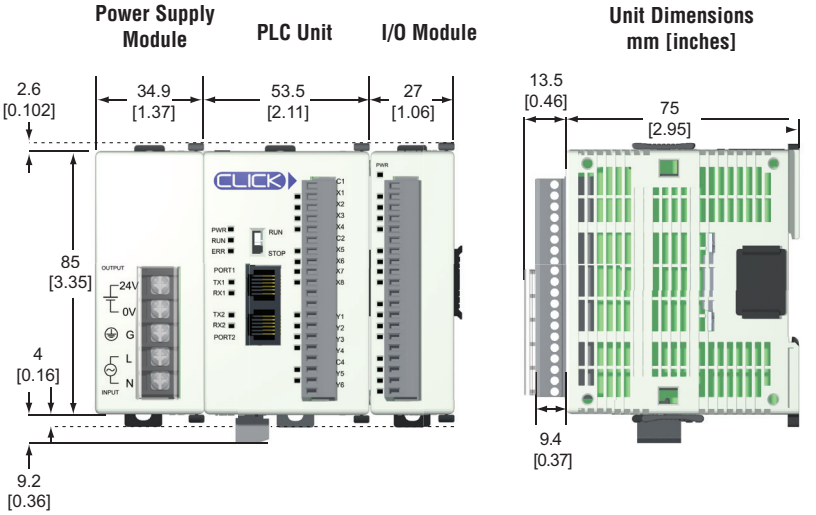
Unit Dimensions

The dimensional drawings here and on the next page show the outside dimensions of the CLICK power suppy, PLC, and I/O modules. The CLICK PLC system is designed to be mounted on standard 35mm DIN rail, or it can be surface mounted.

Allow proper spacing from other components within an enclosure.

Maximum system:

Power Supply + PLC + 8 I/O modules.

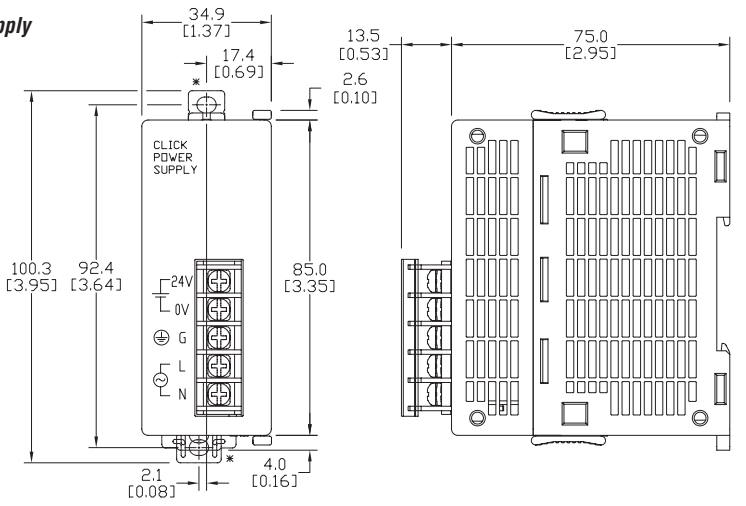


Product Dimensions and Installation

Unit Dimensions

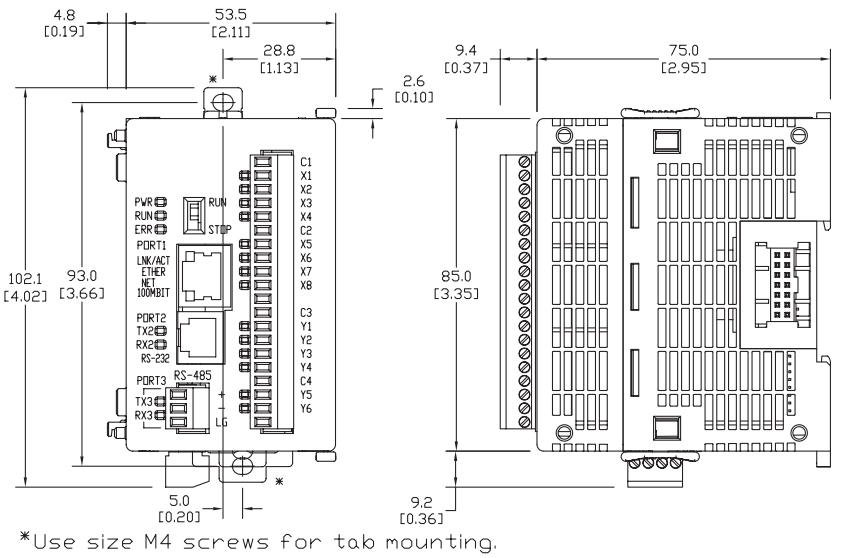
mm [inches]

Power Supply



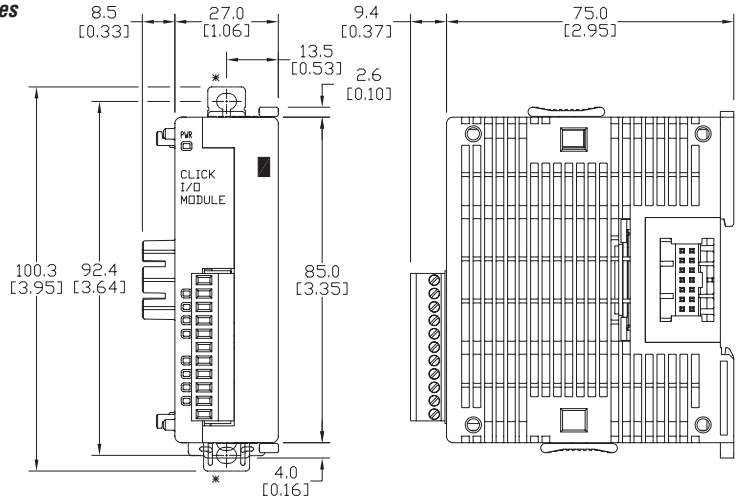
*Use size M4 screws for tab mounting.

PLC Units



*Use size M4 screws for tab mounting.

I/O Modules



*Use size M4 screws for tab mounting.

Networking the CLICK PLC

Built-in Communications Ports

Basic, Standard and Analog PLCs have two built-in RS-232 communications ports. Standard and Analog PLCs also have one built-in RS-485 communications port. One RS-232 port supports the Modbus RTU protocol only and can be used as the programming port. The other ports support either Modbus RTU or ASCII protocol. Both RS-232 ports supply 5V DC, so you can connect a monochrome C-more Micro HMI panel without an additional power supply.

LED Status Indicators

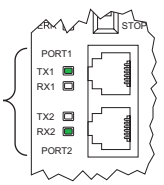
There are LED indicators located to the left of each communications port to indicate when the port is transmitting or receiving.

Basic PLCs

Port 1 & 2 LED Status Indicators

TX1 and TX2 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

RX1 and RX2 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.

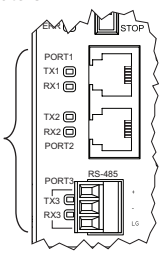


Standard and Analog PLCs

Port 1, 2, & 3 LED Status Indicators

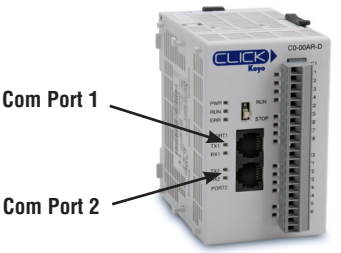
TX1, TX2 and TX3 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

RX1, RX2 and RX3 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.

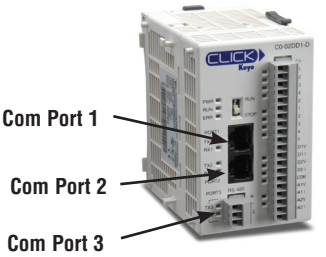


Port Setup

Use CLICK programming software to easily configure the communications ports.



Basic PLC

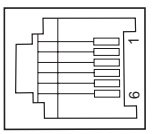


Standard and Analog PLCs

Com Port 1 Specifications
Use: Programming Port / Serial Communications (Slave only)
Physical: 6 pin, RJ12, RS-232
Communication speed (baud): 38400 (fixed)
Parity: Odd
Station Address: 1
Data length: 8 bits
Stop bit: 1
Protocol: Modbus RTU (slave only)

Port 1

6 pin RJ12 Phone Type Jack

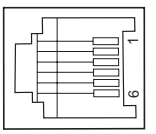


Port 1 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	NC	No connection
6	0V	Power (-) connection (GND)

Com Port 2 Specifications	Default
Use: Serial Communications	-
Physical: 6 pin, RJ12, RS-232	-
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 2

6 pin RJ12 Phone Type Jack

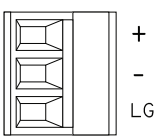


Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

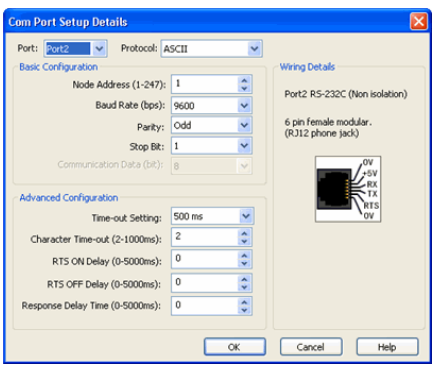
Com Port 3 Specifications	Default
Use: Serial Communications	-
Physical: 3 pin, RS-485	-
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 3

RS-485



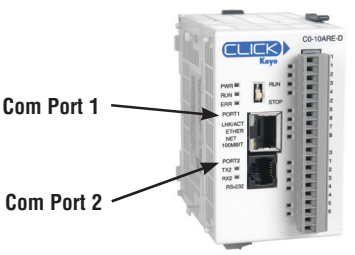
Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground(0 V)



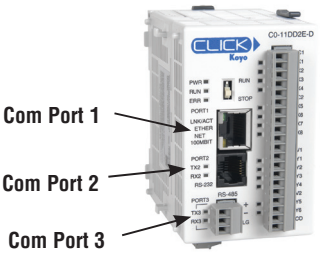
Networking the CLICK PLC

Built-in Communications Ports

Ethernet Basic, Standard and Analog PLCs have one built-in Ethernet communications port and one RS-232 communications port. Ethernet Standard and Analog PLCs also have one built-in RS-485 communications port. The Ethernet port supports the Modbus TCP protocol. The RS-232 and RS-485 ports support either Modbus RTU or ASCII protocol. The RS-232 port supplies 5 VDC, so you can connect a monochrome C-more Micro HMI panel without an additional power supply.



Ethernet Basic PLC

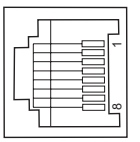


Ethernet Standard and Ethernet Analog PLCs

Com Port 1 Specifications
Use: Programming and Ethernet Communication
Physical: 8 pin, RJ45, Ethernet
Communication speed (Mbps): 10/100
Protocol: Modbus TCP

Port 1

8 pin RJ45

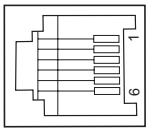


Port 1 Pin Descriptions		
1	TX+	Transmit Data (+)
2	TX-	Transmit Data (-)
3	RX+	Receive data (+)
4	NC	Not connected
5	NC	Not connected
6	RX-	Receive Data (-)
7	NC	No connection
8	NC	No connection

Com Port 2 Specifications	Default
Use: Serial Communication	-
Physical: 6 pin, RJ12, RS-232	-
Communication speed (baud): 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 2

6 pin RJ12 Phone Type Jack



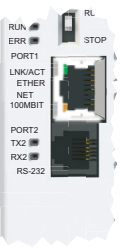
Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

Ethernet Basic PLCs

Port 1 & 2 LED Status Indicators

LNK/ACT LED (Green)	
On	Connected to the network
Blink	Communicating
Off	Disconnected from the network

100MBIT LED (Orange)	
On	Communicating at 100Mbps
Off	Communicating at 10Mbps or disconnected from the network



TX2 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

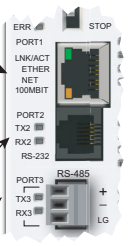
RX2 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.

Ethernet Standard and Ethernet Analog PLCs

Port 1, 2 & 3 LED Status Indicators

LNK/ACT LED (Green)	
On	Connected to the network
Blink	Communicating
Off	Disconnected from the network

100MBIT LED (Orange)	
On	Communicating at 100Mbps
Off	Communicating at 10Mbps or disconnected from the network



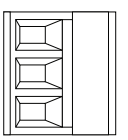
TX2 and TX3 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

RX2 and RX3 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.

Com Port 3 Specifications	Default
Use: Serial Communication	-
Physical: 3 pin, RS-485	-
Communication speed (baud): 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 3

RS-485



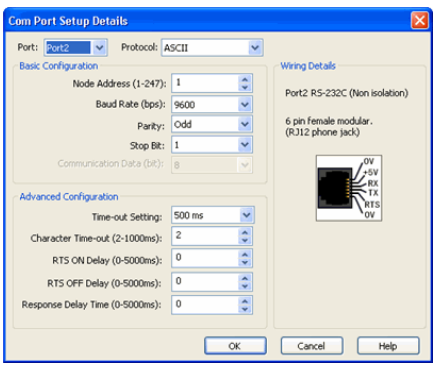
Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground(0 V)

LED Status Indicators

There are LED indicators located to the left of each communication port to indicate when the port is transmitting or receiving.

Port Setup

Use CLICK programming software to easily configure the communication ports.

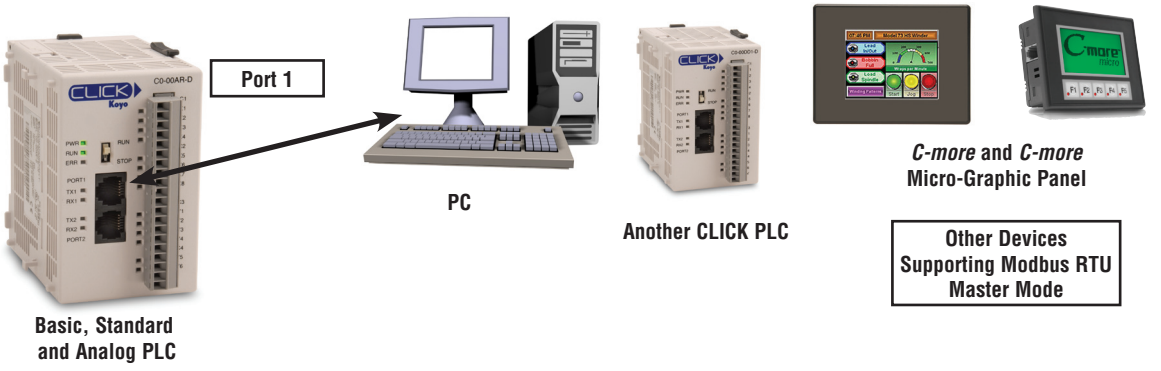


Networking the CLICK PLC

Typical Communication Applications

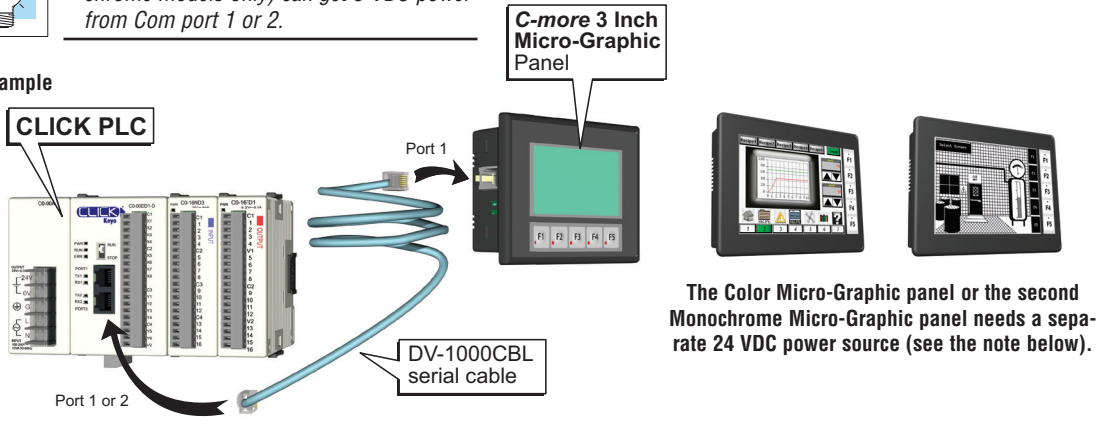
The diagrams on these three pages illustrate the typical uses for the CLICK PLC's communication ports.

Port 1 (RS-232) – Modbus RTU Slave Mode Only



C-more Micro-Graphic panels (monochrome models only) can get 5 VDC power from Com port 1 or 2.

Example



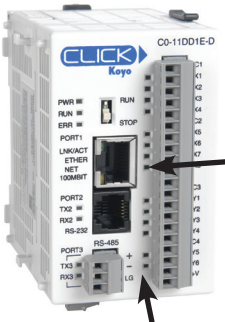
NOTE: *CLICK's (RS-232) Port 1 and Port 2 can provide 5 VDC power to the panel, but not at the same time. If a C-more Micro-Graphic panel is connected to both ports, then at least one of the panels must be powered by a C-more Micro DC power adapter, EA-MG-P1 or EA-MG-SP1, or another 24 VDC power source. Color C-more Micro-Graphic panels must also be powered from a separate 24 VDC source.*

Do not use the following *Direct*LOGIC devices with CLICK's Port 1 or 2:

WARNING: The following *Direct*LOGIC PLC devices cannot be used with a CLICK PLC's Port 1 or Port 2:
Handheld Programmer for DL05, DL06, DL105, DL205 & D3-350 CPUs, p/n D2-HPP
Handheld Programmer for DL405 CPUs, p/n D4-HPP-1
Timer/Counter Access for DL05, DL06, DL105, DL205, DL405 & D3-350 CPUs, p/n DV-1000

Networking the CLICK PLC

Port 1 (Ethernet) – Modbus TCP



Port 1

All CLICK Ethernet PLCs

Modbus TCP Client (Master) Devices

PC

Another CLICK Ethernet PLC

C-more Panel

Other Devices Supporting Modbus TCP Client Mode

Modbus TCP Server (Slave) Devices

Another CLICK Ethernet PLC

Other Devices Supporting Modbus TCP Server Mode

ViewMarq Display

SR55 Soft Starter

GS1 Drive

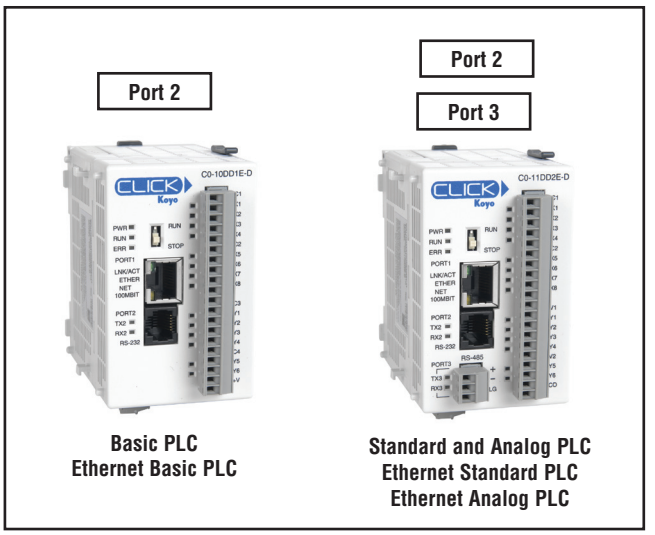
GS3 Drive

Networking the CLICK PLC

Port 2 (RS-232) – Modbus RTU or ASCII

Port 3 (RS-485; Standard, Analog, Ethernet Standard and Ethernet Analog PLCs) – Modbus RTU or ASCII

All PLCs have RS-232 port 2, but only Standard, Analog, Ethernet Standard and Ethernet Analog PLCs have RS-485 port 3. Ports 2 and 3 allow networking to similar devices.



Modbus RTU

Modbus RTU Master Devices

PC

Another CLICK PLC

C-more and *C-more* Micro-Graphic Panel

See Note on previous page about connecting a C-more Micro-Graphic panel to Port 1 or 2.

Other Devices Supporting Modbus RTU Master Mode

ASCII

Devices that SEND ASCII messages

Barcode Reader

Weigh Scale

Other devices that can send ASCII data.

Devices that RECEIVE ASCII messages

Serial Printer

ViewMarq Display

Other devices that can receive ASCII data.

Modbus RTU Slave Devices

Another CLICK PLC

SOLO Temperature Controller (CLICK Port 3 Only)

Other Devices Supporting Modbus RTU Slave Mode

Power Supplies

Power Supplies

The CLICK PLC family offers two 24 VDC power supplies. They are identical except for the output current.

It is not mandatory to use one of these CLICK power supplies for the CLICK PLC system. You can use any other 24 VDC power supply that Automationdirect.com offers, including the PSP24-DC12-1 12 VDC to 24 VDC converter shown below.

C0-00AC Power Supply

Limited auxiliary AC power supply allows you to power the 24 VDC CLICK C0 series PLCs with 100-240 VAC supply power. The 0.5A DC power supply is capable of controlling the PLC plus a limited configuration based on the power budget of each I/O module. The C0-00AC is a low-cost solution for applications requiring only minimal I/O and power consumption. This power supply will not support a fully-populated CLICK PLC system with all possible I/O module combinations.

C0-01AC Power Supply

Expanded auxiliary AC power supply allows you to power the 24 VDC CLICK C0 series PLCs with 100-240 VAC supply power. The 1.3A DC power supply is capable of supporting a fully-populated CLICK PLC system with all possible I/O module combinations, with no concerns for exceeding the power budget.

PSP24-DC12-1 DC-DC Converter

With this DC-DC converter you can operate the CLICK PLC with 12 VDC input power.

CLICK 24 VDC Power Supply Ratings		
Part Number	**Output Current**	**Price**
C0-00AC	0.5 A	$29.00
C0-01AC	1.3 A	$39.00

C0-00AC Power Supply Specifications	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz
Input Current (typical)	0.3 A @ 100 VAC, 0.2 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	0.5 A
Over Current Protection	@ 0.65 A (automatic recovery)
Weight	5.3 oz (150g)

C0-01AC Power Supply Specifications	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz
Input Current (typical)	0.9 A @ 100 VAC, 0.6 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	1.3 A
Over Current Protection	@ 1.6 A (automatic recovery)
Weight	6.0 oz (170g)

PSP24-DC12-1 DC-DC Converter Specifications	
Input Voltage Range	9.5-18 VDC
Input Power (no load)	1.0 W max.
Startup Voltage	8.4 VDC
Undervoltage Shutdown	7.6 VDC
Output Voltage Range	24-28 VDC (adjustable)
Output Current	1.0 A
Short Circuit Protection	Current limited at 110% typical
Weight	7.5 oz (213g)

C0-00AC

24 VDC Output Power Terminals (for CLICK PLC, I/O or field device, etc.)

85-264 VAC Power Source Input Terminals

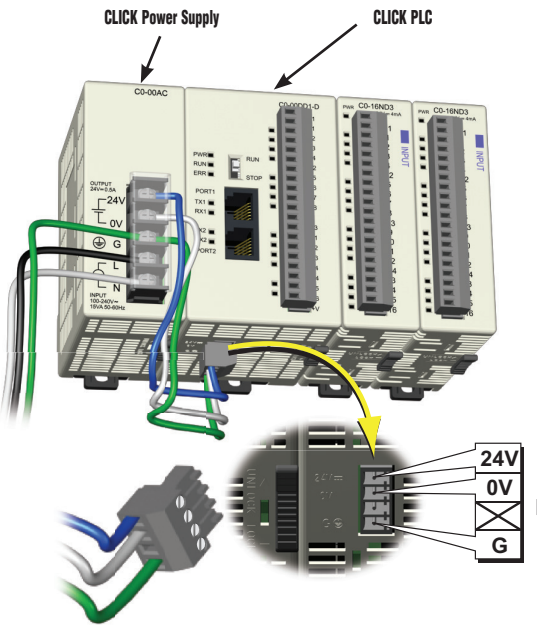
C0-01AC

24 VDC Output Power Terminals (for CLICK PLC, I/O or field device, etc.)

85-264 VAC Power Source Input Terminals

PSP24-DC12-1

CLICK Power Supply **CLICK PLC**



24 VDC power is supplied to the PLC unit through wiring connected from the power supply output to the 4-pin 24 VDC input connector located on the bottom of the PLC unit.

Power Budgeting

Power Budgeting

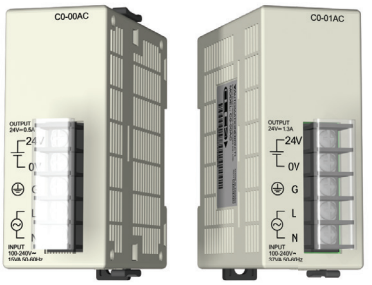
There are two areas to be considered when determining the power required to operate a CLICK PLC system. The first area is the power required by the CLICK PLC, along with the internal logic side power that the CPU provides to its own I/O and any connected I/O modules that are powered through the PLC expansion port; plus any device, such as a C-more Micro-Graphic panel, that is powered through one of the communications ports.

The second area is the power required by all externally connected I/O devices. This should be viewed as the field side power required. The field side power is dependent on the voltage used for a particular input or output device as it relates to the wired I/O point, and the calculated load rating of the connected device.

It is strongly recommended that the power source for the logic side be separate from the power source for the field side to help eliminate possible electrical noise.

Power budgeting requires the calculation of the total current the 24 VDC power source needs to provide to CLICK's logic side, and also a separate calculation of the total current required for all devices operating from the field side of the PLC system.

Refer to the Power Budgeting example shown on the following page. The table shows required current for a CLICK PLC, two I/O modules, and a C-more Micro. Use the total amperage values to select the properly sized power supply.



CLICK 24 VDC Power Supply
C0-00AC or C0-01AC

Other 24 VDC Power Supply
Example: PSP24-60S

Power Consumption for CLICK PLC Units

PLC Current Consumption (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Basic PLC Units		
C0-00DD1-D	120	60
C0-00DD2-D	120	0
C0-00DR-D		
C0-00AR-D		
Standard PLC Units		
C0-01DD1-D	140	60
C0-01DD2-D	140	0
C0-01DR-D		
C0-01AR-D		
Analog PLC Units		
C0-02DD1-D	140	60
C0-02DD2-D	140	0
C0-02DR-D		
Ethernet Basic PLC Units		
C0-10DD1E-D	120	60
C0-10DD2E-D	120	0
C0-10DRE-D		
C0-10ARE-D		
Ethernet Standard PLC Units		
C0-11DD1E-D	140	60
C0-11DD2E-D	140	0
C0-11DRE-D		
C0-11ARE-D		

PLC Current Consumption (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Ethernet Analog PLC Units		
C0-12DD1E-D	140	60
C0-12DD2E-D		0
C0-12DRE-D	160	
C0-12ARE-D		
C0-12DD1E-1-D	140	60
C0-12DD2E-1-D		0
C0-12DRE-1-D	160	
C0-12ARE-1-D		
C0-12DD1E-2-D	140	60
C0-12DD2E-2-D		0
C0-12DRE-2-D	160	
C0-12ARE-2-D	140	

Power Budgeting

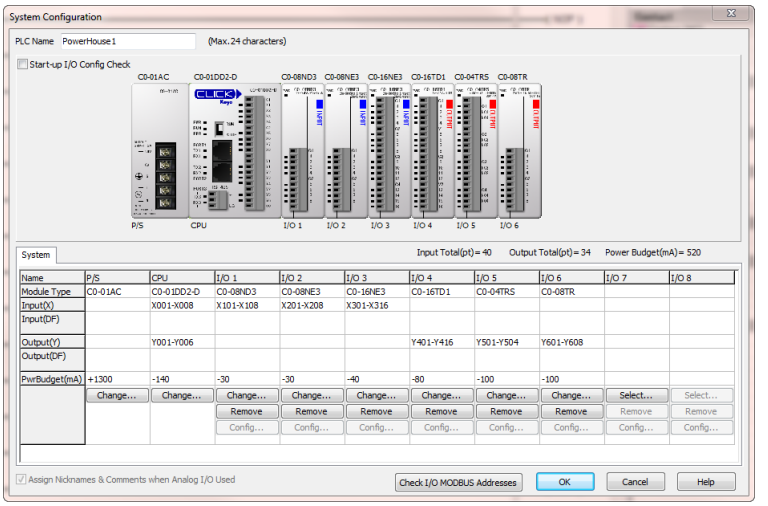
Power Consumption for CLICK I/O Expansion Modules

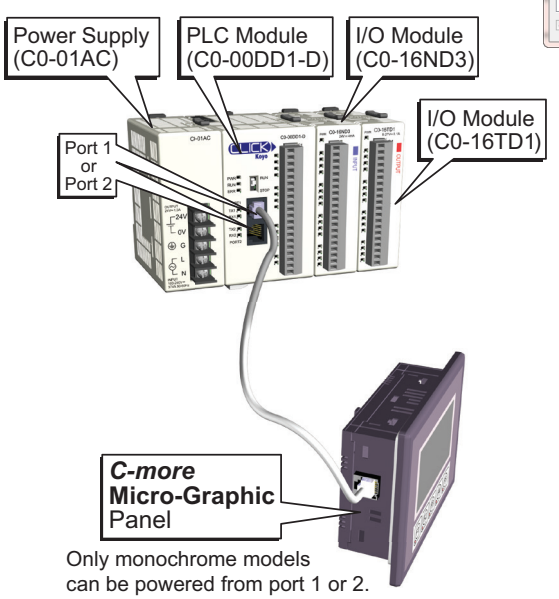
I/O Module Current Consumption (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Discrete Input Modules		
C0-08ND3	30	0
C0-08ND3-1	30	0
C0-16ND3	40	0
C0-08NE3	30	0
C0-16NE3	40	0
C0-08NA	30	0
Discrete Output Modules		
C0-08TD1	50	15
C0-08TD2	50	0
C0-16TD1	80	100
C0-16TD2	80	0
C0-08TA	80	0
C0-04TRS	100	0
C0-08TR	100	0

I/O Module Current Consumption (continued) (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Discrete Combo I/O Modules		
C0-16CDD1	80	50
C0-16CDD2	80	0
C0-08CDR	80	0
Analog Input Modules		
C0-04AD-1	20	65
C0-04AD-2	23	65
C0-04RTD	25	0
C0-04THM	25	0
Analog Output Modules		
C0-04DA-1	20	145
C0-04DA-2	20	85
Analog Combo I/O Modules		
C0-4AD2DA-1	25	75
C0-4AD2DA-2	20	65
C-more Micro-Graphic Panel		
Monochrome only	90	0

Power Budgeting Using the CLICK Programming Software

The CLICK Programming software can also be used for power budgeting. Based on the amperage rating of the power supply selected in the first column, your power budget is calculated by subtracting each consecutive module's power consumption from the total available power budget. If you exceed the maximum allowable power consumption the power budget row is highlighted in red.





Power Budgeting Example

Current Consumption (mA) Example		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
C0-00DD1-D	120	60
C0-16ND3	40	0
C0-16TD1	80	100
C-more Micro	90	0
Total:	330	160*
* Add in calculated load of connected I/O devices.		

Wiring System for CLICK PLCs

Wiring Solutions using the *ZIP*Link Wiring System

*ZIP*Links eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using half the space at a fraction of the cost of standard terminal blocks.

*ZIP*Links are available in a variety of styles to suit your needs, including feedthrough connector module. *ZIP*Links are available for all Basic, Standard and Ethernet CLICK PLC units and most discrete and analog I/O modules. Pre-printed I/O-specific adhesive label strips for quick marking of *ZIP*Link modules are provided with *ZIP*Link cables.

Solution 1: CLICK PLC and I/O Modules to *ZIP*Link Connector Modules

When looking for quick and easy I/O-to-field termination, a *ZIP*Link connector module used in conjunction with a prewired *ZIP*Link cable, consisting of an I/O terminal block at one end and a multi-pin connector at the other end, is the best solution.

Use the "CLICK PLC PLC Unit *ZIP*Link Selector" table and CLICK I/O *ZIP*Link selector tables located in this section:

1. Locate your PLC or I/O module.
2. Select a *ZIP*Link Module.
3. Select a corresponding *ZIP*Link Cable.

Solution 2: CLICK PLC and I/O Modules to 3rd Party Devices

When wanting to connect I/O to another device within close proximity of the I/O modules, no extra terminal blocks are necessary when using the *ZIP*Link Pigtail Cables. *ZIP*Link Pigtail Cables are prewired to an I/O terminal block with color-coded pigtail with soldered-tip wires on the other end.

Use the I/O Modules to 3rd Party Devices selector tables located in the *ZIP*Link section:

1. Locate your PLC or I/O module.
2. Select a *ZIP*Link Pigtail Cable that is compatible with your 3rd party device.

Solution 3: GS Series and DuraPulse Drives Communication Cables

Need to communicate via Modbus RTU to a drive or a network of drives?

*ZIP*Link cables are available in a wide range of configurations for connecting to PLCs and SureServo, SureStep, Stellar Soft Starter and AC drives. Add a *ZIP*Link communications module to quickly and easily set up a multi-device network.

Use the Drives Communication selector tables located in the *ZIP*Link section:

1. Locate your Drive and type of communications.
2. Select a *ZIP*Link cable and other associated hardware.

Solution 4: Serial Communications Cables

*ZIP*Link offers communications cables for use with CLICK PLCs that can also be used with other communications devices. Connections include a 6-pin RJ12 connector which can be used in conjunction with the RJ12 Feedthrough module.

Use the Serial Communications Cables selector table located in the *ZIP*Link section:

1. Locate your connector type
2. Select a cable.

Wiring System for CLICK PLCs

CLICK PLC *ZIP*Link Selector				
PLC		***ZIP*Link**		
PLC Unit	***# of Terms***	***Component***	***Module Part No.***	***Cable Part No.***
C0-00DD1-D	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
C0-00DD2-D				
C0-00DR-D				
C0-00AR-D				
C0-01DD1-D				
C0-01DD2-D				
C0-01DR-D				
C0-01AR-D				
C0-02DD1-D	No *ZIP*Links are available for Analog PLC units.			
C0-02DD2-D				
C0-02DR-D				
C0-10DD1E-D	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
C0-10DD2E-D				
C0-10DRE-D				
C0-10ARE-D				
C0-11DD1E-D				
C0-11DD2E-D				
C0-11DRE-D				
C0-11ARE-D				
C0-12DD1E-D	No *ZIP*Links are available for Ethernet Analog PLC units.			
C0-12DD2E-D				
C0-12DRE-D				
C0-12ARE-D				
C0-12DD1E-1-D				
C0-12DD2E-1-D				
C0-12DRE-1-D				
C0-12ARE-1-D				
C0-12DD1E-2-D				
C0-12DD2E-2-D				
C0-12DRE-2-D				
C0-12ARE-2-D				

1 Note: The C0-04TRS relay output is derated not to exceed 2A per point maximum when used with the ZIPLink wiring system.

2 Note: Fuses (5 x 20 mm) are not included. See Edison Electronic Fuse section for (5 x 20 mm) fuse. S500 and GMA electronic circuit protection for fast-acting maximum protection. S506 and GMC electronic circuit protection for time-delay performance. Ideal for inductive circuits.
To ensure proper operation, do not exceed the voltage and current rating of ZIPLink module. ZL-RFU20 = 2A per circuit.

CLICK PLC Discrete Input Module *ZIP*Link Selector				
I/O Module		***ZIP*Link**		
Input Module	***# of Terms***	***Component***	***Module Part No.***	***Cable Part No.***
C0-08ND3	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-08ND3-1				
C0-08NE3				
C0-08NA				
C0-16ND3	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
		Sensor	ZL-LTB16-24	
C0-16NE3	20	Feedthrough	ZL-RTB20	
		Sensor	ZL-LTB16-24	

CLICK PLC Discrete Output Module *ZIP*Link Selector				
I/O Module		***ZIP*Link**		
Output Module	***# of Terms***	***Component***	***Module Part No.***	***Cable Part No.***
C0-08TD1	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-08TD2				
C0-08TR				
C0-08TA				
C0-16TD1	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20*
		Fuse	ZL-RFU20 [2]	
		Relay (sinking)	ZL-RRL16-24-1	
C0-16TD2	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
		Fuse	ZL-RFU20 [2]	
		Relay (sourcing)	ZL-RRL16-24-2	
C0-04TRS[1]	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *

CLICK PLC Combo I/O Module *ZIP*Link Selector				
I/O Module		***ZIP*Link**		
Combo Module	***# of Terms***	***Component***	***Module Part No.***	***Cable Part No.***
C0-16CDD1	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
C0-16CDD2				
C0-08CDR	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *

CLICK PLC Analog I/O Module *ZIP*Link Selector				
I/O Module		***ZIP*Link**		
Analog Module	***# of Terms***	***Component***	***Module Part No.***	***Cable Part No.***
C0-04AD-1	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-04AD-2	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-04RTD	20	No *ZIP*Links are available for RTD and thermocouple modules.		
C0-04THM	11			
C0-04DA-1	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-04DA-2	11	Feedthrough	ZL-RTB20	ZL-C0-CBL11 *
C0-4AD2DA-1	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *
C0-4AD2DA-2	20	Feedthrough	ZL-RTB20	ZL-C0-CBL20 *

**** Select the cable length by replacing the * with: Blank = 0.5m, -1 = 1.0m, or -2 = 2.0m.***

RHINO PSB Series DIN rail Power Supplies

Single-Phase Input

AutomationDirect's RHINO PSB series of DIN rail power supplies is perfect for applications that require a basic DC voltage power supply. These low cost power supplies offer high performance and reliability without all the additional features of higher cost full-featured power supplies. The following models in the RHINO PSB series are available with universal single-phase input and with output voltages of 12 and 24VDC from 15 to 480 Watts. The rugged plastic and aluminum housings easily install with integral 35mm DIN-rail mounting adapters. These high-quality power supplies include overload, overvoltage and thermal protection, and are UL 508 listed, UL 60950 recognized, CSA certified, CE marked and RoHS compliant.

Features

- Universal input voltage, 120/240 VAC or 120–375 VDC single phase
- 24VDC or 12VDC outputs, 15 to 480 Watts
- Adjustable output voltage
- Rugged plastic or aluminum housings with integral 35mm DIN-rail mounting adapters
- Output voltage status LED
- Robust fixed-screw terminal strips with finger-safe covers
- Overload, overvoltage and thermal protection
- UL 508 listed, UL 60950 recognized, CSA certified, CE marked and RoHS compliant
- Three year warranty

PSB Single-Phase Series Input Specifications

Part No.	Price	Weight	Housing	Input Voltage	Input Frequency Range	Max. Input Current	Inrush Current Limitation I^2t @ 77°F [+25°C] typ.	Leakage Current	Recommended Circuit Breaker	Hold-Up Time at Nominal Load (Typ.) (Mains Buffering)	Turn-on Time
PSB12-015-P	$21.50	0.175 kg [0.39 lb]	Plastic	85–264 VAC (DC input range 120–375 VDC); Nominal 100–240 VAC	47–63 Hz (0Hz @ DC Input)	<0.37 A @ 115VAC, <0.22 A @ 230VAC	<30A @ 115 AC, <65A @ 230VAC	<1mA	6A "B" Curve	>22ms @ 115VAC, >110ms @ 230VAC	<2.5 s
PSB12-030-P	$23.50	0.197 kg [0.43 lb]	Plastic			<0.7 A @ 115VAC, <0.42 A @ 230VAC	<40A @ 115VAC, <80A @ 230VAC				
PSB12-060	$37.25	0.325 kg [0.72 lb]	Aluminum			<1.35 A @ 115VAC <0.8 A @ 230VAC	<50A @ 115VAC, <100A @ 230VAC		16A "B" Curve		
PSB12-100	$56.00	0.636 kg [1.40 lb]	Aluminum			<2.5 A @ 115VAC <1.5 A @ 230VAC	<100A @ 115VAC, no damage @ 230VAC				<600ms
PSB24-060	$34.75	0.37 kg [0.82 lb]	Aluminum			<1.1 A @ 115VAC <0.7 A @ 230VAC	<40A @ 115VAC, <80A @ 230VAC			>20ms @ 115VAC, >125ms @ 230VAC	<3s
PSB24-060-P	$28.00	0.325 kg [0.72 lb]	Plastic			<1.1 A @ 115VAC <0.7 A @ 230VAC	<40A @ 115VAC, <80A @ 230VAC				
PSB24-120	$63.50	0.54 kg [1.19 lb]	Aluminum			<1.4 A @ 115VAC <0.8 A @ 230VAC	<80A @ 115VAC, <150A @ 230VAC			>35ms @ 115VAC, >70ms @ 230VAC	<1s
PSB24-240	$115.00	1.04 kg [2.29 lb]	Aluminum			<2.9 A @ 115VAC <1.5 A @ 230VAC	<40A @ 115VAC, <100A @ 230VAC	<3.5 mA		>20ms @ 115VAC & 230VAC	
PSB24-480	$172.00	1.8 kg [3.97 lb]	Aluminum			<5.7 A @ 115VAC <2.8 A @ 230VAC	<50A @ 115VAC, <150A @ 230VAC	<1.25 mA			

RHINO PSB Series DIN rail Power Supplies

PSB Single-Phase Series Output Specifications									
Part No.	Output Voltage (Vnom) / Adjustment Range	Output Power	Output Current	Ripple and Noise (20MHz)	Startup with Capacitive Loads	Derating	Max Power Dissipation Idling / Nominal Load Approx.	Efficiency	MTBF
PSB12-015-P	12VDC ±2%/11–14VDC (maximum power <15W)	15W	1.25 A	<100mV	Max 5,000µF	>50°C de-rate power by 2.5%/°C >70°C de-rate power by 4%/°C	≤3.2 W	83.5% Min @ 115VAC & 83% Min @ 230VAC	>300,000 hrs.
PSB12-030-P	12VDC ±2%/11–14VDC (maximum power ≤30W)	30W	2.5 A		Max 6,600µF		≤5.6 W	84.5% Min @ 115VAC & 230VAC	
PSB12-060	12VDC ±2%/11–14VDC (maximum power ≤60W)	60W	5A		Max 8,000µF		≤10.2 W	85.5% Min @ 115VAC & 230VAC	
PSB12-100	12VDC ±2%/11–14VDC (maximum power ≤100W)	100W	8.33 A		Max 10,000µF		≤16.3 W	86% Min @ 115VAC & 87% Min @ 230VAC	
PSB24-060	24VDC ±2%/22–28VDC (maximum power ≤60W)	60W	2.5 A	<50mV / <240mVpp	Max 8,000µF	>50°C de-rate power by 2.5%/°C <0°C de-rate power by 1%/°C	10W	>85% typical	>800,000 hrs.
PSB24-060-P	24VDC ±2%/22–28VDC (maximum power ≤60W)	60W	2.5 A						
PSB24-120	24VDC ±2%/22–28VDC (maximum power ≤120W)	120W	5A		Max 10,000µF	>50°C de-rate power by 2.5%/°C	22.5 W	>84% typical	
PSB24-240	24VDC ±2%/22–28VDC (maximum power ≤240W)	240W	10A			>50°C de-rate power by 2.5%/°C >70°C de-rate power by 4%/°C	42.5 W		>300,000 hrs.
PSB24-480	24VDC ±2%/22–28VDC (maximum power ≤480W)	480W	20A			>50°C de-rate power by 2.5%/°C	72W	>86% typical	

PSB Single-Phase Series General Specifications	
Output Line Regulation	<0.5% typical (@ 85–264 VAC input, 100% load)
Output Load Regulation	<1% typical (@ 85–264 VAC input, 0-100% load)
Parallel Operation	PSB60-REM20S, PSB60-REM40S or Oring Diode
Case Cover	Aluminium (Al5052) or Plastic (PC) for P Series
Signals	Green LED DC OK
Humidity at 25°C [77°F], no condensation	<95% RH
Shock	30g half sign, 3 times per direction, 6 directions, per IEC60068-2-27
Vibration (Non-Operating)	10 to 150Hz, 5 g, 90 min. each axis per IEC60068-2-6
Pollution Degree	2
Climatic Class	3K3 according to EN 60721

PSB Single-Phase Series Certification and Standards	
Electrical Equipment of Machines	IEC60204-1 (over voltage category III)
Electronic Equipment for use in Electrical Power Installations	EN 50178 / IEC62103
Safety Entry Low Voltage	PELV (EN 60204), SELV (EN 60950)
Electrical Safety (of information technology equipment)	UR/cUR recognized to UL 60950-1 (file no. E198298), CSA C22.2 No.60950-1 (file no. 249074), CB scheme to IEC60950-1
Industrial Control Equipment	UL listed to UL 508 (file no. E197592), CSA to CSA C22.2 No.107.1-01 (file no. 249074)
Protection Against Electric Shock	DIN 57100-410
CE	In conformance with EMC directive 2004/108/EC and low voltage directive 2006/95/EC

PSB Single-Phase Series Safety and Protection	
Transient surge voltage protection	VARISTOR
Overload/Short Circuit Protection	<150% rated load current, hiccup mode with automatic recovery
Overvoltage Protection	35VDC max.
Isolation Voltage:: Input/output (type test/routine test) Input/GND (type test/routine test) Output/GND (type test/routine test)	 4 kVAC / 3 kVAC 1.5 kVAC / 1.5 kVAC 1.5 kVAC / 500VAC
Protection Degree	IP20
Safety Class	Class I with GND connection

RHINO PSB Series DIN rail Power Supplies

Additional Data				
Part No.	Wire Size / Torque*		Ambient Operating Temperature**	Storage Temperature
	Input	Output		
PSB12-015-P	0.32–2.1 mm² [AWG 22–14] / 0.79 Nm [7.0 lb-in]	0.32–2.1 mm² [AWG 22–14] / 0.79 Nm [7.0 lb-in]	-20°C to 50°C [-4°F to 122°F]	-25°C to 85°C [-13°F to 185°F]
PSB12-030-P				
PSB12-060	0.52–2.1 mm² [AWG 20–14] / 0.78–0.98 Nm [6.94-8.68 lb-in]	0.52–2.1 mm² [AWG 20-14] / 0.78–0.98 Nm [6.94-8.68 lb-in]		
PSB12-100	0.82–2.1 mm² [AWG 18–14] / 0.78–0.98 Nm [6.94–8.68 lb-in]	0.82–2.1 mm² [AWG 18-14] / 0.78–0.98 Nm [6.94-8.68 lb-in]		
PSB24-060	0.32–2.1 mm² [AWG 22–14] / 0.78–0.98 Nm [6.94-8.68 lb–in]	0.32–2.1 mm² [AWG 22-14] / 0.78–0.98 Nm [6.94–8.68 lb-in]	-20°C to 75°C [-4°F to 167°F]	-25°C to 85°C [-13°F to 185°F]
PSB24-060-P				
PSB24-120				
PSB24-240				
PSB24-480	1.3–2.1 mm² [AWG 16–14] / 1.18–1.57 Nm [10.41–13.89 lb-in]	3.5–5.3 mm² [AWG 12–10] / 1.18–1.57 Nm [10.41–13.89 lb-in]		

**Stripping length 7 mm (0.28 in) or use suitable lug to crimp*

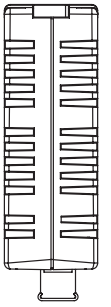
*** See output specifications for temperature derating*

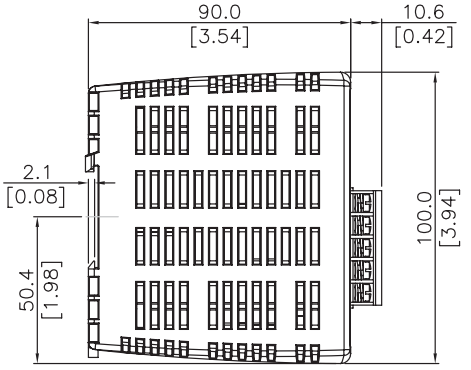
Dimensions

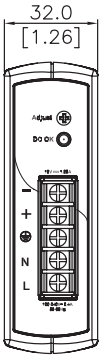
mm [inches]

PSB12-015-P
PSB12-030-P

Wiring Connection			
Input		Output	
L	Line	+	Out +
N	Neutral	-	Out -
⏚	AC Ground		



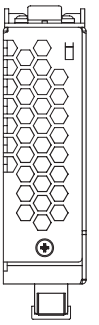


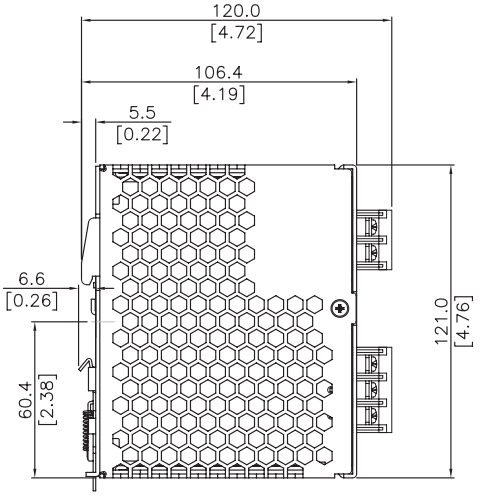


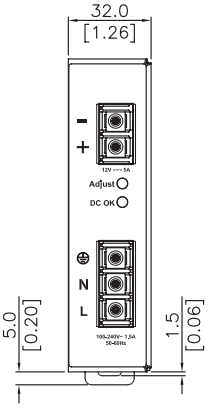
RHINO PSB Series DIN rail Power Supply Dimensions

PSB12-060
PSB24-060

Wiring Connection			
Input		*Output*	
L	Line	+	Out +
N	Neutral	-	Out -
⏚	AC Ground		

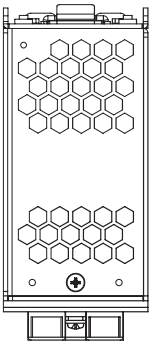


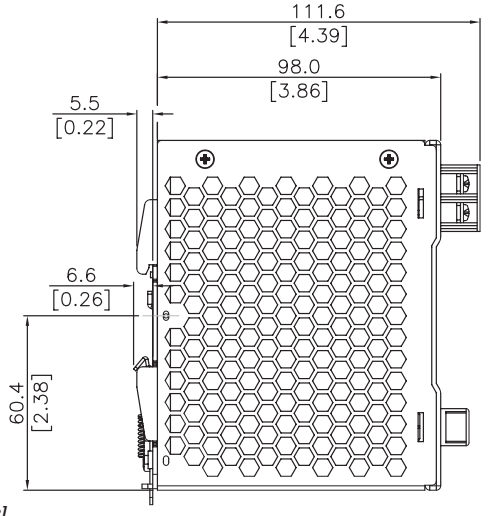


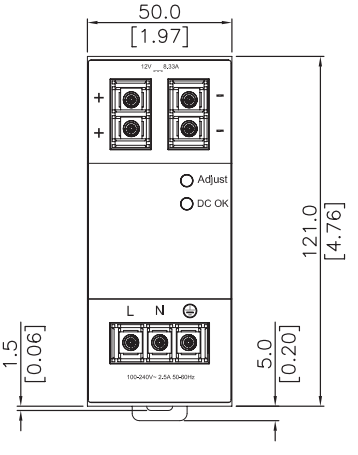


PSB12-100
PSB24-120

Wiring Connection			
Input		*Output*	
L	Line	+	Out +
N	Neutral	-	Out -
⏚	AC Ground		







All dimensions in mm [inches]

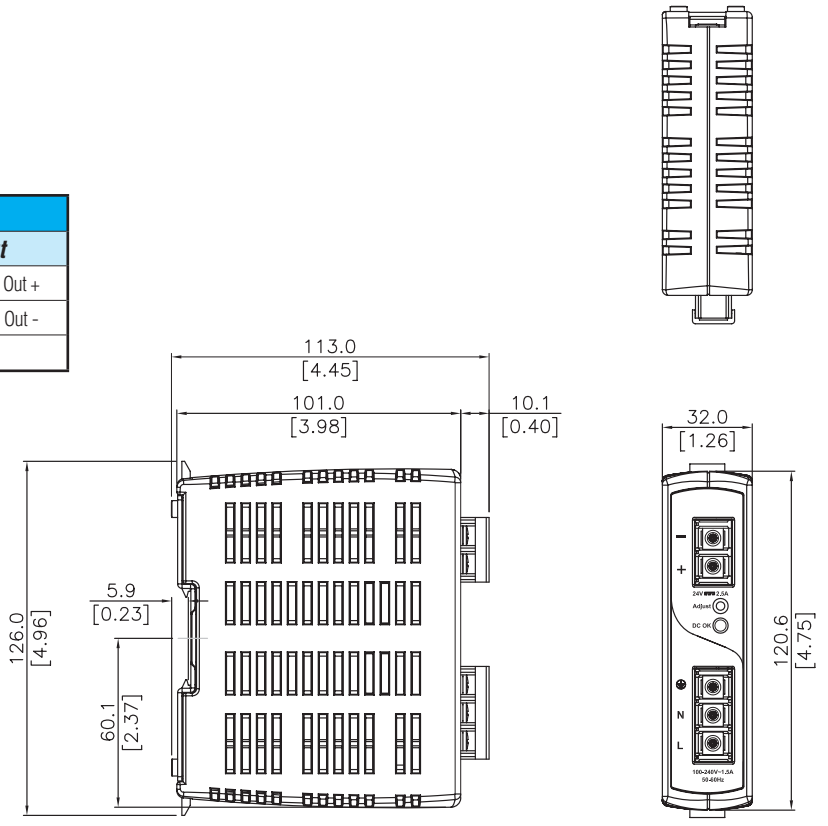
RHINO PSB Series DIN rail Power Supply Dimensions

Dimensions

mm [inches]

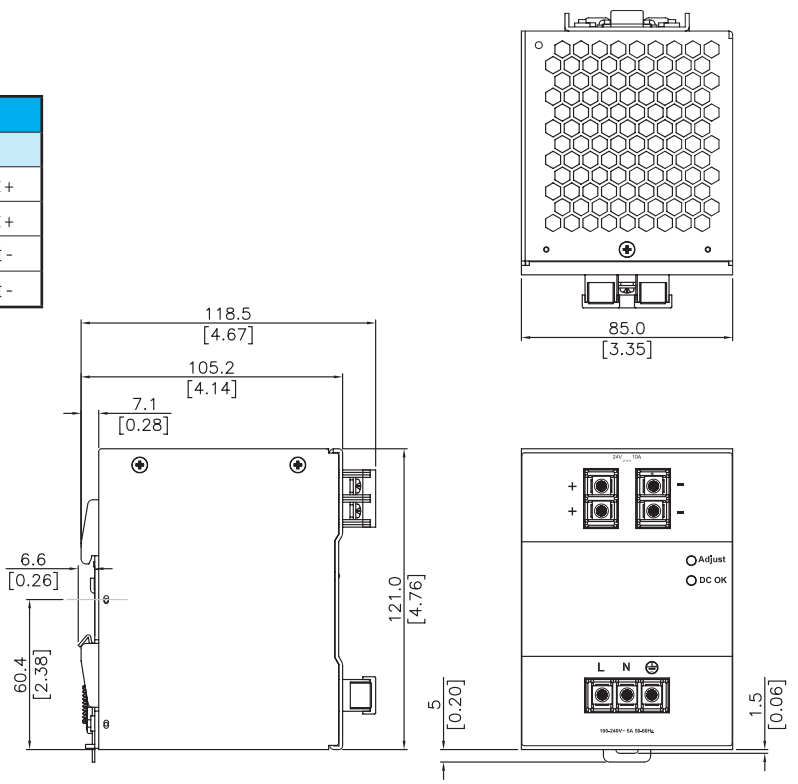
PSB24-060-P

Wiring Connection			
Input		*Output*	
L	Line	+	Out +
N	Neutral	-	Out -
⏚	AC Ground		



PSB24-240

Wiring Connection			
Input		*Output*	
L	Line	+	Out +
N	Neutral	+	Out +
⏚	AC Ground	-	Out -
		-	Out -



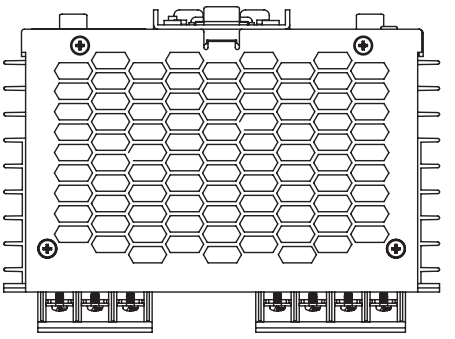
RHINO PSB Series DIN rail Power Supply Dimensions

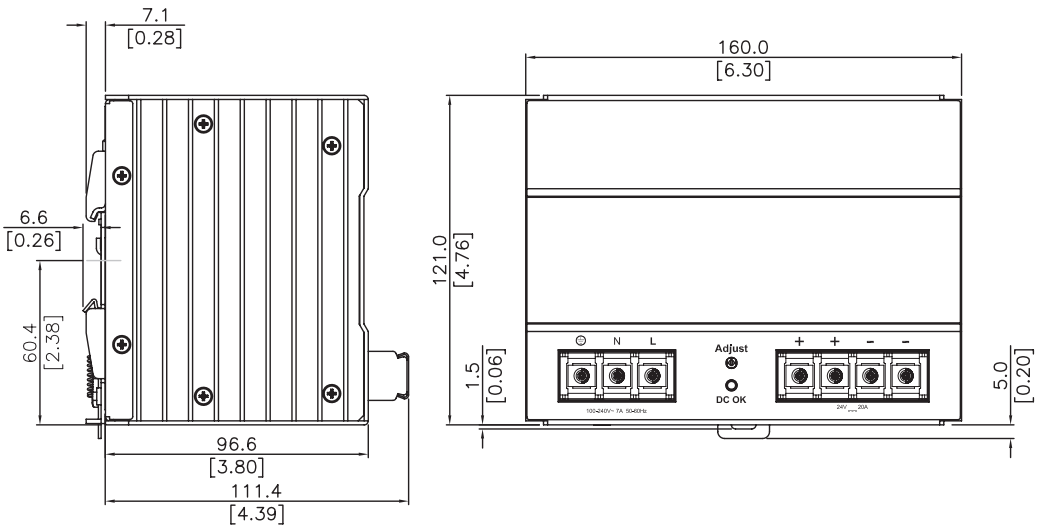
Dimensions

mm [inches]

PSB24-480

Wiring Connection			
Input		***Output***	
L	Line	+	Out +
N	Neutral	+	Out +
⏚	AC Ground	-	Out -
		-	Out -





PSB Power Supply Accessories

PSB Series Power Supply Accessories		
Part No.	***Price***	***Description***
PSB-CVR	$5.00	Universal replacement terminal cover kit for all RHINO PSB series power supplies. Universal kit includes (9) terminal covers to replace all terminal covers on any PSB power supply model

EATON FAZ-NA Miniature Circuit Breakers

Overview

Eaton FAZ-NA miniature circuit breakers offer optimum and efficient protection for branch and control circuits up to 40 amps. The FAZ-NA series is available with C or D trip characteristics in accordance with UL 489. These circuit breakers are current limiting, which means they interrupt fault currents within one half cycle of the fault. The FAZ-NA series is DIN-rail mountable and can be used in feeder and branch circuit applications.

Listings

- UL Listed under UL 489
  Category DIVQ File E235139
  Busbar Accessory
  Category NMTR2.E257181
  Category DIHS E257181
  Category NMTR E307559
- CSA 22.2, No. 5 File 204453
- CE LVD 2006/95/EC
- IEC/EN 60947-2

Features and Benefits

- Dual rated for AC or DC applications
- Complete range of UL 489 listed DIN rail mounted miniature circuit breakers up to 40 ampere current rating
- Single-pole, two-pole and three-pole models
- Current limiting design provides fast short circuit interruption that reduces the let-through energy, which can damage the circuit
- Suitable for branch circuit device protection
- Thermal-magnetic overcurrent protection
  — two levels of short circuit protection, categorized by C and D curves

  C curve magnetic trip point:
  5 to 10 times the rated current, typically used for small transformers, pilot devices, etc.

  D curve magnetic trip point:
  10 to 20 times the rated current, typically used for transformers or very high inductive loads.
- Trip-free design — breaker cannot be defeated by holding the handle in the "ON" position
- Captive screws cannot be lost
- SWD (switching duty) rated circuit breaker — suitable for switching fluorescent lighting loads (In ≤ 20A)
- Fulfills UL 489, CSA C22.2 No.5 and also IEC 60947-2 Standard
- Can also be used in applications for which UL 1077 or CSA C22.2 No.235 are also allowed
- Field installable shunt trip and auxiliary switch subsequent mounting
- Module width of only 17.7 mm (per pole)
- Contact position indicator (red / green)
- 35mm DIN-rail mountable, utilizing spring clip
- Suitable for reverse feed applications

Applications

Feeder and Branch Circuit Protection

- Convenience receptacle circuits (internal / external)
- Motor control circuits
- Load circuits leaving the equipment (external)
- HACR Equipment (Heating Air Conditioning, Refrigeration)
- PLC I/O points
- Computers
- Power supplies
- Control instrumentation
- Relays
- UPS
- Power conditioners

EATON FAZ-NA Miniature Circuit Breakers

Tripping Characteristics

Eaton FAZ-NA miniature circuit breakers are available with "C" and "D" tripping characteristics.

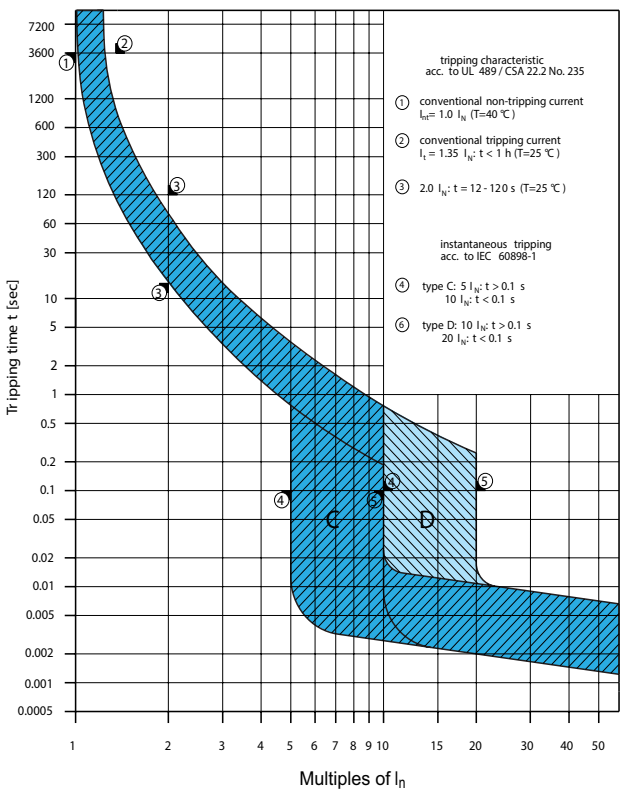
Type C trip curve: 5 to10 *In*

C-curve devices are suitable for applications where medium levels of inrush current are expected. Applications include small transformers, lighting, pilot devices, control circuits and coils. C-curve devices provide a medium magnetic trip point.

Type D trip curve: 10 to 20 *In*

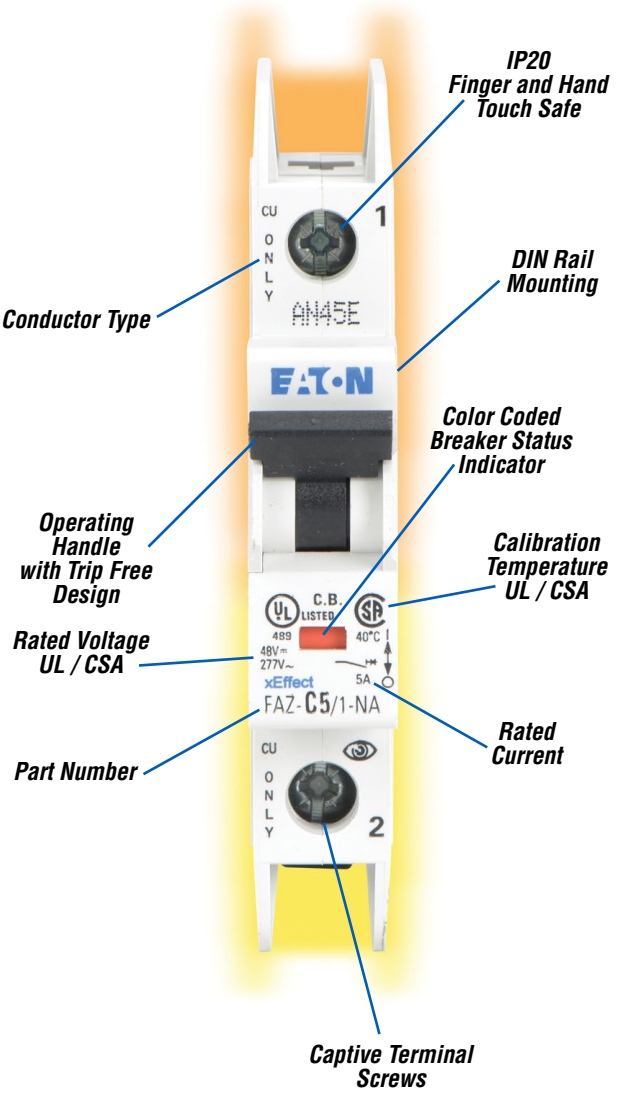
D-curve devices are suitable for applications where high levels of inrush current are expected. The high magnetic trip point prevents nuisance tripping in high inductive applications such as motors, transformers and power supplies.

Eaton FAZ-NA devices are current limiting, which means they interrupt fault currents within one half cycle of the fault. Current limiting devices offer superior protection by reducing peak let-through current and energy.



Labeling

The front of each Eaton FAZ-NA miniature circuit breaker is labeled for positive identification.



EATON FAZ-NA Series Selection Guide

Single-Pole

Note: Eaton product part numbers will contain a [.] instead of [P] and a [/] instead of a [-].
Example: FAZ-C0P5-1-NA-SP = FAZ-C0.5/1-NA-SP

FAZ-NA – Single-Pole Selection Guide				
Ampere Rating	C Curve Part Number	Price	D Curve Part Number	Price
0.5	FAZ-C0P5-1-NA-SP	$18.50	FAZ-D0P5-1-NA-SP	$18.50
1	FAZ-C1-1-NA-SP		FAZ-D1-1-NA-SP	
1.5	FAZ-C1P5-1-NA-SP		FAZ-D1P5-1-NA-SP	
2	FAZ-C2-1-NA-SP		FAZ-D2-1-NA-SP	
3	FAZ-C3-1-NA-SP		FAZ-D3-1-NA-SP	
4	FAZ-C4-1-NA-SP		FAZ-D4-1-NA-SP	
5	FAZ-C5-1-NA-SP		FAZ-D5-1-NA-SP	
6	FAZ-C6-1-NA-SP		FAZ-D6-1-NA-SP	
7	FAZ-C7-1-NA-SP		FAZ-D7-1-NA-SP	
8	FAZ-C8-1-NA-SP		FAZ-D8-1-NA-SP	
10	FAZ-C10-1-NA-SP		FAZ-D10-1-NA-SP	
13	FAZ-C13-1-NA-SP		FAZ-D13-1-NA-SP	
15	FAZ-C15-1-NA-SP		FAZ-D15-1-NA-SP	
16	FAZ-C16-1-NA-SP		FAZ-D16-1-NA-SP	
20	FAZ-C20-1-NA-SP		FAZ-D20-1-NA-SP	
25	FAZ-C25-1-NA-SP		FAZ-D25-1-NA-SP	
30	FAZ-C30-1-NA-SP		FAZ-D30-1-NA-SP	
32	FAZ-C32-1-NA-SP		FAZ-D32-1-NA-SP	
*35	FAZ-C35-1-NA-SP		FAZ-D35-1-NA-SP	
*40	FAZ-C40-1-NA-SP		FAZ-D40-1-NA-SP	
* Rated 240VAC				

Two-Pole

Note: Eaton parts available for sale to North America locations only.

FAZ-NA – Two-Pole Selection Guide				
Ampere Rating	C Curve Part Number	Price	D Curve Part Number	Price
0.5	FAZ-C0P5-2-NA	$36.00	FAZ-D0P5-2-NA	$36.00
1	FAZ-C1-2-NA		FAZ-D1-2-NA	
1.5	FAZ-C1P5-2-NA		FAZ-D1P5-2-NA	
2	FAZ-C2-2-NA		FAZ-D2-2-NA	
3	FAZ-C3-2-NA		FAZ-D3-2-NA	
4	FAZ-C4-2-NA		FAZ-D4-2-NA	
5	FAZ-C5-2-NA		FAZ-D5-2-NA	
6	FAZ-C6-2-NA		FAZ-D6-2-NA	
7	FAZ-C7-2-NA		FAZ-D7-2-NA	
8	FAZ-C8-2-NA		FAZ-D8-2-NA	
10	FAZ-C10-2-NA		FAZ-D10-2-NA	
13	FAZ-C13-2-NA		FAZ-D13-2-NA	
15	FAZ-C15-2-NA		FAZ-D15-2-NA	
16	FAZ-C16-2-NA		FAZ-D16-2-NA	
20	FAZ-C20-2-NA		FAZ-D20-2-NA	
25	FAZ-C25-2-NA		FAZ-D25-2-NA	
30	FAZ-C30-2-NA		FAZ-D30-2-NA	
32	FAZ-C32-2-NA		FAZ-D32-2-NA	
*35	FAZ-C35-2-NA		FAZ-D35-2-NA	
*40	FAZ-C40-2-NA		FAZ-D40-2-NA	
* Rated 240VAC				

EATON FAZ-NA Series Selection Guide

FAZ-NA – Three-Pole Selection Guide				
Ampere Rating	C Curve Part Number	Price	D Curve Part Number	Price
0.5	FAZ-C0P5-3-NA	$56.25	FAZ-D0P5-3-NA	$56.25
1	FAZ-C1-3-NA		FAZ-D1-3-NA	
1.5	FAZ-C1P5-3-NA		FAZ-D1P5-3-NA	
2	FAZ-C2-3-NA		FAZ-D2-3-NA	
3	FAZ-C3-3-NA		FAZ-D3-3-NA	
4	FAZ-C4-3-NA		FAZ-D4-3-NA	
5	FAZ-C5-3-NA		FAZ-D5-3-NA	
6	FAZ-C6-3-NA		FAZ-D6-3-NA	
7	FAZ-C7-3-NA		FAZ-D7-3-NA	
8	FAZ-C8-3-NA		FAZ-D8-3-NA	
10	FAZ-C10-3-NA		FAZ-D10-3-NA	
13	FAZ-C13-3-NA		FAZ-D13-3-NA	
15	FAZ-C15-3-NA		FAZ-D15-3-NA	
16	FAZ-C16-3-NA		FAZ-D16-3-NA	
20	FAZ-C20-3-NA		FAZ-D20-3-NA	
25	FAZ-C25-3-NA		FAZ-D25-3-NA	
30	FAZ-C30-3-NA		FAZ-D30-3-NA	
32	FAZ-C32-3-NA		FAZ-D32-3-NA	
*35	FAZ-C35-3-NA		FAZ-D35-3-NA	
*40	FAZ-C40-3-NA		FAZ-D40-3-NA	
* Rated 240VAC				

Three-Pole

Note: Eaton product part numbers will contain a [.] instead of [P] and a [/] instead of a [-].
Example: FAZ-C0P5-3-NA = FAZ-C0.5/3-NA

EATON FAZ-NA Series Technical Specifications

FAZ-NA Miniature Circuit Breakers – UL/CSA			
		C Curve	D Curve
Short Circuit Trip Response		5 - 10 In	10 - 20 In
Current Range		0.5 - 40 A	
Maximum Voltage Ratings UL / CSA	0.5 - 32 A	277 / 480Y	
	35 - 40 A	240VAC	
	Per pole	48VDC	
	2 poles in series	96VDC Max	
Thermal Tripping Characteristics	Single pole	40°C	
	Multi-pole		
Short Circuit Ratings (@ maximum voltage)	1 pole	10kA *Note: 14 kAIC at select amperages* *B and C curves (15-25 A)* *D curve (13-20 A)*	
	2 pole		
	3 pole		
Rated Frequency		50/60 Hz	
Agency Approvals		UL File #E235139, CSA #204453	

Note: To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

FAZ-NA Miniature Circuit Breaker - IEC			
		C Curve	D Curve
Short Circuit Trip Response		5 - 10 In	10 - 20 In
Current Range		0.5 - 40 A	
Maximum Voltage Ratings - IEC/EN 60947-2	1 pole	240/415 VAC	
	2 pole / 3 pole		
	2 poles in series		
Thermal Tripping Characteristics	Single pole	30°C	
	Multi-pole		
Interrupt Ratings (At Max Voltage)		15kA	
Rated Frequency		50/60 Hz	

General Specifications		
Lifespan / Endurance		≥20,000 (1 operation = ON/OFF)
Operating Temperature		UL 489, CSA C22.2 No.5 = 40°C IEC 60947-2 = 30°C
Shock (UL 489)		10g 20-25 ms
Housing Material		Nylon
Mounting Position		Vertical
Weight	1 pole	0.3 lb (136g)
	2 pole	0.6 lb (272g)
	3 pole	0.9 lb (408g)

Wire Size		
Ampere Rating	Conductor Size	
0.5 - 40	One wire	18 to 6 AWG (0.75 to 13mm²)
	Two wires	18 to 10 AWG (0.75 to 5mm²)

Note: Eaton does not recommend the use of wire ferrules or crimping terminals. The wire gauges are specified above and in the installation instructions included with each circuit breaker.

Tightening Torque	
Conductor Size	Tightening Torque
18 - 12 AWG	21 lb·in (2.4 N·m)
10 - 8 AWG	25 lb·in (2.8 N·m)
6AWG	36 lb·in (4.1 N·m)

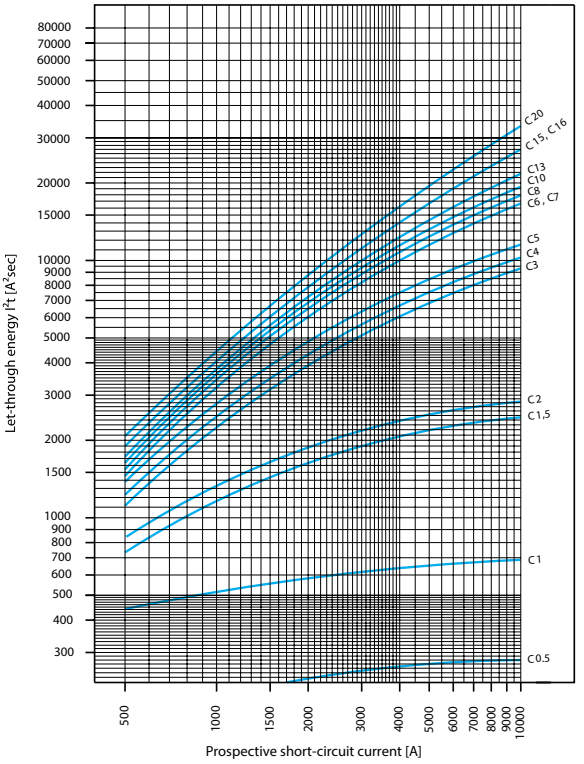
EATON FAZ-NA Series Technical Data

Let-Through Energy

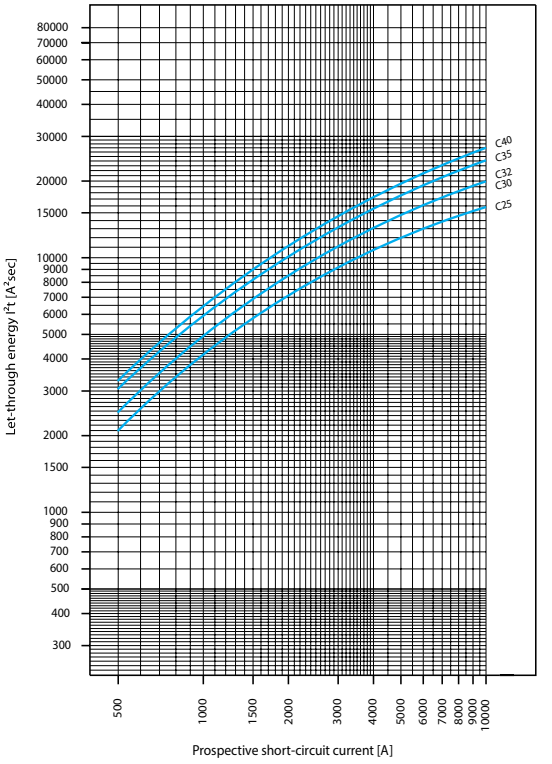
- The X axis shows the prospective short-circuit current levels.
- The Y axis indicates the actual let-through values at those prospective fault ratings for each FAZ-NA device plotted.

As can be interpreted from the bend in the plotted curves, each device acts to limit the damaging let-through energy at those values of short-circuit current.

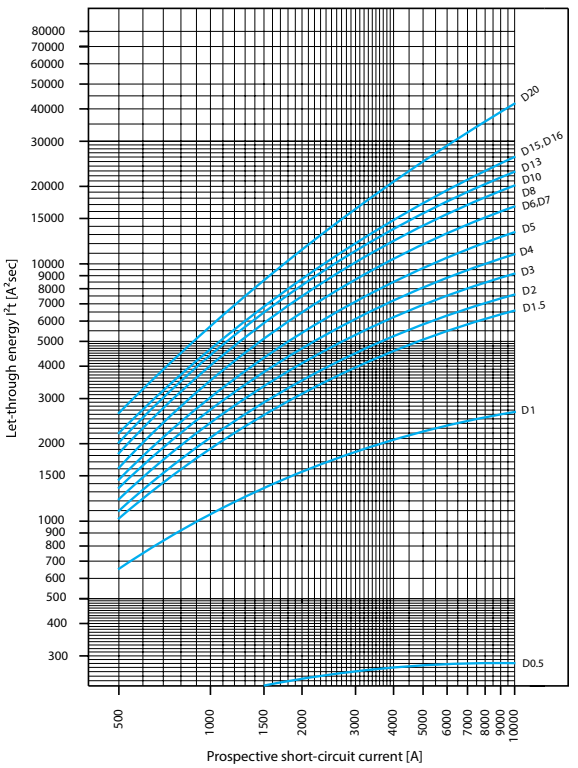
Characteristic C (0.5-20A), 277V



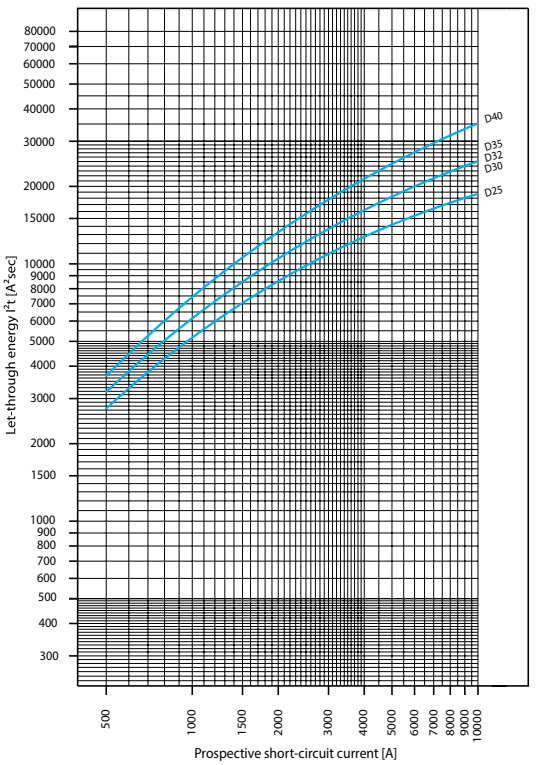
Characteristic C (25-40A), 240V



Characteristic D (0.5-20A), 277V



Characteristic D (25-40A), 240V

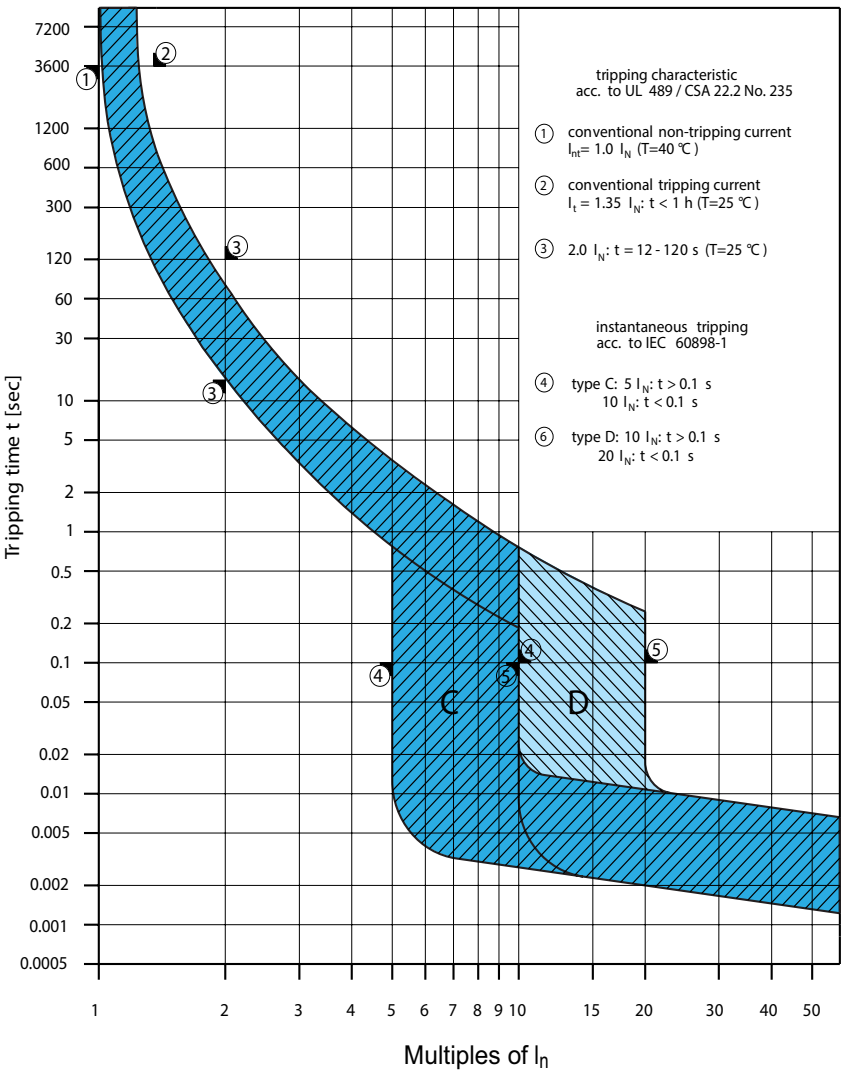


EATON FAZ-NA Series Technical Data

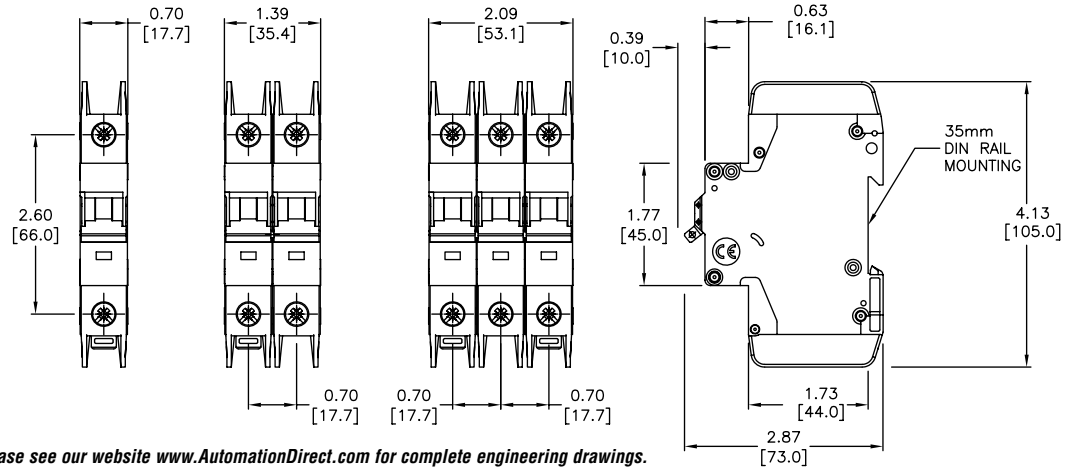
Power Loss at *In*			
Characteristic C			
In [A]	1p P[W]	2p P[W]	3p P[W]
0.5	1.6	3.2	4.7
1	1.1	2.2	3.4
1.5	1.3	2.6	3.9
2	1.4	2.8	4.3
3	1.2	2.4	3.6
4	1.4	2.9	4.3
5	1.9	3.7	5.6
6	1.2	2.3	3.5
7	1.4	2.8	4.3
8	1.4	2.8	4.2
10	1.8	3.6	5.3
13	2.4	4.7	7.1
15	1.9	3.8	5.6
16	2.1	4.3	6.4
20	2.9	5.8	8.7
25	3.1	6.2	9.3
30	3.0	6.0	9.0
32	3.4	6.8	10.2
35	3.7	7.4	11.0
40	4.0	8.1	12.1

Power Loss at *In*			
Characteristic D			
In [A]	1p P[W]	2p P[W]	3p P[W]
0.5	1.6	3.2	4.8
1	0.8	1.5	2.3
1.5	1.0	2.1	3.1
2	1.0	2.1	3.1
3	1.2	2.4	3.6
4	1.4	2.9	4.3
5	1.5	2.9	4.4
6	1.2	2.3	3.5
7	1.4	2.8	4.3
8	1.2	2.4	3.7
10	1.5	3.0	4.5
13	2.0	4.1	6.1
15	1.5	3.1	4.6
16	1.7	3.5	5.2
20	1.8	3.7	5.5
25	2.6	5.1	7.7
30	2.7	5.4	8.1
32	3.1	6.2	9.3
35	3.8	7.6	11.3
40	3.9	7.8	11.6

Tripping Curves



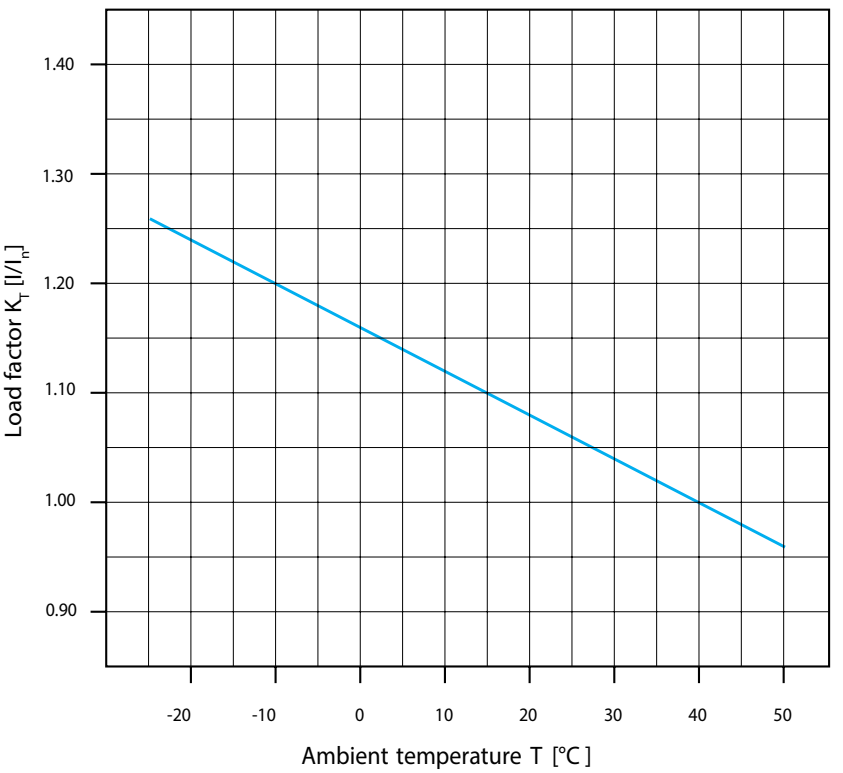
FAZ-NA Miniature Circuit Breakers Dimensions



Please see our website www.AutomationDirect.com for complete engineering drawings. Dimensions are approximate. Not for construction purposes.

EATON FAZ-NA Series Technical Data

Influence of Ambient Temperature T on Load Carrying Capacity								
Device Market Current Rating In (A) at 40°C	**In (A) at Higher Ambient Temperature**							
	15°C	**20°C**	**25°C**	**30°C**	**40°C**	**50°C**	**55°C**	**60°C**
0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9
1.5	1.7	1.6	1.6	1.6	1.5	1.4	1.4	1.4
2.0	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8
3.0	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8
4.0	4.4	4.3	4.2	4.2	4.0	3.8	3.8	3.7
5.0	5.5	5.4	5.3	5.2	5.0	4.8	4.7	4.6
6.0	6.6	6.5	6.4	6.2	6.0	5.8	5.6	5.5
7.0	7.7	7.6	7.4	7.3	7.0	6.7	6.6	6.4
8.0	8.8	8.6	8.5	8.3	8.0	7.7	7.5	7.4
10.0	11.0	10.8	10.6	10.4	10.0	9.6	9.4	9.2
13.0	14.3	14.0	13.8	13.5	13.0	12.5	12.5	12.0
15.0	16.5	16.2	15.9	15.6	15.0	14.4	14.1	13.8
16.0	17.6	17.3	17.0	16.6	16.0	15.4	15.0	14.7
20.0	22.0	21.6	21.2	20.8	20.0	19.2	18.8	18.4
25.0	27.5	27.0	26.5	26.0	25.0	24.0	23.3	23.0
30.0	33.0	32.4	31.8	31.2	30.0	28.8	28.2	27.6
32.0	35.2	34.6	33.9	33.3	32.0	30.7	30.1	29.4
35.0	38.5	37.8	37.1	36.4	35.0	33.6	32.9	32.2
40.0	44.0	43.2	42.4	41.6	40.0	38.4	37.6	36.8



Maximum load I_L at ambient temperature T:
$I_L(T) = I_n K_T(T)$

I_L = Maximum Load
T = Ambient Temperature
I_N = Rated Current in Amps
K_T = Load Factor

EATON FAZ-NA Series Accessories

Field Mountable Accessories

- Auxiliary switch
- Alarm switch
- Shunt trip
- No tools required for mounting

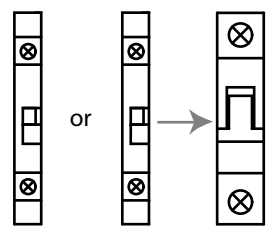
ZNHK
Alarm/Aux Contact

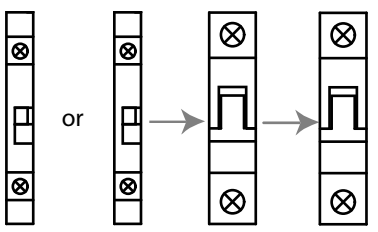
ZIHK-NA
Auxiliary Contact

		ZNHK*	ZIHK-NA
Price		$21.25	$16.50
Electrical Data			
Contact function		2 Form C (one set changeover) (SPDT)	1 N.O. + 1 N.C. (DPST)
Rated voltage		230VAC / 110V AC/DC	600VAC / 230VAC / 120VAC
Frequency		50/60 Hz	
Rated current		2A / 0.5 A	1.2 A / 2A / 6A
Rated thermal current I_{th} 60947-5-1		2A / 250VAC	6A / 250VAC
60947-5-1 Rated operational current I_e	***Utilization category AC13***	3A / 250VAC	
	Utilization category AC15	2A / 250VAC	
	Utilization category DC12	0.5 A / 110VDC	0.5 A / 110VDC 0.25 A / 220VDC
Rated insulation voltage U_i		250VAC	
Minimal operational voltage per Contact U_{min}		5VDC	
Minimum operational current I_{min}		10mA DC	10 mA AC/DC
Rated peak withstand voltage U_{imp} (1.2/50µ)		2.5 kV	4kV
Conditional short-circuit current I_k w/ backup fuse 6A		1kA	1kA
Mechanical Data			
Tripping indicator "electrical tripping"		Blue/white	–
Frame size		45mm	
Mounting		Onto FAZ-NA	
Degree of protection, built-in		IP40	
Terminal protection		Finger and hand touch safe according to BGV A3, OVE-EN 6	
Terminals		Lift terminals	
Terminal capacity		20-18 AWG (0.75 - 2.5 mm²)	20-14 AWG (0.5 - 2.5 mm²)
Terminal screws		M3 (Posidrive Z0 - Phillips)	
Fastening torque of terminal screws		7 lb·in (0.79 N·m)	Max. 10.6 lb·in (1.2 N·m)

Voltage of the FAZ-NA circuit breaker is limited to 300V with contact installed.

Allowable Combinations of Accessories



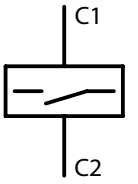


EATON FAZ-NA Series Accessories

Shunt Trip Release

- Remote release for subsequent mounting onto FAZ-NA
- Additional installation of standard auxiliary switch is possible
- Position indicator red-green

FAZ-XAA-NA Series



Circuit Diagram

	FAZ-XAA-NA12-110V	FAZ-XAA-NA110-415V
Price	$30.00	$30.00
Electrical Data		
Can be mounted onto	FAZ-NA	
Operational voltage range	12-110 VAC 12-60 VDC	110-415 VAC 110-230 VDC
Maximum inrush current	15A	2.1 A
Frequency	50/60 Hz	
Mechanical Data		
Frame size	45mm	
Height	4.13 in (105mm)	
Width	0.69 in (17.5 mm)	
Weight	0.28 lb (127g)	
Mounting	Quick fastening with two lock-in positions on EN 50022	
Degree of protection, built-in	IP40	
Terminal protection	Finger and hand touch safe according to BGV A3, OVE-EN 6	
Terminals	Open mouthed/lift	
Terminal capacity, one and two wires	18-10 AWG (0.8 - 5.3 mm²)	
Agency Approval	UL File # E257181, CSA 204453	

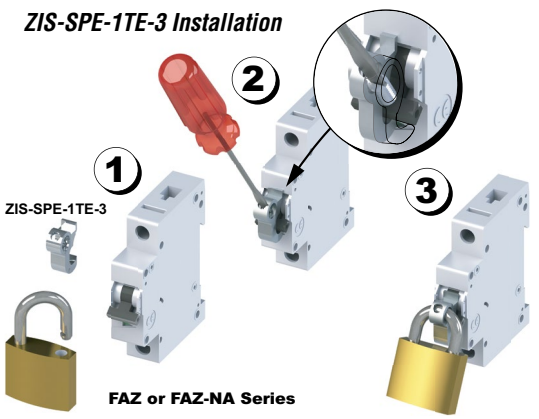
Note: To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Lockout Attachment

Lockout Attachment				
Part Number	***Description***	***Weight***	***Qty***	***Price***
ZIS-SPE-1TE-3	Lockout attachment for Eaton FAZ-NA series supplementary protectors and FAZ-NA mini circuit breakers, suitable to prevent unauthorized activation of a de-energized circuit, accepts lock shackles up to 9/32 in. (7.1 mm) in diameter	0.10 lb (45g)	3	$26.25

ZIS-SPE-1TE-3
Lockout Attachment

ZIS-SPE-1TE-3 Installation

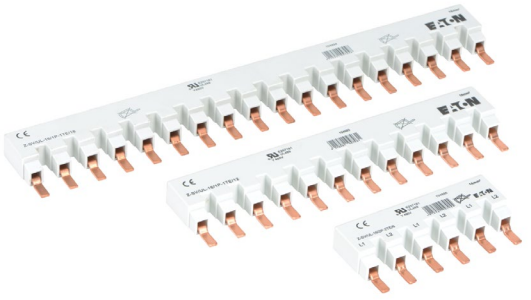


EATON FAZ-NA Series Accessories

Busbar System

(Without auxiliary contacts)

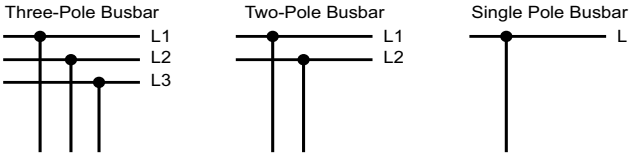
Busbar System for FAZ-NA Series Miniature Circuit Breakers		
Part Number	***Description***	***Price***
ZSVUL16-1P-1TE6SP	Busbar for connecting up to six (6) 1-pole FAZ-NA series circuit breakers	$8.75
ZSVUL16-1P-1TE12SP	Busbar for connecting up to twelve (12) 1-pole FAZ-NA series circuit breakers	$16.00
ZSVUL16-1P-1TE18SP	Busbar for connecting up to eighteen (18) 1-pole FAZ-NA series circuit breakers	$24.00
ZSVUL16-2P-2TE6SP	Busbar for connecting up to three (3) 2-pole FAZ-NA series circuit breakers	$9.75
ZSVUL16-2P-2TE12SP	Busbar for connecting up to six (6) 2-pole FAZ-NA series circuit breakers	$19.50
ZSVUL16-2P-2TE18SP	Busbar for connecting up to nine (9) 2-pole FAZ-NA series circuit breakers	$28.75
ZSVUL16-3P-3TE6SP	Busbar for connecting up to two (2) 3-pole FAZ-NA series circuit breakers	$10.25
ZSVUL16-3P-3TE12SP	Busbar for connecting up to four (4) 3-pole FAZ-NA series circuit breakers	$20.50
ZSVUL16-3P-3TE18SP	Busbar for connecting up to six (6) 3-pole FAZ-NA series circuit breakers	$30.50
Note: FAZ-NA Busbar is not for use with FAZ supplementary protectors.		

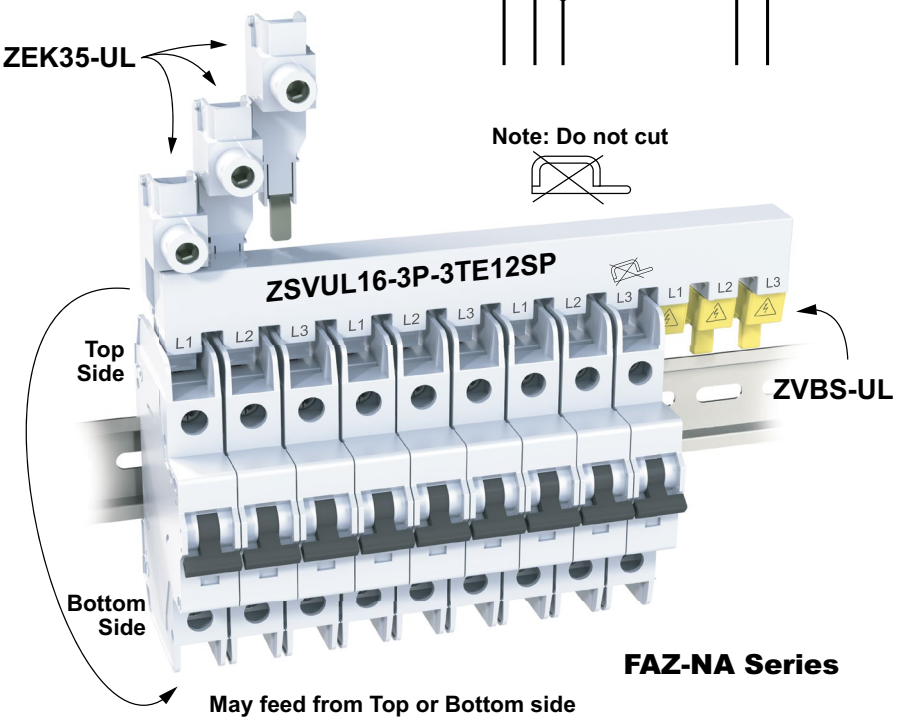


ZSVUL16-xP-xTExSP

Busbar Specifications			
Description	***UL489***		***IEC/EN60947-2***
Operating Voltage	480VAC	96VDC	240/415 VAC
Frequency	50/60 Hz	n/a	50/60 Hz
Rated impulse withstand Uimp	n/a		9.5 kV
Max Current - Ie Fed from End	80A @ 40°C		80A @ 30°C
Cross Section	n/a		16 mm²
Agency Approval	UL File #E257181		

Busbar Connection Diagrams





EATON FAZ-NA Series Accessories

Busbar Accessories

Busbar Accessories for FAZ-NA Series Miniature Circuit Breakers		
Part Number	***Description***	***Price***
ZVBS-UL	Busbar Shroud - covers for unused bus bar terminals, (10) 3-terminal covers per package	$22.50
ZVBS-UL-5	Busbar Shroud - covers for unused bus bar terminals, (5) 3-terminal covers per package	$12.00
ZEK35-UL	Wiring Lug, 2 - 14 AWG (35mm), 3 lugs per package	$32.50
ZEK35-UL-1	Wiring Lug, 2 - 14 AWG (35mm), 1 lug per package	$11.50

ZVBS-UL

ZEK35-UL

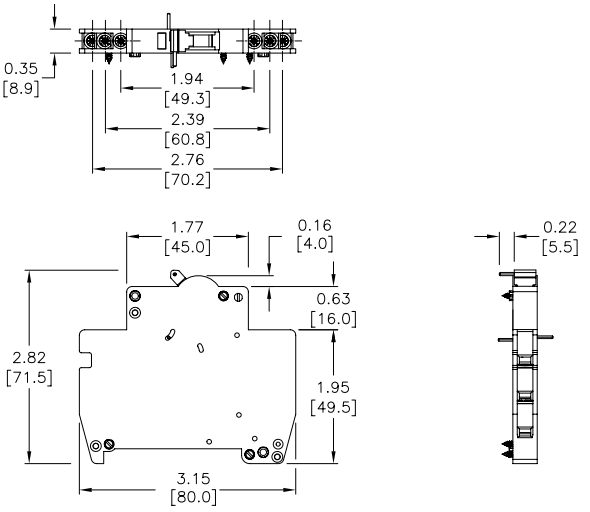
ZEK35-UL – Specifications			
Description	***UL489***		***IEC/EN60947-2***
Operating Voltage	480VAC	96VDC	240/415 VAC
Frequency	50/60 Hz	n/a	50/60 Hz
Rated impulse withstand - Uimp	n/a		9.5 kV
Max Current - Ie	80A @ 40°C		80A @ 30°C
	#2 - 14 AWG		2.5 - 35 mm^2
	0.56 in		14mm
Agency Approval	UL File # E307559		

Note: To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

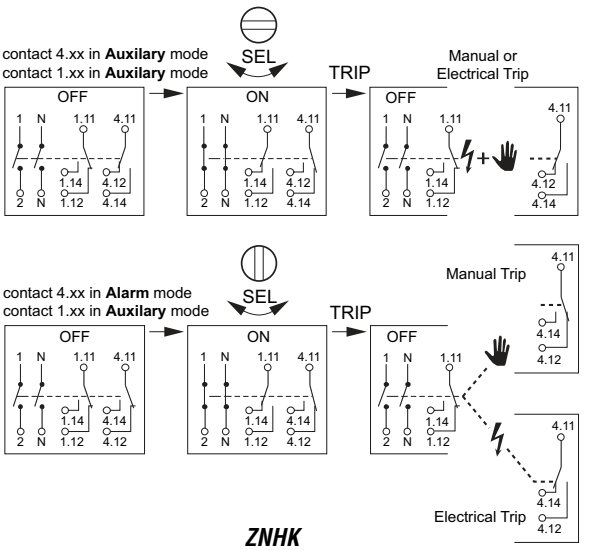
ZEK35-UL – Tightening Torque		
Tested Acc. To	***Cable Size***	***Tightening Torque***
UL 486A	#14 AWG	≥ 20 lb·in (2.3 N·m)
UL 486B	#8 - 12 AWG	≥ 25 lb·in (2.8 N·m)
UL 486E	#6 - 1 AWG	35 lb·in (4 N·m)

EATON FAZ-NA Series Accessories

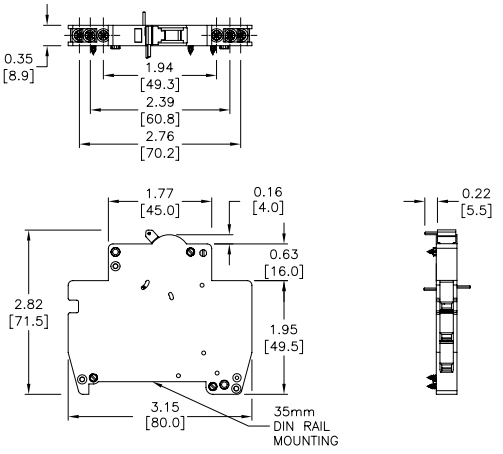
Accessories Dimensions in [mm]



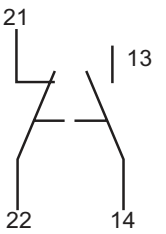
ZNHK



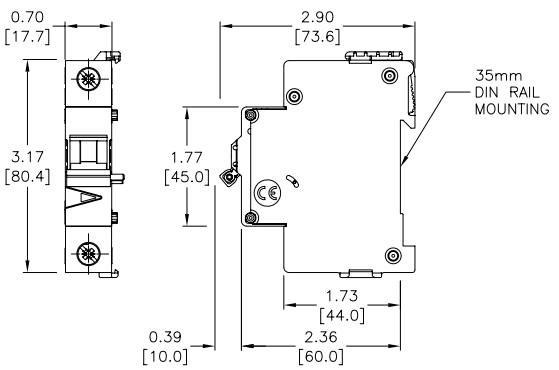
ZNHK Diagrams



ZIHK-NA



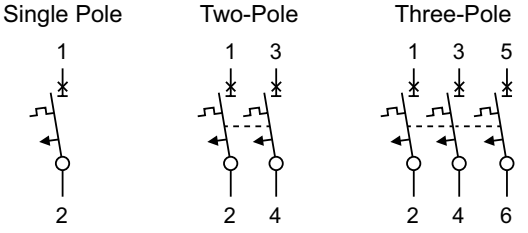
ZIHK-NA Diagram



FAZ-XAA-NA-xxx

FAZ-NA Series Miniature Circuit Breakers

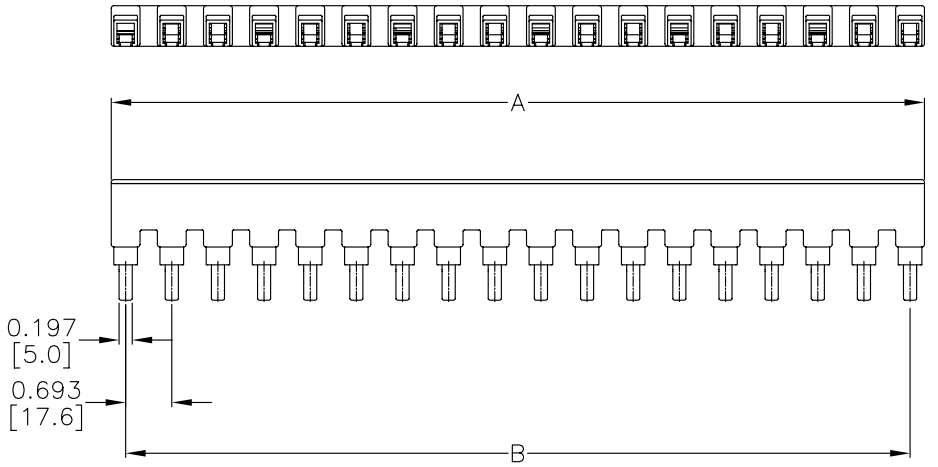
Connection Diagrams

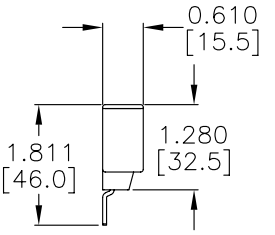


Please see our website www.AutomationDirect.com for complete engineering drawings.
Dimensions are approximate. Not for construction purposes.

EATON FAZ-NA Series Accessories

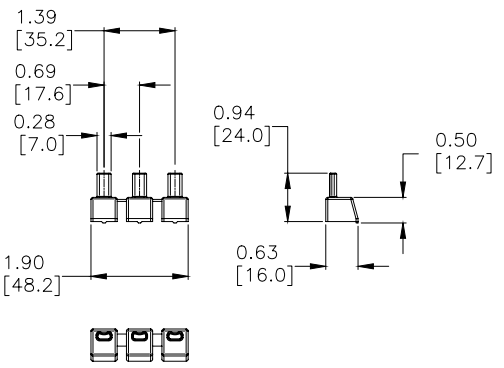
Accessories Dimensions in [mm]



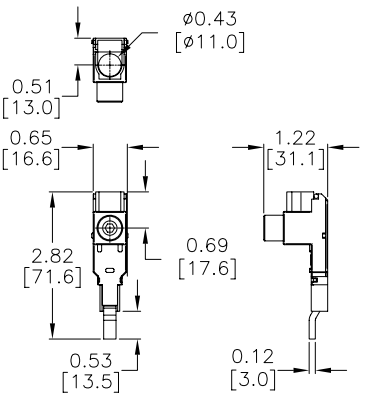


ZSVUL16-xP-xTExSP

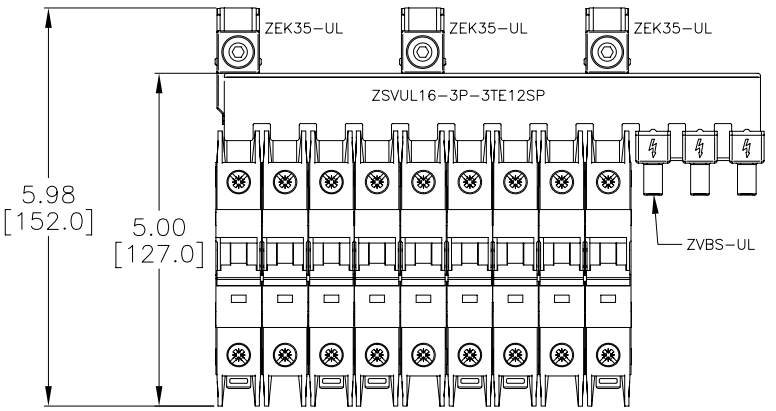
FAZ-NA Busbar Length – in [mm]		
Part Number	***A***	***B***
ZSVUL16-xP-xTE6SP	3.90 [99.0]	3.46 [88.0]
ZSVUL16-xP-xTE12SP	8.06 [204.6]	7.62 [193.6]
ZSVUL16-xP-xTE18SP	12.21 [310.2]	11.78 [299.2]



ZVBS-UL



ZEK35-UL



Please see our website www.AutomationDirect.com for complete engineering drawings. Dimensions are approximate. Not for construction purposes.

UL489 or UL1077?
What are your Circuit Protection Requirements?

An understanding of circuit types and circuit protection products is critical to ensure their proper application.
See NEC Sections 100, 430 and 409 for definitions.

The proper sizing of an overcurrent protection device is the responsibility of the customer and should be determined using the application standards of the NEC (National Electric Code), CEC (Canadian Electrical Code) or other applicable standards. Per fine print note of 2008 NEC Section 100 "A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations."

UL489
Branch Protection




UL1077
Supplementary Protection


What You Need to Know and Look For In Specifications
Certifications – Standards – Acceptance

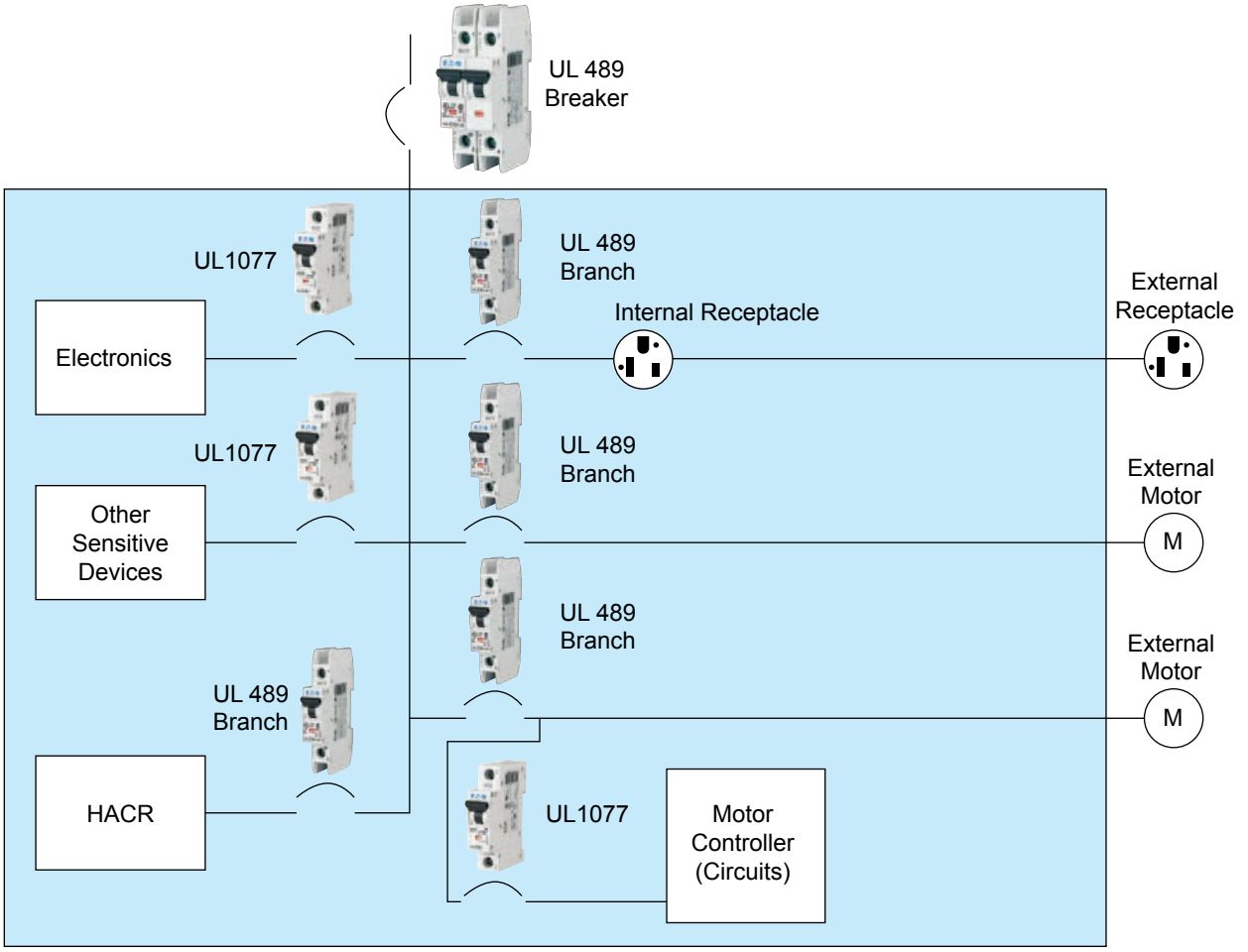
UL489 Branch Protection	UL1077 Supplementary Protection
• UL489 Listed or Recognized • CSA C22.2 No. 5 • International ratings available depending on breaker type	• UL Recognized under UL1077 • CSA 22.2 No. 285 • IEC 60947-2 or IEC 898
Function	
• Opens automatically on Overload and Short Circuit when properly applied within its ratings • Protects wire and cable against Overload and Short Circuit	• Opens automatically on Overload and Short Circuit • Provides additional equipment protection where branch circuit protection is already provided or not required • Not suitable for the protection of branch circuit conductors
Applications	
• Branch circuit protection in control panels, panelboards, switchboards and motor control centers • Motor overload and motor short circuit protection (UL489 Recognized motor circuit protectors) for control panels and motor control centers	• Used within appliances or other electrical equipment such as control circuits, control power transformers, relays, PLC I/O points and lighting circuits • Ideal replacement for fuses that are applied as supplementary protection
Features	
• Bolted down or DIN-rail mounted • External handle mechanisms available • Field mounted accessories • Stand alone branch circuit protection • Various levels of protection (curve type) • High voltage and interruption levels (up to 100 kAIC @ 480V)	• DIN-Rail mounted • Field mounted accessories • Various levels of protection (curve type) • 10 kAIC @ 240 VAC • 10 kAIC @ 277 VAC and 5 kAIC @ 480VAC • 10 kAIC @ 48VDC

kAIC = thousands of Amps interrupt capacity

Summary

A Supplementary Protector can't be used for Branch Circuit Protection.
Understanding the difference between Branch Circuit Protection and Supplementary Protection helps to ensure their proper use.

UL 1077 Supplementary Protectors and UL 489 Circuit Breakers Application Guidelines



Example of UL 489 and UL 1077 Application

UL489 circuit breakers

Used for branch circuit protection, internal/external receptacles, external motors and HACR equipment (heating, air conditioning and refrigeration).

UL1077 supplementary protectors

Used for overcurrent protection within appliances or electrical equipment, where branch circuit protection is already provided or not required.

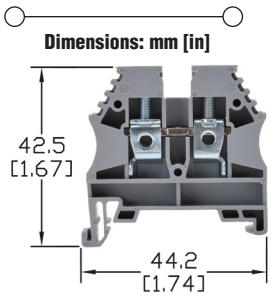
Note: UL489 devices can be used in place of UL1077; UL1077 devices cannot be used in place of UL489.

Single-Level Terminal Blocks

KONNECT-IT TERMINAL BLOCKS

- Screw connection terminal
- UL E179129 (For copper wire only. One conductor in terminal only.)
- VDE (IEC 60947-7-1)
- CE (EN 60947-7-1)

* For 600V application see UL online file usage Group D



See our website: www.AutomationDirect.com for complete engineering drawings

Ordering Information

Colors	Part Number	Qty.	Price	Part Number	Qty.	Price	Part Number	Qty.	Price
Gray	KN-T12GRY	100	$22.00	KN-T10GRY	100	$25.00	KN-T8GRY	100	$49.00
	KN-T12GRY-25	25	$6.00	KN-T10GRY-25	25	$6.50	KN-T8GRY-25	25	$13.50
Blue	KN-T12BLU	100	$22.00	KN-T10BLU	100	$25.00	KN-T8BLU	100	$49.00
	KN-T12BLU-25	25	$6.00	KN-T10BLU-25	25	$6.50	KN-T8BLU-25	25	$13.50
Brown	KN-T12BRN	100	$22.00	KN-T10BRN	100	$25.00	KN-T8BRN	100	$49.00
	KN-T12BRN-25	25	$6.00	KN-T10BRN-25	25	$6.50	KN-T8BRN-25	25	$13.50
Black	KN-T12BLK	100	$22.00	KN-T10BLK	100	$25.00	KN-T8BLK	100	$49.00
	KN-T12BLK-25	25	$6.00	KN-T10BLK-25	25	$6.50	KN-T8BLK-25	25	$13.50
Green	KN-T12GRN	100	$22.00	KN-T10GRN	100	$25.00	KN-T8GRN	100	$49.00
	KN-T12GRN-25	25	$6.00	KN-T10GRN-25	25	$6.50	KN-T8GRN-25	25	$13.50
Orange	KN-T12ORG	100	$22.00	KN-T10ORG	100	$25.00	KN-T8ORG	100	$49.00
	KN-T12ORG-25	25	$6.00	KN-T10ORG-25	25	$6.50	KN-T8ORG-25	25	$13.50
Red	KN-T12RED	100	$22.00	KN-T10RED	100	$25.00	KN-T8RED	100	$49.00
	KN-T12RED-25	25	$6.00	KN-T10RED-25	25	$6.50	KN-T8RED-25	25	$13.50
Yellow	KN-T12YEL	100	$22.00	KN-T10YEL	100	$25.00	KN-T8YEL	100	$49.00
	KN-T12YEL-25	25	$6.00	KN-T10YEL-25	25	$6.50	KN-T8YEL-25	25	$13.50
White	KN-T12WHT	100	$22.00	KN-T10WHT	100	$25.00	KN-T8WHT	100	$49.00
	KN-T12WHT-25	25	$6.00	KN-T10WHT-25	25	$6.50	KN-T8WHT-25	25	$13.50

Technical Specifications

Model	KN-T12			KN-T10			KN-T8		
Width	5mm [0.20 in]			6mm [0.24 in]			8mm [0.31 in]		
Stripping Length	10mm [0.39 in]			10mm [0.39 in]			12mm [0.47 in]		
Tightening Torque	0.4 N·m [3.5 lb·in]			0.5 N·m [4.4 lb·in]			0.8 N·m [7.1 lb·in]		
Density	200/m [60 pcs/ft]			166/m [50 pcs/ft]			125/m [38 pcs/ft]		
UL/CSA Approval	600V	20A	26-12 AWG	*300V	30A	26-10 AWG	*300V	50A	26-8 AWG
VDE Approval	750V	24A	2.5 mm²	750V	32A	4mm²	630V	41A	6mm²
CE Conformity	750V	24A	2.5 mm²	750V	32A	4mm²	630V	41A	6mm²
SCCR Rating	100kA			100kA			100kA		
Operating Temperature	Ambient air temperature: -67°F to 185°F [-55°C to 85°C], Relative humidity: 50% max at 104°F [40°C] and 90% max at 68°F [20°C]								
Material	Current Bar: Copper Alloy / Housing: Polyamide 66 / Screw: Zinc Plated Steel								
DIN Rail Width	35mm								

Accessories

End Covers (International colors)	Gray	KN-ECT6GRY	100/pkg	$16.00	KN-ECT6GRY	100/pkg	$16.00	KN-ECT6GRY	100/pkg	$16.00	
		KN-ECT6GRY-25	25/pkg	$4.00	KN-ECT6GRY-25	25/pkg	$4.00	KN-ECT6GRY-25	25/pkg	$4.00	
	Blue	KN-ECT6BLU	10/pkg	$2.00	KN-ECT6BLU	10/pkg	$2.00	KN-ECT6BLU	10/pkg	$2.00	
	Brown	KN-ECT6BRN			KN-ECT6BRN			KN-ECT6BRN			
	Black	KN-ECT6BLK			KN-ECT6BLK			KN-ECT6BLK			
	Green	KN-ECT6GRN			KN-ECT6GRN			KN-ECT6GRN			
	Orange	KN-ECT6ORG			KN-ECT6ORG			KN-ECT6ORG			
	Red	KN-ECT6RED			KN-ECT6RED			KN-ECT6RED			
	Yellow	KN-ECT6YEL			KN-ECT6YEL			KN-ECT6YEL			
	White	KN-ECT6WHT			KN-ECT6WHT			KN-ECT6WHT			
Separators (International colors)	Gray	KN-ST1GRY	25/pkg	$7.50	KN-ST1GRY	25/pkg	$7.50	KN-ST1GRY	25/pkg	$7.50	
	Blue	KN-ST1BLU	10/pkg	$3.00	KN-ST1BLU	10/pkg	$3.00	KN-ST1BLU	10/pkg	$3.00	
	Brown	KN-ST1BRN			KN-ST1BRN			KN-ST1BRN			
	Black	KN-ST1BLK			KN-ST1BLK			KN-ST1BLK			
	Green	KN-ST1GRN			KN-ST1GRN			KN-ST1GRN			
	Orange	KN-ST1ORG			KN-ST1ORG			KN-ST1ORG			
	Red	KN-ST1RED			KN-ST1RED			KN-ST1RED			
	Yellow	KN-ST1YEL			KN-ST1YEL			KN-ST1YEL			
	White	KN-ST1WHT			KN-ST1WHT			KN-ST1WHT			
Jumpers	2-pole	KN-2J12	25/pkg	$7.50	KN-2J10	25/pkg	$10.50	KN-2J8	25/pkg	$11.00	
	3-pole	KN-3J12	20/pkg	$9.50	KN-3J10	20/pkg	$12.50	KN-3J8	20/pkg	$13.50	
	4-pole	KN-4J12	15/pkg	$11.00	KN-4J10	15/pkg	$12.50	KN-4J8	15/pkg	$13.00	
	10-pole	KN-10J12	5/pkg	$7.50	KN-10J10	5/pkg	$9.50	KN-10J8	5/pkg	$10.50	
Comb-type jumper / 2-pole		KN-2JCC12	25/pkg	$10.00	KN-2JCC10	25/pkg	$20.00	KN-2JCC8	25/pkg	$21.00	
Top Cover / Blank		KN-TC-1	25/pkg	$6.00	KN-TC-1	25/pkg	$6.00	KN-TC-1	25/pkg	$6.00	
Top Cover / Symbol		KN-TC-1s	25/pkg	$8.50	KN-TC-1s	25/pkg	$8.50	KN-TC-1s	25/pkg	$8.50	
Marking Tags		KN-L5 Series			KN-L5 Series			KN-L5 / KN-L6P5 Series			

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Single-Level Terminal Blocks

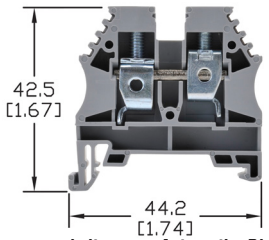
KONNECT-IT TERMINAL BLOCKS

- Screw connection terminal
- UL E179129
  (*For copper wire only. One conductor in terminal only.*)
- VDE (IEC 60947-7-1)
- CE (EN 60947-7-1)

* For 600V application see UL online file usage Group D

Dimensions: mm [in]

KN-T6



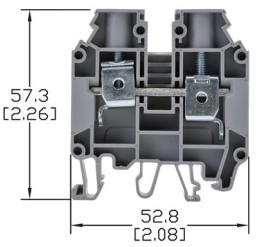
See our website: www.AutomationDirect.com for complete engineering drawings

Ordering Information

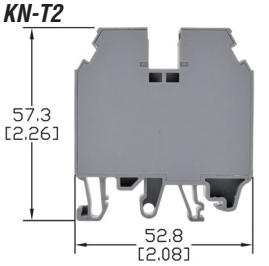
Colors	Part Number	Qty.	Price	Part Number	Qty.	Price	Part Number	Qty.	Price
Gray	KN-T6GRY	100	$69.00	KN-T4GRY	50	$54.00	KN-T2GRY	40	$67.00
	KN-T6GRY-25	25	$18.00	KN-T4GRY-25	25	$33.00	KN-T2GRY-10	10	$18.00
Blue	KN-T6BLU	100	$69.00	KN-T4BLU	50	$54.00	KN-T2BLU	40	$49.50
	KN-T6BLU-25	25	$18.00	KN-T4BLU-25	25	$33.00	KN-T2BLU-10	10	$18.00
Brown	KN-T6BRN	100	$48.00						
	KN-T6BRN-25	25	$18.00						
Black	KN-T6BLK	100	$69.00						
	KN-T6BLK-25	25	$18.00						
Green	KN-T6GRN	100	$48.00						
	KN-T6GRN-25	25	$18.00						
Orange	KN-T6ORG	100	$48.00						
	KN-T6ORG-25	25	$18.00						
Red	KN-T6RED	100	$48.00						
	KN-T6RED-25	25	$18.00						
Yellow	KN-T6YEL	100	$48.00						
	KN-T6YEL-25	25	$18.00						
White	KN-T6WHT	100	$69.00						
	KN-T6WHT-25	25	$18.00						

Dimensions: mm [in]

KN-T4



KN-T2



Technical Specifications

Model	KN-T6			KN-T4			KN-T2		
Width	10mm [0.39 in]			12mm [0.47 in]			16mm [0.63 in]		
Stripping Length	12mm [0.47 in]			16mm [0.63 in]			18mm [0.71 in]		
Tightening Torque	1.2 N·m [10.6 lb·in]			1.2 N·m [10.6 lb·in]			2.5 N·m [22.1 lb·in]		
Density	100/m [33 pcs/ft]			83/m [25 pcs/ft]			62/m [19 pcs/ft]		
UL/CSA Approval	*300V	65A	16-6 AWG	600V	80A	12-4 AWG	600V	115A	10-2 AWG
VDE Approval	630V	57A	10mm²	750V	76A	16mm²	750V	125A	35mm²
CE Conformity	630V	57A	10mm²	750V	76A	16mm²	750V	125A	35mm²
SCCR Rating	100kA			100kA			100kA		
Operating Temperature	Ambient air temperature: -67°F to 185°F [-55°C to 85°C], Relative humidity: 50% max at 104°F [40°C] and 90% max at 68°F [20°C]								
Material	Current Bar: Copper Alloy / Housing: Polyamide 66 / Screws: Zinc Plated Steel								
DIN Rail Width	35mm								

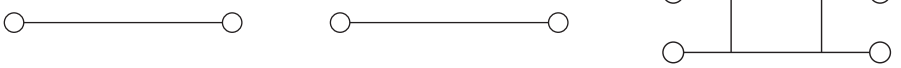
Accessories

End Covers (International colors)	Gray	KN-ECT6GRY	100/pkg	$16.00	KN-ECT4GRY	25/pkg	$7.50	Note: KN-T2 is totally enclosed, no end cover required		
		KN-ECT6GRY-25	25/pkg	$4.00	—	—	—			
	Blue	KN-ECT6BLU	10/pkg	$2.00	KN-ECT4-BLU	10/pkg	$3.50			
	Brown	KN-ECT6BRN			—	—	—			
	Black	KN-ECT6BLK			—	—	—			
	Green	KN-ECT6GRN			—	—	—			
	Orange	KN-ECTORG			—	—	—			
	Red	KN-ECT6RED			—	—	—			
	Yellow	KN-ECT6YEL			—	—	—			
	White	KN-ECT6WHT			—	—	—			
Separators (International colors)	Gray	KN-ST1GRY	25/pkg	$7.50	KN-ST2GRY	25/pkg	$10.00	KN-ST3GRY	10/pkg	$5.00
	Blue	KN-ST1BLU	10/pkg	$3.00	KN-ST3BLU	10/pkg	$10.00	KN-ST3BLU	10/pkg	$5.00
	Brown	KN-ST1BRN			—	—	—	—	—	—
	Black	KN-ST1BLK			—	—	—	—	—	—
	Green	KN-ST1GRN			—	—	—	—	—	—
	Orange	KN-ST1ORG			—	—	—	—	—	—
	Red	KN-ST1RED			—	—	—	—	—	—
	Yellow	KN-ST1YEL			—	—	—	—	—	—
	White	KN-ST1WHT			—	—	—	—	—	—
Jumpers	2-pole	KN-2J6	25/pkg	$14.00	KN-2J4	25/pkg	$22.50	KN-2J2	25/pkg	$23.00
	3-pole	KN-3J6	20/pkg	$15.00	KN-3J4	20/pkg	$24.00	KN-3J2	20/pkg	$25.00
	4-pole	KN-4J6	15/pkg	$15.00	KN-4J4	15/pkg	$24.00	KN-4J2	15/pkg	$25.00
	10-pole	KN-10J6	5/pkg	$11.50	KN-10J4	5/pkg	$19.00	KN-10J2	5/pkg	$19.00
Comb-type jumper / 2-pole		KN-2JCC6	25/pkg	$23.00	—	—	—	—	—	—
Top Cover / Blank		KN-TC-1	25/pkg	$6.00	KN-TC-2	25/pkg	$15.50	KN-TC-2	25/pkg	$15.50
Top Cover / Symbol		KN-TC-1S	25/pkg	$8.50	KN-TC-2s	25/pkg	$15.50	KN-TC-2s	25/pkg	$15.50
Marking Tags		KN-L5/ KN-L6P5 Series			KN-L5/ KN-L6P5 Series			KN-L5/ KN-L6P5 Series		

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Single-Level Terminal Blocks

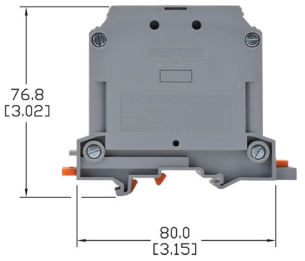
KONNECT-IT TERMINAL BLOCKS



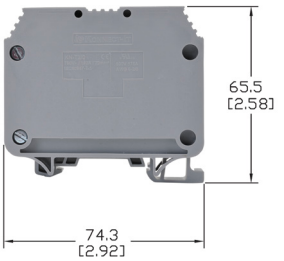
- Screw connection terminal
- UL E179129 (For copper wire only. One conductor in terminal only.)
- CE (EN 60947-7-1)

Dimensions: mm [in]

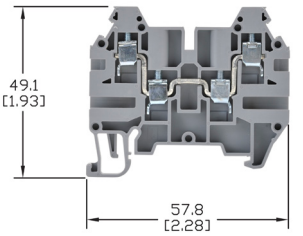
KN-T1/0



KN-T2/0



KN-TSP4



See our website: www.AutomationDirect.com for complete engineering drawings

Ordering Information									
Colors	***Part Number***	***Qty***	***Price***	***Part Number***	***Qty***	***Price***	***Part Number***	***Qty***	***Price***
Gray	***KN-T1/0GRY***	25	$65.00	***KN-T2/0GRY***	10	$41.00	***KN-T12SP4***	100	$119.00
	KN-T1/0GRY-10	10	$25.00	—	—	—	***KN-T12SP4-25***	25	$39.00
Blue	***KN-T1/0BLU***	25	$65.00	***KN-T2/0BLU***	10	$59.00	—	—	—
	KN-T1/0BLU-10	10	$25.00	—	—	—	—	—	—

Technical Specifications									
Model	***KN-T1/0***			***KN-T2/0***			***KN-T12SP4***		
Width	20mm [0.79 in]			22mm [0.87 in]			5mm [0.20 in]		
Stripping Length	20mm [0.79 in]			20mm [0.79 in]			10mm [0.39 in]		
Tightening Torque	6.0 N·m [53.1 lb·in]			6.0 N·m [53.1 lb·in]			0.5 N·m [4.4 lb·in]		
Density	50/m [15 pcs/ft]			45/m [13 pcs/ft]			200/m [60 pcs/ft]		
UL/CSA Approval	600V	150A	6-1/0 AWG	600V	175A	6-2/0 AWG	600V	20A	26-12 AWG
CE Conformity	1000V	150A	50mm²	750V	192A	70mm²	750V	24A	2.5 mm²
SCCR Rating	100kA			100kA			10kA per Table SB4.1, 2009, UL 508A.		
Operating Temperature	Ambient air temperature: -67°F to 185°F [-55°C to 85°C], Relative humidity: 50% max at 104°F [40°C] and 90% max at 68°F [20°C]								
Material	Current Bar: Copper Alloy / Housing: Polyamide 66 / Screws: Zinc Plated Steel								
DIN Rail Width	35mm								

Accessories										
End Covers	***Gray***	—	—	—	—	—	—	***KN-EC12SP4***	25/pkg	$7.00
Jumpers	***2-pole***	***KN-2J1/0***	5/pkg	$7.00	—	—	—	***KN-2JM12***	25/pkg	$6.50
	3-pole	***KN-3J1/0***	5/pkg	$11.50	—	—	—	***KN-3JM12***	20/pkg	$7.50
	4-pole	***KN-4J1/0***	5/pkg	$15.00	—	—	—	***KN-4JM12***	15/pkg	$7.50
	10-pole	—	—	—	—	—	—	***KN-10JM12***	5/pkg	$8.50
Marking Tags		No tags available			***KN-L5 Series*** ***KN-L6P5 Series***			***KN-L5 Series***		

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

100kA Terminal Block Short-Circuit Current Rating Data

KONNECT-IT TERMINAL BLOCKS

Short-Circuit Current Rating Data										
	Suitable Copper Conductor Range (AWG)		Fuse Class Maximum Amperage						SCCR Rating	Volts Max
Part Number	Line	Load	Class J	Class T	Class RK1	Class RK5	Class G	Class CC		
KN-T12 [2]	26-12	26-12	20	20	—	—	20	20	100 kA	600
KN-T10 [2]	26-10	26-10	30	30	—	—	30	30	100 kA	600
KN-T8 [2]	26-8	26-8	50	50	30	—	45	30	100 kA	600
KN-T6 [2]	16-6	16-6	80	80	60	30	60	30	100 kA	600
KN-T4 [2]	12-4	12-4	80	80	60	30	60	30	100 kA	600
KN-T2 [2]	12-2	12-2	125	125	100	30	60	30	100 kA	600
KN-T1/0 [3]	6-1/0	6-1/0	150	150	100	30	60	30	100 kA	600
KN-T2/0 [3]	6-2/0	6-2/0	225	225	100	60	60	30	100 kA	600
KN-D12 [1 2]	26-12	26-12	20	20	—	—	20	20	100 kA	600
KN-D10 [1 2]	26-10	26-10	30	30	—	—	30	30	100 kA	600
KN-TL14 [2]	24-12	24-12	30	30	—	—	30	30	100 kA	600
KN-TG14 [2]	24-12	24-12	30	30	—	—	30	30	100 kA	600
KN-M12 [2]	26-12	26-12	30	30	—	—	30	30	100 kA	600
KN-M10 [2]	14-12	14-12	30	30	—	—	30	30	100 kA	600

Note: [1] KN-D12 and KN-D10 have optional short circuit rating evaluated for use with copper conductors only. Must be protected by the max ampere and Class of overcurrent protective device noted above.

[2] The terminal block short-circuit rating for KN-D12 and KN-D10 were determined based on testing in a minimum size enclosure measuring 4x4x6 inches. The suitability of smaller enclosures shall be determined in the end-use investigation.

[3] The terminal block short-circuit rating for KN-T1/0 and KN-T2/0 were determined based on testing in a minimum size enclosure measuring 12x12x6 inches. The suitability of smaller enclosures shall be determined in the end-use investigation.

KONNECT-IT® Accessories

Multi-Pole Jumper Bars

Multi-pole jumper bars provide terminal block connection flexibility. Screw-down connection jumpers feature all-metal construction and can be installed quickly just by tightening the screws. Screwless comb-style jumpers are also available. See next page for I/O jumper installation instructions.

Multi-Pole Jumper Bars Ordering Information

Type	Part Number	Works With	Number of Poles	Dimensions - mm [in] Height	Length	Width	Fig.	Pcs/ Pkg	Price
Screw-down connection	KN-2J12	KN-T12 KN-D12 KN-D12X KN-D12DR1 KN-D12LED	2	15.8 [0.62]	10.1 [0.40]	4.4 [0.17]	1	25	$7.50
	KN-3J12		3		15.3 [0.60]		2	20	$9.50
	KN-4J12		4		20.4 [0.80]		3	15	$11.00
	KN-10J12		10		51.1 [2.01]		4	5	$7.50
	KN-2J10	KN-T10 KN-D10 KN-D10X KN-D10DR1 KN-D10LED	2	15.5 [0.61]	10.8 [0.43]	6.0 [0.24]	1	25	$10.50
	KN-3J10		3		17.0 [0.67]		2	20	$12.50
	KN-4J10		4		23.0 [0.91]		3	15	$12.50
	KN-10J10		10		59.0 [2.32]		4	5	$9.50
	KN-2J8	KN-T8	2	15.5 [0.61]	14.3 [0.56]	6.0 [0.24]	1	25	$11.00
	KN-3J8		3		22.3 [0.88]		2	20	$13.50
	KN-4J8		4		30.3 [1.19]		3	15	$13.00
	KN-10J8		10		78.3 [3.08]		4	5	$10.50
	KN-2J6	KN-T6	2	15.5 [0.61]	18.0 [0.71]	6.0 [0.24]	1	25	$14.00
	KN-3J6		3		28.0 [1.10]		2	20	$15.00
	KN-4J6		4		38.0 [1.50]		3	15	$15.00
	KN-10J6		10		98.0 [3.86]		4	5	$11.50
	KN-2J4	KN-T4	2	23.0 [0.91]	21.0 [0.83]	6.0 [0.24]	1	25	$22.50
	KN-3J4		3		33.0 [1.30]		2	20	$24.00
	KN-4J4		4		45.0 [1.77]		3	15	$24.00
	KN-10J4		10		117.0 [4.61]		4	5	$19.00
	KN-2J2	KN-T2	2	21.0 [0.83]	29.0 [1.14]	8.0 [0.31]	1	25	$23.00
	KN-3J2		3		45.0 [1.77]		2	20	$25.00
	KN-4J2		4		61.0 [2.40]		3	15	$25.00
	KN-10J2		10		157.0 [6.18]		4	5	$19.00
	KN-2J1/0	KN-T1/0	2	22.3 [0.88]	36.0 [1.42]	12.0 [0.47]	5	5	$7.00
	KN-3J1/0		3		56.0 [2.20]		5	5	$11.50
	KN-4J1/0		4		76.0 [2.99]		5	5	$15.00
	KN-2JTL12	KN-DG12 KN-TG12 KN-TL14 KN-TL14S KN-TL14SLN KN-TL14SP	2	15.5 [0.61]	11.0 [0.43]	4.4 [0.17]	1	25	$11.50
	KN-3JTL12		3		17.0 [0.67]		2	20	$14.50
	KN-4JTL12		4		23.0 [0.91]		3	15	$13.00
	KN-10JTL12		10		59.0 [2.32]		4	5	$11.50
Push-in Connection	KN-2JM10	KN-M10 KN-KBD10	2	23.2 [0.91]	9.5 [0.37]	2.7 [0.11]	6	25	$7.00
	KN-3JM10		3		15.5 [0.61]		7	20	$8.50
	KN-4JM10		4		21.5 [0.85]		8	15	$10.00
	KN-10JM10		10		57.5 [2.26]		9	5	$9.50
	KN-2JM12	KN-M12 KN-T12SP4	2	21.7 [0.85]	8.0 [0.31]	2.3 [0.09]	6	25	$6.50
	KN-3JM12		3		13.0 [0.51]		7	20	$7.50
	KN-4JM12		4		18.0 [0.71]		8	15	$7.50
	KN-10JM12		10		48.0 [1.89]		9	5	$8.50
Screwless Comb-style	KN-2JCC12	KN-T12	2	23.7 [0.93]	8.0 [0.31]	2.8 [0.11]	10	25	$10.00
	KN-2JCC10	KN-T10		24.7 [0.97]	9.5 [0.37]		10	25	$20.00
	KN-2JCC8	KN-T8		25.6 [1.01]	13.5 [0.53]		10	25	$21.00
	KN-2JCC6	KN-T6		26.7 [1.05]	16.0 [0.63]	3.9 [0.15]	10	25	$23.00

Note: ***Screwless Comb-Style jumpers are designed to be connected under the conductor clamp.***

KN-10J12

Figure 1

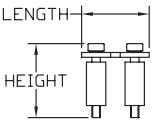


Figure 2

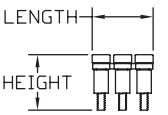


Figure 3

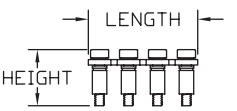
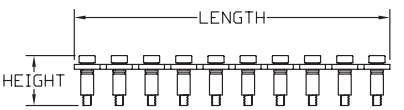


Figure 4



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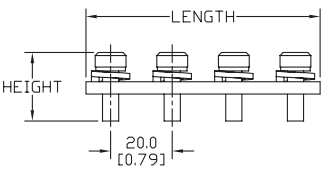


KN-2JM12

Figure 6

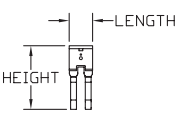


Figure 7

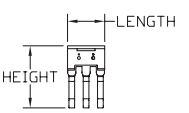


Figure 8

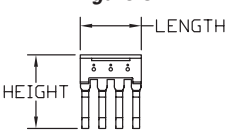
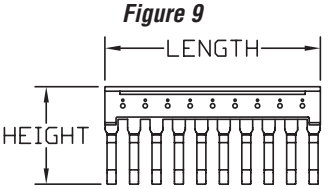
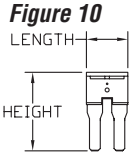


Figure 9



KN-2JCC8

Figure 10



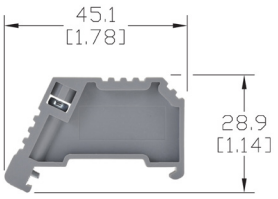
KONNECT-IT® Accessories

End Brackets

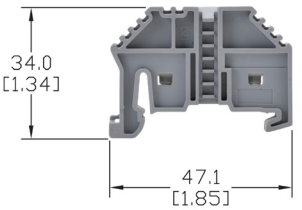
End brackets prevent terminal blocks and other DIN rail mount components and devices from moving laterally on the rail. They are constructed from polyamide 66 and available in configurations for 35mm and 15mm DIN rails.

Dimensions mm [in]

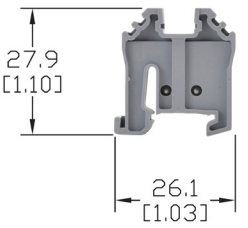
KN-EB3



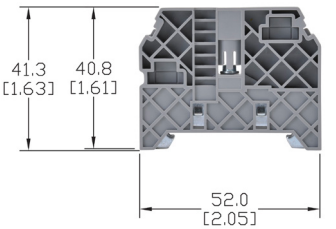
KN-EB4



KN-EB5



KN-EB7



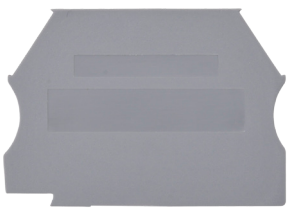
End Brackets Ordering Information												
Gray End Brackets	KN-EB3	100/pkg	$30.00	KN-EB4	100/pkg	$31.00	KN-EB5	100/pkg	$45.00	KN-EB7	50/pkg	$31.00
	KN-EB3-10	10/pkg	$4.00	KN-EB4-10	10/pkg	$3.00	KN-EB5-10	10/pkg	$5.00	KN-EB7-10	10/pkg	$6.00

Technical Specifications				
Description	Screw-type end bracket	Screwless end bracket	Screwless end bracket	Screw type end bracket
Bracket Width	8 mm [0.31 in]	8 mm [0.31 in]	8 mm [0.31 in]	10 mm [0.39 in]
DIN Rail Width	35 mm	35 mm	15 mm	35 mm
Material	Housing: Polyamide 66 / Clamping Connector: Zinc Plated Steel			

End Bracket Accessories												
Label Holder	—	—	—	KN-MA-1	25/pkg	$12.50	—	—	—	KN-MA-2	50/pkg	$33.50
	—	—	—	KN-MA-1-10	10/pkg	$6.00	—	—	—	KN-MA-2-10	10/pkg	$7.50
Marking Tags	KN-L5 Series or KN-L6P5 Series											

End Covers

End covers are used to cover the open side of sectional DIN rail mount terminal blocks. They should be used at the end of an assembly of identical terminal blocks or whenever there is a change in the physical size of the terminal block.
Material: Polyamide 66



End Covers Ordering Information											
Part Number	Color	Dimensions HxLxW mm [in]	Suitable for	Pcs/ Pkg	Price	Part Number	Color	Dimensions HxLxW mm [in]	Suitable for	Pcs/ Pkg	Price
KN-ECT6GRY	gray	34.0x42.7x1.3 [1.34x1.68x0.05]	KN-T12 KN-T10 KN-T8 KN-T6	100	$16.00	KN-ECDORG	orange	48.2x63.2x1.3 [1.90x2.49x0.05]	KN-D10 KN-D12	10	$4.00
KN-ECT6GRY-25	gray			25	$4.00	KN-ECDRED	red				
KN-ECT6BLU	blue			10	$2.00	KN-ECDYEL	yellow				
KN-ECT6BLK	black					KN-ECTL	gray	54.7x87.1x1.3 [2.15x3.43x0.05]	KN-TL14	10	$2.50
KN-ECT6BRN	brown					KN-ECTLS	gray	54.7x72.8x1.2 [2.15x2.87x0.05]	KN-TL14S	10	$3.00
KN-ECT6GRN	green					KN-ECDG12	gray	48.0x71.4x1.2 [1.89x2.81x0.05]	KN-DG12	10	$3.00
KN-ECT6ORG	orange					KN-ECTG12	gray	62.5x87.5x1.2 [2.46x3.44x0.05]	KN-TG12	10	$3.00
KN-ECT6RED	red					KN-ECMGRY	gray	28.1x27.0x3.0 [1.11x1.06x0.12]	KN-M12 KN-M10	100	$34.50
KN-ECT6WHT	white					KN-ECMGRY-10	gray			10	$4.00
KN-ECT6YEL	yellow					KN-ECMBLU	blue				$4.00
KN-ECT4GRY	gray	45.7x52.8x1.2 [1.80x2.08x0.05]	KN-T4	25	$7.50	KN-ECMGRN	green/yellow	28.1x27.0x3.0 [1.11x1.06x0.12]	KN-MG12 KN-MG10	10	$4.00
KN-ECT4BLU	blue			10	$3.50	KN-ECG12SP4	green/yellow	39.7x57.1x1.2 [1.56x2.25x0.05]	KN-G12SP4	10	$3.00
KN-ECDGRY	gray	48.2x63.2x1.3 [1.90x2.49x0.05]	KN-D10 KN-D12	25	$8.00	KN-ECT12SP4	gray	39.7x57.1x1.2 [1.56x2.25x0.05]	KN-T12SP4	25	$7.00
KN-ECDBLU	blue			10	$4.00	KN-ECF10	gray	27.3x59.6x1.2 [1.07x2.35x0.05]	KN-F10	25	$9.00
KN-ECDBLK	black					KN-ECKBD	gray	37.1x53.5x1.2 [1.46x2.11x0.05]	KN-KDB10	10	$4.00
KN-ECDGRN	green										

KONNECT-IT® Accessories

Separators

Separators are used to segment banks of terminal blocks. Allows you to maintain a single row of terminal blocks, but have separate power source clusters.

Separators Ordering Information							
Part Number	Color	Works With	Dimensions - mm [in]			Pcs/ Pkg	Price
			Height	Length	Thickness		
KN-ST1GRY	Gray	KN-T12 KN-T10 KN-T8 KN-T6	39.0 [1.54]	42.5 [1.67]	1.2 [0.05]	25	$7.50
KN-ST1BLU	Blue					10	$3.00
KN-ST1BLK	Black						
KN-ST1BRN	Brown						
KN-ST1GRN	Green						
KN-ST1ORG	Orange						
KN-ST1RED	Red						
KN-ST1WHT	White						
KN-ST1YEL	Yellow						
KN-ST2GRY	Gray	KN-T4	52.5 [2.07]	50.5 [1.99]	1.5 [0.06]	25	$10.00
KN-ST2BLU	Blue					10	$10.00
KN-ST3GRY	Gray	KN-T2	62.6 [2.46]	53.1 [2.09]	1.5 [0.06]		$5.00
KN-ST3BLU	Blue						$5.00

KN-ST1GRY

Top Covers and Label Holders

Top Covers and Label Holders Ordering Information							
Part Number	Description	Works With	Dimensions - mm [in]			Pcs/ Pkg	Price
			Height	Length	Width		
KN-TC-1	Top cover for Konnect-It terminal block, blank, white	KN-T12 KN-T10 KN-T8 KN-T6	6.8 [0.27]	29.0 [1.14]	5.8 [0.23]	25	$6.00
KN-TC-1S	Top cover for Konnect-It terminal block, printed electric symbol, white					25	$8.50
KN-TC-2	Top cover for Konnect-It terminal block, blank, white	KN-T4 KN-T2	7.3 [0.29]	35.8 [1.41]	9.0 [0.35]	25	$15.50
KN-TC-2S	Top cover for Konnect-It terminal block, printed electric symbol, white					25	$15.50
KN-MA-1	Label holder for terminal block group. Label media not included.	KN-EB4	46.2 [1.82]	46.0 [1.81]	11.4 [0.45]	25	$12.50
KN-MA-1-10						10	$6.00
KN-MA-2	Label holder for terminal block group. Label media not included.	KN-EB7	37.5 [1.48]	46.2 [1.82]	9.5 [0.37]	50	$33.50
KN-MA-2-10						10	$7.50
KN-MA-3	Top mounting marking tag adapter for terminal block. Holds up to (4) L5x5 tags	KN-T4 KN-T2	9.3 [0.36]	36.0 [1.42]	9.0 [0.35]	25	$8.50
KN-MA-4	Top mounting marking tag adapter for terminal block. Holds up to (4) L5x5 tags	KN-T12 KN-T10 KN-T8 KN-T6	9.0 [0.35]	29.0 [1.14]	5.7 [0.22]	25	$7.50
KN-MA-5	Label holder for terminal block group. Label media not included.	Attaches to any 35mm DIN rail	46.4 [1.83]	44.5 [1.75]	10.0 [0.39]	50	$27.50
KN-MA-5-25						25	$16.50

KN-MA-1

KN-MA-5

KN-TC-1

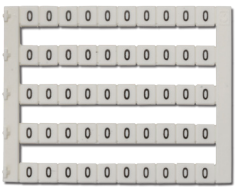
KN-TC-1S

KN-MA-3

KONNECT-IT® Accessories

Marking Tags 5 x 5mm

Use with any Konnect-It series terminal blocks



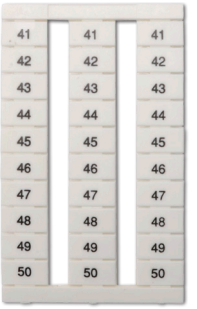
5 x 5mm Marking Tags Ordering Information												
250 Pieces per Package						500 Pieces per Package					
Part Number	Imprint	Price	Part Number	Imprint	Price	Part Number	Imprint	Price	Part Number	Imprint	Price
KN-L5-BLANK-250	Blank	$7.00	KN-L5-A-250	A	$7.00	KN-L5-BLANK	Blank	$11.00	KN-L5-A	A	$13.00
KN-L5-0-250	0	$7.00	KN-L5-B-250	B	$7.00	KN-L5-0	0	$13.00	KN-L5-B	B	$13.00
KN-L5-1-250	1	$7.00	KN-L5-C-250	C	$7.00	KN-L5-1	1	$13.00	KN-L5-C	C	$13.00
KN-L5-2-250	2	$7.00	KN-L5-D-250	D	$7.00	KN-L5-2	2	$13.00	KN-L5-D	D	$13.00
KN-L5-3-250	3	$7.00	KN-L5-E-250	E	$7.00	KN-L5-3	3	$13.00	KN-L5-E	E	$13.00
KN-L5-4-250	4	$7.00	KN-L5-F-250	F	$7.00	KN-L5-4	4	$13.00	KN-L5-F	F	$13.00
KN-L5-5-250	5	$7.00	KN-L5-G-250	G	$7.00	KN-L5-5	5	$13.00	KN-L5-G	G	$13.00
KN-L5-6-250	6	$7.00	KN-L5-H-250	H	$7.00	KN-L5-6	6	$13.00	KN-L5-H	H	$13.00
KN-L5-7-250	7	$7.00	KN-L5-I-250	I	$7.00	KN-L5-7	7	$13.00	KN-L5-I	I	$13.00
KN-L5-8-250	8	$7.00	KN-L5-J-250	J	$7.00	KN-L5-8	8	$13.00	KN-L5-J	J	$13.00
KN-L5-9-250	9	$7.00	KN-L5-K-250	K	$7.00	KN-L5-9	9	$13.00	KN-L5-K	K	$13.00
KN-L5-10-250	10	$7.00	KN-L5-L-250	L	$7.00	KN-L5-10	10	$13.00	KN-L5-L	L	$13.00
KN-L5-1-10-250	1-10	$7.00	KN-L5-M-250	M	$7.00	KN-L5-1-10	1-10	$13.00	KN-L5-M	M	$13.00
KN-L5-11-20-250	11-20	$7.00	KN-L5-N-250	N	$7.00	KN-L5-11-20	11-20	$13.00	KN-L5-N	N	$13.00
KN-L5-21-30-250	21-30	$7.00	KN-L5-O-250	O	$7.00	KN-L5-21-30	21-30	$13.00	KN-L5-O	O	$13.00
KN-L5-31-40-250	31-40	$7.00	KN-L5-P-250	P	$7.00	KN-L5-31-40	31-40	$13.00	KN-L5-P	P	$13.00
KN-L5-41-50-250	41-50	$7.00	KN-L5-Q-250	Q	$7.00	KN-L5-41-50	41-50	$13.00	KN-L5-Q	Q	$13.00
KN-L5-1-50-250	1-50	$7.00	KN-L5-R-250	R	$7.00	KN-L5-1-50	1-50	$13.00	KN-L5-R	R	$13.00
KN-L5-51-100-250	51-100	$7.00	KN-L5-S-250	S	$7.00	KN-L5-51-100	51-100	$13.00	KN-L5-S	S	$13.00
KN-L5-101-150-250	101-150	$7.00	KN-L5-T-250	T	$7.00	KN-L5-101-150	101-150	$13.00	KN-L5-T	T	$13.00
KN-L5-151-200-250	151-200	$7.00	KN-L5-U-250	U	$7.00	KN-L5-151-200	151-200	$13.00	KN-L5-U	U	$13.00
KN-L5-201-250-250	201-250	$7.00	KN-L5-V-250	V	$7.00	KN-L5-201-250	201-250	$13.00	KN-L5-V	V	$13.00
KN-L5-251-300-250	251-300	$7.00	KN-L5-W-250	W	$7.00	KN-L5-251-300	251-300	$13.00	KN-L5-W	W	$13.00
KN-L5-301-350-250	301-350	$7.00	KN-L5-X-250	X	$7.00	KN-L5-301-350	301-350	$13.00	KN-L5-X	X	$13.00
KN-L5-351-400-250	351-400	$7.00	KN-L5-Y-250	Y	$7.00	KN-L5-351-400	351-400	$13.00	KN-L5-Y	Y	$13.00
KN-L5-401-450-250	401-450	$7.00	KN-L5-Z-250	Z	$7.00	KN-L5-401-450	401-450	$13.00	KN-L5-Z	Z	$13.00
KN-L5-451-500-250	451-500	$7.00	KN-L5-POS-250	+	$7.00	KN-L5-451-500	451-500	$13.00	KN-L5-POS	+	$13.00
KN-L5-L1-250	L1	$7.00	KN-L5-NEG-250	-	$7.00	KN-L5-L1	L1	$13.00	KN-L5-NEG	-	$13.00
KN-L5-L2-250	L2	$7.00	KN-L5-GND-250	GND	$7.00	KN-L5-L2	L2	$13.00	KN-L5-GND	GND	$13.00
KN-L5-L3-250	L3	$7.00				KN-L5-L3	L3	$13.00			

KONNECT-IT® Accessories

Marking Tags 6.5 x 10mm

Use with any Konnect-It series terminal blocks 6.5mm or wider.

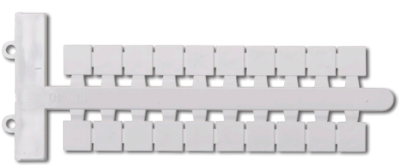
6.5 x 10mm Marking Tags Ordering Information			
Part Number	**Description**	**Pcs/Pkg**	**Price**
KN-L6P5-BLNK-250	Blank	250	$19.00
KN-L6P5-1-10-250	Numbered 1-10	250	$19.50
KN-L6P5-11-20-250	Numbered 11-20	250	$19.50
KN-L6P5-21-30-250	Numbered 21-30	250	$19.50
KN-L6P5-31-40-250	Numbered 31-40	250	$19.50
KN-L6P5-41-50-250	Numbered 41-50	250	$19.50
KN-L6P5-51-60-250	Numbered 51-60	250	$19.50
KN-L6P5-61-70-250	Numbered 61-70	250	$19.50
KN-L6P5-71-80-250	Numbered 71-80	250	$19.50
KN-L6P5-81-90-250	Numbered 81-90	250	$19.50
KN-L6P5-91-100-250	Numbered 91-100	250	$19.50
KN-L6P5-BLNK	Blank	500	$35.00
KN-L6P5-1-10	Numbered 1-10	500	$35.00
KN-L6P5-11-20	Numbered 11-20	500	$35.00
KN-L6P5-21-30	Numbered 21-30	500	$35.00
KN-L6P5-31-40	Numbered 31-40	500	$35.00
KN-L6P5-41-50	Numbered 41-50	500	$35.00
KN-L6P5-51-60	Numbered 51-60	500	$35.00
KN-L6P5-61-70	Numbered 61-70	500	$35.00
KN-L6P5-71-80	Numbered 71-80	500	$35.00
KN-L6P5-81-90	Numbered 81-90	500	$35.00
KN-L6P5-91-100	Numbered 91-100	500	$35.00



Marking Tags 5 x 10mm, 6 x 10mm, 10 x 10mm

Marking Tags Ordering Information			
Part Number*	**Description**	**Pcs/Pkg**	**Price**
KN-L5X-BLNK-220	Blank marking tag, 5x10mm, use with any Konnect-It terminal block series	220	$6.50
KN-L6X-BLNK-180	Blank marking tag, 6x10mm, use with any Konnect-It terminal block 6mm or wider	180	$6.00
KN-L10X-BLNK-100	Blank marking tag, 10x10mm, use with any Konnect-It terminal block 10mm or wider	100	$9.00
KN-L5X-BLNK	Blank marking tag, 5x10mm, use with any Konnect-It terminal block series	440	$12.00
KN-L6X-BLNK	Blank marking tag, 6x10mm, use with any Konnect-It terminal block 6mm or wider	360	$11.50
KN-L10X-BLNK	Blank marking tag, 10x10mm, use with any Konnect-It terminal block 10mm or wider	200	$16.00

Does not fit any KN-T1/0 or KN-G1/0 series block



DIN Rail and Accessories

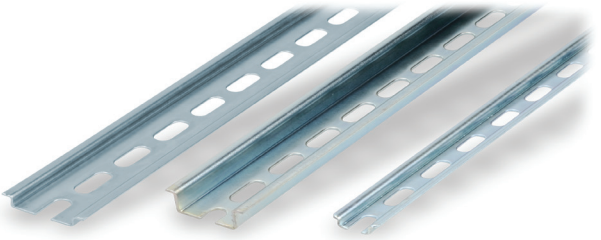
Steel DIN Rails Features

35 mm wide

- Available in 1-meter lengths
- 7.5 mm-high rails primarily used to mount terminal blocks, relays, timers and small PLCs such as the DL05, DL06, DL105, DL205, CLICK, Do-more, and Productivity3000
- 15 mm-high rails for mounting larger and heavier components such as contactors and larger PLCs

15 mm wide

- Available in 1-meter lengths
- DN-R15S1 exclusively for mounting mini terminal blocks.



	Part Number	Pcs/ Pkg	Price/ Pkg	Part Number	Pcs/ Pkg	Price/ Pkg	Part Number	Pcs/ Pkg	Price/ Pkg
DIN Rail	DN-R35S1	10	$28.00	DN-R35HS1	10	$49.50	DN-R15S1	10	$26.00
	DN-R35S1-2	2	$9.00	DN-R35HS1-2	2	$12.00	DN-R15S1-2	2	$8.00
Steel DIN Rails Specifications									
Description	Steel, slotted, 3'3" (1 m) length, 35 mm (1.38 in) wide, 7.5 mm (0.30 in) high			Steel, slotted, 3'3" (1 m) length, 35 mm (1.38 in) wide, 15 mm (0.59 in) high			Steel, slotted, 3'3" (1 m) length, 15 mm (0.59 in) wide, 5.5 mm (0.22 in) high		
Plating	Zinc-plated and chromated								
International Standards	EN 60715, RoHs								
Suggested Mounting Screw Type	M6			M6			M4		

Aluminum DIN Rails Features

35 mm wide

- Non-anodized finish
- Galvanic zinc plating and passivation (minimum thickness 6 microns)
- Lightweight, easy to cut and deburr
- Terminal blocks only
- Maximum mounting screw #10-32 or M5
- Available in 1-meter lengths

35 mm wide raised

- Non-anodized finish
- Galvanic zinc plating and passivation (minimum thickness 6 microns)
- Enables users to raise terminal blocks 2¼" above the back panel
- Terminal blocks only
- Available in 1-meter lengths
- Bushing or grommet recommended for wire access hole

(example Heyco UB-875 not sold by ADC)

	Part Number	Pcs/ Pkg	Price/ Pkg	Part Number	Pcs/ Pkg	Price/ Pkg
DIN Rail	DN-R35SAL1	10	$36.00	DN-R35SAL2-2	2	$24.25
	DN-R35SAL1-2	2	$8.00			
Aluminum DIN Rails Specifications						
Description	Aluminum, slotted, 3'3" (1 m) length, 35 mm (1.38 in) wide, 10 mm (0.39 in) high			Aluminum, slotted, 3'3" (1 m) length, 35 mm (1.38 in) wide, 58 mm (2.28 in) high		
Plating	Galvanic zinc plating, non-anodized finish					
International Standards	DIN 50960, RoHs					
Suggested Mounting Screw Type	#10-32 or M5					

DIN Rail and Accessories

DIN rail support brackets

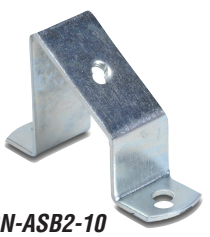
- Angled support brackets raise and tilt mounting rails 30 degrees from mounting surface for easier wiring
- DN-ASB1 plated steel support bracket
- DN-ASB2-10 cold-rolled steel treated with galvanic zinc plating and passivation

DIN rail mounting clips

- Snap small devices not made for mounting onto 35mm DIN rails
- Zinc plated steel

DIN Rail Support Brackets and Mounting Clips			
Part Number	***Description***	***Pcs/Pkg***	***Price Each***
DN-ASB1	30˚angled DIN rail support bracket (M6-1.0 screws not included)	50	$49.50
DN-ASB2-10	30˚angled DIN rail support bracket (M6-1.0 screws included)	10	$12.00
DN-SSB25-10	1" (25 mm) DIN rail support bracket (M6-1.0 screws included)	10	$17.00
DN-SSB50-10	2" (50 mm) DIN rail support bracket (M6-1.0 screws included)	10	$18.25
DN-SSB70-10	2.75" (70 mm) DIN rail support bracket (M6-1.0 screws included)	10	$23.00
DN-SSB90-10	3.5" (90 mm) DIN rail support bracket (M6-1.0 screws included)	10	$24.25
DN-CLIP-FM4	DIN rail mounting clip with M4 x 0.7 mm threaded hole (Screws not included)	40	$45.00
DN-CLIP-FM4-5		5	$6.25
DN-CLIP-FM5	DIN rail mounting clip with M5 x 0.8 mm threaded hole (Screws not included)	40	$49.50
DN-CLIP-FM5-5		5	$7.00

DN-ASB1



DN-ASB2-10

DN-SSB25-10

DN-SSB50-10

DN-SSB70-10

DN-SSB90-10

DN-CLIP-FM4
DN-CLIP-FM4-5

DN-CLIP-FM5
DN-CLIP-FM5-5

KONNECT-IT® Cross Reference

Allen-Bradley®

The following is a list of comparable products. To obtain our high-quality KONNECT-IT terminal blocks, simply find the corresponding part number of the unit you currently use. These are approximate replacements based on UL wire size, ampacity and voltage. Please consult the technical section for specifications to determine suitability for your application. Physical size varies from manufacturer to manufacturer.

Allen-Bradley	KONNECT-IT
1492-J3	KN-T12GRY
1492-J3-B	KN-T12BLU
1492-J3-BL	KN-T12BLK
1492-J3-BR	KN-T12BRN
1492-J3-G	KN-T12GRN
1492-J3-OR	KN-T12ORG
1492-J3-RE	KN-T12RED
1492-J3-W	KN-T12WHT
1492-J3-Y	KN-T12YEL
1492-J4	KN-T10GRY
1492-J4-B	KN-T10BLU
1492-J4-BL	KN-T10BLK
1492-J4-BR	KN-T10BRN
1492-J4-G	KN-T10GRN
1492-J4-OR	KN-T10ORG
1492-J4-RE	KN-T10RED
1492-J4-W	KN-T10WHT
1492-J4-Y	KN-T10YEL
1492-J6	KN-T8GRY
1492-J6-B	KN-T8BLU
1492-J6-BL	KN-T8BLK
1492-J6-BR	KN-T8BRN
1492-J6-G	KN-T8GRN
1492-J6-OR	KN-T8ORG
1492-J6-RE	KN-T8RED
1492-J6-W	KN-T8WHT
1492-J6-Y	KN-T8YEL
1492-J10	KN-T6GRY
1492-J10-B	KN-T6BLU
1492-J10-BL	KN-T6BLK
1492-J10-BR	KN-T6BRN
1492-J10-G	KN-T6GRN
1492-J10-OR	KN-T6ORG
1492-J10-RE	KN-T6RED
1492-J10-W	KN-T6WHT
1492-J10-Y	KN-T6YEL

Allen-Bradley	KONNECT-IT
1492-J16	KN-T4GRY
1492-J16-B	KN-T4BLU
1492-J35	KN-T2GRY
1492-J35-B	KN-T2BLU
1492-J50	KN-T1/0GRY
1492-J50-B	KN-T1/0BLU
1492-J70	KN-T2/0GRY
1492-J70-B	KN-T2/0BLU
1492-JD3	KN-D12GRY
1492-JD3-B	KN-D12BLU
1492-JD3C	KN-D12X
1492-JD3DR	KN-D12DR1
1492-JD4	KN-D10GRY
1492-JD4-B	KN-D10BLU
1492-JD4C	KN-D10X
1492-WTF3	KN-TL14
1492-WTS3	KN-TL14S
1492-JT3M	KN-TG12
1492-J2Q	KN-T12SP4
1492-WM3	KN-M12GRY
1492-WM3-B	KN-M12BLU
1492-WM4	KN-M10GRY
1492-WM4-B	KN-M10BLU
1492-JG3	KN-G10
1492-JG4	KN-G10
1492-JG6	KN-G8
1492-JG10	KN-G8
1492-JG16	KN-G4
1492-JG35	KN-G2
1492-JG50	KN-G1/0
1492-JG2Q	KN-G12SP4
1492-WMG3	KN-MG12
1492-WMG4	KN-MG10
1492-WFB4	KN-F10
1492-JD3FB	KN-F10SP

KONNECT-IT® Cross Reference

DINnectors®

The following is a list of comparable products. To obtain our high-quality KONNECT-IT terminal blocks, simply find the corresponding part number of the unit you currently use. These are approximate replacements based on UL wire size, ampacity and voltage. Please consult the technical section for specifications to determine suitability for your application. Physical size varies from manufacturer to manufacturer.

DIN*nectors*	KONNECT-IT
DN-T12-A	KN-T12GRY
DN-T12B-A	KN-T12BLU
DN-T12BLK-A	KN-T12BLK
DN-T12BR-A	KN-T12BRN
DN-T12GRN-A	KN-T12GRN
DN-T12ORG-A	KN-T12ORG
DN-T12RED-A	KN-T12RED
DN-T12W-A	KN-T12WHT
DN-T12YEL-A	KN-T12YEL
DN-T10-A	KN-T10GRY
DN-T10B-A	KN-T10BLU
DN-T10BLK-A	KN-T10BLK
DN-T10BR-A	KN-T10BRN
DN-T10GRN-A	KN-T10GRN
DN-T10ORG-A	KN-T10ORG
DN-T10RED-A	KN-T10RED
DN-T10W-A	KN-T10WHT
DN-T10YEL-A	KN-T10YEL
DN-T8	KN-T8GRY
DN-T8B	KN-T8BLU
DN-T8BLK	KN-T8BLK
DN-T8BR	KN-T8BRN
DN-T8GRN	KN-T8GRN
DN-T8ORG	KN-T8ORG
DN-T8RED	KN-T8RED
DN-T8W	KN-T8WHT
DN-T8YEL	KN-T8YEL
DN-T6	KN-T6GRY
DN-T6B	KN-T6BLU
DN-T6BLK	KN-T6BLK
DN-T6BR	KN-T6BRN
DN-T6GRN	KN-T6GRN
DN-T6ORG	KN-T6ORG
DN-T6RED	KN-T6RED

DIN*nectors*	KONNECT-IT
DN-T6W	KN-T6WHT
DN-T6YEL	KN-T6YEL
DN-T4	KN-T4GRY
DN-T4B	KN-T4BLU
DN-T1/0	KN-T1/0GRY
DN-T1/0B	KN-T1/0BLU
DN-D10-A	KN-D10GRY
DN-D10B	KN-D10BLU
DN-D10BLK	KN-D10BLK
DN-D10GRN	KN-D10GRN
DN-D10ORG	KN-D10ORG
DN-D10RED	KN-D10RED
DN-D10YEL	KN-D10YEL
DN-D10X-A	KN-D10X
DN-D10DR-A	KN-D10DR1
DN-D10LED1-A	KN-D10LED-24DC
DN-TL14-A	KN-TL14
DN-TL14S-A	KN-TL14S
DN-TL14SLN-A	KN-TL14SLN
DN-TL14SLP-A	KN-TL14SLP
DN-M10-A	KN-M10GRY
DN-M10B-A	KN-M10BLU
DN-G10	KN-G10
DN-G8	KN-G8
DN-G6	KN-G8
DN-G4	KN-G4
DN-G1/0	KN-G1/0
DN-MG10	KN-MG10
DN-F10	KN-F10
DN-F10L110	KN-F10L110AC or KN-F10L110DC
DN-F10L220	KN-F10L220AC or KN-F10L220DC
DN-F10L24	KN-F10L24AC or KN-F10L24DC
DN-DIS10	KN-F10-DCH
DN-KBD12	KN-KBD10

KONNECT-IT® Cross Reference

Entrelec®

The following is a list of comparable products. To obtain our high-quality KONNECT-IT terminal blocks, simply find the corresponding part number of the unit you currently use. These are approximate replacements based on UL wire size, ampacity and voltage. Please consult the technical section for specifications to determine suitability for your application. Physical size varies from manufacturer to manufacturer.

Entrelec	KONNECT-IT
115 486.03	KN-T12GRY
125 486.05	KN-T12BLU
115 116.07	KN-T10GRY
125 116.01	KN-T10BLU
115 118.11	KN-T8GRY
125 118.13	KN-T8BLU
115 120.17	KN-T6GRY
125 120.11	KN-T6BLU
115 129.14	KN-T4GRY
125 129.16	KN-T4BLU
115 124.07	KN-T2GRY
125 124.01	KN-T2BLU
115 216.13	KN-T2/0GRY
125 216.15	KN-T2/0BLU
115 490.13	KN-D12GRY
125 490.15	KN-D12BLU
115 271.22	KN-D10GRY
115.541.11	KN-TL14
115 542.12	KN-TL14S
115 643.27	KN-DG12
110 251.05	KN-M10GRY
120 251.07	KN-M10BLU
165 488.27	KN-G10
165 113.16	KN-G10
165 114.17	KN-G8
165 115.10	KN-G8
165 130.23	KN-G4
165 111.14	KN-G2
160 496.26	KN-MG10
115 657.25	KN-F10
115 604.21	KN-F10SP
115 986.00	KN-KBD10

KONNECT-IT® Cross Reference

Phoenix Contact®

The following is a list of comparable products. To obtain our high-quality KONNECT-IT terminal blocks, simply find the corresponding part number of the unit you currently use. These are approximate replacements based on UL wire size, ampacity and voltage. Please consult the technical section for specifications to determine suitability for your application. Physical size varies from manufacturer to manufacturer.

Phoenix Contact	KONNECT-IT
3003347	KN-T12GRY
3003350	KN-T12BLU
3004362	KN-T10GRY
3004388	KN-T10BLU
3004524	KN-T8GRY
3004977	KN-T8BLU
3005073	KN-T6GRY
3005086	KN-T6BLU
3006043	KN-T4GRY
3006056	KN-T4BLU
3074130	KN-T2GRY
3058350	KN-T2BLU
3213140	KN-T2/0GRY
3244601	KN-T2/0BLU
2771146	KN-D10GRY
3216053	KN-D10BLU
2715979	KN-TL14
2715966	KN-TL14S
0461018	KN-DG12
3011041	KN-TG12
2775375	KN-T12SP4
1413036	KN-M12GRY
1413078	KN-M12BLU
1402940	KN-M10GRY
1402982	KN-M10BLU
0441083	KN-G10
0441504	KN-G10
0442079	KN-G8
3003923	KN-G8
0443023	KN-G4
3074143	KN-G2
2775456	KN-G12SP4
1413117	KN-MG12
0452043	KN-MG10
3004100	KN-F10
3004126	KN-F10L24DC or KN-F10L24AC
3104013	KN-KBD10

KONNECT-IT® Cross Reference

Weidmuller®

The following is a list of comparable products. To obtain our high-quality KONNECT-IT terminal blocks, simply find the corresponding part number of the unit you currently use. These are approximate replacements based on UL wire size, ampacity and voltage. Please consult the technical section for specifications to determine suitability for your application. Physical size varies from manufacturer to manufacturer.

Weidmuller	KONNECT-IT
1020000000	KN-T12GRY
1020080000	KN-T12BLU
1020010000	KN-T12BLK
1037710000	KN-T12BRN
1020090000	KN-T12GRN
1020060000	KN-T12ORG
1020040000	KN-T12RED
1036800000	KN-T12WHT
1020020000	KN-T12YEL
1020100000	KN-T10GRY
1020180000	KN-T10BLU
1020110000	KN-T10BLK
1037810000	KN-T10BRN
1020160000	KN-T10GRN
1036760000	KN-T10ORG
1020140000	KN-T10RED
1036700000	KN-T10WHT
1020120000	KN-T10YEL
1020200000	KN-T8GRY
1020280000	KN-T8BLU
1020300000	KN-T6GRY
1020380000	KN-T6BLU
1020400000	KN-T4GRY
1020480000	KN-T4BLU
1020500000	KN-T2GRY

Weidmuller	KONNECT-IT
1020580000	KN-T2BLU
1021500000	KN-D12GRY
1021580000	KN-D12BLU
1041610000	KN-D12X
1041910000	KN-D10X
1784180000	KN-TL14
7917030000	KN-TG12
1031400000	KN-T12SP4
0697160000	KN-M12GRY
0697180000	KN-M12BLU
9537110000	KN-M10GRY
1038680000	KN-M10BLU
1010000000	KN-G10
1010100000	KN-G10
1010200000	KN-G8
1010300000	KN-G8
1010400000	KN-G4
1010500000	KN-G2
1016500000	KN-G12SP4
1303360000	KN-MG12
0380260000	KN-MG10
1011000000	KN-F10
1012300000	KN-F10L110AC
1012400000	KN-F10L220AC
1011300000	KN-F10L24DC
7910180000	KN-KBD10

Sockets for QL/QM Series Relays

SQL08D

Din-rail mounting, DPDT, for use with QL2 series relays

$4.00

SQL14D

Din-rail mounting, 4PDT, for use with QL4 series relays

$4.50

SQM08D

Din-rail mounting, DPDT, for use with QM2 series relays

$3.50

SQM14D

Din-rail mounting, 4PDT, for use with QM4 series relays

$3.50

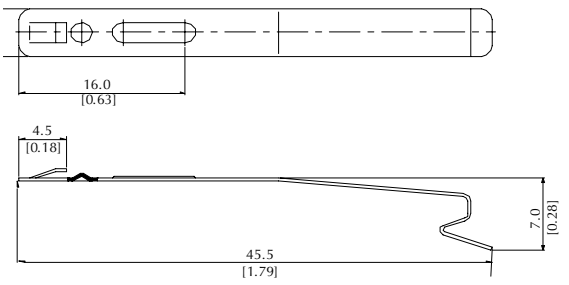
Holding Clips

Holding clips for the QL2, QL4, QM2 and QM4 series relays can be removed by pushing the side of the inserting hole with a sharp object.

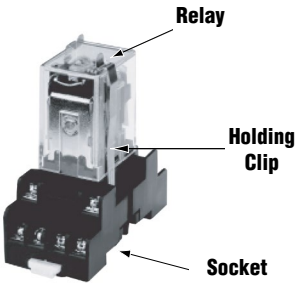
Note: Order sockets separately; holding clips are included with sockets.

Holding Clip Dimensions mm [in]

Holding clip for QL4 series relays is included with SQL14D sockets.

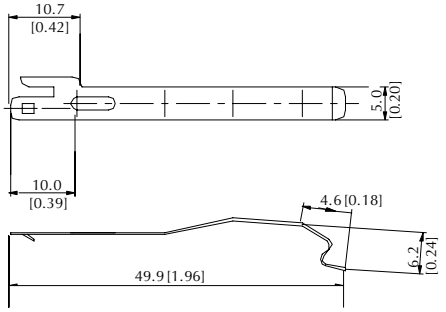


Insert holding clip into the slots provided on the socket.



Holding Clip Dimensions mm [in]

Holding clip for QL2, QM2 and QM4 series relays is included with SQL08D, SQM08D and SQM14D sockets.



Socket Dimensions for QL/QM Series Relays

Dimensions

mm

Figure 3
SQL08D (for QL2 Series Relays)

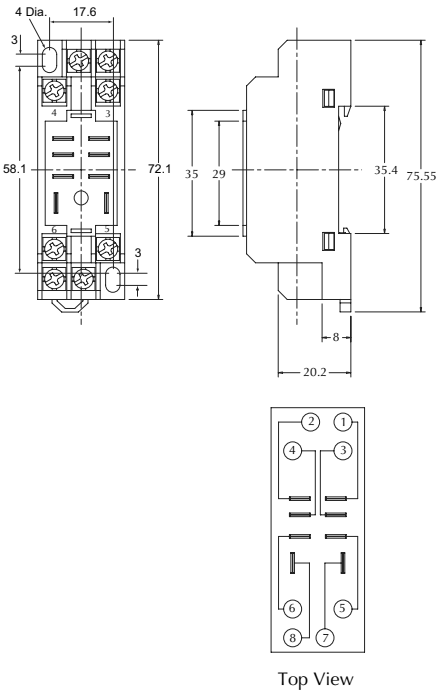


Figure 4
SQL14D (for QL4 Series Relays)

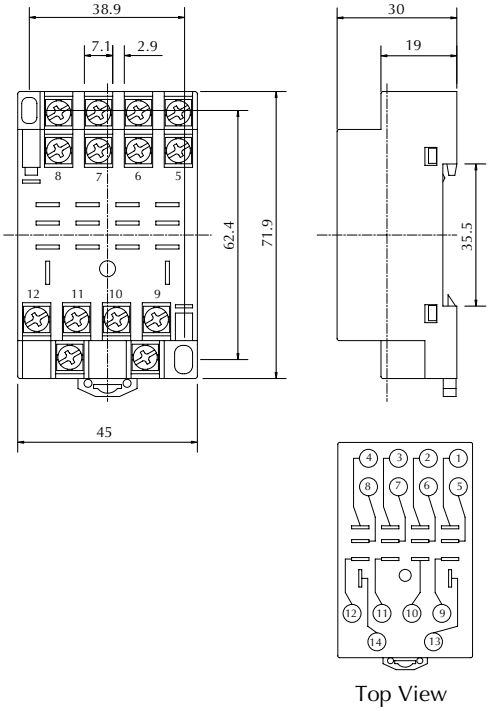


Figure 5
SQM08D (for QM2 Series Relays)

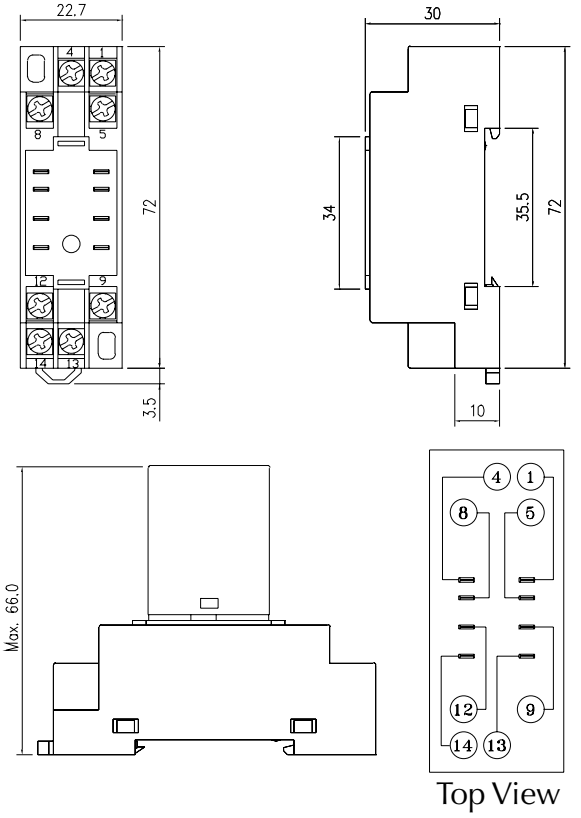
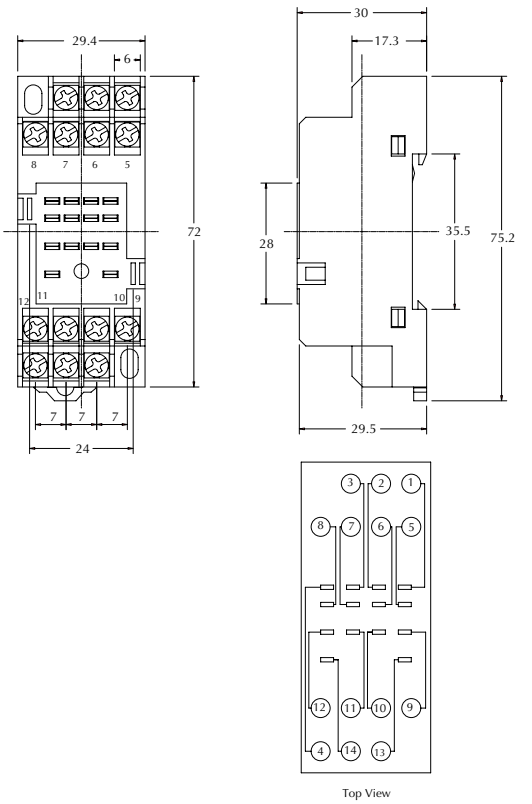
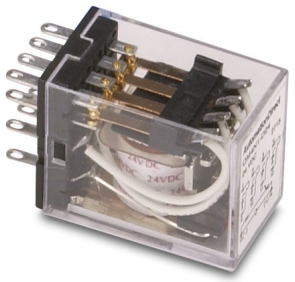


Figure 6
SQM14D (for QM4 Series Relays)



QM Series Electromechanical Relay Selection Guide



QM series relays are general purpose relays designed for a wide range of applications, from power to sequence controls in various factory machines and control panels. They are ideal for electric control panels requiring stable and reliable relays.

Features

- Small package design
- DPDT has a fine silver contact with 5A capability
- 4PDT has a gold-plated silver contact with 3A capability
- High dielectric strength (1,800 VAC)
- High reliability and long life
- Ultra-high sensitivity with quick response time (20 ms max.)
- High vibration and shock resistance
- LED indicator on all models, so you can easily see if relay is working properly without using a voltmeter
- Diode protection on some 24 VDC models protects contacts and electronic components from back EMF
- UL recognized, CE certified, CSA certified (218218)

• *ORDER SOCKET SEPARATELY*

QM Series Selection Guide								
Part Number	***Price***	***Coil Voltage***	***Configuration***	***Contact Rating***	***Dimensions (see page 24-11)***	***Relay Socket Part Number***	***Price***	***Dimensions (see page 24-13)***
QM2N1-A120	$4.75	110/120VAC	2PDT	5A	Figure 1	***SQM08D***	$3.50	Figure 5
QM4N1-A120	$4.75		4PDT	3A	Figure 2	***SQM14D***	$3.50	Figure 6
QM2N1-A220	$4.75	220VAC	2PDT	5A	Figure 1	***SQM08D***	$3.50	Figure 5
QM4N1-A220	$8.25		4PDT	3A	Figure 2	***SQM14D***	$3.50	Figure 6
QM2N1-D24	$4.75	24VDC	2PDT	5A	Figure 1	***SQM08D***	$3.50	Figure 5
QM2X1-D24	$9.25		2PDT	5A	Figure 1	***SQM08D***	$3.50	Figure 5
QM4N1-D24	$4.75		4PDT	3A	Figure 2	***SQM14D***	$3.50	Figure 6
QM4X1-D24	$9.25		4PDT	3A	Figure 2	***SQM14D***	$3.50	Figure 6

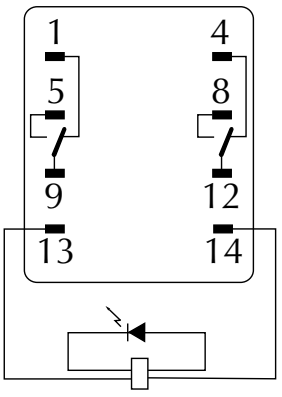
QM Series Electromechanical Relay Specifications

QM Series Specification Table								
Part Numbers	QM2N1-A120	QM2N1-A220	QM4N1-A120	QM4N1-A220	QM2N1-D24	QM2X1-D24	QM4N1-D24	QM4X1-D24
Contact Specifications								
Current Rating	5A		3A		5A		3A	
Contact Type	DPDT		4PDT		DPDT		4PDT	
Terminal Type	Spade plug-in socket							
Rated Max. Resistive Load	5A @ 220VAC/5A @ 24VDC		3A @ 220VAC/3A @ 24VDC		5A @ 220VAC/5A @ 24VDC		3A @ 220VAC/3A @ 24VDC	
Rated Max. Inductive Load	2A @ 220VAC/2A @ 24VDC		1.5 A @ 220VAC/0.8 A @ 24VDC		2A @ 220VAC/2A @ 24VDC		1.5A @ 220VAC/0.8 A @ 24VDC	
Minimum Recommended Load	1mA @ 1VDC							
Max. Switching Cap. (Resistive Load)	1,100VA/120W		660VA/72W		1,100VA/120W		660VA/72W	
Max. Switching Cap. (Inductive Load)	440VA/48W		176VA/36W		440VA/48W		176VA/36W	
Max. Contact Rating	250VAC/125VDC				250VAC/125VDC			
Coil Specifications								
Options	LED Indicator					LED Indicator/ Diode Protection	LED Indicator	LED Indicator/ Diode Protection
Coil Input Voltage	110/120 VAC	220/240 VAC	110/120 VAC	220/240 VAC	24VDC			
Rated Current at 50Hz	9.9 /10.8 mA	6.2/6.8 mA	9.9/10.8 mA	6.2/6.8 mA	36.9 mA			
Rated Current at 60Hz	8.4/ 9.2 mA	5.3/5.8 mA	8.4/9.2 mA	5.3/5.8 mA				
Coil Resistance	4.43 kΩ	12.95 kΩ	4.43 kΩ	12.95 kΩ	650Ω			
Power Consumption	Approx. 0.9 W to 1.1 W (at 60Hz)				Approx. 0.9 W			
Dropout Voltage (% of rated voltage)	Min. 30%				Min. 10%			
Pick-Up Voltage (Must operate voltage)	Max. 80% of the rated coil voltage							
Max. Voltage (Max. continuous voltage)	110% of the rated coil voltage							
Min. Operating Voltage	80% of the rated coil voltage							
General Specifications								
Service Life	Mechanical: AC: Min. 50 million operations; DC: Min. 100 million operations (at operating frequency of 18,000 operations/hour)							
	Electrical: DPDT: Min. 500k operations; 4PDT: Min. 200k operations (at operating frequency of 1,800 operations/hour)							
Operate Time	20ms max							
Release Time	20ms max							
Ambient Temperature	-25° C to 75° C (-13° F to 167° F)							
Ambient Humidity	45% RH to 85% RH							
Contact Material	Fine Silver		Gold-plated Silver		Fine Silver		Gold-plated Silver	
Contact Resistance	50mΩ max							
Operating Frequency	Mechanical: 18,000 operations/hour; Electrical: 1,800 operations/hour							
Vibration Resistance	10Hz to 55Hz at double amplitude of 1.0mm							
Shock Resistance	1,000m/s² (approx. 100G)							
Weight	35g (1.24oz.)							
Agency Approvals and Standards	UL Recognized (#E222847), CE Certified (9667186-9811), CSA Certified (218218)							

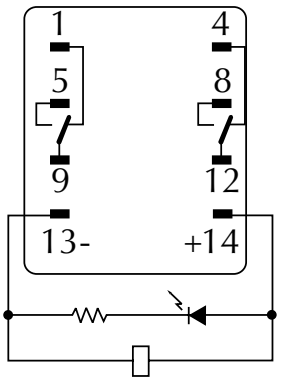
QM Series Wiring Diagrams and Derating Curves

Wiring diagrams

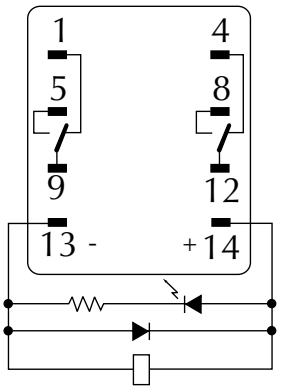
QM2N1-A120
QM2N1-A220



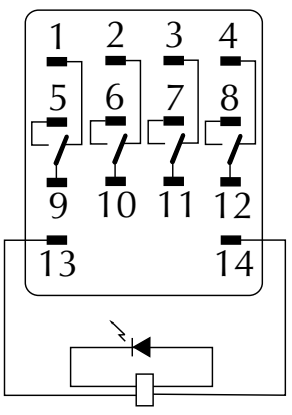
QM2N1-D24



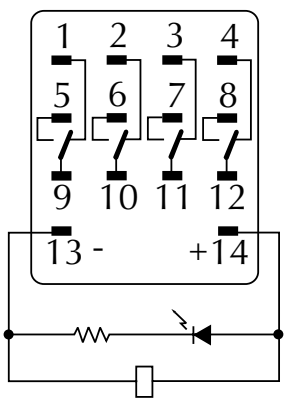
QM2X1-D24



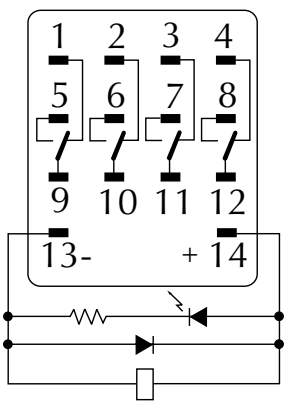
QM4N1-A120
QM4N1-A220



QM4N1-D24



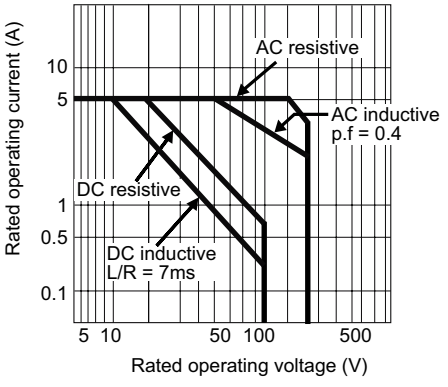
QM4X1-D24



Derating curves

DPDT

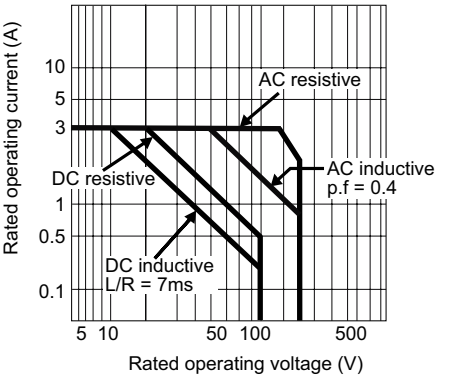
Max. Switching capacity



QM DPDT

4PDT

Max. Switching capacity



QM 4PDT

QM Series Dimensional Drawings

Dimensions

mm [inches]

Figure 1
QM2 Series

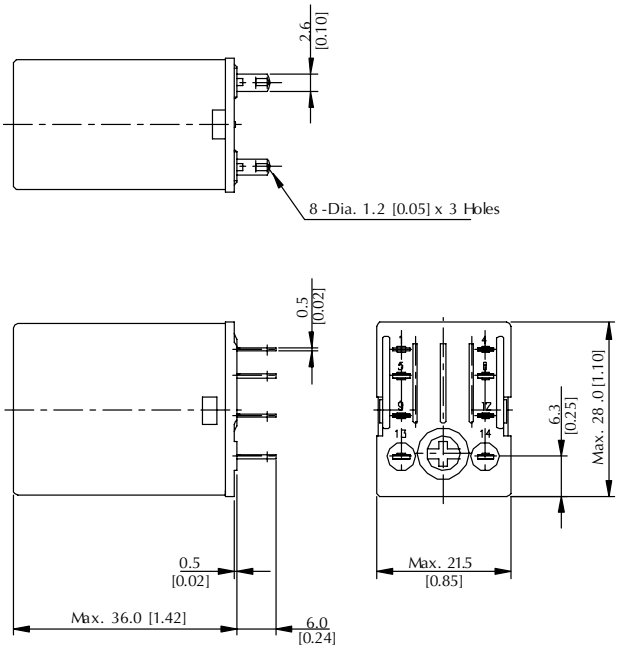
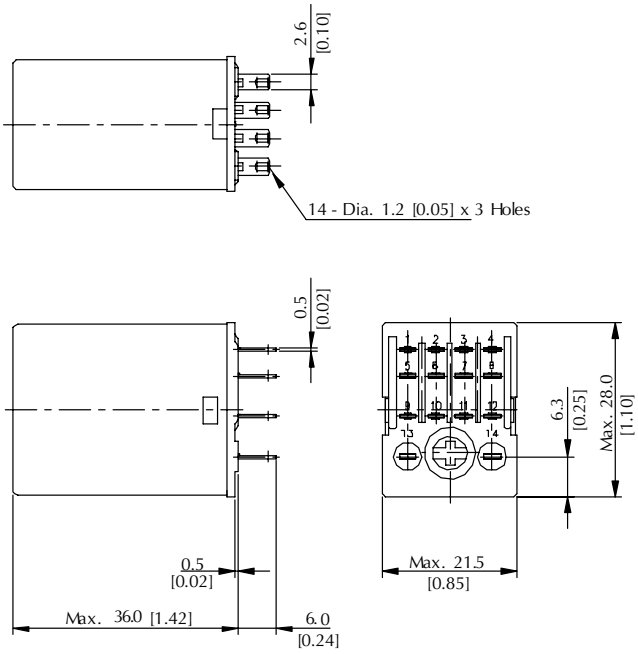


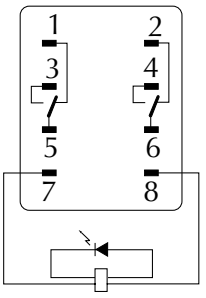
Figure 2
QM4 Series



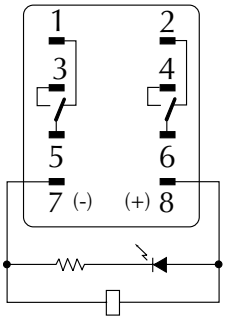
QL Series Wiring Diagrams and Derating Curves

Wiring Diagrams

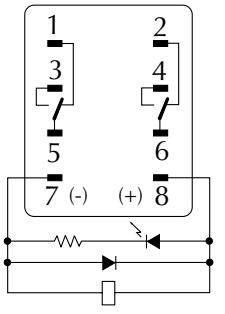
QL2N1-A120
QL2N1-A220



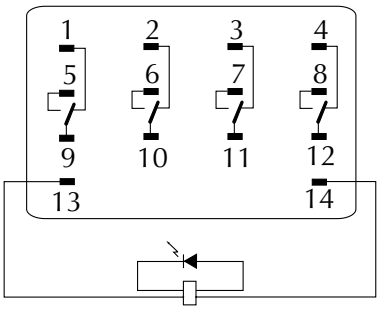
QL2N1-D24



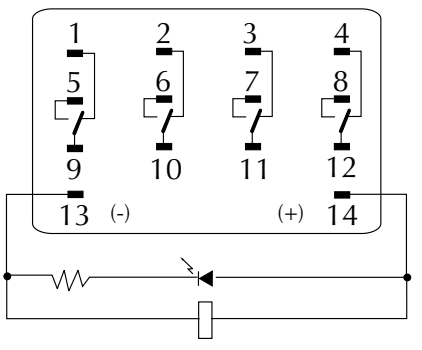
QL2X1-D24



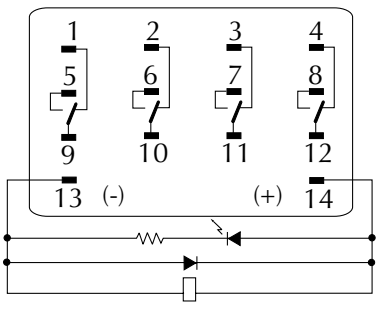
QL4N1-A120
QL4N1-A220



QL4N1-D24



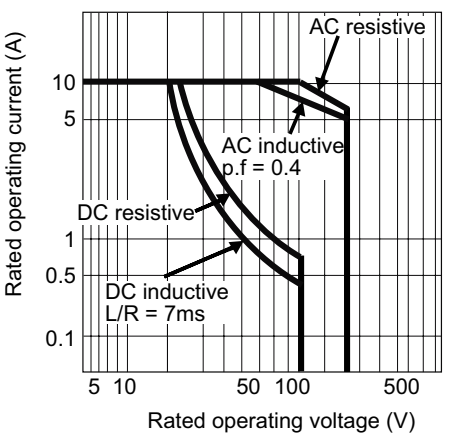
QL4X1-D24



Derating Curves

2PDT

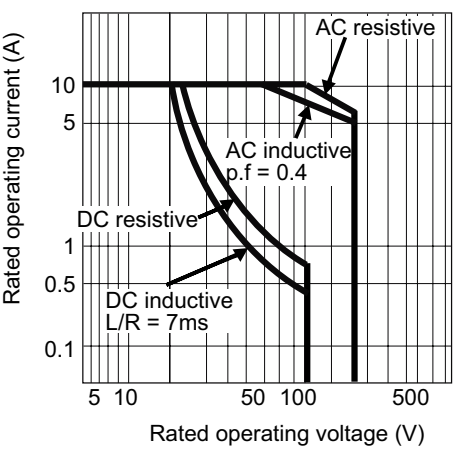
Max. Switching capacity



QL 2PDT

4PDT

Max. Switching capacity



QL 4PDT

QL Series Dimensional Drawings

Dimensions

mm [inches]

Figure 1
QL2

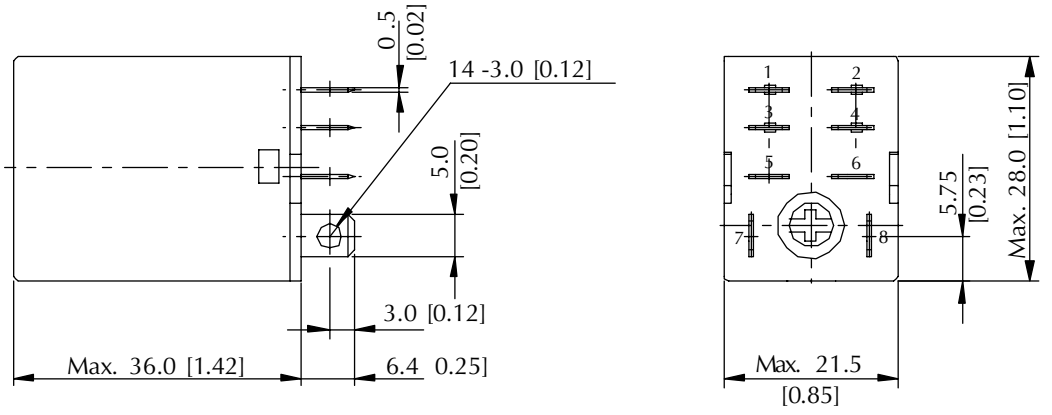
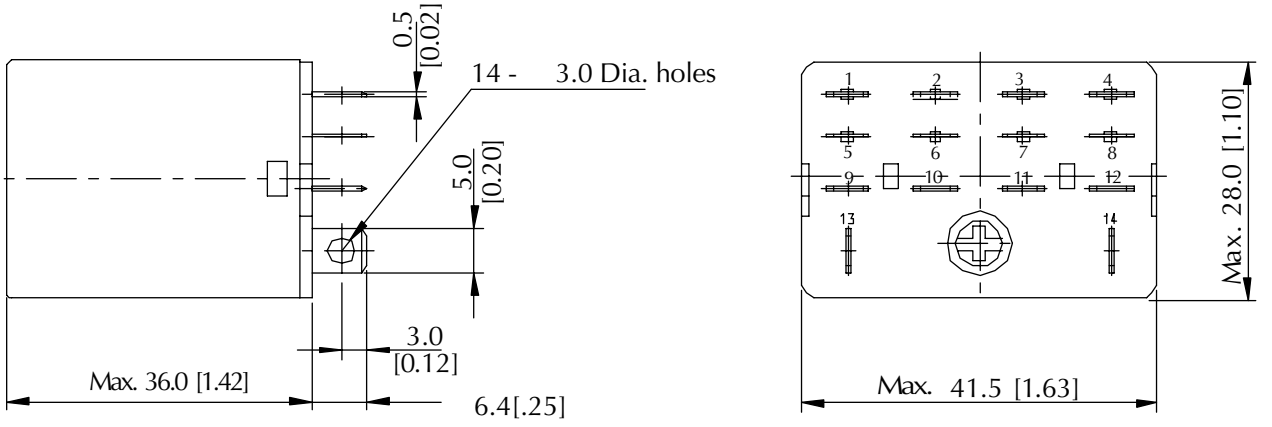


Figure 2
QL4



Sockets for QL/QM Series Relays

SQL08D

Din-rail mounting, DPDT, for use with QL2 series relays

$4.00

SQL14D

Din-rail mounting, 4PDT, for use with QL4 series relays

$4.50

SQM08D

Din-rail mounting, DPDT, for use with QM2 series relays

$3.50

SQM14D

Din-rail mounting, 4PDT, for use with QM4 series relays

$3.50

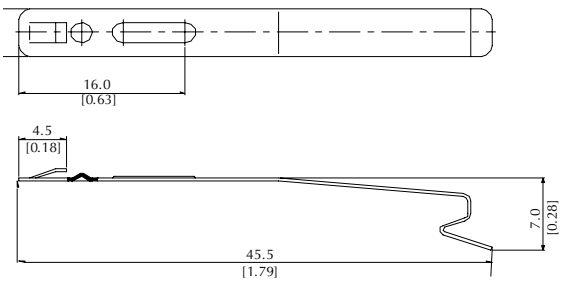
Holding Clips

Holding clips for the QL2, QL4, QM2 and QM4 series relays can be removed by pushing the side of the inserting hole with a sharp object.

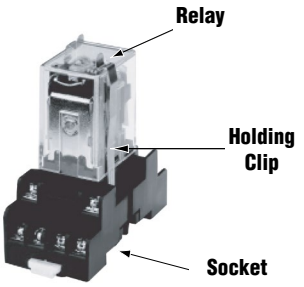
Note: Order sockets separately; holding clips are included with sockets.

Holding Clip Dimensions mm [in]

Holding clip for QL4 series relays is included with SQL14D sockets.

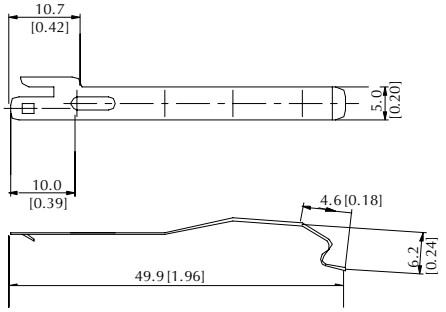


Insert holding clip into the slots provided on the socket.



Holding Clip Dimensions mm [in]

Holding clip for QL2, QM2 and QM4 series relays is included with SQL08D, SQM08D and SQM14D sockets.



Socket Dimensions for QL/QM Series Relays

Dimensions

mm

Figure 3
SQL08D (for QL2 Series Relays)

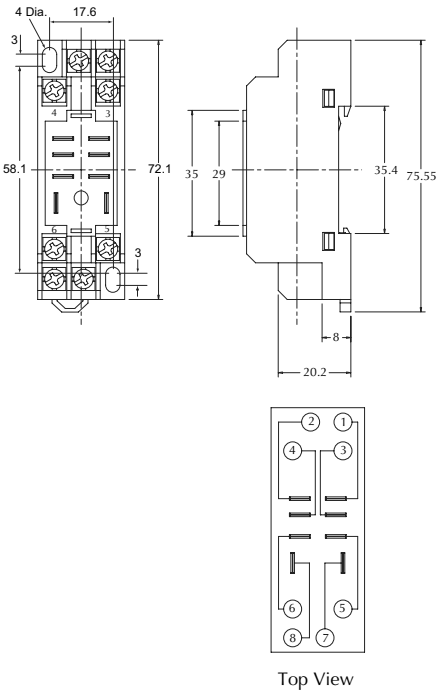


Figure 4
SQL14D (for QL4 Series Relays)

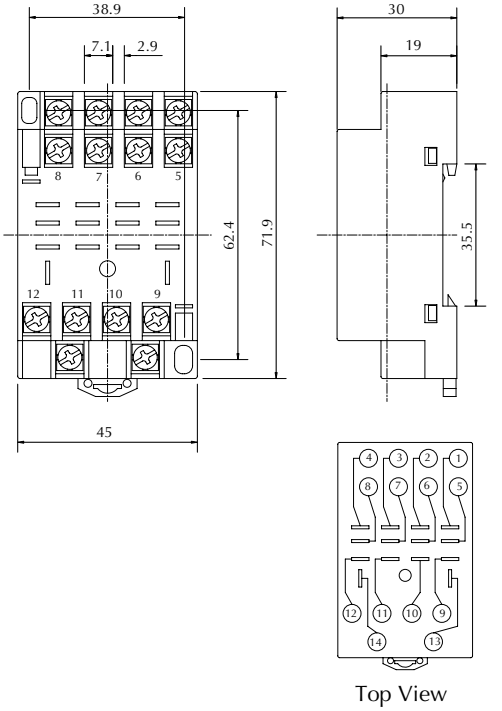


Figure 5
SQM08D (for QM2 Series Relays)

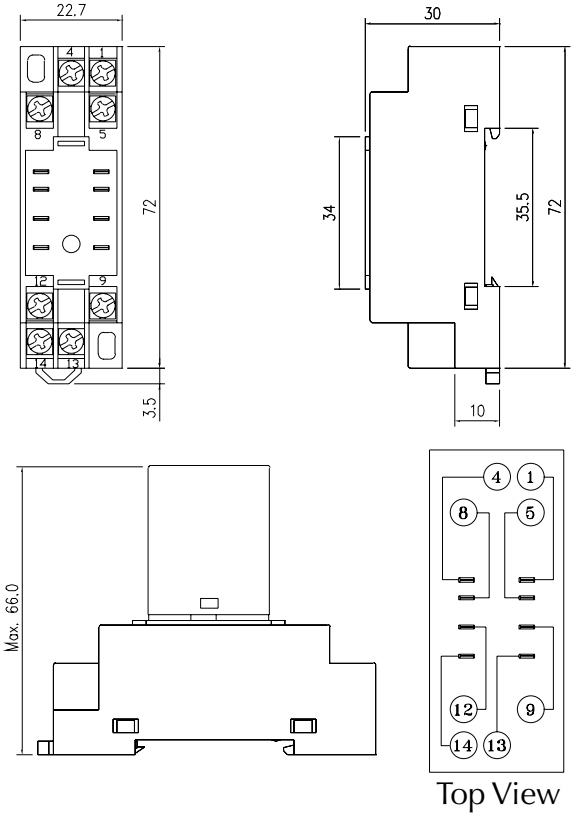
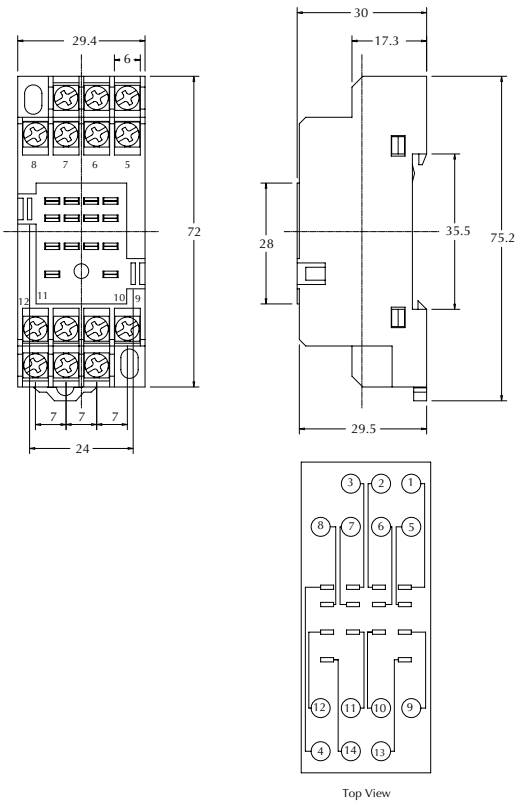


Figure 6
SQM14D (for QM4 Series Relays)



Communication Distribution Modules

The RJ12 multi-port distribution modules allow for fast and convenient RS485 multi-drop connections.

Uses include serial network communication multi-drop to GS series drives, DuraPulse drives and SureServo drives.

Modules mount on 35mm DIN rail (part #DN-R35S1) or 15mm DIN rail (part #DN-R15S1).

ZL-CDM-RJ12X4

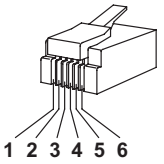
ZL-CDM-RJ12X10

Specifications								
Communication Distribution Modules	**Part #**	**Pcs/ Pkg**	**Price/Pkg**	**Weight (lbs)**	**Part #**	**Pcs/ Pkg**	**Price/Pkg**	**Weight (lbs)**
	ZL-CDM-RJ12X4	1	$18.00	0.14	ZL-CDM-RJ12X10	1	$22.00	0.23
Description [2]	4-port RJ12 Communication Distribution Module				10-port RJ12 Communication Distribution Module			
Voltage Rating [3]	30VDC							
Maximum Current per Circuit	1A							
Number of Circuits per RJ12	6							
Terminal Block Contacts	Copper alloy, tin-lead plated							
Wire Range (Rated Cross Section) [1]	12–24 AWG Solid or Stranded Copper Conductor (2.5 mm²)							
Wire Strip Length	0.24–0.27 in (6–7 mm)							
Screw Torque	4.4 in·lbs (0.5 N·m)							
Connecting Cables (Sold Separately)	ZL-RJ12-CBL-2, ZL-RJ12-CBL-2P, GS-RJ12-CBL-2, ZL-SVC-232RJ12-CBL-2 See Connection Cable specifications tables at the end of this section.							
Surrounding Temperature Range	32 to 140°F (0 to 60°C)							
Cable/Wire Clearances	0.5 in (12.7 mm) Required							
Mounting Restrictions	None							
Approvals	File # E200031 UL, cUL, Class 1, Division 2, Groups A,B,C,D Hazardous Locations, CE, EN 61131-2:2007							

[1] Use conductors rated for 60°/75°C.

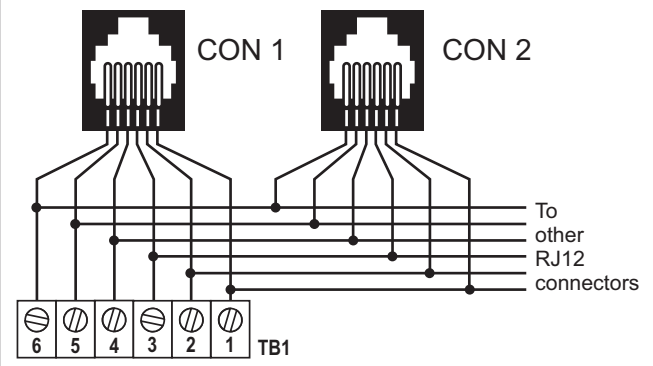
[2] Connecting cables are for internal wiring only.

[3] Use Class 2 power supply.



RJ12 Plug Pin Layout
(For Reference Only)

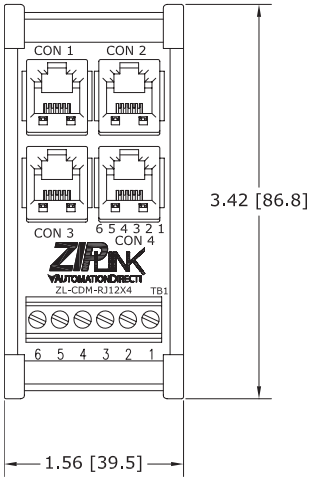
ZL-CDM-RJ12n Typical Internal Circuit

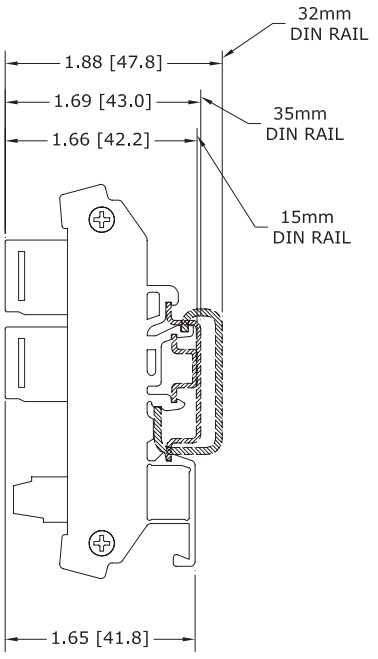


NOTE: SEE WIRING DETAILS AND DIMENSIONAL DRAWINGS ON OUR WEB SITE AT:
http://www.automationdirect.com/static/manuals/ziplinks/ziplinks.html.

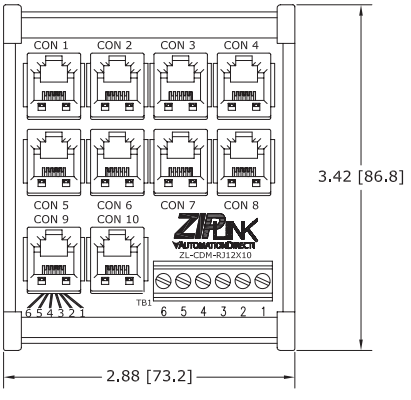
Module Dimensions

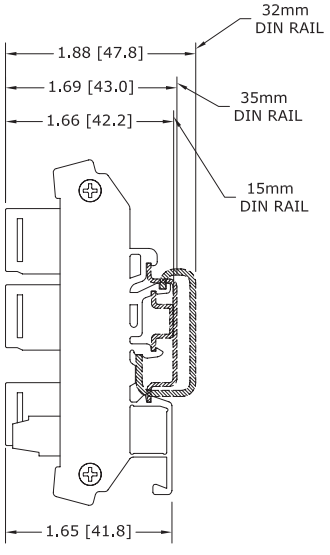
ZL-CDM-RJ12X4



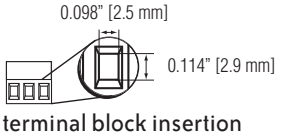


ZL-CDM-RJ12X10





Note: Dimensions shown in Inches [mm]



All terminal block insertion point opening dimensions are the same.

GS1 Series Introduction

GS1 Series Drives					
Motor Rating	hp	0.25	0.5	1	2
	kW	0.2	0.4	0.75	1.5
115V Single-Phase Input / 230V Three-Phase Output		✔	✔		
230V Single-Phase Input / 230V Three-Phase Output		✔	✔	✔	
230VThree-Phase Input / Output		✔	✔	✔	✔

Overview

The GS1 series of AC drives is our most affordable and compact inverter, offering V/Hz control with general purpose application features. These drives can be configured using the built-in digital keypad (which also allows you to set the drive speed, start and stop, and monitor specific parameters) or with the standard RS-485 serial communications port. Standard GS1 features include one analog input, four programmable digital inputs and one programmable normally open relay output.

Features

- Simple Volts/Hertz control
- Pulse Width Modulation (PWM)
- 3–10 kHz carrier frequency
- IGBT technology
- 130% starting torque at 5Hz
- 150% rated current for one minute
- Electronic overload protection
- Stall prevention
- Adjustable accel and decel ramps
- S-curve settings for acceleration and deceleration
- Manual torque boost
- Automatic slip compensation
- DC braking
- Built-in EMI filter
- Three skip frequencies
- Trip history
- Integral keypad and speed potentiometer
- Programmable jog speed
- Three programmable preset speeds
- Four programmable digital inputs
- One programmable analog input
- One programmable relay output
- RS-485 Modbus communications up to 19.2K
- Optional Ethernet communications
- DIN rail or panel mountable
- Two-year warranty
- UL/cUL/CE listed

Accessories

- AC line reactors
- RF filter
- Fuse kits and replacement fuses
- Ethernet interface
- Four and eight-port RS-485 multi-drop termination board
- Serial communication cables available for creating plug and play RS-232/RS-485 networks with AutomationDirect PLCs. See the comm cable matrix on 124.
- KEP***Direct*** I/O or OPC Server
- GSoft drive configuration software
- USB-485M – USB to RS-485 PC adapter (see "Communications Products" chapter for detailed information)

Detailed descriptions and specifications for GS accessories are available in the "GS/DURAPULSE Accessories" section.

Typical Applications

- Conveyors
- Fans
- Pumps
- Shop tools

GS1 Series Specifications

115V/230V CLASS GS1 Series							
Model		**GS1-10P2**	**GS1-10P5**	**GS1-20P2**	**GS1-20P5**	**GS1-21P0**	**GS1-22P0**
Price		$99.00	$117.00	$113.00	$117.00	$134.00	$164.00
Motor Rating	**HP**	1/4 hp	1/2 hp	1/4 hp	1/2 hp	1hp	2hp
	kW	0.2 kW	0.4 kW	0.2 kW	0.4 kW	0.7 kW	1.5 kW
Rated Output Capacity (200V) kVA		0.6	1.0	0.6	1.0	1.6	2.7
Rated Input Voltage		Single-phase: 100–120 VAC ±10%; 50/60 Hz ±5%		Single/three-phase: 200–240 VAC ±10%; 50/60 Hz ±5%			Three-phase: 200–240 VAC±10%; 50/60 Hz ±5%
Rated Output Voltage		Three-phase corresponds to double the input voltage		Three-phase corresponds to the input voltage			
Rated Input Current (A)		6	9	4.9/1.9	6.5/2.7	9.7/5.1	9
Rated Output Current (A)		1.6	2.5	1.6	2.5	4.2	7.0
Watt Loss @ 100% I (W)		19.2	19.2	18.4	26.8	44.6	73
Cooling Fan		no	yes	no	yes		
Weight: kg (lb)		2.10	2.20	2.20	2.20	2.20	2.20
Dimensions (HxWxD) (mm [in])		132.0 x 68.0 x128.1 [5.20 x 2.68 x 5.04]					
Accessories							
Line Reactor *		LR-1xxPx-xxx (refer to "GS/DURApulse Drives Accessories – Line Reactors" section for exact part #)					
RF Filter		RF220X00A					
Fuse Kit **	**Single-Phase****	GS-10P2-FKIT-1P	GS-10P5-FKIT-1P	GS-20P2-FKIT-1P	GS-20P5-FKIT-1P	GS-21P0-FKIT-1P	–
	Three-Phase	–	–	GS-20P2-FKIT-3P	GS-20P5-FKIT-3P	GS-21P0-FKIT-3P	GS-22P0-FKIT-3P
Replacement Fuses	**Single-Phase**	GS-10P2-FUSE-1P	GS-10P5-FUSE-1P	GS-20P2-FUSE-1P	GS-20P5-FUSE-1P	GS-21P0-FUSE-1P	–
	Three-Phase	–	–	GS-20P2-FUSE-3P	GS-20P5-FUSE-3P	GS-21P0-FUSE-3P	GS-22P0-FUSE-3P
Ethernet Communications module for GS Series Drives (DIN rail mounted)		GS-EDRV100					
USB to RS-485 PC Communication Adapter		USB-485M					
RS-485 Communication Distribution Module (for creating plug and play RS-485 networks)		ZL-CDM-RJ12X4 / ZL-CDM-RJ12X10					
RS-485 Serial Cable, GS Drive to DL06/D2-260		GS-485HD15-CBL-2					
RS-485 Serial Cable, GS Drive to ZIPLink CDM Module		GS-485RJ12-CBL-2					
Software		GSoft / KEP*Direct*					
OPC Server		KEP*Direct*					

** GS1-1xxx drives require 115V class input line reactors and 230V class output line reactors.*
*** Single-phase fuse kits and fuses are used only with GS1-1xxx drives.*

GS1 General Specifications

General Specifications			
Control Characteristics			
Control System			Sinusoidal Pulse Width Modulation, carrier frequency 3kHz–10kHz
Rated Output Frequency			1.0 to 400.0 Hz limited to 9999 motor rpm
Output Frequency Resolution			0.1 Hz
Overload Capacity			150% of rated current for 1 minute
Torque Characteristics			Includes manual torque boost, auto-slip compensation, starting torque 130% @ 5.0Hz
DC Braking			Operation frequency 60–0Hz, 0–30% rated voltage. Start time 0.0–5.0 seconds. Stop time 0.0–25.0 seconds
Acceleration/Deceleration Time			0.1 to 600 seconds (can be set individually)
Voltage/Frequency Pattern			V/F pattern adjustable. Settings available for Constant Torque – low and high starting torque, Variable Torque – low and high starting torque, and user configured
Stall Prevention Level			20 to 200% of rated current
Operation Specification			
Inputs	**Frequency Setting**	**Keypad**	Setting by <UP> or <DOWN> buttons or potentiometer
		External Signal	Potentiometer - 5kΩ 0.5W, 0 to 10 VDC (input impedance 47kΩ), 0 to 20 mA / 4 to 20 mA (input impedance 250Ω), Multi-function inputs 1 to 3 (3 steps, JOG, UP/DOWN command), RS485 communication setting
	Operation Setting	**Keypad**	Setting by <RUN>, <STOP> buttons
		External Signal	DI1, DI2, DI3, DI4 can be combined to offer various modes of operation, RS485 communication port
Outputs	**Multi-Function Input Signal**		Multi-step selection 0 to 3, Jog, Accel/decel inhibit, First/second accel/decel switch, Counter, PLC operation, External base block (N.C., N.O.) selection
	Multi-Function Output Signal		AC drive operating, Frequency attained, Non zero speed, Base Block, Fault indication, Local/remote indication, PLC operation indication
	Operating Functions		Automatic voltage regulation, S-curve, Over-voltage stall prevention, DC braking, Fault records, Adjustable carried frequency, Starting frequency setting of DC braking, Over-current stall prevention, Momentary power loss restart, Reverse inhibition, Frequency limits, Parameter lock/reset
Protective Functions			Overcurrent, overvoltage, undervoltage, electronic thermal motor overload, Overheating, Overload, Self testing
Operator Interface	**Operator Devices**		5-key, 4-digit, 7-segment LED, 3 status LEDs, potentiometer
	Programming		Parameter values for setup and review, fault codes
	Parameter Monitor		Master Frequency, Output Frequency, Scaled Output Frequency, Output Voltage, DC Bus Voltage, Output Direction, Trip Event Monitor, Trip History Monitor
	Key Functions		RUN/STOP, DISPLAY/RESET, PROGRAM/ENTER, <UP>, <DOWN>
Environment	**Enclosure Rating**		Protected chassis, IP20
	Ambient Operating Temperature		-10° to 40°C (14°F to 104°F) w/o derating
	Storage Temperature		-20° to 60 °C (-4°F to 140°F) during short-term transportation period)
	Ambient Humidity		0 to 90% RH (non-condensing)
	Vibration		9.8 m/s^2 (1G), less than 10Hz; 5.88 m/s^2 (0.6G) 20 to 50 Hz
	Installation Location		Altitude 1000m or lower above sea level, keep from corrosive gas, liquid and dust
Options			Programming Software (GSOFT)

GS1 Specifications - Installation

Understanding the installation requirements for your GS1 drive will help to ensure that it will operate within its environmental and electrical limits.

NOTE:
Never use only this catalog for installation instructions or operation of equipment; refer to the user manual, GS1-M.

Environmental Specifications	
Protective Structure [1]	IP20
Ambient Operating Temperature [2]	-10 to 40 °C (14 to 104 °F)
Storage Temperature [3]	-20 to 60°C (-4 to 140 °F)
Humidity	up to 90% (no condensation)
Vibration [4]	5.9 m/s^2 (0.6g), 10 to 55 Hz
Location	Altitude 1,000 m or less, indoors (no corrosive gases or dust)

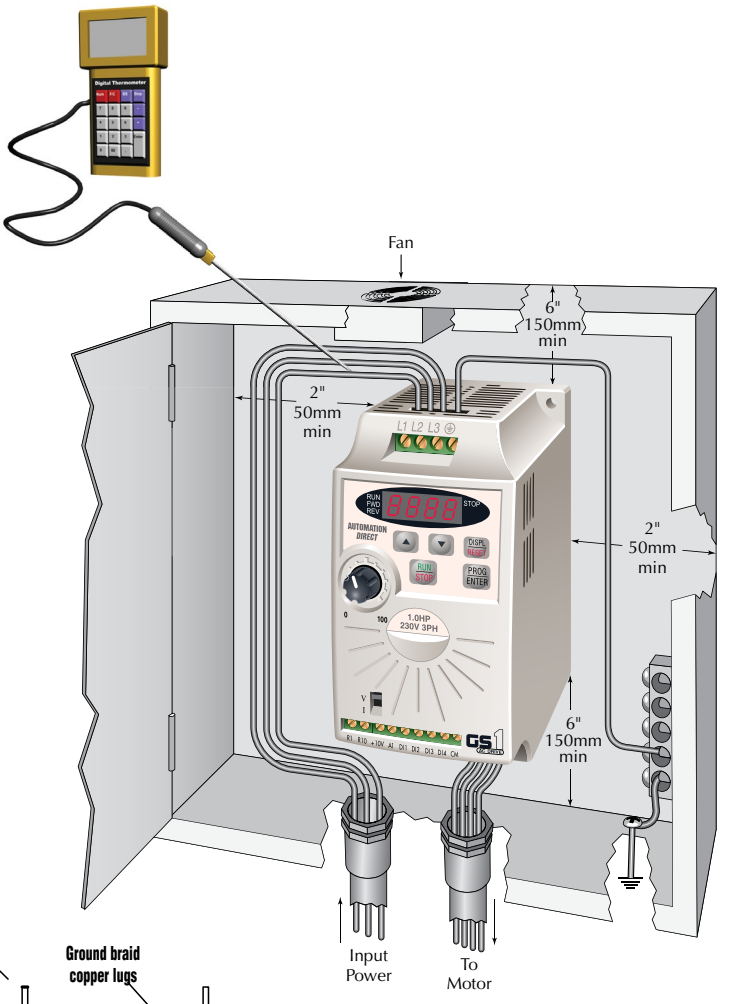
1: Protective structure is based upon EN60529

2: The ambient temperature must be in the range of -10 to 40 °C (14 to 104 °F). If the range will be up to 50°C (122°F), you will need to set the carrier frequency to 3.0 kHz and derate the output current to 80% or less. See our web site for derating curves.

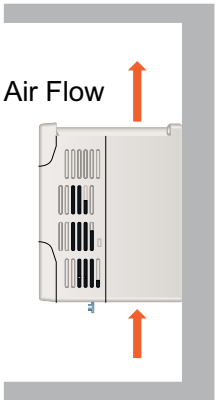
3: The storage temperature refers to the short-term temperature during transport.

4: Conforms to the test method specified in JIS CO911 (1984)

Watt Loss Chart	
GS1 Drive Model	***At full load***
GS1-10P2	19.2
GS1-10P5	19.2
GS1-20P2	18.4
GS1-20P5	26.8
GS1-21P0	44.6
GS1-22P0	73



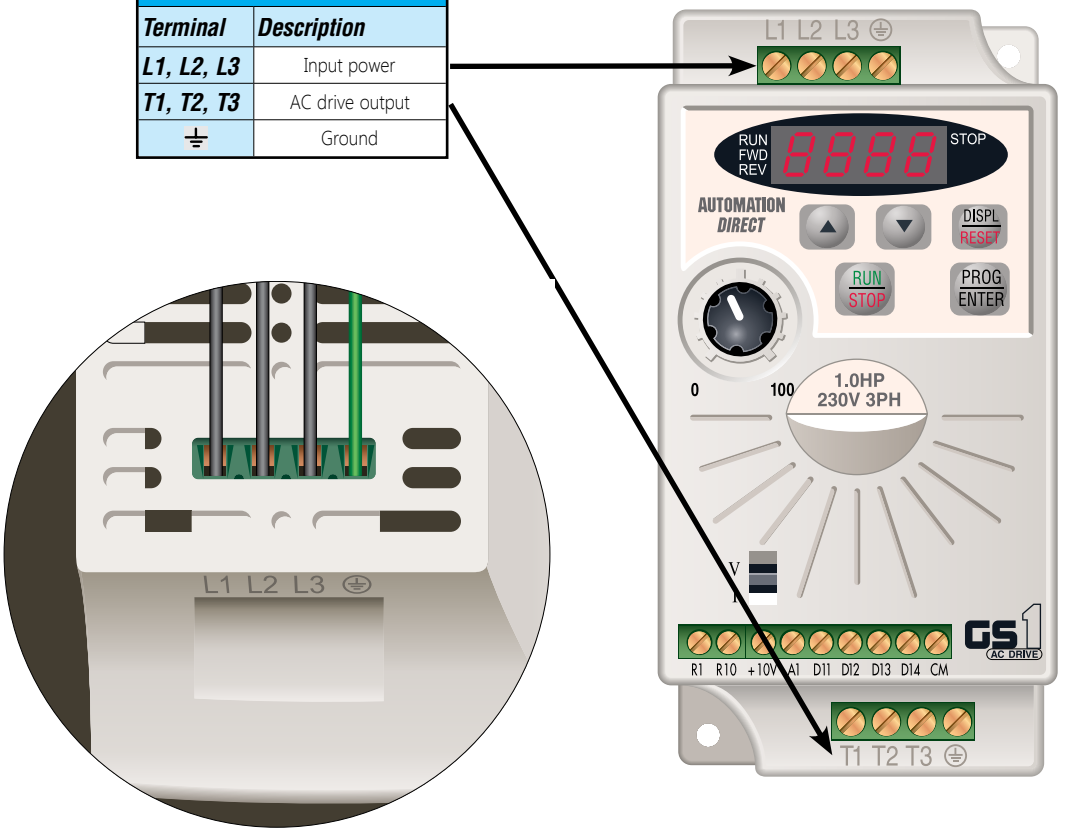
** FOR PAINTED SUB-PANELS, SCRAPE THE PAINT FROM UNDERNEATH THE STAR WASHERS BEFORE TIGHTENING THEM.*



Warning: AC drives generate a large amount of heat, which may damage the AC drive. Auxiliary cooling methods are typically required in order to not exceed maximum ambient temperatures.

GS1 Specifications - Terminals

Main Circuit Wiring	
Terminal	***Description***
L1, L2, L3	Input power
T1, T2, T3	AC drive output
⏚	Ground



Control Circuit Terminals	
Terminal Symbol	***Description***
R10	Relay output 1 normally open
R1	Relay output 1 common
DI1	Digital input 1
DI2	Digital input 2
DI3	Digital input 3
DI4	Digital input 4
AI [1]	Analog input
+10V	Internal power supply (10 mA @ 10 VDC)
CM	Common

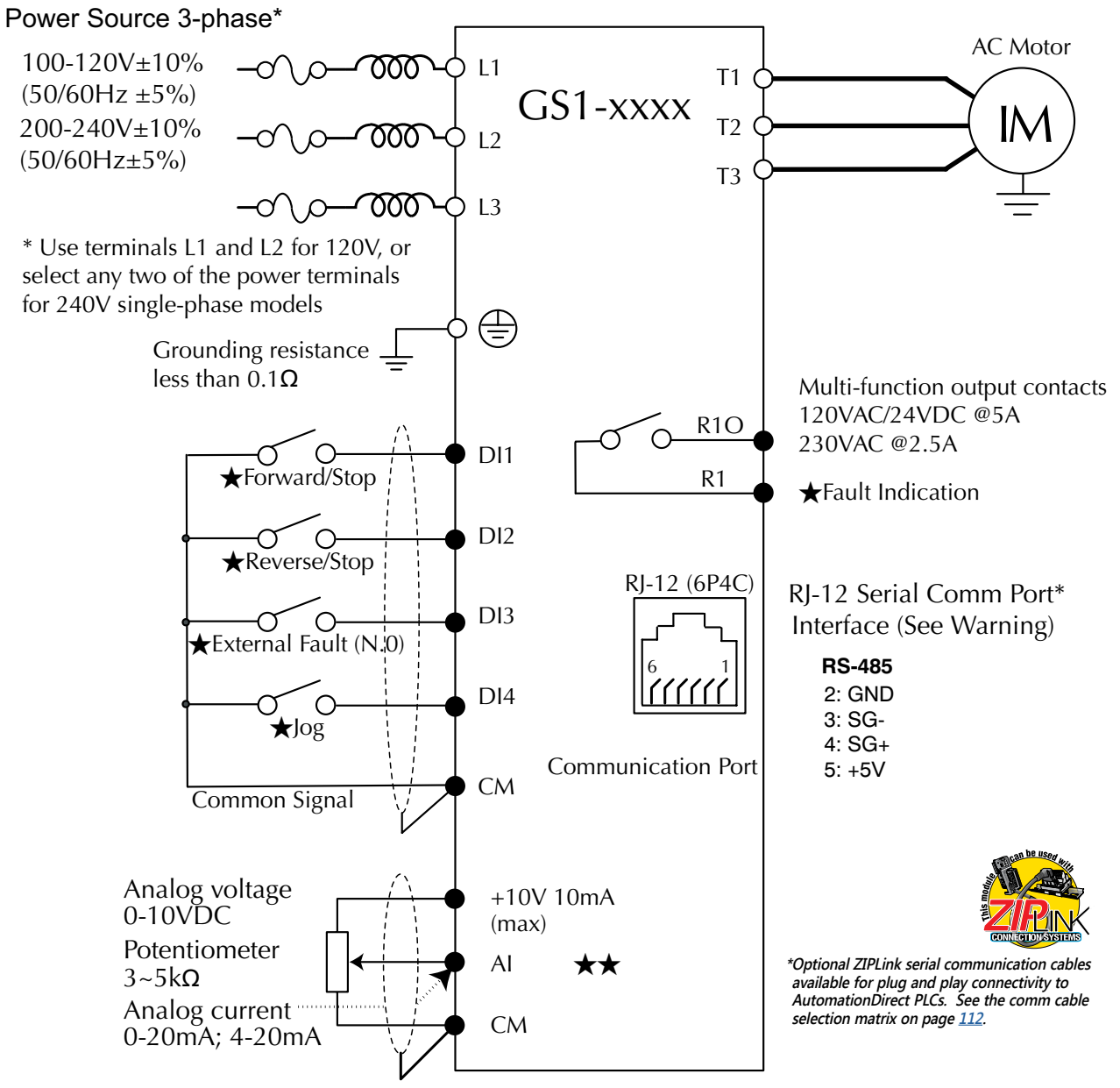
[1] 0 to +10 VDC, 0 to 20 mA, or 4 to 20 mA input represents zero to maximum output frequency.

Note: Use twisted-shielded, twisted-pair or shielded-lead wires for the control signal wiring. It is recommended all signal wiring be run in a separate steel conduit. The shield wire should only be connected at the drive. Do not connect shield wire on both ends.

GS1 Specifications - Basic Wiring Diagram

Note: Users MUST connect wiring according to the circuit diagram shown below. (Refer to user manual GS1-M for additional specific wiring information.)

Note: Please refer to the following pages for explanations and information regarding line reactors (71) and RF filters (111).



*Optional ZIPLink serial communication cables available for plug and play connectivity to AutomationDirect PLCs. See the comm cable selection matrix on page 112.

★Factory default setting

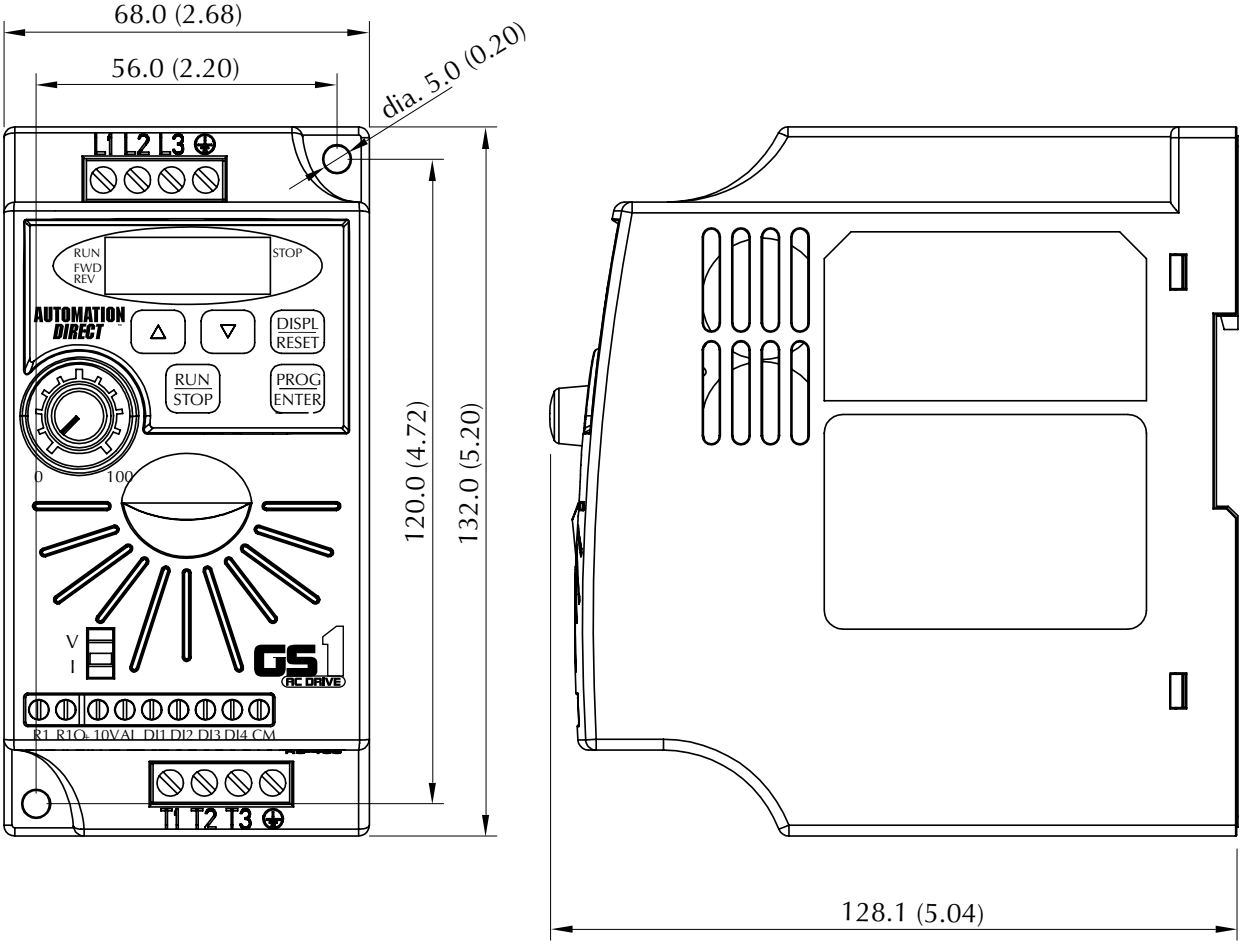
★★Factory default source of frequency command is via the keypad potentiometer

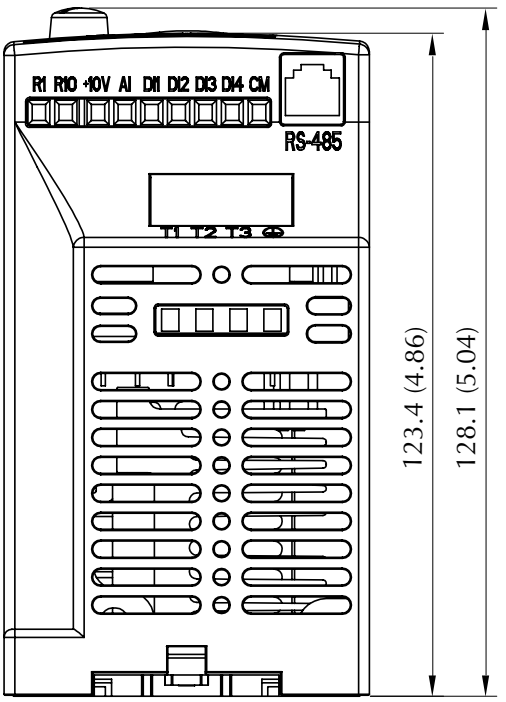
○ Main circuit (power) terminals ● Control circuit terminal ⫩ Shielded leads

WARNING: Do not plug a modem or telephone into the GS1 RJ-12 Serial Comm Port, or permanent damage may result. Terminals 2 and 5 should not be used as a power source for your communication connection.

*The Drives section is in Book 2 of current version of our catalog, or you can download PDF of section here.

GS1 Specifications - Dimensions





Unit: mm (in)

Wiring Solutions

Wiring Solutions using the *ZIP*Link Wiring System

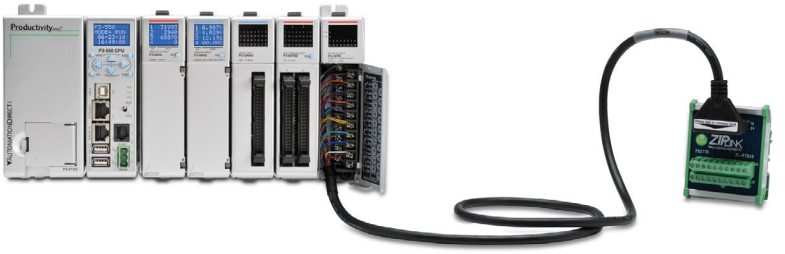
*ZIP*Links eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using half the space at a fraction of the cost of standard terminal blocks. There are several wiring solutions available when using the *ZIP*Link System ranging from PLC I/O-to-*ZIP*Link Connector Modules that are ready for field termination, options for connecting to third party devices, GS, DuraPulse and SureServo Drives, and specialty relay, transorb and communications modules. Pre-printed I/O-specific adhesive label strips for quick marking of *ZIP*Link modules are provided with *ZIP*Link cables. See the following solutions to help determine the best *ZIP*Link system for your application.

Solution 1: DirectLOGIC, CLICK and Productivity3000 I/O Modules to *ZIP*Link Connector Modules

When looking for quick and easy I/O-to-field termination, a *ZIP*Link connector module used in conjunction with a prewired *ZIP*Link cable, consisting of an I/O terminal block at one end and a multi-pin connector at the other end, is the best solution.

Using the PLC I/O Modules to *ZIP*Link Connector Modules selector tables located in this section,

1. Locate your I/O module/PLC.
2. Select a *ZIP*Link Module.
3. Select a corresponding *ZIP*Link Cable.



Solution 2: *Direct*LOGIC, CLICK and Productivity3000 I/O Modules to 3rd Party Devices

When wanting to connect I/O to another device within close proximity of the I/O modules, no extra terminal blocks are necessary when using the *ZIP*Link Pigtail Cables. *ZIP*Link Pigtail Cables are prewired to an I/O terminal block with color-coded pigtail with soldered-tip wires on the other end.

Using the I/O Modules to 3rd Party Devices selector tables located in this section,

1. Locate your PLC I/O module.
2. Select a *ZIP*Link Pigtail Cable that is compatible with your 3rd party device.

Solution 3: GS Series and *DURAPULSE* Drives Communication Cables

Need to communicate via Modbus RTU to a drive or a network of drives?

*ZIP*Link cables are available in a wide range of configurations for connecting to PLCs and *Sure*Servo, *Sure*Step, Stellar Soft Starter and AC drives. Add a *ZIP*Link communications module to quickly and easily set up a multi-device network.

Using the Drives Communication selector tables located in this section,

1. Locate your Drive and type of communications.
2. Select a *ZIP*Link cable and other associated hardware.

Wiring Solutions

Solution 4: Serial Communications Cables

*ZIP*Link offers communications cables for use with *Direct*LOGIC, CLICK, and Productivity3000 CPUs, that can also be used with other communications devices. Connections include a 6-pin RJ12 or 9-pin, 15-pin and 25-pin D-sub connectors which can be used in conjunction with the RJ12 or D-Sub Feedthrough modules.

Using the **Serial Communications Cables** selector table located in this section,

1. Locate your connector type
2. Select a cable.

Solution 5: Specialty *ZIP*Link Modules

For additional application solutions, *ZIP*Link modules are available in a variety of configurations including stand-alone relays, 24VDC and 120VAC transorb modules, D-sub and RJ12 feedthrough modules, communication port adapter and distribution modules, and SureServo 50-pin I/O interface connection.

Using the ***ZIP*Link Specialty Modules** selector table located in this section,

1. Locate the type of application.
2. Select a ZIPLink module.

Solution 6: *ZIP*Link Connector Modules to 3rd Party Devices

If you need a way to connect your device to terminal blocks without all that wiring time, then our pigtail cables with color-coded soldered-tip wires are a good solution. Used in conjunction with any compatible *ZIP*Link Connector Modules, a pigtail cable keeps wiring clean and easy and reduces troubleshooting time.

Using the **Universal Connector Modules and Pigtail Cables** table located in this section,

1. Select module type.
2. Select the number of pins.
3. Select cable.

ZIPLink Motor Controller Communication

Drive / Motor Controller (GS/DURAPULSE/SureServo/SureStep/Stellar) ZIPLink Selector							
Drive / Motor Controller		Communications			ZIPLink Cable		
Controller	**Comm Port Type**	**Network/Protocol**	**Connects to**	**Comm Port Type**	**Cable (2 meter length)**	**Cable Connectors**	**Other Hardware Required**
GS1	RJ12	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
GS2	RJ12	RS-232 Modbus RTU	CLICK PLCs	Port 2 (RJ12)	GS-RJ12-CBL-2	RJ12 to RJ12	–
			DL05 PLCs				–
			DL06 PLCs	Port 2 (HD15)			FA-15HD
			D2-250-1 CPU				
			D2-260 CPU				
			D4-450 CPU	Port 3 (25-pin)			FA-CABKIT
			P3-550 CPU	Port 2 (RJ12)			–
		RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
DuraPulse (GS3)	RJ12	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	GS-485HD15-CBL-2	RJ12 to HD15	–
			D2-260 CPU				–
			GS-EDRV100	RJ12	GS-EDRV-CBL-2	RJ12 to RJ12	–
			ZL-CDM-RJ12Xx*	RJ12	GS-485RJ12-CBL-2		–
			FA-ISOCON	5-pin Connector	GS-ISOCON-CBL-2	RJ12 to 5-pin plug	–
Stellar (Soft Starter) SR44 Series	RJ45**	RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	SR44-485HD15-CBL-2	RJ45 to HD15	SR44-RS485**
			D2-250-1 CPU				
			D2-260 CPU				
			ZL-CDM-RJ12Xx*	RJ12	SR44-485RJ45-CBL-2	RJ45 to RJ12	
SureServo	IEEE1394 (CN3)	RS-232 Modbus RTU	CLICK PLCs	Port 2 (RJ12)	SVC-232RJ12-CBL-2	6-pin IEEE to RJ12	–
			DL05 PLCs				–
			DL06 PLCs	Port 2 (HD15)			FA-15HD
			D2-250-1 CPU				
			D2-260 CPU				
			D4-450 CPU	Port 3 (25-pin)			FA-CABKIT
			P3-550 CPU	Port 2 (RJ12)			–
		RS-485 Modbus RTU	DL06 PLCs	Port 2 (HD15)	SVC-485HD15-CBL-2	6-pin IEEE to HD15	–
			D2-260 CPU				–
			ZL-CDM-RJ12Xx*	RJ12	SVC-485RJ12-CBL-2	6-pin IEEE to RJ12	–
			USB-485M	RJ45	SVC-485CFG-CBL-2	6-pin IEEE to RJ45	–
SureStep	RJ12	RS-232 ASCII	DL06 PLCs	Port 2 (HD15)	STP-232HD15-CBL-2	HD15-pin to RJ12	–
			D2-250-1 CPU				–
			D2-260 CPU (Port2)				–
			DL05 PLCs	RJ12	STP-232RJ12-CBL-2	RJ12 to RJ12	–
			CLICK PLCs				–
			Do-more PLC	Port 2 (Serial)			–
			Productivity Series	RS-232 Serial			–

** When using the ZL-CDM-RJ12Xxx ZIPLink Communication Distribution Module, replace the lowercase "xx" with the number of RJ12 ports, i.e. "4" for four ports, or "10" for ten ports. (ex: ZL-CDM-RJ12X4 or ZL-CDM-RJ12X10)*

*** The SR44-RS485 Communications Adapter must be installed for RS-485 communications with the Stellar soft starters.*

Fuji Duo Series SC-E Contactors

Features

- 5 to 100 hp at 480 VAC
- cULus and CSA approval, CE mark, meets JIS and IEC standards.
- Models SC-E02-xxx to SC-E4-xxx have 3-pole main circuits and come in three sizes with widths of 43 mm, 54 mm, and 67 mm.
- Models SC-E1-xxx to SC-E7-xxx employ a box terminal structure; allowing wires to be connected directly to the main circuit.
- Has a finger-protection terminal structure that prevents the exposure of live parts.
- Models SC-E5-xxx to SC-E7-xxx use a SUPERMAGNET™ (AC-input/DC-output operation) for high operating reliability and requires no surge suppressor.

Small Size

- SC-E02-xxx to E05-xxx: 43mm wide
- SC-E1-xxx to E2S-xxx: 54mm wide
- SC-E3-xxx, E4-xxx: 67mm wide
- SC-E5-xxx: 88mm wide

SC-E2S

Fuji Electric

SC-E7

Safety

- Terminals with finger-touch protection (DIN 57106/VDE 0106 Teil100)

Utility

- Box lug terminal construction
- Long electrical life
- Easy to wire

Environmental

- Low power consumption
- Recycled thermoplastic resin used for plastic parts.
- The names of materials are indicated on all major parts to facilitate recycling

Standards & Approvals

- UL listed , file E42419, Standard UL 508
- cUL listed, file E42419, Standard CSA C 22.2 No.14
- VDE 0660
- JIS C 8201-4-1
- IEC 60947-4-1 / EN 60947-4-1
- CE compliant

Optional accessories

- Auxiliary contact blocks
- Coil surge suppression units
- Replacement coils for contactor sizes SC-E5 and larger

SC-E Series Contactors Specifications - UL and CSA

Model	Price	Nominal Coil Voltage	Rated Capacity (HP)						Rated AC-3 Current (A) [note 1]	Rated AC-1 Thermal Current (A) [note 2]	SCCR Ratings (KA)	Rated Insulation Voltage (V)	Frame Width (mm)
			3-Phase Motor				1-Phase Motor						
			200V	220–240V	440–480V	550–600V	100–120V	220–240V					
SC-E02-24VAC	$15.50	24VAC	2	2	5	5	1/3	1	9	20	5	690	43
SC-E02-110VAC	$15.50	110VAC											
SC-E02-220VAC	$15.50	220VAC											
SC-E02-440VAC	$15.50	440-480VAC											
SC-E02-500VAC	$15.50	500-550VAC											
SC-E02G-24VDC	$17.50	24VDC											
SC-E03-24VAC	$20.00	24VAC	3	3	7.5	7.5	1/2	2	12	20			
SC-E03-110VAC	$20.00	110VAC											
SC-E03-220VAC	$20.00	220VAC											
SC-E03-440VAC	$20.00	440-480VAC											
SC-E03-500VAC	$20.00	500-550VAC											
SC-E03G-24VDC	$28.25	24VDC											
SC-E04-24VAC	$24.75	24VAC	5	5	10	10	1	3	18	25			
SC-E04-110VAC	$24.75	110VAC											
SC-E04-220VAC	$24.75	220VAC											
SC-E04-440VAC	$24.75	440-480VAC											
SC-E04-500VAC	$24.75	500-550VAC											
SC-E04G-24VDC	$34.00	24VDC											
SC-E05-24VAC	$31.50	24VAC	5	7.5	15	15	2	3	25	32			
SC-E05-110VAC	$31.50	110VAC											
SC-E05-220VAC	$31.50	220VAC											
SC-E05-440VAC	$31.50	440-480VAC											
SC-E05-500VAC	$31.50	500-550VAC											
SC-E05G-24VDC	$41.25	24VDC											

TABLE CONTINUED NEXT PAGE

Notes: 1. AC3 type loads consist of squirrel cage three-phase motors; occasional, limited jogging duty.
2. AC1 non-inductive or slightly inductive loads. Typically resistive loads (i.e. furnaces, ovens, etc.)

Fuji Duo Series SC-E Contactors

Fuji Electric

SC-E Series Contactors Specifications - UL and CSA													
Model	Price	Nominal Coil Voltage	Rated Capacity (HP)						Rated AC-3 Current (A) [note 1]	Rated AC-1 Thermal Current (A) [note 2]	SCCR Ratings (KA)	Rated Insulation Voltage (V)	Frame Width (mm)
			3-Phase Motor				1-Phase Motor						
			200V	220–240V	440–480V	550–600V	100–120V	220–240V					
SC-E1-24VAC	$38.75	24VAC	7.5	10	25	25	2	3	32	50	5	690	54
SC-E1-110VAC	$38.75	110VAC											
SC-E1-220VAC	$38.75	220VAC											
SC-E1-440VAC	$38.75	440-480VAC											
SC-E1-500VAC	$38.75	500-550VAC											
SC-E1G-24VDC	$46.00	24VDC											
SC-E2-24VAC	$54.25	24VAC	10	15	30	30	3	5	40	60			
SC-E2-110VAC	$54.25	110VAC											
SC-E2-220VAC	$54.25	220VAC											
SC-E2-440VAC	$54.25	440-480VAC											
SC-E2-500VAC	$54.25	500-550VAC											
SC-E2G-24VDC	$65.50	24VDC											
SC-E2S-24VAC	$65.50	24VAC	15	20	30	30	3	10	50	65			
SC-E2S-110VAC	$65.50	110VAC											
SC-E2S-220VAC	$65.50	220VAC											
SC-E2S-440VAC	$65.50	440-480VAC											
SC-E2S-500VAC	$65.50	500-550VAC											
SC-E2SG-24VDC	$77.75	24VDC											
SC-E3-24VAC	$74.25	24VAC	20	25	50	50	5	15	65	100			67
SC-E3-110VAC	$74.25	110VAC											
SC-E3-220VAC	$74.25	220VAC											
SC-E3-440VAC	$74.25	440-480VAC											
SC-E3-500VAC	$74.25	500-550VAC											
SC-E3G-24VDC	$91.75	24VDC											
SC-E4-24VAC	$76.25	24VAC	25	30	50	50	5	15	80	105			
SC-E4-110VAC	$76.25	110VAC											
SC-E4-220VAC	$76.25	220VAC											
SC-E4-440VAC	$76.25	440-480VAC											
SC-E4-500VAC	$76.25	500-550VAC											
SC-E4G-24VDC	$94.75	24VDC											
SC-E5-24V	$189.75	24VAC/VDC	30	30	60	75	7.5	15	105	150	10		88
SC-E5-100V	$189.75	110VAC/VDC											
SC-E5-200V	$189.75	220VAC/VDC											
SC-E5-400V	$189.75	380-450VAC											
SC-E5-500V	$189.75	460-575VAC											
SC-E6-24V	$241.75	24VAC/VDC	40	40	75	100	10	20	125	150			100
SC-E6-100V	$241.75	110VAC/VDC											
SC-E6-200V	$241.75	220VAC/VDC											
SC-E6-400V	$241.75	380-450VAC											
SC-E6-500V	$241.75	460-575VAC											
SC-E7-24V	$281.50	24VAC/VDC	50	50	100	125	15	25	150	200			115
SC-E7-100V	$281.50	110VAC/VDC											
SC-E7-200V	$281.50	220VAC/VDC											
SC-E7-400V	$281.50	380-450VAC											
SC-E7-500V	$281.50	460-575VAC											

Notes: 1. AC3 type loads consist of squirrel cage three-phase motors; occasional, limited jogging duty.
2. AC1 non-inductive or slightly inductive loads. Typically resistive loads (i.e. furnaces, ovens, etc.)

Fuji Duo Series SC-E Contactors

Fuji Electric

SC-E Series Contactors Specifications - IEC												
Contactor Type	Rated Capacity (kW)				Rated Operating Current (A)						Rated Thermal Current (A)	Internal Auxilliary Contact Arrange-ment
	3-Phase Motor AC-3 / AC-4				3-Phase Motor AC-3 / AC-4				Resistive Load AC-1			
	200-240V	380-440V	500-550V	600-690V	200-240V	380-440V	500-550V	600-690V	200-240V	380-440V		
SC-E02(G)-xxx	2.2 / 2.2	4 / 4	4 / NA	4 / NA	9 / 9	9 / 9	7 / NA	5 / NA	20	20	20	-
SC-E03(G)-xxx	3 / 3	5.5 / 5.5	5.5 / NA	5.5 / NA	12 / 12	12 / 12	9 / NA	7 / NA	20	20	20	-
SC-E04(G)-xxx	4 / 4	7.5 / 7.5	7.5 / NA	7.5 / NA	18 / 18	18 / 18	13 / NA	9 / NA	25	25	25	-
SC-E05(G)-xxx	5.5 / 4	11 / 7.5	11 / NA	7.5 / NA	25 / 18	25 / 18	17 / NA	9 / NA	32	32	32	-
SC-E1(G)-xxx	7.5 / 7.5	15 / 15	15 / NA	11 / NA	32 / 32	32 / 32	24 / NA	15 / NA	50	50	50	-
SC-E2(G)-xxx	11 / 11	18.5 / 18.5	18.5 / NA	15 / NA	40 / 40	40 / 40	29 / NA	19 / NA	60	60	60	-
SC-E2S(G)-xxx	15 / 11	22 / 18.5	25 / NA	22 / NA	50 / 40	50 / 40	38 / NA	26 / NA	65	65	65	-
SC-E3(G)-xxx	18.5 / 18.5	30 / 30	37 / NA	30 / NA	68 / 68	65 / 65	60 / NA	38 / NA	100	100	100	-
SC-E4(G)-xxx	22 / 18.5	40 / 30	37 / NA	37 / NA	80 / 68	80 / 65	60 / NA	44 / NA	105	105	105	-
SC-E5-xxx	30 / 30	55 / 55	5 5/ NA	55 / NA	105 / 105	105 / 105	85 / NA	64 / NA	150	150	150	2NO+2NC
SC-E6-xxx	37 / 37	60 / 60	6 0 / NA	60 / NA	125 / 125	125 / 125	90 / NA	72 / NA	150	150	150	2NO+2NC
SC-E7-xxx	45 / 45	75 / 75	75 / NA	90 / NA	150 / 150	150 / 150	120 / NA	103 / NA	200	200	200	2NO+2NC

Internal Auxiliary Contact Ratings

Internal Auxiliary Contact Ratings - UL and CSA						
Frame Size (note 1)	Rated Insulation Voltage (V)	NEMA ICS 5-2000 Ratings (note 2)				
		AC Ratings			DC Ratings	
		Designation	Making VA	Breaking VA	Designation	Making/Breaking VA
E5 to E7-xxx	690	A600	7200	720	Q300	69

Notes:
1. E02(G) to E4(G) do not have internal auxiliary contact.
2. NEMA ICS 5-2000. For more information, refer to Control Circuit Contact Electrical Ratings, see page MRC-111.

Internal Auxiliary Contact Ratings - IEC, JIS									
Based on IEC 60974-4-1, EN 60947-4-1, JIS C 8201-4-1									
Frame Size (note 1)	Rated Insulation Voltage (V)	Rated Thermal Current (A)	Making and Breaking Capacity (A)		Rated Operational Current (A)				Minimum Operating Voltage and Current
			AC Voltage	Amps	AC Voltage	AC-15 (Ind. load)	DC Voltage	DC-13 (Ind. load)	
E5 to E7-xxx	690	10	120V	60	120V	6	24V	3	5VDC, 3mA
			220V	30	220V	3	48V	1.5	
			440V	15	440V	1.5	110V	0.55	
			600V	12	600V	1.2	220V	0.27	

Note 1: E02(G) to E4(G) do not have internal auxiliary contact.

Fuji Duo Series SC-E Contactors

Coil Characteristics

AC Coil Characteristics								
Frame Size	Power Consumption (VA)		Power Loss (W)		Pick-Up Voltage (V)	Drop-Out Voltage (V)	Operating Time (ms)	
	Inrush 50/60Hz	Sealed 50/60Hz	50Hz	60Hz			Coil ON to Contact ON	Coil OFF to Contact OFF
E02 to E05-xxx	90/95	9/9	2.7	2.8	0.85 - 1.1 x U.S. rated coil voltage	0.2 - 0.75 x U.S. rated coil voltage	9-20	5-16
E1 to E2S-xxx	120/135	12.7/12.4	3.6	3.8	0.85 - 1.1 x U.S. rated coil voltage	0.2 - 0.75 x U.S. rated coil voltage	10-17	6-13
E3, E4-xxx	180/190	13.3/13.4	4.5	5	0.85 - 1.1 x U.S. rated coil voltage	0.2 - 0.75 x U.S. rated coil voltage	10-18	8-18
E5-xxx	80/95	4/4.6	3.2	3.6	0.85 - 1.1 x U.S. rated coil voltage	0.2 - 0.75 x U.S. rated coil voltage	39-45	27-33
E6, E7-xxx	190/230	4.9/5.8	3.4	3.7	0.8 - 1.1 x U.S. rated coil voltage	0.1 - 0.65 x U.S. rated coil voltage	31-37	30-36

DC Coil Characteristics						
Frame Size	Power Consumption (W)		Pick-Up Voltage (V)	Drop-Out Voltage (V)	Operating Time (ms)	
	Inrush	Sealed			Coil ON to Contact ON	Coil OFF to Contact OFF
E02G to E05G-xxx	7	7	0.85 - 1.1 x U.S. rated coil voltage	0.1 - 0.75 x U.S. rated coil voltage	45-49	10-26
E1G to E2SG-xxx	9	9	0.85 - 1.1 x U.S. rated coil voltage	0.1 - 0.75 x U.S. rated coil voltage	40-50	8-17
E3G, E4G-xxx	12	12	0.85 - 1.1 x U.S. rated coil voltage	0.1 - 0.75 x U.S. rated coil voltage	60-70	14-21
E5-xxx	90	2.8	0.85 - 1.1 x U.S. rated coil voltage	0.1 - 0.75 x U.S. rated coil voltage	35-41	26-32
E6, E7-xxx	225	3.2	0.8 - 1.1 x U.S. rated coil voltage	0.1 - 0.65 x U.S. rated coil voltage	28-34	27-33

Operating Coil	
AC Coil, SC-E02-xxx to SC-E4-xxx	
Voltage Code	Coil Operating Voltage / Frequency
24VAC	24VAC 50Hz / 24-26VAC 60Hz
110VAC	100-110VAC 50Hz / 110-120VAC 60Hz
220VAC	200-220VAC 50Hz / 220-240VAC 60Hz
440VAC	415-440VAC 50Hz / 440-480VAC 60Hz
500VAC	480-500VAC 50Hz / 500-550VAC 60Hz

Operating Coil	
AC/DC Coil (SUPERMAGNET), SC-E5-xxx to SC-E7-xxx	
Voltage Code	Coil Operating Voltage / Frequency
24V	24-25VAC 50/60Hz; 24VDC
100V	100-127VAC 50/60Hz; 100-120VDC
200V	200-250VAC 50/60Hz; 200-240VDC
400V	380-450VAC 50/60Hz
500V	460-575VAC 50/60Hz

Operating Coil	
DC Coil, SC-E02G-xxx to SC-E4G-xxx	
Voltage Code	Coil Operating Voltage
24VDC	24VDC

Performance Data

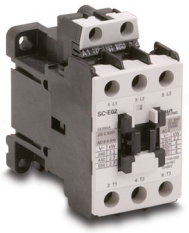
Frame size	Making current (A)		Breaking current (A)		Operating cycles per hour	Durability (operations)	
	220V	440V	220V	440V		Electrical	Mechanical
SC-E02	108	108	90	90	1800	2 million	10 million
SC-E03	144	144	120	120	1800	1.5 million	10 million
SC-E04	216	216	180	180	1800	1.5 million	10 million
SC-E05	250	250	200	200	1200	1.5 million	10 million
SC-E1	384	384	320	320	1200	1.5 million	10 million
SC-E2	480	480	400	400	1200	1.5 million	10 million
SC-E2S	500	500	400	400	1200	1.5 million	10 million
SC-E3	816	780	680	650	1200	1.5 million	5 million
SC-E4	816	800	680	650	1200	1 million	5 million
SC-E5	1260	1260	1050	1050	1200	1 million	5 million
SC-E6	1500	1500	1250	1250	1200	1 million	5 million
SC-E7	1800	1800	1500	1500	1200	1 million	5 million

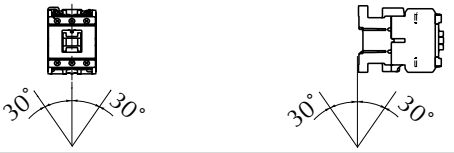
Fuji Duo Series SC-E Contactors

Fuji Electric

Standard operating conditions

The magnetic contactors are manufactured for use in the standard operating conditions given in the table.



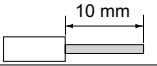
Standard Operating Conditions	
Ambient Temperature	Operating: -5 to 55°C No sudden temperature changes resulting in condensation or icing (The average temperature over a 24-hour period must not exceed 35°C) Storage: -40 to 65°C
Humidity	45 to 85%RH
Altitude	2000m or lower
Atmosphere	No excessive dust, smoke, corrosive gases, flammable gases, steam, or salt
Vibration	10 to 55Hz 15m/s^2
Shock	50m/s^2
Mounting	35mm IEC DIN rail mounting (SC-E02 to SC-E4), screw mounting
Mounting Angle	
Standard	IEC 947-4-1, EN 60947-4-1, VDE 0660 JIS C 8201-4-1, JEM 1038 UL 508, file E42419; CSA C22.2, file 20479

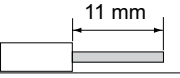
Wiring

Be sure to perform wiring correctly with reference to the wiring diagrams. Main terminals for models SC-E02 to SC-E7 are wired using solid wires or stranded wires. Stranded wires or flexible stranded wires can be connected by twisting them together and crimping a sleeve (ferrule) onto them before connecting.

Tightening torque

If wires are not tightened sufficiently, they may become hot or loosen, resulting in a fire, short-circuit, electric shock, or other potentially dangerous situation. Tighten wires to the torques specified in these tables.

Wire Sizes, Tightening Torques - Control Circuit		
Solid or Stranded Wire (mm^2)	***One***	0.75 to 2.5 (1 to 1.6 mm diameter)
	Two	0.75 to 2.5 (1 to 1.6 mm diameter)
AWG	***One***	18 to 14
	Two	18 to 14
Insulation Stripping Length		
Fork Terminal		Max. 7.7mm wide
Terminal Screw Size		M3.5
Tool		Phillips screwdriver, H-type, No. 2 (ISO 8764); ADC part number DN-SP1 or DN-SP2
		Flat-blade screwdriver, 1 x 5.5 x L-type, B (ISO 2830); ADC part number DN-SS5
Tightening Torque (N·m)		0.8 to 1

Wire Sizes, Tightening Torques - Main Circuit					
Contactor Type		***SC-E02-xxx***	***SC-E03-xxx***	***SC-E04-xxx***	***SC-E05-xxx***
Solid Wire (mm^2)	***One***	0.75 to 4		0.75 to 6	
	Two	1 to 4		1.5 to 6	
Stranded Wire (mm^2)	***One***	0.75 to 4		0.75 to 6	
	Two	1 to 4		1.5 to 6	
AWG	***One***	12 max.		10 max.	
	Two	12 max.		10 max.	
Insulation Stripping Length					
Terminal Screw Size		M4			
Tool		Phillips screwdriver, H-type, No. 2 (ISO 8764); ADC part number DN-SP1 or DN-SP2			
		Flat-blade screwdriver, 1 x 5.5 x L-type, B (ISO 2830); ADC part number DN-SS5			
Tightening Torque (N·m)		1.2 to 1.5			

Fuji Duo Series SC-E Contactors

Wire Sizes, Tightening Torques - Main Circuit						
Contactor Type			***SC-E1, E2, E2S-xxx***	***SC-E3, E4-xxx***	***SC-E5, E6-xxx***	***SC-E7-xxx***
Top-Only Connection	***Solid or stranded wire (mm 2) 1***		0.75 to 35	1.5 to 70	4 to 70	4 to 120
	Flexible stranded wire with sleeve (mm 2) 1		0.75 to 25	1.5 to 50	2.5 to 50	2.5 to 95
	Flexible stranded wire without sleeve (mm 2)		0.75 to 25	1.5 to 50	4 to 50	4 to 95
	AWG		18 to 2	16 to 2/0	12 to 2/0	12 to 250MCM
	Solid or stripping length (mm)		15	19.5	26.5	28.5
Bottom-Only Connection	***Single stranded wire (mm 2) 1***		0.75 to 25	1.5 to 50	4 to 70	4 to 120
	Flexible stranded wire with sleeve (mm 2) 1		0.75 to 16	1.5 to 35	2.5 to 50	2.5 to 95
	Flexible stranded wire without sleeve (mm 2)		0.75 to 16	1.5 to 35	4 to 50	4 to 95
	AWG		18 to 3	16 to 1/0	12 to 2/0	12 to 250MCM
	Sheath stripping length (mm)		12.5	16	26.5	28.5
Top/Bottom Connection	***Solid or stranded wire (mm 2) 1***	***Top/ bottom***	0.75 to 25	1.5 to 50	4 to 70	4 to 120
	Flexible stranded wire with sleeve (mm 2) 1	***Top/ bottom***	0.75 to 16	1.5 to 35	2.5 to 50	2.5 to 95
	Flexible stranded wire without sleeve (mm 2)	***Top/ bottom***	0.75 to 16	1.5 to 35	4 to 50	4 to 95
	AWG	***Top/ bottom***	18 to 3	16 to 1/0	12 to 2/0	12 to 250MCM
Tool			Phillips screwdriver, H-type, No.2 (ISO 8764); ADC part number DN-SP1 or DN-SP2	Hex. wrench 4 (ISO 2936)		
			Flat-blade screwdriver, 1 x 5, 5xL-type, B (ISO 2830); ADC part number DN-SS5			
Tightening Torque (Nm)			2.5	8		10
Self-locking Torque (Nm) 2			1	2		

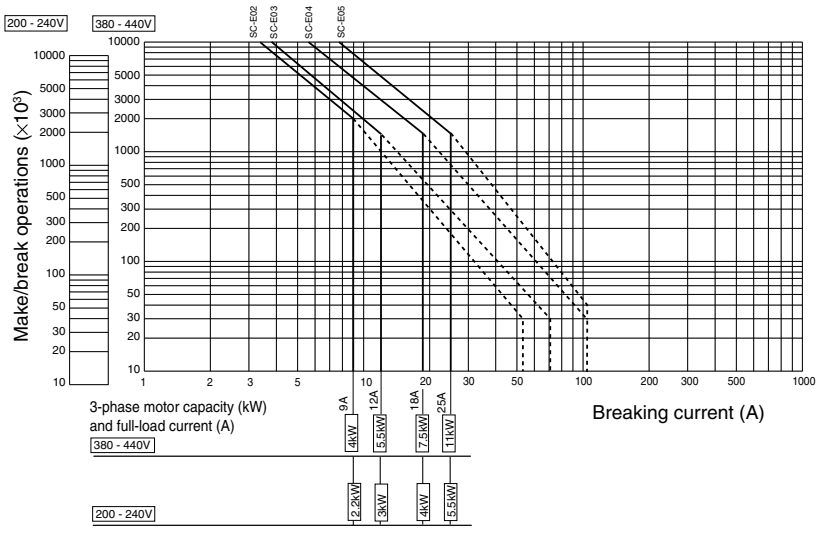
Note 1: Stranded wire (0 to 25mm^2) consists of 7 wires or less. Stranded wire (35 to 120mm^2) consists of 19 wires or less. Flexible stranded wire consists of more number wires than the above.

Note 2: The tightening bolt must be loosened in order to insert the wire. However, stop loosening the bolt when the anti-drop attachment on the bottom of the bolt reaches the top edge of the terminal. If a torque exceeding that given in the table is applied in this state, the retaining bracket may loosen.

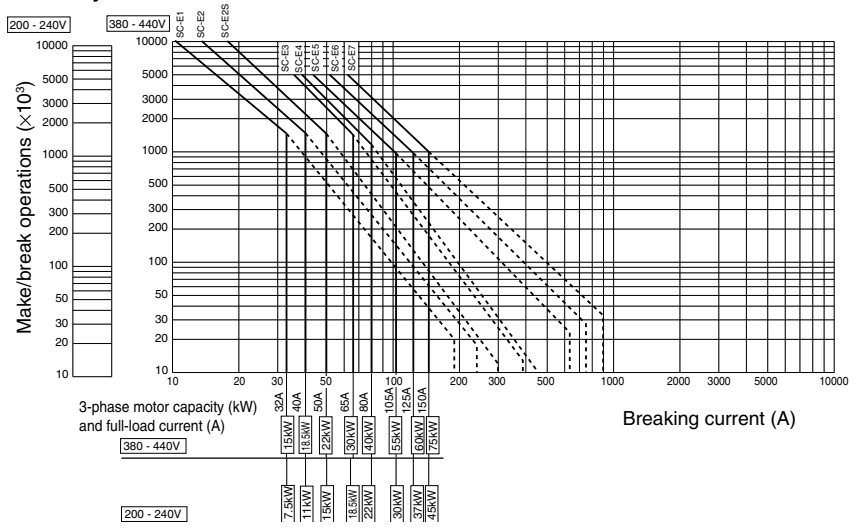
Fuji Duo Series SC-E Contactors

Electrical durability

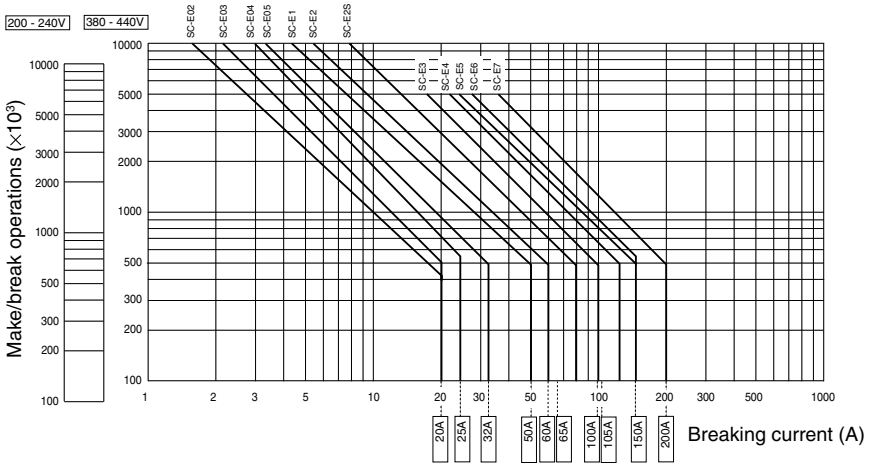
AC-3 duty / SC-E02 to SC-E05-xxx



AC-3 duty / SC-E1 to SC-E7-xxx

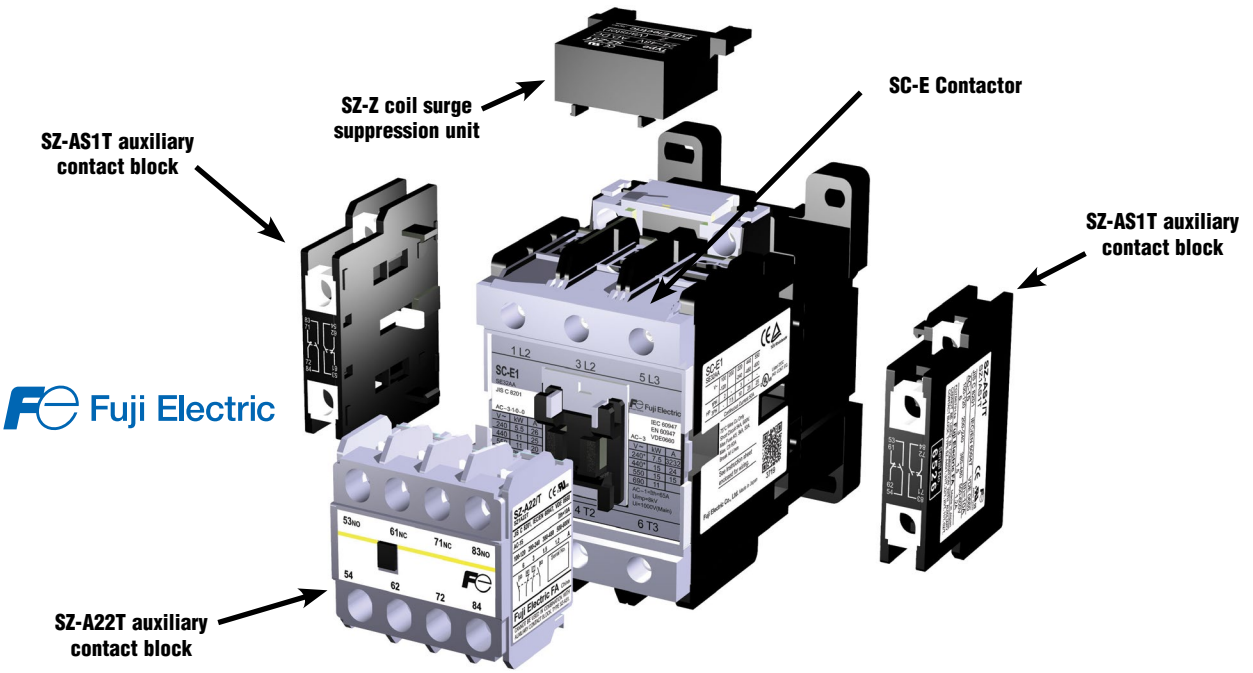


AC-1 duty / SC-E02 to SC-E7-xxx



Fuji Duo Series SC-E Contactors Accessories

Optional accessories



Auxiliary contact blocks with terminal covers

Maximum auxiliary contact blocks: 2 side mounted (1 per side) **OR** 1 front mounted. The front and side blocks cannot be mounted together on the same contactor.

Caution on use:

1. Front mounting auxiliary contact block and side mounting block cannot be attached to one contactor at the same time.
2. Only one front mounting block can be attached to one contactor.
3. Where interlock unit is already attached, side mounting auxiliary contact block can be attached on one side only.

SZ-A22T

SZ-A11T

SZ-AS1T

SZ-AS2T

Auxiliary Contact Blocks with Terminal Covers					
Part Number	***Price***	***Applicable Contactor***	***Mounting***	***Number of Contacts***	***Contact Arrangement***
SZ-A22T	$13.00	SC-E02(G)-xxx to E4(G)-xxx	Front mounting	4	2NO + 2NC
SZ-A20T	$8.25			2	2NO
SZ-A11T	$8.25				1NO + 1NC
SZ-AS1T	$13.00	SC-E02(G)-xxx to E4(G)-xxx	Side mounting	2	1NO + 1NC
SZ-AS2T	$13.00	SC-E5, E6, E7-xxx, SC-N4, N5, N6, N7, N8, N10, N11, N12, SC-E5(G)-xxx to E7(G)-xxx		2	1NO + 1NC

Accessory Auxiliary Contact Ratings - UL and CSA				
NEMA ICS 5-2000 Ratings *(note 1)*				
AC Ratings			***DC Ratings***	
Designation	***Making VA***	***Breaking VA***	***Designation***	***Making/Breaking VA***
A600	7200	720	Q300	69
For more information, refer to Control Circuit Contact Electrical Ratings, page MRC-111				

Accessory Auxiliary Contact Ratings - IEC and JIS continued on next page.

Fuji Duo Series SC-E Contactors Accessories

Accessory Auxiliary Contact Ratings - IEC and JIS							
Rated Thermal Current (A)	Making and Breaking Capacity at AC (A)		Rated operational current (A)				Minimum Operating Voltage and Current
			AC		DC		
			Voltage	AC-15 (Ind. load)	Voltage	DC-13 (Ind. load)	
10	120V	60	120V	6	24V	3	5VDC, 3mA
	220V	30	220V	3	48V	1.5	
	440V	15	440V	1.5	110V	0.55	
	600V	12	600V	1.2	220V	0.27	

Coil surge suppression units

SZ-Z1

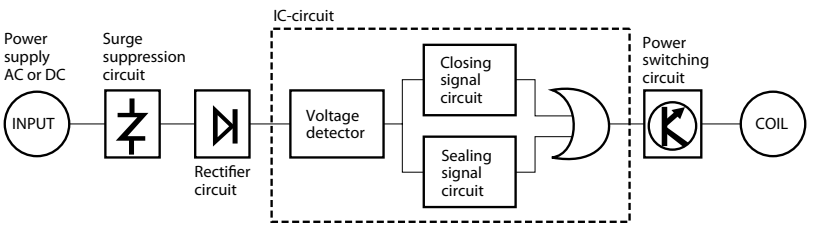
SZ-Z37

Suppress surge voltage due to contactor ON-OFF operations; easily connect to contactor coil terminals.

Important: When driving 24VDC Fuji contactors with a PLC solid-state output, we recommend using diode terminal block part number DN-D10DR-A or ZL-TSD8-24. Please see application note AN-MISC-032 for additional information located on Automationdirect.com/technotes.

Coil Surge Suppression Units					
Part Number	Price	Applicable Contactor		Operating Coil Voltage	Device
		AC Operated	DC Operated		
SZ-Z1	$10.25	SC-E02-xxx to E05-xxx	SC-E02G-xxx to E05G-xxx	24-48V AC/DC	varistor
SZ-Z2	$10.25			100-250V AC/DC	
SZ-Z31	$14.00	SC-E1-xxx to -E4xxx	SC-E1G-xxx to E4G-xxx	24-48V AC/DC	
SZ-Z32	$14.00			100-250V AC/DC	
SZ-Z4	$11.75	SC-E02-xxx to E05-xxx	SC-E02G-xxx to E05G-xxx	24-48V AC/DC	capacitor / resistor
SZ-Z5	$11.75			100-250V AC/DC	
SZ-Z34	$14.00	SC-E1-xxx to E4-xxx	-	24-48V AC/DC	
SZ-Z35	$14.00			100-250V AC/DC	
SZ-Z36	$14.00	-	SC-E1G-xxx to E4G-xxx	24-48V AC/DC	
SZ-Z37	$14.00			100-250V AC/DC	
SC-E02 to E05				380-440V AC/DC	
SC-E1 to E4				380-440V AC/DC	

Note: Super Magnet Coils on SC-E5, SC-E6, and SC-E7 contactors have internal surge suppression. See diagram below.



Replacement contactor coils

SZ-GSN5-100

SC-E Series Replacement Contactor Coils			
Part Number	Price	Applicable Contactor	Coil Voltage
SZ-GSN5-100	$124.25	SC-E5-xxx	100-127VAC 50/60Hz / 100-120VDC
SZ-GSN6-100	$136.50	SC-E6-xxx, SC-E7-xxx	100-127VAC 50/60Hz / 100-120VDC
SZ-GSN5-200	$124.25	SC-E5-xxx	200-250VAC 50/60Hz / 200-240VDC
SZ-GSN6-200	$136.50	SC-E6-xxx, SC-E7-xxx	200-250VAC 50/60Hz / 200-240VDC
SZ-GSN5-24	$124.25	SC-E5-xxx	24-25VAC/ 50/60Hz / 24VDC
SZ-GSN6-24	$136.50	SC-E6-xxx, SC-E7-xxx	24-25VAC/ 50/60Hz / 24VDC

Replacement coils are available for contactor sizes SC-E5 and larger only.
Replacement coils are not available for coil codes 440VAC, 500VAC, 400V, 500V.

Fuji Duo Series SC-E Accessories

Connection kits for reversing SC-E contactors

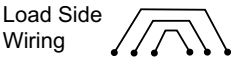
SZ-ERW1A

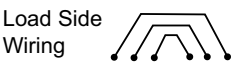
SZ-ERW1B

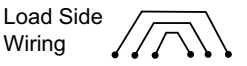
SZ-ERW1D

SZ-ERW2A

SZ-ERW2B





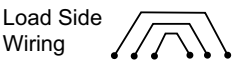


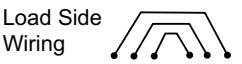
SZ-ERW2D

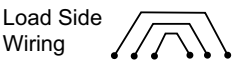
SZ-ERW3A

SZ-ERW3B

SZ-ERW3D







Connection Kits			
Part Number	***Price***	***Description***	***Use with Contactors***
SZ-ERW1A	$4.75	Line side reversing connection kit.	SC-E02-xxx to SC-E05-xxx
SZ-ERW1B*	$4.75	Load side reversing connection kit. For wiring load side when using contactors only or with a MMS device.	
SZ-ERW1D	$4.75	Load side reversing connection kit. For wiring load side when using two contactors with a thermal overload relay.	
SZ-ERW2A	$10.25	Line side reversing connection kit.	SC-E1-xxx to SC-E2S-xxx
SZ-ERW2B*	$10.25	Load side reversing connection kit. For wiring load side when using contactors only or with a MMS device.	
SZ-ERW2D	$10.25	Load side reversing connection kit. For wiring load side when using two contactors with a thermal overload relay.	
SZ-ERW3A	$19.00	Line side reversing connection kit.	SC-E3-xxx to SC-E4-xxx
SZ-ERW3B*	$19.00	Load side reversing connection kit. For wiring load side when using contactors only or with a MMS device.	
SZ-ERW3D	$19.00	Load side reversing connection kit. For wiring load side when using two contactors with a thermal overload relay.	

**** When using the SZ-ERWxB, a TK-E thermal overload relay must be separately mounted and wired using an SZ-HxE base. To assemble a TK-E overload directly to the contactor use a SZ-ERWxD load side connection kit.***

Mechanical interlock unit

SZ-RM

Mechanical Interlock Unit			
Part Number	***Price***	***Description***	***Use with Contactors***
SZ-RM	$13.00	Used when building a reversing starter. Prevents both contactors from being pulled in at once.	SC-E02-xxx to SC-E4-xxx

NOTE: Mechanical interlock unit cannot be used with SC-E5-xxx through E7-xxx contactors.

Parts for reversing Fuji SC-E contactors

- SC-E (Contactors - qty. 2)
- SZ-ERWxA (Line side connection kit - qty. 1)
- SZ-ERWxB* (Load side connection kit - qty. 1)
- SZ-RM (Mechanical interlock - qty. 1)
- SZ-AxxT (Auxiliary contact blocks - qty. 1)

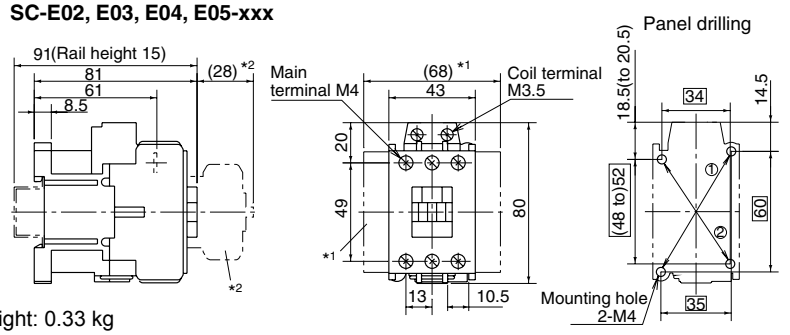
Fuji Electric

Fuji Duo Series SC-E Contactors

Dimensions (mm)

Contactors

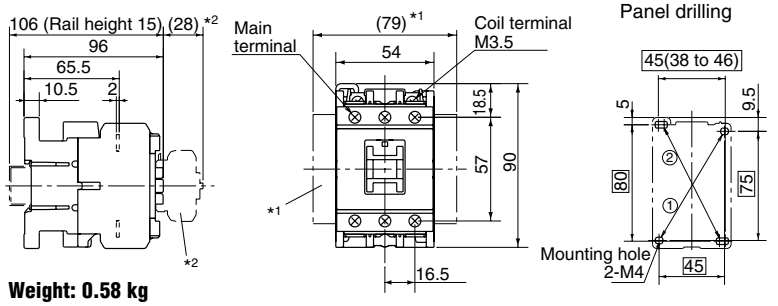
SC-E02, E03, E04, E05-xxx



Weight: 0.33 kg

Use the two mounting holes on a diagonal line
① or ② to mount contactor
①: 35 × 60 ②: 35 × (48 to) 52

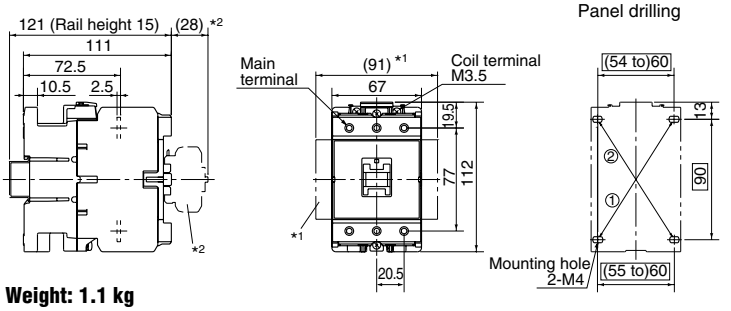
SC-E1, E2, E2S-xxx



Weight: 0.58 kg

Use the two mounting holes on a diagonal line
① or ② to mount contactor
①: 45×75 ②: 45 (38 to 46)×80

SC-E3, E4-xxx



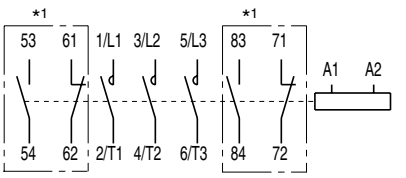
Weight: 1.1 kg

Use the two mounting holes on a diagonal line
① or ② to mount contactor
①: (55 to) 60 × 90 ②: (54 to) 60 × 90

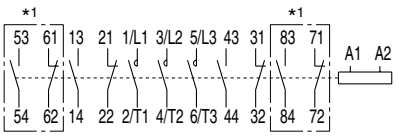
Wiring diagrams

Contactors

SC-E02 to E05-xxx
SC-E1 to E4-xxx
SC-E02G to E05G-xxx
SC-E1G to E4G-xxx
SC-E2S, E2SG-xxx



SC-E5, E6, E7-xxx



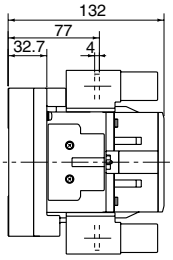
*1 In case of aux. contact 4NO+4NC

Fuji Duo Series SC-E Contactors

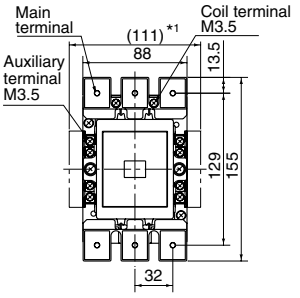
Dimensions (mm)

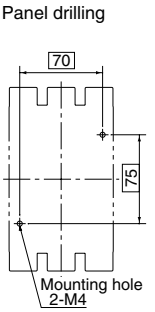
Contactors

SC-E5-xxx



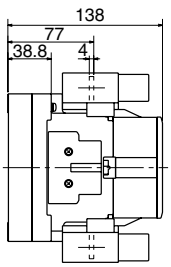
Weight: 2.0 kg



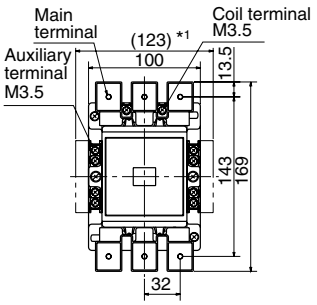


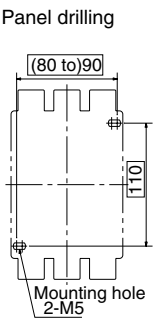
*1 Side mounting aux. contact block
*2 Front mounting aux. contact block

SC-E6-xxx

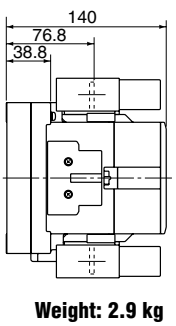


Weight: 2.6 kg

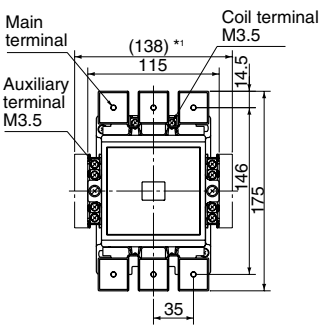


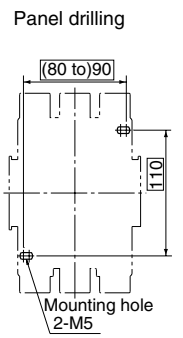


SC-E7-xxx

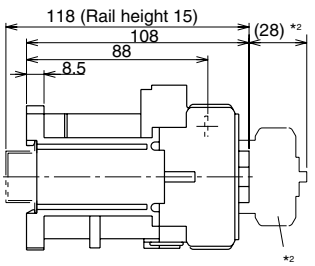


Weight: 2.9 kg

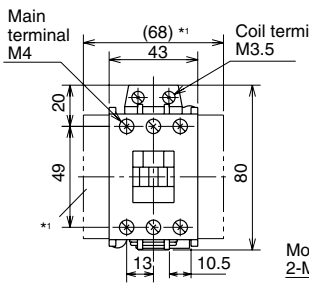


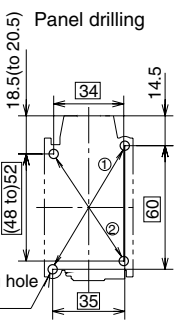


SC-E02G, E03G, E04G, E05G-xxx



Weight: 0.59 kg





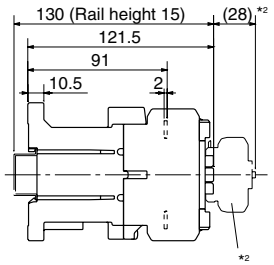
Use the two mounting holes on a diagonal line
① or ② to mount contactor
① 35 × 60 ②: 35 × (48 to) 52

Fuji Duo Series SC-E Contactors

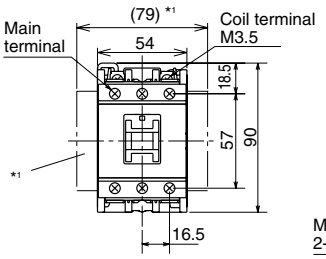
Dimensions (mm)

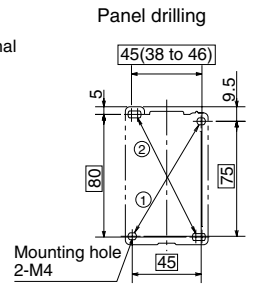
Contactors

SC-E1G, E2G, E2SG-xxx



Weight: 0.79 kg

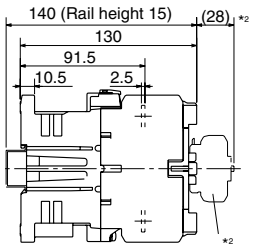




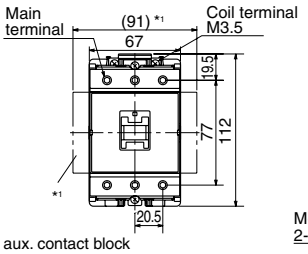
*1 Side mounting aux. contact block
*2 Front mounting aux. contact block

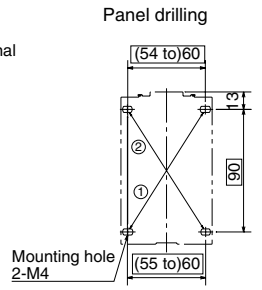
Use the two mounting holes on a diagonal line
① or ② to mount contactor
①: 45×75 ②: 45 (38 to 46)×80

SC-E3G, E4G-xxx



Weight: 1.4 kg





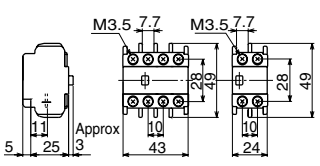
*1 Side mounting aux. contact block
*2 Front mounting aux. contact block

Use the two mounting holes on a diagonal line
① or ② to mount contactor
①: (55 to) 60 × 90 ②: (54 to) 60 × 90

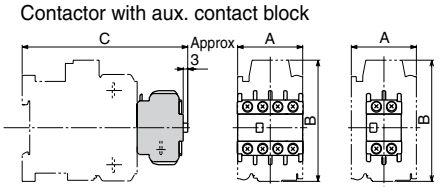
Dimensions-mm

Auxiliary contact blocks - front mounting

SZ-A22T, A20T, A11T for SC-E02 (G)-xxx to E4 (G)-xxx



Contactor with aux. contact block

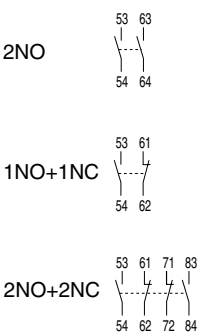


A22T **Weight: 36 g**
SZ-A20T , A11T **Weight: 20 g**

Type	A	B	C
SC-E02, E03, E04, E05-xxx	43	80	109
SC-E1, E2, E2S-xxx	54	90	124
SC-E3, E4-xxx	67	112	139
SC-E02G, E03G, E04G, E05(G)-xxx	43	80	136
SC-E1G, E2G, E2SG-xxx	54	90	149.5
SC-E3G, E4G-xxx	67	112	158

Wiring diagrams

SZ-A22T, A20T, A11T



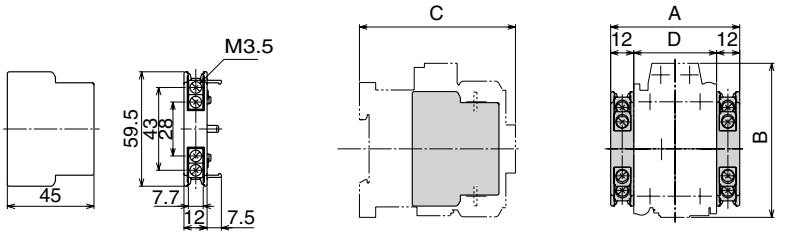
Fuji Duo Series SC-E Contactors

Dimensions (mm)

Auxiliary contact blocks - side mounting

SZ-AS1T for SC-E02(G)-xxx to E4(G)-xxx

Contactor with aux. contact block

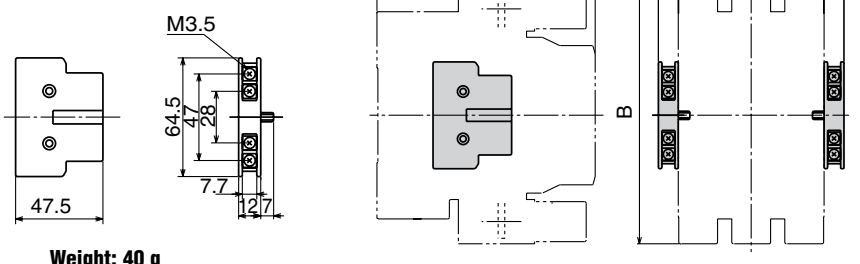


Weight: 28 g

Type	A	B	C	D
SC-E02, E03, E04, E05-xxx	67	80	81	43
SC-E1, E2, E2S-xxx	78	90	54	54
SC-E3, E4-xxx	91	112	67	67
SC-E02G, E03G, E04G, E05(G)-xxx	67	80	108	43
SC-E1G, E2G, E2SG-xxx	78	90	121.5	54
SC-E3G, E4G-xxx	91	112	130	67

SZ-AS2T for SC-E5 to E7-xxx

Contactor with aux. contact block



Weight: 40 g

Type	A	B	C	D
SC-E5-xxx	112	155	132	88
SC-E6-xxx	124	169	138	100
SC-E7-xxx	139	175	140	115

Wiring diagrams

1 N.O. + 1 N.C.

Mounted on right side

Mounted on left side

1 N.O. + 1 N.C.

Mounted on right side

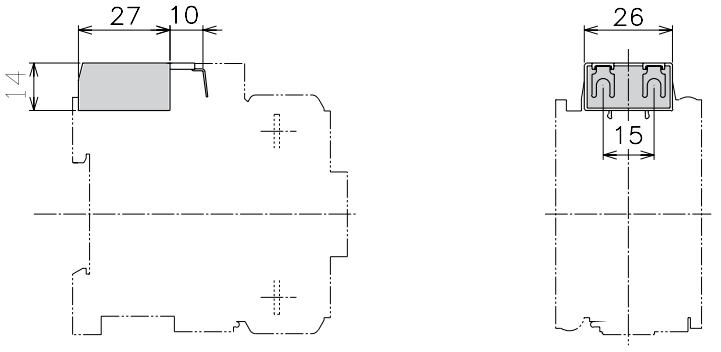
Mounted on left side

Fuji Duo Series SC-E Contactors

Dimensions (mm)

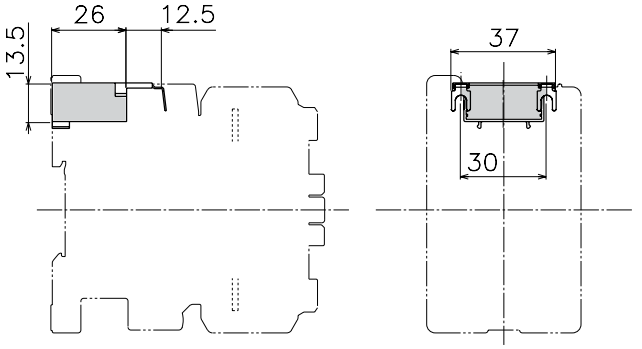
Coil surge suppression units

SZ-Z1, Z2, Z4, Z5

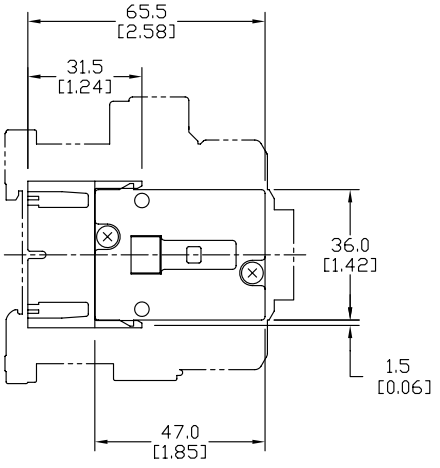


Weight: 14 g

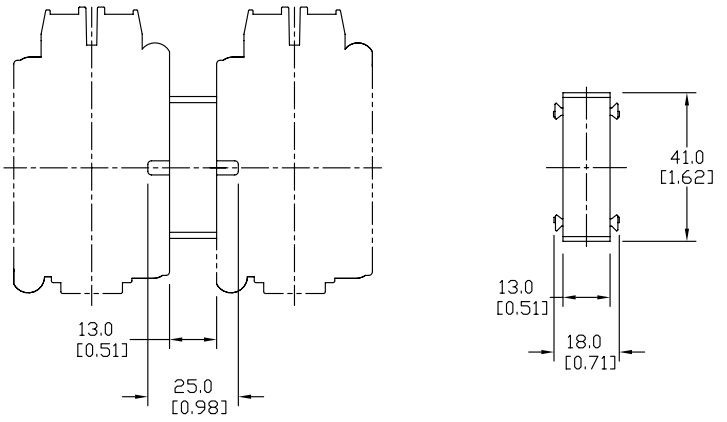
SZ-Z31, Z32, Z34, Z35, Z36, Z36, Z37



Weight: 15 g

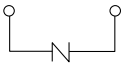


SZ-RM

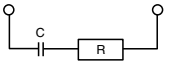


Wiring diagrams

SC-E02 to E05-xxx + SZ-Z1, Z2
(Built-in varistor)

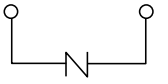


SC-E02 to E05-xxx + SZ-Z4, Z5
(Built-in capacitor/resistor)



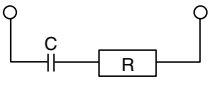
SC-E1 to E4-xxx + SZ-Z31, Z32

(Built-in varistor)



SC-E1 to E4-xxx + SZ-Z34, Z35
(Built-in capacitor/resistor)

SC-E1G to E4G-xxx + SZ-Z36, Z37
(Built-in capacitor/resistor)



C-more Micro 6-inch TFT EA3 Touch Panel

Model EA3-T6CL ***C-more*** 6-inch Micro touch panel has a 5.7-inch TFT LCD 320 x 240 pixel display and a palette of 32K colors for customizing objects, screen backgrounds and displaying bitmap graphics. It features five user-defined function keys, each key with a user-defined red LED indicator. The ***C-more*** 6-inch Micro TFT panels are powered from a Class 2, 12-24 VDC power supply*. The panel is NEMA 4/4X indoor when installed correctly.

***NOTE: Recommended DC power supply to power the *C-more* Micro Panel, *AutomationDirect* Part No. PSC-24-010.**

Part No. EA3-T6CL

Shown in Landscape (Horizontal) mode

$299.00

Function	*Available*
Ethernet	Optional (EA-ECOM)
USB Programming Port	Yes
Serial RJ12 Port	Yes
Serial DB15 Port	Yes

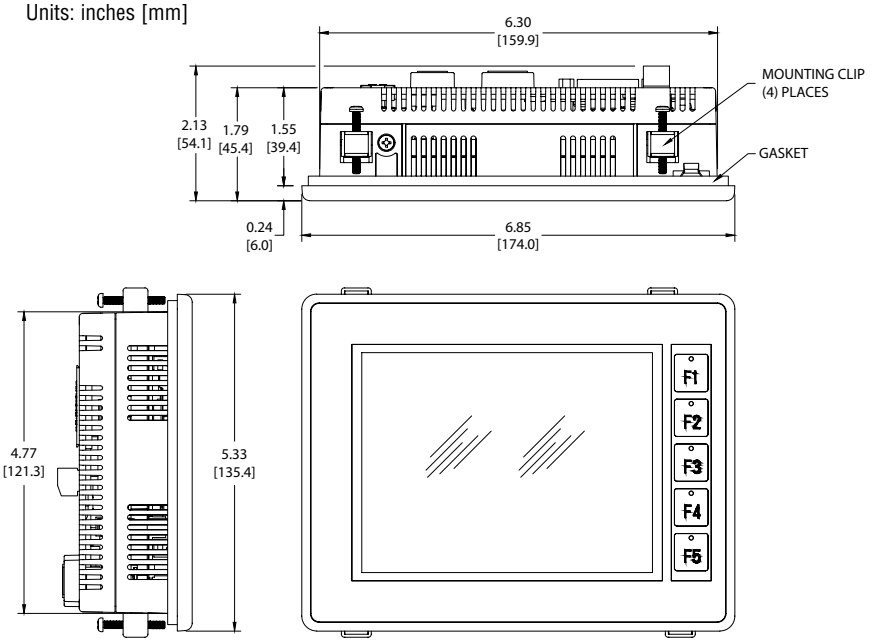
Features

- Touch screen display
- Free downloadable programming software
- 320 x 240 pixel display with up to 40 lines by 80 characters of text and graphics in landscape mode
- Up to 40 characters of dynamic text with embedded variables and phrases mixed with graphics
- Five programmable function keys can change with every screen. Can increment / decrement values, trigger recipes, view index of screens.
- 32K colors
- Optional replaceable clear screen overlay
- 6MB memory
- Supports Ethernet expansion module (EA-ECOM)
- Built-in USB type B programming port
- Built-in 15-pin serial communications port
- Built-in RJ12 serial communications port
- Built-in Alarm Control setup that activates beep, backlight flash, customized alarm banner, and red LED blinking
- 0 to 50 °C (32 to 122 °F) operating temperature range (IEC 60068-2-14)
- NEMA 4/4X, IP65 compliant when mounted correctly, indoor use only
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

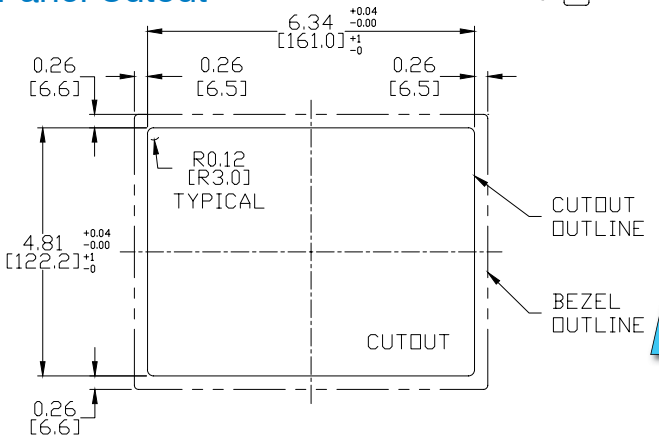
***NOTE: The EA3-T6CL can be powered through the USB port when connected to a PC for programming, the screen brightness is diminished because the panel is running in Low-Power Mode. For full brightness, connect an external Class 2, 12-24 VDC power source to the 6" panel's power connection. An external Class 2, 12-24 VDC power source must be used when the panel is installed in its application.**

Dimensions

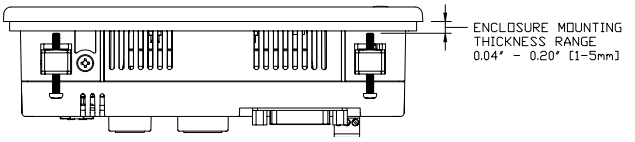
Units: inches [mm]



Panel Cutout



Panel Thickness



NOTE: The *C-more* 6-inch Micro cutout dimensions are not equivalent to previous AutomationDirect text panels. The *C-more* 6-inch Micro panels will not fit in cutouts for DV-1000, EZText, Optimate panels or *C-more* 6-inch panels.

C-more Micro 6-inch, 8-inch and 10-inch EA3 Panel Specifications

EA3-T6CL, EA3-T8CL and EA3-T10CL Specifications			
Part Number:	***EA3-T6CL***	***EA3-T8CL***	***EA3-T10CL***
Description:	320 x 240 pixel LCD display (Landscape mode), Five user defined keypad function buttons with five user defined LED indicators	800 x 600 pixel LCD display (Landscape mode), Seven user defined keypad function buttons with seven user defined LED indicators	
Display:			
• Type	5.7" TFT Graphical type with LED Backlight	8.4" TFT Graphical type with LED Backlight	10.4" TFT Graphical type with LED Backlight
• Resolution	320 (W) x 240 (H) pixel (Landscape Mode) 240 (W) x 320 (H) pixel (Portrait Mode)	800 (W) x 600 (H) pixel (Landscape Mode) 600 (W) x 800 (H) pixel (Portrait Mode)	
• Color	32768 colors		
• Display Brightness (Reference)	270 nits (typ)	295 nits (typ)	270 nits (typ)
• Viewing Area Size	4.57" (W) x 3.44" (H) [116.2 mm x 87.4 mm]	6.86" (W) x 5.17" (H) [174.2 mm x 131.2 mm]	8.46" (W) x 6.41" (H) [214.8 mm x 162.7 mm]
• Active Area Size	4.54" (W) x 3.40" (H) [115.2 mm x 86.4 mm]	6.71" (W) x 5.03" (H) [170.4 mm x 127.8 mm]	8.31" (W) x 6.24" (H) [211.2 mm x 158.4 mm]
• Contrast / Brightness	Adjusted from the panel's built-in configuration setup menu		
• Viewing Angle (Landscape Mode)	3, 9 o'clock axis –> 80 degrees 6 o'clock axis –> 65 degrees 12 o'clock axis –> 80 degrees	3, 9 o'clock axis –> 80 degrees 6 o'clock axis –> 60 degrees 12 o'clock axis –> 80 degrees	3, 9 o'clock axis –> 80 degrees 6 o'clock axis –> 80 degrees 12 o'clock axis –> 60 degrees
Backlight:			
• Type	LED		
• Color	White		
• User Replaceable	No		
Touch Screen:			
•Type	Analog resistive, single touch*		
• Operation	82 gram force [0.8 N] maximum		
• Life	Minimum of 1,000,000 cycles		
Features:			
• User Memory	6MB	30MB	
• Number of Screens	Up to 999 – limited by project memory usage		
• Beep (Internal)	Yes		
• Keypad Function Buttons	Five user defined function key buttons with the ability to customize label with an overlay. Minimum of 500,000 cycles	Seven user defined function key buttons with the ability to customize label with an overlay. Minimum of 500,000 cycles	
• Keypad Function Button LEDs	Each function key button includes a red LED that can be user programmed.		
• Programming Port	USB 2.0 Type B		
• Serial Communications	RJ12 serial communications port (RS-232) 15-pin D-sub serial communications port (RS-232, RS-485 / 422).		
• Ethernet Communications	10/100 Base-T (Automatic Negotiation) with EA-ECOM Module		
Screen Objects			
• Functional Devices	Pushbutton, Switch, Indicator Button, Indicator Light, Graphic Indicator Light, Numeric Display, Numeric Entry, Inc/Dec Value, Bar Graph, Bitmap Button, Static Bitmap, Dynamic Bitmap, Recipe Button, Static Text, Lookup Text, Dynamic Text, Screen Change Pushbutton, Screen Selector, Adjust Contrast, Function, Key Configuration Object, Real Time Graphics Line Graph, Analog Meter.		
• Static Shapes	Lines, Rectangles, Circles and Frames		
• Displayable Fonts	Fixed fonts: 4x6, 6x6, 6x6B, 6x8, 8x16, 8x32, 8x64, 16x16, 16x32, 16x64, 32x16, 32x32, 32x64, and Windows fonts		

***Note: The Touchscreen is designed to respond to a single touch. If it is touched at multiple points at the same time, an unexpected object may be activated.**

***C-more* Micro EA3-T6CL, EA3-T8CL and EA3-T10CL panel specifications continued on next page.**

C-more Micro 6-inch, 8-inch and 10-inch EA3 Panel Specifications

EA3-T6CL, EA3-T8CL and EA3-T10CL Specifications (cont'd)			
Part Number:	***EA3-T6CL***	***EA3-T8CL***	***EA3-T10CL***
Electrical:			
• Input Power	10.2 - 26.4 VDC; Class 2 or SELV (Safety Extra-Low Voltage) or Limited Energy Circuit power supply 5VDC USB B-Port to PC	10.2 - 26.4 VDC; Class 2 or SELV (Safety Extra-Low Voltage) or Limited Energy Circuit power supply	
• Power Consumption	7.5 W (External power supply) 2.0 W (USB)	8W	10W
• Maximum Inrush Current	13A for 800µs	10A for 1ms	
• Acceptable External Power Drop Duration	Maximum 1ms		
Environmental:			
• Operating Temperature	0 to 50 °C (32 to 122 °F); Maximum surrounding air temperature rating: 50 °C (122 °F) IEC 60068-2-14 (Test Nb, Thermal Shock)		
• Storage Temperature	–20 to +60 °C (–4 to +140 °F) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)		
• Humidity	5–95% RH (non-condensing)		
• Environmental Air	For use in Pollution Degree 2 environment, no corrosive gases permitted		
• Housing Material	ABS Plastic		
• Gasket Material	Silicone Rubber		
• Overlay Sheet Material	PET		
• Vibration	IIEC60068-2-6 (Test Fc)		
• Shock	IEC60068-2-27 (Test Ea)		
• Altitude	Up to 2000m (6562ft)		
• Noise Immunity	(EN61131-2) EN61000-4-2 (ESD), EN61000-4-3 (RFI) EN61000-4-4 (FTB) EN61000-4-5 (Serge) EN61000-4-6 (Conducted) EN61000-4-8 (Power frequency magnetic field immunity) (Local Test) RFI, (145MHz, 440Mhz 10W @ 10cm) Impulse 1000V @ 1µs pulse		
• Enclosure	NEMA 250 type 4/4X indoor use only UL50 type 4X indoor use only IP-65 indoor use only (not tested by UL) (When mounted correctly)		
• Agency Approvals	CE (EN61131-2), UL508, CUL Canadian C22.2 No. 142-M95, UL E157382, RoHS (2011/65/EU) To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page		
Physical:			
• Enclosure Mounting Thickness Range	0.04" – 0.2" [1 – 5 mm]		
• Mounting Clip Screw Torque Range	21 – 28 oz·in [0.15 – 0.20 Nm]	63 – 77 oz·in [0.45 – 0.55 Nm]	
• Weight	21.1 oz. (600g)	39.9 oz. (1130g)	57.1 oz. (1620g)

C-more Micro EA3 Series PLC Drivers

PLC Drivers		
Serial - port1 or port2	Serial - port2 only	Ethernet*
AutomationDirect Productivity Series	Allen-Bradley DF1 Half Duplex	AutomationDirect Productivity Series Ethernet
AutomationDirect Do-more / BRX**	Allen-Bradley DF1 Full Duplex	AutomationDirect Do-more / BRX Ethernet
AutomationDirect CLICK	Allen-Bradley PLC5 DF1	AutomationDirect CLICK Ethernet
AutomationDirect K-sequence	Allen-Bradley DH485	AutomationDirect ECOM Ethernet
AutomationDirect DirectNET	GE SNPX (90/30, 90/70, Micro 90, VersaMax Micro)	Modbus TCP/IP
AutomationDirect Modbus	Mitsubishi FX	Allen-Bradley EtherNet/IP(Client) SLC5/05
Modicon Modbus RTU	Mitsubishi Q & QnA	Allen-Bradley EtherNet/IP(Client) ENI Adapter
Entivity Modbus RTU	Omron Host Link (C200 Adapter, C500)	Allen-Bradley EtherNet/IP(Client) MicroLogix 1100/1400
	Omron FINS Serial (CJ1, CS1)	
	Siemens PPI (S7-200 CPU)	
	AutomationDirect SOLO Temperature Controller	
	AutomationDirect GS Drives	

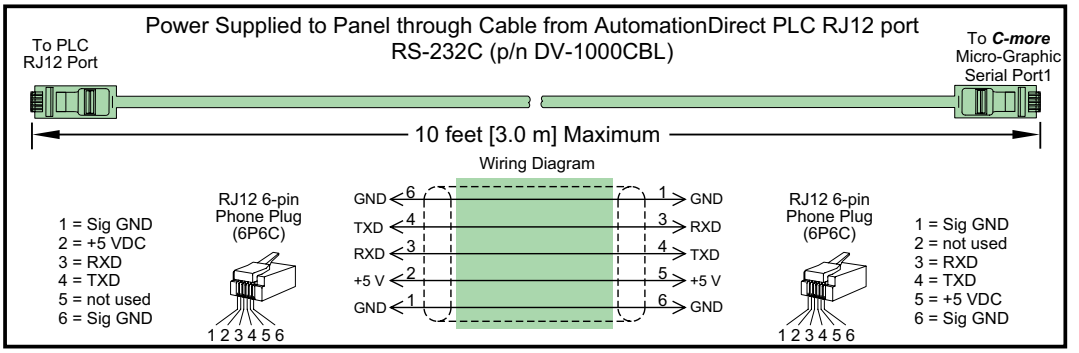
* Ethernet port is built in to EA3-S3ML and EA3-T4CL. EA3-T6CL, EA3-T8CL and EA3-T10CL require the optional EA-ECOM module for Ethernet.

** BX-P-SER2-RJ12 is required

C-more Micro EA3 Series Power Connection Wiring

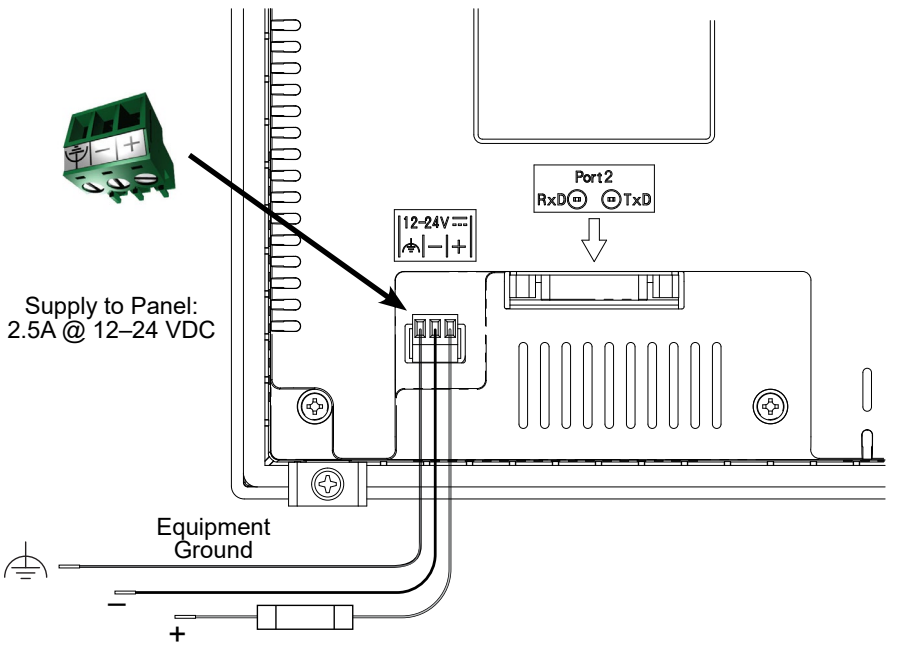
EA3-S3ML-RN and EA3-S3ML-R

- EA3-S3ML-RN and EA3-S3ML-R ***C-more*** Micro panels are powered during programming from the PC through the USB to RS-232 Programming Cable Assembly, EA-MG-PGM-CBL.
- During operation, EA3-S3ML-RN and EA3-S3ML-R ***C-more*** Micro panels can be powered from most AutomationDirect PLC's RJ12 serial communications ports by using the DV-1000CBL communications cable.



EA3-S3ML, EA3-T4CL, EA3-T6CL, EA3-T8CL and EA3-T10CL

EA3-S3ML, EA3-T4CL, EA3-T6CL, EA3-T8CL and EA3-T10CL ***C-more*** Micro EA3 series panels are powered by a Class 2, 2.5 Amp @ 12-24 VDC power source in normal operation.



C-more Micro EA3 Series PLC Connections

Cabling requirements

When using the built in RJ12 serial port (Port1) on EA3 models to connect with the CLICK, ProductivitySeries, DL05, DL06, DL105, DL205, D3-350 and D4-450 CPUs, your cabling choices are fairly simple.

- **D0-CBL — connects to Productivity Series, Do-more / BRX*, CLICK, DL05, DL06, DL105, DL205, D3-350 and D4-450 phone jack.**

  BX-P-SER2-RJ12 is required

EA3-T6CL, EA3-T8CL and EA3-T10CL cannot be powered from a PLC.

The ***C-more*** EA3 series Micro panels (except -RN and -R models) can communicate through a built-in 15-pin serial port (Port2) via RS-232, RS-422 and RS-485 using these cables.

- **EA-2CBL — connects to Productivity Series, Do-more / BRX*, CLICK, DL05, DL105, DL205, D3-350 and D4-450 phone jack.**
- **EA-2CBL-1 — connects to D2-250, D250-1, D2-260, DL06 VGA connector.**

  BX-P-SER2-RJ12 is required

The USB programming port on these TFT models is for programming only.

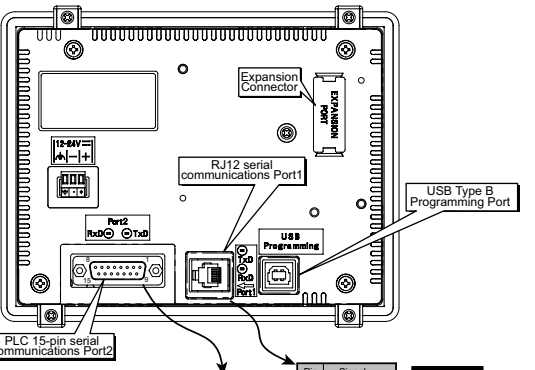
Drivers for your Controller

- AutomationDirect Productivity Series – serial / Ethernet*
- AutomationDirect Do-more / BRX – serial / Ethernet*
- AutomationDirect CLICK (Modbus)– serial / Ethernet*
- ***Direct***LOGIC K-sequence, *Direct*LOGIC *Direct*NET, ***Direct***LOGIC Modbus (Koyo Addressing)
  DirectLOGIC ECOM Ethernet*
- Modbus RTU
  Modbus TCP/IP*
- Allen-Bradley DF1 Full Duplex, Allen-Bradley DF1 Half Duplex, Allen-Bradley PLC5 DF1, AB DH485, Allen-Bradley EtherNet/IP (Client) SLC5/05, NET-ENI, MicroLogix 1100/1400*
- Omron Host Link (C200 Adapter, C500)
  Omron FINS serial (CJ1, CS1)
- GE SNPX (90/30, 90/70, Micro 90, VersaMax Micro)
- Mitsubishi Melsec FX
- Siemens PPI
- Entivity Modbus RTU
- AutomatiionDirect GS Drives
- AutomationDirect SOLO Temperature Controllers
- Mitsubishi Q/QnA

**** Ethernet port is built in to EA3-S3ML and EA3-T4CL. EA3-T6CL, EA3-T8CL and EA3-T10CL require the optional EA-ECOM module for Ethernet.***

Communication Ports

EA3-T6CL



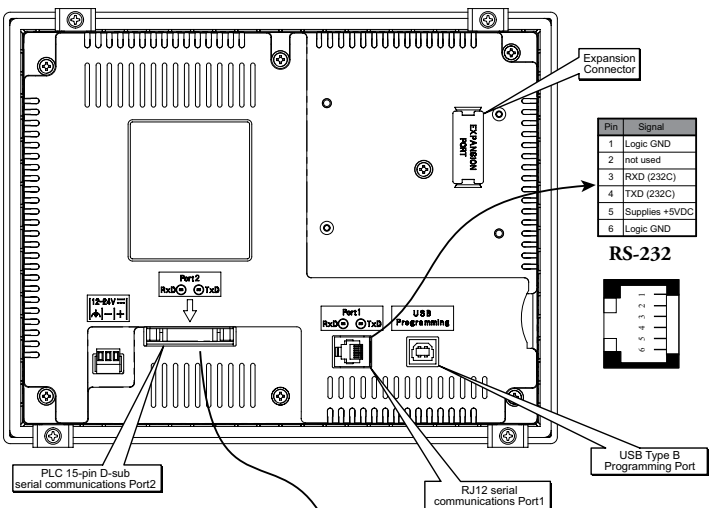
Pin	Signal	Pin	Signal	Pin	Signal
1	Frame GND	6	LE	11	TXD+ (422/485)
2	TXD (232C)	7	CTS (232C)	12	TXD– (422/485)
3	RXD (232C)	8	RTS (232C)	13	Term. Resistor
4	Supplies +5VDC	9	RXD+ (422/485)	14	do not use
5	Logic GND	10	RXD– (422/485)	15	do not use

RS-232/422/485

Pin	Signal
1	Logic GND
2	not used
3	RXD (232C)
4	TXD (232C)
5	Receives 5VDC
6	Logic GND

RS-232

EA3-T8CL & EA3-T10CL



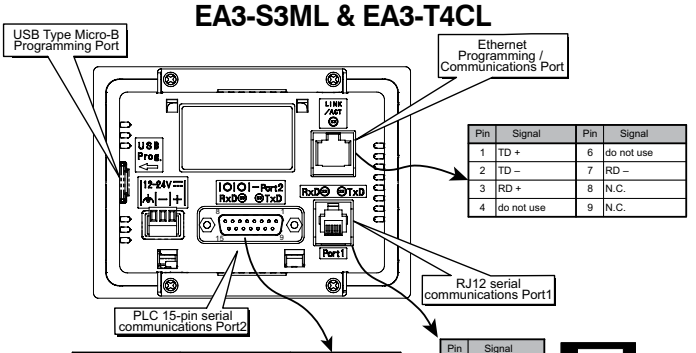
Pin	Signal
1	Logic GND
2	not used
3	RXD (232C)
4	TXD (232C)
5	Supplies +5VDC
6	Logic GND

RS-232

Pin	Signal	Pin	Signal	Pin	Signal
1	Frame GND	6	LE	11	TXD+ (422/485)
2	TXD (232C)	7	CTS (232C)	12	TXD– (422/485)
3	RXD (232C)	8	RTS (232C)	13	Term. Resistor
4	Supplies +5VDC	9	RXD+ (422/485)	14	do not use
5	Logic GND	10	RXD– (422/485)	15	do not use

RS-232/422/485

EA3-S3ML & EA3-T4CL

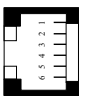


Pin	Signal	Pin	Signal
1	TD +	6	do not use
2	TD –	7	RD –
3	RD +	8	N.C.
4	do not use	9	N.C.

Pin	Signal	Pin	Signal	Pin	Signal
1	Frame GND	6	LE	11	TXD+ (422/485)
2	TXD (232C)	7	CTS (232C)	12	TXD– (422/485)
3	RXD (232C)	8	RTS (232C)	13	Term. Resistor
4	do not use	9	RXD+ (422/485)	14	do not use
5	Logic GND	10	RXD– (422/485)	15	do not use

RS-232/422/485

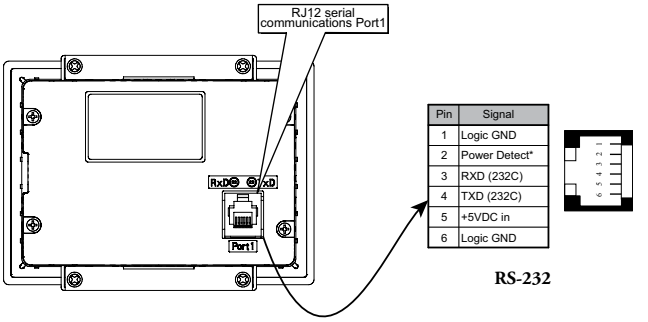
Pin	Signal
1	Logic GND
2	Power Detect*
3	RXD (232C)
4	TXD (232C)
5	+5VDC in*
6	Logic GND



* EA3-T4CL not used

RS-232

EA3-S3ML-RN & EA3-S3ML-R



Pin	Signal
1	Logic GND
2	Power Detect*
3	RXD (232C)
4	TXD (232C)
5	+5VDC in
6	Logic GND

RS-232

C-more Micro EA3 Series Accessories

EA3 Series Communication Expansion Module

The EA-ECOM ***C-more*** Micro communication module is compatible with EA3 series ***C-more*** Micro 6-inch, 8-inch and 10-inch panels. It adds an Ethernet (RJ45) port for programming and PLC communications at 10/100 Mbps. Software and firmware version 4.0 or later is required

Part No. EA-ECOM

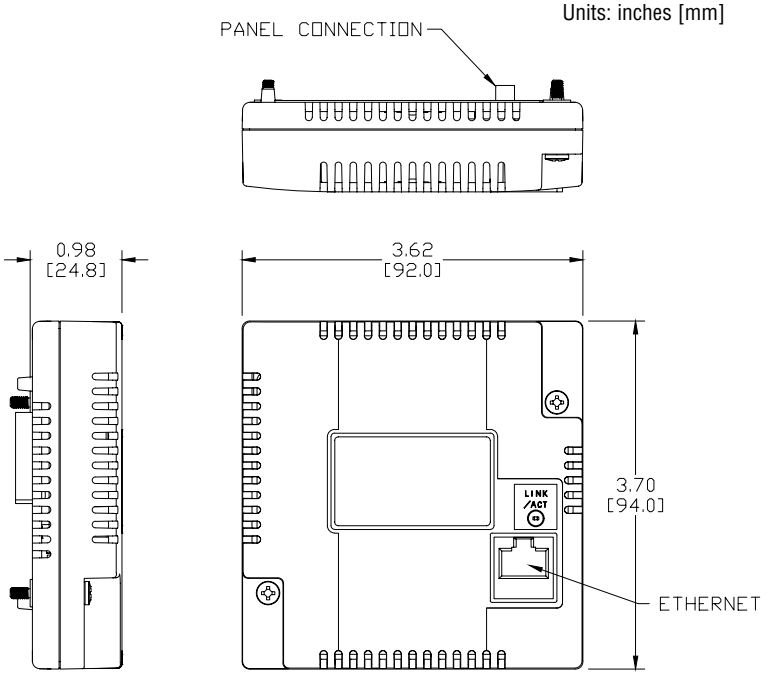
$50.00

Ethernet Communication Interface Specifications	
Standard Specification	Conforms to IEEE802.3
Communication Speed	10/100 Base-T (Automatic Negotiation)
Cable Specification	Category 5
Auto MDI / MDI-X	Yes
Connector Type	RJ45

PLC Drivers
AutomationDirect Productivity Series Ethernet
AutomationDirect Do-more / BRX Ethernet
AutomationDirect CLICK Ethernet
AutomationDirect ECOM Ethernet
Modbus TCP/IP
Allen-Bradley EtherNet/IP (Client) SLC5/05
Allen-Bradley EtherNet/IP (Client) ENI Adapter
Allen-Bradley EtherNet/IP (Client) MicroLogix 1100/1400

Dimensions

Units: inches [mm]



Link Status LED (Green)	
On	Ethernet Linked
Off	No Ethernet Comm.
Blinking Green	Comm. Activity

EA-ECOM Specifications	
Part Number	EA-ECOM
Operating Temperature	0 to 50 °C (32 to 122 °F) Maximum surrounding air temperature rating: 50 °C
Storage Temperature	–20 to +60 °C (–4 to +140 °F)
Humidity	5–95% RH (non-condensing)
Environmental Air	For use in pollution degree 2 environment
Vibration	IEC60068-2-6 (Test Fc), 5-9 Hz: 3.5 mm amplitude, 9-150 Hz: 1.0G, sweeping, at a rate of 1 octave/min. (±10%), 10 sweep cycles per axis on each of 3 mutually perpendicular axes
Shock	IEC60068-2-27 (Test Ea), 15 G peak, 11ms duration, three shocks in each direction per axis, on 3 mutually perpendicular axes (total of 18 shocks)
Noise Immunity	NEMA ICS3-304 RFI, (145 MHz, 440 MHz 10 W @ 10 cm) Impulse 1000 V @ 1 µs pulse
Emission	EN55011 Class A (Radiated RF emission)
Enclosure (panel door installation)	NEMA 250 type 4/4X indoor use only UL50 type 4X indoor use only IP-65 indoor use only (When mounted correctly)
Agency Approvals	CE (EN61131-2), UL508, CUL Canadian C22.2 To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page
Mounting Torque	50 oz·in [0.35 N·m]
Weight	0.23 lb [105g]

C-more Micro EA3 Panel Accessories

D-SUB 15-pin 90-degree Communication Port Adapter

The EA-ADPTR-4 adapter plugs into the 15-pin serial port on the rear of ***C-more*** Micro EA3 Series 3-inch*, 4-inch and 6-inch panels to allow a controller communication cable to be plugged in at a 90 degree angle to reduce panel depth requirements. 15-pin straight through pin-out. UL Recognized.

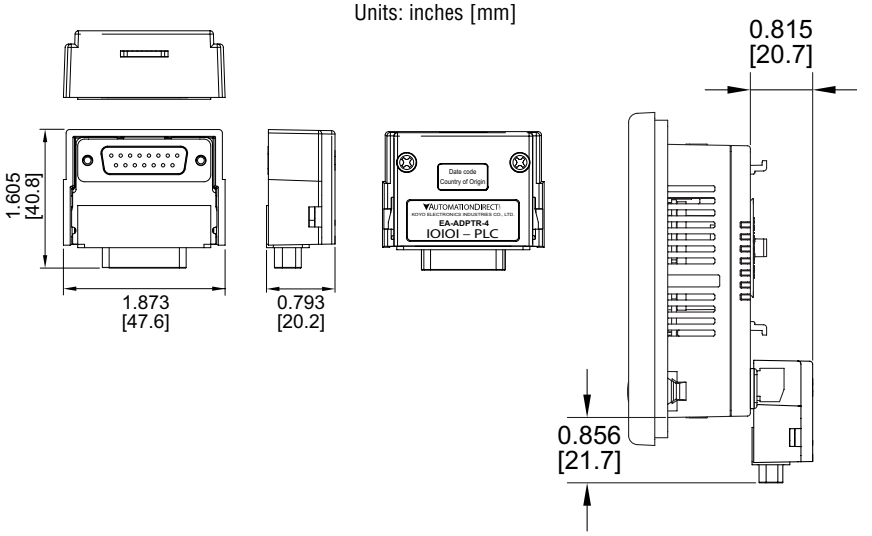
**** EA3-S3ML-RN and EA3-S3ML-R are not equipped with a 15-pin serial port.***

Part No.
EA-ADPTR-4

$39.00

Dimensions

Units: inches [mm]



D-SUB 15-pin to Terminal Block Adapter

The EA-COMCON-3 adapter plugs into the 15-pin serial port on the rear of C-more Micro EA3 Series 3-inch*, 4-inch and 6-inch panels to allow wire terminal connections for an RS-422/RS-485/DH485 PLC communication cable. UL Recognized.

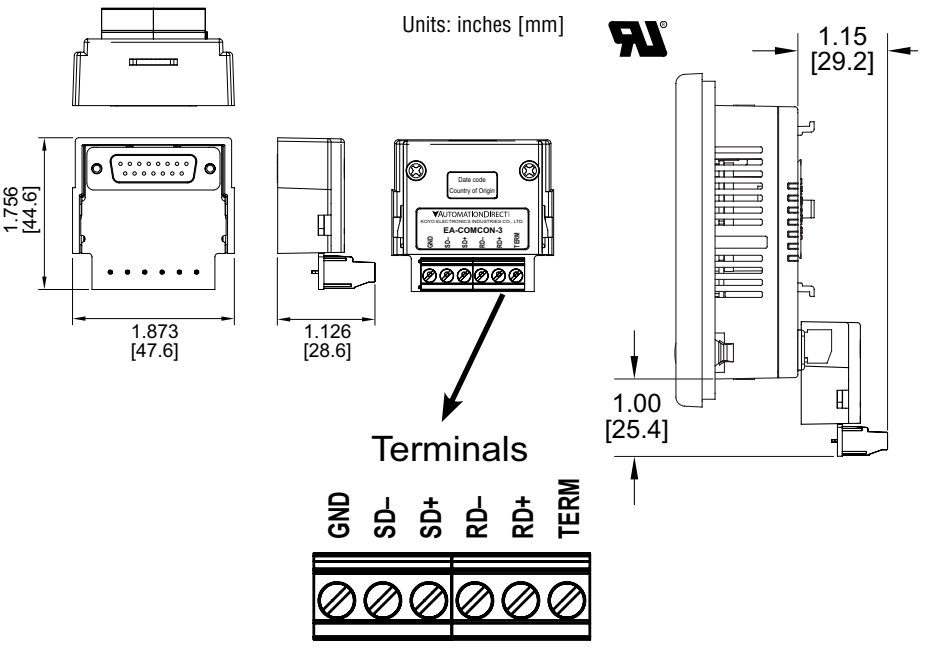
**** EA3-S3ML-RN and EA3-S3ML-R are not equipped with a 15-pin serial port.***

Part No.
EA-COMCON-3

$42.00

Dimensions

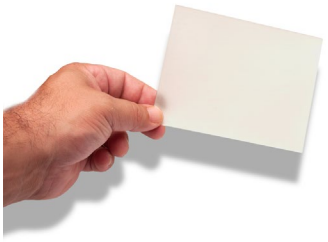
Units: inches [mm]



C-more Micro EA3 Panel Accessories

Clear Screen Overlay

Optional clear screen overlay used to protect ***C-more*** Micro displays from minor scratches and wear. EA-MG-COV-CL contains 5 clear screen overlays. All other packages contain 3 clear screen overlays.



Part No. EA-MG-COV-CL
$35.50

Part No. EA-4-COV3
$33.50

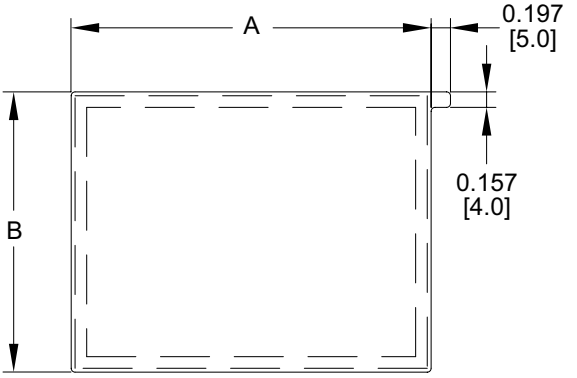
Part No. EA-6-COV2
$37.00

Part No. EA-8-COV2
$40.00

Part No. EA-10-COV2
$45.50

Dimensions

Units: inches [mm]



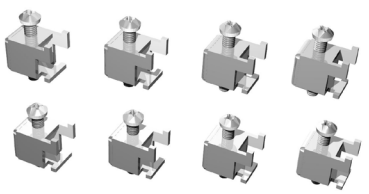
Part Number	Dimensions - inch [mm]	
	A	B
EA-MG-COV-CL	3.13 [79.4]	1.75 [44.4]
EA-4-COV3	4.15 [105.5]	2.52 [64.0]
EA-6-COV2	4.91 [124.8]	3.80 [96.4]
EA-8-COV2	7.32 [185.8]	5.44 [138.2]
EA-10-COV2	8.91 [226.2]	6.61 [168.0]

C-more Micro 6-inch EA3 Panel Replacement Parts

Replacement parts at a glance:

Part Number	Description	Price
EA-MG-BZ2-BRK	Panel mounting brackets, replacement. Package of 8. For use with C-more Micro 4in and 6in panels, all 6in bezels, and 3in bezel EA-MG-BZ2.	$18.50
EA-MG-DC-CON	DC 3-terminal power connector, replacement. Package of 5. For use with all C-more Micro 4in, 6in, 8in and 10in panels, and power adapters EA-MG-P1 and EA-MG-SP1.	$14.00
EA-MG6-S6ML-GSK	Replacement mounting gasket for ***C-more*** 6" Micro panels	$11.00
EA-MG6-S6ML-FKL	Replacement function key label insert for ***C-more*** 6" Micro panels (pk of 5; 3 blank, 1 F1-F5 for landscape, 1 F1-F5 for portrait)	$18.00

Panel Mounting Clips
Part No. EA-MG-BZ2-BRK

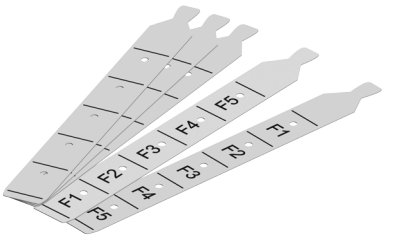


(pk of 8)

DC Power Connector
Part No. EA-MG-DC-CON

(pk of 5)

Function Keys Label Inserts
Part No. EA-MG6-S6ML-FKL



(pk of 5; 3 blank, 1 F1-F5 for landscape, 1 F1-F5 for portrait)

Panel Gasket
Part No. EA-MG6-S6ML-GSK

C-more Micro Communication Cables and Cable Kits

Cable Description	Cable Part Number	Price
Cables used with RJ-12 RS-232 serial Port1		
AutomationDirect Productivity Series, Do-more / BRX*, CLICK, *Direct*LOGIC PLC RJ-12 port, DL05, DL06, DL105, DL205, D3-350, D4-450 & H2-WinPLC (RS-232C) 3.66m (12ft) cable length	***D0-CBL***	$19.00
*Direct*LOGIC (VGA Style) 15-pin port, DL06, D2-250 (250-1), D2-260 (RS-232C) Use with D0-CBL cable.	***FA-15HD***	$8.00
*Direct*LOGIC PLC 15-pin D-sub port, DL405 (RS-232C) Use with D0-CBL cable.	***FA-CABKIT***	$40.00
*Direct*LOGIC PLC RJ-11 port, D3-340 (RS-232C) 2m (6.56 ft) cable length	***OP-3CBL-1***	$6.00
Cables used with 15-pin RS-232/422/485 serial Port2		
AutomationDirect Productivity Series, Do-more / BRX*, CLICK, *Direct*LOGIC PLC RJ-12 port, DL05, DL06, DL105, DL205, D3-350, D4-450 & H2-WinPLC (RS-232C) 3m (9.8 ft) cable length	***EA-2CBL***	$20.00
*Direct*LOGIC (VGA Style) 15-pin port, DL06, D2-250 (250-1), D2-260 (RS-232C) 3m (9.8 ft) cable length	***EA-2CBL-1***	$20.00
*Direct*LOGIC PLC RJ-11 port, D3-340 (RS-232C). 3m (9.8 ft) cable length	***EA-3CBL***	$20.00
*Direct*LOGIC DL405 PLC 15-pin D-sub port, DL405 (RS-232C). 3m (9.8 ft) cable length	***EA-4CBL-1***	$20.00
*Direct*LOGIC PLC 25-pin D-sub port, DL405, D3-350, DL305 DCU and all DCM's (RS-232C). 3m (9.8 ft) cable length	***EA-4CBL-2***	$20.00
Allen-Bradley MicroLogix 1000, 1100, 1200, 1400 & 1500 (RS-232C) 3m (9.8 ft) cable length	***EA-MLOGIX-CBL***	$30.00
Allen-Bradley SLC 5-03/04/05, ControlLogix, CompactLogix, FlexLogix DF1 port (RS-232C) 3m (9.8 ft) cable length	***EA-SLC-232-CBL***	$20.00
Allen-Bradley PLC-5 DF1 port (RS-232C) 3m (9.8 ft) cable length	***EA-PLC5-232-CBL***	$20.00
Allen-Bradley MicroLogix, SLC-5-01/02/03, PLC5 DH485 port (RS-232C) 3m (9.8 ft) cable length	***EA-DH485-CBL***	$20.00
GE 90/30 and 90/70, Micro 90, VersaMax Micro (Port 2) 15-pin D-sub port (RS-422A) 3m (9.8 ft) cable length	***EA-90-30-CBL***	$20.00
MITSUBISHI FX Series 25-pin port (RS-422A) 3m (9.8 ft) cable length	***EA-MITSU-CBL***	$20.00
MITSUBISHI FX Series 8-pin mini-DIN (RS-422A) 3m (9.8 ft) cable length	***EA-MITSU-CBL-1***	$20.00
OMRON Host Link C200 Adapter, C500 (RS-232C) 3m (9.8 ft) cable length	***EA-OMRON-CBL***	$20.00
**** BX-P-SER2-RJ12 is required***		
EA3-T8CL and EA3-T10CL cannot be powered by a PLC and cannot communicate with a PLC through the USB Programming Port.		
Note: Adding the optional EA-ECOM module allows communication via an Ethernet connection (EA3 series only).		

D0-CBL

OP-3CBL-1

FA-15HD

FA-CABKIT

EA-2CBL-1

EA-2CBL

EA-4CBL-1

EA-3CBL

EA-MLOGIX-CBL

EA-4CBL-2

EA-PLC5-232-CBL

EA-SLC-232-CBL

EA-DH485-CBL

EA-90-30-CBL

EA-MITSU-CBL

EA-MITSU-CBL-1

EA-OMRON-CBL

C-more Micro Programming Software

FREE software!

C-more Micro Programming Software can be downloaded at no charge or a CD version may be purchased by ordering EA-MG-PGMSW. The software requires a USB port or Ethernet connection* on your PC to connect to the ***C-more*** Micro panel. Software Help Files are included in the download. This software programs all the ***C-more*** Micro panels (does not program the ***C-more*** 6-inch through 15-inch touch panels).

Note: This software is used to program *C-more* Micro panels only.

Note: The Ethernet port is built in to EA3-S3ML and EA3-T4CL. EA3-T6CL, EA3-T8CL and EA3-T10CL require the optional EA-ECOM module for Ethernet.

Part Number	Panel Software / Firmware Version Required
EA1-S3ML	1.0 or later
EA1-S3ML-N	
EA1-S3MLW	1.5 or later
EA1-S3MLW-N	
EA1-T4CL	3.0 or later
EA1-T6CL	2.5 or later
EA3-S3ML-RN	4.30 or later
EA3-S3ML-R	
EA3-S3ML	4.20 or later
EA3-T4CL	
EA3-T6CL	3.6 or later
EA3-T8CL	3.5 or later
EA3-T10CL	

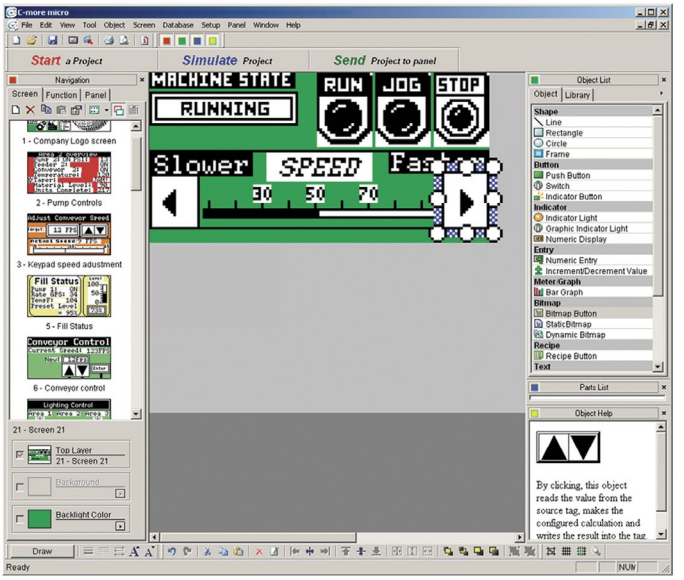
C-more Micro Programming Software is a spin-off of its powerful sibling ***C-more*** Touch Panel. It offers very high end features designed to reduce your configuration time. Simply drag and drop the objects from the object list (right side of screen) onto the screen construction area. Then configure your PLC tags and click on the objects you wish to use. Use the built-in simulator to review your work on your PC before ever downloading your project! The time saving benefits of the ***C-more*** Micro configuration software could easily pay for the panel. Check out www.CmoreMicro.com to download a free version.

Built-in project simulator

- Runs your project on your PC
- Test all of your screens before downloading
- Time savings pays for the panel
- Simulate function keys and keypad bezel

Built-in user object/ screen libraries

Save time by re-using your custom objects and screens.



Thumbnail project preview pane

Helps keep track of multi-screen projects.

Scrolling object selection window

Lets you find the object you want fast. Just drag and drop it on the screen.

PC requirements

Following are the minimum system requirements for running ***C-more*** Micro Programming Software, EA-MG-PGMSW, on a PC:

- Operating System - Windows® XP Professional Edition Service Pack 2, Windows® 7 (32 or 64 bit), Windows 8 (32 or 64 bit) or Windows 10
- 150 MB free hard-disk space
- CD-ROM or DVD drive for installing software from the CD, or internet access to download free programming software
- USB port to use with the correct Programming Cable Assembly for project transfer from the programming software to the panel

Scrolling help window

Gives you helpful information on each object

C-more Micro EA3 Series Accessories

EA3 Series Communication Expansion Module

The EA-ECOM ***C-more*** Micro communication module is compatible with EA3 series ***C-more*** Micro 6-inch, 8-inch and 10-inch panels. It adds an Ethernet (RJ45) port for programming and PLC communications at 10/100 Mbps. Software and firmware version 4.0 or later is required

Part No. EA-ECOM

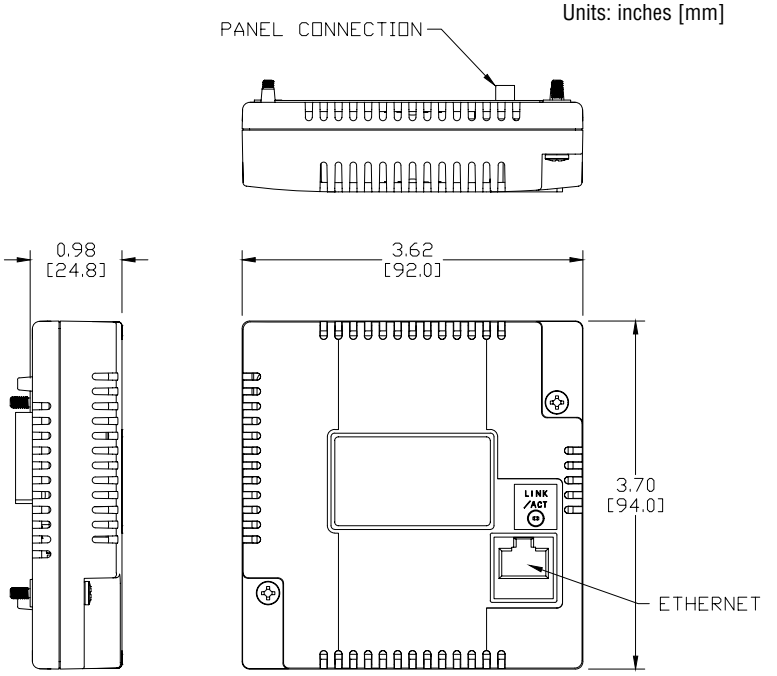
$50.00

Ethernet Communication Interface Specifications	
Standard Specification	Conforms to IEEE802.3
Communication Speed	10/100 Base-T (Automatic Negotiation)
Cable Specification	Category 5
Auto MDI / MDI-X	Yes
Connector Type	RJ45

PLC Drivers
AutomationDirect Productivity Series Ethernet
AutomationDirect Do-more / BRX Ethernet
AutomationDirect CLICK Ethernet
AutomationDirect ECOM Ethernet
Modbus TCP/IP
Allen-Bradley EtherNet/IP (Client) SLC5/05
Allen-Bradley EtherNet/IP (Client) ENI Adapter
Allen-Bradley EtherNet/IP (Client) MicroLogix 1100/1400

Dimensions

Units: inches [mm]



Link Status LED (Green)	
On	Ethernet Linked
Off	No Ethernet Comm.
Blinking Green	Comm. Activity

EA-ECOM Specifications	
Part Number	EA-ECOM
Operating Temperature	0 to 50 °C (32 to 122 °F) Maximum surrounding air temperature rating: 50 °C
Storage Temperature	–20 to +60 °C (–4 to +140 °F)
Humidity	5–95% RH (non-condensing)
Environmental Air	For use in pollution degree 2 environment
Vibration	IEC60068-2-6 (Test Fc), 5-9 Hz: 3.5 mm amplitude, 9-150 Hz: 1.0G, sweeping, at a rate of 1 octave/min. (±10%), 10 sweep cycles per axis on each of 3 mutually perpendicular axes
Shock	IEC60068-2-27 (Test Ea), 15 G peak, 11ms duration, three shocks in each direction per axis, on 3 mutually perpendicular axes (total of 18 shocks)
Noise Immunity	NEMA ICS3-304 RFI, (145 MHz, 440 MHz 10 W @ 10 cm) Impulse 1000 V @ 1 µs pulse
Emission	EN55011 Class A (Radiated RF emission)
Enclosure (panel door installation)	NEMA 250 type 4/4X indoor use only UL50 type 4X indoor use only IP-65 indoor use only (When mounted correctly)
Agency Approvals	CE (EN61131-2), UL508, CUL Canadian C22.2 To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page
Mounting Torque	50 oz·in [0.35 N·m]
Weight	0.23 lb [105g]

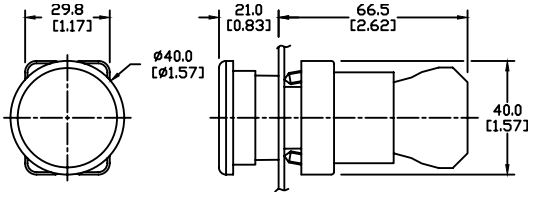
GCX Series 22mm Plastic Illuminated Pushbuttons

Mushroom-style illuminated pushbuttons

All pushbuttons include operator, support base, indicating bulb (if applicable) and contact block. They are shipped unassembled. Legend plate is not included and must be ordered separately. All switches in this series use replacement contact block ECX1030 (Red, NC) or ECX1040 (Green, N.O.), sold separately in packages of two or five.

GCX3221-24

Dimensions: mm [inches]

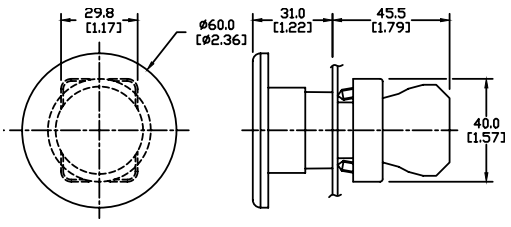


Part Number	Lamp Color	Price	Mushroom-style Illuminated Pushbuttons Description	Replacement Incandescent Bulb	Replacement LED Lamp
Incandescent					
GCX3221-24	Red	$11.00	22mm plastic **momentary** pushbutton with incandescent illuminated 40mm mushroom actuator, **24VDC/VAC, one N.C.** contact block	**ECX1902-5** 5/pk 80mA	**ECX1911-2** 2/pk, 26mA
GCX3221-120	Red	$12.50	22mm plastic **momentary** pushbutton with incandescent illuminated 40mm mushroom actuator, **120VDC/VAC,one N.C.** contact block	**ECX1904-5** 5/pk 20mA	**ECX1921-2** 2/pk, 5mA
GCX3226-24	Red	$12.50	22mm plastic pushbutton with incandescent illuminated 40mm mushroom **twist-to-release** actuator, **24VDC/VAC, one N.C.** contact block	**ECX1902-5** 5/pk 80mA	**ECX1911-2** 2/pk, 26mA
GCX3226-120	Red	$14.00	22mm plastic pushbutton with incandescent illuminated 40mm mushroom **twist-to-release** actuator, **120VDC/VAC, one N.C.** contact block	**ECX1904-5** 5/pk 20mA	**ECX1921-2** 2/pk, 5mA
LED					
GCX3221-24L	Red	$15.50	22mm plastic **momentary** pushbutton with LED illuminated 40mm mushroom actuator, **24VDC/VAC, one N.C.** contact block	**ECX1902-5** 5/pk 80mA	**ECX1911-2** 2/pk 26mA
GCX3221-120L	Red	$17.00	22mm plastic **momentary** pushbutton with LED illuminated 40mm mushroom actuator, **120VDC/VAC, one N.C.** contact block	**ECX1904-5** 5/pk 20mA	**ECX1921-2** 2/pk 5mA
GCX3226-24L	Red	$17.50	22mm plastic pushbutton with LED illuminated 40mm mushroom **twist-to-release** actuator, **24VDC/VAC, one N.C.** contact block	**ECX1902-5** 5/pk 80mA	**ECX1911-2** 2/pk 26mA
GCX3226-120L	Red	$18.50	22mm plastic pushbutton with LED illuminated 40mm mushroom **twist-to-release** actuator, **120VDC/VAC, one N.C.** contact block	**ECX1904-5** 5/pk 20mA	**ECX1921-2** 2/pk 5mA

Non-illuminated mushroom pushbuttons

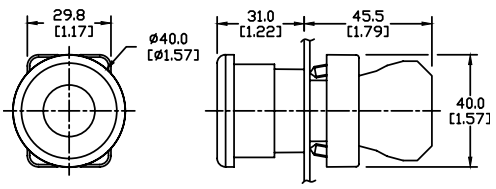
Feature large 60mm dia. actuator and mount in standard 22mm hole.

GCX3137



Dimensions: mm [inches]

GCX3141 (key operated)



Note: Keyed switches come with two keys. All plastic 22mm keyed switches are keyed alike. Replacement keys are available. Order part no. ECX1067-2 (pkg. of 2).

Part Number	Color	Price	Description
GCX3131	Red	$9.25	**Twist-to-release** actuator with **one N.C.** contact block, fits in 22mm dia. hole. Has large 40mm dia. mushroom-style actuator.
GCX3134	Black	$7.50	**Momentary action** with **one N.O.** contact block, fits in 22mm dia. hole, has large 40mm dia. mushroom-style actuator.
GCX3135	Red	$7.50	**Momentary action** with **one N.C.** contact block, fits in 22mm dia. hole, has large 40mm dia. mushroom-style actuator. EMERGENCY legend plate available (see Accessories).
GCX3136	Red	$11.50	**Twist-to-release** actuator with **one N.C.** contact block, fits in 22mm dia. hole. 60mm dia. mushroom-style actuator.
GCX3137	Red	$9.25	**Momentary action** with **one N.C.** contact block, fits in 22mm dia. hole, has large 60mm dia. mushroom-style. EMERGENCY legend plate available (see Accessories).
GCX3139	Yellow	$7.50	**Momentary action** with **one N.O.** contact block, fits in 22mm dia. hole, has large 40mm dia. mushroom-style actuator.
GCX3141	Red	$13.50	**Key operated release** with **one N.C.** contact block, fits in 22mm dia. hole, has large 40mm dia. mushroom-style actuator. EMERGENCY legend plate available (see Accessories).

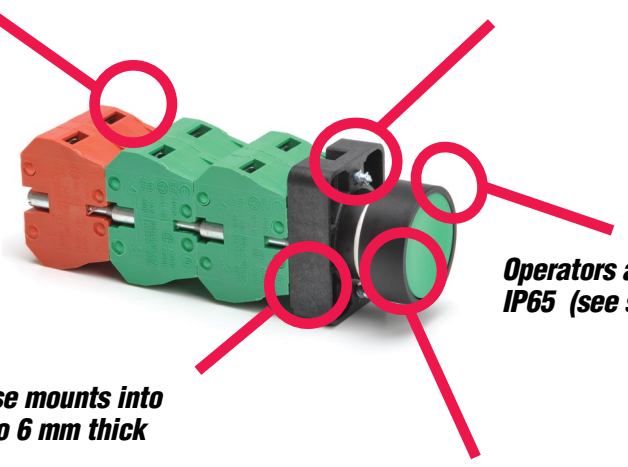
For accessories, see 22mm Plastic Pilot Device Accessories in this section.

GCX Series 22mm Plastic Pilot Devices

Features

Any combination of contact blocks is allowed, up to a total of six (two blocks wide and three blocks deep)

Secure mounting method eliminates twisting in mounting hole

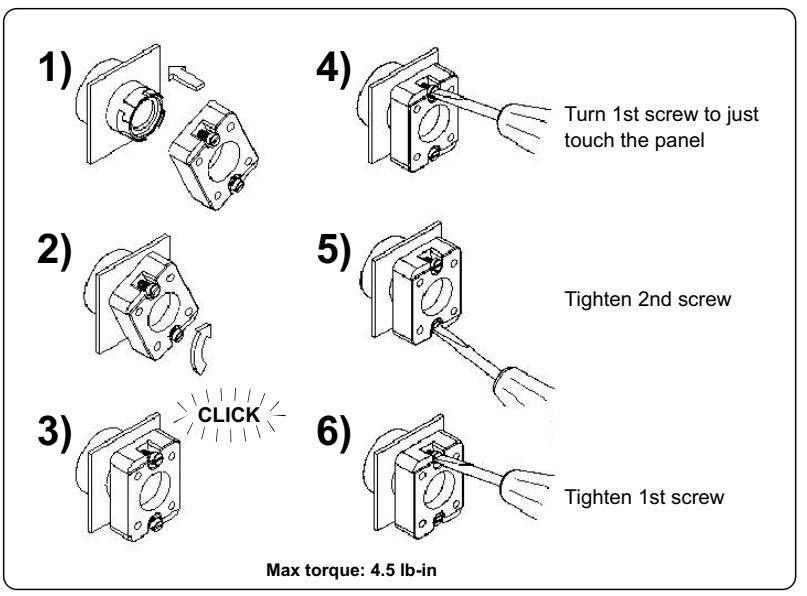


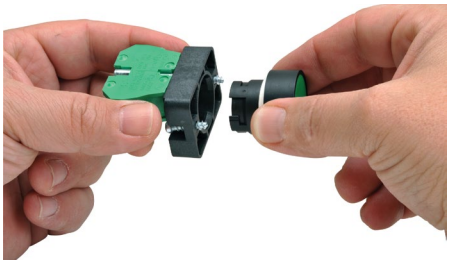
Operators are protected to IP 40 or IP65 (see specifications below)

Support base mounts into panels up to 6 mm thick

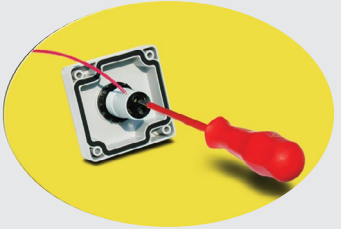
Fiberglass reinforced thermoplastic bezel

Easy installation

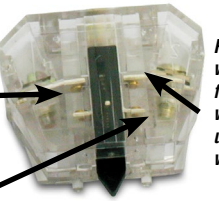




All indicators offer side wire entry with back screw terminals for easy wiring



Self-cleaning silver contacts provide reliable, low-energy switching



Pressure plate wiring terminals for easy, secure wiring, accepting up to 14 AWG wire

Contacts rated A300

(Refer to E22 Series mounting/contact rating section for details)

Clear contact block for illustration purposes. Clear contact blocks are not available for sale from AutomationDirect.

22mm Plastic Pilot Device Accessories

Replacement incandescent bulbs

ECX1902-5

Replacement Incandescent Bulbs				
Part Number	**Quantity**	**Price**	**Rating**	**Description**
ECX1900-5	Pkg of 5 bulbs	$8.50	6V@ 200mA , 1.2 watts	6V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4
ECX1902-5	Pkg of 5 bulbs	$8.50	24V@ 80mA 2 watts	24V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4
ECX1904-5	Pkg of 5 bulbs	$17.50	130V@20mA 2.6 watts	120V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4

Note: Bulb removal tool available. Order part number HT8LAMPTOOL.

Replacement LED lamps

ECX1915-2

Replacement LED Lamps					
Part Number	**Color**	**Quantity**	**Price**	**Rating**	**Description**
ECX1911-2	Red	Pkg of 2 LED lamps	$15.50	24V@26mA 0.6 watts	LED replacement lamp for miniature bayonet bases Works with 22mm switches and indicators, but illumination will not be as even when used with the ECX 22mm indicators Note: **Will not replace** sealed Cutler-Hammer monoblock LED indicators.
ECX1912-2	Green		$19.50		
ECX1913-2	Yellow		$15.50		
ECX1914-2	Blue		$21.00		
ECX1915-2	White		$25.00		
ECX1921-2	Red		$15.50	120V@5mA 0.6 watts	
ECX1922-2	Green		$19.50		
ECX1923-2	Yellow		$15.50		
ECX1924-2	Blue		$21.00		
ECX1925-2	White		$25.00		

Note: LED modules have very low current draw and should not be used with triac output devices like PLC triac output modules. It is recommended that dry contact outputs be used to switch 120 volt AC LED modules.

Hole plug

ECX1490

Hole Plug			
Part Number	**Color**	**Price**	**Description**
ECX1490	Black	$2.75	Plastic hole plug for 22.5 mm openings in panels and enclosures; supplied with O-ring and mounting screw. Two plugs per package.

Protective covers for pushbuttons

ECX1703-5

Protective Covers for Pushbuttons				
Part Number	**Color**	**Quantity**	**Price**	**Description**
ECX1700-5	Black	Pkg of 5 protective caps	$6.50	Silicone protective covers for use with 22mm standard-size flush pushbuttons. **Will not work** with Cutler-Hammer pushbuttons, 22mm plastic illuminated or extended pushbuttons, or 22mm plastic pushbuttons with 40mm actuator face.
ECX1701-5	Red		$6.50	
ECX1702-5	Green		$6.50	
ECX1703-5	Yellow		$6.50	
ECX1704-5	Blue		$6.50	
ECX1705-5	Clear		$6.50	
ECX1706-5	Clear		$11.50	Clear silicone protective covers for use with 22mm illuminated and **extended pushbuttons only. Will not work** with Cutler-Hammer pushbuttons or 22mm mushroom pushbuttons.

Knockout Punches

109225

Ruko's knockout punch hole-cutting tool includes punch, die and draw bolt (without ball bearing). Use for sheet steel, stainless-steel sheets, non-ferrous and light metals, and plastics up to 0.16" (8 ga.) thick. Replacement bolts are offered in three of the most popular sizes. See the Tools section of the catalog for details.

Note: Part number 109225 is recommended when punching holes for 22mm pilot devices.

Replacement keys

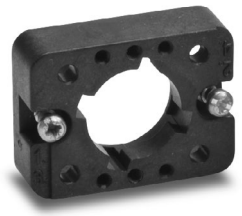
ECX1067-2

Replacement Keys			
Part Number	**Quantity**	**Price**	**Description**
ECX1067-2	Pkg of 2	$5.75	Replacement key for GCX series key-actuated selector switches, pack of 2 sets (2 keys each). NOTE: Will not work with Cutler-Hammer 22mm switches.

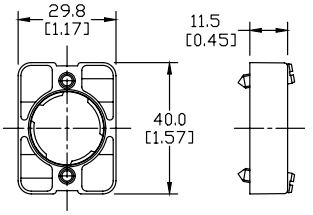
Note: All key-actuated 22mm plastic selector switches are keyed alike.

22mm Plastic Pilot Device Accessories

Replacement 22mm support base



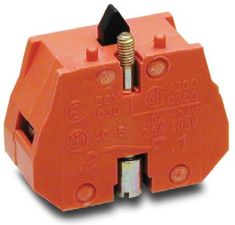
ECX3029-2



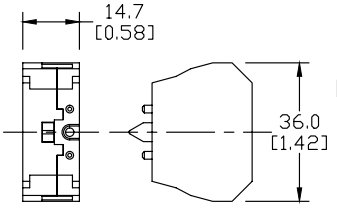
Dimensions: mm [inches]

Replacement 22mm Support Base			
Part Number	**Quantity**	**Price**	**Description**
ECX3029-2	Pkg of 1	$1.75	22mm plastic support base Note: This item is supplied as a replacement part and is not required with any switch assembly. **Will not work** with Cutler-Hammer 22mm switches sold by AutomationDirect

Replacement contact blocks



ECX1030-2



Dimensions: mm [inches]

Replacement Contact Blocks				
Part Number	**Quantity**	**Price**	**Contacts**	**Description**
ECX1030-2	Pkg of 2	$6.25	Red, normally-closed (N.C.)	Replacement contact block for 22mm pushbuttons and selector switches. Tightening Torque, terminal screw: 0.8 N·m max mounting screw: 0.5 N·m max Note: **Will not work** with Cutler-Hammer 22mm switches sold by AutomationDirect
ECX1030-5	Pkg of 5	$15.00		
ECX1040-2	Pkg of 2	$6.25	Green, normally-open (N.O.)	
ECX1040-5	Pkg of 5	$15.00		
ECX1042-2	Pkg of 2	$6.25	Brown, normally-open (N.O.), push-push	Use on lighted Push-push button only

Note: See electrical specificatons on GCX Series 22mm Plastic Pilot Devices Specifications page at beginning of this section.

EMERGENCY STOP legend plate

ECX1651

EMERGENCY STOP Legend Plate			
Part Number	**Quantity**	**Price**	**Description**
ECX1651	pkg. of 1	$2.75	Oversize yellow circular EMERGENCY STOP legend plate for 22mm E-stop type mushroom pushbuttons, 60mm outside diameter.

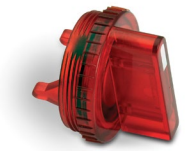
Two-position short lever operator

GR1172PR-5

Short Lever Replacement Operator				
Part Number	**Lamp Color**	**Price**	**2-Position**	**Use with**
GR1172PR-5	Red	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	Part numbers starting with GCX124, GCX125 GCX324, GCX325
GR1172PV-5	Green	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PG-5	Yellow	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PB-5	Blue	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PN-5	Clear	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	

22mm Plastic Pilot Device Accessories

Three-position short lever operator



GR1288PR-5

Short Lever Replacement Operator				
Part Number	**Lamp Color**	**Price**	**3-Position**	**Use with**
GR1288PR-5	Red	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	Part numbers starting with GCX126, GCX128 GCX326, GVX328
GR1288PV-5	Green	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PG-5	Yellow	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PB-5	Blue	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PN-5	Clear	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	

Mushroom switch replacement operator

PL1298P-5

Mushroom Switch Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
PL1171PR-5	Red	$6.25	22mm, illuminated **momentary** Mushroom switch replacement operator, red, 5/pk	Part numbers starting with GCX1221, GCX3221 mushroom-style illuminated pushbuttons
PL1298P-5	Red	$6.25	22mm illuminated **twist-to-release** mushroom switch replacement operator, red, 5/pk	Part numbers starting with GCX1226, GCX3226 mushroom-style illuminated pushbuttons

Flush pushbutton replacement operator

GR1168PR-5

Flush Pushbutton Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
GR1168PR-5	Red	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	Part numbers starting with GCX119, GCX120 GCX319, GCX320
GR1168PV-5	Green	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PG-5	Yellow	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PB-5	Blue	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PN-5	Clear	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PW-5	White	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	

Extended pushbutton replacement operator

PL1308PR-5

Extended Pushbutton Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
PL1308PR-5	Red	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	Part numbers starting with GCX121, GCX321
PL1308PV-5	Green	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PG-5	Yellow	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PB-5	Blue	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PN-5	Clear	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PW-5	White	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	

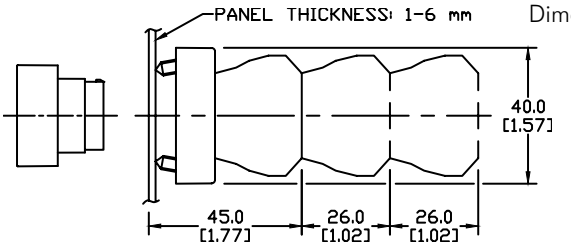
Note: All dimensions are in inches [millimeters].

GCX Series 22mm Plastic Pilot Devices Specifications

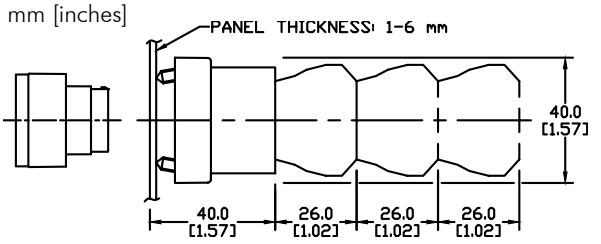
Assembly information

These pushbuttons and indicator lights are supplied with the appropriate contact blocks, unless otherwise indicated. Use these drawings as a guide to make sure there is adequate clearance behind the panel.

Pushbuttons and selector switches

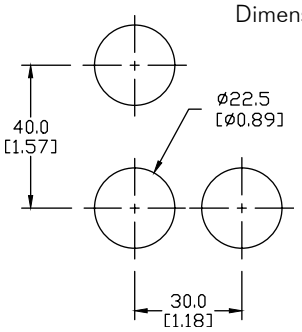


Illuminated pushbuttons and selector switches/indicator lights

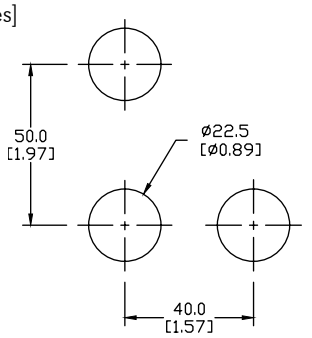


Mounting

Dimensions: mm [inches]



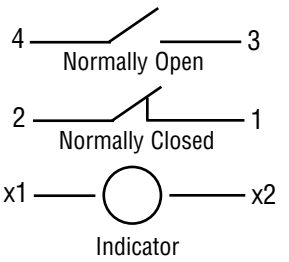
This layout is suitable if all switches are 230V or less and the same polarity.



This layout is suitable if all switches are 400V or less and different polarity.

NOTE: Contact blocks can be arranged up to three deep by two wide.

Typical Wiring



Specifications

These specifications apply to all the GCX and ECX 22mm plastic pushbuttons and switches.

Physical Specifications	
Standards Reference	CEI EN 60947-5-1, CSA C22-2 n.14
Approvals	UL File E189258, IMQ (where specified)
Enclosure Material	Fiberglass reinforced thermoplastic
Contacts Material	Silver
Protection Degree	IP 40 for GCX3151-24, GCX3151-120, GCX3153-24 and GCX3153-120. IP 65 for all others.(See Appendix of this catalog for explanation of IP ratings according to IEC 144 CEI 70-1.)
Electric Shock Protection	IEC 536, Class II
Temperature Ratings	Storage: -40° -to 80°C (-40° to 176° F) Operating: -25° to +70°C (-13° to 158° F)
Working Positions	All working positions are allowed
Mechanical Life	Pushbuttons, selector switches, joy stick switches: 1,000,000 operations Emergency mushrooms and push-push pushbuttons: 300,000 operations
Positive Opening Operation	(according to IEC 947-5-1) All functions incorporating an NC contact are positive opening operation

Electrical Specifications	
Rated Thermal Current (contact block)	A300, Q300 (Refer to E22 Series mounting/contact rating section for details)
Rated Insulation Voltage	Ui 660V according to CEI EN 60947-5-1, 300V according to CSA C22-2 n.14 and UL 508
Dielectric Strength	3kV (1 second)
Insulation Resistance	2MΩ min. (500VDC)
Initial Contact Resistance	≤25mΩ
Short-Circuit Protection*	Cartridge fuses gl 10 A-500V 10, 3x38I1 100 KA
Terminal Markings	According to CENELEC EN 50013
Connections	Single screw with non-loosening plate clamp,14AWG max., Tighten to 0.8Nm max
Contacts Operation	Self-cleaning types EN01 (N.C.) EN 10 (N.O.) slow action, positive opening
Operation Frequency	3600 operations per hour max.
Utilization Category	AC15 (Control of AC electromagnetic loads) 24 volts AC at 10 amps 130 volts AC at 6.5 amps DC13 (Control of DC electromagnetic loads) 24 volts DC at 1.5 amps 110 volts DC at 0.5 amps

***Note: Recommended, not supplied**

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

GCX Series 22mm Plastic Key Switches and Selector Switches

Key-operated selector switches

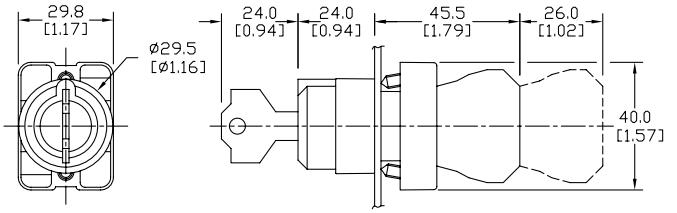
GCX3420 (2-position maintained)
- Keyed switches come with two keys.

Part Number	Price	Description
GCX3420	$13.50	22mm plastic selector switch, key-operated, **two-position maintained**, key can be removed in all positions. **One N.O.** contact block. Replacement keys available
GCX3430	$13.50	22mm plastic selector switch, key-operated, **two-position spring-return from right. One N.O.** contact block. Replacement keys available
GCX3470-22	$20.00	22mm plastic selector switch, key-operated, **three-position maintained,** key can be removed in all positions. **Two N.O.** and **two N.C.** contact blocks. Replacement keys available

Note: Keyed switches come with two keys. All plastic 22mm keyed switches are keyed the same. Replacement keys are available. Order part no. ECX1067-2 (pkg. of 2). Keys for plastic 22mm keyed switches are not compatible with Cutler-Hammer key switches.

Note: When using switches having two-deep contact blocks (such as, Model GCX3470-22) with the 22mm plastic enclosures, be sure to use enclosures that are 74mm deep. 51 mm-deep enclosures are too shallow and the switch body will not fit.

Dimensions: mm [inches]

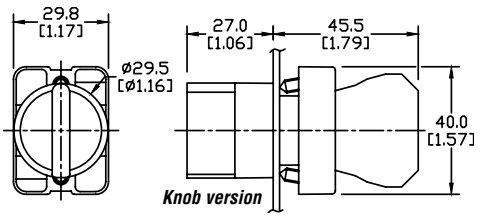


Two-position selector switches

GCX3300
Knob version

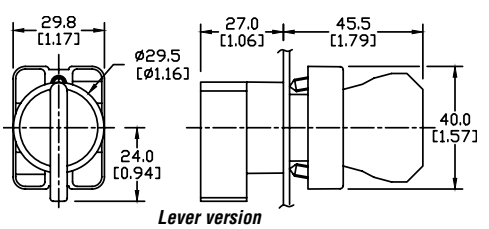
GCX3350
Lever version

Part Number	Price	Description - 2-Position Switches
GCX3300	$7.25	22mm plastic selector switch, two-position **maintained**, black knob. **One N.O.** contact block
GCX3310	$8.00	22mm plastic selector switch, two-position **spring-return from right**, black knob. **One N.O.** contact block
GCX3350	$8.00	22mm plastic selector switch, two-position **maintained**, black lever. **One N.O.** contact block
GCX3360	$8.50	22mm plastic selector switch, two-position **spring-return from right**, black lever. **One N.O.** contact block



Knob version

Dimensions: mm [inches]



Lever version

Contact Closure Sequence for Two-Position Switch

Contact Closure Sequence - 2-Position Switch				
Contact Blocks	Contact Arrangement (viewed from front)		Switch Position (viewed from front)	
	Left	Right	Left (Note 1)	Right (Note 2)
1 x NC	NC		X	
		NC	X	
1 x NO	NO			X
		NO		X
2 x NC	NC	NC	XX	
2 x NO	NO	NO		XX

Note 1: Left switch position deactivates all contacts.
Note 2: Right switch position activates all contacts.

For accessories, see 22mm Plastic Pilot Device Accessories in this section.

GCX Series 22mm Plastic Selector Switches

Three-position selector switches

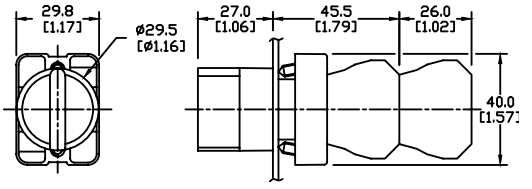
Part Number	Price	Description - 3-Position Switches
GCX3320-22	$14.00	22mm plastic selector switch, three-position **maintained**, black knob, **Two N.O.** and **two N.C.** contact blocks
GCX3330-22	$14.50	22mm plastic selector switch, three-position **spring-return to center**, black knob, **Two N.O.** and **two N.C.** contact blocks
GCX3370-22	$14.50	22mm plastic selector switch, three-position, **maintained**. black lever, **Two N.O.** and **two N.C.** contact blocks
GCX3380-22	$15.00	2mm plastic selector switch, three-position **spring-return to center**, black lever, **Two N.O.** and **two N.C.** contact blocks

Note: When using switches having two-deep contact blocks with the 22mm plastic enclosures, be sure to use enclosures that are 74 mm deep; 51 mm-deep enclosures are too shallow and the switch body will not fit.

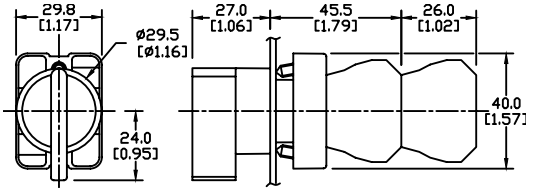
GCX3330-22 Knob version

GCX3370-22 Lever version

Dimensions: mm [inches]



Knob version



Lever version

Contact Closure Sequence for Three-Position Switch

Contact Closure Sequence - 3-Position Switch					
Contact Blocks	Contact Arrangement (viewed from front)		Switch Position (viewed from front)		
	Left	Right	Left (Note 1)	Center (Note 2)	Right (Note 3)
1 x NC	NC			X —	— X
		NC	X —	— X	
1 x NO	NO		X		
		NO			X
2 x NC	NC	NC	X—	—XX—	—X
2 x NO	NO	NO	X		X

Note 1: Left switch position activates left side contacts (viewed from front).
Note 2: Center switch position deactivates all contacts.
Note 2: Right switch position activates right side contacts (viewed from front).

For accessories, see 22mm Plastic Pilot Device Accessories in this section.

22mm Plastic Pilot Device Accessories

Replacement incandescent bulbs

ECX1902-5

Replacement Incandescent Bulbs				
Part Number	**Quantity**	**Price**	**Rating**	**Description**
ECX1900-5	Pkg of 5 bulbs	$8.50	6V@ 200mA , 1.2 watts	6V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4
ECX1902-5	Pkg of 5 bulbs	$8.50	24V@ 80mA 2 watts	24V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4
ECX1904-5	Pkg of 5 bulbs	$17.50	130V@20mA 2.6 watts	120V replacement bulb for 22mm switches and indicators. Miniature bayonet base T31/4

Note: Bulb removal tool available. Order part number HT8LAMPTOOL.

Replacement LED lamps

ECX1915-2

Replacement LED Lamps					
Part Number	**Color**	**Quantity**	**Price**	**Rating**	**Description**
ECX1911-2	Red	Pkg of 2 LED lamps	$15.50	24V@26mA 0.6 watts	LED replacement lamp for miniature bayonet bases Works with 22mm switches and indicators, but illumination will not be as even when used with the ECX 22mm indicators Note: **Will not replace** sealed Cutler-Hammer monoblock LED indicators.
ECX1912-2	Green		$19.50		
ECX1913-2	Yellow		$15.50		
ECX1914-2	Blue		$21.00		
ECX1915-2	White		$25.00		
ECX1921-2	Red		$15.50	120V@5mA 0.6 watts	
ECX1922-2	Green		$19.50		
ECX1923-2	Yellow		$15.50		
ECX1924-2	Blue		$21.00		
ECX1925-2	White		$25.00		

Note: LED modules have very low current draw and should not be used with triac output devices like PLC triac output modules. It is recommended that dry contact outputs be used to switch 120 volt AC LED modules.

Hole plug

ECX1490

Hole Plug			
Part Number	**Color**	**Price**	**Description**
ECX1490	Black	$2.75	Plastic hole plug for 22.5 mm openings in panels and enclosures; supplied with O-ring and mounting screw. Two plugs per package.

Protective covers for pushbuttons

ECX1703-5

Protective Covers for Pushbuttons				
Part Number	**Color**	**Quantity**	**Price**	**Description**
ECX1700-5	Black	Pkg of 5 protective caps	$6.50	Silicone protective covers for use with 22mm standard-size flush pushbuttons. **Will not work** with Cutler-Hammer pushbuttons, 22mm plastic illuminated or extended pushbuttons, or 22mm plastic pushbuttons with 40mm actuator face.
ECX1701-5	Red		$6.50	
ECX1702-5	Green		$6.50	
ECX1703-5	Yellow		$6.50	
ECX1704-5	Blue		$6.50	
ECX1705-5	Clear		$6.50	
ECX1706-5	Clear		$11.50	Clear silicone protective covers for use with 22mm illuminated and **extended pushbuttons only. Will not work** with Cutler-Hammer pushbuttons or 22mm mushroom pushbuttons.

Knockout Punches

109225

Ruko's knockout punch hole-cutting tool includes punch, die and draw bolt (without ball bearing). Use for sheet steel, stainless-steel sheets, non-ferrous and light metals, and plastics up to 0.16" (8 ga.) thick. Replacement bolts are offered in three of the most popular sizes. See the Tools section of the catalog for details.

Note: Part number 109225 is recommended when punching holes for 22mm pilot devices.

Replacement keys

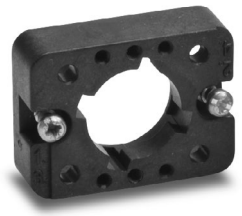
ECX1067-2

Replacement Keys			
Part Number	**Quantity**	**Price**	**Description**
ECX1067-2	Pkg of 2	$5.75	Replacement key for GCX series key-actuated selector switches, pack of 2 sets (2 keys each). NOTE: Will not work with Cutler-Hammer 22mm switches.

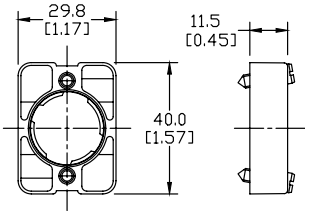
Note: All key-actuated 22mm plastic selector switches are keyed alike.

22mm Plastic Pilot Device Accessories

Replacement 22mm support base



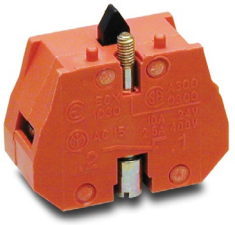
ECX3029-2



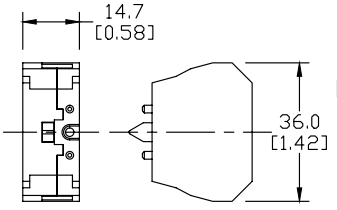
Dimensions: mm [inches]

Replacement 22mm Support Base			
Part Number	**Quantity**	**Price**	**Description**
ECX3029-2	Pkg of 1	$1.75	22mm plastic support base Note: This item is supplied as a replacement part and is not required with any switch assembly. **Will not work** with Cutler-Hammer 22mm switches sold by AutomationDirect

Replacement contact blocks



ECX1030-2



Dimensions: mm [inches]

Replacement Contact Blocks				
Part Number	**Quantity**	**Price**	**Contacts**	**Description**
ECX1030-2	Pkg of 2	$6.25	Red, normally-closed (N.C.)	Replacement contact block for 22mm pushbuttons and selector switches. Tightening Torque, terminal screw: 0.8 N·m max mounting screw: 0.5 N·m max Note: **Will not work** with Cutler-Hammer 22mm switches sold by AutomationDirect
ECX1030-5	Pkg of 5	$15.00		
ECX1040-2	Pkg of 2	$6.25	Green, normally-open (N.O.)	
ECX1040-5	Pkg of 5	$15.00		
ECX1042-2	Pkg of 2	$6.25	Brown, normally-open (N.O.), push-push	Use on lighted Push-push button only

Note: See electrical specificatons on GCX Series 22mm Plastic Pilot Devices Specifications page at beginning of this section.

EMERGENCY STOP legend plate

ECX1651

EMERGENCY STOP Legend Plate			
Part Number	**Quantity**	**Price**	**Description**
ECX1651	pkg. of 1	$2.75	Oversize yellow circular EMERGENCY STOP legend plate for 22mm E-stop type mushroom pushbuttons, 60mm outside diameter.

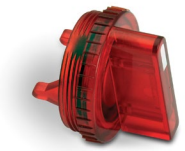
Two-position short lever operator

GR1172PR-5

Short Lever Replacement Operator				
Part Number	**Lamp Color**	**Price**	**2-Position**	**Use with**
GR1172PR-5	Red	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	Part numbers starting with GCX124, GCX125 GCX324, GCX325
GR1172PV-5	Green	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PG-5	Yellow	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PB-5	Blue	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	
GR1172PN-5	Clear	$14.50	22mm 2-position selector switch illuminated short lever replacement operator, 5/pk	

22mm Plastic Pilot Device Accessories

Three-position short lever operator



GR1288PR-5

Short Lever Replacement Operator				
Part Number	**Lamp Color**	**Price**	**3-Position**	**Use with**
GR1288PR-5	Red	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	Part numbers starting with GCX126, GCX128 GCX326, GVX328
GR1288PV-5	Green	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PG-5	Yellow	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PB-5	Blue	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	
GR1288PN-5	Clear	$14.50	22mm 3-position selector switch illuminated short lever replacement operator, 5/pk	

Mushroom switch replacement operator

PL1298P-5

Mushroom Switch Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
PL1171PR-5	Red	$6.25	22mm, illuminated **momentary** Mushroom switch replacement operator, red, 5/pk	Part numbers starting with GCX1221, GCX3221 mushroom-style illuminated pushbuttons
PL1298P-5	Red	$6.25	22mm illuminated **twist-to-release** mushroom switch replacement operator, red, 5/pk	Part numbers starting with GCX1226, GCX3226 mushroom-style illuminated pushbuttons

Flush pushbutton replacement operator

GR1168PR-5

Flush Pushbutton Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
GR1168PR-5	Red	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	Part numbers starting with GCX119, GCX120 GCX319, GCX320
GR1168PV-5	Green	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PG-5	Yellow	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PB-5	Blue	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PN-5	Clear	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	
GR1168PW-5	White	$8.00	22mm illuminated flush pushbutton replacement operator, 5/pk	

Extended pushbutton replacement operator

PL1308PR-5

Extended Pushbutton Replacement Operator				
Part Number	**Lamp Color**	**Price**	**Description**	**Use with**
PL1308PR-5	Red	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	Part numbers starting with GCX121, GCX321
PL1308PV-5	Green	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PG-5	Yellow	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PB-5	Blue	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PN-5	Clear	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	
PL1308PW-5	White	$6.00	22mm illuminated extended pushbutton, replacement operator, 5/pk	

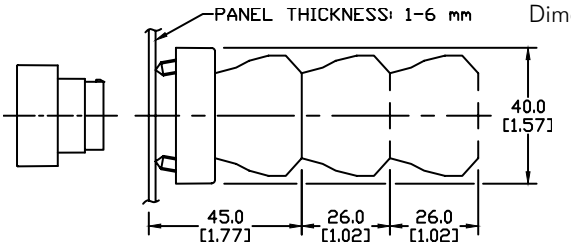
Note: All dimensions are in inches [millimeters].

GCX Series 22mm Plastic Pilot Devices Specifications

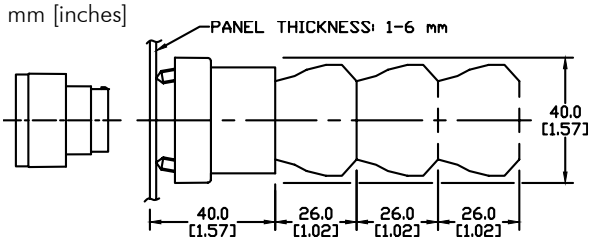
Assembly information

These pushbuttons and indicator lights are supplied with the appropriate contact blocks, unless otherwise indicated. Use these drawings as a guide to make sure there is adequate clearance behind the panel.

Pushbuttons and selector switches

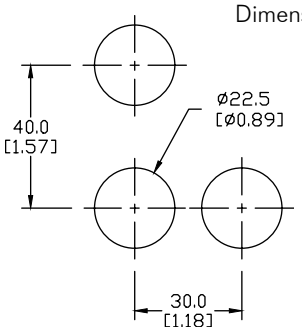


Illuminated pushbuttons and selector switches/indicator lights

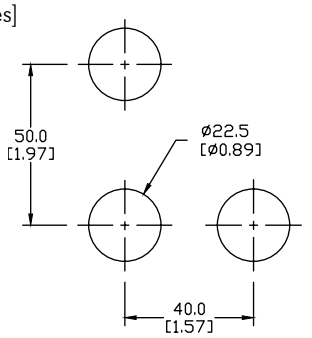


Mounting

Dimensions: mm [inches]



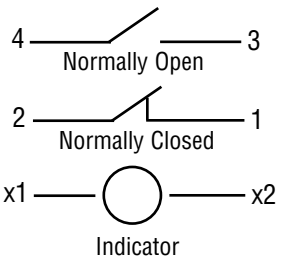
This layout is suitable if all switches are 230V or less and the same polarity.



This layout is suitable if all switches are 400V or less and different polarity.

NOTE: Contact blocks can be arranged up to three deep by two wide.

Typical Wiring



Specifications

These specifications apply to all the GCX and ECX 22mm plastic pushbuttons and switches.

Physical Specifications	
Standards Reference	CEI EN 60947-5-1, CSA C22-2 n.14
Approvals	UL File E189258, IMQ (where specified)
Enclosure Material	Fiberglass reinforced thermoplastic
Contacts Material	Silver
Protection Degree	IP 40 for GCX3151-24, GCX3151-120, GCX3153-24 and GCX3153-120. IP 65 for all others.(See Appendix of this catalog for explanation of IP ratings according to IEC 144 CEI 70-1.)
Electric Shock Protection	IEC 536, Class II
Temperature Ratings	Storage: -40° -to 80°C (-40° to 176° F) Operating: -25° to +70°C (-13° to 158° F)
Working Positions	All working positions are allowed
Mechanical Life	Pushbuttons, selector switches, joy stick switches: 1,000,000 operations Emergency mushrooms and push-push pushbuttons: 300,000 operations
Positive Opening Operation	(according to IEC 947-5-1) All functions incorporating an NC contact are positive opening operation

Electrical Specifications	
Rated Thermal Current (contact block)	A300, Q300 (Refer to E22 Series mounting/contact rating section for details)
Rated Insulation Voltage	Ui 660V according to CEI EN 60947-5-1, 300V according to CSA C22-2 n.14 and UL 508
Dielectric Strength	3kV (1 second)
Insulation Resistance	2MΩ min. (500VDC)
Initial Contact Resistance	≤25mΩ
Short-Circuit Protection*	Cartridge fuses gl 10 A-500V 10, 3x38I1 100 KA
Terminal Markings	According to CENELEC EN 50013
Connections	Single screw with non-loosening plate clamp,14AWG max., Tighten to 0.8Nm max
Contacts Operation	Self-cleaning types EN01 (N.C.) EN 10 (N.O.) slow action, positive opening
Operation Frequency	3600 operations per hour max.
Utilization Category	AC15 (Control of AC electromagnetic loads) 24 volts AC at 10 amps 130 volts AC at 6.5 amps DC13 (Control of DC electromagnetic loads) 24 volts DC at 1.5 amps 110 volts DC at 0.5 amps

***Note: Recommended, not supplied**

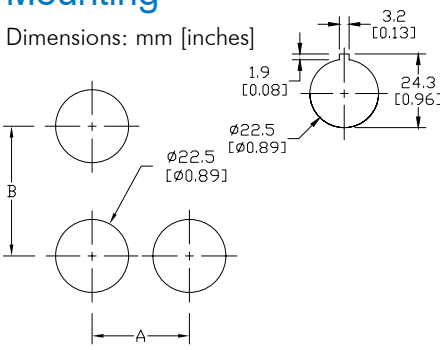
To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

EATON
Cutler-Hammer

E22 Mounting / NEMA Aux Contact Ratings

Mounting

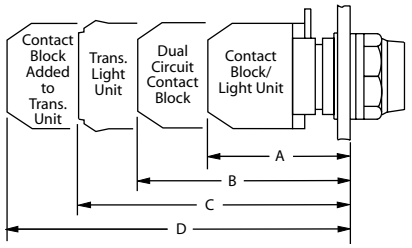
Dimensions: mm [inches]



Minimum Spacing — mm [inches]		
Size/Type of Operator	**Dimensions**	
	A	**B**
All types up to 30 (1.18) dia. including knob and key operated selector switches — except those listed below Three-way adapter	30 (1.18)	50 (1.97)
50 (1.97) dia. operators	55 (2.16)	55 (2.16)
Large yellow round legend plate - 70 (2.76) diameter	75 (2.95)	50 (1.97)

Back-of-panel extensions

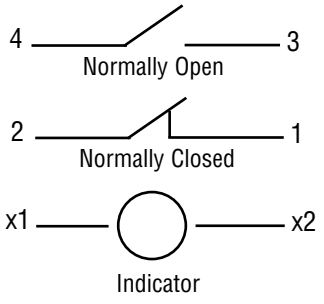
Note: This view is to show dimensions only. Contact blocks are not stackable.



Approximate Dimensions — mm [inches]			
A	**B**	**C**	**D**
Single circuit block — full voltage and resistor units	Dual circuit contact block	Transformer light unit	Transformer light unit and single circuit contact block
Pushbuttons (All Types and Push-Pull)			
51 [2.0]	66 (2.6)	74 (2.91)	94 (3.7)
Key and Knob Selector Switches			
57 [2.2]	72 (2.83)	80 (3.15)	99 (3.9)

Control Circuit Contact Electrical Ratings and Wiring

Typical Wiring



NEMA Mechanical Switching Ratings and Test Values for DC Control Circuit Contacts					
Contact Rating Desig-nation	**Thermal Continuous Test Current (A)**	**Maximum Make or Break DC Current (A)**			**Volt amperes**
		125 Volts	**250 Volts**	**301 to 600 Volts**	
P300	5.0	1.1	0.55	---	138
P600	5.0	1.1	0.55	0.20	138
Q300	2.5	0.55	0.27	---	69
Q600	2.5	0.55	0.27	0.10	69
R300	1.0	0.22	0.11	---	28

This chart is provided as a guideline only, and the ratings and values are not guaranteed to be accurate. It is the users' responsibility to properly size their control circuit devices. The chart values are from NEMA Standard ICS 5-2000, Table 1-4-2.

NEMA Mechanical Switching Ratings and Test Values for AC Control Circuit Contacts											
Contact Rating Designation	**Thermal Continuous Test Current (A)**	**Maximum AC Current, 50/60Hz (A)**								**Volt amperes**	
		120 Volts		**240 Volts**		**480 Volts**		**600 Volts**			
		Make	**Break**	**Make**	**Break**	**Make**	**Break**	**Make**	**Break**	**Make**	**Break**
A300	10	60	6.00	30	3.00	---	---	---	---	7200	720
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B300	5	30	3.00	15	1.50	---	---	---	---	3600	360
B600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180

This chart is provided as a guideline only, and the ratings and values are not guaranteed to be accurate. It is the users' responsibility to properly size their control circuit devices. The chart values are from NEMA Standard ICS 5-2000, Table 1-4-1.

NEMA 12 and 13 Lift-Off Cover Wall Mount

HUBBELL WIEGMANN
Enclosures for Electrical/Electronic Equipment

Applications

The Hubbell/Wiegmann B Series JIC box is a standard of the automotive industry, but also has a wide number of uses in other industries. The box incorporates a chain-secured, lift-off cover and is designed to safeguard components against exposure to dust, dirt, oil and water.

Construction

- Bodies fabricated from 14 gauge steel; doors fabricated from 16 gauge steel
- Continuously welded seams ground smooth
- Lids are sealed with closed cell oil resistant neoprene gasket
- External mounting plates, top and bottom of enclosure
- Weldnuts provided for mounting optional subpanels securely on models 6"x4" and larger
- External screw clamps are quick and easy to operate
- Lift-off cover design. Chain holds cover to box when cover is removed
- Grounding provisions provided

Finish

- ANSI 61 gray polyester powder light texture inside and out over phosphatized surfaces

Listings

- UL 50, Types 12 and 13 [6x6x4 and above].
- UL 508, Types 12 and 13 [6x4x4 and smaller] [UL Files E23553, E64791]
- CSA Certified, Type 12 [CSA File LL66078]
- NEMA/EEMAC Types 12 and 13
- JIC EL-1-71

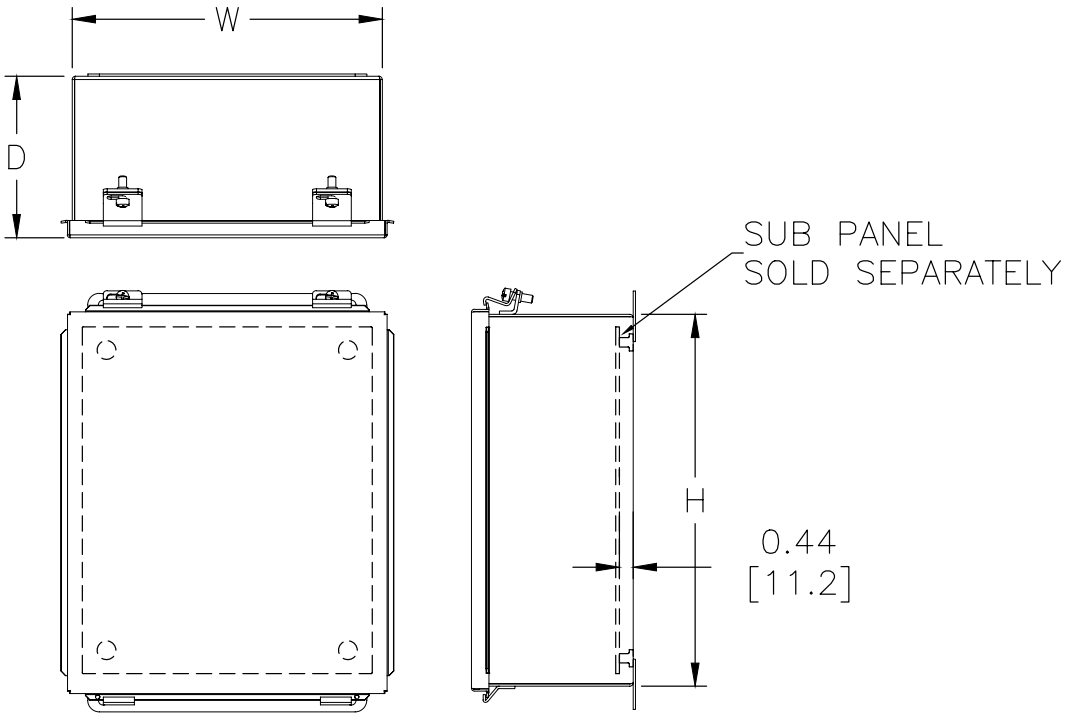
Enclosure Shipping Schedule	
Same day	1 - 7 days
Color indicates shipping lead time in business days.	

NEMA 12 and 13 Lift-Off Cover Wall Mount					
Part Number	***Price***	***Enclosure Size HxWxD***	***Painted Steel Subpanel***	***Stainless Steel Subpanel***	***Galvanized Subpanel***
B040403	$35.50	4x4x3 [102x102x76]	–	–	–
B040404	$37.50	4x4x4 [102x102x102]	–	–	–
B060403	$41.00	6x4x3 [152x102x76]	***P0604***	***P0604SS***	***P0604G***
B060404	$43.50	6x4x4 [152x102x102]	***P0604***	***P0604SS***	***P0604G***
B060604	$48.00	6x6x4 [152x152x102]	***P0606***	***P0606SS***	***P0606G***
B080603	$51.00	8x6x3.50 [203x152x89]	***P0806***	***P0806SS***	***P0806G***
B080606	$57.00	8x6x6 [203x152x152]	***P0806***	***P0806SS***	***P0806G***
B080804	$56.00	8x8x4 [203x203x102]	***P0808***	–	***P0808G***
B100804	$63.00	10x8x4 [254x203x102]	***P1008***	***P1008SS***	***P1008G***
B100806	$68.00	10x8x6 [254x203x152]	***P1008***	***P1008SS***	***P1008G***
B121005	$81.00	12x10x5 [305x254x127]	***P1210***	***P1210SS***	***P1210G***
B121206	$92.00	12x12x6 [305x305x152]	***P1212***	***P1212SS***	***P1212G***
B141206	$102.00	14x12x6 [356x305x152]	***P1412***	***P1412SS***	***P1412G***
B161406	$120.00	16x14x6 [406x356x152]	***P1614***	***P1614SS***	***P1614G***

Note: Subpanels must be ordered separately. Dimensions in inches [millimeters]; letters in table correspond to letters on dimensional drawings.

NEMA 12 and 13
Lift-Off Cover Wall Mount

Dimensions
in [mm]



NOTES:

1. PANELS ARE 14GA STEEL.
2. PANEL SCREWS ARE #10–32 PAN HEAD.
3. TWO CLAMPS ARE USED IF W=8" OR MORE.
4. CHAIN IS SUPPLIED BUT NOT SHOWN.

See our website: www.AutomationDirect.com for complete engineering drawings.

Enclosure Subpanels

HUBBELL WIEGMANN
Enclosures for Electrical/Electronic Equipment

Subpanels

Subpanels are not included with most enclosures and must be purchased separately. The specifications table for each enclosure family lists the part number of the subpanel that goes with each enclosure.

Subpanels for Small NEMA 12 (B) and NEMA 4 (BN4) Enclosures

- 14 gauge (painted, stainless, and galvanized)
- Painted steel subpanels are white polyester powder over phosphatized surfaces
- Galvanized subpanels have a conductive finish (no paint)
- Subpanels fit the following enclosures: B, B_CH, BN4, BN4_CH, BN4_CHQT, BN4_SS, BN4_CHSS, BN4_CHSSA, BN4_CHQTSS, BN4_CHQTSSA ("_" refers to dimensions).

Subpanels for B and BN4 Enclosures

Painted Steel	Price	304 Stainless Steel	Price	Galvanized	Price	Nominal Enclosure Size HxW	Subpanel Size AxB
P0604	$3.00	P0604SS	$10.75	P0604G	$3.00	6 x 4	4.88 x 2.88 [124 x 73]
P0606	$3.25	P0606SS	$13.25	P0606G	$3.25	6 x 6	4.88 x 4.88 [124 x 124]
P0806	$4.00	P0806SS	$15.50	P0806G	$4.00	8 x 6	6.88 x 4.88 [175 x 124]
P0808	$4.75	–		P0808G	$4.75	8 x 8	6.88 x 6.88 [175 x 175]
P1008	$5.25	P1008SS	$22.50	P1008G	$5.25	10 x 8	8.88 x 6.88 [226 x 175]
P1010	$7.25	–		P1010G	$7.25	10 x 10	8.88 x 8.88 [226 x 226]
P1206	$5.75	–		P1206G	$5.75	12 x 6	10.88 x 4.88 [276 x 124]
P1210	$7.50	P1210SS	$30.00	P1210G	$7.50	12 x 10	10.88 x 8.88 [276 x 226]
P1212	$9.00	P1212SS	$37.50	P1212G	$9.00	12 x 12	10.88 x 10.88 [276 x 276]
P1408	$8.00	–		P1408G	$8.00	14 x 8	12.88 x 6.88 [327 x 175]
P1412	$9.75	P1412SS	$43.00	P1412G	$9.75	14 x 12	12.88 x 10.88 [327 x 276]
P1610	$10.75	–		P1610G	$10.75	16 x 10	14.88 x 8.88 [378 x 226]
P1614	$12.00	P1614SS	$57.00	P1614G	$12.00	16 x 14	14.88 x 12.88 [378 x 327]

Notes: Dimensions in inches [millimeters].
Letters in table correspond to letters on dimensional drawing.

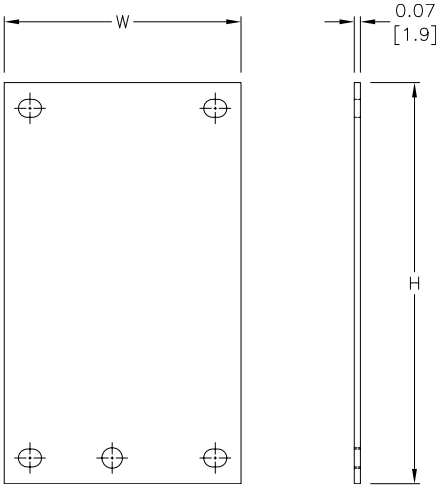
Enclosure Shipping Schedule

Same day	1 - 7 days

Color indicates shipping lead time in business days.

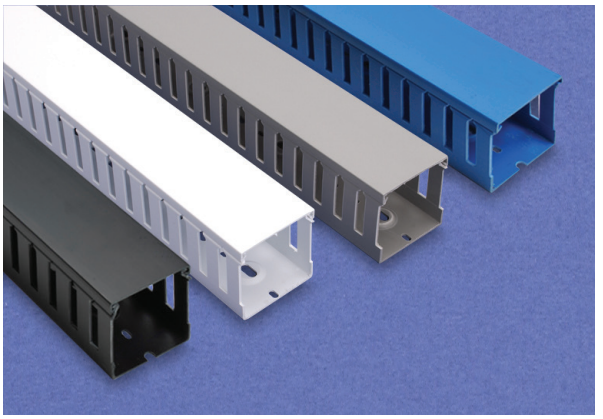
Dimensions

in [mm]



See our website: www.AutomationDirect.com for complete engineering drawings.

Wiring Duct – T1 Series - Slotted



UL file E123572

Overview

Rugged wiring duct made of rigid PVC carries a UL 94V-0 flammability rating for your wire containment needs. All our wiring duct comes in 6.56 feet (2 meter) lengths, complete with cover. Replacement duct covers can be purchased separately.

Features

- Standard mounting holes
- Wide finger design provides greater rigidity and larger slot width
- Rounded, burr-free edges will not cut installers' hands or insulation
- Non-slip cover
- Flush cover design holds 10% -12% more wires than traditional designs
- Restricted slot design for fast and easy wire installation/removal
- Two predetermined break lines, one for breaking off and removal of sidewall finger segments only, and another for removal of sidewall finger and base segments
- Patented recess boss for fast mounting of components
- Intrinsic Blue color per ISA-RD12.6 (Instrument Society of America)
- Black color to compliment the look of historically black telecommunications racks and hardware
- Temperature range -15 ˚C to +50 ˚C max.

T1 Series Gray Open Slot Rigid PVC (including cover)

Part No.	Package Quantity	Price
T1-0506G-1	1	$10.00
T1-0510G-1	1	$11.00
T1-1010G-1	1	$13.00
T1-1015G-1	1	$16.00
T1-1022G-1	1	$17.00
T1-1030G-1	1	$21.00
T1-1040G-1	1	$25.00
T1-1515G-1	1	$18.00
T1-1522G-1	1	$19.00
T1-1530G-1	1	$23.00
T1-1540G-1	1	$27.00
T1-2215G-1	1	$19.00
T1-2222G-1	1	$20.00
T1-2230G-1	1	$25.00
T1-2240G-1	1	$28.00
T1-3015G-1	1	$25.00
T1-3022G-1	1	$26.00
T1-3030G-1	1	$30.00
T1-3040G-1	1	$34.00
T1-3050G-1	1	$46.00
T1-4015G-1	1	$26.00
T1-4022G-1	1	$29.00
T1-4030G-1	1	$33.00
T1-4040G-1	1	$40.00
T1-4050G-1	1	$53.00
T1-6040G-1	1	$62.00

T1 Series White Open Slot Rigid PVC (including cover)

Part No.	Package Quantity	Price
T1-1010W-1	1	$13.00
T1-1015W-1	1	$16.00
T1-1022W-1	1	$17.00
T1-1030W-1	1	$21.00
T1-1040W-1	1	$25.00
T1-1515W-1	1	$18.00
T1-1522W-1	1	$19.00
T1-1530W-1	1	$23.00
T1-1540W-1	1	$27.00
T1-2222W-1	1	$20.00
T1-2230W-1	1	$25.00
T1-2240W-1	1	$28.00
T1-3022W-1	1	$26.00
T1-3030W-1	1	$30.00
T1-3040W-1	1	$34.00
T1-3050W-1	1	$46.00
T1-4022W-1	1	$29.00
T1-4030W-1	1	$33.00
T1-4040W-1	1	$40.00
T1-4050W-1	1	$53.00
T1-6040W-1	1	$62.00

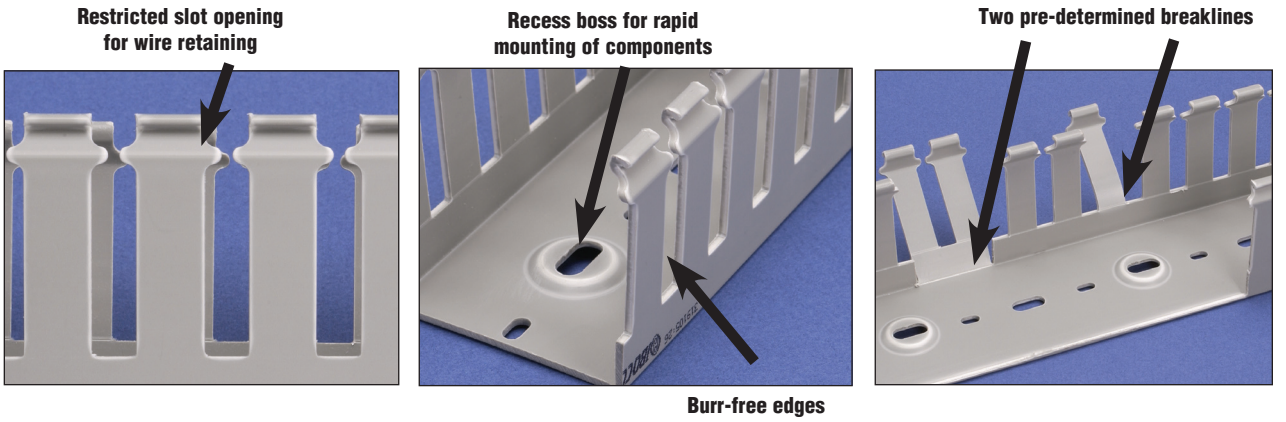
T1 Series Black Open Slot Rigid PVC (including cover)

Part No.	Package Quantity	Price
T1-1040K-1	1	$28.00
T1-1530K-1	1	$26.00
T1-2222K-1	1	$23.00
T1-2240K-1	1	$32.00
T1-3030K-1	1	$34.00
T1-3040K-1	1	$39.00
T1-3050K-1	1	$52.00
T1-4040K-1	1	$45.00
T1-4050K-1	1	$60.00

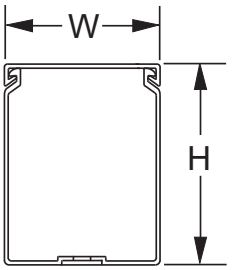
T1 Series Blue Open Slot Rigid PVC (including cover)

Part No.	Package Quantity	Price
T1-1010B-1	1	$15.00
T1-1022B-1	1	$20.00
T1-1030B-1	1	$25.00
T1-1515B-1	1	$20.00
T1-1522B-1	1	$22.00
T1-1530B-1	1	$27.00
T1-2215B-1	1	$23.00
T1-2222B-1	1	$23.00
T1-2230B-1	1	$29.00
T1-3030B-1	1	$35.00
T1-4030B-1	1	$38.00
T1-4040B-1	1	$46.00

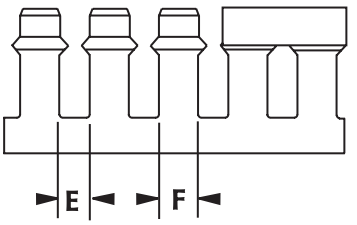
Wiring Duct – T1 Series



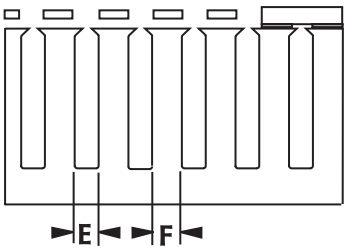
Dimensions



Nominal 5/8" - 1"



Nominal 1½" - 2¼" - 3" - 4"



Open Slot Rigid PVC (including cover) Dimensions				
Nominal Size (WxH) inches (mm)	*Catalog Part Number*	*Actual Size (WxH) inches (mm)*	*Dimension E inches (mm)*	*Dimension F inches (mm)*
0.50 x .625 (12.7 x 15.88)	T1-0506G-1	0.60 x .7 (15 x 18)	0.20 (5.08)	0.30 (7.62)
0.50 x 1.00 (12.7 x 25.4)	T1-0510G-1	0.60 x 1.18 (15 x 30)		
1.00 x 1.00 (25.4 x 25.4)	T1-1010-1*•	1.00 x 1.18 (25 x 30)		
1.00 x 1.50 (25.4 x 38.1)	T1-1015-1*	1.00 x 1.57 (25 x 40)	0.31 (7.87)	0.47 (11.94)
1.00 x 2.25 (25.4 x 57.15)	T1-1022-1*•	1.00 x 2.36 (25 x 60)		
1.00 x 3.00 (25.4 x 76.2)	T1-1030-1*•	1.00 x 3.15 (25 x 80)		
1.00 x 4.00 (25.4 x 101.6)	T1-1040-1*†	1.00 x 3.94 (25 x 100)		
1.50 x 1.50 (38.1 x 38.1)	T1-1515-1*•	1.57 x 1.57 (40 x 40)		
1.50 x 2.25 (38.1 x 57.15)	T1-1522-1*•	1.57 x 2.36 (40 x 60)		
1.50 x 3.00 (38.1 x 76.2)	T1-1530-1*•†	1.57 x 3.15 (40 x 80)		
1.50 x 4.00 (38.1 x 101.6)	T1-1540-1*	1.57 x 3.94 (40 x 100)		
2.25 x 1.50 (57.15 x 38.1)	T1-2215G-1•	2.36 x 1.57(60 x 40)		
2.25 x 2.25 (57.15 x 57.15)	T1-2222-1*•†	2.36 x 2.36 (60 x 60)		
2.25 x 3.00 (57.15 x 76.2)	T1-2230-1*•	2.36 x 3.15 (60 x 80)		
2.25 x 4.00 (57.15 x 101.6)	T1-2240-1*†	2.36 x 3.94 (60 x 100)		
3.00 x 1.50 (76.2 x 38.1)	T1-3015G-1	3.15 x 1.57 (80 x 40)		
3.00 x 2.25 (76.2 x 57.15)	T1-3022-1*	3.15 x 2.36 (80 x 60)		
3.00 x 3.00 (76.2 x 76.2)	T1-3030-1*•†	3.15 x 3.15 (80 x 80)		
3.00 x 4.00 (76.2 x 101.6)	T1-3040-1*†	3.15 x 3.94 (80 x 100)		
3.00 x 5.00 (76.2 x 127)	T1-3050-1*†	3.15 x 4.92 (75 x 125)		
4.00 x 1.50 (101.6 x 38.1)	T1-4015G-1	3.94 x 1.57 (100 x 40)		
4.00 x 2.25 (101.6 x 57.15)	T1-4022-1*	3.94 x 2.36 (100 x 60)		
4.00 x 3.00 (101.6 x 76.2)	T1-4030-1*•	3.94 x 3.15 (100 x 80)		
4.00 x 4.00 (101.6 x 101.6)	T1-4040-1*•†	3.94 x 3.94 (100 x 100)		
4.00 x 5.00 (101.6 x 127)	T1-4050-1*†	3.94 x 4.92 (100 x 125)		
6.00 x 4.00 (152.4 x 101.6)	T1-6040-1*	5.91 x 3.94 (150 x 100)		

***Note:** All T1 duct comes in 6.56 feet (2m) lengths.*
Accessory bosses not present on 0.5 and 1.0 inch width duct.

Duct Color Notes:

- Intrinsic Blue color per ISA-RD12.6 (Instrument Society of America)
- Black color typically used to compliment the look of historically black telecommunications racks and hardware

***Color:** *add suffix "G" for Light Gray*
**add suffix "W" for White*
•add suffix "B" for Blue
†add suffix "K" for Black

Wiring Duct – T1 Series Wire Fill Capacity

Wire Fill Capacity						
Nominal Duct Size (in inches)	12 AWG	14 AWG		16AWG	18 AWG	22 AWG
	Insulation Thickness					
	1/32	3/64	1/32	1/32	1/32	1/64
	OD-0.158	0D-0.165	0D-0.139	OD-0.125	OD-0.113	OD-0.065
	Recommended Maximum Number of Wires per Wiring Duct (based on 50% fill capacity)					
1/2 x 5/8	7	6	9	11	14	43
1/2 x 1	12	11	16	20	24	74
1 x 1	22	21	29	36	44	134
1 x 1 1/2	31	28	39	48	59	180
1 x 2 1/4	45	40	57	71	85	261
1 x 3	59	53	75	92	113	341
1 x 4	72	66	93	115	141	426
1 1/2 x 1 1/2	51	46	65	81	99	299
1 1/2 x 2 1/4	77	70	98	121	148	449
1 1/2 x 3	102	92	130	160	196	593
1 1/2 x 4	125	113	159	197	241	729
2 1/4 x 1 1/2	78	70	99	123	150	453
2 1/4 x 2 1/4	114	103	146	180	221	667
2 1/4 x 3	156	141	199	246	302	912
2 1/4 x 4	194	176	247	306	375	1132
3 x 1 1/2	105	95	134	165	203	612
3 x 2 1/4	159	144	203	251	307	928
3 x 3	214	193	272	337	412	1246
3 x 4	267	242	341	421	515	1558
3 x 5	309	283	399	493	604	1826
4 x 1 1/2	132	120	169	208	255	771
4 x 2 1/4	201	182	256	316	387	1171
4 x 3	270	244	344	425	520	1573
4 x 4	336	305	429	531	650	1963
4 x 5	415	381	536	663	812	2455
6 x 4	512	464	653	807	988	2987

Overview

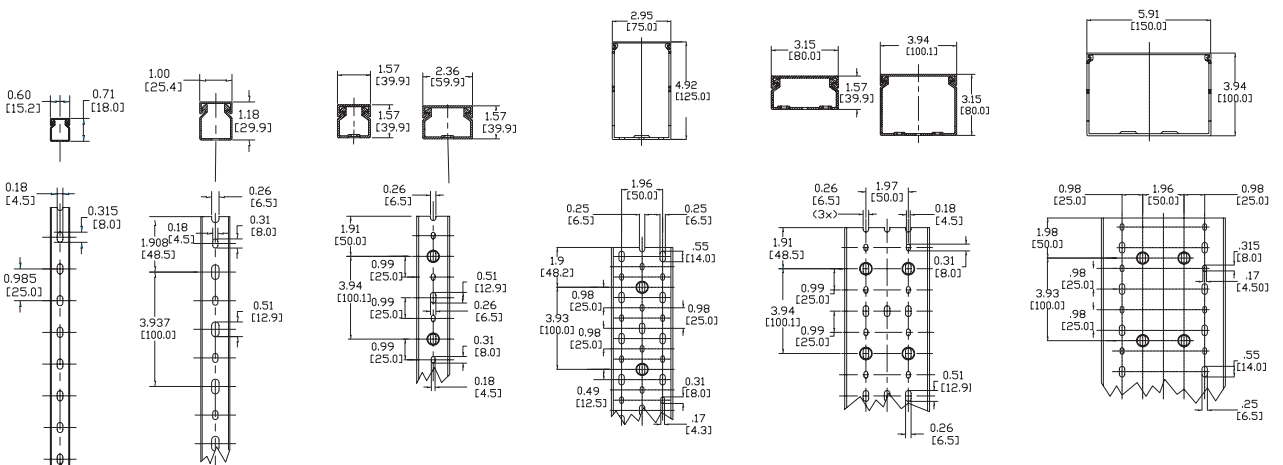
The base perforation of the T1 wiring duct series allows mounting on the panel with rivets R6 or R4 or on DIN rails.

The recess bosses in the base permit rapid mounting of wire retainers (CL series), inserts (ZP2), and separators (SEP series) inside the wiring duct.

Note: Duct base perforation according to DIN 43659 and DIN VDE 0660 TEIL 506.

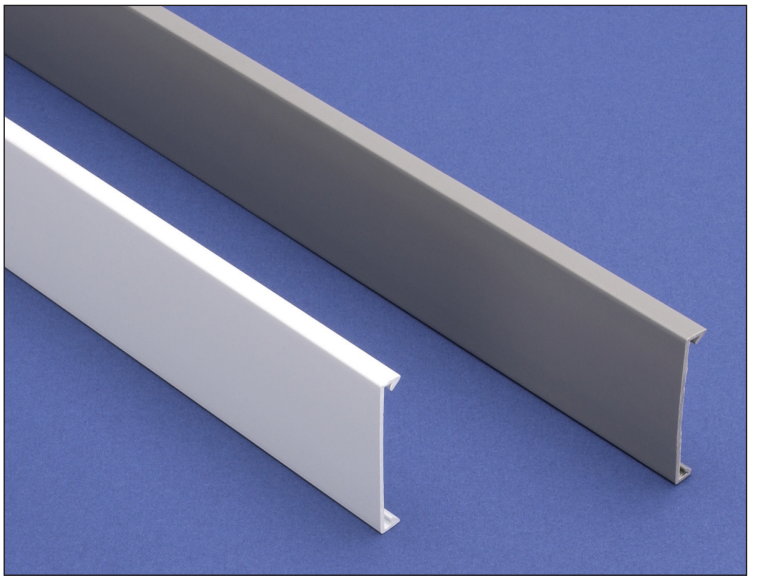
Dimensions

T1-0506 T1-1010 T1-15** and T1-22** T1-3050 only T1-30** and T1-40** T1-6040



Note: Dimensions are in inches (millimeters).

Wiring Duct Cover



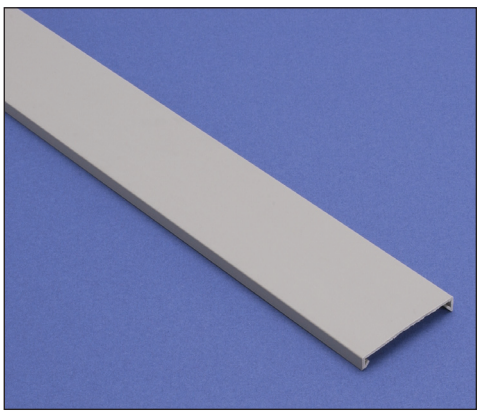
Duct Cover

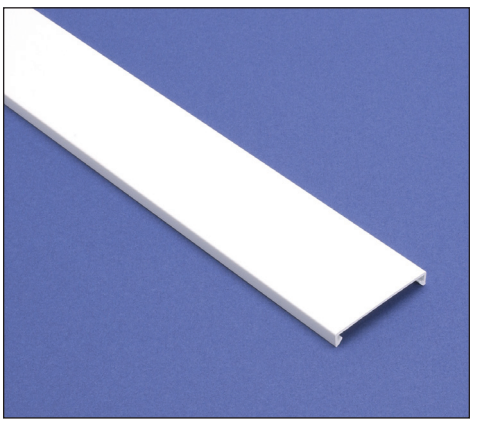
Our standard wire duct products are supplied complete with covers. These replacement covers are manufactured from the same rigid self-extinguishing PVC material.

UL file E123572

Duct Cover Specifications					
Part Number	***Price***	***Description***	***Color***	***Pcs/Pkg***	***Actual Total Length ft (m)***
COV-05G-1	$4.00	Cover for 0.5" wide duct	Gray	1	6.56 (2)
COV-10G-1	$4.00	Cover for 1.0" wide duct	Gray	1	6.56 (2)
COV-10W-1	$4.00	Cover for 1.0" wide duct	White	1	6.56 (2)
COV-15G-1	$5.00	Cover for 1.5" wide duct	Gray	1	6.56 (2)
COV-15W-1	$5.00	Cover for 1.5" wide duct	White	1	6.56 (2)
COV-22G-1	$6.00	Cover for 2.25" wide duct	Gray	1	6.56 (2)
COV-22W-1	$6.00	Cover for 2.25" wide duct	White	1	6.56 (2)
COV-30G-1	$9.00	Cover for 3.0" wide duct	Gray	1	6.56 (2)
COV-30W-1	$9.00	Cover for 3.0" wide duct	White	1	6.56 (2)
COV-40G-1	$11.00	Cover for 4.0" wide duct	Gray	1	6.56 (2)
COV-40W-1	$11.00	Cover for 4.0" wide duct	White	1	6.56 (2)
COV-60G-1	$21.00	Cover for 6.0" wide duct	Gray	1	6.56 (2)
COV-60W-1	$21.00	Cover for 6.0" wide duct	White	1	6.56 (2)

Note: Standard length of covers is 6.56 feet (2m) to fit T1, T1E and TSH duct.





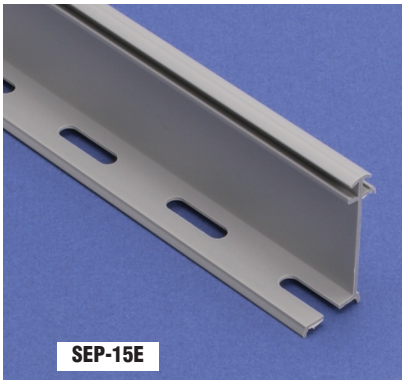
Wiring Duct – Accessories

Duct Separators

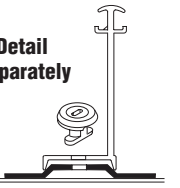
Duct separators allow the physical separation of circuits within a single piece of duct. The various mounting arrangements allow alternate compartmentalization of duct and differing ratios of usable sections.

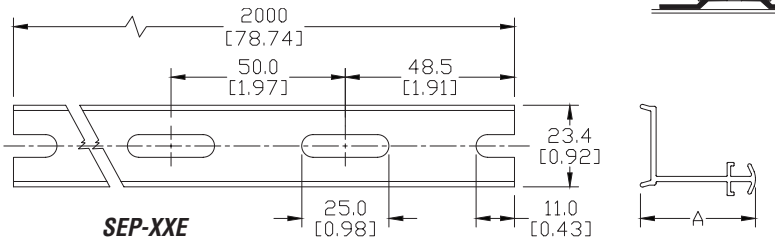
Duct Separators					
Part Number	**Price**	**Description**	**Color**	**Pcs/Pkg**	**Length ft (m)**
SEP-15E-1	$6.00	Separator for 1.5" high duct	Gray	1	6.56 (2)
SEP-22E-1	$8.00	Separator for 2.25" high duct	Gray	1	6.56 (2)
SEP-30E-1	$9.00	Separator for 3.0" high duct	Gray	1	6.56 (2)

Note: Length of separators is 6.56 ' (2m).



SEP-E Mounting Detail
Order ZP1 mount separately





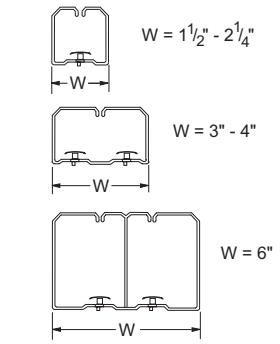
SEP-XXE

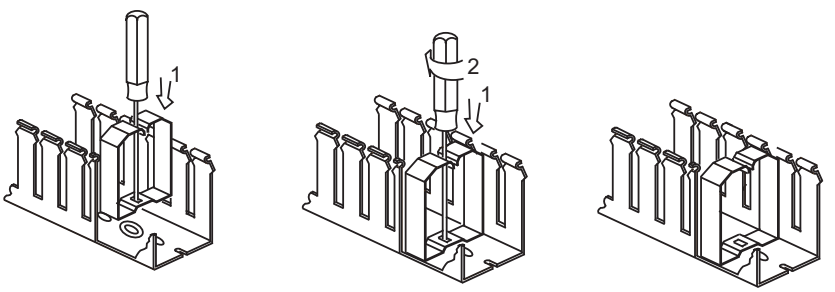
Note: Dimensions are in inches (mm).

Wire Retainers

For holding wires during wiring operations, these retainers are essential. They allow easy access to the interior of the wiring duct during maintenance or alterations, while assuring that wiring bundles will not fall out when the duct cover is removed. Installed with a simple rotating movement, they anchor firmly in the recess boss in the duct base.

Wire Retainers				
Part Number	**Price**	**Description**	**Color**	**Pcs/Pkg**
CL-1515	$51.00	Wire retainer fastener for 1.5" x 1.5" duct	Gray	40
CL-1522	$55.00	Wire retainer fastener for 1.5" x 2.25" duct	Gray	40
CL-1530	$31.00	Wire retainer fastener for 1.5" x 3.0" duct	Gray	20
CL-2215	$60.00	Wire retainer fastener for 2.25" x 1.5" duct	Gray	40
CL-2222	$34.00	Wire retainer fastener for 2.25" x 2.25" duct	Gray	20
CL-2230	$34.00	Wire retainer fastener for 2.25" x 3.0" duct	Gray	20
CL-2240	$38.00	Wire retainer fastener for 2.25" x 4.0" duct	Gray	20
CL-3022	$21.00	Wire retainer fastener for 3.0" x 2.25" duct	Gray	10
CL-3030	$24.00	Wire retainer fastener for 3.0" x 3.0" duct	Gray	10
CL-3040	$24.00	Wire retainer fastener for 3.0" x 4.0" duct	Gray	10
CL-4015	$23.00	Wire retainer fastener for 4.0" x 1.5" duct	Gray	10
CL-4022	$26.00	Wire retainer fastener for 4.0" x 2.25" duct	Gray	10
CL-4030	$24.00	Wire retainer fastener for 4.0" x 3.0" duct	Gray	10
CL-4040	$16.00	Wire retainer fastener for 4.0" x 4.0" duct	Gray	5
CL-6040	$20.00	Wire retainer fastener for 6.0" x 4.0" duct	Gray	5



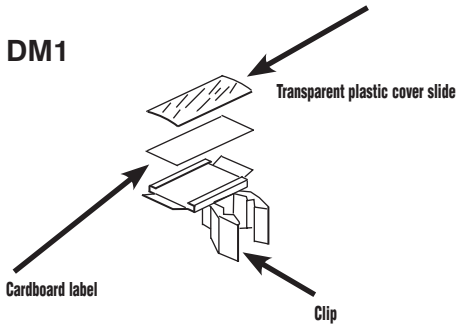


Wiring Duct – Accessories

Duct Marking Tags			
Part Number	**Price**	**Description**	**Pcs/Pkg**
DM1	$24.00	Single-width white cardboard identification label for wiring duct. Supplied with black plastic mounting clip and transparent plastic cover slide	50

Note: DM1 marking tags can only be used with T1 series wire duct.

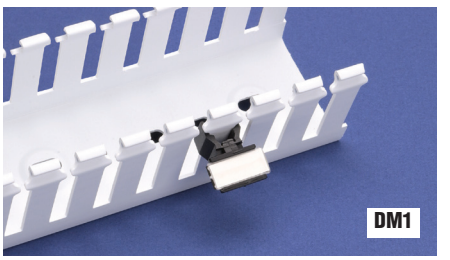
DM1



Identification Tags

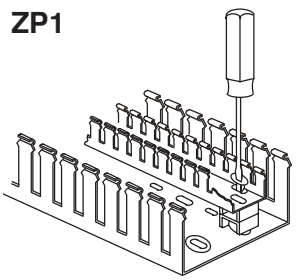
Allowing easy identification of control gear and switchgear, these tags are mounted by snapping the clip onto the sidewall finger segments of the duct. No gluing - no drilling! After installation, they need not be removed during maintenance or any work which involves the removal of the covers.

Note: Take care that clip is installed above the wires coming out to the sidewall slots.

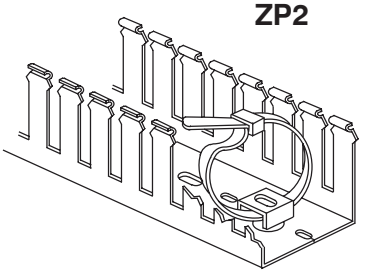


Mounting Devices			
Part Number	**Price**	**Description**	**Pcs/Pkg**
ZP1	$12.00	Round, white polyamide 'button' used to mount components and separators inside duct.	100
ZP2	$15.00	Square white polyamide cable tie mount used to tighten a wire bundle inside duct.	50

ZP1

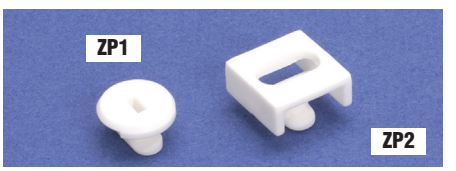


ZP2

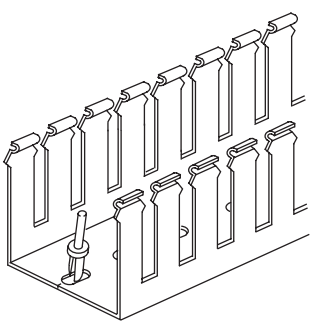


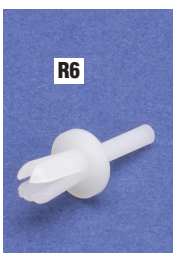
Mounting Inserts

We carry mounts in two styles: ZP1 for mounting components and SEP-E separators inside duct, or for mounting small sizes of duct inside larger sizes (for separation of circuits with different functions); and ZP2, which is used with a cable tie to secure a wire bundle inside the duct.



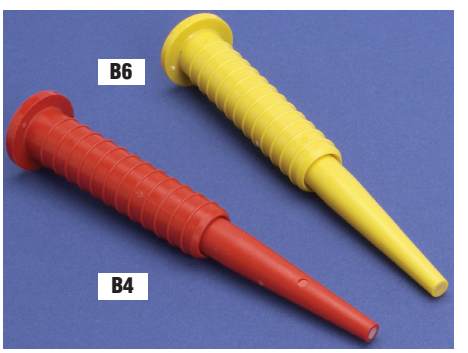
Wiring Duct Rivets and Rivet Tools			
Part Number	**Price**	**Description**	**Pcs/Pkg**
R4	$14.00	Blue polyamide rivet used to install all types of wiring duct with standard 4.5 mm [0.17 in] mounting holes.	250
B4	$37.00	Red polyamide rivet tool used to install R4 rivets.	1
R6	$16.00	Natural polyamide rivet used to install all types of wiring duct with standard 6.5 mm [0.26 in] mounting holes.	250
B6	$37.00	Yellow polyamide rivet tool used to install R6 rivets.	1



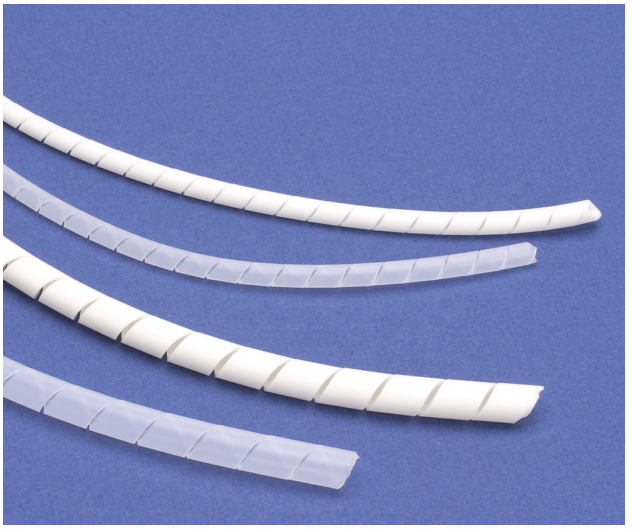


Rivets and Rivet Tools

Wiring duct rivets install quickly and easily with the companion rivet tool, offering good temperature resistance and excellent mechanical properties. They can be used to install all types of wiring duct with standard mounting holes.



Wiring Duct – Accessories

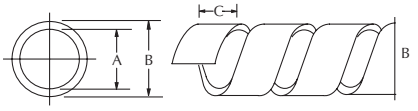


Spiral Wrap

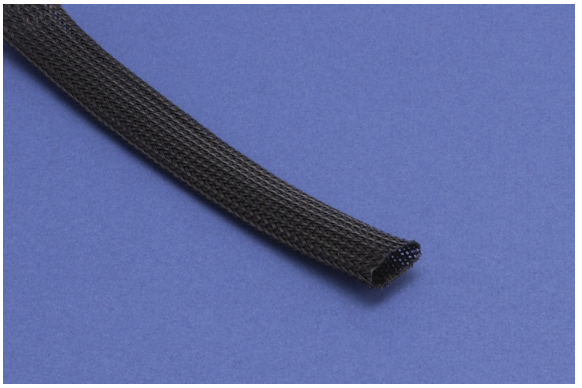
For neatly grouping wire bundles simply and economically, spiral wrap has no equal. Strong, yet easy to install, it protects the wire bundle, keeping it flexible though tightly contained. It is easily removed and reusable for temporary wiring.

Spiral Wrap				
Part Number	**Price**	**Description**	**Color**	**Length**
P-1	$14.00	0.125" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/16 to 1/2 inch diameter.	Natural	160 ft./pack
PA1	$20.00	0.125" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/16 to 1/2 inch diameter.	White	160 ft./pack
P-2	$15.00	0.25" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/4 to 2 inch diameter.	Natural	80 ft./pack
PA2	$21.00	0.25" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/4 to 2 inch diameter.	White	80 ft./pack
P-3	$24.00	0.375" nominal o.d. Polyethylene spiral wrap used for wire bundles from 3/8 to 3 inch diameter.	Natural	80 ft./pack
PA3	$37.00	0.375" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 3/8 to 3 inch diameter.	White	80 ft./pack
P-4	$32.00	0.5" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/2 to 4 inch diameter.	Natural	65 ft./pack
PA4	$46.00	0.5" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/2 to 4 inch diameter.	White	65 ft./pack

Dimensions



Catalog Number		Dimensions in Inches			Wire Bundle Size in Inches	Feet per Carton
Polyethylene	Flame-Retardant Polyethylene	A	B	C		
P-1	PA1	.06	.12	.20	1/16 to 1/2	160
P-2	PA2	.16	.24	.31	¼ to 2	80
P-3	PA3	.31	.39	.47	3/8 to 3	80
P-4	PA4	.35	.47	.47	½ to 4	65



Braided Sleeving

This lightweight, expandable, self-extinguishing polyester sleeving has an open weave to allow maximum diameter expansion. It is super-flexible and easy to install, gripping objects of various shapes and sizes reliably. Abrasion-resistant, it provides extra protection against chemicals and flame.

Braided Expandable Sleeving Material Specifications	
Operating Temp	-50°C to +150°C (-58°F to +302°F)
Physical Properties	Self-extinguishing for UL 94V-2
Maximum Elongation	42%
Diameter Expansion	100%
Other	Halogen-free

Expandable Sleeving				
Part Number	**Price**	**Description**	**Color**	**Length**
TY-5	$95.00	Braided expandable polyester sleeving, 0.197"(5mm) nominal i.d., 0.157"(4mm) to 0.472"(12mm) nominal range	Black	325 ft./pack
TY-10	$177.00	Braided expandable polyester sleeving, 0.375"(10mm) nominal i.d., 0.315"(8mm) to 0.866"(22mm) nominal range	Black	325 ft./pack
TY-20	$152.00	Braided expandable polyester sleeving, 0.750"(20mm) nominal i.d., 0.630"(16mm) to 1.378"(35mm) nominal range	Black	164 ft./pack
TY-30	$219.00	Braided expandable polyester sleeving, 1.125"(30mm)nominal i.d., 0.984"(25mm) to 1.890"(48mm) nominal range	Black	164 ft./pack
TY-50	$315.00	Braided expandable polyester sleeving, 2.0"(50mm) nominal i.d., 1.575"(40mm) to 2.825"(72mm) nominal range	Black	164 ft./pack

Wiring Duct – Material Specifications

Material Specifications								
Materials / **Technical Characteristics**	**Test Standard**	**Unit of Measure**	**Rigid PVC**	**Polypropylene**	**PVC Molded Components**	**Polyamide 6**	**Polyethylene**	**Flame Retardant Polyethylene**
Chemical/Physical Properties								
Specific Gravity	ASTM D792	g/cm^3	1.55	1.01	1.32	1.14	0.92	0.97
H_2O 73.4°F Absorption	ISO 62	%	<0.1	0.02	<0.1	2.5	<0.1	<0.1
Formaldehyde	–	ppm	absent	absent	absent	absent	absent	absent
Cadmium	–	ppm	absent	absent	absent	absent	absent	absent
Mechanical Properties								
Tensile Stress at Break	ASTM D638	MPa	39	28	30	45	17	15
Traction Strength	ASTM D638	MPa	44	27	27	55	9.5	9
Elongation at Break	ASTM D638	%	130	200	97	250	400	600
Modulus of Elasticity at Traction	ASTM D638	MPa	4400	n/a	–	950	–	240
Modulus of Elasticity at Flexion	ASTM D790	MPa	3200	2100	–	1100	210	130
Thermal Properties								
Temperature VICAT	ASTM D1525	°C	84	95	70	198	89	–
HDT	ASTM D648	°C	72	60	60	185	–	–
Coefficient of Expansion	ASTM D696	K^{-1}	$6\ 10^{-5}$	10^{-5}	$8\ 10^{-5}$	$8\text{-}10\ 10^{-5}$	$22\ 10^{-5}$	10^{-5}
Specific Heat	ASTM C351	kJ/kgK	0.94	n/a	1.24	1.7	–	–
Thermal Conductivity	ASTM C177	W/mK	0.14	0.21	0.14	0.29	0.32	0.32
Electrical Properties								
Dielectric Constant	ASTM D150	–	3.2 - 4.0	2.5	3.2	5.0	2.4	2.3
Dielectric Strength	IEC 243	kV/mm	70	25	60	35	90	90
Surface Resistance	IEC 93	Ω	10^{13}	10^{13}	10^{13}	$5\ 10^{11}$	10^{13}	10^{13}
Self-Extinguishing								
Self-Extinguishing UL 94 1.6 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Self-Extinguishing UL 94 3.2 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Hot Wire Test (2 mm)	IEC 695-2-1	°C	960	960	960	650	650	850
Oxygen Number	ASTM D2863	%	43	30	34	25	–	25

IronHorse® Rolled-Steel AC Motors – 3-Phase

56C/56HC-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp

Features

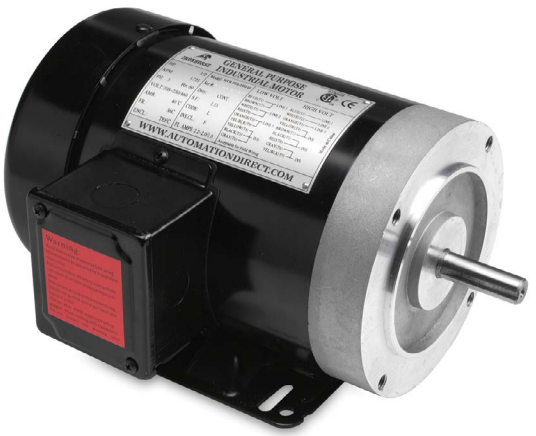
- Totally Enclosed Fan Cooled (TEFC) enclosure
- NEMA 56C or 56HC flange mount (56HC are suitable for 56, 143T, or 145T frame mounting dimensions)
- Rolled steel shell frame / cast aluminum end bell
- Removable base / bolt-on/bolt-off mounting feet
- Steel fan cover
- Large easy-to-wire junction box with rubber gasket
- Heavy duty oversized ball bearings
- High tensile strength steel shaft
- Electrically reversible
- Inverter capable (3-phase only)
- NEMA design B
- Class F winding insulation
- Service Factor: 1.15 across-the-line (1.0 for 3-phase with AC drive)
- Two year warranty
- $_{C}CSA_{US}$ certified, CE

Accessories Available

- Junction boxes (replacement/spare)
- Fans (replacement/spare)
- Fan shrouds (replacement/spare)
- Motor bases (replacement/spare)
- Adjustable mounting slide bases

Applications

- Conveyors
- Fans
- Gear reducers
- Pumps



MTR Series 3-phase motor

MTRP Series 3-phase motor

MTR2 Series 3-phase motor

IronHorse® Rolled-Steel AC Motors – 3-Phase

56C/56HC-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp

Motor Specifications – Three-Phase 56C/56HC-Frame Motors – 1800 & 3600 RPM										
Part Number	**Price**	**HP**	**Base RPM**	**Phase**	**Voltage**	**Housing**	**NEMA Frame**	**Service Factor**	**F.L. Amps @ 230V/460V**	**Approx Weight (lb)**
MTR2-P33-3BD18	$102.00	1/3	1800	3	230/460	TEFC rolled steel frame with cast aluminum end bell F1 conduit box location	56C flange mount (MTRP = 56HC)*	1.15	1.4 / 0.7	18
MTR2-P33-3BD36	$83.00		3600						1.3 / 0.65	18
MTR2-P50-3BD18	$108.00	1/2	1800						1.9 / 0.95	19
MTR2-P50-3BD36	$91.00		3600						1.7 / 0.85	19
MTR2-P75-3BD18	$117.00	3/4	1800						2.6 / 1.3	22
MTR2-P75-3BD36	$99.00		3600						2.4 / 1.2	21
MTR-P33-3BD18	$97.00	1/3	1800		208-230/460				1.6 / 0.8	23
MTR-P33-3BD36	$79.00		3600						1.6 / 0.8	23
MTR-P50-3BD18	$100.00	1/2	1800						2.0 / 1.0	24
MTR-P50-3BD36	$87.00		3600						2.2 / 1.1	24
MTR-P75-3BD18	$112.00	3/4	1800						2.8 / 1.4	26
MTR-P75-3BD36	$95.00		3600						2.9 / 1.45	26
MTR-001-3BD18	$125.00	1	1800						3.6 / 1.8	29
MTR-001-3BD36	$101.00		3600						3.6 / 1.8	28
MTRP-001-3BD18	$153.00		1800						3.2 / 1.6	35
MTRP-001-3BD36	$125.00		3600						3.0 / 1.50	23
MTR-1P5-3BD18	$145.00	1-1/2	1800						4.8 / 2.4	33
MTR-1P5-3BD36	$114.00		3600						4.6 / 2.3	34
MTRP-1P5-3BD18	$175.00		1800						4.5 / 2.25	43
MTRP-1P5-3BD36	$142.00		3600						4.0 / 2.0	31
MTR-002-3BD18	$166.00	2	1800						6.0 / 3.0	42
MTR-002-3BD36	$127.00		3600						6.0 / 3.0	43
MTRP-002-3BD18	$204.00		1800						6.0 / 3.0	49
MTRP-002-3BD36	$152.00		3600						5.2 / 2.6	33
MTRP-003-3BD36	$197.00	3	3600						7.4 / 3.7	39

Note: Please review the AutomationDirect Terms & Conditions for warranty and service on this product.

IronHorse Motors with product numbers ending in P are Premium Efficiency motors and meet or exceed all current efficiency guidelines.

****56HC motors are capable of 56C C-face mounting, and are also compatible with 56, 143T, and 145T foot mounting dimensions.***

IronHorse® Rolled-Steel AC Motors – 3-Phase

56C/56HC-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp – Performance Data

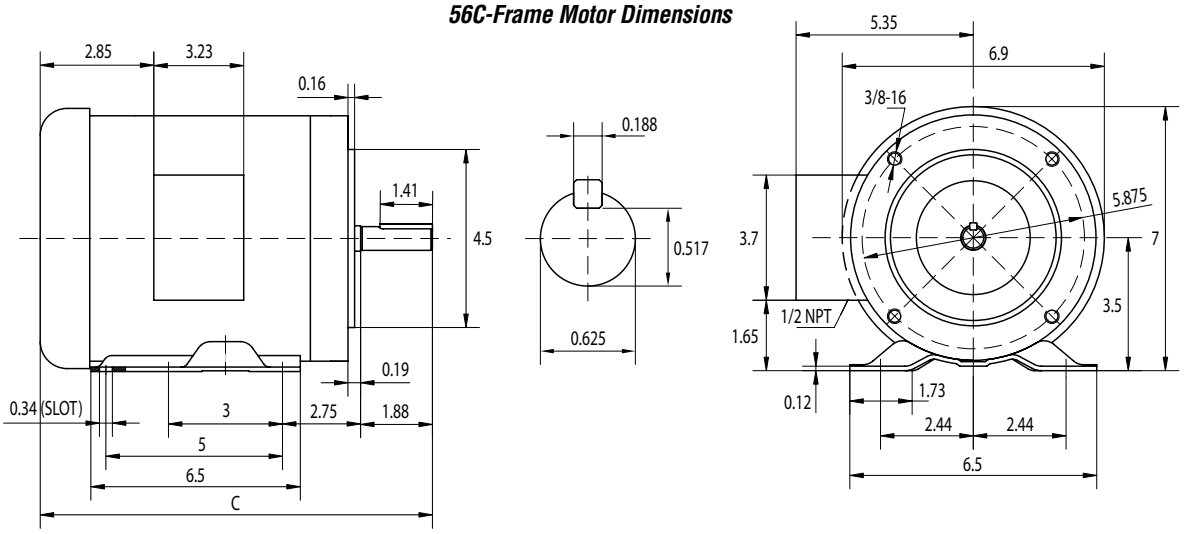
Performance Data – Three-Phase 56C/56HC-Frame Motors (460V data except as indicated) – 1800 & 3600 RPM																
Part Number	HP	NEMA Design	FL RPM	Minimum Speed (rpm)		Current @ 230V/460V (Amps)			Torque (lb·ft)			Maximum Speed (rpm)		FL Efficiency (%)	FL Power Factor	Rotor Inertia (lb·ft²)
				CT	VT	No Load	Full Load	Locked Rotor	Full Load	Locked Rotor	Break-down	CHP*	Safe			
MTR2-P33-3BD18	1/3	B	1725	431	172	1.10 / 0.55	1.4 / 0.7	7 / 3.5	1.03	2.93	3.77	2700	5400	67.0	0.65	0.0329
MTR2-P33-3BD36			3450	862	345	0.8 / 0.4	1.3 / 0.65	7.6 / 3.8	0.50	1.14	1.99	5400		60.0	0.75	0.0245
MTR2-P50-3BD18	1/2		1725	431	172	1.36 / 0.68	1.9 / 0.95	10 / 5	1.53	3.81	4.96	2700		70	0.69	0.038
MTR2-P50-3BD36			3450	862	345	1.0 / 0.5	1.7 / 0.85	10.8 / 5.4	0.74	1.81	2.96	5400		67.5	0.74	0.0277
MTR2-P75-3BD18	3/4		1725	431	172	1.60 / 0.80	2.6 / 1.3	12.2 / 6.6	2.31	5.41	7.17	2700		73.0	0.73	0.048
MTR2-P75-3BD36			3450	862	345	1.3 / 0.7	2.4 / 1.2	16 / 8	1.14	2.95	4.25	5400		71.5	0.78	0.031
MTR-P33-3BD18	1/3		1725	863	345	0.53 / 0.27	1.6 / 0.8	8 / 4	1.02	2.55	2.81	2700		67.0	0.70	0.058
MTR-P33-3BD36			3450	1725	690	1.2 / 0.59	1.6 / 0.8	9 / 5	0.50	3.0	3.0	5400		57.0	0.71	0.084
MTR-P50-3BD18	1/2		1725	863	345	0.67 / 0.33	2.0 / 1.0	12 / 6	1.52	3.80	4.18	2700		69.0	0.72	0.068
MTR-P50-3BD36			3450	1725	690	1.4 / 0.7	2.2 / 1.1	14 / 7	0.75	4.4	4.5	5400		62.0	0.71	0.095
MTR-P75-3BD18	3/4		1725	863	345	0.93 / 0.47	2.8 / 1.4	18 / 9	2.29	5.73	6.30	2700		71.0	0.74	0.075
MTR-P75-3BD36			3450	1725	690	1.5 / 0.75	2.9 / 1.45	17 / 8.9	1.13	6.0	5.8	5400		67.0	0.78	0.107
MTR-001-3BD18	1		1725	863	345	1.2 / 0.6	3.6 / 1.8	24 / 12	3.02	7.55	8.31	2700		73.0	0.76	0.086
MTR-001-3BD36			3450	1725	690	1.7 / 0.85	3.6 / 1.8	25 / 13	1.50	7.9	7.1	5400		69.0	0.82	0.122
MTRP-001-3BD18			1760	440	176	2.18 / 1.09	3.22 / 1.61	31 / 16	3	12.35	14.51	2700	2700	85.5	0.69	0.107
MTRP-001-3BD36			3500	875	350	1.52 / 0.76	3.00 / 1.50	22 / 11	1.51	3.98	4.93	5400	5400	77	0.83	0.034
MTR-1P5-3BD18	1-1/2		1725	863	345	1.53 / 0.77	4.8 / 2.4	36 / 18	4.57	10.28	11.43	2700	5400	75.0	0.78	0.108
MTR-1P5-3BD36			3450	1725	690	1.8 / 0.9	4.6 / 2.3	29 / 17	2.25	11.2	8.4	5400	5400	72.0	0.85	0.143
MTRP-1P5-3BD18			1760	440	176	2.8 / 1.4	4.52 / 2.26	47 / 24	4.4	21.68	21.76	2700	2700	86.5	0.72	0.135
MTRP-1P5-3BD36			3500	875	350	1.8 / 0.9	3.96 / 1.98	38 / 19	2.21	7.94	9.03	5400	5400	84.0	0.85	0.048
MTR-002-3BD18	2		1725	863	345	2.0 / 1.0	6.0 / 3.0	48 / 24	6.09	13.70	15.23	2700	5400	77.0	0.80	0.143
MTR-002-3BD36			3450	1725	690	3.4 / 1.7	6.0 / 3.0	57 / 30	3.06	18.9	13.4	5400	5400	75.0	0.78	0.188
MTRP-002-3BD18			1760	440	176	3.62 / 1.81	5.92 / 2.96	61 / 31	6.03	27.3	27.46	2700	2700	86.5	0.74	0.158
MTRP-002-3BD36			3500	875	350	2.28 / 1.14	5.22 / 2.61	53 / 27	3.02	12.23	12.8	5400	5400	85.5	0.86	0.056
MTRP-003-3BD36	3		3500	875	350	3.54 / 1.77	7.38 / 3.69	89 / 45	4.49	19.44	20.39	5400	5400	86.5	0.85	0.069

** Maximum Constant HP RPM is for direct coupled loads.*

IronHorse® Rolled-Steel AC Motors – 3-Phase

56C Frame TEFC Motors – Three-Phase – 0.33 to 3 hp – Dimensions

MTR Three-Phase
56C-Frame Motor Dimensions

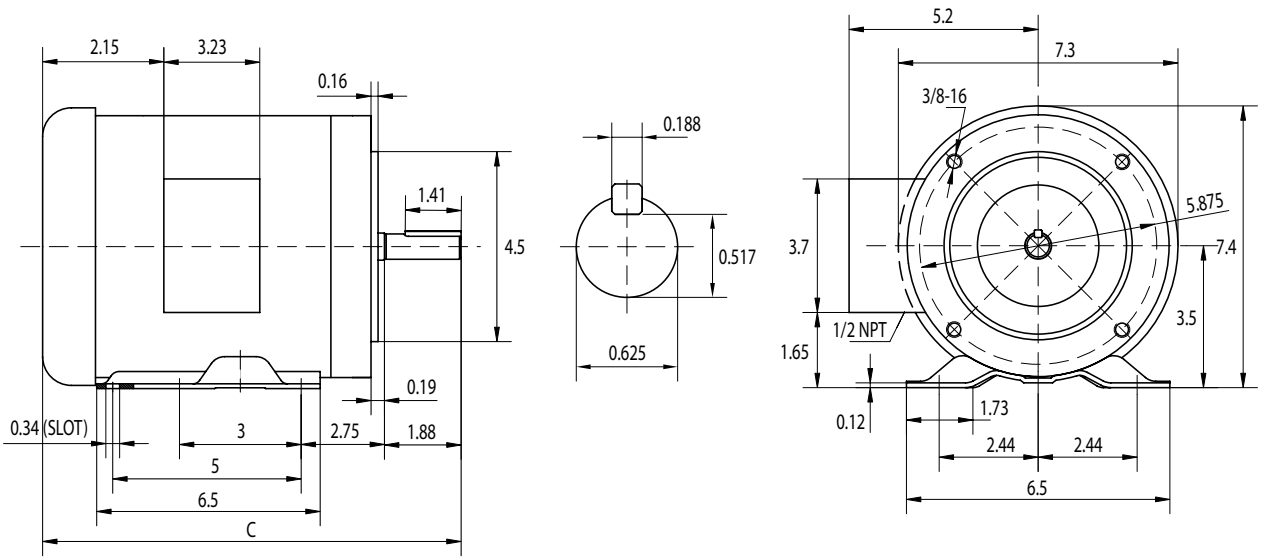


C = 12.2″; 0.33 to 1hp motors
C = 12.6″; 1.5hp MTR-1P5-3BD18
C = 12.2″; 1.5hp MTR-1P5-3BD36
C = 13.8″; 2hp MTR-002-3BD18
C = 12.4″; 2hp MTR-002-3BD36

UNITS = INCHES

MTR-xxx-3BDxx IronHorse Motors
(3-phase rolled steel)

MTRP Three-Phase
56HC-Frame Motor Dimensions
Suitable for 56, 143T, and 145T Frame Mounting



C = 12.4″; 1.0 hp MTRP-001-3BD18
C = 13.4″; 1.5hp MTRP-1P5-3BD18
C = 13.9″; 2hp MTRP-002-3BD18
C = 11.9″; 1 to 2hp MTRP-xxx-3BD36
C = 12.9″; 3hp MTRP-003-3BD36

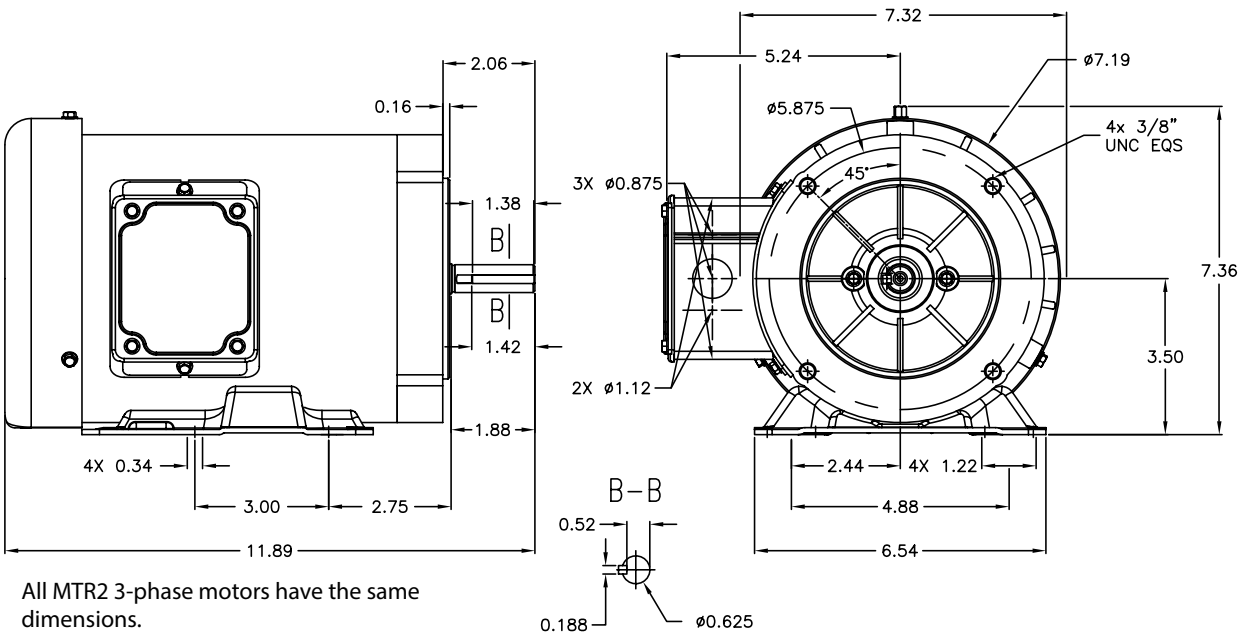
UNITS = INCHES

MTRP-xxx-3BDxx IronHorse Motors
(3-phase rolled steel)

IronHorse® Rolled-Steel AC Motors – 3-Phase

56C Frame TEFC Motors – Three-Phase – 0.33 to 3 hp – Dimensions

MTR2 Three-Phase
56C-Frame Motor Dimensions



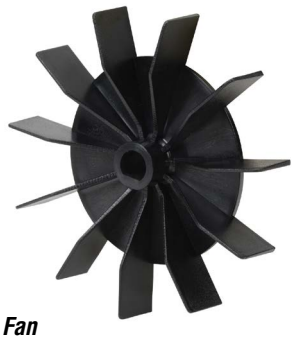
All MTR2 3-phase motors have the same dimensions.

IronHorse® AC Motor Accessories – 3-Phase

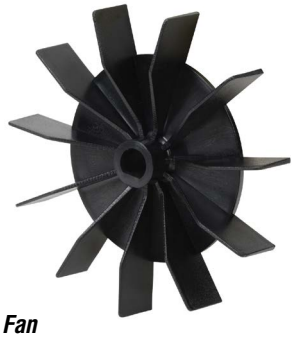
56C-Frame TEFC Motors – Three-Phase – 0.33 to 3 hp – Motor Accessories

Motor Base
MTAR-BASE-56

Fan
MTAR-FAN-56



Fan
MTA2-FAN-56



Fan
MTA2-FAN-56-1

Junction Box
MTAR-JBOX-56

Fan
Shroud
MTAR-SHROUD-56

MTR Series Three-Phase Motor Spare/Replacement Parts*				
Part Number	***Price***	***Accessory Type***	***Applicable MTR Motor Number***	***MTR Motor HP : RPM***
MTAR-BASE-56	$12.00	Motor base	MTR-xxx-xBDxx	All
MTAR-FAN-56	$12.00	Fan		
MTAR-JBOX-56	$12.00	Junction box		
MTAR-SHROUD-56	$12.00	Fan shroud		
**** These accessories are spare/replacement components only for MTR series IronHorse motors.***				

MTR2/MTRP Series Three-Phase Motor Spare/Replacement Parts				
Part Number	***Price***	***Accessory Type***	***Applicable MTRP Motor Number***	***MTRP Motor HP : RPM***
MTA2-BASE-56	$12.00	Motor base	MTRP-xxx-3BDxx MTR2-Pxx-3BDxx	All
MTA2-SHROUD-56	$12.00	Fan shroud		
MTA2-JBOX-56	$12.00	Junction box		
MTA2-FAN-56	$12.00	Fan	MTR2-Pxx-3BDxx	
MTA2-FAN-56-1*	$8.00	Fan	MTRP-xxx-3BDxx	
**** This accessory is a spare/replacement component only for MTRP series IronHorse motors.***				

AC Motor Selection – IronHorse® General Purpose Motors

IronHorse® General Purpose Motor Selection					
Characteristics	**1-Phase**		**3-Phase**		
	56C/56HC Frame Rolled Steel* **	**T Frame Farm Duty**	**56C/56HC Frame Rolled Steel*** **	**56C Frame Stainless Steel**	**Cast Iron T & TC Frames**
Electrical Characteristics					
Horsepower range	1/3 – 2	2 – 5	1/3 – 3	1/3 – 3/4	PE: 1–200(T); 1–100(TC) EPAct: 250–300(T)
Base speed (# Poles)	1800 (4), 3600 (2)	1800 (4)	1800 (4), 3600 (2)		1200(6), 1800 (4), 3600(2)
Standard Voltage	115/208-230, 115/230	230	208-230/460		208-230/460 (250 & 300 hp 460V only)
Phase / Base Frequency (Hz)	1 / 60		3 / 60		
Service Factor	1.15		1.15 (line) ; 1.0 (drive)		
Design Code (NEMA)	L, N	L	B		
Insulation Class	F				
Insulation System	dip & bake twice	VPI, then bake, then dip and bake	dip & bake	double dip & bake	EPAct: double dip & bake PE: VPI
Duty Cycle	continuous				
Thermal protection	none	yes	none		
Mechanical Characteristics					
Frame size (mounting)	56C or 56HC	182T – 184T	56C or 56HC		143T/TC – 405TC/449T
Enclosure	TEFC				
Frame material	rolled steel			304 stainless steel	cast iron
End bracket material	aluminum	cast iron	aluminum	304 stainless steel	cast iron
Junction box material	steel			304 stainless steel	cast iron
Fan guard material	steel	steel	steel	304 stainless steel	steel
Fan material	polypropylene plastic	plastic	plastic	heat-resistant polyethylene	plastic (143T/TC - 445/7T) aluminum (449T)
Lead termination	junction box				
Standard mounting	C-Face with Removable Rigid Base	Rigid Base	C-Face with Removable Rigid Base	C-Face with Rigid Base C-Face with Round Body	Rigid Base (C-Flange kit available EPAct) C-Face with Rigid Base (1-100 hp)
Drive end shaft slinger	yes				
Paint	black	green	black	n/a	EPAct: epoxy primer / synthetic alkyd enamel PE: polyurethane enamel
Bearings	ball				1-75 hp: ball 100-300 hp: roller
Grease	Mobil Polyrex EM			Korschun lithium-based	Mobil Polyrex EM
Standard junction box assembly position	F1				F1 (some sizes reversible to F2)
Performance Characteristics					
Constant Torque speed range	n/a	n/a	2:1 (MTR, MTSS); 4:1 (MTRP, MTR2)		2:1 (EPAct) 4:1 (Premium Efficiency)
Variable Torque speed range	n/a	n/a	5:1 (MTR, MTSS); 10:1 (MTRP, MTR2)		5:1 (EPAct) 10:1 (Premium Efficiency)
Constant Horsepower speed range	n/a	n/a	1.5:1		1.5:1
Temperature rise	F	B			
Encoder provisions	none				
Other Characteristics					
Warranty*	2 years			1 year	2 years
**Agency Approvals ** **	CE, $_{C}$CSA$_{US}$			$_{C}$CSA$_{US}$	CE, $_{C}$CSA$_{US}$

See Terms and Conditions for motor warranty explanation.

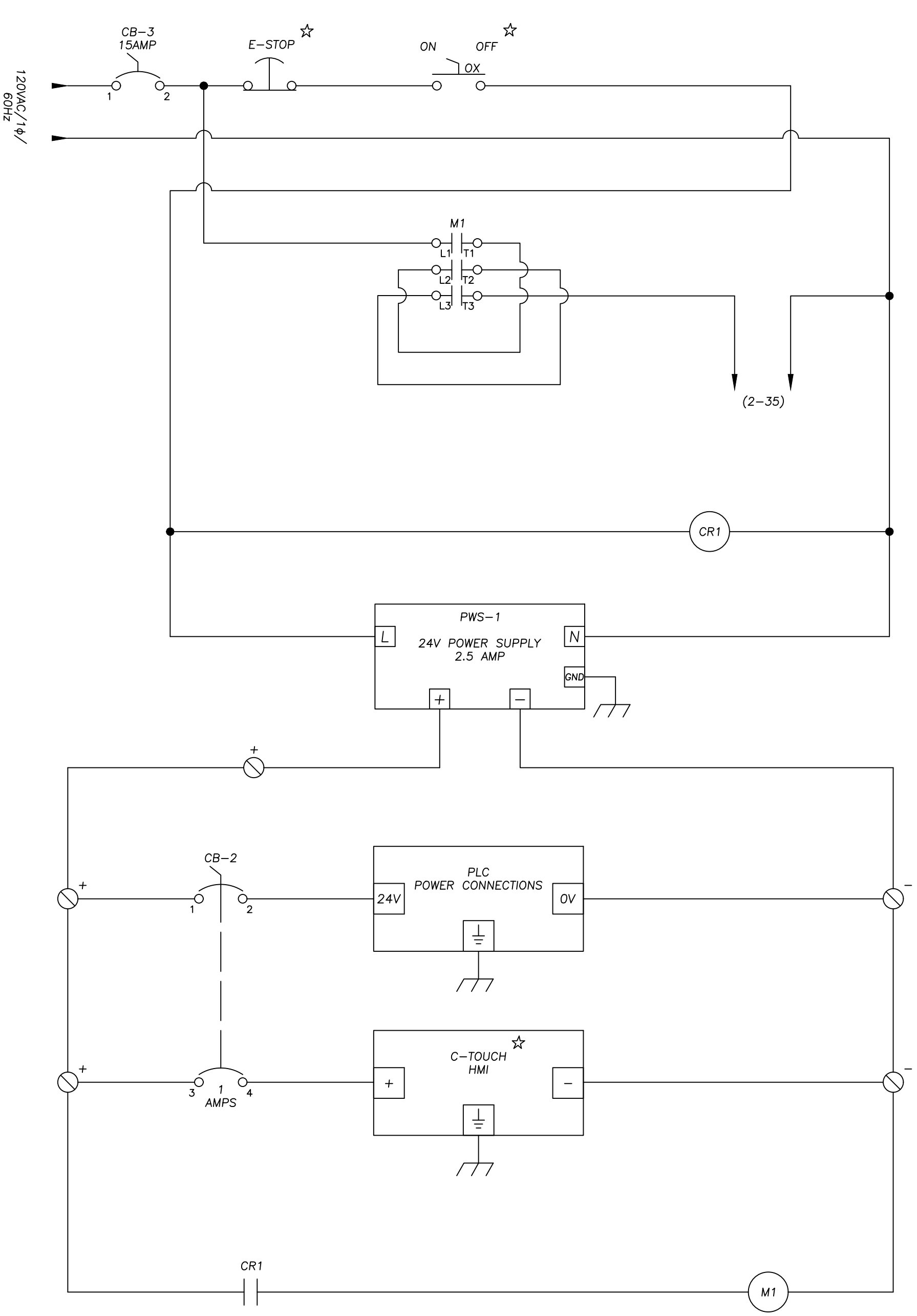
1) For warranty on IronHorse motors below 50 hp, warranty service can be arranged through AutomationDirect.

2) For warranty on IronHorse motors 50 hp and above, motors must be inspected by a local EASA motor repair or service center; (see AutomationDirect Terms & Conditions).

****** To obtain the most current agency approval information, see the Agency Approval Checklist on the specific part number's web page.***

******* 56HC motors are capable of 56C C-face mounting, and are also compatible with 56, 143T, and 145T foot mounting dimensions.***

120VAC POWER & 24VDC POWER



–	NONE	5 JUL 18	NLA	A S – B U I L T
LTR	ECN #	DATE	DRAFTSMAN	DESCRIPTION

CUSTOMER: SENIOR PROJECT

CSR. P.O.:

PROJECT: AUTOMATION DIRECT VFD CONTROL PANEL

PROJ DESC: 120VAC, 1ϕ, 60Hz VFD CONTROL PANEL W/ HMI AND PLC

STATUS: AS–BUILT – 05 JULY 2018

SCALE: NONE

ASSEMBLIES TO MAKE FROM THIS DRAWING:

FILE NMBR: SP–E–500010

DRWG TITLE: ELEMENTARY DIAGRAM

SHEET: 1

PROJECT NMBR: SP–E–500000

OF: 4

PLC AND VFD CONNECTIONS

AUTOMATION
DIRECT PLC
C0-12ARE-1-D

AD
1I

AD1I

ETHERNET
CONNECTION

FROM LINE 1-15

1L1

1L2

L1

L2

GND

T1

T2

T3

PE

M1

† 0.5 HP
230VAC
2.2FLA

RJ12
SERIAL
MODBUS
CONNECTION

–	NONE	5 JUL 18	NLA	AS-BUILT
LTTR	ECN #	DATE	DRAFTSMAN	DESCRIPTION

CUSTOMER: SENIOR PROJECT

CSR. P.O.:

PROJECT: AUTOMATION DIRECT VFD CONTROL PANEL

PROJ DESC: 120VAC, 1ϕ, 60Hz VFD CONTROL PANEL W/ HMI AND PLC

STATUS: AS-BUILT – 05 JULY 2018

SCALE: NONE

ASSEMBLIES TO MAKE FROM THIS DRAWING:

FILE NMBR: SP-E-500020

DRWG TITLE: ELEMENTARY DIAGRAM

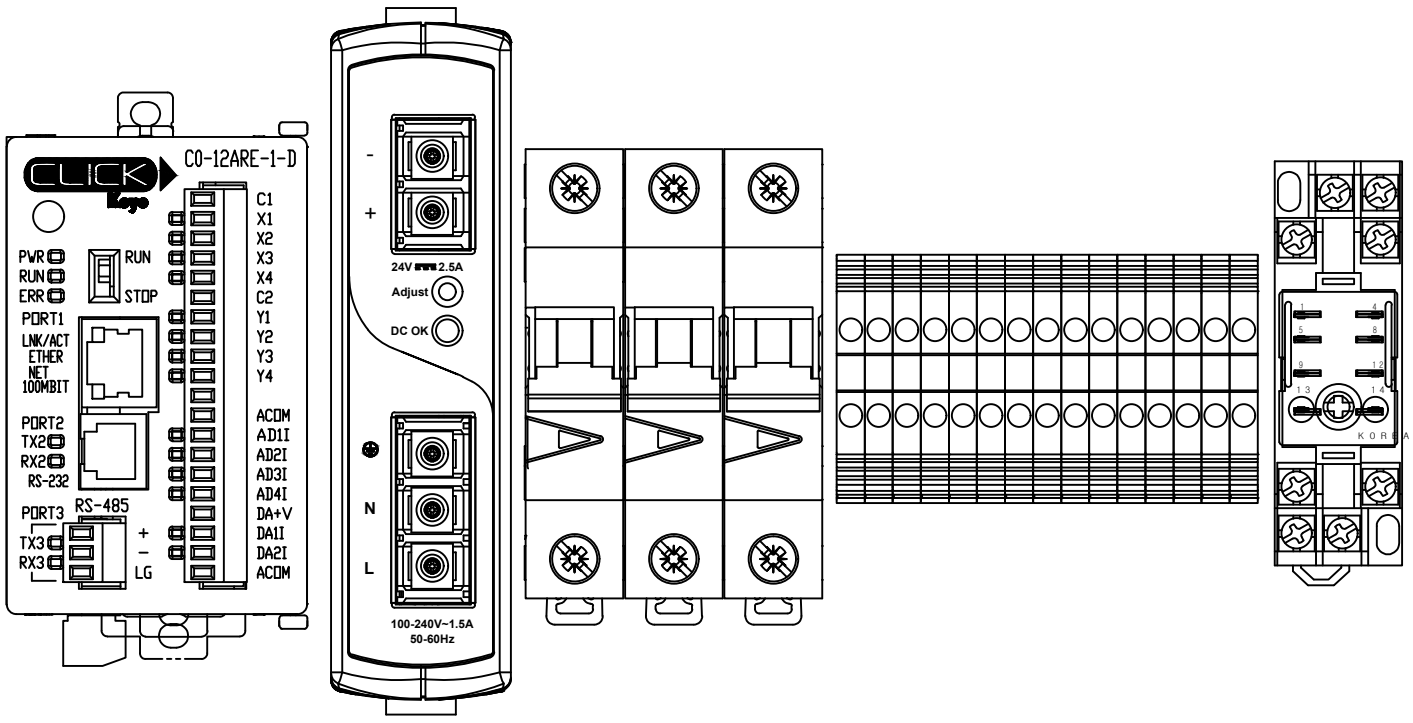
SHEET: 2

PROJECT NMBR: SP-E-500000

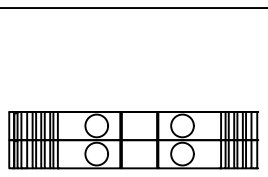
OF: 4

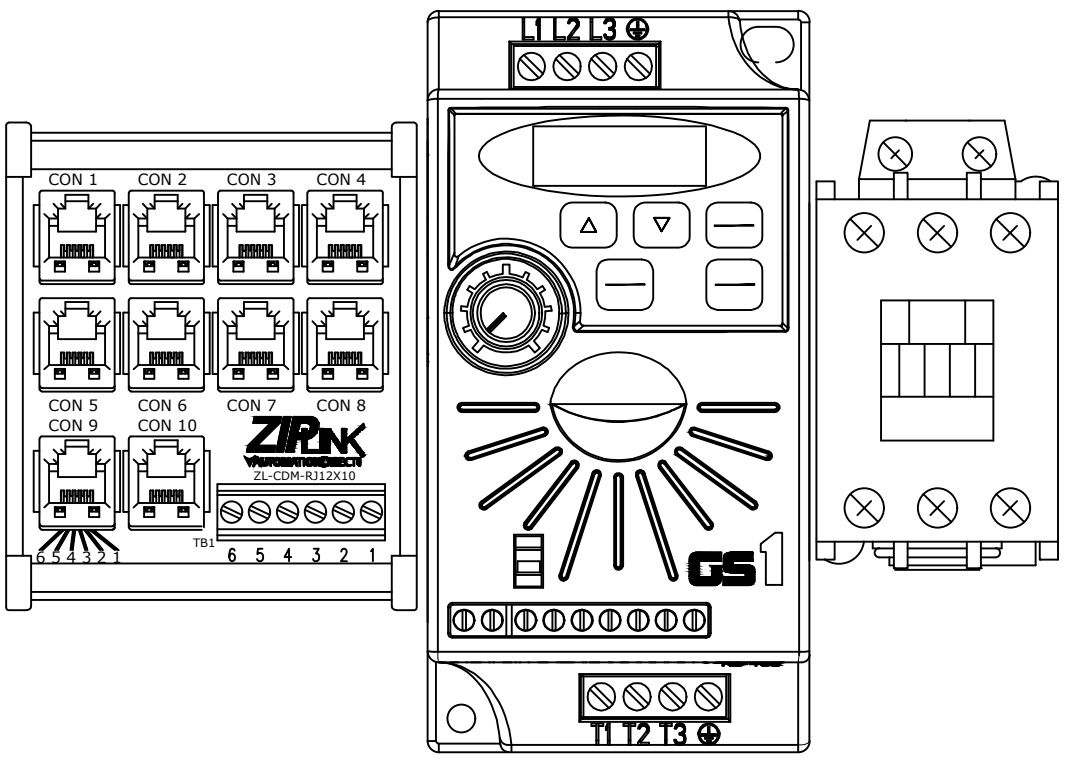
PANEL LAYOUT

1 ” x 1 ” WIRE DUCT



1 ” x 1 ” WIRE DUCT





1 ” x 1 ” WIRE DUCT

CUSTOMER: SENIOR PROJECT

CSR. P.O.:

PROJECT: AUTOMATION DIRECT VFD CONTROL PANEL

PROJ DESC: 120VAC, 1ϕ, 60Hz VFD CONTROL PANEL W/ HMI AND PLC

STATUS: AS-BUILT – 05 JULY 2018

LTR	ECN #	DATE	DRAFTSMAN	DESCRIPTION
–	NONE	5 JUL 18	NLA	AS – BUILT

SCALE: NONE

ASSEMBLIES TO MAKE FROM THIS DRAWING: 1

CAD FILE NAME: SP-E-500030

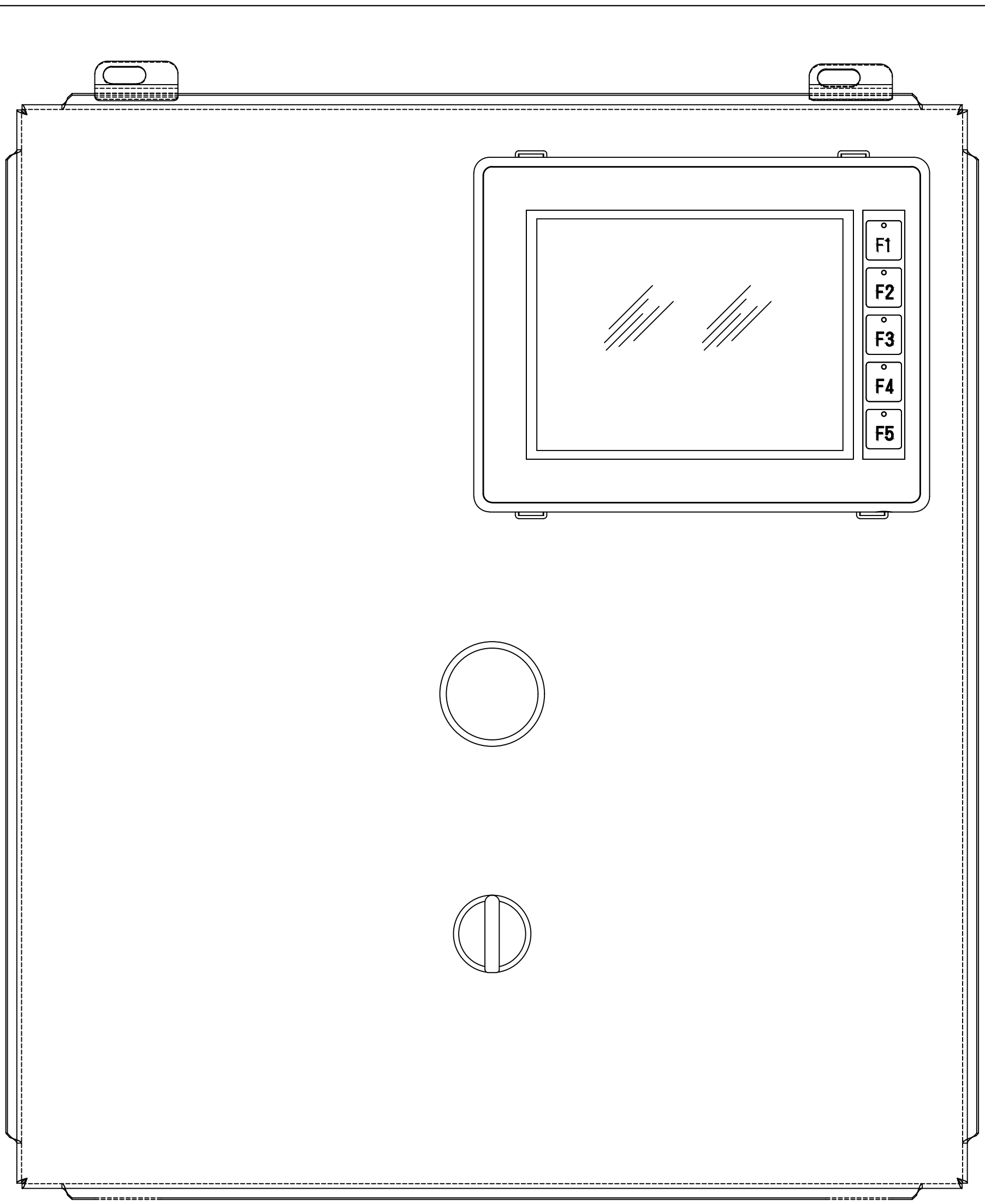
DRWG TITLE: ELEMENTARY DIAGRAM

DWRG NMBR: SP-E-500000

SHEET: 3

OF: 4

ENCLOSURE LAYOUT



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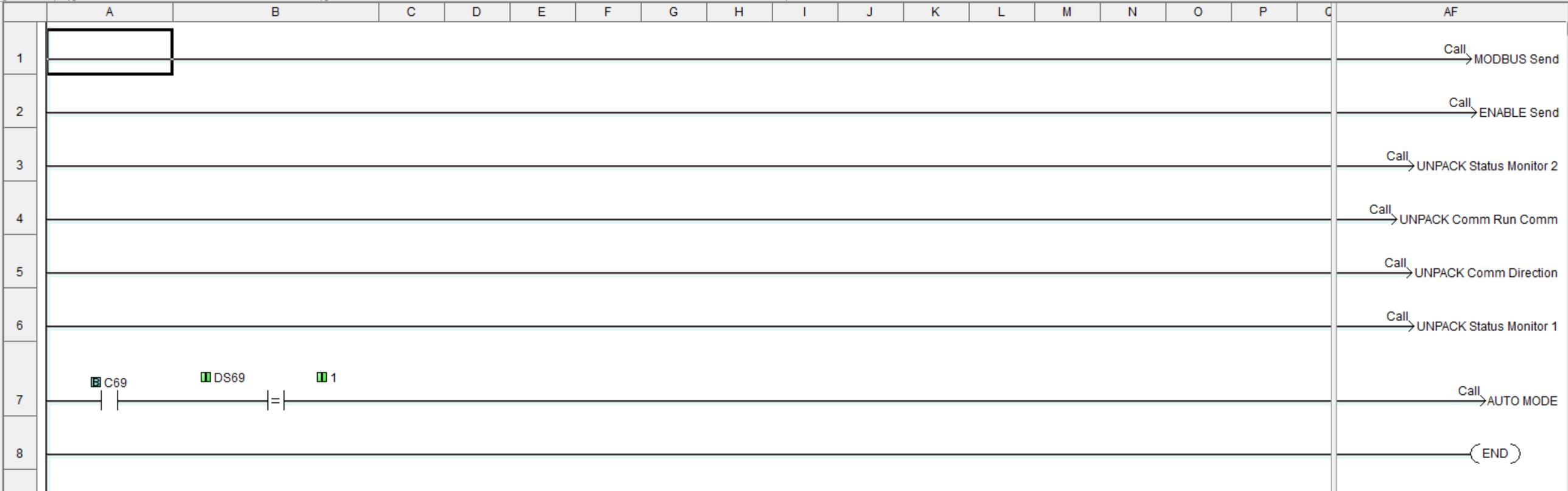
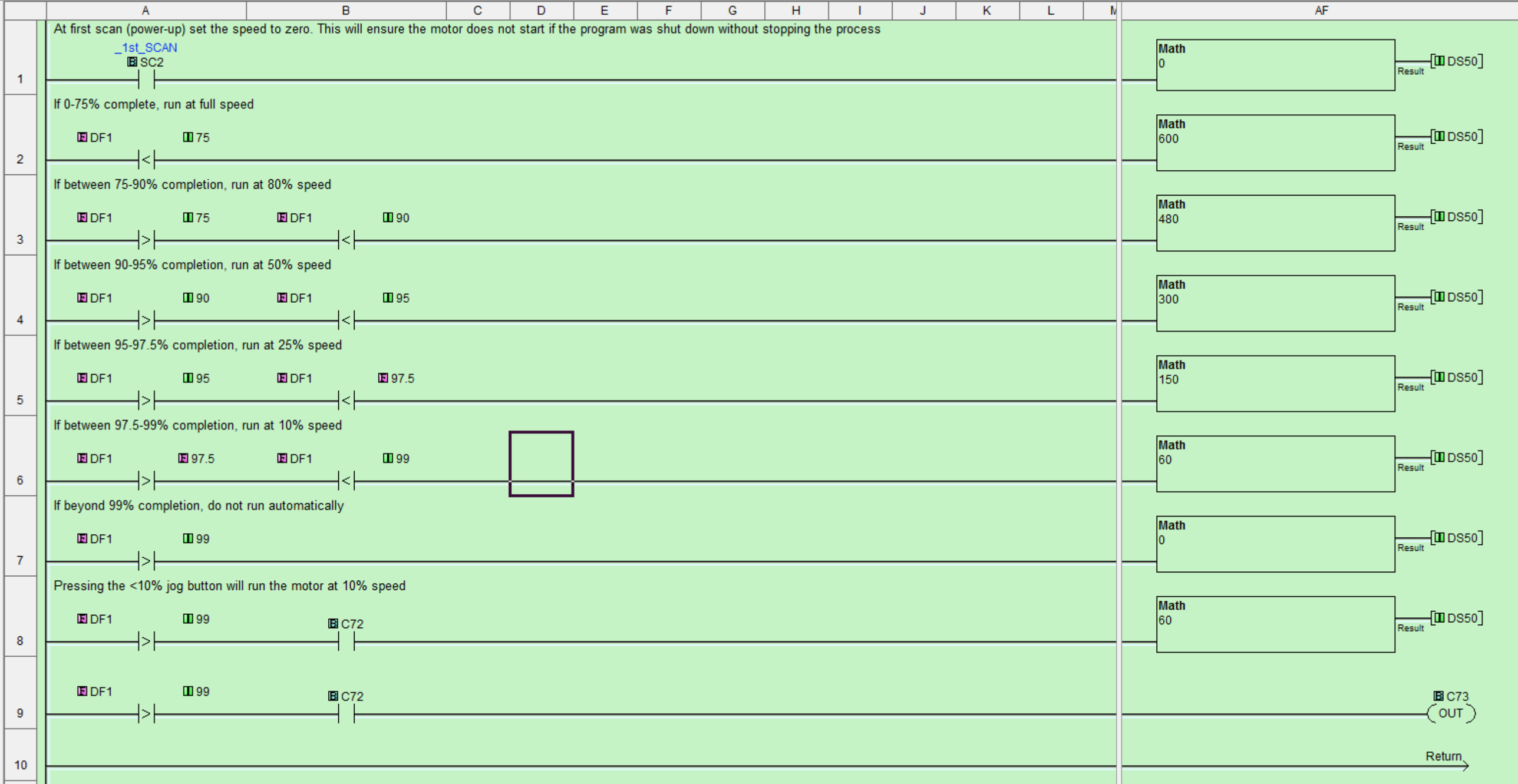
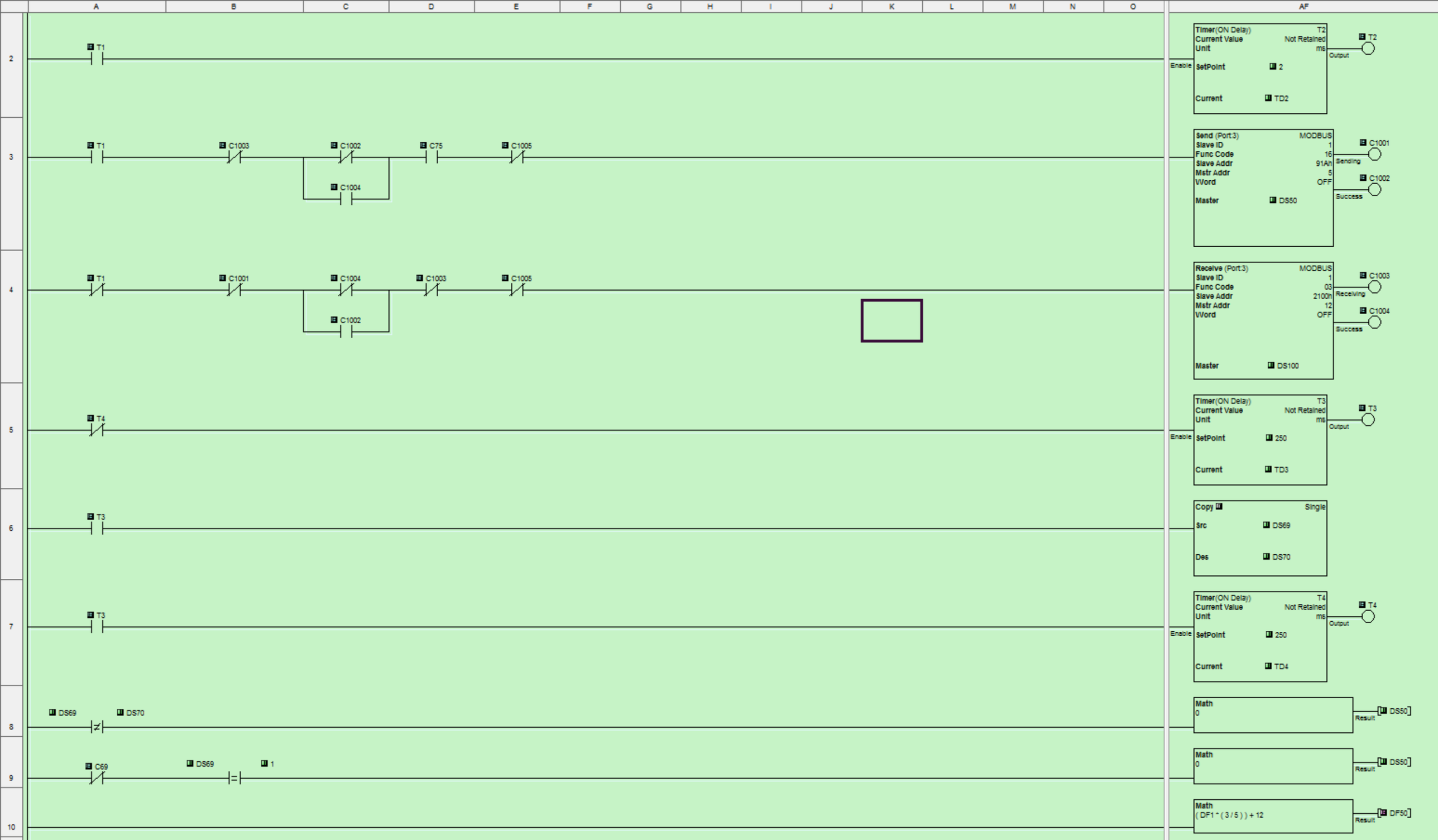
CSR. P.O.:		LTTR	ECN #	DATE	DRAFTSMAN	DESCRIPTION
PROJECT: AUTOMATION DIRECT VFD CONTROL PANEL		SCALE: NONE		ASSEMBLIES TO MAKE FROM THIS DRAWING: 1		CAD FILE NAME: SP–E–500040
PROJ DESC: 120VAC, 1ϕ, 60Hz VFD CONTROL PANEL W/ HMI AND PLC		DRWG TITLE: ELEMENTARY DIAGRAM				SHEET: 4
STATUS: AS–BUILT – 05 JULY 2018		DWRG NMBR: SP–E–500000				OF: 4


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
AF
1
2
3
4
5
6
7
8
Call
MODBUS Send
Call
ENABLE Send
Call
UNPACK Status Monitor 2
Call
UNPACK Comm Run Comm
Call
UNPACK Comm Direction
Call
UNPACK Status Monitor 1
C69
DS69
=
1
Call
AUTO MODE
END


A
B
C
D
E
F
G
H
I
J
K
L
M
AF
At first scan (power-up) set the speed to zero. This will ensure the motor does not start if the program was shut down without stopping the process
_1st_SCAN
SC2
Math
0
Result
DS50
If 0-75% complete, run at full speed
DF1
75
Math
600
If between 75-90% completion, run at 80% speed
DF1
75
DF1
90
Math
480
If between 90-95% completion, run at 50% speed
DF1
90
DF1
95
Math
300
If between 95-97.5% completion, run at 25% speed
DF1
95
DF1
97.5
Math
150
If between 97.5-99% completion, run at 10% speed
DF1
97.5
DF1
99
Math
60
If beyond 99% completion, do not run automatically
DF1
99
Math
0
Pressing the <10% jog button will run the motor at 10% speed
DF1
99
C72
Math
60
DF1
99
C72
C73
OUT
Return


A B C D E F G H I J K L M N O AF
2
T1
Timer(ON Delay) T2
Current Value Not Retained
Unit ms
Enable
SetPoint 2
Current TD2
T2
Output
3
T1
C1003
C1002
C75
C1005
C1004
Send (Port:3) MODBUS
Slave ID 1
Func Code 16
Slave Addr 91Ah
Mstr Addr 5
Word OFF
Master DS50
C1001
Sending
C1002
Success
4
T1
C1001
C1004
C1003
C1005
C1002
Receive (Port:3) MODBUS
Slave ID 1
Func Code 03
Slave Addr 2100h
Mstr Addr 12
Word OFF
Master DS100
C1003
Receiving
C1004
Success
5
T4
Timer(ON Delay) T3
Current Value Not Retained
Unit ms
Enable
SetPoint 250
Current TD3
T3
Output
6
T3
Copy Single
Src DS69
Des DS70
7
T3
Timer(ON Delay) T4
Current Value Not Retained
Unit ms
Enable
SetPoint 250
Current TD4
T4
Output
8
DS69
DS70
Math
0
Result DS50
9
C69
DS69
1
Math
0
Result DS50
10
Math
(DF1 * (3 / 5)) + 12
Result DF50

If the values have changed since the last scan, this will allow the Modbus communication to send data. This frees the communication line to be receiving if the data being sent is not changed.

Subroutine call for all MODBUS Send commands

1 Call MODBUS Send

Subroutine call to enable MODBUS Send when data changes are detected

2 Call ENABLE Send

Subroutine call for unpacking and monitoring Status Monitor 2 status bits (VFD address 0x2101)

3 Call UNPACK Status Monitor 2

Subroutine call for unpacking and monitoring RUN status bits (VFD address 0x091B)

4 Call UNPACK Comm Run Comm

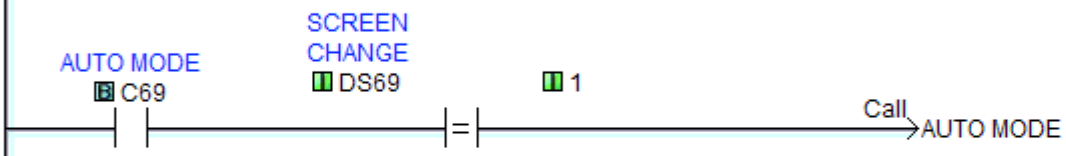
Subroutine call for unpacking and monitoring DIRECTION status bits (VFD address 0x091C)

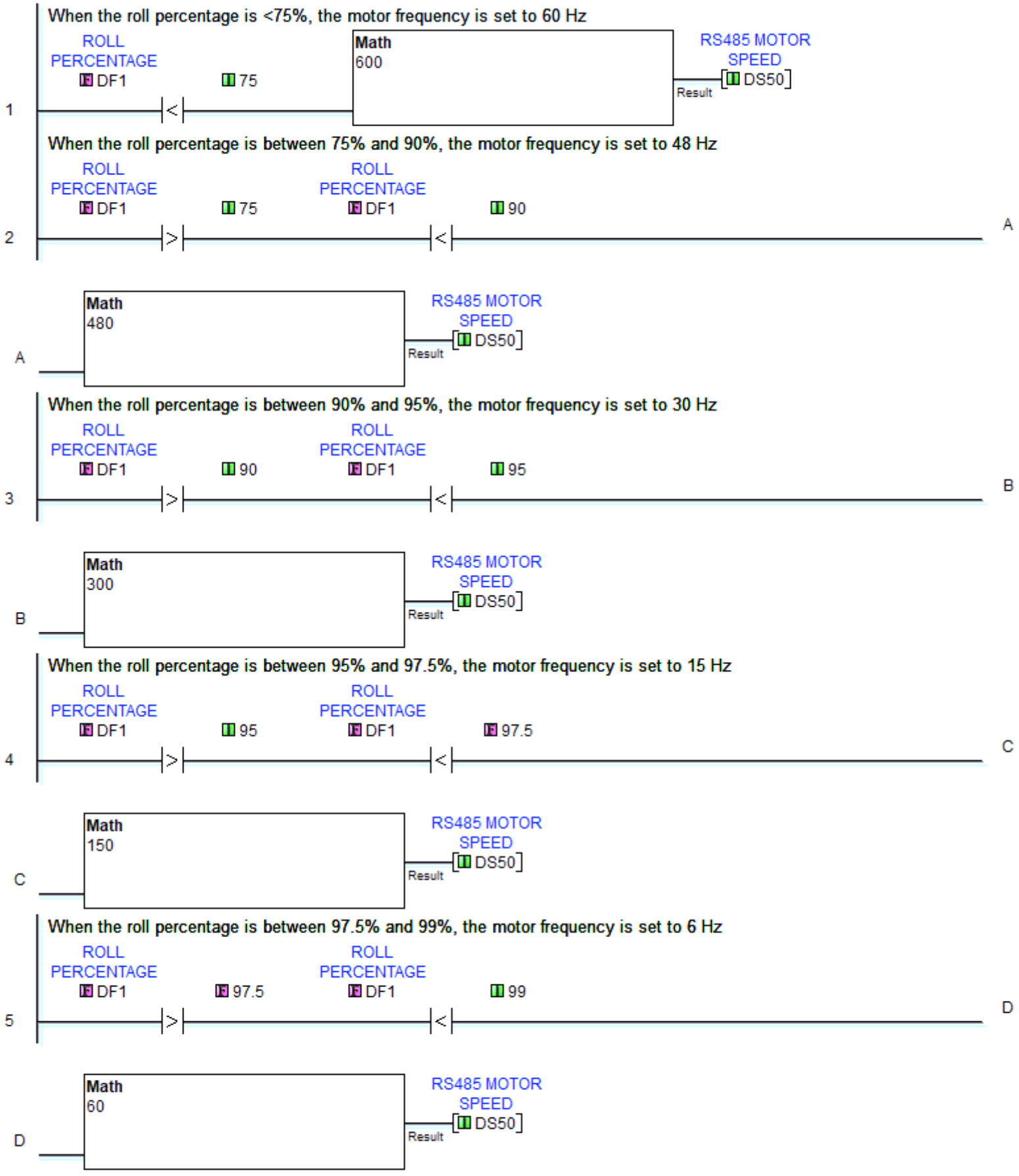
5 Call UNPACK Comm Direction

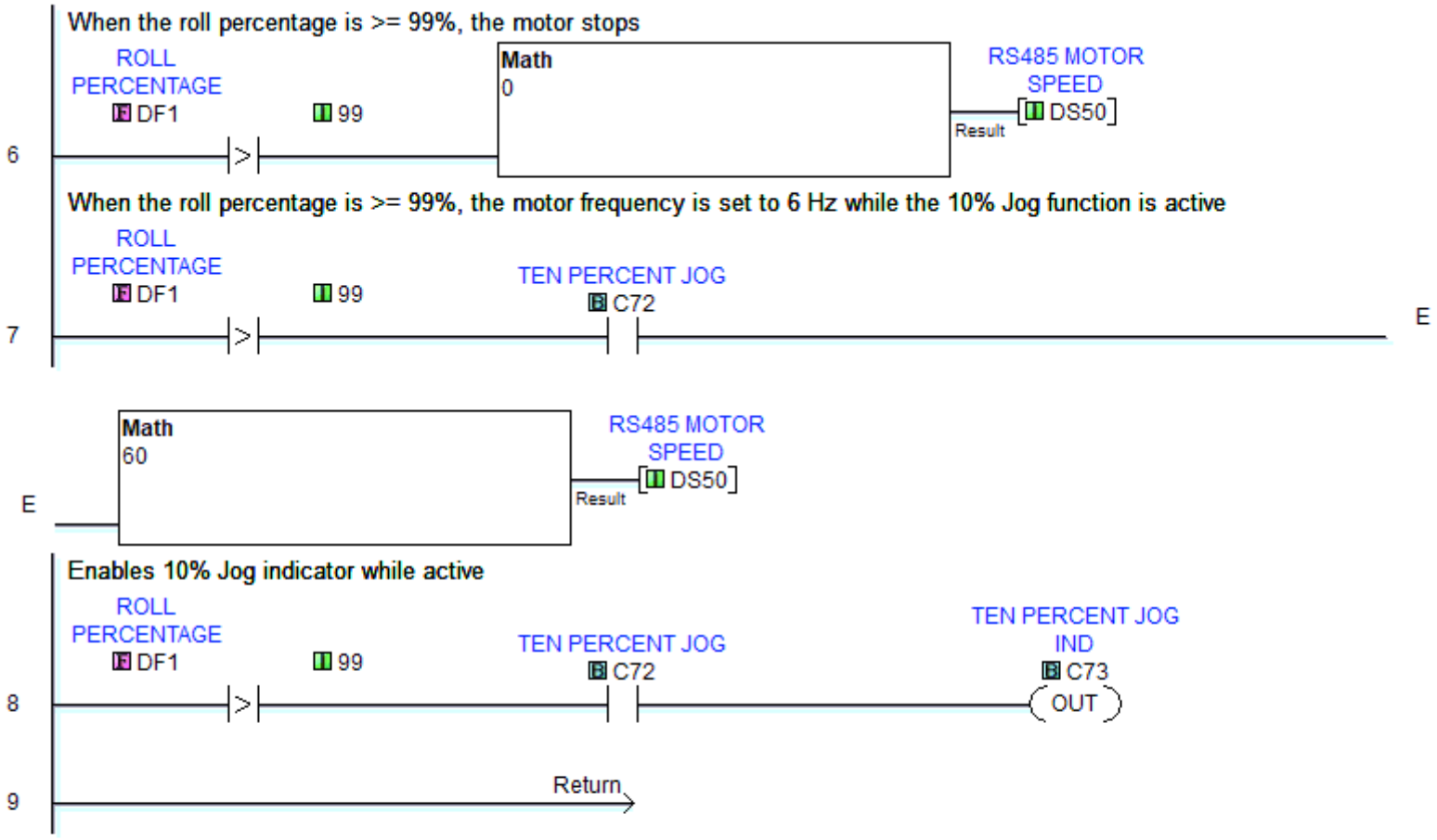
Subroutine call for unpacking and monitoring Status Monitor 1 status bits (VFD address 0x2100)

6 Call UNPACK Status Monitor 1

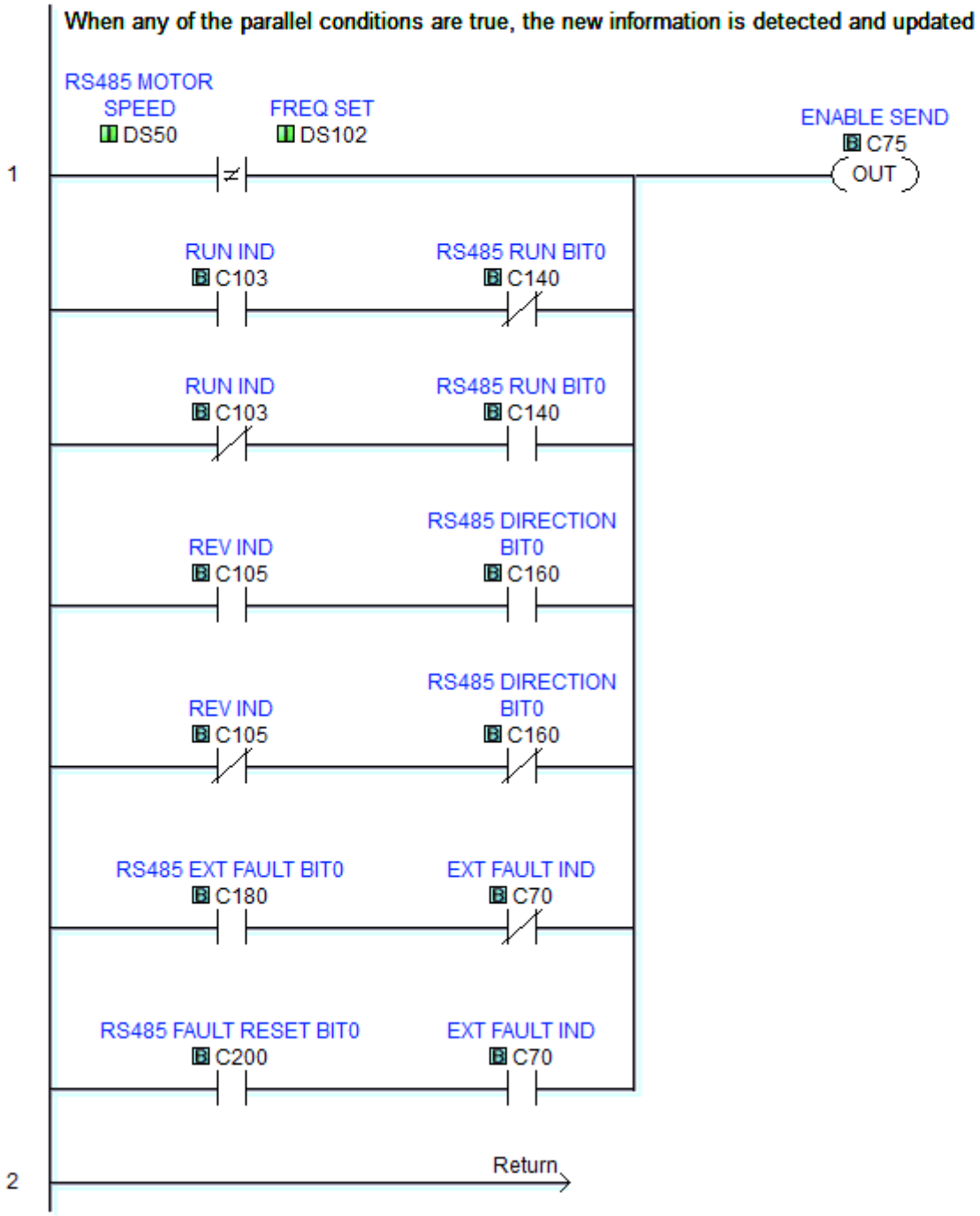
Subroutine call for all AUTO Mode functionality



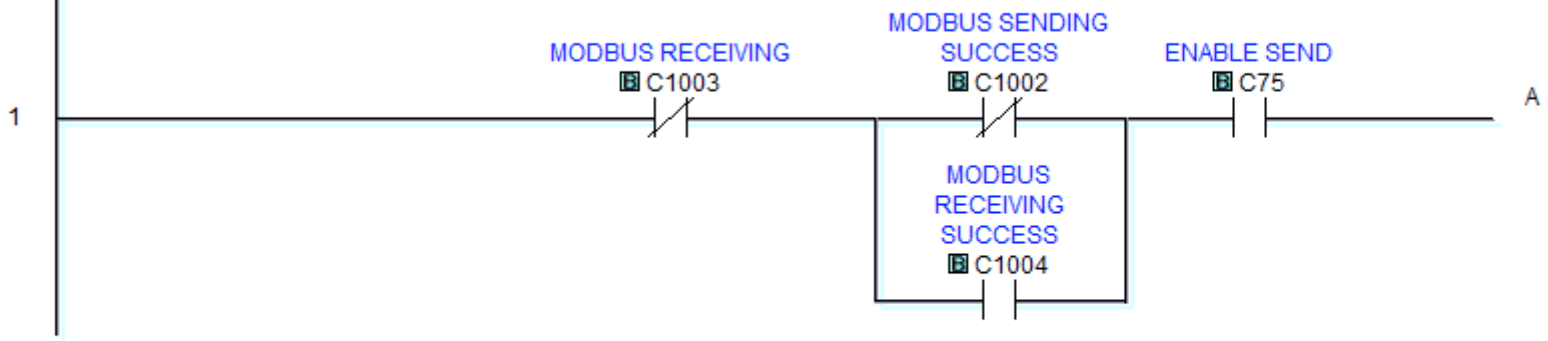

When the roll percentage is <75%, the motor frequency is set to 60 Hz
ROLL PERCENTAGE
DF1
75
Math
600
RS485 MOTOR SPEED
DS50
Result
1
When the roll percentage is between 75% and 90%, the motor frequency is set to 48 Hz
ROLL PERCENTAGE
DF1
75
ROLL PERCENTAGE
DF1
90
2
A
A
Math
480
RS485 MOTOR SPEED
DS50
Result
When the roll percentage is between 90% and 95%, the motor frequency is set to 30 Hz
ROLL PERCENTAGE
DF1
90
ROLL PERCENTAGE
DF1
95
3
B
B
Math
300
RS485 MOTOR SPEED
DS50
Result
When the roll percentage is between 95% and 97.5%, the motor frequency is set to 15 Hz
ROLL PERCENTAGE
DF1
95
ROLL PERCENTAGE
DF1
97.5
4
C
C
Math
150
RS485 MOTOR SPEED
DS50
Result
When the roll percentage is between 97.5% and 99%, the motor frequency is set to 6 Hz
ROLL PERCENTAGE
DF1
97.5
ROLL PERCENTAGE
DF1
99
5
D
D
Math
60
RS485 MOTOR SPEED
DS50
Result

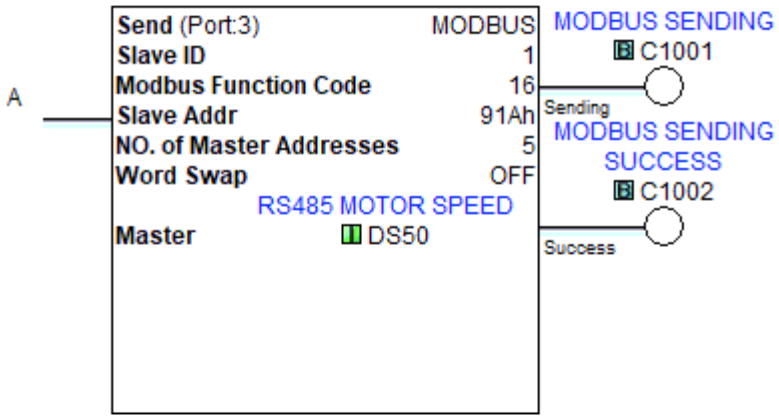

When the roll percentage is >= 99%, the motor stops
ROLL PERCENTAGE
DF1
99
Math
0
RS485 MOTOR SPEED
DS50
Result
6
When the roll percentage is >= 99%, the motor frequency is set to 6 Hz while the 10% Jog function is active
ROLL PERCENTAGE
DF1
99
TEN PERCENT JOG
C72
7
E
Math
60
RS485 MOTOR SPEED
DS50
Result
E
Enables 10% Jog indicator while active
ROLL PERCENTAGE
DF1
99
TEN PERCENT JOG
C72
TEN PERCENT JOG IND
C73
OUT
8
Return
9

When any of the parallel conditions are true, the new information is detected and updated on the HMI

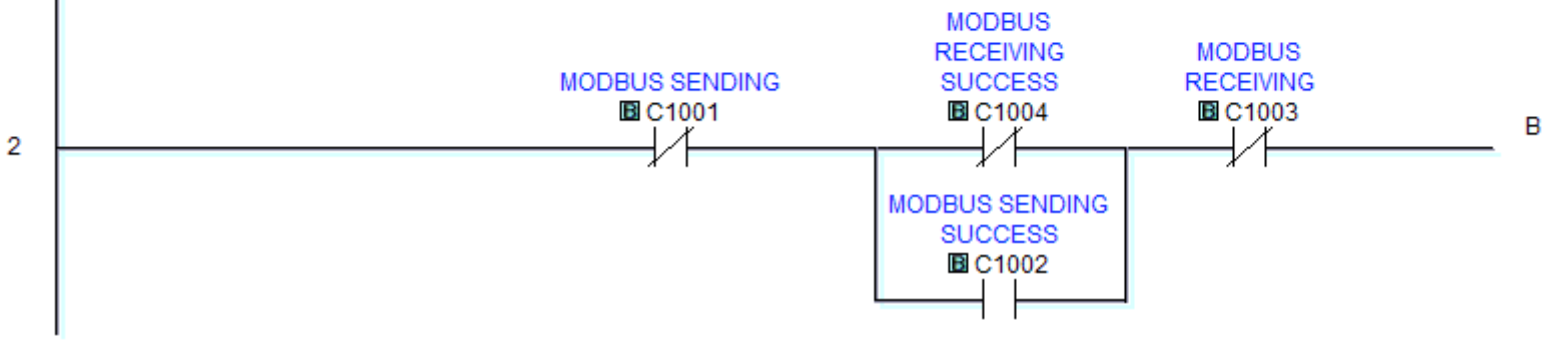


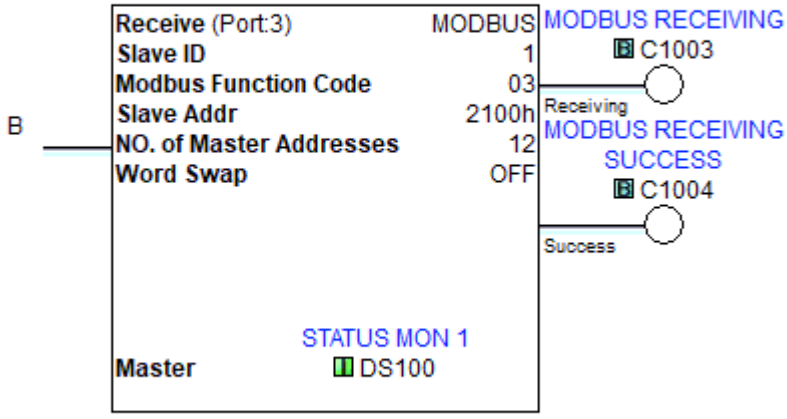
Sends data to addresses starting at the motor speed to the VFD over RS485 MODBUS RTU with half-duplex logic to ensure all Receiving has completed

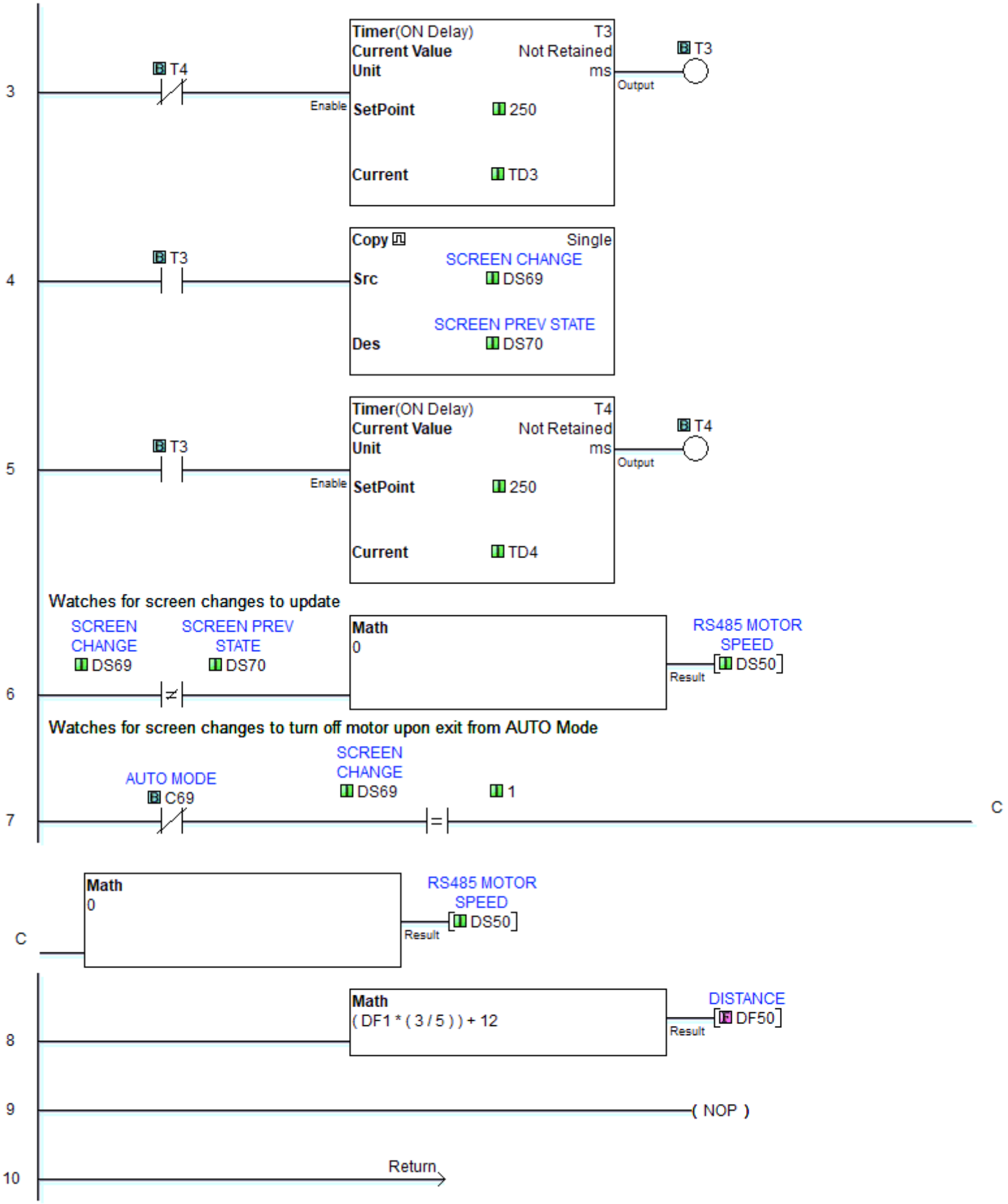


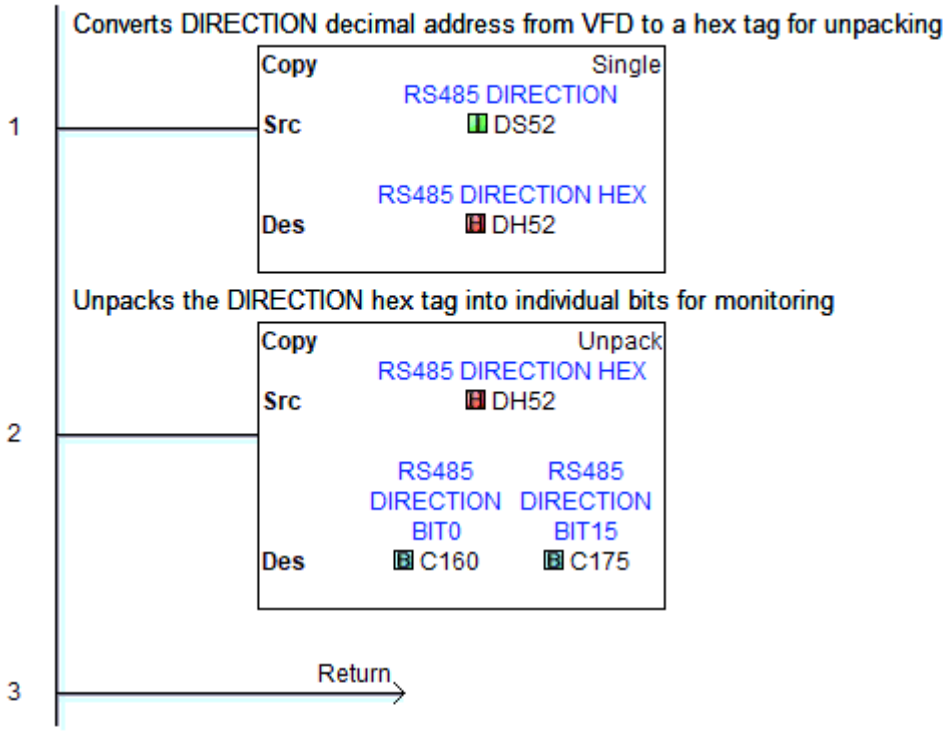


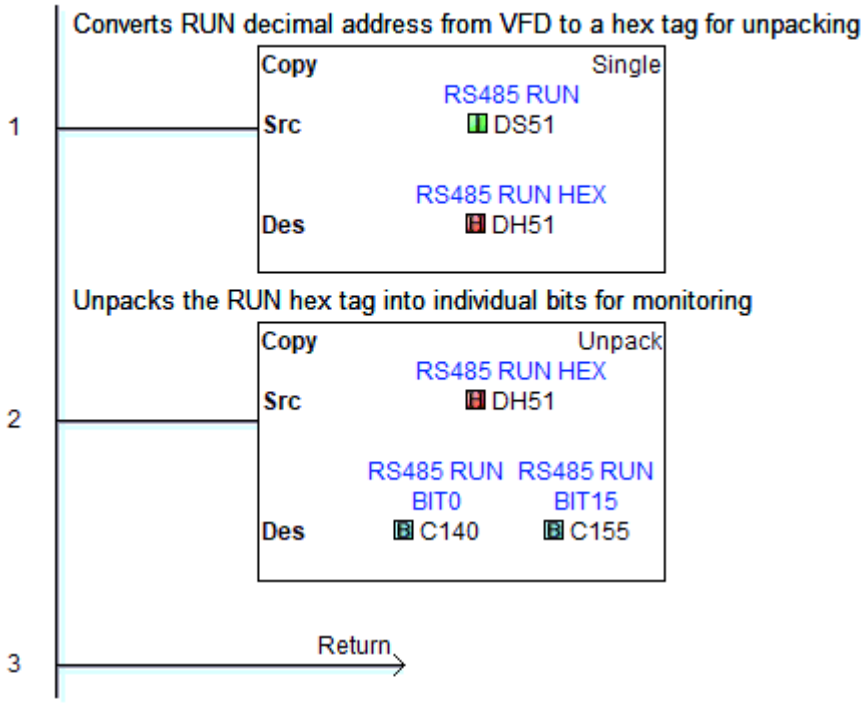
Receives data from addresses starting at Status Monitor 1 from the VFD over RS485 MODBUS RTU with half-duplex logic to ensure all Sending has completed

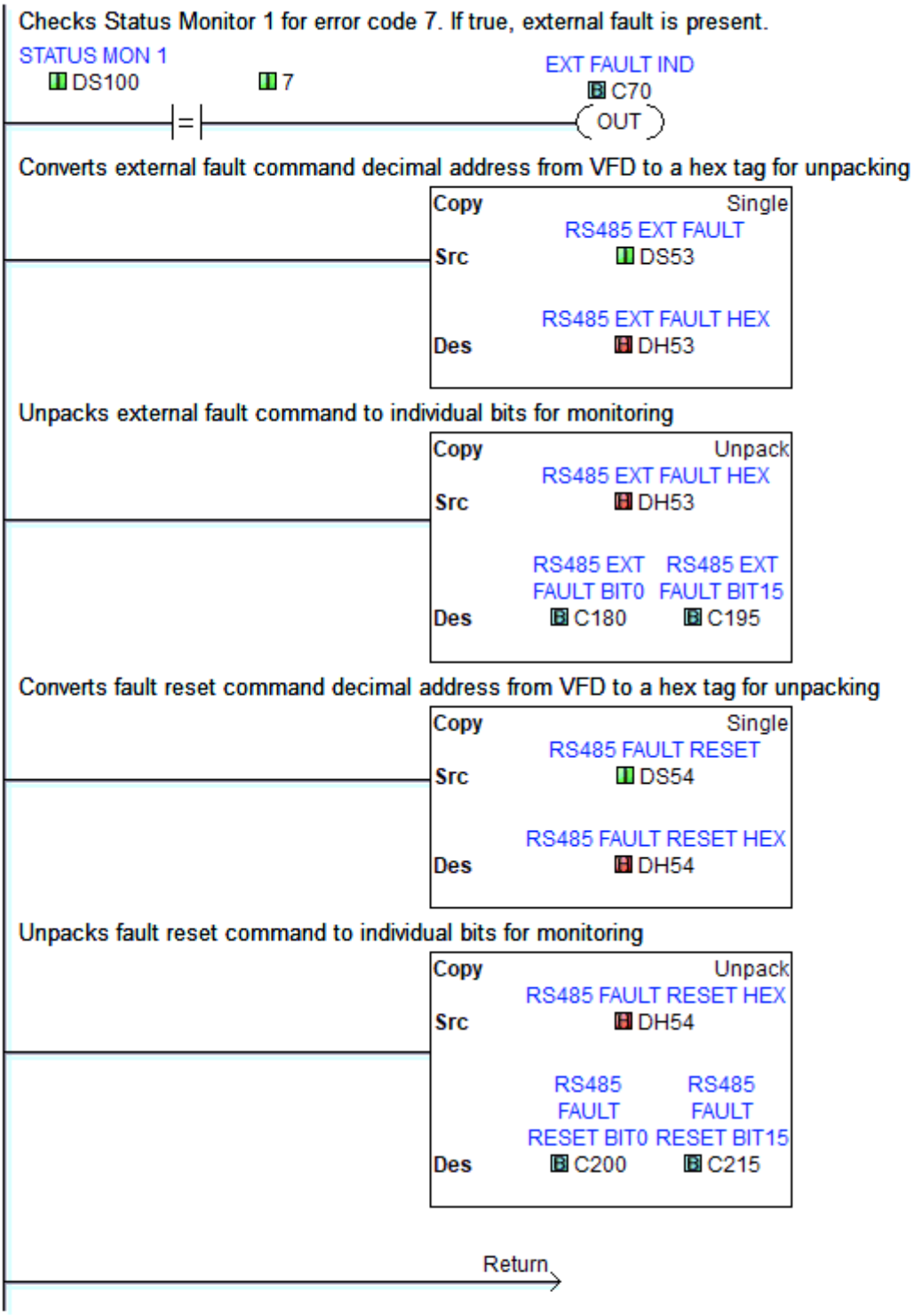





3
T4
Enable
Timer(ON Delay) T3
Current Value Not Retained
Unit ms
SetPoint 250
Current TD3
Output
T3
4
T3
Copy Single
SCREEN CHANGE
Src DS69
SCREEN PREV STATE
Des DS70
5
T3
Enable
Timer(ON Delay) T4
Current Value Not Retained
Unit ms
SetPoint 250
Current TD4
Output
T4
Watches for screen changes to update
SCREEN CHANGE DS69
SCREEN PREV STATE DS70
6
Math
0
Result
RS485 MOTOR SPEED DS50
Watches for screen changes to turn off motor upon exit from AUTO Mode
AUTO MODE C69
SCREEN CHANGE DS69
1
7
C
C
Math
0
Result
RS485 MOTOR SPEED DS50
8
Math
(DF1 * (3 / 5)) + 12
Result
DISTANCE DF50
9
(NOP)
10
Return

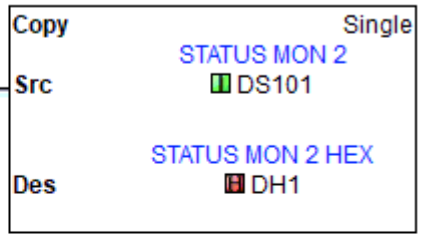

Converts DIRECTION decimal address from VFD to a hex tag for unpacking
1
Copy
Single
RS485 DIRECTION
Src
DS52
RS485 DIRECTION HEX
Des
DH52
Unpacks the DIRECTION hex tag into individual bits for monitoring
2
Copy
Unpack
RS485 DIRECTION HEX
Src
DH52
RS485 DIRECTION BIT0
RS485 DIRECTION BIT15
Des
C160
C175
3
Return


Converts RUN decimal address from VFD to a hex tag for unpacking
Copy
Single
RS485 RUN
1
Src
DS51
RS485 RUN HEX
Des
DH51
Unpacks the RUN hex tag into individual bits for monitoring
Copy
Unpack
RS485 RUN HEX
2
Src
DH51
RS485 RUN BIT0
RS485 RUN BIT15
Des
C140
C155
Return
3


Checks Status Monitor 1 for error code 7. If true, external fault is present.
STATUS MON 1
DS100
7
EXT FAULT IND
C70
OUT
1
Converts external fault command decimal address from VFD to a hex tag for unpacking
Copy
Single
RS485 EXT FAULT
Src
DS53
RS485 EXT FAULT HEX
Des
DH53
2
Unpacks external fault command to individual bits for monitoring
Copy
Unpack
RS485 EXT FAULT HEX
Src
DH53
RS485 EXT FAULT BIT0
RS485 EXT FAULT BIT15
Des
C180
C195
3
Converts fault reset command decimal address from VFD to a hex tag for unpacking
Copy
Single
RS485 FAULT RESET
Src
DS54
RS485 FAULT RESET HEX
Des
DH54
4
Unpacks fault reset command to individual bits for monitoring
Copy
Unpack
RS485 FAULT RESET HEX
Src
DH54
RS485 FAULT RESET BIT0
RS485 FAULT RESET BIT15
Des
C200
C215
5
Return
6

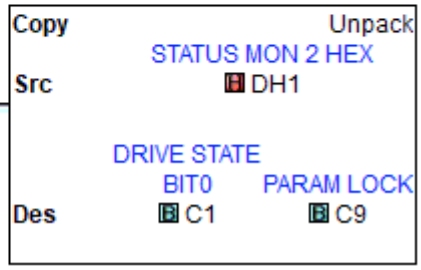
Converts Status Monitor 2 decimal address from VFD to a hex tag for unpacking

1



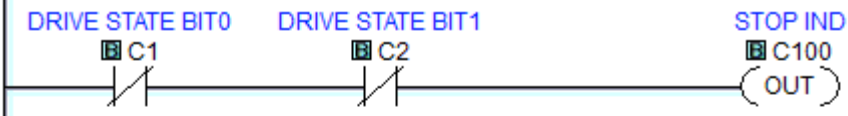
Unpacks the Status Monitor 2 hex tag into individual bits for monitoring

2



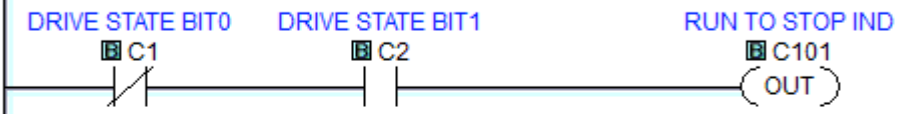
Checks DRIVE STATE Bits 0 and 1 for motor STOP state

3



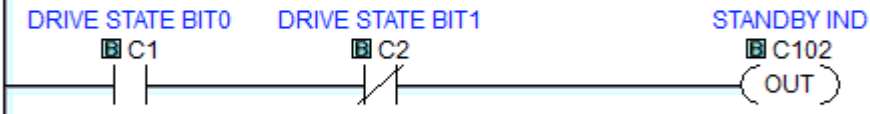
Checks DRIVE STATE Bits 0 and 1 for motor RUN to STOP transition state

4



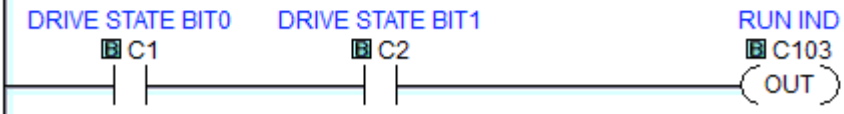
Checks DRIVE STATE Bits 0 and 1 for motor STANDBY state

5



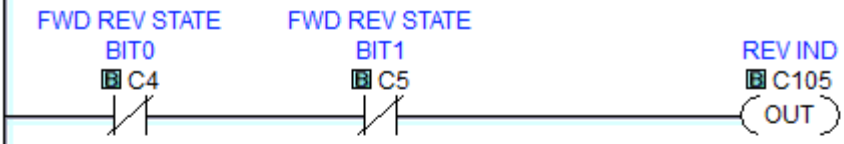
Checks DRIVE STATE Bits 0 and 1 for motor RUN state

6



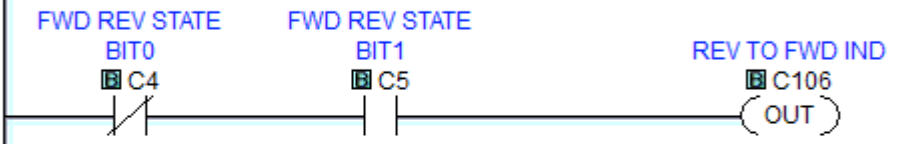
Checks FWD REV STATE Bits 0 and 1 for motor REVERSE state

7



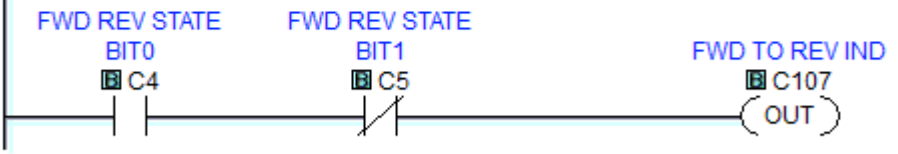
Checks FWD REV STATE Bits 0 and 1 for motor REVERSE to FORWARD transition state

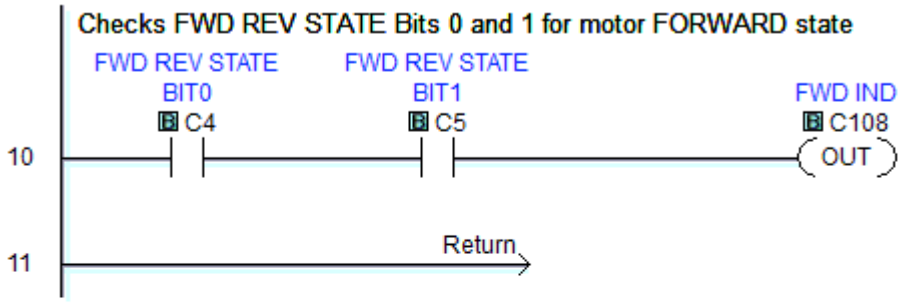
8



Checks FWD REV STATE Bits 0 and 1 for motor FORWARD to REVERSE transition state

9




Checks FWD REV STATE Bits 0 and 1 for motor FORWARD state
FWD REV STATE
BIT0
B C4
FWD REV STATE
BIT1
B C5
FWD IND
B C108
OUT
10
Return
11

Address Picker(Page 1 of 6)

Address	Nickname	DataType	InitialValue	Retentive	Comment
C1	DRIVE STATE BIT0	Bit	Off	No	
C2	DRIVE STATE BIT1	Bit	Off	No	
C3	JOG ACTIVE BIT	Bit	Off	No	
C4	FWD REV STATE BIT0	Bit	Off	No	
C5	FWD REV STATE BIT1	Bit	Off	No	
C6	SERIAL MOTOR FREQ SOURCE	Bit	Off	No	
C7	ANALOG INPUT FREQ SOURCE	Bit	Off	No	
C8	SERIAL MOTOR CONTROL	Bit	Off	No	
C9	PARAM LOCK	Bit	Off	No	
C69	AUTO MODE	Bit	Off	No	
C70	EXT FAULT IND	Bit	Off	No	
C72	TEN PERCENT JOG	Bit	Off	No	
C73	TEN PERCENT JOG IND	Bit	Off	No	
C75	ENABLE SEND	Bit	Off	No	
C100	STOP IND	Bit	Off	No	
C101	RUN TO STOP IND	Bit	Off	No	
C102	STANDBY IND	Bit	Off	No	
C103	RUN IND	Bit	Off	No	
C105	REV IND	Bit	Off	No	
C106	REV TO FWD IND	Bit	Off	No	
C107	FWD TO REV IND	Bit	Off	No	
C108	FWD IND	Bit	Off	No	
C140	RS485 RUN BIT0	Bit	Off	No	
C141	RS485 RUN BIT1	Bit	Off	No	
C142	RS485 RUN BIT2	Bit	Off	No	
C143	RS485 RUN BIT3	Bit	Off	No	
C144	RS485 RUN BIT4	Bit	Off	No	
C145	RS485 RUN BIT5	Bit	Off	No	
C146	RS485 RUN BIT6	Bit	Off	No	
C147	RS485 RUN BIT7	Bit	Off	No	
C148	RS485 RUN BIT8	Bit	Off	No	
C149	RS485 RUN BIT9	Bit	Off	No	
C150	RS485 RUN BIT10	Bit	Off	No	
C151	RS485 RUN BIT11	Bit	Off	No	
C152	RS485 RUN BIT12	Bit	Off	No	
C153	RS485 RUN BIT13	Bit	Off	No	
C154	RS485 RUN BIT14	Bit	Off	No	
C155	RS485 RUN BIT15	Bit	Off	No	
C160	RS485 DIRECTION BIT0	Bit	Off	No	
C161	RS485 DIRECTION BIT1	Bit	Off	No	
C162	RS485 DIRECTION BIT2	Bit	Off	No	
C163	RS485 DIRECTION BIT3	Bit	Off	No	
C164	RS485 DIRECTION BIT4	Bit	Off	No	
C165	RS485 DIRECTION BIT5	Bit	Off	No	
C166	RS485 DIRECTION BIT6	Bit	Off	No	
C167	RS485 DIRECTION BIT7	Bit	Off	No	
C168	RS485 DIRECTION BIT8	Bit	Off	No	
C169	RS485 DIRECTION BIT9	Bit	Off	No	
C170	RS485 DIRECTION BIT10	Bit	Off	No	
C171	RS485 DIRECTION BIT11	Bit	Off	No	
C172	RS485 DIRECTION BIT12	Bit	Off	No	
C173	RS485 DIRECTION BIT13	Bit	Off	No	

Address Picker(Page 2 of 6)

Address	Nickname	DataType	InitialValue	Retentive	Comment
C174	RS485 DIRECTION BIT14	Bit	Off	No	
C175	RS485 DIRECTION BIT15	Bit	Off	No	
C180	RS485 EXT FAULT BIT0	Bit	Off	No	
C181	RS485 EXT FAULT BIT1	Bit	Off	No	
C182	RS485 EXT FAULT BIT2	Bit	Off	No	
C183	RS485 EXT FAULT BIT3	Bit	Off	No	
C184	RS485 EXT FAULT BIT4	Bit	Off	No	
C185	RS485 EXT FAULT BIT5	Bit	Off	No	
C186	RS485 EXT FAULT BIT6	Bit	Off	No	
C187	RS485 EXT FAULT BIT7	Bit	Off	No	
C188	RS485 EXT FAULT BIT8	Bit	Off	No	
C189	RS485 EXT FAULT BIT9	Bit	Off	No	
C190	RS485 EXT FAULT BIT10	Bit	Off	No	
C191	RS485 EXT FAULT BIT11	Bit	Off	No	
C192	RS485 EXT FAULT BIT12	Bit	Off	No	
C193	RS485 EXT FAULT BIT13	Bit	Off	No	
C194	RS485 EXT FAULT BIT14	Bit	Off	No	
C195	RS485 EXT FAULT BIT15	Bit	Off	No	
C200	RS485 FAULT RESET BIT0	Bit	Off	No	
C201	RS485 FAULT RESET BIT1	Bit	Off	No	
C202	RS485 FAULT RESET BIT2	Bit	Off	No	
C203	RS485 FAULT RESET BIT3	Bit	Off	No	
C204	RS485 FAULT RESET BIT4	Bit	Off	No	
C205	RS485 FAULT RESET BIT5	Bit	Off	No	
C206	RS485 FAULT RESET BIT6	Bit	Off	No	
C207	RS485 FAULT RESET BIT7	Bit	Off	No	
C208	RS485 FAULT RESET BIT8	Bit	Off	No	
C209	RS485 FAULT RESET BIT9	Bit	Off	No	
C210	RS485 FAULT RESET BIT10	Bit	Off	No	
C211	RS485 FAULT RESET BIT11	Bit	Off	No	
C212	RS485 FAULT RESET BIT12	Bit	Off	No	
C213	RS485 FAULT RESET BIT13	Bit	Off	No	
C214	RS485 FAULT RESET BIT14	Bit	Off	No	
C215	RS485 FAULT RESET BIT15	Bit	Off	No	
C1001	MODBUS SENDING	Bit	Off	No	
C1002	MODBUS SENDING SUCCESS	Bit	Off	No	
C1003	MODBUS RECEIVING	Bit	Off	No	
C1004	MODBUS RECEIVING SUCCESS	Bit	Off	No	

Address	Nickname	DataType	InitialValue	Retentive	Comment
DS50	RS485 MOTOR SPEED	Integer	Disable	Yes	
DS51	RS485 RUN	Integer	Disable	Yes	
DS52	RS485 DIRECTION	Integer	Disable	Yes	
DS53	RS485 EXT FAULT	Integer	Disable	Yes	
DS54	RS485 FAULT RESET	Integer	Disable	Yes	
DS69	SCREEN CHANGE	Integer	Disable	Yes	
DS70	SCREEN PREV STATE	Integer	Disable	Yes	
DS100	STATUS MON 1	Integer	Disable	Yes	
DS101	STATUS MON 2	Integer	Disable	Yes	
DS102	FREQ SET	Integer	Disable	Yes	

Address	Nickname	DataType	InitialValue	Retentive	Comment
DF1	ROLL PERCENTAGE	Float	Disable	Yes	
DF5	SPEED COMMAND	Float	Disable	Yes	
DF50	DISTANCE	Float	Disable	Yes	

Address	Nickname	DataType	InitialValue	Retentive	Comment
DH1	STATUS MON 2 HEX	Hex	Disable	Yes	
DH51	RS485 RUN HEX	Hex	Disable	Yes	
DH52	RS485 DIRECTION HEX	Hex	Disable	Yes	
DH53	RS485 EXT FAULT HEX	Hex	Disable	Yes	
DH54	RS485 FAULT RESET HEX	Hex	Disable	Yes	

Address	Nickname	DataType	InitialValue	Retentive	Comment
SD50	_Port2_Received_Data_Len	Integer	0	No	
SD60	_Port3_Received_Data_Len	Integer	0	No	

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
C1	DRIVE STATE BIT0	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C1	DRIVE STATE BIT0	Bit	UNPACK Status Monitor 2	4	1	A	Contact (NC)
C1	DRIVE STATE BIT0	Bit	UNPACK Status Monitor 2	3	1	A	Contact (NC)
C1	DRIVE STATE BIT0	Bit	UNPACK Status Monitor 2	5	1	A	Contact (NO)
C1	DRIVE STATE BIT0	Bit	UNPACK Status Monitor 2	6	1	A	Contact (NO)
C2	DRIVE STATE BIT1	Bit	UNPACK Status Monitor 2	4	1	B	Contact (NO)
C2	DRIVE STATE BIT1	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C2	DRIVE STATE BIT1	Bit	UNPACK Status Monitor 2	6	1	B	Contact (NO)
C2	DRIVE STATE BIT1	Bit	UNPACK Status Monitor 2	3	1	B	Contact (NC)
C2	DRIVE STATE BIT1	Bit	UNPACK Status Monitor 2	5	1	B	Contact (NC)
C3	JOG ACTIVE BIT	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C4	FWD REV STATE BIT0	Bit	UNPACK Status Monitor 2	8	1	A	Contact (NC)
C4	FWD REV STATE BIT0	Bit	UNPACK Status Monitor 2	9	1	A	Contact (NO)
C4	FWD REV STATE BIT0	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C4	FWD REV STATE BIT0	Bit	UNPACK Status Monitor 2	10	1	A	Contact (NO)
C4	FWD REV STATE BIT0	Bit	UNPACK Status Monitor 2	7	1	A	Contact (NC)
C5	FWD REV STATE BIT1	Bit	UNPACK Status Monitor 2	9	1	B	Contact (NC)
C5	FWD REV STATE BIT1	Bit	UNPACK Status Monitor 2	8	1	B	Contact (NO)
C5	FWD REV STATE BIT1	Bit	UNPACK Status Monitor 2	10	1	B	Contact (NO)
C5	FWD REV STATE BIT1	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C5	FWD REV STATE BIT1	Bit	UNPACK Status Monitor 2	7	1	B	Contact (NC)
C6	SERIAL MOTOR FREQ SOURCE	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C7	ANALOG INPUT FREQ SOURCE	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C8	SERIAL MOTOR CONTROL	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C9	PARAM LOCK	Bit	UNPACK Status Monitor 2	2	1	AF	Copy
C69	AUTO MODE	Bit	MODBUS Send	7	1	A	Contact (NC)
C69	AUTO MODE	Bit	Main Program	7	1	A	Contact (NO)
C70	EXT FAULT IND	Bit	ENABLE Send	1	6	B	Contact (NC)
C70	EXT FAULT IND	Bit	ENABLE Send	1	7	B	Contact (NO)
C70	EXT FAULT IND	Bit	UNPACK Status Monitor 1	1	1	AF	Out
C72	TEN PERCENT JOG	Bit	AUTO MODE	8	1	B	Contact (NO)
C72	TEN PERCENT JOG	Bit	AUTO MODE	7	1	B	Contact (NO)
C73	TEN PERCENT JOG IND	Bit	AUTO MODE	8	1	AF	Out
C75	ENABLE SEND	Bit	ENABLE Send	1	1	AF	Out

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
C75	ENABLE SEND	Bit	MODBUS Send	1	1	D	Contact (NO)
C100	STOP IND	Bit	UNPACK Status Monitor 2	3	1	AF	Out
C101	RUN TO STOP IND	Bit	UNPACK Status Monitor 2	4	1	AF	Out
C102	STANDBY IND	Bit	UNPACK Status Monitor 2	5	1	AF	Out
C103	RUN IND	Bit	ENABLE Send	1	3	A	Contact (NC)
C103	RUN IND	Bit	ENABLE Send	1	2	A	Contact (NO)
C103	RUN IND	Bit	UNPACK Status Monitor 2	6	1	AF	Out
C105	REV IND	Bit	ENABLE Send	1	5	A	Contact (NC)
C105	REV IND	Bit	ENABLE Send	1	4	A	Contact (NO)
C105	REV IND	Bit	UNPACK Status Monitor 2	7	1	AF	Out
C106	REV TO FWD IND	Bit	UNPACK Status Monitor 2	8	1	AF	Out
C107	FWD TO REV IND	Bit	UNPACK Status Monitor 2	9	1	AF	Out
C108	FWD IND	Bit	UNPACK Status Monitor 2	10	1	AF	Out
C140	RS485 RUN BIT0	Bit	ENABLE Send	1	3	B	Contact (NO)
C140	RS485 RUN BIT0	Bit	ENABLE Send	1	2	B	Contact (NC)
C140	RS485 RUN BIT0	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C141	RS485 RUN BIT1	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C142	RS485 RUN BIT2	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C143	RS485 RUN BIT3	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C144	RS485 RUN BIT4	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C145	RS485 RUN BIT5	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C146	RS485 RUN BIT6	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C147	RS485 RUN BIT7	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C148	RS485 RUN BIT8	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C149	RS485 RUN BIT9	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C150	RS485 RUN BIT10	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C151	RS485 RUN BIT11	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C152	RS485 RUN BIT12	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C153	RS485 RUN BIT13	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C154	RS485 RUN BIT14	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C155	RS485 RUN BIT15	Bit	UNPACK Comm Run Comm	2	1	AF	Copy
C160	RS485 DIRECTION BIT0	Bit	ENABLE Send	1	4	B	Contact (NO)
C160	RS485 DIRECTION BIT0	Bit	ENABLE Send	1	5	B	Contact (NC)
C160	RS485 DIRECTION BIT0	Bit	UNPACK Comm Direction	2	1	AF	Copy

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
C161	RS485 DIRECTION BIT1	Bit	UNPACK Comm Direction	2	1	AF	Copy
C162	RS485 DIRECTION BIT2	Bit	UNPACK Comm Direction	2	1	AF	Copy
C163	RS485 DIRECTION BIT3	Bit	UNPACK Comm Direction	2	1	AF	Copy
C164	RS485 DIRECTION BIT4	Bit	UNPACK Comm Direction	2	1	AF	Copy
C165	RS485 DIRECTION BIT5	Bit	UNPACK Comm Direction	2	1	AF	Copy
C166	RS485 DIRECTION BIT6	Bit	UNPACK Comm Direction	2	1	AF	Copy
C167	RS485 DIRECTION BIT7	Bit	UNPACK Comm Direction	2	1	AF	Copy
C168	RS485 DIRECTION BIT8	Bit	UNPACK Comm Direction	2	1	AF	Copy
C169	RS485 DIRECTION BIT9	Bit	UNPACK Comm Direction	2	1	AF	Copy
C170	RS485 DIRECTION BIT10	Bit	UNPACK Comm Direction	2	1	AF	Copy
C171	RS485 DIRECTION BIT11	Bit	UNPACK Comm Direction	2	1	AF	Copy
C172	RS485 DIRECTION BIT12	Bit	UNPACK Comm Direction	2	1	AF	Copy
C173	RS485 DIRECTION BIT13	Bit	UNPACK Comm Direction	2	1	AF	Copy
C174	RS485 DIRECTION BIT14	Bit	UNPACK Comm Direction	2	1	AF	Copy
C175	RS485 DIRECTION BIT15	Bit	UNPACK Comm Direction	2	1	AF	Copy
C180	RS485 EXT FAULT BIT0	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C180	RS485 EXT FAULT BIT0	Bit	ENABLE Send	1	6	A	Contact (NO)
C181	RS485 EXT FAULT BIT1	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C182	RS485 EXT FAULT BIT2	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C183	RS485 EXT FAULT BIT3	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C184	RS485 EXT FAULT BIT4	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C185	RS485 EXT FAULT BIT5	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C186	RS485 EXT FAULT BIT6	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C187	RS485 EXT FAULT BIT7	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C188	RS485 EXT FAULT BIT8	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C189	RS485 EXT FAULT BIT9	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C190	RS485 EXT FAULT BIT10	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C191	RS485 EXT FAULT BIT11	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C192	RS485 EXT FAULT BIT12	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C193	RS485 EXT FAULT BIT13	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C194	RS485 EXT FAULT BIT14	Bit	UNPACK Status Monitor 1	3	1	AF	Copy

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
C195	RS485 EXT FAULT BIT15	Bit	UNPACK Status Monitor 1	3	1	AF	Copy
C200	RS485 FAULT RESET BIT0	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C200	RS485 FAULT RESET BIT0	Bit	ENABLE Send	1	7	A	Contact (NO)
C201	RS485 FAULT RESET BIT1	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C202	RS485 FAULT RESET BIT2	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C203	RS485 FAULT RESET BIT3	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C204	RS485 FAULT RESET BIT4	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C205	RS485 FAULT RESET BIT5	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C206	RS485 FAULT RESET BIT6	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C207	RS485 FAULT RESET BIT7	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C208	RS485 FAULT RESET BIT8	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C209	RS485 FAULT RESET BIT9	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C210	RS485 FAULT RESET BIT10	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C211	RS485 FAULT RESET BIT11	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C212	RS485 FAULT RESET BIT12	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C213	RS485 FAULT RESET BIT13	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C214	RS485 FAULT RESET BIT14	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C215	RS485 FAULT RESET BIT15	Bit	UNPACK Status Monitor 1	5	1	AF	Copy
C1001	MODBUS SENDING	Bit	MODBUS Send	2	1	B	Contact (NC)
C1001	MODBUS SENDING	Bit	MODBUS Send	1	1	AF	Send
C1002	MODBUS SENDING SUCCESS	Bit	MODBUS Send	2	2	C	Contact (NO)
C1002	MODBUS SENDING SUCCESS	Bit	MODBUS Send	1	1	AF	Send
C1002	MODBUS SENDING SUCCESS	Bit	MODBUS Send	1	1	C	Contact (NC)
C1003	MODBUS RECEIVING	Bit	MODBUS Send	2	1	AF	Receive
C1003	MODBUS RECEIVING	Bit	MODBUS Send	2	1	D	Contact (NC)
C1003	MODBUS RECEIVING	Bit	MODBUS Send	1	1	B	Contact (NC)
C1004	MODBUS RECEIVING SUCCESS	Bit	MODBUS Send	2	1	AF	Receive
C1004	MODBUS RECEIVING SUCCESS	Bit	MODBUS Send	2	1	C	Contact (NC)
C1004	MODBUS RECEIVING SUCCESS	Bit	MODBUS Send	1	2	C	Contact (NO)
T3		Bit	MODBUS Send	3	1	AF	Timer
T3		Bit	MODBUS Send	4	1	A	Contact (NO)
T3		Bit	MODBUS Send	5	1	A	Contact (NO)
T4		Bit	MODBUS Send	3	1	A	Contact (NC)
T4		Bit	MODBUS Send	5	1	AF	Timer
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	1	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	2	1	AF	Math

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	3	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	4	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	5	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	6	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	AUTO MODE	7	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	ENABLE Send	1	1	A	Compare
DS50	RS485 MOTOR SPEED	Integer	MODBUS Send	1	1	AF	Send
DS50	RS485 MOTOR SPEED	Integer	MODBUS Send	7	1	AF	Math
DS50	RS485 MOTOR SPEED	Integer	MODBUS Send	6	1	AF	Math
DS51	RS485 RUN	Integer	UNPACK Comm Run Comm	1	1	AF	Copy
DS52	RS485 DIRECTION	Integer	UNPACK Comm Direction	1	1	AF	Copy
DS53	RS485 EXT FAULT	Integer	UNPACK Status Monitor 1	2	1	AF	Copy
DS54	RS485 FAULT RESET	Integer	UNPACK Status Monitor 1	4	1	AF	Copy
DS69	SCREEN CHANGE	Integer	MODBUS Send	7	1	B	Compare
DS69	SCREEN CHANGE	Integer	MODBUS Send	6	1	A	Compare
DS69	SCREEN CHANGE	Integer	MODBUS Send	4	1	AF	Copy
DS69	SCREEN CHANGE	Integer	Main Program	7	1	B	Compare
DS70	SCREEN PREV STATE	Integer	MODBUS Send	6	1	A	Compare
DS70	SCREEN PREV STATE	Integer	MODBUS Send	4	1	AF	Copy
DS100	STATUS MON 1	Integer	UNPACK Status Monitor 1	1	1	A	Compare
DS100	STATUS MON 1	Integer	MODBUS Send	2	1	AF	Receive
DS101	STATUS MON 2	Integer	UNPACK Status Monitor 2	1	1	AF	Copy
DS102	FREQ SET	Integer	ENABLE Send	1	1	A	Compare
DH1	STATUS MON 2 HEX	Hex	UNPACK Status Monitor 2	1	1	AF	Copy
DH1	STATUS MON 2 HEX	Hex	UNPACK Status Monitor 2	2	1	AF	Copy
DH51	RS485 RUN HEX	Hex	UNPACK Comm Run Comm	1	1	AF	Copy
DH51	RS485 RUN HEX	Hex	UNPACK Comm Run Comm	2	1	AF	Copy
DH52	RS485 DIRECTION HEX	Hex	UNPACK Comm Direction	1	1	AF	Copy
DH52	RS485 DIRECTION HEX	Hex	UNPACK Comm Direction	2	1	AF	Copy
DH53	RS485 EXT FAULT HEX	Hex	UNPACK Status Monitor 1	2	1	AF	Copy
DH53	RS485 EXT FAULT HEX	Hex	UNPACK Status Monitor 1	3	1	AF	Copy
DH54	RS485 FAULT RESET HEX	Hex	UNPACK Status Monitor 1	4	1	AF	Copy
DH54	RS485 FAULT RESET HEX	Hex	UNPACK Status Monitor 1	5	1	AF	Copy
DF1	ROLL PERCENTAGE	Float	AUTO MODE	1	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	2	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	2	1	B	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	3	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	3	1	B	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	4	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	4	1	B	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	5	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	5	1	B	Compare

Address	Nickname	DataType	ProgramName	Rung	Row	Column	Instruction
DF1	ROLL PERCENTAGE	Float	AUTO MODE	6	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	7	1	A	Compare
DF1	ROLL PERCENTAGE	Float	AUTO MODE	8	1	A	Compare
DF1	ROLL PERCENTAGE	Float	MODBUS Send	8	1	AF	Math
DF50	DISTANCE	Float	MODBUS Send	8	1	AF	Math
TD3		Integer	MODBUS Send	3	1	AF	Timer
TD4		Integer	MODBUS Send	5	1	AF	Timer
SD50	_Port2_Received_Data_Len	Integer	MODBUS Send	2	1	AF	Receive
SD60	_Port3_Received_Data_Len	Integer	MODBUS Send	2	1	AF	Receive

System Configuration

PLC Name :

Start-up I/O Config Check : No

No	Module Type	Module Name	Module Setting
1	Power Supply	External P/S	
2	CPU	C0-12ARE-1-D	<AD1I> Address=DF1, Input Type=Current (0 to 20mA) Input Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes) <AD2I> Address=DF2, Input Type=Current (0 to 20mA) Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes) <AD3I> Address=DF3, Input Type=Current (0 to 20mA) Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes) <AD4I> Address=DF4, Input Type=Current (0 to 20mA) Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes) <DA1I> Address=DF5, Output Type=Current (4 to 20mA) Output Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes) <DA2I> Address=DF6, Output Type=Current (4 to 20mA) Output Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
3	I/O 1	C0-08ND3	
4	I/O 2	C0-16TD2	
5	I/O 3	-	
6	I/O 4	-	
7	I/O 5	-	
8	I/O 6	-	
9	I/O 7	-	
10	I/O 8	-	

Com Port Setup

No	Name	Port1	Port2	Port3
1	Protocol	Modbus TCP	Modbus RTU	Modbus RTU
2	Node	-	2	1
3	Baud Rate	-	19200	19200
4	Parity Bit	-	ODD	ODD
5	Stop Bit	-	1	1
6	Data Bit	-	-	-
7	Time-out	-	100ms	500ms
8	Char Time-out	-	2ms	2ms
9	RTS ON Delay	-	0ms	-
10	RTS OFF Delay	-	0ms	-
11	Response Delay Time	-	0ms	0ms
12	IP Address	10.0.0.25	-	-
13	Subnet Mask	255.255.255.0	-	-
14	Default Gateway	0.0.0.0	-	-
15	Network Configuration	Manually	-	-
16	Client Timeout	5ms	-	-
17	Client Retries	0	-	-
18	Server Inactivity	1sec	-	-
19	TCP Port Number	502	-	-
20	Concurrent Sessions	3	-	-
21	Client Inactivity Timeout	60sec	-	-

Scan Time

Regular Scan Mode

Watch Dog Timer

Timer Value (1000ms)

Password Setup

Interrupt Setup (Software Setup)

No	Interval Time	Interrupt Program Name
1	-	-
2	-	-
3	-	-
4	-	-

Interrupt Setup (External Setup)

No	I/O	Interrupt Program Name
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-

CPU Built-in I/O Setup

No	I/O	Type	Note
1	X001	Regular Input	
2	X002	Regular Input	
3	X003	Regular Input	
4	X004	Regular Input	
5	AD1I	0-20mA Input	Address=DF1 Input Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
6	AD2I	0-20mA Input	Address=DF2 Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
7	AD3I	0-20mA Input	Address=DF3 Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
8	AD4I	0-20mA Input	Address=DF4 Input Range = 0mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
9	Y001	Regular Output	
10	Y002	Regular Output	
11	Y003	Regular Output	
12	Y004	Regular Output	
13	DA1I	4-20mA Output	Address=DF5 Output Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)
14	DA2I	4-20mA Output	Address=DF6 Output Range = 4mA to 20mA Scale Range = 0 to 100 (Range Limitter:Yes)

ProtocolID	DeviceNam	TagName	DataType	DataCount	Retentive	Address	ArrayStart	ArrayEnd
113	DEV001	MANUAL M	Discrete	1	FALSE	C1	0	0
113	DEV001	AUTO MOI	Discrete	1	FALSE	C2	0	0
0	<INTERNA	GO TO MA	Discrete	1	FALSE		0	0
113	DEV001	MANUAL S	Discrete	1	FALSE	C3	0	0
113	DEV001	0%	Discrete	1	FALSE	C4	0	0
113	DEV001	25%	Discrete	1	FALSE	C5	0	0
113	DEV001	50%	Discrete	1	FALSE	C6	0	0
113	DEV001	75%	Discrete	1	FALSE	C7	0	0
113	DEV001	C	Discrete	1	FALSE	C8	0	0
113	DEV001	MANUAL E	Discrete	1	FALSE	C9	0	0
113	DEV001	MANUAL S	Discrete	1	FALSE	C10	0	0
113	DEV001	FWD	Discrete	1	FALSE	C11	0	0
113	DEV001	REVERSE	Discrete	1	FALSE	C12	0	0
113	DEV001	FWD ON	Discrete	1	FALSE	C13	0	0
113	DEV001	REV ON	Discrete	1	FALSE	C14	0	0
113	DEV001	MANUAL S	Floating_P	1	FALSE	DF10	0	0
113	DEV001	ACTUAL S	Floating_P	1	FALSE	DF11	0	0

AUTO ON

WIND

UNWIND

CURRENT SPEED	DISTANCE
1234 RPM	123.4 in

<10%
JOG

STATE	STATE
RUN	STOP

MOTOR FREQ ENTRY

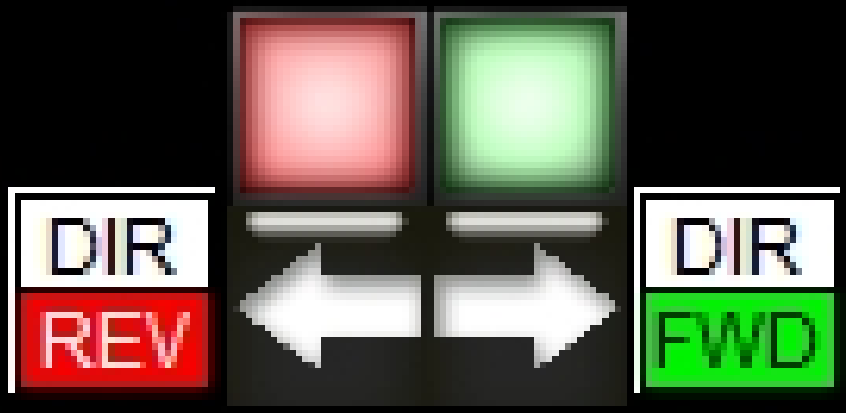
12.3 Hz

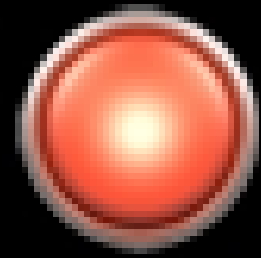
RAMP UP ENTRY

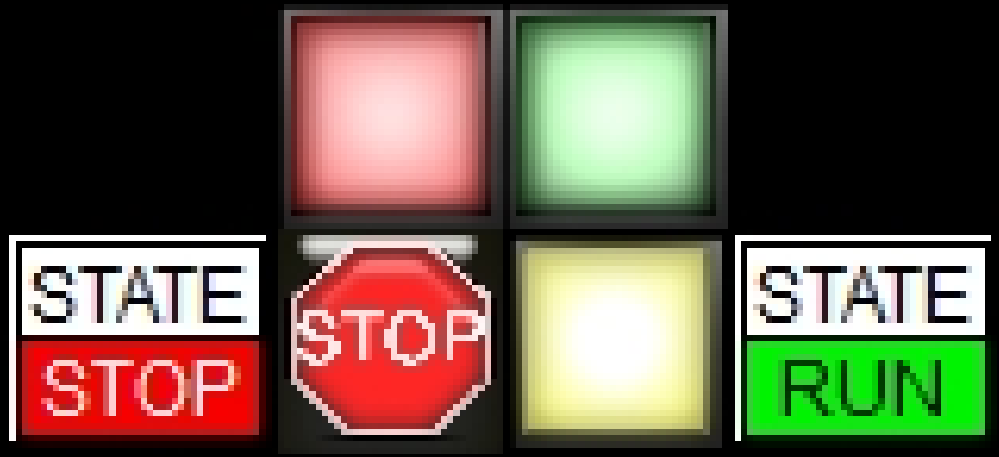
12.3 Hz/s

RAMP DOWN ENTRY

12.3 Hz/s

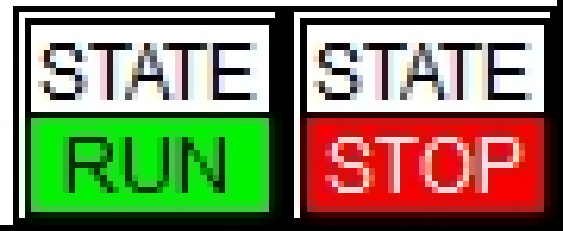






FAULT
SET

FAULT
RESET


STATE
RUN
STATE
STOP

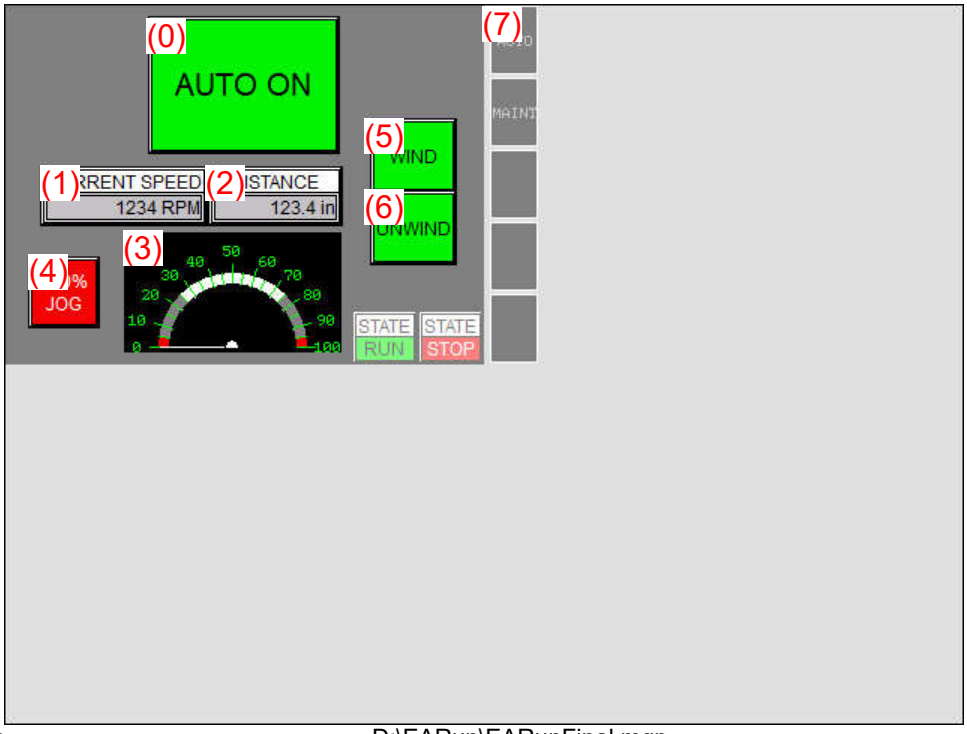
ProtocolID	DeviceNam	TagName	DataType	DataCount	Retentive	Address	ArrayStart	ArrayEnd
113	SONICHM	FAULT IN	Discrete	1	FALSE	C70	0	0
113	SONICHM	STANDBY	Discrete	1	FALSE	C102	0	0
113	SONICHM	RUN TO S	Discrete	1	FALSE	C101	0	0
113	SONICHM	STOP IND	Discrete	1	FALSE	C100	0	0
113	SONICHM	RUN IND	Discrete	1	FALSE	C103	0	0
113	SONICHM	REV IND	Discrete	1	FALSE	C105	0	0
113	SONICHM	REV TO F\	Discrete	1	FALSE	C106	0	0
113	SONICHM	FWD TO R	Discrete	1	FALSE	C107	0	0
113	SONICHM	FWD IND	Discrete	1	FALSE	C108	0	0
113	SONICHM	AUTO MOI	Discrete	1	FALSE	C69	0	0
113	SONICHM	TEN PERC	Discrete	1	FALSE	C72	0	0
113	SONICHM	TEN PERC	Discrete	1	FALSE	C73	0	0
113	SONICHM	RS485 RAI	Unsigned_	1	FALSE	DS55	0	0
113	SONICHM	RS485 RAI	Unsigned_	1	FALSE	DS56	0	0
113	SONICHM	SPEED	Unsigned_	1	FALSE	DS107	0	0
113	SONICHM	RS485 MO	Unsigned_	1	FALSE	DS50	0	0
113	SONICHM	RS485 RU	Unsigned_	1	FALSE	DS51	0	0
113	SONICHM	RS485 DIR	Unsigned_	1	FALSE	DS52	0	0
113	SONICHM	RS485 EX	Unsigned_	1	FALSE	DS53	0	0
113	SONICHM	RS485 FA	Unsigned_	1	FALSE	DS54	0	0
113	SONICHM	SCREEN C	Unsigned_	1	FALSE	DS69	0	0
113	SONICHM	DISTANCE	Floating_P	1	FALSE	DF50	0	0
113	SONICHM	ROLL PER	Floating_P	1	FALSE	DF1	0	0

Tag Database

Project Name : D:\EARun\EARunFinal.mgp
No Of PLC Tags : 23
PLC Protocol : AutomationDirect CLICK Ethernet

Tag No	Tag Name	Tag Data Type	PLC Address
1	AUTO MODE	Discrete	C69
2	DISTANCE	Floating PT 32	DF50
3	FAULT IND	Discrete	C70
4	FWD IND	Discrete	C108
5	FWD TO REV IND	Discrete	C107
6	GO TO MANUAL	Discrete	
7	REV IND	Discrete	C105
8	REV TO FWD IND	Discrete	C106
9	ROLL PERCENTAGE	Floating PT 32	DF1
10	RS485 DIRECTION	Unsigned int 16	DS52
11	RS485 EXTERNAL FAULT	Unsigned int 16	DS53
12	RS485 FAULT RESET	Unsigned int 16	DS54
13	RS485 MOTOR RPM	Unsigned int 16	DS50
14	RS485 RAMP DOWN	Unsigned int 16	DS56
15	RS485 RAMP UP	Unsigned int 16	DS55
16	RS485 RUN	Unsigned int 16	DS51
17	RUN IND	Discrete	C103
18	RUN TO STOP IND	Discrete	C101
19	SCREEN CHANGE	Unsigned int 16	DS69
20	SPEED	Unsigned int 16	DS107
21	STANDBY IND	Discrete	C102
22	STOP IND	Discrete	C100
23	TEN PERCENT JOG	Discrete	C72
24	TEN PERCENT JOG IND	Discrete	C73

1 - Auto Mode



Project Name	D:\EARun\EARunFinal.mgp
Screen Description	: Operator screen with limited controls.
Backlight Color	: 0
Background Screen	: 3 - Motor Controls Bkgnd

[Object list]

(0)	: AutoToggleButton
(1)	: CurrentSpeedDisplay
(2)	: DistanceDisplay
(3)	: RollStatus
(4)	: TenPercentJogButton
(5)	: WindingIndicator
(6)	: UnwindingIndicator
(7)	: ScreenChangeFunctionBar

(0)

[Main]

Name	: AutoToggleButton
Description	: Toggle pushbutton to control the automatic functionality status
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 96
Top	: 8
Right	: 223
Bottom	: 99

[General]

Tag	: AUTO MODE
ObjectType	: Toggle
ObjectStyle	: Style1

[OnText]

OnText	: AUTO ON
OnTextColor	: 0
OnBackColor	: 32
OnTextFont	: Arial - 16
OnTextAlignment	: Middle

[OffText]

OffText	: AUTO OFF
OffTextColor	: 15
OffBackColor	: 16
OffTextFont	: Arial - 16
OffTextAlignment	: Middle

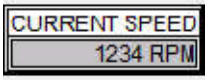
[Label]

Label	: False
LabelText	: PUSHBUTTON
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: False
VisibleTag	: AUTO MODE
VisibleCondition	: 0
VisibleValue	: 0

(1)



[Main]

Name	: CurrentSpeedDisplay
Description	: Displays the current motor speed in RPM
DisplayFrame	: Theme
InnerLine	: True

[Coordinates]

Left	: 24

Top : 108
Right : 135
Bottom : 147

[General]

Tag : SPEED
UseDecimalPointTag : False
DecimalPointTag : Not Defined

[Display]

DataType : Dec : Unsigned int 16/32
Justify : Leading Spaces
TextFont : Arial - 9
TotalDigits : 4
FractionalDigits : 0
CommaSeparator : False
FormatPrefix :
FormatSurfix : RPM
TextColor : 0

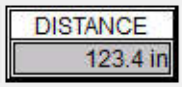
[Label]

Label : True
LabelText : CURRENT SPEED
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(2)



[Main]

Name : DistanceDisplay
Description : Displays distance detected by ultrasonic sensor in inches
DisplayFrame : Theme
InnerLine : True

[Coordinates]

Left : 136
Top : 108
Right : 225
Bottom : 147

[General]

Tag : DISTANCE
UseDecimalPointTag : False
DecimalPointTag : Not Defined

[Display]

DataType : Float : Floating PT 32
Justify : Leading Spaces
TextFont : Arial - 9
TotalDigits : 4
FractionalDigits : 1
CommaSeparator : False
FormatPrefix :
FormatSurfix : in
TextColor : 0

[Label]

Label	: True
LabelText	: DISTANCE
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle
[Visibility]	
Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(3)

[Main]	
Name	: RollStatus
Description	: Displays the current roll percentage based on distances set by operator.
DisplayFrame	: None
InnerLine	: False
[Coordinates]	
Left	: 80
Top	: 152
Right	: 224
Bottom	: 231
[General]	
Tag	: ROLL PERCENTAGE
Division	: True
MajorDivision	: 10
MinorDivision	: 2
NeedleColor	: 15
Movement	: Clockwise
ObjectStyle	: Style1
[AlarmBand]	
HighHighAlarm	: True
HighHighValue	: 95
[Label]	
Label	: False
LabelText	: ANALOG METER
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle
[Range]	
RangeMin	: 0
RangeMax	: 100
DecimalPoint	: 0
[Visibility]	
Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(4)

[Main]

Name	: TenPercentJogButton
Description	: When the roll diameter is within 10% of full/empty, operator shall manually jog motor. Button will hide in Manual Mode.
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 16
Top	: 168
Right	: 63
Bottom	: 215

[General]

ButtonTag	: TEN PERCENT JOG
IndicatorTag	: TEN PERCENT JOG IND
ObjectType	: Momentary On
ObjectStyle	: Style1

[OnText]

OnText	: <10% JOG
OnTextColor	: 15
OnBackColor	: 16
OnTextFont	: Arial - 9
OnTextAlignment	: Middle

[OffText]

OffText	: <10% JOG
OffTextColor	: 0
OffBackColor	: 12
OffTextFont	: Arial - 9
OffTextAlignment	: Middle

[Label]

Label	: False
LabelText	: INDICATOR BUTTON
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: True
VisibleTag	: AUTO MODE
VisibleCondition	: 0
VisibleValue	: 1

(5)

[Main]

Name	: WindingIndicator
Description	: Winding indicator for Auto Mode. Not visible in Manual Mode.
DisplayFrame	: Theme
InnerLine	: False

[Coordinates]

Left : 244
Top : 76
Right : 301
Bottom : 125

[General]
Tag : FWD IND
ObjectStyle : Style1

[OnText]
OnText : WIND
OnTextColor : 0
OnBackColor : 32
OnTextFont : Arial - 9
OnTextAlignment : Middle

[OffText]
OffText : WIND
OffTextColor : 8
OffBackColor : 12
OffTextFont : Arial - 9
OffTextAlignment : Middle

[Label]
Label : False
LabelText : INDICATOR LIGHT
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]
Visible : True
VisibleTag : AUTO MODE
VisibleCondition : 0
VisibleValue : 1

(6)

[Main]
Name : UnwindingIndicator
Description : Unwinding indicator for Auto Mode. Not visible in Manual Mode.
DisplayFrame : Theme
InnerLine : False

[Coordinates]
Left : 244
Top : 124
Right : 301
Bottom : 173

[General]
Tag : REV IND
ObjectStyle : Style1

[OnText]
OnText : UNWIND
OnTextColor : 0
OnBackColor : 32
OnTextFont : Arial - 9
OnTextAlignment : Middle

[OffText]
OffText : UNWIND
OffTextColor : 8
OffBackColor : 12

OffTextFont : Arial - 9
OffTextAlignment : Middle

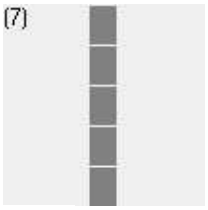
[Label]

Label : False
LabelText : INDICATOR LIGHT
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : True
VisibleTag : AUTO MODE
VisibleCondition : 0
VisibleValue : 1

(7)



[Main]

Name : ScreenChangeFunctionBar
Description : Controls access to maintenance and auto screens via the physical function buttons.

[Coordinates]

Left : 324
Top : 0
Right : 355
Bottom : 239

[General]

FunctionShow : False
FunctionAct1 : Screen Change
FunctionAct2 : Screen Change
FunctionAct3 : None
FunctionAct4 : None
FunctionAct5 : None
FunctionAct6 : None
FunctionAct7 : None
FunctionAct8 : None
FunctionAct9 : None
FunctionAct10 : None
FunctionScrNo1 : 1
FunctionScrNo2 : 2
FunctionScrNo3 : 3
FunctionScrNo4 : 4
FunctionScrNo5 : Previous
FunctionScrNo6 : None
FunctionScrNo7 : None
FunctionScrNo8 : None
FunctionScrNo9 : None
FunctionScrNo10 : None
[Function1]
Font Size : 6x8
Text : 1 - AUTO
: 2 -
: 3 -
: 4 -
: 5 -
[Function2]
Font Size : 6x8

Text : 1 - MAINT
: 2 -
: 3 -
: 4 -
: 5 -

[Function3]
Font Size : 6x8
Text : 1 -
: 2 -
: 3 -
: 4 -
: 5 -

[Function4]
Font Size : 6x8
Text : 1 -
: 2 -
: 3 -
: 4 -
: 5 -

[Function5]
Font Size : 6x8
Text : 1 -
: 2 -
: 3 -
: 4 -
: 5 -

[Function6]
Font Size : 6x8
Text : 1 - F6
: 2 -
: 3 -
: 4 -
: 5 -

[Function7]
Font Size : 6x8
Text : 1 - F7
: 2 -
: 3 -
: 4 -
: 5 -

[Function8]
Font Size : 6x8
Text : 1 - F8
: 2 -
: 3 -
: 4 -
: 5 -

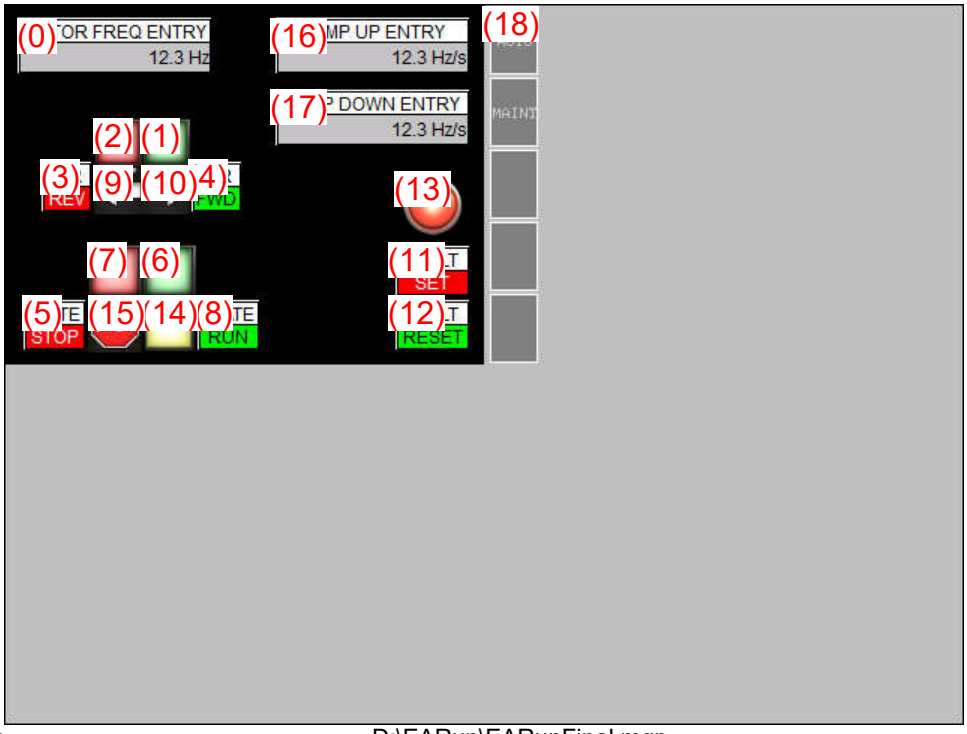
[Function9]
Font Size : 6x8
Text : 1 - F9
: 2 -
: 3 -
: 4 -
: 5 -

[Function10]
Font Size : 6x8
Text : 1 - F10
: 2 -
: 3 -
: 4 -
: 5 -

[LEDControl]
FunctionLED : False

Tag	: Not Defined
LEDControl1	: by Button
LEDControl2	: by Button
LEDControl3	: by Button
LEDControl4	: by Button
LEDControl5	: by Button

2 - Maintenance



Project Name : D:\EARun\EARunFinal.mgp
Screen Description : Maintenance screen used to monitor and debug motor functions.
Backlight Color : 0

[Object list]

(0) : MotorFrequencyTextbox
(1) : ForwardIndicator
(2) : ReverseIndicator
(3) : SerialReversePushbutton
(4) : SerialForwardPushbutton
(5) : SerialStopPushbutton
(6) : StateRunInd
(7) : StateStopInd
(8) : StateRunPushbutton
(9) : ForwardReverseIndicator
(10) : ReverseForwardIndicator
(11) : SetExternalFaultPushbutton
(12) : ExternalFaultResetPushbutton
(13) : FaultActiveIndicator
(14) : StandbyIndicatior
(15) : RunToStopTransitionIndicator
(16) : RampUpEntry
(17) : RampDownEntry
(18) : ScreenChangeFunctionBar

(0)

[Main]

Name	: MotorFrequencyTextbox
Description	: Sends the entered motor frequency to the VFD over RS485 Modbus RTU
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 8
Top	: 8
Right	: 139
Bottom	: 47

[General]

SingleTag	: False
Tag	: RS485 MOTOR RPM
EntryTag	: Not Defined
UseDecimalPointTag	: False
ObjectStyle	: Style1

[Display]

DataType	: Dec : Unsigned int 16/32
Justify	: Leading Spaces
TextFont	: Arial - 9
TotalDigits	: 3
FractionalDigits	: 1
CommaSeparator	: False
FormatPrefix	:
FormatSurfix	: Hz
TextColor	: 0

[Label]

Label	: True
LabelText	: MOTOR FREQ ENTRY
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Range]

Range	: True
RangeMin	: 0
RangeMax	: 600
DataType	: Dec : Unsigned int 16/32

[Visibility]

Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(1)

[Main]

Name : ForwardIndicator
Description : Indicates the motor is running in the forward state (clockwise)
DisplayFrame : None
InnerLine : False

[Coordinates]

Left : 92
Top : 76
Right : 123
Bottom : 107

[GraphicIndicator]

Tag : FWD IND
ObjectStyle : 111

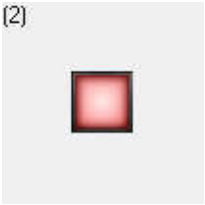
[Label]

Label : False
LabelText : GraphicIndicatorLight
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(2)



[Main]

Name : ReverseIndicator
Description : Indicates the motor is running in reverse (counter-clockwise)
DisplayFrame : None
InnerLine : False

[Coordinates]

Left : 60
Top : 76
Right : 91
Bottom : 107

[GraphicIndicator]

Tag : REV IND
ObjectStyle : 112

[Label]

Label : False
LabelText : GraphicIndicatorLight
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(3)

[Main]

Name	: SerialReversePushbutton
Description	: Sends the Modbus command over RS485 to change rotation direction to reverse.
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 24
Top	: 104
Right	: 59
Bottom	: 139

[General]

Recipe No.	: 1
Data Type	: Unsigned Decimal
Destination Data	: RS485 DIRECTION
Source Data	: 0

[Text]

Text	: REV
TextFont	: Arial - 9
TextColor	: 15
TextAlignment	: Middle

[Label]

Label	: True
LabelText	: DIR
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(4)

[Main]

Name	: SerialForwardPushbutton
Description	: Sends the Modbus command over RS485 to change rotation direction to forward.
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 124
Top	: 104
Right	: 159
Bottom	: 139

[General]

Recipe No. : 1
Data Type : Unsigned Decimal
Destination Data : RS485 DIRECTION
Source Data : 1

[Text]
Text : FWD
TextFont : Arial - 9
TextColor : 0
TextAlignment : Middle

[Label]
Label : True
LabelText : DIR
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]
Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(5)

[Main]
Name : SerialStopPushbutton
Description : Sends the Modbus command over RS485 to stop the motor.
DisplayFrame : Theme
InnerLine : False
Function Key Assign : None

[Coordinates]
Left : 12
Top : 196
Right : 55
Bottom : 231

[General]
Recipe No. : 1
Data Type : Unsigned Decimal
Destination Data : RS485 RUN
Source Data : 0

[Text]
Text : STOP
TextFont : Arial - 9
TextColor : 15
TextAlignment : Middle

[Label]
Label : True
LabelText : STATE
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]
Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(6)

[Main]

Name	: StateRunInd
Description	:
DisplayFrame	: None
InnerLine	: False

[Coordinates]

Left	: 92
Top	: 160
Right	: 127
Bottom	: 195

[GraphicIndicator]

Tag	: RUN IND
ObjectStyle	: 111

[Label]

Label	: False
LabelText	: GraphicIndicatorLight
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(7)

[Main]

Name	: StateStopInd
Description	:
DisplayFrame	: None
InnerLine	: False

[Coordinates]

Left	: 56
Top	: 160
Right	: 91
Bottom	: 195

[GraphicIndicator]

Tag	: STOP IND
ObjectStyle	: 112

[Label]

Label	: False
LabelText	: GraphicIndicatorLight
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(8)

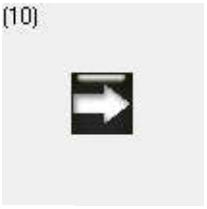
[Main]
Name : StateRunPushbutton
Description : Sends the Modbus command over RS485 to start the motor.
DisplayFrame : Theme
InnerLine : False
Function Key Assign : None
[Coordinates]
Left : 128
Top : 196
Right : 171
Bottom : 231
[General]
Recipe No. : 1
Data Type : Unsigned Decimal
Destination Data : RS485 RUN
Source Data : 1
[Text]
Text : RUN
TextFont : Arial - 9
TextColor : 0
TextAlignment : Middle
[Label]
Label : True
LabelText : STATE
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle
[Visibility]
Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(9)

[Main]
Name : ForwardReverseIndicator
Description : Indicates the transition period from forward to reverse rotation.
DisplayFrame : None
InnerLine : False
[Coordinates]
Left : 60
Top : 108
Right : 91

Bottom	: 139
[General]	
Tag	: FWD TO REV IND
[OnImage]	
OnBmpMaintainRatio	: True
OnBmpStretch	: True
OnBmpAlignment	: 4
[OffImage]	
OffBmpMaintainRatio	: True
OffBmpStretch	: True
OffBmpAlignment	: 4
[Label]	
Label	: False
LabelText	: DYNAMIC BITMAP
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle
[Visibility]	
Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

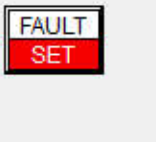
(10)



[Main]	
Name	: ReverseForwardIndicator
Description	: Indicates the transition period from reverse to forward rotation.
DisplayFrame	: None
InnerLine	: False
[Coordinates]	
Left	: 92
Top	: 108
Right	: 123
Bottom	: 139
[General]	
Tag	: REV TO FWD IND
[OnImage]	
OnBmpMaintainRatio	: True
OnBmpStretch	: True
OnBmpAlignment	: 4
[OffImage]	
OffBmpMaintainRatio	: True
OffBmpStretch	: True
OffBmpAlignment	: 4
[Label]	
Label	: False
LabelText	: DYNAMIC BITMAP
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle
[Visibility]	
Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0

VisibleValue : 1

(11)



[Main]
- Name : SetExternalFaultPushbutton
- Description : Sends the Modbus command over RS485 to throw an external fault on the VFD.
- DisplayFrame : Theme
- InnerLine : False
- Function Key Assign : None

[Coordinates]
- Left : 260
- Top : 160
- Right : 311
- Bottom : 195

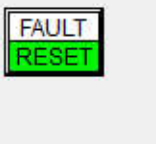
[General]
- Recipe No. : 1
- Data Type : Unsigned Decimal
- Destination Data : RS485 EXTERNAL FAULT
- Source Data : 1

[Text]
- Text : SET
- TextFont : Arial - 9
- TextColor : 15
- TextAlignment : Middle

[Label]
- Label : True
- LabelText : FAULT
- LabelTextColor : 0
- LabelBackColor : 15
- LabelPosition : Top
- LabelAlignment : Middle

[Visibility]
- Visible : False
- VisibleTag : Not Defined
- VisibleCondition : 0
- VisibleValue : 1

(12)



[Main]
- Name : ExternalFaultResetPushbutton
- Description : Sends the Modbus command over RS485 to reset external faults on the VFD.
- DisplayFrame : Theme
- InnerLine : False
- Function Key Assign : None

[Coordinates]
- Left : 260
- Top : 196
- Right : 311

Bottom : 231

[General]

Recipe No. : 1
Data Type : Unsigned Decimal
Destination Data : RS485 EXTERNAL FAULT
Source Data : 0
Recipe No. : 2
Data Type : Unsigned Decimal
Destination Data : RS485 FAULT RESET
Source Data : 1

[Text]

Text : RESET
TextFont : Arial - 9
TextColor : 0
TextAlignment : Middle

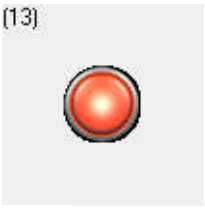
[Label]

Label : True
LabelText : FAULT
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(13)



[Main]

Name : FaultActiveIndicator
Description : Indicator for the fault state (ON = system fault)
DisplayFrame : None
InnerLine : False

[Coordinates]

Left : 264
Top : 112
Right : 307
Bottom : 155

[GraphicIndicator]

Tag : FAULT IND
ObjectStyle : 107

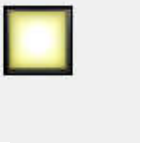
[Label]

Label : False
LabelText : GraphicIndicatorLight
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(14)



[Main]

Name	: StandbyIndicatior
Description	: Indicates when the reported motor state is STANDBY
DisplayFrame	: Line
InnerLine	: False

[Coordinates]

Left	: 92
Top	: 196
Right	: 127
Bottom	: 231

[GraphicIndicator]

Tag	: STANDBY IND
ObjectStyle	: 114

[Label]

Label	: False
LabelText	: GraphicIndicatorLight
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(15)

[Main]

Name	: RunToStopTransitionIndicator
Description	: Displays the RUN to STOP transition state
DisplayFrame	: None
InnerLine	: False

[Coordinates]

Left	: 56
Top	: 196
Right	: 91
Bottom	: 231

[General]

Tag	: RUN TO STOP IND

[OnImage]

OnBmpMaintainRatio	: True
OnBmpStretch	: True
OnBmpAlignment	: 4

[OffImage]

OffBmpMaintainRatio	: True
OffBmpStretch	: True
OffBmpAlignment	: 4

[Label]

Label	: False

LabelText : DYNAMIC BITMAP
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0
VisibleValue : 1

(16)

[Main]

Name : RampUpEntry
Description : Sends the motor acceleration rate to the VFD over RS485 Modbus RTU
DisplayFrame : Theme
InnerLine : False
Function Key Assign : None

[Coordinates]

Left : 180
Top : 8
Right : 311
Bottom : 47

[General]

SingleTag : False
Tag : RS485 RAMP UP
EntryTag : Not Defined
UseDecimalPointTag : False
ObjectStyle : Style1

[Display]

DataType : Dec : Unsigned int 16/32
Justify : Leading Spaces
TextFont : Arial - 9
TotalDigits : 3
FractionalDigits : 1
CommaSeparator : False
FormatPrefix :
FormatSurfix : Hz/s
TextColor : 0

[Label]

Label : True
LabelText : RAMP UP ENTRY
LabelTextColor : 0
LabelBackColor : 15
LabelPosition : Top
LabelAlignment : Middle

[Range]

Range : True
RangeMin : 0
RangeMax : 600
DataType : Dec : Unsigned int 16/32

[Visibility]

Visible : False
VisibleTag : Not Defined
VisibleCondition : 0

VisibleValue : 1

(17)

[Main]
- Name : RampDownEntry
- Description : Sends the motor deceleration rate to the VFD over RS485 Modbus RTU
- DisplayFrame : Theme
- InnerLine : False
- Function Key Assign : None

[Coordinates]
- Left : 180
- Top : 56
- Right : 311
- Bottom : 95

[General]
- SingleTag : False
- Tag : RS485 RAMP DOWN
- EntryTag : Not Defined
- UseDecimalPointTag : False
- ObjectStyle : Style1

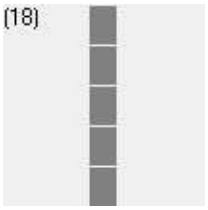
[Display]
- DataType : Dec : Unsigned int 16/32
- Justify : Leading Spaces
- TextFont : Arial - 9
- TotalDigits : 3
- FractionalDigits : 1
- CommaSeparator : False
- FormatPrefix :
- FormatSurfix : Hz/s
- TextColor : 0

[Label]
- Label : True
- LabelText : RAMP DOWN ENTRY
- LabelTextColor : 0
- LabelBackColor : 15
- LabelPosition : Top
- LabelAlignment : Middle

[Range]
- Range : True
- RangeMin : 0
- RangeMax : 600
- DataType : Dec : Unsigned int 16/32

[Visibility]
- Visible : False
- VisibleTag : Not Defined
- VisibleCondition : 0
- VisibleValue : 1

(18)



[Main]

Name	: ScreenChangeFunctionBar
Description	: Controls access to maintenance and auto screens via the physical function buttons.

[Coordinates]

Left	: 324
Top	: 0
Right	: 355
Bottom	: 239

[General]

FunctionShow	: False
FunctionAct1	: Screen Change
FunctionAct2	: Screen Change
FunctionAct3	: None
FunctionAct4	: None
FunctionAct5	: None
FunctionAct6	: None
FunctionAct7	: None
FunctionAct8	: None
FunctionAct9	: None
FunctionAct10	: None
FunctionScrNo1	: 1
FunctionScrNo2	: 2
FunctionScrNo3	: 3
FunctionScrNo4	: 4
FunctionScrNo5	: Previous
FunctionScrNo6	: None
FunctionScrNo7	: None
FunctionScrNo8	: None
FunctionScrNo9	: None
FunctionScrNo10	: None
[Function1]	
Font Size	: 6x8
Text	: 1 - AUTO
	: 2 -
	: 3 -
	: 4 -
	: 5 -
[Function2]	
Font Size	: 6x8
Text	: 1 - MAINT
	: 2 -
	: 3 -
	: 4 -
	: 5 -
[Function3]	
Font Size	: 6x8
Text	: 1 -
	: 2 -
	: 3 -
	: 4 -
	: 5 -
[Function4]	
Font Size	: 6x8
Text	: 1 -
	: 2 -
	: 3 -
	: 4 -
	: 5 -
[Function5]	
Font Size	: 6x8
Text	: 1 -
	: 2 -

: 3 -
: 4 -
: 5 -

[Function6]
Font Size : 6x8
Text : 1 - F6
: 2 -
: 3 -
: 4 -
: 5 -

[Function7]
Font Size : 6x8
Text : 1 - F7
: 2 -
: 3 -
: 4 -
: 5 -

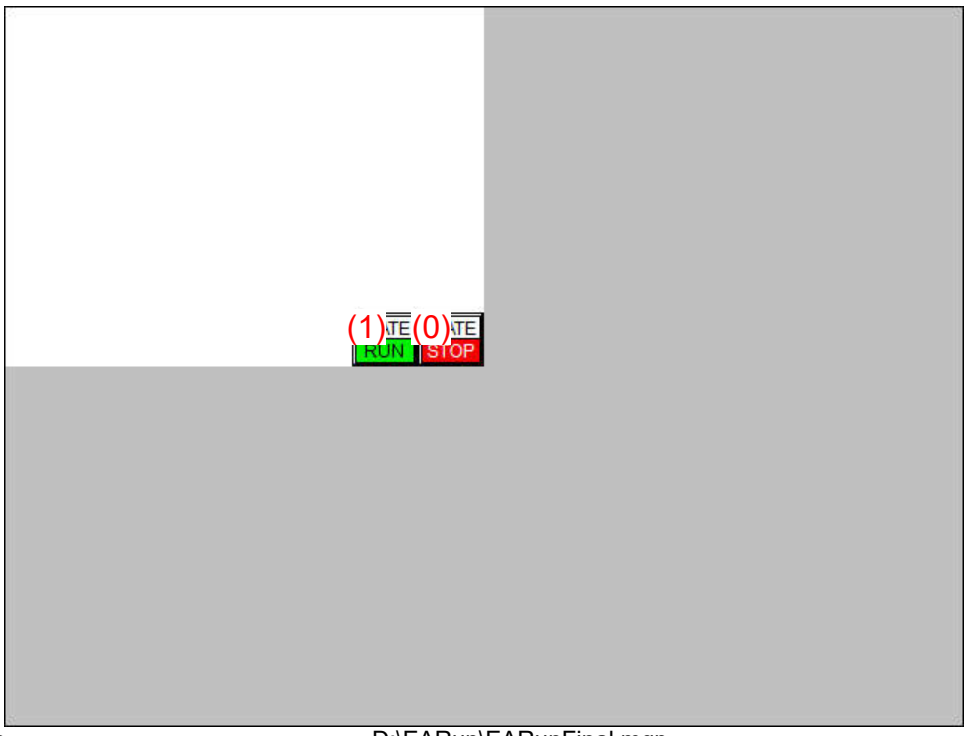
[Function8]
Font Size : 6x8
Text : 1 - F8
: 2 -
: 3 -
: 4 -
: 5 -

[Function9]
Font Size : 6x8
Text : 1 - F9
: 2 -
: 3 -
: 4 -
: 5 -

[Function10]
Font Size : 6x8
Text : 1 - F10
: 2 -
: 3 -
: 4 -
: 5 -

[LEDControl]
FunctionLED : False
Tag : Not Defined
LEDControl1 : by Button
LEDControl2 : by Button
LEDControl3 : by Button
LEDControl4 : by Button
LEDControl5 : by Button

3 - Motor Controls Bkgnd



Project Name	D:\EARun\EARunFinal.mgp
Screen Description	:
Backlight Color	: 15

[Object list]

(0)	: GlobalSerialStopPushbutton
(1)	: GlobalSerialRunPushbutton

(0)

[Main]

Name	: GlobalSerialStopPushbutton
Description	: Sends the Modbus command over RS485 to stop the motor.
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 276
Top	: 204
Right	: 319
Bottom	: 239

[General]

Recipe No.	: 1
Data Type	: Unsigned Decimal
Destination Data	: RS485 RUN
Source Data	: 0

[Text]

Text	: STOP
TextFont	: Arial - 9
TextColor	: 15
TextAlignment	: Middle

[Label]

Label	: True
LabelText	: STATE
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle

[Visibility]

Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1

(1)

[Main]

Name	: GlobalSerialRunPushbutton
Description	: Sends the Modbus command over RS485 to start motor.
DisplayFrame	: Theme
InnerLine	: False
Function Key Assign	: None

[Coordinates]

Left	: 232
Top	: 204
Right	: 275
Bottom	: 239

[General]

Recipe No.	: 1

Data Type	: Unsigned Decimal
Destination Data	: RS485 RUN
Source Data	: 1
[Text]	
Text	: RUN
TextFont	: Arial - 9
TextColor	: 0
TextAlignment	: Middle
[Label]	
Label	: True
LabelText	: STATE
LabelTextColor	: 0
LabelBackColor	: 15
LabelPosition	: Top
LabelAlignment	: Middle
[Visibility]	
Visible	: False
VisibleTag	: Not Defined
VisibleCondition	: 0
VisibleValue	: 1