

Installation Instructions

Original Instructions



Allen-Bradley
by ROCKWELL AUTOMATION



Guardmaster Safedge Pressure Sensitive Safety Edge System

Catalog Numbers 440F-C251D, 440F-C251P, 440F-C252D

Introduction

The Safedge™ Safety Edge System is ideal as a safety sensor in applications such as power-operated doors, automated vehicles, and moving machinery beds, for use when you require object detection by touch. The system provides a continuous line of high sensitivity touch sensing along or around practically anything. See publication [440F-UM002](#) for more information.

Description

The Safedge safety edge system consists of up to 50 m (164 ft) of profile, a cable connector, an ending resistor, a C-rail, and a control unit. The control unit can monitor lengths of up to 50 m (164 ft). All profiles have the same principle of operation.

This publication covers the use of the parts of the Safedge safety edge system. If you require joints, corners, or further assistance, contact your local Allen-Bradley distributor or Rockwell Automation sales office. Suitably trained and qualified personnel must complete all installation work in accordance with statutory requirements for safety.

Specifications

Attribute	440F-C251P Surface Mount	440F-C251D DIN Rail	440F-C252D DIN Rail
Conformity	EN ISO 13849-1 PLd, Cat. 3, EN ISO 13856-2		
System response time	13 ms		
Environmental protection	IP65	<ul style="list-style-type: none"> Enclosure: IP40 DIN0470 Terminals: IP20 DIN0470 	
Safedge profile voltage, max	12V DC (open circuit)		
Operating voltage, nom	4V (run condition)		
Output fuse, max	2 A quick acting		5 A quick acting
Impulse withstand voltage	2500V		
Over voltage	Category 2		
Contamination level	III		
Switched current/voltage, min	10 mA/10V		
Power consumption	< 6VA		
Relay outputs	<ul style="list-style-type: none"> 2 x independent volt free N.O. safety contacts 1 x volt free N.C. auxiliary contact ⁽¹⁾ 		<ul style="list-style-type: none"> 1 x independent volt free N.O. safety contacts 1 x volt free N.C. auxiliary contact ⁽¹⁾
Utilization category	<ul style="list-style-type: none"> AC - 15; 2 A/250V DC DC - 13; 2 A/30V DC 		
Safety inputs	Safedge profile (open resistance 6 kΩ)		
Status indicators	<ul style="list-style-type: none"> 1 - Green: Run 2 - Yellow: Open 3 - Red: Stop 		
Internal controls	AC voltage selector		
Internal fuses	2 A safety fuses, replaceable (2 off); 500 mAAT supply fuse, replaceable (1 off)	500 mAAT supply fuse (reset ability) (1 off)	

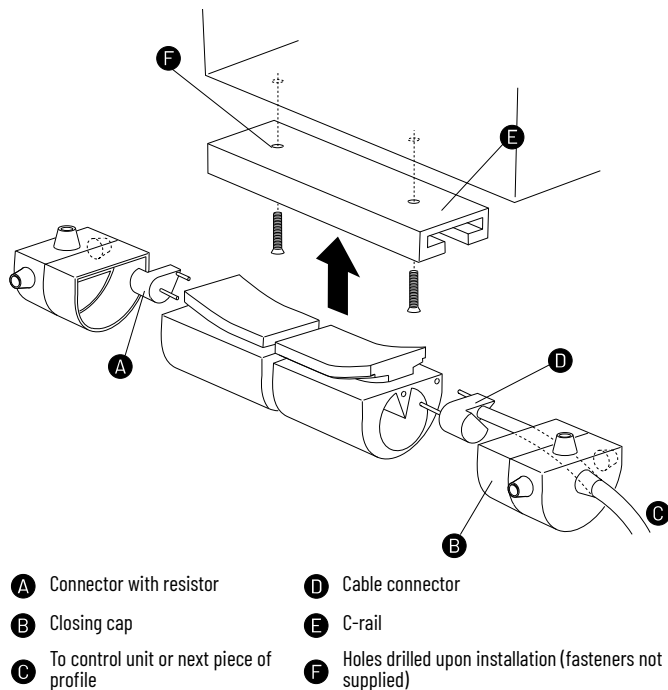
Attribute	440F-C251P Surface Mount	440F-C251D DIN Rail	440F-C252D DIN Rail
Output fuse, max	—		<ul style="list-style-type: none"> AC: 4 A DC: 2 A
Ambient temperature [°C (°F)]	<ul style="list-style-type: none"> Control unit: -10...+55 (-14...+131) Profile: -5...+55 (23...131) EPDM (ethylene propylene diene modified rubber) Excluding 110 N and 01610N: 0...55 (32...131) NBR/CR (acrylonitrile [34% nitrile] butadiene rubber/chloroprene rubber) 		
Humidity	Up to 90% RH at 55 °C (131 °F).		
Vibration	Tested in accordance with IEC 68-2-6, frequency range 10...55 Hz, displacement 0.15 mm (0.01 in.), 10 cycles per axis, sweep rate 1 octave per minute		
MC-MC contactor monitor loop	N.C. (normally closed) contactor loop		
Conductor size, max	<ul style="list-style-type: none"> 1 x 1 mm² (0.001 in.²) stranded with sleeves stripped 5 mm (0.2 in.) 1 x 1.5 mm² (0.002 in.²) solid conductor 		<ul style="list-style-type: none"> 1 x 2.5 mm² (0.004 in.²) stranded with sleeves stripped 8 mm (0.31 in.) 1 x 4 mm² (0.006 in.²) solid conductor
Terminals	Minus terminal screws M2 spring action		Plus-minus terminal screws M3.5 with self-lifting connection, washer terminal boards separately removable
Installation group	C, in accordance with VDE 0110.		
Material	Control unit: Polycarbonate		
Mounting details	4 x M4 holes	45 mm (1.77 in.) DIN rail	22.5 mm (0.89 in.) DIN rail
Housing [mm (in.)]	<ul style="list-style-type: none"> Depth: 75 (2.95) Height: 130 (5.12) Width: 130 (5.12) 		<ul style="list-style-type: none"> Depth: 120 (4.72) Height: 73 (2.87) Width: 45.5 (1.79) 16 way
Weight [g (oz)]	650 (22.9)		450 (14.1)
Miscellaneous	The Safedge profile must end with a 6 kΩ resistor.		
Bend radius, min	500 mm (19.8 in.)		

(1) Do not use the auxiliary for safety.

Install the Safedge Safety Edge System

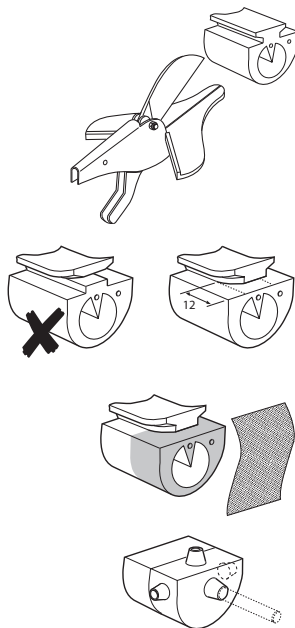
IMPORTANT Only use cyanoacrylate adhesive. Use Loctite 401 for dry applications. Use Loctite 380E for wet applications. This type of cyanoacrylate adhesive achieves a lasting sealing and high protection in accordance with the IP65 rating

Figure 1 - C-rail Installation and Mounting

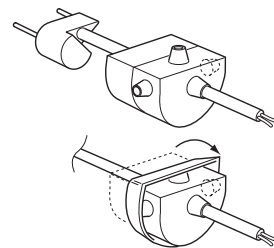


Assemble and Install the Safedge Profile

1. Cut the Safedge profile to length. Cut profiles without the coating chamber with rubber shears. Cut profiles with the coating chamber with a fine tooth saw.
2. When you use the catalog number 440F-A1302 closing cap with sealing lip, cut back the profile base to a length of 12 mm (0.46 in.). Precisely trim off the profile base completely and leave a flush surface.
3. Roughen the shaded areas with emery/sand paper.
4. The closing caps are molded with four grommets, each with a rubber plug. When you fit a resistor, leave the plugs intact. When you make a cable connection, select the appropriate cable exit, and remove the plug from the grommet with a hole punch.

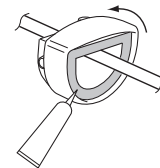


5. Pull the connecting cable through the hole.
6. Pierce each of the copper wires with one of the needles. Press the needle contacts of the connector in the direction shown: Wedge outwards, straight into the copper wires.



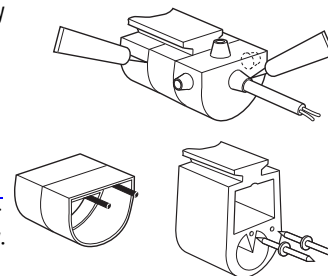
ATTENTION: The narrow side (wedge) of the connector must show outwards.

7. Fold back the sealing lip of the cap, then:
 - a. Apply adhesive to the shaded area of the closing cap as illustrated, then affix to the edge of the profile. Apply pressure for 10 seconds to enable adhesion.
 - b. Apply adhesive to the remainder of the shaded area and allow the sealing lip to contact the profile.



IMPORTANT Spread the adhesive evenly over the shaded area. Verify that no adhesive enters the profile.

8. To achieve a complete seal, apply more adhesive to the Safedge profile, especially around the grommet/cable exit and sealing lip of the closing cap.
9. Use the axial profile connector catalog number 440F-A0061S for extensions and repairs (see [step 1](#)...[step 9](#)) for the catalog number 440F-E0110 series of profiles only. For other types, use straight pin connectors. When you insert the profile into the C-rail, use a lubricant to reduce friction. During installation, do not pull on the connecting cable or on the rubber profile.



Sensing Surface of Safedge Safety Edge System

The sensing surface of the Safedge safety edge system is active along almost the full length of the edge. The 10 mm (0.4 in.) at the beginning and end are not active.

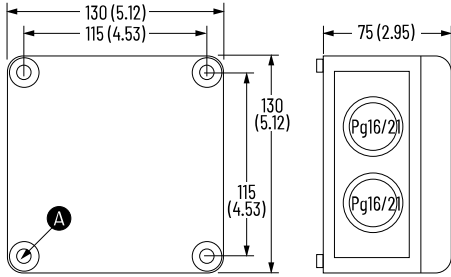
Catalog number 440F-E1111S is a cover profile only and is non-functioning.

- Maximum speed is 100 mm/s
- Suitable for the detection of fingers

Do not mount the control unit inside the hazard zone. Mount the control unit so it is visible during operation, as access to the control unit is required for manual reset or for routine indicator observation. You can mount the control unit on either side of the power doors, as long as the only hazard is the actual doors. In all other cases, mount the control unit anywhere convenient outside the hazard zone, with consideration for access requirements for test and maintenance.

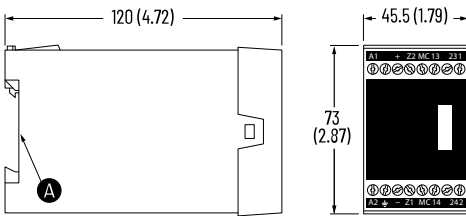
Mounting

Figure 2 - 440F-C251P Safedge Control Unit (Surface Mounted) [mm (in.)]



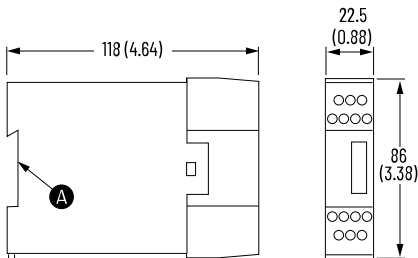
- A** 4 x M4 Mounting Holes

Figure 3 - 440F-C251D Safedge Control Unit (DIN Rail) [mm (in.)]



- A** 35 mm (1.38 in.) DIN rail mounting

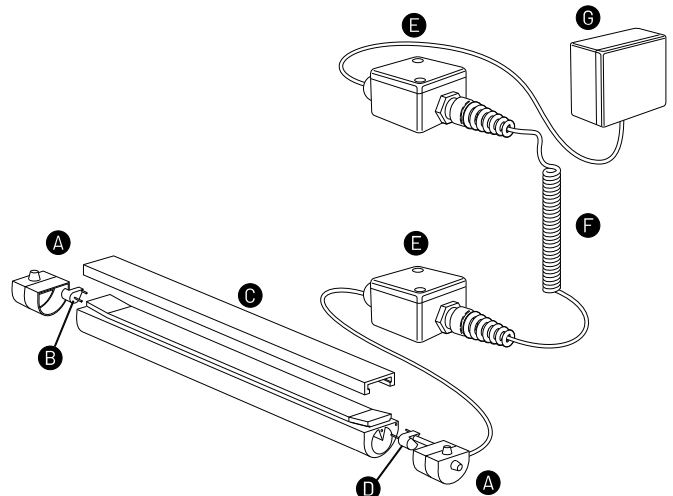
Figure 4 - 440F-C252D Safedge Control Unit (DIN Rail) [mm (in.)]



- A** 35 mm (1.38 in.) DIN rail mounting

Terminal Connections

To help prevent strain on terminal connections, use connection boxes and coiled cables.



- A** Closing cap
- B** Connector with resistor
- C** C-rail
- D** Cable connector
- E** Connecting box
- F** Coiled cable
- G** Control unit

Wiring

IMPORTANT Wiring must be in accordance with the [British] National Electric Code and applicable local codes and ordinances. Carefully follow [Table 1](#) for correct installation.

Figure 5 - 440F-C251P Safedge Control Unit

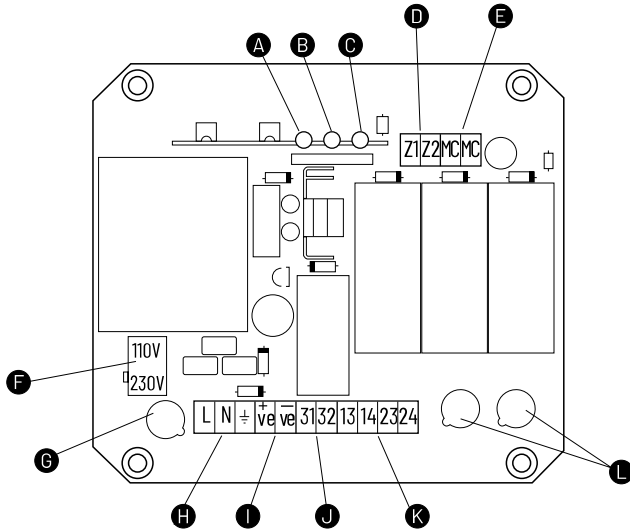


Figure 6 - 440F-C251D Safedge Control Unit

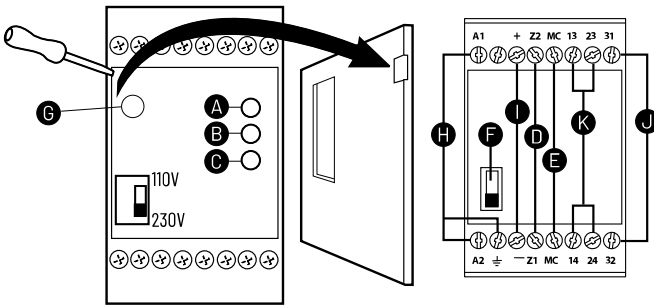


Figure 7 - 440F-C252D Safedge Control Unit

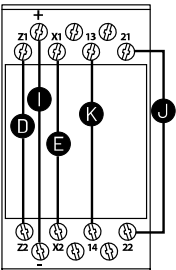


Table 1 - [Figure 5](#)...[Figure 7](#) Callouts

Callout	Description
A	Stop (red) status indicator
B	Open (yellow) status indicator
C	Run (green) status indicator
D	Profile connection to control units These terminals are used to connect the profile to the: • Z1 = Brown (inner conductor) • Z2 = White (outer conductor) See Typical Wiring Diagrams on page 5 . A profile must end with a 6 kΩ resistor (yellow) for series connection. If two profiles connect directly to Z1 and Z2 (in parallel), each profile must end with a 15K resistor (blue).
E	Reset terminal MC-MC or X1 - X2 on catalog number 440F-C252 These terminals are used for a number of different functions (the surface mount version is supplied with jumpers, while the DIN rail version is supplied without a jumper). Without the jumper, the terminals can be connected to positively guided normally closed auxiliary contacts on the machine contactors to provide monitoring of the contactors in dual-channel control systems. If one contactor fails to isolate the power at de-energization of its control coil, the Safedge safety edge system does not allow the other contactor to be energized until the fault has been rectified. Fit a jumper between these terminals on the DIN rail unit if this function is not required. This terminal is also used for auto/manual reset. If the MC-MC terminal remains jumped or connected only to the normally closed contact of the contactor, the unit is in Automatic Reset mode. In Automatic Reset mode, the output is achieved solely by removal of the actuating force. The output is also achieved at the powerup of the actuator (when there is no actuation force present). If a spontaneous restart can generate a risk, based on the result of a risk assessment to ISO12100, then this mode must not be used. See IEC60204-1 and EN ISO13849-1. For Manual Reset mode, a normally open spring return (not latching) push button must be connected across the MC-MC terminals or in series with the normally closed contactors. When the actuating force is removed, the unit does not operate until the button is pressed. The button also has to be pressed after powering up the control unit.
F	Main selector switch If you use a 110V AC or a 230V AC supply, set the voltage selector switch before you turn on the power. The default factory setting of the unit is 230V AC.
G	Supply fuse 500 mA
H	Main input terminal LN PE (A1, A2, PE) If you use a 110V AC or 230V AC supply, the power supply must be wired together with a protective earth (ground) to the terminals shown. The size of the protective earth (PE, ground) wire must at least be equal to that of the supply wire. Also check the main selector switch. If these terminals are used, ignore the following items.
I	24V AC/DC input terminal +ve and -ve or + and - If a 24V AC/DC supply is used, the supply must be connected to these terminals, verifying that the correct polarity is observed. Do not make any connections to the terminals of the main input terminal. When a 24V AC or DC supply is used, it must be isolated from the main supply in accordance with international electrical safety practice (IEC 364-4-41). One pole must be grounded to the earth. For 24V DC, the negative pole must be grounded. With 24V AC, the ground of the power supply must be connected to the negative terminal.
J	Auxiliary output terminals 31 and 32 or 21 and 22 This terminal provides an auxiliary normally closed contact (that is closed when the green Run status indicator is off) which is suitable for indication or for alarm devices. As it is an auxiliary, it must not be connected to the safety circuit.
K	Safety output terminals 13, 14, 23 and 24 These terminals are volt-free contacts for connection to the machine safety circuits—in other words, they are connected in series with the machine contactor control circuit (max rating 2 A at 250V AC). Both of these safety circuits are internally fused but must also be externally protected with a 2 A quick-acting fuse. If you are using only one contactor, terminals 13 and 24 are required and terminals 14 and 23 must be jumpered together. For two contactors with two independent control circuits (that is a dual-channel system), use 13-14 for one contactor and 23-24 for the other. For two contactors, also see Typical Wiring Diagrams on page 5 .
L	Safety fuses 2 A

Typical Wiring Diagrams

Figure 8 and Figure 9 show 110/230V AC applications with one contactor, profile pressed, Safedge input, manual reset, and monitored output.

- A Safedge
- B Reset
- C 24V Ground

Figure 8 - Series End, Dual-channel Output

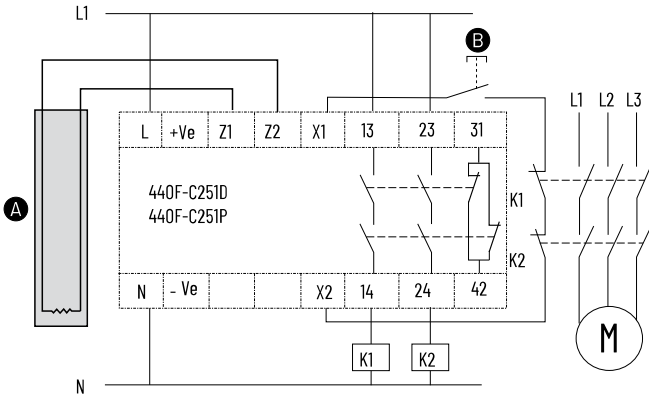


Figure 9 - Parallel End, Single-channel Output

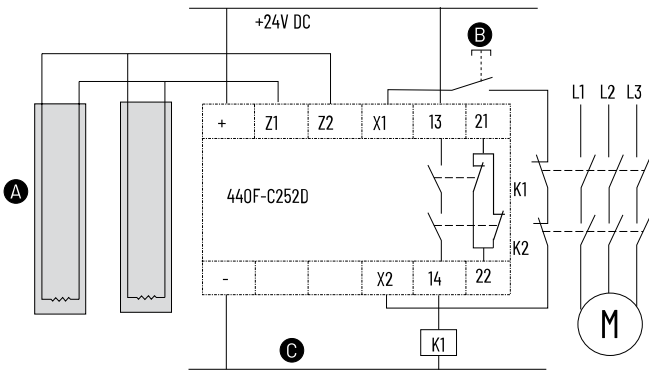


Figure 10 and Figure 11 show 110/230V AC series end applications with two contactors, contactor monitoring, Start/Stop circuit, profile pressed, Safedge input, automatic reset, and no output monitoring.

- A Safedge
- B 24V Ground

Figure 10 - Cascaded, Dual-channel Output

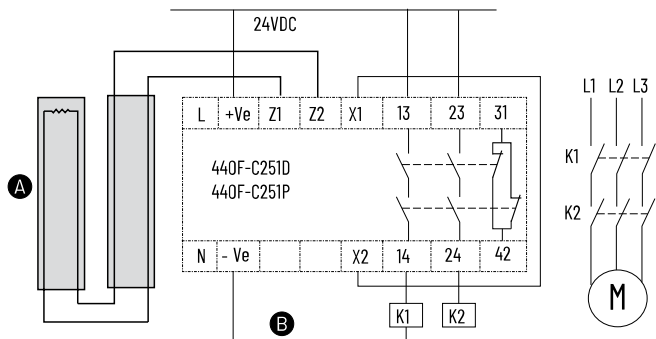


Figure 11 - Single-channel Output

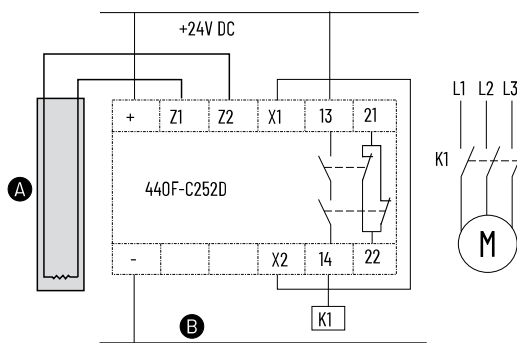
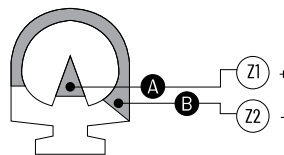


Figure 12 - Profile



- A Brown
- B White

Declaration of Conformity

CE Conformity

Rockwell Automation declares that the products that are shown in this document conform with the 2014/30/EU Electromagnetic Compatibility Directive (EMC) and 2006/42/EC Machinery Directive (MD) and that the respective standards and/or technical specifications have been applied.

For a comprehensive CE certificate, see: rok.auto/certifications.

UKCA Conformity

Rockwell Automation declares that the products that are shown in this document are in compliance with 2016 No. 1091 Electromagnetic Compatibility Regulations and 2008 No. 1597 Supply of Machinery (Safety) Regulations and that the respective standards and/or technical specifications have been applied.

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Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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