

Electromechanical Relays 78 Series Selection Guide



| Electromechanical Relays 78 Series | | | | |
|------------------------------------|--|--|--|--|
| Specification | 781 Series | 782 Series | 783 Series | 784 Series |
| Coil Voltages | 120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC | 120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC | 120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC | 120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC |
| Configuration | SPDT | DPDT | 3PDT | 4PDT |
| Contact Rating | 15A | 15A | 15A | 15A |
| Base Socket | 5 pin spade terminal | 8 pin spade terminal | 11 pin spade terminal | 14 pin spade terminal |
| Agency Approvals | UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610 | UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610 | UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610 | UL Recognized (E191059), CE, CSA 244610 |

Overview

These ice cube style relays are power relays designed for applications demanding high power control in various factory machines and control panels. They are ideal for electrical control panels requiring stable and reliable relays.

Features

- Small package design
- Silver alloy gold flashed contact
- High open contact dielectric strength (up to 2500V rms)
- High reliability and long life
- High vibration and shock resistance
- LED indicator on all models, so you can easily see if the relay is working properly without using a voltmeter
- Flag indicator shows relay status in manual or powered condition
- A pushbutton allows manual operation of the relay without the need for power to the coil
- Lock-Down door, when activated, holds pushbutton and contacts in the "operate" position, allowing circuits to be analyzed.
- SPDT, DPDT, 3PDT and 4PDT models
- Finger grip cover allows easier removal of relays from sockets than conventional relays
- I.D. tag/write labels for identifying relays in multi-relay circuits

Electromechanical Relays 78 Series

Selection Guide

| Electromechanical Relays 78 Series | | | | | | | |
|------------------------------------|---------|---------------------|--------------|---------------|------------------------------|--------|---------------------|
| Part Number | Price | Drawing Link | Coil Voltage | Configuration | Relay Socket Part Number | Price | Drawing Link |
| 781-1C-12D | \$5.25 | PDF | 12VDC | SPDT | 781-1C-SKT | \$4.50 | PDF |
| 781-1C-12A | \$5.25 | PDF | 12VAC | | | | |
| 781-1C-24D | \$5.00 | PDF | 24VDC | | | | |
| 781-1C-24A | \$5.25 | PDF | 24VAC | | | | |
| 781-1C-120A | \$5.25 | PDF | 120VAC | | | | |
| 781-1C-240A | \$6.25 | PDF | 240VAC | | | | |
| 782-2C-12D | \$6.50 | PDF | 12VDC | DPDT | 782-2C-SKT | \$4.50 | PDF |
| 782-2C-12A | \$6.50 | PDF | 12VAC | | | | |
| 782-2C-24D | \$6.50 | PDF | 24VDC | | | | |
| 782-2C-24A | \$6.75 | N/A | 24VAC | | | | |
| 782-2C-120A | \$6.75 | N/A | 120VAC | | | | |
| 782-2C-240A | \$7.50 | N/A | 240VAC | | | | |
| 783-3C-12D | \$6.75 | PDF | 12VDC | 3PDT | 783-3C-SKT | \$5.00 | PDF |
| 783-3C-12A | \$9.00 | PDF | 12VAC | | | | |
| 783-3C-24D | \$9.50 | N/A | 24VDC | | | | |
| 783-3C-24A | \$9.50 | N/A | 24VAC | | | | |
| 783-3C-120A | \$9.50 | N/A | 120VAC | | | | |
| 783-3C-240A | \$9.50 | N/A | 240VAC | | | | |
| 784-4C-12D | \$8.50 | PDF | 12VDC | 4PDT | 784-4C-SKT-1 | \$5.25 | PDF |
| 784-4C-12A | \$11.00 | PDF | 12VAC | | | | |
| 784-4C-24D | \$8.75 | PDF | 24VDC | | | | |
| 784-4C-24A | \$8.75 | N/A | 24VAC | | | | |
| 784-4C-120A | \$8.75 | N/A | 120VAC | | | | |
| 784-4C-240A | \$8.75 | N/A | 240VAC | | | | |

NOTE: Not recommended for low current switching. Find contacts' Minimum Switching Requirement on following page.
For low current switching, please see the QM4N1 and QM4X1 series.

Electromechanical Relays 78 Series Specifications

| Electromechanical Relays 78 Series Specifications | | | | | | | | | | | | |
|--|--|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|
| Part Numbers | 781-1C-12D | 781-1C-12A | 781-1C-24D | 781-1C-24A | 781-1C-120A | 781-1C-240A | 782-2C-12D | 782-2C-12A | 782-2C-24D | 782-2C-24A | 782-2C-120A | 782-2C-240A |
| General Specifications | | | | | | | | | | | | |
| *Service Life: Mechanical / Electrical Operations | Mechanical: 10,000,000 operations not powered Electrical: 100,000 operations @ rated resistive load | | | | | | | | | | | |
| Operating Temperature | -40 to 55°C [-40 to 131°F] | | | | | | | | | | | |
| Response Time | 20ms | | | | | | | | | | | |
| Vibration Resistance | ± 1mm [10-35 Hz] and 3gn [35-50Hz] | | | | | | | | | | | |
| Shock Resistance | 15gn | | | | | | | | | | | |
| Weight | 26g [0.92 oz] | | | | | | 36g [1.27 oz] | | | | | |
| Environmental Protection | IP40 | | | | | | | | | | | |
| NEMA B300 Pilot Duty Rated | Yes | | | | | | | | | | | |
| **Agency Approvals and Standards | UL Recognized File E191059, CE, CSA | | | | | | | | | | | |
| Coil Specifications | | | | | | | | | | | | |
| Standard | Mechanical flag indicator, LED Indicator, lockable push to test button | | | | | | | | | | | |
| Coil Input Voltage | 12VDC | 12VAC | 24VDC | 24VAC | 120VAC | 240VAC | 12VDC | 12VAC | 24VDC | 24VAC | 120VAC | 240VAC |
| Coil Resistance | 115Ω | 44Ω | 450Ω | 177Ω | 4.43kΩ | 17.72kΩ | 177Ω | 44Ω | 640Ω | 177Ω | 4.43 kΩ | 17.72 kΩ |
| Power Consumption | 1.4 W DC, 1.9 W AC @ 50/60 Hz | | | | | | 1.15 W DC, 1.4 W AC @ 50/60 Hz | | | | | |
| Dropout Voltage (% of nominal voltage or more) | 10% | 15% | 10% | 15% | | | 10% | 15% | 10% | 15% | | |
| Pull-in Voltage (% of nominal voltage or less) | 85% | 85% | 85% | 85% | | | 80% | 85% | 80% | 85% | | |
| Max. Voltage (Max. continuous voltage) | 110% of the rated coil voltage | | | | | | | | | | | |
| Contact Specifications | | | | | | | | | | | | |
| Contact Type | SPDT | | | | | | DPDT | | | | | |
| Contact Material | Silver alloy, gold flashed | | | | | | | | | | | |
| Minimum Switching Requirement | 10mA @ 17VDC | | | | | | | | | | | |
| Max. Contact Rating | Refer to Contact Ratings charts. | | | | | | | | | | | |
| Dielectric Strength Between Contacts | Between coil contact: 2000V rms; Between poles 2000V rms; Between contacts 1500V rms | | | | | | | | | | | |

*Note: These devices are rated for 1,000 cycles when used in a motor application. (Per Table 45.1, UL 508).

**Note: UL listed when used with sockets [781-1C-SKT](#), [782-2C-SKT](#), [783-3C-SKT](#), or [784-4C-SKT-1](#). Current limited to rating of relay or socket, whichever is less.

| 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) | | | | | | | | Voltamperes | |
| | | 120 Volts | | 240 Volts | | 480 Volts | | 600 Volts | | | |
| | | Make | Break | Make | Break | Make | Break | Make | Break | Make | Break |
| B300 | 5 | 30 | 3.00 | 15 | 1.50 | --- | --- | --- | --- | 3600 | 360 |

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.

| Contact Ratings 781 Series (current) | | | | |
|--------------------------------------|---------|-----|-----|-------------|
| Resistive | | | | *Motor Load |
| Voltage | Nominal | UL | CSA | UL |
| 28VDC | 15A | 15A | 12A | --- |
| 120VAC | 15A | 15A | 15A | 1/2Hp |
| 277VAC | 15A | 12A | 12A | 1Hp |

| Contact Ratings 782 Series (current) | | | | |
|--------------------------------------|---------|-----|-----|-------------|
| Resistive | | | | *Motor Load |
| Voltage | Nominal | UL | CSA | UL |
| 28VDC | 15A | 15A | 12A | --- |
| 120VAC | 15A | 15A | 15A | 1/2Hp |
| 277VAC | 15A | 12A | 12A | 1Hp |

Electromechanical Relays 78 Series Specifications

| Electromechanical Relay 78 Series Specifications | | | | | | | | | | | | | |
|--|--|------------|------------|------------|-------------|-------------|-------------------------------|------------|------------|------------|-------------|-------------|--|
| Part Numbers | 783-3C-12D | 783-3C-12A | 783-3C-24D | 783-3C-24A | 783-3C-120A | 783-3C-240A | 784-4C-12D | 784-4C-12A | 784-4C-24D | 784-4C-24A | 784-4C-120A | 784-4C-240A | |
| General Specifications | | | | | | | | | | | | | |
| *Service Life: Mechanical / Electrical Operations | Mechanical: 10,000,000 operations not powered Electrical: 100,000 operations @ rated resistive load | | | | | | | | | | | | |
| Operating Temperature | -40 to 55°C [-40 to 131°F] | | | | | | | | | | | | |
| Response Time | 20ms | | | | | | | | | | | | |
| Vibration Resistance | ± 1mm [10-35 Hz] and 3gn [35-100 Hz] | | | | | | | | | | | | |
| Shock Resistance | 15gn | | | | | | | | | | | | |
| Weight | 60g [2.12 oz] | | | | | | 80g [2.82 oz] | | | | | | |
| Environmental Protection | IP40 | | | | | | | | | | | | |
| NEMA B300 Pilot Duty Rated | Yes | | | | | | | | | | | | |
| **Agency Approvals and Standards | UL Recognized File E191059, CE, CSA | | | | | | | | | | | | |
| Coil Specifications | | | | | | | | | | | | | |
| Standard | Mechanical flag indicator, LED Indicator, lockable push to test button | | | | | | | | | | | | |
| Coil Input Voltage | 12VDC | 12VAC | 24VDC | 24VAC | 120VAC | 240VAC | 12VDC | 12VAC | 24VDC | 24VAC | 120VAC | 240VAC | |
| Coil Resistance | 80Ω | 30Ω | 320Ω | 110Ω | 2.88 kΩ | 11.3 kΩ | 76Ω | 20Ω | 303Ω | 80Ω | 2.1 kΩ | 8kΩ | |
| Power Consumption | 1.85 W DC, 2.05 W AC @ 50/60 Hz | | | | | | 1.5 W DC, 1.5 W AC @ 50/60 Hz | | | | | | |
| Dropout Voltage (% of nominal voltage or more) | 10% | 15% | 10% | 15% | | | 10% | 15% | 10% | 15% | | | |
| Pull-in Voltage (% of nominal voltage or less) | 80% | 85% | 80% | 85% | | | 80% | 85% | 80% | 85% | | | |
| Max. Voltage (Max. continuous voltage) | 110% of the rated coil voltage | | | | | | | | | | | | |
| Contact Specifications | | | | | | | | | | | | | |
| Contact Type | 3PDT | | | | | | 4PDT | | | | | | |
| Contact Material | Silver alloy, gold flashed | | | | | | | | | | | | |
| Minimum Switching Requirement | 10mA @ 17VDC | | | | | | | | | | | | |
| Max. Contact Rating | Refer to Contact Ratings charts. | | | | | | | | | | | | |
| Dielectric Strength Between Contacts | Between coil and contacts: 2000V rms; Between poles: 2000V rms; Between contacts: 1500V rms | | | | | | | | | | | | |

*Note: These devices are rated for 1,000 cycles when used in a motor application. (Per Table 45.1, UL 508).

**Note: UL listed when used with sockets 781-1C-SKT, 782-2C-SKT, 783-3C-SKT, or 784-4C-SKT-1. Current limited to rating of relay or socket, whichever is less.

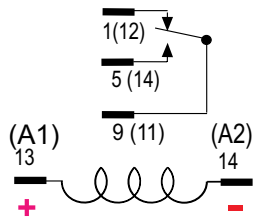
| Contact Ratings 783 Series (current) | | | | |
|--------------------------------------|-----------|-----|-------------------------------|----------------------|
| Voltage | Resistive | | | *Motor Load |
| | Nominal | UL | CSA | UL |
| 28VDC | 15A | 15A | 15A @ 28VDC 30A max total | - |
| 120VAC | 15A | - | 15A | 1/2 hp |
| 277VAC | 15A | 15A | 15A @ 150VAC 30A max total | 1hp 2hp max total |

| Contact Ratings 784 Series (current) | | | | |
|--------------------------------------|-----------|-----|-------------------------------|----------------------|
| Voltage | Resistive | | | *Motor Load |
| | Nominal | UL | CSA | UL |
| 28VDC | 15A | 15A | 15A @ 28VDC 30A max total | - |
| 120VAC | 15A | - | 15A | 1/2Hp |
| 277VAC | 15A | 15A | 15A @ 150VAC 30A max total | 1hp 2hp max total |

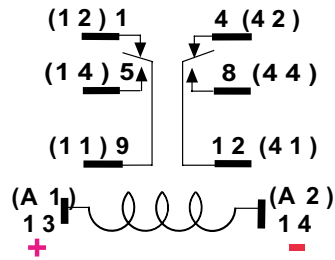
Wiring Diagrams 78 Series

Wiring Diagrams (viewed from pin end)

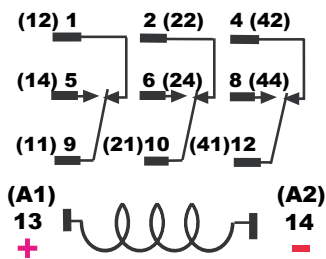
781-1C-XXX



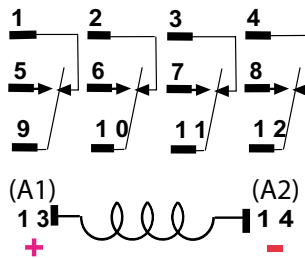
782-2C-XXX



783-3C-XXX



784-4C-XXX



*Note: ALTERNATE NEMA OR IEC () NUMBERS, VIEWED FROM PIN SIDE

Relay Sockets 78 Series



781-1C-SKT



782-2C-SKT



783-3C-SKT



784-4C-SKT-1

| Relay Sockets 78 Series | | | | |
|----------------------------|--------|---|---------------------|--|
| Part Number | Price | Description | Drawing Link | Agency Approval |
| <u>781-1C-SKT</u> | \$4.50 | AutomationDirect relay socket, 35mm DIN rail or panel mount. For use with 781 series cube relays. | PDF | UL Recognized file number: E225080 |
| <u>782-2C-SKT</u> | \$4.50 | AutomationDirect relay socket, 35mm DIN rail or panel mount. For use with 782 and AD-70S2 series cube relays. | PDF | |
| <u>783-3C-SKT</u> | \$5.00 | AutomationDirect relay socket, 35mm DIN rail or panel mount. For use with 783 series cube relays. | PDF | |
| <u>784-4C-SKT-1</u> | \$5.25 | AutomationDirect relay socket, 35mm DIN rail or panel mount. For use with 784 series cube relays. | PDF | |

| Relay Sockets 78 Series Screw Torques and Wire Sizes | | |
|--|---|---|
| Part Number | Maximum Screw Torques | Maximum Wire Sizes |
| <u>781-1C-SKT</u> | Terminals 13, 14: 7 in-lbs/0.8 N·m Terminals 1, 5, 9: 9 in-lbs/1.0 N·m | Terminals 13, 14: 18 to 20 AWG, solid or stranded, one or two identical wires Terminals 1, 5, 9: 12 to 20 AWG, solid or stranded, one or two identical wires |
| <u>782-2C-SKT</u> | All terminals: 9 in-lbs/1.0 N·m | All terminals: 12 to 20 AWG, solid or stranded, one or two identical wires |
| <u>783-3C-SKT</u> | | |
| <u>784-4C-SKT-1</u> | | |

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

Packaged M.O.V.s and Diodes

Overview

Metal Oxide Varistors (MOV) and Diode circuits are offered as convenient plug-in modules. Plugging a module into the relay socket connects the circuit in parallel with the relay coil. No additional wiring is required.

Modules fit within the maximum dimensions of the relay and socket.

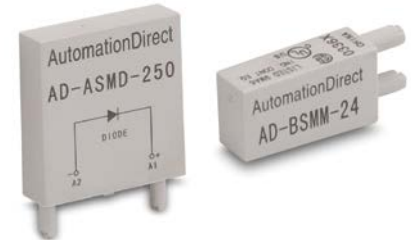
Features

- MOVs protect by shunting potentially damaging electrical spikes away from the relay coil. Ideal for AC and DC applications.
- Diodes protect external drive circuitry from inductive voltages generated when removing coil voltage. Ideal for DC applications. Polarity sensitive.

Application

Many PLC systems control one or more inductive load devices. These inductive loads (devices with a coil) generate transient voltages when they are de-energized with a relay contact. When a relay contact is closed it "bounces", which causes the coil to energize and de-energize until the "bouncing" stops. The transient voltage which is generated is much larger in amplitude than the supply voltage, especially with a DC supply voltage.

When switching a DC-supplied inductive load the full supply voltage is always present when the relay contact opens (or "bounces"). When switching an AC-supplied inductive load, if the voltage is not zero when the relay contact opens, there is energy stored in the inductor that is released when the voltage to the inductor is suddenly removed. This release of energy is what produces transient voltages.



When inductive load devices (motors, motor starters, interposing relays, solenoids, valves, etc.) are controlled with relay contacts, it is recommended that a surge suppression device be connected directly across the coil of the field device. If the inductive device has plug-type connectors, the suppression device can be installed on the terminal block of the relay output.

Metal oxide varistors (MOV) and diodes are devices which provide good surge and transient suppression of AC and DC powered coils.

| Protection Devices | | | | | | |
|-----------------------------|---------|-----|---|-----------------------|----------------------|--|
| Part Number | Price | QTY | Description | Nominal Input Voltage | Dimensions & Package | Mating Socket |
| AD-ASMD-250 | \$11.00 | 5 | Protection diode module for 783, 784 and 75 series relays. | 6-250VDC | Figure 1 | 783-3C-SKT 784-4C-SKT-1 750-2C-SKT 750-3C-SKT |
| AD-ASMM-24 | \$9.25 | 5 | MOV module for 783, 784 and 75 series relays that operate at 24VAC coil voltage. | 24VAC/VDC | | |
| AD-ASMM-120 | \$9.25 | 5 | MOV module for 783, 784 and 75 series relays that operate at 120VAC coil voltage. | 120VAC/VDC | | |
| AD-ASMM-240 | \$9.25 | 5 | MOV module for 783, 784 and 75 series relays that operate at 240VAC coil voltage. | 240VAC/VDC | | |
| AD-BSMD-250 | \$9.25 | 5 | Protection diode module for 782 series relays. | 6-250VDC | Figure 2 | 782-2C-SKT |
| AD-BSMM-24 | \$9.25 | 5 | MOV module for 782 series relays that operate at 24VAC coil voltage. | 24VAC/VDC | | |
| AD-BSMM-120 | \$9.25 | 5 | MOV module for 782 series relays that operate at 120VAC coil voltage. | 120VAC/VDC | | |
| AD-BSMM-240 | \$9.25 | 5 | MOV module for 782 series relays that operate at 240VAC coil voltage. | 240VAC/VDC | | |

Dimensions

inches [mm]

Figure 1

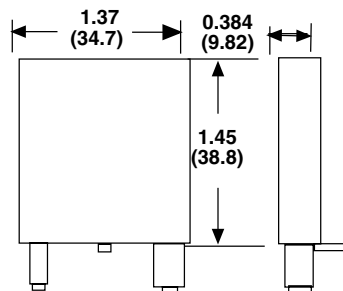


Figure 2

