

Alternate Maintenance Setting (AMS) Switch



Conmutador de ajuste de mantenimiento alternativo (AMS)

Interrupteur de réglage d'entretien alternatif (AMS)

Instruction Bulletin
Boletín de instrucciones
Directives d'utilisation

80298-171-01

Retain for Future Use. /
Conservar para uso futuro. /
À conserver pour usage ultérieur.



by **Schneider** Electric

Alternate Maintenance Setting (AMS) Switch

Retain for future use.

Introduction

Square D® brand Masterpact® circuit breakers, manufactured by Schneider Electric, have superior arc-flash protection characteristics. The Masterpact circuit breakers feature additional arc flash protection when a Short-Time Zone Selective Interlocking (ST-ZSI) scheme is used. When properly applied, the circuit breakers provide reduced arc flash incident energy (AFIE) without changing settings or temporarily compromising the system selective coordination.

For applications where the above solutions are not sufficient, Schneider Electric has developed a method to temporarily reduce the short-time delay setting of the circuit breaker using an alternate maintenance setting (AMS) switch.

In order to quantify the AFIE reduction, an arc-flash analysis must first be performed. Values must be calculated for the possible maintenance setting to determine if any practical changes to maintenance procedures, such as reduction of PPE levels, is even possible.

Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified personnel.
- Perform such work only after reading and understanding all of the instructions contained in this bulletin.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Practice lock-out / tag-out procedures according to OSHA requirements.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly. Neglecting fundamental installation and maintenance requirements may lead to personal injury, as well as damage to electrical equipment or other property.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.

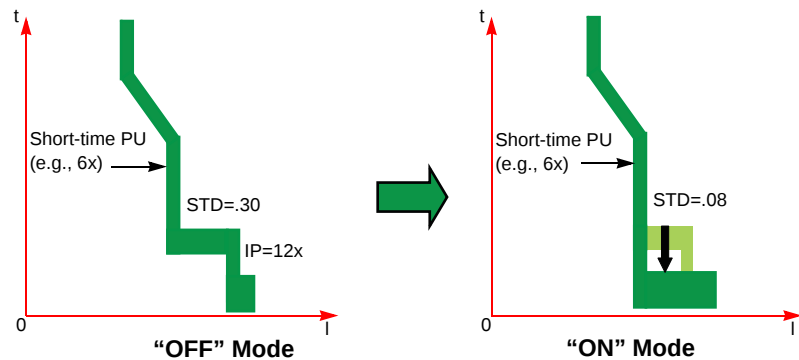
AMS Switch Application

When the AMS Switch is Turned “ON”

The AMS switch can be turned “ON” to reduce circuit breaker tripping time. In the “OFF” mode, a typical short-time delay (STD) setting is 0.3 seconds. The STD setting can be reduced to 0.08 seconds when the switch is in the “ON” mode. See Figure 1.

This is almost equivalent to setting the instantaneous pickup down to the short-time pickup (e.g., instantaneous pickup from 12x to 6x—the difference is that instantaneous maximum clearing time is 0.05 seconds, and unrestrained AMS switch maximum clearing time is 0.08 seconds).

Figure 1: AMS Switch “OFF” and “ON” Mode



For an AMS-controlled breaker to be effective for arc-flash reduction, the breaker's short-time current pickup setting (considering the positive tolerance) must be set below 85% of the minimum arcing current at the system location where it is expected to provide “fast” interruption (considering all fault current scenarios in an arc flash study).

For example, if a switchgear main circuit breaker is to provide “fast” interruption for an arcing fault in a feeder breaker cell, its short-time current pickup setting (considering the positive tolerance) would need to be set below 85% of the arcing fault current at the switchgear main bus. To ensure coordination, the main and feeder circuit breakers should be coordinated via a time-current coordination analysis (as usual). This application should be documented in the arc flash analysis and safety practices so future breaker adjustments will not result in the arc flash hazard unknowingly increasing for the workers.



Do not use a short-time delay I²T “ON” breaker trip-unit setting with an AMS switch.

Nuisance Tripping

When the AMS switch is “ON” (breaker is in maintenance PU mode), the breaker's short-time delay setting is overridden and the breaker will trip with no intentional delay. As a result, the potential for nuisance tripping increases. Nuisance tripping can be caused by a motor starting, transformer inrush, or some other momentary power disturbance.

Other Considerations

The use of the AMS switch should be integrated into the overall safety policy. Lock-out / tag-out procedures require the use of personal protective equipment (PPE), so adding the necessary steps to ensure the AMS switch is turned to the “ON” position when it should be and turned back to the “OFF” position, as well as using appropriate PPE for each of these modes, are critical for proper application of the AMS switch.

Every AMS switch user must be trained on the proper use of this equipment and how it impacts their safety policy. Additional considerations are as follows:

- Impact of lost selectivity
- Nuisance trips
- Possibility of using wrong AMS switch for desired upstream circuit breaker
- False sense of security
- Increased reliance on procedures
- Equipment planning
- Labeling issues—one reasonable approach is to place arc flash information labels on equipment based on the normal settings mode (which is the AMS switch turned to the “OFF” position) and when using maintenance settings. The user must develop administrative controls based on the user’s safety practices.

NFPA 70B requires proper maintenance of the electrical system. NFPA 70E recommends updating the arc flash study every five years or whenever system modifications are made, such as adjustment of protective device settings.

Selecting Maintenance Mode

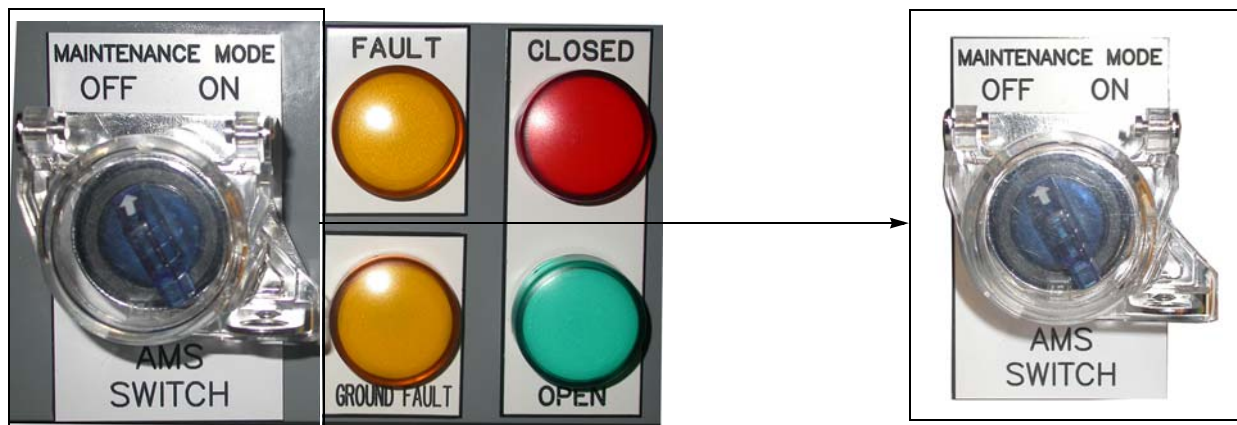


For the following sections, “Local” refers to the local equipment. “Remote” refers to downstream equipment connected to the local equipment.

Local AMS Switch Option

Locate the AMS switch for the intended circuit breaker (see Figure 2).

Figure 2: Local AMS Switch

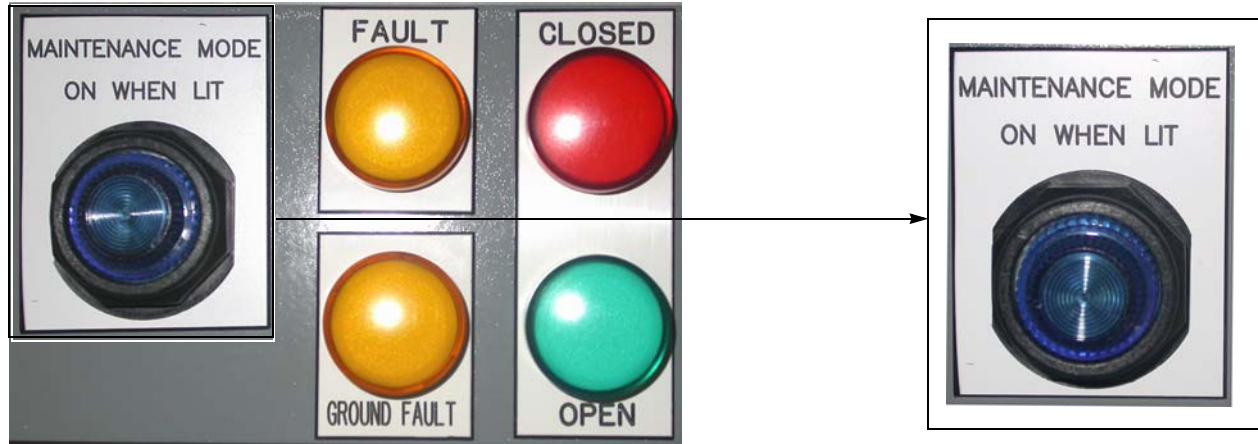


1. Turn the AMS switch to the “ON” position. The switch should now illuminate blue, indicating the circuit breaker is in maintenance mode.
2. To return to normal operation, turn the AMS switch to the “OFF” position. The switch should no longer illuminate.

Remote AMS Switch Option

When the remote AMS switch option is ordered, a local maintenance mode indicator light will be placed near the circuit breaker feeding the remote downstream equipment (see Figure 3).

Figure 3: Local Maintenance Mode Indicator Light



1. Locate the user placed remote AMS switch.
2. Turn the remote AMS switch to the "ON" position. The remote switch and the local maintenance mode indicator light near the circuit breaker should both illuminate blue, indicating the circuit breaker is in maintenance mode.
3. To return to normal operation, turn the remote AMS switch to the "OFF" position. The remote switch and the local maintenance mode indicator light (near the circuit breaker) should no longer illuminate.

Testing the AMS System

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- This equipment must be installed and serviced by qualified personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that the power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

The system should be tested upon initial start-up and at regular intervals afterward.

To test the AMS system, follow the steps listed below. Refer to Figure 4 below and Figure 5 on page 6.

1. Verify AMS switch is in the "OFF" position.
2. Locate the restraint interface module (RIM) associated with the AMS switch and circuit breaker to be tested.
 - a. Observe the LEDs on the RIM and check that ML-0 In and all six upstream LEDs are lit.
 - b. The maintenance mode indicator light on the AMS switch must be off. If using the remote AMS switch option, then the local indicator light must be off as well.
3. Press and hold the AMS switch pushbutton at the bottom of the RIM (terminals 3 and 4). All the LEDs on the RIM must be unlit.
4. While continuing to press the AMS switch pushbutton, press and hold the Push-to-Test button on the RIM, and verify the following:
 - a. All six upstream LEDs are lit.
 - b. The "Isd" LED at the top of the circuit breaker trip unit will flash on and off in a repeating pattern. See Figure 4.
5. Release both pushbuttons on the RIM.
6. Turn the AMS switch to the "ON" position.
7. The maintenance mode indicator light on the AMS switch must illuminate. If using the remote AMS switch option, then the local maintenance mode indicator light must illuminate as well.
8. Turn the AMS switch to the "OFF" position. The maintenance mode indicator light on the switch must turn off. If using the remote AMS switch option, the local maintenance mode indicator light must turn off as well.
9. Check LEDs and maintenance mode indicator lights(s).
 - a. If light(s) function as described, the AMS system is functional.
 - b. If light(s) do not function as described, check for problems with items such as power supplies, LEDs, lamps, wiring, etc.



If the problems still persist after checking power supplies, contact your local Schneider Electric sales office.



The above test procedure verifies that the circuit breaker trip unit has received the AMS signal. A complete tripping functionality test must be periodically performed using primary or secondary injection current testing.

Figure 4: Micrologic Circuit Breaker Trip Units—LEDs

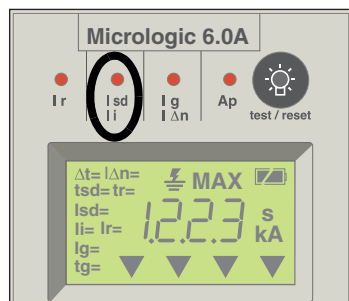
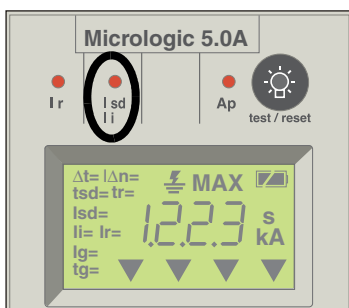
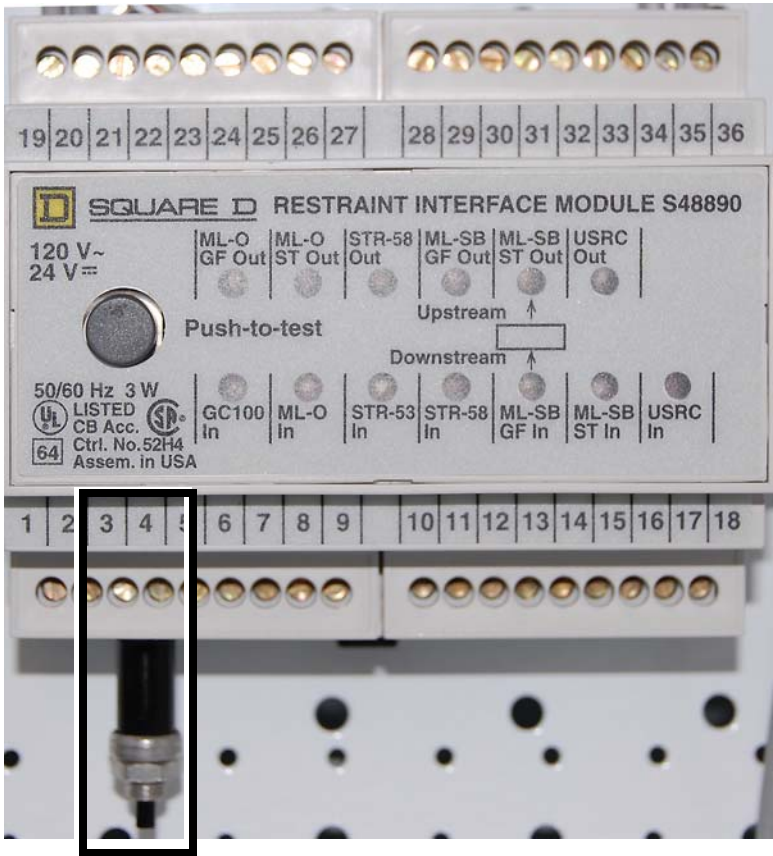


Figure 5: Restraint Interface Module (RIM) and Pushbutton Switch



Remote Options and Mounting
Instructions

The standard AMS switch offering is a local lighted switch (see Figure 2 on page 3) located near the circuit breaker. In addition, the user can install a remote maintenance mode indicator wired in parallel to the local maintenance mode indicator. To wire the remote indicator, see Figure 7 on page 8. The dashed lines in the wiring diagram indicates user wiring with 14 AWG wire.

An alternate offering is for the user to install a remote lighted switch assembly at the downstream equipment. See the “Remote AMS Switch Option” in the wiring diagram (see Figure 7 on page 8). With this option, only a local maintenance mode indicator light is provided near the circuit breaker (see Figure 3 on page 4).

Table 1: Parts for Remote AMS
Switch Components

Quantity	Catalog Number	Description
1	9001K11J38LLL	Switch with blue indicator light
1	9001KA3	Switch contact block
1	9001K7	Padlock attachment
1	80298-173-01	AMS switch nameplate



The user must provide parts (refer to Table 1) for the remote AMS switch.

The user wires the remote lighted switch to the local equipment with 14 AWG wire as shown with the dashed lines in the wiring diagram (see Figure 7 on page 8). At that time, the factory supplied jumper should be removed as indicated.

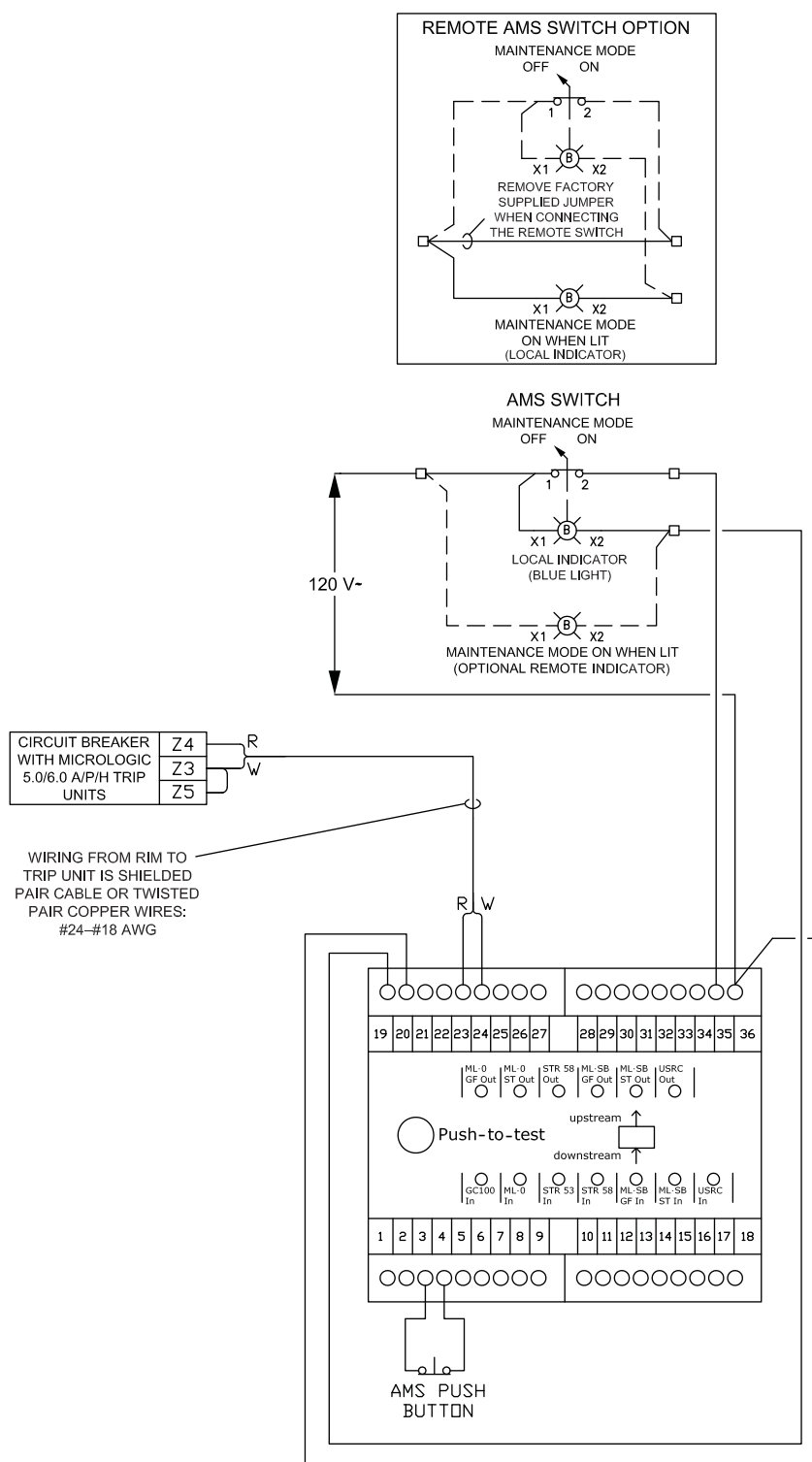


When the remote AMS switch option is selected, this instruction bulletin includes a label that will need to be applied near the remote AMS switch.

Figure 6: Label for Remote AMS Switch Option



Figure 7: Wiring Diagram



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