

Instruction Bulletin

48049-134-01
4/01
Cedar Rapids IA, USA
ECN K453

ME Test Kit User Manual U.S. Catalog No.: 55391

Retain for future use.



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Section 1—General Information

TEST KIT IDENTIFICATION

- A—Input power socket
- B—ON/OFF Switch
- C—Input fuse holder and voltage selector
- D—Duration thumb wheels (six): Sets duration of injection
- E—Injection current thumb wheels (four): Sets injection current
- F—Start button
- G—Stop/reset button
- H—? LED: Indicates injection circuit open or injection stopped by the test kit thermal protection
- I—Ready LED: Indicates test kit ready to inject
- J—24 Vdc outlets
- K—24 V fuse holder
- L—OF/SDE auxiliary switch jack and two terminals
- M—Injection current outlets
- N—LED1: Indicates long-time tripping test, short-time tripping, instantaneous tripping
- O—LED2: Indicates ground-fault protection test
- P—Selector button for tripping function
- Q—Display screen: Indicates tripping time (in seconds)

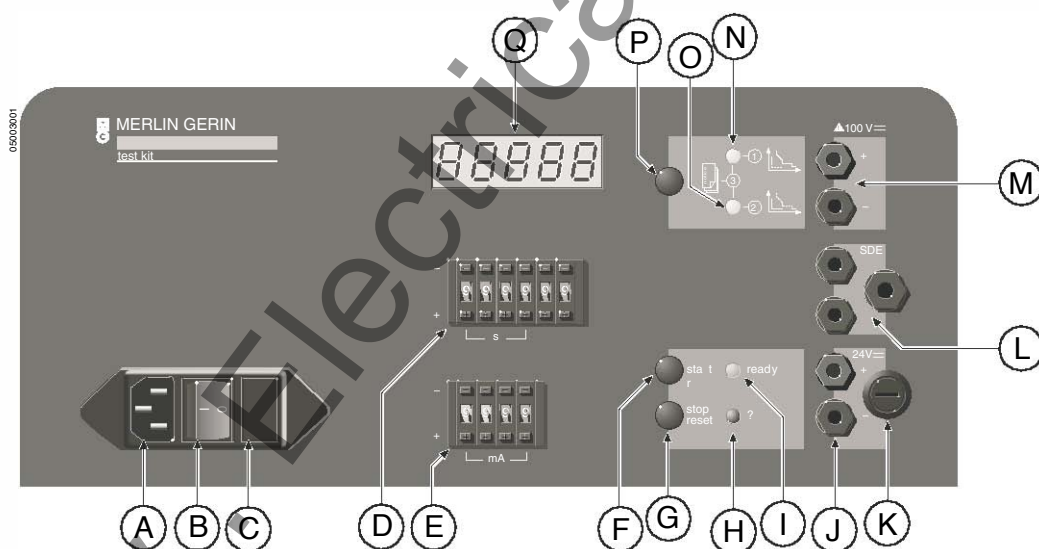

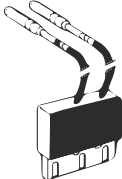
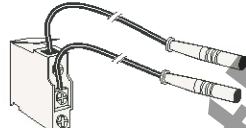
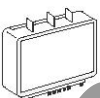
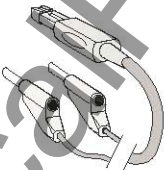


Figure 1: Test Kit Identification

TEST KIT ACCESSORIES

Table 1: Test Kit Accessories

Accessory	Description	Part No.
05003002 	Red test cable for ST trip units	1519932
	Black test cable for ST trip units	1519933
05003004 	SDE connection cable for MASTERPACT® trip unit	1519935
05003005 	Wiring assembly including an OF auxiliary switch for COMPACT® NS circuit breakers	1519936
05003007 	Adapter for CM test	1519999
05003006 	Test cable for STR trip units	0677928
	Blue cables (2) for SDE auxiliary switch connection (not shown)	1519931
	Power supply cable , 6.5 ft. (2 m) (not shown)	

HOW TO USE THE TEST KIT

Connection to AC Power Supply

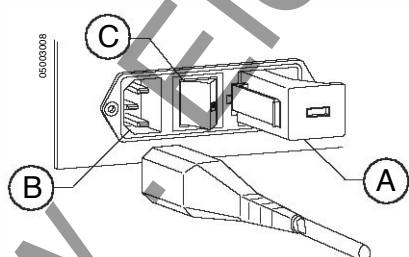


Figure 2: Connecting Power Supply

1. Select the proper voltage setting using the voltage selector (A).
2. Plug one end of the test kit power cord into the power cord receptacle (B); plug the other end into a grounded power source.
3. Press the power button (C) to turn on the unit.

ME Test Kit Section 1—General Information

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Power-up

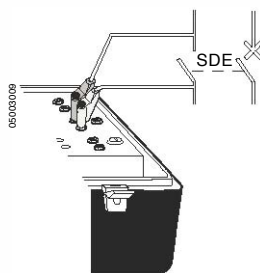
The display screen and LEDs flash on and off once then remain on with **0.00** showing on the display screen and ready LED and LED1 on.

Connection to Device Being Tested

When connecting trip units to the test kit, make sure to observe the polarities. For detailed instructions on connecting to circuit breakers, see:

- Section 2 for MASTERPACT circuit breakers
- Section 3 for COMPACT circuit breakers
- Section 4 for COMPACT NS circuit breakers

Measuring Tripping Time



Connect the following devices to the SDE terminals:

- OF auxiliary switch (N/O)
- SDE auxiliary switch (N/O or N/C)
- Main contact (circuit breaker disconnected from the protected power circuit)

Figure 3: Connecting to SDE Terminals

Settings

1. Set the test current using the injection current thumb wheels.
2. Set the current injection duration using the time duration thumb wheels.
3. For long-time, short-time and instantaneous tripping tests press the selector push button until LED1 illuminates.
4. For ground-fault protection test press the selector push button until LED2 illuminates (except STCM3).
5. For the STR22ME test press the selector push button until LED1 and LED2 illuminate.

Definitions

Io: Rating Plug	Tm: Short-time Delay
In: Sensor Rating	I: Instantaneous Pickup
Ir: Long-time Pickup	Ih: Ground-fault Pickup
Tr: Long-time Delay	Th: Ground-fault Delay
Im: Short-time Pickup	

Tests

Press start button. Current injection stops on any of the following events:

- Pressing the stop-reset button.
- Opening the SDE auxiliary contacts or the main contacts of the device.
- Reaching the end of a specified duration.
- Tripping the test kit thermal protection system (? LED on).
- Opening the injection circuit (e.g., due to a faulty test plug connection) (? LED on).

Another test may be carried out when the ready LED comes on to signal the end of the cooling period. Close circuit breaker after each test.

TECHNICAL DATA

Injection Current

8 mA rms to 2820 mA rms current accuracy:

- ± 5% for $I \leq 20$ mA rms
- ± 2% for $I > 20$ mA rms

Maximum Injection Duration

- Infinite if $I < 120$ mA rms (set the duration thumb wheels to 9999.99)
- 600 msec. if $I \geq 1200$ mA rms
- Proportional to I^2 rms for 120 mA rms $< I < 1200$ mA rms
- Time setting accuracy: ± 1%

Input Power

- 110 Vac position: 100 Vac (–20%) to 127 Vac (+15%)
- 220 Vac position: 200 Vac (–20%) to 240 Vac (+15%)
- Frequency range: 50 to 60 Hz

Fuse Type

- 24 V: 250 V–200 mA
- Mains : 250 V–630 mA

CHECKING TEST KIT PERFORMANCE

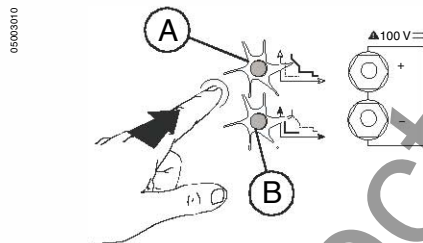


Figure 4: Connecting Power Supply

CAUTION

HAZARD OF INVALID READING

Use an ammeter capable of measuring the rms values of a rectified full-wave sinusoidal ac current.

Failure to follow this instruction can result in inaccurate test results.

1. Make sure that both LED1 (A) and LED2 (B) are on.
2. Measure output voltage of the 24 V outlet using an accurate voltmeter. Record the voltage in the column marked 24 V in Table 2.
3. Connect an ammeter in series with a 10 Ω 3 W or higher resistor and the current outlets on the trip unit. Set the time duration thumb wheels to 100.00 seconds. Set the injection current thumb wheels to 100 mA.
4. Press the start button and check that the current set by the injection current thumb wheels corresponds to the value on the ammeter. Record the current reading in the column marked "Current Reading" in Table 2.
5. Press the stop button.
6. Set the time duration thumb wheels to 100.00 seconds. Set the injection current thumb wheels to 1000 mA.
7. Press the start button and compare the reading of the tripping time display using an accurate timer. Record the readings in the column marked "Timer Reading" in Table 2.

Table 2: Periodic Testing

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Section 2—Testing MASTERPACT® Circuit Breakers

PRELIMINARY INFORMATION

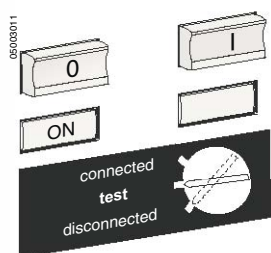


Figure 5: Circuit Breaker in Test Position

⚠ DANGER

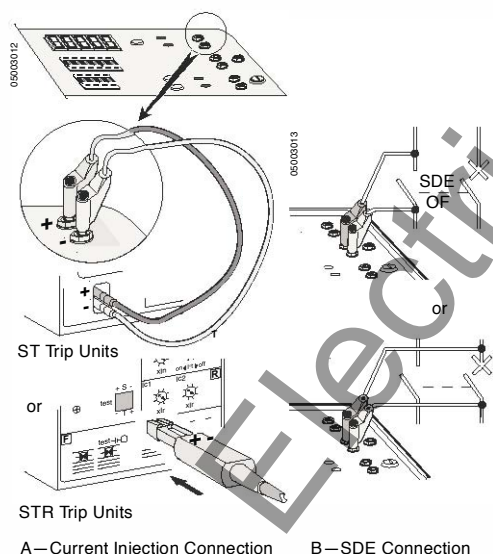
HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm 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.

1. Turn off all power supplying this equipment before working on or inside equipment.
2. Check the time/current characteristic curves for each of the trip units. Before each test, make sure the circuit breaker is closed (in test or disconnected position).

CONNECTION



Connect the trip unit to test kit:

A—Current injection connection

B—SDE connection

Figure 6: Connect Trip Unit to Test Kit

STR18–STR58 TRIP UNITS

Long-time Tripping Test

Table 3: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 2	2	3	4	5	6	7	8	9	10
200–630 A	100 mA/In	200 mA	300 mA	400 mA	500 mA	600 mA	700 mA	800 mA	900 mA	1000 mA
800–1250 A	100 mA/In	200 mA	297 mA	396 mA	494 mA	595 mA	693 mA	796 mA	885 mA	996 mA
1600 A	100 mA/In	200 mA	300 mA	399 mA	488 mA	578 mA	670 mA	767 mA	851 mA	956 mA
2000 A	100 mA/In	200 mA	289 mA	376 mA	465 mA	556 mA	645 mA	739 mA	821 mA	923 mA
2500 A	100 mA/In	200 mA	300 mA	387 mA	467 mA	557 mA	623 mA	695 mA	758 mA	839 mA
3000/3200 A	100 mA/In	200 mA	298 mA	377 mA	458 mA	543 mA	609 mA	680 mA	743 mA	823 mA
4000 A	100 mA/In	200 mA	299 mA	390 mA	481 mA	576 mA	668 mA	765 mA	850 mA	955 mA
5000 A	100 mA/In	200 mA	294 mA	369 mA	447 mA	543 mA	602 mA	667 mA	725 mA	799 mA
6000/6300 A	100 mA/In	200 mA	300 mA	373 mA	442 mA	510 mA	567 mA	630 mA	686 mA	757 mA

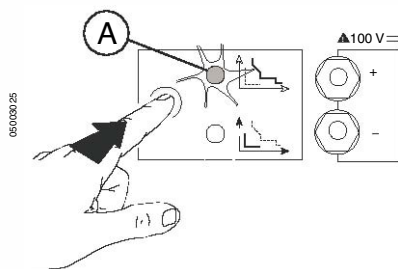


Figure 7: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 6.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 3 to determine the injection current for the tripping test.

Example: 5000 A circuit breaker

- Trip unit setting: $I_r = 0.5 I_n$ ($I_o = 2500$ A rating plug and $I_r = 1.0$ or $I_o = 0.5$ and $I_r = 1.0$)
 - 5000 A frame/2500 A rating plug = 0.5 or I_o (set at 0.5) $\times I_r$ (set to 1.0) = 0.5
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 0.5 = 3 I_n$)
 - Table indicates the level of current that must be injected: 294 mA
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
5. Use the thumb wheels to set the injection current.
 6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
 7. Press the start button.
 8. When the circuit breaker trips read the tripping time and compare it to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Short-time Tripping Test

Table 4: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating					
	Up to 6	6	7	8	9	10
200–500 A	100 mA/In	600 mA	700 mA	800 mA	500 mA	600 mA
600–800 A	100 mA/In	600 mA	705 mA	810 mA	494 mA	595 mA
1000 A	100 mA/In	600 mA	705 mA	809 mA	488 mA	578 mA
1200/1250 A	100 mA/In	600 mA	706 mA	813 mA	465 mA	556 mA
1600 A	100 mA/In	600 mA	708 mA	815 mA	467 mA	557 mA
2000 A	100 mA/In	600 mA	700 mA	800 mA	458 mA	543 mA
2500 A	100 mA/In	600 mA	693 mA	785 mA	481 mA	576 mA
3000/3200 A	100 mA/In	600 mA	681 mA	763 mA	447 mA	543 mA
4000 A	100 mA/In	600 mA	705 mA	810 mA	442 mA	510 mA
5000/6300 A	100 mA/In	600 mA	687 mA	773 mA	442 mA	510 mA

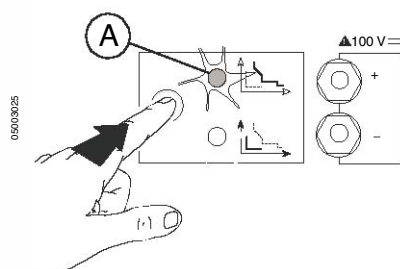


Figure 8: LED1 is On

Make sure that LED1 (A) is on. Make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting. Short-time settings are based on I_r . Use the previous example to calculate I_r .

Instantaneous Tripping Test

Table 5: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 10	10	12	14	17	19	20	22	24	28
200–630 A H1/H2	100 mA/In	960 mA	1100 mA	1470 mA	1710 mA	1930 mA	2000 mA	2130 mA	2250 mA	2480 mA
200–630 A L1/L2	100 mA/In	960 mA	1260 mA	1470 mA	1710 mA	1930 mA	2000 mA	2130 mA	2250 mA	2480 mA
800/1000 A	100 mA/In	960 mA	1260 mA	1470 mA	1710 mA	1930 mA	2000 mA	2130 mA	2250 mA	2480 mA
1200–1600 A	100 mA/In	960 mA	1270 mA	1470 mA	1690 mA	1880 mA	1940 mA	2050 mA	2170 mA	
2000 A	100 mA/In	1020 mA	1180 mA	1320 mA	1500 mA	1600 mA	1660 mA			
2500 A	100 mA/In	980 mA	1113 mA	1240 mA						
3000–6300 A	100 mA/In	960 mA	1100 mA							

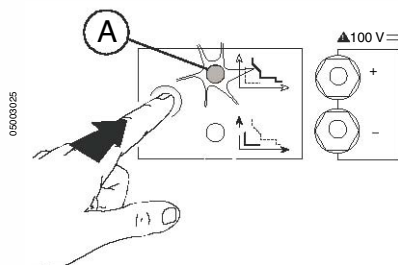


Figure 9: LED1 is On

Ground-fault Protection Test

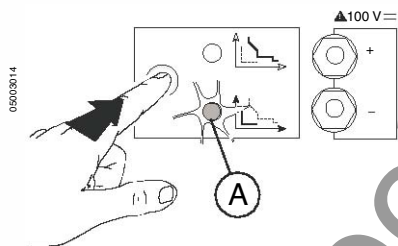


Figure 10: LED2 is On

Make sure that the LED1 (A) is on. Make sure the instantaneous setting is adjusted lower than the injection current setting. Instantaneous settings are based on In only. No calculations for Ir are required.

CAUTION

HAZARD OF INVALID READING

Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

1. Make sure that LED2 (A) is on.
2. Set the injection current to 100 mA/In for all ratings.
3. Press the start button. The circuit breaker must trip in less than two seconds.

ST208–ST418 TRIP UNITS

Long-time and Short-time Tripping Test

Table 6: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating							
	Up to 4	4	5	6	7	8	9	10
200–6300 A	100 mA/In	400 mA	500 mA	580 mA	685 mA	790 mA	850 mA	940 mA

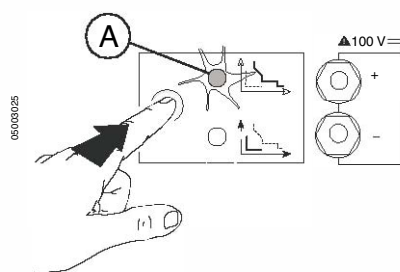


Figure 11: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 6.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 6 to determine the injection current for the tripping test.
Example : 2500 A circuit breaker
 - Trip unit setting: $I_r = 0.8 I_n$
 - Long-time tripping test: $5 \times I_r$ (i.e., an equivalent of $5 \times 0.8 = 4 I_n$)
 - Table indicates the level of current that must be injected: 400 mA (4×100 mA)
 - The tripping time obtained must be compared to the value at the $5 \times I_r$ line on the official time/current characteristic curve for the device
5. Use the thumb wheels to set the injection current.
6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
7. Press the start button.
8. When the circuit breaker trips read the tripping time and compare it to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Instantaneous Tripping Test

Table 7: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating								
	Up to 6	6	8	11	12	14	18	22	28
200–3200 A	100 mA/In	585 mA	780 mA	1000 mA	1085 mA	1329 mA	1730 mA	1941 mA	2369 mA
4000–6300 A	100 mA/In	585 mA	780 mA	1100 mA	1200 mA				

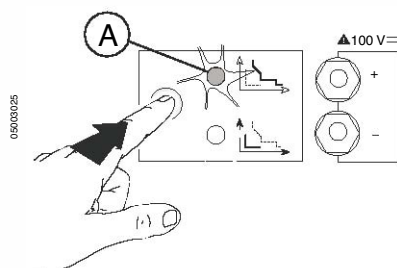


Figure 12: LED1 is On

Make sure that LED1 (A) is on. Instantaneous settings are based on In only. No calculations for Ir are required.

Ground-fault Protection Test

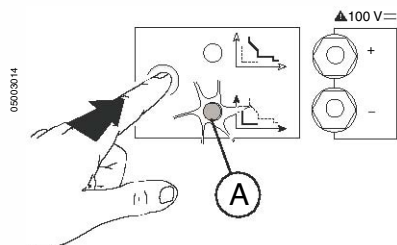


Figure 13: LED2 is On

CAUTION

HAZARD OF INVALID READING

Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

1. Make sure that the LED2 (A) is on.
2. Set the injection current to 100 mA/In for all ratings.
3. Press the start button. The circuit breaker must trip in less than two seconds.

Section 3—Testing COMPACT® Circuit Breakers

PRELIMINARY INFORMATION

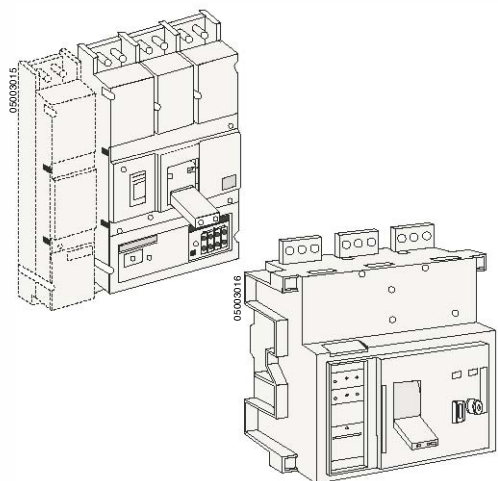


Figure 14: Circuit Breaker in Test Position

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

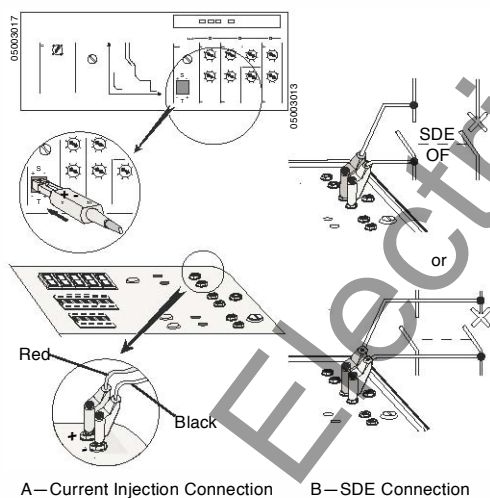
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning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

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

1. Turn off all power supplying this equipment before working on or inside equipment.
2. Check the time/current characteristic curves for each of the trip units. Before each test, make sure the circuit breaker is closed (in test or disconnected position).

STR25–STR55 TRIP UNITS

Connection



Connect the trip unit to test kit:

A—Current injection connection

B—SDE connection

Figure 15: Connect Trip Unit to Test Set

Long-time and Short-time Tripping Test

Table 8: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating						
	Up to 5	5	6	7	8	9	10
400–1250 A	100 mA/In	500 mA	600 mA	700 mA	800 mA	900 mA	950 mA

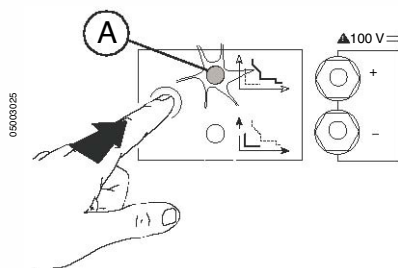


Figure 16: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 15.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 8 to determine the injection current for the tripping test.

Example: 1200 A circuit breaker

- Trip unit setting: $I_r = 0.85 I_n$ ($I_o = 1000$ A rating plug and $I_r = 1.0$ or $I_o = 1.0$ and $I_r = 0.85$)
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 0.85 = 5.1 I_n$)
 - Table indicates the level of current that must be injected: 510 mA (5.1×100 mA)
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
5. Use the thumb wheels to set the injection current.
 6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
 7. Press the start button.
 8. When the circuit breaker trips read the tripping time and compare it to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Instantaneous Tripping Test

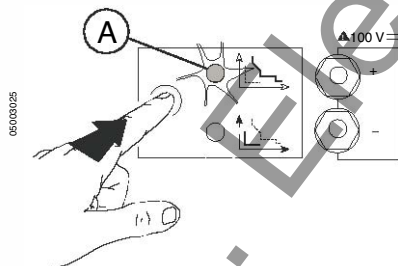


Figure 17: LED1 is On

Table 9: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating			
	Up to 8	8	12	15
400–1250 A	100 mA/In	959 mA	1211 mA	1515 mA

Make sure that LED1 (A) is on. Instantaneous settings are based on I_n only. No calculations for I_r are required.

Ground-fault Protection Test

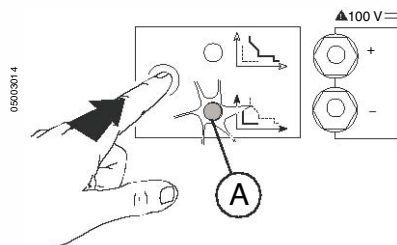


Figure 18: LED2 is On

CAUTION

HAZARD OF INVALID READING

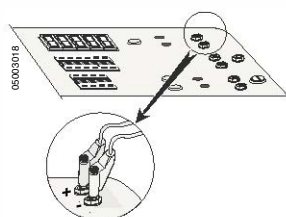
Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

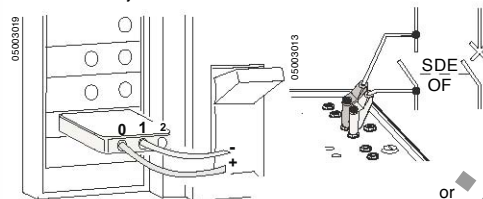
1. Make sure that LED2 (A) is on.
2. Set the injection current to 100 mA/In for all ratings.
3. Press the start button. The circuit breaker must trip in less than two seconds.

STCM2 AND STCM3 TRIP UNITS

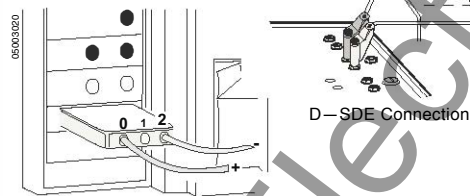
Connection



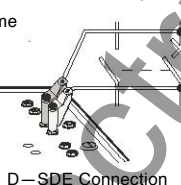
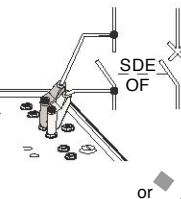
A—Current Injection Connection



B—Long-time Tripping Test/Short-time Tripping Test Connection



C—Ground-fault Protection Connection



D—SDE Connection

Connect the trip unit to test kit:

A—Current injection connection

B—Long-time tripping test/short-time tripping test connection

C—Ground-fault protection connection

D—SDE connection

Figure 19: Connect Trip Unit to Test Set

Long-time and Short-time Tripping Test

Table 10: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 2	2	3	4	5	6	7	8	9	10
400–3200 A	100 mA/In	200 mA	300 mA	385 mA	475 mA	565 mA	652 mA	740	822	905

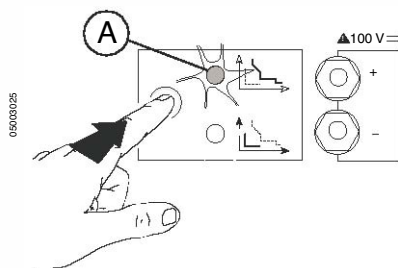


Figure 20: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 19.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 10 to determine the injection current for the tripping test.

Example: 3200 A circuit breaker

- Trip unit setting: $I_r = 0.5 I_n$
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 0.5 = 3 I_n$)
 - The table above indicates the level of current that must be injected: 300 mA (3.0×100 mA)
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
5. Use the thumb wheels to set the injection current corresponding to the pickup setting on the trip curve.
 6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
 7. Press the start button.
 8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Ground-fault Protection Test

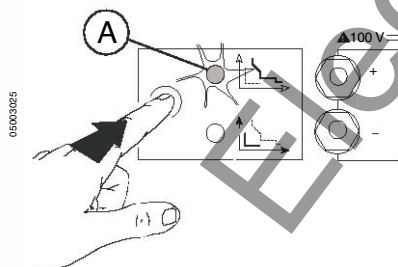


Figure 21: LED1 is On

CAUTION

HAZARD OF INVALID READING

Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

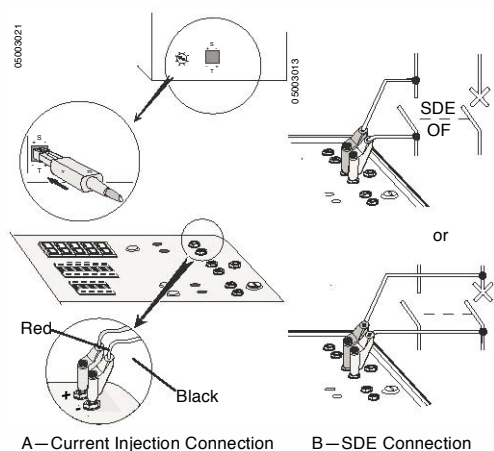
1. Make sure that LED1 is on.
2. Connect the test kit to the trip unit as shown in Figure 19.
3. Ground fault settings are based on I_n only. No calculations for I_r are required.
4. Use the thumb wheels to set the injection current corresponding to the pickup setting on the trip curve.
5. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
6. Press the start button.

7. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

ST204–ST224 TRIP UNITS

Connection



Connect the trip unit to test kit:

A—Current injection connection

B—SDE connection

Figure 22: Connect Trip Unit to Test Set

Instantaneous Tripping Test

Table 11: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 6	6	7	8	9	10	11	12	13	14
400–630 A	50 mA/In	50 mA	50 mA	50 mA	50 mA	50 mA	50 mA	50 mA	50 mA	50 mA

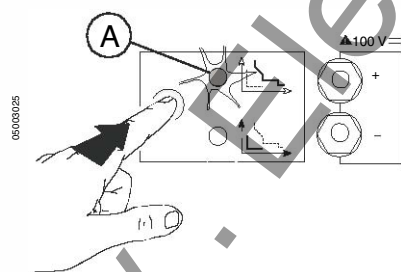


Figure 23: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 22.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 11 to determine the injection current for the tripping test.

Example: 600 A circuit breaker

- Trip unit setting: $I_r = 1 I_n$
- Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 1 = 6 I_n$)
- The table above indicates the level of current that must be injected: 300 mA (6×50 mA)

ME Test Kit Section 3—Testing COMPACT Circuit Breakers

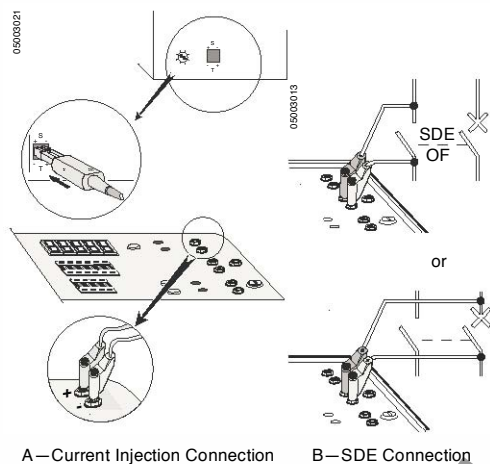
48049-134-01
4/01

- The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device.
- 5. Use the thumb wheels to set the injection current corresponding to the pickup setting on the trip curve.
- 6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
- 7. Press the start button.
- 8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

ST205–ST315 TRIP UNITS

Connection



Connect the trip unit to test kit:

A—Current injection connection

B—SDE connection

Figure 24: Connect Trip Unit to Test Set

Short-time and Long-time Tripping Test

Table 12: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating							
	Up to 4	4	5	6	7	8	9	10
200–3200 A	100 mA/In	400 mA	500 mA	580 mA	685 mA	790 mA	850 mA	940 mA

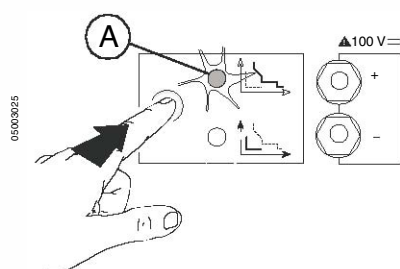


Figure 25: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 24.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 12 to determine the injection current for the tripping test.

Example: 1200 A circuit breaker

- Trip unit setting: $I_r = 1 I_n$
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 1 = 6 I_n$)
 - The table above indicates the level of current that must be injected: 580 mA
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
5. Use the thumb wheels to set the injection current corresponding to the pickup setting on the trip curve.
 6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
 7. Press the start button.
 8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Ground-fault Protection Test

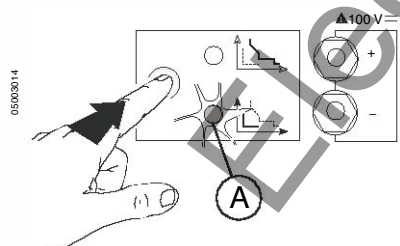


Figure 26: LED2 is On

CAUTION

HAZARD OF INVALID READING

Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

1. Make sure that the LED2 (A) is on.
2. Set the injection current to 100 mA/In for all ratings.
3. Press the start button. The circuit breaker must trip in less than two seconds.

Section 4—Testing COMPACT® NS Circuit Breakers

PRELIMINARY INFORMATION

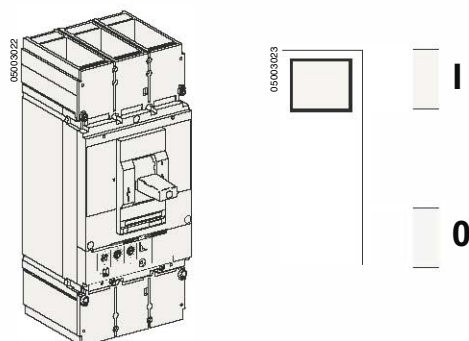


Figure 27: Circuit Breaker in Test Position

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm 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.

1. Turn off all power supplying this equipment before working on or inside equipment.
2. Check the time/current characteristic curves for each of the trip units. Before each test, make sure the circuit breaker is closed (in test or disconnected position).

CONNECTION

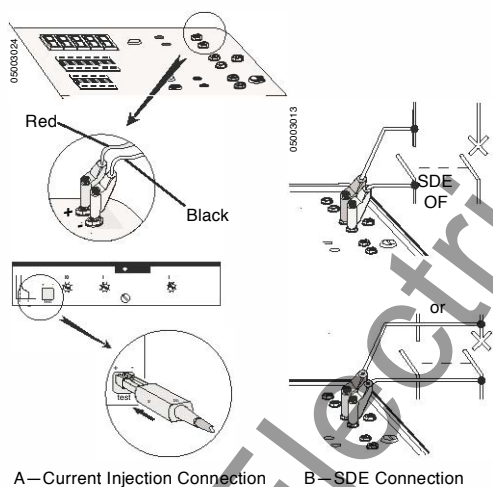


Figure 28: Connect Trip Unit to Test Set

Connect the trip unit to test kit:

A—Current injection connection

B—SDE connection

STR22 (EXCEPT STR22ME) AND STR23 TRIP UNITS

Long-time and Short-time Tripping Test

Table 13: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating						
	Up to 5	5	6	7	8	9	10
All Ratings	100 mA/In	500 mA	600 mA	700 mA	800 mA	900 mA	1000 mA

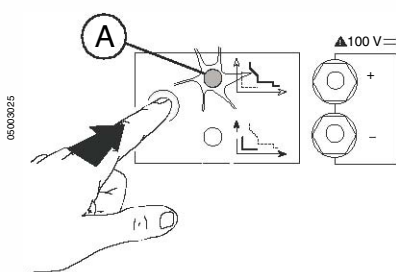


Figure 29: LED1 is On

1. Make sure that LED1 (A) is on.
2. Connect the test kit to the trip unit as shown in Figure 28.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 13 to determine the injection current for the tripping test.
Example: 250 A circuit breaker
 - Trip unit setting: $I_0 = 1.0$, $I_r = 0.8$
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 0.8 = 4.8 I_n$)
 - Table indicates the level of current that must be injected: 480 mA (4.8×100 mA)
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
 - Thermal memory: If a long-time tripping test is repeated within 15 minutes of a previous test, divide the trip time on the time/current characteristic curve by 2.5
5. Use the thumb wheels to set the injection current.
6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
7. Press the start button.
8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

STR22ME TRIP UNITS

Long-time and Short-time Tripping Test

Table 14: STR53 (Four Setting to) Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 5	5	6	7	8	9	10	11	12	13
All Ratings	100 mA/In	500 mA	600 mA	700 mA	800 mA	900 mA	1000 mA	1100 mA	1200 mA	1300 mA

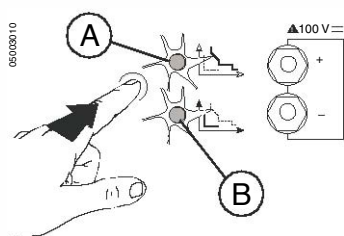


Figure 30: LED1 and LED2 are On

1. Make sure that both LED1 (A) and LED2 (B) are on.
2. Connect the test kit to the trip unit as shown in Figure 28.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and Table 14 to determine the injection current for the tripping test.
Example: 160 A circuit breaker
 - Trip unit setting: $I_o = 1.0$, $I_r = 0.8$
 - Long-time tripping test: $6 \times I_r$ (i.e., an equivalent of $6 \times 1.0 \times 0.8 = 4.8 I_n$)
 - Table indicates the level of current that must be injected: 480 mA (4.8×100 mA)
 - The tripping time obtained must be compared to the value at the $6 \times I_r$ line on the official time/current characteristic curve for the device
 - Thermal memory: Allow 20 minutes between each test
5. Use the thumb wheels to set the injection current.
6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
7. Press the start button.
8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Instantaneous Tripping Test

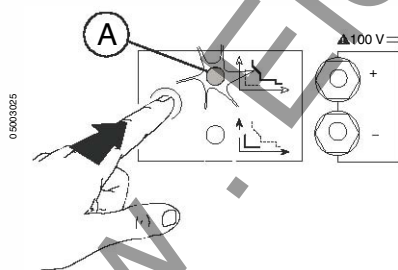


Figure 31: LED1 is On

Table 15: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating			
	Up to 13	13	14	15
All Ratings	100 mA/In	1200 mA	1300 mA	1400 mA

Make sure that LED1 is on. Instantaneous settings are based on I_n only. No calculations for I_r are required.

STR43 AND STR53 TRIP UNITS

Long-time and Short-time Tripping Test

Table 16: STR53 (Four Settings I_o) Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 4	4	5	6	7	8	9	10	11	12
400–630 A	100 mA/I _n	400 mA	500 mA	572 mA	644 mA	716 mA	788 mA	880 mA	932 mA	1040 mA

Table 17: STR53 (Six Settings I_o) and STR43 Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating									
	Up to 4	4	5	6	7	8	9	10	11	12
400–630 A	100 mA/I _n	400 mA	500 mA	600 mA	700 mA	800 mA	900 mA	1000 mA	1100 mA	1200 mA

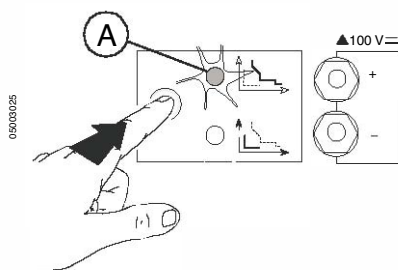


Figure 32: LED1 is On

1. Make sure that LED1 (A) is on. Time-delay settings 0.1, 0.2 and 0.3.
2. Connect the test kit to the trip unit as shown in Figure 28.
3. Check the trip unit settings and adjust as necessary for the tripping test. For example, during a short-time tripping test make sure the instantaneous setting is adjusted higher than the injection current setting and the short-time setting is set below the injection current setting.
4. Use the trip curve and either Table 16 or Table 17 to determine the injection current for the tripping test.
Example: 600 A circuit breaker
 - Trip unit setting: I_o = 0.6, I_r = 0.9
 - Long-time tripping test: 6 x I_r (i.e., an equivalent of 6 x 0.6 x 0.9 = 3.24 I_n)
 - Table indicates the level of current that must be injected: 324 mA (3.24 x 100 mA)
 - The tripping time obtained must be compared to the value at the 6 x I_r line on the official time/current characteristic curve for the device
 - Thermal memory: If a long-time tripping test is performed within 10 minutes after a previous test, the tripping time will respond as the minimum delay
5. Use the thumb wheels to set the injection current.
6. Use the thumb wheels to set the duration time slightly longer than the expected trip time as shown on the trip curve.
7. Press the start button.
8. When the circuit breaker trips read the tripping time and compare to the trip curve.

NOTE: If the circuit breaker does not trip after the expected duration, stop the test and check at another current level.

Instantaneous Tripping Test

Table 18: Current to be Injected (mA)

Sensor Rating	Multiple of Sensor Rating							
	Up to 6	6	7	8	9	10	11	12
400–630 A H1/H2	100 mA/In	600 mA	700 mA	789 mA	866 mA	944 mA	1022 mA	1100 mA

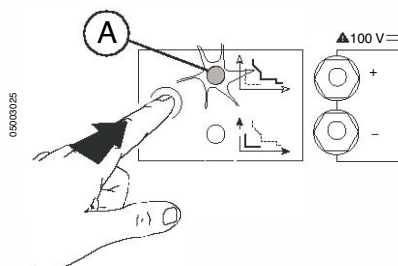


Figure 33: LED1 is On

Make sure that LED2 is on and that the instantaneous setting is adjusted lower than the injection-current setting. Instantaneous settings are based on In only. No calculations for Ir are required.

Ground-fault Protection Test

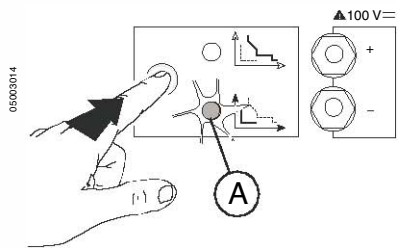


Figure 34: LED2 is On

CAUTION

HAZARD OF INVALID READING

Do not reverse the injection cable. Current must equal 100 mA/In for all ratings.

Failure to follow this instruction can result in inaccurate test results.

1. Make sure that LED2 (A) is on.
2. Set the injection current to 100 mA/In for all ratings.
3. Press the start button. The circuit breaker must trip in less than two seconds.

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