



QUICK REFERENCE

Fisher Pierce® Overhead and Underground Faulted Circuit Indicators

page(s)

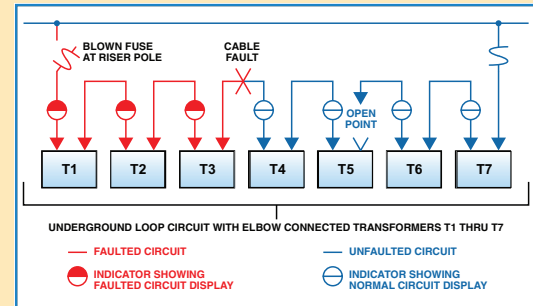
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Improve your service restoration time.

Fisher Pierce® Faulted Circuit Indicators (FCIs) for both overhead and underground applications are cost-effective tools to locate faults faster, enabling you to reduce outage duration — and customer complaints. For more than 40 years, Fisher Pierce® has provided utilities with reliable, competitive solutions for fault location. As the need for system information increases, you can always turn to Fisher Pierce® for fault-location solutions.

Quickly locate faulted cable or equipment in overhead and underground distribution systems through 35kV (L-G).

With a complete line of cable-mount and test-point mounted faulted circuit indicators, voltage indicators and phase indicators, Fisher Pierce has the right fault-indication solution to meet your system's performance needs. Fisher Pierce® fault indicators reduce outage duration by quickly pinpointing the location of faults. As illustrated in the circuit diagram, the fault is located between the last tripped indicator and the first untripped indicator. Once identified, this section can be switched to become the new open point, allowing full service restoration to the rest of the customers during repairs.



Features

Benefits/Descriptions

Adaptive Trip™ Logic	Most flexible and recommended for the majority of applications, less chance for misapplication, can handle load growth.
AccQTrip™ Logic Circuitry	“Off-the-trip” logic circuit with high/low trip setting selection prevents false tripping due to transient current surges or system overloading.
Inrush Restraint	More reliable fault detection. Eliminates false tripping due to capacitor inrush and cold load pickup.
Temporary Fault Detection	Helps locate nuisance temporary faults.
Highly Visible Strobe, LED and Fluorescent Orange Flag Indication Options	Easier viewing in daylight, as well as during outage / storm conditions.
Multiple Reset Options	Supporting current, voltage and time allows proper FCI choice for any application.
Directional Capability	Allows for fault sensing based on phase relationship for network applications.
Internal Adjacent Phase Shielding	Prevents electromagnetic interference from adjacent phase conductors.

What is...

...Inrush Current and Inrush Restraint?

Circuit inrush is a condition that occurs when a de-energized circuit becomes energized, such as from cold load pickup or recloser operation. The inrush of current is caused by the many loads attached to the circuit. The amount of inrush current depends upon the length of the circuit and circuit loading. Fault indicators without inrush-restraint logic would sense high inrush current and provide a false indication that a fault occurred. For this reason, Fisher Pierce® has developed inrush-restraint logic to mitigate the possibility of false trips due to inrush current.

...Backfeed and Backfeed Restraint?

Distribution system capacitors have been identified as a potential source of backfeed trips downstream of the actual faulted location. Field-testing has characterized most backfeeds from this source to have duration of less than 1 cycle. The backfeed-restraint feature applies to the trip algorithm, which ignores any overcurrent with a duration of less than 1.5 cycles. This feature can greatly improve the reliability of the FCI targets during an outage condition. System Consideration: The backfeed-restraint feature is not recommended if the clearing time of the protective device is faster than 2 cycles and the expected fault current magnitude is less than 300 amps.

...Trip Logic?

In non-adaptive trip applications, trip logic is the fixed or programmable current level at which the FCI is set to switch the indicator to the “tripped” or “fault” position.

...Reset Logic?

Reset logic is the means by which the FCI returns the indicator to the “un-tripped” or “no fault” position.

...Directional Fault capability?

After a settling period is satisfied when a feeder is energized, a phase relationship is learned, stored and considered normal power flow. When the trip current is sensed, the phase angle is calculated and compared to the normal phase angle. If the measured relationship is within the normal relationship, the FCI will indicate a valid fault. If the measured relationship is outside the predetermined phase relationship, the FCI will not trip to indicate a fault.

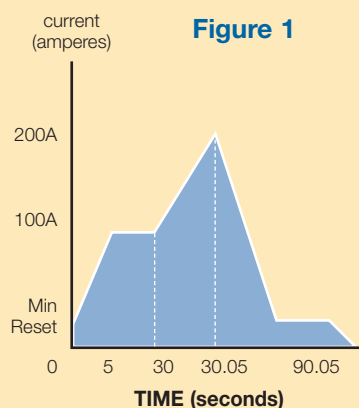
How does Fisher Pierce® Adaptive Trip™ logic work?

Full criteria for the Adaptive Trip™ FCI to trip are as follows:

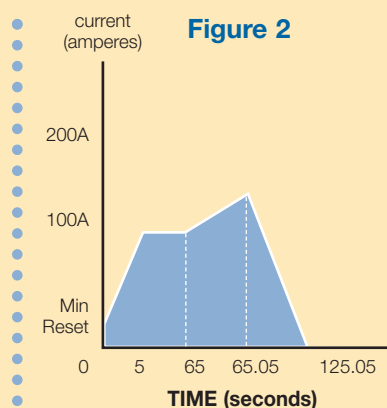
1. Range of operation is from the minimum reset current level (dependent on model selected) to 800A maximum. Load current within this range must be present for at least 60 seconds to energize the unit to sense a fault condition.
2. When a system disturbance occurs, the line current must increase by a minimum of the preset fault current level (dependent on model selected) within a 50 msec. time frame.
3. The total current must be greater than the original load current plus the preset fault current level to enable operation of the indicator.
4. Following the current increase, a loss of line current for 150 msec. (duration dependent on model selected), must take place within 40–60 seconds, confirming that the increase resulted from a fault and not from a sudden load increase.

All four of these steps must take place in proper sequence for the Adaptive Trip™ FCI to indicate that a fault has occurred.

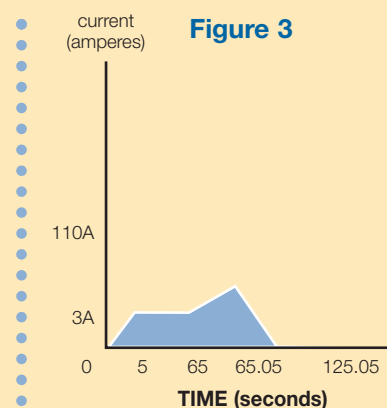
Example based on model parameters: Reset Current = 3A; Trip Current = 100A di/dt



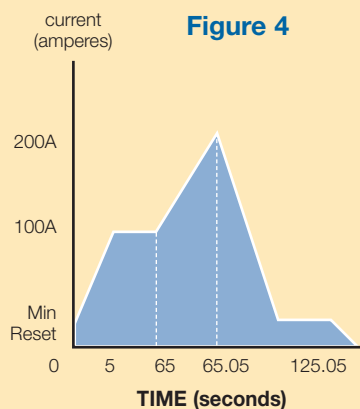
Conditions 1 and 4 not met.
Unit in inrush restraint.
Unit will not enable.



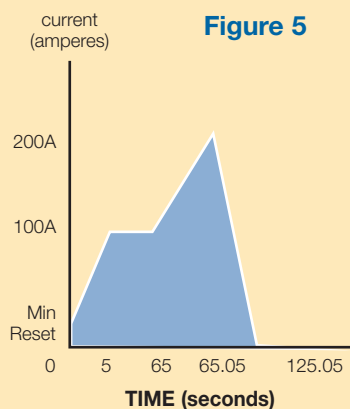
Condition 2 not met.
di/dt Rate of change not satisfied.
Unit not armed.



Condition 3 not met.
Total line current magnitude not met.
Unit will not enable.



Condition 4 not met.
Total loss of load current not met.
Unit armed, trip not activated.



All 4 conditions satisfied.
Normal trip indication.
Unit armed and tripped.

Which Fisher Pierce FCI is recommended for your application?

	1580	1548	1547	1543	1542	1541	1516	1515	1514	TPMVF	TPMVL	TPMVOL	TPMTL	UCMTL	OLMVOL	OLMVF	OLMVL	OLMTL
Reference page	26	36	39	45	45	45	47	42	42	52	52	52	52	56	58	58	58	58
Overhead	X	X	X					X	X						X	X	X	X
Underground			X	X	X	X	X	X	X	X	X	X	X	X				
Padmounted Enclosure	X		X	X	X	X	X	X	X	X	X	X	X	X				
Residential/Secondary			X	X	X	X	X	X	X									
Sectionalizing Cabinet			X	X		X		X	X									
Close Proximity Enclosure (3" center-to-center cables)								X	X	X	X	X	X	X				
Backfeed Restraint		X								X	X	X			X	X	X	
Inrush Restraint		X	X	X	X	X	X	X	X	X	X	X			X	X	X	
Temporary Fault Detection		X																
Directional Fault Capability (Option)									X									
Neutral Current (Cap. Banks)	X																	
Phase(s)	1	1	1	3	2	1	1	3	1	1	1	1	1	1	1	1	1	1
Trip Logic																		
Fixed Current Trip		X		X	X	X	X	X	X									
Adaptive Trip		X	X															
High/Low trip										X	X	X	X	X	X	X	X	X
Reset Logic																		
Current		X	X															
Voltage							X			X	X	X				X	X	
Time		X	X	X	X	X		X	X			X	X	X	X	X	X	X
Manual		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fault Indication Options																		
LED	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X
Fluorescent Flag		X	X				X	X	X	X								
Flag & LED		X						X										
Strobe Light		X																
Fiber Optic Display			X	X	X	X		X	X		X	X	X	X				
Audible Alarm				X	X	X												
Radio Transmitter		X	X					X	X									
SCADA Contacts			X				X		X									
Batteryless Options	X									X						X		

Fisher Pierce® Series 1548 Overhead FCIs

Reliable fault indication for single-phase overhead applications.



FCIs with Radio Transmitters

Series 1548 radio FCIs can signal faults to handheld receivers, radio receivers and the SmartLink™ Series 5000 cellular remote terminal unit (RTU) systems integrated with SCADA- and web-based reporting systems. Status, alarms and other event notifications can be integrated into SCADA systems, as well as sent to customer-designated personnel via e-mail, pager or text message. Having precise fault information reduces outage duration, improves system reliability and lowers operation costs.

Trip/Reset Tool AT2186-10

Manual trip/reset test for both permanent and temporary fault indication using hotstick-mountable reset tool.



Features	Benefits/Descriptions
Trip Logic	Adaptive or fixed current trip with inrush restraint logic. Adaptive trip logic eliminates the need for trip-rating selection or revision with changing load.
Reset Logic	Automatic reset with return of load current and/or time reset of permanent fault indication. Automatic time reset for temporary fault indication. Manual trip test and reset capabilities using hotstick-mountable trip/reset tool.
Fault Indication	Visual indication choices of LED, 5-LED Array, Flag or Strobe Light. Highly viewable 360° indication (Strobe or LED). Radio fault reporting capability also available.
Mounting	Hotstick mounting with automatic torque limiting.
Replaceable Lithium Battery	Offers 10-year, maintenance-free service life. (Note that Flag model has non-replaceable battery).
Supports a Wide Range of Conductors	Mounts on conductors with diameters from 0.14" to 1.20" (3.56mm to 30.48mm).
Optional Features Available	Options include temporary/permanent fault indication, instantaneous recloser coordination feature and backfeed restraint using a delay-trip scheme (requires protective device to pass two cycles minimum of fault current before closing).

Specifications

System Voltage

Flag, Strobe Models:
44kV max.

LED, Radio Models:
69kV max.

Continuous Withstand Load:
1,000A max.

Operating Temperature:
-40° C to 85° C

Reset Time Accuracy:
±10% at 23° C

Current Reset:
3A or 8A min. (model specific)

Fixed Trip Current Level:
50 to 1,500A

Adaptive Trip:

100 di/dt, 300 di/dt

Fault Withstand:

25kA for 10 cycles (per ANSI/IEEE 495-1986)

Trip Accuracy:

±10% at 23° C

Battery:

Replaceable 10-yr. Lithium Cell (flag model non-replaceable)

Battery Operating Life at 23° C
Single Ultra Bright LED & Flag:

1,000 operating hrs.

5 Red LED:

400 operating hrs.

Strobe:

120 operating hrs.

Radio with LED:

800 operating hrs.

Temporary Fault Model
1 Amber (temporary fault) LED:

1,500 operating hrs.

4 Red (permanent fault) LED:

400 operating hrs.

Housing: Semi-conductive
UV-stable polycarbonate

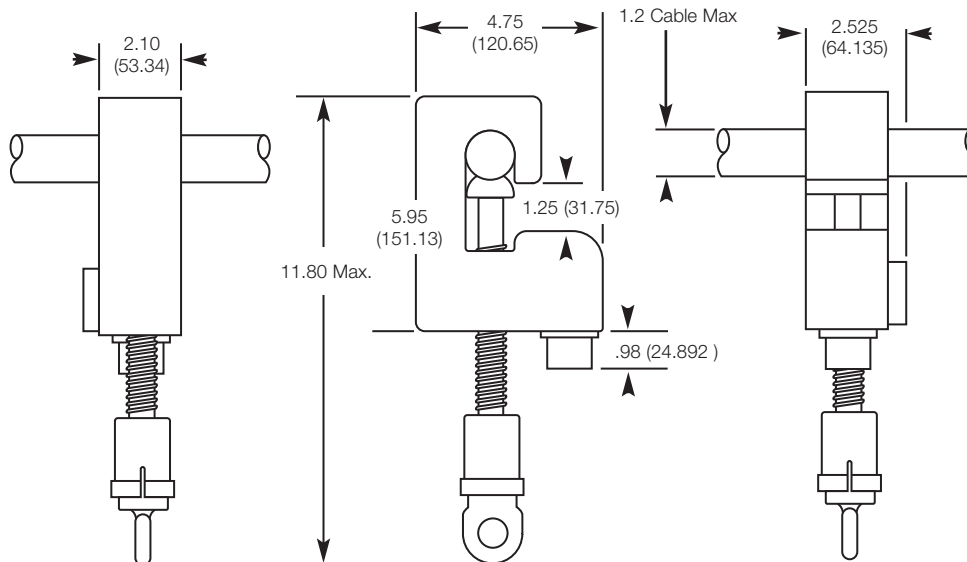
Cable Diameter: 0.14" to 1.2"
(3.56mm to 30.48mm)

Certifications:

Complies with ANSI/IEEE 495-1986

Mechanical Data


(all dimensions in inches with millimeter equivalents in parentheses)



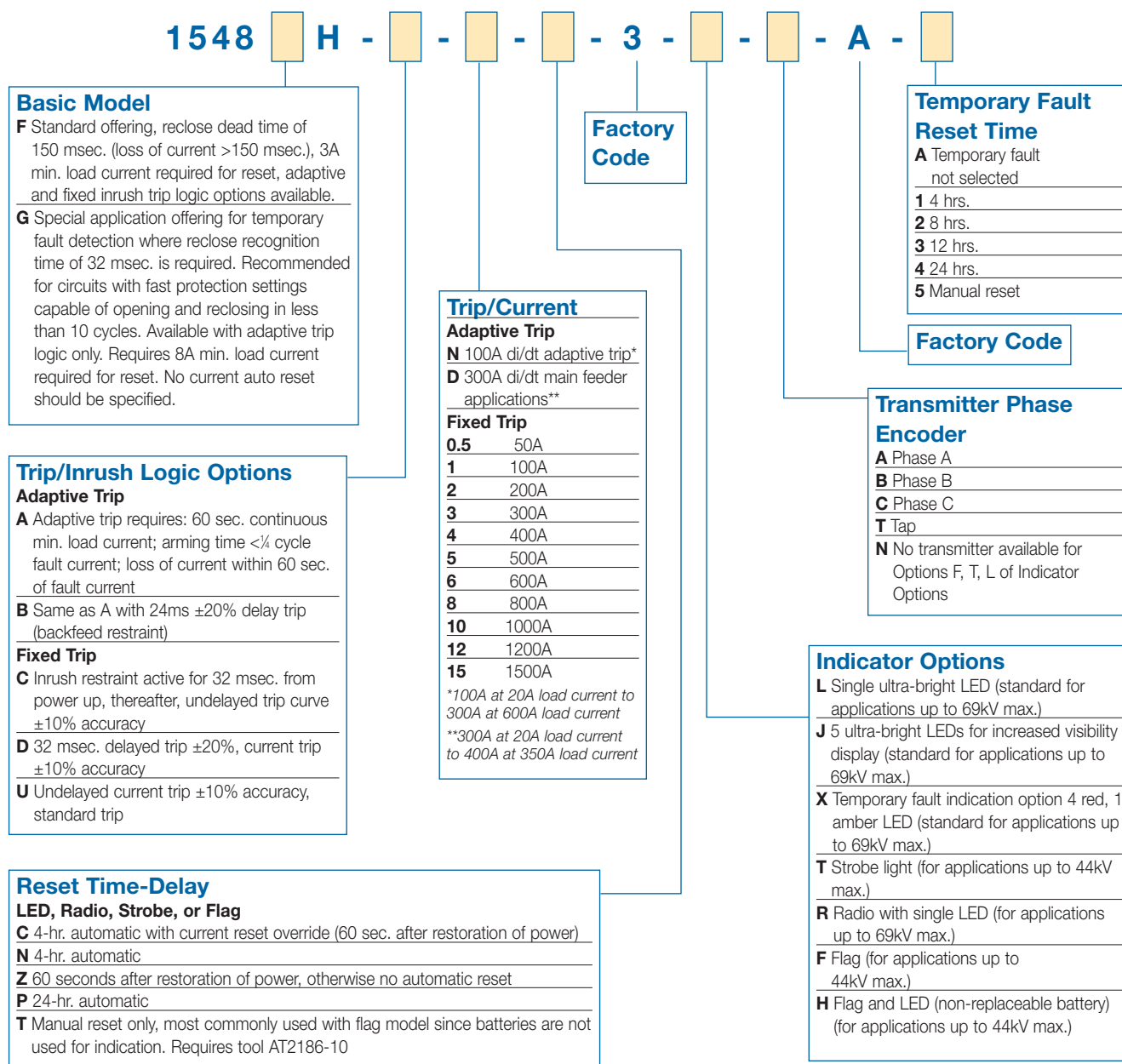
Ordering Information for Fisher Pierce® Series 1548 Overhead FCIs
Recommended Models

CAT. NO.	Description
1548FH-ANC3-L-N-A	Branch Feeder (3A min. load, 100A increase within 50 msec. di/dt adaptive trip)
1548FH-BDC3-L-N-A	Main Feeder (3A min. load, 300A di/dt adaptive trip, 24 msec. delay for backfeed restraint)
1548FH-BDC3-X-N-A-1	Temporary Fault Indication (3A min. load, 100A increase with 50 msec. di/dt adaptive trip); permanent fault indication with 4 hr. delay reset with 60 sec. current reset override, temporary fault indication with 8 hr. time delayed reset
Accessories	
AT2186-10	Manual test and reset tool
A615	Battery for L option
A616	Battery for L, X and R options
H2403-10	Battery renewal sticker

The following diagram shows how to construct a catalog number for the Series 1548 FCI.

 Indicates field that must be filled in to complete order.

NOTE: Availability of selected configuration will be verified at quotation time.



Fisher Pierce® Series 1547 Adaptive Trip™ FCIs

For single-phase underground or overhead applications.

- Trip Logic: Adaptive current trip with inrush restraint logic.
- Reset Logic: Automatic reset with return of load current and/or time reset of fault indication. Manual reset also available.
- Fault Indication: Visual indication choices of Flag, LED or 10-ft. remote fiber optic display. Integrated radio transmitter with or without LED also available.

Other Features

- SCADA output available
- Durable Lexan housing
- Sturdy, epoxy-coated sensors
- Mounting kits available to enable view-plate mounting for padmount applications



Features	Benefits/Descriptions
Trip Logic	Adaptive current trip with inrush restraint logic.
Reset Logic	Automatic reset with return of load current and/or time reset of fault indication. Manual reset also available.
Fault Indication	Visual indication choices of Flag, LED or 10-ft. remote fiber optic display. Integrated radio transmitter with or without LED also available.
SCADA Output Available	N.O. or N.C. contact enables fault indication alert to be integrated into SCADA systems.
Durable Lexan Housing and Epoxy-Coated Sensors	Protection from moisture promotes long, maintenance-free service life.
Mounting Kits Available	Enables view-plate mounting for padmount applications.

Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)

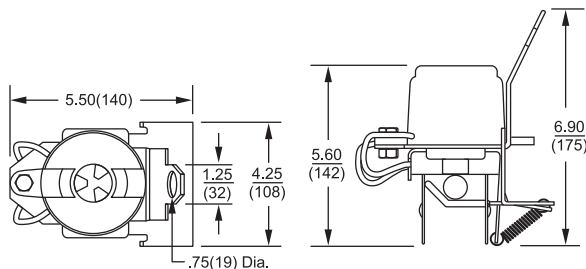


Figure A — Indicator with Attached Sensor. Hotstick Mounting.

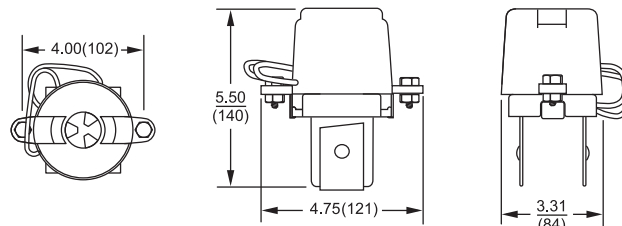


Figure B — Indicator with Attached Sensor. Tie-Wrap Mounting.

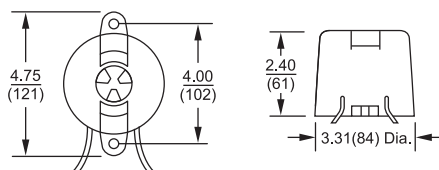


Figure C — Bracket/Surface Mounting.

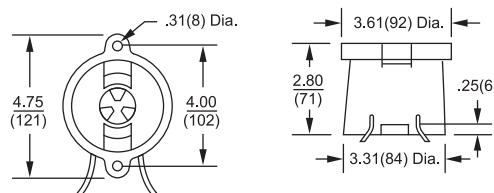


Figure D — Window/Flush Mounting.

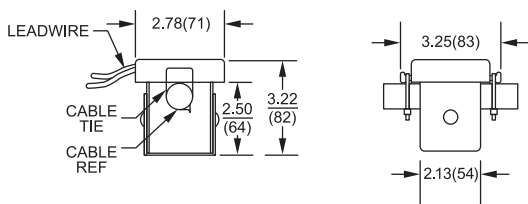


Figure E — Remote Sensor. Tie-Wrap Mounting.

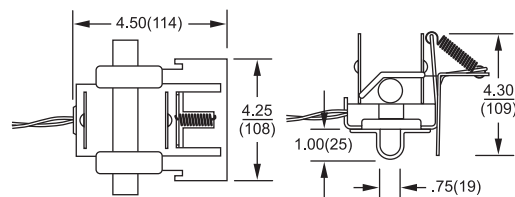


Figure F — Remote Sensor. Hotstick Mounting.



Specifications

Operating Speed:

Coordinates with properly applied current-limiting fuses, provided FCI trip-set and trip-release conditions are satisfied

Fault Withstand Capability:

25kA for 10 cycles per ANSI/IEEE 495-1986

Operating Current Range:

Min. reset current to 800A for trip operation

Continuous Current Rating:

800A max.

Submersibility:

Tested to 30 ft.

Reset Function:

Resets to normal indication according to unit selected from Ordering Information
Reset Delay Options

Reset Current Level:

1½" sensor with U-lamination:	1.0A
2½" sensor with U-lamination:	1.5A
1½" sensor w/o U-lamination:	2.0A
2½" sensor w/o U-lamination:	3.0A

Life Expectancy:

(Series 1547A flag type) 20+ years

Rated Battery Life:

800 hrs. of operation. Lithium cell, rated for 10-yr. life.
(Series 1547B LED type;
Series 1547C fiber optic type)

Line Current Adjust:

Adjusts to line current 40–60 sec. after line current exceeds min. reset current

Trip Operation:

- Trip Enable Condition: Occurs whenever line current increases by the rate of 100A (or greater) within 3 cycles
- Trip Indication: FCI indicates trip only when line current drops 0.5A above min. reset current within 40–60 sec. after trip-set condition occurs

Approx. Shipping Weight:

2.0 lbs.

Operating Temperature:

-40° C to 85° C

Certifications:

Complies with ANSI/IEEE 495-1986

Ordering Information for Fisher Pierce® Series 1547 Adaptive Trip™ FCIs

The following diagram shows how to construct a catalog number for the Series 1547 FCI. Not all combinations are possible; consult factory.

 Indicates field that must be filled in to complete order.

NOTE: Availability of selected configuration will be verified at quotation time.

1 5 4 7 - - - - -

BASIC MODEL

1547A	Standard Faulted Circuit Indicator Flag type
1547B	Standard Faulted Circuit Indicator LED type
1547C	Standard Faulted Circuit Indicator. 10-ft. Remote Fiber Optic cable display*
1547D	Integral Radio Transmitter LED type
1547E	Integral Radio Transmitter. No LED type**

* Consult Factory for other cable lengths

** For special applications

Indicator Mounting Options

B	Bracket/Surface Mount (See Mechanical Data Fig. C)
P*	Window/Flush Mount (See Mechanical Data Fig. D)
M	Tie-Wrap Mount (See Mechanical Data Fig. B)
H*	Hotstick Mount with Clamp (See Mechanical Data Fig. A)

* See Series 1547A and 1547B options

Reset Delay
Flag with Manual Reset

P	24-hr. reset time delay after power restoration
W	4-hr. reset time delay after power restoration
Z	60-sec. reset time delay after power restoration
R	Manual reset only

LED or Remote Fiber Optic

C	4-hr. reset with current override
E	4-hr. reset with current and manual reset override
M	4-hr. reset with manual reset
N	4-hr. reset with manual trip and manual reset
T	4-hr. reset time delay with current override; manual trip and manual reset override

W 4-hr. reset time delay only

**1547D/1547E Radio FCI
(manual trip, manual reset)**

J	4-hr. reset with current override
K	4-hr. reset time delay
Z	60-sec. reset time delay only

Sensor Mounting

S	Remote tie-wrap (see Mechanical Data Fig. E)
G	Integral tie-wrap (see Mechanical Data Fig. B)
H	Remote hotstick (see Mechanical Data Fig. F)
T	Integral hotstick (see Mechanical Data Fig. A)

**Transmitter
Phase Encoding**

A	Phase A
B	Phase B
C	Phase C
T	Tap

Close Proximity

R	Raised zero reference to 7A
N	Standard

**Lead Length
between Sensor and Display**

10	10 ft. (standard)
XX	Specify length in feet. (30 ft. max.)
N	None. Attached indicator sensor units, "M" or "H" sensor termination

SCADA Output

A	N.O. (10-ft. lead)
B	N.C. (10-ft. lead)
N	No SCADA

Reset Current

M*	1.0A (1%" sensor with U-lamination)
L*	1.5A (2%" sensor with U-lamination)
B	2.0A (1%" sensor)
D	3.0A (2%" sensor)

* Equipped with snap-on U-lamination sensor for circuit isolation. Recommended for padmount or underground applications.

Consult Factory for Series 1547A and 1547B Options:

Mechanical (for both LED and flag indicators)

P(1): Window-mounting kit (AT2050-1)
Bracket-mounting kits (N1767-1, -2, -3)
Reset tool (AT2186)

TRIP: Manual trip override (LED) (overhead applications only)

Underground Application Note

A solution to problem FCI applications caused by close proximity cable placement and orientation is to set the loss of current operate point at 7A. This raised zero reference point greatly improves the adjacent field immunity of the Adaptive Trip FCI. The option is available only with time delayed reset and closed core U-lam sensor. When ordering, add the suffix "R" to the model number. A 3" minimum separation between adjacent cables is recommended for installation.

Fisher Pierce® Series 1514/15

Current-Reset FCIs

For single-phase or three-phase underground or overhead applications.

- Trip Logic: Adaptive current trip with inrush restraint logic.
- Reset Logic: Automatic reset with return of load current and/or time reset of fault indication. Manual reset also available.
- Fault Indication: Visual indication choices of Flag, LED or 10-ft. remote fiber optic display. Integrated radio transmitter with or without LED also available.

Other Features

- SCADA output available
- Durable Lexan housing
- Sturdy, epoxy-coated sensors
- Mounting kits available to allow view-plate mounting for padmount applications



Faulted Circuit Indicators

Features	Benefits/Descriptions
Trip Logic	Fixed current trip with inrush restraint logic.
Reset Logic	Automatic time reset with return of load current and/or time reset of fault indication. Manual reset also available.
Fault Indication	Visual indication choices of Flag, LED or 6-ft. remote fiber optic display. Integrated radio transmitter with LED also available.
SCADA Output Available	N.O. contact enables fault indication alert to be integrated into SCADA systems.
Durable Lexan Housing and Epoxy-Coated Sensors	Protection from moisture promotes long, maintenance-free service life.

Specifications

System Voltage: 29.3 kV max	Operating Temperature: - 40° C to 85° C
Trip Current: Factory preset from 50 to 1,500A	Submersibility: Tested to 30 ft.; exceeds ANSI/IEEE 495-1986
Trip Current Accuracy: ± 10%	Life Expectancy: 30+ years (flag type)
Trip Response Speed: Coordinates with properly applied current-limiting or expulsion fuses	Rated Battery Life: 10 years (long-life lithium cell)
Reset Current: Factory preset for 1.2, 1.5, 3.0 and 5.0A	Model 1514B/1515B — 800 hrs. of operation
Fault Withstand Capability: 25 kA for 10 cycles per ANSI/IEEE 495-1986	Model 1514D — 300 hrs. of operation
Maximum Continuous Load Current: 1,000A	Warranty: 3 years
	Certifications: Complies with ANSI/IEEE 495-1986



Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)

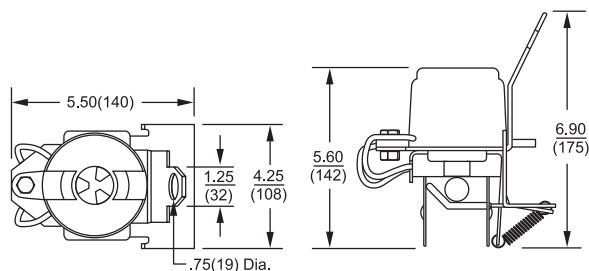


Figure A — Indicator with Attached Sensor. Hotstick Mounting.

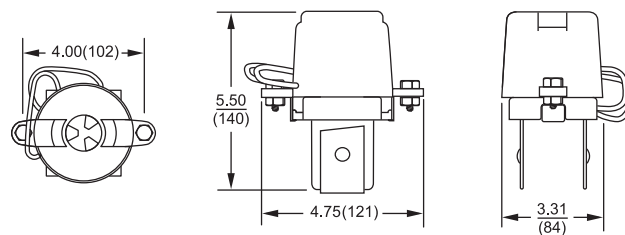


Figure B — Indicator with Attached Sensor. Tie-Wrap Mounting.

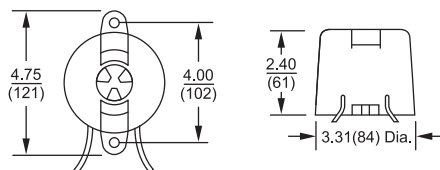


Figure C — Bracket/Surface Mounting.

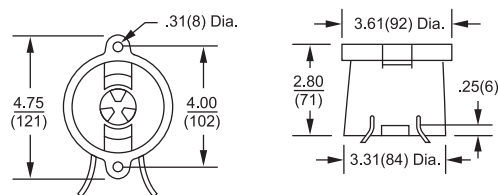


Figure D — Window/Flush Mounting.

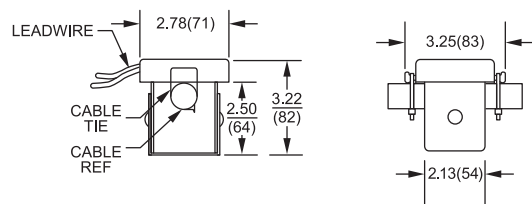


Figure E — Remote Sensor. Tie-Wrap Mounting.

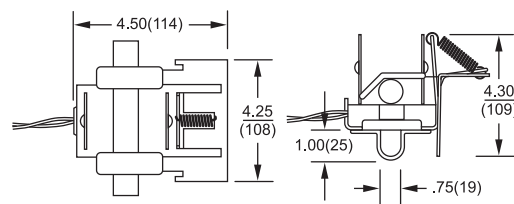


Figure F — Remote Sensor. Hotstick Mounting.

Ordering Information Fisher Pierce® Series 1514/15 Current-Reset FCIs

The following diagram shows how to construct a catalog number for the Series 1514 or 1515 FCI. Not all combinations are possible; consult factory.

 Indicates field that must be filled in to complete order.

NOTE: Availability of selected configuration will be verified at quotation time.

1 5 1 4 - - - **B** -

Factory Code

Basic Model

1514 Single-phase (one sensor, one indicator)

1515 Three-phase (three sensors, one indicator)

Unit requires current in all three phases to reset

1514S/
1515W Flag display

1514A/ Flag display and single (N.O.) latching

1515A* SCADA output contact

1514B/
1515B LED Display (non-replaceable battery)

1514C/
1515C Remote, 6-ft. fiber optic LED display (requires "M" mounting)

1514D Integral Radio/LED display, requires hotstick mounting

1514H/
1515H LED/Flag Display (non-replaceable battery),
inrush restraint only, remote bracket or panel-mount
underground or hotstick overhead applications

1514M/
1515M* Flag display with momentary (N.O.) SCADA output

Indicator Mounting Options

B Bracket/surface mounting (remote from sensor)

P(1) Window/flush mounting (remote from sensor)

H(2) Hotstick mounting, attached indicator/sensor
(B and D sensors only, one phase only)

M Tie-wrap mounting (attached indicator/sensors)

Trip Setting

0.5	50A
1	100A
2	200A
3	300A
4	400A
6	600A
8	800A
10	1,000A
12	1,200A
15	1,500A

Transmitter Phase Encoding

A Phase A (1514D only)

B Phase B (1514D only)

C Phase C (1514D only)

Max. Cable Diameter

B 1 $\frac{1}{8}$ "

D 2 $\frac{3}{16}$ "

K 2 $\frac{7}{16}$ "

M* 1 $\frac{1}{8}$ "

L* 2 $\frac{3}{16}$ "

N* 2 $\frac{7}{16}$ "

Sensor Termination

S Terminates with remote lead connected to sensor

T Sensor and indicator attached to hotstick clamp

H Hotstick clamp attached to sensor (1 $\frac{1}{8}$ " and
2 $\frac{3}{16}$ " sensors only)

G Remote LED, removable fiber optic cable

**Lead Length between Sensor
and Display**

10 10 ft. (standard)

XX Specify length in feet (30 ft. max.)

N None. Attached indicator sensor units, "G"
or "T" sensor termination

Minimum Reset Current Level

1.2 1.2A ("M" sensor only)

1.5 1.5A ("L" & "N" sensors only)

3 3A

*SCADA Contacts: 3.0A @ 125/250 VAC; 1/10 hp @ 250 VAC,
10-ft. cable length

Consult factory for options: Manual reset tool (AT2186)

(1) Special Lexan mounting kit (AT2050-1) for Code "P" mounting is available.

(2) Special Lexan spacer (F2079) available for small (<1" dia.) conductor
overhead installation.

Underground Application Note

A solution to problem FCI applications, caused by close proximity cable placement and orientation, is to set the loss of current operate point at 7A. This raised zero reference point greatly improves the adjacent field immunity of the Adaptive Trip FCI. The option is available only with time delayed reset and closed core U-lam sensor. When ordering, add the suffix "R" to the model number. A 3" minimum separation between adjacent cables is recommended for installation.

Inrush Restraint/Reset Delay Options

**Flag Display (1514A, 1514M, 1514S, 1515A, 1515M, 1515W),
Manual Reset Override**

A	Standard trip curve, 10 to 30-sec. delay after restoration of power
Z	Inrush restraint, 60-sec. reset time delay after restoration of power
W	Inrush restraint, 4-hr. reset time delay after restoration of power
N	Inrush restraint, no automatic reset, manual reset only
P	Inrush restraint, 24-hr. reset time delay after restoration of power
LED Display (1514B, 1514C, 1514R, 1515B, 1515C, 1515R), Inrush Restraint	
W	4-hr. reset time delay after fault occurrence
C	Same as W with current reset override upon energization of line
N	Same as W with manual trip and manual reset override
T	Same as N with current reset override
M	Same as W with manual reset override
E	Same as C with manual reset override

Radio Indication (1514D), Inrush Restraint, Manual Trip and Manual Reset Override

K	4-hr. reset time delay after fault occurrence
J	Same as K with current reset override upon energization of line
Z	60-sec. time delay after fault occurrence

Fisher Pierce® Series 1541/42/43 Automatic Time Reset FCIs

For single-phase, two-phase or three-phase underground applications.

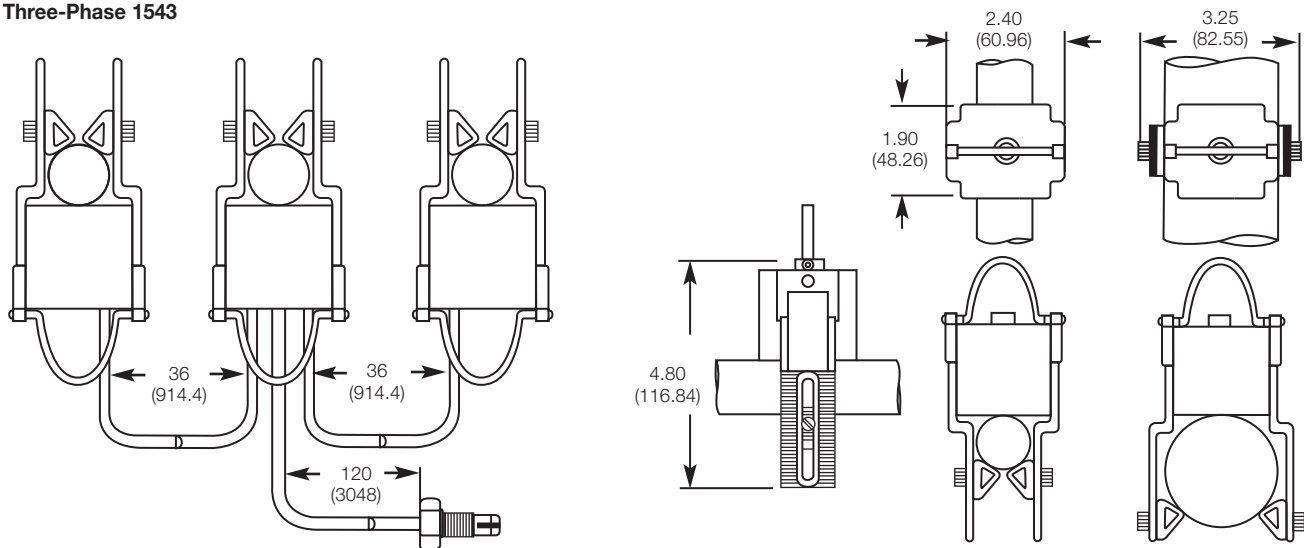
Faulted Circuit Indicators



Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)

Three-Phase 1543



Features	Benefits/Descriptions
Trip Logic	Fixed current trip with inrush delay.
Reset Logic	Automatic time reset of fault indication. Manual reset also available.
Fault Indication	Visual indication choices of LED with replaceable or non-replaceable battery. Audible alarm fault indication with replaceable battery also available.
Optional Features Available	Permanent or removable remote fiber optic display.

Specifications

Fault Registration:

Red, high-intensity LED with choice of hard-wired or fiber optic cable remote mounting or audible intermittent beeper signal

Trip current:

Factory preset to customer specifications within range of 50A and 100A to 1,500A in 100A increments

Trip Current Accuracy:

±10% of trip rating (calibrated using 1" dia. cable for 400A trip or less or 2.0" dia. cable for greater than 400A trip)

Trip Response Speed:

Consult trip curves (coordinated to properly applied link, expulsion, power and current-limiting fuses)

Reset Time:

4 hrs., 2 hrs., 1 hr., manual trip/reset standard

Overload Capacity:

Capable of withstanding 25,000A for 10 cycles

Continuous Load Current:

Rated at 1,000A max.

Temperature Range:

-40° C to 85° C

Submersibility:

Tested to 30 ft.

Operating Battery Life:

800 hrs. for LED indication, 160 hrs. for audible indication, both with 10-yr. life at 20° C

Battery:

Long-life lithium cell

Cable Ranges:

0.63" (16mm) to 1.58" (40mm); 1.58" (40mm) to 2.36" (60mm); 2.36" (60mm) to 3.55" (90mm)

Remote Fiber Optic Options:


Permanent or removable (10 ft. standard, 30 ft. max.)

Certifications:

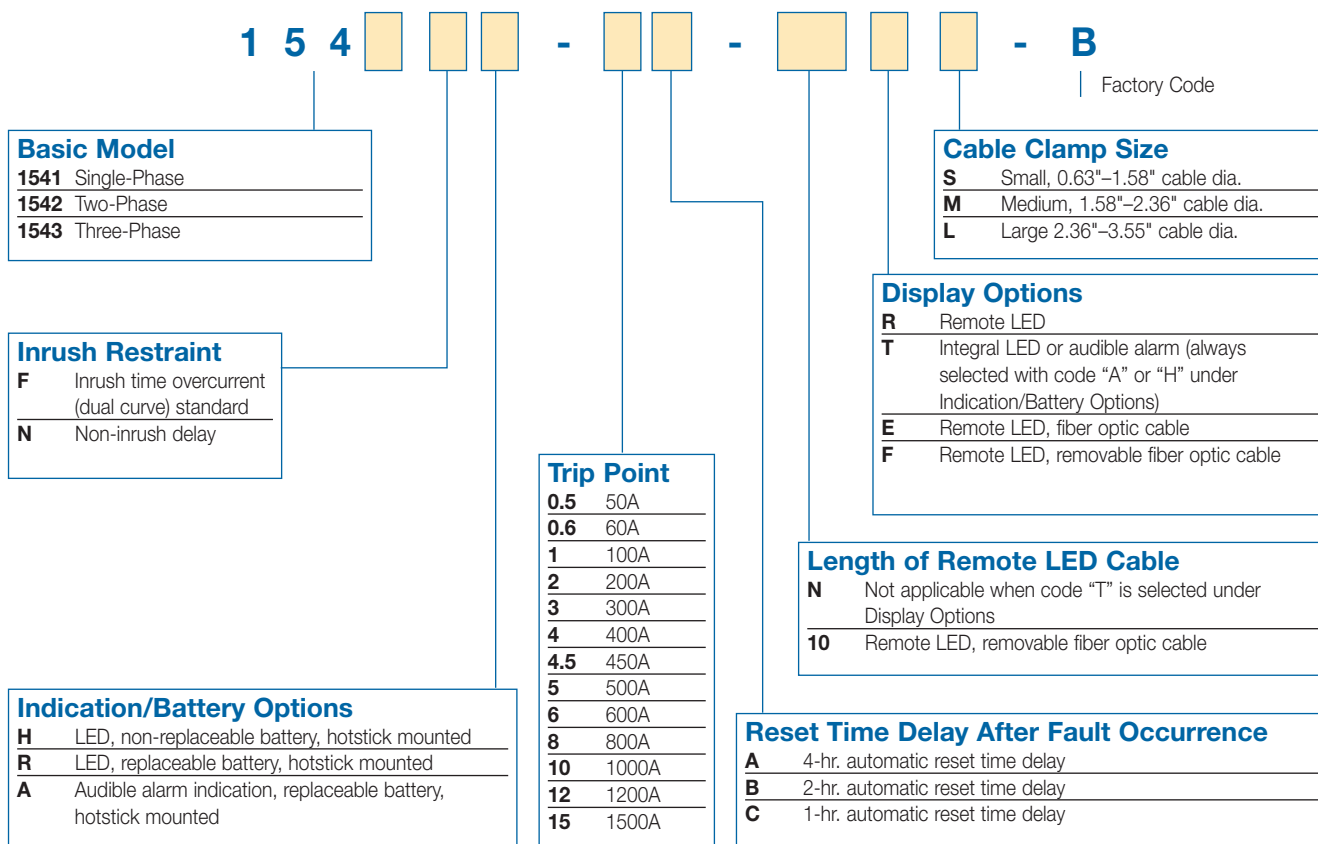
Complies with ANSI/IEEE 495-1986

Ordering Information for Fisher Pierce® Series 1541/42/43 Automatic Time Reset FCIs

The following diagram shows how to construct a catalog number for Series 1541/1542/1543 FCIs. Not all combinations are possible; consult factory for ordering assistance.

 Indicates field that must be filled in to complete order.

NOTE: Availability of selected configuration will be verified at quotation time.



Fisher Pierce® Series 1516 Voltage Reset FCIs

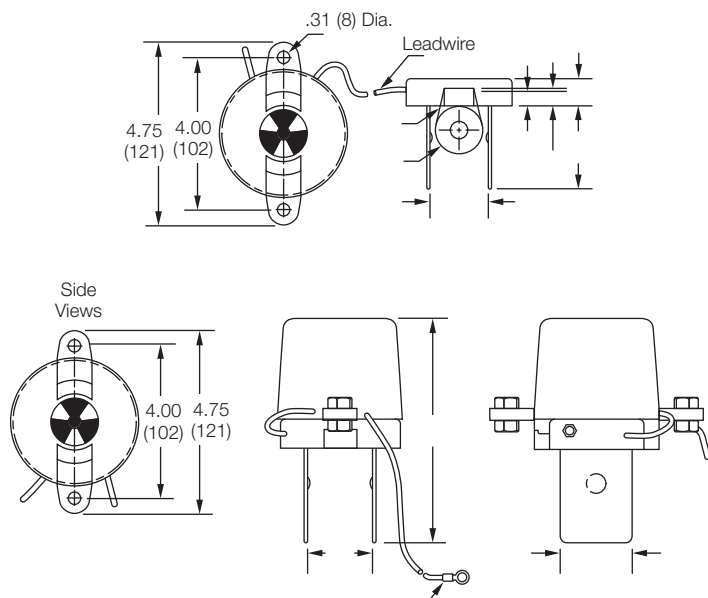
For single-phase underground applications.



Mechanical Data

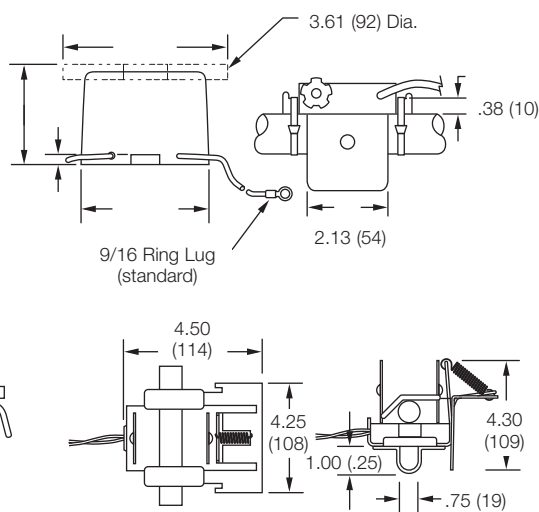
(all dimensions in inches with millimeter equivalents in parentheses)

Remote Sensor Leads. Tie-Wrap Mounting.



Indicator with Attached Sensor without U-Lamination. Tie-Wrap Mounting.

Flange on panel/flush mounting units only. See Indicator/Mounting Options of ordering information Code "P"



Remote Sensor Leads. Hotstick Mounting.

Features	Benefits/Descriptions
Trip Logic	Fixed current trip with inrush restraint.
Reset Logic	Automatic reset after restoration of secondary voltage. Manual reset also available.
Fault Indication	Visual indication choice of Flag only.

Specifications

Trip Current:
Factory preset from 100 to 1,500A

Trip Current Accuracy:
±10%

Trip Response Speed:
Coordinates with properly applied
current-limiting fuses

Reset Voltage (factory preset):
120V Rating: 102V min.
277V Rating: 235V min.

Max. Reset Response Time:
60 sec.

Reset Lead Length:
4 or 6 ft.

Life Expectancy:
±20 yrs.

Fault Withstand Capability:
25kA for 10 cycles per ANSI/IEEE 495-1986

Secondary Voltage Surge Withstand Capability:
Conforms to ANSI/IEEE C62.41

Max. Continuous Load Current:
1,000A


Operating Temperature:
-40° C to 85° C

Submersibility: Tested to 20 ft.










Certifications:
Complies with ANSI/IEEE 495-1986

Ordering Information for Fisher Pierce® Series 1516 Voltage-Reset FCIs

The following diagram shows how to construct a catalog number for Series 1516 FCIs. Not all combinations are possible; consult factory for ordering assistance and for information on available mounting kits and brackets.

 Indicates field that must be filled in to complete order.

NOTE: Availability of selected configuration will be verified at quotation time.

1 5 1 6						-																B																							
																						Factory Code																							
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <div> Basic Model 1516 Automatic reset after restoration of secondary voltage </div> <div> Trip Sensitivity and Outputs S Standard sensitivity +10% with latching relay A Standard sensitivity +10% with latching relay and SCADA output contacts (N.O.) </div> <div> Indicator Mounting Options B Bracket/surface mounted (remote from sensor) P* Panel/flush mounted (remote from sensor) M Tie-wrap mounted (attached indicator/sensors) </div> <div> Trip Current Setting <table border="1"> <tr><td>1</td><td>100A</td></tr> <tr><td>2</td><td>200A</td></tr> <tr><td>2.5</td><td>250A</td></tr> <tr><td>3</td><td>300A</td></tr> <tr><td>4</td><td>400A</td></tr> <tr><td>5</td><td>500A</td></tr> <tr><td>6</td><td>600A</td></tr> <tr><td>8</td><td>800A</td></tr> <tr><td>10</td><td>1000A</td></tr> <tr><td>12</td><td>1200A</td></tr> <tr><td>15</td><td>1500A</td></tr> </table> </div> <div> Reset Voltage Sensitivity 1 120V nominal (102V minimum reset voltage) for use on 208 /120V three-phase and 240/120V single-phase 2 277V nominal (235V minimum reset voltage) for use on 480/277V three-phase </div> <div> Trip Curve/Reset Time A Standard B Standard with inrush restraint </div> </div> <div style="width: 50%;"> <div> Reset Voltage and Lead Length 6 6 ft. (standard) XX Specify length in feet (12 ft. max.) </div> <div> Max. Cable Diameter B 1 1/8" D 2 3/16" K 2 5/16" </div> <div> Sensor Termination G Sensor attached to indicator, tie-wrap mount S Terminates with remote lead-connected sensor H Hotstick clamp attached to sensor ("B" & "D" sensors only) </div> <div> Lead Length between Sensor and Display 10 10 ft. (standard) XX Specify length in feet (30 ft. max.) N None. Attached indicator sensor units, "G" sensor termination </div> </div> </div>																								1	100A	2	200A	2.5	250A	3	300A	4	400A	5	500A	6	600A	8	800A	10	1000A	12	1200A	15	1500A
1	100A																																												
2	200A																																												
2.5	250A																																												
3	300A																																												
4	400A																																												
5	500A																																												
6	600A																																												
8	800A																																												
10	1000A																																												
12	1200A																																												
15	1500A																																												

* P Mounting Kit (2050-1)

Fisher Pierce® Model 16514AM-45102 SmartNet™ Directional Network FCI

For single-phase underground applications.

Operation

- Max. operational current: 25kA per ANSI 495
- Max. current withstand: 40kA for 10 cycles with no damage
- When the feeder is energized, the unit's control algorithm initiates a settling period to allow unwanted transients to dampen. After the settling period is satisfied, a phase relationship is learned, stored and considered normal power flow. When the trip current is sensed, the phase angle is compared to the learned phase angle and, if within the pre-determined phase relationship, is considered a valid fault.



Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)

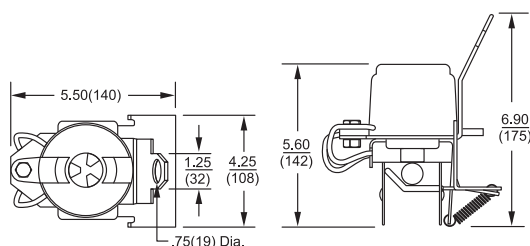


Figure A — Indicator with Attached Sensor. Hotstick Mounting.

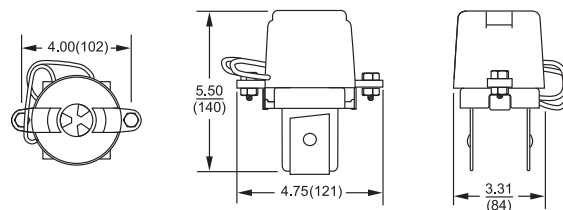


Figure B — Indicator with Attached Sensor. Tie-Wrap Mounting.

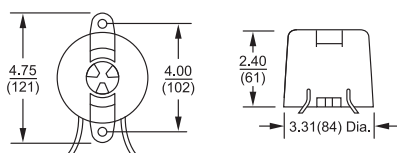


Figure C — Bracket/Surface Mounting.

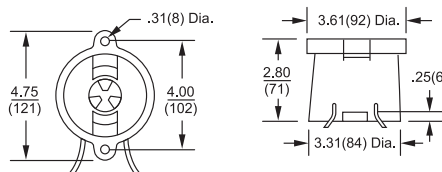


Figure D — Window/Flush Mounting.

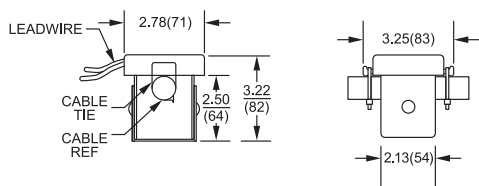


Figure E — Remote Sensor. Tie-Wrap Mounting.

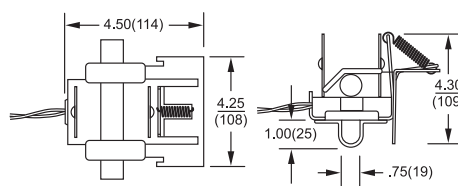


Figure F — Remote Sensor. Hotstick Mounting.

Features	Benefits/Descriptions
Trip Logic	Programmable fixed-current trip.
Reset Logic	Automatic reset of fault indication; manual reset also available.
Fault Indication	Visual indication choice of LED only.

Ordering Information for Fisher Pierce® Model 16514AM-45102 SmartNet™ Directional Network FCI

To order Fisher Pierce® Model 16514AM-45102 SmartNet™ Directional Network FCIs, please contact the factory.

Fisher Pierce® SmartLink™ Series 5000 Cellular RTU for Fisher Pierce® FCIs

Reliable, cost-effective, two-way communication for fault reporting.

The Fisher Pierce® SmartLink™ Series 5000 integrated cellular Remote Terminal Unit (RTU) provides reliable and cost-effective two-way communication for automated fault reporting from Fisher Pierce® Series 1548 radio FCIs. Electric utility operations personnel can have precise fault alarms and data fed to a variety of applications in seconds, increasing response time and system reliability.

The SmartLink™ Series 5000 RTU uses technology from Telemetric to communicate over the digital or analog cellular data networks, with coverage available to over 98% of the population in North America. No additional radio equipment, license or local cellular account is required. The SmartLink™ Series 5000's intelligent processor provides flexible reporting of permanent and temporary fault conditions. Utilities can access a secure, web-based fault-reporting application or integrate automatic fault reporting into SCADA/EMS systems using optional software from Telemetric.

The secure, web-based application displays device data that can be queried or polled remotely. A variety of user-specified fault alarms can be configured to notify a designated person of a reported event by e-mail, pager or text message.

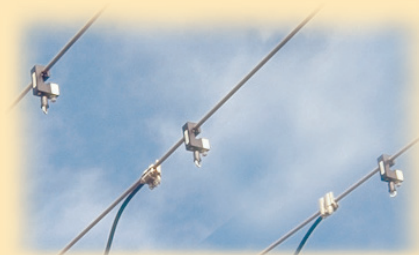


Faulted Circuit Indicators

Features	Benefits/Descriptions
Uses local RF signal	Reports fault alarms from up to four Series 1548 radio FCIs (A, B, C phase + tap), located up to 100 feet away
Immediate Reporting of Alarm Conditions	Provides instant notification of: Permanent fault on any phase, phase status; fault-cleared status by phase; overvoltage or undervoltage setpoints on control power phase; and low battery alarm.
Immediate or Off-Peak Reporting of Momentary Fault Data	User-configurable to receive instant notification of momentary fault data or wait for lower-cost off-peak hours.
Nationwide GPRS Support	Communicates over cellular data networks via Cingular Wireless and affiliated roaming partners with a variety of application data plans, with coverage available to more than 98% of the North American population.
RTU Status-Point Querying	Available at any time through the web-based application or by SCADA/EMS using optional Telemetric™ SCADA-Xchange™ software.
RTU Battery-Status Check and Low-Battery Alarms	Sent automatically to ensure continuous, reliable operation.

How Radio FCIs help locate and report faults.

Helps crews locate faults easily when fault indicators are not directly visible.



1548 FCI In Field Location



SmartLink™ 5000



Cell Tower

No Utility
Communication
Infrastructure Required

Designed for distribution
RTU/SCADA overhead systems

RTU/SCADA
System



1560-1

Handheld Receiver

1560-2, -3, -4

Fixed-Mount Receiver



Utility Control Room

Specifications

Fault Indicator Receiver

Operating Frequency:
312 MHz

Receiver Range:
100 ft. min. typical

Receiver Sensitivity Adjustment:
Selectable via local configuration or web application to max. range of local RF radio (low gain, high gain)

Certification:
Complies with FCC part 15 emissions

Cellular Radio Technology

Dual-band, dual-mode supporting GSM/GPRS 850/1900 MHz; nationwide GPRS support via Cingular Wireless and affiliated roaming partners with a variety of application data plans

Transmit Power:
0.6 to 1.2W

External mounted antenna, flexible dual-band (850/1900) cellular, SMA(F) connector

Fault receiver antenna (312 MHz RF system, BNC connector)

Measurement Points List - Calls & Polling

- Permanent fault status indication from radio FCI
- Control Power Voltage Measurements: Undervoltage/Overvoltage Value Alarm
- Control Power Status (Outage)
- Battery Status
- Temporary Fault Data
- Time Scheduled Calls
- Alarm Calls (permanent fault, clearing, phase status, low battery)
- Polling of all status and analog points

Intelligent Web Server

- Data is secure and password protected
- Server authentication using 128-bit encryption key validation
- E-mail, text message or pager notification options

Local Serial Port

RS-232 communications port for local configuration.
Windows-based configuration software included with RTU

Front-Panel LED Indicators

Qty.	Color	Label (Indication)
1	Green	Cellular Communication Present
1	Green	Processor OK
4	Red	Fault Received (A, B, C and Tap)
1	Tri-Color	Radio Signal Strength Indicator

Electrical/Environmental

Operating Voltage:
95 – 135 VAC, 60Hz

Surge Withstand:
ANSI/IEEE C37.90.1-2002, 4kV min.
@ 1.2/50 μ s surge

FNM style Slo-Blo® fuse, barrel-mounted

Operating temperature range:
-40° C to 70° C

Battery Backup

Standard:
Lead Acid, rechargeable 12V
(3 to 5 yrs. expected service life)

Carryover Time:
4-hr. typical, 3-hr. min.

Recharge Time after 3–4-hr. Carryover:
6 hrs. typical

Accessibility:
Front-panel replaceable.

Status message sent weekly or by request.

Enclosure

Lexan enclosure for meter socket mounting

NEMA 3R Rating

Security latch for meter seal or $\frac{3}{8}$ " hasp padlock

Fisher Pierce® Series 1650 Receivers for FCIs

Drive-By FCI Status.

1560-1
Handheld Receiver

Specifications

Frequency:
312 MHz

Range:
100 ft. max.

Power:
9V battery

Handheld

Complies with FCC Part 15 emissions



1560-2, -3, -4
Fixed-Mount Receiver

Specifications

Frequency:
312 MHz

Range:
100 ft. max.

Power:
9–12 VDC, 20mA external

Complies with FCC Part 15 emissions



Ordering Information for Fisher Pierce® SmartLink™ 5000 Cellular RTU and Radio Receivers

CAT. NO.	DESCRIPTION
3175B0126G1	SmartLink™ 5000 Cellular RTU (includes battery back-up and antennas)
1560-1	Handheld Receiver with audible and LED indicator
1560-2	RTU/SCADA Radio Receiver with 3 dry contact outputs for Phase A, B and C (includes mounting bracket)
1560-3	RTU/SCADA Radio Receiver with 1 dry contact output for Phase A, B or C (includes mounting bracket)
1560-4	RTU/SCADA Radio Receiver with 4 dry contact outputs for Phase A, B, C and tap (includes mounting bracket)

Fisher Pierce® TPM Series Test Point Fault Indicators

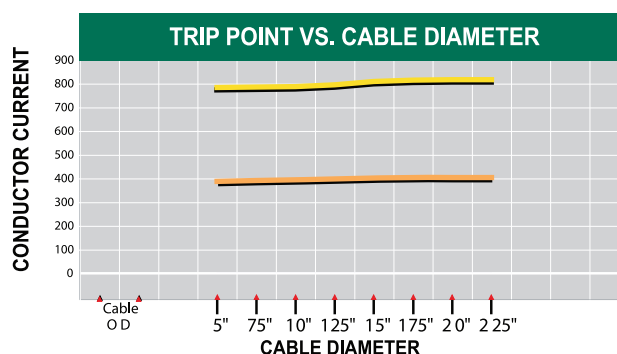
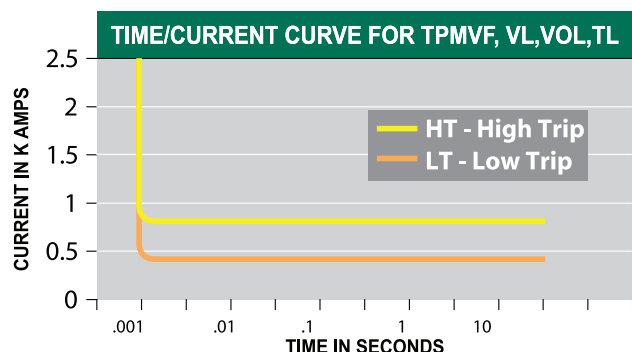
Mount directly to any IEEE 386 standard capacitive test point.

Fisher Pierce® Test Point Mounted Fault Indicators consist of a solid-state current sensor connected to a faulted-circuit display, providing a clear visual means for quickly locating faulted cables and equipment on underground distribution systems.

Designs incorporate advanced circuit logic and monitoring system protection operation to prevent the indicator from tripping unless an overcurrent condition is followed by a loss of system voltage. Trip and reset operations are automatic, and for versatility and convenience, the same indicator may be used for 5KV thru 35KV applications.


**Faulted Circuit
Indicators**

Features	Benefits/Descriptions
AccQTrip™ Logic Circuitry	Prevents false indications in voltage-reset units due to inrush currents, cold load pickup and overloading.
High/Low Trip-Setting Selection	Requires no minimum load current and no load surveys.
Internal Magnetic Shielding	Prevents adjacent phase effects.
1 msec. Trip Response	Coordinates with current-limiting fuses, as well as other protection devices
Magnetically Latched Flag	Prevents flag indication from changing state due to shock or vibration.
Test Point Mounting	Mounts directly to 200 and 600 amp elbows, splices and other cable accessories equipped with IEEE 386 standard capacitive test points from Fisher Pierce™ and other manufacturers.
Built-In Pulling Eye	Enables safe, easy hotstick installation and removal from test points.
Durable Construction	Enclosed in a rugged, yet lightweight and compact, sealed, impact- and corrosion-resistant Lexan housing with EPDM molded-rubber test point mounting boot.

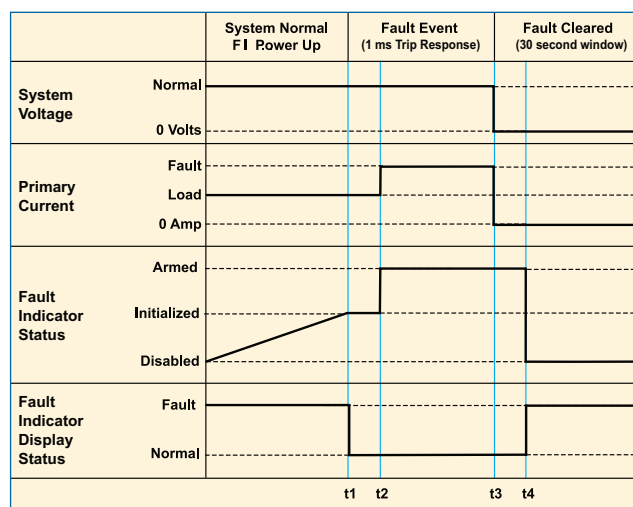


Basic Operation

A faulted circuit produces an associated magnetic field, which closes a reed switch in the indicator, resulting in a tripped display. Trip response occurs in .001 seconds (1 msec.), allowing the fault indicator to properly coordinate with all types of circuit-protection schemes, including current-limiting fuses. To eliminate confusing false trips, voltage-reset indicators are equipped with inrush, backfeed, overload and cold-load pick-up restraint circuitry. Current sensors feature internal shielding to prevent inadvertent tripping when located in close proximity to adjacent phases, such as in junction-mounted applications.

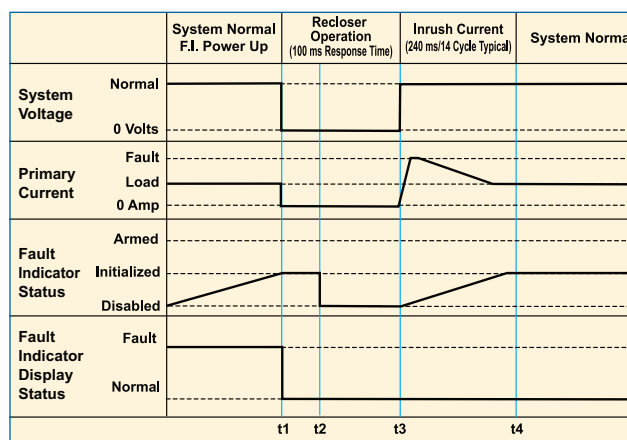
Faulted-Circuit Operation

- t1** Fault Indicator is connected to the system and powers up. At 5kV, this takes 3 minutes for the test point mounted unit and 6 minutes for the overhead type unit. At higher voltages, power-up time is shorter.
- t2** Fault current is detected. Fault Indicator is armed after 1 msec. Fault Indicator display shows Normal.
- t3** Breaker/recloser locks out and voltage drops.
- t4** Voltage is lost. A 30-second time window allows for the protective device to clear the fault and reclose. Indicator changes state.



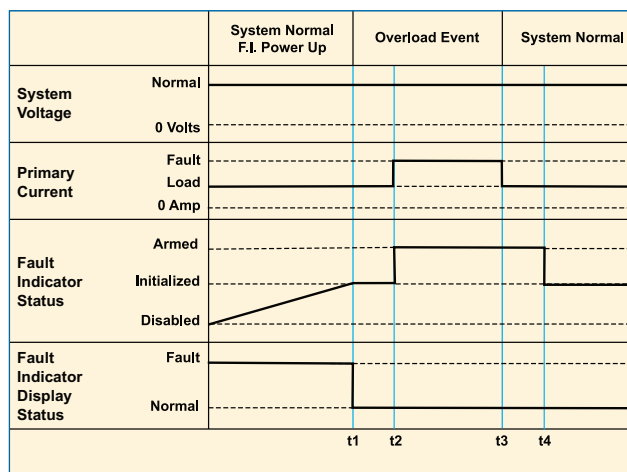
Inrush-Restraint Operation

- t1** Fault Indicator is connected to the system and powers up. At 5kV, this takes 3 minutes for the test point mounted unit and 6 minutes for the overhead type unit. At higher voltages, power-up time is shorter.
- t1-t2** Upline recloser/breaker operation due to fault on another phase. After 100 msec. (t2), the Fault Indicator is disabled because no fault current is detected.
- t3** Recloser closes back. Voltage is back to normal. Unfaulted phases see inrush. No change in the Fault Indicator display.



Overloading Operation

- t1** Fault Indicator is connected to the system and powers up. At 5kV, this takes 3 minutes for the test point mounted unit and 6 minutes for the overhead type unit. At higher voltages, power-up time is shorter.
- t2** Device downline from Fault Indicator switches, creating an overload. Fault Indicator is armed after 1msec. Fault Indicator display shows Normal.
- t3** Overload condition over. Fault Indicator does not change state.
- t4** After 30 seconds, Fault Indicator goes back to initialized state.



Specifications
**Specifications for TPM Voltage Operated,
Time Reset, LED Display: Model TPMVOL**

Nominal Voltage 4.16-60kV (L-L)	LED Display Time 4 Hour – Standard
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Reset Time 4 Hour – Standard (longer times available upon request)
Trip Response Time 1mS	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Fault Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Battery Capacity 2.4 Ah
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Operating Life 1200 Flash Hours Minimum
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Battery Storage Life 15-20 Years
Inrush/Backfeed Restraint 100mS (Disable Delay)	Temperature Range -40° C to 85° C
Load Current Requirements None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Power Up Requirement 3 Minutes @ 5kV	Weight 258 Grams
Display Type Flashing Super Bright LED	Certifications Complies with ANSI/IEEE 495-1986
Flash Rate 30 Flashes per Minute	

Specifications
**Specifications for TPM Voltage Reset,
LED Display: Model TPMVL**

Nominal Voltage 4.16-60kV (L-L)	LED Display Time 4 Hour – Standard
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Voltage Reset Time 6 Minutes @ 5kV
Trip Response Time 1mS	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Fault Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Battery Capacity 2.4 Ah
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Operating Life 1200 Flash Hours Minimum
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Battery Storage Life 15-20 Years
Inrush Restraint Response 100mS (Disable Delay)	Temperature Range -40° C to 85° C
Load Current Requirements None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Power Up Requirement 3 Minutes @ 5kV	Weight: 258 Grams
Display Type Flashing Super Bright LED	Certifications: Complies with ANSI/IEEE 495-1986
Flash Rate 30 Flashes per Minute	

Specifications
**Specifications for TPM Voltage Reset,
Flag Display: Model TPMVF**

Nominal Voltage 4.16-60kV (L-L)	Minimum Reset Voltage 5kV (Beginning Initializing Sequence)
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Voltage Reset Time 3 Minutes @ 5kV
Trip Response Time 1mS	Power Source Volt Test Point Powered
Fault-Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Temperature Range -40° C to 85° C
Maximum Surge Level 25kA 10 Cycles 60 Hz	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Weight 258 Grams
Inrush Restraint Response 100mS (Disable Delay)	Certifications: Complies with ANSI/IEEE 495-1986
Load Current Requirements None	
Display Type Mechanical Flag	

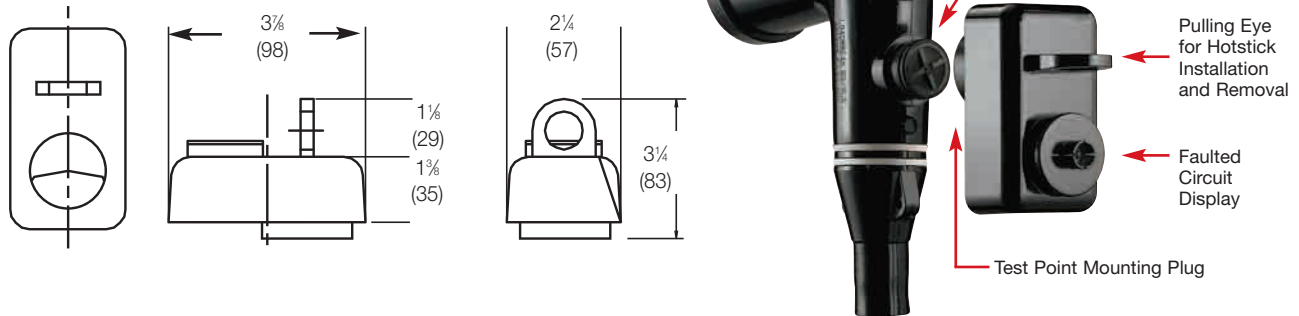
Specifications
**Specifications for TPM Time Reset,
LED Display: Model TPMTL**

Nominal Voltage 4.16-60kV (L-L)	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Battery Capacity 2.4 Ah
Trip Response Time 1mS	Battery Operating Life 1200 Flash Hours Minimum
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Storage Life 15-20 Years
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Temperature Range -40° C to 85° C
Power Up Requirement None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Display Type Flashing Super Bright LED	Weight 258 Grams
Flash Rate 30 Flashes per Minute	Certifications: Complies with ANSI/IEEE 495-1986
Reset Time 4 Hour – Standard	

1. Prevents false trips due to short time interruptions without loss of voltage.
2. Inrush restraint is standard on voltage reset models. It is not available on the time reset models.
3. Battery powers LED and it is active only when LED is ON. Lithium Thionyl Chloride batteries provide accurate indication throughout the entire temperature range.

Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)



Ordering Information

for Fisher Pierce® TPM Series Test Point Fault Indicators

CAT. NO.	DESCRIPTION
TPMTL -[_]	Time Reset with LED Display (auto-resets to normal after 4 hrs.; may also be manually reset using an FTT test tool)
TPMVF -[_]	Voltage Reset with Flag Display (auto-resets to normal after system voltage restoration; reset requires 5kV min. voltage with time required for reset proportional to system voltage)
TPMVL -[_]	Voltage Reset with LED Display (auto-resets to normal after system voltage restoration; reset requires 5kV min. voltage with time required for reset proportional to system voltage)
TPMVOL -[_]	Voltage Operated, Time Reset, LED Display (auto-resets after 4 hrs.; longer time resets available upon request)
CAT. NO. SUFFIX	DESCRIPTION
-LT	For 200A. All fused taps use LOW trip rating. For URD applications, use LOW trip rating.
-HT	For 600A. For URD applications, use HIGH trip rating.

NOTE: For overhead bulk feeder applications, use HIGH or LOW trip ratings (whichever is greater than the minimum pickup setting of the related protection device).

AccQTrip™ and AccQClamp™ are trademarks of Quality Indications, Inc.



Fisher Pierce® UCM Series Underground Clamp Type Fault Indicators

Locate faulted cables and equipment on underground distribution systems.

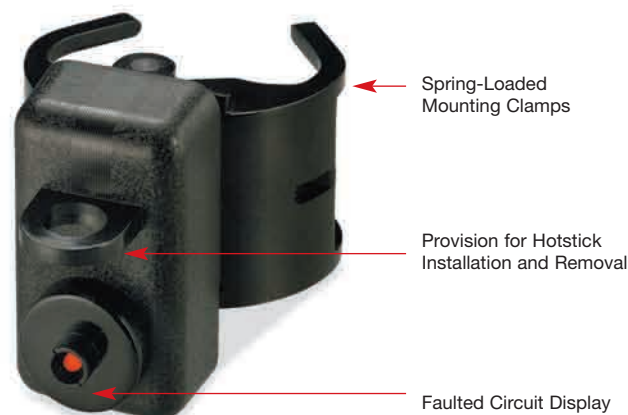
Self-powered Fisher Pierce® UCM Series Underground Clamp Type Fault Indicators consist of a solid-state current sensor connected to a faulted circuit display. Units are designed for direct installation to an underground power cable using a spring-loaded, over-center toggle clamp mounting provision. The clamp accommodates cables ranging from .4" to 2.2" diameter and includes retainer pads to prevent slip

and twist. The clamp positions the cable conductor at a constant distance from the current sensor, maintaining indicator trip accuracy over the entire range of cable sizes. Designs feature compact, shielded and sealed, corrosion-resistant construction. The indicator is enclosed in a durable, impact-resistant Lexan® housing and includes a built-in pulling eye for easy hotstick installation and removal from the cable.



Basic Operation

A faulted circuit produces an associated magnetic field, which closes a reed switch in the indicator, resulting in a tripped display. Trip response occurs in .001 seconds, allowing the fault indicator to properly coordinate with all types of circuit protection schemes including current-limiting fuses. Series VCM fault indicators are constructed with an internally shielded current sensor that prevents inadvertent tripping when located in close proximity to adjacent phases, such as junction-mounted applications.



Faulted Circuit Indicators

Features	Benefits/Descriptions
AccQClamp™ Mounting Provision	Universal one-size-fits-all design automatically adjusts.
High/Low Trip Setting Selection	No minimum load current requirement and no load surveys needed.
Trip Response of .001 Seconds	Coordinates with current-limiting fuses, as well as other protection devices.
Internal Magnetic Shielding	Prevents adjacent phase effects.

TYPICAL INSTALLATION

Install Fault Indicator in Area Shown

As shown, proper installation of VCM cable mounted fault indicators requires routing cable neutral wires to prevent the ground return from affecting trip accuracy. Similar procedures should be followed for tape, wire, LC or other types of shielded cable constructions.

Do not install indicator directly over the concentric neutral to avoid misindication (Fig. 4).

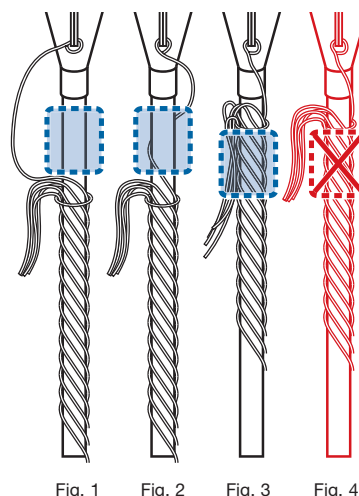


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Specifications

Specifications for UCM Time-Reset, LED Display: Model UCMTL

Nominal Voltage
4.16-60kV (L-L)

Nominal Trip Ratings
Low, 400 Amp; High, 800 Amp

Trip Response Time
1mS

Maximum Surge Level
25kA 10 Cycles 60 Hz

Effect of Adjacent Phase
Internal Shielding Prevents Adjacent Phase Effects

Display Type
Flashing Super Bright LED

Flash Rate
30 Flashes per Minute

Reset Time
4 Hour - Standard

Power Source¹
3.6 Volt Lithium Thionyl Chloride Battery

Battery Capacity
2.4 Ah

Battery Operating Life
1200 Flash Hours Minimum

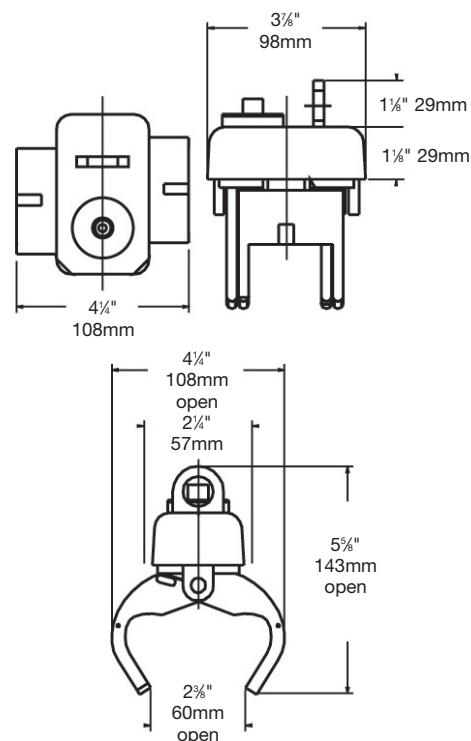
Battery Storage Life
15-20 Years

Temperature Range
-40° C to +85° C

Housing Material
Mounting Boot – EPDM Conductive Rubber
Housing Body – UV Stabilized Polycarbonate Polymer

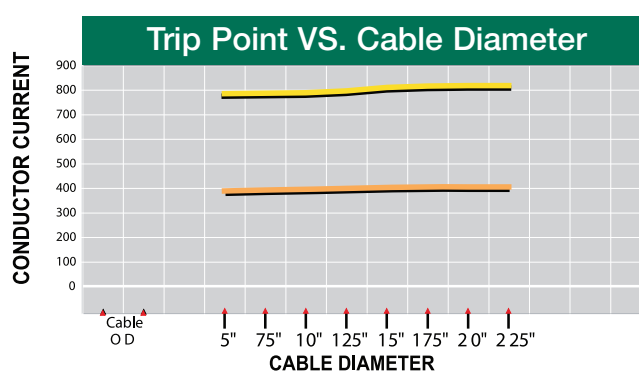
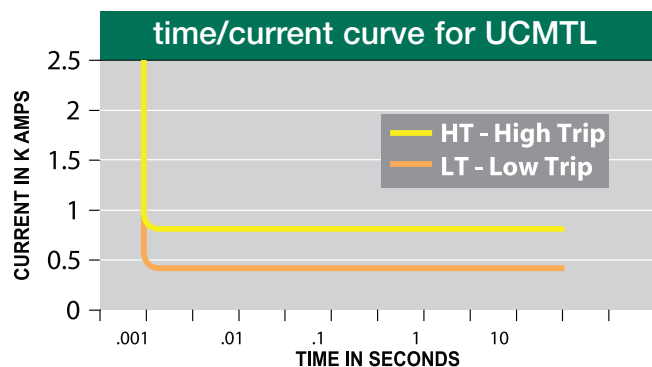
Weight
258 Grams

Certification
Complies with ANSI/IEEE
495-1986



NOTES:

- 1) Battery powers LED and it is active only when LED is ON. Lithium Thionyl Chloride batteries provide accurate indication throughout the entire temperature range.



Ordering Information for Fisher Pierce® UCM Series Underground Clamp Type Fault Indicators

CAT. NO. PREFIX	DESCRIPTION
UCMTL	Time Reset with LED Display (Indicator auto-resets to normal after a four hour time duration. Indicator may also be manually reset using an FTT test tool.)
CAT. NO. SUFFIX	DESCRIPTION
LT	All fused taps use LOW trip rating. For 200 amp circuits. URD applications, use LOW trip rating.
HT	For 600 amp. circuits. URD Applications, use high trip rating.

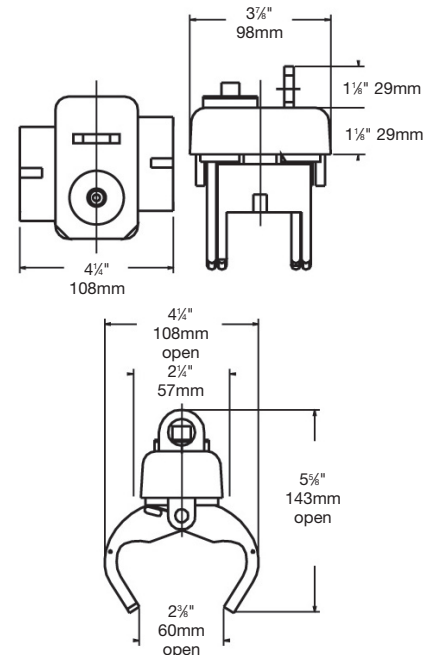
NOTE: For overhead bulk feeder applications, use HIGH or LOW trip ratings (whichever is greater than the minimum pickup setting of the related protection device).

AccQTrip™ and AccQClamp™ are trademarks of Quality Indications, Inc.

Fisher Pierce® Series OLM Overhead Line Fault Indicators

Locate faulted circuits and equipment on overhead distribution systems.

Self-powered Fisher Pierce® Series OLM Overhead Line Fault Indicators consist of a solid-state current sensor connected to a faulted circuit display. Advanced circuit logic monitors system protection operation and prevents indicator tripping unless an overcurrent condition is followed by a loss of system voltage. Trip and reset operations are automatic, and the same indicator may be used for 5kV thru 35kV line-to-ground applications. These compact, sealed and corrosion-resistant units are designed for direct installation to an overhead line using a spring-loaded, over-center toggle clamp. Equipped with retainer pads to prevent slip and twist, the clamp positions the conductor at a constant distance from the current sensor, maintaining trip accuracy over the entire conductor diameter range of .4" to 2.2".

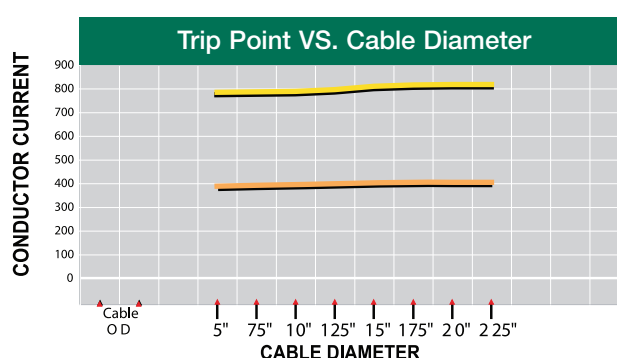
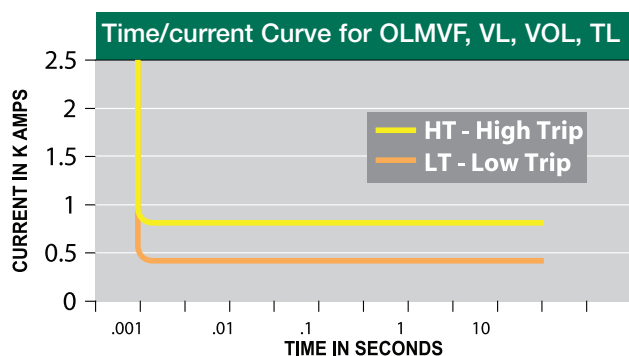


**Faulted Circuit
Indicators**

Basic Operation

A faulted circuit produces a magnetic field, which closes a reed switch in the indicator and causes a tripped display. A trip response time of .001 seconds enables the indicator to properly coordinate with all circuit-protection schemes, including current-limiting fuses. To eliminate confusing false trips, indicators feature inrush, overload and cold-load pick-up restraint circuitry as standard. Internal shielding of current sensors prevents inadvertent tripping when in close proximity to adjacent phases.

Features	Benefits/Descriptions
AccQTrip™ Logic Circuitry	In voltage reset units prevents false indications due to inrush currents, cold load pickup and overloading.
AccQClamp™ Mounting Provision	Universal one-size-fits-all design automatically adjusts.
High/Low Trip Setting Selection	No minimum load current requirement and no load surveys needed.
Trip Response of .001 Seconds	Coordinates with current-limiting fuses, as well as other protection devices.
Internal Magnetic Shielding	Prevents adjacent phase effects.
Magnetically Latched Flag Indication	Flag indication will not change states due to shock or vibration.
Lightweight Enclosure	Compact and sealed



Specifications

Specifications for OLM Voltage Operated, Time Reset, LED Display: Model OLMVOL

Nominal Voltage 4.16-60kV (L-L)	LED Display Time 4 Hour – Standard
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Reset Time 4 Hour – Standard (longer times available upon request)
Trip Response Time 1mS	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Fault Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Battery Capacity 2.4 Ah
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Operating Life 1200 Flash Hours Minimum
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Battery Storage Life 15-20 Years
Inrush/Backfeed Restraint 100mS (Disable Delay)	Temperature Range -40° C to 85° C
Load Current Requirements None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Power Up Requirement 6 Minutes @ 5kV	Weight 258 Grams
Display Type Flashing Super Bright LED	Certifications Complies with ANSI/IEEE 495-1986
Flash Rate 30 Flashes per Minute	

Specifications

Specifications for OLM Voltage Reset, LED Display: Model OLMVL

Nominal Voltage 4.16-60kV (L-L)	LED Display Time 4 Hour – Standard
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Voltage Reset Time 6 Minutes @ 5kV
Trip Response Time 1mS	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Fault Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Battery Capacity 2.4 Ah
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Operating Life 1200 Flash Hours Minimum
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Battery Storage Life 15-20 Years
Inrush Restraint Response 100mS (Disable Delay)	Temperature Range -40° C to 85° C
Load Current Requirements None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Power Up Requirement 6 Minutes @ 5kV	Weight: 258 Grams
Display Type Flashing Super Bright LED	Certifications: Complies with ANSI/IEEE 495-1986
Flash Rate 30 Flashes per Minute	

Specifications

Specifications for OLM Voltage Reset, Flag Display: Model OLMVF

Nominal Voltage 4.16-60kV (L-L)	Minimum Reset Voltage 5kV (Beginning Initializing Sequence)
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Voltage Reset Time 6 Minutes @ 5kV
Trip Response Time 1mS	Power Source Volt Test Point Powered
Fault-Clearing Time¹ .001 – 30 Seconds Subsequent to Arming	Temperature Range -40° C to 85° C
Maximum Surge Level 25kA 10 Cycles 60 Hz	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Weight 258 Grams
Inrush Restraint Response 100mS (Disable Delay)	Certifications: Complies with ANSI/IEEE 495-1986
Load Current Requirements None	
Display Type Mechanical Flag	

Specifications

Specifications for OLM Time Reset, LED Display: Model OLMTL

Nominal Voltage 4.16-60kV (L-L)	Power Source³ 3.6 Volt Lithium Thionyl Chloride Battery
Nominal Trip Ratings Low, 400 Amp; High, 800 Amp	Battery Capacity 2.4 Ah
Trip Response Time 1mS	Battery Operating Life 1200 Flash Hours Minimum
Maximum Surge Level 25kA 10 Cycles 60 Hz	Battery Storage Life 15-20 Years
Effect of Adjacent Phase Internal Shielding Prevents Adjacent Phase Effects	Temperature Range -40° C to 85° C
Power Up Requirement None	Housing Material Mounting Boot – EPDM Conductive Rubber Housing Body – UV Stabilized Polycarbonate Polymer
Display Type Flashing Super Bright LED	Weight 258 Grams
Flash Rate 30 Flashes per Minute	Certifications: Complies with ANSI/IEEE 495-1986
Reset Time 4 Hour – Standard	

1. Prevents false trips due to short time interruptions without loss of voltage.
2. Inrush restraint is standard on voltage reset models. It is not available on the time reset models.
3. Battery powers LED and it is active only when LED is ON. Lithium Thionyl Chloride batteries provide accurate indication throughout the entire temperature range.

Ordering Information for Fisher Pierce® Series OLM Overhead Line Fault Indicators		
CAT. NO. PREFIX	DESCRIPTION	RESET OPERATION
OLMTL	Time Reset with LED Display	Indicator auto-resets to normal after a four hour time duration. indicator may also be manually reset using an FTT test tool.
OLMVF	Voltage Reset with Flag Display	Indicator auto-resets to normal after system voltage restoration. Reset requires 5kV minimum voltage to operate. Reset operation time is proportional to system voltage.
OLMVL	Voltage Reset with LED Display	Example: at 15kV, reset occurs 30 seconds after system voltage restoration.
OLMVOL	Voltage Operated, Time Reset, LED Display	Indicator auto-resets after a four hour time duration. Longer time resets are available upon request.
CAT. NO. SUFFIX	DESCRIPTION	
LT	All fused taps use LOW trip rating For 600 amp. Overhead applications, use LOW trip rating.	
HT	For 600 amp. Overhead applications, use HIGH trip rating.	

Accessories for Series TPM, VCM and OLM Fault Indicators

FTT (Field Test Tool)

Permits field testing and reset of fault indicators and provides assurance that the indicator is properly functioning. The test tool is lightweight, portable and incorporates a built-in magnet which operates the indicator trip and reset functions. The unit is equipped with provisions for hotstick handling and operation.

FO-Cable06

Remote Fiber Optic Indicator for Underground Fault Indicators with LED Display can be extended to the outside of enclosures and/or vaults for ease of access and fault location. All the hardware for mounting the remote end of the cable to the enclosure is included. The display has a large reflective bolt to enhance visibility.



Ordering Information for Fisher Pierce® Fault Indicator Accessories	
CAT. NO.	DESCRIPTION
FTT	Field Test Tool, overall dimensions 2" wide x 3" high x 5/8" deep
FO-CABLE06	Remote Fiber Optic Indicator for UFI

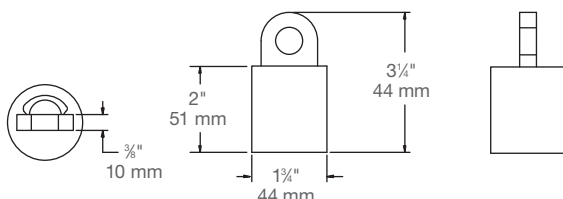
V2 Voltage Indicator

Easy way to visually determine the energized status of underground distribution circuits.

The V2 Voltage Indicator consists of a self-powered voltage sensor connected to a neon light that flashes when energized. Simply plug it into any IEEE 836 standard capacitive test point to determine the energized status of underground distribution circuits. Because the flash rate is proportional to the phase-to-phase system voltage, as indicated in the chart, one V2 model supports a wide range of applications – from 5 to 35kV.

Mechanical Data

(all dimensions in inches with millimeter equivalents in parentheses)



VOLTAGE	FLASH RATE	VOLTAGE	FLASH RATE
5kV	20	25kV	140
10kV	40	30kV	160
15kV	70	35kV	180
20kV	100		



V2-TB Test Box for easy field testing of V2 Voltage Indicators.

If the V2 Neon Voltage Indicator indicates a power failure in an underground distribution circuit, you'll want to ensure that it's actually the circuit that's failed and not the V2 itself. For fast, simple assurance, field test the V2 with the compact, portable V2-TB Voltage Indicator Test Box, powered by replaceable C batteries.

Features	Benefits/Descriptions
Wide Application Range	Single model supports applications from 5kV to 35kV.
Easy to Read	Flash rate per minute indicates system voltage (see chart below).
IEEE 386 Test Interface	Mounts to 200 and 600 amp elbows, splices and other cable accessory components equipped with IEEE 386 capacitive test points from Fisher Pierce® or other manufacturers.
Rugged Construction	Molded EPDM-rubber housing for shielded, sealed and corrosion-resistant construction.
Built-In Pulling Eye	Enables safe, easy hotstick installation and removal from test point.
20-Year Neon Bulb	Yields long, maintenance-free service life.
Testable with V2-TB	Easily tested for confirmation of proper operation with the V2-TB voltage indicator test box.

Ordering Information

for Fisher Pierce® V2 Voltage Indicator — Test Point Mounted

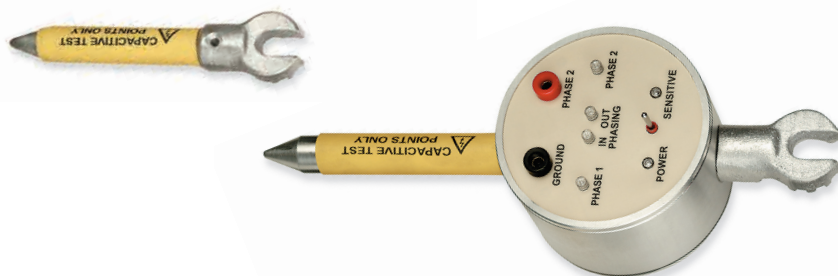
CAT. NO.	DESCRIPTION
V2	Voltage Indicator with Neon Display
V2-TB	Voltage Indicator Test Box

PD35 Voltage and Phasing Indicator

Safely determine the correct phasing and energized status of single- and three-phase underground distribution circuits from 5kV to 35kV.

Designed for hotstick operation, the PD35 Voltage and Phasing Indicator eliminates direct exposure to high voltage while using established indirect test methods for capacitance-coupled, cable connection test points. Its advanced, low-impedance, solid-state circuitry provides accurate and reliable readings with sensitivity as low as 1.5kV phase to ground.

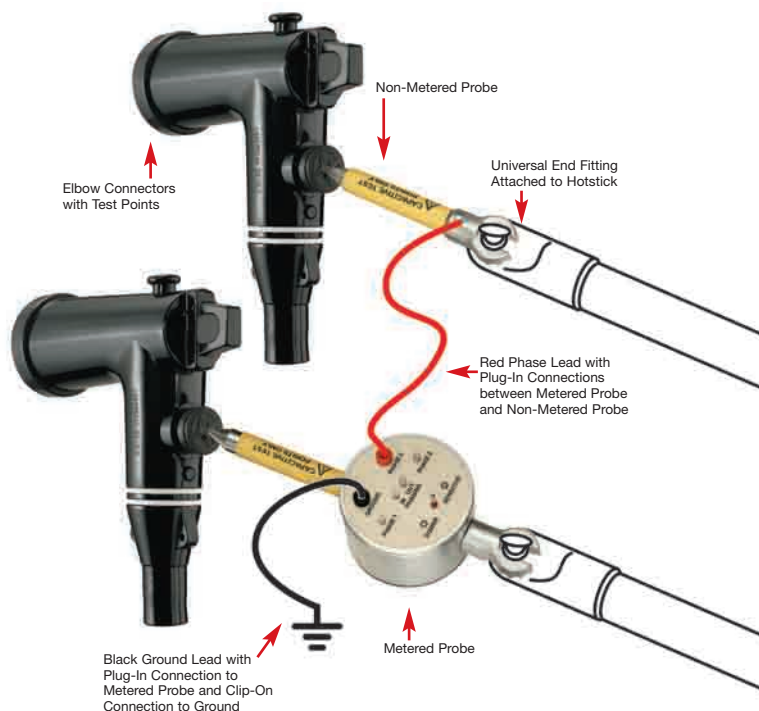
**Faulted Circuit
Indicators**



Features	Benefits/Descriptions
IEEE 386 Test Interface	Designed for use on 200 and 600 amp elbows, splices and other cable accessory components equipped with IEEE 386 capacitive test points from Fisher Pierce® or other manufacturers.
Universal End Fittings	Enable convenient mounting to existing hotsticks.
Rugged Construction	Housed in an impact-resistant case to withstand field conditions.
LED Indicator Lights	Easy to read test results.
Lightweight and Battery-Powered	Highly portable for field use and powered by a standard, replaceable 9V battery — no external power source required.

How to Use the PD 35 Voltage and Phasing Indicator

1. **Attach the metered probe to a hotstick and connect the BLACK ground lead.**
2. **Switch the meter to the ON position.** The red LED power light will illuminate, indicating that battery voltage is sufficient. All other LED indicators will momentarily light, showing that the meter is operating properly.
3. **To test for voltage,** touch the metered probe to the test point on the cable connection. The amber PHASE 1 LED will illuminate, showing that the high-voltage circuit is energized.
4. **To test for proper phasing,** attach the non-metered probe to an additional hotstick and connect the RED phase lead from the metered probe to the non-metered probe. Touch one probe to the test point on one of the cable connections. Touch the other probe to the test point on the other cable connection.
 - The **amber PHASE 1** and **PHASE 2 LEDs** will illuminate, showing that each of the high-voltage circuits are energized.
 - If the circuits are **IN PHASE**, the **green LED** will illuminate.
 - If the circuits are **OUT of PHASE**, the **red LED** will illuminate.



Ordering Information

for Fisher Pierce® PD35 Voltage and Phasing Indicator

CAT. NO.	DESCRIPTION
PD-35	Voltage & Phasing Indicator