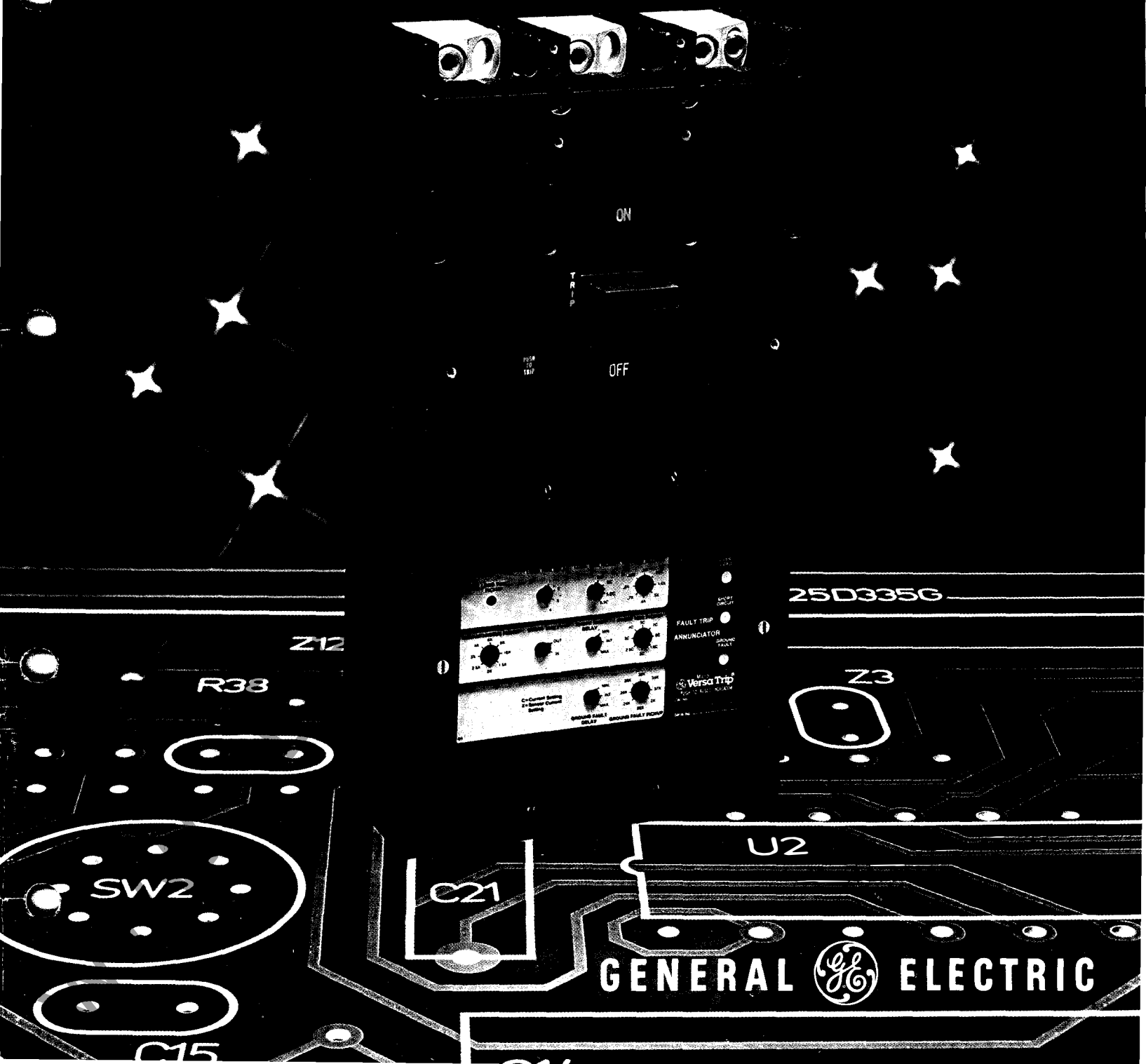
GEA-10676A

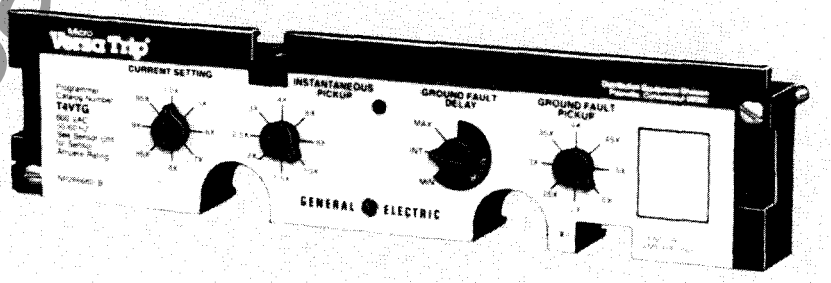
With Micro-VersaTrip® Solid State Programmers

Molded Case Circuit Breakers



Micro-VersaTrip® Solid-State Protection Programmers

9 Function Programmer



4 Function Programmer

Table of Contents

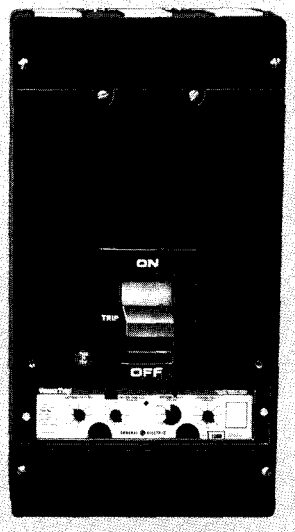
Micro-VersaTrip®. . . Reliability, Flexibility, Accuracy, Quality . . . in One Protection Package

Micro-VersaTrip® is a miniaturized, standardized, state-of-the-art programmer, incorporating technological advancements in overcurrent protection. It is the latest in a series of protection packages designed and manufactured by the General Electric Company to provide reliable, flexible protection systems.

Expanded functions, with increased versatility and coordination are contained in the Micro-VersaTrip programmer which in many cases requires no external relaying power supply or accessories.

4 Function Micro-VersaTrip® Circuit Breakers

J-FRAME



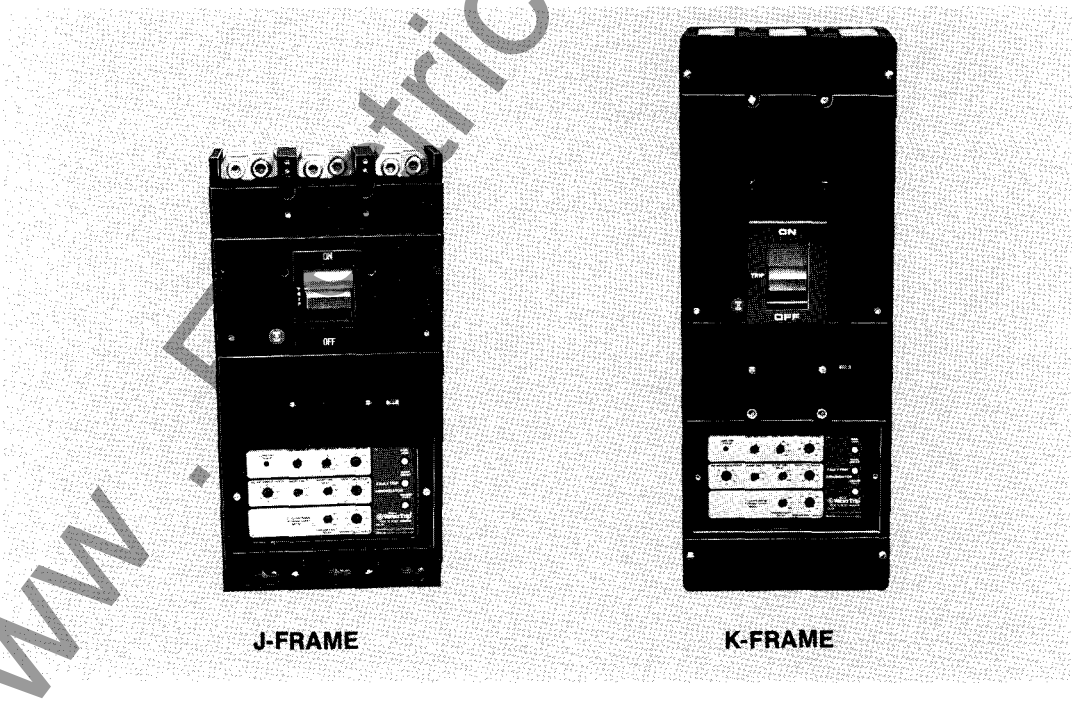
K-FRAME

Today's sophisticated distribution systems require increased accuracy, reliability and versatility. Micro-VersaTrip with its new generation solid state circuitry offers:

- Integral ground fault protection with memory.
- Increased selectivity with both ramp functions and zone-selective interlocking on short time and ground fault.
- Improved system coordination with accurate 8-point trip adjustment switches and multiple time-delay bands.
- Enhanced signaling capabilities with long-time timing light and local and remote popout fault indication targets.
- Full function Micro-VersaTrip test set provides field testing capabilities for programmer electronics, flux shifter and current sensors.
- Maximum flexibility with combinations of long time, short time, instantaneous, ground fault, signaling and system interlocking functions.
- Increased accuracy and reliability through the use of high grade components, gold-plated switches and a protective conformal epoxy coating on the electronics.

These new dimensions in electronics offer the additional benefits of a single programmer concept (Micro-VersaTrip replaces previous Versatrip,® Selectrip,™ ECS and SST™ solid state devices), similar programmer options among different breaker lines, a single test set and only three time current curves to cover the full GE line of molded-case circuit breakers, POWER BREAK insulated case circuit breakers and AKR low voltage power circuit breakers.

9 Function Micro-VersaTrip® Circuit Breakers



J-FRAME K-FRAME

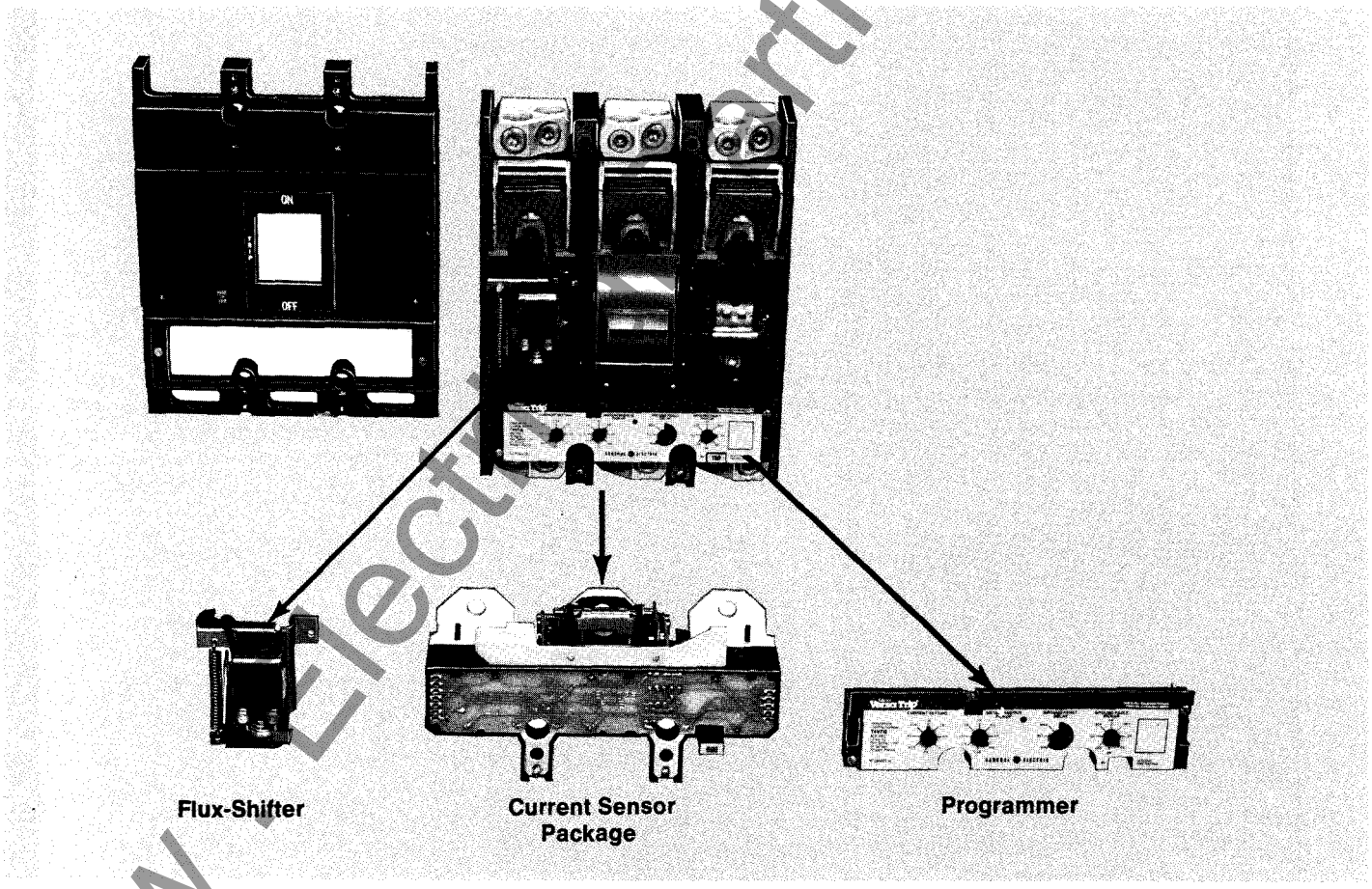
The Micro-VersaTrip® System: Programmer, Flux Shifter, Current Sensors

The Micro-VersaTrip system for molded case circuit breakers consists of three parts; a plug-in protection programmer, a flux shift trip device, and current sensor package.

Protection Programmer

Current sensor-powered solid-state logic unit. Incorporates rotary adjustment knobs for up to nine functions as well as targets for mechanical fault trip indications. (Micro-VersaTrip 9). Up to four adjustments with Micro-VersaTrip 4.

4 Function Micro-VersaTrip® System



Flux-shift Trip Device

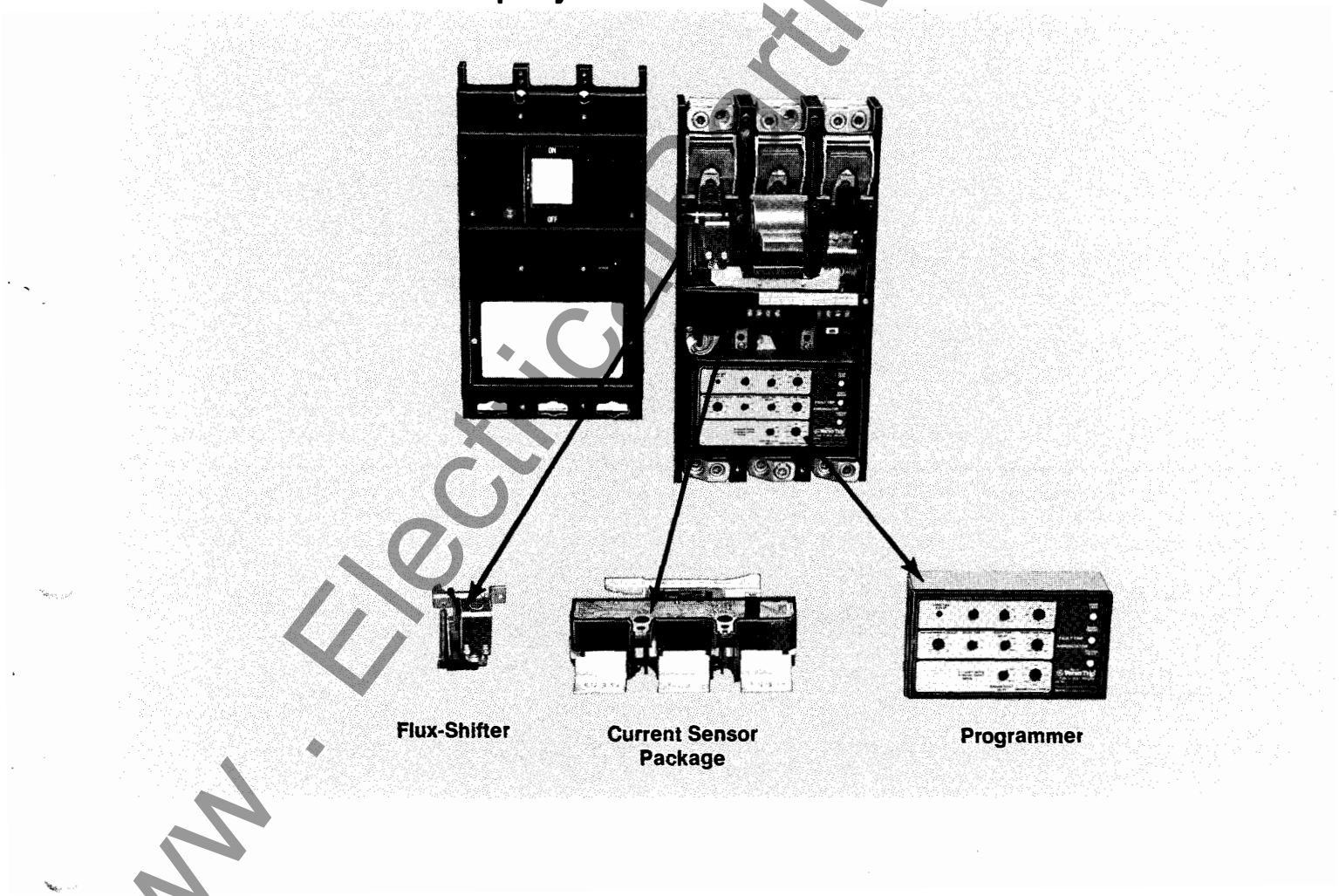
Low energy positive action tripping device. Automatically powered and controlled by the protection programmer.

Current Sensor Package

Three phase current sensors incorporated into a single package providing maximum flexibility and reliability.

These reliable components, coupled with the proven dependability of General Electric Molded Case circuit breakers, combine to provide the most flexible and reliable solid state protection system available.

9 Function Micro-VersaTrip® System



The Micro-VersaTrip® Programmer . . . Electronic Precision for Breaker Reliability and Stability

Programmable Micro-Electronic Processor

The programmable micro-electronic processor forms the basis of the Micro-VersaTrip protection programmer. This miniaturization of circuitry provides the increased flexibility required to incorporate up to nine adjustable time-current functions, three mechanical fault indicators (local and remote), a long-time pickup LED indicator (local and remote) and zone selective interlocking. All adjustable programmer functions are automatic and self-contained. This compilation of functions provides the basis for the most flexible and useful breaker design presently available.

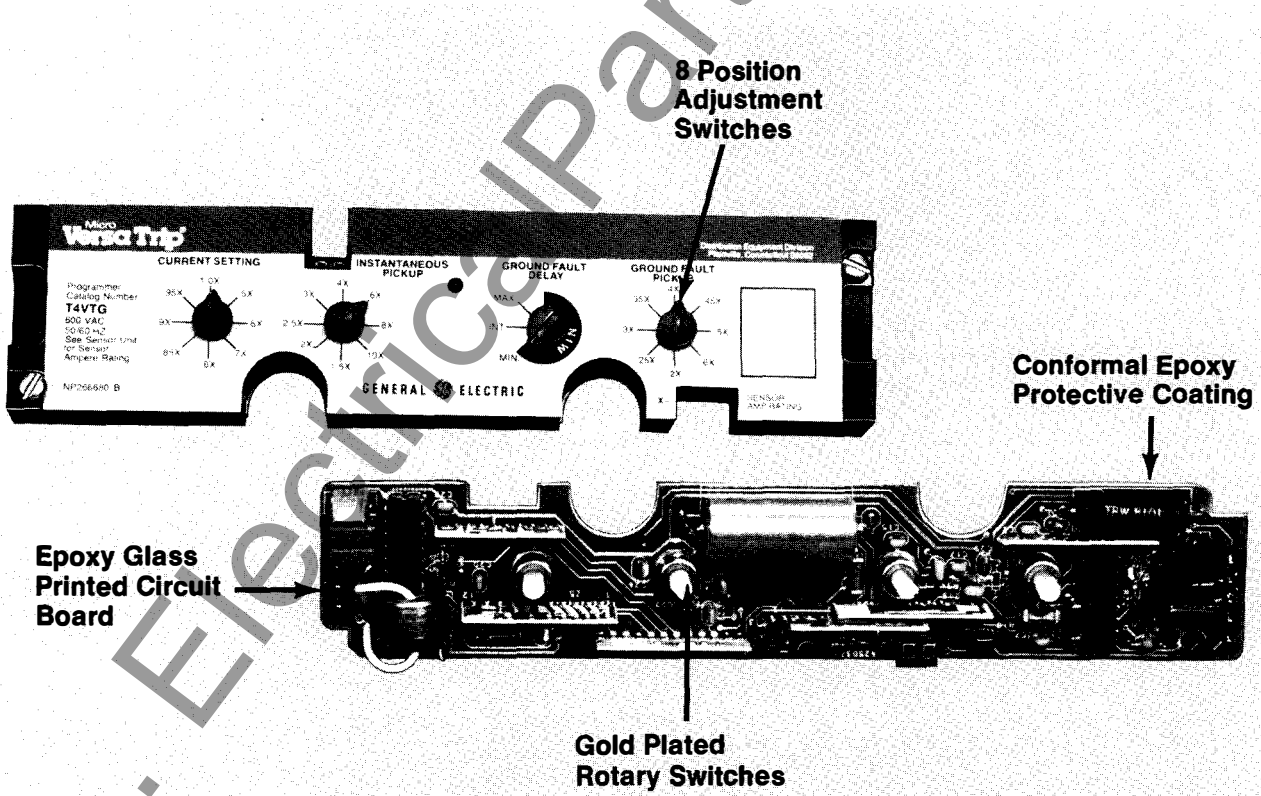
Specially Treated Printed Circuit Cards

Each printed circuit card is given a protective conformal epoxy coating to prevent moisture absorption, fungus growth and signal leakage. All electronics are housed within a metallic or molded enclosure designed to protect against hi-fault interruption arcs, magnetic interference, dust and other contaminants.

Gold-Plated Rotary Switch Adjustments

Gold-plated rotary switch adjustments provide highly reliable fixed point field programmable controls for greater repetitive accuracy and more precise Micro-VersaTrip trip unit settings.

4 Function Micro-VersaTrip® Programmer

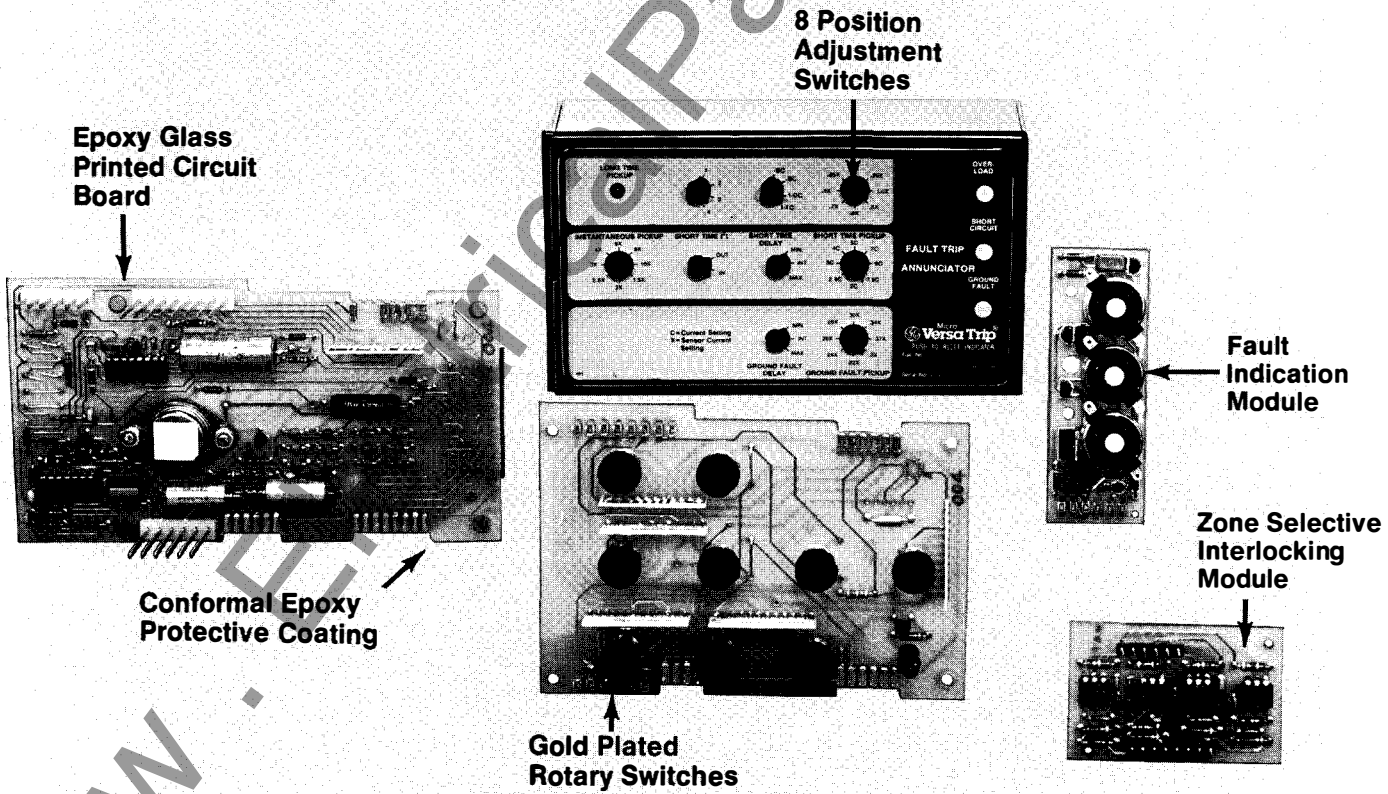


Gold-plated surfaces on all electrical connectors and adjustments provide long-lasting and positive electrical contact.

Integral Circuitry

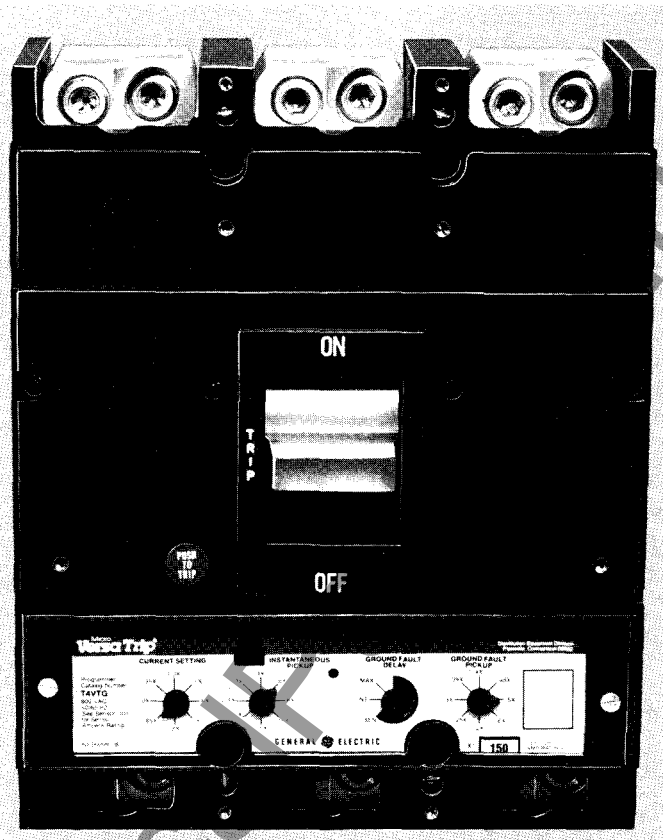
Integral circuitry is designed to reduce system down time by analyzing any overcurrent fault and visually identifying its cause as an overload, short circuit or ground fault. Both local and remote indication is available. A long-time pickup timing indicator is also provided as an aid in testing and identifying an overcurrent condition in process.

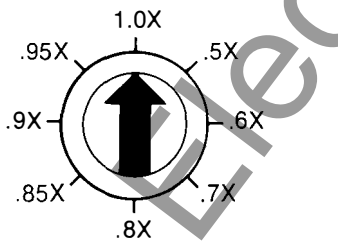
9 Function Micro-VersaTrip® Programmer



Micro-VersaTrip® 4 Programmer

4 Function Micro-VersaTrip® Circuit Breaker





CURRENT SETTING(C)

8 Position Discrete Point Switches

Wide Range of Ampere Adjustment is provided in two levels:

1. The programmer current setting is supplied with a 50-100 percent adjustment range—standard. The programmer long-time pickup is factory set at 1.1 times the current setting.
2. Fixed ratio current sensors are available up to the maximum frame rating of the breaker—standard.

Micro-VersaTrip® 4 Programmer Characteristics

Table 11.1—Micro-VersaTrip®4 Programmer Selection

Programmer Functions		Standard Programmer	Optional Functions Add to Standard Programmer				
			N	G	GR	NG	NGR
Long Time	• Adjustable Current Setting (C)	X	X	X	X	X	X
	Fixed Long-Time Pickup (1.1C)	X	X	X	X	X	X
	Fixed Long-Time Delay	X	X	X	X	X	X
	Long-Time Timing Light	X	X	X	X	X	X
Short Time	• Adj Short-Time Pickup		X			X	X
	Short-Time Delay I^2t ramp		X			X	X
Instanta-neous	• Adj Instantaneous Pickup	X		X	X		
	• Fixed Instantaneous Pickup		X			X	X
Ground Fault	• Adj Ground Fault Pickup [1] —Zero Sequence			X		X	
	—Ground Return				X		X
	• Adj Ground Fault Delay			X	X	X	X

[1] For 1PH, 2W—1PH, 3W—3PH, 3W—3PH, 4W systems. Order neutral transformer by catalog number when neutral is present.

Table 11.2—Micro-VersaTrip®4 Programmer Characteristics

Frame Size	Maximum Rating (Amps)	(X) Fixed Sensors: Sensor Current Ratings (Amps)	Current Setting (Multiple of Sensor Current Rating) (X)	Long-Time: Pickup (Multiple of Current Setting) (C)	Long-Time: Delay [1] (Seconds)	Short-Time: Pickup (Multiple of Current Setting) (C)	Short-Time: I^2t Delay [1] Ramp (Seconds)	Adjustable Instantaneous Pickup (Multiple of Sensor Current Rating) (X)	Ground Fault: Pickup (Multiple of Sensor Current Rating) (X)	Ground Fault: Delay [2] (Seconds)
J400	400	150, 200, 300, 400	.5, .6, .7, .8, .85, .9, .95, 1.0 (X)	Fixed at 1.1C	12.5	1.5, 2, 2.5, 3, 4, 5, 7, 9 (C)	0.4	1.5, 2, 2.5, 3, 4, 6, 8 10 (X)	.2, .25, .3, .35, .4, .45, .5, .6 (X)	0.10, 0.22, 0.36
J600	600	150, 200, 300, 400, 500, 600	"	"	"	"	"	"	"	"
K800	800	400, 600, 800	"	"	"	"	"	"	"	"
K1200	1200	400, 600, 800, 1000, 1200	"	"	"	"	"	"	"	"

[1] Time delay shown at ,600% of current setting at lower limit of each band.
[2] Time delay shown at lower limit of each band.
All pickup tolerances are ± 10%.
Ground Fault pickup not to exceed 1200 amperes.

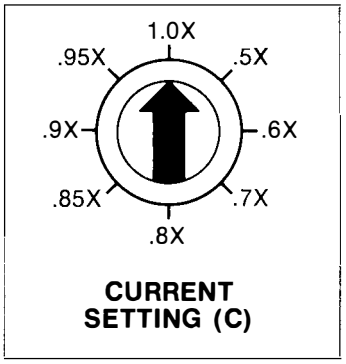
X = Sensor Current Rating
C = Current Setting

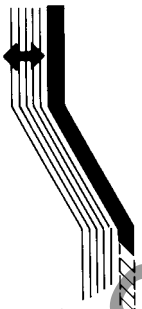
Micro-VersaTrip® 4 Programmer Functions

Overload and Short Circuit

Current Setting (Standard)

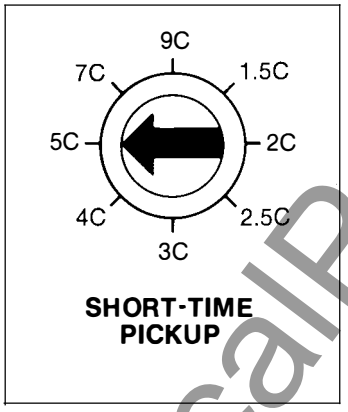
The adjustable current setting varies the level of current the breaker will carry indefinitely without tripping. Adjustable in 8 steps from 50-100% of sensor current rating, changing this setting has the same effect as changing the trip unit in an interchangeable trip circuit breaker.





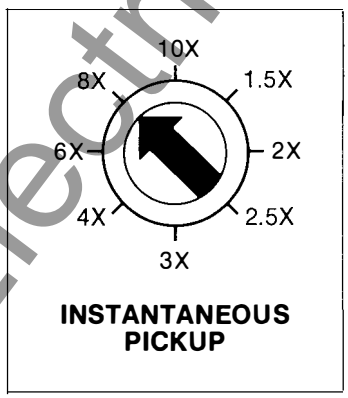
Short-Time Pickup (Optional)

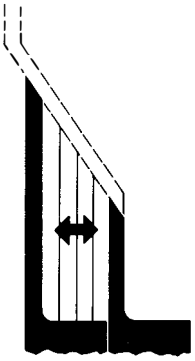
The short-time pickup adjustment controls the level of high current the breaker can carry for short periods of time without tripping. Permits downstream breakers to clear short-circuit faults without tripping out the up-stream protective device. Available as an option with the "N" suffix. (Fixed instantaneous supplied with "N" suffix.)



Adjustable Instantaneous Pickup (Standard)

The instantaneous trip point determines the level at which the breaker will trip without the intentional time delay (0.025 seconds or less). This immediate interruption occurs only as a result of a severe overcurrent condition, thereby minimizing damage to the electrical system and equipment. Add suffix "N" for fixed instantaneous. No suffix added for adjustable instantaneous.





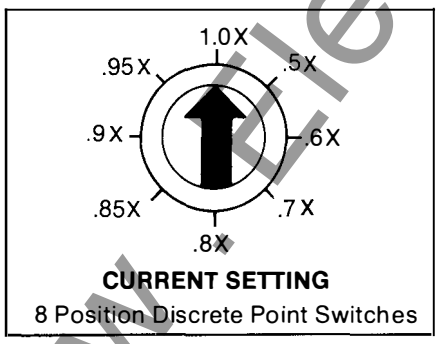
A fixed instantaneous set at 15X is provided when the "N" short time programmer is supplied.

Adjustable Ground Fault Pickup and Delay (Optional)

See page 19 for ground fault characteristics.

Micro-VersaTrip® 9 Programmer

9 Function Micro-VersaTrip® Circuit Breaker



CURRENT SETTING
8 Position Discrete Point Switches

Wide Range of Ampere Adjustment is provided in three levels:

1. The programmer current setting is supplied with a 50-100 percent adjustment range—standard.
2. The programmer long-time pickup setting provides an 80-110 percent pickup adjustment range—optional.
3. Fixed ratio current sensors, offering set current ratings, are available up to the maximum frame rating of the breaker—standard.

Micro-VersaTrip® 9 Programmer Characteristics

Table 14.1—Micro-VersaTrip®9 Programmer Selection

Programmer Functions		STD	Alternate Programmers			Optional Functions									
			Add to Standard or Alternate Programmer (Suffix)												
		No Suffix	S	D	N	L	T	G	GR	A1	A2	A3	A	Z1	Z2	Z
Long Time	• Adjustable Current Setting	X	X	X	X											
	• Adj Long-Time Pickup					X										
	• Adj Long-Time Delay	X	X	X	X											
	• Long-Time Timing Light	X	X	X	X											
	• Remote Long-Time Timing Light						X									
Short Time	• Adj Short-Time Pickup		X	X	X											
	• Adj Short-Time Delay		X	X												
	• Short-Time Delay I^2t ramp				X											
	• Short-Time I^2t Switch [1]					X										
Instanta-neous	• Adj Instantaneous Pickup	X	X													
	• Fixed Instantaneous			X	X											
Ground Fault	• Adj Ground Fault Pickup [2] —Zero Sequence —Ground Return							X	X							
	• Adj Ground Fault Delay							X	X							
Other Functions	• Trip Indication Targets —Overload & Short Circuit —local only —local and remote —O/L, S/C and Ground Fault [3] —local only —local and remote									X	X	X	X			
	• Zone Selective Interlock [4] —Ground Fault [3] —Short Time [1]													X	X X	X X

[1] Adjustable Short-Time Delay is required.
[2] For 1PH, 2W—1PH, 3W—3PH, 3W—3PH, 4W systems. Order neutral transformer by catalog number when neutral is present.
[3] Ground Fault Required.
[4] TIM1—interlock modul required—one per system. Ground Fault and Short-Time require separate modules. To be ordered separately.

Table 14.2—Micro-VersaTrip® 9 Trip Characteristics

Frame Size	Maximum Rating (Amps)	(X) Fixed Sensors Sensor Current Rating (Amps)	Current Setting (Multiple of Sensor Current Rating) (X)	Long-time Pickup (Multiple of Current Setting) (C)	Long-time Delay [1] (Seconds)	Short-time Pickup (Multiple of Current Setting) (C)	Short-time Delay [2] (Seconds)	Adjustable Instantaneous Pickup (Multiple of Sensor Current Rating) (X)	Short-time I^2t [1] (Seconds)	Ground Fault Pickup (Multiple of Sensor Current Rating) (X)	Ground Fault Delay [2] (Seconds)
J600	600	150, 200 300, 400 500, 600	.5, .6, .7, .8, .85, .9, .95, 1.0 (X)	.8, .9, 1.0, 1.1 (C)	2.5, 5, 10, 21	1.5, 2, 2.5, 3, 4, 5, 7, 9 (C)	0.10, 0.22, 0.36	1.5, 2, 2.5, 3, 4, 6, 8 10 (X)	0.4	.2, .25, .3, .35, .4, .45, .5, .6 (X)	0.10, 0.22, 0.36
K1200	1200	400, 600 800, 1000 1200	"	"	"	"	"	"	"	"	"

[1] Time delay shown at .600% of ampere setting at lower limit of each band.
[2] Time delay shown at lower limit of each band.
All pickup tolerances are ± 10%.
Ground Fault pickup not to exceed 1200 amperes.

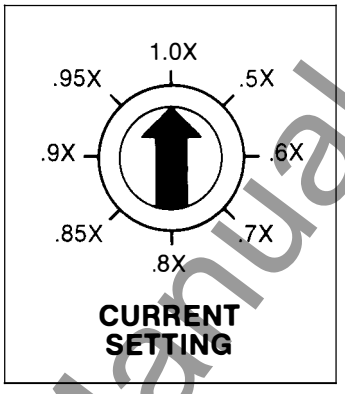
X = Sensor Current Rating.
C = Current Setting.

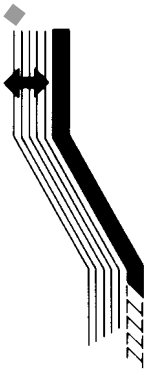
Micro-VersaTrip® 9 Programmer Functions

Overload and Short Circuit

Current Setting (Standard)

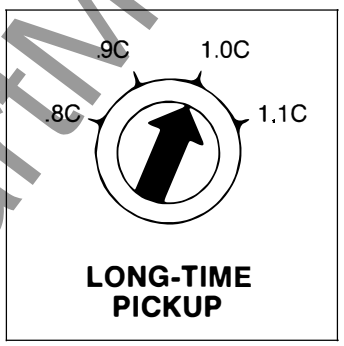
The adjustable current setting varies the level of current the breaker will carry indefinitely without tripping (when long time pickup is set at 1.1C). Adjustable in 8 steps from 50-100% of sensor current rating, changing this setting has the same effect as changing the trip unit in an interchangeable trip circuit breaker.





Long-Time Pickup (Optional)

The long-time pickup adjustment provides fine tuning capability of the breaker current setting. This pickup level is adjustable in four steps from 80-110% of the current setting. Changing this setting does not affect any other portion of the time-current curve. Long-time pickup is provided on "L" suffix programmers when ordered with "S" or "D" functions.



Long-Time Delay (Standard)

The long-time delay adjustment varies the time it will take the breaker to trip under sustained over-load conditions. It provides the function of withstanding momentary overloads such as motor starting, welding, or other overcurrent conditions without interrupting the service.

Long-Time Pickup Light (Standard)

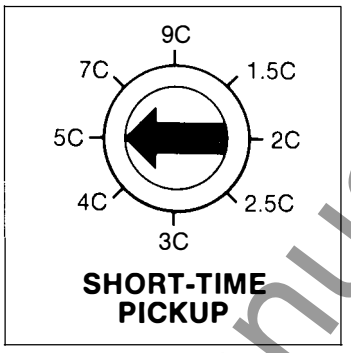
The long-time pickup light provides visual indication that the breaker is experiencing an overload condition. Indication is provided by a light-emitting diode (LED) which is only activated prior to trip-out and during long-time time-out. Saves test and system start up time. Available in local only, (standard), or local and remote (optional) with "T" suffix.

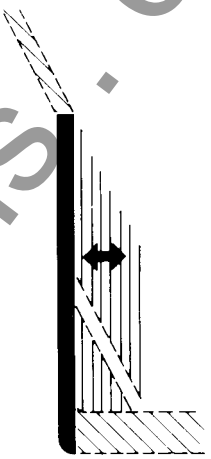
Micro-VersaTrip® 9 Programmer Functions

Short-Time Pickup (Optional)

The short-time pickup adjustment controls the level of high current the breaker can carry for short periods of time without tripping. Permits downstream breakers to clear short-circuit faults without tripping out the up-stream protective device.

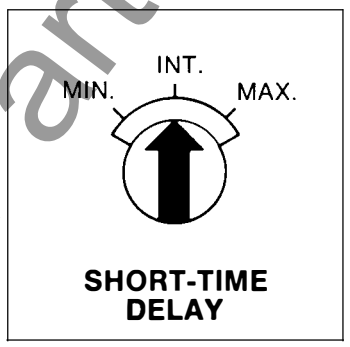
Available with the "S" (adjustable short-time plus adjustable instantaneous), "D" (adjustable short-time plus fixed instantaneous) or "N" adjustable short-time plus I^2t delay ramp) suffix letters.

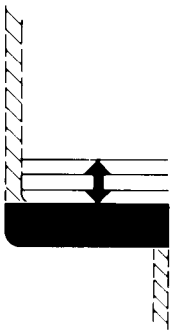




Short-Time Delay (Optional)

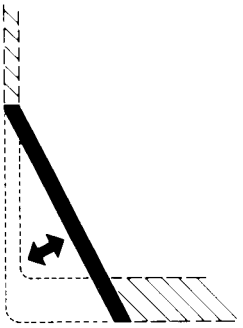
The short-time delay adjustment is used in conjunction with the short-time pickup setting to provide a further refinement of coordination between circuit breakers. It establishes the time interval the breaker will wait before responding to the short-circuit current level selected on the short-time trip point adjustment. Provided with the "S" or "D" suffix letters.





Short-Time I^2t Switch (Optional)

The short-time I^2t switch provides the ability of introducing an I^2t ramp function in the short-time characteristic. This provides maximum coordination with downstream devices such as thermal-magnetic breakers and fuses whose time-current curves do not easily relate to the square shape sensing characteristics common to solid state trip devices. The I^2t curve is designed to withstand a 12X current level for 0.1 second, the magnetizing current level for transformers and motors. Provided when the "L" suffix is ordered in addition to the "S" or "D" suffix letters.



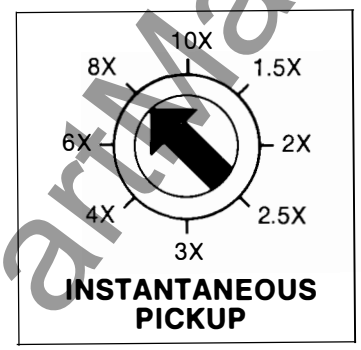
Micro-VersaTrip® 9 Programmer Functions

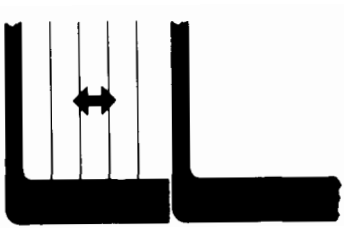
Fixed Short-Time I^2t Ramp (Optional)
The fixed short-time I^2t ramp in conjunction with adjustable short-time pickup and fixed instantaneous pickup provides the minimum complexity short-time unit which can be used for improved selectivity and device protection over long time-

instantaneous units. Optional with the "N" suffix.

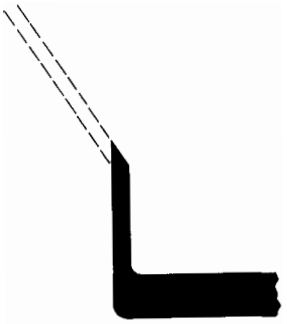
Adjustable Instantaneous Pickup (Standard)
The instantaneous trip point determines the level at which the breaker will trip without intentional time delay (0.025 seconds or less). This immediate interruption occurs only as a result of a severe overcurrent condition, thereby

minimizing damage to the electrical system and equipment.





Fixed Instantaneous Pickup (Optional)
The fixed instantaneous pickup is provided on programmers equipped with type "D" or "N" short-time units and is factory set at 15 times the current sensor rating (X).



Micro-VersaTrip® 9 Programmer Functions

Zone Selective Interlock and Fault Trip Indicator

Fault Trip Indicators

Designed to reduce system downtime by analyzing any overcurrent fault and identifying its cause. Mechanical pop-out type indicators are available on the programmer as type "A1" for identifying overload or short circuit overcurrent faults when breakers are ordered without integral ground fault protection. Type "A3" indicators are available to identify overload, short circuit and ground fault trips—for breakers supplied with integral ground fault protection.

Remote fault indication is available in the form of a mechanical contact which may be incorporated directly into the customer's control circuitry. One N.O. contact is supplied per indicator. Each contact is rated 0.25 amp. at 125V dc, or 1.0 amp. at 120V ac. Both local and remote indicators are provided with suffix types "A2" (overload and short circuit) and "A" (overload, short circuit and ground fault).

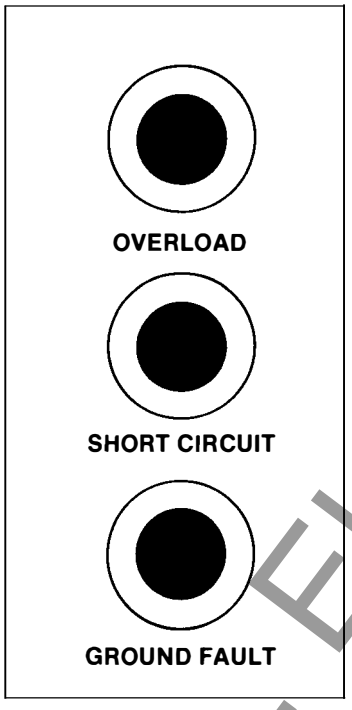
Zone Selective Interlocking

The standard means of obtaining selectivity between main and feeder breakers is by incorporating programmers with time-coordinated trip characteristics. This consists of setting the farthest downstream breaker with a small time delay, and progressively increasing the time delay as you get closer to the main protective device. The disadvantage in this method is that the system must now endure the stress of the high current fault until timeout occurs.

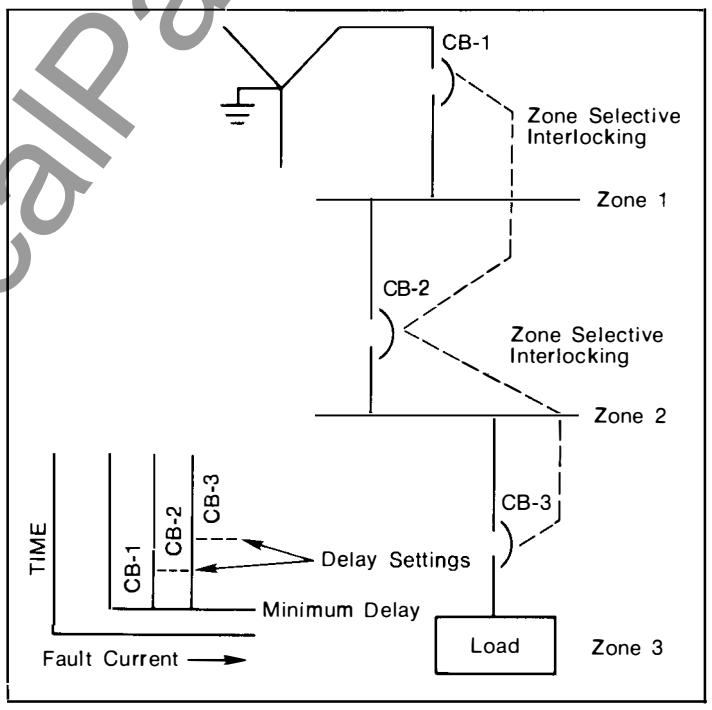
In the Zone Selective Interlock system, the breaker which senses the fault proceeds to trip immediately. It also sends a signal to all "upstream" breakers to block them from tripping. The "upstream" breakers respond to the fault by timed tripping on their set band. Timed tripping provides backup protection for the downtown devices.

Zone Selective Interlocking is available for the short-time function (Z2), the ground fault function (Z1) or both (Z).

Fault Trip Indicators



Zone Selective Interlocking



Micro-VersaTrip® 4 and Micro-VersaTrip® 9 Programmer Functions

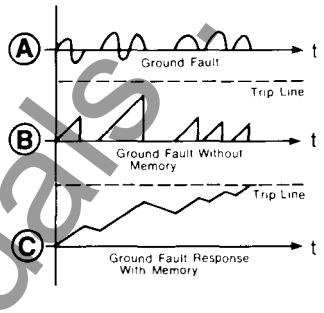
Ground Fault Function

Because of the highly intermittent and erratic nature of arcing ground faults, a memory circuit has been incorporated in all Micro-VersaTrip ground fault sensing circuits as standard. The memory circuit integrates arcing fault current with time, essentially summing the intermittent ground current spikes. In the diagrams to the right, it can be seen how the memory function works.

Diagram A shows a typical ground fault with half-cycles, whole cycles and multiple cycles missing, as normally occurs.

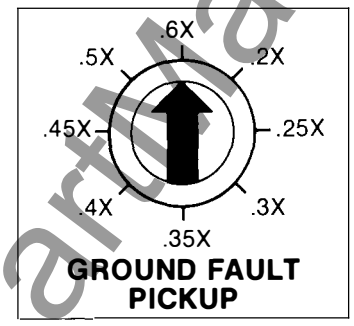
Diagram B shows trip response of a typical ground fault function which does not include memory. The breaker never trips because the time delay circuits are reset with every missing cycle.

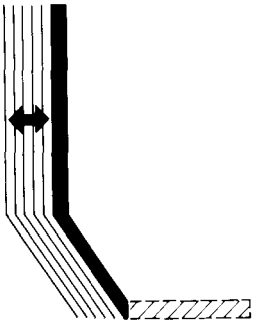
Diagram C shows response of Micro-VersaTrip ground fault circuits to the same ground fault; the circuit's memory carries through the missing cycles and generates a trip signal after the preset time delay.



Ground Fault Pickup (Optional)

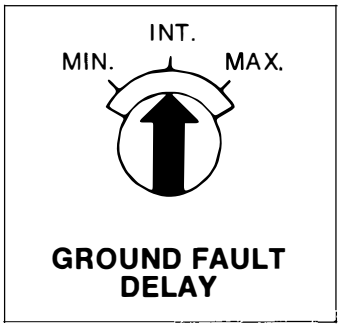
The ground fault pickup adjustment controls the level of ground fault current at which circuit interruption will occur. To comply with the 1981 National Electrical Code (NEC 230-95), no trip point exceeds 1200 amperes. The common square knee of the curve has been replace with an I^2t function to facilitate coordination with downstream devices such as thermal-magnetic breakers and fuses whose time-current curves do not easily relate to the square-shape sensing characteristics common to solid state trip devices, provided with optional "G" or "GR" suffix.

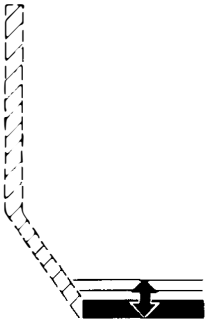




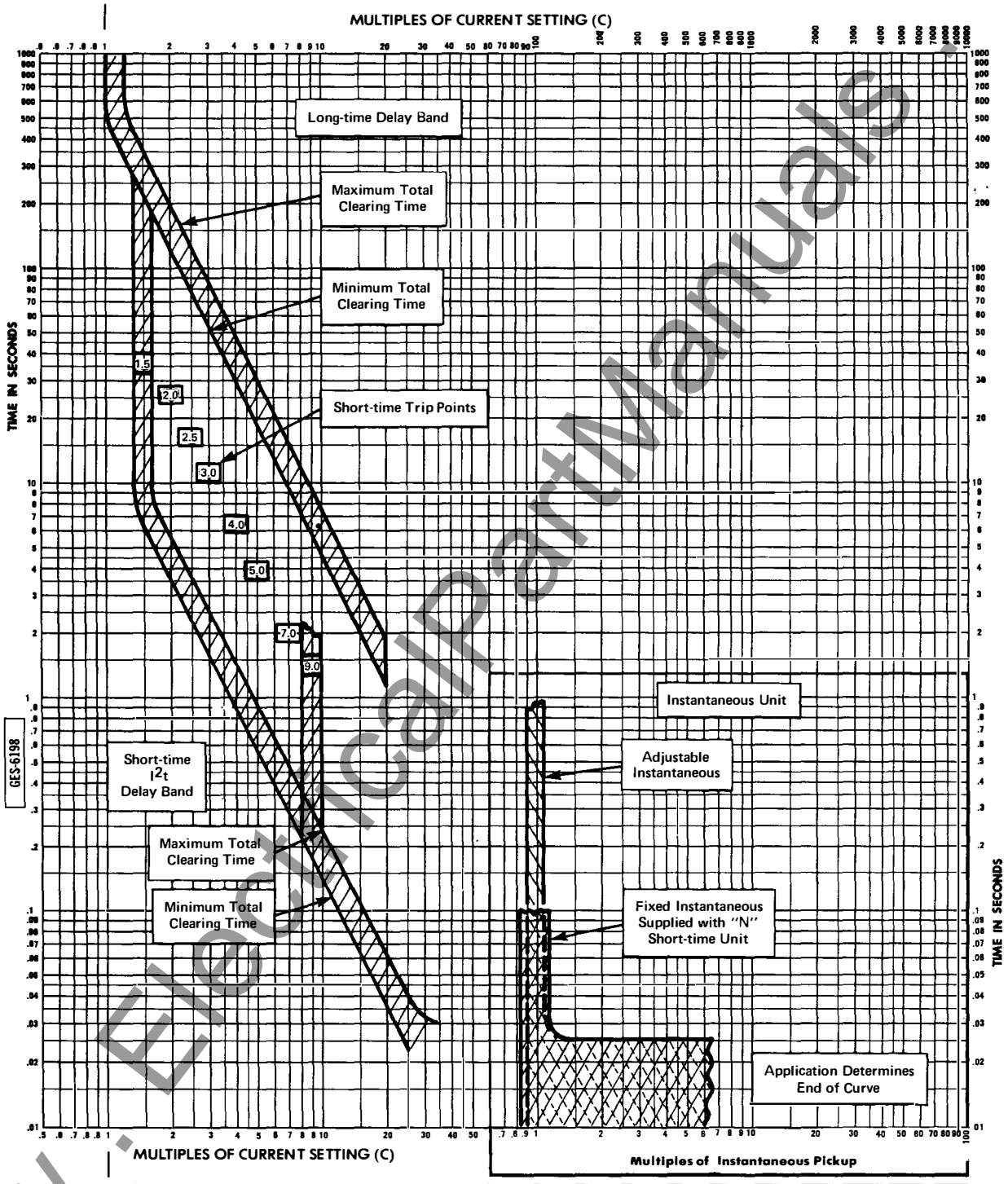
Ground Fault Delay

The ground fault delay adjustment is used to add a pre-determined delay in time to the trip point once the ground fault pickup level has been reached. This provides tripping selectivity between main and feeder or other downstream breakers. The ground fault unit also includes as standard an inverse I^2t ramp to substantially improve coordination with downstream protective devices such as fuses and thermal magnetic circuit breakers. Provided with optional "G" or "GR" suffix.





Micro-VersaTrip®
Time Current Curves



GENERAL ELECTRIC

INSULATED CASE AND MOLDED CASE CIRCUIT BREAKERS with Micro-VersaTrip®

Long-time-delay and Instantaneous or Long-time-delay, Short-time-delay and Instantaneous Time-current Curves

GES-6198

X = Current Sensor Rating

Current Sensor Rating (Amperes)
400A frame: 400, 300, 200, 150
600A frame: 600, 500, 400, 300
800A frame: 800, 600, 500, 400
1200A frame: 1200, 1000, 800, 600
Voltage Rating—600 volts ac maximum

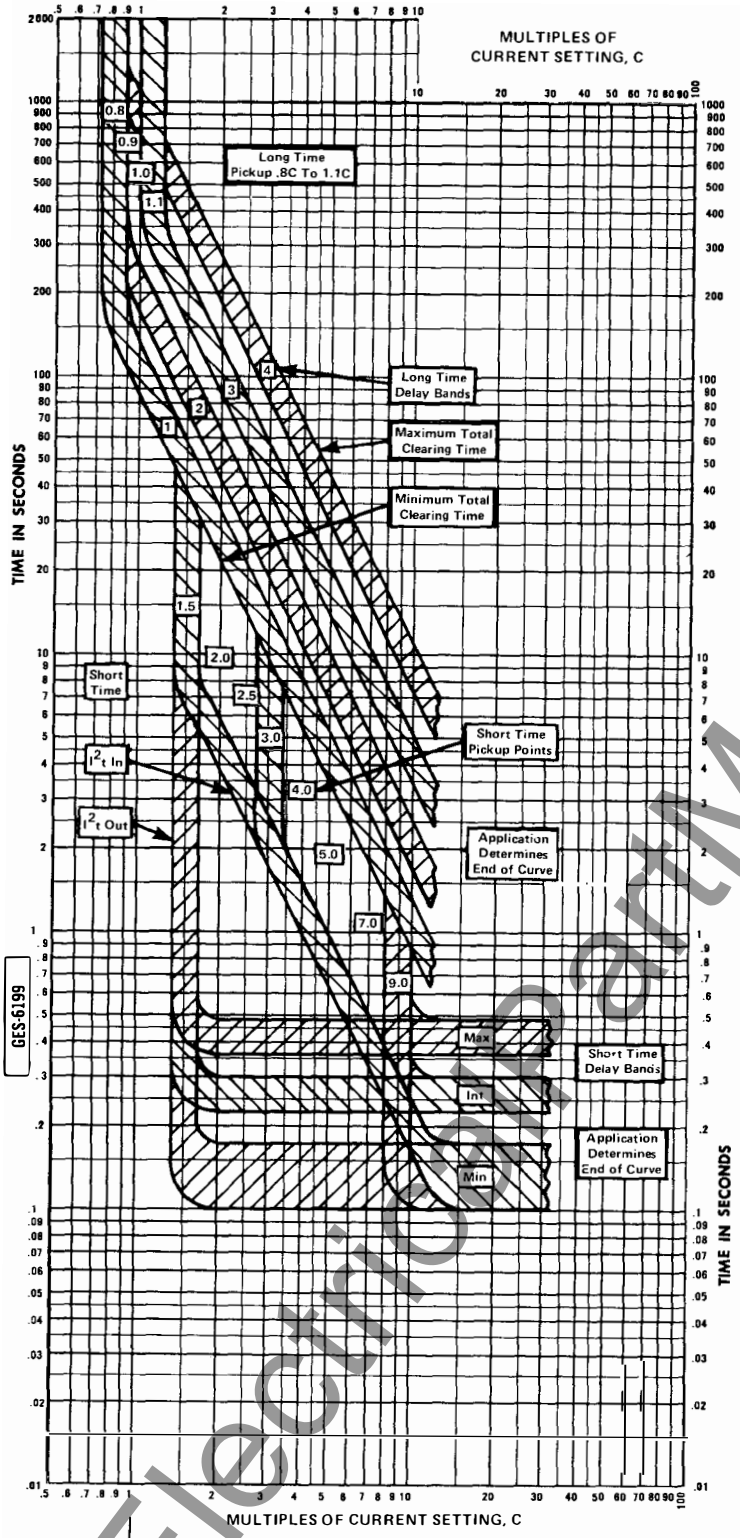
Fixed Current Sensor Ratings (Amperes) ICCB and MCCB
150, 200, 300, 400, 500, 600, 800, 1000
1200, 1600, 2000, 2500, 3000, 4000

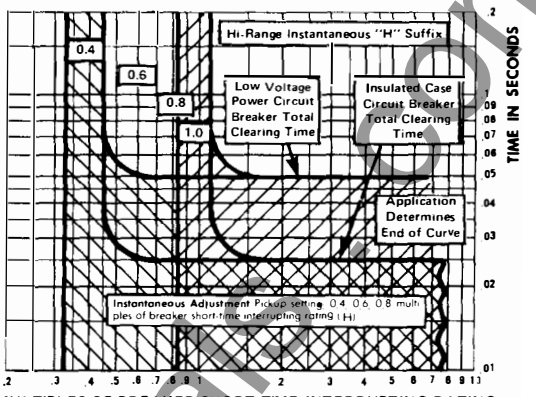
Current Sensor Taps (Amperes) ICCB
800 Envelope 400/200, 600/300, 800/400
1600 Envelope 800/400, 1000/500, 1200/600, 1600/1000
2000 Envelope 2000/1200
2500 Envelope 600/300, 800/400, 1000/500, 1200/600, 1600/1000, 2000/1200/2500/1800
3000 Envelope 3000/2400
4000 Envelope 4000/3000

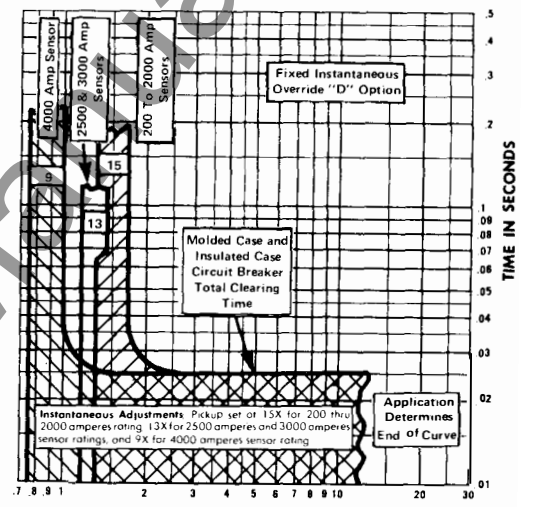
Adjustments

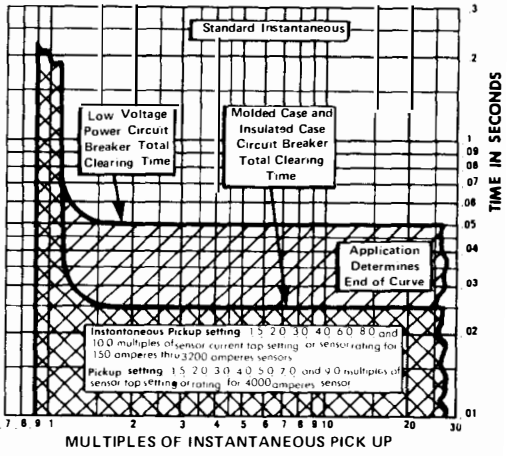
Long-time Delay Unit Current Settings (C): 0.50, 0.60, 0.70, 0.80, 0.85, 0.90, 0.95 and 1.00 multiples of the current sensor rating (X).
Pickup: Fixed at 1.1 multiples of the Current Setting.
Short-time Delay Unit Pickup setting: 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0 and 9.0 multiples of the Current Setting.
Delay Bands: One nonadjustable, inverse I^2t = Constant.
Instantaneous Unit Pickup Setting: Fixed at 15 multiples of the current sensor rating when short-time unit is included. Adjustable to 1.5, 20, 25, 3.0, 4.0, 6.0, 8.0, 10.0 multiples of current sensor rating (X) without short time.

(Curves apply at 50/60 Hertz and from −20C to +55C breaker ambient)









GENERAL ELECTRIC

LOW-VOLTAGE POWER CIRCUIT BREAKERS
TYPE AKR
INSULATED-CASE CIRCUIT BREAKERS
TYPE TPV, THV
MOLDED-CASE CIRCUIT BREAKERS
TYPES TJ9V, THJ9V, TK9V, THK9V
with Micro-VersaTrip®

Long-time-delay, Short-time delay, and Instantaneous Time-current Curves

(Curves apply at 50/60 Hertz and from
−20C to +55C breaker ambient
or −20C to +70C programmer ambient)

GES-6199

X = Current Sensor Tap Setting or Rating

Current Sensor Taps (Amperes) LVPCB

AKR-10	100/150/225/300 or 300/400/600/800
AKR-30	300/400/600/800 or 600/800/1200/1600
AKR-50	800/1200/1600/2000
AKRT-50	800/1200/1600/2000
AKR-75	1200/1600/2000/3200
AKR-100	1600/2000/3000/4000

Current Sensor Taps (Amperes) ICCB

800 Envelope	400/200&100/300/800/400
1600 Envelope	800/400/1000/500 1200/600/1600/1000
2000 Envelope	2000/1200
2500 Envelope	600/800/400/1000/500 1200/600/1600/1000 2000/1200/2500/1600

Fixed Current Sensor Ratings (Amperes) LVPCB

AKR-30	100/150/225/300/400/600/800
AKR-50	300/400/600/800/1200/1600
AKRT-50	800/1200/1600/2000
AKR-75	1200/1600/2000/1200
AKR-100	1600/2000/3000/4000

Fixed Current Sensor Ratings (Amperes) ICCB and MCCB

3000 Envelope	3000/2400
4000 Envelope	4000/3000

150/200/300/400/500/600/800/1000
1200/1600/2000/2500/3000/4000

Voltage Rating 600 Volts ac, 50/60 Hertz

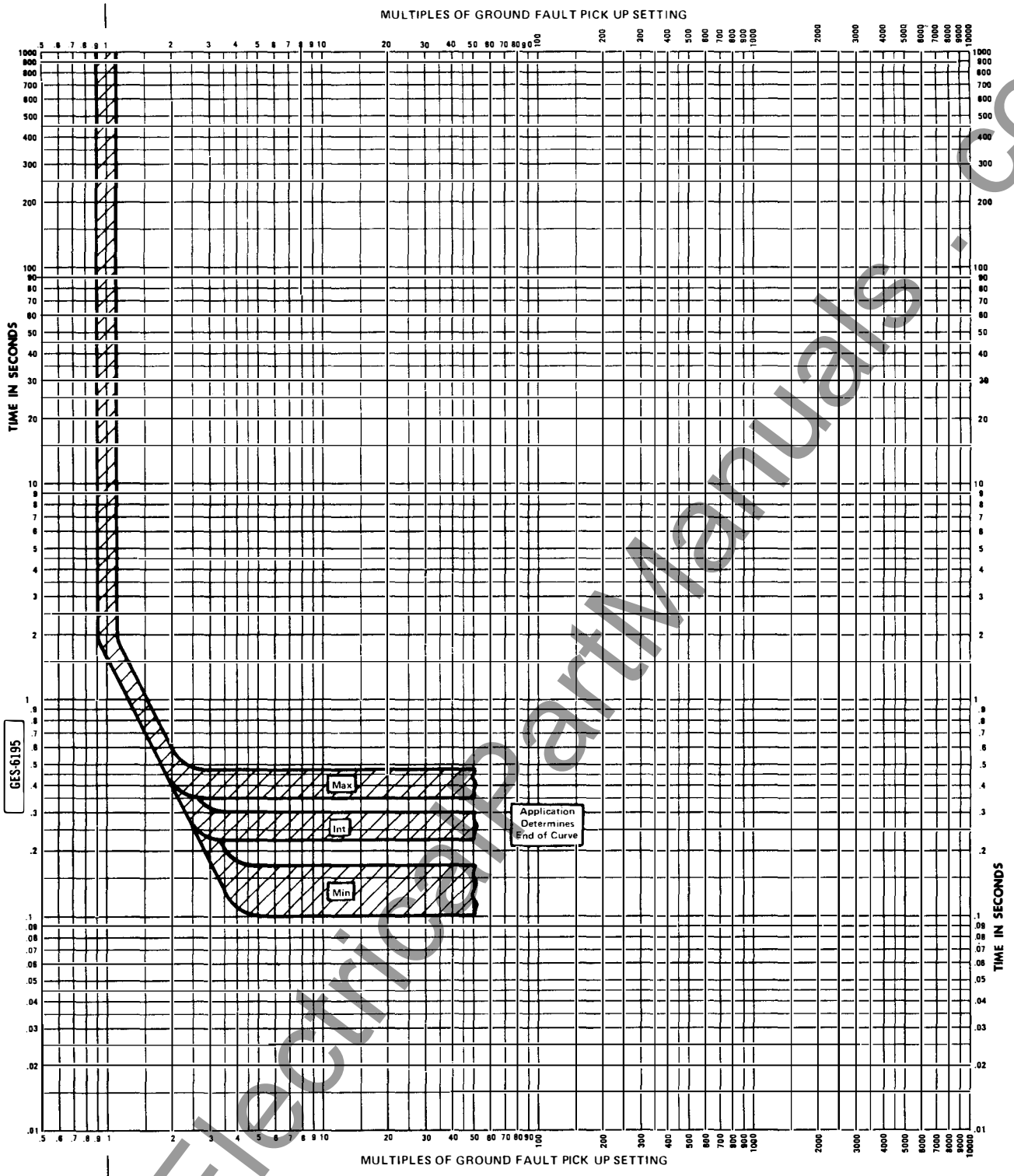
Programmer Adjustments

Long Time Delay Unit Current Settings (C): 0.50, 0.60, 0.70, 0.80, 0.85, 0.90 and 1.00 multiples of current sensor tap setting or rating (X). Pickup: 0.8, 0.9, 1.0, 1.1 multiples of the Current Setting (C). Delay Bands: 1, 2, 3 and 4.

Short Time Delay Unit Pickup Settings: 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 7.0, and 9.0 multiples of current setting (C).

Delay Bands: MIN, INT, MAX; I²t Constant

Instantaneous Adjustments: See Curves above



GENERAL ELECTRIC

LOW-VOLTAGE POWER CIRCUIT BREAKERS INSULATED-CASE AND MOLDED-CASE CIRCUIT BREAKER with Micro-VersaTrip ᴿ

Ground Fault Time-current Curves

GES-6195

X = Current Sensor Tap Setting or Rating

Current Sensor Taps (Amperes) LVPCB

AKR 30 100/150/225/100 or 300/400/600/800
AKR 50 300,400/600/800 or 600/800/1200/1600
AKRT 50 800/1200/1600/2000
AKR 75 1200/1600/2000/3200
AKR 100 1600/2000/3000/4000

Fixed Current Sensor Ratings (Amperes) LVPCB

AKR 30 100,150,225,300,400,600,800
AKR 50 300,400,600,800,1200,1600
AKRT 50 800,1200,1600,2000
AKR 75 1200,1600,2000,3200
AKR 100 1600,2000,3000,4000

Voltage Rating: 600 Volts, ac 50/60 Hertz

Current Sensor Taps (Amperes) ICCB

800 Envelope 400/200,600,(800,800/400
1600 Envelope 800/400, 1000/500, 1200/600,1600/1000
2000 Envelope 2000/1200
2500 Envelope 600,800/400,1000/500, 1200/600,1600/1000, 2000/1200,2500/1800
3000 Envelope 3000/2400
4000 Envelope 4000/3000

Fixed Current Sensor Ratings (Amperes) ICCB and MCCB

150,200,300,400,500,600,800,1000, 1200,1600,2000,2500,3000,4000

Ground Fault Unit

Pickup Settings: 0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 05, 0.6 multiples of the current sensor tap setting or rating (X) for sensors of 150 to 2000 amperes

Pickup Settings: 0.2, 0.22, 0.24, 0.26, 0.28, 0.30, 0.34, 0.37 multiples of the current sensor tap setting or rating (X) for sensors of up to 3200 amperes

Pickup Settings: 0.2, 0.22, 0.24, 0.26, 0.28, 0.30 multiples of the current sensor tap setting or rating (X) for sensors of up to 4000 amperes

Delay Bands: 3 settings of MIN, INT, MAX for all ratings

(Curves apply at 50/60 Hertz and from − 20C to + 55C breaker ambient)

Micro-VersaTrip® 4 & 9 Interrupting Capacities

Table 23.1—Micro-VersaTrip® Circuit Breakers

AC Volts	Breaker Frame Designation	Symmetrical Interrupting Capacity	Available Current— Sensor Ratings
240	TJ THJ	42,000 65,000	150, 200, 300, 400, 500, 600
	TK THK	42,000 65,000	400, 600, 800, 1000, 1200
480	TJ THJ	30,000 35,000	150, 200, 300, 400, 500, 600
	TK THK	30,000 50,000	400, 600, 800, 1000, 1200
600	TJ THJ	22,000 25,000	150, 200, 300, 400, 500, 600
	TK THK	22,000 25,000	400, 600, 800, 1000, 1200

Micro-VersaTrip® 4 & 9 Selection and Ordering

How to Order:

Select basic breaker from breaker catalog number tables 25.1, 25.2 and 25.3 and this will be supplied as a factory assembled unit.

If standard programmer functions are required no change to the catalog number is needed. If optional functions are required add appropriate trip characteristic suffix from programmer tables 26.1 and 26.2.

Add suffix "WL" for CU AL line and load lugs when required. Basic breaker supplied less lugs. See table 27.2 for available lugs from lug suffix table. Combinations of line and load lugs are indicated.

When a neutral current transformer for 3Ph 4W or 1Ph 3W ground fault is required, select by separate catalog number from Table 27.1.

Select accessories by individual catalog number from their respective product tables.

Complete order should read as:
THJ9V2606NGWL, TSRG206 and TVST12RS

Example:

THJ9V2606

NG

WL

TSRG 206

TVST12RS

Catalog Number Construction

TH J 9 V 2 6 06 NG WL

Current interrupting capability
T = standard break
TH = high break

Frame Type
J or K

Programmer type
4 = Micro-VersaTrip 4 function
9 = Micro-VersaTrip 9 function

Frame Rating
VV = 100% equipment rating
V = Standard Rated

Ampere Rating of Frame
1 = 400A
2 = 600A
3 = 800A
4 = 1200A

Breaker Voltage Rating
6 = 600V ac

Terminals
(Blank) = Less Lugs
WL = cu/Al line and load lugs

Programmer Functions

4 function Micro-VersaTrip
Blank (STD)
N
G or GR

9 function Micro-VersaTrip
Blank (STD)
S or D or N
L
T
G or GR
A1 or A2 or A3 or A
Z1 or Z2 or Z

Continuous Current Rating Sensor Amperes

01 = 150A	05 = 500A
02 = 200A	06 = 600A
03 = 300A	08 = 800A
04 = 400A	10 = 1000A
	12 = 1200A

Micro-VersaTrip® 4 & 9 Selection and Ordering

150-1200 Amperes,
600 Volts ac, 3-Pole, 50/60 Hz

Table 25.1—4 Function Micro-VersaTrip®—
UL Listed. Supplied Less Lugs.
For Lugs Add Suffix WL.

Frame Size	Sensor Rating	Breaker Cat. No. (1)	
		Std. Break	Hi-Break
J400	150	TJ4V1601	THJ4V1601
	200	TJ4V1602	THJ4V1602
	300	TJ4V1603	THJ4V1603
	400	TJ4V1604	THJ4V1604
J600	150	TJ4V2601	THJ4V2601
	200	TJ4V2602	THJ4V2602
	300	TJ4V2603	THJ4V2603
	400	TJ4V2604	THJ4V2604
	500	TJ4V2605	THJ4V2605
	600	TJ4V2606	THJ4V2606
K800	400	TK4V3604	THK4V3604
	600	TK4V3606	THK4V3606
	800	TK4V3608	THK4V3608
K1200	400	TK4V4604	THK4V4604
	600	TK4V4606	THK4V4606
	800	TK4V4608	THK4V4608
	1000	TK4V4610	THK4V4610
	1200	TK4V4612	THK4V4612

Table 25.2—9 Function Micro-VersaTrip®—
UL Listed. Supplied Less Lugs.
For Lugs Add Suffix WL.

Frame Size	Sensor Rating	Breaker Cat. No. (1)
J600	150	THJ9V2601
	200	THJ9V2602
	300	THJ9V2603
	400	THJ9V2604
	500	THJ9V2605
	600	THJ9V2606
K1200	400	THK9V4604
	600	THK9V4606
	800	THK9V4608
	1000	THK9V4610
	1200	THK9V4612

Table 25.3—9 Function Micro-VersaTrip®—
100% Equipment Rated
UL Listed.

Frame Size	Sensor Rating	Breaker Cat. No. (1) (2)
J600	150	THJ9VV2601
	200	THJ9VV2602
	300	THJ9VV2603
	400	THJ9VV2604
	500	THJ9VV2605
	600	THJ9VV2606
K1200	400	THK9VV4604
	600	THK9VV4606
	800	THK9VV4608
	1000	THK9VV4610
	1200	THK9VV4612

(1) Add trip characteristic suffix letter(s) for optional programmer functions.
(2) Supplied with back connected assembly.

	9 Function Breaker	4 Function Breaker
Standard Features	• Adjustable Current Setting • Long-Time Timing Light • Adjustable Instantaneous Pickup • Adjustable Long-Time Delay	• Adjustable Current Setting • Long-Time Timing Light • Adjustable Instantaneous Pickup
Optional Features	• Adjustable Ground Fault Pickup and Delay • Short-Time —Adjustable Short-Time Pickup with Short-Time Delay I^2t Ramp and Fixed Instantaneous —Adjustable Short-Time Pickup and Delay —Adjustable Short-Time Pickup and Delay with Fixed Instantaneous • Adjustable Long-Time Pickup and Short Time I^2t Switch	• Adjustable Ground Fault Pickup and Delay • Short Time —Adjustable Short-Time Pickup with Short-Time Delay I^2t Ramp and Fixed Instantaneous
Additional Programmer Options	• Zone Selective Interlocking on Short-Time and Ground Fault • Local and Remote Fault Indication Targets on Overload, Short Circuit and Ground Fault • Remote Long-Time Timing Light	

Micro-VersaTrip® 4 & 9 Selection and Ordering

Table 26.1—4 Function Micro-VersaTrip® Characteristics (From Table 25.1)

		Standard Programmer	Optional Programmers				
			N	G	GR	NG	NGR
Long Time	• Adjustable Current Setting (C)	X	X	X	X	X	X
	Fixed Long-Time Pickup (1.1C)	X	X	X	X	X	X
	Fixed Long-Time Delay	X	X	X	X	X	X
	Long-Time Timing Light	X	X	X	X	X	X
Short Time	• Adj Short-Time Pickup		X			X	X
	Short-Time Delay I^2t ramp		X			X	X
Instanta-neous	• Adj Instantaneous Pickup	X		X	X		
	• Fixed Instantaneous Pickup		X			X	X
Ground Fault	• Adj Ground Fault Pickup [1] —Zero Sequence			X		X	
	—Ground Return				X		X
	• Adj Ground Fault Delay			X	X	X	X

[1] For 1PH, 2W—1PH, 3W—3PH, 3W—3PH, 4W systems. Order neutral transformer by catalog number when neutral is present.

Table 26.2—9 Function Micro-VersaTrip® Characteristics (From Tables 25.2 and 25.3)

Programmer Functions		STD	Alternate Programmers			Optional Functions Add to Standard or Alternate Programmer (Suffix)										
		No Suffix	S	D	N	L	T	G	GR	A1	A2	A3	A	Z1	Z2	Z
Long Time	• Adjustable Current Setting	X	X	X	X											
	• Adj Long-Time Pickup					X										
	• Adj Long-Time Delay	X	X	X	X											
	• Long-Time Timing Light	X	X	X	X											
	• Remote Long-Time Timing Light						X									
Short Time	• Adj Short-Time Pickup		X	X	X											
	• Adj Short-Time Delay		X	X												
	• Short-Time Delay I^2t ramp				X											
	• Short-Time I^2t Switch [1]					X										
Instanta-neous	• Adj Instantaneous Pickup	X	X													
	• Fixed Instantaneous			X	X											
Ground Fault	• Adj Ground Fault Pickup [2] —Zero Sequence —Ground Return							X	X							
	• Adj Ground Fault Delay							X	X							
Other Functions	• Trip Indication Targets —Overload & Short Circuit —local only —local and remote —O/L, S/C and Ground Fault [3] —local only —local and remote									X	X	X	X			
	• Zone Selective Interlock [4] —Ground Fault [3] —Short Time [1]													X	X	X X

[1] Adjustable Short-Time Delay is required.
[2] For 1PH, 2W—1PH, 3W—3PH, 3W—3PH, 4W systems. Order neutral transformer by catalog number when neutral is present.
[3] Ground Fault Required.
[4] TIM1—interlock modul required—one per system. Ground Fault and Short-Time require separate modules. Order separately.

Micro-VersaTrip® 4 & 9 Selection and Ordering

Neutral Current Transformers for 3-Phase, 4-Wire Ground Fault Systems

Table 27.1— 4 & 9 Function Micro-VersaTrip®

Breaker Type	Amperes	Cat. No.
J	150	TSRG 201
	200	TSRG 202
	300	TSRG 203
	400	TSRG 204
	500	TSRG 205
	600	TSRG 206
K	400	TSKG 404
	600	TSKG 406
	800	TSKG 408
	1000	TSKG 410
	1200	TSKG 412

Table 27.2—Lug Catalog Numbers

Breaker Type	Sensor Ampere Rating	Standard Lugs cu/AL	Optional Lugs cu only	Lug Covers
J 4 and 9 Function	150 200 300 400	TCAL43	TC043	—
	500 600	TCAL63	TC063	—
K 9 Function Only	400 600 800	TCAL81	TC081A	286A8066G-3
	1000 1200	TCAL121	TC0121	286A8066G-1
K 4 Function Only	400 600 800	TCAL81-Line TCAL91-Load	TC081A-Line TC091-Load	286A8066G-3
	1000 1200	TCAL121-Line TCAL131-Load	TC0121-Line TC0131-Load	286A8066G-1

Lug covers supplied on all K Frame Breakers when ordered with lugs. End cover (286A8066G-2) supplied on K Frame Breakers when ordered less lugs.

Micro-VersaTrip® 4 & 9 Accessories

Internally Mounted Signaling and Control

Table 27.3—Available Accessories—UL Listed When Factory Installed for Use in All J and K Frame Micro-VersaTrip® Breakers.

Accessory Installation	Pole Mounting			Lead Exit		Total Number of Accessories Within Any One Circuit Breaker
	Left	Center	Right	Side (1)	Back (2)	
Auxiliary Switches	—	—	✓	✓	✓	Any One Plus Bell Alarm
Shunt Trip	—	—	✓	✓	✓	
Blown Fuse Trip	—	—	✓	✓	✓	
Bell Alarm Switch	—	✓	—	✓	✓	
Undervoltage Release	—	—	✓	✓	✓	
Combination Shunt Trip with Aux. Sw.	—	—	✓	✓	✓	
Combination Under Voltage with Aux. Sw.	—	—	✓	✓	✓	

(1) Standard lead exit right side except bell alarm with lead exit left side.
(2) Optional specify B suffix after accessory catalog number. (Applies only to J Frame.)

Micro-VersaTrip® 4 & 9 Accessories

Internally Mounted Signaling and Control

Shunt Trip

A Shunt Trip Device can be used to trip and open a breaker by remote control. When the breaker opens, the shunt trip coil circuit is de-energized by means of an auxiliary switch. Meets U/L requirements for operation at 55% of rated voltage for use on ground fault systems.

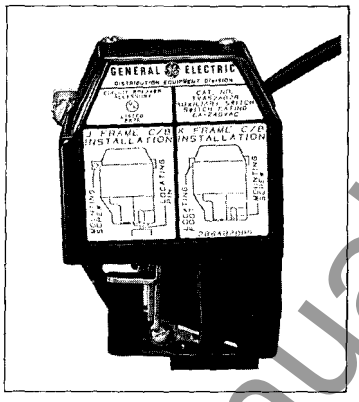


Table 28.1—Shunt Trip

Shunt Trip Cat. No.	Voltage		Instructions
	AC	DC	
TVST7RS		12V	GEH-4623
TVST8RS		24V	
TVST9RS		48V	
TVST11RS		250V	
TVST12RS	120V	125V	
	240V		
TVST13RS	480V		
	600V		

Undervoltage Release (UVR)

The Undervoltage Release instantaneously trips the breaker when voltage drops to 35-70% of normal rating. The device re-trips the breaker if it is closed before normal voltage is restored.

Time-delay Unit— For use with UVR

Prevents nuisance tripping due to momentary loss of voltage.

Separate externally mounted unit has 120 volt ac input and 125 volt dc output with delay adjustable from .1 to .5 seconds. Used in conjunction with 125 volt dc undervoltage release, which must be ordered separately. Unit mounts external to the breaker. Cat. No. TD110A530. For time delay of .1 to 1.0 sec order Cat. No. TD1000.

Table 28.2—Undervoltage Release

Undervoltage Cat. No.	Voltage		Instructions
	AC	DC	
TVUV1RS	120V		GEH- 4623
TVUV2RS	240V		
TVUV3RS	380V		
TVUV4RS	480V		
TVUV6RS	600V		
TVUV7RS		12V	
TVUV8RS		24V	
TVUV9RS		48V	
TVUV10RS		125V	
TVUV11RS		250V	

Auxiliary Switch

These switches operate ON-OFF indicating lights, relay and control circuits as a function of breaker ON-OFF position. Switch is SPDT rated six amperes at rated volts ac; ½ ampere at 125 volts dc; ¼ ampere at 250 volts dc.

Table 28.3—Auxiliary Switch

Auxiliary Switch Cat. No.	No. of Single-Pole, Double Throw Switch Elements	Switch Rating	Instructions
TVAS2AB2RS	2	6A—250V ac 1/2A—125V dc 1/4A—250V dc	GEH-4623
TVAS2AB4RS	4		
TVAS6AB2RS (1)	2	6A—600V ac 1/2A—125V dc 1/4A—250V dc	
TVAS6AB4RS (1)	4		

(1) Not UL listed.

Micro-VersaTrip® 4 & 9 Accessories

Internally Mounted
Signaling and Control

Bell Alarm

These switches are used to indicate a breaker trip. Will not activate when breaker is manually operated.

Switch is SPDT, rated five amperes at 240 volts ac non-inductive, one ampere, 120 volts ac inductive, 2.5 amperes at 28 volts dc inductive.

Table 29.1—Bell Alarm

Bell Alarm Switch Cat. No.	Single Pole Double Throw Switch Rating	Instructions
TJVBALS TKVBALS	5A—250V ac 2.5A—28V dc	GEH-4626 GEH-4663

Blown Fuse Trip

Provides single-phase protection for fuse and circuit-breaker combinations, factory installation only. Suitable for system voltages of 208 to 600 volts ac.

Table 29.2—Blown Fuse Trip

Blown Fuse Trip Cat. No.	Voltage	Instructions
TVBFD316RS	208V ac to 600V ac	GEH-4624

Combination Accessory

Consists of an under voltage release and a two stage auxiliary switch.

Table 29.3—UVR/Auxiliary Switch

Combination Undervoltage/ 2-250V Aux. Sws.	Combination Undervoltage/ [1] 2-600V Aux. Sws.	Voltage		Instruction Sheet
		AC	DC	
TV2AB2UV1RS	TV6AB2UV1RS	120V		GEH-4623
TV2AB2UV2RS	TV6AB2UV2RS	240V		
TV2AB2UV3RS	TV6AB2UV3RS	380V		
TV2AB2UV4RS	TV6AB2UV4RS	480V		
TV2AB2UV6RS	TV6AB2UV6RS	600V		
TV2AB2UV7RS	TV6AB2UV7RS		12V	
TV2AB2UV8RS	TV6AB2UV8RS		24V	
TV2AB2UV9RS	TV6AB2UV9RS		48V	
TV2AB2UV10RS	TV6AB2UV10RS		125V	
TV2AB2UV11RS	TV6AB2UV11RS		250V	

[1] Not UL listed.

Combination Accessory

Consists of a shunt trip and a two stage auxiliary switch.

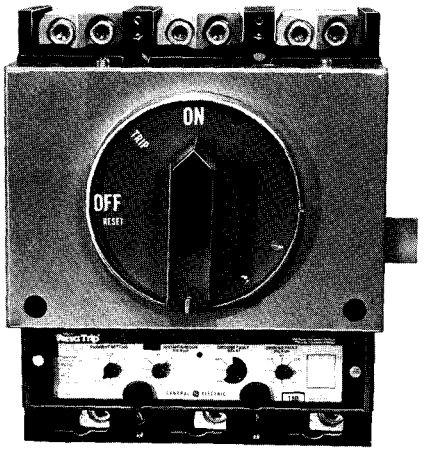
Table 29.4—Shunt Trip/Auxiliary Switch

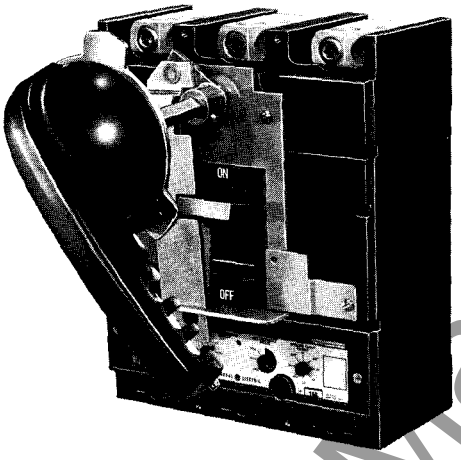
Combination Shunt Trip/ 2-250 V Aux. Sws.	Combination Shunt Trip/ [1] 2-600V Aux. Sws.	Voltage		Instruction Sheet
		AC	DC	
TV2AB2ST7RS	TV6AB2ST7RS		12V	GEH-4623
TV2AB2ST8RS	TV6AB2ST8RS		24V	
TV2AB2ST9RS	TV6AB2ST9RS		48V	
TV2AB2ST11RS	TV6AB2ST11RS		250V	
TV2AB2ST12RS	TV6AB2ST12RS	120V	125V	
		240V		
TV2AB2ST13RS	TV6AB2ST13RS	480V		
		600V		

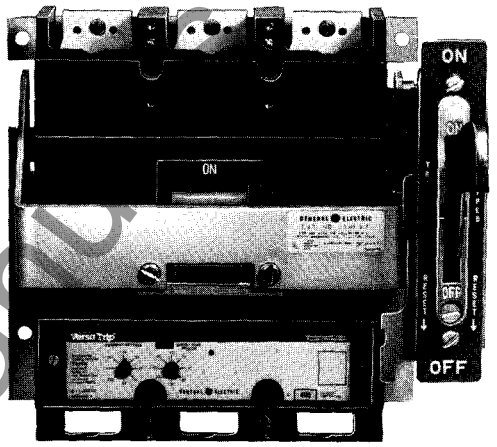
[1] Not UL listed.

Micro-VersaTrip® 4 & 9 Accessories

Externally Mounted Handle Operating Mechanisms







TDR Rotary Operating Handle

The Rotary-Operating Integral Handle mounts directly to the breaker, and operates through the door of the enclosure. A mechanical interlock prevents unauthorized opening of the enclosure when the handle is in the ON position. The locking hasp accommodates up to three padlocks. Suitable for horizontally or vertically mounted breakers. For NEMA 1 and NEMA 12 enclosures.

TDM Adjustable Depth Handles

TDM Door-Mounting Handles are available in shallow mounting types and extended shaft type for vertical or horizontal breaker mounting. Mechanism provides interlocking. The door-mounted handle accommodates up to three padlocks. Suitable for NEMA 1 and NEMA 12 enclosures.

NOTE: A pendulum-type handle designated Cat. No. THCH45 is also available for NEMA 4 and 5 enclosures.

TDF Safety Handle

TDF Safety Handle Mechanisms are designed to meet automotive, machine tool manufacturers' and control panel builders' requirements. Interlock prevents enclosure opening with handle ON. Available for thru-door or thru-flange operation, right- or left-hand mounting. Vault-type hardware available. For mounting in enclosure depths through $19\frac{9}{32}$ inches.

Table 30.1—TDR Handle Mechanism Catalog Numbers

Circuit Breaker Types	Vert.	Horiz.	Instruction Sheet No.	Provision For Kirk Key Interlock (Add Suffix) (1)	Instruction Sheet No.
J	TJVR1B	TJVR1HB	GEH-4629	—KLP	GEH-4634
K	TKVR1B	TKVR1HB	GEH-4633		

(1) Kirk Lock must be supplied by customer. Accepts Kirk Key Lock Type "FN" with one-inch bolt extension and key removable when bolt extended (circuit breaker in OFF position).

Table 30.2—Accessories for TDR Handle Mechanisms

Circuit Breaker Types	Door Ring Interlock Catch Kit	Gasket Kit	Instruction Sheet No.
J	343L483G7	792A484G2	GEH-4638
K	343L483G8	792A484G3	

Table 31.1—TDM Handle Mechanism Catalog Numbers

Breaker Type	Box Depth	Complete Mechanism	Operating Mechanism Only	Handle Only	Instruction Sheet No.
J	Shallow Extended	TJVHM1 TJVHM2	TJVOM1 TJVOM2	TH2	GEH-4632
K	Shallow Extended	TKVHM1 TKVHM2	TKVOM1 TKVOM2	TH2	GEH-4318

Table 31.2—TDF Handle Mechanism Catalog Numbers

Circuit Breaker Type	Enclosure Type (NEMA)	Basic Handle and Operator		Mounting Plate For Through Door Mounting [1]		Instruction Book No.
		RH Mounting	LH Mounting	Short	Long	
J4	1, 12 4 [4]	THFV3 [2] THFV355 [2]	THFV3L [2] THFV3SSL [2]	—	343L531G2	GEH-4528
J9	1, 12 4 [4]	THFV30 [2] THFV30SS [2]	THFV3OL [2] THFV30SSL [2]	343L531G1	343L531G2	
K4	1, 12 4 [4]	THFV4 [3] THFV4SS [3]	THFV4L [3] THFV4SSL [3]	—	343L531G2	GEH-4529
K9	1, 12 4 [4]	THFV40 [3] THFV40SS [3]	THFV40L [3] THFV40SSL [3]	—	343L531G2	

[1] Thru-door mounting is not recommended for oil- and water-tight applications. For thru door mounting, order escutcheon Catalog Number 343L530G2.
[2] 6-17/32-in. min. to 19-9/32-in max. mounting depth.
[3] 8-5/32-in. min. to 19-9/32-in. max. mounting depth.
[4] Stainless steel external parts.

Table 31.3—Accessories for TDF Mechanisms

Breaker Type	Adapter for Remote Operation	
	RH Mounting	LH Mounting
J, K	THFVRA	THFVRAL

Table 31.4—Auxiliary Switches for All TDF Mechanisms [1]

Double Throw	Variable Depth		Fixed Depth		Auxiliary Switch Rating		
	LH Mtg	RH Mtg	LH Mtg	RH Mtg	Voltage	Single Pole (Amps)	Double Pole (Amps)
Single Pole Double Pole	343L533G2 343L533G6	343L533G1 343L533G5	343L533G4 343L533G8	343L533G3 343L533G7	120V 240V 480V 600V } ac	15 10 6 5	3.0 1.5 1.0 0.8
					125V 250V } dc	0.5 0.2	0.2 0.1

Table 31.5—Door Hardware For Flange-mounted TDF Mechanisms [1] [2]

	Interlocking Vault Type with 2-point Roller Latches and 4″ Handle		Auxiliary Roller Latch For 3rd Point Locking		Long 6″ Door Handle	Non-interlocking Vault-type with two-point roller latch and four-inch handle for use on secondary doors	
	RH Mtg	LH Mtg	RH Mtg	LH Mtg	RH or LH	RH Mtg	LH Mtg
For NEMA 1 & 12	343L513G1	343L513G2	343L513G3	343L513G4	343L513G5	343L513G6	343L513G7
For NEMA 4 use [3]	343L513G8	343L513G9	343L513G10	343L513G11	343L513G12		

[1] Not UL listed.
[2] Interlock kit for double doors, Cat. No. 343L574G1.
[3] Stainless steel external parts.

Micro-VersaTrip® 4 & 9 Accessories

Externally Mounted Handle Operating Mechanisms

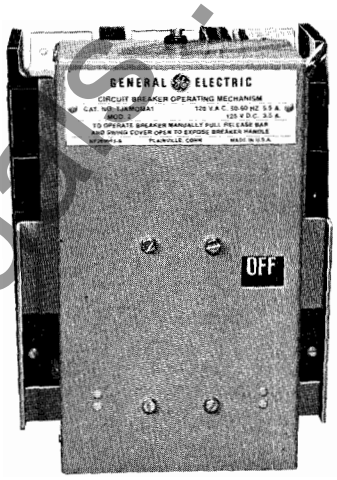
Motor-Operated Mechanism

A motor-operated mechanism can open, close or reset a breaker, remotely. This convenient attachment mounts integrally with the breaker, without modification to the breaker or its handle. Just lift the cover of the accessory mechanism to operate the breaker manually. Breaker ON-OFF is indicated in the operating mechanism cover.

Table 32.1

Breaker Type	Cat. No.	Volts	Instruction Sheet
J	TJVMOMA1	120V ac	GEH-4582
		125V dc	
	TJVMOMA2 (1)	240V ac	
		250V dc	
	TJVMOMA8	24V dc	
	TJVMOMA9	48V dc	
K	TKVMOMA1	120V ac	GEH-4583
		125V dc	
	TKVMOMA2 (1)	240V ac	
		250V dc	
	TKVMOMA8	24V dc	
	TKVMOMA9	48V dc	

(1) For 208V ac use 240V ac device.



Remote Operating

Table 32.2—600V ac—Auxiliary Switch—Not UL Listed

No. of SPDT Switch Elements	Field Installable Cat. Nos.		Factory Installed Cat. Nos.	
	Breaker Envelope Size (Amperes)			
	800, 1600 & 2000 (2)	3000 & 4000 (1)	800, 1600 & 2000	3000 and 4000
1	TPAS6AB1	TSAS6AB1	TPAS6AB1S	TSAS6AB1B
2	TPAS6AB2	TSAS6AB2	TPAS6AB2S	TSAS6AB2B
3	TPAS6AB3	TSAS6AB3	TPAS6AB3S	TSAS6AB3B
4	TPAS6AB4	TSAS6AB4	TPAS6AB4S	TSAS6AB4B
5	TPAS6AB5	TSAS6AB5	TPAS6AB4S	TSAS6AB5B
6	TPAS6AB6	TSAS6AB6	TPAS6AB5S	TSAS6AB6B
7	—	—	TPAS6AB7S	TSAS6AB7B
8	—	—	TPAS6AB8S	TSAS6AB8B
9	—	—	TPAS6AB8S	TSAS6AB9B
10	—	—	TPAS6AB10S	TSAS6AB10B
11	—	—	TPAS6AB10S (3)	TSAS6AB11B (3)
12	—	—	TPAS6AB12S (3)	TSAS6AB12B (3)

(1) Field installed aux. switches and shunt trips must mount on opposing poles only.
(2) Mounts in right pole only when shunt trip specified.
(3) Not available on breakers equipped with a shunt trip.

Micro-VersaTrip® 4 & 9 Accessories

Back Connected Studs

Studs are supported by a sub-base, but make positive contact with each line and load terminal. Once fastened to sub-base, a stud no longer has to be removed to remove or install breaker. Requires insulated mounting plate.

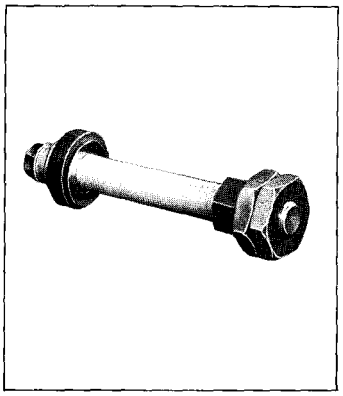


Table 33.1

Circuit Breaker Type	Ampere Rating	Length, Back of Breaker in Inches	Catalog Number
J	400	5 17/32	TJK1
	600	5 17/32	TJK2
K	400	5 1/2	TKM9
	600	5 1/2	TKM10
	800	5 1/2	TKM11
	1200	8	TKM12

Plug-in Base Assembly

Plug-in Base Assembly provides for quick change-out of breakers. Breaker plug-in terminals align with terminals on one-piece backplate assembly.

Each plug-in mounting base assembly includes all mounting hardware, studs, and male or female connectors for attachment to one end of breaker.

Studs are of different length so by using proper combinations of PD1A and PD2A units, adequate electrical spacing will be assured between adjacent breakers, i.e., a short-long-short (SLS) unit must be used adjacent to a long-short-long (LSL) unit.

The optional mounting plate (TMP3, etc.) is supplied at no cost when ordered with a pair of plug-in mounting bases. It accurately locates and supports the line and load plug-in mounting-base assemblies, provides convenient means to attach the entire unit to a metal structure, and serves as a deadfront barrier.

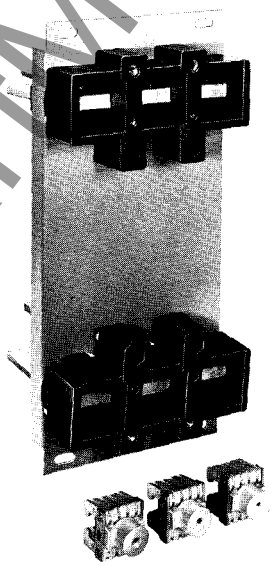


Table 33.2

Plug In Mounting Base—2 Required Per Breaker						Optional Mounting Plate		
Circuit Breaker Type	Ampere Rating	No. Poles	Stab Configuration		Catalog No.	Catalog No.		Instruction Book No.
			PD1	PD2		4 Function Micro	9 Function Micro	
J	400	2	SOS	LOL	TJ 42 PD 1A, 2A	TMP3	TMP6	GEH-4342
		3	SLS	LSL	TJ 43 PD 1A, 2A			
	600	2	SOS	LOL	TJ 62 PD 1A, 2A			
		3	SLS	LSL	TJ 63 PD 1A, 2A			
K	600	2	SOS	LOL	TK 62 PD 1A, 2A	TMP4	TMP7	GEH-4342
		3	SLS	LSL	TK 63 PD 1A, 2A			
	800	2	SOS	LOL	TK 82 PD 1A, 2A			
		3	SLS	LSL	TK 83 PD1A, 2A			
	1000	2	SOS	LOL	TK 102 PD 1A, 2A			
		3	SLS	LSL	TK 103 PD 1A, 2A			
	1200	2	SOS	LOL	TK 122 PD 1A, 2A			
		3	SLS	LSL	TK 123 PD 1A, 2A			

Micro-VersaTrip® 4 & 9 Accessories

Drawout Assembly

The drawout mechanism is designed for heavy duty applications in load center unit substations, motor control centers and switchboards in industrial, commercial, and institutional buildings. It permits rapid examination and maintenance of circuit breakers without having to deenergize the switchboard bus structure.

All drawouts have four discreet positions: engaged, test, disengaged and fully withdrawn. Provisions are provided for padlocking the carriage in each of these positions. Mechanical interlocking is also built in to prevent the movement of a closed breaker into or out of the engaged or test positions. Each beaker position is clearly identified.

The racking handle is an integral part of the drawout frame. All main and secondary contacts are self-aligning. The carriage may be hand rotated 180 degrees on the rails for contact maintenance or inspection.

All drawouts (except where noted otherwise) are UL listed.

Ordering Information

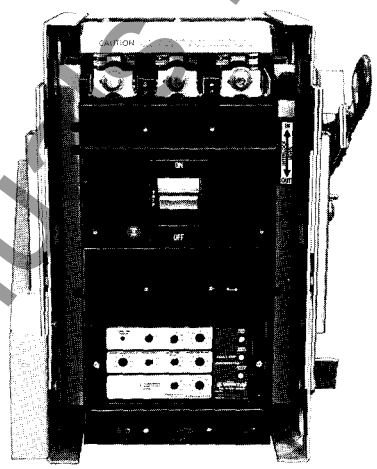
The drawout may be ordered as a complete assembly, carriage only or stationary frame only. The complete assembly consists of stationary frame and carriage. The carriage must be factory assembled to the circuit breaker. Breakers and breaker related options are ordered separately.

When the complete drawout assembly or carriage only is ordered with the breaker, secondary disconnects are supplied as required for control and accessory wiring. The breaker will be factory installed and unit shipped complete unless otherwise specified.

Secondary disconnects are not supplied when drawout frames are ordered separately. They are, however, supplied as required for carriage and breaker.

Vertical bus connectors are provided as standard. For horizontal connectors, add suffix "H" to catalog number.

When ordering the 100% rated drawout specify the *standard* UL listed Micro-VersaTrip Breaker. This combination is UL listed, 100% rated. The *100%* rated Micro-VersaTrip Breaker will be rejected by the drawout construction.



Micro-VersaTrip in drawout assembly

Table 34.1—Drawout Catalog Numbers (3)

Circuit Breaker Type	Complete Drawout	Stationary Mounting Frame Only	Carriage (1) Only
UL LISTED			
THJ9V THK9V	TJD03 TKD03	TJFD03 TKCD03	TJCD03 TKCD03
UL LISTED—100% RATED (2)			
THJ9V THK9V	TJDD03 TKDD03	TJFDD03 TKFDD03	TJCDD03 TKCDD03

(1) Must be factory assembled to breaker.
(2) Order standard UL listed breakers only, *NOT* types THJ9VV or THK9VV.
(3) Add suffix E for electrically operated units.

Bypass Switch

This switch is used to provide control circuit continuity or downstream signalling when drawout is disengaged. It consists of a switch assembly which mounts to the stationary frame and an actuator which mounts on the carriage. Each switch assembly consists of four SPDT (AB type) elements wired and preassembled on a mounting bracket. Switch is rated 5 amperes at 240V ac, 1/2 ampere at 125V dc and 1/4 ampere at 250V dc.

Specify catalog number TJBP1 for the J-Frame or catalog number TKBP1 for the K-Frame.

Secondary Disconnects

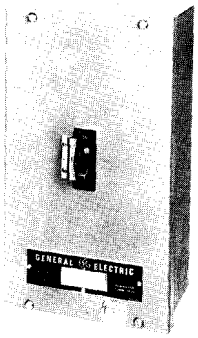
Available in blocks of 8 circuits each, these disconnects are used for control and accessory wiring.

Drawouts will accept up to 3 blocks (24 circuits).

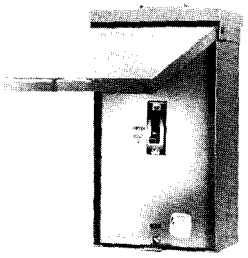
Each secondary disconnect kit includes the stationary as well as moveable contact blocks. Two gold contact neutral current transformer. Order catalog number TSDLD.

Micro-VersaTrip® 4 & 9 Accessories

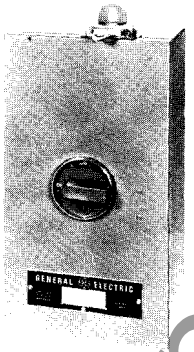
Enclosure Types



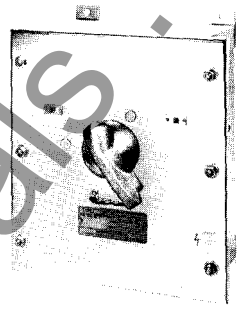
NEMA Type 1, handle-thru-cover, surface or flush mounting



NEMA Type 3R, Outdoor raintight



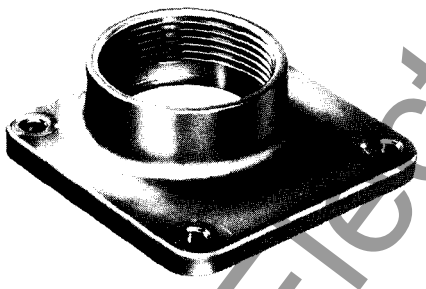
NEMA Types 12K and 12, rotary handle integral with breaker



NEMA Types 4 and 5, stainless steel, water-tight, dust-tight

Table 35.1—Enclosure Catalog Numbers

Breaker Type	NEMA 1	NEMA 3R	NEMA 12	NEMA 4/5	Neutral	Neutral For Ground Fault	Current Sensor For Ground Fault
J4	TJ4V600F,S	TJ4V600R	TJ4V600J,MJ (Instruction GEH-4641, 4582)	TJ4V600CS	TNI400 TNI600	TNI400VG TNI600VG (Instruction GEH-4640)	TSRG201 TSRG202 TSRG203 TSRG204 TSRG205 TSRG206
J9	TJ9V600F,S	TJ9V600R	TJ9V600J,MJ (Instruction GEH-4641, 4582)				
K4	TK4V1200F,S	TK4V1200R	TK4V1200J,MJ (Instruction GEH-4644, 4583)	—	TNI800 TNI1200	TNI800G TNI1200G (Instruction GEH-3484)	TSKG404 TSKG406 TSKG408 TSKG410 TSKG412
K9	—	—	TK9V1200J,MJ (Instruction GEH-4645, 4583)	—			



Universal Outdoor Hubs

For 'RH' suffix outdoor devices.

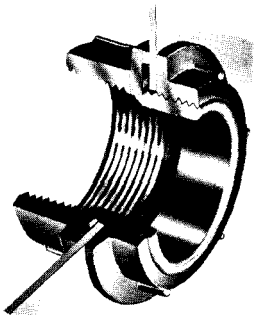
Field Installed Only

Nominal Conduit Diameter in Inches	Catalog Number	Standard Pkg Qty
3/4	TC75	10
1	TC100	
1 1/4	TC125	
1 1/2	TC150	
2	TC200	
2 1/2	TC250	
Closing Cap	TCCP	

Myers-Type Conduit Hubs

For "R" outdoor devices and all NEMA 12 and 4/5

Field Installed Only—unplated or chrome plated.

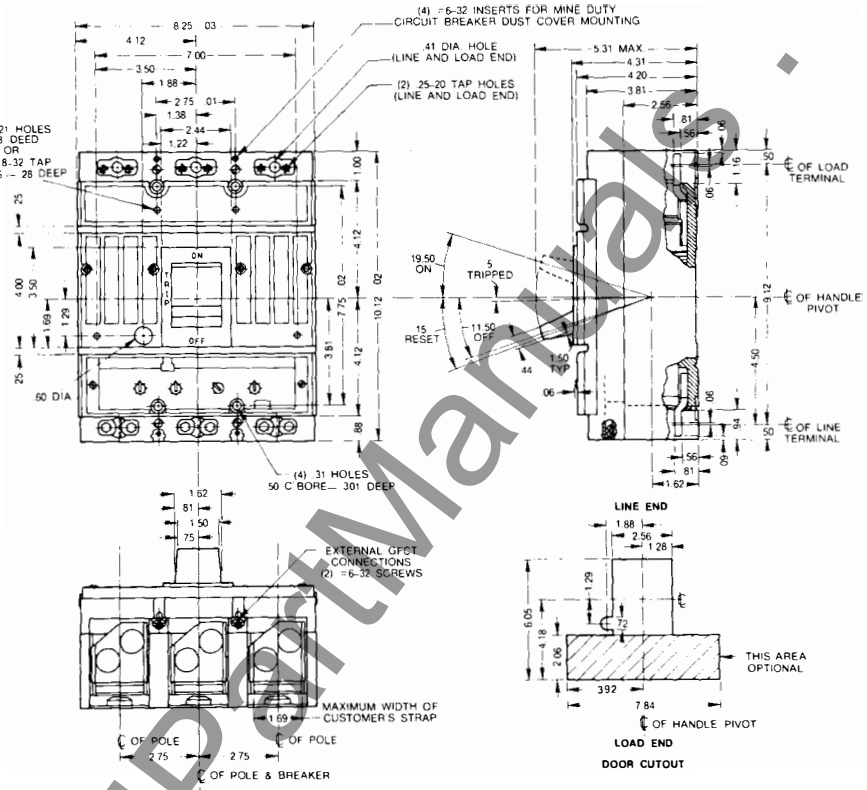


Nominal Conduit Diameter in Inches	Unplated Hub Catalog Number	Chrome Plated Hub Catalog Number
1/2	343L647G3	343L647G17
3/4	343L647G4	343L647G18
1	343L647G5	343L647G19
1 1/4	343L647G6	343L647G20
1 1/2	343L647G7	343L647G21
2	343L647G8	343L647G22
2 1/2	343L647G9	343L647G23
3	343L647G10	343L647G24
3 1/2	343L647G11	343L647G25
4	343L647G12	343L647G26

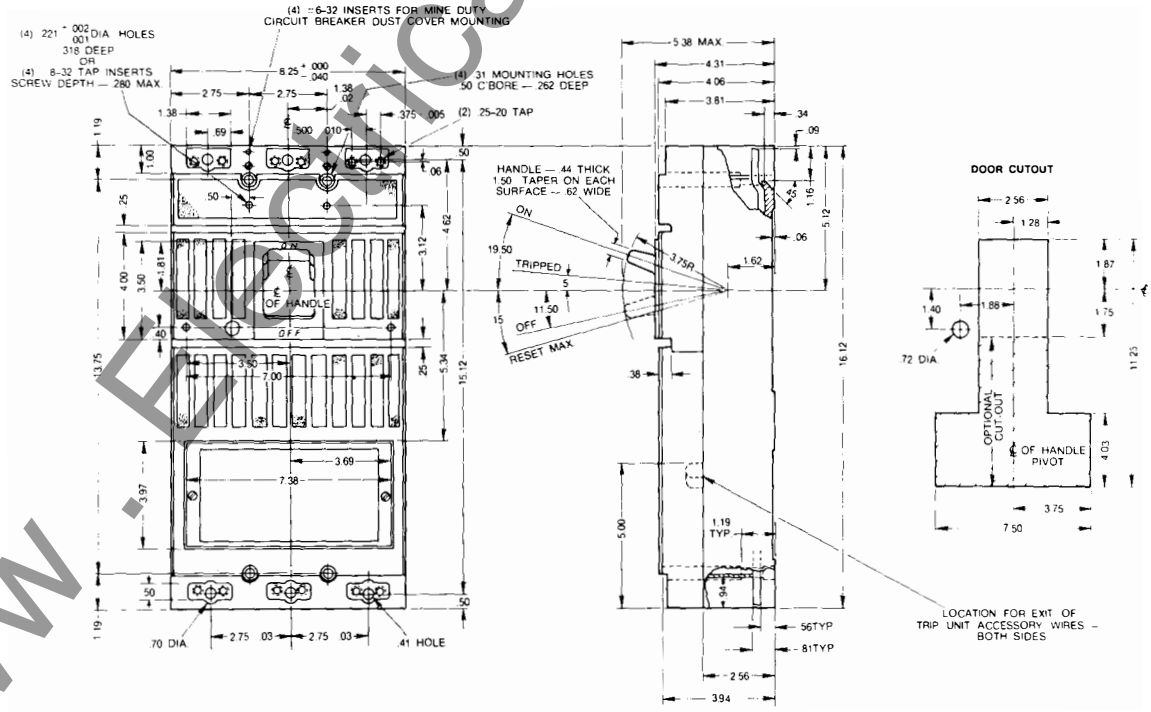
Outline Drawings

Breaker Dimensions (In Inches)

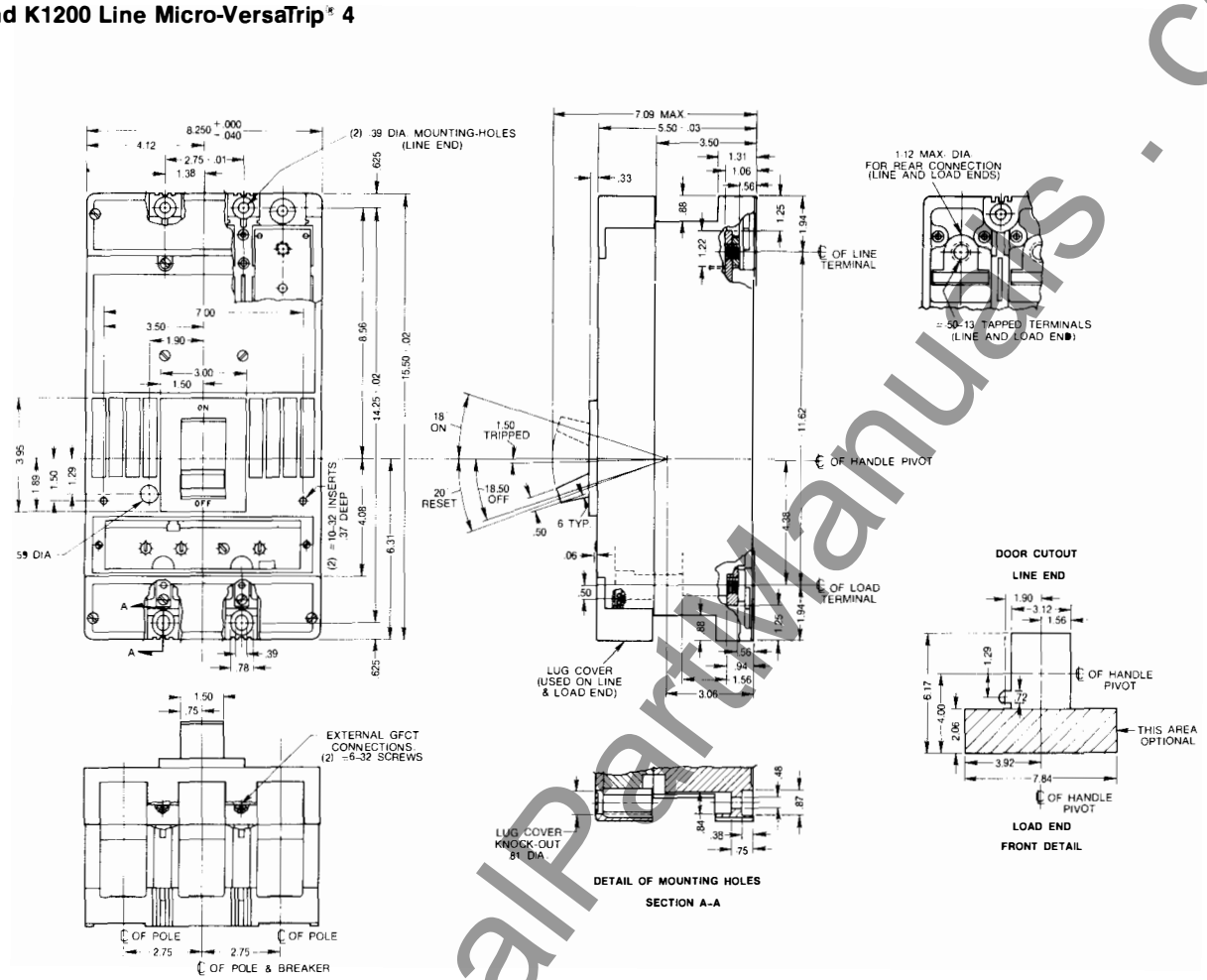
J400 and J600 Line Micro-VersaTrip® 4



J600 Line Micro-VersaTrip® 9



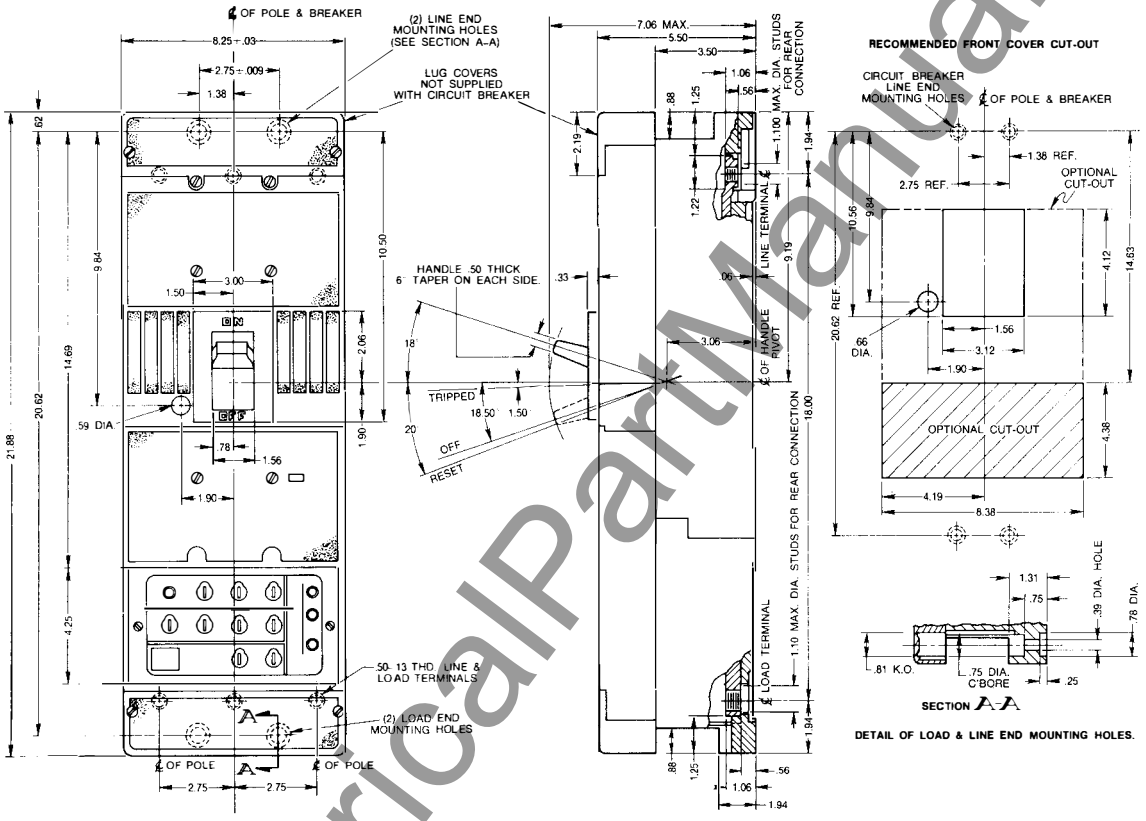
K800 and K1200 Line Micro-VersaTrip® 4



Outline Drawings

Breaker Dimensions (In Inches)

K1200 Line Micro-VersaTrip® 9



Guide Form Specifications

Micro-VersaTrip® Circuit Breakers 150-1200 Amperes, 600V ac

The basic circuit breaker must be trip free, offer a quick-make, quick-break mechanism, have a trip indicating handle position and push to trip button on the cover of the breaker.

The breaker should be 3 pole, 600 Volts ac with 400, 600, 800 and 1200 ampere frames available. Specific sensor ampere ratings shall be 150, 200, 300, 400, 500, 600, 800, 1000 or 1200 amperes.

The solid state tripping mechanism must offer overload, short circuit and ground fault over current protection with an overload indication light. The breaker and solid state programmer shall have available the following standard and optional programmer functions:

	9 Function Breaker	4 Function Breaker
Standard Features	• Adjustable Current Setting • Long-Time Timing Light • Adjustable Instantaneous Pickup • Adjustable Long-Time Delay	• Adjustable Current Setting • Long-Time Timing Light • Adjustable Instantaneous Pickup
Optional Features	• Adjustable Ground Fault Pickup and Delay • Short-Time —Adjustable Short-Time Pickup with Short-Time Delay I^2t Ramp and Fixed Instantaneous —Adjustable Short-Time Pickup and Delay —Adjustable Short-Time Pickup and Delay with Fixed Instantaneous • Adjustable Long-Time Pickup and Short Time I^2t Switch	• Adjustable Ground Fault Pickup and Delay • Short Time —Adjustable Short-Time Pickup with Short-Time Delay I^2t Ramp and Fixed Instantaneous
Additional Programmer Options	• Zone Selective Interlocking on Short-Time and Ground Fault • Local and Remote Fault Indication Targets on Overload, Short Circuit and Ground Fault • Remote Long-Time Timing Light	

Table 39.1—Interrupting Ratings in Thousands

The solid state circuit breaker shall be General Electric type Micro-VersaTrip with interrupting ratings of:

Breaker Type	240V ac	480V ac	600V ac
TJ	42	30	22
THJ	65	35	25
TK	42	30	22
THK	65	50	25

Programmers should be conformal epoxy coated and incorporate gold plated surfaces on all electrical connectors and adjustments to assure long lasting and positive electrical contact.

Eight position rotary switches shall be offered with adjustable current, adjustable short time pickup, adjustable instantaneous and adjustable ground fault pickup settings for maximum versatility. Four long time delay bands should be available with adjustable long-time delay. I^2t ramp functions shall be available on short time and ground fault.

Internally mounted accessories consisting of shunt trip, under-voltage release, bell alarm, auxiliary switches, blown fuse trip and combination accessories of auxiliary switches and short trips or UVR devices must be available. Drawout mechanisms, NEMA 1, 3R, 12 and 4/5 enclosures, back connected studs, plug in mounting bases, motor operated mechanisms and handle mechanisms (TDF, TDM and TDR) shall be suitable for use with the Micro-VersaTrip breakers.

A full function test kit allowing a test of the programmer time current characteristics, flux shift shunt trip and continuity of the breaker current sensor package shall be available.

General Electric Literature for Premium Protection

Description	Number
Molded Case Circuit Breakers	
Molded Case Circuit Breakers with Micro-Versatrip®	GEA 10676
Molded Case Circuit Breakers-Application and Selection	GET 2779
THQE Circuit Breakers and Terminations	GEA 9755
Mag-Break® Motor Circuit Protectors	GEA 7498
Mine Duty Circuit Breakers	GET 6207
Insulated Case Circuit Breakers	
Power Break® Insulated Case Circuit Breakers with Micro-Versatrip®	GEA 10677
Power Break® Insulated Case Circuit Breakers—Quick Selection	GEA 9752
Low-Voltage Power Circuit Breakers	
Type AKR Low-Voltage Power Circuit Breakers	GEA 10667
SST Conversion Kits	GEA 10672
Type AKR Low Voltage Power Circuit Breakers	GEA 10265
Ground Fault Protective Products	
Ground Fault Circuit Interrupters	GEA 10664
Ground-Break® Systems	GET 2964
Safety Switches	
Spec-Setter™ Type TG General Duty Safety Switches	GEA 10674
Spec-Setter™ Type TH Heavy Duty Safety Switches	GEA 10675
Spec-Setter™ Mill Duty Safety Switches	GEA 9747
Replacement Parts-Spec-Setter™ Safety Switches-Type TG, TH and TC	GEF 4452
Disconnect Switches	
HCI General Purpose Disconnects	GEA 10673
Type HPC High Pressure Contact Switches	GET 6205

Description	Number
Circuit Breaker Load Centers	
PowerMark + ® Circuit Breaker Load Centers—Thru 600A	GEA 7484
PowerMark + ® Riser Panels, Parallel Type	GEA 7494
PowerMark + ® Riser Panels, Series Type	GIZ 2362-17
Replacement Parts-Circuit Breaker Load Centers, Modular Metering	GEF 4453
Busway	
Types FVK-FVA 225-1000A	GEA 6470
Armor-Clad® 225-5000A	GEA 7946
Type CL Current Limiting	GEA 10257
Type DH 100A	GEA 7943
Type LW 30/60A	GEA 6743
Panelboards	
Types NLTQ/NLAB	GEA 6737
Types NAB/NHB	GEA 6738
Type CCB	GEA 6739
Type QMR Fusible	GEA 6740
Switchboards	
AV-LINE® Switchboards	GEA 7931
Automatic Throwover Equipment	GEA 10261
AV-LINE® Installation Instructions	GEH 2621
Power-Break® Installation Instructions	GEH 2638
Power-Break® Draw Out Assembly 3000-4000A	GEH 2639
Power-Break® Switchboards	GEA 10258
Switchgear	
Type AKD-6 Low-Voltage Switchgear and Load Center Unit Substations	GEA 10279
Type AKD-6 Installation Instructions	GEK 72101
Type AKD-8 Low-Voltage Switchgear	GEA 10264

For further information call or write your local General Electric Sales Office or...

Distribution Equipment Division
41 Woodford Avenue
Plainville, CT 06062

Outside the U.S. and Canada Write Export Sales and Trading Division, 570 Lexington Avenue, New York, NY 10022

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