

High-speed current differential protection of transmission lines for single or three-phrase tripping.

Features and Benefits

- Innovative current differential scheme with adaptive restraint
- FlexLogic[™] and distributed FlexLogic[™]
- Virtual and expandable I/Os
- Flash memory for field upgrades
- Common drawout modules to reduce spare parts costs
- Charging current compensation for applications on long lines or cables
- Channel asymmetry compensation (GPS)

Applications

- Transmission lines of any voltage level, including series compensated lines
- Stand-alone or component in automated substation control system
- NEW 📒 enerVista.com compatible (see page 275)

Protection and Control

- Current differential protection, DTT
- Phase and ground distance
- Multiple current and voltage elements
- Directional phase and neutral
- FlexElement[™] universal comparator
- 📲 互 Single-pole dual-breaker autoreclosure

Monitoring and Metering

- Actual remote, local and differential per phase current
- Current, voltage, power, power factor, frequency, fault location

User Interfaces

- URPC software for HMI
- RS232, RS485 and Ethernet ports



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Protection and Control

The L90 is an advanced current differential relay intended for use on transmission lines of any voltage level, including series compensated lines. As a member of the Universal Relay Family, the L90 offers unparalleled digital protection that includes:

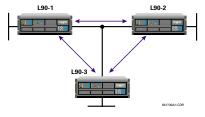
Current Differential Function

This function utilizes adaptive restraint to maintain high security and prevent mis-operation. If CT saturation is detected on external fault relay increases restraint.

Pilot Communications Channels

Peer-to-peer architecture between L90s allows replication of protection and distributed synchronization. Terminals are time synchronized with frequency tracking.

Current phasors are sent from each relay to every other relay.



Relays communicate through fiber optic interface or RS422 and G.703 interfaces at 64,000 bps via direct fiber optic cable or multiplexed networks. A unique ID may be assigned to every L90 in a protection scheme.

Fiber optic typical distances.

Emitter Type	Typical (km)
820 nm LED	1.65
1300 nm LED	3.8
1300 nm ELED	11.4
1300 nm LASER	64.0
1550 nm LASER	105.0

Direct Transfer Trip (DTT)

Besides current differential DTT (single or three-phase), up to eight signals can be sent over pilot communications channels by the relay, or by the user through configurable logic or communication ports.

Channel Monitor

Communications channel deterioration or failure will activate an alarm, alerting the user to enable backup protection. Channel propagation delay is monitored and adjusted according to variations in communication paths.

Trip Logic

50DD (Disturbance Detector) provides security for single-pole or three-pole tripping logic and sealsin the trip command.

Charging Current Compensation

Compensation of the line capacitive current makes the L90 applicable to long transmission lines or cables.

Tapped Transformer Applications

The L90 can remove any zerosequence current from its operating signals. This makes it immune to zero-sequence infeed from tapped transformers (including wyegrounded) during external ground faults.

Distance Protection

Protection includes single-zone phase and ground with power swing detection and permissive over-reaching transfer trip. Line pickup provides tripping if the breaker is closed onto a fault. Distance elements are reversible and can be shaped to mho, lens or quadrilateral characteristics. Load encroachment can be configured to block selected elements. Distance elements can be applied on series compensated lines.

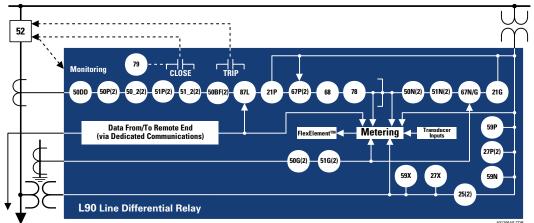
Overcurrent Protection

Instantaneous and time protection functions are provided for phase, ground, neutral and negativesequence currents. A variety of standard time curves are provided plus two user-programmable curves.

Directional Overcurrent

Phase directional elements use memory polarization. Neutral directional elements can work under zero-sequence voltage, ground current or dual polarization.





Voltage Protection

Over and undervoltage protection functions are provided.

Synchronism Check

Two independent synchronism check elements are provided to monitor differences in voltage, phase angles and frequencies.

Autoreclosure

A four-shot three-pole autoreclosure is provided.

Breaker Failure

Two independent breaker failure functions are incorporated through the current and breaker auxiliary contacts. Initiation and blocking is done via input contacts or external communications.

User-Defined Protection Functions

Eight universal comparators called FlexElements[™] can be programmed to respond to a variation in the signal being measured by the relay.

Monitoring and Metering

Advanced metering functions are common across the UR platform (see page 7). The L90 provides additional specific monitoring and metering functions which include:

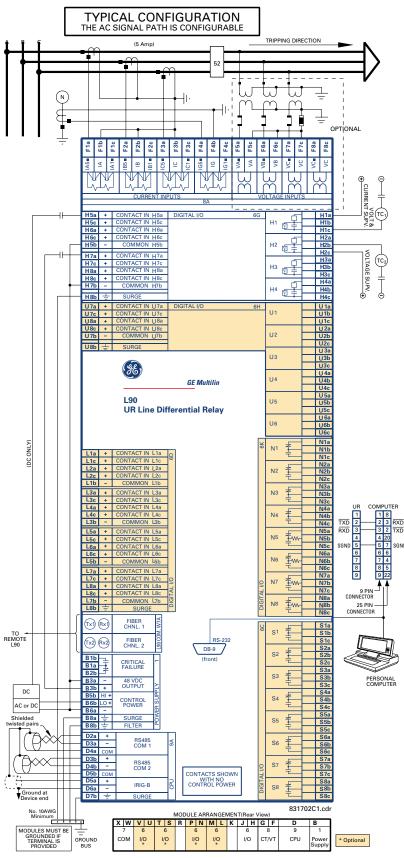
Breaker Arcing Current (I²t) Monitoring

The L90 tracks the per-phase wear (arc) on the breaker contacts against a programmable threshold. The measurement for each phase is available locally and remotely, and can be stored in the oscillography file or data logger.

CT Failure/Current Unbalance Alarm

The L90 features current unbalance alarm logic. The alarm may be supervised by the zero sequence voltage, and will not function during an open pole condition on a singlephase tripping scheme. Additionally, the user can block tripping functions during such condition.





L90 Guideform Specifications

For an electronic version of the L90 guideform specifications, please visit: www.GEindustrial.com/ Multilin/specs, fax your request to 905-201-2098 or email to literature.multilin@indsys.ge.com.

Guideform Specifications Available on the Product CD, Online or from your Sales Representative

www.GEindustrial.com/Multilin

UR Family Advantage

View the UR Family brochure. on page 7 for all the details.

Ordering

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90 * 00	HC* VF*	F ** F **	H ** H **	L ** L **	N ** N **	S **	U **	W ** R **	For full sized horizontal mount For reduced size vertical mount
L90				- I					Base unit
A									RS485 + RS485 (ModBus [®] RTU, DNP)
Ċ									RS485 + 10BaseF (MMS/UCA2, ModBus® TCP/IP, DNP)
Ď									RS485 + redundant 10BaseF (MMS/UCA2, ModBus® TCP/IP, DNP)
00									No software options
••	HC								Horizontal mount (19" rack)
	VF								Vertical mount (3/4 size)
	Ĥ								125/250 V AC/DC
	Ĺ								24 – 48 V (DC only)
		8A							Standard 4CT/4VT
		8C							Standard 8CT
				хx	XX	XX	XX		No module
			6A	6A	6A	6A	6A		2 Form A (voltage w/ opt current) and 2 Form C outputs, 8 digital inputs
			6B	6B	6B	6B	6B		2 Form A (voltage w/ opt current) and 4 Form C outputs, 4 digital inputs
			6C	6C	6C	6C	6C		8 Form C outputs
			6D	6D	6D	6D	6D		16 digital inputs
			6E	6E	6E	6E	6E		4 Form C outputs, 8 digital inputs
			6F	6F	6F	6F	6F		8 fast Form C outputs
			6G	6G	6G	6G	6G		4 Form A (voltage w/ opt current) outputs, 8 digital inputs
			6H	6H	6H	6H	6H		6 Form A (voltage w/ opt current) outputs, 4 digital inputs
			6K	6K	6K	6K	6K		4 Form C and 4 Fast Form C outputs
			6L	6L	6L	6L	6L		2 Form A (current w/ opt voltage) and 2 Form C outputs, 8 digital inputs
			6M	6M	6M	6M	6M		2 Form A (current w/ opt voltage) and 4 Form C outputs, 4 digital inputs
			6N	6N	6N	6N	6N		4 Form A (current w/ opt voltage) outputs, 8 digital inputs
			6P	6P	6P	6P	6P		6 Form A (current w/ opt voltage) outputs, 4 digital inputs
			6R	6R	6R	6R	6R		2 Form A (no monitoring) and 2 Form C outputs, 8 digital inputs
			6S	6S	6S	6S	6S		2 Form A (no monitoring) and 4 Form C outputs, 4 digital inputs
			6T	6T	6T	6T	6T		4 Form A (no monitoring) outputs, 8 digital inputs
			6U	6U	6U	6U	6U		6 Form A (no monitoring) outputs, 4 digital inputs
			5C	5C	5C	5C	5C		8 RTD inputs
			5E	5E	5E	5E	5E		4 DCmA inputs, 4 RTD inputs select a maximum of 4
			5F	5E	5E	5F	5E		8 DCmA inputs
			•••		•••	••	•••	7A	820 nm, multi-mode, LED, 1 channel inter-relay communications
								7B	1300 nm, multi-mode, LED, 1 channel
								70	1300 nm, single-mode, ELED, 1 channel
								7D	1300 nm, single-mode, LASER, 1 channel
								7D 7E	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED
								7D 7E 7F	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED
								7D 7E 7F 7G	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED
								7D 7E 7F 7G 7Q	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER
								7D 7E 7F 7G 70 7H	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels
								7D 7E 7F 7G 70 7H 7I	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, multi-mode, LED, 2 channels
								7D 7E 7F 7G 70 7H 7I 7J	1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels
								7D 7E 7G 70 7H 7J 7J 7J	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels 1300 nm, single-mode, LASER, 2 channels
								7D 7F 7G 7D 7H 7J 7J 7L	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channels
								7D 7F 7G 7D 7H 7J 7J 7K 7M	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED
								7D 7E 7F 7G 70 7H 7J 7K 7L 7M 7N	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, multi-mode, LED
								7D 7E 7G 7Q 7H 7J 7J 7K 7N 7N 7N 7P	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER
								7D 7E 7G 7Q 7H 71 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER
								7D 7E 7F 7Q 7L 7H 71 7 7K 7N 7N 7R 7R 7S	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channel channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, ELED channel 1 – RS422; channel 2 – 1300 nm, single-mode, ELED channel 1 – RS422; channel 2 – 1300 nm, single-mode, ELED channel 1 – RS422; channel 2 – 1300 nm, single-mode, ELED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel
								7D 7E 7F 7Q 70 H 71 7J 7K 7N 7N 7N 7N 7N 7N 7N 7N 7N 7N 7N 7N 7N	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, ELED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel
								7D 7E 7F 7G 0 7H 71 7J 7H 7N 7N 7P 7R 7T 7W	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel G.703, 2 channels RS422, 1 channel RS422, 2 channels
								7D 7E 7F 7G 0 7H 7J 7K 7N 7N 7P 7R 7S T 7W 72	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel G.703, 2 channels RS422, 1 channel RS422, 2 channels 1550 nm, single-mode LASER, 1 channel
								7D 7E 7F 7G 0 7H 71 7J 7K 7N 7N 7P 7R 7S 7T W 72 73	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel G.703, 2 channels RS422, 1 channel RS422, 2 channels 1550 nm, single-mode LASER, 1 channel 1550 nm, single-mode LASER, 2 channels
								7D 7E 7F 7G 70H 71 7J 7K 7L 7M 7R 7S 7T 7W 72 73 74	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel G.703, 2 channels RS422, 1 channels 1550 nm, single-mode LASER, 1 channel 1550 nm, single-mode LASER, 2 channels
ccessor								7D 7E 7F 7G 0 7H 71 7J 7K 7N 7P 7R 7S T 7W 72 73	 1300 nm, single-mode, LASER, 1 channel channel 1 – G.703; channel 2 – 820 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, multi-mode, LED channel 1 – G.703; channel 2 – 1300 nm, single-mode, ELED channel 1 – G.703; channel 2 – 1300 nm, single-mode, LASER 820 nm, multi-mode, LED, 2 channels 1300 nm, single-mode, LED, 2 channels 1300 nm, single-mode, LASER, 2 channels channel 1 – RS422; channel 2 – 820 nm, multi-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER channel 1 – RS422; channel 2 – 1300 nm, single-mode, LED channel 1 – RS422; channel 2 – 1300 nm, single-mode, LASER G.703, 1 channel G.703, 2 channels RS422, 1 channel RS422, 2 channels 1550 nm, single-mode LASER, 1 channel 1550 nm, single-mode LASER, 2 channels

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