

Transmission Line Differential & Phase – Selector Guide

Transmission Protection

Features	Device	L30	L90	P541/2	P543/5	P544/6	L60	P547
APPLICATIONS								
Stepped Distance	21		•		•	•		•
Pilot Protection / Channel Aided Schemes		•	•		•	•		•
Line Current Differential	87L			•	•	•	•	
Line Phase Comparison	87PC					•	•	•
Breaker-and-Half Configurations			•			•	•	
PROTECTION & CONTROL								
Typical Operating Time (cycles)		<1.5	<1.5	<1.5	<1.5	<1.5	<1	<1.75
Phase Current Differential	87LP	•	•	•	•	•		
Ground (Neutral) Current Differential	87N/G	96	96		32	32/64	96	32
Mho Phase & Ground Distance (No. of Zones)	21P/G		5		5	5	3	5
Quad Phase & Ground Distance (No. of Zones)	21P/G		5		5	5	3	5
Instantaneous Overcurrent	50G/N/P/ 2	•	•	•	•	•	•	•
Time Overcurrent	51G/N/P/ 2	•	•	•	•	•	•	•
Directional overcurrent - Neutral	67N	•	•		•	•	•	•
Directional overcurrent - Phase	67P	•	•		•	•	•	•
Directional overcurrent - Negative Sequence	67_2	•	•		•	•	•	•
Time Overcurrent		•	•	•	•	•	•	•
Directional overcurrent - Neutral	67N	•	•		•	•	•	•
Directional overcurrent - Phase	67P	•	•		•	•	•	•
Directional overcurrent - Negative Sequence	67_2	•	•		•	•	•	•
Overvoltage - Measured Neutral Displacement/Auxiliary	59X	•	•		•	•	•	•
Overvoltage - Neutral	59N	•	•		•	•	•	•
Overvoltage - Negative Sequence	59_2	•	•		•	•	•	•
Undervoltage - Phase/Auxiliary	27P/X	•	•		•	•	•	•
Under Frequency	81U	•	•		•	•		•
Over Frequency	81O	•	•		•	•		•
Frequency Rate of Change	81R	•	•		•	•		•
Power Swing Blocking	68		•		•	•	•	•
Out-of-Step Tripping / System Separation	78	•	•				•	
Switch onto Fault (Line Pickup)	SOTF		•		•	•	•	•
Load Encroachment			•		•	•	•	•
Breaker Failure	50BF	•	•	•	•	•	•	•
Lockout Functionality	86	•	•	•	•	•	•	•
Synchronism Check or Synchronizing	25	•	•		•	•	•	•
AC Reclosing (No. of Shots)	79	4	4	4 (P542)	4	4	4	4
Trip Modes: Three-Pole/Single-Pole		3	1&3	3	1&3	1&3	1&3	1&3
Channel Aided Schemes			•		•	•	•	•
Petersen Coil / Isolated Ground Systems				•	•	•		
Series Compensation		•	•	•	•	•	•	•
Three terminal lines			•	•	•	•	•	•
Lines with In-zone transformers		•	•	•	•	•		
Synchphasors		•	•				•	
AUTOMATION								
Programmable Protection Logic		•	•	•	•	•	•	•
FlexElements™ (number)		8	8				8	
Watchdog/Critical Failure Self-Test Monitoring		•	•	•	•	•	•	•
Settings Groups		6	6	4	4	4	6	4
Non-volatile latches (including contact latches) (up to)		16	16	•	•	•	16	•
Contact Inputs Programmable - (up to)		80	80	8/16	16/32	16/24	80	24
Contact Outputs Programmable - (up to)		70	70	7/14	14/32	14/32	70	32
Virtual Inputs - (up to)		64	64		32	32/64	64	32
Virtual GOOSE Inputs / Remote Inputs (up to)		96	96		32	32/64	96	32
Virtual Outputs - (up to)		96	96		32	32/64	96	32
Virtual GOOSE Outputs / Remote Outputs (up to)		•	•		•	•	•	•
Breaker Control (up to)		2	4	1	1	2	2	1
User-Programmable LEDs (up to)		48	48	8	18	18	48	18
User-Programmable Push Buttons (up to)		16	16		10	10	16	10
User Definable Displays		•	•				•	
Timers (number)		32	32	16	16	16	32	16
Selector Switch (number)		2	2				2	
Digital Counters (number)		8	8				8	
Digital Elements / Limit Values (number)		48	48				48	
IRIG-B Input		•	•	•	•	•	•	•
Transducer Analog Inputs (up to)		24	24				24	
Transducer Analog Outputs (up to)		12	12				12	
RTD Inputs (up to)		24	24				24	

Features Continued	Device	L30	L90	P541/2	P543/5	P544/6	L60	P547
MONITORING & METERING								
Voltage		•	•	•	•	•	•	•
Current		•	•	•	•	•	•	•
Symmetrical Components		•	•	•	•	•	•	•
Power - Apparent, Real, Reactive				•	•	•		•
Energy		•	•		•	•	•	•
Power Factor		•	•		•	•	•	•
Frequency		•	•		•	•	•	•
Demand			•	•		•		•
Fault Location		•	•		•	•	•	•
Fault Report (number)		15	15	15	15	15	15	15
Event Recorder - Number of Events		1024	1024	512	1024	1024	1024	1024
Oscillography/Transient Recorder - Sampling Rate		64/32/16/8	64/32/16/8	48	48	48	64/32/16/8	48
Voltage Transformer Fuse Failure	VTFF/VTS	•	•		•	•	•	•
Current Transformer Supervision	CTS	•	•		•	•	•	•
Open Pole Detector / Pole Dead			•	•	•	•	•	•
Broken Conductor Detection		•	•	•	•	•		•
Thermal Overload		•	•	•	•	•	•	•
Breaker Arcing Current		•	•	•	•	•	•	•
Breaker Flashover			•				•	
Breaker Restrike			•					
Trip/Close Coil Supervision		•	•	•	•	•	•	•
Data Logger / Trend Recording		•	•				•	
COMMUNICATIONS INTERFACES								
Front Port Local Access		•	•	•	•	•	•	•
Rear RS485 Port		•	•	•	•	•	•	•
Rear Ethernet Port (Fiber and Copper, up to)		3	3		2	3	3	2
Inter-Relay Direct Fiber Communications		•	•	•	•	•	•	•
Rear Communication Interface (G.703, C37.94)		•	•	•	•	•	•	
Rear Communication Interface (RS422/RS485)					•	•		
Rear Communication Interface (V.35, X.21)					32	32/64		32
PROTOCOLS								
ModBus RTU		•	•	•	•	•	•	•
DNP3 Serial		•	•	•	•	•	•	•
IEC 60870-5-104		•	•				•	
IEC 61850		•	•		•	•	•	•
IEEE 1588 (PTP)		•	•		•	•	•	
IEC 62439 Parallel Redundancy Protocol		•	•		•	•	•	•
IEC 62439 HSR Ring Redundancy Protocol					•	•		
Simple Network Time Protocol (SNTP)		•	•		•	•	•	•
HTTP, TFTP, SFTP		•	•				•	
IEC 60870-5-103		•	•	•	•	•	•	•
Process Bus (IEC 61850-9-2)		•	•			P546		

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