

# Distribution Feeder Protection – Selector Guide

Features	Device	350	F650	750/760	P14N/D/DH	P94V	P15D	P154
<b>APPLICATIONS</b>								
Parallel Feeders / Mesh Network Protection					P14D/DH			
Isolated Ground / Petersen Coil Compensated			•		P14DH			
Feeders with Reclosure Automation		•	•		•			
Advanced Feeder Protection		•	•	•	•			
LV/MV Bus Transfer Schemes (ATS)			•		•	•		
Up to 6 Feeders in One Box								
HiZ Fault Detection					P14N/D			
<b>PROTECTION &amp; CONTROL</b>								
Directional Power	32		•	•	P14D/DH			
Dir., Negative Sequence	67N_2			•	P14D/DH			
Dir., Phase	67P	•	•	•	P14D/DH			
Dir., Neutral/Ground	67N/G	•	•	•	P14D/DH			
Breaker Failure	50BF	•	•	•	•			•
Instantaneous Overcurrent - Phase	50P	•	•	•	•		•	•
Instantaneous Overcurrent - Neutral	50N	•	•	•	•			•
Time Overcurrent - Phase	51P	•	•	•	•		•	•
Time Overcurrent - Neutral	51N	•	•	•	•			•
Voltage-Dependent Overcurrent	51V				P14D (VCO/VRO)			
Time Overcurrent - Ground	51G	•	•	•	•		•	•
Time Overcurrent - Neg. Seq.	51_2	•	•	•	•			•
Neutral Admittance Protection					P14D			
Sensitive Ground Fault Overcurrent / SEF	50SG/51SG	•	•	•	P14N/D			•
Undervoltage, Phase/Auxiliary	27 P/X	P/X	P/X	P/X	P (P14D/DH)	P		
Restricted Ground / Earth Fault	87G/RGF/REF			•	P14N/D			•
Second Harmonic Restraint					•	•	•	•
Wattmetric Zero Seq. Directional			•		P14D			
High Impedance Fault Detection (Hi-Z)	HiZ				P14N/D			
Transient Ground Fault Detection	TEFD				P14DH			
Overvoltage - Phase	59P	•	•	•	P	P		
Overvoltage - Auxiliary	59X	•	•					
Overvoltage - Neutral	59N	•	•	•	•	•		
Overvoltage - Negative Sequence	59_2	•	•		•	•		
Arc Flash Detection								
Graphical Display with Bay Control & Monitoring			•					
Synchronism Check	25	•	•	•	P14D/DH			
Current Disturbance Detector	50DD							
AC Reclosing (Shots)	79	4	4	4	P14N/D			
Underfrequency	81U	•	•	•	P14D/DH	•		
Overfrequency	81O	•	•	•	P14D/DH	•		
Load-Shedding by df/dt and/or dv/dt	81R				P14D	•		
Frequency supervised ROCOF, Ave. ROCOF, Load restoration			•		P14D	•		
Lockout Protection	86		•	•	•	•		•
Broken Conductor Detection	I2/I1		•		•			•
Voltage Transformer Fuse Failure	VTFE/VTS	•	•	•	P14D/DH			
Current Transformer Supervision	CTS				P14D			
Thermal Overload (Thermal Model)	49	•	•		•		•	•
Dynamic Line Thermal	49DL							
Power Factor	55			•				
Sensitive Ground Directional Element	67SG	•	•	•	P14D			
Temperature monitoring (RTD)	38/49T							
Load Encroachment			•		P14D			
Custom programmable/FlexCurves™ curves		•	•	•	•	•		
<b>HARDWARE</b>								
Number of Current Inputs		4	5	5	4		4	4
Number of Voltage Inputs		4	4		4 (P14D/DH)	4		
Contact Inputs (Min. & Max.)		10	8 to 64 (up to 128 with 1 CIO)	14	3 to 13	3 to 13	4	6
Contact Outputs (Min. & Max.)		5	8 to 18 (up to 32 with 1 CIO)	8	4 to 12	4 to 12	2	6
Types of outputs (Form-A)		2			12	12		
Types of outputs (Form-C)		5	16				2	6
Types of outputs - High Breaking Duty	HSHB							
Harsh Environment Conformal Coating		•	•	•	•	•		
Draw-out Design		•		•	•	•		

Feeder Protection

Features Continued

Device	350	F650	750/760	P14N/D/DH	P94V	P15D	P154
<b>AUTOMATION</b>							
Settings Groups	2	3	4	4	4	2	2
Non-volatile latches (including contact latches) (up to)		•		•	•		
Trip/Close Coil Supervision	TCM(74) / CCM	•	•	•	•		•
FlexElements™ (Number of Elements)	8 to 16						
Breaker Control	•	•	•	•	•		•
Programmable Logic	•	•		•	•		
Timers (Number)	•	8 max in each logic scheme	•	16	16		
Digital Counters (Number)		8					
Digital Elements/Limit Values (Number)	16	512		300	300		4
Virtual Inputs	32	32					
GOOSE Virtual Inputs / Remote Inputs / RxGOOSE Boolean Inputs (up to)	32	32	14	32	32		
Virtual Outputs		512					
GOOSE Virtual Outputs / Remote Outputs / TxGOOSE Boolean Outputs (up to)	32	32	16	32	32		
<b>MONITORING &amp; METERING</b>							
Voltage	•	•	•	P14D/DH	•		
Current	•	•	•	•		•	•
Power Factor	•	•	•	P14D/DH			
Real, Reactive & Apparent Power	•	•	•	P14D/DH			
Current, MW, MVAR, MVA Demand		•	•	P14D/DH			
Energy	•	•	•	P14D/DH			
Frequency	•	•	•	P14D/DH	•		
Frequency Decay		•	•				
Transducer Analog Inputs/Outputs		•	•				
Fault Location	21FL	•	•	P14D			
Event Recorder - Number of Events	256	479	512	2048	2048	100	512
Oscillography/Transient Recorder - Sampling Rate	32	Programmable to 4, 8, 16, 32 or 64 samples/cycle	16	24	24	12	16
Breaker Arcing Current		•	•				
Breaker Health							
Battery Voltage Monitoring				•	•		
Environmental Monitoring							
Data Logger/Trend Recording		•	•				
THD & Harmonics Meter							
<b>COMMUNICATIONS</b>							
Front Port Local Access	•	•	•	•	•	•	•
Rear Communication Interface (RS422/RS485)				RS485	RS485	RS485	RS485
RS422 Port, G.703, C73.94							
Ethernet	•	•	•	•	•		
Fiber	•	•		•	•		
USB Front Port	•	•		•	•	•	•
Wifi							
ModBus Serial	•	•	•	•	•	•	•
ModBus TCP/IP	•	•	•				
DNP3.0 Serial	•	•	•	•	•		
DNP3.0 TCP/IP	•	•	•	•	•		
IRIG-B Input	•	•	•	•	•		
TCP/IP	•	•					
Simple Network Time Protocol (SNTP)	•	•		•	•		
IEEE 1588	•	•					
IEC 60870-5-103	•	•		•	•	•	•
IEC 60870-5-104	•	•					
Courier Protocol				•	•		
IEC61850 Protocol	•	•		•	•		
IEC62439 / PRP	•	•					
IEC62439 / HSR	•	•					

Feeder Protection

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# Distribution Feeder Protection – Selector Guide

Features	Device	P161/2/3	850	F35	P141/2/3/4/5	F60	P341
<b>APPLICATIONS</b>							
Parallel Feeders / Mesh Network Protection		P163			•		•
Isolated Ground / Petersen Coil Compensated					P144		
Feeders with Reclosure Automation		•	•		P142/3/4/5	•	•
Advanced Feeder Protection			•		•	•	•
LV/MV Bus Transfer Schemes (ATS)			•		•		
Up to 6 Feeders in One Box				•			
HiZ Fault Detection						•	
<b>PROTECTION &amp; CONTROL</b>							
Directional Power	32	P163	•		•	•	•
Dir., Negative Sequence	67N_2		•		•	•	•
Dir., Phase	67P	P163	•		•	•	•
Dir., Neutral/Ground	67N/G	P162/3	•		•	•	•
Breaker Failure	50BF	•	•	Logic	•	•	•
Instantaneous Overcurrent - Phase	50P	•	•	•	•	•	•
Instantaneous Overcurrent - Neutral	50N	•	•	•	•	•	•
Time Overcurrent - Phase	51P	•	•	•	•	•	•
Time Overcurrent - Neutral	51N	•	•	•	•	•	•
Voltage-Dependent Overcurrent	51V	P163 (VRO)	VCO/VRO		VCO/VRO	VCO/VRO	
Time Overcurrent - Ground	51G	•	•	•	•	•	•
Time Overcurrent - Neg. Seq.	51_2	•	•		•	•	•
Neutral Admittance Protection		P162/3			•		
Sensitive Ground Fault Overcurrent / SEF	50SG/51SG	P162/3	•	•	•	•	•
Undervoltage, Phase/Auxiliary	27 P/X	P/X (P163)	P/X	P/X	P	P/X	P
Restricted Ground / Earth Fault	87G/RGF/REF	P162/3	•		•		•
Second Harmonic Restraint		•			•		•
Wattmetric Zero Seq. Directional			•	•	•	•	
High Impedance Fault Detection (Hi-Z)	HiZ					•	
Transient Ground Fault Detection	TEFD				P144		
Overvoltage - Phase	59P	P/X (P163)	•		P	•	P
Overvoltage - Auxiliary	59X			•		•	
Overvoltage - Neutral	59N	P163	•	•	•	•	•
Overvoltage - Negative Sequence	59_2		•		•	•	
Arc Flash Detection			•				
Graphical Display with Bay Control & Monitoring		P163	•				
Synchronism Check	25	P163	•		P143/P145	•	•
Current Disturbance Detector	50DD			•		•	
AC Reclosing (Shots)	79	P162/3	4	4	P142/3/5	4	
Underfrequency	81U	P163	•	•	•	•	•
Overfrequency	81O	P163	•		•	•	•
Load-Shedding by df/dt and/or dv/dt	81R				•		
Frequency supervised ROCOF, Ave. ROCOF, Load restoration					•		
Lockout Protection	86	•	•	•	•	•	•
Broken Conductor Detection	I2/I1	•	•	•	•	•	•
Voltage Transformer Fuse Failure	VTFF/VTS	P163	•		•	•	•
Current Transformer Supervision	CTS	•			•		•
Thermal Overload (Thermal Model)	49	•	•		•		•
Dynamic Line Thermal	49DL						•
Power Factor	55		•				
Sensitive Ground Directional Element	67SG	P163	•		•	•	•
Temperature monitoring (RTD)	38/49T		•	•		•	
Load Encroachment			•		•	•	•
Custom programmable/FlexCurves™ curves			•	•	•	•	•
<b>HARDWARE</b>							
Number of Current Inputs		7	5	24	5	4	4
Number of Voltage Inputs		1(P162), 4(P163)	4	12	4	4	4
Contact Inputs (Min. & Max.)		18	7 to 14		up to 48		8 to 24
Contact Outputs (Min. & Max.)		12	4 to 10		up to 32		7 to 24
Types of outputs (Form-A)		11	2 to 4	40	up to 24	40	18
Types of outputs (Form-C)		1	4 to 9	40	up to 8	40	6
Types of outputs - High Breaking Duty	HSHB				up to 8		4
Harsh Environment Conformal Coating			•	•	•	•	•
Draw-out Design			•				

Feeder Protection

Features Continued

Device	P161/2/3	850	F35	P141/2/3/4/5	F60	P341
<b>AUTOMATION</b>						
Settings Groups	4	6	6	4	6	4
Non-volatile latches (including contact latches) (up to)		•		•	•	
Trip/Close Coil Supervision	TCM(74) / CCM	•	•		•	•
FlexElements™ (Number of Elements)		8	16		8	
Breaker Control		•	•		•	
Programmable Logic		•	•		•	•
Timers (Number)	80	32	32	16	32	16
Digital Counters (Number)	20	16	8		8	
Digital Elements/Limit Values (Number)	500		48	300	48	300
Virtual Inputs		32				
GOOSE Virtual Inputs / Remote Inputs / RxGOOSE Boolean Inputs (up to)	128	32	64	128	64	64
Virtual Outputs		32				
GOOSE Virtual Outputs / Remote Outputs / TxGOOSE Boolean Outputs (up to)	128	32	96	32	96	64
<b>MONITORING &amp; METERING</b>						
Voltage		• (P163)	•	•	•	•
Current		•	•	•	•	•
Power Factor		• (P163)	•	•	•	•
Real, Reactive & Apparent Power		• (P163)	•	•	•	•
Current, MW, MVAR, MVA Demand		• (P163)	•	•	•	•
Energy		• (P163)	•	•	•	•
Frequency		• (P163)	•	•	•	•
Frequency Decay			•		•	
Transducer Analog Inputs/Outputs				•	•	
Fault Location	21FL	P163	•	•	•	•
Event Recorder - Number of Events		10000	1024	1024	512	1024
Oscillography/Transient Recorder - Sampling Rate		36	128	64	24	64
Breaker Arcing Current			•	•	•	
Breaker Health			•			
Battery Voltage Monitoring						
Environmental Monitoring			•			
Data Logger/Trend Recording			•	•	•	
THD & Harmonics Meter			•	•	•	
<b>COMMUNICATIONS</b>						
Front Port Local Access		•		•	•	•
Rear Communication Interface (RS422/RS485)		RS485	RS485	•	RS485	RS485
RS422 Port, G.703, C73.94				•	•	
Ethernet		•	•	•	•	•
Fiber		•	•	•	•	•
USB Front Port		•	•	•	•	
Wifi			•			
ModBus Serial		•	•			•
ModBus TCP/IP			•			
DNP3.0 Serial			•	•	•	
DNP3.0 TCP/IP			•	•	•	
IRIG-B Input			•	•	•	•
TCP/IP			•	•	•	
Simple Network Time Protocol (SNTP)		•	•	•	•	
IEEE 1588			•			
IEC 60870-5-103		•	•			•
IEC 60870-5-104			•	•	•	
Courier Protocol				•		•
IEC61850 Protocol		•	•	•	•	•
IEC62439 / PRP		•	•	•	•	•
IEC62439 / HSR				•		•

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