


Distribution Feeder Protection – Selector Guide

Features	350	F650	750/760	P14N/D/DH	P94V	P161/2/3	850E
APPLICATIONS & FUNCTIONALITY							
Parallel Feeders / Mesh Network Protection	•			P14D/DH		P163	
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			
Advanced M&D features							•
PROTECTION & CONTROL							
Volts/Hz	•						
Directional Power	•	•	•	P14D/DH		P163	•
Dir., Negative Sequence			•	P14D/DH			•
Dir., Phase	•	•	•	P14D/DH		P163	•
Dir., Neutral/Ground	•	•	•	P14D/DH		P162/3	•
Undercurrent Detection							
SOTF: Switch Onto Fault							
Breaker Failure	•	•	•	•		•	•
Instantaneous Overcurrent - Phase	•	•	•	•		•	•
Instantaneous Overcurrent - Neutral	•	•	•	•		•	•
Time Overcurrent - Phase	•	•	•	•		•	•
Time Overcurrent - Neutral	•	•	•	•		•	•
Voltage-Dependent Overcurrent				P14D (VCO/ VRO)		P163 (VRO)	
Time Overcurrent - Ground	•	•	•	•		•	•
Time Overcurrent - Neg. Seq.	•	•	•	•		•	•
Neutral Admittance Protection				P14D		P162/3	•
Sensitive Ground Fault Overcurrent / SEF	•	•	•	P14N/D		P162/3	•
AC Circuit Breaker Pole Discordance							
Undervoltage, Phase/Auxiliary	P/X	P/X	P/X	P (P14D/DH)	P	P/X (P163)	P/X
Restricted Ground / Earth Fault			•	P14N/D		P162/3	•
Second Harmonic Restraint	•			•	•	•	•
Wattmetric Zero Seq. Directional		•		P14D			•
High Impedance Fault Detection (Hi-Z)				P14N/D			
Transient Ground Fault Detection				P14DH			•
Negative Sequence overcurrent (IOC and TOC)							•
Overvoltage - Phase	•	•	•	P	P	P/X (P163)	•
Overvoltage - Auxiliary	•	x					•
Overvoltage - Neutral	•	•	•	•	•	P163	•
Overvoltage - Negative Sequence	•	x		•	•		•
Voltage vector shift				P14D			
Arc Flash Detection	•			50G/SG HS			•
Graphical Display with Bay Control & Monitoring		•				•	•
Synchronism Check	•	•	•	P14D/DH		P163	•
Current Disturbance Detector							
Out of Step							
AC Reclosing (Shots)	4	4	4	P14N/D		P162/3	4
Underfrequency	•	•	•	P14D/DH	•	P163	•
Overfrequency	•	•	•	•	•	P163	•
Dv/dt rate of change of voltage							•
Df/dt rate of change of frequency				•			•
Frequency supervised ROCOF, Ave. ROCOF, Load restoration		x		P14D	•		•
Lockout	•	•	•	•	•	•	•
Broken Conductor Detection	•	•		•			•
Voltage Transformer Fuse Failure	•	•	•	P14D/DH		P163	•
Current Transformer Supervision	•			P14D		•	•
CLP – Cold Load Pickup	•						•
Thermal Overload (Thermal Model)	•	•		•		•	•
Dynamic Line Thermal							
Switchgear Control and Configurable SLD							•
Display/Control of Swg. Elements from HMI							10/12
Power Factor			•				•
Sensitive Ground Directional Element	•	•	•	P14D		P163	•
Load Encroachment		•		P14D			•
Custom programmable/FlexCurves™ curves	•	•	•	•	•		•
Phasor/Harmonic measurement graphical display							•

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Features	350	F650	750/760	P14N/D/DH	P94V	P161/2/3	850E
HARDWARE							
Number of Current Inputs	4	5	5	4		7	4 or 8
Number of Voltage Inputs	4	4		4 (P14D/DH)	4	1(P162), 4(P163)	5 or 8
Contact Inputs (Min. & Max.)	10	8 to 128	14	3 to 13	3 to 13	18	7 to 50
Contact Outputs (Min. & Max.)	7	8 to 32	8	4 to 12	4 to 12	12	5 to 23
Types of outputs (Form-A)	2			12	12	11	2 to 20
Types of outputs (Form-C)	5	16				1	1 to 9
Types of outputs - High Breaking Duty							
Harsh Environment Conformal Coating	•	•	•	•	•		•
Draw-out/Non-Drawout Design	•	•	•	•	•		•
Solid State Output Relay	2						4 to 12
Field Swappable Power Supply							•
AUTOMATION							
Settings Groups	2	3	4	4	4	4	6
Setting mode- Simple/Advanced							•
Non-volatile latches (including contact latches) (up to)		•		•	•		•
Trip/Close Coil Supervision	•	•	•	•	•	•	•
User Definable Protection (Flexible Protection, Customized Functions)	8 to 16						8
Breaker Control	•	•	•	•	•	•	•
Programmable Logic	•	•	•	•	•	•	•
Timers (Number)	x	8 max per scheme	•	16	16	80	32
Digital Counters (Number)		8				20	16
Digital Elements/Limit Values (Number)	16	512		300	300	500	
Virtual Inputs	32	32					64
GOOSE Virtual Inputs / Remote Inputs / RxGOOSE Boolean Inputs (up to)	32	32	14	32	32	128	64
Virtual Outputs		512					96
GOOSE Virtual Outputs / Remote Outputs / TxGOOSE Boolean Outputs (up to)	32	32	16	32	32	128	64
Maintenance/Simulation Mode (Test/Commission Facilities)							•
MONITORING & METERING							
Voltage	•	•	•	P14D/DH	•	(P163)	•
Current	•	•	•	•		•	•
Power Factor	•	•	•	P14D/DH		(P163)	•
Real, Reactive & Apparent Power	•	•	•	P14D/DH		(P163)	•
Current, MW, MVAR, MVA Demand	•	•	•	P14D/DH		(P163)	•
Energy	•	•	•	P14D/DH		(P163)	•
Frequency	•	•	•	P14D/DH	•	(P163)	•
Frequency Decay		•	•				
Transducer Analog Inputs/Outputs		•	•				
Fault Location		•	•	P14D		P163	•
Event Recorder - Number of Events	256	479	512	2048	2048	10000	1024
Oscillography/Transient Recorder - Sampling Rate	32	programmable (to 64)	16	24	24	36	128
Breaker Arcing Current		•	•				•
Breaker Health	•	x					•
Battery Voltage Monitoring				•	•		
Environmental Monitoring							•
Data Logger/Trend Recording		•	•				•
THD & Harmonics Meter							•
COMMUNICATIONS							
Front Port Local Access	•	•	•	•	•	•	•
Rear Communication Interface (RS422/RS485)	x	x		RS485	RS485	RS485	RS485
Serial (fiber)		•					
Ethernet (copper)	•	•	•	•	•	•	•
Ethernet (Fiber)	1	2			1	2	•
USB Front Port	•	•		•	•	•	•
Wifi							•
ModBus Serial	•	•	•	•	•	•	•
ModBus TCP/IP	•	•	•	•	•	•	•
DNP3.0 Serial	•	•	•	•	•	•	•
DNP3.0 TCP/IP	•	•	•	•	•	•	•
IRIG-B Input	•	•	•	•	•	•	•
Simple Network Time Protocol (SNTP)	•	•		•	•	•	•
IEEE 1588 (PTP)	•	•					•
IEC 60870-5-103	•	•		•	•	•	•
IEC 60870-5-104	•	•					•
Courier Protocol				•	•		
IEC61850 Protocol	•	•		•	•	•	•
IEC62439 / PRP	•	•		•	•	•	•
IEC62439 / HSR	•	•		•			
Link Loss Alert (LLA)	•						

Feeder Protection

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Features	850D	850P	F35	P141/2/3/4/5	F60	P341	P15D	P154
APPLICATIONS & FUNCTIONALITY								
Parallel Feeders / Mesh Network Protection				•		•		
Isolated Ground / Petersen Coil Compensated	•			P144				
Feeders with Reclosure Automation	•			P142/3/4/5	•	•		
Advanced Feeder Protection	•			•	•	•		
LV/MV Bus Transfer Schemes (ATS)	•			•	Logic			
Up to 6 Feeders in One Box			•					
HiZ Fault Detection					•			
Advanced M&D features	•	•						
PROTECTION & CONTROL								
Volts/Hz								
Directional Power	•			•	•	•		
Dir., Negative Sequence	•			•	•	•		
Dir., Phase	•			•	•	•		
Dir., Neutral/Ground	•			•	•	•		
Undercurrent Detection	•							
SOTF: Switch Onto Fault	•				Logic			
Breaker Failure	•	•	Logic	•	•	•		•
Instantaneous Overcurrent - Phase	•	•	•	•	•	•	•	•
Instantaneous Overcurrent - Neutral	•	•	•	•	•	•		•
Time Overcurrent - Phase	•	•	•	•	•	•	•	•
Time Overcurrent - Neutral	•	•	•	•	•	•		•
Voltage-Dependent Overcurrent				VCO/VRO	VCO/VRO			
Time Overcurrent - Ground	•	•	•	•	•	•	•	•
Time Overcurrent - Neg. Seq.	•	•		•	•	•		•
Neutral Admittance Protection	•			•				
Sensitive Ground Fault Overcurrent / SEF	•		•	•	•	•		•
AC Circuit Breaker Pole Discordance	•							
Undervoltage, Phase/Auxiliary	P/X		P/X	P	P/X	P		
Restricted Ground / Earth Fault	•			•		•		•
Second Harmonic Restraint	•	•		•		•	•	•
Wattmetric Zero Seq. Directional	•		•	•	•			
High Impedance Fault Detection (Hi-Z)					•			
Transient Ground Fault Detection	•			P144				
Negative Sequence overcurrent (IOC and TOC)	•	•			•			
Overvoltage - Phase	•			P	•	P		
Overvoltage - Auxiliary	•		•		•			
Overvoltage - Neutral	•	•	•	•	•	•		
Overvoltage - Negative Sequence	•	•		•	•			
Voltage vector shift						•		
Arc Flash Detection	•							
Graphical Display with Bay Control & Monitoring	•	•	•		•			
Synchronism Check	•			P143/P145	•	•		
Current Disturbance Detector			•		•			
Out of Step								
AC Reclosing (Shots)	4		4	P142/3/5	4			
Underfrequency	•		•	•	•	•		
Overfrequency	•			•	•	•		
Dv/dt rate of change of voltage	•			•	•	•		
Df/dt rate of change of frequency	•				•	•		
Frequency supervised ROCOF, Ave. ROCOF, Load restoration	•			•				
Lockout	•		•	•	•	•		•
Broken Conductor Detection	•		•	•	•	•		•
Voltage Transformer Fuse Failure	•			•	•	•		
Current Transformer Supervision	•			•		•		
CLP – Cold Load Pickup	•							
Thermal Overload (Thermal Model)	•			•		•	•	•
Dynamic Line Thermal						•		
Switchgear Control and Configurable SLD	•	•			•			
Display/Control of Swg. Elements from HMI	10/12	10/12			•			
Power Factor	•				•			
Sensitive Ground Directional Element	•			•	•	•		
Load Encroachment	•			•	•			
Custom programmable/FlexCurves™ curves	•	•	•	•	•	•		
Phasor/Harmonic measurement graphical display	•	•			•			

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Features	850D	850P	F35	P141/2/3/4/5	F60	P341	P15D	P154
HARDWARE								
Number of Current Inputs	4 or 8	12	24	5	8	4	4	4
Number of Voltage Inputs	6 or 8	4VT or 6 LEA	12	4	8	4		
Contact Inputs (Min. & Max.)	7 to 50	7 to 50		up to 48	up to 80	8 to 24	4	6
Contact Outputs (Min. & Max.)	5 to 23	5 to 23		up to 32	up to 64	7 to 24	2	6
Types of outputs (Form-A)	2 to 20	2 to 20	40	up to 24	40	18		
Types of outputs (Form-C)	1 to 9	1 to 9	40	up to 8	40	6	2	6
Types of outputs - High Breaking Duty				up to 8		4		
Harsh Environment Conformal Coating	•	•	•	•	•	•		
Draw-out/Non-Drawout Design	•	•						
Solid State Output Relay	4 to 12	4 to 12			up to 20			
Field Swappable Power Supply	•	•			•			
AUTOMATION								
Settings Groups	6	6	6	4	6	4	2	2
Setting mode- Simple/Advanced	•	•						
Non-volatile latches (including contact latches) (up to)	•	•		•	•			
Trip/Close Coil Supervision	•	•		•	•	•		•
User Definable Protection (Flexible Protection, Customized Functions)	8	8	16		8			
Breaker Control	•	•		•	•			•
Programmable Logic	•	•		•	•	•		
Timers (Number)	32	32	32	16	32	16		
Digital Counters (Number)	16	16	8		8			
Digital Elements/Limit Values (Number)			48	300	48	300		4
Virtual Inputs	64	64			64			
GOOSE Virtual Inputs / Remote Inputs / RxGOOSE Boolean Inputs (up to)	64	64	64	128	64	64		
Virtual Outputs	96	96			96			
GOOSE Virtual Outputs / Remote Outputs / TxGOOSE Boolean Outputs (up to)	64	64	96	32	96	64		
Maintenance/Simulation Mode (Test/Commission Facilities)	•	•						
MONITORING & METERING								
Voltage	•	•	•	•	•	•		
Current	•	•	•	•	•	•	•	•
Power Factor	•	•	•	•	•	•		
Real, Reactive & Apparent Power	•	•	•	•	•	•		
Current, MW, MVAR, MVA Demand	•	•	•	•	•	•		
Energy	•	•	•	•	•	•		
Frequency	•	•	•	•	•	•		
Frequency Decay					•			
Transducer Analog Inputs/Outputs			•		•			
Fault Location	•	•	•	•	•	•		
Event Recorder - Number of Events	1024	1024	1024	512	1024	512	100	512
Oscillography/Transient Recorder - Sampling Rate	128	128	64	24	64	24	12	16
Breaker Arcing Current	•	•	•		•			
Breaker Health	•	•						
Battery Voltage Monitoring								
Environmental Monitoring	•	•						
Data Logger/Trend Recording	•	•	•		•			
THD & Harmonics Meter	•	•	•		•			
COMMUNICATIONS								
Front Port Local Access			•	•	•	•	•	•
Rear Communication Interface (RS422/RS485)	RS485	RS485	•	RS485	•	RS485	RS485	RS485
Serial (fiber)			•		•			
Ethernet (copper)	•	•	•	•	•	•		
Ethernet (Fiber)	•	•	2	2	2	2	3	2
USB Front Port	•	•	•		•		•	•
Wifi	•	•						
ModBus Serial	•	•		•	•	•	•	•
ModBus TCP/IP	•	•						
DNP3.0 Serial	•	•	•	•	•			
DNP3.0 TCP/IP	•	•	•	•	•			
IRIG-B Input	•	•	•	•	•	•		
Simple Network Time Protocol (SNTP)	•	•	•	•	•			
IEEE 1588 (PTP)	•	•			•			
IEC 60870-5-103	•	•		•		•	•	•
IEC 60870-5-104	•	•	•		•			
Courier Protocol				•		•		
IEC61850 Protocol	•	•	•	•	•	•		
IEC62439 / PRP	•	•	•	•	•	•		
IEC62439 / HSR				•		•		
Link Loss Alert (LLA)								

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