Selection table

		Substation		Transformer		Motor	Generator		Cap.
Protection	**ANSI code**	**S60**	**S62**	**T60**	**T62**	**M61**	**G60**	**G62**	**C60**
Phase overcurrent (1)	50/51	4	4	4	4	4	4	4	4
Earth fault / Sensitive earth fault (1)	50N/51N 50G/51G	4	4	4	4	4	4	4	4
Breaker failure	50BF	1	1	1	1	1	1	1	1
Negative sequence / unbalance	46	2	2	2	2	2	2	2	2
Thermal overload for cables	49RMS		1						
Thermal overload for machines (1)	49RMS			2	2	2	2	2	
Thermal overload for capacitors	49RMS								1
Restricted earth fault	64REF			2	2				
Directional phase overcurrent (1)	67		2		2			2	
Directional earth fault (1)	67N/67NC		2		2	2		2	
Directional active overpower	32P		2		2	2	2	2	
Directional reactive overpower	32Q					1	1	1	
Directional active underpower	37P						2	2	
Phase undercurrent	37					1			
Excessive starting time, locked rotor	48/51LR/14					1			
Starts per hour	66					1			
Field loss (underimpedance)	40					1	1	1	
Overspeed (2 set points) (2)	12					□	□	□	
Underspeed (2 set points) (2)	14					□	□	□	
Voltage-restrained overcurrent	50V/51V						1	1	
Underimpedance	21B						1	1	
Undervoltage (L-L or L-N)	27	2	2	2	2	2	2	2	2
Positive sequence undervoltage	27D	2	2	2	2	2	2	2	2
Remanent undervoltage	27R	2	2	2	2	2	2	2	2
Overvoltage (L-L or L-N)	59	2	2	2	2	2	2	2	2
Neutral voltage displacement	59N	2	2	2	2	2	2	2	2
Negative sequence overvoltage	47	2	2	2	2	2	2	2	2
Overfrequency	81H	2	2	2	2	2	2	2	2
Underfrequency	81L	4	4	4	4	4	4	4	4
Rate of change of frequency	81R	2	2				2	2	
Recloser (4 cycles) (2)	79	□	□						
Thermostat / Buchholz (2)	26/63			□	□	□	□	□	
Temperature monitoring (2x8RTDs) (3)	38/49T			□	□	□	□	□	□
Synchro-check (4)	25	□	□	□	□		□	□	
Control and monitoring									
Circuit breaker / contactor control (2)	94/69	□	□	□	□	□	□	□	□
Automatic transfer sources (ATS) (2)		□	□	□	□		□	□	
Load shedding / automatic restart (2)						□			
De-excitation (2)							□	□	
Genset shutdown (2)							□	□	
Logic discrimination (2)	68	□	□	□	□	□	□	□	□
Latching / acknowledgement	86	■	■	■	■	■	■	■	■
Annunciation	30	■	■	■	■	■	■	■	■
Switching of groups of settings		■	■	■	■	■	■	■	■
Adaptation using logic equations		■	■	■	■	■	■	■	■

The figures indicate the number of relays available for each protection function.
■ *standard,* □ *options.*
(1) Protection functions with 2 groups of settings.
(2) According to parameter setting and optional MES120 input/output modules.
(3) With optional MET148-2 temperature input modules.
(4) With optional MCS025 synchro-check module.

Selection table

	Substation		Transformer		Motor	Generator		Cap.
Metering	**S60**	**S62**	**T60**	**T62**	**M61**	**G60**	**G62**	**C60**
Phase current I1, I2, I3 RMS	■	■	■	■	■	■	■	■
Residual current Io, sum Io	■	■	■	■	■	■	■	■
Demand current I1, I2, I3	■	■	■	■	■	■	■	■
Peak demand current IM1, IM2, IM3	■	■	■	■	■	■	■	■
Voltage U21, U32, U13, V1, V2, V3	■	■	■	■	■	■	■	■
Residual voltage V0	■	■	■	■	■	■	■	■
Positive sequence voltage Vd / rotation direction	■	■	■	■	■	■	■	■
Negative sequence voltage Vi	■	■	■	■	■	■	■	■
Frequency	■	■	■	■	■	■	■	■
Active power P, P1, P2, P3	■	■	■	■	■	■	■	■
Reactive power Q, Q1, Q2, Q3	■	■	■	■	■	■	■	■
Apparent power S, S1, S2, S3	■	■	■	■	■	■	■	■
Peak demand power PM, QM	■	■	■	■	■	■	■	■
Power factor	■	■	■	■	■	■	■	■
Calculated active and reactive energy (±Wh, ±VARh)	■	■	■	■	■	■	■	■
Active and reactive energy by pulse counting [2] (± Wh, ± VARh)	□	□	□	□	□	□	□	□
Temperature (2x8RTDs) [3]			□	□	□	□	□	□
Rotation speed [2]					□	□	□	
Network and machine diagnosis								
Tripping context	■	■	■	■	■	■	■	■
Tripping current Trip I1, Trip I2, Trip I3, Trip Io	■	■	■	■	■	■	■	■
Phase fault and earth fault trip counters	■	■	■	■	■	■	■	■
Unbalance ratio / negative sequence current Ii	■	■	■	■	■	■	■	■
Harmonic distortion (THD)	■	■	■	■	■	■	■	■
Current and voltage Ithd, Uthd	■	■	■	■	■	■	■	■
Phase displacement φ1, φ2, φ3	■	■	■	■	■	■	■	■
Disturbance recording recorded	■	■	■	■	■	■	■	■
Thermal capacity used		■	■	■	■	■	■	■
Remaining operating time before overload tripping		■	■	■	■	■	■	■
Waiting time after overload tripping		■	■	■	■	■	■	■
Running hours counter / operating time			■	■	■	■	■	■
Starting current and time					■			
Start inhibit time					■			
Number of starts before inhibition					■			
Cable arcing fault detection	■	■	■	■	■	■	■	■
Apparent positive sequence impedance Zd	■	■	■	■	■	■	■	■
Apparent phase-to-phase impedances Z21, Z32, Z13	■	■	■	■	■	■	■	■
Third harmonic voltage, neutral point or residual						■	■	
Difference in amplitude, frequency and phase of voltages compared for synchro-check [4]	□	□	□	□		□	□	
Switchgear diagnosis	**ANSI code**							
CT / VT supervision	60/60FL	■	■	■	■	■	■	■	■
Trip circuit supervision [2]	74	□	□	□	□	□	□	□	□
Cumulative breaking current		■	■	■	■	■	■	■	■
Number of operations, operating time, charging time, number of racking out operations [2]		□	□	□	□	□			
Additional moduls								
2 modules MET148-2 of 8 temperature sensor inputs. [3]				□	□	□	□	□	□
1 low level analog output - MSA141 module		□	□	□	□	□	□	□	□
Logic inputs/outputs - MES114/MES114E/MES114F (10I/4O) module		□	□	□	□	□	□	□	□
Communication interface - ACE949-2, ACE959, ACE937, ACE969TP-2, ACE969FO-2, ACE850FP, ACE850F0 or ECI850		□	□	□	□	□	□	□	□

■ *standard,* □ *options.*
(2) According to parameter setting and optional MES120 input/output modules.
(3) With optional MET148-2 temperature input modules.
(4) With optional MCS025 synchro-check module.