ANSI	Function	Abbr.	Available	Application Templates				
				1	2	3	4	5
	Expandable hardware quantity structure	I/O	■					
	Process bus client protocol (hint: PB client requires a separate ETH-BD-2FO plug-in module, from V8.0)	PB client	■					
	IEC61850-9-2 Merging Unit Stream (hint: Each stream requires a separate ETH-BD-2FO plug-in module, from V8.0)	MU	■					
21T	Impedance protection for transformers	Z<	■				■	■
24	Overexcitation protection	V/f	■	■	■	■	■	■
25	Synchrocheck, synchronization function	Sync	■				■	
25	Synchronization function with adjusting commands	Sync	■					
27	Undervoltage protection: "3-phase" or "positive-sequence system V1" or "universal Vx"	V<	■	■	■			
27	Undervoltage protection: "3-phase" or "universal Vx"	V<	■					
27R, 59R	Voltage change protection (starting with V8.30)	dV/dt	■					
	Undervoltage-controlled reactive power protection	Q>/V<	■					
32, 37	Power protection active/reactive power	P<>, Q<>	■					
32R	Reverse-power protection	- P<	■	■	■	■	■	■
37	Undercurrent	I<	■					
37	Power-plant disconnection protection	-dP	■					
38	Temperature supervision	θ>	■					
40	Underexcitation protection	1/xd	■		■	■	■	■
46	Negative-sequence system overcurrent protection	I2>	■					
46	Unbalanced-load protection (thermal)	$I2^2$ t>	■	■	■	■	■	■
46	Negative-sequence system and overcurrent protection with direction	I2>, ∠(V2, I2)	■					
47	Overvoltage protection, negative-sequence system	V2>	■					
47	Overvoltage protection, negative-sequence system/positive-sequence system	V2/V1>	■					
48	Starting time monitoring for motors	I^2start	■					
49	Thermal overload protection	θ, I^2t	■		■	■	■	■
49	Thermal overload protection, user-defined characteristic curve	θ, I^2t	■					
49H	Hotspot calculation	θh, I^2t	■					
49R	Thermal overload protection, rotor (motor)	θR	■					
49F	Field-winding overload protection	IL^2 t	■					
49S CG	Stator overload protection with cold gas consideration	θ, I^2t	■					
49R CG	Field-winding overload protection with cold gas consideration	θ, IL^2t	■					
50/51 TD	Overcurrent protection, phases	I>	■					
	Instantaneous tripping at switch onto fault	SOTF	■					
50HS	Instantaneous high-current tripping	I>>>	■					
50/51 TD	Overcurrent protection with positive-sequence current I1 (from V7.9)	I1>	■					
50N/ 51N TD	Overcurrent protection, ground	IN>	■					
50N/ 51N TD	Overcurrent protection, 1-phase	IN>	■					

Generator Protection – SIPROTEC 7UM85

ANSI	Function	Abbr.	Available	Application Templates				
				1	2	3	4	5
50 Ns/ 51Ns	Sensitive ground-fault detection for grounded arc suppression coils and isolated power systems including a) 3I0> b) admittance Y0>, c) 3I0-harm> (from V7.8)	INs>	■					
50 Ns/ 51Ns	Sensitive ground-current protection for power systems with resonant or isolated neutral	INs>	■					
	Intermittent ground-fault protection	IIE>	■					
50GN	Shaft-current protection	INs>	■					
50/27	Inadvertent energization protection (to halted generator)	I>, V< dropout	■					
50N DC, 27.59F DC	Direct current/direct-voltage protection	IDC<>, VDC <>	■					■
50	Startup overcurrent protection	I-Anf>	■					
50BF	Circuit-breaker failure protection, 3-pole	CBFP	■				■	■
50RS	Circuit breaker restrike monitoring	CBRM	■					
50L	Load-jam protection	I>L	■					
51V	Voltage-controlled overcurrent protection	t=f(I, V)	■	■	■	■	■	■
59, 59N	Overvoltage protection: "3-phase" or "zero-sequence system V0" or "positive-sequence system V1" or "universal Vx"	V>	■	■	■	■	■	■
59N, 67Ns	Stator ground-fault protection (non-directional, directional)	V0>, ∠(V0, I0)	■	■	■	■	■	■
27TH, 59TH, 59 THD	Stator ground-fault protection with 3rd harmonic	V03.H<, V03.H>; ΔV03.H	■			■		
59N IT	Turn-to-turn Fault Protection	V0>	■					
60	Voltage-comparison supervision	ΔV>	■					
64S	100 % stator ground-fault protection (20 Hz)	RSE<	■				■	■
64F, frated	Rotor ground-fault protection (IRE>, fn)	IRE>	■	■	■	■		
64F, frated	Rotor ground-fault protection (RE<, fn)	IRE<	■				■	
64F (1-3Hz)	Rotor ground-fault protection (1 - 3 Hz)	IRE<	■					■
66	Restart inhibit for motors	I²t	■					
67	Directional overcurrent protection, phases	I>, ∠(V, I)	■					
67N	Directional overcurrent protection, ground	IN>, ∠(V, I)	■					
67N	Directional ground-fault protection in grounded power systems	IN>, ∠(V, I)	■					
67 Ns	Sensitive ground-fault detection for grounded arc suppression coils and isolated power systems including a) 3I0> b) V0>, c) cos/sine Phi, d) transient ground fault, e) Phi(V, I), f) admittance		■					
	Directional tripping stage with one harmonic; hint: this stage also requires the function "67Ns sensitive ground-fault detection for grounded arc suppression coils and isolated power systems"	∠(V0h,I0h)	■					
	Directional Intermittent Ground-Fault Protection	IIEdir>	■					
68	Power-swing blocking	ΔZ/Δt	■					
74TC	Trip-circuit supervision		■	■	■	■	■	
78	Out-of-step protection	ΔZ/Δt	■				■	■
74CC	Single circuit monitoring (from V7.9)		■					
81	Frequency protection: "f>" or "f<" or "df/dt"	f<>; df/dt<>	■	■	■	■	■	■
81 AF	Abnormal frequency protection	fBand	■					
81U	Underfrequency load shedding	f<(ULS)	■					
	Vector-jump protection	Δφ>	■					
87B	Busbar differential protection for the 7UM85 (starting with V8.01)	ΔI	■					

ANSI	Function	Abbr.	Available	Application Templates				
				1	2	3	4	5
	Bay		■					
86	Lockout		■	■	■	■	■	■
87T	Transformer Differential Protection	ΔI	■			■	■	
87N T	Restricted ground-fault protection	ΔIN	■					
87M	Differential motor protection	ΔI	■					
87G	Generator differential protection	ΔI	■		■		■	■
PMU	Synchrophasor measurement	PMU	■					
AFD	Arc protection (only with plug-in module ARC-CD-3FO)		■					
	Measured values, standard		■	■	■	■	■	■
	Measured values, extended: Min, max, average		■					
	Switching statistics counter		■	■	■	■	■	■
	PQ – Basic measured values: THD (Total Harmonic Distortion) and harmonic component (starting with V8.01) and THD voltage average values (starting with V8.40)		■					
	PQ – Basic measured values: Voltage unbalance (starting with V8.40)		■					
	PQ – Basic measured values: Voltage changes – monitoring of voltage dips, overvoltages and voltage interruptions (starting with V8.40)		■					
	PQ – Basic measured values: TDD - Total Demand Distortion (starting with V8.40)		■					
	CFC (standard, control)		■	■	■	■	■	■
	CFC arithmetic		■					
	Circuit-breaker wear monitoring	ΣIx, I²t, 2P	■					
	Switching sequence function		■					
	Inrush-current detection		■					
	External trip initiation		■					
	Control		■	■	■	■	■	■
PoW	Point-on-wave switching (starting with V7.90)	PoW	■					
	Circuit breaker		■	■	■	■	■	■
	Disconnector/grounding conductor		■					
	Fault recording of analog and binary signals		■	■	■	■	■	■
	Monitoring		■	■	■	■	■	■
	Protection interface, serial		■					
	Frequency group tracking (from V7.8)		■					
	Cyber security: Role-Based Access Control (from V7.8)		■					
	Temperature recording via communication protocol		■					
	Cyber security: Authenticated network access using IEEE 802.1X (starting from V8.3)		■					
	Transformer side 7UM85		■					
Function point class:				0	100	125	350	275
The configuration and function point class for your application can be determined in the SIPROTEC 5 order configurator at *www.siemens.com/siprotec*.								

Table 2.13/1 SIPROTEC 7UM85 – Functions, Application Templates

(1) Generator basis

(2) Generator bus connection

(3) Generator unit connection basis

(4) Enhanced generator unit connection

(5) Large generator

Standard Variants for SIPROTEC 7UM85		
AA1	1/3, 11 BI, 9 BO, 4 V, 4 I,	
	Housing width 1/3 x 19"	
	11 binary inputs	
	9 binary outputs (1 life contact, 2 standard, 6 fast)	
	4 voltage-transformer inputs	
	3 current-transformer inputs	
	1 sensitive ground-current input	
	Contains the following modules: base module with PS201 and IO202	
AA2	1/3, 7 BI, 14 BO, 4 V, 4 I,	
	Housing width 1/2 x 19"	
	7 binary inputs	
	14 binary outputs (1 life contact, 5 standard, 8 fast)	
	4 voltage-transformer inputs	
	3 current-transformer inputs	
	1 sensitive ground-current input	
	Contains the following modules: base module with PS201 and IO208	
AA3	1/2, 15 BI, 20 BO, 8 V, 8 I,	
	Housing width 1/2 x 19"	
	15 binary inputs	
	20 binary outputs (1 life contact, 7 standard, 12 fast),	
	8 voltage-transformer inputs	
	6 current-transformer inputs	
	2 sensitive ground-current inputs	
	Contains the following modules: base module with PS201 and IO208	
	Expansion module IO202	
AA4	1/2, 11 BI, 16 BO, 7 V, 8 I, 4 MU	
	Housing width 1/2 x 19"	
	11 binary inputs	
	16 binary outputs (1 life contact, 5 standard, 10 fast),	
	7 voltage-transformer inputs	
	6 current-transformer inputs	
	2 sensitive ground-current inputs	
	4 fast measuring-transducer inputs (alternatively 20 mA, 10 V)	
	Contains the following modules: base module with PS201 and IO202	
	Expansion module IO210	
AA5	2/3, 15 BI, 20 BO, 7 V, 16 I, 4 MU	
	Housing width 1/2 x 19"	
	15 binary inputs	
	20 binary outputs (1 life contact, 5 standard, 14 fast)	
	7 voltage-transformer inputs	
	14 current-transformer inputs	
	2 sensitive ground-current inputs	
	4 fast measuring-transducer inputs (alternatively 20 mA, 10 V)	
	Contains the following modules: base module with PS201 and IO202	
	Expansion modules IO210 and IO203	

Table 2.13/2 Standard Variants for SIPROTEC 7UM85

You can find the technical data in the manual
www.siemens.com/siprotec.

7SJ81 Overcurrent-Time Protection - Overview Function points calculation

(P1J613099)

Functions Free of Charge

ANSI	Function	Abbr.	Included
	Protection functions for 3-pole tripping	3-pole	✓
37	Undercurrent	I<	✓
38	Temperature supervision	θ>	✓
46	Negative-sequence overcurrent protection	I2>	✓
49	Thermal overload protection	θ, I^2t	✓
	Instantaneous tripping at switch onto fault	SOTF	✓
50HS	Instantaneous high-current tripping	I>>>	✓
50N/ 51N TD	Overcurrent protection, ground	IN>	✓
50N/ 51N TD	Overcurrent protection, 1-phase	IN>	✓
50Ns/ 51Ns	Sensitive ground-current detection for systems with resonant or isolated neutral systems incl. a) 3I0>, b) admittance Y0>	INs>	✓
74TC	Trip-circuit supervision	TCS	✓
86	Lockout		✓
AFD	Arc-protection (only with plug-in module ARC-CD-3FO)		5 X ✓
	Measured values - standard		✓
	Switching statistic counters		✓
	PQ-Basic measured values: THD (Total Harmonic Distortion) and harmonics (from V8.01) THD voltage aggregation values (from V8.40)		✓
	CFC (Standard, control)		✓
	Switching sequences function		20 X ✓
	Inrush current detection		✓
	External trip initiation		✓

	Control		✓
	1 Circuit-breaker object (Qty. not extendable)		✓
	Disconnector/Grounding switch		3 X ✓
	3 Disconnector/Gnd. switch objects (Qty. not extendable)		✓
	Monitoring and supervision		✓
	Fault recording of analog and binary signals		✓
	Temperature acquisition via communication protocol		✓

Functions with Costs

ANSI	Function	Abbr.	Included	Quantity	Value	Points
25	Synchrocheck, synchronization function	Sync		0	50	0
27	Undervoltage protection: "3-phase" or "positive-sequence system V1"	V<		0	5	0
27R, 59R	Rate-of-voltage-change protection (from V8.30)	dV/dt		0	5	0
	Undervoltage-controlled reactive power protection	Q>/V<		0	15	0
32, 37	Power protection active/reactive power	P<>, Q<>		0	10	0
47	Overvoltage protection, negative-sequence system	V2>		0	5	0
50/51 TD	Overcurrent protection, phases	I>	2 X ✓	0	30	0
	Intermittent ground-fault protection	Iie>		0	20	0
50BF	Circuit-breaker failure protection, 3-pole	CBFP		0	5	0
59, 59N	Overvoltage protection: "3-phase" or "zero-sequence system V0"	V>		0	5	0
67	Directional overcurrent protection, phases			0	15	0
67N	Directional overcurrent protection, ground			0	15	0

67Ns	Dir. sensitive ground-fault detection for systems with resonant or isolated neutral incl. a) 3I0>, b) V0>, c) Cos-/SinPhi, d) Transient ground-fault fct., e) Phi(V,I), f) admittance			0	30	0
	Directional intermittent ground-fault protection	Iie dir>		0	20	0
79	Automatic reclosing, 3-pole	AR		0	35	0
81	Frequency protection: "f>" or "f<" or "df/dt"	f<>; df/dt<>		0	5	0
	Vector-jump protection	Δφ>		0	20	0
FL	Fault locator, single-sided	FL-one		0	25	0
	PQ-Basic measured values: Voltage unbalance (from V8.40)			0	20	0
	PQ-Basic measured values: Voltage variations - voltage dips, swells and interruptions (from V8.40)			0	30	0
	PQ-Basic measured values: TDD - Total Demand Distortion (from V8.40)			0	10	0
	CFC arithmetic			0	80	0
	Circuit-breaker monitoring (from V9.20)	ΣIx, I^2t, 2P, tO, tC, pole scatter, discepancy		0	10	0
	Disconnector monitoring (from V9.50)	tO, tC		0	5	0
	Multiplexing of protection interface			0	50	0
SSR	Slow-scan recorder (Mod.: from V8.80, Non-Mod.: from V9.40)	SSR	1 X ✓	0	40	0
CR	Continuous recorder (Mod.: from V9.20, Non-Mod.: from V9.40)	CR	1 X ✓	0	20	0
	Cyber Security: Role-Based Access Control (from V7.8)			0	25	0
	Cyber Security: IEEE 802.1x based network authentication (from V8.3)			0	10	0
27-CEI	Region Italy: undervoltage protection according to the CEI 0-16 standard (from V9.50)	V<		0	5	0

59-CEI	Region Italy: overvoltage protection according to the CEI 0-16 standard (from V9.50)	V>		0	5	0
81-CEI	Region Italy: frequency protection according to the CEI 0-16 standard (from V9.50)	f<>		0	10	0
Total:						0