

SIPROTEC 5 Devices and Fields of Application

Bay Controllers – SIPROTEC 6MD86

ANSI	Function	Abbr.	Available	Application Templates				
				1	2	3	4	5
	Protection functions for 3-pole tripping	3-pole	■	■	■	■	■	
	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	■					
	IEC61850-9-2 Merging Unit Stream 7SS85 CU (hint: Only for communication with a 7SS85 CU. A separate ETH-BD-2FO plug-in module is required starting with V8.40)	MU	■					
25	Synchrocheck, synchronization function	Sync	■		■	■	■	
27	Undervoltage protection: "3-phase" or "universal Vx"	V<	■					
27R, 59R	Voltage change protection (starting with V8.30)	dV/dt	■					
32, 37	Power protection active/reactive power	P<>, Q<>	■					
38	Temperature supervision	θ>	■					
46	Negative-sequence system overcurrent protection	I2>	■					
49	Thermal overload protection	θ, I²t	■					
50/51 TD	Overcurrent protection, phases	I>	■		■	■	■	
	Instantaneous tripping at switch onto fault	SOTF	■					
50HS	Instantaneous high-current tripping	I>>>	■					
50N/ 51N TD	Overcurrent protection, ground	IN>	■					
50BF	Circuit-breaker failure protection 1-pole/3-pole	CBFP	■				■	
50EF	End-fault protection (hint: For use only in decentralized busbar protection with a 7SS85 CU starting with V8.40)		■					
51V	Voltage-controlled overcurrent protection	t=f(I, V)	■					
59	Overvoltage protection: "3-phase" or "positive-sequence system V1" or "universal Vx"	V>	■					
67	Directional overcurrent protection, phases	I>, ∠(V, I)	■					
67N	Directional overcurrent protection, ground	IN>, ∠(V, I)	■					
74TC	Trip-circuit supervision		■					
74CC	Single circuit monitoring (from V7.9)		■					
79	Automatic reclosing, 1-pole/3-pole	AREC	■				■	
81	Frequency protection: "f>" or "f<" or "df/dt"	f<>; df/dt<>	■					
81U	Underfrequency load shedding	f<(ULS)	■					
86	Lockout		■					
90 V	Voltage controller for two-winding transformer		■					
90 V	Voltage controller for two-winding transformer with parallel control		■					
	Number of two-winding transformers with parallel control (hint: only together with the function "voltage controller for two-winding transformer with parallel control")		■					
90 V	Voltage controller for three-winding transformer		■					
90 V	Voltage controller for grid coupling transformer		■					
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		■		■	■	■	

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ANSI	Function	Abbr.	Available	Application Templates				
				1	2	3	4	5
	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	ΣI_x , I^2t , 2P	■					
	Switching sequence function		■			■		
	Inrush-current detection		■					
	External trip initiation		■					
	Control		■		■	■	■	■
PoW	Point-on-wave switching (starting with V7.90)	PoW	■					■
	Circuit breaker		■		■	■	■	■
	Disconnect/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)		■					
Function point class:				0	0	0	75	200
The configuration and function point class for your application can be determined in the SIPROTEC 5 order configurator at www.siemens.com/siprotec .								

Table 2.16/4 SIPROTEC 6MD86 – Functions, Application Templates

- (1) Not preconfigured
- (2) Breaker-and-a-half type 1
- (3) Double busbar
- (4) Breaker-and-a-half type 2
- (5) Point-on-wave switching

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Standard Variants for SIPROTEC 6MD86

The standard variants of the 6MD86 also include an Ethernet communication module, a large display, and key switch (starting with type K2)

K1	1/3, 11 BI, 9BO, 4 I, 4 V	
	Housing width 1/3 x 19" 1 electrical Ethernet module ETH-BA-2EL 11 binary inputs 9 binary outputs (1 life contact, 2 standard, 6 fast) 4 sensitive current-transformer inputs 4 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202	
K2	1/2, 27 BI, 17 BO, 4 I, 4 V	
	Housing width 1/2 x 19" 1 electrical Ethernet module ETH-BA-2EL 27 binary inputs 17 binary outputs (1 life contact, 10 standard, 6 fast) 4 sensitive current-transformer inputs 4 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202 Expansion module IO207	
K4	2/3, 43 BI, 25 BO, 4 I, 4 V	
	Housing width 2/3 x 19" 1 electrical Ethernet module ETH-BA-2EL 43 binary inputs 25 binary outputs (1 life contact, 18 standard, 6 fast) 4 sensitive current-transformer inputs 4 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202 Expansion modules 2 x IO207	
K5	5/6, 59 BI, 33 BO, 4 I, 4 V	
	Housing width 5/6 x 19" 1 electrical Ethernet module ETH-BA-2EL 59 binary inputs 33 binary outputs (1 life contact, 26 standard, 6 fast) 4 sensitive current-transformer inputs, 4 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202 Expansion modules 3 x IO207	
K7	1/1, 75 BI, 41 BO, 4 I, 4 V	
	Housing width 1/1 x 19" 1 electrical Ethernet module ETH-BA-2EL 75 binary inputs 41 binary outputs (1 life contact, 34 standard, 6 fast) 4 sensitive current-transformer inputs 4 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202 Expansion modules 4 x IO207	

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K8	1/1, 67 BI, 39 BO, 8 I, 8 V	
	Housing width 1/1 x 19" 1 electrical Ethernet module ETH-BA-2EL 67 binary inputs 39 binary outputs (1 life contact, 26 standard, 12 fast) 8 sensitive current-transformer inputs 8 voltage-transformer inputs Contains the following modules: base module with PS201 and IO202 Expansion modules IO202, 3 x IO207	
K9	5/6, 35BI, 17BO(8HS), 4I, 4V, 8 MT-F	
	Housing width 5/6 x 19" 35 binary inputs 17 binary outputs (1 life contact, 2 standard, 6 fast, 8 high-speed relays with semiconductor acceleration) 4 current transformers (protection) 4 voltage transformers 8 fast measuring-transducer inputs for current (20 mA) or voltage (10 V)	

Table 2.16/5 Standard Variants for Bay Controllers SIPROTEC 6MD86

You can find the technical data of the devices in the manual

www.siemens.com/siprotec

6MD86 Bay Controller Unit - Overview Function points calculation

(P1G93994)

Functions Free of Charge

ANSI	Function	Abbr.	Included
	Protection functions for 3-pole tripping	3-pole	✓
	Hardware quantity structure expandable	I/O	✓
25	Synchrocheck, synchronization function	Sync	✓
38	Temperature supervision	θ>	✓
49	Thermal overload protection	θ, I²t	✓
50/51 TD	Overcurrent protection, phases	I>	✓
	Instantaneous tripping at switch onto fault	SOTF	✓
50HS	Instantaneous high-current tripping	I>>>	✓
74TC	Trip-circuit supervision	TCS	✓
86	Lockout		✓
AFD	Arc-protection (only with plug-in module ARC-CD-3FO)		✓
	Measured values - standard		✓
	Measured values - extended: Min, Max, Avg		99 X ✓
	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)		✓
	CFC arithmetic		✓
	Switching sequences function		50 X ✓
	Inrush current detection		✓
	External trip initiation		✓
	Control		✓

	Circuit-breaker		✓
	Disconnecter/Grounding switch		✓
	Protection interface, serial		✓
	Monitoring and supervision		✓
	Fault recording of analog and binary signals		✓
	Frequency-tracking groups (from V7.8)		6 X ✓
	Temperature acquisition via communication protocol		✓

Functions with Costs

ANSI	Function	Abbr.	Included	Quantity	Value	Points
	IEC 61850-9-2 Merging Unit function (Note: Max. 2 streams per MU function, each MU function requires a ETH-BD-2FO plug-in module)	MU		0	200	0
	Process Bus Client function (Note: This function requires a ETH-BD-2FO plug-in module)	PB client		0	100	0
	IEC 61850-9-2 Merging Unit function for 7SS85 CU (Note: Only for communication with a 7SS85 with Significant properties: "CU: ...". This function requires a ETH-BD-2FO plug-in module)	MU (7SS85 CU)		0	295	0
	IEEE 1588v2/PTP Grandmaster Clock (Note: This function requires a ETH-BD-2FO, with V9.20)	GMC		0	200	0
27	Undervoltage protection: "3-phase" or "universal Vx"	V<		0	5	0
27R, 59R	Rate-of-voltage-change protection (from V8.30)	dV/dt		0	5	0
32, 37	Power protection active/reactive power	P<>, Q<>		0	10	0
46	Negative-sequence overcurrent protection	I2>		0	10	0
50N/ 51N TD	Overcurrent protection, ground	IN>		0	10	0
50BF	Circuit-breaker failure protection, 1-/3-pole	CBFP		0	15	0

50EF	End-fault protection (Note: Only useable for distributed busbar protection with 7SS85 CU with V8.40)			0	5	0
51V	Overcurrent protection, voltage dependent	$t=f(I,V)$		0	10	0
52PD	Circuit-breaker pole discrepancy	CBPD		0	5	0
59	Overvoltage protection: "3-phase" or "positive-sequence system V1" or "universal Vx"	$V>$		0	5	0
67	Directional overcurrent protection, phases			0	35	0
67N	Directional overcurrent protection, ground			0	35	0
74CC	Closed-circuit supervision (from V7.9)	CCS		0	5	0
79	Automatic reclosing, 1-/3-pole	AR		0	45	0
81	Frequency protection: "f>" or "f<" or "df/dt"	$f<>; df/dt<>$		0	5	0
81U	Underfrequency load-shedding	$f<(UFLS)$		0	15	0
90V	Automatic voltage controller for two-winding transformer			0	150	0
90V	Automatic voltage controller for two-winding transformer with parallel operation			0	180	0
	Number of two-winding transformers with parallel operation (Note: only together with the function "Automatic voltage controller for two-winding transformer with parallel operation")		2 X ✓	0	5	0
90V	Automatic voltage controller for three-winding transformer			0	200	0
90V	Automatic voltage controller for grid coupling transformer			0	175	0
PMU	Synchrophasor measurement	PMU		0	40	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
	Circuit-breaker monitoring (from V9.20)	ΣI_x , I^2t , 2P, tO, tC, pole scatter, discepancy		0	10	0
	Disconnecter monitoring (from V9.50)	tO, tC		0	5	0
PoW	Point-on-wave switching (from V7.90)	PoW		0	200	0
	Point-on-wave with residual flux estimation (from V9.80)	PoW		0	240	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	25	0
	PQ-10/12 cycle values for continuous recorder (from V9.20)	CR		0	25	0
TR	Trend recorder (Mod.: from V9.30, Non-Mod.: from V9.40)	TR	1 X ✓	0	25	0
	PQ-Trend value for Trend Recorder (from V9.30)	TR		0	25	0
	PQ-Flicker values for Trend Recorder (from V9.30)	TR		0	25	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
Total:						0