

Description

The SIPROTEC 6MD85 bay controller is a general-purpose control and automation device with protection function. It is designed for use in all voltage levels from distribution to transmission. As part of the SIPROTEC 5 family, it enables a wealth of protection functions from the SIPROTEC library. The modular hardware permits integration of the IOs depending on the application. Adapt the hardware exactly to your requirements and rely on future-oriented solutions for protection, control, automation, monitoring, and Power Quality – Basic.

Main function	Bay controller for medium and high to extra-high voltage switchgear with integrated operation and comprehensive protection functions. Powerful automation, simple configuration with DIGSI 5
Inputs and outputs	5 predefined standard variants with 4 current transformers, 4 voltage transformers, 11 to 75 binary inputs, 9 to 41 binary outputs
Hardware flexibility	Flexibly adjustable and expandable I/O quantity structure within the scope of the SIPROTEC 5 modular system. If high requirements are placed on the quantity structure, the device can be extended in the 2nd row. For example, 240 (and more) binary inputs are possible with the IO230.
Housing width	1/3 × 19 inches to 2/1 × 19 inches

Benefits

- Safe and reliable automation and control of your plants
- Purposeful and simple operation of the devices and software thanks to user-friendly design
- Cybersecurity to NERC CIP and BDEW Whitepaper requirements
- Highest availability even under extreme environmental conditions by standard coating of the populated printed circuit boards

Functions

DIGSI 5 permits all functions to be configured and combined as required and as per the functional scope that has been ordered.

- Integrated bay controller with versatile protection function from medium to extra-high voltage
- Control of switching devices
- Synchrocheck and switchgear interlocking protection
- Fixed integrated electrical Ethernet RJ45 interface for DIGSI 5 and IEC 61850 (reporting and GOOSE)
- Up to 4 pluggable communication modules, usable for different and redundant protocols (IEC 61850-8-1, IEC 61850-9-2 Client, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, DNP3 serial and TCP, PROFINET IO, PROFINET IO S2 redundancy)
- Virtual network partitioning (IEEE 802.1Q - VLAN)
- Reliable data transmission via PRP and HSR redundancy protocols
- Arc protection



[SIP5_GD_SS_W3, 2, --, --]

Figure 2.16/2 Bay Controller SIPROTEC 6MD85 (1/3 Device with 1/6 Expansion Module with Key Switch Operation Panel)

- Extensive cybersecurity functionality, such as role-based access control (RBAC), logging of security-related events, signed firmware, or authenticated IEEE 802.1X network access
- Simple, fast, and secure access to the device via a standard Web browser to display all information and diagnostic data, vector diagrams, single-line and device display pages
- Graphical logic editor to create powerful automation functions in the device
- Optional overcurrent protection for all voltage levels with 3-pole tripping
- Also used in switchgear with breaker-and-a-half layout
- Selective protection of overhead lines and cables with single-ended and multi-ended feeders using protection communication
- Overcurrent protection also configurable as emergency function
- Secure serial protection communication, also over great distances and all available physical media (optical fiber, two-wire connections and communication networks)
- PQ – Basic: Voltage unbalance; voltage changes: overvoltage, dip, interruptions; TDD, THD, and harmonics
- Detecting operational measured variables and protection function measured values to evaluate the plant state, to support commissioning, and to analyze faults
- Synchrophasor measured values with the IEEE C37.118 protocol integrated (PMU)
- Powerful fault recording (buffer for a max. record time of 80 sec. at 8 kHz and 320 sec. at 2 kHz)
- Auxiliary functions for simple tests and commissioning
- Flexibly adjustable I/O quantity structure within the scope of the SIPROTEC 5 modular system.

SIPROTEC 5 Devices and Fields of Application

Bay Controllers – SIPROTEC 6MD85

Applications

The SIPROTEC 6MD85 bay controller is a general-purpose control and automation device with a protection function based on the SIPROTEC 5 system. The standard variants of the SIPROTEC 6MD85 device are delivered with instrument transformers. Furthermore, protection-class current transformers are also possible in SIPROTEC 6MD85 devices, thus allowing protection functions to be used. Due to its high flexibility, the device is suitable as selective protection equipment for overhead lines and cables with single-ended and multi-ended infeeds when protection communication is used. The device supports all SIPROTEC 5 system characteristics as well as detection and recording of power-quality data in the medium-voltage and subordinate low-voltage power system.

Application Templates

DIGSI 5 provides application templates for standard applications. They include basic configurations and default settings.

The following application templates are available:

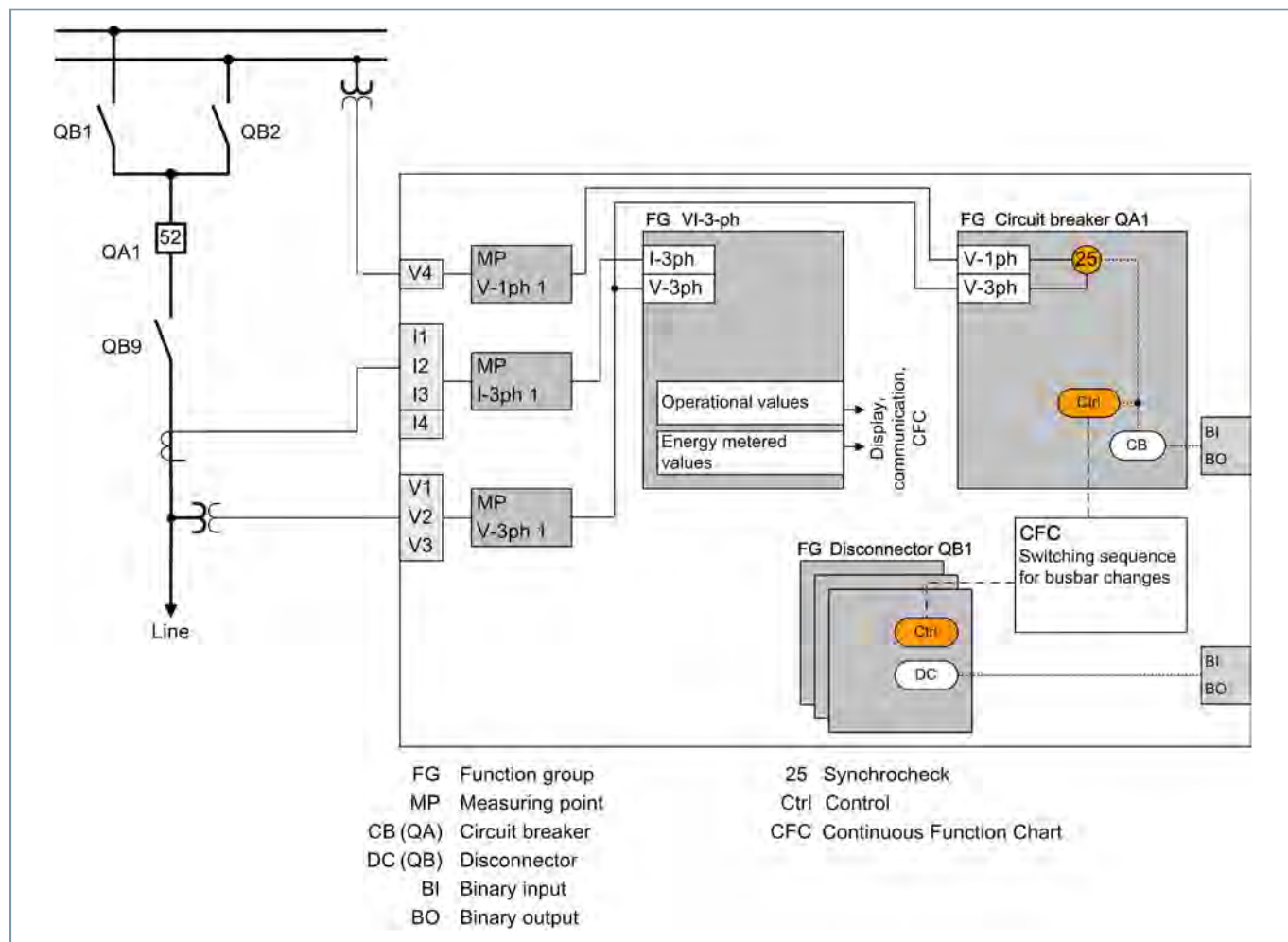
- *SIPROTEC 6MD85 Standard*
 - Double busbar feeder with switchgear interlocking protection
- *SIPROTEC 6MD85 Not preconfigured*
- *SIPROTEC 6MD85 Extended control*
 - In addition to the SIPROTEC 6MD85 Standard application template, this template also includes the CFC building blocks for switching sequences and arithmetic.
 - Switching sequence for automatic busbar switchover is preconfigured (triggered by function key)

Application Example

Double Busbar with Switching Sequences

Figure 2.16/3 shows a simple typical application with a SIPROTEC 6MD85 on a double busbar. The **FG Circuit breaker** function group includes the synchrocheck. The disconnectors are also controlled by 1 function group each. Operational meas-

ured values and energy metered values are calculated in the **FG VI-3-ph** function group. They are available for output on the display, transfer to the substation automation technology, and processing in the CFC. A switching sequence stored in the CFC that is activated via a function key starts an automatic busbar switchover process.



[dw_6MD8-Bsp-Application-1, 2, en_US]

Figure 2.16/3 SIPROTEC 6MD85 Bay Controller for Double Busbars with Switching Sequence for Busbar Switchover

SIPROTEC 5 Devices and Fields of Application

Bay Controllers – SIPROTEC 6MD85

ANSI	Function	Abbr.	Available	Application Templates		
				1	2	3
	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>	■			
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)		■			
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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SIPROTEC 5 Devices and Fields of Application

Bay Controllers – SIPROTEC 6MD85



ANSI	Function	Abbr.	Available	Application Templates		
				1	2	3
	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	$\Sigma I_x, I^2t, 2P$	■			
	Switching sequence function		■			■
	Inrush-current detection		■			
	External trip initiation		■			
	Control		■	■		■
	Circuit breaker		■	■		■
	Disconnectors/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	20
The configuration and function point class for your application can be determined in the SIPROTEC 5 order configurator at www.siemens.com/siprotec .						

Table 2.16/2 SIPROTEC 6MD85 – Functions, Application Templates

- (1) Standard
- (2) Not preconfigured
- (3) Control expanded

SIPROTEC 5 Devices and Fields of Application

Bay Controllers – SIPROTEC 6MD85

Standard Variants for SIPROTEC 6MD85		
J1	1/3, 11 BI, 9 BO, 4 I, 4 V Housing width 1/3 x 19" 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	
J2	1/2, 27 BI, 17 BO, 4 I, 4 V Housing width 1/2 x 19" 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	
J4	2/3, 43 BI, 25 BO, 4 I, 4 V Housing width 2/3 x 19" 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	
J5	5/6, 59 BI, 33 BO, 4 I, 4 V Housing width 2/3 x 19" 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	
J7	1/1, 75 BI, 41 BO, 4 I, 4 V Housing width 1/1 x 19" 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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Table 2.16/3 Standard Variants for Bay Controllers SIPROTEC 6MD85

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