SIPROTEC 5 Devices and Fields of Application

Merging Unit – SIPROTEC 6MU85

Description

The new merging unit SIPROTEC 6MU85 has been universally designed based on the flexible SIPROTEC 5 system for conventional and non-conventional instrument transformers (LPIT) and enables all primary data to be digitized close to the process. SIPROTEC 5 process-bus solutions enable a wide range of implementation options and migration concepts for new and existing systems.

Main function	Merging Unit, Circuit-breaker and disconnector-switch functions, Backup protection functions, Additional functions
Communication	Up to 4 sampled measured value streams according to IEC 61850-9-2LE or IEC 61850-9-2/IEC 61869 flexible streams
Hardware flexibility	Flexibly adjustable and expandable I/O quantity structure within the scope of the modular SIPROTEC 5 system; 1/6 expansion modules can be added
Housing width	1/3 × 19 inches to 2/1 × 19 inches
Standard	Coated modules

Benefits

- Can be adjusted to a wide range of current transformer, voltage transformer, and low-power instrument transformer (LPIT) sensors [4]
- The number of binary inputs and outputs can be scaled.
- It can be expanded by a second row.
- Direct **High-speed** circuit-breaker tripping < 1 ms
- Additional data acquisition (temperature, pressure, tap-changer setting, ...)
- Cybersecurity in accordance with NERC CIP and BDEW White-paper requirements
- Highest availability even under extreme environmental conditions by standard coating of the modules

Functions

Merging Unit

- 1 or 2 sampled measured value streams per ETH-BD-2FO Ethernet module
  - Up to 32 analog values in every combination of current and voltage measured values or
  - 4 x current, 4 x voltage (IEC 61850-9-2LE)
- Up to 4 ETH-BD-2FO modules possible
- Reliable and redundant data transmission via PRP
- Compliant with IEC 61869-9, IEC 61869-13
- IEC 61850-8-1 GOOSE, MMS, and Merging Unit protocol on the same Ethernet module
- Measured value and date/time synchronization via IEEE 1588v2/PTP

[SIP5_OD_o.LED_W3, 2, --_--]

Figure 2.18/1   Merging Unit SIPROTEC 6MU85

- Redundant power supply
- Expanded temperature ranges (-40 °C to 70 °C)

Circuit-breaker and disconnector-switch functions

- Control system with switchgear interlocking
- Circuit-breaker failure protection (50BF)
- Circuit-breaker wear monitoring
- Switching statistics
- Point-on-wave switching (PoW)
- Trip-circuit supervision (74TC)
- Automatic reclosing (79)
- Synchrocheck (25)

Backup protection functions

- Non-directional overcurrent protection (50/51, 50N/51N)
- Directional overcurrent protection (67/67N)
- Overvoltage and undervoltage protection (27/59)

Additional protection functions

- Phasor Measurement Unit (PMU) for synchrophasor measured values and IEEE C37.118 protocol
- Arc protection
- Utility functions for simple commissioning and tests
- Temperature acquisition using a TR1200 RTD unit (7XV5662-6AD10 or 7XV5662-8AD10)
- 4-mA to 20-mA measuring input for a wide range of analog process values, for example, pressure, tap-changer setting
- PQ – Basic: Voltage unbalance; voltage changes: overvoltage, dip, interruptions; TDD, THD, and harmonics

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[4]   In preparation

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Communication

- Pluggable communication modules, usable for different and redundant protocols (IEC 61850-8-1, IEC 61850-9-2 Merging Unit, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, DNP3 serial and TCP, PROFINET IO, PROFINET IO S2 redundancy)
- Serial protection communication via optical fibers, two-wire connections, and communication networks (IEEE C37.94 and others), including automatic switchover between ring and chain topology.
- 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
- Virtual network partitioning (IEEE 802.1Q - VLAN)

Applications

Merging Unit for

- Analog measured values and digital inputs and outputs
- Centralized merging unit for transformer process-data acquisition
- Centralized protection
- Bay units for decentralized busbar protection
- Process-bus fault recorder
- Centralized synchrocheck
- Detection and recording of power-quality data in the medium-voltage and subordinate low-voltage power system

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Application Templates

Application templates are available in **DIGSI 5** for applications of device 6MU85. The application templates contain the basic configurations, required functions, and default settings.

The following application templates are available for the merging unit 6MU85 in the **DIGSI 5** function library:
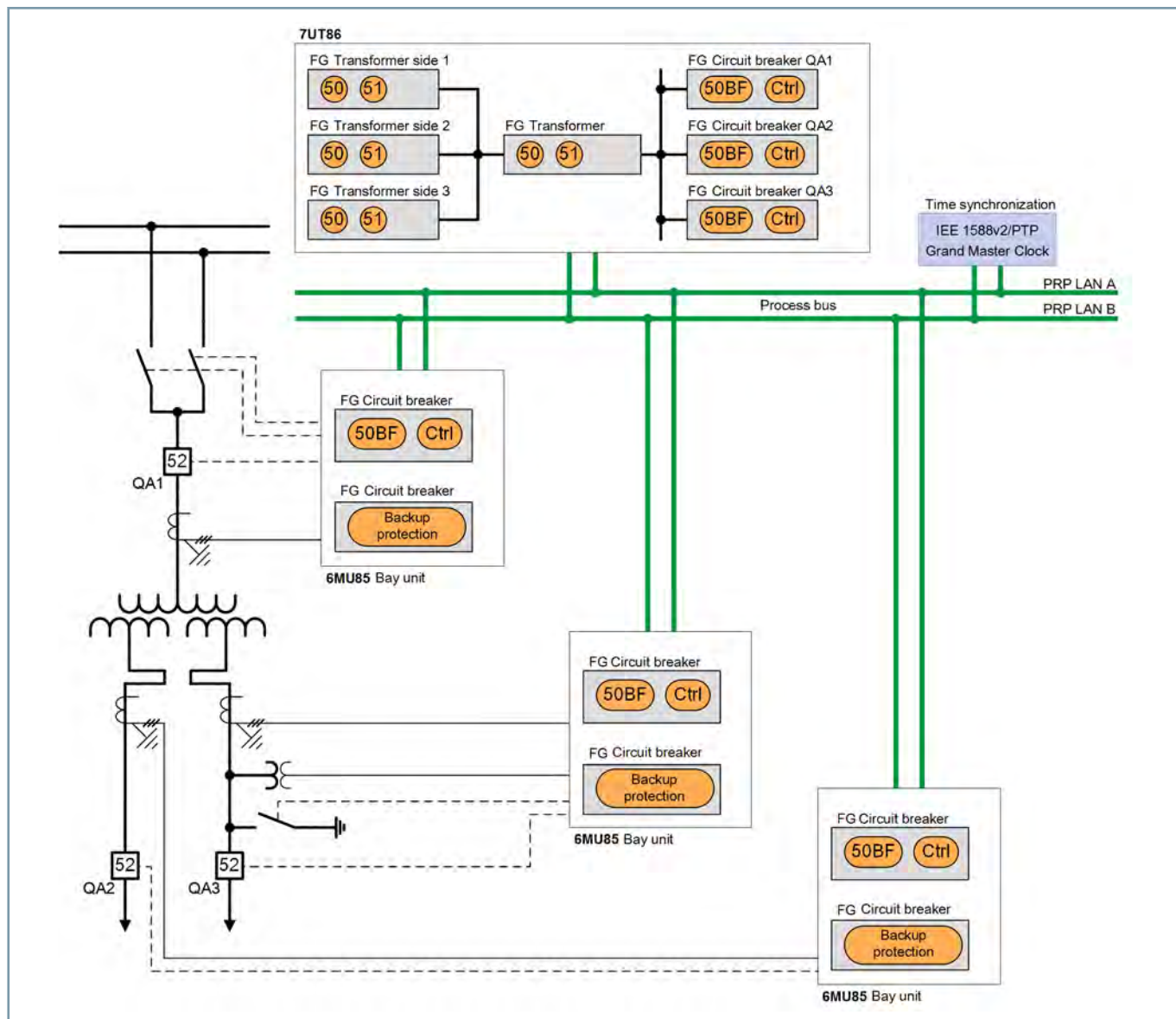
- Basic application template 6MU85 Merging Unit

- Application template 6MU85 Merging Unit – 4I

- Application template 6MU85 Merging Unit – 4I, 4U

- Appl. template 6MU85 Merging Unit – 4I, 4U, overcurrent protection

- Application template 6MU85 Merging Unit – 8I
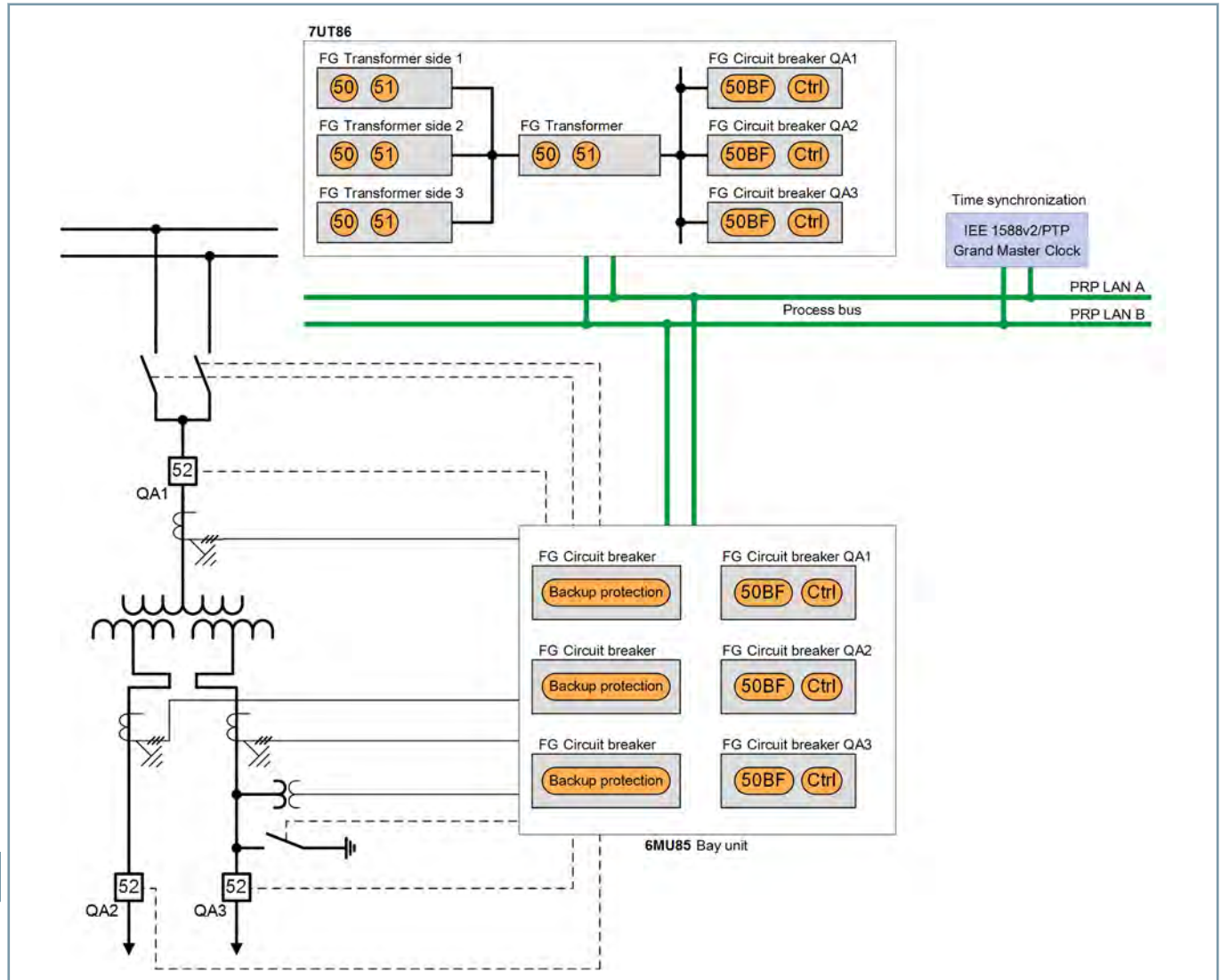
[dw_centr-trans-prot_with_one_merging_6MU85, 1, en_US]

Figure 2.18/2   Centralized Transformer Protection with a 6MU85 Merging Unit

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[dw_centr-trans-prot_with_3-merging_6MU85, 1, en_US]

Figure 2.18/3   Centralized Transformer Protection with 3 6MU85 Merging Units

Merging Unit – SIPROTEC 6MU85

ANSI	Function	Abbr.	Available	Application Templates
				1
	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 "positive-sequence system V1" or "universal Vx"	V<	■	
27R, 59R	Voltage change protection (starting with V8.30)	dV/dt	■	
38	Temperature supervision	θ>	■	
47	Overvoltage protection: "Negative-sequence system V2" or "negative-sequence system V1/positive-sequence system V1"	V2>; V2/V1>	■	
50/51 TD	Overcurrent protection, phases	I>	■	
	Instantaneous tripping at switch onto fault	SOTF	■	
50N/ 51N TD	Overcurrent protection, ground	IN>	■	
50BF	Circuit-breaker failure protection, 3-pole	CBFP	■	
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)		■	
50RS	Circuit breaker restrike monitoring	CBRM	■	
59, 59N	Overvoltage protection: "3-phase" or "zero-sequence system V0" 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	■	
79	Automatic reclosing, 3-pole	AREC	■	
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	
	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)		■		
Function point class:				0	
The configuration and function point class for your application can be determined in the SIPROTEC 5 order configurator at *www.siemens.com/siprotec*.					

Table 2.18/1   SIPROTEC 6MU85 – Functions, Application Templates

(1) Merging Unit

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Merging Unit – SIPROTEC 6MU85

Standard Variants for SIPROTEC 6MU85		
AJ1	1/3 x 19", 4 I, 11 BI, 9 BO	
	Housing width 1/3 x 19"	
	no display	
	4 current-transformer inputs	
	11 binary inputs	
	9 binary outputs (1 life contact, 2 standard, 6 fast)	
	Contains the modules: base module with PS201 and IO201	
	Communication module ETH-BD-2FO	
AJ2	1/3 x 19", 4 V, 4 I, 11 BI, 9 BO	
	Housing width 1/3 x 19"	
	no display	
	4 voltage-transformer inputs	
	4 current-transformer inputs	
	11 binary inputs	
	9 binary outputs (1 life contact, 2 standard, 6 fast)	
	Contains the modules: base module with PS201 and IO202	
	Communication module ETH-BD-2FO	
AJ3	1/3 x 19", 8 I, 7 BI, 7 BO	
	Housing width 1/3 x 19"	
	no display	
	8 current-transformer inputs	
	7 binary inputs	
	7 binary outputs (1 life contact, 2 standard, 4 fast)	
	Contains the modules: base module with PS201 and IO203	
	Communication module ETH-BD-2FO	

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