

Controlled switching with PSD04

siemens-energy.com/circuit-breakers



Full control with PSD04

Energizing and de-energizing loads in the high voltage grid can lead to high inrush currents, switching overvoltages, and transients, causing electrodynamic and dielectric stresses. Controlled switching, such as that provided by Siemens Energy's PSD04 control unit, can minimize these overvoltages and inrush currents.

The new design leverages over 25 years of experience in controlled switching for applications like capacitor bank and reactor switching, transformer energizing, and uncompensated transmission lines up to 1100 kV. The PSD04 features two selectable station control protocols, IEC61850 and DNP3, allowing retrieval of live data, configurations, switching actions, and alarms via MMS, including remote switching commands.

Its integrated web application offers platform-independent operation with a modern design, enabling live data viewing through a dashboard and complete configuration online. An integrated graphical viewer allows on-site analysis of recordings, with export functions for offline analysis using the provided tool.

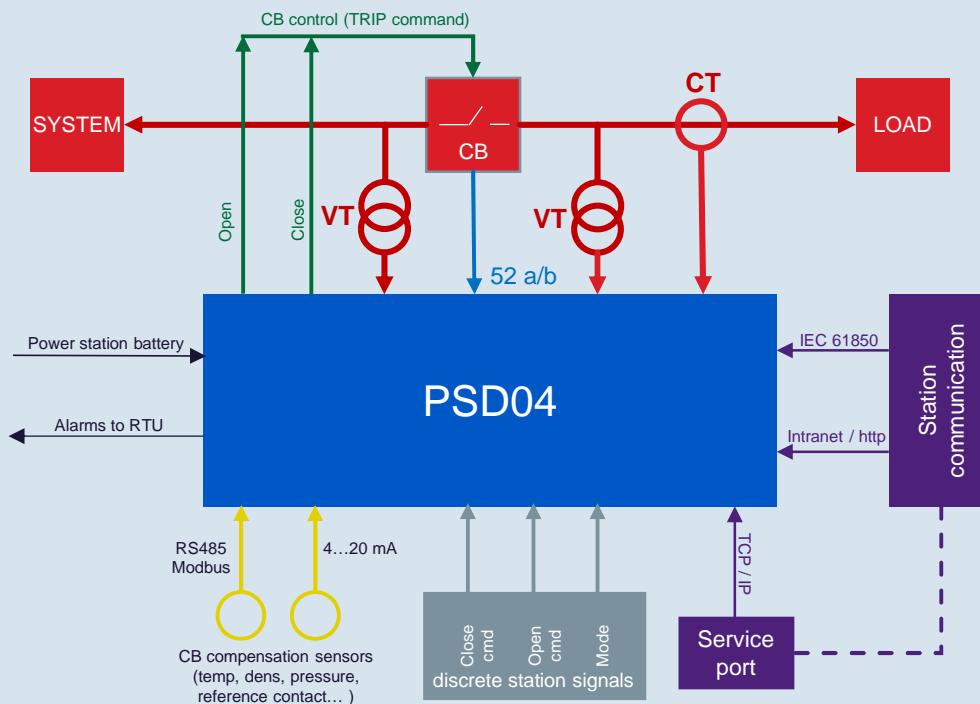
User administration complies with IEEE1686, and a digital signature ensures firmware integrity, while the secure boot function guarantees a secure system startup.

Main benefits at a glance

- IEC61850 & DNP3 station control protocol as standard
 - MMS data exchange: configuration, results, alarms, live data
 - MMS remote close & open operation command
- Integrated webserver
 - Online configuration
 - Online monitoring
 - Graphical interface
- Switching of capacitor banks, filters, transformers, residual flux control, shunt reactors and lines/cables with the same device



Connection block overview



Main features

- Cyber- & embedded security features
 - User management according to IEEE 1686
 - Secure boot with file authentication
 - Secure update with file authentication
- 5" color display with touch function
- Offline configuration & evaluation tool
- 3 Ethernet ports
 - Station communication protocol , IEC 61850 / DNP3
 - Station communication HTTP / web application; data exchange via REST-API
 - Local service@front
- Pluggable through hole current transformer (CTA)
 - 3 selectable ranges 0.2 A / 1 A / 5 A
- Comtrade format for transient data exchange
- Local database for more than 500 events
- Changeable LED labelling (4 languages default)
- Process interface for Modbus transmitter
- Single & three-phase auto-reclosing
- Standard close and open circuits
- Two sequence setups for different loads can be specified for the same circuit breaker control
- Switching & cyclic history, alarms, measurement values
- Linear and vectoral compensation of operation time changes
- The PSD04 includes a plug-in through-hole current transformer at the rear, allowing it to be seamlessly integrated into the customer's protective current transformer secondary circuit.
- Three current measuring ranges can be set directly on the PSD04 current transformer CTA5 via externally accessible DIP switches for optimum adaptation
- 5 language labels are supplied: English, Spanish, Portuguese, French, German.
- Additional 1 clean label, for free use.

Integrated WEB application

The integrated web application in a modern web design enables platform-independent operation of the PSD04 device.

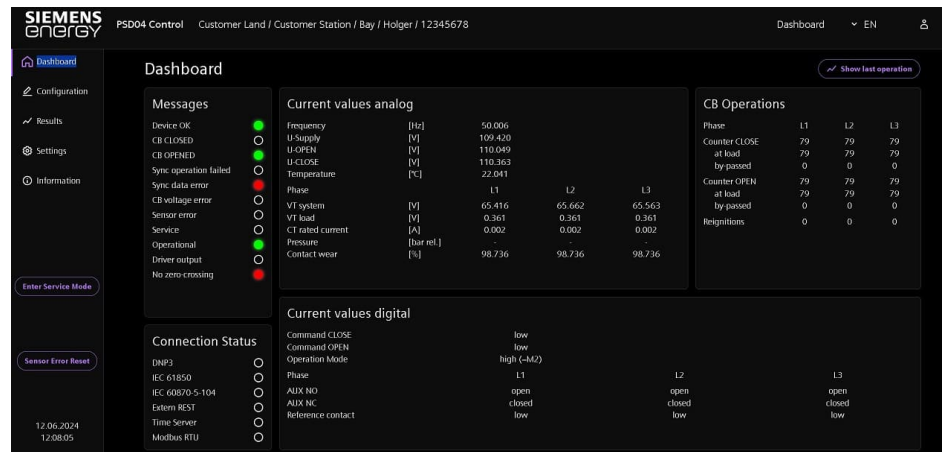
All information, including the operating instructions, can be obtained directly from the PSD04 device.

For offline work, an offline version is available to the service engineer, which contains all the functions required to analyze results and create preliminary switching configurations.

The offline version is provided free of charge with the PSD04 device.

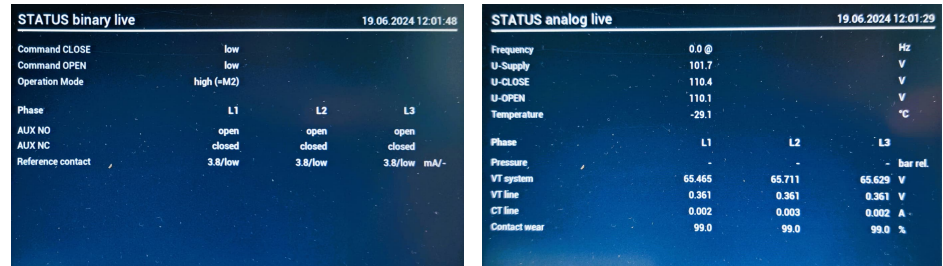
Web dashboard view:

The live data can be viewed via a dashboard. In addition, the most important measured values and statuses are also shown on the device display.



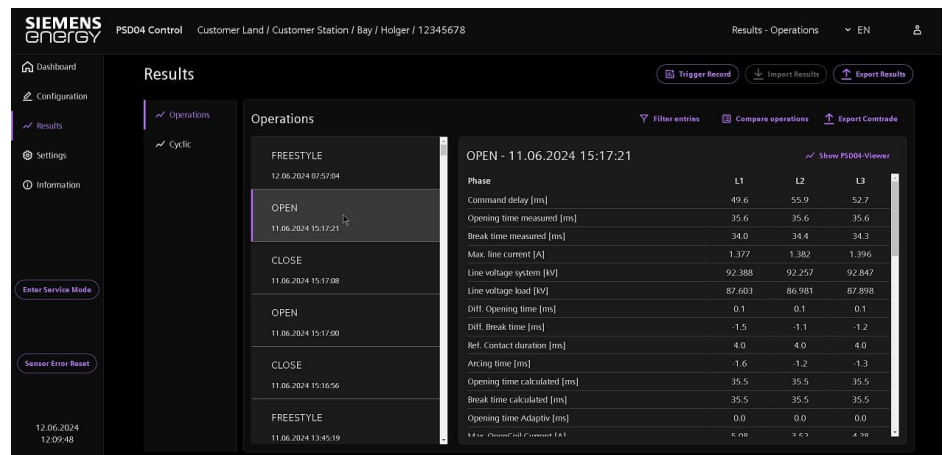
PSD front:

Live status analog & binary



WEB result view:

All results of an operation or a cyclical event are displayed and evaluated in the WEB-result. The results of several events can be directly compared and exported via a list display. The integrated graphical viewer enables a preliminary evaluation based on the graphical signal curves using a cursor function. Several circuits can also be graphically compared with each other in order to detect visual deviations. The most important results of an operation are also displayed on the PSD04 device front.



Integrated WEB application

PSD front:
Last result overview

RESULTS last operation CLOSE				RESULTS last operation OPEN			
19.06.2024 12:02:48				19.06.2024 12:02:55			
Timestamp last operation: 19.06.2024 11:15:58				Timestamp last operation: 19.06.2024 11:16:15			
Phase	L1	L2	L3	Phase	L1	L2	L3
Command delay	46.8	53.5	50.1 ms	Command delay	47.3	54.0	50.7 ms
Closing time meas.	96.2	96.0	96.2 ms	Opening time meas.	40.7	40.7	40.6 ms
Make time meas.	96.3	96.2	96.3 ms	Break time meas.	40.8	40.8	40.7 ms
diff. closing time	0.3	0.2	0.3 ms	diff. opening time	0.3	0.3	0.2 ms
diff. make time	0.4	0.4	0.3 ms	diff. break time	0.4	0.4	0.3 ms
Pressure	0.00	0.00	0.00 bar rel.	Pressure	0.00	0.00	0.00 bar rel.
VT system, max.	92.159	92.011	92.732 kV	VT system, max.	92.208	91.962	92.798 kV
VT line, max.	87.538	86.817	87.882 kV	VT line, max.	87.472	86.751	87.849 kV
CT line, max.	1.410	1.417	1.469 A	CT line, max.	1.381	1.379	1.400 A
I-CLOSE Coil, max.	4.7	3.2	4.0 A	I-OPEN Coil, max.	5.1	3.6	4.4 A
U-CLOSE, min.	72.7		V	U-OPEN, min.	74.4		V
Mode	low (M1)			Mode	low (M1)		

WEB-integrated
graphical viewer



WEB configuration view:
The complete switching case configuration is carried out via the web application.

The most important configuration parameters are also displayed informatively on the front panel of the PSD04.

SIEMENS energy PSD04 Control DE / Paulstern / 201 / Q0 / 123456 Configuration EN

Configuration

- Change Log (Date: 19.06.2024 15:29:07 | Device: 123456)
- Alarm Messages
- System settings
- Power Transformer Design
- CLOSE**
- Initial Values
- Compensation
- Phase relation

PSD-front:
configuration information

CONFIGURATION OPEN				CONFIGURATION CLOSE			
19.06.2024 12:02:38				19.06.2024 12:02:00			
@Mode M1/M2	capacitor/reactor			@Mode M1/M2	capacitor/none		
Switching application	none/none			Switching application	none/---		
Adaptive control	3.0 ms			Adaptive control	3.0/3.0 ms		
Permitted difference opening time	3.0/3.0 ms			Permitted difference closing time	3.0/3.0 ms		
Permitted difference break time	0.100/0.000 A			Permitted difference make time	2.000/---		
Current trigger	0.000/0.000 A			Current trigger	0.000/---		
Current alarm	0.000/0.000 V			Current alarm	0.000/---		
Voltage alarm	Us_L1/Us_L1			Voltage alarm	Us_L1/Us_L1		
Trigger source	L1 L2 L3			Trigger source	L1 L2 L3		
Phase	L1	L2	L3	Phase	L1	L2	L3
Voltage trigger pole A	0.000/0.000	0.000/0.000	0.000/0.000 V	Voltage trigger pole A	0.000/---	0.000/---	0.000/---
Calculated opening time	40.4	40.4	40.4 ms	Calculated closing time	95.8	95.8	95.8 ms

CONFIGURATION general			
19.06.2024 12:01:55			
Substation	Paulstern		
Bay	201		
CB name	Q0		
CB serial number	123456		
CB type	4AQ7		
Number of drives	3		
Phase relation	Pole A	Pole B	Pole C
	L1	L2	L3

Technical data

The device is designed and manufactured for application in industrial environment. The product conforms with the international standards of IEC 60255 and the German standards VDE 0435.

The conformity has been proved by tests performed in agreement with the standard IEC 60255-26 and IEC 60255-27 by Siemens Energy by independent laboratories.

Article code		
Standard PSD04	C1B45200003005	
Supply		
Power supply	60 ... 300 Vdc@15 W (down to 38 VDC possible), 50 ms	
Mains buffering, protected against polarity reversal, short-circuits, no-load and over-load, monitoring of supply interruption		
Outputs		
3 x power outputs CLOSE 3 x power outputs OPEN	24 ... 300 Vdc, 20 A, 2.5 s or 25 A, 200 ms (90°C), I _{max} = 30 A (90°C), short-circuit interrupt time < 10 μs	
8 x relay contact	1 two-way contact, switching capacity 2000 VA constant current 8 A, operating range 300 Vdc / 0.5 A	
8 x LED display	LED color individual changeable	
Analog inputs		
1 x temperature	4 ... 20 mA, 24 V, ±0.5%	internal supply
3 x reference contact	4 ... 20 mA, 24 V, ±0.5%	internal supply
1 x supply voltage	0 ... 400 Vdc, ±0.5%	insulated
1 x CLOSE-trip voltage	±400 Vdc, ±0.5%	insulated
1 x OPEN-trip voltage	±400 Vdc, ±0.5%	insulated
6 x voltage transformer	±400 Vdc, ±0.5% 280 Vac	f ₀ = 1 kHz, R _{in} = 240 kΩ, insulated
3 x current transformer	±1.25 Vdc, ±0.5% (0.2 / 1 / 5 arms)	f ₀ = 1 kHz, R _{in} = 88 mΩ, insulated, I _{max} 100 A 10 s (only with CTA5)
Digital inputs		
1 x MODE	15 ... 300 Vdc, R _{in} = 150 kΩ	protected against polarity reversal, insulated
3 x AUX-NO-contact	15 ... 300 Vdc, R _{in} = 150 kΩ	protected against polarity reversal, insulated
3 x AUX-NC-contact	15 ... 300 Vdc, R _{in} = 150 kΩ	protected against polarity reversal, insulated
1 x CLOSE-command	15 ... 300 Vdc, R _{in} = 150 kΩ	protected against polarity reversal, insulated
1 x OPEN-command	15 ... 300 Vdc, R _{in} = 150 kΩ	protected against polarity reversal, insulated

Technical data

Communication interfaces

1 x FO-LC 1000 Mbit, station communication protocol, IEC61850 (MMS) or DNP3

1 x FO-LC 100 Mbit, station communication http, for data exchange via REST-API & WEB-application access

1 x RJ45, Ethernet, 100 Mbit for local service access

1 x EIA RS-485, (station protocol: Modbus RTU available, for external transmitter) - optional

System

Sampling rate: 10 kHz, 16 Bit, 250 ms record time, sensor inputs 1 s

Switching precision: 0.1 ms

64-bit quad-core 1.8 GHz processor, secure boot, boot fuses, protected firmware update

BlackBerry QNX-OS8.0 real time operation system

Housing

42HP/3U HF sub rack support with perforated cover plate

Protection category IP20

Height 132.5 mm (3U)

Width 237 mm (9.5")

Depth 240 mm

Weight 3.4 kg

Ambient conditions

Operation temperature -25°C to +70°C, free air convection, non-condensing

Storage temperature -40° to +85°C

Maximum operation altitude above sea level 2000 m

Graphic display

Dimensions 5" (108 x 65 mm)

Technology TFT active matrix / transmissive / normally white

Display 16.7 M colors, high-contrast LCD supertwist display, resistive touch panel

Backlight white, LED

Pixels 800 (RGB) x 480

Technical data

Data & record storage	
Number of operation events	> 500 entries
Number of stored comtrade records	> 500
Number of cyclic events	> 500 entries
Number of logging entries	1,000,000 entries; 12 years@228 entries/day

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