INDUSTRIAL-SWITCHGEAR-SYSTEMS

MOTOR-CONTROL-CENTER

Withdrawable · Plug-in · Fixed mounting technology



Product family

With the patent-protected brand name



registration number 304 078 42 (German Patent and Trademark Office), a product family has been developed for power supply at low and medium-voltage levels for AC/DC voltages. All the latest developments and innovations have been incorporated into these products.

A new generation,

INDUSTRIAL-SWITCHGEAR-SYSTEM



which is economical, needs-based, and type-tested (TTA), has been developed for low-voltage applications for the following performance levels:

»	POWER CENTER	up to	8500 A
»	MOTOR-CONROL-CENTER	up to	8500 A

- » Building distributors up to 3200 A
- » Drive and automation technology.

It is available in fixed mounting, plug-in and withdrawable technology for power plant technology, the processing industry and infrastructure. The technical basis for this product was developed at Siemens AG.

Additional arc fault tests in accordance with IEC 61641, VDE 0660 Part 500, Supplement 2 guarantee the highest possible level of plant and operator safety.

The low-voltage switchgear forms a link between equipment used for power generation (generators), its transportation (cables, overhead power lines), the transforming of energy (transformers) on the one hand, and consumers, such as motors, gears, motor-integrated drive systems, pumps, lighting, etc. on the other.

Type-tested modules, coordinated products and standardized connections within the **ENERGOLINE** family help create consistency across the entire portfolio.



Power plant technology / Infrastructure



Processing industry



Technical characteristis

Standards and provisions		Type-tested low-voltage switchgear combination Testing of behavior in the case of internal errors (arc fault) Protection against touching with the fingers or back of the hand in accordance with BGV A3 Protection against electric shock Air and creepage distances	IEC 60439-1 a. DIN EN 60439-1 (DIN VDE 0660 Teil 500) IEC 61641, VDE 0660 Teil 500, Beiblatt 2 DIN VDE 0106 Teil 100 DIN EN 50274, VDE 0660 Teil 514 DIN VDE 0110 Insulation group C for 1000 V	
Electrical characteristics	Rated voltages	Rated insulation voltage U _i Rated operating voltage U _e Rated frequency	1000 V 690 V up to 60 Hz	
	Rated currents I _e	Main busbars Distribution bars L - Panel T5/T50 - Panel F1/F10 - Panel F5/F51 - Panel	up to 8500 A up to 6300 A up to 1900 A up to 2000 A up to 1900 A	
	Rated peak withstand current I _{pk}	Main busbars Distribution bars L - Panel T5/T50 - Panel F1/F10 - Panel F5/F51 - Panel	375 kA up to 330 kA up to 143 kA up to 120 kA up to 120 kA	
	Nominal device current I _n	Air circuit breakers SIEMENS SENTRON 3WL ABB SACE Emax Merlin Gerin Masterpact NT/NW	up to 6300 A up to 6300 A up to 6300 A	
		Molded-case circuit breakers Siemens SENTRON 3VL ABB Tmax Merlin Gerin Compact NS	up to 1600 A up to 1600 A up to 3200 A	
		In-Line Switch Disconnectors with Fuses 3NJ4/EFEN/JeanMüller Siemens 3NJ6/Slime Line/SASIL	up to 1250 A up to 630 A	
Mechanical characteristics	Panel dimensions	Cabinets and supporting frames Height Width Depth Preferred dimensions according to DIN 41488 Sheet 2	2200, 2600 mm 400, 600, 800, 900, 1000 mm 600, 800 mm Individual adjustments possible	
	Protection classes	according to IEC 60529, EN 60529	IP 20 bis IP 54	
	Surface protection	Coating according to DIN 43656, epoxy polyester powder coating Coating thickness Standard Supporting frame Enclosure	65 μm RAL 7035 RAL 7035 Special colors and double coating up to 130 μm also possible	

Versatility in conjunction with safety

With the MOTOR-CONTROL-CENTER, the type-tested INDUSTRIAL-SWITCHGEAR-SYSTEM



offers a sophisticated modular standard product for flexible applications in process-oriented plants and is available in the following designs:

- » Fixed mounting technology,
- » Plug-in technology and
- » Withdrawable technology.

In many industrial applications, it is an economic necessity to ensure that a setup takes up as little space as possible. Thanks to the consistent modular design approach taken with the electrical and mechanical construction of our switching cabinet, you can freely select the type of construction, protection class, and interior equipment needed to meet your individual requirements. This allows different installation technologies and functional units to be incorporated in the same panel, i.e. applications for power distribution can be combined with applications for switching drive units.

MOTOR-CONTROL-CENTER are exclusively project-designed from needs-based, standardized and type-tested modules. Modifications to meet new performance requirements can be made quickly and easily by exchanging or extending the different modules. The exclusive use of high-quality switchgear guarantees a long service life, selective protection for your supply units, and seamless integration into management and control systems.

The power supply must be consistently guaranteed in all areas of industrial application at every point along the process chain, ranging from feed-in to the final consumer and from energy management to the emergency power system–ultimately, ensuring that facilities such as power stations, refineries and industrial plants operate without any malfunctions or interruptions is a key economic factor. Type testing guarantees the highest possible level of operational and personal safety. Below, you will find the certificates that were achieved in close cooperation with the IPH test laboratory (Prüffeld für elektrische Hochleistungstechnik GmbH).

Based on testing under arc conditions, the

MOTOR-CONTROL-CENTER can provide verification of a high level of personal safety in the area of the facility, as well as verification of the safety of the systems themselves. The quality of our products and services is a key priority in our company. A continuous testing process as part of our internal quality management ensures consistently high quality of our products for our customers.

Your benefits at a glance

- » Highest level of plant safety thanks to typetested standard modules (TSK)
- » Enhanced safety thanks to safe and straightforward handling
- » Maximum personal safety with a design that incorporates arc fault protection (testing under arc conditions)
- Economies of scale thanks to the combination of different installation technologies in one panel
- » High availability through rapid conversion with no downtime
- » Modular construction of the equipment compartments
- Individual construction of the slide-in modules and shuttle
- » Compact construction, panel depth 600/800 mm
- » Flexible busbar arrangements above/behind
- » Consistency thanks to a type-tested trunking busbar system connection
- » High-quality switchgear ensures reliable operation
- » Front of board and back-to-back arrangement



Typ-tested combination of switching decices

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Overview

Circuit breaker panel from 630 A to 6300 A Fixed mounting and withdrawable technology





see page 7





MOTOR-CONTROL-CENTER T5/T50 panel - plug-in technology up to 630 A

MOTOR-CONTROL-CENTER F5/F51 panel - withdrawable technology up to 630 A





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Circuit breaker panel L Panel

Type-tested modules in fixed mounting and withdrawable technology

Construction

- » Needs-based internal subdivision compartmentalization Form 1 to Form 4b
- » Feed-in possible from above and below
- » Switching device panel above or below the circuit breaker to facilitate the addition of a wide range of control systems and locking devices
- Incorporation of the measuring devices and touch panels at eye level for the panel-high door or compartment doors
- Cable connection rails for: Installation of current transformers
 Max. 24 single conductors 300 mm²
- » Consistency thanks to a type-tested trunking busbar system connection

Device spectrum

Dimensions

- Air circuit breakers
 SIEMENS SENTRON 3WL
 ABB SACE Emax
 Merlin Gerin Masterpact NT/NW
- » Panel height: 2200 mm

» Panel depth: 600/800 mm

- » Panel width: according to
- circuit breaker specifications

Air circuit breakers (TNC networks)

Size	Туре	Nominal current	Short-circuit breaking capacity I _{CU} in kA		
		l _n in A	AC 415 V	AC 500 V	AC 690 V
I	3WL11	630	55/66	55/66	42/50
	3WL11	800	55/66	55/66	42/50
	3WL11	1000	55/66	55/66	42/50
3WL11		1250	55/66	55/66	42/50
	3WL11	1600	55/66	55/66	42/50
11	3WL12	800	66/80/100	66/80/100	50/75/85
	3WL12	1000	66/80/100	66/80/100	50/75/85
	3WL12	1250	66/80/100	66/80/100	50/75/85
	3WL12	1600	66/80/100	66/80/100	50/75/85
3WL12		2000	66/80/100	66/80/100	50/75/85
3WL12		2500	66/80/100	66/80/100	50/75/85
	3WL12	3200	66/80/100	66/80/100	50/75/85
	3WL13	4000	100/150	100/150	85/150
3WL13		5000	100/150	100/150	85/150
3WL13		6300	100/150	100/150	85/150
E1	SACE Emax	800	42/50	42/50 42/50	
SACE Emax		1000	42/50	42/50	42/50
	SACE Emax	1250	42/50	42/50	42/50
E2 SACE Emax 1600 42/65/85/13		42/65/85/130	42/55/65/85	42/55/65/85	
	SACE Emax	2000	42/65/85/130	42/55/65/85	42/55/65/85
E3	SACE Emax	C E Emax 2500 75/100/130 75/		75/100	75/85/100
	SACE Emax	3200	75/100/130	75/100	75/85/100
E4	SACE Emax	4000	75/100/150	75/100/150	75/85/100
E5 SACE Emax 5000 100/150		100/150	100/130	100	
	SACE Emax	6300	100/150	100/130	100

Detailed information on design features, model types, electronic triggers, etc. for the installation devices can be found in the manufacturers' catalogues.

Panels of application

Incoming and outgoing supply

Longitudinal and transverse coupling

L panel: input panel with withdrawable circuit breaker



L panel: coupling with withdrawable circuit breaker



MOTOR-CONTROL-CENTER F1/F10 Panel

Type-tested modules in fixed mounting technology

With some applications, it is not necessary to exchange the MCC functional assemblies under operating conditions, or alternatively short downtime periods are acceptable. In such cases, the MOTOR-CONTROL-CENTER with fixed mounting technology offers a safe, flexible, and cost-efficient alternative.

Construction

- » Flexibly combinable MCC functional assemblies in modular technology
- » Module plates for fitting with switchgear and protection devices and combinations
- Straightforward replacement of the MCC functional assemblies with the system offline
- Cable connection directly to the switchgear and protection devices, or in a separate cable terminal compartment
- Incorporation of the control and measuring devices in the panel-high door
- » Bracket with top hat rails for the installation of terminal blocks
- » Cable attachment to the height-adjustable cable bracket

Device spectrum

- » MCC module plates up to 630 kW / 1000 A equipped with high-quality switchgear and protection devices, ideally manufactured by SIEMENS, ABB or Schneider Electric, guarantee reliable operation:
 - · Circuit breakers
 - Load disconnectors
 - Contactors and contactor combinations for switching motors
 - · Overload relays
 - Motor and soft starters
 - · Motor management, monitoring and control units
 - Circuit breaker outgoing lines up to 1250 A
 - Frequency converter

Example (see interior view)

- SIMATIC ET 200, connection to the control system via PROFIBUS-DP
- Protection with 40-A fuse load disconnectors 40
 A
- DOL starter, fuse-based technology
 11 kW
- Reversing starter, fuseless technology
 4 kW
- Frequency converter
 1,8 kW

The panel can be equipped with up to 22 module plates, each with an installation height of 80 mm (1HE).

Panels of application

Motor and outgoing feeders Feeders to subdistributions

F1: Outgoing panel with MCC functional assemblies in modular technology



F1: Outgoing panel – interior (E-Plan)



MOTOR-CONTROL-CENTER T5/T50 Panel

Type-tested modules in plug-in technology

With its plug-in technology, the MOTOR-CONTROL-CENTER offers a cost-efficient, slide-in modular technology solution. The outgoing power and motor units are subdivided into functional assemblies.

MCC plug-in modules and pluggable fuse switches in strip form (SASIL, SlimeLine, 3NJ6) can be combined as required. The MCC modules can be exchanged without any downtime.

Construction

- » Fitting the panel with load disconnectors with fuses in strip form as:
 - Switch-disconnector with fuses featuring double-break isolation
 - Integrated ammeter (1-pole current measurement)
 - 3-pole current measurement possible
 - Optional: fuse monitoring in the strips
- » Flexibly combinable MCC functional assemblies
- Description of the plug-in modules with switchgear and protection devices and combinations, installation of the control and measuring devices in the swivel-mounted compartment door
- » Conversion, modification and exchange of an outgoing feeder without disconnecting the switchgear
- » Side guiderails to ensure safe docking with the panel rails and plug contacts
- » Protection against touching the panel rails with the fingers or back of the hand
- » Cable connection work for power and control lines for PROFIBUS-DP interfaces in a separate cable connection compartment:
 - Standard widths: 400 und 600 mm
 - · Bracket with top hat rails for the installation of terminal blocks
 - Variable adjustment possible

Device spectrum

- » Switch-disconnectors with fuses in strip form:
 - SIEMENS, 3NJ6 125 up to 630 A
 - ABB, SlimeLine 125 up to 630 A
 - Jean Müller, SASIL 125 up to 630 A
- » MCC plug-in modules up to 250 kW / 630 A fitted with highquality switchgear and protection devices, ideally manufactured by SIEMENS, ABB or Schneider Electric, guarantee reliable operation:
 - Circuit breakers
 - Load breakers
 - Contactors and contactor combinations for switching motors
 - Overload relays
 - Motor and soft starters
 - Motor management, monitoring and control units

Dimensions

- Panel depth: 800 mm; 600 mm (with exclusive fitting with fuse switch disconnectors)
- » Panel height: 2200 mm
- » Panel width: varies according to design

Panels of application

Motor and outgoing feeders Feeders to subdistributions

T50 panel: combination of plug-in modules and fuse switch disconnectors (SASIL)



T50 panel: combination of plug-in modules and fuse-switch-disconnectors (SlimeLine)



MOTOR-CONTROL-CENTER T5/T50 Panel

Type-tested modules in plug-in technology

There is a device compartment height of 1750 mm for the combination of the pluggable fuse-switch-disconnectors and plug-in modules. The distribution bar (plug-in busbar) is installed at the back of the panel and provides sensing apertures in the module grid of 50 mm. Reserve spaces can be provided for future retrofitting.

Fitting with MCC plug-in modules

Fuseless technology, 400 V/50 Hz, 50 kA, assignment type 2

module size	DOL starter	reversing	star/delta
	in kW	circuit	in kW
		in kW	
100	22	11	-
200	45	45	22
300	110	45	45
400	160	75	55
500	250	132	110
600	250	250	160

Cable connection

- Input side: power plugged via power contacts to field busbar
- » Feeder side:
 - Outgoing feeders firmly connected control pluggable via control contacts
 - Outgoing feeders firmly connected control pluggable via control contacts
 - Outgoing feeders and control lines pluggable via contacts (≤ 18, 5 kW)

» Plug-in module:

DOL starter 90 kW with Simocode PRO C, module height 300 mm



Panels of application

Motor and outgoing feeders Feeders to subdistributions

T5 panel: plug-in modules



» Plug-in module:

DOL starter 45 kW with Simocode PRO V, module height 150 mm



Plug-in module: DOL starter 55 kW with soft start and bypass contactor, module height 150 mm



MOTOR-CONTROL-CENTER F5/F51 Panel

Type-tested modules in withdrawable technology

The new generation of the MOTOR-CONTROL-CENTER, using modular technology, is remarkable for its high availability, ease of operation and service, and high level of flexibility for every business solution. Based on its technical properties and high packaging density, it is suitable for all MCC variants, particularly in process-driven production facilities.

Commissioning and maintenance processes can be greatly simplified and optimized using the "test and disconnected position" functions.

Construction

- Fitting of the plug-in modules with switchgear and protection devices and combinations, installation of the control and measuring devices in the compartment door
- » Conversion, retrofitting and exchange of an outgoing feeder without disconnecting the switchgear
- » Slide-in modules in the following sizes:
 - Small slide-in modules E0.25: 1/4; E0.5: 1/2
 - Full slide-in modules E1H: 200 mm
 - Cranked slide-in modules KE200; KE400, KE600, KE800
- Traversing mechanism follows the sequence "Disconnected position - Test position - Operating position" and similarly in reverse
- Dontact assemblies to interlock the main circuit and control circuit for safe disconnection between bar and device compartments
- Protection against touching the field busbar with the fingers or back of the hand
- 12; 24; 36 control contacts can be configured as required (E0.25 max. 24 control contacts)
- » Optional insert coding with identical slide-in module sizes
- Cable connection works for power and control lines, and also lines for PROFIBUS-DP interfaces in a separate cable connection compartment:
 - Standard widths: 400 and 600 mm
 - Bracket with top hat rails for the installation of terminal blocks
 - Variable adjustment possible

Device spectrum

- » MCC slide-in modules up to 250 kW / 630 A equipped with high-quality switching and protection devices (ideally manufactured by SIEMENS, ABB or Schneider Electric), guarantee reliable operation:
 - Circuit breakers
 - Load breakers
 - · Contactors and contactor combinations for switching motors
 - Overload relays
 - Motor and soft starters
 - Motor management, monitoring and control units

Dimensions

- » Panel depth: 600/800 mm
- » Panel height: 2200 mm
- » Panel width: varies according to design

Panels of application

Motor and outgoing feeders Feeders to subdistributions

F51-panel: MCC outgoing panel with cranked slide-in modules KE200 and KE400



F51-panel: MCC outgoing panel with 5 shuttle levels (1/4 and 1/2 slide-in modules), E1H and KE400



MOTOR-CONTROL-CENTER F5/F51 Panel

Type-tested modules in withdrawable technology

The small slide-in modules E0.25 (1/4) and E0.5 (1/2) are inserted into a shuttle via a second plug level. They can be easily combined in one panel and exchanged without isolating the switchgear. The shuttle is firmly mounted on the switch cabinet.

The full slide-in module E1H is an insert with the dimensions (HxWxD) 170 x 540 x 520 mm, grid height 200 mm, a full width, and a full depth. A switch is used to mechanically lock and unlock the slide-in modules, and to open or close the main circuit and control circuit (in conformity with DIN VDE 0600 Part 500).

After their insertion in the switch panel using a crank, the cranked slide-in modules are moved into the "operating, test, and isolation positions" by means of a drive mechanism. Only when the door is closed can the slide-in modules be moved into the required position, by moving the isolating contact assemblies of the primary and control circuits. This means that the slide-in modules can remain in the compartment even in the isolation position, once the system has received its protection type, without dirt or foreign bodies falling into them. This greatly reduces the risk of faults caused by this problem.

Fitting with MCC slide-in modules

fuseless technology, 400 V/50 Hz, 50 kA, assignment type 2

slide-in unit sizes	power output	direct output	reversing starter	star/delta
	circuit breaker	circuit breaker, contactor, automatic trol device, interposing relay or Sim		tomatic con- or Simocode
E0,25	16 A	5,5 kW	-	
E0, 5	32 A	18,5 kW	11 kW	11 kW
E1H	80 A	45 kW	45 kW	45 kW
KE200	250 A	90 kW	45 kW	-
KE400	400 A	160 kW	90 kW	90 kW
KE600	630 A	250 kW	160 kW	160 kW
KE800	630 A	250 kW	250 kW	250 kW

handling of cranked plug-in units



Panels of application

MCC slide-in module: cranked slide-in module KE400

Motor and outgoing feeders Feeders to subdistributions



slide-in unit sizes	power output	direct reversing output starter		star/delta
	circuit breaker	circuit breaker, contactor, aut trol device, interposing relay		tomatic con- or Simocode
E0, 25	16 A	5,5 kW	-	
E0, 5	32 A	18,5 kW	11 kW	11 kW
E1H	80 A	45 kW	45 kW	45 kW
KE200	125 A	45 kW	22 kW	-
KE400	250 A	90 kW	45 kW	75 kW
KE600	400 A	160 kW	160 kW	160 kW
KE800	630 A	250 kW	250 kW	250 kW



drive unit

0-position

inting frame

hand crank



MCC slide-in module: crank module KE200

MCC slide-in module: crank module KE400





Connection to management and control level

New perspectives are opened up for the implementation of costefficient and high-availability INDUSTRIAL-SWITCHGEAR-SYSTEMS through features such as high system availability, prompt fault alarms, and troubleshooting, in conjunction with a high degree of system transparency, all of which helps achieve a permanent reduction in operating costs.

This is why intelligent MOTOR-CONTROL-CENTERS, whose task is to control and protect motors, are today to be found everywhere in a wide range of industrial applications. Modular motor starters in a slide-in modular system and equipped with fieldbus-capable intelligent motor protection and control devices represent the current state of the art in technology.

Device spectrum

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- » Switchgear and protection devices with communication module
 - fuse load circuit breakers
 - air circuit breakers
- » Communicative soft starter
- » Motor management and control devices with integrated communication function
- » Multimeters with communication interface

Features

- » Communication module as data interface
 - · Connection to the PROFIBUS-DP or MODBUS
 - · Remote operation, parameterization, and diagnosis
 - Continuous recording of system and operating data, such as switch status, voltage, power for acyclical data transfer
 - Modification of the switch-on interlock and operating sequence without rewiring

Measuring station



- » Communicative motor starter with control function
 - Connection to the PROFIBUS-DP or MODBUS
 - Recording of operating, service, and diagnosis data, which is also available for visualization
 - · Electronic full motor protection, e.g.
 - Current-dependent electronic overload protection
 - Phase failure detection
 - Earth fault monitoring
 - Integrated control function, e.g.
 - DOL and reversing starter
 - Star/delta starter, also with reversal of rotation



Incorporation into automation level

Maximum system and personal protection

The MOTOR-CONTROL-CENTER within the product family



is a type-tested, low-voltage switchgear combination (TTA) whose physical properties have been verified in the "Prüffeld für elektrische Hochleistungstechnik GmbH" testing laboratory in Berlin, an accredited testing institute, for both operating and fault situations.

Type testing

- » Verification by testing of compliance with temperature rise limit
- » Verification by testing of insulation capability
- Verification of a perfect connection between the assembly components and protective conductor by checking or by resistance measurement
- » Verification by testing the short-circuit strength of the protective conductor circuit
- » Verification of air and creepage distances
- » Verification of mechanical function
- » Verification of IP protection class

Testing under arc conditions

Arc fault safety is today a key feature; indeed, it is an essential requirement for many applications in modern

INDUSTRIAL-SWITCHGEAR-SYSTEMS.

Arc faults cause an increase in pressure that results from a rapid rise in temperature in the interior of the switching cabinet. Their effects can endanger people working nearby. They can also damage equipment, with partial or complex destruction of the switchgear, along with secondary damage to buildings. No matter what the extent of the damage, the system operator can expect to face long production stoppages and high downtime costs.

Testing under arc conditions is deemed a special test in accordance with IEC 61641 or VDE 0660 Part 500, Supplement 2. The supplement in question relates to design-based arc fault protection.

Based on testing under arc conditions, the MOTOR-CONTROL-CENTER can provide verification of a high level of personal safety in the area of the facility, as well as verification of the safety of the systems themselves.

L panels	726 V to	65/85 kA 0.3 s
Outgoing panel, MCC panel	726 V to	85 kA 0.3 s





Factory routine testing before delivery

As a general rule, each switching cabinet undergoes routine testing in the factory before it is delivered:

- » Inspection of the switchgear combination or wiring
- » Conformity with the approved documentation
- » Optional electrical functional testing
- » Insulation test
- » Control of protective measures and inspection of the continuous protective conductor connections

Additional safety requirements

These exacting safety standards are backed up by further details:

- » Avoidance of faulty operation with the plug-in and slide-in modular technology, thanks to precisely developed mechanical guide mechanisms and locking devices
- >> Use of only a limited number of exclusive, high-quality insulation materials (e.g. for stiffening, rail support, etc.)
- The use of high-quality switchgear from well-known and reliable manufacturers ensures a long service life and minimum downtimes
- Safe disconnection with circuit breaker after 70 to 100 ms, even with long delay times, with reduced time selectivity control
- » IT-based project planning ensures accurate selection and placement of equipment
- » Effective quality management

Map/address

Fertigungscenter für Elekrische Anlagen Sangerhausen GmbH

