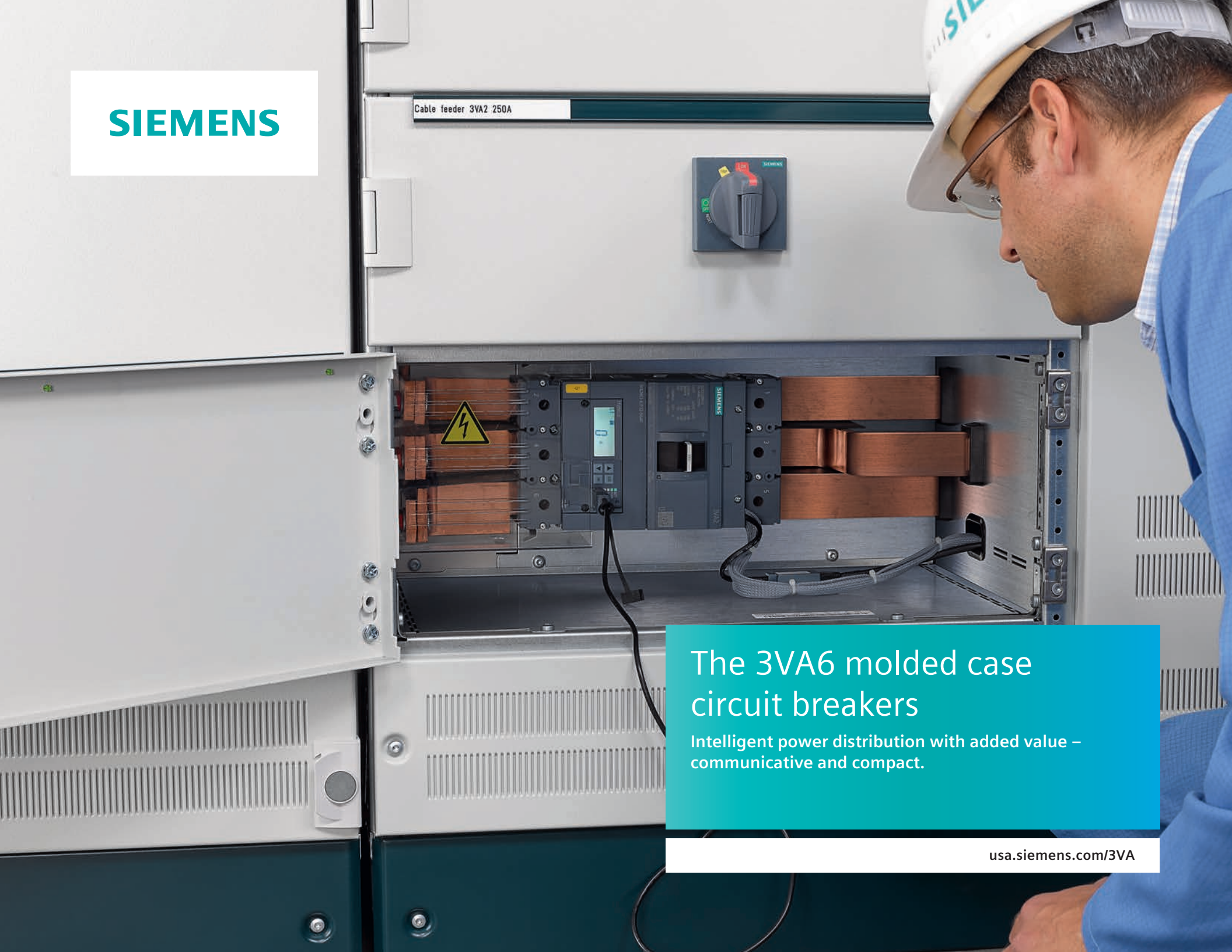
SIEMENS



The 3VA6 molded case circuit breakers

Intelligent power distribution with added value – communicative and compact.

usa.siemens.com/3VA

Contents

The increase in digitalization and automation is creating tremendous challenges for electrical power distribution. Reliable protection of personnel, high plant availability, direct control options, and greater energy efficiency are essential. Therefore, systems and components must reliably communicate with one another to keep production plants and machines running.

The 3VA6 molded case circuit breakers ensure a totally safe, efficient, and flexible power supply, while at the same time guaranteeing seamless production processes – through a triple integration of electrical power distribution into digital environments.

The 3VA6 molded case circuit breakers can be easily integrated ...

1.

Integration into automated engineering processes

... via a comprehensive range of software and CAx data

2.

Integration into industrial automation

... via a variety of bus systems and open interfaces

3.

Integration into holistic energy efficiency concepts

... via integrated measuring functions for highly transparent power consumption values

The new generation of circuit breakers.

Highlights

- Modular, well thought-out, highly variable system
- Easy integration into energy management and automation systems
- Integrated measuring function with the ETU 8-series
- Simple, efficient monitoring
- Numerous communication options available via standard bus systems

3VA electronic trip unit (ETU) molded case circuit breakers are at the core of highly available power distribution systems. The extremely variable, integrated system assists you every step of the way, from initial planning to the actual operation of electrical power distribution.

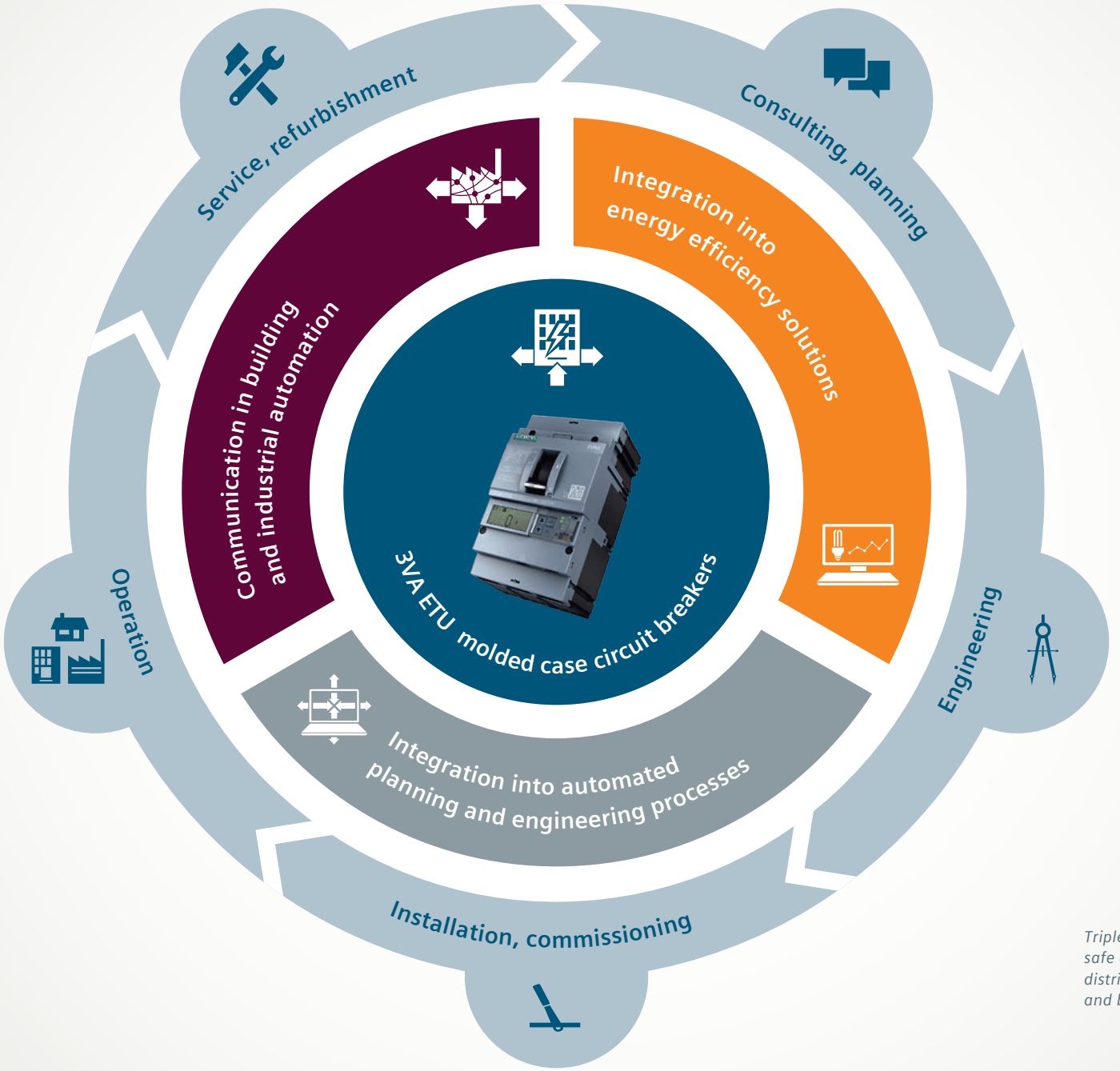
Easy to integrate

3VA6 molded case circuit breakers can be seamlessly integrated into an existing technical infrastructure and automation environment via standard bus systems. Comprehensive CAx data is also available for the engineering process and can be integrated into all standard planning and project management tools.

Highly communicative

3VA6 molded case circuit breakers are genuine all-rounders, particularly when it comes to energy savings and efficient power distribution. Integrated measuring functions and optional communication ensure that the status of power distribution and its energy flows will always be sufficiently transparent.

3VA6 molded case circuit breakers: Easy integration into energy management and automation systems.



Triple integration as a basis for safe and efficient power distribution in digital factories and buildings.

One system. Many options.

Communication-capable 3VA6 molded case circuit breakers are suitable for a variety of applications and perform a wide range of functions in industry, buildings, and infrastructure.

Best of all: With open interfaces and standard protocols (PROFIBUS, PROFINET, Modbus TCP, Modbus RTU), 3VA ETU molded case circuit breakers can be seamlessly integrated into an existing technical infrastructure and automation environment, ensuring that the processes in your plant will always be transparent.

Power monitoring –
for transparency in power distribution


System safety –
securely protect sensitive
areas
Application monitoring –
minimize plant downtimes
Identification of potential
savings – trace loads with
high power consumption

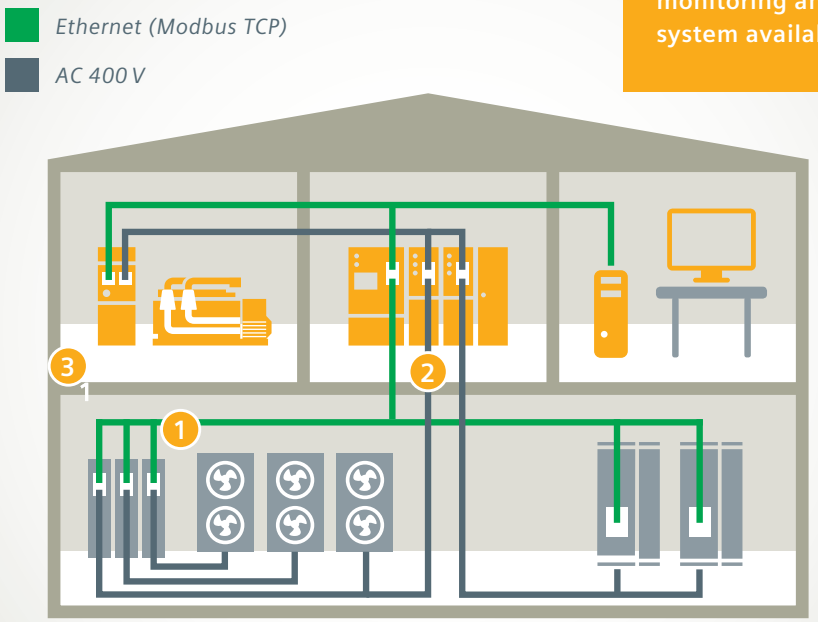
The new system strategy: Maximum fail-safe level.

3VA6 molded case circuit breakers provide specific information about your system's capacity utilization and status, providing perfect plant monitoring and maximum system availabiliy.

Take precautions to ensure sufficient protection for sensitive systems and system components (a data center, for example) – and be confident of trouble-free operation. Critical system statuses, caused by harmonics or overload, for instance, can be recognized at an early stage, allowing a rapid response.

Keep an eye on all data

Communications capability and integrated measuring function mean the 3VA ETU molded case circuit breakers and the 7KM PAC measuring devices form an ideal basis for monitoring your system. Set limit values can be monitored using monitoring software, such as powermanager, or as part of a control system, enabling an impending overload to be identified at an early stage. If a fault still occurs because of an overload or short circuit, the selective 3VA6 molded case circuit breakers ensure that only the affected system component is switched off, thus preventing your entire system from being shut down.



Example: Data center

Functions:

1. 3VA6 molded case circuit breakers measure power consumption and support load management
2. 3VA electronic trip unit molded case circuit breakers monitor the power supply for asymmetry (power quality); 7KM PAC measuring devices monitor the harmonics (line quality)
3. 7KM PAC measuring devices monitor the uninterrupted power supply

Highlights:

- Outstanding selectivity to ensure high system availability
- Comprehensive communicative properties to transmit measured values and system statuses
- Recording of diagnostic data to prevent dangerous system statuses and thus prevent outages

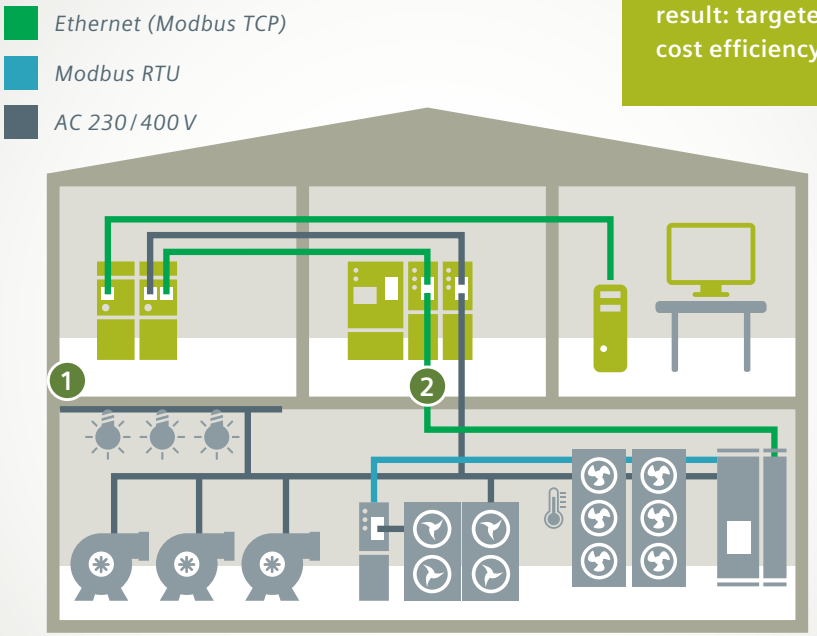
Right for building technology: Transparent power distribution.

3VA6 molded case circuit breakers constantly record consumption values and indicate where power usage by individual loads is disproportionately high. The result: targeted energy and cost efficiency.

Typical loads such as ventilation systems, compressors, pumps, elevators, and lighting are in constant use within buildings. The motor protection versions of the 3VA6 molded case circuit breakers make it possible to monitor these loads selectively by feeder and quickly track down loads with unusual high power consumption.

Find inefficient loads more quickly

The motor protection versions of the 3VA ETU molded case circuit breakers protect the various loads against overload and short circuits. The integrated measuring function can also transmit consumption data to higher-level building automation systems, in addition to providing the protection function. This makes each individual load's power consumption transparent, so peak loads can be specifically avoided and consumption behavior adapted as appropriate. In addition, inefficient loads can be individually located and replaced.



Example: Individual applications in a building

Functions:

1. Main infeed: 3VA electronic trip unit molded case circuit breakers with integrated measuring function record total plant consumption
2. Partial infeed: Motor protection versions of the 3VA ETU molded case circuit breakers monitor and record measured values from individual loads selectively by feeder

Highlights:

- Targeted recording of power consumption by individual loads
- Easy identification of loads with high power consumption
- Reduction of peak loads, adaptation of consumption behavior

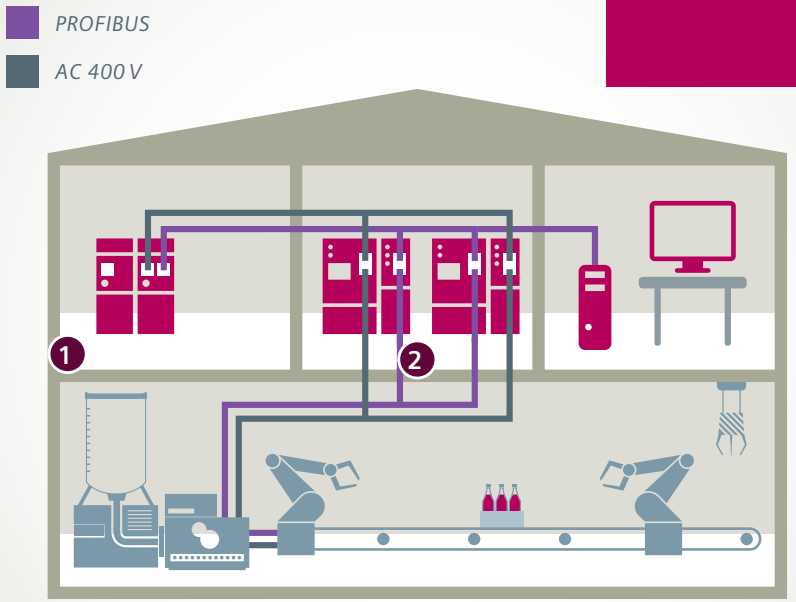
Preventing a shutdown: Efficient plant monitoring.

The integrated measuring function allows the 3VA6 molded case circuit breakers to prevent costly plant downtimes and mechanical damage.

Processes must work together smoothly in manufacturing. If the amount of power used by a specific load changes, the measured values recorded in the process enable conclusions to be drawn about the mechanical or electrical condition of that part of the system, which lets you adapt your maintenance intervals and avoid costly plant downtimes.

Automatically maintain an overview

Impending damage to a bearing, a torn belt or a pump running dry will always have repercussions on a motor's consumption behavior. The diagnostic data supplied by the 3VA6 molded case circuit breakers (e.g. reason for tripping, violation of set threshold values) makes it quick and easy to locate faults of this type. The integrated measuring function also makes is possible to identify a slow change in load performance (such as bearing damage) at an early stage. You can then carry out preventive maintenance or adapt your maintenance schedules before expensive mechanical damage occurs. This also means you can keep downtimes or maintenance times to a minimum.



Example: Manufacturing plant

Functions:

1. Main infeed: 3VA ETU molded case circuit breakers ensure reliable protection for the entire plant
2. Infeed for a subapplication: Motor protection versions of the 3VA6 molded case circuit breakers with integrated measuring function provide early identification of potential faults

Highlights:

- Monitoring of consumption behavior of individual plant components
- Rapid fault location and identification using measurement and diagnostic data
- Adjustment of maintenance intervals and avoidance of costly plant downtimes

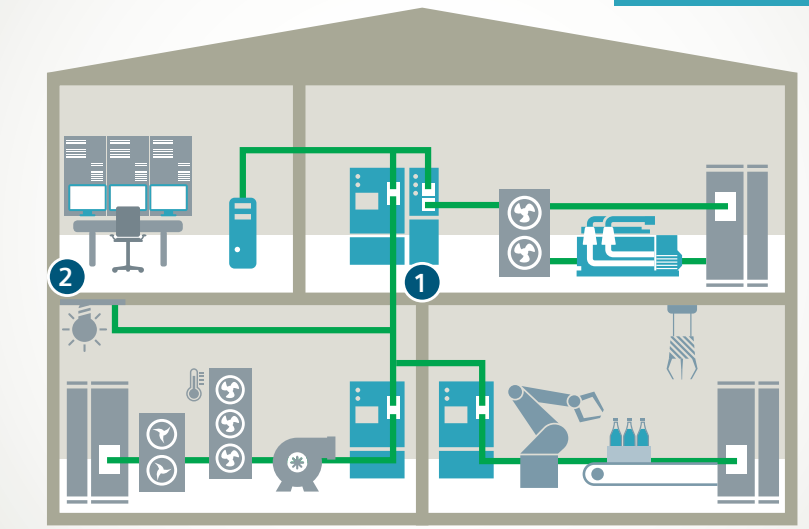
Increased energy awareness: Intelligent power monitoring.

3VA6 molded case circuit breakers provide a complete overview of all energy-relevant data. This ensures end-to-end monitoring, evaluation, documentation, and control.

Since 2015 it is becoming increasingly more common for companies throughout the world to perform energy audits, with big fines for those who do not comply. Using the measured values from the 3VA ETU molded case circuit breakers and the 7KM PAC measuring devices, your company can meet its responsibilities in the low-voltage power distribution area.

Identify and manage potential savings

Efficient energy management starts with data collection and documentation, which makes your potential savings visible. To do this, you need a clean record of consumption values for entire applications, partial infeeds within the application and the individual loads. The data is forwarded to a higher-level power monitoring system, e.g. the power-manager power monitoring software or a SIMATIC system, via a communications connection. It is then further processed for documentation and cost center billing.



Example: Power monitoring in a factory

Functions:

1. 3VA electronic trip unit molded case circuit breakers and 7KM PAC measuring devices record consumption and power data
2. powermanager power monitoring software evaluates, documents, and archives the acquired energy data

Highlights:

- Accurate recording of performance data and documentation of individual load values to provide a comprehensive overview of all energy-relevant data
- Perfect preparation for mandatory energy audits according to EN 16247

Communication is everything. For perfect monitoring.

It's easy to make optimal use of the energy data acquisition and communication capabilities of 3VA6 molded case circuit breakers. The following coordinated components support the measurement and communication capabilities of 3VA ETU molded case circuit breakers:

Efficient software support and visualization

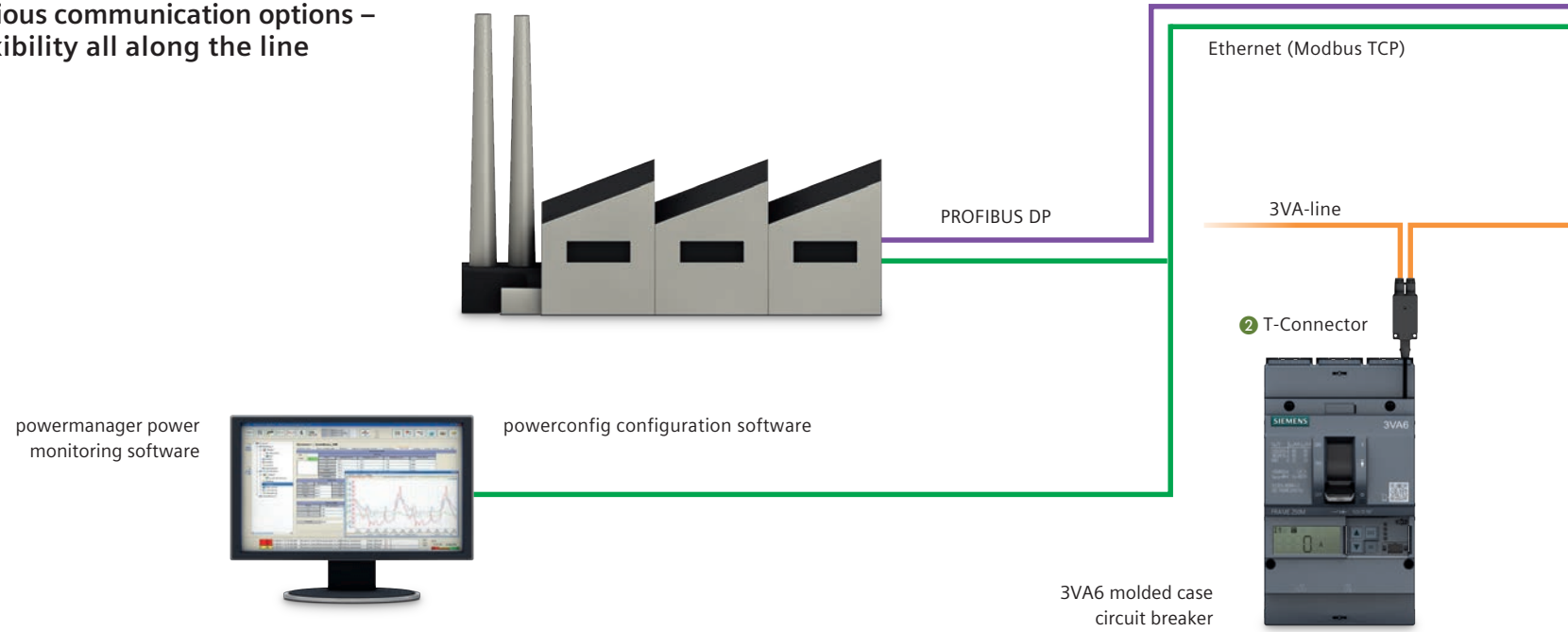
The powerconfig configuration software facilitates timesaving and safe commissioning as well as detailed maintenance work. The powermanager power monitoring software manages and archives the acquired energy data, which can then be analyzed in a variety of ways and displayed as a report.

3VA6 molded case circuit breaker with ETU 5-series (ETU550, ETU560)
Acquires current values and diagnostic data; with parameterization option, measured value display, and optional communication.

3VA6 molded case circuit breaker with ETU 8-series (ETU850, ETU860 und ETU860M)
Acquires current, voltage, and power values as well as diagnostic data; with parameterization option, measured value display, and optional communication.

Communicative:
The 3VA6 molded case circuit breakers can be connected to higher-level management systems via standard bus systems.

Various communication options – flexibility all along the line



COM060 communication module
COM060 communication modules are mounted in the right-hand accessories compartment of the 3VA6 molded case circuit breakers and establish a connection to the 3VA-line via T-Connectors. This connection is used to transmit measured and diagnostic data and to forward the resulting information to the COM100 / COM800 breaker data servers.

T-Connectors and preassembled connecting cables
Installation of the 3VA-line is fast and flexible using the T-Connectors and corresponding connecting cables of varying lengths. The cables can be up to 20 meters long. The 3VA-line is furnished with a terminating resistor at each outer end.

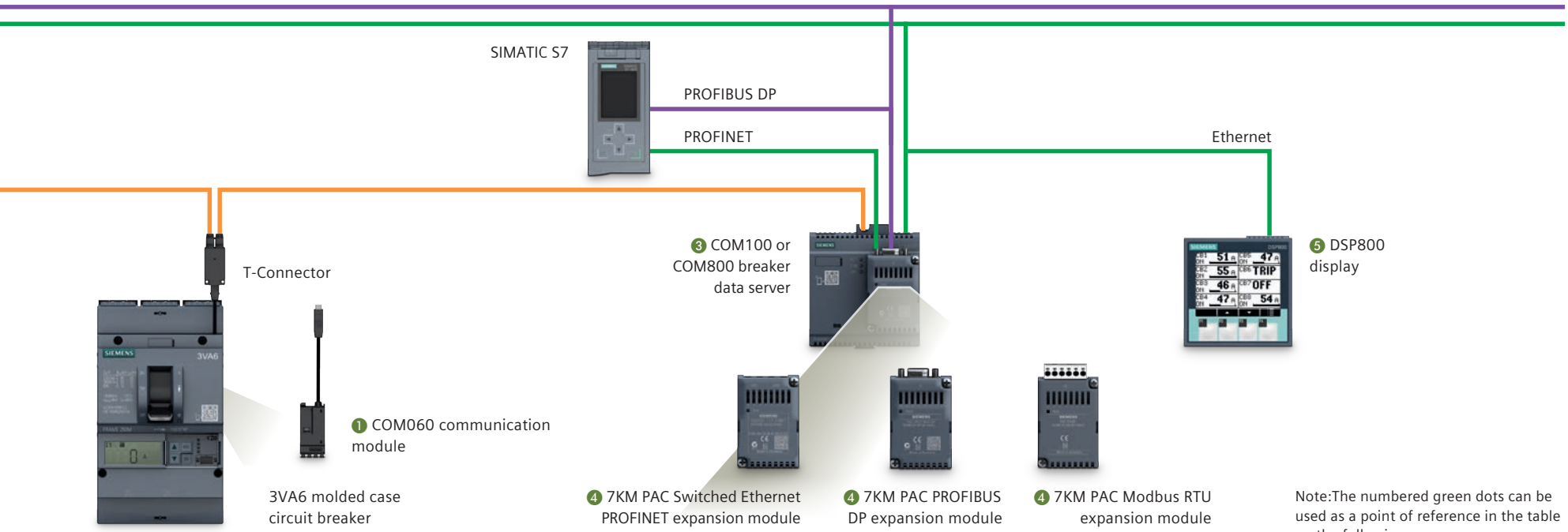
COM100 and COM800 breaker data servers
For linking one or up to eight 3VA6 molded case circuit breakers to standard bus systems. COM100 / COM800 breaker data servers feature an integrated Ethernet interface (10/100 Mbit/s) and an interface to the expansion modules for optional bus connections.

7KM PAC Switched Ethernet PROFINET, 7KM PAC PROFIBUS DP, and 7KM PAC Modbus RTU expansion modules
Expansion modules for the COM100 and COM800 breaker data servers, for connecting to the PROFIBUS, PROFINET, Ethernet (Modbus TCP), and Modbus RTU bus systems. Modbus TCP is integrated into the COM100 / COM800 breaker data servers and the 7KM PAC Switched Ethernet expansion module.

DSP800 display
Situated in an easily accessible location (for example, in the cubicle door), the DSP800 display serves to display the data (for example, measured variables, parameters, diagnostic data) of up to eight 3VA6 molded case circuit breakers without programming effort.

Highlights

- Protection, measurement, and communication in a single device
- Efficient connection of up to eight 3VA6 molded case circuit breakers to various bus systems
- Integrated current transformer and voltage tap
- Display of measured values from up to eight molded case circuit breakers



Note:The numbered green dots can be used as a point of reference in the table on the following page.

Optimum support thanks to efficient and intelligent tools.

The series of 3VA6 molded case circuit breakers are an integral part of Siemens' tool environment and greatly simplifies planning, parameterization, and integration into automation and energy management systems.

Efficient planning with the SIMARIS tools

The 3VA6 molded case circuit breakers are fully supported by the SIMARIS tools. SIMARIS design makes it possible to calculate networks and plan the mechanical design, while SIMARIS project generates bids. SIMARIS curves can assist in the display and analysis of tripping characteristics in conjunction with other protection devices, such as fuses.

Fast parameterization with powerconfig

The powerconfig configuration software is a commissioning and service tool for communication-capable measuring devices and circuit breakers in the SENTRON product family. The PC-based tool makes device parameterization easier, which results in considerable time savings – particularly when multiple devices require setup. powerconfig can also be used to parameterize, document, operate, and monitor 3VA6 molded case circuit breakers via their various communication interfaces.

Efficient monitoring with powermanager

3VA ETU molded case circuit breakers supply important measured values and diagnostic data via standardized bus systems. The PC-based powermanager power monitoring software makes it easy to analyze, archive, and monitor the measured values acquired. In conjunction with the 7KM PAC measuring devices from the SENTRON portfolio, it helps you to create the ideal technical basis for an operational energy management system according to ISO 50001.

Integration into automation

3VA6 molded case circuit breakers can be easily integrated into all Siemens automation platforms. Libraries of pregenerated program and image blocks are available for the SIMATIC PCS7 process control system. To facilitate the integration of 3VA6 molded case circuit breakers into SIMATIC STEP7 (Classic) and SIMATIC TIA-Portal automation systems, we offer prepared, sample applications that can easily be modified, making them flexible to use. Applications are also available for the Desigo building automation system.

Communication: All the components at a glance.

3VA6 molded case circuit breakers with ETU 5-series

Line protection: ETU550, ETU560
- Acquisition of current values
- Parameterization and measured value display directly at the ETU
- Optional communication

3VA6 molded case circuit breakers with ETU 8-series

Line protection: ETU850, ETU860 / motor protection: ETU860M
- Acquisition of current, voltage, and power values
- Parameterization and measured value display directly at the ETU
- Optional communication

Communication accessories in the molded case circuit breaker

1 	**COM060 communication module** ▪ For mounting in the right-hand accessories compartment of the 3VA6 molded case circuit breaker ▪ Communication with breaker data server ▪ Includes a T-Connector	**3VA9187-0TB10* – IEC** **3VA9387-0TB10**– IEC** **3VA9177-0TB10*** – Global (UL)** **3VA9377-0TB10**** – Global (UL)**

Breaker data server

3 	**COM800 / COM100 breaker data server** **For connecting 3VA6 molded case circuit breakers to standard bus systems** ▪ Integrated Ethernet interface (10/100 Mbit/s) ▪ Includes two terminating resistors ▪ COM800 breaker data server: central communication module for connecting up to eight 3VA6 molded case circuit breakers via the 3VA-line	**3VA9977-0TA10 – IEC/Global (UL)** COM800 for connecting up to eight 3VA6 molded case circuit breakers **3VA9977-0TA20 – IEC/Global (UL)** COM100 for connecting one 3VA6 molded case circuit breaker
4 	**7KM PAC expansion modules** ▪ Switched Ethernet PROFINET / PROFIBUS DP / Modbus RTU ▪ Interface expansion for COM100 and COM800 breaker data servers ▪ Mounted on a breaker data server by means of plug-in technology	PROFINET **7KM9300-0AE01-0AA0 – IEC/Global (UL)** PROFIBUS DP **7KM9300-0AB01-0AA0 – IEC/Global (UL)** Modbus RTU **7KM9300-0AM00-0AA0**

Accessories for communication

2 	**T-Connector (spare part)** Provides spur line feeder to COM060 communication module and loops through to the next circuit breaker	**3VA9987-0TG10 – IEC/Global (UL)**
	**Preassembled connecting cable T-Connector-to-T-Connector or T-Connector-to-COM800 / COM100**	
	▪ 0.4 m long	**3VA9987-0TC10 – IEC/Global (UL)**
	▪ 1 m long	**3VA9987-0TC20 – IEC/Global (UL)**
	▪ 2 m long	**3VA9987-0TC30 – IEC/Global (UL)**
	▪ 4 m long	**3VA9987-0TC40 – IEC/Global (UL)**
	**Preassembled connecting cable for extending the COM060-to-T-Connector spur line connection**	
	▪ 0.4 m long	**3VA9987-0TF20 – IEC/Global (UL)**
	▪ 0.8 m long	**3VA9987-0TF10 – IEC/Global (UL)**

*Frame sizes 3VA2 100A, 160A, 250A
**Frame sizes 3VA2 400A, 630A
***Frame sizes 3VA6 150A and 250A
****Frame sizes 3VA6 400A and 600A

Note: The numbered green dots can be used as a point of reference in the diagram on pages 12 and 13.

Accessories for communication

	**Additional bus terminating resistors (spare part)**	**3VA9987-0TE10 – IEC/Global (UL)**
	**Voltage tap to external N conductor (spare part)** Cable for connecting the neutral point for the measuring function of the ETU 8-series, 1.5 m long	**3VA9987-0UC10 – IEC/Global (UL)**
	**External current transformer for N conductor** Connects an external current transformer for the N conductor for 3-pole 3VA2 molded case circuit breakers with ETUs 5-series and 8-series, including connecting cable	
	▪ I_n = 25 ... 100 A	**3VA9007-0NA10**
	▪ I_n = 160 ... 250 A	**3VA9107-0NA10 – IEC only /Global (UL) N/A**
	▪ I_n = 400 ... 630 A	**3VA9307-0NA10 – IEC only /Global (UL) N/A**
	Spare part: cable for connecting an external current transformer for an N conductor	**3VA9907-0NB10 – IEC only /Global (UL) N/A**

Display

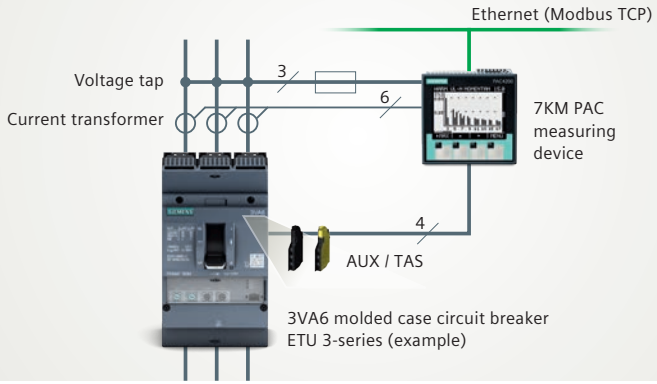
5 	**DSP800 display** ▪ For displaying the status, measured values, and parameters of up to eight 3VA6 molded case circuit breakers ▪ Connection to COM800 / COM100 breaker data server via integrated Ethernet interface	**3VA9987-0TD10 – IEC/Global (UL)**

Software

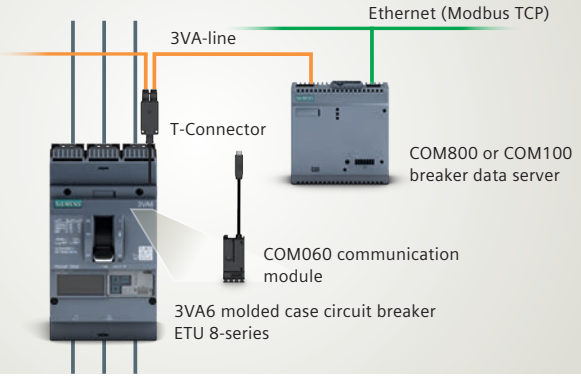
	**Powerconfig configuration software** Commissioning and service tool for communication-capable circuit breakers and measuring devices from the SENTRON portfolio Download free of charge at http://support.automation.siemens.com/WW/view/de/63452759	Library 7KM PAC3200 for SIMATIC PCS 7 **3ZS2781-1CC11-0YG0** Library 3WL / 3VA / 3VL for SIMATIC PCS 7 **3ZS2782-1CC10-0YG0** Library 7KM PAC3200 for SIMATIC WinCC **3ZS2791-1CC11-0YG0**
	Function block libraries for the seamless integration of circuit breakers and measuring devices in SIMATIC PCS 7 and SIMATIC WinCC	

Integrated measuring function and external measured value recording.

Solution with 7KM PAC measuring devices



Solution with a 3VA6 molded case circuit breaker with integrated measuring function



Ambient conditions	Retrofit / conversion of a power distribution board	Without circuit breaker replacement: upgrade measuring function and communication only	With circuit breaker replacement
	Additional space in cubicle / installation effort	Additional current transformers required Installation and wiring of three / four current transformers, fuse-protected voltage taps, and feedback on circuit breaker status	No additional space required, all transformers integrated into 3VA6 molded case circuit breaker
Measuring requirements	Measuring accuracy / update time	⩽ 2% power / faster than 2 s	Up to 2%
	Measuring function	Via external transformers	Integrated
	Special measuring requirements	Harmonics and phase angle	–
System-specific requirements	Diagnosis of protection device (molded case circuit breaker)	Upgradable auxiliary and signaling switches (AUX/TAS)	Access to circuit breaker data via communication interface
	Measured value acquisition for each load feeder	–	Motor protection version with integrated measuring function

High transparency.

Protect, measure, and communicate, all with a single device – that's exactly what the 3VA6 molded case circuit breakers from the SENTRON portfolio enable you to do. It's an integrated system for a fail-safe, highly available power supply.

The table on the right compares the technical features of the 3VA6 molded case circuit breakers with integrated measuring function with those of the 7KM PAC measuring devices.

	7KM PAC3100 measuring device	7KM PAC3200 measuring device	3VA6 molded case circuit breaker with ETU 8-series	7KM PAC4200 measuring device
Performance				
Measuring range / connection				
Max. input voltage L-L / L-N	480 V / 276 V	690 V / 400 V	600V / 480V	690 V / 400 V
Transformer connection version	x / 5 A	x / 1 A / x / 5 A	Integrated	x / 1 A / x / 5 A
Direct connection version	–	–	25 A – 1000 A	–
Version with DC extra-low-voltage power supply unit	–	22 ... 65 V / 110 – 340 V DC	24 V DC	22 ... 65 V / 110 – 340 V DC
Basic variables				
Current, voltage, power, frequency, power factor	■	■	■	■
Power detection				
Apparent, active, reactive power	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■	■ / ■ / ■
Extended variables				
Load profile recording with time stamp and min. / max. values	–	–	■	■
Total harmonic distortion factor THD (voltage, current)	–	–	■	■
Harmonics (voltage, current)	–	–	–	3rd – 31st
Phase angle, phase diagram	–	–	–	■
Monitoring function				
Operating hours counter	–	■	■	■
Limit-value monitoring	–	■	■	■
Logic functions	–	■	–	■
Event log	–	–	■	> 4000 events
Gateway function	–	–	–	■
System integration and communication				
Digital inputs (DI) / digital outputs (DO)	2 / 2	1 / 1	via EFB300: 1/4	2 / 2
S0 interface	■	■	via EFB300	■
4DI / 2DO expansion module	–	–	–	optional
Modbus RTU	■		optional	optional
Ethernet with Modbus TCP	–	■	■	■
PROFIBUS DPV1	–	optional	optional	optional
PROFINET IO / PROFIenergy	–	optional	optional	optional
Parameterizing software	powerconfig	powerconfig	powerconfig	powerconfig
Integration into power monitoring system	powermanager	powermanager powerrate	powermanager powerrate	powermanager powerrate
General data				
Measuring accuracy – current, voltage	0.5 % – 0.2 %[1]	0.5 % – 0.2 %[1]	1 %[2] / 1 %[3]	0.5 % – 0.2 %[1]
Measuring accuracy – active, reactive power	1/2	0.5 S/2	Up to 2%	0.5 S/2
Installation	Front mounting	Front mounting	Fixed mounting, plug-in technology, draw-out technology	Front mounting
Dimensions	96 x 96 x 56 mm	96 x 96 x 56 mm	Depending on size	96 x 96 x 82 mm
Measured value display	Display	Display	Display in the ETU / optional: DSP800	Display

[1] Without transformer
[2] Including transformer 1% in the 0.2 ... 1.2 xI_n range
[3] Including transformer 1% in the 80 ... 800 V range

3VA Power and data comparisons

	PAC 3100	3VA-ETU8	PAC 3200	PAC 4200
Power, energy and demand				
Voltage/current: per phase, average	☐	☐	☐	☐
Voltage/current: unbalance	☐	☐	☐	☐
Power: real, reactive, apparent, power factor, frequency kW/kWh	☐	☐	☐	☐
Energy: bi-directional, import, export	☐	☐	☐	☐
Energy: total, net	☐	☐	☐	☐
Demand: block, sliding window	☐		☐	☐
Demand: thermal predicted				
Power quality analysis				
Sag/swell monitoring				
Voltage disturbance direction detection				
Transient detection, microseconds				
Harmonics (individual, even, odd, total) up to		THD & Min/Max THD only - 5% accuracy	THD only	31st
Sampling rate, maximum samples/cycle	64	88	64	204
Flicker, harmonics to EN50160, IEC 6100-4-7 / 4-15				
Configurable for IEEE 519-1992, IEEE 1159, SEMI/ITIC				
Data and waveform logs				
Triggered by setpoint, schedule, or external signal				
Sequence-of-event logs, variable log depth				☐
Minimum/maximum logs		☐ (No Logs)	☐	☐
Historical logs / maximum # of channels				
Waveform recording				
Time-stamps, resolution in seconds				0.1
Event log		☐		
GPS time synchronization				SNTP
Waveform in COMTRADE format with FTP				

Notes

Published by
Siemens 2020

Siemens Industry, Inc.
3617 Parkway Ln.
Peachtree Corners, GA 30092

Siemens Technical Support: 1-800-333-7421
info.us@siemens.com

Order No. CBBR-3VACM-1220

Printed in USA

usa.siemens.com/3VA