SENTRON ATC5300 - Automatic Transfer Control Device

SENTRON switching, protection and measuring devices

The SENTRON ATC5300, when equipped with two motor-driven circuit breakers, serves as a transfer system that automatically or manually switches between two power supply systems in low-voltage power distribution applications.

- It can be deployed in all areas
  In particular, the SENTRON ATC5300 is deployed everywhere where a power failure is especially critical, e.g. in hospitals, in conjunction with UPS systems, and for industrial processes. With its broad measuring voltage range covering up to 690 V U_{L-L}, the SENTRON ATC5300 is suitable for use in the industry, infrastructure, and building management systems.

- Safe power supply maintenance
  In case of a power failure, the SENTRON ATC5300 automatically switches to a second power supply, which ensures that loads can be supplied with power at all times. If necessary, loads not authorized to draw power can be switched off by the load shedding function.

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**Highlights**

- User-friendly, exact parameter settings and LED displays for displaying measured values
- Versatility through option for switching between the power sources: system to system, system to generator or generator to generator
- Easy programming using SENTRON SOFTWARE ATC
- Integration into energy management system via RTU modbus
- Generator test function for mandatory testing intervals

Answers for industry.
Automatic Transfer Control Device

Transfer between two power supply systems in low-voltage power distribution

Benefits
The advantages of the SENTRON ATC5300 at a glance:
- Controls compact molded case circuit breakers MCCB, air circuit breakers ACB, switch disconnectors LBS, or contactors
- Two measuring inputs for single-phase and multi-phase power supply systems
- Option for switching between system to system, generator to system, system to generator, and generator to generator configurations
- Direct connection and measurement of three-phase industrial systems ranging up to 400 V AC \(L-N\) or 690 V AC \(L-L\) (converter costs, no assembly and installation costs for converters)
- Two power supply units for covering all common AC/DC voltages. Alternative supply is possible through the main and standby system
- Low space requirements due to door installation and compact design
- Two displays for monitoring the normal/standby system and displaying the phase and interlinked cable voltages
- Setting control parameters for generator activation requirements
- Calendar clock
- 8 digital inputs, 6 of which are programmable, 7 relay outputs, 5 of which are programmable
- 4 selectable operating modes: off, manual, automatic, test
- Data, parameter and logged events (e.g. power failure, faults) remain accessible and unaltered even after a power failure or restarting a device
- Status display of the connected circuit breakers or contactors
- Occurring events are logged and can be compiled into statistics
- Easy system integration through integrated modbus interface (RTU and ASCII), e.g. for integrating into a power management system
- The illuminated LED display makes reading measured values and parameters easy, even under unfavorable lighting conditions
- The SENTRON SOFTWARE ATC programming software saves considerable time when setting parameters and setting up the SENTRON ATC5300
- Generator test run function for mandatory testing intervals
- Command option for switching to the second set of protection parameters in the ETU76B (air circuit breaker SENTRON 3WL).

Application

SENTRON ATC5300 front

Measurement variables
The SENTRON ATC5300 records and monitors the following measurement variables:

<table>
<thead>
<tr>
<th>Measured variables</th>
<th>Default setting</th>
<th>Limit value setting</th>
<th>Delay time</th>
<th>Can be deactivated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated system voltage (U_{b})</td>
<td>V AC 100 ... 690</td>
<td>70 % ... 98 % (75 % ... 100 %) (^{1})</td>
<td>0.1 ... 900 s</td>
<td>✔</td>
</tr>
<tr>
<td>Voltage asymmetry</td>
<td>%</td>
<td>1 % ... 20 %</td>
<td>0.1 ... 900 s</td>
<td>✔</td>
</tr>
<tr>
<td>Phase failure</td>
<td>%</td>
<td>60 % ... 85 %</td>
<td>0.1 ... 30 s</td>
<td>✔</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Left, right</td>
<td>--</td>
<td>--</td>
<td>✔</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td>50/60</td>
<td>0.1 ... 900 s</td>
<td>✔</td>
</tr>
<tr>
<td>Battery voltage (U_{b})</td>
<td>V DC 12/24/48</td>
<td>70 % ... 100 %(^{2})</td>
<td>0 ... 60 s</td>
<td>✔</td>
</tr>
</tbody>
</table>

\(^{1}\) Hysteresis value for switch back authorization, \(^{2}\) warning only, no switching

Automatic system transfer with the SENTRON ATC5300
The SENTRON ATC5300 controls the transfer between both power supplies fully automatically, while talking into consideration the set limit values and delay times. It detects fluctuations occurring in the main power supply quickly and switches to the standby power supply. The control device only switches to the standby power supply after it has ensured that the standby supply is delivering the required power supply quality. The devices switch back to the main power supply taking into consideration the set parameters once the required power supply quality is available again.

If the standby power supply and/or the main power supply is fed by a generator, the control device also offers a wide range of settings, such as a generator lead time, delay time, and generator start test at specified times.

The SENTRON ATC5300 can be deployed for the following applications:
- Feeding UPS systems (uninterruptible power supply)
- Hospital power supplies
- Public building, hotel and airport power supplies
- Data centers and communication system power supplies
- Supplying power to industrial processes that require a high level of operational continuity
Applications in low-voltage power supplies

SENTRON ATC5300 is ideally suited for low-voltage power supplies thanks to its wide voltage range covering up to 690 V \( U_{L-L} \).

Two separate power supplies are required to maintain a continuous power supply to loads in the event of a power failure. Loads can be supplied with power through the following configurations system to system, system to generator, or generator to generator (see image 1). The SENTRON ATC5300 can be deployed throughout the entire range of low-voltage power distribution applications (see image 2). It can be integrated as a control panel instrument in low-voltage main distribution units, sub-distribution units, and distribution boards.

Implementing an automatic transfer system using the SENTRON ATC5300

The compact SENTRON ATC5300 is used to automatically and manually switch from a main power supply to a standby power supply and vice versa. In case system faults occur, the SENTRON ATC5300 controls the switching operations fully automatically. This ensures a very high level of operational continuity.

SENTRON ATC5300 allows the implementation of an automatic transfer control unit in conjunction with compact molded case circuit breakers MCCB, air circuit breakers ACB, switch disconnectors LBS, or contactors.

The following SENTRON products are ideally matched to the SENTRON ATC5300:
- SENTRON 3VL Molded case circuit breakers
- 3VT Molded case circuit breakers
- SENTRON 3WL Air circuit breakers
- 3WT Air circuit breakers

Functions

The control device is equipped four selectable modes:
- Automatic
- Manual
- Test
- Off

In Manual mode, the system can be switched manually on the SENTRON ATC5300. The Test mode allows the generator to be started or tested in the system-generator configuration, without switching to the standby power supply. This ensures that the power flow to the load is not interrupted.

Examples of switching options with truth table (image 1)

Application areas in low-voltage power distribution (image 2)

The control device is also equipped with programmable inputs and outputs. They enable the implementation of the following functions, among other things:
- Load shedding (unauthorized loads are disconnected from the system)
- Load shedding preparation (machines can be switched into safe mode)
- Generator start and stop signal
- Collective fault message (e.g. message to PLC, light)
- An external signal initiates the transfer to the standby system
- An external signal can communicate to the control device that switching is not permitted, even if the limit value is not maintained

The SENTRON ATC5300 can be connected to a higher-level power management system using the modbus interface (RTU or ASCII). Modbus enables the transfer of all data, parameter sets, and status messages of the device.
Integration

System transfer configuration
- Feed-in system line 1 (main system) and line 2 (standby system) are connected to SENTRON ATC5300.
- In case of system anomalies, the SENTRON ATC5300 activates components Q1 and Q2 accordingly.
- Q1 and Q2 can be implemented with compact molded case circuit breakers MCCB, air circuit breakers ACB, switch disconnectors LBS, or contactors.

Q1 and Q2, configured with SENTRON circuit breakers

All SENTRON circuit breakers connected to the SENTRON ATC5300 must be equipped with the following accessories:
- MCCB SENTRON 3VL or 3VT circuit breakers
  - One motor drive
  - One alarm switch
  - Two auxiliary switches 1 NO / 1 NC
- ACB SENTRON 3WL or 3WT air circuit breakers
  - One motor drive
  - One closing solenoid
  - One auxiliary release (shunt release)
  - One tripped signaling switch
  - One auxiliary switch block 2NO/2NC (standard fittings)

The following is also required for each ACB 3WL:
- One motor drive
- One closing solenoid
- One auxiliary release (shunt release)
- One tripped signaling switch (standard fittings)
- One auxiliary switch block 2NO/2NC (standard fittings)

Implementation of an automatic transfer system

SENTRON ATC5300 in a modbus RTU system

The SENTRON ATC5300 supports the modbus communication protocol (RTU or ASCII) through the RS485 interface.

Easy system integration through integrated modbus interface, e.g. for integrating into a power management system
Programming

Setting parameters and monitoring using SENTRON ATC SOFTWARE

In addition to operation and setting parameters on-site, you can also monitor and set the parameters of the control device using the SENTRON ATC SOFTWARE. The software offers a high level of convenience and quick access to all device settings. Various time settings required when connecting generators can be easily programmed using the software. If parameters for several devices must be set, the data sets can be easily duplicated. The SENTRON ATC5300 features internal memory that logs the occurring events. The software can read out this data and compile it into statistics.
**Application**

**Feeding UPS systems**

The SENTRON ATC5300 guarantees a high level of reliability and operational continuity. It can be deployed in all areas, such as industry, infrastructure, and buildings. Standby power supplies are required in public buildings, high-rise buildings, hospitals, or other locations where people work.

UPS systems are essential for areas with high demands regarding supply safety, such as in hospitals and IT systems. Using the SENTRON ATC5300 in conjunction with USP systems ensures the maximum level of continuous power distribution. In case of a power failure, the end loads are immediately supplied by the USP system until the control device has successfully switched to the standby system.

**Design**

**SENTRON ATC5300**

- A) Switchover between measured data (voltage, frequency), when in the parameter setting programming mode
- B) Manual switchover
- C) In Test mode, the generator start-up can be tested, without switching over to the standby power supply.
- D) Automatic switchover to the standby power supply in case of fault
- E) Manual switchover possible
- F) Switch off, access for programming

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**Front**

- A) Output for controlling: motorized operating mechanisms, contactors 250 V AC 12 A
- B) Programmable inputs and outputs, e.g. for electrical interlock, generator start signal, alarm output, etc.
- C) Power supply: 220-240 V AC or 12-24-48 V DC
- D) Measuring lead, main power supply
- E) Measuring lead, standby power supply
- F) RS485 communication (Modbus RTU)
- G) RS232 communication (connection to PC with SENTRON SOFTWARE ATC)

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**Rear**

- A) Programmable inputs and outputs
- B) DIN-rail (for mounting)
Technical specifications

SENTRON ATC5300  3KC9-000-8TL30

**Power supply**
- Rated voltage \( (U_n) \): 220 … 240 V AC
- 12-24-48 V DC
- Operating range: 187 … 264 V AC
- 9 … 70 V DC
- Frequency: 45 … 65 Hz
- Power consumption (max.): 9 VA \( (U_{us} 240 V AC) \)
- Power loss (max.): 6.3 W \( (U_n 240 V AC) \)
- Power consumption (max.): 300 mA at 12 V DC
- 180 mA at 24 V DC
- 90 mA at 48 V DC

**Safety in the event of a short interruption**: 50 ms

**Measuring inputs**
- Max. rated voltage \( U_n \): 690 V AC L-L (400 V AC L-N)
- Measuring range: 80 … 800 V AC L-L
- Frequency range: 45 … 65 Hz
- Measuring method: RMS value (true RMS)
- Measuring input impedance:
  - >1.1 M\( \Omega \) L-L and
  - >0.5 M\( \Omega \) L-N
- Connection method: Single-phase, two-phase, or three-phase system
- Measuring errors: 0.25 %, Value range ± 1 digit

**Digital inputs**
- Input type: Negative
- Input current: ≤10 mA
- Input signal – logic state “0”: ≤1.5 (typ. 2.9 V)
- Input signal – logic state “1”: ≥5.3 (typ. 4.3 V)
- Input signal delay: ≥50 ms

**Relay outputs**
- Number of outputs: 7
- Contact configuration:
  - 2 relays: 1NO, 12A, 250 V AC (AC1)
  - 3 relays: 1NO, 8A, 250 V AC (AC1)
  - 2 relays: 1CO, 8A, 250 V AC (AC1)
- Reversing time of control device: 1 s

**Communication interfaces**
- Serial RS 232 interface
- Programurable baud rate
- 1200 … 38400 b/s connection via RJ45 plug

**Communication interfaces**
- Serial RS 485 interface
- Optically isolated with programmable baud rate
- 1200 … 38400 b/s connection via pluggable terminals

**Real-time clock**
- Energy storage: Storage capacitors
- Operating time without feeding voltage: approx. 12 … 15 days

**Insulation voltage**
- Rated insulation voltage \( (U) \): 690 V

**Ambient conditions**
- Operating temperature: -20 … +60 °C
- Storage temperature: -30 … +80 °C
- Relative humidity: <90 %
- Max. pollution degree: 3
- Overvoltage category: 3
- Measuring category: CAT III

**Ports**
- Terminals: Removable/pluggable
- Cable cross-section (min-max): 0.2 … 2.5 mm² (AWG 24 … 12)
- Tightening torque: 0.5 Nm (4.5 lbf in)

**Enclosure**
- Enclosure material: Thermoplast LEXAN 3412R
- Version: Door installation
- Degree of protection: IP41 front, IP20 rear
- Weight: 950 g

**Standards and Approvals**
- Complies with the ATS/ATSE standard IEC 60947-6-1, in combination with 3VL, 3VT, 3WL or 3WT ¹
- Environmental classifications:
  - 3K6 - IEC 60721-3-3
  - 3B2 - IEC 60721-3-3
  - 3C3 - IEC 60721-3-3
  - 3S2 - IEC 60721-3-3
  - 3M6 - IEC 60721-3-3
- EMC standard:
  - according to IEC 60947-6-1
- ¹ See device manual for further information

**Dimensional drawings**
### Selection and ordering data (Dated 01/2010)

<table>
<thead>
<tr>
<th>Transfer control device and programming software</th>
<th>Screw terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENTRON ATC5300</td>
<td>3KC9-000-8TL30</td>
</tr>
<tr>
<td>Control panel instrument</td>
<td></td>
</tr>
<tr>
<td>144mm x 144mm x 96mm</td>
<td></td>
</tr>
<tr>
<td>with the following features:</td>
<td></td>
</tr>
<tr>
<td>• Screw terminal connection</td>
<td></td>
</tr>
<tr>
<td>• AC/DC power supply unit</td>
<td></td>
</tr>
<tr>
<td>• 220 ... 240 V AC, 45 ... 60 Hz</td>
<td></td>
</tr>
<tr>
<td>• 9 ... 70 V DC</td>
<td></td>
</tr>
<tr>
<td>• Rated setting range: 100 ... 690 V AC</td>
<td></td>
</tr>
<tr>
<td>3KC9-000-8TL30</td>
<td></td>
</tr>
<tr>
<td>SENTRON SOFTWARE ATC</td>
<td>3KC9-000-8TL70</td>
</tr>
<tr>
<td>Software for setting parameters and remote control operations, incl. connection cable from control device to PC</td>
<td></td>
</tr>
<tr>
<td>Cable length 1.8 m</td>
<td></td>
</tr>
<tr>
<td>• CD incl. software and manuals.</td>
<td></td>
</tr>
<tr>
<td>• Hard and software requirements:</td>
<td></td>
</tr>
<tr>
<td>- Pentium, 64 MB RAM</td>
<td></td>
</tr>
<tr>
<td>- COM interface (serial RS232)</td>
<td></td>
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<tr>
<td>- CD drive</td>
<td></td>
</tr>
<tr>
<td>- Windows 95/98/2000/XP/Vista/Windows 7</td>
<td></td>
</tr>
<tr>
<td>3KC9-000-8TL70</td>
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</tr>
</tbody>
</table>

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