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DA Partner Conference
SUE3000 and HSTS

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High Speed Transfer Device SUE 3000

The Challenge

Direct and indirect costs due to loss of power, example

5,000 EUR: Identification of damage (extrusion, combustion, melting processes, chemical equipment)
20,000 EUR: Repair of damaged production equipment and machines
10,000 EUR: Detection and disposal of defective product, elimination of environmental damage
20,000 EUR: Re-start of production machines (re-start costs)

5,000 EUR: Increased quality control
10,000 EUR: Delay in delivery
... EUR: Loss of trust and image

Sum of all costs ≥ 70,000 EUR+ xxx per incident
High Speed Transfer Device SUE 3000
The Solution

Function

- Ensures continuous power supply to essential electrical equipment by changing over from a main to a stand-by feeder as fast as possible.
- Suitable for HV, MV and LV networks.
- Benefits:
  - Increased plant availability
  - Ensuring process continuity
  - Quality of energy supply
  - Prevention of costly production outages
  - Protection of facilities, environment and workers

Only one successful transfer can create a full amortization of the investment
# High Speed Transfer Device SUE 3000

## Application Areas

<table>
<thead>
<tr>
<th>Power stations</th>
<th>Automotive industry</th>
<th>Chemical industry</th>
<th>Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water desalination</td>
<td>Glass &amp; plastic industry</td>
<td>Refineries</td>
<td>Metal &amp; aluminum industry</td>
</tr>
</tbody>
</table>
**Prerequisites for the application**

- Existence of at least two -usually independent- synchronous feeders
- Circuit-breakers with short operating times < 100ms
- Existence of appropriate initiation devices
- General suitability of plant for network change-over: load configuration with rotating devices
High Speed Transfer Device SUE 3000

Connections

**Interfaces**

- Circuit Breakers:
  - Control (Trip/Close commands)
  - Indication (CB position)
- Analogue Measurements:
  - Voltage Transformers (Feeder U, Busbar U)
  - Current Transformers (optional, Feeder I)
- External protection
- Instrumentation & Control
- SCADA/DCS connection

Permanent supervision of incomers, busbars and CBs
High Speed Transfer Device SUE 3000

Construction

Central unit & HMI

Available communication protocols (optional):
- IEC 61850-8-1
- IEC 60870-5-103
- Ethernet interface
- ModBUS TCP
- ModBUS RTU
- Profibus DP (via adapter)
- SPA

AI board
Mainboard
Comm. board
AO board
3x BI/O boards
Power supply board
High Speed Transfer Device SUE 3000

Installation

Options

- SUE 3000 as loose device solution for further installation in a LV compartment of a MV panel
- SUE 3000 installed in a standalone steel sheet cabinet (installation of more than one device per cabinet possible)
High Speed Transfer Device SUE 3000

Variants

**Variant 1**

**Variant 2/4**

**Variant 3/5**

Variant 2: Between feeder A or B and coupler

Variant 4: Between all breakers

Variant 3: Between feeder A and B or C

Variant 5: Between all breakers
High Speed Transfer Device SUE 3000

Functional modes

Four transfer modes

- Fast transfer
- First phase coincidence transfer
- Residual voltage transfer
- Time depending transfer
# High Speed Transfer Device SUE 3000

## Functional modes

### Total transfer duration definition

The total transfer duration consists per definition of following main time components:

- Protection time for fault detection and transfer initiation
- SUE 3000 processing time
- Circuit breaker operating times

### Transfer mode

<table>
<thead>
<tr>
<th>Transfer mode</th>
<th>Average total transfer duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast transfer</td>
<td>30* – 100 ms</td>
</tr>
<tr>
<td>1st phase coincidence transfer</td>
<td>250 – 500 ms</td>
</tr>
<tr>
<td>Residual voltage transfer</td>
<td>400 – 1200 ms</td>
</tr>
<tr>
<td>Time depending transfer</td>
<td>&gt; 1500 ms</td>
</tr>
</tbody>
</table>

* Only in case of use of HSTS system
High Speed Transfer Device SUE 3000

Functional modes: fault record of a manual fast transfer
## High Speed Transfer Device SUE 3000

### SUE 3000 vs. ATS

**SUE 3000**
- Typical transfer time <100ms (including CB operation times)
- Dynamic and conditions-based transfer mode selection
- 4 matched transfer modes in order to achieve fast and safe transfers
- Uninterrupted and undisturbed function of the processes in case of an incomer fault
- Smooth transfer considering phase angle and voltage differences from initiation to transfer end
- CB operating times considerations during transfer operations
- Extendable system for time performance enhancement (HSTS)
- Safety features (decoupling, CB open, CB indication inconsistent)

**ATS**
- Typical total transfer time > 500ms
- Limited transfer mode selection
- Risk of interruption on loads and processes in case of an incomer fault
- Uncontrolled transfer at high voltage levels (above 40% \(U_n\)) leading to equipment damage (shafts, bearings, etc...)
- CB operating times not considered

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**SUE 3000 or ATS? A question of performance requirement**
High Speed Transfer System HSTS
From fast to superfast

The step forward

- For fast fault detection optimized REF542plus initiation units:
  - equipped with special protection functions enabling fast fault detection
  - fast and supervised optical communication link towards the SUE 3000

- Vacuum CBs VM1-T with magnetic drive:
  - 9 ms breaking time
  - 16 ms making time

- Ideal solution for process industry, hospitals, logistic centers and data center

Total transfer time 30ms!
High Speed Transfer System HSTS

Total transfer duration: SUE 3000 vs. HSTS

- Protection initiation time (ms)
- SUE 3000 processing time (ms) (incl. BIO times)
- CB operating time -closing- (ms)

<table>
<thead>
<tr>
<th></th>
<th>Fast Transfer Mode</th>
<th>Balance Transfer Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUE 3000</td>
<td>x (&gt;20) 12 x (&gt;60)</td>
<td></td>
</tr>
<tr>
<td>SUE 3000 with REF542plus</td>
<td>6 7 x (&gt;60)</td>
<td></td>
</tr>
<tr>
<td>SUE 3000 with VM1-T</td>
<td>x (&gt;20) 12 16</td>
<td></td>
</tr>
<tr>
<td>HSTS</td>
<td>6 7 16</td>
<td></td>
</tr>
</tbody>
</table>

X = Components provided by customer, times can vary

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Summary

Benefits

- Continuous Processes
- Uninterrupted Power Supply
- Protection of Production Equipment
- No Costly Outages
- Plant Availability
- Easy Integration into the System
- Protection of Employees and Environment