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Current transformer special applications
Knowledge base information

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1 Description

This document provides some information for the application of the external current transformers (CT’s) which are used to measure the load- or line-side currents.

Please read the general description of using CT’s in the Installation and Operation manual first.

2 Use of 1A current transformers (instead of 5A)

The recommended secondary CT output-current is 5 Amps. This is the measurement-range of the AHF-internal data acquisition.

It is possible to use CT’s with 1 Amp secondary output. Note, however, that the measurement accuracy in that case is 1/5 of what it would be using a 5A CT.

In most applications, however, one may not be able to detect a difference in performance between utilization of a 5A and 1A CT.

If you use a 1A CT please

- Use a CT with a ratio suitable for the application and corresponding to the maximum current. The CT-ratio should not be higher than absolutely necessary.
- Make sure to set the correct ratio for parameter P310, because the ratio in P310 is based on CT’s with a 5A secondary current.

Table 1: Examples for parameter setting using a 1A CT

<table>
<thead>
<tr>
<th>Used 1A CT</th>
<th>Correct value for P310</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 : 1A</td>
<td>2500 : 5A</td>
</tr>
<tr>
<td>1000 : 1A</td>
<td>5000 : 5A</td>
</tr>
</tbody>
</table>
3  CT setting for the case of using a step-up transformer

If an AHF is used with a step-up transformer, and the CT’s are placed on the high-voltage side the ratio of CT’s has to be adapted to the step-up transformer-ratio. The following figure gives an example:

**Note**

Please note the permissible rated ECOsine® Active voltages and line frequencies when designing this type of compensation system.

![Diagram showing CT setting for step-up transformer](image)

**Fig. 1:** Application example for using of output transformer

**Table 2: Parameter setting for application example**

<table>
<thead>
<tr>
<th>Parameter no.</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>P300</td>
<td>loadside</td>
<td>position of CT</td>
</tr>
<tr>
<td>P310</td>
<td>875 : 5A</td>
<td>adapted ratio of CT (800*525V/480V)</td>
</tr>
<tr>
<td>P320</td>
<td>150A</td>
<td>parallel current (3*50A)</td>
</tr>
</tbody>
</table>
4 Parallel operation of AHF units with CT’s placed on the AC-line side

4.1 Supply with one feeding transformer

In case of parallel operation of more than 1 AHF and the CT’s placed on the AC-line side it is necessary to provide additional cancellation CT’s and summation CT’s to form the equivalent of the load-side current. **The ratios of the summation CT’s must be adapted to the ratio of the AC-line side CT’s and the ratio of the cancellation CT’s as you may have chosen different current-ratios for both.** The following figure gives an example. Other CT ratios are possible.

Fig. 2: Application example for parallel operation of 2 AHF (50A) with CT’s on the AC-line side
Table 3: Parameter setting for application example parallel operation

<table>
<thead>
<tr>
<th>Parameter no.</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
</table>
| P300          | loadside   | position of CT (load current is calculated by summation of current signals)  
Please note the correct direction of the cancellation CT´s (from AHF P1 to load P2) |
| P310          | 1300 : 5A  | adapted ratio of CT (1000A+300A)                                      |
| P320          | 100A       | parallel current (2*50A)                                             |

4.2 Supply with two independent feeding transformers

Fig. 3: Application example for parallel operation of 2+1 AHF (each 50A) with CT´s placed on the AC-line side and two independent transformers
Table 4: Parameter setting for application example parallel operation

<table>
<thead>
<tr>
<th>Parameter no.</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>P300</td>
<td>loadside</td>
<td>position of CT (load current is calculated by summation of current signals)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Please note the correct direction of the cancellation CT (from AHF P1 to load P2!)</td>
</tr>
<tr>
<td>P310</td>
<td>3400 : 5A</td>
<td>adapted ratio of CT (1500A+1500A+400A)</td>
</tr>
<tr>
<td>P320</td>
<td>50A (set in device 1)</td>
<td>100A (set in device 2 and 3)</td>
</tr>
</tbody>
</table>
5 Combination of AHF and PFC units with main CT’s placed on the AC-line side

If there is no possibility to place CTs somewhere downstream (neither for AHF nor for PFC) the following CT wiring can be a solution.

5.1 PFC in combination with one AHF unit

Fig. 4: Application example for one AHF with CT’s placed on the AC-line side and PFC system
5.2 PFC in combination with multiple AHF units

In case of parallel operation of more than 1 AHF and the CT’s placed on the AC-line side it is necessary to provide additional cancellation CT’s and summation CT’s to form the equivalent of the load-side current. The ratios of the summation CT’s must be adapted to the ratio of the AC-line side CT’s and the ratio of the cancellation CT’s as you may have chosen different current-ratios for both. The following figure gives an example. Other CT ratios are possible.

Fig. 5: Application example for parallel operation of 2 AHF (each 50A) with main CT’s placed on the AC-line side and PFC system
Table 5: Parameter setting for application example PFC in combination with multiple AHF units

<table>
<thead>
<tr>
<th>Parameter no.</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>P300</td>
<td>loadside</td>
<td>position of CT (load current is calculated by summation of current signals)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Please note the correct direction of the cancellation CT (from AHF P1 to load P2!)</td>
</tr>
<tr>
<td>P310</td>
<td>1900 : 5A</td>
<td>adapted ratio of CT (1500A-400A)</td>
</tr>
<tr>
<td>P320</td>
<td>100A (set in each device)</td>
<td>parallel current</td>
</tr>
</tbody>
</table>

Fig. 6: Wiring diagram for Application example running 2 AHF in parallel operation (each 50A) with main CT’s placed on the AC-line side and PFC system