

Accuracy related definitions

Offset errors

The offset errors are independent from the present value of the primary current. They are measured with open primary circuit, and expressed in parts per million (ppm) of the rated output voltage or current. Offset errors are present in Zero-flux units with current or voltage output.

Initial offset error

The output voltage or current with open primary circuit, at 5 minutes after turn-on, at 25°C, in the first year after calibration.

It includes uncertainty in the offset calibration procedure and effects of remanent field in the measuring head.

Offset error versus temperature

The changes in offset error caused by changes in ambient temperature.

Offset error versus time

The change in offset error caused by time.

Load induces offset error

Part of the offset is caused by the thermal effects of sustained high measured current. This type of offset is proportional with squared measured current, averaged over a time constant of several minutes. It is present both in types with voltage and current output, and specified as the difference in output with open primary circuit before and after applying nominal current for 1 hour, expressed in ppm of nominal output.

Ratio error

Is the difference between

- the primary current to output voltage ratio of the tested unit, after nulling any offset error and
- the ratio of these two quantities referenced to national standards

The ratio is normally calibrated near rated primary current for less than 2 minutes. Ratio error is caused by the burden resistor and output amplifier. It can be measured at any current, and is expressed in ppm of the nominal ratio. The current-output Zero-flux has no ratio error.

Initial ratio error

The calculated error of the measuring set-up and the uncertainty in the reference unit at the moment of calibration at 25°C.

Ratio error versus temperature

The changes in ratio error due to change of the ambient temperature.

Ratio error versus time

The changes in ratio error due to aging.

Load induced ratio error

This type ratio error is caused by warming-up of the burden resistor and output amplifier, and is proportional with the square of the measured current averaged with a time constant of several minutes. The load induced ratio error is specified as the difference in ratio errors at turn on of nominal current and that after one hour.

The effect of load induced ratio error for very slow variations of the primary current is that of a linearity error.

Ambient related definitions

Ambient temperature range

(measuring head)

The range of air temperatures at 0.1m distance from the measuring head, as allowed without damage to the head at maximum continuous current and a busbar temperature that is 40°C more than the highest ambient temperature. The influence of temperature on the accuracy is negligible for the measuring head.

Ambient temperature range

(electronics)

The range of air temperatures of the electronics over which proper operation within the specified parameters is guaranteed. In case the electronics is integrated in the measuring head, only one ambient temperature range is specified.

Minimum safe distance to external circuits

The measuring head has some sensitivity for current in nearby conductors, especially when these are in parallel to the axis of the measuring head.

The minimum safe distance is that distance between the centre of a long conductor at rated current and the parallel centre axis of the Zero-flux measuring head (without primary conductor), where the output voltage is twice the initial offset error.

Related to the primary side

Primary current

The sum of all currents following in conductors through the hole in the measuring head.

Rated current (I_n)

The highest primary current in either direction to which all specifications apply, and to which all relative accuracy specifications are related. Where this highest primary current is different between polarities, the highest of the two is the rated current.

Overload current

The maximum primary current at which the output voltage or current is still proportional with the primary current at the minimum supply voltage. At higher currents the compensating amplifier saturates, and the relation between primary current and output value is lost. Absence of the "output valid" contact signals this situation.

Short-circuit current

The highest primary DC current that will not damage the measuring head nor the electronics. Its duration is limited only by the primary busbar for DC current, or limited to 0.1 s. in case of AC current. All types recover automatically from this situation.

Maximum continuous current

The highest rms value of the primary current, as averaged over any 10 minutes period, that the current transformer can measure continuously at the maximum ambient temperature without damage. It is equal to the rated current for DC or low frequency waveforms unless manufactured for a lower value on customer spec.

Current slew rate limit

The maximum rate of change of the primary current in either direction for which the current transformer operates properly.

Test voltage primary to secondary

The test voltage as applied between a primary conductor, filling up the entire hole, and all secondary windings and screens. It is applied as 50Hz ac voltage for 1 minute.

Related to output of Zero-flux with current output

Rated output current

This is the output current at rated input current. This current can be positive or negative depending on primary current polarity. It is set only by the number of turns of the compensating winding.