DIgSILENT

POWERFACTORY

PowerFactory 2021

Technical Reference

Measurement Block

RelMeasure, TypMeasure

PF2021

POWER SYSTEM SOLUTIONS

MADE IN GERMANY

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Contents

1 General Description

The Measurement block is typically used in any relay model to calculate the current and/or the voltage RMS values used by the protective elements. It is described by the type class TypMeasure and the element class RelMeasure. The block is used to define the following features of a relay model:

- Analog filters.
- Digital filters.
- Sequence components calculation.
- Earth current and voltage calculation.

Figure 1.1 illustrates a typical protective relaying application.

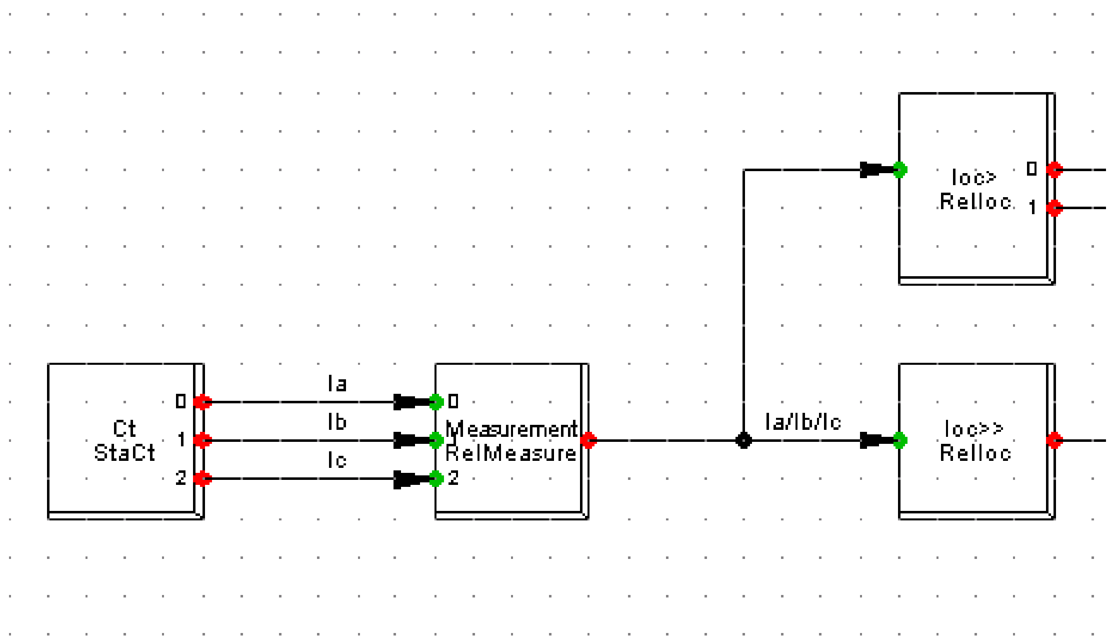

Figure 1.1: Typical application of a measurement block

The Measurement block receives always the inputs from a Ct and/or from a Vt block, while the output of the Measurement block will typically be sent to the protective element blocks. The function performed by a Measurement block will depend on whether a static or a dynamic simulation is being carried out. The output from a Measurement block will depend upon the status of the inputs as well as the operation that the user defines for the block.

1.1 Analog filters

A 2^{nd} order analog filter is active when a EMT simulation is run. Power Factory models an analog low pass filter with DC component filter.

The algorithm executed by the transfer procedure each simulation step is using two internal variables (S_1, S_2) and their derivative (S_1', S_2'). The algorithm is:

$S_1' = (Value^n - Value^{n-1}) * 2\pi f$

where:
$S_1 = 1^{st} internal variable derivative$
$Value^n = input value read during the n step of the simulation$
$f = system frequency$

$S_2' = (Value^n - S_1 - S_2)/T_f$

where:
$S_2 = 2^{nd} internal variable derivative$
$S_1, S_2 = 1^{st} and 2^{nd} internal variable$
$Value^n = input value read during the n step of the simulation$
$T_f = filter time constant$

$Output^n = \sqrt{2} * S_2 / \sqrt{1 + w^2 T_f^2}$

where:
$Output^n = filter output value during the n step of the simulation$
$S_2 = 2nd internal variable$
$T_f = filter time constant$

1.2 RMS calculation using an Integral

A steady state (i.e.) voltage signal in the time domain can be described by the equation:

$v(t) = V_{peak} * sin(\varpi t + \theta)$

In a digital relay, this signal is sampled N times per cycle. Thus the input is represented by a series of samples, S_k, where $k = 1 to N$.

“Rectangle” method The following formula is used when the selected RMS calculation method is “Rectangles”:

$$V = \sqrt{1/N \sum_{K=0}^{N-1} S_k^2}$$

“Trapeziums” method The following formula is used when the selected RMS calculation method is “Trapeziums”:

$$V = \sqrt{1/N \sum_{K=0}^{N-1} (S_k^2 + S_{k+1}^2)/2}$$

1.3 Digital filters

The digital filters process the sampled data points, S_k, by multiplying each sample by a coefficient determined by the type of digital filter employed. The purpose of the digital filters is to remove the non-fundamental frequencies and to provide phasor information regarding the fundamental frequency.

The following digital filters are available:

- DFT
- DFT $1/2$ cycle
- FFT
- Cosine Filter

1.3.1 DFT

The equation

$v(t) = V_{peak} * sin(\varpi t + \theta)$

can be expanded as

$v(t) = V_{peak} * sin(\varpi t) * cos(\theta_\nu) + V_{peak} * sin(\theta_\nu) cos(\varpi t)$

When v(t) is sampled, the resulting sample values are denoted by S_k. Since S_k represents sampled values with a fixed sample rate of N samples per cycle of sinusoidal voltage, the Discrete Fourier Transform Calculation of the fundamental components can be defined by the following equations:

$V_{real} = (2/N) * \sum_{K=1}^{N} |S_K sin(2\pi * k/N)|$

$V_{imag} = (2/N) * \sum_{K=1}^{N} |S_K cos(2\pi * k/N)|$

Applying these equations to the original voltage equation results in the following expressions:

$V_{real} = V_{peak} * cos(\theta_\nu)$

$V_{imag} = V_{peak} * sin(\theta_\nu)$

The magnitude of the voltage phasor can be calculated by the following equation:

$V_{magn} = \sqrt{V_{imag}^2 + V_{real}^2}$

The phase angle of the voltage phasor can be calculated by the following equation:

$V_{angle} = \arctan(V_{imag}/V_{real})$

With these definitions, the Discrete Fourier Transform calculation is able to convert the sinusoidal voltage wave shape to a phasor. The phasor is represented by two forms, the first form is the rectangular form where the real and imaginary components define the phasor; the second form is the polar form where the magnitude and the phase angle define the phasor. A measurement block using the Discrete Fourier Transform calculation determines the real and imaginary parts of each of the currents and/or voltages present as block inputs. This means that each current and voltage sample is multiplied by a sine factor to obtain the real component and by a cosine factor to obtain the imaginary component. These quantities will then be summed over N consecutive samples to obtain the actual components. The measure block is currently using the rectangular form to represent the calculation results: for each input quantity the block will output 3 values: the magnitude (also described as instantaneous RMS), the real and the imaginary component of the RMS phasor. For instance the Phase A current block input will generate the I_A, Ir_A and Ii_A block outputs.

1.3.2 DFT 1/2 cycle

The *Discrete Fourier Transform* has the capability of working on different sized windows. The Full Cycle window generates the sums using all the sampled data collected over the last cycle. This means that the "window" includes the last full cycle's worth of data. The Half Cycle window generates the sums using the sampled data collected in the last half cycle. Therefore, the data "window" is a half cycle. Using a Half Cycle window allows the Discrete Fourier Transform to more quickly track a change in the sampled datathan is possible with a Full Cycle window. Also, less data will need to be saved for Half Cycle window than a Full Cycle window.

1.3.3 FFT

If the number of samples per cycle is great and equal to 2n it could be interesting to use a Fast Fourier Transform algorithm instead of the normal DFT method. The standard DIgSILENT FFT library is used when the "FFT" filter is selected.

1.3.4 Cosine Filter

The *Discrete Fourier Transform* described previously uses sine and cosine coefficients to develop the real and imaginary components of the filtered signals. In order to obtain the real and imaginary components, two signals 90 electrical degrees apart are required; the sine and cosine coefficient meet this requirement in the Fourier approach. Another approach is to only use the coefficients from the cosine with the second signal being the cosine value from the calculation 90 electrical degrees previous. This method requires that only one set of calculations be performed for each sample rather than the two sets required with the Fourier. The Cosine filter uses a one and a quarter cycle window rather than the one cycle window used by the Fourier, and therefore slower operating times may be expected.

1.4 Measurement block types

The following types of measurement block are available:

- 3ph. RMS Currents.
- 3ph. RMS Delta Currents.
- RMS Sequence Currents.
- 1ph. RMS Current.
- 3ph. Currents and Voltages.

- Single Phase Current or Voltage.
- 3ph. Currents/Delta Voltages.
- Single Phase Current and Voltage.
- Sequence Currents and Voltages.
- 1ph. RMS Current+Select.
- 3ph.Delta Currents and Voltages.
- ABB Discontinuity Current.

1.4.1 3ph. RMS Currents

This measurement type provides in a 3 phases system the phase current RMS values, the zero sequence current RMS value and the negative sequence current RMS values. The greater between the phase current RMS signals is returned in a separated output signal(“Imax”). If the zero sequence current inputs (wI0x3r and wI0x3i) are connected the zero sequence RMS value is measured directly otherwise if the ”Calculate earth current/Voltage” check box in the measurement type dialogue (“TypMeasure” class) is set, the value is calculated internally using the phase current values . The block returns only current RMS values, no voltage input/output signals are available.

1.4.2 3ph. RMS Delta Currents

This measurement type provides the same features and the same signal mapping of the *3ph. RMS Currents* measurement type but it calculates internally the delta currents values.

1.4.3 RMS Sequence Currents

This measurement type provides in a 3 phases system the positive sequence current RMS value, the zero sequence current RMS value and the negative sequence current RMS value. If the zero sequence current input signals (“wI0x3r” and “wI0x3i”) are connected the zero sequence RMS value is measured directly otherwise if the *Calculate earth current/Voltage* check box in the type measurement dialogue is set, the value is calculated internally using the phase current values . The block returns only RMS values, no voltage input/output signals are available.

1.4.4 1ph. RMS Current

This measurement type provides for a single phase the current RMS value calculated using the current real and imaginary values.

1.4.5 3ph. Currents and Voltages

This measurement type provides in a 3 phases system the phase current and voltage RMS values and instantaneous values (real part and imaginary part), the zero sequence current

RMS value and instantaneous values (real part and imaginary part), the negative sequence current RMS values. The greater between the phase current RMS signals is returned in a separated output signal(”Imax”). If the zero sequence current and voltage inputs (“wI0x3r”, “wI0x3i”, “wU0x3r”, and “wU0x3i”) are connected the zero sequence RMS values are measured directly otherwise if the *Calculate earth current/Voltage* check box in the measurement type dialogue (TypMeasure class) is set, the values are calculated internally using the phase current and voltage values . It is the widely used measurement block. It provides a whole set of current and voltage signals. Only when a complete set of sequence quantities instantaneous values is required the ”Sequence current and voltage” measurement type must be used.

1.4.6 Single Phase Current and Voltage

This measurement type provides for a single phase the current and the voltage RMS values and instantaneous values (real part and imaginary part) calculated using the current and the voltage real and imaginary part input values.

1.4.7 3ph. Currents/Delta Voltages

This measurement type provides in a 3 phases system the phase current and the phase-phase voltage RMS values and instantaneous values (real part and imaginary part). This measurement type provides a whole set of phase current and phase-phase voltage signals. The phase-phase voltages are calculated internally. If the zero sequence current and voltage inputs (“wI0x3r” and “wI0x3i”, “wU0x3r” and “wU0x3i”) are connected the zero sequence RMS values are calculated otherwise if the *Calculate earth current/Voltage* check box in the measurement type dialogue (TypMeasure class) is set, the value are calculated internally using the phase current and voltage values .

1.4.8 Sequence Currents and Voltages

This measurement type provides in a 3 phases system the positive sequence current and voltage RMS values and instantaneous values (real part and imaginary part), the zero sequence current and voltage RMS values and instantaneous values (real part and imaginary part), the negative sequence current and voltage RMS values and instantaneous values (real part and imaginary part). If the zero sequence current and voltage inputs (“wI0x3r” and “wI0x3i”, “wU0x3r” and “wU0x3i”) are connected the zero sequence RMS value is measured directly otherwise if the *Calculate earth current/Voltage* check box in the type measurement dialogue is set, the values are calculated internally using the phase current and voltage values.

1.4.9 Single Phase Current or Voltage

This measurement type provides for a single phase the current or the voltage RMS value and instantaneous values (real part and imaginary part) calculated using the real and imaginary part input values (only 2 input values).

1.4.10 1ph. RMS Current+Select

This measurement type provides for a 3 three phases system the current RMS value and instantaneous values (real part and imaginary part) calculated using the real and imaginary part input values of the phase corresponding to the value of the "iphase" input signal/parameter. Please set "iphase" equal to 0 to use the phase A values or set "iphase" equal to 1 to use the phase B values or set "iphase" equal to 2 to use the phase C values.

1.4.11 3ph.Delta Currents and Voltages

This measurement type provides in a 3 phases system the phase-phase current and the phase-phase voltage RMS values and instantaneous values (real part and imaginary part). The greater between the phase-phase current RMS signals is returned in a separated output signal("Ilmax"). This measurement type provides a whole set of phase-phase current and voltage signals.

1.4.12 ABB Discontinuity Current

This measurement type provides the same signals of the *3ph. Currents and Voltages* measurement type (see1.4.5) plus the "I_DI" output signal.

The parameters used to configure the operation of the Measurement block are described in the following section.

2 Functional Parameter Descriptions

Parameters are referenced within this document using the following convention. *A: B - C*, where,

- *A* is the level of extraction of the block model at which the parameter can be edited.
- *B* is the description of the parameter used within the dialogue associated with A.
- *C* is the parameter name used within the software.

2.1 TypMeasure parameters

2.1.1 *TypMeasure: Object modified - gnrl_modif*

Purpose: To record the date and time at which the TypMeasure object was last modified to facilitate error tracking etc.

Definition: Each time the user edits the TypMeasure object, the date and time of the operation is recorded. The date and time recorded is the time at which the user accepts the modification.

Use: Info for the user.

2.1.2 *TypMeasure: Object modified by - gnrl_modby*

Purpose: To record the name of the user who last modified the TypMeasure object to facilitate error tracking etc.

Definition: The name of the user is derived from the *PowerFactory* username active at the time the object was modified. The username is recorded only when the user accepts the modification.

Use: Info for the user.

2.1.3 *TypMeasure: Name - loc_name*

Purpose: To allow the user to define a unique name for any TypMeasure object.

Definition: The user may input any name up to 40 characters in length.

Use: The chosen name is then used within multiple dialogues encountered throughout the user interface. In particular, when using the object browser.

2.1.4 *TypMeasure: Nominal Current - rInom*

Purpose: To define the range of nominal current settings that are available within the relay hardware model.

Definition: The range of available settings can be entered as a stepped, discrete or continuous range. A stepped range is entered using the following convention x-y;z. Where x is the minimum current setting in the range, y is the maximum current setting in the range and z is the step interval. A discrete range is entered using the convention, x;y;z;...etc up to a limit of 80 characters where x,y, and z represent discrete current settings. A continuous range is entered using the convention x-y where x is the minimum current setting in the range and y is the maximum current setting in the range.

Use: The selected range is presented when selecting parameter *RelMeasure: Current Setting - Inom* (see 2.2.3) so that a precise setting can be selected.

2.1.5 *TypMeasure: Nominal Voltage - rUnom*

Purpose: To define the range of nominal voltage settings that are available within the relay hardware model.

Definition: The range of available settings can be entered as a stepped, discrete or continuous range. A stepped range is entered using the following convention x-y;z. Where x is the minimum current setting in the range, y is the maximum current setting in the range and z is the step interval. A discrete range is entered using the convention, x;y;z;...etc up to a limit of 80 characters where x,y, and z represent discrete current settings. A continuous range is entered using the convention x-y where x is the minimum current setting in the range and y is the maximum current setting in the range.

Use: The selected range is presented when selecting parameter *RelMeasure: Current Setting - Unom* (see 2.2.4) so that a precise setting can be selected.

2.1.6 *TypMeasure: Current Setting - rIs*

Purpose: To define the range of current settings that are available within the relay hardware model.

Definition: The range of available settings can be entered as a stepped, discrete or continuous range. A stepped range is entered using the following convention x-y;z. Where x is the minimum current setting in the range, y is the maximum current setting in the range and z is the step interval. A discrete range is entered using the convention, x;y;z;...etc up to a limit of 80 characters where x,y, and z represent discrete current settings. A continuous range is entered using the convention x-y where x is the minimum current setting in the range and y is the maximum current setting in the range.

Use: The selected range is presented when selecting parameter *RelMeasure: Current Setting - Is* (see 2.2.5) so that a precise setting can be selected.

2.1.7 *TypMeasure: Type - atype*

Purpose: To define which kind of input currents and voltage the block gets and which kind of output current and voltage values must be calculated.

Definition: Twelve types can be selected in a combobox. These are *3ph. RMS Currents*, *3ph. RMS Delta Currents*, *RMS Sequence Currents*, *1ph. RMS Current*, *3ph. Currents and Voltages*, *3ph. Currents/Delta Voltages*, *Single Phase Current and Voltage*, *Sequence Currents und Voltages*, *Single Phase Current or Voltage*, *1ph. RMS Current+Select*, *3ph.Delta Currents and Voltages*, and *ABB Discontinuity Current*.

Use: To configure the inputs and the outputs configuration.

2.1.8 *TypMeasure: Calculate Earth Current/Voltage Setting - icalI0*

Purpose: To define if the earth current and voltage output signal values must be calculated by the block or provided by

Definition: A check box in the TypMeasure dialogue which allows to enable or disable the feature. The setting can be equal to 0 (“false”) or to 1 (“true”).

Use: When the feature is enabled the earth current and the voltage values are calculated using the phase values and an Holmgreen’s connection.

2.1.9 *TypMeasure: Measuring Time - Tf*

Purpose: To define the analog filter time constant.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 0 (“false”).

Use: To define the delay of the analog filter which is available only when the RMS calculation feature is deactivated.

2.1.10 *TypMeasure: RMS Updating Period - Trms*

Purpose: To define the refresh time of the RMS value.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 ("true").

Use: To define how often the calculation of the RMS values must be executed.

2.1.11 *TypMeasure: Samples per cycle - cyclesamples*

Purpose: To define how many samples of the input values are given during each cycle.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - inablerms* (see 2.1.17) is 1 ("true").

Use: This values is used by both the integral algorithms which calculate the RMS values and by the digital filter algorithms (DFT, Cosine filter, etc)

2.1.12 *TypMeasure: RMS calculation samples - meassamples*

Purpose: To define how many samples are used to calculate the input signal RMS value.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 ("true") and the parameter *TypeMeasure:Filter - idftenabled* is 0 ("Off").

Use: This values is used by the integral algorithms which calculate the RMS values.

2.1.13 *TypMeasure: RMS calculation Method - integrtype*

Purpose: To define which integral algorithm type is used to calculated the RMS values of the input signals.

Definition: a combobox with two items: "Rectangles" and "Trapeziums". The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 ("true") and the parameter *TypeMeasure:Filter - idftenabled* is 0 ("Off").

Use: To simulate the older microprocessor protective devices not using any digital filter.

2.1.14 *TypMeasure: Oversampling factor - avgsamples*

Purpose: To define how many samples are put together to calculate an average value and generate the set of values used by the integral algorithm and by the digital filters.

Definition: A value ≥ 0 may be entered. An edit box allows to insert the number of samples.

Use: To simulate the noise compensation algorithm used by some microprocessor protective devices (i.e. Siemens 7SA522 relay).

2.1.15 *TypMeasure: Filter - idftenabled*

Purpose: To enable the digital filters.

Definition: a combobox with five items: “Off”, “DFT 1 cycle”, “DFT 1/2 cycle”, “FFT”, and “Cosine”.

Use: To simulate the digital filters of the microprocessor protective devices.

2.1.16 *TypMeasure: DC Offset Compensation - dcmethod*

Purpose: To enable the DC component compensation algorithm

Definition: A check box allows to enable or to disable an algorithm based on the average value of two samples taken at 180°of the sinusoidal wave; the algorithm considers the average value equal to the input wave DC component and subtracts such value to any sample taken between the two samples used to calculate the average value.

Use: To simulate the DC compensation algorithm available in some digital protective devices.

2.1.17 *TypMeasure: RMS Calculation - ienablerms*

Purpose: To enable the RMS calculation using an integration method or a digital filter (“DFT”, “Cosine” etc).

Definition: A checkbox is present in the TypMeasure dialogue. If the check box is set the *RMS calculation* is active.

Use: To simulate a static or an digital measurement element.

2.1.18 *TypMeasure: Harmonic - dftharmonic*

Purpose: To define the harmonic number which is extracted from the input current and/or voltage samples by the “DFT” and the “Cosine” digital filter algorithm.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 (“true”) and the parameter *TypeMeasure:Filter - idftenabled* is 1 (“DFT 1 cycle”) or 4 (“Cosine”).

Use: The parameter value is used by the “DFT” and by the “Cosine” digital filter algorithm. Only the harmonic specified in the parameter is extracted from the input samples.

2.1.19 *TypMeasure: Firs Harmonic - fftfirstharm*

Purpose: To define the first harmonic which is extracted from the input current and/or voltage samples by the “FFT” digital filter algorithm.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 (“true”) and the parameter

TypeMeasure:Filter - idftenabled is 3 (“FFT”).

Use: The parameter value is used by the “FFT” digital filter algorithm. The harmonic specified in the parameter is the lower harmonic extracted from the input samples.

2.1.20 *TypMeasure: Last Harmonic - fftlastharm*

Purpose: To define the last harmonic which is extracted from the input current and/or voltage samples by the “FFT” digital filter algorithm.

Definition: A value ≥ 0 may be entered. The relevant edit box is visible only when the parameter *TypMeasure:RMS Calculation - ienablerms* (see 2.1.17) is 1 (“true”) and the parameter *TypeMeasure:Filter - idftenabled* is 3 (“FFT”).

*Use:*The parameter value is used by the “FFT” digital filter algorithm. The harmonic specified in the parameter is the higher harmonic extracted from the input samples.

2.2 RelMeasure parameters

2.2.1 *RelMeasure: Name - loc_name*

Purpose: To allow the user to define a unique name for any RelMeasure object.

Definition: The user may input any name up to 40 characters in length.

Use: The name chosen is then used within multiple dialogues encountered throughout the user interface. In particular, when using the object browser.

2.2.2 *RelMeasure: Type (TypMeasure*) - typ_id*

Purpose: To allow the user to identify the associated TypMeasure object when looking at dialogues associated with the RelMeasure object.

Definition: A TypMeasure object reference is automatically assigned to this parameter when the RelMeasure object is entered as the parameter *ElmRelay: Net Elements - Pdiselm*. In the main RelMeasure dialogue a shortcut to the associated TypMeasure object dialogue is provided.

Use: To define the input and output signal configuration and which RMS and instantaneous values must be calculated.

2.2.3 *RelMeasure: Nominal Current - Inom*

Purpose: To allow the user to select a specific setting from the range of settings defined by parameter *TypMeasure: Nominal Current - rInom*

Definition: Any setting may be selected from the range of settings defined by the *Ranges* frame parameter *TypMeasure: Nominal Current - rInom* . The setting unit is secondary amperes.

Use: To calculate the measurement block output currents dividing the input currents by the parameter value.

2.2.4 *RelMeasure: Nominal Voltage - Unom*

Purpose: To allow the user to select a specific setting from the range of settings defined by parameter *TypMeasure: Nominal Current - rUnom*

Definition: Any setting may be selected from the range of settings defined by the *Ranges* frame parameter *TypMeasure: Nominal Current - rUnom* . The setting unit is secondary amperes.

Use: To calculate the measurement block output voltages dividing the input voltages by the parameter value.

2.2.5 *RelMeasure: Nominal Current - Is*

Purpose: To allow the user to select a specific setting from the range of settings defined by parameter *TypMeasure: Nominal Current - rIs*

Definition: Any setting may be selected from the range of settings defined by the *Ranges* frame parameter *TypMeasure: Nominal Current - rIs* . The setting unit is secondary amperes.

Use: To calculate the measurement block output currents dividing the input currents by the parameter value.

2.2.6 *RelMeasure: Phase - iphase*

Purpose: To define which phase is measured.

Definition: A combo box with three items: “a”, “b”, and “c”. The combobox is visible only when the *TypMeasure:Type - atype* is “1ph RMS current + Select” (see 2.1.7)

Use: Define which phase must be measured.

2.2.7 *RelMeasure: Object modified - gnrl_modif*

Purpose: To record the date and time at which the RelMeasure object was last modified to facilitate error tracking etc.

Definition: Each time the user edits the RelMeasure object, the date and time of the operation is recorded. The date and time recorded is the time at which the user accepts the modification.

2.2.8 *RelMeasure: Object modified by - gnrl_modby*

Purpose: To record the name of the user who last modified the RelMeasure object to facilitate error tracking etc.

Definition: The name of the user is derived from the *PowerFactory* username active at the time the object was modified. The username is recorded only when the user accepts the modification.

2.2.9 *RelMeasure: Characteristic Name - chr_name*

Purpose: To specify a string which identifies the loc protective element.

Definition: a 20 characters long string.

Use: Documentation purposes.

2.2.10 *RelMeasure: Foreign Key - for_name*

Purpose: To specify a string which identifies the loc protective element in unique way.

Definition: a 40 characters long string.

Use: To allow to select the loc protective element with the database search tools.

2.2.11 *RelMeasure: Data source - dat_src*

Purpose: To specify a ID to identify the source of the data used to create the loc protective element.

Definition: a 3 characters long string.

Use: Short reference to the data source for documentation purposes.

3 Input parameters

Table 3.1: Type Parameters (Class: TypMeasure)

Parameter name	Reference Object type	Default Value	Description	Selectable Values	Unit
gnrl_modif		01.01.1970 01:00:00	Object modified		int
gnrl_modby			Object modified by		char[40]
loc_name			Name		char[40]
rInom			Nominal Current		char[80]
rUnom			Nominal Voltage		char[80]
rIs			Current Setting		char[80]
atype		3rms	Type		char[4]
icalI0		0	Calculate Earth Current/ Voltage	x=0 or x=1	int
Tf		0.001	Measuring Time		float
Trms		1	RMS Updating Period	$x > 0$	float
cyclesamples		20	Samples per cycle	x≥0	int
meassamples		20	RMS Calculation Samples	x≥0	int
iintegrtype		0	RMS calculation Method		int
avgsamples		1	Oversampling Factor	$x > 0$	int
idftenabled		0	Filter	x≥0	int
dcmethod		0	DC Offset Compensation		int
ienablerms		0	RMS calculation	x≥0	int
dftharmonic		1	Harmonic	x≥1	int
fftfirstharm		1	First Harmonic	x≥1	int
fftlastharm		1	LAst Harmonic	x≥1	int

Table 3.2: Element Parameters (Class: RelMeasure)

Parameter Name	Reference Object Type	Default Value	Description	Selectable Values	Unit
loc_name			Name		char[40]
typ_id	TypMeasure		Type		DBObject*
Inom			Nominal Current		float
Unom			Nominal Voltage		float
Is			Current Setting		float
iphase			Phase	$x \geq 1$ and $x < 5$	int
chr_name			Characteristic Name		char[20]
for_name			Foreign Key		char[40]
dat_src			Data source		char[3]

4 Signals

Table 4.1: 3ph. RMS Currents block input/output signals

Name	Description	Unit	Type	Model
wIr_A	Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Ground current, real part	Secondary Amperes	IN	any
wI0x3i	Ground current, imaginary part	Secondary Amperes	IN	any except EMT
I_A	Phase A Current RMS value	Secondary Amperes	OUT	any
I_B	Phase B Current RMS value	Secondary Amperes	OUT	any
I_C	Phase C Current RMS value	Secondary Amperes	OUT	any
I0x3	Three times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
Imax	Maximum value between the phase current RMS values	Secondary Amperes	OUT	any
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any
I2x3	Three times the negative sequence current RMS value	Secondary Amperes	OUT	any
clock	Clock signal	1/0	OUT	EMT

Table 4.2: 3ph. RMS Delta Currents block input/output signals

Name	Description	Unit	Type	Model
wIr_A	Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any

Table 4.2: 3ph. RMS Delta Currents block input/output signals

Name	Description	Unit	Type	Model
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Ground current, real part	Secondary Amperes	IN	any
wI0x3i	Ground current, imaginary part	Secondary Amperes	IN	any except EMT
I_A	AB current RMS value	Secondary Amperes	OUT	any
I_B	BC current RMS value	Secondary Amperes	OUT	any
I_C	CA current RMS value	Secondary Amperes	OUT	any
I0x3	3 times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
Imax	Maximum value between the phase current RMS values	Secondary Amperes	OUT	any
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any
I2x3	3 times the negative sequence current RMS value	Secondary Amperes	OUT	any
clock	Clock signal	1/0	OUT	EMT

Table 4.3: RMS Sequence Currents block input/output signals

Name	Description	Unit	Type	Model
wIr_A	Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Ground current, real part	Secondary Amperes	IN	any
wI0x3i	Ground current, imaginary part	Secondary Amperes	IN	any except EMT
I0x3	3 times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
I1	Positive sequence current RMS value	Secondary Amperes	OUT	any
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any

Table 4.3: RMS Sequence Currents block input/output signals

Name	Description	Unit	Type	Model
I2x3	3 times the negative sequence current RMS value	Secondary Amperes	OUT	any
clock	Clock signal	1/0	OUT	EMT

Table 4.4: 3ph. Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
wIr_A	A Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Zero sequence current, real part	Secondary Amperes	IN	any
wI0x3i	Zero sequence current, imaginary part	Secondary Amperes	IN	any except EMT
wUr_A	Phase A input Voltage, real part	Secondary Volts	IN	any
wUi_A	Phase A input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_B	Phase B input Voltage, real part	Secondary Volts	IN	any
wUi_B	Phase B input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_C	Phase C input Voltage, real part	Secondary Volts	IN	any
wUi_C	Phase C input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wU0x3r	Zero sequence Voltage, real part	Secondary Volts	IN	any
wU0x3i	Zero sequence Voltage, imaginary part	Secondary Volts	IN	any except EMT
I_A	Phase A Current RMS value	Secondary Amperes	OUT	any
Ir_A	Phase A Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii_A	Phase A Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I_B	Phase B Current RMS value	Secondary Amperes	OUT	any
Ir_B	Phase B Current instantaneous value, real part	Secondary Amperes	OUT	any

Table 4.4: 3ph. Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
Ii_B	Phase B Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I_C	Phase C Current RMS value	Secondary Amperes	OUT	any
Ir_C	Phase C Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii_C	Phase C Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I0x3	3 times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0x3r	3 times the zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I0x3i	3 times the zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
I0r	Zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I0i	Zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
Imax	Maximum value between the phase current RMS values	Secondary Amperes	OUT	any
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any
I2x3	3 times the negative sequence current RMS value	Secondary Amperes	OUT	any
U_A	Phase A Voltage RMS value	Secondary Volts	OUT	any
Ur_A	Phase A Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_A	Phase A Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U_B	Phase B Voltage RMS value	Secondary Volts	OUT	any
Ur_A	Phase B Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_A	Phase B Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U_C	Phase C Voltage RMS value	Secondary Volts	OUT	any
Ur_C	Phase C Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_C	Phase C Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U0x3	3 times the zero sequence Voltage RMS value	Secondary Volts	OUT	any

Table 4.4: 3ph. Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
U0x3r	3 times the zero sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U0x3i	3 times the zero sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U0	Zero sequence Voltage RMS value	Secondary Volts	OUT	any
U0r	Zero sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U0i	Zero sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
clock	Clock signal	1/0	OUT	EMT

Table 4.5: ABB Discontinuity Current block input/output signals

Name	Description	Unit	Type	Model
wI_A	Phase A input Current	Secondary Amperes	IN	any
wI_B	Phase B input Current	Secondary Amperes	IN	any
wI_C	Phase C input Current	Secondary Amperes	IN	any
wIr_A	A Phase A input Current, real part	Secondary Amperes	IN	any
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
I_DI	ABB discontinuity Current RMS value	Secondary Amperes	OUT	any

Table 4.6: 3ph. Delta Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
wIr_A	A Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT

Table 4.6: 3ph. Delta Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
wUr_A	Phase A input Voltage, real part	Secondary Volts	IN	any
wUi_A	Phase A input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_B	Phase B input Voltage, real part	Secondary Volts	IN	any
wUi_B	Phase B input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_C	Phase C input Voltage, real part	Secondary Volts	IN	any
wUi_C	Phase C input Voltage, imaginary part	Secondary Volts	IN	any except EMT
Il_A	Phase A Current RMS value	Secondary Amperes	OUT	any
Ilr_A	Phase A Current instantaneous value, real part	Secondary Amperes	OUT	any
Ili_A	Phase A Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
Il_B	Phase B Current RMS value	Secondary Amperes	OUT	any
Ilr_B	Phase B Current instantaneous value, real part	Secondary Amperes	OUT	any
Ili_B	Phase B Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
Il_C	Phase C Current RMS value	Secondary Amperes	OUT	any
Ilr_C	Phase C Current instantaneous value, real part	Secondary Amperes	OUT	any
Ili_C	Phase C Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
Ilmax	Maximum value between the phase current RMS values	Secondary Amperes	OUT	any
Ul_A	Phase A Voltage RMS value	Secondary Volts	OUT	any
Ulr_A	Phase A Voltage instantaneous value, real part	Secondary Volts	OUT	any
Uli_A	Phase A Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
Ul_B	Phase B Voltage RMS value	Secondary Volts	OUT	any
Ulr_A	Phase B Voltage instantaneous value, real part	Secondary Volts	OUT	any
Uli_A	Phase B Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
Ul_C	Phase C Voltage RMS value	Secondary Volts	OUT	any
Ulr_C	Phase C Voltage instantaneous value, real part	Secondary Volts	OUT	any

Table 4.6: 3ph. Delta Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
Uli_C	Phase C Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
clock	Clock signal	1/0	OUT	EMT

Table 4.7: 3ph. Currents and Delta Voltages block input/output signals

Name	Description	Unit	Type	Model
wIr_A	A Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Zero sequence current, real part	Secondary Amperes	IN	any
wI0x3i	Zero sequence current, imaginary part	Secondary Amperes	IN	any except EMT
wUr_A	Phase A input Voltage, real part	Secondary Volts	IN	any
wUi_A	Phase A input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_B	Phase B input Voltage, real part	Secondary Volts	IN	any
wUi_B	Phase B input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_C	Phase C input Voltage, real part	Secondary Volts	IN	any
wUi_C	Phase C input Voltage, imaginary part	Secondary Volts	IN	any except EMT
I_A	Phase A Current RMS value	Secondary Amperes	OUT	any
Ir_A	Phase A Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii_A	Phase A Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I_B	Phase B Current RMS value	Secondary Amperes	OUT	any
Ir_B	Phase B Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii_B	Phase B Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled

Table 4.7: 3ph. Currents and Delta Voltages block input/output signals

Name	Description	Unit	Type	Model
I_C	Phase C Current RMS value	Secondary Amperes	OUT	any
Ir_C	Phase C Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii_C	Phase C Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I0x3	3 times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0x3r	3 times the zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I0x3i	3 times the zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
I0r	Zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I0i	Zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
Imax	Maximum value between the phase current RMS values	Secondary Amperes	OUT	any
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any
I2x3	3 times the negative sequence current RMS value	Secondary Amperes	OUT	any
U_A	Phase A Voltage RMS value	Secondary Volts	OUT	any
Ur_A	Phase A Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_A	Phase A Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U_B	Phase B Voltage RMS value	Secondary Volts	OUT	any
Ur_A	Phase B Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_A	Phase B Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U_C	Phase C Voltage RMS value	Secondary Volts	OUT	any
Ur_C	Phase C Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui_C	Phase C Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U0x3	3 times the zero sequence Voltage RMS value	Secondary Volts	OUT	any
U0x3r	3 times the zero sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any

Table 4.7: 3ph. Currents and Delta Voltages block input/output signals

Name	Description	Unit	Type	Model
U0x3i	3 times the zero sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U0	Zero sequence Voltage RMS value	Secondary Volts	OUT	any
U0r	Zero sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U0i	Zero sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
clock	Clock signal	1/0	OUT	EMT

Table 4.8: Sequence Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
wIr_A	A Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
wI0x3r	Zero sequence current, real part	Secondary Amperes	IN	any
wI0x3i	Zero sequence current, imaginary part	Secondary Amperes	IN	any except EMT
wUr_A	Phase A input Voltage, real part	Secondary Volts	IN	any
wUi_A	Phase A input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_B	Phase B input Voltage, real part	Secondary Volts	IN	any
wUi_B	Phase B input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wUr_C	Phase C input Voltage, real part	Secondary Volts	IN	any
wUi_C	Phase C input Voltage, imaginary part	Secondary Volts	IN	any except EMT
wU0x3r	Zero sequence Voltage, real part	Secondary Volts	IN	any
wU0x3i	Zero sequence Voltage, imaginary part	Secondary Volts	IN	any except EMT
I0x3	3 times the zero sequence current RMS value	Secondary Amperes	OUT	any
I0x3r	3 times the zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any

Table 4.8: Sequence Currents and Voltages block input/output signals

Name	Description	Unit	Type	Model
I0x3i	3 times the zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I0	Zero sequence current RMS value	Secondary Amperes	OUT	any
I0r	Zero sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I0i	Zero sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I1	Positive sequence current RMS value	Secondary Amperes	OUT	any
I1r	Positive sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I1i	Positive sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
I2	Negative sequence current RMS value	Secondary Amperes	OUT	any
I2r	Negative sequence current instantaneous value, real part	Secondary Amperes	OUT	any
I2i	Negative sequence current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
U0x3	3 times the zero sequence Voltage RMS value	Secondary Volts	OUT	any
U0x3r	3 times the zero sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U0x3i	3 times the zero sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U1	Positive sequence Voltage RMS value	Secondary Volts	OUT	any
U1r	Positive sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U1i	Positive sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
U2	Negative sequence Voltage RMS value	Secondary Volts	OUT	any
U2r	Negative sequence Voltage instantaneous value, real part	Secondary Volts	OUT	any
U2i	Negative sequence Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
clock	Clock signal	1/0	OUT	EMT

Table 4.9: 1ph. RMS Current block input/output signals

Name	Description	Unit	Type	Model
wInpr	Input Current, real part	Secondary Amperes	IN	any
wInpi	Input Current, imaginary part	Secondary Amperes	IN	any except EMT
Out	3 Current RMS value	Secondary Amperes	OUT	any
clock	Clock signal	1/0	OUT	EMT

Table 4.10: Single Phase Current and Voltage block input/output signals

Name	Description	Unit	Type	Model
wIr	Input Current, real part	Secondary Amperes	IN	any
wIi	Input Current, imaginary part	Secondary Amperes	IN	any except EMT
wUr	Input Voltage, real part	Secondary Volts	IN	any
wUi	Input Voltage, imaginary part	Secondary Volts	IN	any except EMT
I	Current RMS value	Secondary Amperes	OUT	any
Ir	Current instantaneous value, real part	Secondary Amperes	OUT	any
Ii	Current instantaneous value, imaginary part	Secondary Amperes	OUT	any except EMT with digital filter disabled
U	Voltage RMS value	Secondary Volts	OUT	any
Ur	Voltage instantaneous value, real part	Secondary Volts	OUT	any
Ui	Voltage instantaneous value, imaginary part	Secondary Volts	OUT	any except EMT with digital filter disabled
clock	Clock signal	1/0	OUT	EMT

Table 4.11: 1ph. RMS Current+Select block input/output signals

Name	Description	Unit	Type	Model
wIr_A	Phase A input Current, real part	Secondary Amperes	IN	any
wIi_A	Phase A input Current, imaginary part	Secondary Amperes	IN	any except EMT
wIr_B	Phase B input Current, real part	Secondary Amperes	IN	any
wIi_B	Phase B input Current, imaginary part	Secondary Amperes	IN	any except EMT

Table 4.11: 1ph. RMS Current+Select block input/output signals

Name	Description	Unit	Type	Model
wIr_C	Phase C input Current, real part	Secondary Amperes	IN	any
wIi_C	Phase C input Current, imaginary part	Secondary Amperes	IN	any except EMT
OutI	Current RMS value	Secondary Amperes	OUT	any

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